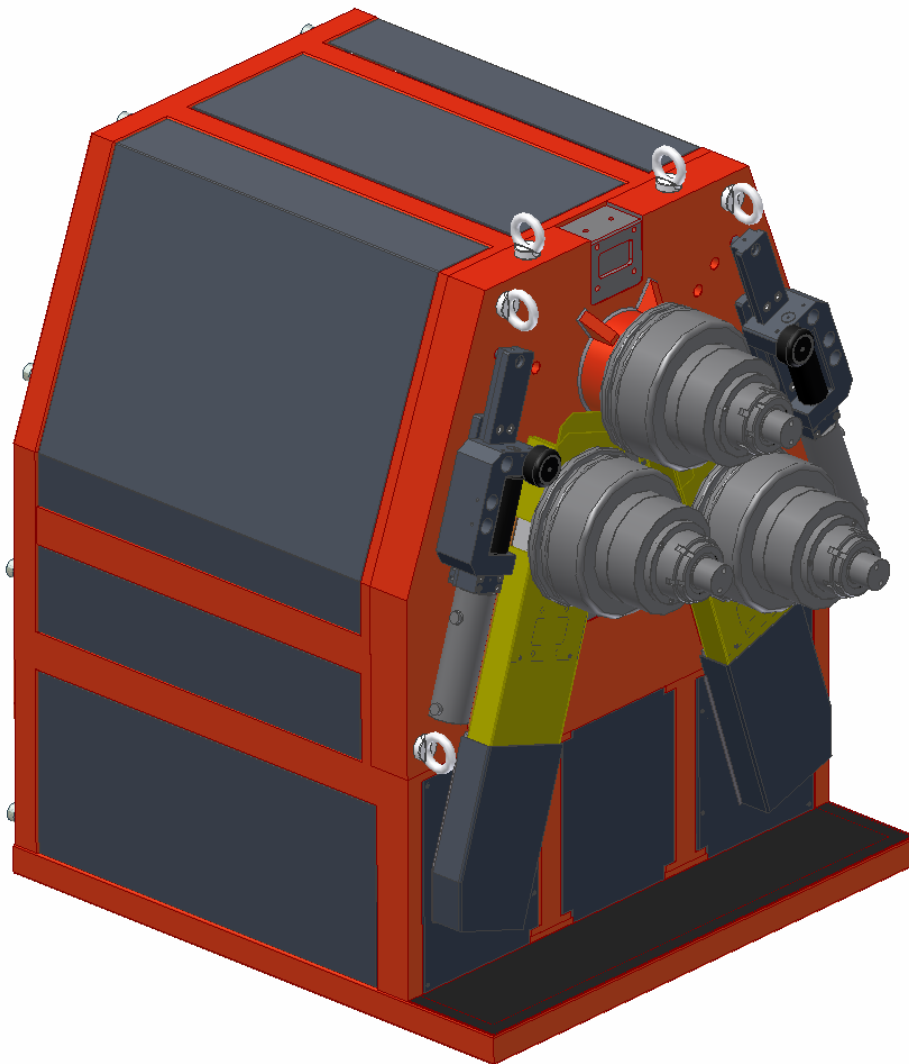




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BENDING MACHINE ALPHA 100



User and Maintenance Manual

Version: 1.0
Issue by: 20/02/2005

The information contained in this manual is the property of TAURING S.p.A.

TAURING S.p.A. reserves the right to make changes, without prior notice, to the product characteristics described in this manual.

This manual is not to be distributed or duplicated, even partially, without prior written authorization from TAURING S.p.A.

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GENERAL INFORMATION

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1 GENERAL INFORMATION

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1.1 INTRODUCTION

The purpose of this manual is to provide the persons operating the system with the indications and instructions for use. The manual also contains all the information needed for a correct installation and to carry out the necessary maintenance on the system, in accordance with the technical and project characteristics and the purpose for which it has been designed.

It is most important that this manual is read carefully, but this cannot substitute the skills of the assigned personnel who will run the system after receiving adequate training.

TAURING S.p.A. insists that this document be read by the personnel that will run and service the machine, as well as by the personnel involved in the transport and installation.

This document constitutes the Instructions manual for the bending machine **Alpha 100** and has been drawn up in conformity with the EEC directive 98/37, annex 1 section 1.7.4. The User and Maintenance manual is to be considered as an integrating part of the machine and is to be kept until its final demolition. The manual is to be kept by the person responsible for the machine after the installation.

The drawings and other documents that are handed over with the system are the property of TAURING S.p.A. that reserves the rights and underlines that they are not to be passed over to third parties. Therefore they are not to be duplicated in any way by electronic or mechanical means for any type of use, without written permission from TAURING S.p.A.

If the instructions contained in this manual are ignored, TAURING S.p.A. shall not be held in any way liable for damage to the system or subsequent performance that does not correspond to the technical specifications supplied.

1.2 MANUFACTURE'S ADDRESS

1.2.1 Instructions for After Sales Services

For any type of information or clarification regarding the use, maintenance, installation, etc., please contact the TAURING S.p.A. Technical Office.

When making contact, please state the requirements clearly, with reference to this manual and always indicating the data on the identification plates of this machine.

All requests for services in the Customer's plant or for clarifications regarding technical matters of this document are to be addressed to:



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1.3 STRUCTURE OF THE MANUAL

This manual is divided into 7 chapters and 1 annexe.

CHAPTER 1 – GENERAL INFORMATION

This chapter contains the descriptions regarding the arrangement of the manual, the topics dealt with, the symbols and definitions used, the guarantee and responsibilities.

CHAPTER 2 – SAFETY AND RESIDUAL RISKS

This chapter describes standards, working environment conditions, limits of use, ergonomics, accident prevention devices used, residual risks, warning and danger plates applied to the machine and the manufacturer's declaration of conformity.

CHAPTER 3 – DESCRIPTION

This chapter contains the description of the machine operating principles, general technical data and descriptions of the mechanical assemblies and systems.

CHAPTER 4 – TRANSPORT AND INSTALLATION

This chapter contains the instructions for the correct execution of packing, handling, transport, unloading, installation in the user's plant, link-ups to the mains, checks, controls and any adjustments to be carried out before the start-up.

CHAPTER 5 – USE AND OPERATION

This chapter is addressed to the operators and maintenance staff. It contains the instructions for start-up and use of the machine in the different operation cycles, with descriptions of the controls available for the operator, the most important operating sequences and the use of the diagnostic systems.

CHAPTER 6 – MAINTENANCE

This chapter is mainly intended for the maintenance engineers. It contains the warnings, precautions and instructions to correctly carry out the maintenance operations on the machine.

CHAPTER 7 – SPARE PARTS

This chapter contains the list of spare parts used in this machine.

ANNEX A – DRAWINGS

This chapter contains the references of the schematics (mechanical, electrical, pneumatic and fluidic) that are supplied with the system.

1.4 SAFETY STANDARDS CONTAINED IN THE MANUAL

The prescriptions, indications, standards and safety notes described in the different chapters of the manual have the purpose of defining behaviour and obligations that are to be observed when carrying out the various activities. The safety standards contained are addressed to all authorised personnel, instructed and assigned to carry out the various activities and operations for:










- transport
- installation
- operation
- use
- management
- maintenance
- cleaning
- putting out of service and dismantling

General information

1.5 SYMBOLS USED

In the manual some symbols are used to call the attention of the reader and to highlight certain important conditions when operating.

The table below lists and describes the meaning of the symbols used.

SYMBOL	MEANING	NOTE
	Danger	Indicates a hazard with accident risk, even death, for the user. Pay very careful attention to the texts indicated by this symbol.
	Warning	A warning of possible downgrading or damage to the machine, the equipment or personal belongings of the user. Pay attention to the texts indicated by this symbol.
	Caution Note	A warning or Note regarding key functions or useful information. Pay attention to the texts indicated by this symbol.
	Additional information	Texts that contain additional information are indicated by this symbol. This information does not relate directly to the description of an operation or to the development of a procedure. It may give reference to other supplementary documentation such as attached instructions for use handbooks, technical documentation or other sections of this handbook.
	Avoid damage to material	Indicates there is a high risk of damaging a part, for example using a wrong tool or assembling following an incorrect procedure.
	Special tool	Indicates that for this operation a special tool or fixture is necessary.
	Visual check	Informs the reader that a visual check is to be made. This symbol will also be found in the instructions for use. The user is told to read a measure value, to check an indication, etc.
	Sound check	Informs the reader that a sound check is to be made. This symbol will also be found in the instructions for use. The user is told to listen to an operating noise.
	See the maintenance charts	Indicates that a special maintenance chart is to be consulted.

1.6 MANUFACTURER'S RESPONSIBILITIES

TAURING S.p.A. declines any responsibility deriving from the incorrect or improper use of the machine in object and for any damages caused by the use of spare parts other than those recommended, by maintenance operations not performed correctly and from tampering on circuits, components and system software.

The technical staff in charge of the activities on the machine is responsible for the application of the safety precautions contained herein. They are to ascertain that the operators assigned to carry out the required activities are qualified, that they observe and are familiar with the prescriptions contained in this manual and the general safety standards applicable to the system.

The non-observance of the safety standards could cause injuries to persons and damage to the system.

1.7 GUARANTEE

TAURING S.p.A. undertakes to deliver machines conforming with the specifications and without flaws that make them unsuitable for the use indicated in the descriptive leaflet that applies to the TAURING S.p.A machinery.

Under no circumstances TAURING S.p.A. shall be obliged to deliver a machine for a special use that is not indicated in the descriptive literature, unless this has been specifically agreed with the Customer in writing. In spite of this, conditions could arise in which certain bends cannot be obtained due to the natural elongation limits or the poor quality of the material used.

Every machine is designed and built according to the characteristics that are highlighted for each model in the documents and catalogues supplied by TAURING S.p.A. with the machine, so as to ensure the best operation and the longest life. The guarantee is no longer valid if the machine is used ignoring the maximum capacity limits indicated by the manufacturer or for appliances that are different to those for which it has been designed, or that contrast with the instructions for use.

The guarantee only covers parts that have construction defects. The replacement or the repair of these parts will be carried out free of charge by the manufacturer.

The guarantee does not cover any other form of reimbursement for damages that derive directly or indirectly from this construction defect.

General information

The costs involved for the sending and the withdrawal of the machine and/or the repaired and/or replaced parts are to be borne by the customer. TAURING S.p.A. shall send the parts to replace the faulty parts and/or repair the defective machine in accordance with the technical times required for these operations.

If the replacement or the repair takes place at the works of the User, the latter shall be debited the travelling and living costs and the travelling time for the transfer of the TAURING staff according to the rates in force, unless they have been estimated otherwise.

In this case the User is to undertake to terminate the work in progress before the arrival of the service engineer so that the machine is ready for use and if necessary assist the service engineer with additional persons for a rapid execution of the job.

If in the unquestionable judgement of TAURING S.p.A. the replacement or the repair in the User's plant is not possible or involves excessive costs, the latter shall provide, at its own cost, the shipping of the machine to the works of TAURING S.p.A.

If the claim should result unjustified, all the travelling expenses and any other expenses involved shall be charged to the User.

EXCLUSIONS FROM THE GUARANTEE

Any defects or flaws are excluded from the guarantee if caused by: natural wear, uncontrollable course of events, bad installation, unskilled operators, negligence in following the rules for use and maintenance contained in the USE AND MAINTENANCE MANUAL supplied with the machine.

The guarantee shall not be applicable for machines on which the User carries out disassembly, assembly, maintenance or modifications that are not indicated in the instructions supplied TAURING S.p.A. or that have not been authorised by the same.

The guarantee is not applicable for machinery or fixtures that have not been assembled by TAURING S.p.A. or that, for any reason have been shipped disassembled. Furthermore the guarantee of the complete machinery shall be annulled if the fixture used has not been manufactured by TAURING S.p.A.

The guarantee shall be cancelled in the event where the User has modified the machine or parts of it without the written consent of the manufacturer, or if the removal or alteration of the serial number is found.

DURATION OF THE GUARANTEE

The machines manufactured by TAURING S.p.A. have a guarantee period of 12 months from the shipping date, as specified herein.

The duration of the contract is usually for 12 months from the date of shipping, unless otherwise stipulated at the time of drawing up the contract.

In the case of tests in the Customer's works, the guarantee shall be valid for 12 months from the date of the inspection certificate. In no case shall it exceed 14 months from the date of shipping.

NOTIFICATION OF CONFORMITY DEFECTS AND FLAWS

If flaws or defects are detected by the User, they are to be communicated to TAURING S.p.A. in writing within and not after 15 days of the discovery, or within which they should have been discovered, so as to avoid forfeiture of rights. In no case the claim regarding the conformity defect or the flaw shall be considered valid after the expiry date of the guarantee conditions.

The User shall also forfeit the guarantee in the case of refusal to permit every reasonable check that the manufacturer requests or if, the manufacturer having requested the return of the faulty part, the User does not return it at his own expense within fifteen days from the request.

1.8 MACHINE MANAGEMENT

The machine is only to be managed by authorised and suitably instructed operators who have adequate technical experience.

The operators assigned to the running and the maintenance of the machine are to be aware that the knowledge and application of the safety standards is an integral part of their job.

Operators not assigned to the machine shall not have access to the operating area or the machine control panel.

Before starting up the machine, carry out these operations:

- read this instructions manual with careful attention;
- know which protections and emergency stop devices are available on the machine, where they are located and how they function.

Protections and safety devices installed to safeguard the personnel in hazardous areas of the machine are not to be removed, even partially.

The same ruling applies for the warning plates.

It is strictly forbidden to open the electric cabinet access door while the system is running or immediately after it has been shut down.

The protections and safety devices are to be kept in perfect order, to ensure the correct functioning. In the case of malfunctioning or faults of these devices, they are to be immediately repaired or replaced.

The use of commercial components that are not those specified for safety devices and protections could cause malfunctioning, or hazardous situations for the operators running the system.

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SAFETY AND RESIDUAL RISKS

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2 SAFETY AND RESIDUAL RISKS

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2.1 GENERAL INFORMATION

The user plant is to instruct the personnel regarding accident risks, safety devices and general rules regarding accident prevention as per the EU directives and the legislation of the country where the machine is installed.

The operators are to know the location and functioning of all the controls and machine characteristics. They shall also have read this manual from cover to cover.

Maintenance operations are to be carried out by skilled operators after setting the machine in the required conditions.

Tampering or unauthorised replacement of machine parts, the use of accessories that change its use or the use of spare parts that are not those recommended can become the cause of accident risks.



DANGER

Never cut-out/tamper with the safety devices installed on the system.

The manufacturer shall not be held liable for the machine safety if these prohibitions are ignored.

2.1.1 Reference Standards

DIRECTIVE/ REFERENCE	EDITION	TITLE
98/37	JULY 1998	Machines Directive
89/336/CEE	JAN. 1996	Concepts relating to electromagnetic compatibility problems.
73/23/CEE	JAN. 1997	Low voltage Directive
UNI EN418	JUNE 1994	Safety of machinery – Emergency stop equipment - Functional aspects – Principles for design.
UNI EN626-1	SEPT. 1996	Machine safety. Reduction of risks to health arising from hazardous substances emitted by the machines. Principles and specifications for the machine manufacturers.
UNI EN626-2	JUNE 1997	Machine safety – Reduction of risks for health arising from hazardous substances emitted by the machines – Methodology to define the verification procedures.
UNI EN953	SEPT. 2000	Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards.
UNI EN983	JULY 1997	Safety of machinery. Safety requirements for fluid power systems and their components. Pneumatics.
UNI EN 999	NOV. 2000	Safety of machinery - The positioning of protective equipment in respect of approach speeds of parts of the human body.
UNI EN1037	APR. 1997	Safety of machinery. Prevention of unexpected start-up.
UNI EN1050	NOV. 1998	Safety of machinery. Principles for risk assessment.
UNI EN ISO11202	OCT. 1997	Acoustics – Noise emitted by the machines and equipment – Measurement of sound pressure levels at the work place and in other specific positions – Checking method on site.
ISO EN 12100-1	APR. 2005	Safety of machinery – Basic concepts: general principles for design. Basic terminology, methodology.
ISO EN 12100-2	APR. 2005	Safety of machinery - Basic concepts: general principles for design. Technical principles and specifications.
CEI EN 50081-2		Electromagnetic compatibility – Generic standard regarding emission – Part 2 – Industrial environment.
CEI EN60204-1	APR. 1998	Safety of machinery – Electrical equipment of the machines. Part 1: basic requirements.

Safety and residual risks

2.1.2 Machine Certification

The system is delivered with the **CE** Declaration of Conformity to the essential safety requirements as per Machines Directive 98/37/CE (annex II A), Low Voltage Directive 73/23/EEC and the Electromagnetic Compatibility Directive 89/336/EEC.

A copy is enclosed of the **CE** marking applied to the machine (figure 2.1).



NOTE

Any changes made to the **bending machine ALPHA 100** will immediately annul the **CE** certification issued by the manufacturer.

	
Via Lombardore, 314 - 10040 LEINI' (TO) - ITALY	
MODELLO	<input type="text"/>
TIPO	<input type="text"/>
MATRICOLA	<input type="text"/>
ANNO COSTRUZIONE	<input type="text"/>
MASSA	<input type="text"/> Kg

Figure 2.1 –**CE** marking



“CE” declaration of conformity

(as per Machines Directive, annex II letter A)

The manufacturer

TAURING S.p.A.

Plant address

Via Lombardore, 314 - 10040 Leini Italy

Tel.

+39 011.99.77.111

Telefax

+39 011.99.77.190

HEREBY DECLARES THAT THE MACHINE:

Model

Type of machine

Machine serial number

Year of manufacture

**CONFORMS TO THE LEGAL PROVISIONS THAT ARE BASED ON THE MACHINES
DIRECTIVE 98/37 AND SUBSEQUENT AMENDMENTS**

**The manufacturer forbids the use of the machine /fixture subject of this
declaration in any manner other than as described in this instructions for use
handbook.**

**Furthermore the manufacturer declares that the machine conforms to the
following other European directives (where applicable): 73/23/CEE, 89/336/CEE,
87/404/CEE.**

Assigned representative:

Office:

Signature

.....

Leini,

2.1.3 Foreseen and Unforeseen Use



DANGER

The use of the machine for purposes and jobs that are not described in this manual is considered as **IMPROPER USE**. TAURING S.p.A. shall not be held in any way liable for any damages caused to goods and/or persons and shall consider invalidated every type of machine guarantee.

Furthermore, the manufacturer shall not be liable in the case of tampering on the bending machine, unauthorised modifications or maintenance operations carried out by untrained personnel.



DANGER

If the machine behaves anomalously or in the case of missing power supplies, do not intervene, since this is the specific task of the maintenance operators.

The following is **NOT ALLOWED** on the bending machine:

- Connect and use the machine without having read this use and maintenance manual.
- Remove guards from the gears or other rotating parts
- Remove the dust shields, because they also function as guards.
- Assemble or disassemble fixtures with the main switch on or even worse, with the rolls in motion.
- Operate on the electric system without cutting out the voltage from the mains.
- Move the machine using inadequate lifting equipment.
- Attempt to manually support a load in pre-loading balance.
- Alter the electrical system attempting to remove the continuous pressure controls.
- Change the machine operating speed.

- Remain distracted during bending operations or the assembly of fixtures.
- Rest the hands on the material while it advances.
- Work with more than one operator in the immediate vicinity of the machine.
- Have a restricted work zone, in relation to the length of the parts being processed.
- Use the machine over its maximum capacities, indicated by TAURING S.p.A.
- Use the machine for processes other than bending section bars.
- Execution of operations on the machine parts by persons not specifically specialised to do so.
- Assemble the rollers or fixtures that do not conform with those supplied by TAURING S.p.A.
- Clean machine parts without cutting out the power.
- Use the hands to overlay the section bar, on rolls, in the case of 360° bending.
- Remain above or below the section bar coming out or entering into the machine.
- Start the rotation with the hand resting on the section bar about to enter between the rolls.
- Leave the machine with the power on.

The following actions **ARE NECESSARY** on the bending machine:

- Handle the materials wearing protective gloves.
- Use a hard-hat in the case of section bar directed upwards.
- Wear safety shoes for protection against the falling of heavy parts.
- Use safety glasses to protect against rolling dross that could detach from the section bar during the bending.
- Take note beforehand of the location of emergency stop buttons and wires.

Safety and residual risks

- It is important that only one operator loads the section bar and activates the machine movement controls.
- Have the correct space in front of the machine and in the operator working zones.
- Pay attention to the part coming out because it could move suddenly due to the pinching of the section bar between the rolls when coming out.
- Remember that the curved bar has the same weight as the bar to be bent but in a much more concentrated space.
- Carefully read the plates and warning indications on the machine.
- Always remain at the side of the section bar exiting or entering the machine and visually follow the movement.
- Delimit the bending operation working area with appropriate barriers.
- Give adequate training to the operator who will be using the bending machine.



WARNING

A further protection is to be provided by the operator or the person responsible for the use of this machine according to the characteristics of the work it performs.

The TAURING S.p.A. technicians can offer advice regarding the most appropriate way of obtaining these guards.

Even with the use of guards, the machine is not to be inserted in an automated line.

2.2 ENVIRONMENT WORKING CONDITIONS

To obtain the best possible environment conditions the **Customer** must arrange the machine and its relevant systems in the premises in such a way that there is the ideal ventilation and that the conditions are in accordance with EN60204-1 items 4.4.2 - 4.4.3 - 4.4.4 - 4.5, regarding the indicated temperature, humidity and altitude.

The machine is to be located in an environment equipped with all the safety precautions required by the laws of the user country.

2.2.1 Fire Prevention Installation

The system has been designed to avoid this risk.

In any case, the Customer is to assess the need to provide an adequate fire-fighting system on the site where the machine is installed, in compliance with the safety and fire prevention standards in force in the user country and with the plant in-house regulations.

Powder extinguishers are to be provided in the area where the electric cabinets are located, since they could catch fire in the case of a failure.

No inflammable liquids are in free circulation in the system.



DANGER

In the case of fire always cut out the machine electric cabinet main switch immediately and also that of the main power supply line.
It is not sufficient to press the emergency stop button since this does not cut out the cabinet main supply.

Safety and residual risks

2.2.2 Lighting

The system does not have its own lighting system.

The Customer user of the machine is to provide the internal lighting of the place (cabin) where the machine is located with special attention to the operator work stations, to comply to the relevant standards of the user country and in accordance with the EU Directives.

2.2.3 Vibrations

The system does not produce vibrations that are hazardous for the health of the operators.



WARNING

Excessive vibration can only be caused by a mechanical fault, that is to be immediately reported and removed, to avoid compromising the safety of the system and the persons running it.

2.2.4 Noise

The noise levels of the bending machines depend on the type of processing applied.

The noise measurements have been carried out as established by acoustic standard EN ISO 11200 and consequent standards.

The typical phonometric data is kept by TAURING S.p.A.

The machine operating characteristics are such that, when in motion, the overall noise generated is ≤ 75 dB. (A), measured near the control panel (work station) and at 1.6 m from the ground, with an ANSI S1.4.1971 standard sound-level meter, in accordance with the relevant instructions.

The measurements have been taken on identical machines.



NOTE

The sound level pressure under the actual working conditions depends on the characteristics, the programming of the specific processes and the materials used.



NOTE

The measurements of the level of exposure to noise to which the operators are subjected are therefore to be carried out by the user, in accordance with the criteria of the laws in force in the country of the user customer (in ITALY Legislative Decree D.Lgs 277/91 and subsequent amendments and integrations).

2.2.5 Electromagnetic Emissions

The machine contains electronic components subject to the Electromagnetic Compatibility standards regarding conducted and radiated emissions.

The values of the emissions remain within the standard specifications by the use of components conforming to the Electromagnetic Compatibility directive, appropriate connections and the installation of filters where necessary.

The system is therefore in conformity with the Electromagnetic Compatibility directive (EMC).



WARNING

Any maintenance activities on electrical equipment performed in a manner that does not conform, or incorrect replacement of components could jeopardise the efficiency of the system.

2.3 SAFETY DEVICES

The bending machine **ALPHA 100** is fitted with the following safety devices / safety solutions:

Type of device/solution	Function	Description in paragraph
Main switch	Cuts out the machine electric power.	2.3.1
Emergency stop	Complete or partial machine emergency stop.	2.3.2
“Person present” type controls	Protection of machine working zones where the presence of an operator is foreseen.	2.3.3
Guards or casings on rotating parts	Protection of the machine working zone.	2.3.4
Automatic protection switches	Cuts out the electric supply in the event of overload or short circuit.	2.3.5
Work station ergonomics	The work zone is dimensioned to permit a comfortable working position.	2.3.6

2.3.1 Cutting Out Energy Sources

Function: To cut out the energy sources of the bending machine ALPHA 100.

Characteristics and modalities: Before starting any type of maintenance operation on the machine or a part of it, the energy sources are to be cut out and any accumulated energy is to be discharged.

The machine electric power is to be cut out by means of the main switch **(A)** located in the electric cabinet.

After cutting out the energy sources, the handling levers are to be padlocked.



When carrying out maintenance, it is not sufficient to use the emergency stop buttons to cut out the system power.



For further information regarding the access procedure for maintenance operations, see chapter 5 "USE AND OPERATION".



For further information regarding the safety devices maintenance procedures see chapter 6 "MAINTENANCE".

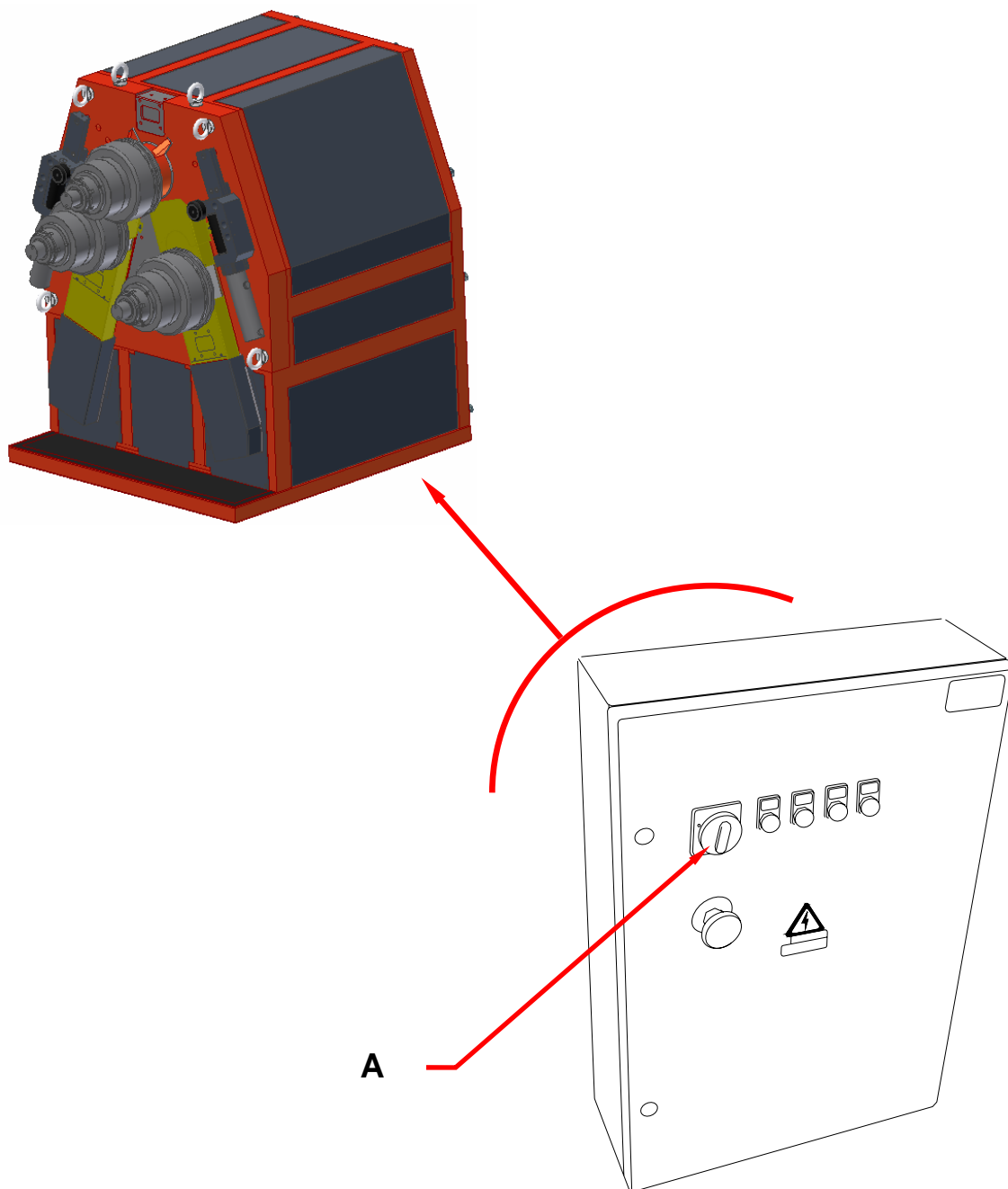


Figure 2.3 – Electrical cabinet

2.3.2 Emergency Stop

Function: Emergency stop, pressing the red mushroom head pushbutton of the ALPHA 100 bending machine following a hazardous situation that endangers the safety of the operator and/or the system.

Characteristics and modalities: Stops the automatic movements of the machine.

Pressing the emergency stop button (**A**) deactivates all motion as the power supply to the control PLC outputs and the system actuators is deactivated and the axes enable signal is cut.

If pressed, the emergency stop button remains in the lowered position. To reset, it is necessary to turn the mushroom head clockwise.

On the control pedal unit there is a black stop device actuator (**B**), with multi-directional sensitivity, that can easily be activated by the limb that carries out the movement, and immediately stops the rolls.

The safety circuit is reset by pressing the EMERGENCY RESET pushbutton.



When carrying out maintenance work, it is not sufficient to use the emergency pushbuttons to cut out the system power.



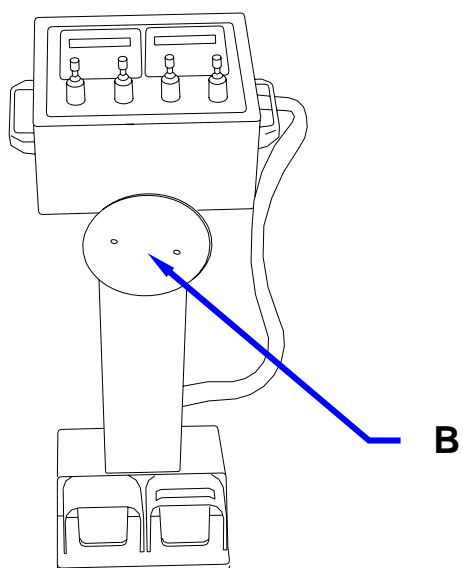
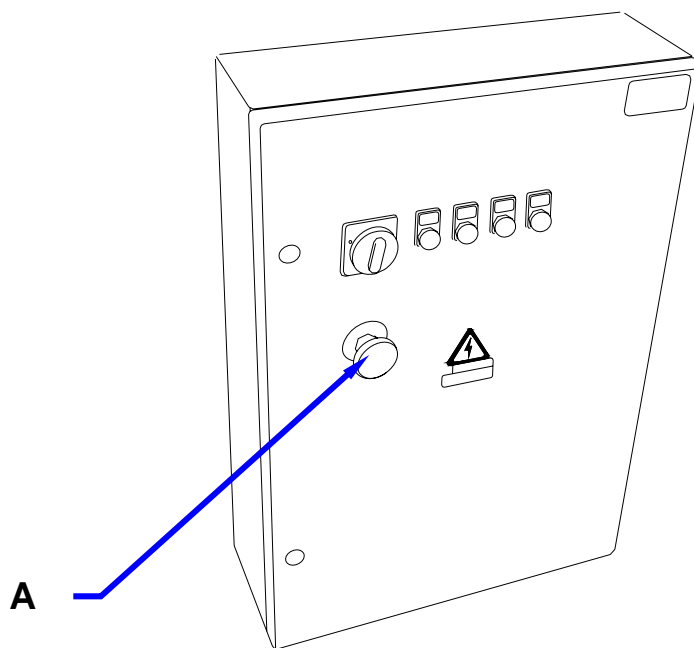
Periodically check the emergency pushbutton to ascertain the correct functioning.



For further information regarding the safety devices maintenance procedures see chapter 6 "MAINTENANCE".



Stops the automatic movements of the machine.



2.3.3 Guards or Casings on Rotating Parts

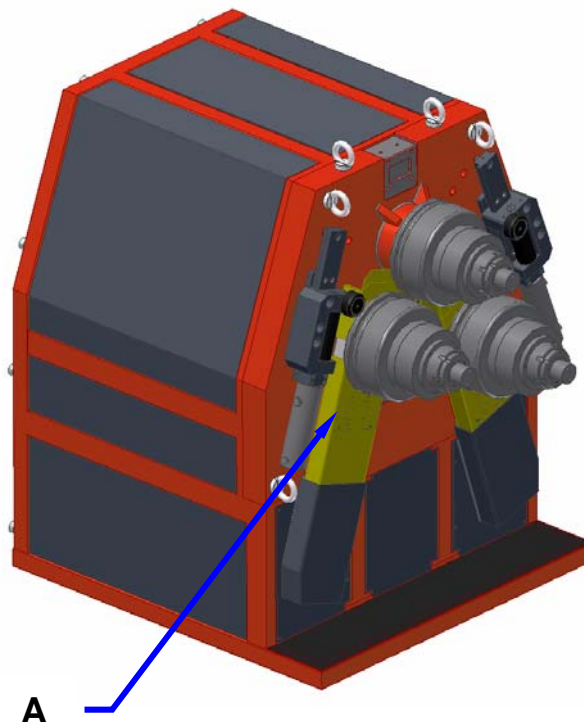
Function: Machine working zone protection.

Characteristics and modalities: The material feeding unit consists of an epicyclic reduction gear applied in cascade to a hydraulic motor, reducing the output speed to the driving shaft to the number of nominal revolutions of the shafts and thus, of the bending rolls. Furthermore, the application of this reduction also increases the torque available on the bending machine shafts and therefore the “driving force”.

Before removing the casing for maintenance work, make sure the main switch on the electric panel has been deactivated and that the machine has been disconnected from the power supply line.



Do not remove the protections to clean, oil, grease, repair or adjust moving parts with the power on.



2.3.4 Automatic Protection Switches

Function: To control the electric circuits and cut-out the electric power before hazardous overloads/short circuits are generated.

Characteristics and modalities: In the event of an overload or short circuit, the automatic circuit breakers cut out the power supply to the circuits and cause the immediate stop of the system.

The automatic switches are installed inside the main electric cabinet.

2.3.5 Work Station Ergonomics

Function: To reduce physical stress caused by the posture and activities assigned to the operator of the bending machine ALPHA 100.

Characteristics and modalities: The operator's work station has been dimensioned to allow easy handling and arrangement of the parts on which he/she operates.

If the weight of the parts to be lifted requires it, use specific lifting equipment, that is to be provided by the Customer.

2.3.6 Individual Protection Devices

Function: To protect the operator during the process.

Characteristics and modalities:

The operators who carry out the various activities on the system are to use all the personal protection equipment that reduces any possible risks.

! The clothes of those operating or servicing the system are to conform with the essential safety requirements defined in the EU directives 89/656/EEC and 89/868/EEC, and with the laws in force in the country where the system is installed.



During the use and maintenance of the system, protective glasses, gloves, hard hat and clothes that completely cover the skin **MUST** be worn.



During management and maintenance operations the personnel are to wear appropriate work clothes, to avoid accidents.

To avoid mechanical risks such as dragging, entrapment, etc., it is forbidden to wear such items as bracelets, watches, rings or chains during the work cycle and maintenance operations.



The area of the floor where the operator carries out the activities, besides remaining free of foreign objects, is to be treated to render it slip-proof (task of the Customer). As an alternative gripping mats can be used.

The operator is always to wear safety shoes with rubber soles and reinforced tip.

2.4 RESIDUAL RISKS

2.4.1 General Information

During the project, all the hazardous zones and parts have been assessed, and as a consequence all the necessary precautions have been taken to avoid risks to persons and damage to the machine components.



NOTE

Periodically check the functioning of all the safety devices. Do not remove fixed or movable protections installed on the machine. Do not leave unnecessary objects and tools in the machine working area.

2.4.2 Residual Risks

After having taken into consideration and removed all possible risks caused by the use of the system, the solutions are indicated to reduce the residual risks, thus restricting consequent hazards for the persons exposed.



WARNING

As a precautionary measure for safety, periodically check the correct functioning of the safety devices.

Regarding the functioning and the safety of the machine, the following points have been identified:

- Dropping of bent workpiece
- Projection of bent workpiece

Dropping of bent workpiece

When the machine is running, it may happen that at the end of the bending, the workpiece comes out from the rolls dropping to the ground.

This is a hazardous situation if the bending is with a wide radius, since the workpiece when dropping could hit the operator.

It is therefore recommended to work in horizontal position so that at the end of the bending the workpiece remains resting on the straightening rolls.

Projection of bent workpiece

When the machine is running, it may happen that at the end of the bending, the workpiece remains entrapped between the rolls which are still in motion and is dragged into the rotation by them.

This hazardous situation only occurs at the end of the bending when the workpiece is no longer held by all three rolls.

Since the machine is controlled manually, the operator has full control over the machine. In this manual it is indicated many times that overhanging workpieces are to be sustained, taking care to secure them during the end of bending operation.

Furthermore to avoid that the section bar remains pinched it is advised to keep a sufficient clearance between the roll slots, so that the material can swell in the internal part of the bending when the compression of the material takes place.

Safety and residual risks

2.4.3 Indication Plates on the Machine

Following the risks and the identification of residual risks, TAURING S.p.A. has installed a series of plates on the bending machine **ALPHA 100** indicating danger, warning, or obligatory actions in accordance with European standards regarding the graphic symbols to be used on the systems (Directive 92/58/EEC).

The maintenance service is to immediately replace all plates that become illegible due to wear.

The plates are in a well visible position on the machine.

!

WARNING

It is strictly forbidden to remove the plates installed on the machine.

The manufacturer shall not be held in any way liable for the machine safety if this prohibition is ignored.

The list of plates applied to the machine are shown below with the relevant location.

PLATE 1



PLATE 2



PLATE 3



PLATE 4



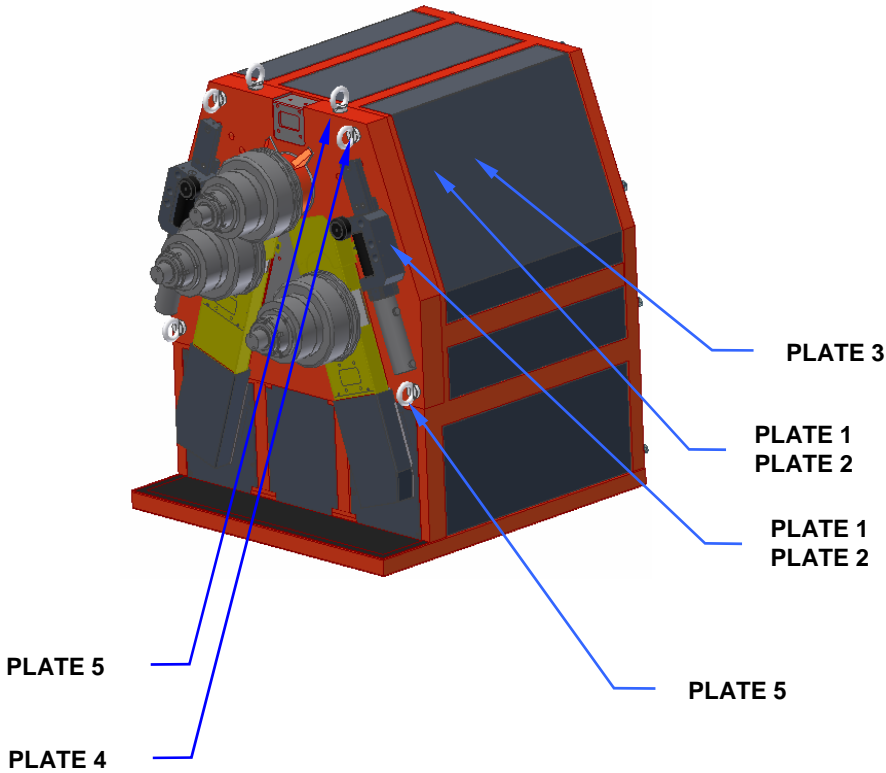
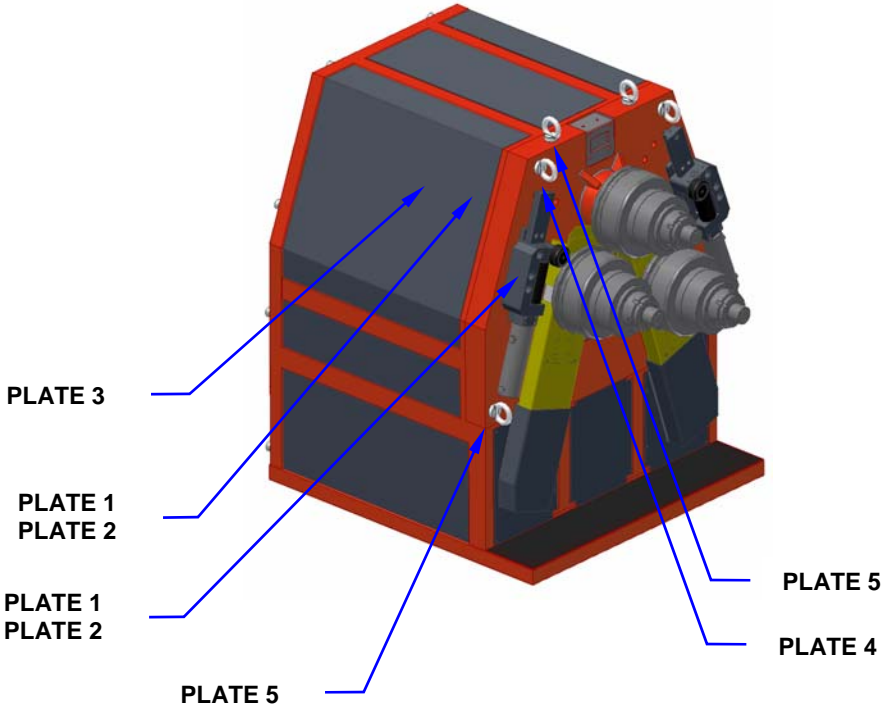
PLATE 5



PLATE 6



Safety and residual risks



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DESCRIPTION

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3 DESCRIPTION

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Description

3.1 GENERAL RULES

This chapter indicates the operations to be performed to obtain the final product.

The **ALPHA 100** bending machine consists mainly of three cylindrical parts, called “rolls” arranged in a triangle. With their stroke appropriately adjusted, they determine the bending of the straight section bar that is inserted.

The centre distance of the rolls establishes the radius of the section bar bend; the smaller the centre distance, the smaller the bending radius, on the contrary, the larger the centre distance, the larger the bending radius.

The minimum bending limit is determined by several factors, among which:

- The ratio between the resistance of the material and the maximum capacity of the machine.
- The capacity of the section bar not to undergo alteration during the bending, for example, a thin tube, if bent with a very narrow radius, is first ovalised then causing a “collapse”.
- Outer diameter of the inner roll at the bend.
- Diameter of the lower rolls, if these have a diameter that is too small, the limit of the regulation stroke is not sufficient to allow them to come close to each other.
- Rolls regulation stroke.
- Stroke of any fixtures used.

Instead, the maximum bending limit is infinite. In fact, if the rolls are regulated over their tangential position, a radius tending to the infinite is obtained.



NOTE

When possible, it is better to execute the bends in a single pass, to avoid wasting time and causing excessive wear on the section bar surface. If the material requires it, and it is not possible to proceed in another manner, use the “multi-pass” bending, that executes repeated passes forward and backward until the required radius is obtained.

3.2 TECHNICAL CHARACTERISTICS

The main technical characteristics of the system are contained in the following table.

Dimensional data	
Roll carrier shafts diameter	80 mm
Standard shafts useful length	220 mm
Standard rolls diameter	275 mm
Lower rolls centre distance (max)	457 mm
Bending axis maximum stroke	140 mm
Shafts rotation speed	9 min ⁻¹
Force applied by bending cylinder	125 kN
Bending machine width with straighteners open	1140 mm
Bending machine height	1550 mm
Bending machine depth	1450 mm
Electrical data	
Bending machine (hydraulic power pack motor)	7,5 kW
Total	8 kW
Total electrical input	16,5 A
Weights	
Bending machine	2000 kg

Description

3.3 BENDING MACHINE COMPOSITION

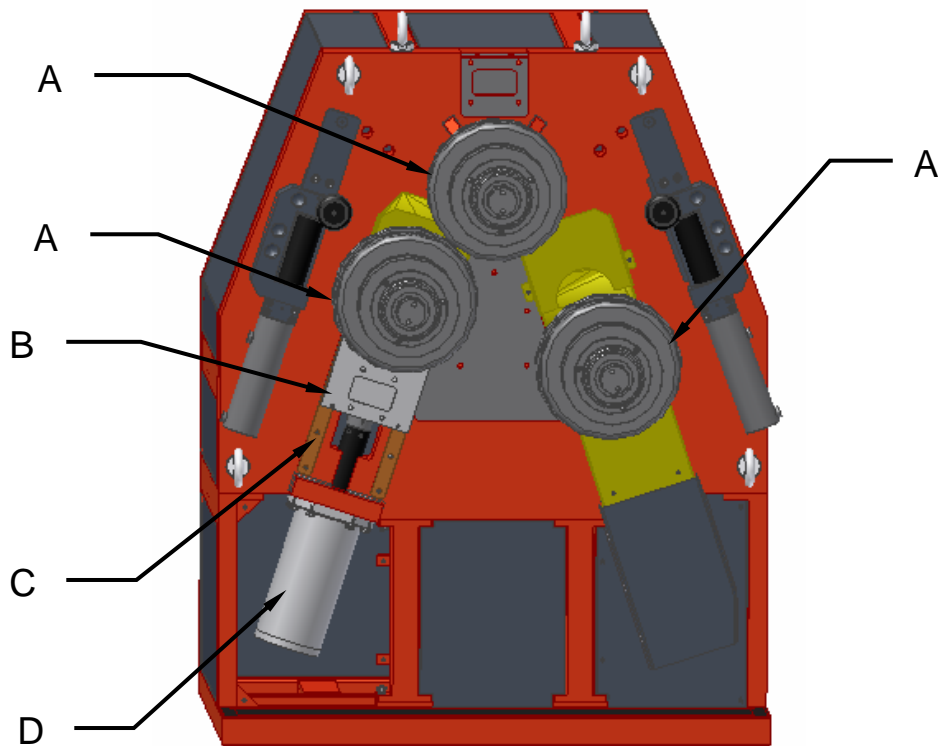
This machine has 3 motor driven rolls (A) that as they turn cause the section bar to advance.



NOTE

The normal sliding direction of the section bar is from left to right.

Of these three rolls, arranged in a triangle, the upper one is fixed, whereas the lower ones are mounted on a slide (B) that runs on two guides (C) and is moved by a hydraulic cylinder (D).



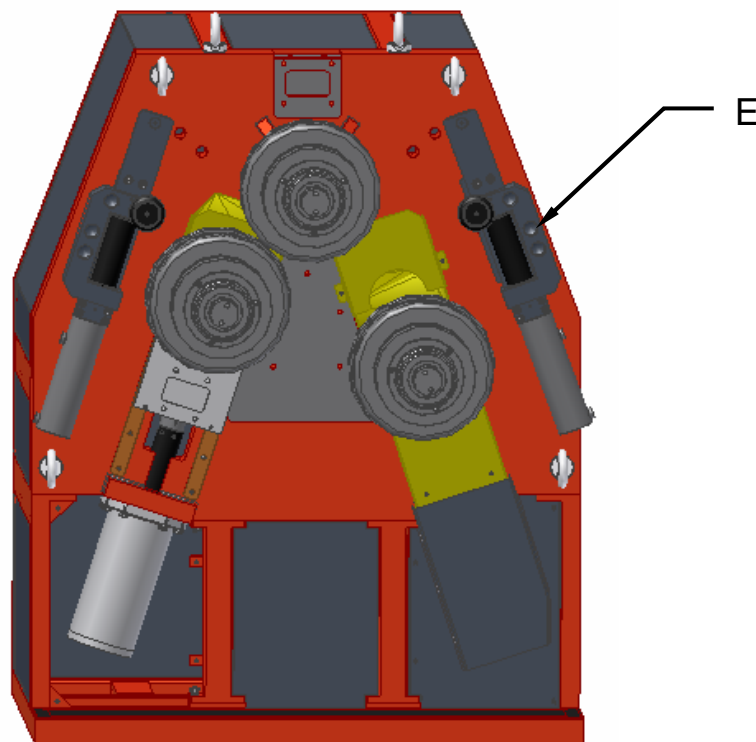
Calibrating rolls can be installed on the machine to regulate the bending of the material, making the necessary adjustments to the section bar coming out from the calibrating rolls.

They also act as support for the material, preventing bending on the wrong planes that would cause unsatisfactory precision of the finished product.

They can also be used to set a certain pitch for a tube that has to be bent along its entire length (to obtain coils, spiral staircases, etc.).

Before starting the actual bending, the calibrator device (**E**), has to be adjusted so as to immediately have available the appropriate settings when running the work program.

For bending radii that are particularly wide, it is advised to set the fixture with an almost vertical inclination, proceeding with angles that become narrower and more acute as the radii become tighter.



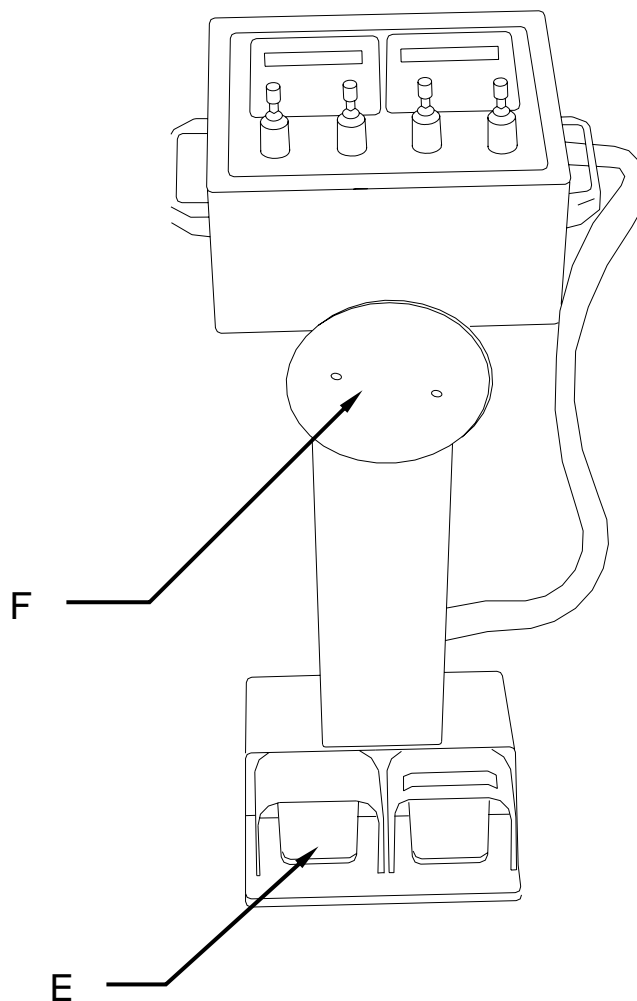
Description

The machine controls, on a pedal unit (**E**), comply to precise ergonomic requirements, collecting all the main adjustments in a single appropriately structured casing.

These controls concern the rotation and adjustment of the bending rolls.

They consist of a double pedal unit, fitted with safety lock in “stop” position, and structured to prevent any accidental or involuntary starting. There is also a “person present” control system.

There is also a safety actuator (**F**) next to the rolls rotation control, so that the operator can carry out the normal production activities in complete safety.



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TRANSPORT AND INSTALLATION

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4 TRANSPORT AND INSTALLATION

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4.1 GENERAL INFORMATION

This chapter contains the information needed for the correct installation of the Bending machine ALPHA 100.

4.1.1 General Safety Precautions

The operations described in this chapter are only to be carried out by authorised persons.

The persons assigned to all the installation operations described in this chapter, regarding packing, handling, transport, unloading, positioning, connections, verifications and checks of the machine are to be well trained and have good knowledge of accident prevention standards.

All unauthorised persons are to remain outside the area of these operations.

The accident prevention precautions and operations to be carried out that are contained in this section are to be strictly followed during the different operations so as to avoid injuries to persons and damage to the equipment.



NOTE

The handling and installation of the machine components is only to be carried out by the authorised persons.



DANGER

Make sure that around the equipment there are no obstacles (cables, pipes, etc) that could cause interference or hazards for the operators.

4.2 SUPPLY CONDITIONS

4.2.1 General Information

According to the distance, the Customer's requests and the time the goods shall remain in the packing, the machine may be shipped.

4.2.2 Packing and Transport

The transport of the Bending machine ALPHA 100, from the TAURING S.p.A. plant to the user's plant is under the care of TAURING S.p.A.

All external parts subject to oxidation (machined surfaces, unpainted parts, etc.) are protected by a film of anti-oxidant oil.

Usually fragile parts are protected with plastic material to avoid damage when lifting and during transport.

The machine parts are shipped, according to the destination, in these ways:

BY SEA ⇒ the assembly is packed in a flat bottom crate and anchored by tie-bars. The crate is lined with tarred paper and has a flap for Customs inspections; it contains bags with drying salts to protect against humidity and salt.

BY AIR ⇒ the assembly is packed in a flat bottom crate and anchored by tie-bars. The crate is lined with tarred paper and has a flap for Customs inspections; it contains bags with drying salts to protect against humidity and other atmospheric agents.

BY LAND ⇒ Land transport can be divided into two types:

LONG DISTANCE TRANSPORT ⇒ the assembly is covered with protective sheets, enclosed in a flat bottom wooden cage and clamped with tie-rods to the loading bed of the semi-trailer.

To lift the crate, scrupulously follow the instructions stamped on the outside of the packing. The packaging can be kept for further use; it is therefore a good practice to keep it in a protected area so that it does not become damaged and hence not reliable. If it is to be disposed of, it will be the responsibility of the **Customer** to dispose of it in compliance with the laws in force in the country.

MEDIUM AND SHORT DISTANCE TRANSPORT ⇒ each separate component of the machine is fastened to a bed and covered with protective sheets.

The transport packages indicate the securing points for lifting.

Also, the outer packing has all the indications to identify the contents and for safe handling:

- **address of receiver and sender**
- **dimensions (length, width, height)**
- **gross, net weights and tare**
- **centre of gravity**
- **notes and symbols (e.g. fragile, this side up, etc.)**
- **packing list pocket (a copy must be present on every package).**

4.3 CHECKING THE PACKAGES AT SYSTEM DELIVERY

When delivered, the packages are to be checked according to the following criteria:

- The cases are to be intact and not crushed; there shall be no damage to mechanical parts such as tie-bars, guides, platens, etc.
- If damage should be found, the acceptance is to be made with reservation since it is necessary to check the integrity.
- Before removing the packing from the system parts, if damage has been found, contact TAURING S.p.A. immediately.
- Visually check the condition of the system both outside and inside the packing. Deformation indicates impacts that the system has been subjected to during transport, that could have effects on the normal functioning.

In particular, check the good condition of the metal and painted surfaces and the tightness of the screws, bolts and fittings.

4.3.1 In the Event of Damage

Before transferring the system, check it is in good condition. Any damage could impair the system functioning and cause injuries to persons or damage to goods.

Notify TAURING S.p.A. immediately of any damage caused by transport.

4.4 CHOICE OF SITE AND VERIFICATION OF INSTALLATION REQUIREMENTS

Apart from exceptions established when drawing up the contract, the customer is to provide:

- Appropriate lifting equipment.
- Fixtures and consumable materials.
- Machine arrangement in the working area, considering:
 - Working spaces.
 - Free passages (e.g. for plant transport, lift trucks, etc.).
 - Machine overall dimensions (indicated in chapter 3 “DESCRIPTION”).
- The floor of the area chosen for the installation is to be smooth, level and flat and able to support the weight of the system.
- Environment operating conditions (given in detail in chapter 2 “SAFETY”).
- The area is to be equipped in accordance with the current safety standards of the user country and ensure correct ventilation. Lighting and grounding of the equipment.
- The machine main electric power supply, including the ground conductors, with the characteristics and tolerances as indicated and specified in this handbook, in paragraph “ELECTRICAL CONNECTION TO THE MAINS”.
- The system hydraulic supply with the characteristics and tolerances as indicated and specified in this handbook, in paragraph “HYDRAULIC SUPPLY CONNECTION”.



NOTE

TAURING S.p.A. shall not be held liable for anomalous functioning if the power supplies are not those specified.

4.5 LIFTING AND HANDLING

4.5.1 General Information

The persons assigned to the machine handling are to be appropriately trained so as to avoid wrong operations that could damage the system.

If there is not a clear view to ensure that the operator can work in safety, arrange for persons on the ground to control and signal the movements to be made to the handling operator.

In particular:

- When lifting, check the condition and correct fastening of the lifting equipment and use adequate slings and equipment.
- As far as possible, the machine installation area should be clear, free of materials that could impede or limit visibility, create hindrance or tripping.
- If present, remove any fastening brackets or clamping devices installed for the transport.

4.5.2 Shipping Packages

The system supplied consists of the following components:

- 1 main bending unit.
- 1 control pedal unit to control the machine moving parts.
- Set of tools (polyvalent rolls) to bend the most varied profiles.

4.5.3 Handling Procedures

To lift and handle the packages into which the machine is divided, follow the instructions below.

!

WARNING

To lift the packages, suitable lifting equipment is to be used, taking into account the safety margins prescribed by law and the current safety standards. Do not use chains instead of metal cables.

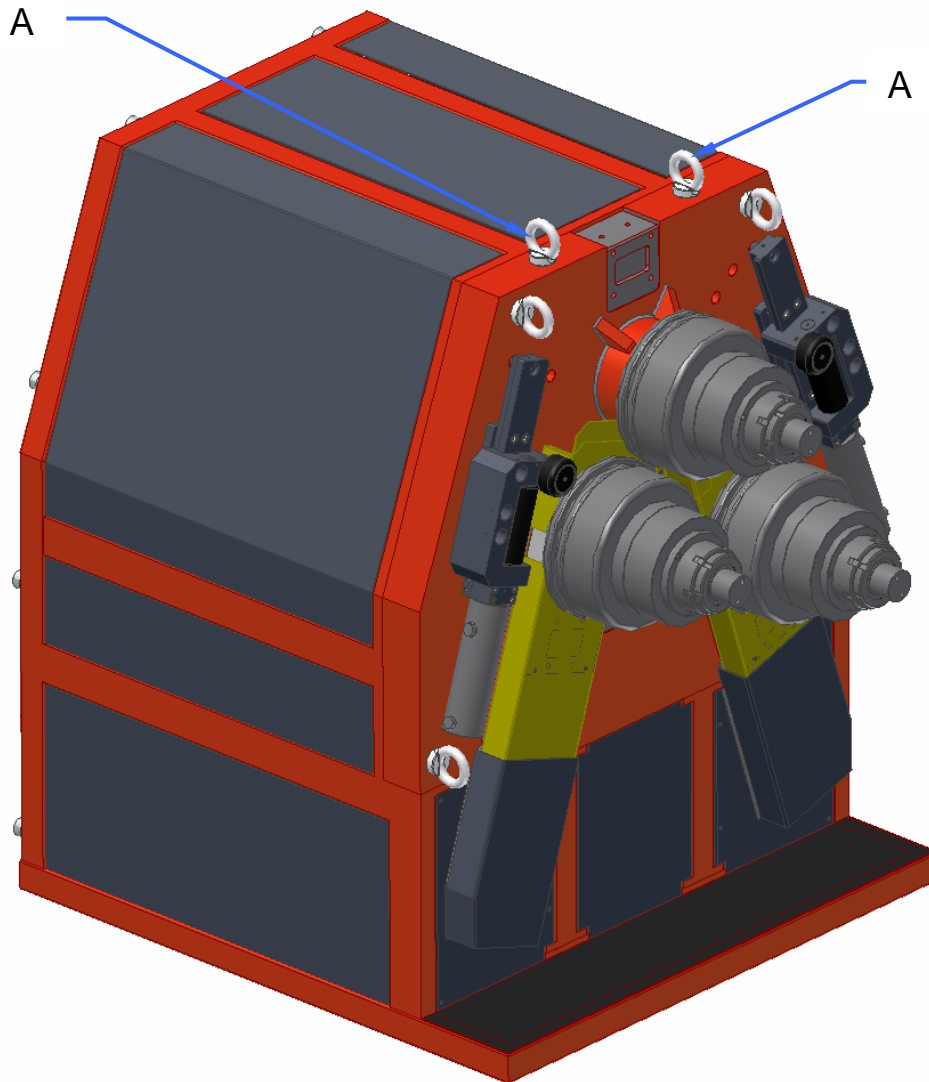
When handling the packages there should be at least three operators working as a team, one in charge of the movements and the other two on the ground to check the load.

- Insert lifting bands with an appropriate length and capacity in the specific eyebolts (A) so they converge in a single point above. The distance of this point from the top of the bending machine will depend on the manoeuvring height available and the length of the lifting bands.

!

WARNING

The lifting eyebolts are the only points that are to be used for transport and handling. The use of other points could cause the machine to overturn or fall, with serious risks and/or damage for the personnel and for the condition of the system o.



- Before lifting the packages, check there are no moving parts or tools on them.
- Always check that the load to be handled and lifted is well balanced, lifting it slightly from the ground.
- Once the load has been lifted, keep at a safe distance.

4.6 INSTALLATION

Before starting up the bending machine ALPHA 100, it is necessary to:

- Remove the protective packing.
- Remove any fastening restraints used for the transport.

4.6.1 Positioning and Assembly

The area where the system is to be situated is to have sufficient space to allow the persons involved to carry out the installation and work under safe conditions, as specified by the standards in force.

The site is to be provided with the required air and electric power connections.

In the case of anomalies, problems or difficulties, contact the design technical office.

The machine has been assembled, tested and inspected in the manufacturer's plant.

It is the responsibility of the Customer to prepare the area so that it conforms with the safety standards in force in the country. The customer shall also guarantee the grounding of the equipment.



WARNING

The surfaces of the components are to be carefully cleaned to remove the grease and rust-proof paints before assembly.

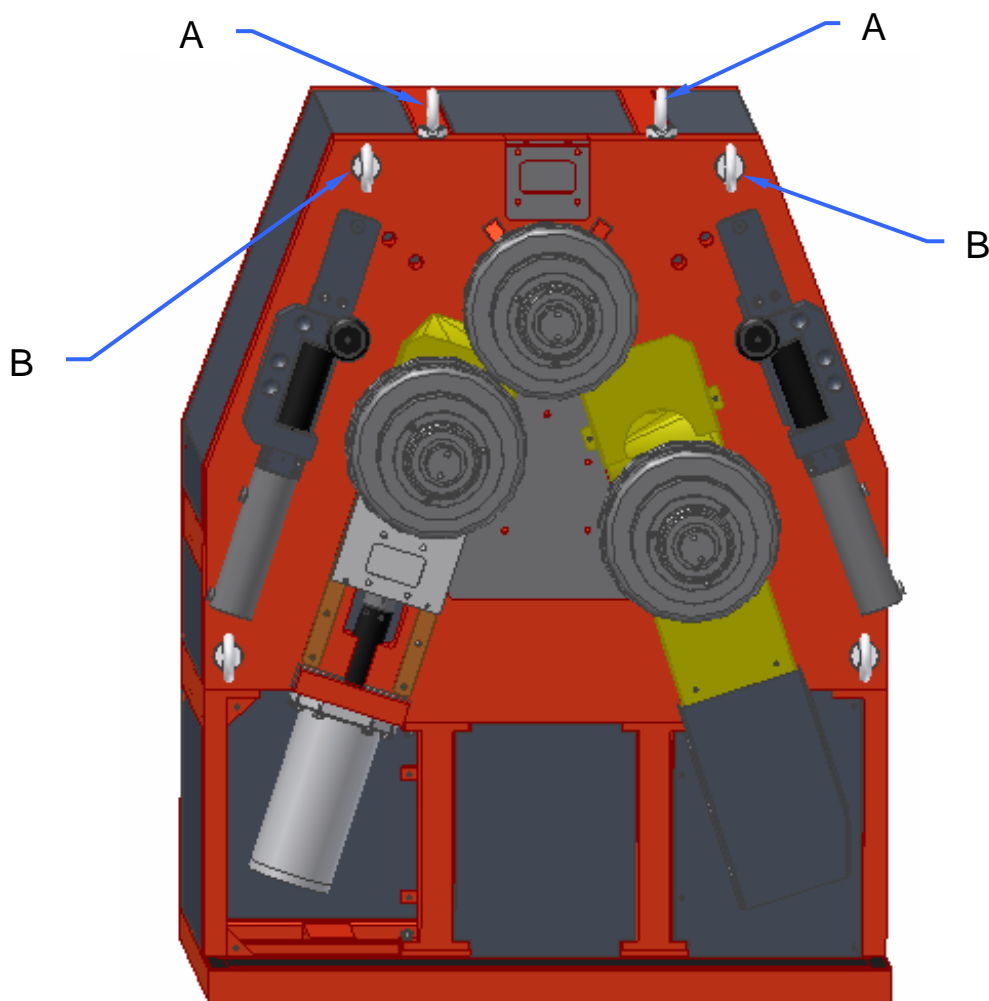
To carry out the cleaning operations properly, see chapter 6 "MAINTENANCE".

Transport and installation

4.6.2 Installation

This machine can be installed in either vertical position (with the shafts horizontal) or in horizontal position (with the shafts vertical). This position is very useful when bending heavy material or coils that require continual support during the process.

To allow overturning under safe conditions, the machine is fitted with eyebolts in the front part of the head in the upper (A) and front (B) positions.



The eyebolts (A) are used to bring the machine in vertical position, whereas the eyebolts (B) are used to bring it in horizontal position.

4.6.3 Cleaning and Washing

Once the bending machine has been installed, using soft cloths, remove the rust-proof grease that was used by TAURING S.p.A. to cover the unpainted parts of the machine and its fixtures.

The following is necessary for this operation:

- Normal washing solvent. Do not use petrol, inflammable solutions or other hazardous substances.
- Soft cloths.

The operator, besides taking the usual precautions, is to be provided with personal protection equipment, such as overalls, glasses, gloves etc according to the products used.

The cleaning is to be carried out with care, to avoid damaging surfaces and painted parts.

On some unpainted surfaces TAURING S.p.A. carries out a burnishing treatment to avoid, over time, the formation of rust.

However, it is advised to spread a thin film of oil or grease on these surfaces, especially if the machine remains stationary for long periods and if the environment has a high rate of humidity.



WARNING

Check that no infiltrations of water or humidity have corroded unpainted metal parts of the machinery.

The assembly zone is to be protected against draughts which could convey impurities.

The tubes and components are to reach the assembly zone tightly sealed.

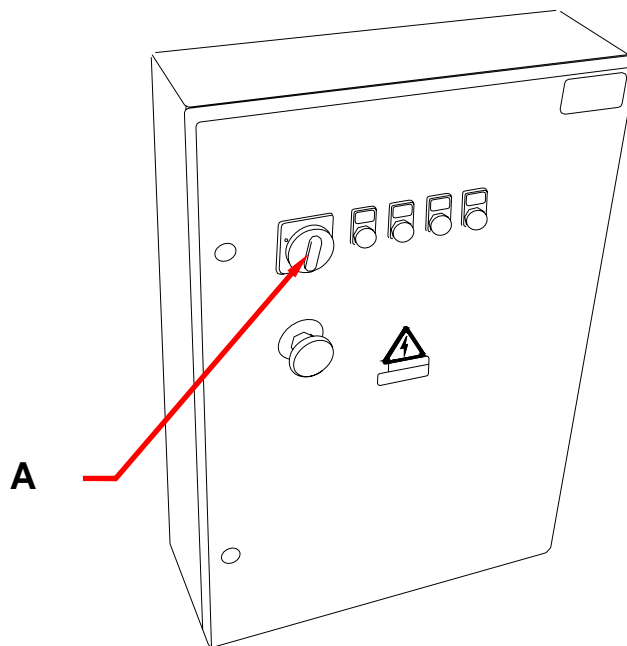
If material from storage is used that has not been previously filled or treated with protective oil, it has to be disassembled, cleaned and lubricated .

4.6.4 Electrical Connection to the Mains

The voltage of the electric power supply and the frequency of the pump motor are set by the manufacturer according to the requirements of the customer.

Before starting any type of electrical connection:

- Check that the lever of the main switch (A) on the cabinet door is in OPEN position.



- Check that all the PLC modules and the control units of the commercial fixtures are fastened in their housings.
- Visually check the connection of terminals and wiring.



DANGER

Check that the electric distribution line is dimensioned according to the load of the bending machine.

Connect the ground system to the equipotential protection circuit before making any other connection to the electric distribution line.

Check the correct voltage value indicated on the machine identification plate and the type of connection on the power supply transformer located on the electric panel.

**CAUTION:**

I The electrical system wiring is numbered. Any parts that are not connected are to be restored following the relevant wiring diagrams, attached to this manual.

The power supply cable is not supplied with the machine, It is recommended to always use material that conforms with the current standards in force.

The power supply cable is to be armoured four-pole type (three phases plus the protection conductor for the ground).

The connector or plug is to comply with current machine standards and is to have the four contacts needed (three the same and one different) for the connection of the three phases and the protection ground conductor.

Remove the main switch terminals protection cover and connect the three cables of the power supply phases through the corresponding terminals. The power supply cables are taken to the main switch through a hole on the cabinet roof.

Refit the switch covers and connect the yellow/green ground cables to the ground terminals provided (PE).

**DANGER**

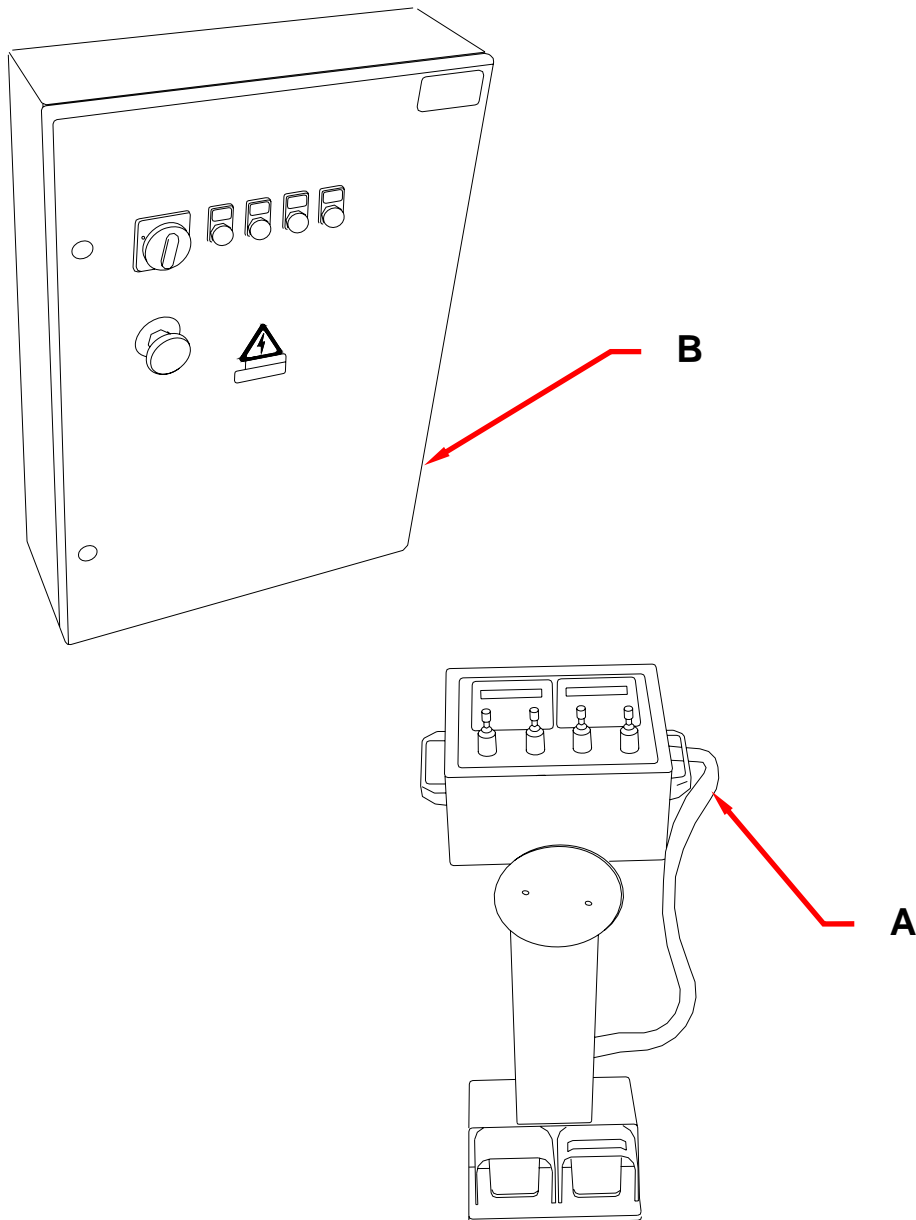
The system power supply connections are only to be carried out by skilled experts and they are to use the relevant personal protection equipment.

The system is able to operate correctly with the electric power supply that corresponds to the relevant harmonised standards requirements.

The system has only one electric power supply point, located on the electric cabinet terminal board. There is also only one terminal (PE) for the external connection of the ground circuit.

4.6.5 Control Pedal Unit Connection

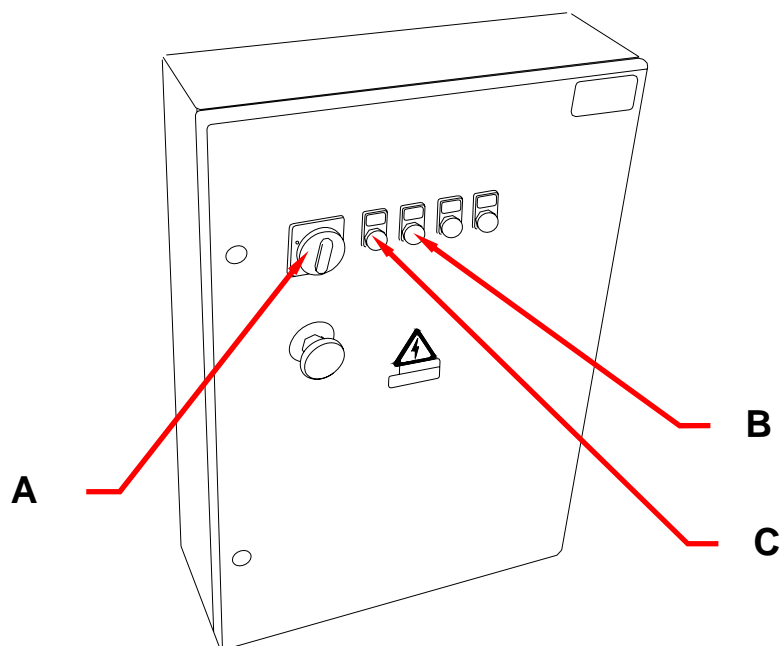
Connect the panel Harting socket (A) to the connector on the rear of the electric cabinet (B) locking it with the clamps.



4.6.6 Electrical Connection Check

To safely check the correct connection of the electric power supply phases, proceed as follows:

- Supply the external line upstream of the electric panel.
- Turn the system main switch to position 1 (A).
- Enable the auxiliary circuits with the “Start auxiliaries/reset” pushbutton (B). The associated warning light will switch on (C).



If the rolls turn correctly this indicates that the connection has been made correctly; otherwise, if the rolls do not move, disconnect the machine from the mains and invert two of the three phases.

Transport and installation

4.6.7 Hydraulic Power Pack

The hydraulic power pack is driven by an asynchronous three-phase motor that, by means of a pump, introduces oil into the hydraulic cylinder chambers and controls the hydraulic motor that rotates the rolls.

When the bending machine is shipped, all the oil is emptied from the power pack. Before starting the machine, this has to be filled.

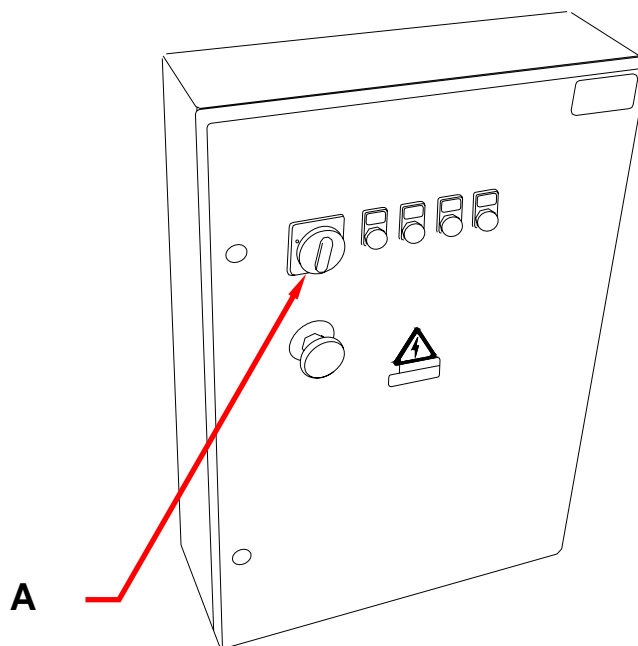
TAURING S.p.A. recommends the use of:

- AGIP ARNICA 32 oil, for a machine with numeric control;
- AGIP LH 32 oil, for a machine without numeric control.

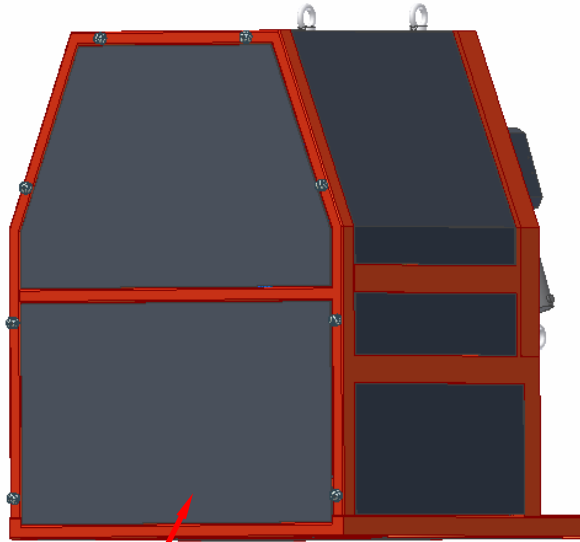
During these operations, wear protective gloves.

To fill with oil, proceed as follows:

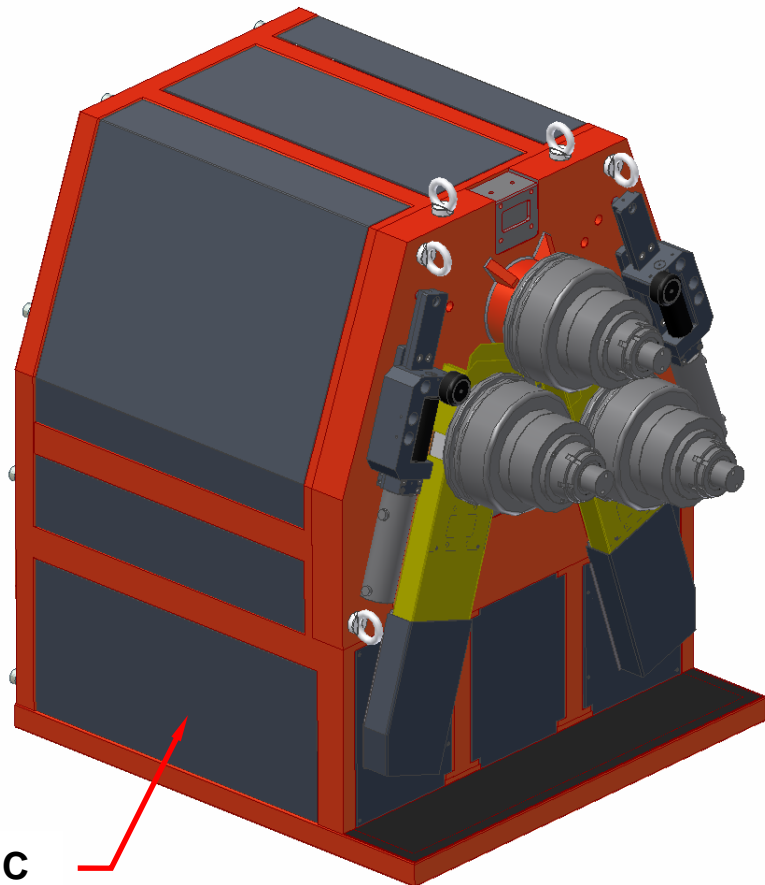
1. Disconnect the system electric power supply main circuit breaker and lock it in open position.



2. Remove the rear panel (**B**) and that on the left side (**C**) of the bending machine to have free access to the hydraulic power pack zone.



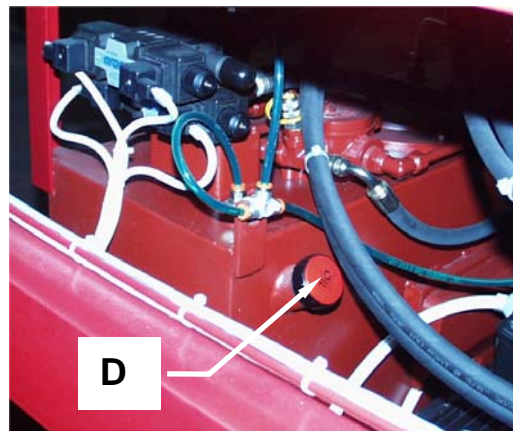
B



C

Transport and installation

3. Unscrew the filler cap (D).



4. Fill the tank to half the indicator level (E).



NOTE:

TAURING S.p.A. recommends the use of AGIP ARNICA 32 oil or AGIP LH 32 oil.

5. Tighten the cap and refit the bending machine panels.
6. Restore the machine energy sources checking the correct operation of all the hydraulic drives. If there are problems or malfunctioning, contact the TAURING S.p.A After Sales Service.

4.7 DISPOSAL

During the entire machine life different types of reject or waste materials are produced, such as lubricants, filters, flexible hoses, etc; for the disposal of some of these materials there are specific regulations to safeguard the environment.

For the disposal of waste lubricants, the following environment protection standards are to be complied with:

- Lubricant can pollute water and land, therefore, never pour lubricant products on the ground, in waterways, in sewers. Infringement of this regulation can be prosecuted by law. When using lubricants always have an oil agglomerate on hand.
- Recover waste oils with care, separating mineral base products from synthetic base products. When disposing, attain to the regulations in force regarding the disposal of waste oils.

The customer must be aware of the laws in force in the country and operate in compliance with this legislation.

4.8 PUTTING OUT OF SERVICE, DISMANTLING AND DEMOLITION

The dismantling of the machine takes place when it has ended its production cycle or it has become technologically obsolete.

The next paragraph contains some hints and indications to correctly carry out the operations to put out of service, dismantle and remove hydraulic bender at the end of its operating life.



ADDITIONAL INFORMATION

The operations described are the exclusive competency of authorised personnel.

- There must be sufficient space around the machine so that the persons can carry out all the movements needed without incurring risks.
- Disconnect the system electric power supply main circuit breaker and lock it in open position.
- Disconnect the power supply cables from the cut-out device, first disconnecting the power conductors, then the ground.
- Depressurise any pneumatic and hydraulic accumulation tanks.
- Empty the oil from the hydraulic power pack and the reducers, to avoid dispersion in the environment.

Since the machine is mainly composed of ferrous and non ferrous material, with accessories in plastic, rubber and a series of geared motors, after dismantling the ferrous materials are to be separated from the non ferrous materials.

Divide the steel from the aluminium and copper, taking care to remove oil and grease residue from the various parts. Next separate the plastic tubes from those in rubber.

Group separately the electric motors divided from the reducers. The latter are to be emptied of any oil. The oil collected is to be poured into bins and stored as described in the next paragraph.



DANGER

Pay utmost attention to the possible falling of machine parts or components during removal. This could be a serious hazard for the operators.



ADDITIONAL INFORMATION

The disposal operations are to be carried out in compliance with current standards in the country where the system is installed.

4.8.1 Storage Methods

The ferrous and non ferrous materials, appropriately divided, are to be stacked on an impermeable floor without drainage, duly covered with impermeable material to avoid possible pollution of the ground surrounding the impermeable floor.

The plastic and rubber tubes are to be stacked on an impermeable slab, divided according to type, checking with care that the tubes of the hydraulic circuit do not pollute the surrounding area with oily residue.

The electrical material and reducers are to be collected on an impermeable slab and covered with impermeable material. Pay attention that there is no oil outflow from the reducers that could pollute the surrounding area.

The lubricants in the geared motors are classified as “waste” and therefore hazardous refuse. They are to be stored in sealed containers on an impermeable slab with a containment basin without drainage and a covering roof.

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USE AND OPERATION

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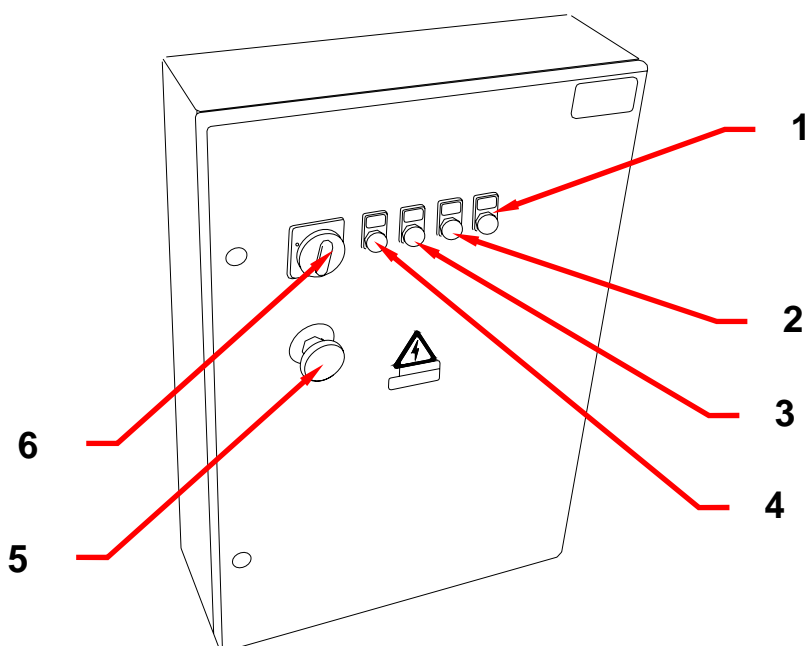
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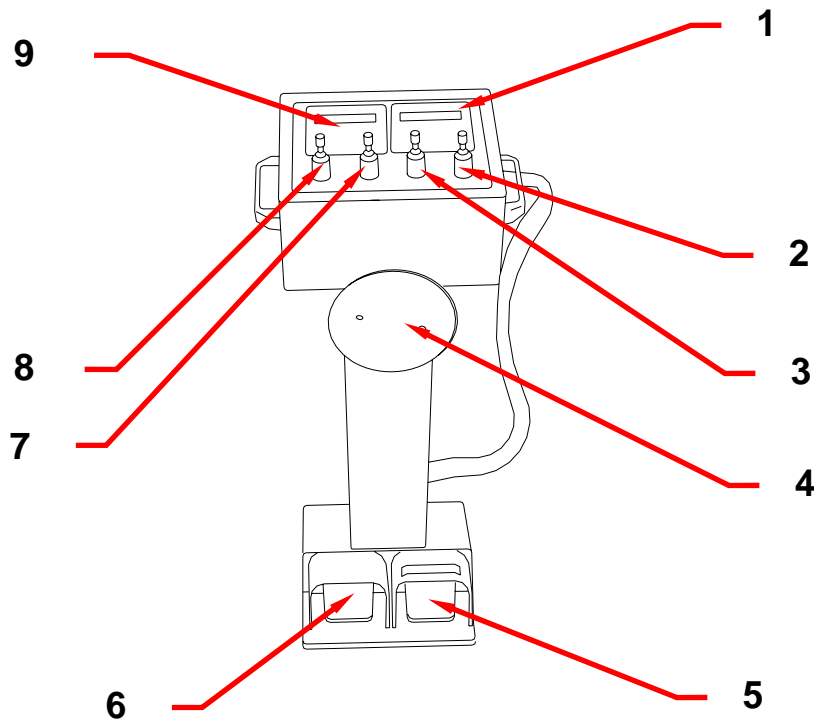
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5.1 IDENTIFICATION OF CONTROLS

This paragraph gives a **quick identification of the controls** providing the machine user with a valid tool to rapidly trace each part of the control push button panel.



1. **THERMAL LOCK:** Orange warning light that indicates a problem on the magneto-thermal switch.
2. **OIL TEMPERATURE HIGH:** Red warning light that indicates an increase in the oil temperature inside the system.
3. **AUXILIARIES ON:** Green luminous pushbutton that enables/disables the electric power supply to the 24 Vdc auxiliary lines.
4. **LINE POWER ON:** White warning light that indicates power is supplied inside the panel.
5. **EMERGENCY:** Immediate stop in the event of an emergency. It is used in a hazardous situation or an emergency. The machine immediately stops the moving parts, whether in automatic or manual mode, stopping the hydraulic power pack. The machine cannot be restarted until the reset procedure has been carried out.
6. **MAIN SWITCH:** Activates (ON) / deactivates (OFF) the power supply to the electric circuit of the entire machine. The door of the electric panel can only be opened when the main switch is in OFF position (open).



1. **AXIS Y INTELLIGENT POSITIONER:** Control panel with display and 15-key keyboard.
2. **AXIS Y STRAIGHTENER MOVEMENT:** Handle to control positive (+) and negative (-) movement of the UY and TY axis.
3. **AXIS Y MOVEMENT:** Handle to control positive (+) and negative (-) movement of axis Y.
4. **MULTI-DIRECTIONAL STOP:** Immediate stop in the event of an emergency. It is used in a hazardous situation or an emergency. The machine immediately stops the moving parts, whether in automatic or manual mode, stopping the hydraulic power pack. The machine cannot be restarted until the reset procedure has been carried out.
5. **AXIS X NEGATIVE ROTATION:** Pushbutton and pedal for anticlockwise rotation of the driving rolls.
6. **AXIS X POSITIVE ROTATION:** Pushbutton and pedal for clockwise rotation of the driving rolls.
7. **AXIS W MOVEMENT:** Handle to control positive (+) and negative (-) movement of axis W.
8. **AXIS W STRAIGHTENER MOVEMENT:** Handle to control positive (+) and negative (-) movement of UW and TW axis.
9. **AXIS W INTELLIGENT POSITIONER:** Control panel with display and 15-key keyboard.

5.2 START-UP PROCEDURE

The bending machine start-up procedure can be divided into:

1. First checks.
2. Power-on.

5.2.1 First Checks

When the machine is started up for the first time, certain checks have to be made:

- Accurate cleaning of all the machine parts to remove dust, residue and the coating of protective grease (see the paragraph: “Cleaning and washing” in chapter 2).
- Correct connection to electric mains.
- Correct filling of oil in the hydraulic power pack.

Before each start-up, always check that the “EMERGENCY” stop button is in released position.

5.2.2 Power-on

Proceed as follows:

1. Turn the main switch located on the electric cabinet to 1 (the white “LINE POWER ON” warning light switches on).
2. Press the green pushbutton to power the auxiliaries.

At this point the machine is ready to receive the section bars for bending. For the explanation of the bending method, see the related manual attached.

5.3 TROUBLESHOOTING

This section helps the operator to identify, and possibly solve any anomalies that could occur during the normal operating cycle of the machine.

Breakdowns or failures caused by neglect or careless or improper use of the machine are not taken into consideration

The TAURING S.p.A. after-sales service can solve problems that may occur on the machine; to do so, the following information is necessary:

- The type of fault found.
- Detailed description of the operations during which the fault occurred.
- Frequency of the fault.
- Operating environment conditions.

However, before asking for the intervention of the After-sales service, check whether in the faults described below there is reference to the fault found.

Use and operation

5.3.1 Fault

Fault	Cause	Remedy
The machine does not function, the rolls do not turn and the hydraulic power pack does not function.	Current is not arriving to the power section of the system.	Check the voltage presence in the mains, then check the main switch is on, and the activation of the "AUXILIARIES ON" pushbutton.
The hydraulically adjusted roll does not hold the fixed dimension, but has a "springy" movement during the introduction and bending of the material.	Air has formed inside the hydraulic circuit.	Bleed the hydraulic circuit.
The hydraulically adjusted roll does not hold the position after the dimension has been reached, but slowly loses the position when the material passes between the rolls.	The hydraulic circuit has a leak from the hydraulic cylinder lock valve or the piston gasket.	Replace the lock valve or remove the cylinder and replace the piston gaskets.

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MAINTENANCE

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6 MAINTENANCE

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6.1 PRE SAFETY PRECAUTIONS

The maintenance, troubleshooting and repair operations are only to be carried out by the authorised personnel.

The persons assigned to the running and the maintenance of the equipment must be well trained and have in-depth knowledge of accident prevention standards; unauthorised persons are to remain outside the working area during operation

The accident prevention precautions contained in this section are to be always rigorously observed during the running and maintenance of the system to avoid injury to persons and damage to the equipment.

These precautions will be further indicated with more details throughout this Manual under the form of **CAUTION** and **DANGER** notes, whenever a procedure is required that could cause damage or injury.

- **DANGER** notes are given before an operation that, if not carried out correctly, could cause injury.
- **CAUTION** notes are given before an operation that, if not carried out correctly, could cause damage to equipment;

After every maintenance operation it is **obligatory** to restore the protections installed, checking the correct functioning.

6.1.1 Danger Notes



A series of general danger notes follow that are to be observed when carrying out maintenance operations. They indicate hazards with risk of injury, even death, for the operator.

- High voltages can cause death upon contact. Always work with utmost caution in accordance with the accident prevention standards of the country.
- When the system is running there are moving parts that could cause serious injuries. Therefore, all cleaning and special maintenance operations regarding disassembly or replacement of system components or parts of the **control units are to be carried out with the system off and with no pressure in the systems:**
 - **The main 400V switch / switches is/are to be in OFF (OPEN) position and locked with safety padlock (s) that prevent the movement to ON position;**
- Place specific warning signboards **EQUIPMENT BEING SERVICED – DO NOT POWER-ON** on the main switches and on the reduction units and air filtering units.
- Check that any mechanical systems or assemblies with motion controlled by springs are in idle position.
- Do not use harmful solvents.
- Always use the protective accident prevention equipment when carrying out maintenance on the system.
- Make sure that electrical tools are in perfect condition and have insulating grips. Check that the insulation of equipment cables and conductors has no signs of breaks or damage.
- Fixtures without ground connection can cause serious injuries to persons. Always make sure that the ground is connected and that it is in conformity with current standards.
- Prolonged overloads or failures could cause overheating of electric motors and electrical equipment with the formation of harmful fumes; cut out the power immediately as a safety precaution, and do not approach the equipment until the fumes have been dispersed by adequate ventilation. Do not inhale the fumes remaining in the system when making the repairs.

Maintenance

- Never use water in the case of fire on the equipment; cut out all the power supplies and use CO₂ extinguishers.
- Avoid prolonged, excessive or repeated contact of the skin with lubrication products and immediately change clothes if they become impregnated, because lubricants are very harmful to the skin (see chapter 2).
- Do not handle lubricants (oils, greases, etc.) near electric sparks or naked flames.



DANGER

Lubricants are inflammable products, follow the instructions indicated on the containers.

- The equipment installation is to always conform with the accident-prevention standards. All moving parts and transmission components are to be protected against accidental contact.
- Carefully inspect all unions making sure there is no dust, oil, dirt or flaws on the threads before making connections.
- Make sure all the fittings and couplings are tightly locked before pressurising the system after a repair job.
- Always make sure, before starting the equipment, that the maintenance staff is outside the protected area and that no tools or materials have been left near the equipment.
- Troubleshooting, as far as possible, is to be carried out remaining outside the protected area; if, during the troubleshooting activities it becomes necessary to act on the control unit and the system while live, all the necessary precautions are to be taken that are specified by safety standards when working in the presence of hazardous voltages and on units handled while live.
- Always keep away from any component that could be set in motion by hydraulic pressure when this has not been fully discharged from the system. Do not wear objects that could become tangled in the equipment and act as conductors (chains, bracelets etc.).
- After maintenance, repair and troubleshooting operations the correct functioning of the system is to be checked and all the safety devices are to be restored.

6.1.2 Caution Notes!

These notes, to be borne in mind during maintenance operations, are a warning of possible deterioration or damage to the machines of the system, the equipment or other personal belongings of the user.

- The maximum machine reliability and minimum maintenance costs are the result of a scheduled maintenance and inspection plan that is to be scrupulously followed during the entire machine life. Always strictly follow the set maintenance time-scales and the frequency of operations according to the specific needs according to the system production cycle.
- If more complex operations are required, it is advised to contact the manufacturer to have further details regarding the project or after-sales service.
- Before starting up the equipment again after a fault, inspect carefully and check to point out any damage.
- Always use perfectly dry air when cleaning, with a pressure less than 0,2 MPa.
- Always use equipment that is in perfect condition and specific to the operation to be carried out; the use of unsuitable or inefficient equipment can cause serious damage.
- Carry out repair jobs in clean environments, and as far as possible, free of dust. Protect all connection openings with plastic plugs and carefully clean all the machined surfaces of disassembled parts when reassembling them on the machine.
- When dismantling, mark the separate parts with an identity tag to ensure the correct reassembly later.
- After every maintenance operation that requires disconnection of wiring and/or fixed and moving parts, check the number/tag consistency between the fixed and the moving part.
- Before starting up the equipment after a failure, it is to be carefully inspected and checked to highlight any damage.
- Always pay maximum attention to checks on the presence of lubrication on the various system components, since insufficient or faulty lubrication could jeopardise proper functioning.

Maintenance

- Use only the recommended lubricants or others with equivalent properties of a known and tested quality (see “Corresponding Lubricants table” in this chapter).
- The lubricants used are to have a good emulsion stability and are not to alter with age.
- It is most important to continue to use the lubricants used for the first filling. If this is not possible due to organisation and management policies, use only products that conform with the “Corresponding Lubricants table” contained in this chapter.
- To complete the traditional maintenance activities indicated on the charts, the maintenance engineers are to carry out, where foreseen, also instrumental predictive maintenance, consisting of analyses and specialised checks that can foresee in time failures that could occur in components of the entire system.

6.2 WHAT IS MAINTENANCE

The expression “maintenance” includes all the following jobs and operations:

- PREVENTIVE MAINTENANCE
- REVISION
- REPAIR

6.2.1 Preventive Maintenance

Preventive maintenance covers all those operations carried out at set intervals, or according to prescribed criteria, that are aimed to reducing the probability of a failure or the downgrading of the machine operation.

For example, preventive maintenance includes the operations described in the table below.

OPERATION	DESCRIPTION
Adjustment	Adjustment and calibration of the most important nominal operation values of the system, for example: <ul style="list-style-type: none"> • fluid systems working pressure • working parameters • tension of belts or chains.
Cleaning	Cleaning operations on mechanical, fluidic or electrical assemblies, for example: <ul style="list-style-type: none"> • draining of condensation • cleaning of part support systems
Lubrication	Lubrication of a mechanical assembly, to be done manually with greasers, or when the necessary appliances are installed (grease lubricators, purging plugs, filler plugs, etc.) and other operations such as: <ul style="list-style-type: none"> • lubrication system reset in certain machine parts.
Replacement	Simple operations to replace at the scheduled intervals mechanical, fluidic or electrical machine parts that are more critical and subject to wear, for example: <ul style="list-style-type: none"> • filtering element replacement in the pneumatic system filters • replacement of part supporting, positioning or centring elements.

6.2.2 Revision

An “overhaul” is the group of operations that serve to determine and to assess the actual operating situation of a machine (or other technical equipment). For example, the overhaul includes the activities described in the following table:

OPERATION	DESCRIPTION
Functioning check	Operations to check the serviceability of a mechanical assembly/appliance. This may be carried out on the machine, or after the removal of the mechanical assembly/appliance, for example: <ul style="list-style-type: none"> • check on lubrication efficiency or the lubrication system on the machine • check on position detection systems (proximity switches, photocells, light barriers, safety limit switches on access doors) • check on strokes, correct movements and shifting of a mechanical assembly.
Check	Function checks regarding the condition of a mechanical assembly, for example: <ul style="list-style-type: none"> • check on pipe seals • check on wear of the guides • check on heating of motors or electrical parts • check on current draw of electric motors • check for irregular noises.



NOTE

Always compare the results of the overhaul with:

(A) – results of precedent overhauls to note the differences and check the stock of spare parts still available in the warehouse.

(B) – the nominal status of the assembly, to determine possible causes of flaws and take the opportune measures, such as repair or replacement.

6.2.3 Repair

“Repairs” are all those operations that serve to bring the machine back to its normal operating condition. For example, they include the activities described in the table below:

OPERATION	DESCRIPTION
Repair	<p>Operations to restore the operating conditions, or to replace a mechanical assembly or faulty, broken or worn machine parts, such as :</p> <ul style="list-style-type: none"> • raceways • movement transmission assemblies • detection or position measurement systems • fluidic actuators • proximity switches



NOTE

The frequency of repair operations is to be:

- A) according to the state of wear:
a repair operation is carried out after assessing the results of a preliminary overhaul, so as to avoid the mechanical assembly becoming damaged.
- B) Following a failure or deterioration;
an overhaul, during which the failure or the deterioration is determined, precedes the repair.

The repair is to be made after assessing the results of the overhaul.

6.3 HINTS CONCERNING MAINTENANCE

6.3.1 Cleaning the Machine



NOTE

machine is to be cleaned at regular intervals, following the frequency indicated in the maintenance schedule.



DANGER

Before starting any cleaning operation on the machine, cut-out and padlock all energy sources and lock the moving units in a safe position. Place the warning signboard "MACHINE BEING SERVICED – DO NOT POWER-ON" near the main switch.

The cleaning staff are not to remove guards and/or protection devices installed on the machine.



WARNING

The machine parts are to be cleaned with extreme care, removing dust and other substances such as excess oil or grease. It is recommended to use cleaning liquids that have good solvent properties and at the same time do not have a harmful effect on rubber gaskets and seals.

During these operations, the persons assigned to the job are to be provided with appropriate personal protection equipment (gloves, glasses) and are to use cloths and rags that do not fray.



WARNING

To clean delicate mechanisms, references and lubricated mechanisms, use only dry, soft cloths that do not fray, or flexible silk bristle brushes.



NOTE

With regard to the use of cleaning liquids, comply with the types and limits of use specified by the related standards in the machine user country.



DANGER

It is forbidden to use cleaning liquids/solvents that are not allowed in the system user country, or compressed air having a pressure over 0.2 MPa for cleaning operations.

Do not allow the persons to remain exposed for a prolonged period to the cleaning/solvent vapours. Use these liquids away from naked flames, ensuring that the environment is well ventilated.

Ignoring these precautionary rules could cause injuries to the personnel.

A series of general warnings follow that are to be observed during the cleaning operations.

- If, during the cleaning operations encrusted dirt that is difficult to remove with dry cloths or brushes is encountered, use an appropriate cleaning liquid or solvent that does not harm seals or rubber parts, that has a low toxic strength, that is not flammable and that is permitted in the country of the system user.
- Do not spray the cleaning liquid or solvent using pressurised bottles, since the volatility would non allow a satisfactory cleaning action and could generate vapours in the working environment; use well wetted soft cloths to obtain a better result and/or domestic type hand sprays.

Maintenance

- Avoid prolonged contact with cleaning liquids and solvents and do not inhale the vapours. Do not use near naked flames or heat sources. Make sure there is adequate ventilation in the area where they are used.
- During the cleaning operations, the operator is to be provided with appropriate personal protection equipment, such as overalls, glasses, gloves and shoes according to the jobs to be done.
- The cleaning is to be carried out with care, especially on guides and sliding parts; after these operations, spread a thin film of oil to protect against corrosive agents on these parts.

6.3.2 Lubrication Operations

Lubrication and use of oils

This system is not fitted with a centralised lubrication system, and as a consequence it is necessary to carry out certain checking operations and manual lubrication.

The correct use of appropriate lubricants considerably contributes to maximum output and fewer failures.

When handling lubricants, the following measures to protect health are most important:

- Only use the quantity of lubricant needed to lubricate the mechanism. Carefully dry off any surplus oil, grease or graphite with a cloth that does not fray.
- Too much lubricant can, at times be as harmful as an insufficient lubrication and jeopardise the machine functioning.
- Use only the recommended lubricants, or others with equivalent properties, and of a known and tested quality
- Avoid a long, excessive or repeated contact of the skin with lubrication products and do not inhale their vapours or fumes.
- Protect the skin by wearing appropriate clothes and protections (for example, overalls, glasses and gloves) or apply a protective product.
- If the skin comes into contact, wash with soap and abundant water or specific products.



DANGER

Lubricants are inflammable, follow the instructions indicated on the containers.

When disposing of waste lubricants, comply to the following environment protection regulations:

- Lubricants can contaminate water or the land. Therefore never pour lubricant products on the ground, in water or in drains or sewers. Infringement of these regulations can be prosecuted by law. When using lubricants always have on hand an oil agglomerate.
- Recover waste lubricants with care, separating mineral based products from those with a synthetic base. When disposing, respect the regulations in force regarding the disposal of waste oils.

The lubricants used are to have good emulsion stability and not change with age. They are not to corrode the material of the oil scrapers and joints, nor the paint.

It is most necessary to continue to use the same lubricants as used for the first filling.



WARNING

Never mix lubricants of different qualities, since their composition and the additives they contain are not the same. This rule is to be applied especially to mixtures of synthetic and mineral lubricants.

If it is foreseen that other lubricants will have to be used, check beforehand whether the two products are compatible. If in doubt, the lubricant used up to that moment is to be completely removed by washing the entire circuit.



WARNING

To avoid contamination risks, the lubrication procedures are to be performed paying attention to maintain absolute cleanliness.

6.3.3 Operations Connected to Long Stoppage Periods

If it becomes necessary to stop the system for a long period, the maintenance engineer is to prepare it following this procedure:

- Clean the machine sucking up any residual material or dirt.
- Spread the specific oil on the machined surfaces, the raceways and the sliding parts.
- Clean and dry all other painted surfaces of the machine.
- Run the machine briefly once a week and, before starting up, check there are no signs of rust on the raceways.

6.3.4 Screw Tightening Torques

During the maintenance procedures it is often necessary to use a torque wrench to tighten steel screws of different types and dimensions.

The following tables indicate, according to the strength of the material and the size of the screw, the maximum torque value to be used.

TIGHTENING TORQUES FOR STEEL SCREWS WITH ISO COARSE PITCH THREAD

SCREW NOMINAL DIAMETER	MAX. TORQUE Ma (kgm)			
	6.6	8.8	10.9	12.9
M4x0.7	0.17	0.31	0.43	0.52
M5x0.8	0.33	0.6	0.84	1.01
M6x1	0.58	1.03	1.46	1.75
M7x1	0.94	1.69	2.36	2.83
M8x1.25	1.39	2.48	3.49	4.19
M9x1.25	2.05	2.67	5.18	6.17
M10x1.5	2.83	4.97	7	8.37
M12x1.75	4.74	8.46	11.9	14.3
M14x2	7.54	13.46	18.92	22.7
M16x2	11.5	20.4	28.8	34.6
M18x2.5	16	28.4	40	48
M20x2.5	22.2	39.6	55.6	66.6
M22x2.5	30	53	74.5	90
M24x3	39	70	98	117
M27x3	56	101	142	170
M30x3	77	138	193	232

Maintenance

TIGHTENING TORQUES FOR STEEL SCREWS WITH ISO FINE PITCH THREAD

SCREW NOMINAL DIAMETER	MAX. TORQUE Ma (kgm)			
	6.6	8.8	10.9	12.9
M8x1	1.48	2.6	3.7	4.4
M10x1.25	2.9	5.2	7.3	8.7
M12x1.25	5.3	9.1	12.8	15.4
M12x1.5	5	8.9	12.5	15
M14x1.5	8	14.3	20	24
M16x1.5	12	21.5	30	36
M18x1.5	17.4	31	43	52
M20x1.5	24.4	43	61	73
M22x1.5	32	57.5	80.5	97
M24x2	41	76.5	103	124
M27x2	60	107	150	180
M30x2	83	147	208	250

6.4 STOP PROCEDURE FOR MAINTENANCE

Before starting the maintenance procedures described in the next chapter, the operator has to stop the machine and set it in the safe maintenance condition.

Observe the following procedure:

- Prepare the system in the best condition to be able to resume operation without delays caused by faulty cycle conditions.
- Check for the presence of hanging loads and take the necessary precautions, to remove the correlated risk.
- Cut out all the machine power sources if required by the maintenance operations. In other cases take care not to act on other devices not mentioned on the maintenance chart.
- Place the signboard “MACHINE BEING SERVICED – DO NOT PUT IN MOTION – WORK IN PROGRESS DO NOT EXECUTE MOVEMENTS” near the main switches.
- Carry out the maintenance operations indicated on the related charts.
- After the maintenance operations, restore the energy sources previously deactivated.
- Before resuming the system normal operation, check the entire system again, as indicated in the start-up procedures contained in Chapter 5 “USE AND OPERATION”.

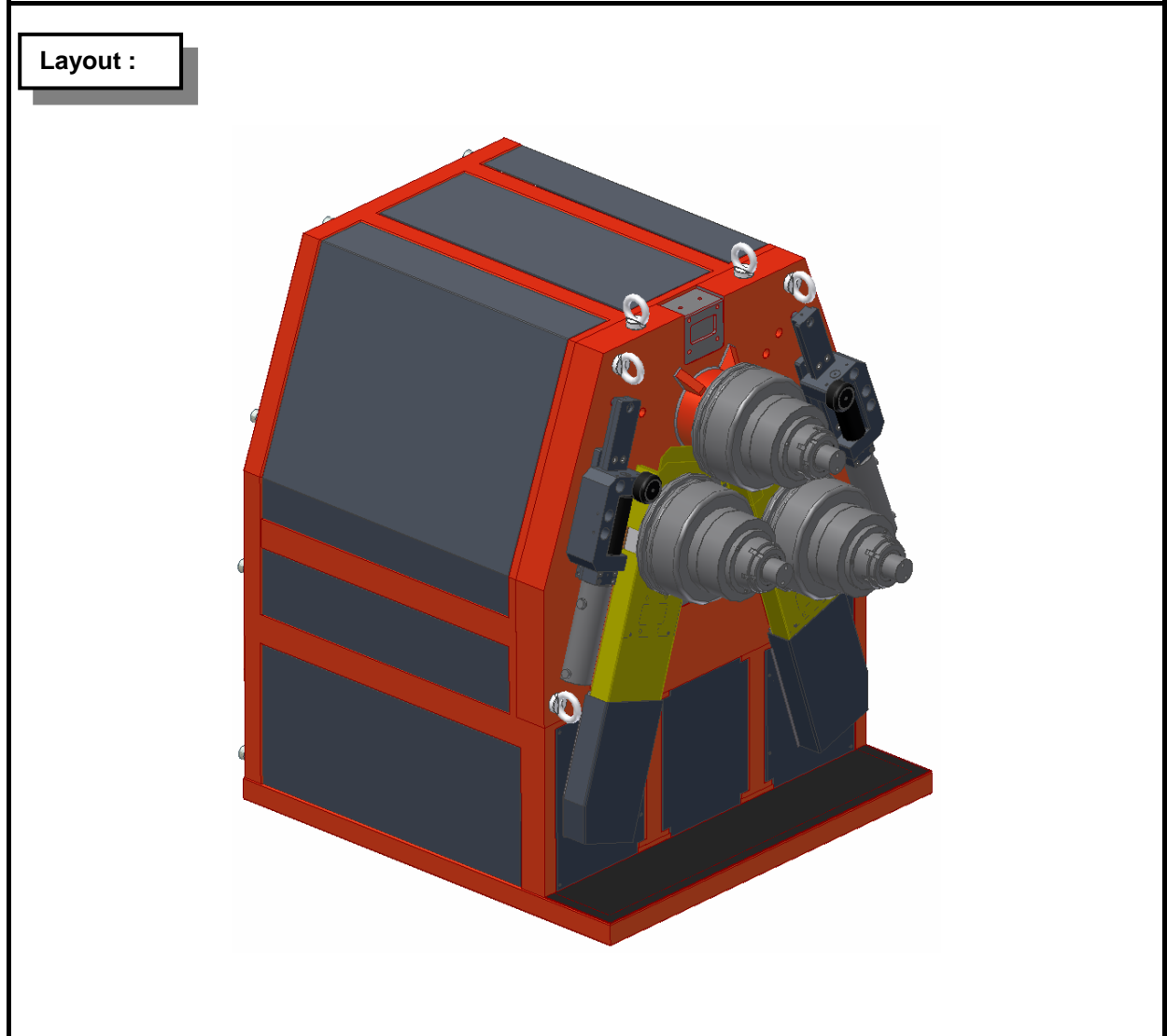
After carrying out any maintenance operation, check the correct operation of the machine running a few work cycles.

6.5 MAINTENANCE CARDS

N°	GROUP	OPERATION	FREQUENCY
1	Complete system	Cleaning	Every day
2	Complete system	Check emergency circuit	Every week
3	Complete system	Limit switch functioning check	Every month
4	Axis X feed reducer	Check lubricant level and top-up if necessary	Every month
5	Axis X feed reducer	Replace lubricant	Every years
6	Hydraulic power pack	Check oil level and top-up	Every month
7	Hydraulic power pack	Replace oil	Every two years

MAINTENANCE			CARD
<input checked="" type="checkbox"/> CLEANING	<input type="checkbox"/> LUBRICATION	<input type="checkbox"/> INSPECTION	NR. 1
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	<input type="text" value="Bending machine ALPHA 100"/>		
Group :	<input type="text" value="Complete system"/>		
Operation :	<input type="text" value="Cleaning"/>		
Operator :	<input type="text" value="1"/>	Every :	<input type="text" value="Every day"/>





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.

Read carefully the "SAFETY PRECAUTIONS" section.

The cleaning of the machine is fundamental to keep the system in efficient running order, avoiding damage that could be serious, such as seizing and breakage of sliding parts, that would call for extremely onerous repair operations.

For this purpose the system is designed paying particular attention to the use of dust shields and casings, to avoid that dross, chips and other damaging elements penetrate into the sensitive and easily damaged guards.

In any case, on these guards and on exposed parts that cannot be protected by a fixed guard, accurate cleaning operations are fundamental.

Clean all the indicator and alarm warning lights, as well as the viewing and positioning displays, to ensure an excellent visual control of the system operation.

Carefully clean all the system parts, paying special attention to the machine working zones.

For this operation use a brush or a small broom to remove the larger dross particles, taking them toward the exterior of the machine, away from the moving parts, then use a vacuum cleaner to remove the dross, taking care not to push it into the machine.

After cleaning, carefully clean the floor around the work zone and remove any oil, chips or other matter that could make the surfaces slippery.

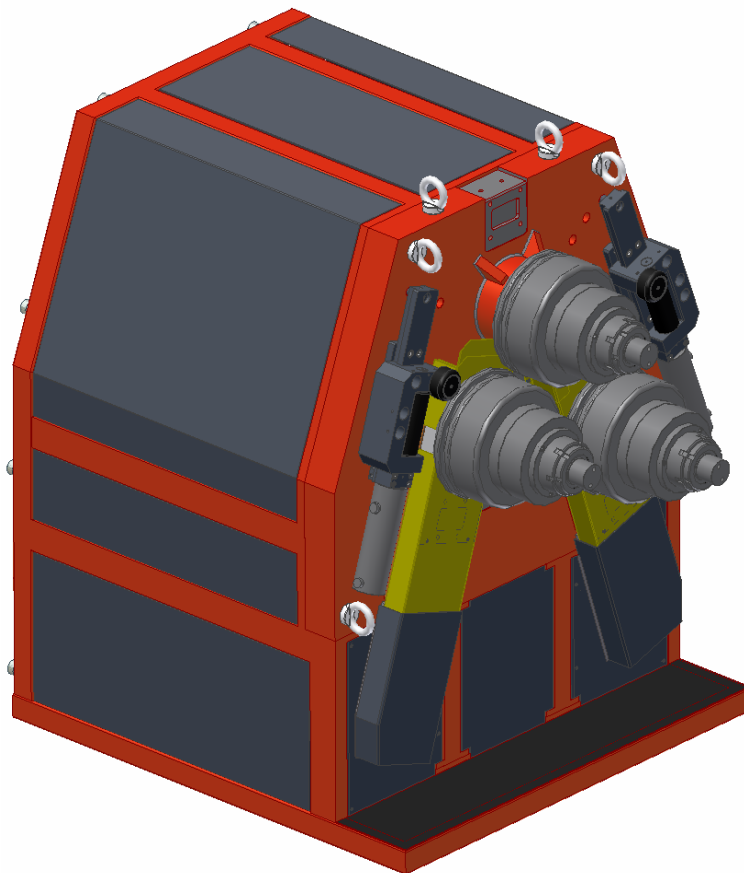


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MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input type="checkbox"/> LUBRICATION	<input checked="" type="checkbox"/> INSPECTION	NR. 2
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	Bending machine ALPHA 100		
Group :	Complete system		
Operation :	Check emergency circuit		
Operator :	1	Every :	Every week

Layout :





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.

Read carefully the "SAFETY PRECAUTIONS" section.

This type of control ensures the use of the system in absolute safety and tranquillity, guaranteeing the safety of the operator.

On the control pedal unit there is a safety device actuator, that performs the same functions of a normal emergency device, although it does not have a mechanical lock in safety position.

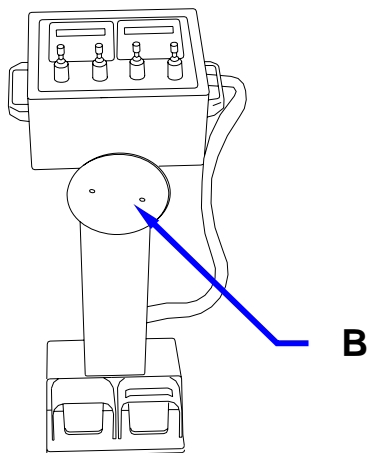
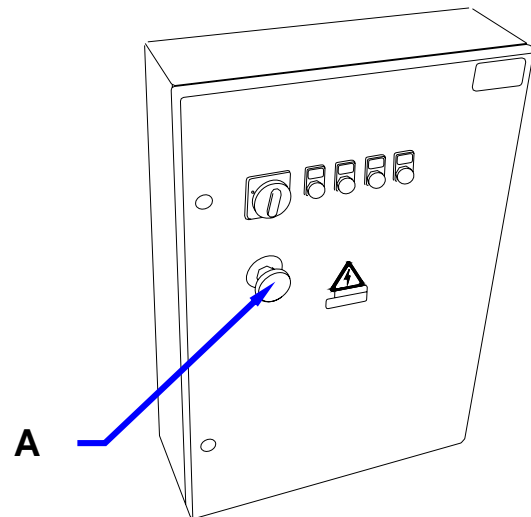
The check is to be made with the system running, therefore pay maximum attention to the motion of the machine and its components.

After approaching the emergency device on the electric cabinet (**A**) (or the safety actuator on the control pedal unit (**B**)), start the rotation of the rolls.

Activate one of the two emergency stop devices and make sure that the moving parts stop immediately.

Reset the emergency pushbutton; keeping the driving rolls rotation actuator pressed, there should be no movement of moving components.

Switch off the machine from the main switch, then restore the energy sources, following the system start-up procedure.



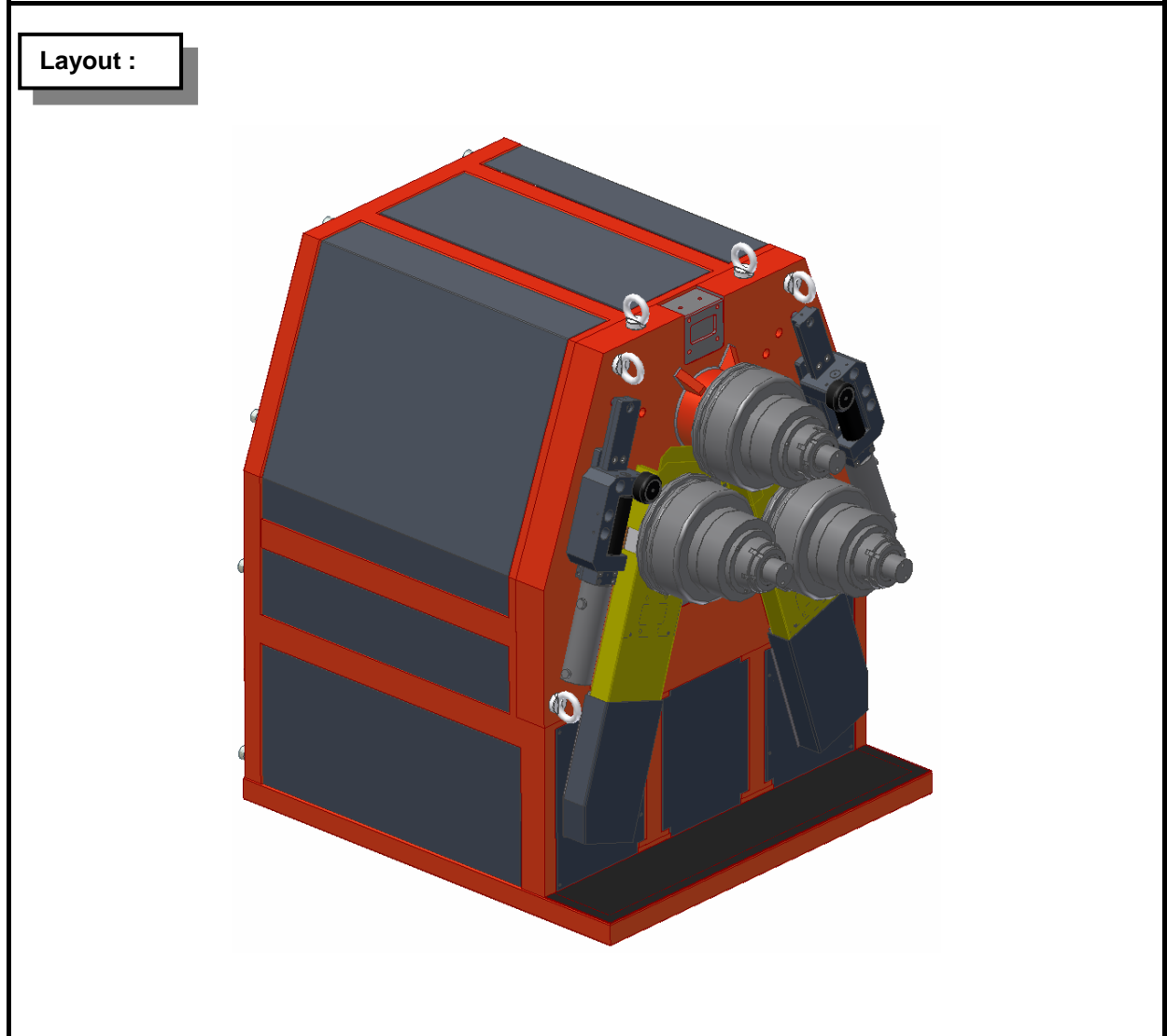
WARNING

If failures or malfunctioning of the emergency circuit are detected, contact the TAURING S.p.A. After Sales Service immediately.

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MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input type="checkbox"/> LUBRICATION	<input checked="" type="checkbox"/> INSPECTION	NR. 3
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	<input type="text" value="Bending machine ALPHA 100"/>		
Group :	<input type="text" value="Complete system"/>		
Operation :	<input type="text" value="Limit switch functioning check"/>		
Operator :	<input type="text" value="1"/>	Every :	<input type="text" value="Every month"/>





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

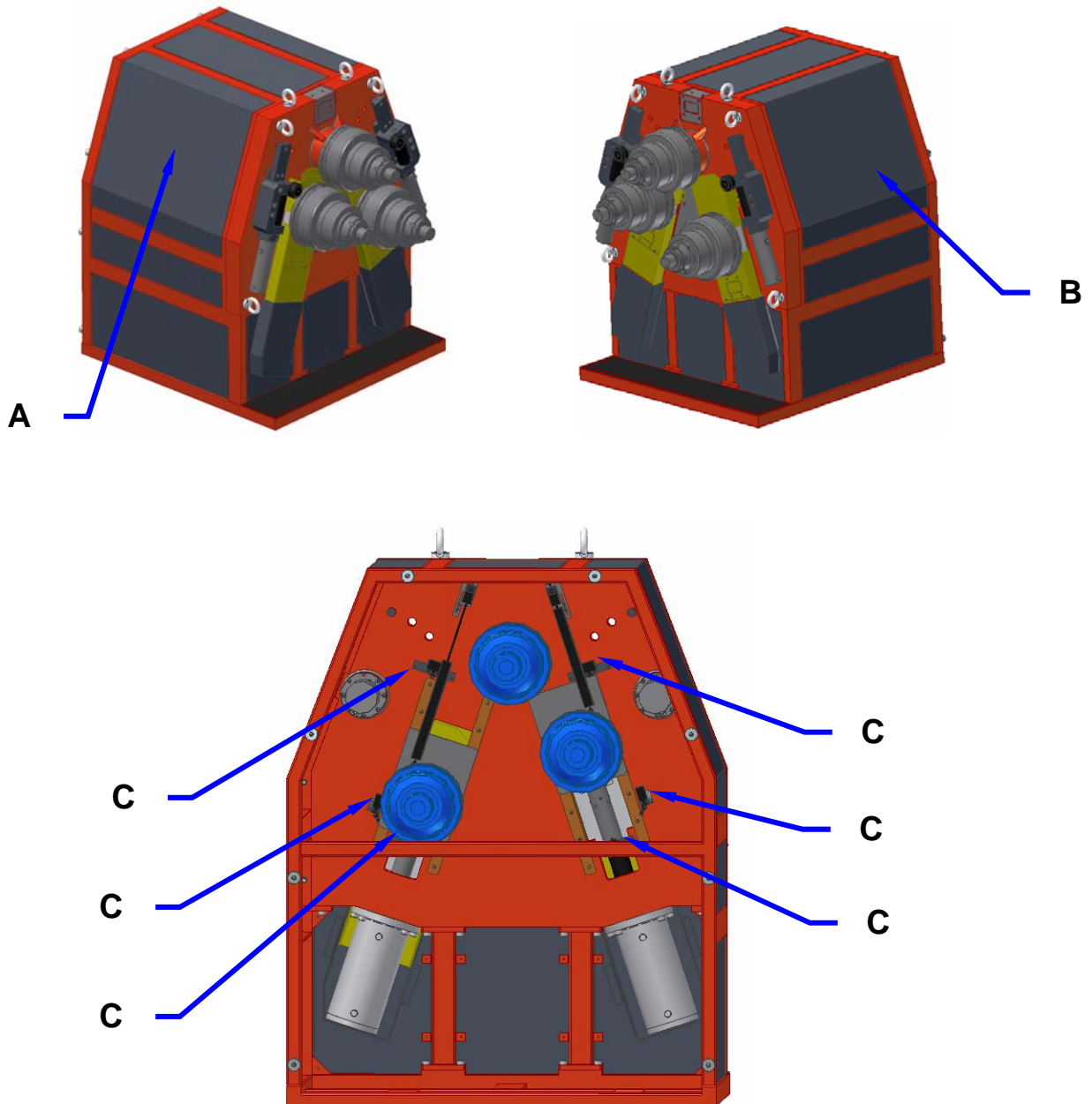
The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.

Read carefully the "SAFETY PRECAUTIONS" section.

This type of control ensures the maximum efficiency in the use of the system.

After removing the side panels (left **(A)** and right **(B)**) check the correct tightness of the limit switch securing screws **(C)** and if necessary tighten them completely.



Check the efficiency, checking that the mechanical limit switch cam acts correctly on the pushbuttons and that the system reacts according to the foreseen modes and frequency. If necessary, adjust the cam and/or the position of the mechanical limit switch.

Maintenance

Visually check for wear on the limit switch pushbuttons or wheels. If necessary, replace.

To replace the limit switch, activate the mobile device with the cam(s) in position to free all the limit switch pushbuttons. Remove the electrical connections and take out the limit switch after unscrewing the securing screws.

Fit the new limit switch fully tightening the securing screws and restore the electrical connections.

Refit the left and right side panels.

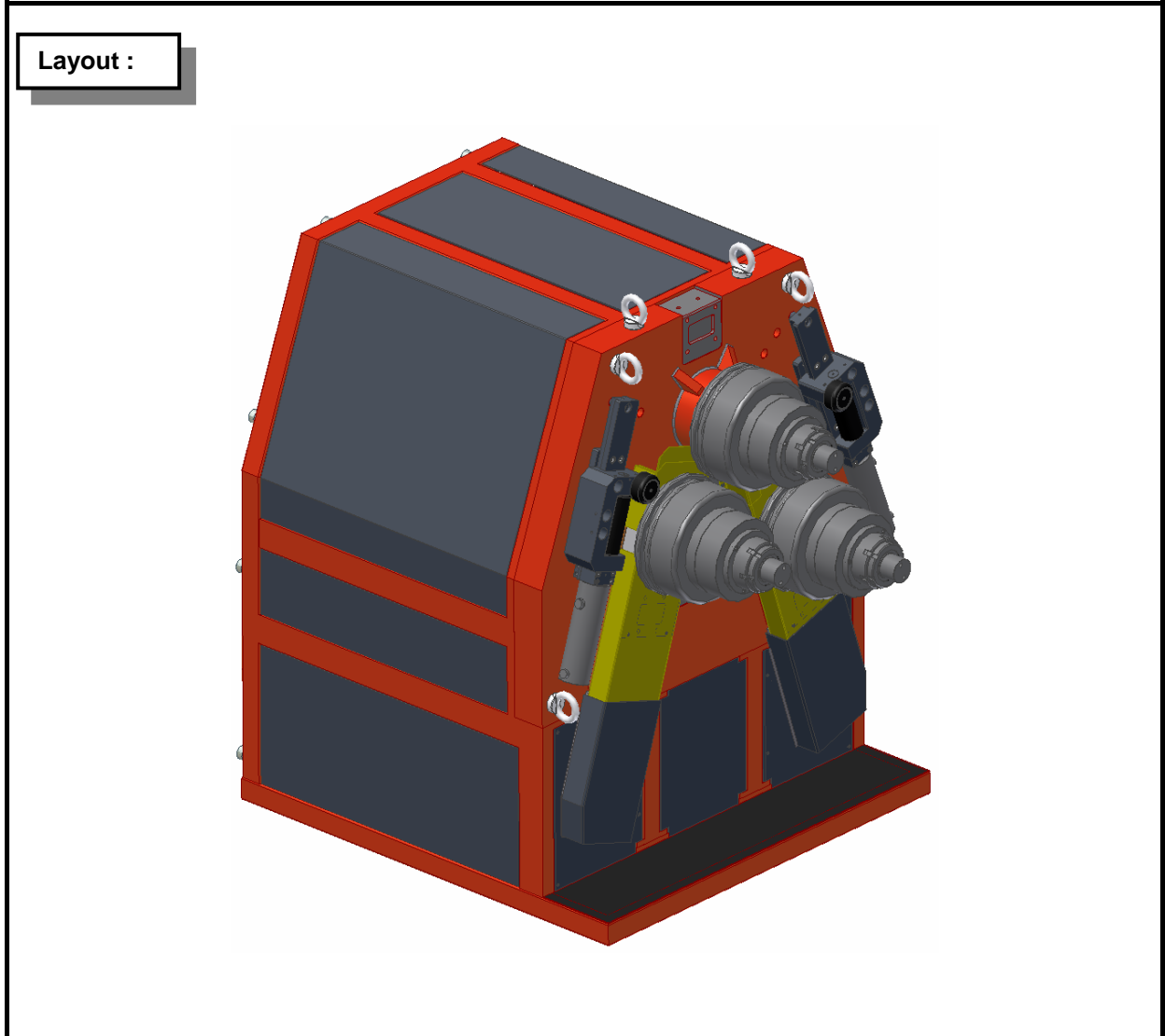


NOTE

After assembly, run the machine, checking that the limit switch is appropriately positioned and that the cams act correctly.

MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input checked="" type="checkbox"/> LUBRICATION	<input type="checkbox"/> INSPECTION	NR. 4
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	<input type="text" value="Bending machine ALPHA 100"/>		
Group :	<input feed="" reducer"="" type="text" value="Axis " x"=""/>		
Operation :	<input type="text" value="Check lubricant level and top-up"/>		
Operator :	<input type="text" value="1"/>	Every :	<input type="text" value="Every month"/>





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

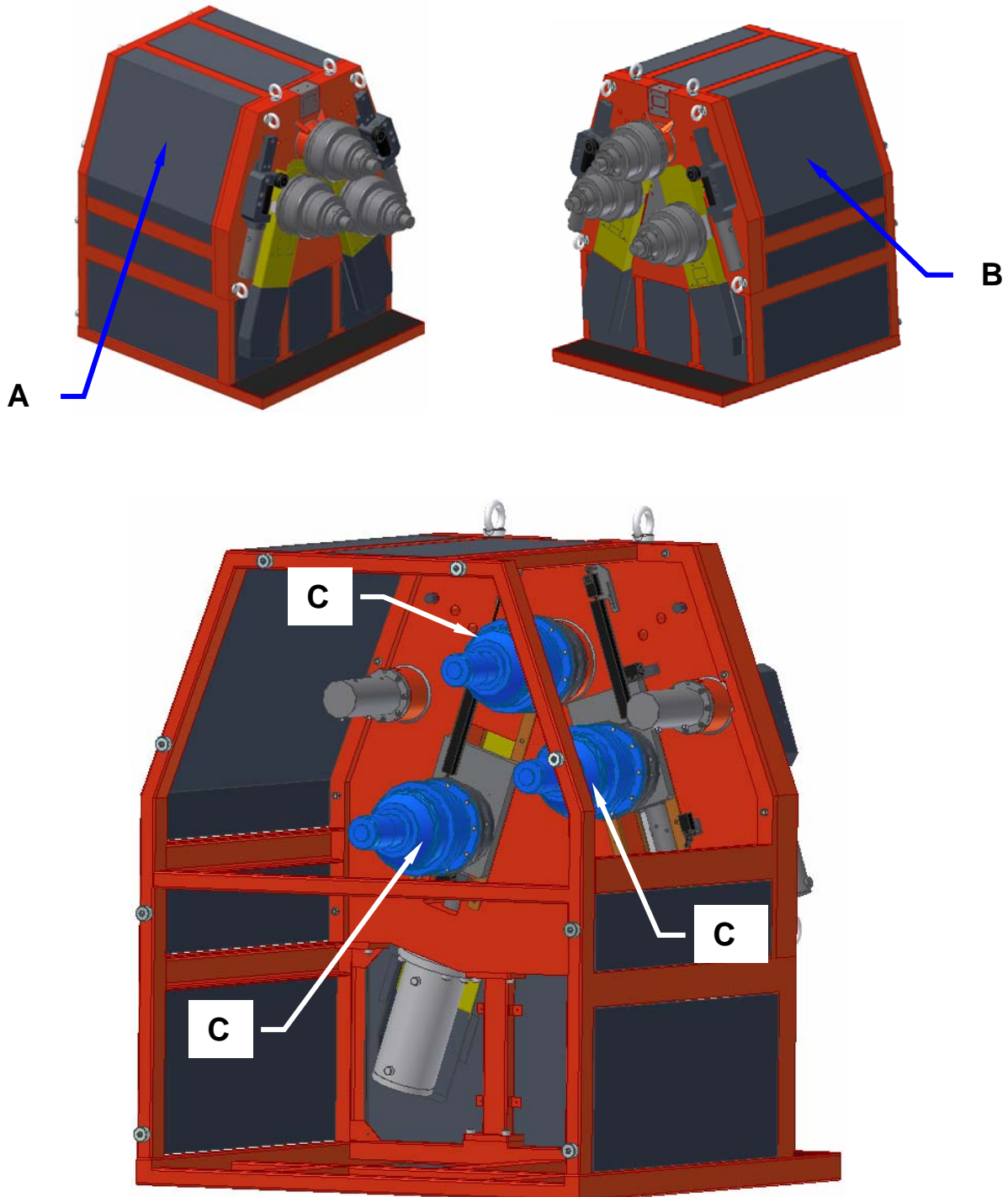
The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.


Read carefully the "SAFETY PRECAUTIONS" section.

The reducers that transmit the advance motion between the hydraulic motor and the driving shafts do not require any particular maintenance operations, except the checking and replacement of the oil used.



To check the oil level, remove the side panels (left (A) and right (B)) to have easy access to the reducers zone (C).



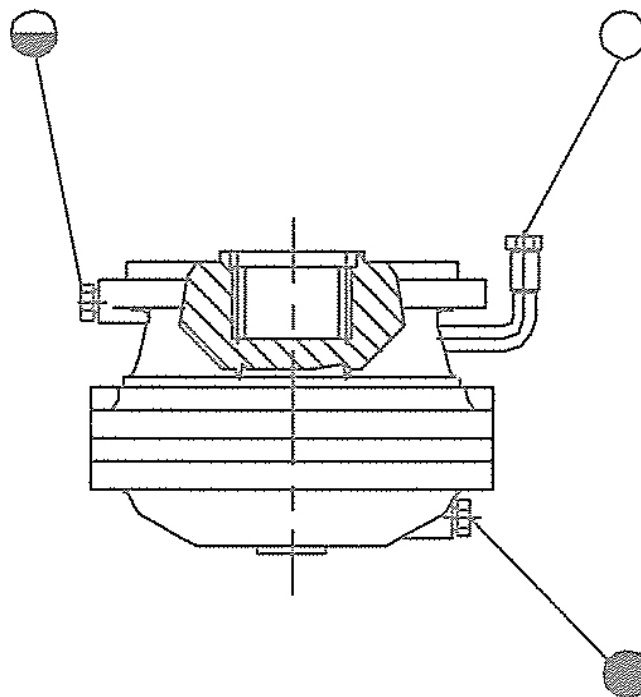
Maintenance

Unscrew the level plug  and check that the lubricant fills the reducer up to the height of the plug.

If the lubricant is at the correct level, close the plug and refit the panels.

If instead the lubricant is insufficient, top-up through the filler plug   with AGIP BLASIA 150.

After this operation, refit the plugs and protection panels.



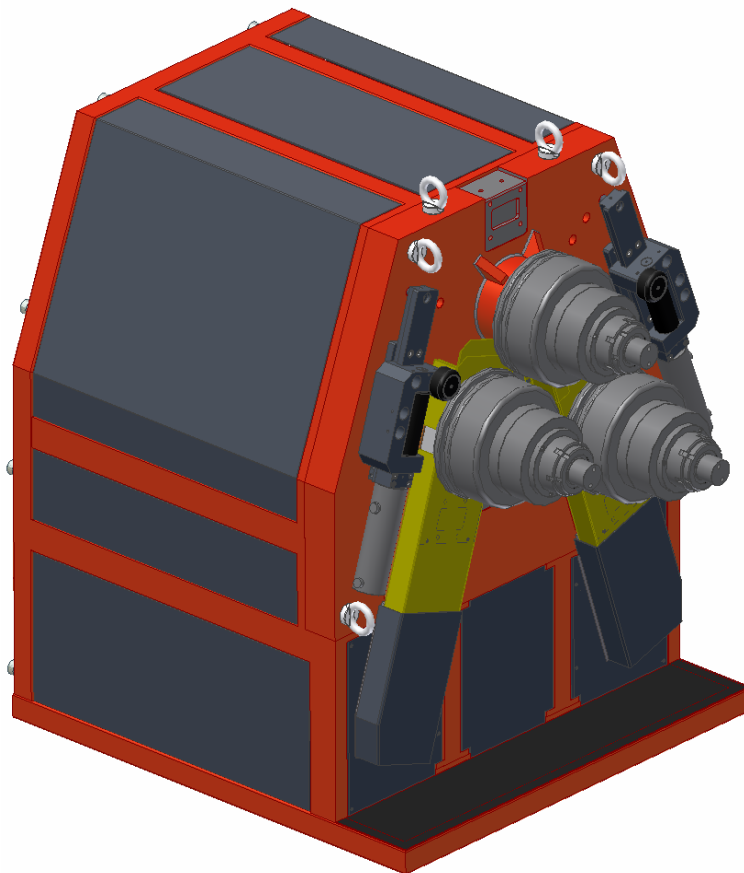
NOTE

After assembly, start-up the machine, checking that during normal operation the reducer surface temperature never exceeds 80 °C.

MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input checked="" type="checkbox"/> LUBRICATION	<input type="checkbox"/> INSPECTION	NR. 5
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	Bending machine ALPHA 100		
Group :	Axis "X" feed reducer		
Operation :	Replace lubricant		
Operator :	1	Every :	Every year

Layout :





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.



CAUTION - DANGER!

Be very careful when emptying the reducer.

Use the appropriate protection equipment.

The disposal of waste lubricant is to be carried out in accordance with current national standards in force.

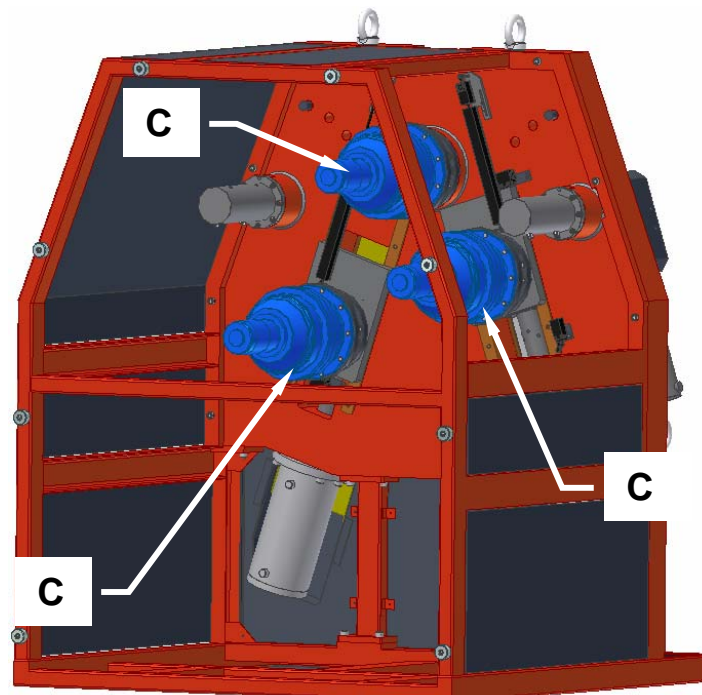
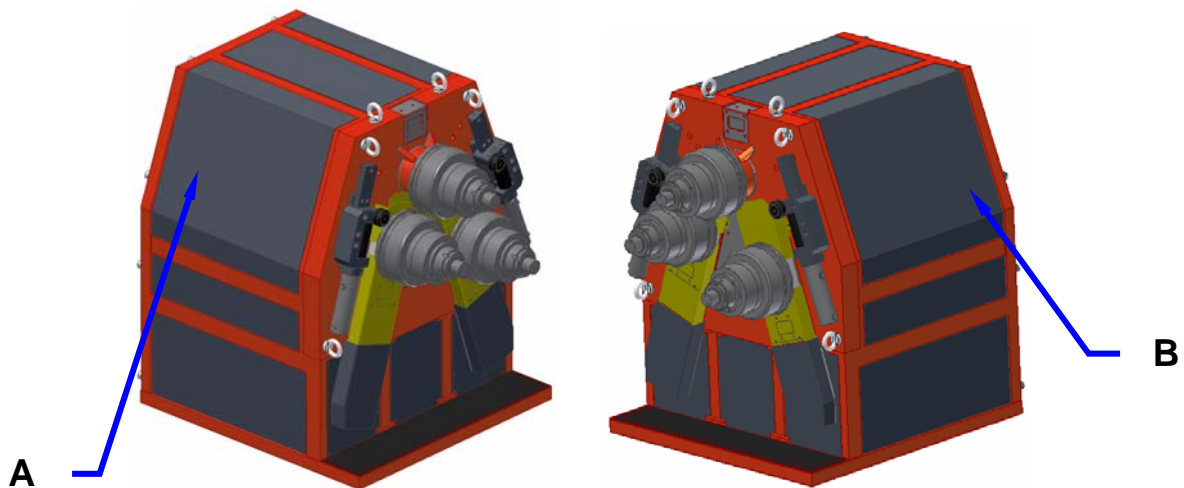
Do not mix different types of lubricants, whether of the same make or of different makes. Never mix mineral oils with synthetic oils.

Read carefully the “SAFETY PRECAUTIONS” section.


The reducers that transmit the advance motion between the hydraulic motor and the driving shafts do not require any particular maintenance operations, except the checking and replacement of the oil used.

The oil has to be replaced with the reducers still hot to avoid the depositing of sludge.

To replace the oil in the reducer, remove the side panels (left (A) and right (B)) to have easy access to the reducers (C).



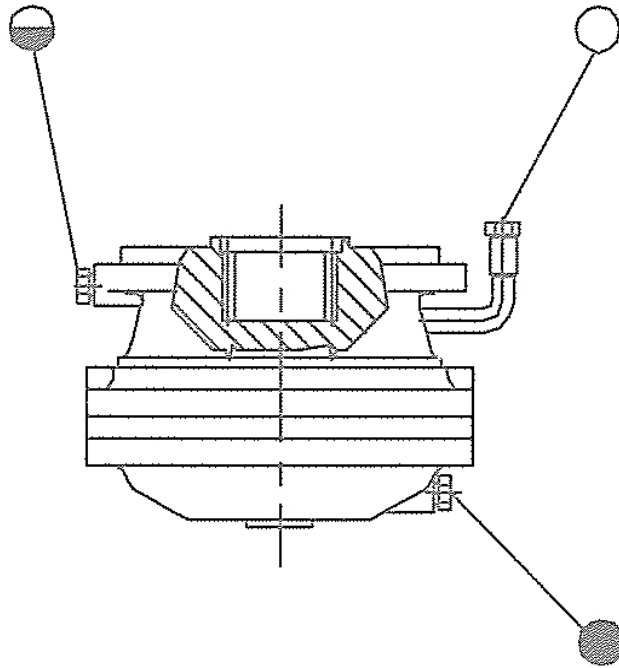
Maintenance

Unscrew the drainage plug  , on the lower part of the reducer, collecting the oil in a container able to contain approx 3 litres of oil.

Flush inside the reducer with a liquid detergent recommended by the lubricant manufacturer.

Top-up through the filler plug  with AGIP BLASIA 150 oil or equivalent.

Check through the side level plug  the quantity of oil introduced (approx 2.6 liters).



Clean the removed plugs from any dross or impurities, then screw them firmly in their housings. Refit the protection panels.



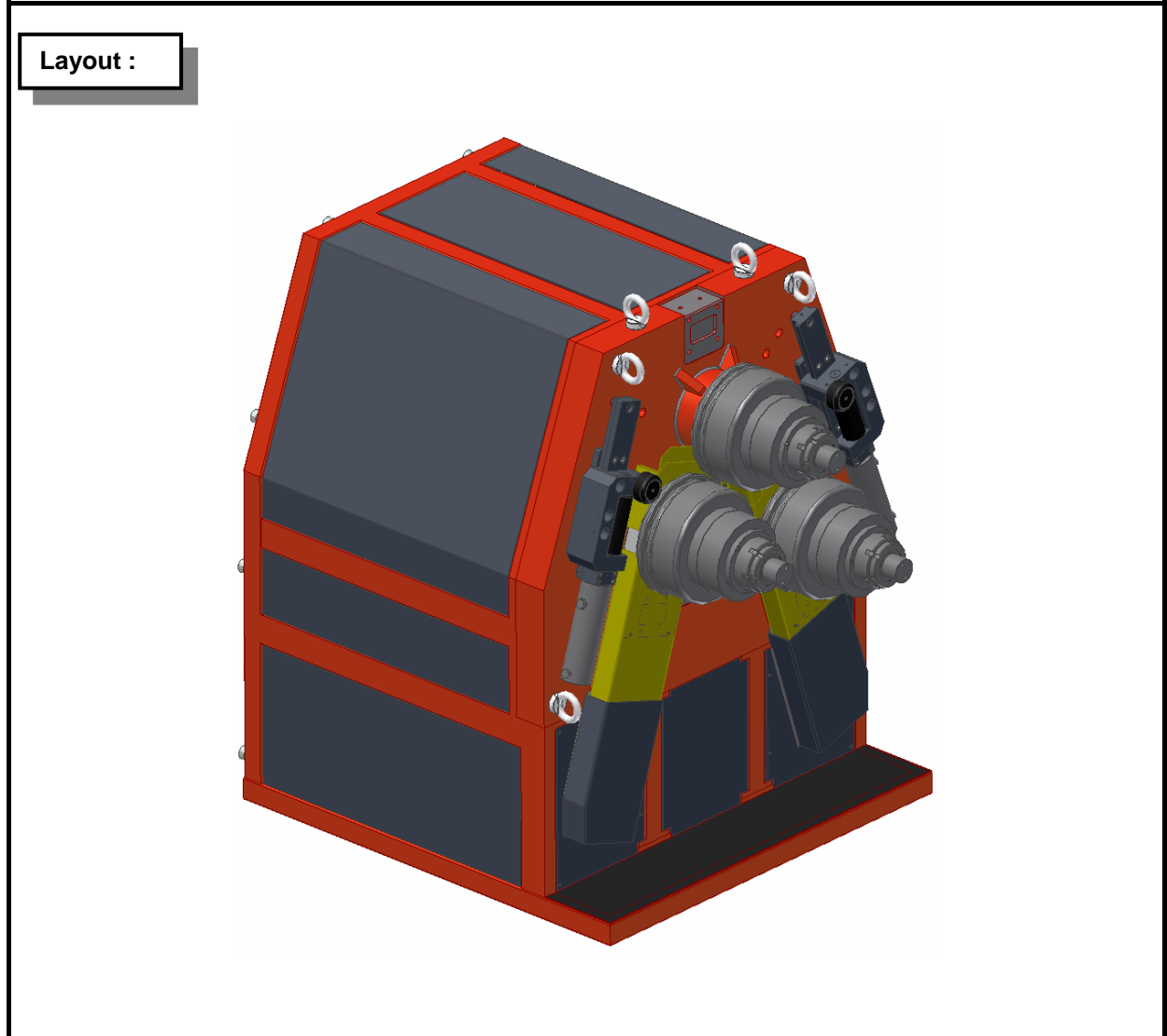
NOTE

After about a week of operation, check the oil level and if necessary top-up, checking that the temperature of the reducer external surfaces never exceeds 80 °C during operation.

If the machine works in overturned position, the reduction units have to be filled to a higher level, with approx. 5.2 litres of oil.

MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input checked="" type="checkbox"/> LUBRICATION	<input type="checkbox"/> INSPECTION	NR. 6
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	Bending machine ALPHA 100		
Group :	Hydraulic power pack		
Operation :	Check oil level and top-up		
Operator :	1	Every :	Every month





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

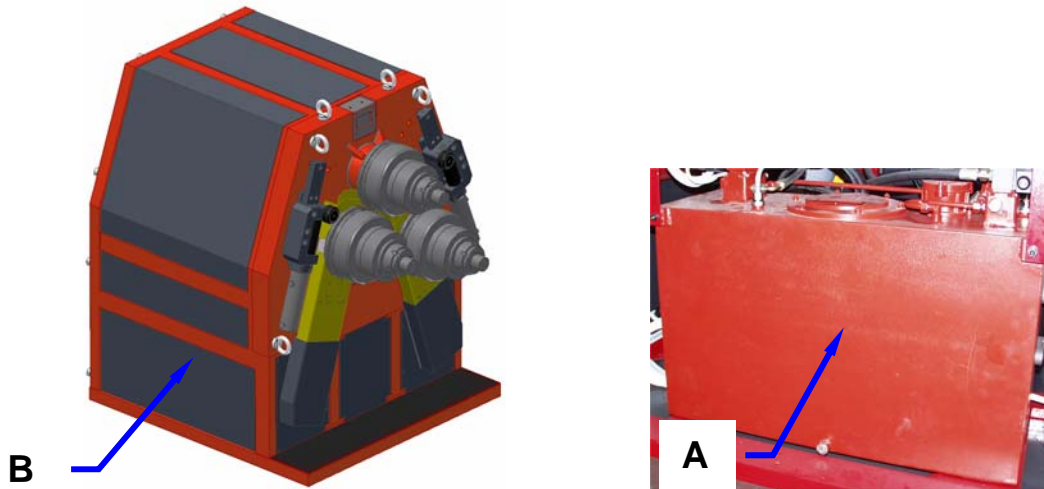
The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.

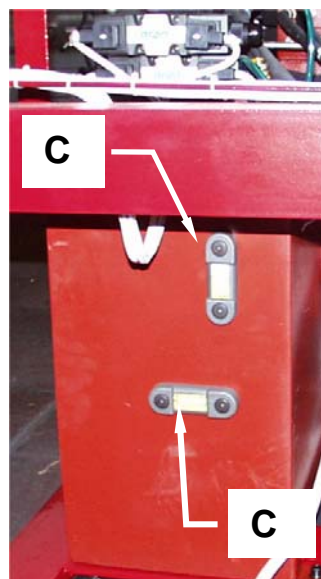
Read carefully the "SAFETY PRECAUTIONS" section.

The check on the oil contained in the hydraulic power pack is to be made regularly, so as to ensure that the various moving components always function correctly.

To check the hydraulic power pack oil level (A) remove the left side panel (B).

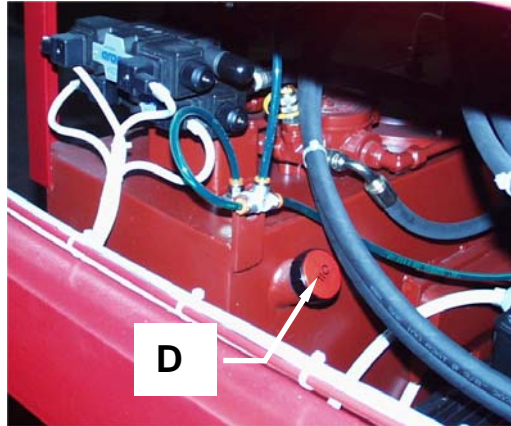


Find the level indicator (C) on the side of the hydraulic power pack.



Maintenance

Check that the oil reaches the required level, i.e. at least half-way up the indicator. If it does not, top-up the hydraulic liquid to the correct level, using the filler plug (D).



Check the general condition of the system, checking that there are no air leaks from the fittings, the gaskets or the solenoid valve inlet and outlet tubes.

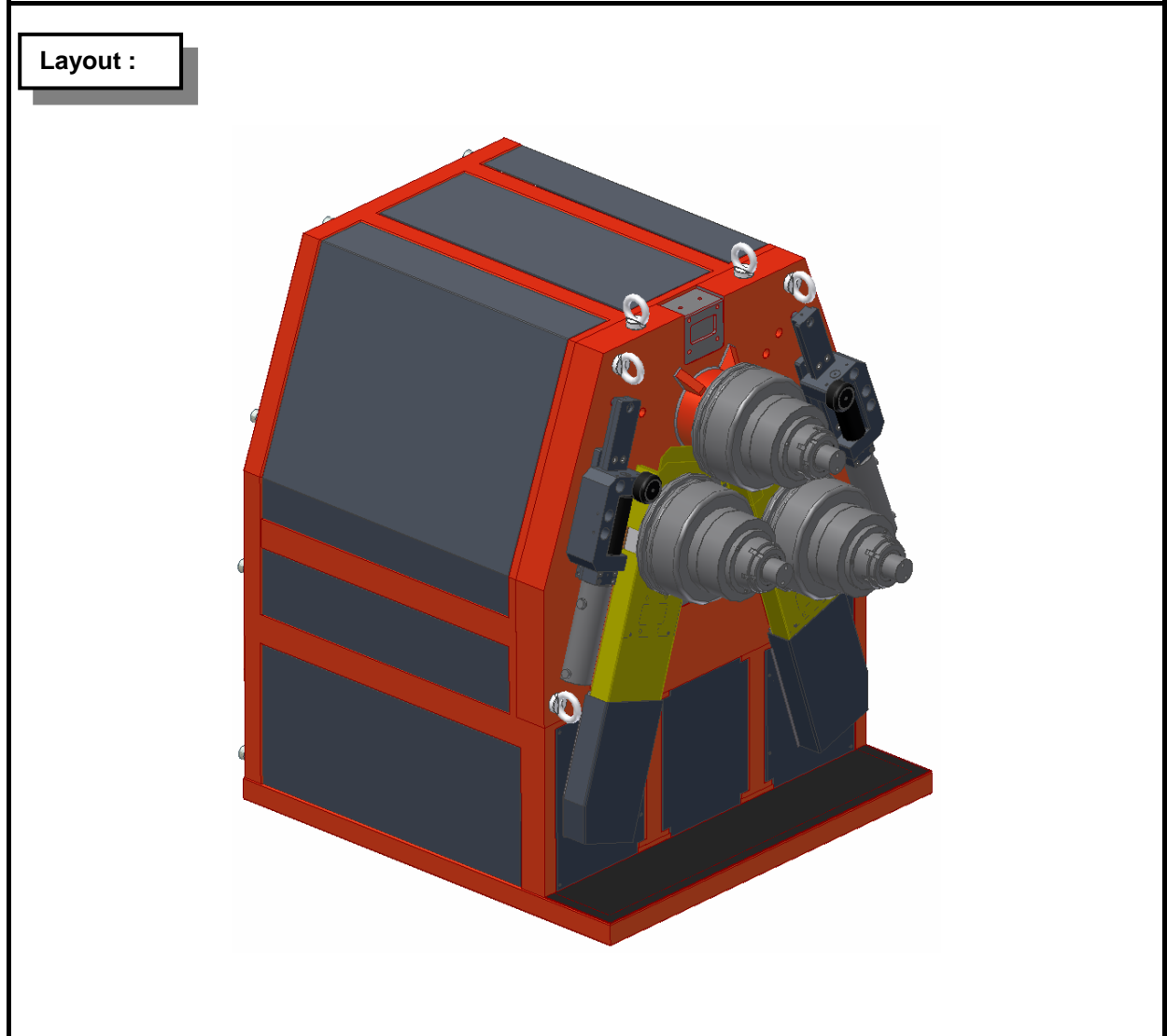
In the case of a pack assembly, check there are no leaks between one under-base and another.

If necessary tighten the fittings, and if the leak continues, replace the fitting/nozzle.

Check also that the solenoid valve control connector is correctly fastened to it.

MAINTENANCE			CARD
<input type="checkbox"/> CLEANING	<input checked="" type="checkbox"/> LUBRICATION	<input type="checkbox"/> INSPECTION	NR. 7
<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> MECHANICAL	<input type="checkbox"/> PNEUMATIC	

Name:	Bending machine ALPHA 100		
Group :	Hydraulic power pack		
Operation :	Replace oil		
Operator :	1	Every :	Every two years





CAUTION - DANGER!

Lock the main switch in the OFF position with the padlock after setting all the components in idle position.

Place the warning notice "MACHINE BEING SERVICED – DO NOT POWER ON" near the main switch.

Subsequently disconnect the safety devices.



CAUTION - DANGER!

The operator works in a hazardous environment. Therefore the following rules are to be followed.

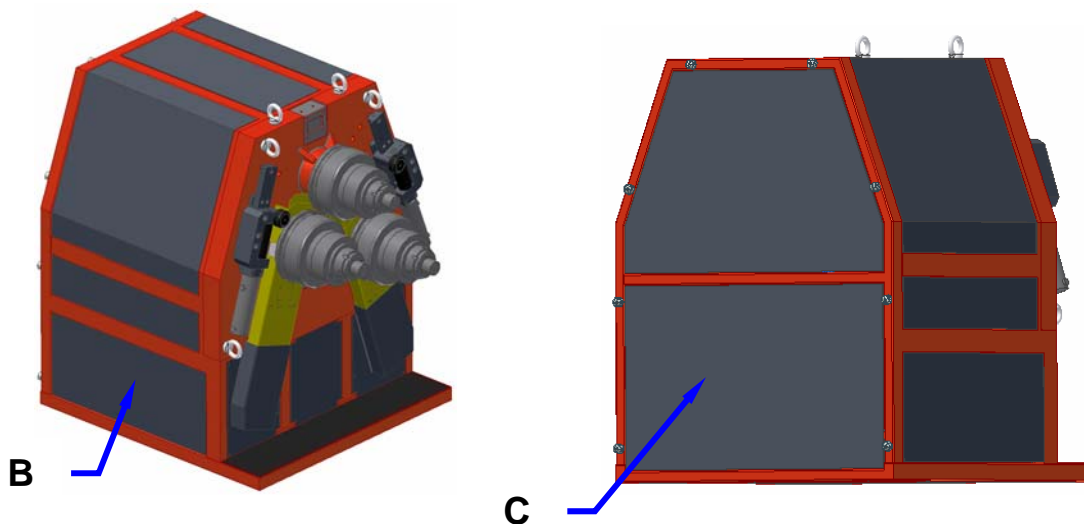
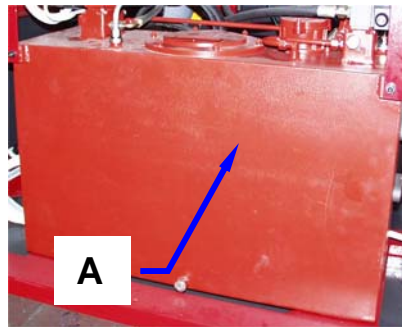
The persons authorised for the activity are to be informed of the procedures to be carried out and of every potential hazard to which they may be exposed during the operation, as well as the correct use of the safety devices installed on the system. The operator is to take care and work with caution.

The maintenance engineers, before starting the inspections and maintenance jobs are to deactivate the system and take all the necessary safety measures and precautions.

Read carefully the "SAFETY PRECAUTIONS" section.

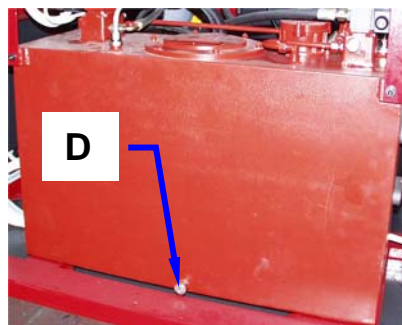
The oil in the hydraulic power pack is to be replaced regularly, so as to ensure that the various moving components always function correctly.

To replace the oil in the hydraulic power pack (A) remove the left side panel (B) and the rear panel (C).



Since the power pack contains approx 120 dm³ of oil, provide a collection container of an adequate capacity.

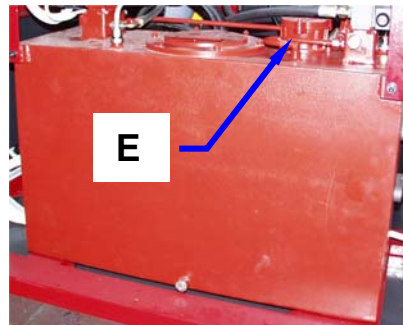
Unscrew the drainage plug (D) on the lower part at the rear of the hydraulic power pack to allow the oil to flow out from the reservoir.



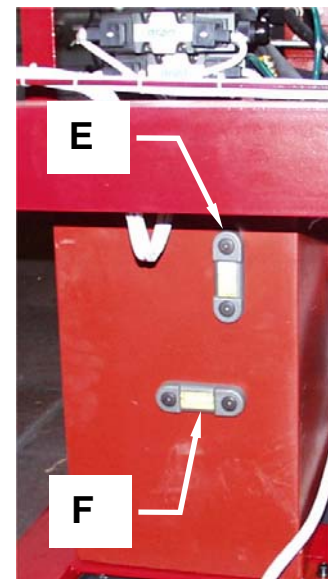
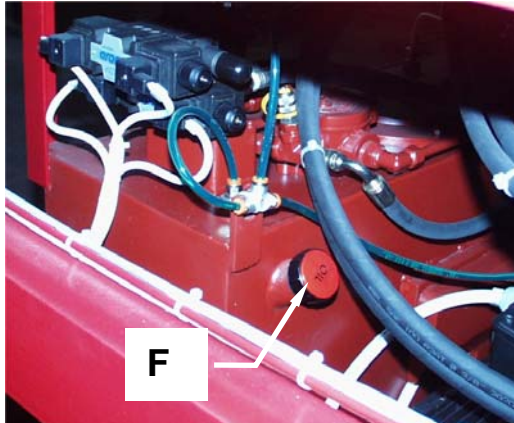
Maintenance

After the complete outflow, carefully clean the drainage plug applying Teflon to the plug thread before fully tightening it into its housing.

Remove the oil drainage filter (E) and replace with a new one having the same characteristics.



Fill the reservoir (through the filler plug (F) with approx 120 dm³ of oil, or in any case to reach the necessary level, at least half-way up the level indicator (G) on the side of the hydraulic power pack.



■