

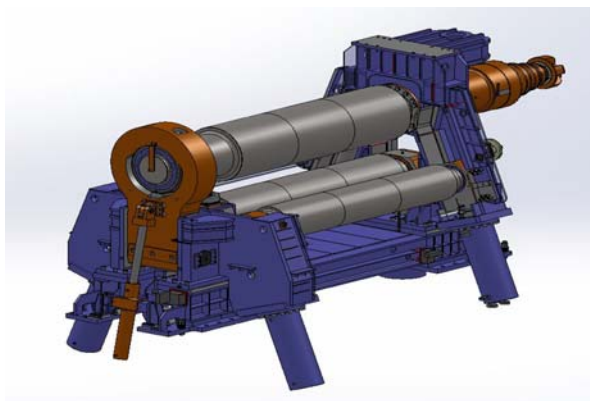


**HYDRAULIC 3 - 4 ROLLS BENDING MACHINES
VERTICAL PLANTS
HYDRAULIC PRESSES
FLANGING MACHINE
SECTION BENDING MACHINES
BEVELLING MACHINES
SPECIAL APPLICATIONS**

BENDING MACHINE RIMI 4RV BULL

Type: 40-160

Serial Number: 2475



USE AND MAINTENANCE HANDBOOK

Original instruction

Sertom M. M. S.p.A.

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— SERTOM M.M. S.p.A. —



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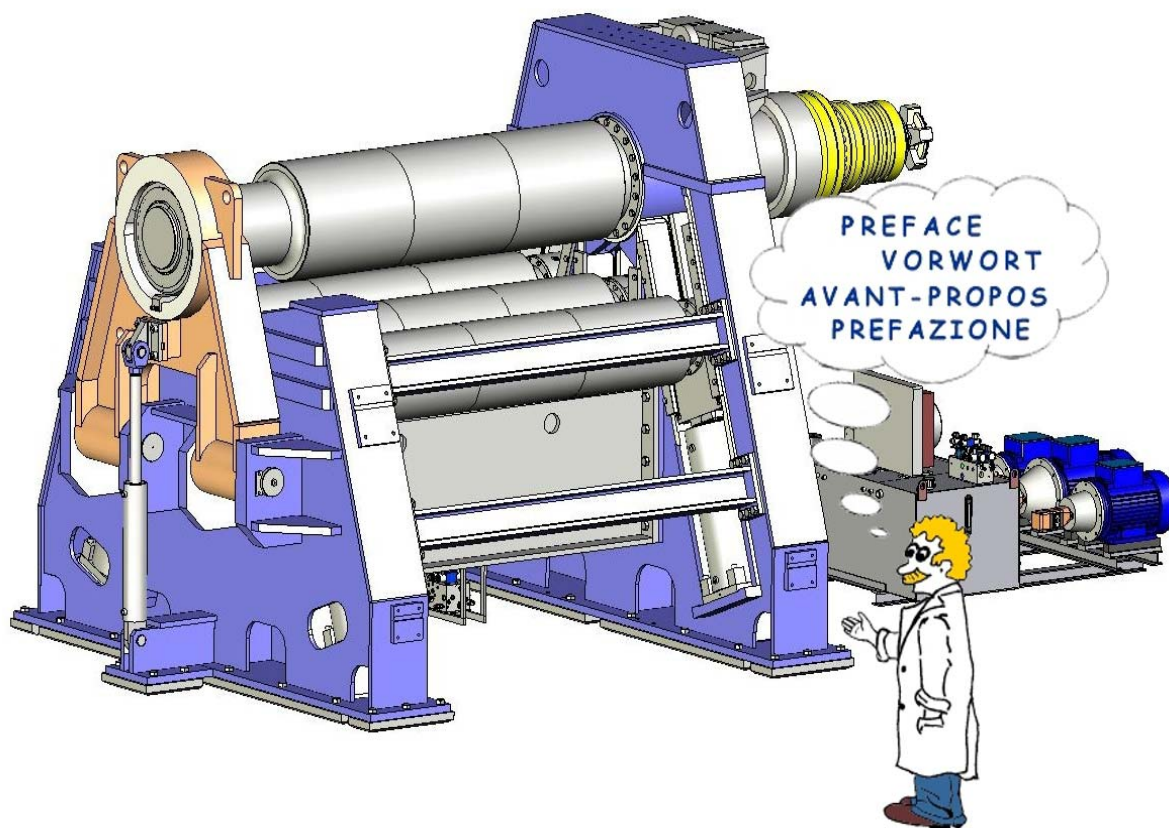
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chapter 2: PREFACE



-
- Certificate of origin.
 - Assistance.
 - Warnings.
 - Responsibility and guarantee.
 - User's handbook composition.
 - Symbols and definitions used in this handbook.
-





2.1 CERTIFICATE OF ORIGIN

- ◆ **DENOMINATION:** Bending machine RIMI 4RV Bull
- ◆ **TYPE:** 40-160
- ◆ **MANUFACTURER:** **Sertom M.M. S.p.A.** - Collebeato - BRESCIA -Italia-
- ◆ **SERIAL NUMBER:** 2475
- ◆ **WORKING PRESSURE:** 28000 kPa
- ◆ **CLOSING FORCE:** 33500 kN
- ◆ **WEIGHT OF MACHINE:** 311 ton
- ◆ **RATED VOLTAGE:** 400 V
- ◆ **FREQUENCY:** 50 Hz
- ◆ **Nr. PHASES:** 03
- ◆ **BREAKING CAPACITY:** ref. electrical scheme
- ◆ **WIRING DRAWING:** Sertom 2475
- ◆ **RATED CURRENT:** 515 A
- ◆ **YEAR OF MANUFACTURE:** 2015

The marking data are reported in compliance with the Machine directive 2006/42/CE on the appropriate plate with grey background and written in black to be clearly visible in the Bending machine RIMI 4RV Bull command zone.

	
Sertom M.M. S.p.A. Via E. Mattei 16/b 25060 Collebeato [BS]	
MODELLO :	
MATRICOLA :	
POTENZA NOMINALE:	
MASSA COMPLESSIVA :	
ANNO DI COSTRUZIONE :	



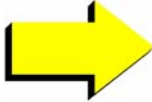
	Sertom M.M. S.p.A.		
	Via E. Mattei 16/b 25060 Collebeato [BS]		
TENSIONE : V			
N° FASI : FREQUENZA : HZ			
CORRENTE NOMINALE : A			
POTERE DI INTERRUZIONE: KA			
NUMERO DI SERIE :			
SCHEMA ELETTRICO :			

This plate is at the inside of the main control cabinet.

	IT IS FORBIDDEN TO REMOVE THE EC PLATE AND/OR CHANGE IT WITH OTHER PLATES. SHOULD, FOR ACCIDENTAL REASONS, THE EC PLATE BE DAMAGED, DETACHED FROM THE MACHINE OR SHOULD THE VINCOLATING MANUFACTURERS SEAL BE MISSING, THE CUSTOMER IS OBLIGED TO INFORM Sertom M.M. S.p.A. .
--	---

The machine is supplied with Certification of type A as documented by EC CONFORMITY DECLARATION attached to this Instructions Handbook. (*)

For this reason, any modifications caused by accessories such as an extractor, lubricator, robot, belt conveyors, etc., becoming an integral part of the original machine, create a new machine which requires further and/or alternative safety and protection systems. Such modifications, not having been part of the original installation plan, render it necessary to re-verify everything for the purpose of a new EC certification by whomsoever has carried out same modifications and who is then considered, to all effects, to be the (new) manufacturer of the machine. Same new manufacturer will also be responsible for ensuring that the new plant conforms to the legislative rules in force regarding machinery safety measures.

	FOR THIS REASON, Sertom M.M. S.p.A. FORBID THE PRODUCTIVE USE OF THE MACHINE UNTILL THE WORKING CELL, WHEREIN THE MACHINE OPERATES, IS DECLARED IN COMPLIANCE WITH THE MACHINE DIRECTIVE 2006/42/CE AND WITH THE NATIONAL LAWS AND RULES IN FORCE. Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY REGARDING POSSIBLE DAMAGES OR INJURIES CAUSED TO THINGS OR PEOPLE DUE TO IMPROPER USE OF THE BENDING MACHINE RIMI 4RV BULL .
---	--

(*) Please see [Chapter 12.1 EEC DECLARATION OF CONFORMITY](#).



SERTOM M.M. S.p.A.

2.2 ASSISTANCE

The machine assembling, the setting-up and start-up must be carried out by specialised personnel with the supervision of the manufacturing company's technicians.



Ordinary maintenance on the machine must be carried out by qualified personnel.



Extraordinary maintenance must be carried out by specialised personnel with experience in the sector.



For any abnormal functioning, fault or breakage requiring particular interventions not specified in the use and maintenance manual it is necessary to contact the manufacturing company's specialised personnel.



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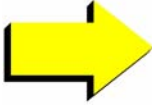
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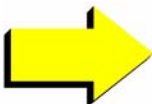
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SERTOM M.M. S.p.A.

	IMPROPER USE OF ALL OR PART OF THE SUPPLY, USE OF NON AUTHORISED SPARE PARTS, USE OF THE MACHINE BY UNQUALIFIED PERSONNEL, VIOLATE THE SAFETY REGULATIONS REGARDING THE ENGINEERING, CONSTRUCTION AND USE FORESEEN FOR THE SUPPLY AND Sertom M.M. S.p.A. CANNOT BE HELD RESPONSIBLE FOR ANY DAMAGES OR INJURIES CAUSED TO THINGS OR PEOPLE.
---	---

	MAINTENANCE ASSISTANCE OR MODIFICATIONS TO THE MECCHANICAL, HYDRAULIC, ELECTRICAL AND ELECTRONIC HARDWARE AND SOFTWARE PARTS CARRIED OUT BY OTHER COMPANIES RELIEVES Sertom M.M. S.p.A. FROM ANY RESPONSIBILITY FOR DAMAGES CAUSED TO PEOPLE OR THINGS.
---	---

Sertom M.M. S.p.A. is at your disposal to solve any problem related to the use and maintenance of the machine.

Before requiring the intervention of our technicians you need to carry out a complete and detailed analysis of the problem and of its possible causes; in details you must indicate:

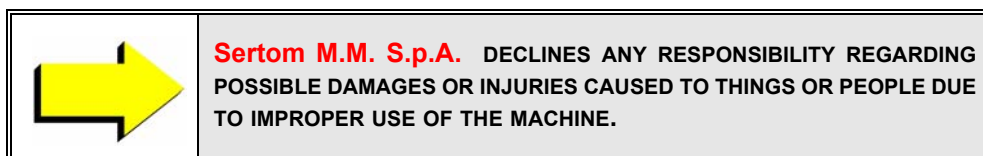
- the defects found in the machine;
- the checks carried out;
- the adjustments carried out and its results;
- any other information which could be useful.



2.3 WARNINGS

- 1) Bending machine RIMI 4RV Bull object of this Instruction Handbook was manufactured to carry out **the corrugated sheet iron or plate tube of corrugated sheet iron with the characteristics explained in this Instructions Handbook (Please see [Chapter 2.1.2](#)) according to the production capability of the machine.**

If the machine is used for any other purpose we consider this use non complying to the original destination.



- 2) **The Bending machine RIMI 4RV Bull described in this user's handbook has been projected and constructed in accordance with the essential safety requirements foreseen in the following directives:**

- ◆ EC Directive 2006/42 "Machine" and further updating;
- ◆ EC Directive 2004/108 "Electromagnetic compatibility" and further updating;
- ◆ EC Directive 2006/95 "Low tension" and further updating;
- ◆ EC Directive 97/23 "PED (Pressure equipment directive)" and further updating;

and made in according to the following harmonized norms:

EN 60204-1 Electrical equipment of machines.

EN ISO 12100:2010

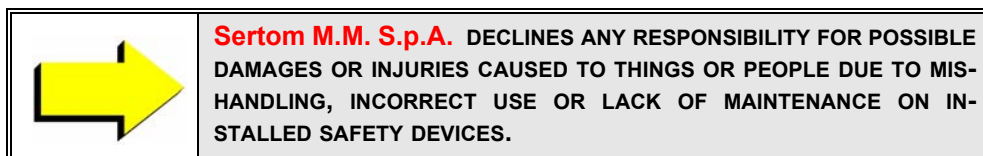
CEI EN 60204-1

UNI EN ISO 13857

UNI EN 349

This manual, which has been prepared in conformity to EC Directive 2006/42 "Machine" and further updating, UNI 10653, UNI 10893, CEI EN 62079, is meant to represent the USER'S AND MAINTENANCE HANDBOOK.

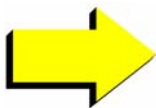
With the aim of operating in conditions bearing the maximum respect to existing regulations and to assure maximum working reliability to the user, **Sertom M.M. S.p.A.** has carried out the engineering of the machine in a way to eliminate all possible risks caused by its use, bearing in mind every interaction operator/machine for the foreseen uses and for its whole working life. Sertom has furthermore carefully chosen the materials and components to be used in constructing the same machine which, finally, before delivery, undergoes a complete inspection.



- 3) All the pictures and drawings in this handbook are aimed to supply a general idea with no particular regards to constructions details.



- 4) All maintenance interventions must always be carried out **by specialized personnel with the machine in a rest position and the working voltage off**. Maintenance personnel operating on the Bending machine RIMI 4RV Bull are called to work according to the instructions given in the user's handbook and as per the rules stated in safety and protection legislation.



Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY FOR POSSIBLE DAMAGE OR INJURY CAUSED TO THINGS OR PEOPLE DUE TO NON-OBSERVANCE OF THE INFORMATION CONTAINED IN THE USER'S HANDBOOK OR POSSIBLE MODIFICATIONS MADE BY THE CUSTOMER AND NOT FORESEEN BY THE PRESENT HANDBOOK, TO THE WORKING CYCLE AND MACHINE PARAMETERS AS ORIGINALLY ESTABLISHED.



2.4 RESPONSIBILITY AND GUARANTEE

2.4.1 RESPONSIBILITY.

2.4.1.1 CUSTOMER RESPONSIBILITY

As these machines operate with electric current, moving parts and with hydraulic circuits and/or pneumatics under pressure, the customer/user and his employees must observe a series of commitments and duties:

COMMITMENTS AND DUTIES OF CUSTOMER/USER	COMMITMENTS AND DUTIES OF OPERATORS
The customer is responsible for training and divulging this manual to all personnel operating with the machine. Then the user must be sure that operators and maintenance workers read, understood and learned the content of this Instructions Handbook.	Only qualified and opportunely trained personnel can carry out the start-up operation, enter machine parameters and extraordinary maintenance.
Installation, start-up, use and maintenance must be carried out exclusively by qualified personnel, expert and authorised by the customer, who has previously participated and received training by Sertom M.M. S.p.A. technicians .	Qualified operators authorised to operate on the machine and with adequate training regarding the existing rules regarding occupational safety must, before beginning work, consult this manual by carefully reading it and correctly interpreting it.
Whenever abnormal functioning, faulty safety protection systems or any possible hazardous situation arises and which the user is unable to autonomously eliminate, Sertom M.M. S.p.A. must be contacted as soon as the entity and causes of the problems have been established in accordance to the instruction in this user's manual.	Operators, authorised to use the machine and duly trained, must keep strictly to what written in this document, adopting, then, the safety specific rules to make each type of man-machine interaction free from risks complying with general accident-prevention rules provided for by European Union Directives and by the laws in force in the machine destination countries.
The customer, to comply with the safety conditions foreseen, must guarantee that the machine operates exclusively in working conditions as described in this manual.	Operators must notify any eventual deficiency and/or potential hazardous situation, which could verify.
Please remember that some consumable materials used on the machine become special waste materials when replaced and/or dismantled. They are therefore subject to controlled dismantling as foreseen in existing rules on the subject with which the user must comply.	
It is strictly forbidden for the user, operators and/or third parties (excluding Sertom M.M. S.p.A. authorised personnel) to carry out any modifications of any type to the machine or to its functions, as indicated in this technical document.	



2.4.1.2 MANUFACTURERS RESPONSIBILITY

Sertom M.M. S.p.A. constructs its machines with the maximum respect of existing safety regulations, with the aim of giving the user the maximum guarantee in carrying out all the foreseen operations, as well as the minimum possibility of accident and eventual residual risks occurrence.

2.4.1.3 NON ACCEPTANCE OF RESPONSIBILITY

Sertom M.M. S.p.A. points out that any eventual damage to people, to the machine, to the systems or to the environment caused by.

- ❖ Improper machine use by personnel not adequately trained;
- ❖ Use contrary to existing laws
- ❖ Incorrect installation;
- ❖ Serious deficiency in foreseen maintenance;
- ❖ Modifications and/or interventions not authorised or carried out by unqualified personnel;
- ❖ Tampering with safety devices;
- ❖ Use of non original spare parts or not specifically for the model;
- ❖ Partial or total non observance of these instructions;

cannot be attributed to **Sertom M.M. S.p.A.** and, consequently, conditions have been realized for the immediate:

- NON ACCEPTANCE OF CIVIL LIABILITY BY **Sertom M.M. S.p.A.** .
- CUSTOMER LOSS OF GUARANTEE.

2.4.2 GENERAL GUARANTEE TERMS

2.4.2.1 COVERING.

Sertom M.M. S.p.A. guarantees to the original buyer that Bending machine RIMI 4RV Bull comply with the specifications and does not present defects of materials or of fabrication.

As to terms and specific conditions of guarantee period please see the related sales contract

Sertom M.M. S.p.A. applies a guarantee to all components (see purchase order/contract) of its machines from the date of machine delivery. The guarantee includes supply and replacement free-of-charge of the faulty part.

The guarantee only covers components and not man labour costs.

As to intervention in guarantee period for which you need to send back to **Sertom M.M. S.p.A.** one or more components of the system, first contact After Sales Department of the company and get the written authorisation to the goods sending back.

All the expenses borne for shipment, taxes and duties, are at Buyer's charge.

Parts replace under guarantee condition become property of **Sertom M.M. S.p.A.** .

Components must be packed with care.

Sertom M.M. S.p.A. accept no responsibilities for components which are damaged during the transport due to improper packaging or to unsuitable manual operations.



The Buyer must immediately inform **Sertom M.M. S.p.A.** about any complaints during guarantee period. In no case **Sertom M.M. S.p.A.** will accept requests under guarantee conditions after seven (7) days from guarantee period expiry.

The guarantee above does not cover defects caused by:

- components or accessories, with their own guarantee, produced by other companies.
- improper or inadequate maintenance on behalf of Buyer.
- inadequate or deficient training of operators.
- modifications non authorised or improper use.

Sertom M.M. S.p.A. accept no responsibilities for products supplied by the Customer.

The obligations of **Sertom M.M. S.p.A.** are limited to repair or replacement, free of charge, of equipment which are defective during guarantee validity period. Systems sent to replace damaged parts can include refurbished parts.

Repaired or replaced parts are guaranteed only for the period of original guarantee.

Guarantee does not cover damage due to improper use, carelessness or accidents, or damage caused by installation, repair, or adjustment which were not specifically authorised in written form by **Sertom M.M. S.p.A.** .

2.4.2.2 LAPSE.

The guarantee automatically lapses in case of repairs, modifications or removal of components which have not been communicated and approved by **Sertom M.M. S.p.A.** , or machine improper use (see list previously indicated at preceding paragraph).

However, upon verification of technical inconveniences or machine incorrect operation during the period of guarantee, **Sertom M.M. S.p.A.** should be informed immediately.

2.4.2.3 TEMPORARY EXTENSION.

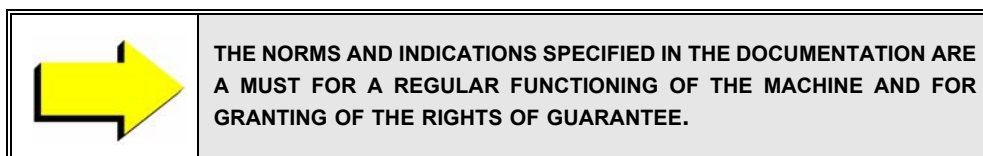
The period covered by guarantee expires one year after the date of machine delivery.

Sertom M.M. S.p.A. remains however at complete disposal for any inconveniences and/or malfunctioning of the machine which may occur.



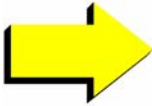
2.5 USER'S HANDBOOK COMPOSITION

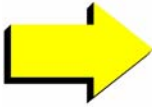
- This book constitutes the USER'S AND MAINTENANCE HANDBOOK of the machine in question. When the Bending machine RIMI 4RV Bull is inserted into a working unit, each machine of the unit or accessory installed on the machine has its own instruction handbook enclosed to the working unit documentation.
- This handbook constitutes, along with the instructions of each single plant component machine, a part of the entire plant's documentation.
Such documentation has to be always available for the personnel involved in commanding, conducting, programming and maintaining.



- This user's handbook, regarding the machine in question, is made up of the following separate sections:
 - ◆ Safety.
 - ◆ User's handbook for the machine use and maintenance, including optional accessories of **Sertom M.M. S.p.A.** manufacture, complete with technical documentation for the commercial parts and drawings in compatible form.
Each chapter of this handbook is self-contained and indicates all information required for the specific use as indicated in the title.
 - ◆ Electric and hydraulic drawing of the machine operating and other necessary documentation.
 - ◆ User's handbook for machine use and maintenance for externally supplied parts assembled on the machine.
- All the pictures and drawings in this handbook are aimed to supply a general idea and do not always give detailed information regarding the construction.
- Precise observance of the safety precautions indicated in the user's handbook is recommended, both during installation and during operation, servicing, repairing, and dismantling. As **Sertom M.M. S.p.A.** is fully aware that it cannot anticipate all the circumstances which could become hazardous, **Sertom M.M. S.p.A.** underlines the necessity of a constant checking on safety conditions.

- It is to be noted, however, that to use the machine in safe conditions, the user's handbook cannot, in any way, substitute adequate experience of the user. In fact, being daily use an important requisite in gaining experience regarding the correct operational use, this handbook is to be used as a reminder of the main operations to be carried out on the machine by personnel with suitable training.
- It is recommended that all safety precautions are read, understood, and carried out by all personnel and that these precautions become a normal part of their operation.
- This handbook must be kept with and duly used for the whole life of the machine, even when it is passed on to third parties. Further copies' s request of this document can be addressed, with the usual order requests to **Sertom M.M. S.p.A.** . To correctly preserve this handbook for long time it is recommended to:
 - ◆ Use it in a manner not to damage the contents. In particular do not leave the manual lying around when used and replace it in its place after consultation.
 - ◆ Do not remove, tear away or write over any parts of the document. Any manual parts replacement must be requested to the manufacturing company.
 - ◆ Keep the handbook in a dry area, away from heat or other environmental agents, which could damage it.

	Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY FOR POSSIBLE DAMAGES OR INJURIES CAUSED TO THINGS OR PEOPLE DUE TO NEGLIGENCE OR NON-OBSERVANCE OF REGULATIONS AND LACK OF PRECAUTIONS REGARDING SPECIFIC WARNINGS GIVEN IN THIS HANDBOOK.
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	THIS HANDBOOK IS EXCLUSIVE PROPERTY OF Sertom M.M. S.p.A. , CANNOT THEREFORE BE TAMPERED WITH, REPRODUCED EITHER PARTIALLY OR TOTALLY WITHOUT PREVIOUS AUTHORIZATION, OR HANDED OVER TO STRANGERS. THIS IS A DOCUMENT ISSUED AND SUPPLIED FOR A SPECIFIC JOB ORDER AND AN INTEGRAL PART WITH THE MACHINE, PERSONALIZED WITH THE SERIAL NUMBER AS TO BE RECOGNIZABLE AND TRACEABLE FOR FURTHER REFERENCE.
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2.6 **SYMBOLS USED IN THIS HANDBOOK**

All text and descriptions of particular importance for personnel safety and for correct machine use, including incorrect behaviour and relative commitments and warnings, are accompanied by an appropriate symbol illustrated hereunder, and used where necessary, in relative paragraphs.

DANGER SIGNS

These symbols indicate that the description is of utmost importance to guarantee operator safety and can give rise to a hazardous situation if the interventions are not carried out strictly in respect of the safety regulation.



Caution: lightening danger.

This symbol indicates that the description includes parts, which could cause electric shock.



Caution: lightening danger

This symbol indicates that the description includes parts, which could cause electric shock.



Caution: burns danger.

This symbol indicates that the description includes parts, which could cause thermal shock.



Caution: crushing danger.

This symbol indicates that the description includes parts, which could cause crushing or squashing owing to gear and transmission movement.



Caution: crushing danger.

This symbol indicates that the description includes parts, which could cause crushing or squashing owing to chain transmission movement.



Caution: crushing danger.

This symbol indicates that the description includes parts, which could cause crushing or squashing.



Caution: danger of contact with moving parts.

This symbol indicates that the description includes parts, which could cause contact risks with handling control devices.



Caution: suspended loads.

This symbol indicates that the description includes parts, which could cause crushing or squashing from fall of suspended loads.



COMPULSORY SIGNS

These symbols indicate that the description includes relevant important parts to guarantee operator safety and can give rise to a hazardous situation if the interventions are not carried out strictly respecting the safety regulations.



Compulsory use ppd.

All interventions described and marked with these symbols must be carried out wearing the suitable individual safety equipment.

Compulsory use of the sound proofing hood.

This symbol warns the operator that the sound proofing hood must be worn.

Compulsory use of protective systems.

All the operations described and marked with this symbol must be carried out with tightly closed shelters and protections and fixed with the supplied devices.

Compulsory use of earthing devices.

Before starting the operations described and marked with this symbol it is compulsory to check the unipotential connection efficiency.

It is compulsory to act with the machine at rest.

All maintenance interventions described and marked with this symbol must be carried out with the machine at rest, the electric power switched off from the control panel, any inserted keys removed and the main switchboard locked.

Compulsory locking of all closings .

All the operations described and marked by this symbol must be carried out only after having carefully checked the perfect locking of the closures.



PROHIBITED SIGNS

These symbols indicate that the description includes highly important parts to guarantee operator safety, which could become hazardous if forbidden intervention is carried out.



Do not repair or register during operation.

This symbol warns that it is strictly forbidden to carry out any maintenance with the machine in movement.



Do not use the machine with protections open.

This symbol warns that it is strictly forbidden to operate with moving protections and/or left open. The interested parts can present crushing or trapping risks.



Do not work with water jets.

This symbol warns that it is strictly forbidden to use water jets near electrical equipment.

WARNING SIGNS

These symbols indicate that the part described is of utmost importance for machine safety and operation.



Warning

This symbol indicates that the description includes highly important parts as they can cause serious mechanical and electrical damage and the non-functioning of the machine in case the regulations in force are not followed. The non-observance of rules indicated by this symbol causes the automatic lapse in any form of guarantee and/or responsibility by the manufacturers.



Consulting the user's manual

This symbol indicates that the operation requires consulting the manual for specific information and/or enclosed documents.



Maintenance

This symbol indicates that the parts presented need maintenance.



Lubricating

This symbol indicates that the parts described need lubricating interventions.



2.7 **MEASUREMENT UNITS**

These symbols indicate the international measurement units used in this Instructions Handbook.

MEASUREMENT UNITS	DEFINITION
%	Percentage
dm ³	Volume unit: cubic decimeter = 1l
h	Time unit: hour
kg	Weight unit: kilogram
mm	Length unit: millimeter
°C	Temperature unit: Celsius degrees
V	Voltage unit: Volt
Ω	Resistance unit: Ohm
A	Current unit: Ampère
Hz	Frequency unit: Herz = cycles per second
kW	Kilowatt = 1.000 Watt; Watt = Power unit
c.a.	Alternating Current
c.c.	Direct Current
MPa	1 MegaPascal = 10 ⁶ Pa = 10 bar; Pascal = Pressure unit
dB(A)	Noise level: decibel (normalized according to curve A)



Lunghezza			UNIT CONVERSION TABLE		to obtain these units	originally expressed in these units	multiply by this factor	for the reverse multiply by this factor	
1 mm	=	0,03937 in							
1 in	=	25,4 mm							
1 mm	=	0,00328 ft							
1 ft	=	304,8 mm							
Forza			METRIC to METRIC	length	m	km	1000.0	0.001	
1 kp	=	9,81 N			cm	m	100.0	0.01	
1 N	=	0,102 kp		liquid volume	cm³	lit	1000.0	0.001	
1 kp	=	2,2046 lbf			N	kg (force)	9.806	0.102	
1 lbf	=	0,4536			kg	ton (metric)	1000.0	0.001	
					N	daN	10.0	0.1	
Coppia				mass/force	daN	kg (force)	0.9806	1.02	
1 N * m	=	8,85 lbf * in			Nm	kgm	9.806	0.102	
1 lbf * in	=	0,1129 N * m							
1 N * m	=	0,737 lbf * ft							
1 lbf * ft	=	1,355 N * m		torque	pressure	Mpa	bar (kg/cm²)	0.09806	10.197
Velocità angolare					power	CV	kW	1.3596	0.7355
1 RPM	=	0,1047 rad/s	speed			m/min	km/h	16.67	0.06
1rad/s	=	9,549 RPM							
Potenza			U.S. & IMP. to U.S. & IMP.	length	inch	foot	12.0	0.08333	
1 kW	=	1,341 HP			foot	yard	3.0	0.3333	
1 HP	=	0,7457 kW			yard	mile	5280.0	0.0001894	
1 kW	=	1,3596 PS							
1 PS	=	0,7355 kW		liquid volume	cu.ins	gall. (U.S.)	231.0	0.004329	
1 Kw	=	101,972 kp * m/s			cu.ins	gall. (Imp.)	277.4	0.003605	
1 kp * m/s	=	0,0984 kw		mass/force	pounds	ton (short)	2000.0	0.0005	
					pounds	ton (long)	2240.0	0.0004464	
					pounds	100wt (long)	112.0	0.008929	
Pressione				METRIC to & from U.S. & IMP.	speed	ft/min	mph	88.0	0.01136
1 bar	=	0,981 kp/cm ²							
1 kp/cm²	=	1,02 bar			length	km	mile	1.609	0.6214
1bar	=	14,5 PSI	m			foot	0.3048	3.2808	
1 PSI	=	0,0689 bar	cm			inch	2.54	0.3937	
1 Mpa	=	145 PS	lit			gall.(U.S.)	3.785	0.2642	
1 PSI	=	0,00689 Mpa	liquid volume		lit	gall. (Imp.)	4.546	0.22	
					cm³	cu.ins	16.387	0.061	
Capacità / Portata			mass/force		ton (metric)	ton (long)	1.016	0.984	
1 l/min	=	0,22 Imp GMP			ton (metric)	ton (short)	0.9072	1.1023	
1 Imp GPM	=	4,546 l/min			kg	pound	0.4536	2.2046	
1 l/min	=	0,2642 US GMP			N	pound	4.448	0.2248	
1 US GPM	=	3,785 l/min	torque	Kgm	ib.ft	0.138	7.233		
Volume / Cilindrata				pressure	bar	psi	0.0703	14.223	
1 cm³	=	0,061 in³	power		KW	HP	0.7457	1.341	
1 in³	=	16,387 cm³		CV	HP	1.0139	0.9863		
Temperatura			speed	km/h	mph	1.609	0.6214		
1°C	=	5/9 (°F - 32)		m/min	ft/min	0.3048	3.2808		
1°F	=	32 + 9/5°C							



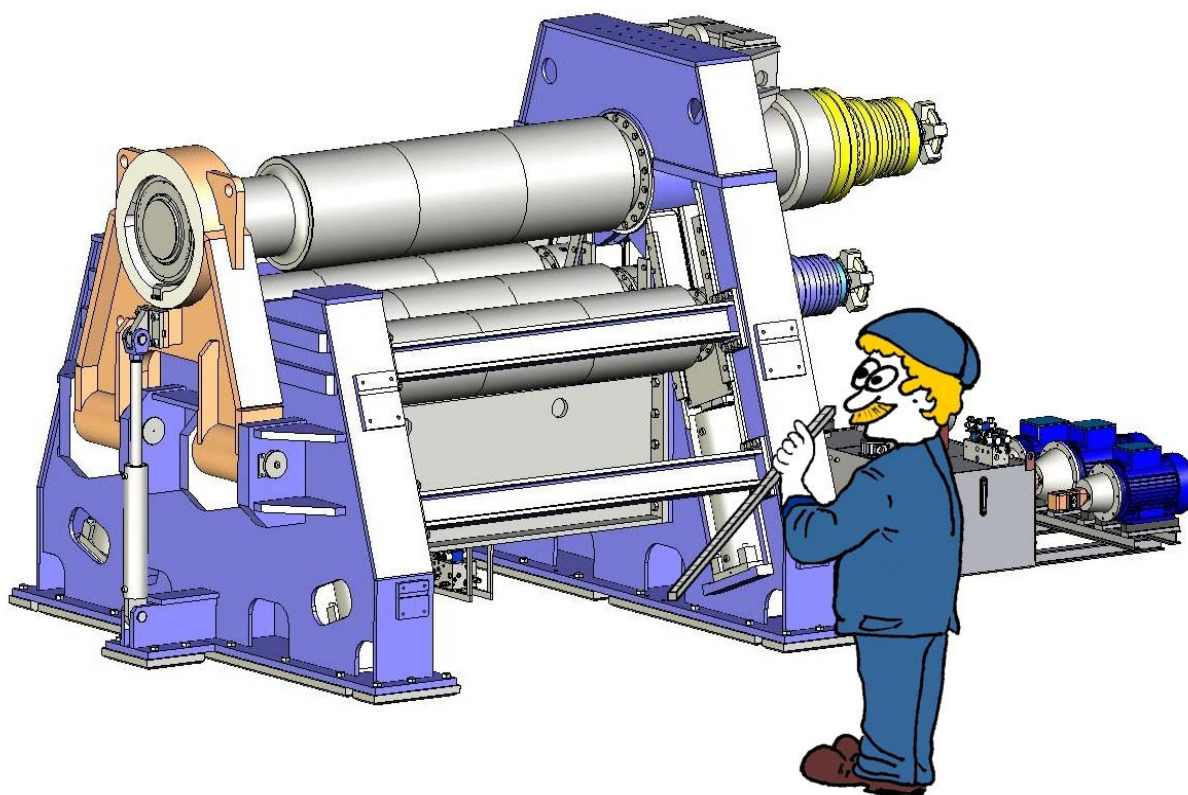
2.8 **DEFINITIONS USED IN THE INSTRUCTION'S MANUAL**

In accordance to the Machine directive 2006/42/CE the hereunder definitions are to be noted:

HAZARDOUS AREA	Means any zone within and/or around machinery in which a person is subject to a risk to his health or safety.
PERSON EXPOSED	Means any person wholly or partially in a danger zone.
OPERATOR	Means the person or persons installing, operating, adjusting, maintaining, cleaning, repairing or moving machinery.
USER	Company or person responsible and/or machine owners.
RISK	Means a combination of the probability and the degree of an injury or damage to health that can arise in a hazardous situation
HAZARD	Means a potential source of injury or damage to health
GUARD	Means a part of the machinery used specifically to provide protection by means of a physical barrier
PROTECTIVE DEVICE	Means a device (other than a guard) which reduces the risk, either alone or in conjunction with a guard



chapter 2: TECHNICAL SPECIFICATIONS AND MACHINE DESCRIPTION



-
- Technical specifications
 - Operating Description
 - Technical Description
-





2.1 TECHNICAL SPECIFICATIONS

2.1.1 GENERAL DATA

DESCRIPTION	M.U.	VALUE
Installed Electric Power	kW	280
Working Voltage	V	400±10% (**)
Network Frequency	Hz	50±1% (**)
Control Voltage	V	24 DC
Level of acoustic pressure under load (*)	dB(A)	< 80
Level of acoustic pressure without load	dB(A)	< 60
Total Mass	Kg	311.000
Machine Length without accessories	mm	10.800 (◆)
Machine Height without accessories	mm	4.500 (◆)
Machine Width without accessories	mm	5.200 (◆)

(*) The quoted values were measured in operator area under standard working conditions. Height measured from ground level.

(**) except special voltages for non-European markets.

2.1.2 TECHNICAL DATA OF PRODUCTIVITY

DESCRIPTION	M.U.	VALUE
Length of top rolls table	mm	4.100
Length of side rolls table	mm	4.100
Pre-bendable thickness (*)	mm	145
Bending thickness (*)	mm	160
Maximum Diameter of bended shape	mm	8.000
Rolls rotation speed	m/min	0-6
Maximum load on top roll	kN	33500

(*) The values refer to material with yield load equal to 260MPa. (◆◆)
Reference internal diameter for bended shape is - mm.
Considered standard length is - times the thickness (indicatively).



2.1.3 OPERATION TECHNICAL DATA

	DESCRIPTION	M.U.	VALUE
MECHANICAL STRUCTURE	Top roll diameter	mm	1.150
	Lower rolls diameter	mm	750
	Pinching roll diameter	mm	950
	Top roll motorisation	kNxm	900
	Pinching roll motorisation	kNxm	260
	Pinching roll translation speed	mm/min	150-500
	Lower rolls translation speed	mm/min	150-500
	Maximum distance between rolls	mm	322
	Minimum working height of side rolls from ground	mm	1100
HYDRAULIC SYSTEM	Number of power units	n	4
	Pump motor power	kW	75+55+55+55
	Max. Working pressure in H.P.	bar	250
	Max. Working pressure in L.P	bar	170
	Hydraulic fluid type	Mineral oil (◆◆◆)	
	Capacity of hydraulic tank	l	3800
	Amount for first filling	l	4000
LUBRICATION SYSTEM	Number of lubrication stations	n	2
	Feeding Voltage	V.	24 DC
	Grease Consumption	cm ³ /min	3x2,4
	Lubrication tank capacity	l	1,5
	Lubricant type	Lubricant Grease (◆◆◆◆)	
	System Type	Mono-line progressive	

2.1.4 AUXILIARY DEVICES TECHNICAL DATA

	DESCRIPTION	M.U.	VALUES
SIDE SUPPORT	Max. Load	Kg	25.000
CENTRAL SUPPORT	Max. Load	Kg	40.000
	Bended Shape Minimum Diameter	mm	2.500
	Bended Shape Maximum Diameter	mm	8.000
OTHER	Motorized tilting plate conveyor - max load	kg	80.000

(◆) Please see [Chapter 12.4 WORKING CELL LAYOUT - FOUNDATIONS](#)

(◆◆) Please see [Chapter 12.3 BENDING DIAGRAMS](#)

(◆◆◆) Please see [Chapter 2.2.1 HYDRAULIC FLUID](#)

(◆◆◆◆) Please see [Chapter 2.2.2 LUBRICANT FOR WEARING PARTS](#)



2.2 FLUIDS AND LUBRICANTS

The following paragraphs describe chemical and physical specifications of fluids which are required for machine operation. Refilling modes are described in this Technical Handbook (please see [Chapter 5.4.2 on page 5.20](#)).

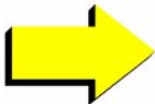
2.2.1 HYDRAULIC FLUID

	CAUTION! IMPORTANT	
	The hydraulic fluid type to be used in accordance with environmental conditions is regulated by existing occupational health and safety regulations. The machine has been engineered and inspected for use of mineral oil and use of a product with the following features is recommended.	

Table 2.1: Recommended mineral oil

ISO and UNI symbols	HM46	
NLGL Grades		46
Viscosity at 40°C	cSt	46
Viscosity at 100°C	°E	6,8
Viscosity index	cSt	100
Yield value	°C	-24
Fire point V.A	°C	230
Mass	kg/m ³	877

Particularly suitable is:

	TOTAL AZOLLA ZS 46 ITS TECHNICAL SPECIFICATIONS ARE ENCLOSED	
---	--	--

The correspondent trade products are:

MOBIL	AGIP	SHELL	API	IP	ESSO
DTE 25	OSO 46	Tellus oil 46	CIS 46	Hidrus oil 46	NUTO H 46

The working conditions are

DESCRIPTION	RECOMMENDED TEMPERATURE	
	°C	°F
Working temperature	38÷45	100÷113
Pre-alarm calibration for maximum temperature	45	113
Alarm calibration for maximum temperature	60	140



2.2.2 LUBRICANT FOR WEARING PARTS

The following table lists all the wearing parts which need to be lubricated, distinguishing all the ones reached by the centralised lubricating system from those ones which need to be manually lubricated and, for each one, suggests the most suitable lubricant.

	CAUTION! IMPORTANT
	The Bending machine RIMI 4RV Bull is equipped with progressive single line centralised grease lubrication system.

Table 2.2: Lubricating system for wearing parts

PARTS TO BE LUBRICATED	CENTRALISED LUBRICATING SYSTEM	LUBRICANT GUN
Guides and slides	Grease	-----
Bushings and rings	Grease	-----
	Grease	-----
	Grease	-----
Articulated joints of optional accessories cylinders	-----	Grease
Pins of accessories articulated joints	-----	Grease

We suggest to use lubricant oil with the following characteristics:

Table 2.3: Recommended lubricant grease for centralized system

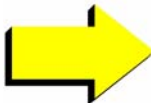
ISO and UNI symbols	XM2	
NLGL Grades		2
Manipulated penetration at 25°C	mm/10	290
ASTM Dropping point	°C	185
Kinematic viscosity at 40°C	cSt	150
Kinematic viscosity at 100°C	cSt	15,5
Minimum operative temperature	°C	-20
Maximum operative temperature	°C	110

AVERAGE INDICATIVE VALUES

The correspondent trade products are:

MOBIL	AGIP	SHELL	API	IP	ESSO
Mobilplex 46	GR MU EP 2	Alvania EP Grease 2	Apigrease PGX-2	IP Athesia GR 2	Beacon EP 2

Particularly suitable is

	TOTAL MULTIS EP2
	ITS TECHNICAL SPECIFICATIONS ARE ENCLOSED



2.2.3 LUBRICANT FOR REDUTION GEARS

As to reduction gears, or anyway as to gear boxes installed onto the machine, we suggest to use lubricant oil with the following characteristics:

Table 2.4: Recommended oil for centralized unit

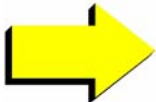
ISO and UNI symbols	XP 320	
ISO Grades		320
Kinematic viscosity at 40°C	cSt	320
Kinematic viscosity at 100°C	cSt	24,1
Viscosity index		97
Yield value	°C	-24
Fire point V.A	°C	240
Specific weight at 15°C	Kg/dm ³	0.90

AVERAGE INDICATIVE VALUES

The correspondent trade products are:

MOBIL	AGIP	SHELL	API	IP	ESSO
Mobilgear 600 XP 320	Blasia 320	Omala320	API-IP 320	IP Bantia oil HG 320	Febis K 320

Particularly suitable is

	MOBIL MOBILGEAR 600 XP 320 ITS TECHNICAL SPECIFICATIONS ARE ENCLOSED
---	---



2.2.4 TECHNICAL SPECIFICATIONS FOR SUGGESTED PRODUCTS



Wearproof oil for hydraulic driving.

DESCRIPTION

AZOLLA ZS is prepared with a refined paraffin-based compound with an antioxidant additive, rust prevention, anti-foaming and anti-wearing properties. It has various grades of viscosity, as described in the table.

UTILIZATION

AZOLLA ZS are recommended for oil-dynamic controls working at high pressure. Using incorrect oil can cause excessive wearing of the control pumps units (gears, rotors, pistons).

AZOLLA ZS are successfully adopted to hydraulic drive machines such as hoists, stamping presses, rolling mills or material working machines. They are recommended also for reduction gear, bushes and ball-bearings lubrication. This product complies with Sperry Vickers, ABEX DENISON HF2 and THYSENMANNESSMANN (46 Grades) specifications.

ADVANTAGES

Wearing additive.

High viscosity index.

Antioxidant additive.

Considerable demulsibility.

Anti-foaming additive

Rust preventer additive

- ◆ Provides minimum mechanical wearing of the pump rotors and oil-dynamic gear systems.
- ◆ The product's viscosity undergoes minimal variations during temperature changes, thus ensuring maximum efficiency of the plant in different work conditions.
- ◆ The **AZOLLA ZS** include inhibitors which protect against oxidation and reduce metal catalysis effect.
- ◆ The product is able to separate immediately from water arising from air humidity condensation or accidental external infiltration.
- ◆ The air contained in the oil can be released in the tank rapidly and easily, even at maximum circulation velocity.
- ◆ Protects metal parts against corrosion preventing any related inconveniences, particularly on valves and mechanical machinery.

FEATURES	UNITS	GRADES			
		32	46	68	100
Colour		2	L2	L2,5	3
Density at 20/4°C		0,868	0,873	0,879	0,885
Viscosity at 50 °C.	°E	3	4	5,5	8,2
Viscosity at 40 °C.	cSt	31,7	46,1	64,6	101,7
Viscosity at 100 °C.	cSt	5,4	6,8	8,5	11,5
Viscosity index		103	100	100	100
Fire point VA	°C	214	220	226	231
Yield value	°C	-27	-27	-27	-24





Mobilgear 600 XP Series

Gear Oil

Features and Benefits

Mobilgear 600 XP Series products are a leading member of the Mobil brand of industrial lubricants that enjoy a reputation for innovation and high performance capability. These mineral-based products are designed to provide high quality industrial gear oils, meeting the latest industry standards and with high versatility to lubricate a broad range of industrial and marine equipment.

Mobilgear 600 XP Series products offer the following features and potential benefits:

Features	Advantages and Potential Benefits
Enhanced gear wear protection from micropitting	Less gear and bearing wear resulting in less unexpected downtime
Reduced debris denting from generated wear particles	Up to 22% improvement in bearing life reducing bearing replacement costs and improving productivity
Improved bearing wear protection	Improved bearing life resulting in higher productivity
Outstanding compatibility with a range of seal materials	Reduced leakage, oil consumption and contamination ingress helping to reduce maintenance, extend gearbox reliability and higher productivity
Excellent resistance to oil oxidation and thermal degradation	Helps extend lubricant life with lower lubricant and lubrication costs and reduced scheduled downtime.
High resistance to sludge and deposit formation	Cleaner systems and reduced maintenance
Wide range of applications	Fewer grades of lubricant required because of wide range of application, leading to lower purchase and storage costs and less danger of using wrong lubricant
Optimised resistance to rust and corrosion of steel and corrosion of copper and soft metal alloys	Excellent protection of machine parts, with reduced maintenance and repair costs
Resistance to foaming and emulsion formation	Effective lubrication and problem free operation in the presence of water contamination or in equipment prone to oil foaming

Applications

Mobilgear 600 XP lubricants are used in a wide range of industrial and marine applications, especially spur, helical, bevel and worm gearing. Specific applications include:

- Industrial gearing for conveyers, agitators, dryers, extruders, fans, mixers, presses, pulpers, pumps (including oil well pumps), screens, extruders and other heavy duty applications
- Marine gearing including main propulsion, centrifuges, deck machinery such as winches, windlasses, cranes, turning gears, pumps, elevators and rudder carriers
- Non-gear applications include shaft couplings, screws and heavily loaded plain and rolling contact bearings operating at slow speeds.

Specifications and Approvals

Mobilgear 600 XP Series meets or exceeds the following industry specifications:	Mobilgear 600 XP	Mobilgear 680 XP	Mobilgear 100	Mobilgear 150	Mobilgear 220	Mobilgear 320	Mobilgear 460	Mobilgear 680
Flender BA 7300 Table A		Approved	Approved	Approved	Approved	Approved	Approved	Approved
AGMA 9005-E02	2 EP	3 EP	4 EP	5 EP	6 EP	7 EP	-	-
DIN 51517 Part 3	CLP 68	CLP 100	CLP 150	CLP 220	CLP 320	CLP 460	CLP 680	-
ISO 12925-1 Type	CKD 68	CKD 100	CKD 150	CKD 220	CKD 320	CKC 460	CKC 680	-
Textron Power Transmission Grade	E2	E3	E4	E5	E6	E7	E8	-
Mueller Weingarten DT 55 005		CLP 100 Approved	CLP 150 Approved	CLP 220 Approved	CLP 320 Approved	CLP 460 Approved	-	-





Typical Properties

Mobilgear 600 XP	68	100	150	220	320	460	680
ISO Viscosity Grade	68	100	150	220	320	460	680
Viscosity, ASTM D 445							
mm ² /s @ 40°C	68	100	150	220	320	460	680
mm ² /s @ 100°C	8.8	11.2	14.7	19.0	24.1	30.6	39.2
Viscosity Index, ASTM D 2270	101	97	97	97	97	96	90
Pour Point, °C, ASTM D 97	-27	-24	-24	-24	-24	-15	-9
Flash Point, °C, ASTM D 92	230	230	230	240	240	240	285
Density @15.6 °C, ASTM D 4052, kg/l	0.88	0.88	0.89	0.89	0.90	0.90	0.91
FZG Micropitting, FVA 54, Fail Stage / Rating		10 / High	10 / High	10 / High	10 / High	10 / High	10 / High
FE 8 wear test, DIN 51819-3, D7,5/80-80. Roller wear, mg	2	2	2	2	2	2	2
Timken OK Load, ASTM D 2782, lb	65	65	65	65	65	65	65
4-Ball EP test, ASTM D 2783,							
Weld Load, kg	200	200	250	250	250	250	250
Load Wear Index, kgf	47	47	47	48	48	48	48
FZG Scuffing, Fail Stage							
A/8.3/90	12+	12+	12+	12+	12+	12+	12+
A/16.6/90		12+	12+	12+	12+	12+	12+
Rust protection, ASTM D 665, Sea Water	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Copper Strip Corrosion, ASTM D 130, 3 hrs @ 100°C	1B	1B	1B	1B	1B	1B	1B
Demulsibility, ASTM D 1401, Time to 3ml emulsion, minutes @ 82°C	30	30	30	30	30	30	30
Foam Test, ASTM D 892, Tendency/Stability, ml/ml Sequence 1	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Sequence 2	30/0	30/0	30/0	30/0	30/0	30/0	30/0

Health and Safety

Based on available information, this product is not expected to produce adverse effects on health when used for the intended application, following the recommendations provided in the Material Safety Data Sheet (MSDS). MSDSs are available upon request through your sales contract office, or via the Internet on <http://www.exxonmobil.com>. This product should not be used for purposes other than its intended use. If disposing of used product, take care to protect the environment.





MULTIS EP2

Lithium/calcium based multipurpose grease for extreme pressure.

UTILIZATION

Multipurpose grease EP
General lubrication

Recommendation

- ♦ **MULTIS EP2** is a multipurpose grease, especially formulated for following: ball, needle and roller bearings, for wheels, for standard joints, frames and equipment exposed to impacts and vibrations.
- ♦ Possible use in transportation, farming, TP, and cars and trucks adapted to all kinds of ground conditions with or without water.
- ♦ **MULTIS EP2** can be also used for every element when a lubricant grade NLGI 2 for extreme pressure is called for.
- ♦ **It is strongly advised not to allow the grease to come into contact with dust, dirt or any other contaminant. It is advised to use a pneumatic pump system or cartridge for lubricate.**

SPECIFICATIONS

- ♦ ISO 6743-9: L-XBCEB1 – Approved by DAIMLER CHRYSLER page 267.0
- ♦ DIN 51 502; KP2K -25

ADVANTAGES

Lubricant sealing

Mixing

Mechanical stability

Adhesiveness features

Thermal stability

Lack of harmful substances

- ♦ **MULTIS EP2** lubricant can be applied in different ways and makes it possible to save storage time, and to simplify maintenance operations, replacing many other lubricants. Excellent lubricant sealing during the work allows for reduction of maintenance costs and interruptions in work times.
- ♦ Can be mixed with most other lubricants and common soap.
- ♦ Excellent mechanical stability protecting against any emission and consistency loss during the work.
- ♦ Excellent adherence to the metal.
- ♦ Good thermal stability, excellent resistance to temperature variance.
- ♦ **MULTIS EP2** is lead-free, nor does it contain any other heavy metal which could be harmful to health or to the environment

FEATURES	METHOD	UNITS	MULTIS EP2
Thickening agent			Lithium/Calcium
NLG Grade	ASTM D 217/DIN 51 818		2
Colour	Visual		Light brown
Appearance	Visual		Smooth
Temperature range.		°C	-25 ÷ 120
Penetration at 25 C	ASTM D 217/DIN 51 818	0,1 mm	265 – 295
Test :4 balls welding	DIN 51 350-4	daN	260 – 280
Rust preventer performance SKF-EMCOR	DIN 51 802/IP220/NFT 60-135/ISO 11007	quotient	0 – 0
Dropping point	IP 396/DIN ISO 2176	°C	<190
Kinematic viscosity at 40 °C'.	ASTM D 445/DIN 51 562-1/ISO 3104/IP71	cSt	150



2.3 CONVENTIONAL ORIENTATION

The figure below illustrates the orientation convention, i.e. what is meant by the following terms when used in the instruction handbook: Front side, Rear side, Left side, Right side of the machine as well as the sections and accessible machine areas.

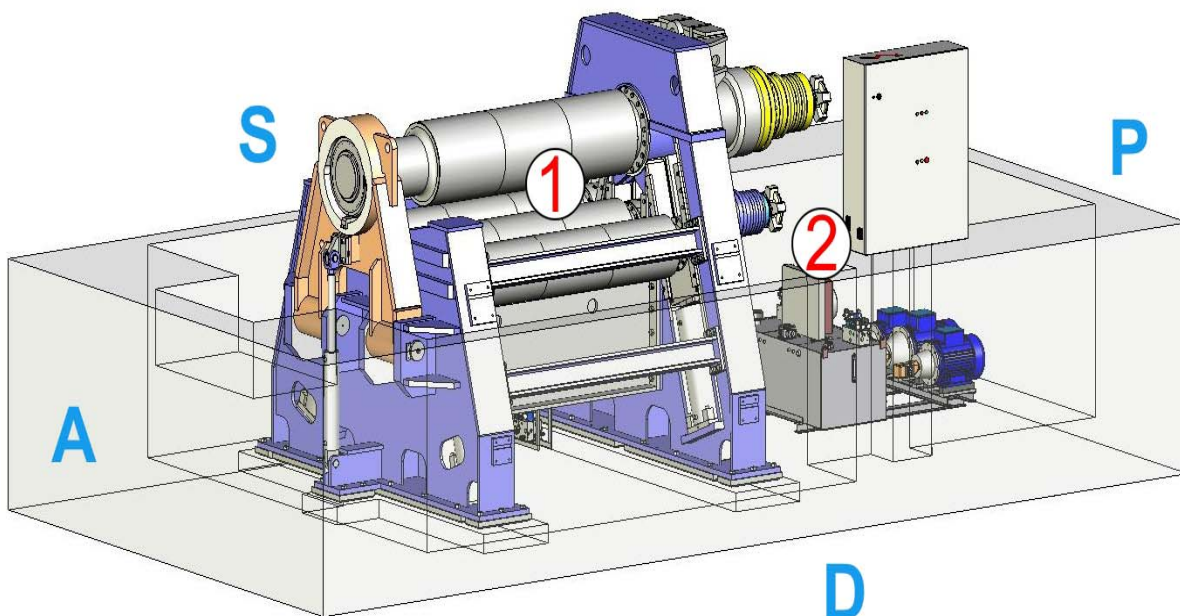


Figure 2.1: Conventional orientation

- 1) Working area
- 2) Plates loading area

- A** Front side
- P** Rear side
- S** Left side
- D** Right side

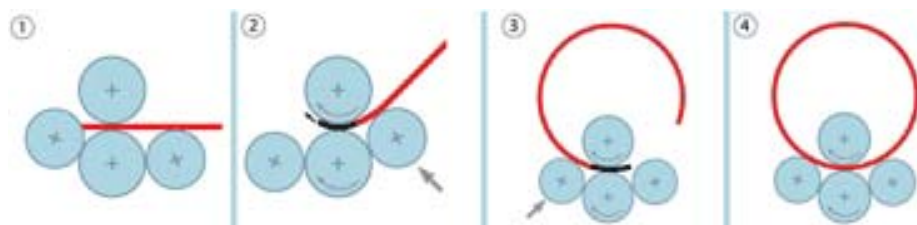
	CAUTION! IMPORTANT
	The position of the control cabinet and of the push-button panel can vary on the basis of the needs of the individual plant. Control cabinet and push-button can be installed in different position.



2.4 OPERATION DESCRIPTION

Bending machine RIMI 4RV Bull purpose is to bend plates with the characteristics and according to the production capability explained in this Technical Handbook (please see [Chapter 2.1.2 on page 2.3](#)).

Production process of the machine is carried out under operator control, who can totally control the machine from the movable control panel on which all control devices and indicators are installed.



Working cycle, controlled by a PLC (optional item), is adjusted by limit-switches, position transducers and other indicating sensors whose intervention guarantees work precision and eliminates the possibility of procedural errors. Through the touch panel, interface located on the control console, it is possible to gather several manual operations into simple guided executions.

In order to help the user to better understand the terms used in this Instructions Handbook, the following page indicates the location of machine groups and machine parts.

ITEM	DESCRIPTION
1)	Front Shoulder
2)	Rear Shoulder
3)	Beams
4)	Top roll
5)	Top roll motorization
6)	Pinching roll
7)	Pinching roll motorization
8)	Pinching roll translation cylinder
9)	Right side roll
10)	Moving cylinder of right side roll
11)	Left side roll
12)	Moving cylinder of left side roll
13)	Drop - end
14)	Drop - end operation cylinder
15)	Hydraulic station tank
16)	Power units
17)	Control cabinet
18)	Safety devices



WARNING! IMPORTANT

The location of Control cabinet for electrical devices and auxiliary optional devices is not binding. According to operation needs in the plant engineering context, the Control cabinet, the Control panel and the auxiliary devices can be located in a different position.



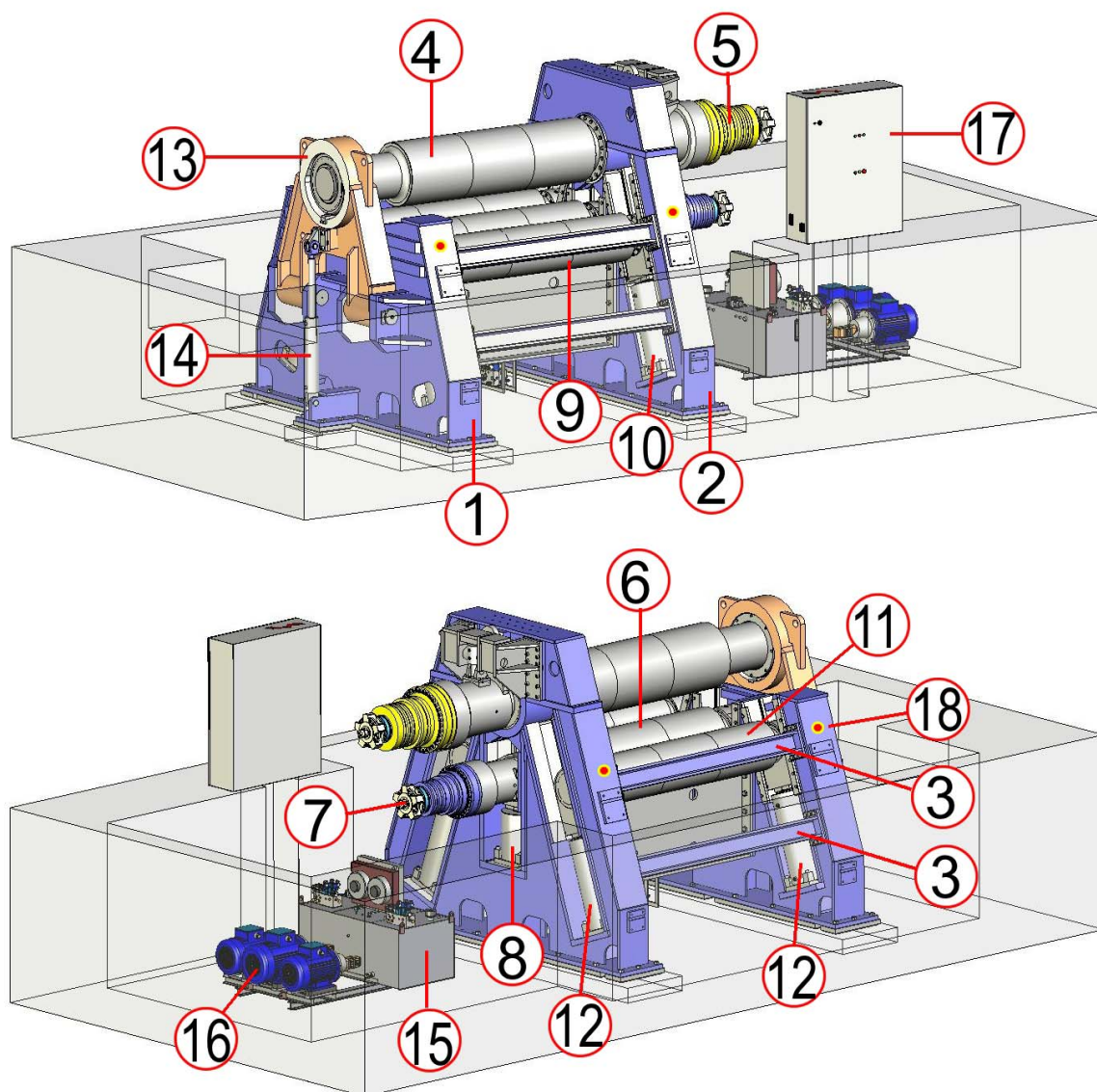


Figure 2.2: Machine Layout



The Layout Drawing of the real installation is attached to this Instructions Handbook (please see [Chapter 12.4 WORKING CELL LAYOUT - FONDATIONS](#)).



2.5 TECHNICAL DESCRIPTION

The following Figure shows the machine assembly complete with accessories and ready for production.

Bending machine RIMI 4RV Bull main structural parts are the following:

- 1) Mechanical structure.
- 2) Top roll group.
- 3) Side rolls group.
- 4) Pinching roll group.
- 5) Drop - end group
- 6) Hydraulic system.
- 7) Electrical system.
- 8) Safety devices.
- 9) Centralised lubricating system.
- 10) Optional accessories.

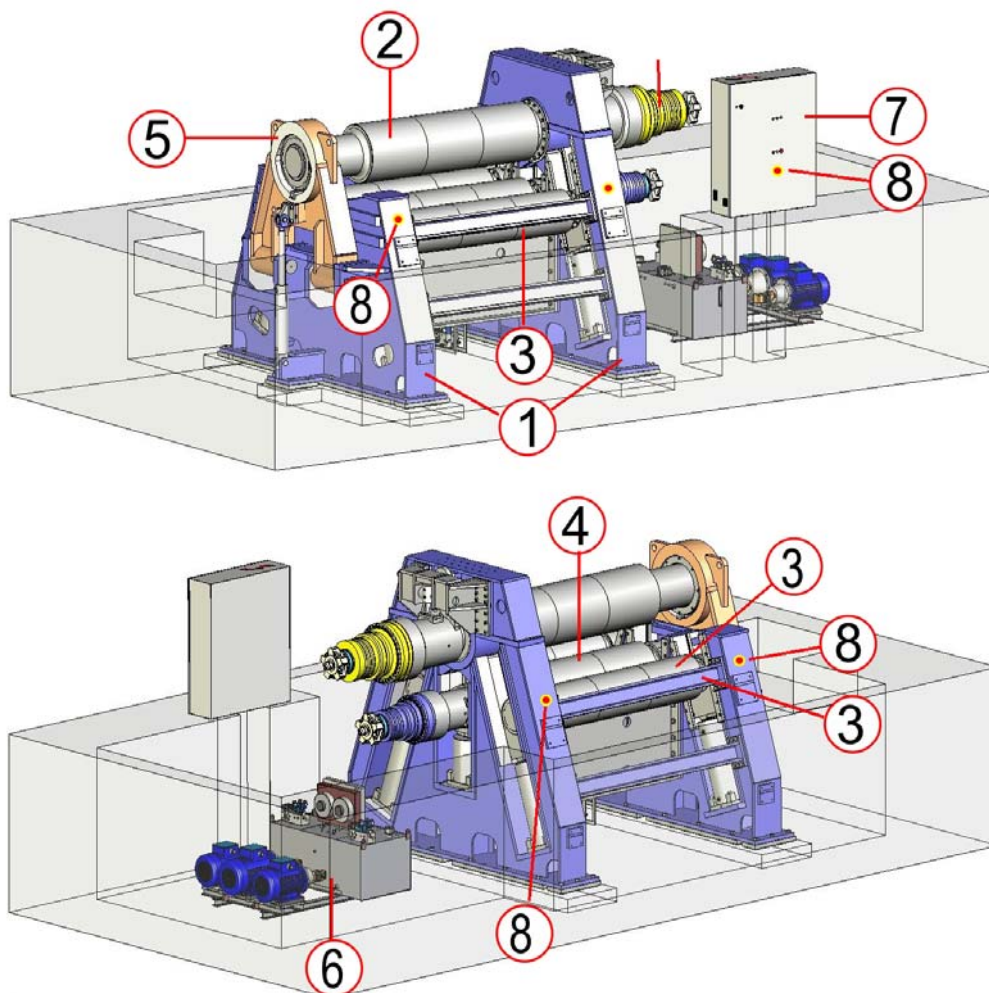


Figure 2.3: Machine Topography

2.5.1 MECHANICAL STRUCTURE



Machine mechanical structure essentially consists of front shoulder (1), rear shoulder (2) and beams, which serves to connect the front shoulder (1) to the rear shoulder (2), to reduce shoulders flexion when they are under load and to give stiffness to machine main structure.

Besides there is another function: to act as base for machine hydraulic system pipes.

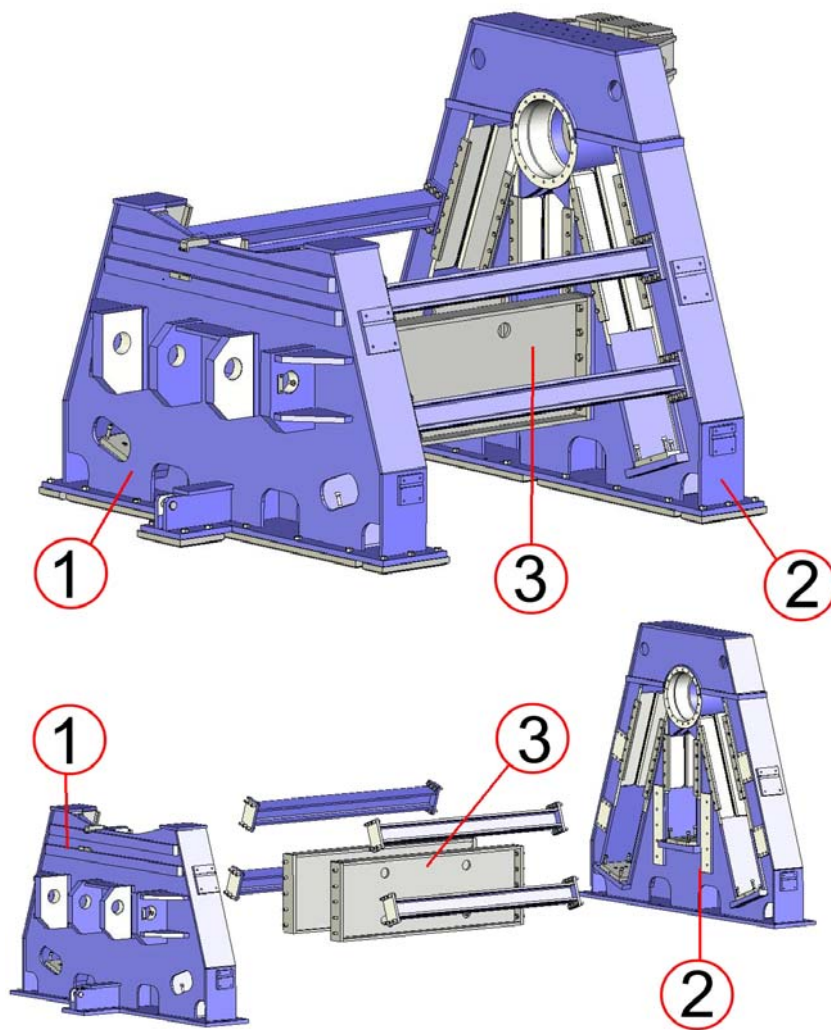


Figure 2.4: Mechanical structure

2.5.1.1 FRONT SHOULDER AND REAR SHOULDER

Shoulders are the supporting structure of the machine and consist of two structural works in electrowelded steel (S355JR) plates, which were subjected to stress relieving treatment and machined with machine tool.

Inside both shoulders there are the housings for:

- The connection to the beams through screws.
- The top roll group.
- Side cylinders, which control side rolls movement, and respective sliding guides.
- Cylinders, which control pinching roll movement
- Sliding guides of front and rear supports of side rolls and pinching roll.

On front shoulder (1) there is the housing of tilting support (called drop-end or front carriage), to allow the extraction of the tube.

On rear shoulder (2) is secured the fixing system of top roll (called "supporting device"), which grants to support it when the drop-end device is opened.

The structure is sand blasted to allow a better adhesion of epoxidic painting to plate surface.

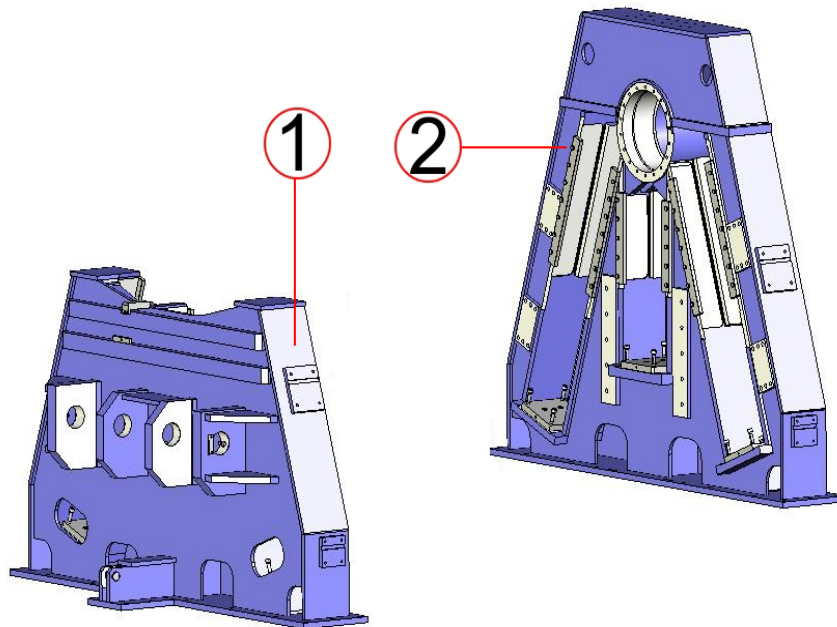


Figure 2.5: Shoulders

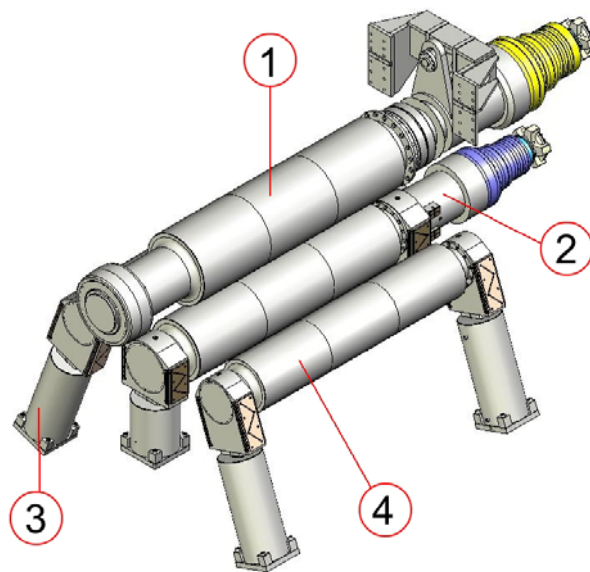
2.5.2 ROLLS



Depending on dimensions, rolls are made of forged steel obtained through vacuum smelting or from rolled bar; both forged and finished products are carefully checked through ultrasound test and Magnetoscopic test. Rolls material grants high endurance strength.

On request, rolls surface is subjected to hardening and tempering treatment to get high surface hardness of roll, which keeps internal toughness.

Customer can check rolls specifications to verify all quality requirements. On request, rolls are induction hardened and grounded, when the machine must be used to machine stainless steel or aluminium plates.



- | | |
|-------------------------|--------------------------|
| 1) Top roll group | 2) Pinching roll group |
| 3) Side left roll group | 4) Side right roll group |

Figure 2.6: Rolls

Standard machine has top and pinching roll motorized..

Kinematic chain for the rotation consists of:

- **Transmission joint**, which allows to transfer the torque of reduction gears to the rolls.
- **Epicycloidal reduction gear**, which amplifies the torque coming from the hydraulic motor
- **Hydraulic motor**, which converts the hydraulic energy of the pressurised fluid into mechanical power, transferred, then, to the shaft through the epicycloidal reduction gear.





- 1) Hydraulic motor 2) Epicyclic reduction 3) Transmission joint 4) Stop gear

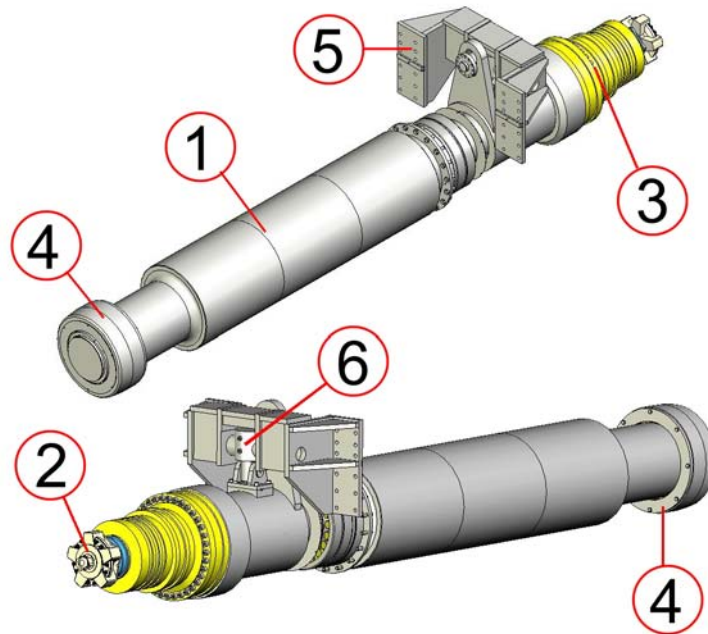
Figure 2.7: Motorisation of top roll



Technical specifications of each component of kinematic chain of top roll rotation are attached to this Technical Handbook (please see [Chapter 12.5 KINEMATIC DRIVING CHAIN OF THE ROLLS](#)).

2.5.2.1 TOP ROLL GROUP

Top roll is operated by hydraulic motor coupled with epicycloidal reduction gear.



- | | | |
|----------------|----------------------------|-------------------------------|
| 1) Top roll | 2) Hydraulic motor | 3) Reduction gear |
| 4) Fifth wheel | 5) Supporting device group | 6) Supporting device cylinder |

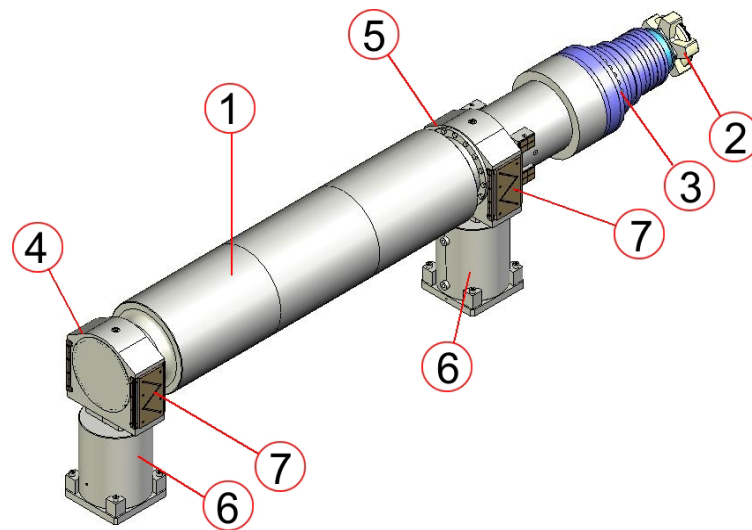
Figure 2.8: Top roll group

2.5.2.2 PINCHING ROLL GROUP

Pinching roll vertically translates under the top roll and assures the dragging of plate. The position of each end of the pinching roll is always controlled by transducers (potentiometers) shown in the following figures.

Pinching roll, driven by hydraulic motor coupled with epicycloidal reduction gear, is mounted onto two carriages fitted with shoes made of antifriction material. These ones, driven by two hydraulic cylinders, vertically slide on proper guides realised on the shoulders





- | | | |
|------------------|--------------------|--------------------------------|
| 1) Top roll | 2) Hydraulic motor | 3) Reduction gear |
| 4) Rear carriage | 5) Front carriage | 6) Vertical operation cylinder |
| 7) Guiding shoes | | |

Figure 2.9: Pinching roll group

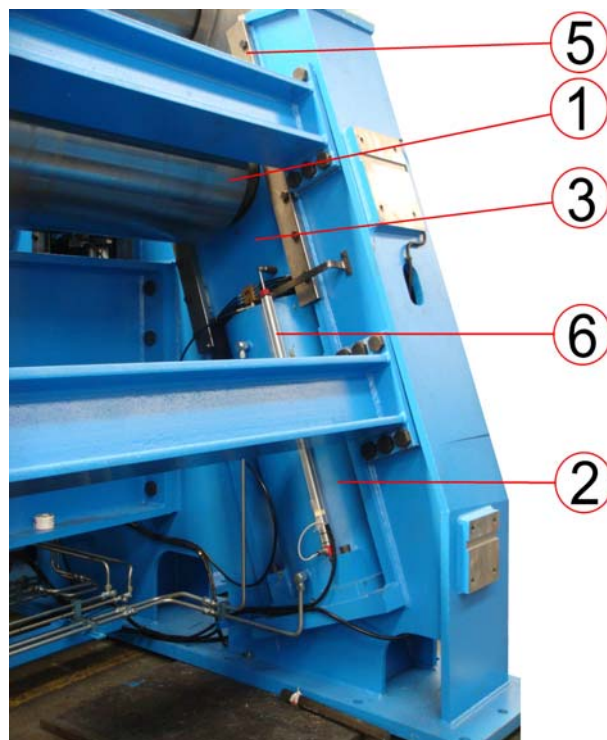
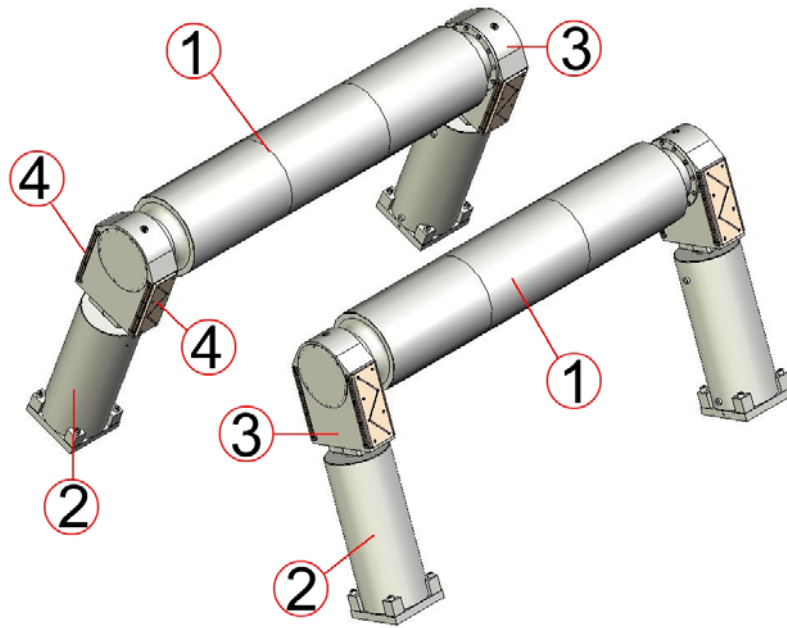
2.5.2.3 SIDE ROLLS

Side rolls are the opposing element for plate rolling. Each roll, driven by a couple of hydraulic cylinders and fitted with anti-friction slides, slides on tilted guides mounted onto the shoulders. The sliding on the tilted guides increases or decreases the distance between bottom rolls centers and simultaneously changes their distance from the top roll. The controlled movement of side rolls allows to realise the operations described in this Handbook (please see [Chapter 2.4 on page 2.13](#)).

The position of each end of the side rolls is always controlled by transducers (potentiometers) shown in the following figure.



The technical documentation of the position transducers is attached to this Instructions Handbook (please see [Chapter 12.12 POSITION TRANSDUCER](#)).



- | | | |
|---------|----------------------------|------------------------|
| 1) Roll | 2) Side hydraulic cylinder | 3) Support |
| 4) Head | 5) Titled guide | 6) Position transducer |

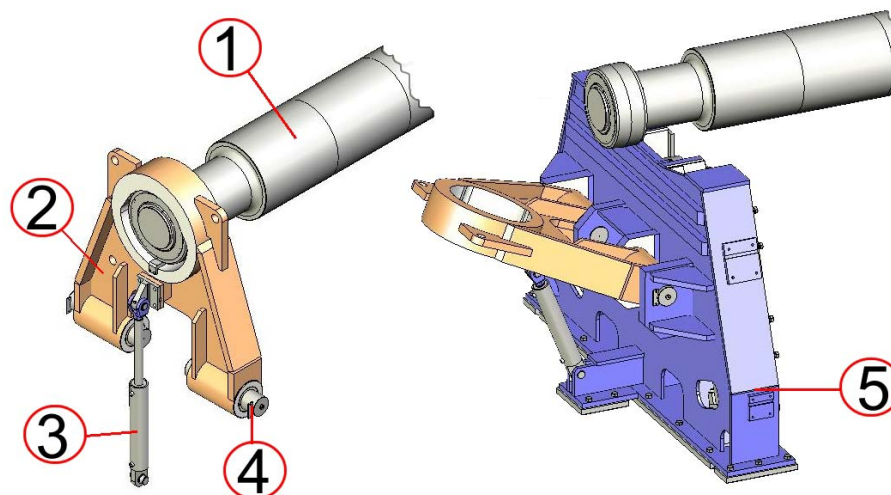
Figure 2.10: Side rolls



2.5.3 DROP-END DEVICE



To allow the extraction of plate tube, on front shoulder a tilting support (called drop-end) is housed. It releases the front end of top roll.



- | | | |
|----------------------|--------------------|----------------------|
| 1) Top roll | 2) Drop-end device | 3) Drop-end cylinder |
| 4) Drop-end trunnion | 5) Front shoulder | |

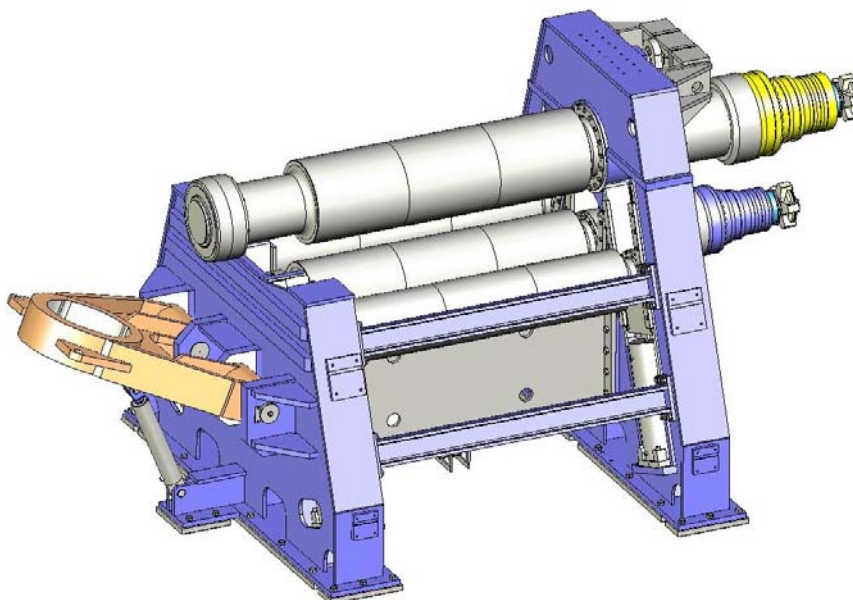


Figure 2.11: Machine with drop-end opened

Top roll, without its front support, is nearly hold by a supporting device (1) shown in the following Figure.

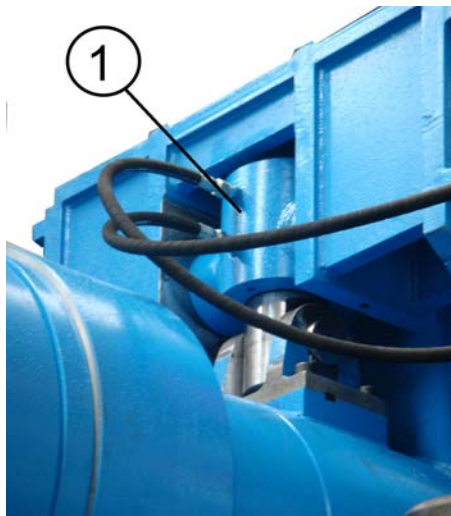
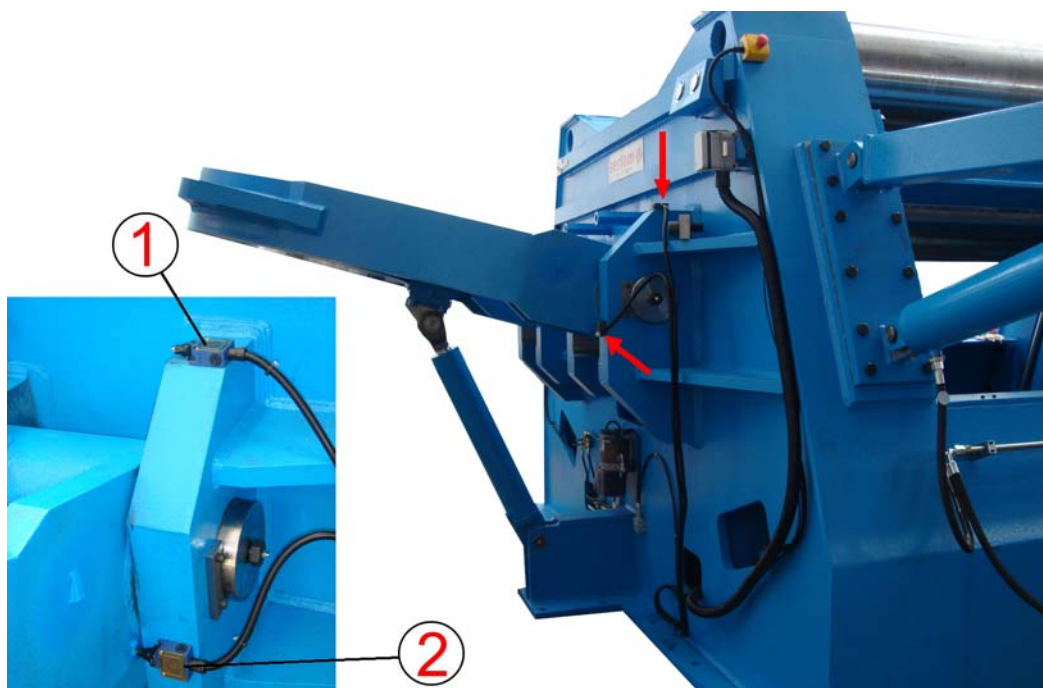


Figure 2.12: Supporting device cylinder

When the Drop-end is open, a limit-switch stops any machine operation. Only when the drop-end is closed the machine re-starts the regular functioning.



- 1) Limit switch of closed drop -end device 2) Limit switch of open drop -end device

Figure 2.13: Drop -end device limit switch

2.5.4 OPTIONAL ACCESSORIES

It is possible to equip the machine with the following accessory devices, which can be activated from control console:



- 1) Side support (Right and/or left)
- 2) Central support (flag)
- 3) Conical device
- 4) Handling roller table
- 5) Rolls in alloyed steel
- 6) Interchangeable top roll
- 7) Touch panel
- 8) Numerical Control

For special working requirements we can also supply induction hardened rolls. Induction hardened rolls, in facts, are useful to carry out plate tubes with very high hardness or in stainless steel or aluminium.

This option can be accepted only for small and middle size machines and it consists in a surface hardening and tempering treatment, which gives a hardness of at least 50 HRC.

2.5.4.1 SIDE SUPPORT (RIGHT AND/OR LEFT)



Usually side supports (1) are located on left machine side or right machine side or on both of them (according to customer's requirement) and are driven by hydraulic cylinders (2).

Side supports can be made of double articulation, but independent one from each other and they allow to support the plate during the delicate phase of first bending, especially to get plate tubes with big diameter and small thickness.

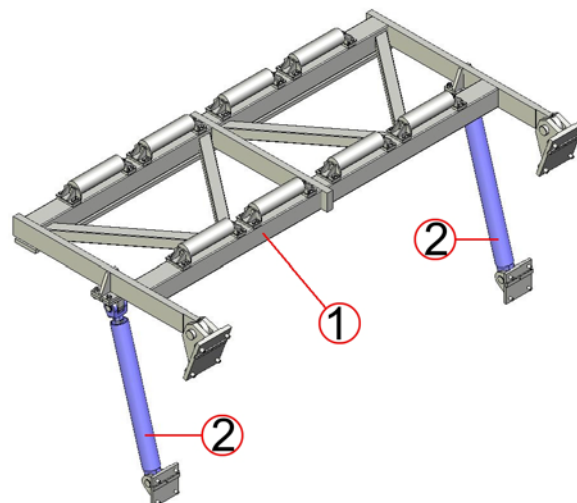


Figure 2.14: Side support

2.5.4.2 CENTRAL SUPPORT (FLAG)



The central support or flag is located on the rear shoulder with supports interposition (1) when it is necessary.

It consists of a support (4) translating from the top to down onto uprights (3) to follow tubes profile and to support them during bending phase. Central support has tie rods (5) to fix it to the floor and the user must arrange anchoring points in the foundations.

Central support can be hydraulically or electrically controlled (2).

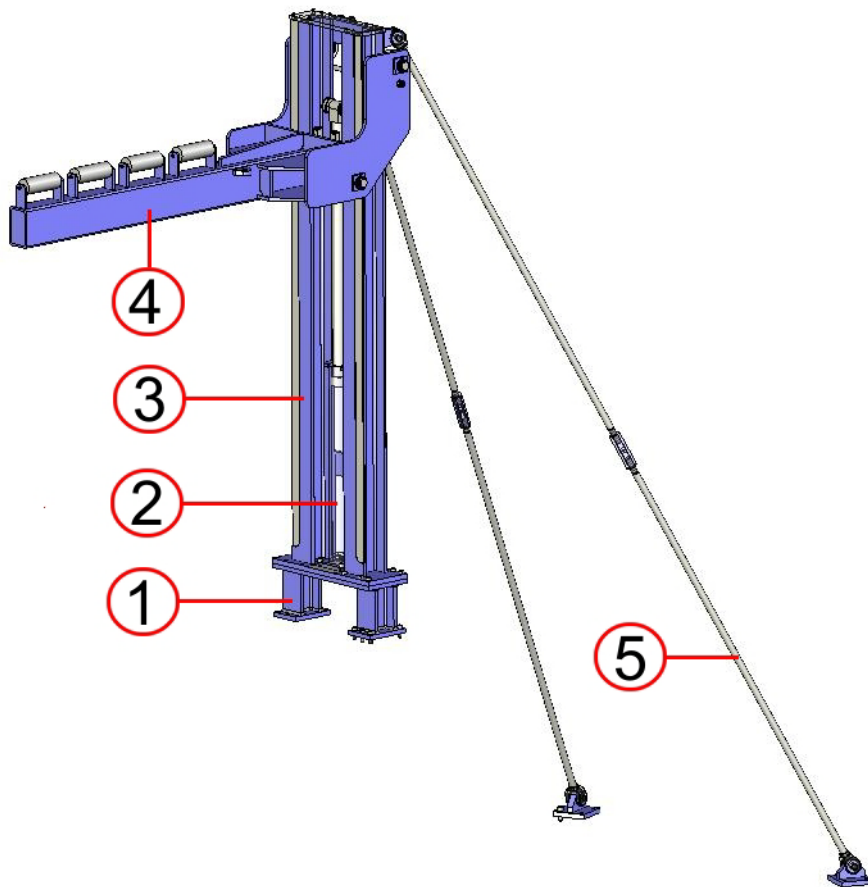


Figure 2.15: Central support

2.5.4.3 CONICAL DEVICE



This accessory device makes the execution of the tapered shaped pipes easier. Substantially it consists of a roller (2) fitted on front machine side upon the support of pinching roll (1).

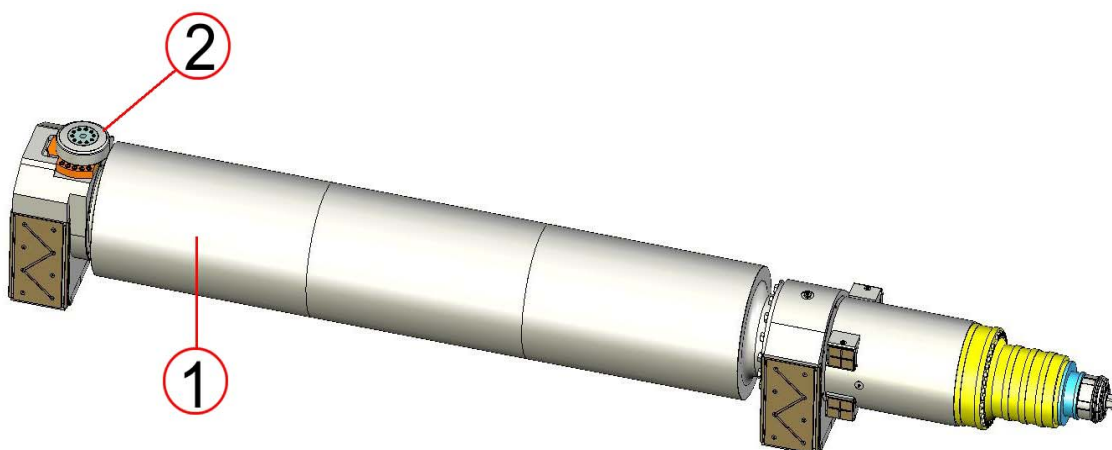


Figure 2.16: Conical device



You must remember that the conical device is supplied as an accessory and it is not able to guarantee the machining of a complete range of cones.

2.5.4.4 INTERCHANGEABLE TOP ROLL



For the production of plate tubes with smaller diameter it is possible to equip the machine with an interchangeable top roll with smaller diameter.

The replacement is easy. (Please see [Chapter 12.10 INTERCHANGEABLE TOP RULL](#)).



2.5.4.5 HANDLING ROLLER TABLE



This accessory device makes the movement of heavy plates easier.

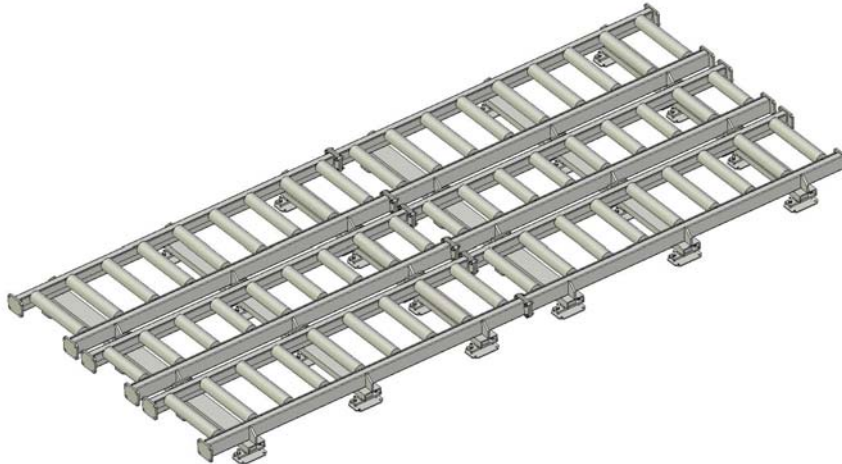


Figure 2.17: Handling roller table.

2.5.4.6 TOUCH PANEL



The touch panel is an interface located on control console, which allows to gather several manual operations and transform them into simple guided executions, so that the machining is faster and more efficient.

The touch panel allows moreover to monitor the instantaneous movements of rolls and to activate accessory programmed functions, such as periodical lubrication cycle.

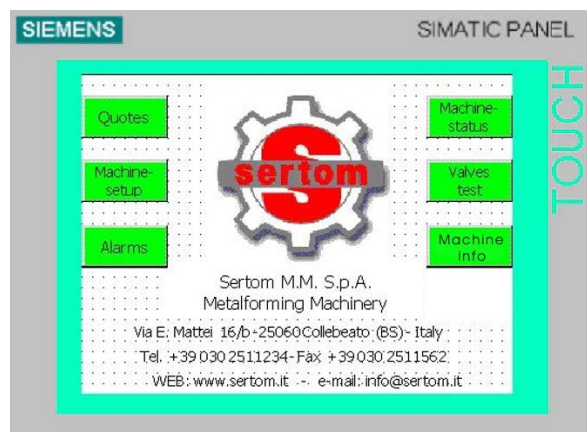


Figure 2.18: Touch panel



2.5.5 HYDRAULIC SYSTEM



It has the following functions:

- 1) Top and pinching roll rotation.
- 2) Side rolls translation.
- 3) Pinching roll translation.
- 4) Top cylinder supporting device driving.
- 5) Right and/or left side support driving (Optional item).
- 6) Central support driving (Optional item).

The functions above are realised through hydraulic actuators belonging to a hydraulic circuit installed onto the machine, according to the hydraulic drawing attached to this Technical Handbook (Please see **Chapter 12.6 HYDRAULIC DIAGRAM**), and controlled by a hydraulic unit.

Hydraulic unit, shown in the following figures, essentially consists of:

- 1) Tank which is an electrowelded steel work. On which we find: an optical level indicator an optical thermometer, level switch, thermostat, inlet air filter, outlet filter, filling pipe and outlet plug, lever operated ball valves.
- 2) Power unit with horizontal axis. Consisting of three phase motors connected to one or more gear pumps or piston operated pumps, having the specifications explained in **Chapter 12.7 POWER UNIT**. Power unit is installed near the machine, on anti-vibration pads as the connection between pump and tank is realised through flexible pipes to reduce noise. Motor-pump group starting, for motors with power >20Kw, is realised through star-delta connection. Power unit number varies according to the power and /or speed and accessories required by the customer. For special needs, power unit can consists of a motor with vertical axis mounted onto tank cover and immersed pump.
- 3) Suction filter (if required) with electrical control of vacuum and clogging visualisation. Filter cartridges can be removed for cleaning without draining the tank. The return hydraulic fluid goes through pipes which are mounted under the minimum level of the tank, in order to have the best down flow.
- 4) Pressure control group. Consisting of hydraulic block in which we find a circuit to which inlet flexible hoses, outlet rigid pipes, check valves, Max. H.P. valves, the distributor (driving the main cylinder) refer according to the attached hydraulic drawing.
- 5) Distributors of accessory optional devices.
- 6) Hydraulic fluid cooling group. Usually the fluid is cooled by a air-oil heat exchanger before going back to the tank. When there are special environmental conditions, hydraulic fluids cooling in the tank is carried out by a dedicated circuit, consisting of: motor-pump with vertical axis and air-oil or water-oil heat exchanger.

Hydraulic fluid level control system consists of optical level indicator (6) and level switch (4) having the function of Minimum level Alarm with immediate pumps stop.

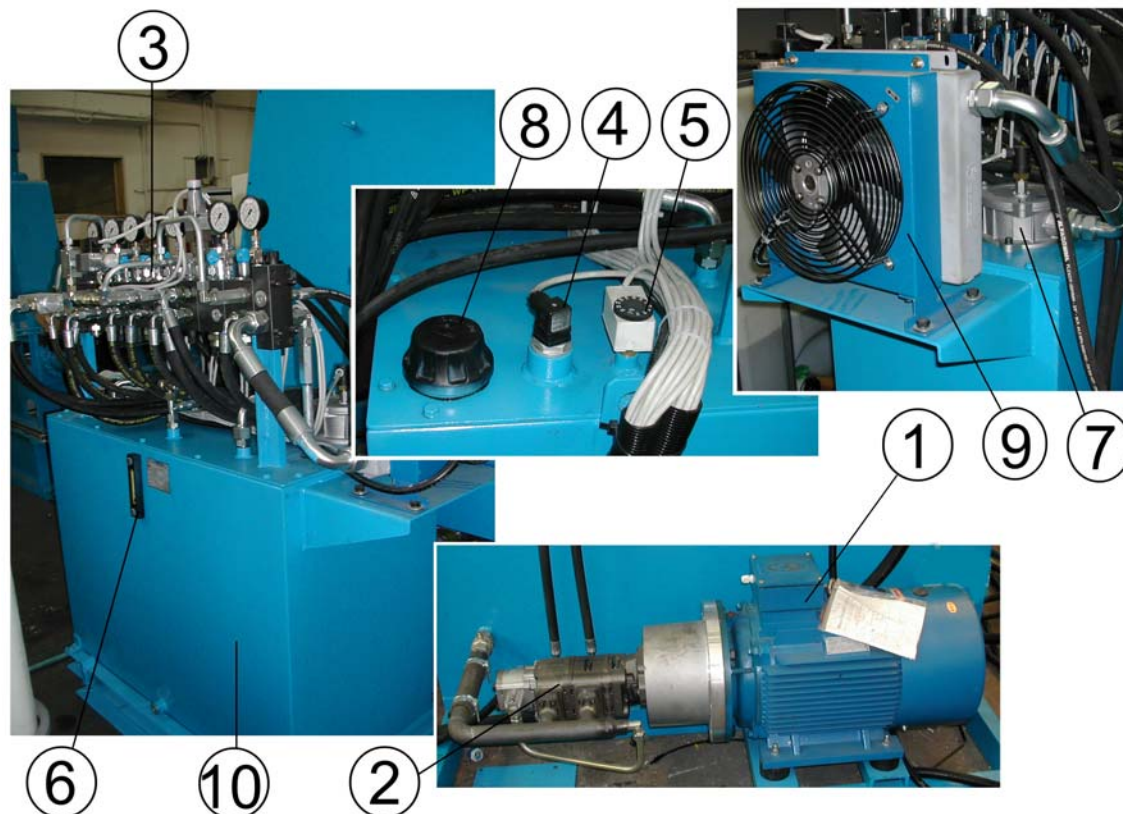
Temperature control system consists of programmable thermostat (5), which activates the heat exchanger. Working temperature is indicated by a thermometer.



Temperature thresholds, which controls cooling system, are the following:

- ◆ 40°C Activates the heat exchanger. (If the heat exchanger is water -oil type, it opens the electrovalve which let water circulates).
- ◆ 60°C Alarm temperature because oil is too hot, let all the drives stop and visualises alarm situation.

Depending on installation area, these parameter could be changed by the manufacturer



DESCRIPTION	
1)	Power unit
3)	Distributors
5)	Thermostat which controls temperature
7)	Outlet oil filter
9)	Heat exchanger

DESCRIPTION	
2)	Pumps group
4)	Level switch, minimum oil level alarm
6)	Optical level indicator
8)	Filling Tap and vent with filter
10)	Tank

Figure 2.19: Hydraulic unit



The hydraulic drawing is attached to this Instructions Handbook (Please see [Chapter 12.6 HYDRAULIC DIAGRAM](#)).



2.5.6 ELECTRICAL SYSTEM



Electric machine system main parts are the following:

- Control cabinet with main switch of line and all the necessary equipment to operating.
- Push-button panels for manual machine control.
- Electrical motors.
- Wiring on machine and on hydraulic unit.

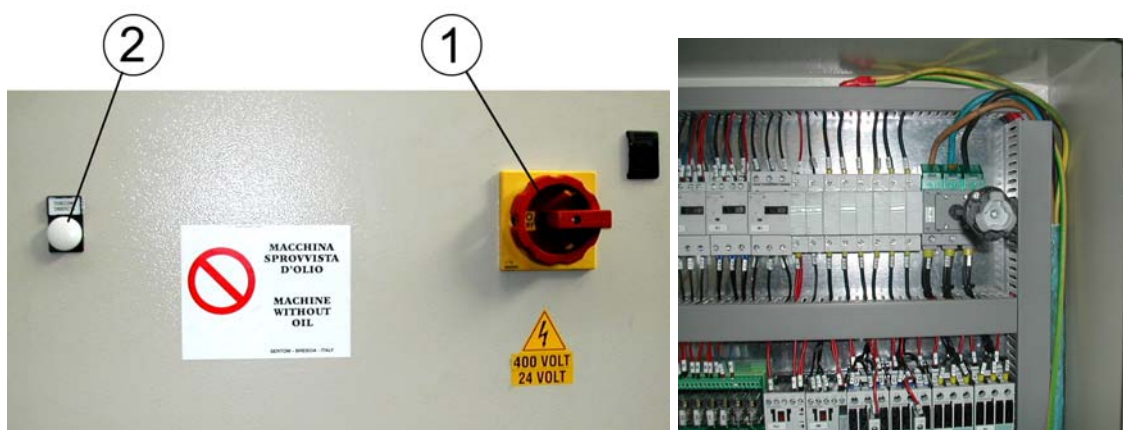
2.5.6.1 CONTROL CABINET

The following figures show two details of the control cabinet of the machine.

It hosts the lockable main line switch, the transformer, all control electric devices and auxiliary electric devices and, when the machine is controlled by the touch-screen system, also the PLC.

When the control cabinet is switched on, the machine control panel and the optional programming panel (touch-screen), located on the main control console, are activated.

The door of control cabinet is keyed and fitted with mechanical interlock.



1) Main switch of line

2) Pilot lamp

Figure 2.20: Control cabinet detail



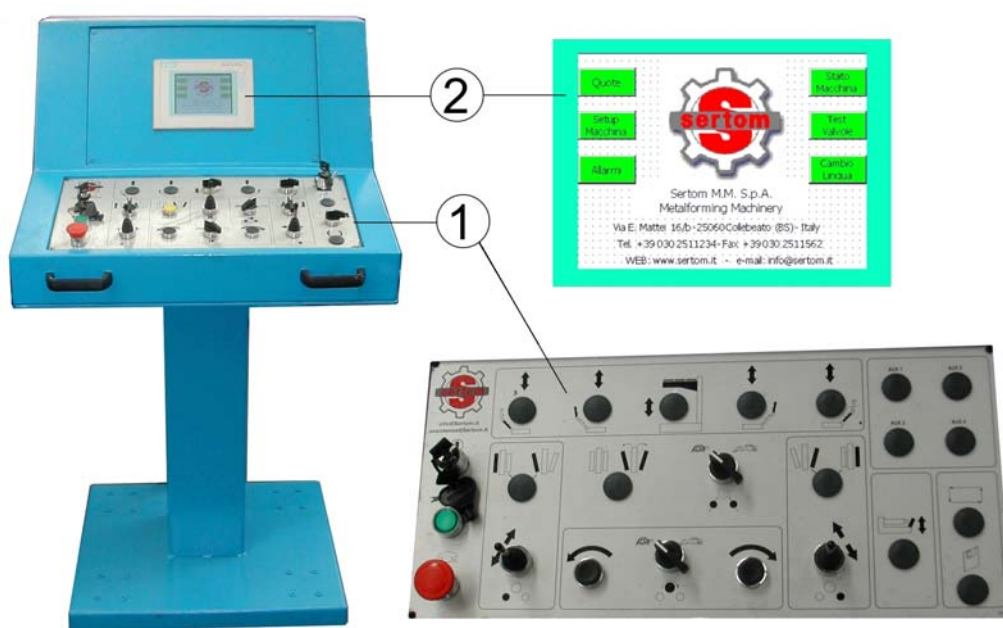
The position of control cabinet is not binding. According to functional needs, in the machine engineering context, it can be assembled onto the machine or on the floor, anyway in the correct position both from logistic point of view and from safety point of view.

2.5.6.2 MACHINE CONTROL CONSOLE

Machine push button panel and programming panel (touch panel) - optional item - are included into a control console fitted with wheels and electrically connected to main control cabinet. This allows the operator to choose the most suitable point to carry out bending operations and to insert the pieces into the machine.

Through the push button panel it is possible to control all machine functions and auxiliary devices under safe conditions. Specific symbols and push buttons with different colours help the operator to identify the different controls.

Programming panel allows to gather several manual operations together in simple guided executions, to monitor instantaneous movements of machine members and to control machine state through alarms and diagnostic.



1) Control push button panel

2) Programming panel (optional item)

Figure 2.21: Machine push button panel



Detailed description of all the controls , of push button panel and of programming panel are included in this Technical Handbook (Please see [Chapter 6.1 DESCRIPTION OF MACHINE CONTROLS](#)).



SERTOM M.M. S.p.A.

2.5.6.3 MOTORS

The motors are threephase with V. 400/50 Hz., (except for special voltages required by non-European markets) with automatic star/delta start and protections against overloads. They belong to the category of threephase asynchronous motors with closed construction type B3/B5 (or B5 when the motors has vertical axis), with cage motor and cooled by external ventilation. The design of their structure, the electrical components, parts of components, and the testing all comply with European standards.

2.5.6.4 WIRING ON THE MACHINE

It is carried out using flexible hoses coated with a protecting metal braiding. The standard length of cables is 4 m and the outlet from the control cabinet is on left side (front view).

In the area of hydraulic unit and inside the bed there are junction boxes connected to the control cabinet through sheats with multipolar plugs. The cables, which are inside the sheats, can be shielded according to the components they are connecting.

Moreover there is a connection, with flexible sheath and multipolar plugs, between the machine and the control console.

All electrical components have parts in cadmium plated and passivated steel, therefore usually tropicalized and with the following use limitations:

% RELATIVE HUMIDITY	°C
90%	20 °C
80%	40 °C
50%	50 °C

Under these conditions, each temperature change can cause condensations phenomena for a short time. If the condensation is frequent, we suggest you to install heating elements inside the containers. In very heavy work conditions (equatorial environments, corrosive atmospheres etc.) we arrange suitable protecting treatments.



Electric Diagram and testing report are attached to this Instructions Handbook. (Please see [Chapter 12.8 ELECTRICAL DIAGRAM](#)).

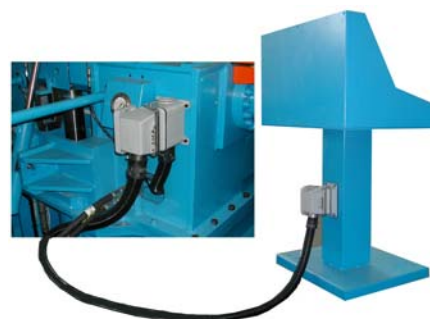


Figure 2.22: Examples of wiring on the machine



2.5.7 CENTRALISED LUBRICATING SYSTEM



Bending machine RIMI 4RV Bull 40-160 is equipped with 2 monoline progressive centralised lubricating system with grease whose drawing is shown later (Please see [Figure 2.23 on page 2.35](#)).

Some system is located on the front shoulder and other on the rear shoulder to lubricate the sliding guides of the side rolls and pinching roll.



FRONT SHOULDER



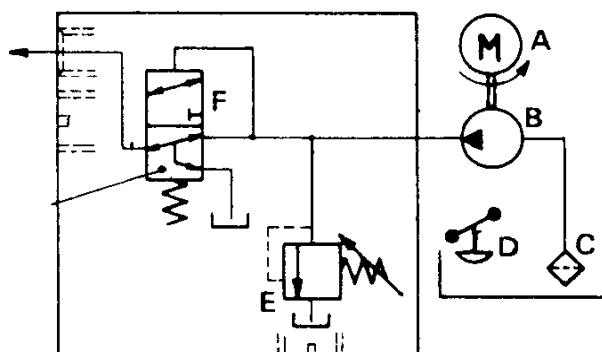
REAR SHOULDER

Each lubricating system is controlled by a lubricating unit, shown in the following figure, which automatically starts when the operator switch on the machine and carries out the lubrication programme sending lubricant, according to the set intervals, to all the provided points which are shown in the lubrication drawing above mentioned. (Please see [Figure 2.24 on page 2.36](#)).

At the end of the line there are a pressure switch, controlling the maximum pressure on the line, and an electronic indicator of minimum level. These two devices grant a safe and automatic operation.

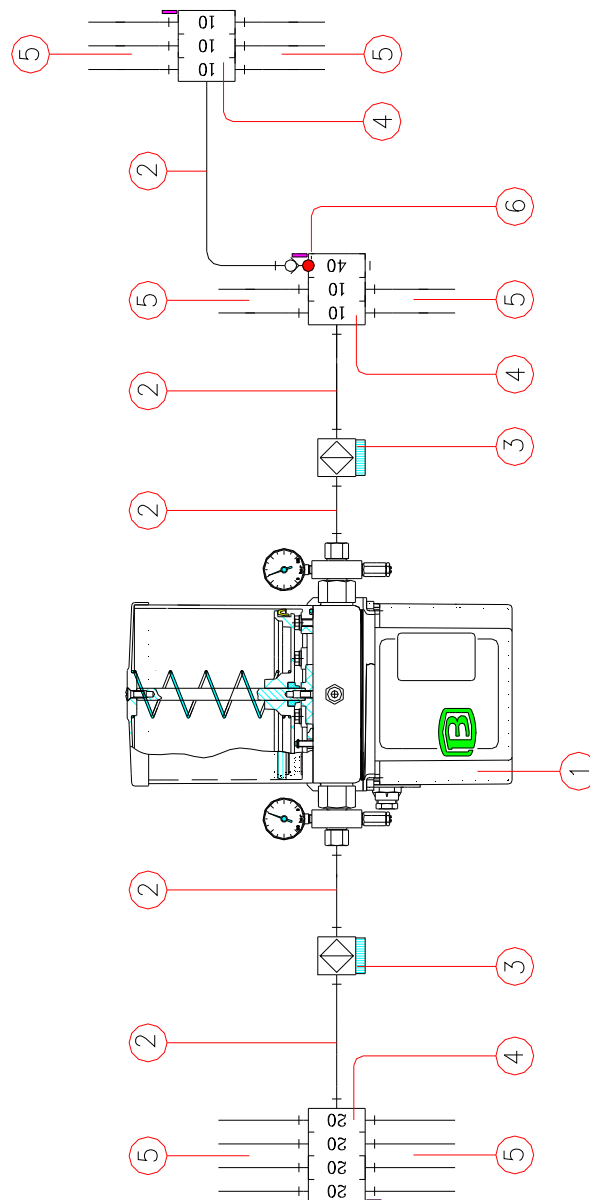
The following figures show the lubrication pump and its operation.





- | | |
|-----------------------|---------------------------------|
| A) Motor | D) Minimum level contact |
| B) Pump | E) Valve for pressure adjusting |
| C) Filling connection | F) Release valve |

Figure 2.23: Centralised lubricating system of the machine



- | | |
|-----------------------------------|---|
| 1) Pump | 2) High pressure hose 8x6 steel/copper/flexible |
| 3) Filter | 4) Distributor |
| 5) Hose 6x4 steel/copper/flexible | 6) Over pressure indicator with memory |

Figure 2.24: Drawing of the centralised lubricating system



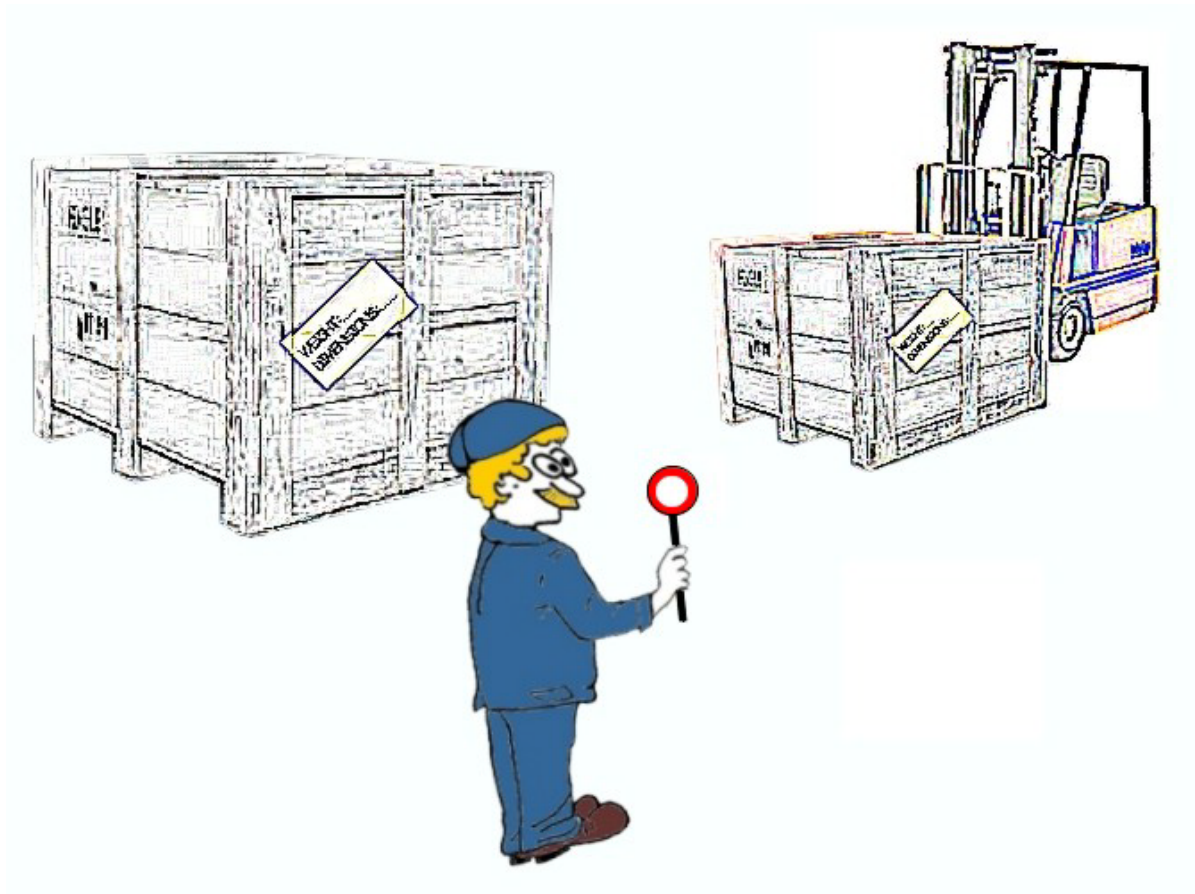
The figure above is indicative. The real drawing is attached to this Technical Handbook (Please see [Chapter 12.9 LUBRICATING SYSTEM](#)).







chapter 3: CONSIGNMENT AND TRANSPORT OF THE MACHINE



-
- Lifting and transport
-





3.1 **TRANSPORT**

When the structural geometry, the dimensions, the weight and the typology allow it, the machine is delivered completely assembled, otherwise it is divided into parts fit to get transportable packages and then re-assembled at the final destination.

A big size machine, which is installed into a pit, complete with all the accessories and delivered on a truck, could be divided into the following parts.

Table 3.1: Parts of the machine

PACK	DESCRIPTION	PACK	DESCRIPTION
1)	Top roll group	2)	Pinching roll group with reduction gear
3)	Side roll	4)	Front shoulder
5)	Right side roll group	6)	Left side roll group
7)	Rear Shoulder	8)	Hydraulic motor + reduction gear
9)	Drop -end group with cylinder	10)	Beams
11)	Hydraulic unit	12)	Control consolle
13)	Flag	14)	Control cabinet
15)	Right side arm	16)	Left side arm
17)	Anchoring plates	18)	Cases

Packing-list enclosed in this technical handbook (Please see [Chapter 12.2 PACKING-LIST](#)) contains description of weight, dimensions and packaging of each pack.

All parts not painted are protected by grease and lubricating oil. To be transported the machine is packaged as per contract specification

According to the type of transport, the packaging can be carried out as follows:

- ❖ **Box packaging.** For long distance transport, particularly by sea, the machine is packed in closed boxes protected from atmospheric conditions. **The weight, in tons, and the way the box should be positioned during transport are indicated on the box side.**
- ❖ **Free packing.** For on-road transport, the machine must be secured with appropriate belts to the vehicle. floor.

The boxes handling can be effected either by fork lift, cranes or bridge cranes according to the weights indicated on the boxes and with proper lifting slings.



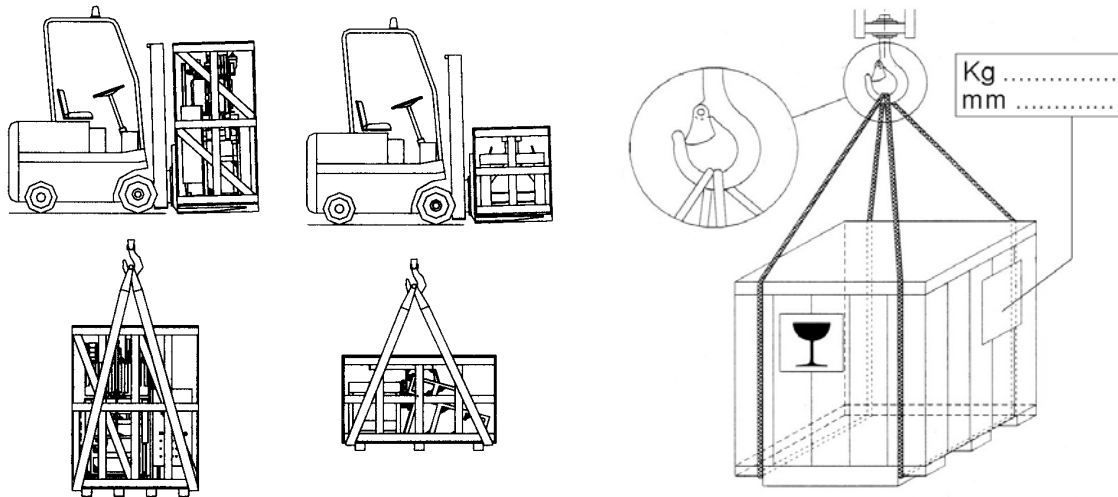


Figure 3.1: Box Handling

In order to carry out lifting operations it is necessary to:

- 1) Be aware of the technical details of the equipment to be used and, prior to lifting, make sure that the bearing zone is free and prearranged.
- 2) Always carefully check the lifting prior to use. Do not use any ropes slings or cords, which have, at any point, diminished in diameter more than 10%.
- 3) The hook lifting systems must be equipped with spring or gravity safety devices.

It is forbidden:

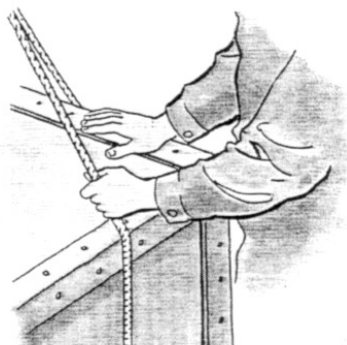
- 1) To use load slings or hooking systems different from the ones specified in this manual.
- 2) To make any changes on its own or use expedient means to hook up and lift the machine.
- 3) To use the tip of the hooks to lift the machine.
- 4) To carry out any manoeuvres which could compromise the hooks and ropes means.
- 5) During handling operations it to remove the blocks inserted by the manufacturer to prevent load unexpected moves and to keep same in central position for gravity means.

It is un-advisable to use slings, ropes or cords with divergence summit exceeding 120° angle beyond which the load varies a lot with small variations to the angle of use.

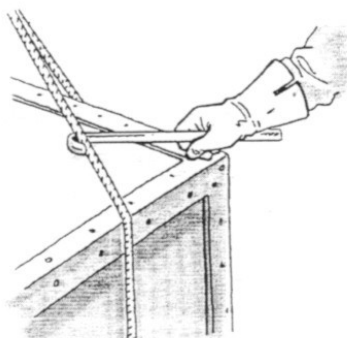


If during slings operations it is necessary to place the cords manually, then make sure to do it by positioning hands where there is no danger to be squashed.

WRONG



CORRECT

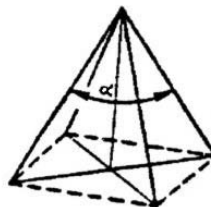


CAUTION! IMPORTANT

Handling and transport operations must be carried out by trained and qualified personnel, fork lift driver and crane operators to use cranes or bridge cranes.

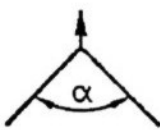
When the loads are lifted by sling it is a must to refer to the hereunder weight table concerning steel ropes and chains.

QUADRUPLE SLINGS



SERTOM M.M. S.p.A.

SLINGS OF STEEL ROPES

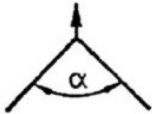
$\varnothing$ (mm)									
				$\alpha=60^\circ$	$\alpha=90^\circ$	$\alpha=120^\circ$	$\alpha=60^\circ$	$\alpha=90^\circ$	$\alpha=120^\circ$
				Kg					
6	250	185	500	425	355	250	400	315	224
8	400	300	800	670	560	400	630	500	355
10	630	470	1260	1060	900	630	1000	800	560
12	1000	745	2000	1700	1400	1000	1600	1250	900
14	1600	1195	3200	2650	2240	1600	2500	2000	1400
16	2000	1490	4000	3360	2800	2000	3150	2500	1800
18	2500	1865	5000	4250	3550	2500	4000	3150	2240
20	3150	2350	6300	5300	4500	3150	5000	4000	2800
22	4000	2985	8000	6700	5600	4000	6300	5000	3550
26	5000	3730	10000	8500	7100	5000	8000	6300	4500
30	6300	4700	12600	10600	9000	6300	10000	8000	5600
32	8000	5970	16000	13200	11200	8000	12500	10000	7100

NOTES

- 1) This table has been obtained from the UNI n. 00092 project and it refers to wire lines with a resistance not less than 160 Kg/mm^2
- 2) For the quadruple slings the α angle is the one within the two diagonally opposed chain strands. As the load is rarely equally distributed, the double sling load with the same gage must be considered as the managing load.
- 3) The minimum break load must not be minor than five times the safety load.

Table 3.2: Weight of the steel ropes

SLINGS OF CHAIN ROPES

							
		$\alpha=60^\circ$	$\alpha=90^\circ$	$\alpha=120^\circ$	$\alpha=60^\circ$	$\alpha=90^\circ$	$\alpha=120^\circ$
		Kg					
8	400	670	560	400	1320	1120	800
10	600	1060	900	600	2120	1800	1250
12.5	1000	1700	1400	1000	3350	2800	2000
16	1600	2650	2240	1600	5300	4500	3150
17.5	2000	3350	2800	2000	6700	5600	4000
19	2500	4250	3550	2500	8500	7100	5000
20.5	3200	5300	4500	3200	10600	9000	6300
24	4000	6700	5600	4000	13200	11200	8000
27	5000	8500	7100	5000	17000	14000	10000
30	6000	10600	9000	6000	21200	18000	12500
33	8000	13200	11200	8000	26500	22400	16000
37	10000	17000	14000	10000	33500	28000	20000

NOTES

- 1) This table has been obtained from the UNI 5427-64 and it refers to short, non-calibrated linked chains, such as UNI 4418 of special steel, with a traction resistance of 34÷42 Kg/mm²
- 2) For the slings of chain ropes the angle is the one within the two diagonally opposed rope strands. As the load is rarely equally distributed, the double sling load with the same rope diameter must be taken on as the managing load.
- 3) The minimum break load must not be less than six times the safety load.

Table 3.3: Weight of the link chains

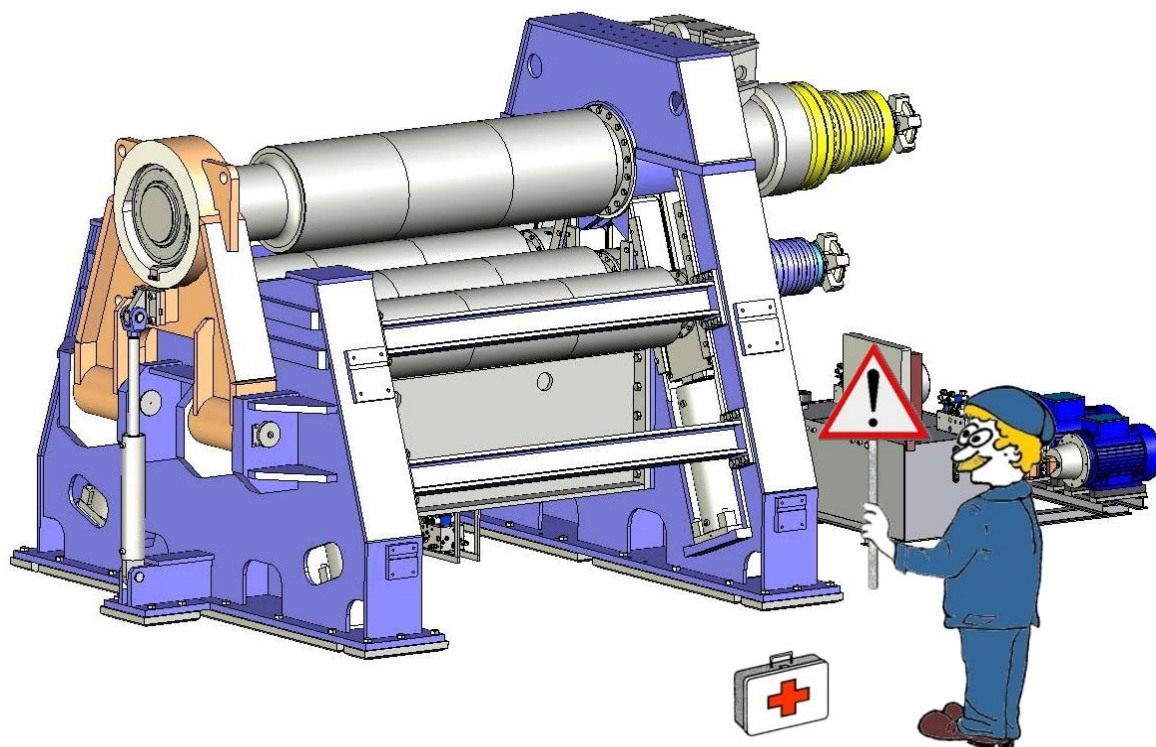
	CAUTION! IMPORTANT The boxes must be stored in adequately covered and protected areas according as per environment and climatic conditions.
---	---

When unpacking, check that the machine parts have not been damaged: remove the upper planks of the packing box and then the side planks.





chapter 4: SAFETY SYSTEMS AND DEVICES



-
- Safety devices.
 - Identification of operating personnel.
 - Work safety.
 - Analysis of residual risks.
 - Possible emergencies.
-





4.1 SAFETY DEVICE INSTALLED (MANUFACTURER'S MEASURES)

The machine has been manufactured in compliance with National and EC existing safety regulations according to the following categories of possible danger.

1) Mechanical hazards caused by movement

- ❖ Rolls movement
- ❖ Accessory devices movement
- ❖ Plate movement



Since it is not possible to eliminate this type of hazards, we identified as dangerous area of the machine the whole perimeter of the same, with a minimum distance to be defined by the customer after a discussion with Sertom M.M. S.p.A. technicians, inside that area the presence of non authorised personnel is forbidden.

The manufacturing of perimeter safety fences and protections for dangerous areas is at customer's charge, if there is no different agreements in the contract.

2) Hazards caused by pressurized fluids

- ❖ In the pipelines
- ❖ In the flexible pipes
- ❖ In the cylinders



All the parts working with pressurized fluids are firmly blocked and/or protected by special safety devices.

3) Electrical hazards

- ❖ Direct or indirect electric contacts
- ❖ Action on the equipment from the outside
- ❖ Failure causing by unexpected movement of the machine



Providing all the protections required after residual risks evaluation, we avoid all electric dangers.

- 4) Hazards generated by the non-application of the ergonomic principles
- 5) Hazards caused by faulty energy feeding or breakage of mechanical parts
- 6) Hazards caused by temporary loss and/or incorrect positioning of safety devices.



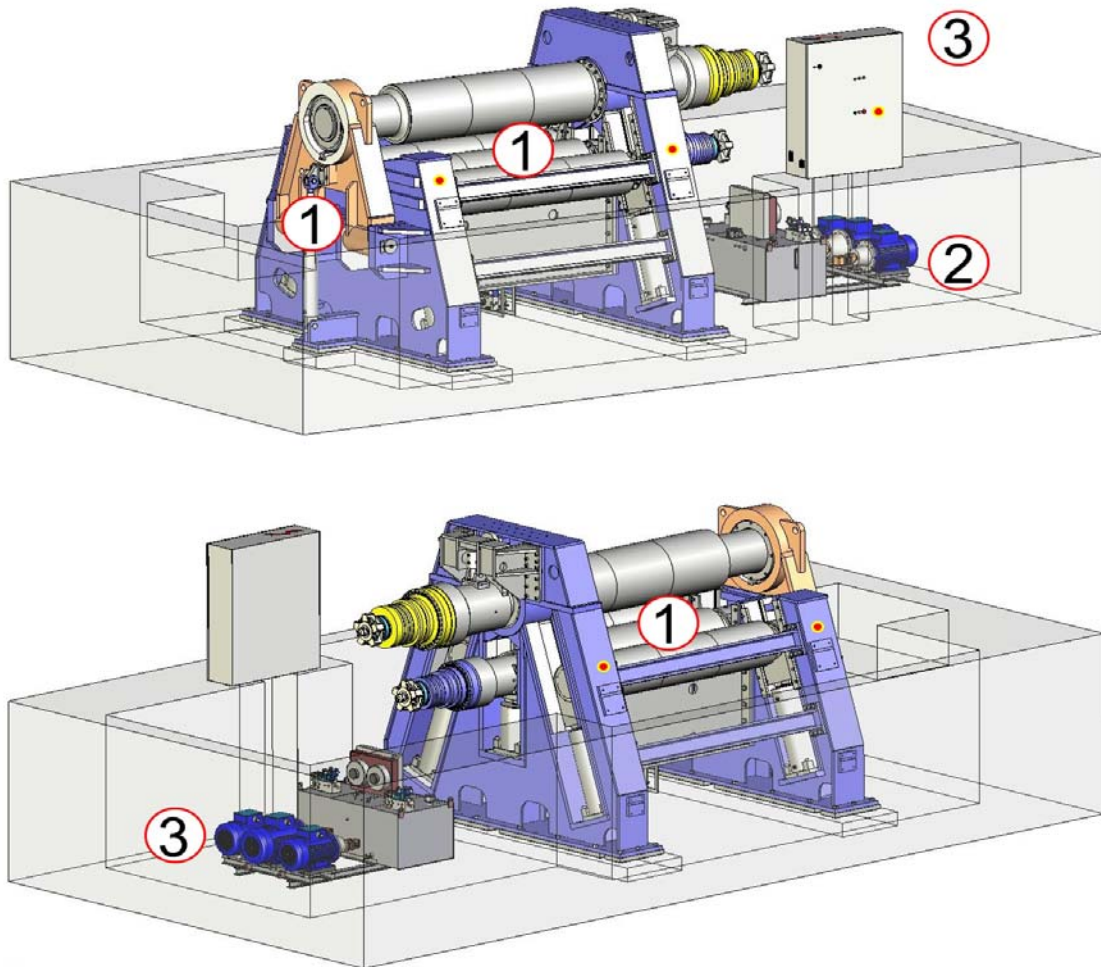


Figure 4.1: Layout of machine hazards

The safety devices described below have been adopted to overcome the above mentioned hazards:

Table 4.1: Operator's safety devices installed.

ITEM	DESCRIPTION	OPERATION
1)	Fixed and moving guards	Prevent the contact with parts in movement and/or fall of the operator, when the machine is installed in a pit.
2)	Emergency buttons	Stop of all parts in movement.
3)	Control cabinet door mechanical locking device	Opening of the main electric control panel by key or proper tool only.
4)	Peripheral trim wire (This device is fitted only if required for particular logistic requirements).	In case of interference it stops the machine
5)	Safety system of interlocked movements	Inhibits the start of drop-end device operation if the top roll is not in the uppermost position
6)	Discontinued flashing signalling on panel	Visual signal to indicate anomalies in course.



**CAUTION! IMPORTANT**

The machine may only be used with all safety devices in position and activated.

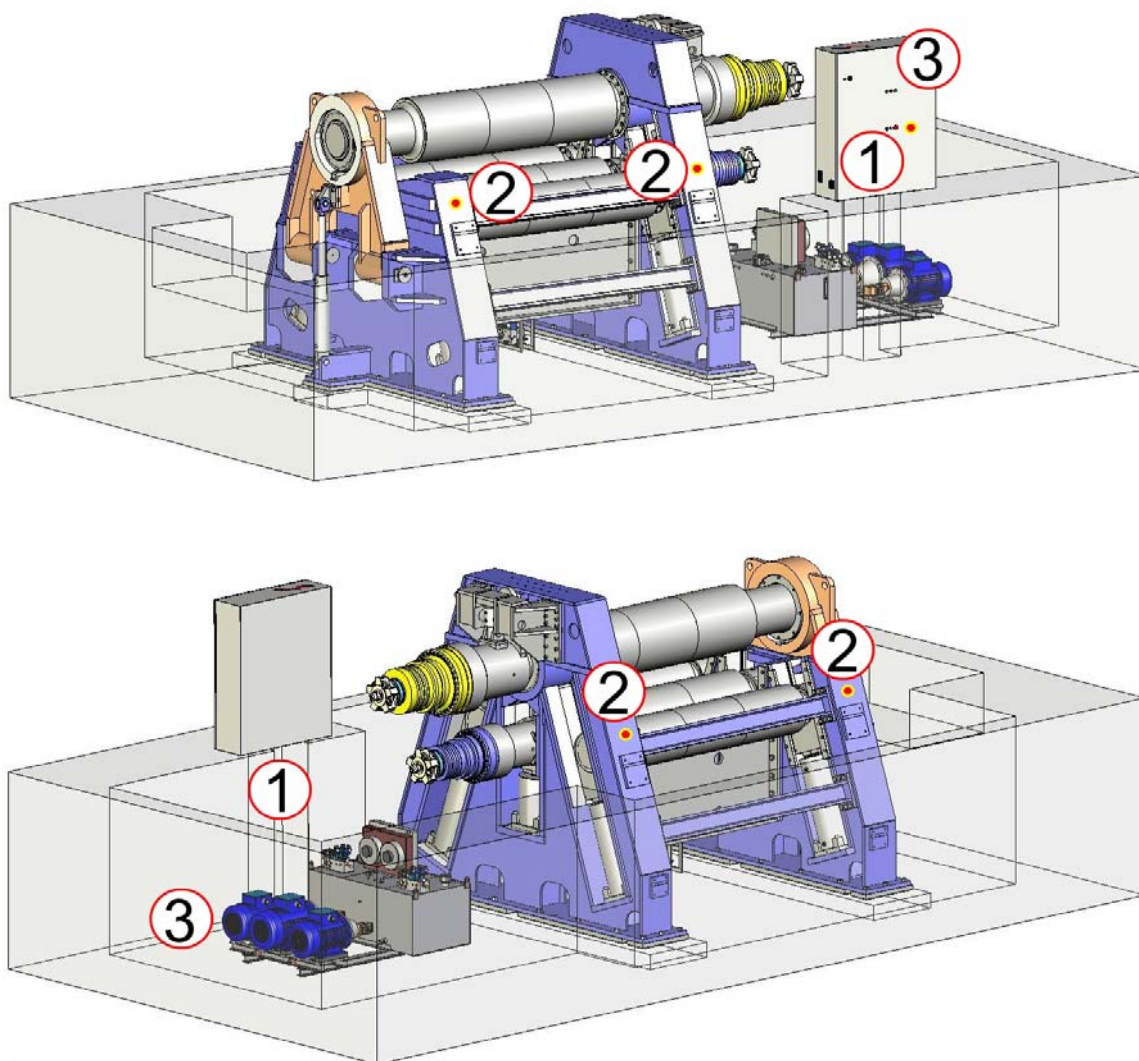


Figure 4.2: Layout of the safety devices installed

	CAUTION! IMPORTANT
	All the safety devices and guards installed on the machine must be in an excellent conditions by proper periodic maintenance made by qualified person and <u>according to the instructions of this user's manual</u>. (Please see Chapter 9). Improper operations can occur serious risks of injuries.

	Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY FOR DAMAGE CAUSED TO THINGS OR PEOPLE BY MISHANDLING, IMPROPER USE OR LACK OF MAINTENANCE ON THE INSTALLED SAFETY DEVICES.
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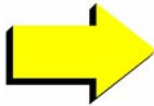
4.1.1 FIXED AND MOVING DEVICES OF PROTECTION

In order to guarantee the necessary safety requirements and to ensure operator's safety, the machine is completely encased in the following fixed and moving protective devices which:

- 1) Prevent access to the parts in movement;
- 2) Prevent access to the hazardous area with the upper limbs;
- 3) Ensure necessary safety space in order to prevent the crushing of body parts.

4.1.1.1 FIXED DEVICES OF PROTECTION

The cinematic driving commands designated to move the Bending machine RIMI 4RV Bull parts are totally protected by fixed devices so as to prevent access to the parts in movement. Normal workshop tools are used in order to open or remove the fixed guards, which are stably installed in position.



THE FIXED GUARDS MUST NOT BE REMOVED FROM THEIR POSITION. IN THE CASE OF UTMOST NECESSITY ONLY, REMOVAL CAN TAKE PLACE WITH THE MACHINE AT A STANDSTILL POSITION. THE GUARDS MUST BE ABSOLUTELY REPLACED AS PER PREVIOUS CORRECT POSITION PRIOR TO WORK RESUMPTION.

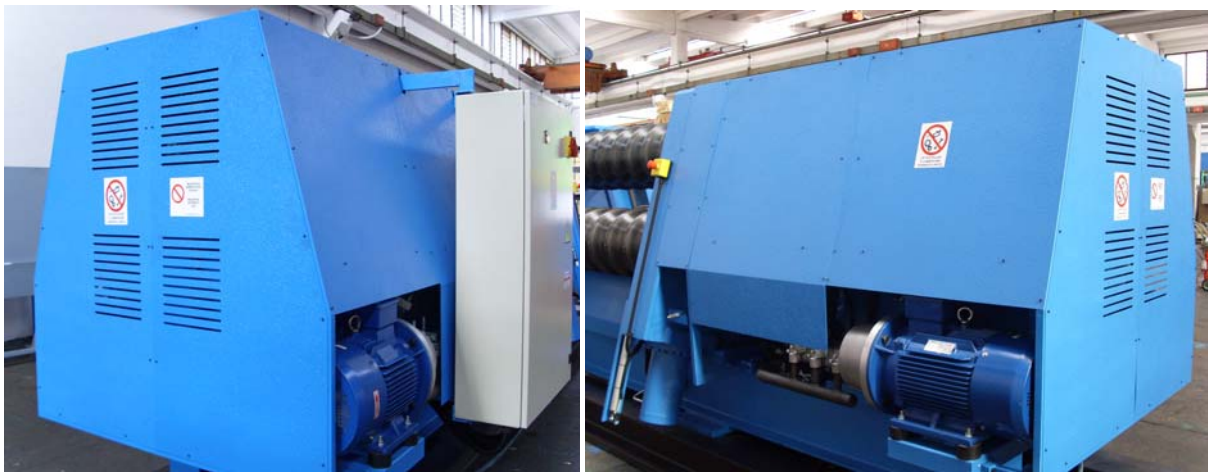


Figure 4.3: Examples of fixed guards



	CAUTION! IMPORTANT
	When the machine is installed in a pit, fixed protections can only be partial. Their function, in this case, is replaced by the walls and the coating of the pit. The manufacturing of perimeter safety fences and protections for dangerous areas is at customer's charge, should there not be different agreements in the contract.

4.1.1.2 MOVING DEVICES OF PROTECTION

The moving guards are interlocked, that is equipped with a limit switch or different safety sensor with electromechanical unlocking device, which allows access to the machine when this is motionless.

When the guard is opened or unlocked, it is not possible to set in motion any part of the machine and the guards can be locked only if any guard is closed.

The interlocking system depends on actuators (actuator end-switch control) and special keys (end-switch unlocking key and unlocking requirement selector key) and therefore there is some risk connected to the actuators copies and those special keys.

	CAUTION! DANGER
	It is recommended for final users to avoid availability actuators and special keys copies on which interlocking system depends , unless in the case of absolute necessity.

In this category there are:

○ **Door of main control and cabling box with interlocking.**

The disconnecting switch is equipped with interlocking device in order to prevent the opening of the door of the main electrical panel.

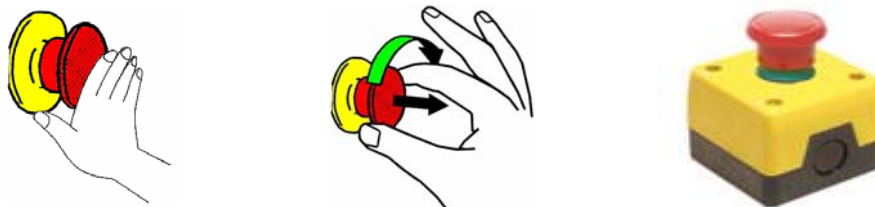
The disconnecting switch is also provided with padlock in order to guarantee the necessary safety during the maintenance.



4.1.1.3 ELECTRICAL, HYDRAULIC AND ELECTROMECHANICAL SAFETY DEVICES

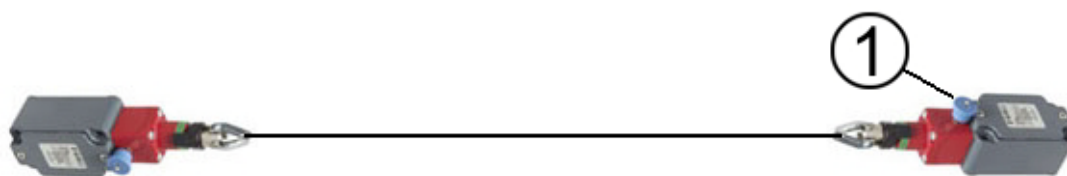
○ Emergency pushbuttons

These disconnect electric supply to the equipment, permit the arrest of the pump and also thereby of the machine in the case of an accident. The push buttons are visible and easy to select as they are in mushroom shape and are in red against a yellow background in accordance with the legal norms. When you clockwise rotate emergency push button and pull it toward the external part, you reactivate it.



○ Safety Side Cord

It is a string which connects two rope switches located on the front side and rear side of the machine. When they are intercepted by the operator, they produce the same effects of a mushroom-shaped emergency push button. Pressing the push button (1) you can reactivate these safety side cords.

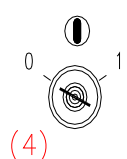


OPTIONAL

This device is fitted only if required for particular logistic requirements

○ Key selector for push button panel disabling

On the control panel there is a key selector which disable all the controls of the push button panel so that no one can use the push buttons and selectors of push button panel when the operator/ maintenance worker is working on the machine.

	Key selector with two fixed positions	0	Auxiliary circuits OFF and control console disabled
		1	Auxiliary circuits ON, live control console and programming panel (if any) activated.



CAUTION! DANGER

We recommend to the operator/ and/or maintenance worker on service to disable the control panel and to take away the key when they leave the control panel and not to give to other people copy of the key, if not strictly necessary.



○ Hydraulic circuit max pressure safety valve

They prevent an dangerous build-up of pressure, opening hydraulic circuit when pressure exceed a set value

The following drawing shows the exact position of emergency push buttons on the machine and of safety side cord.

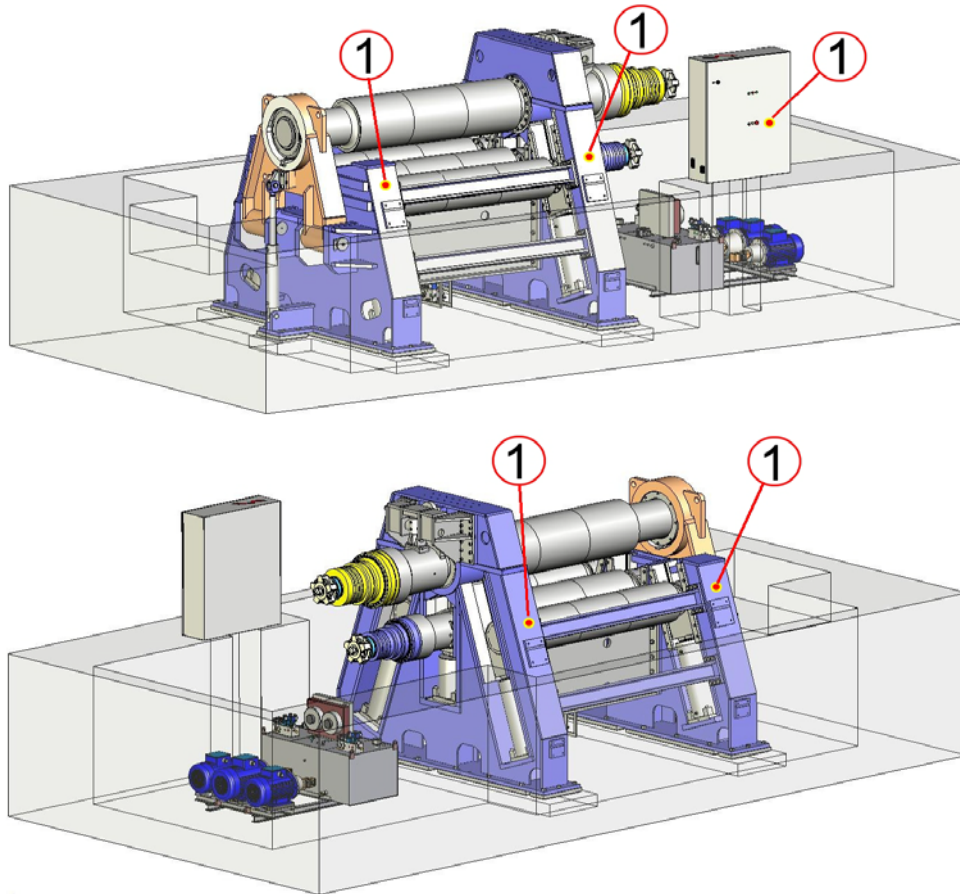


Figure 4.4: Position of emergency push buttons.

Apart from the listed devices, the following safety aspects have also been prearranged in accordance to existing regulations:

- ❖ Control push buttons are coloured and/or luminous with indication of functions carried out by graphical or written signs.
- ❖ Each selector position corresponds to only one functioning mode and the command selected has priority on other control systems excluding the emergency stop.
- ❖ Automatic operation remains excluded without the possibility of being activated when movements are inserted with the manual commands.
- ❖ The working cycle cannot be accidentally started.
- ❖ The safety signalling is present at working positions.

Installed safety devices allow the operators to run the machine in safe conditions both during regular machine operation and during maintenance operations.

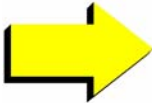


	CAUTION! IMPORTANT
	<u>It is compulsory to switch the motors OFF</u> in all the cases in which it is necessary to carry out rolls maintenance, mechanical-electrical adjustments. Opening the protective devices when the machine is running has the same effect as actuating the emergency button; subsequently it is necessary to re-start the machine.
	CAUTION! IMPORTANT
	The Bending machine RIMI 4RV Bull Sertom M.M. S.p.A. are built in accordance with the European Community obligatory norms, which in the case of connection with automation peripherals devices also provide appropriate protection barriers.

4.1.2 **LIGHTING SYSTEM OF THE WORK STATION**

The artificial lighting has to be suitable for all kinds of work regarding intensity, quality and spot-light location.

It is particularly important to check the lighting in the work place according to the obligatory standards.

	FOR SAFETY AND ORGANIZATION REASONS WE ARE OBLIGED TO INFORM YOU THAT ANY MECHANICAL, HYDRAULIC, ELECTRIC, ELECTRONIC OR SOFTWARE CHANGES MADE ON OUR MACHINE BY UNAUTHORISED PERSONS WILL IMMEDIATELY RESULT IN: ○ INFRINGEMENT OF ALL ASPECTS OF THE WARRANTY IMMEDIATELY; ○ NO RESPONSIBILITY ON OUR PART IN THE CASE OF WORK ACCIDENT.
---	---



4.2 IDENTIFICATION OF OPERATING PERSONNEL

Being the operators classified according to levels based on their specific competence, it is recommended, to guarantee individual safety according to the existing rules, that each operator carries out only the work which he's qualified for.

To help to identify the different operative levels, this manual makes use of symbols, indicating the minimum qualification requested for each specific operation. The use of these symbols at the beginning of the text or section page indicates that the operation described is exclusively the competence of the identified operator according to the difficulty or danger of the operations themselves.

Here below are the symbols and descriptions of the competence levels for the machine function.



Machine operator

This symbol indicates personnel suitable for managing the system in normal working conditions, using the foreseen on-board controls and without excluding any of the foreseen safety devices.



Programmer

This symbol indicates personnel, in charge of preparing the work programmes for the foreseen production, select working parameters, prepare and programme necessary equipment for carrying out the working cycle.



Ordinary service personnel

This symbol indicates personnel in charge of ordinary maintenance interventions, preventive and non-, such as cleaning, level controls, oil changes, regulating, etc.



Extraordinary service personnel

This symbol identifies personnel in charge of extraordinary maintenance operations (repairing accident faults), in the mechanical, fluid mechanics and electric fields. This personnel is qualified to operate with all foreseen precautions, with some of the safety devices excluded.



Specialized technician

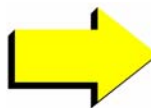
This symbol identifies skilled technical personnel capable of carrying out any type of intervention in any part of the plant. The manufacturer is supplying this personnel.

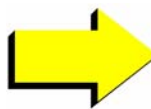
The levels described remain the exclusive care and responsibility of the user with the exclusion of the "**SERTOM SPECIALIZED TECHNICIAN**" who is sent by the manufacturer himself.

Depending on the specific company reality, it is possible that:

- One operator can assume more than one operating level:
 - ❖ Machine operator / programmer.
 - ❖ Machine operator / ordinary maintenance.
 - ❖ Ordinary maintenance / extraordinary maintenance.
 - ❖ Etc.
- An operating level is covered by more than one person.
 - ❖ Ordinary maintenance mechanic / electrical / fluid mechanic / etc.

	CAUTION! IMPORTANT
	Only one operator is permitted in the working area; access to the machine is prohibited to any other persons.

	Sertom M.M. S.p.A. CANNOT BE HELD RESPONSIBLE FOR ANY OPERATORS CHOSEN BY THE USER, FOR THEIR TRAINING OR EFFECTIVE PROFESSIONAL COMPETENCE.

	UPON CLIENT REQUEST, Sertom M.M. S.p.A. WILL ORGANISE SPECIFIC AND QUALIFYING TRAINING COURSES.



4.3 **WORK SAFETY**



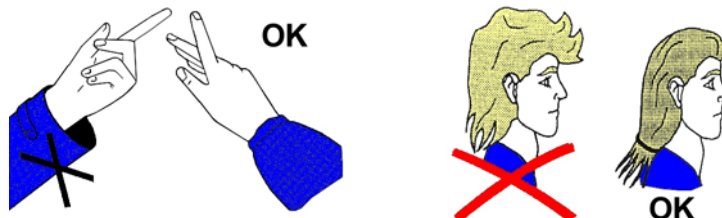
4.3.1 **GENERALITY**

The machine has been engineered and constructed in conformity to rules and regulations concerning safety devices, sanitary ones and fire prevention and is sent to customer as per contract specification.

The operators responsible for the machine operations, assembling and maintenance must however respect provisions in force regarding accident prevention and particularly referring to:

1) Use of individual protective devices foreseen:

- ◆ Wear a safety helmet (for maintenance);
- ◆ Wear gloves (for maintenance and pieces loading and unloading);
- ◆ Wear overalls (avoid wearing loose clothing, necklaces, rings and bracelets, which could get entangled in the moving parts).
- ◆ Wear safety glasses and masks for protection from splints, dust and smoke;
- ◆ Wear protective shoes against the risk of falling material..

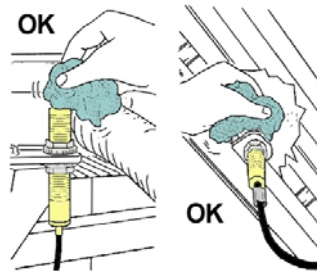


2) Pay attention to warning signals regarding possible danger near the machine.

3) Avoid obstructing or difficult access to emergency switches..



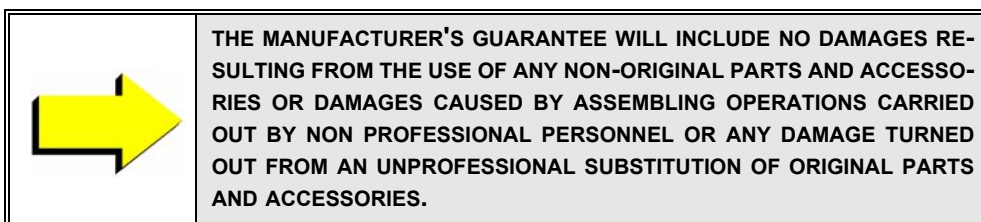
- 4) Keep the photoelectric cell always clean, wiping the reading surfaces with non-treacy rags or with a light blow of compressed air



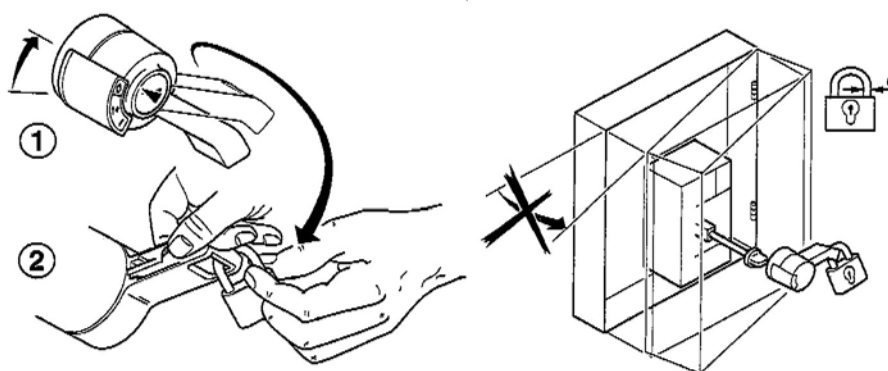
- 5) Do not go near the machine with free flames.
- 6) Do not use the machine above its loading and power limits.
- 7) Do not carry out checks with the machine in movement.
- 8) Start the various machine components only when they are free of personal or foreign objects.
- 9) Make sure that the area around the machine allows easy passage for operators.
- 10) Carry out a compulsory machine check at least once every working shift to make sure that there is no damage or externally notable difficulty. Any subsequent modifications (including working programmes) must be immediately communicated if they compromise the safety aspects. The machine can be used only in perfect conditions.
- 11) Daily check that the emergency and various safety devices of the machine are functioning and make sure, before start of operation, that they are working properly.
- 12) Check the machine earth system efficiency and in case of possible damage to the earth protection system put the machine at rest to avoid undesired or accidental start-up.
- 13) Stop the machine in case of damage or fault to a safety device, until it is serviced and again operational.
- 14) The evacuation of waste materials or residues must always be carried out when the machine is stopped. Whenever any intervention must be carried out inside the danger zones, this must be done using the appropriate equipment by skilled personnel wearing protective clothing.
- 15) Place the machine out of order for safety reasons, and follow the relative instructions in case of dismantling during its installation, repair or maintenance. At the end of these interventions reset the safety devices checking their operation.
- 16) Use only original spare parts obtained from **Sertom M.M. S.p.A.** spare parts service.



- 17) Always use protection fuses or automatic switches in conformity to the ones indicated by the existing safety regulations, of correct value and with suitable mechanical features.



- 18) Do not carry out any internal or external intervention, if not under the supervision of another person able to intervene in case of assistance.
- 19) Use, regulation or setup operations should be handled by one person only, forbidding access to the machine by no authorized people and if possible excluding the guards.
- 20) Do not use compressed air to remove chipping or for cleaning pieces or parts of the machine as this could cause injury with the parts moved by the air jet.
- 21) Carry out washing and/or maintenance operations, indicated in this manual with the symbol on the right, with the main switch "open" and locked in the "off" position. It can be done by turning the handle to 0-position and inserting padlock as per figure. Door or cover interlock is now effective.



- 22) It is compulsory to fix an appropriate warning on isolating devices (switches, isolating switches, valves, etc.) which forbids reinsertion, and if possible to lock these devices, during maintenance or other operations requiring the isolation of energy sources.

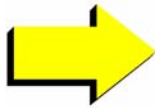


23) All service products must be used respecting the manufacturer's technical and toxicological specifications. All service products (in particular lubricants and detergents) must be used observing the instructions. Where the manufacture supplies a safety specification this should include the following indications, which absolutely must be respected:

- chemical characteristics
- physical-technical safety data
- transport
- specifications
- safety measures, storing and treatment
- measures to be taken in case of accidents or fire
- ecological data
- toxicological data



This applies particularly to the correct disposal of service products. The producer's specifications gives information regarding the appropriate means of disposal, which document will be supplied upon request.



Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY FOR POSSIBLE DAMAGE OR INJURY CAUSED TO THINGS OR PEOPLE DUE TO NEGLIGENCE OR NON-OBSERVANCE OF REGULATIONS.



4.3.2 SAFETY IN MACHINE-EQUIPPING PHASE.



The operator's behaviour during the machine-equipping phase is described here below.

- **Equipping phase**

	CAUTION! IMPORTANT
	1) During the machine-equipping phase for assembling of a roll with different dimensions and in all those cases where operations must be carried out either inside or outside the machine, <u>the operator must switch off the motors and lock the main switch at OFF using a padlock.</u> 2) All the services of machine driving in equipping phase have to be carried out by one person only. Unauthorized people must not be admitted to the machine.

Once the above mentioned phase has terminated, then the check phase begins.

- **Checking phase**

The checking phase, after finishing the roll installation, is carried out by selecting low speeds through proper selectors as described in this Technical Handbook. (Please see [Chapter 6.1.2 on page 6.5](#)). In this phase rolls movements are very slow.

	CAUTION! DANGER
	All the services of adjustment or tuning must be carried out by one person only. Unauthorized people must not be admitted to the machine. Protective barriers must be present.

The key selector together with the controls held and slow movements of the machine, guarantee that the operator cannot inadvertently gives commands during the equipping phase.

- **Necessity of a new service**

In order to carry out any new service on the machine the operator must turn off the pumps and repeat the operations of "Equipping phase".



4.4 ANALYSIS OF RESIDUAL RISKS

The machine has been manufactured according to the National and EC safety regulations and the possible hazards that may be caused by the working operations have been taken into account.

The safety measures and devices adopted by the manufacturer do not totally cover the operator from all risk of accidents. The following table lists a series of hazards, which could not be to totally eliminated.

If the machine is fitted with the possibility to carry out hot rolling (Optional item), the technological process requires the use of material with very high temperature, therefore the working temperature could extremely be dangerous and cause the following risks:

- 1) Risk of fire ;
- 2) Risk of fumes coming from the combustion of residuals on the plates;
- 3) Risks caused by contact with hot metal.

Therefore, it is essential to provide a proper fire-extinguishing plan and prescribe wearing of individual protective devices during the use of the equipment. It will be at operator's care the cleaning of the machine moving site prior to start every working cycle.

Table 4.2: List of residual risks

No	TYPE OF HAZARD	CONDITIONS DETERMINING THE HAZARD	INSTRUCTION TO ELIMINATE HAZARD
1.1	Crush hazard.	Possibility to crush fingers during the contact with the plate.	During machine running, the operator absolutely must avoid pushing or following the plate to be worked.
1.8	Friction and abrasion hazard.	Contact with plate to be worked, because this always shows surface defects, which could harm hands.	During machine running, the operator absolutely must avoid touching the plate to be worked.
4.	Hazards arising from noise	A) When the machine is running with no load, the noise level is acceptable but can become unacceptable when working at full load	A) Service the machine as instructed, to keep the no load noise at original level.



No	TYPE OF HAZARD	CONDITIONS DETERMINING THE HAZARD	INSTRUCTION TO ELIMINATE HAZARD
7.1	Hazards caused by contact or inhalation of fluids, gas, fog, fumes and dust which have a dangerous effect.	A) Contact with hydraulic fluid. B) Contact or inhalation of smoke and/or dust from the working of some types of materials and from the combination of coolant and/or working material.	A) Avoid ingestion, eyes and skin contact by wearing suitable clothing. For first aid treatment see the product technical sheet. B) Check that the smoke and dust produced are not an hazard for human beings. C) Install smokes and dust suction devices.
7.3	Biological and microbiological hazards (virus and bacteria).	A) Possible formation of bacteria or moulding in the hydraulic liquid collecting tank.	A) Periodically replace the liquid according to the supplier's recommendations.
8.3	Lack of personal protection devices.	A) Falling pieces (during maintenance phase or equipping) with possible injury to operator feet. B) Possible finger pinching during working phase or movement. Hands burns caused by translating parts. Contact with irritating liquids or dust. C) Contact with moving machine parts (rotating or translating). D) Inhalations of harmful smoke or dust. E) Excess noise.	A) Wear protective shoes properly shielded. B) Wear suitable gloves. C) Avoid wearing loose clothing. D) Wear the appropriate mask. E) Wear appropriate ear protection.
8.5	Excess or lack of concentration. Tension.	A) Unsuitable or incorrectly trained operator.	A) Choose a suitable operator for the kind of machine and adequately train him to use the machine.
10	Hazards caused by faulty electrical feeding, breakage of machine parts and other abnormal operation.	A) Sudden, accidental and unforeseen faults.	A) Immediately press the emergency mushroom-head push button.



No	TYPE OF HAZARD	CONDITIONS DETERMINING THE HAZARD	INSTRUCTION TO ELIMINATE HAZARD
11	Hazards caused by the temporary absence and/or incorrect positioning of safety measures.	A) Safety devices inhibition. Alteration of start-up and stop devices. Removal of devices for power supplies interruption.	A) Operations indicated herein can be carried out only by specialised and trained personnel duly authorised in the following cases: ❖ Installation and machine first start-up. ❖ Extraordinary maintenance. ❖ Technical assistance.

In order to avoid all dangers described it is absolutely necessary for the operator to know the correct operations and use of the machine before use it.



These risks can be identified and eliminated by paying the utmost attention to the safety warning plates on the machine and by following the information given in the present user's handbook. The following warning signs are affixed onto the machine. Strict and careful attention must be paid to these instructions.

Caution: live electrical equipment

This symbol indicates that the parts concerned present risks of electrical shock, if the interventions are not carried out in accordance with the safety regulations.



Cut off power supply before starting

The danger stops when the electrical supply is completely disconnected from the main switch in the electrical equipment box, **with the exception of the main switch itself, which remains under voltage till the power plant network is isolated.**



Caution: crushing

This symbol indicates that the parts can present risks of squashing, if the interventions are not carried out in accordance with the safety regulations.



Caution: general danger

This symbol indicates that the parts can present risks of physical injury if the interventions are not carried out in accordance with the safety regulations.



Caution: burns

This symbol indicates that the parts can present risks of burns, if the interventions are not carried out in accordance with the safety regulations.



Caution: moving parts

This symbol indicates that the parts can present risks of squashing or being trapped if the interventions are not carried out in accordance with the safety regulations.

Do not repair or adjust parts during movement.



Caution: check the earth connection

This symbol indicates that before starting work it is compulsory to check the equipotential connection efficiency.



4.4.1 PERSONNEL TRAINING

The use of the machine in safety conditions and the use of personal protection devices during the operation require a level of performance and qualifications which include:

- ❖ Knowledge of the machine;
- ❖ Knowledge of permitted and non permitted operations;
- ❖ Knowledge of permitted ordinary maintenance interventions;
- ❖ Capability of intervening, in emergencies, to block the machine in safety conditions.

This can be reached with the following systems:

1) Careful reading of the user's handbook.

To better understand the matters treated in the user's handbook it is advisable that the operator has a basic knowledge of general mechanics, of machine tools, and their common use.

2) Attainment of objectives set by an optional training course, which must be agreed upon with Sertom M.M. S.p.A. .

Thanks to the training course, the operator must acquire the fundamental criteria for the correct use of the machine in safe conditions for himself and other surrounding people.

4.4.2 OPTIONAL TRAINING COURSE



The courses are held by qualified **Sertom M.M. S.p.A.** , personnel or authorised by the latter in its seat or that of an agent, or directly at the customer's premises.

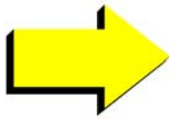
The courses are made up of a theoretical part regarding the basic machine knowledge and its components and a practical part carried out directly on the machine regarding its use and maintenance.

During the courses, various educational materials such as user's manuals, drawings, tables, etc. are used. This handbook is also considered as educational material, same is for the one concerning the electrical equipment and the use and programming of the central control unit.

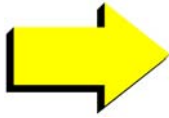
The course programs are established according to the objectives to be reached, previously agreed, and subdivided as per hereunder subjects:

- ❖ Technology of the machine's type;
- ❖ Procedures for putting the machine into and out of service;
- ❖ Use of the machine commands;
- ❖ Criteria for machine conduction;
- ❖ Machine operating exercises (use, maintenance, and emergencies);
- ❖ Safety requirements.





ALL PERSONNEL ENCHARGED WITH COMMANDING, MAINTAINING AND REPAIRING THE MACHINERY MUST PREVIOUSLY HAVE READ AND UNDERSTOOD THE TECHNICAL DOCUMENTATION. WRITTEN CONFIRMATION OF THE ABOVE IS ADVISABLE.



IT IS NECESSARY TO APPOINT ONE PERSON WHO IS RESPONSIBLE FOR COMMANDING, CONDUCTING, MAINTAINING AND REPAIRING THE MACHINERY; OTHERWISE SAFETY COULD BE SERIOUSLY COMPROMISED.



4.5 POSSIBLE EMERGENCIES

4.5.1 FIRE



In case of fire it is advisable to refer to the established emergency plan wherein the machine is positioned and put it into operation, and if the machine is functioning, it must be immediately isolated from the electric power network, by opening the differential switch, positioned upstream.

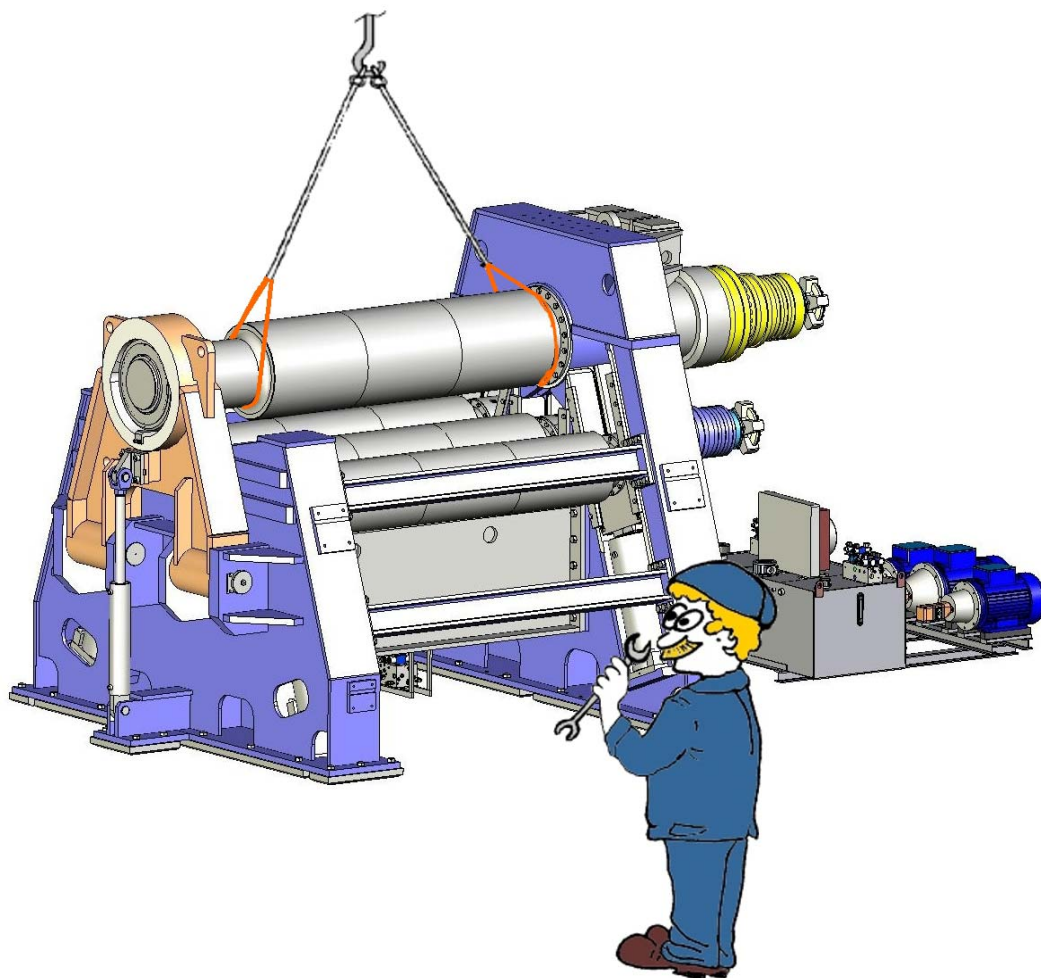
Extinguishers must be handled with the best attention and in observance of the legislative regulations.

- ◆ Act according to the instructions received, bearing clearly on mind that parts of the machine are electrical apparatus, therefore the use of fire hoses and foam extinguishers is forbidden.
- ◆ Pay attention to the signs indicating the areas where the use of water hoses is dangerous.
- ◆ The instructions and procedures to be implemented using an extinguisher are indicated on the front of the cylinder.
- ◆ Compatibly with the entity of the fire, the alarm must be raised immediately for the purpose of getting outside help

	CAUTION! DANGER Remember that halogenous hydrocarbon extinguishers, despite using a particularly clean extinguishing agent, suitable for electronic circuits and systems are developing poison gas. It is a must therefore to refresh the area after use.
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chapter 5: INSTALLATION AND START-UP



-
- Installation preparation
 - Machine installation
 - Wiring and connection
 - Supply
 - First start-up and cold trials
-



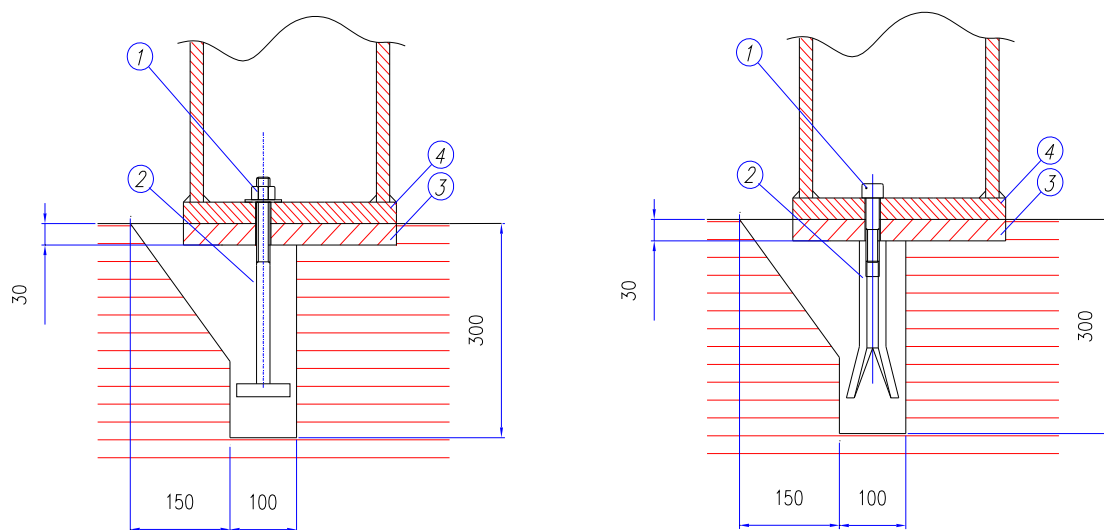


5.1 PREPARATION FOR INSTALLATION

Qualified personnel according to the indications in the user's manual must place the machine in position. The levelling, first start-up and inspection are usually carried out by I **Sertom M.M. S.p.A.** personnel.

5.1.1 PREPARATION OF THE FOUNDATION SURFACE

The machine can be installed on the floor or in a pit, but anyway it must be fixed to foundations through proper systems, which are sketched in the following figure. Other type of anchorage can be agreed with **Sertom M.M. S.p.A.** technical office.



DESCRIPTION	
1)	Fixing screw
2)	Cramp with threaded hole
3)	Kickback plate
4)	Machine foot

Figure 5.1: Anchorage systems



The real position and number of anchorages, the loads characteristics carried by the supports, and all the other information regarding set up geometry for foundation and supply are in the drawing "**WORKING CELL LAYOUT - FOUNDATIONS**" enclosed in this user's handbook.



	CAUTION! IMPORTANT
	To position the machine you need to arrange accessibility areas suitable to allow use and maintenance operations. You need, therefore to stick to the attached drawing WORKING CELL LAYOUT - FOUNDATIONS.

The bending machines with small weight and small overall dimensions can be installed directly on the floor, the ones with heavier weight and big size must be positioned into a pit, in order to have the lower rolls at the working height of about 300/900 mm, which is the ideal one.

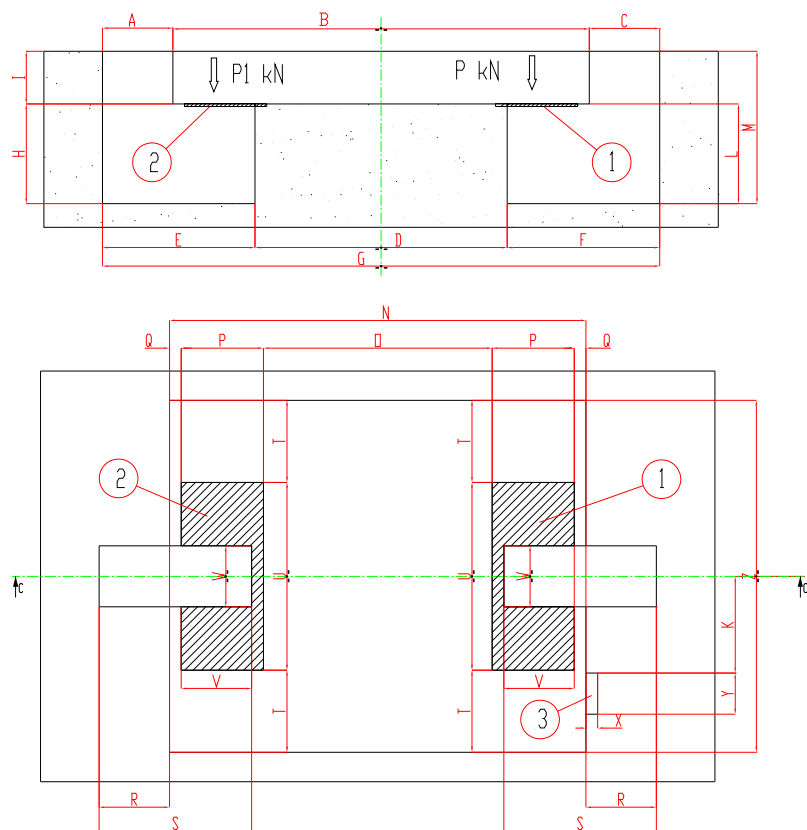
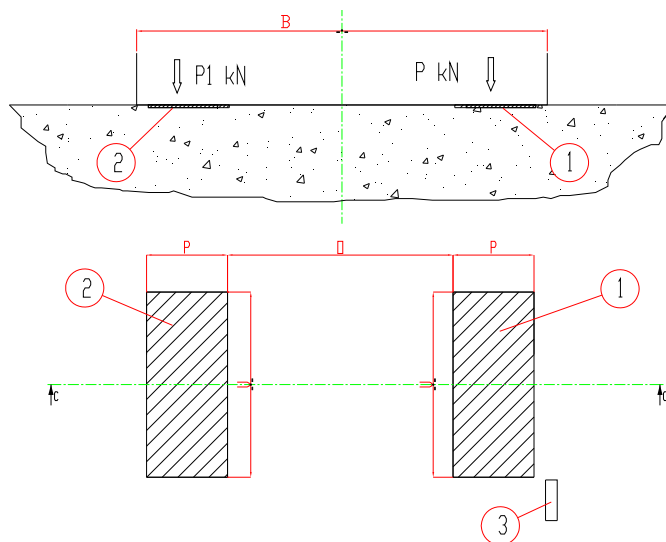
	CAUTION! IMPORTANT
	In case the customer need to change the working height, there will be the need to adjust foundation pit depth and immediately contact Sertom M.M. S.p.A. .

The foundation must be prepared with care by the customer, based on the machine weight and the ground type, but the thickness must be sufficient to allow the use of anchorage systems. The foundation must be timely prepared to allow the machine placement on a solid foundation.

To easier installation operations, the maximum care along with the maximum level of precision and finishing must be paid to carry out the construction works.

	CAUTION! IMPORTANT
	The machine efficiency and precision depend upon its exact positioning and the mechanical and geometrical features of ground fixing devices.



**EXAMPLE OF INSTALLATION INTO FOUNDATION PIT****EXAMPLE OF INSTALLATION ONTO THE FLOOR**

- 1) Rear plate 2) Front plate 3) Cables passage chamber

Figure 5.2: Foundation examples (Figure indicative)

5.1.2 NECESSARY EQUIPMENT

In order to correctly install the machine the personnel responsible for this operation must have the following equipment.

- ◆ Crane or bridge crane with adequate capacity.
- ◆ Sufficient number of metallic ropes and chains for harnessing and lifting the machine as described in this user's manual. (Please see [Chapter 5.2.1 on page 5.7](#)).
- ◆ Nr 2 sets of normal workshop tools.
- ◆ Nr 1 torque spanner or impact wrench.
- ◆ Nr 1 level indicator.



Sertom M.M. S.p.A. will ask the customer to arrange additional material, if required .

5.1.3 ACCESS TO INSTALLATION AREA

The assembling area must be entire accessible and provides around of the machine appropriate space for the machine's disassembling and running in the both phases: during its work and maintenance. During positioning is therefore necessary to carry out the indications of the drawing "Foundations Plan" enclosed in this instructions handbook (Please see [Figure 12.4 on page 12.11](#)).



5.2 MACHINE INSTALLATION



Being installation and first start-up are carried out by **Sertom M.M. S.p.A.**, technical details regarding the same are omitted, some notions regarding the machine positioning are given anyway.

	CAUTION! IMPORTANT
	The machine has not been engineered to operate in explosive surroundings. Installation and use in such areas are strictly forbidden.

5.2.1 LIFTING

When the structural geometry, the dimensions, the weight and the typology allow it, the machine is delivered completely assembled, otherwise it is divided into parts fit to get transportable packages and then re-assembled at the final destination.

A big size machine, which is installed into a pit, complete with all the accessories and delivered on a truck, could be divided into the following parts.

Table 5.1: Parts of the machine

PACK	DESCRIPTION	PACK	DESCRIPTION
1)	Top roll group	2)	Pinching roll group with reduction gear
3)	Side roll	4)	Front shoulder
5)	Right side roll group	6)	Left side roll group
7)	Rear Shoulder	8)	Hydraulic motor + reduction gear
9)	Drop -end group with cylinder	10)	Beams
11)	Hydraulic unit	12)	Control consolle
13)	Flag	14)	Control cabinet
15)	Right side arm	16)	Left side arm
17)	Anchoring plates	18)	Cases

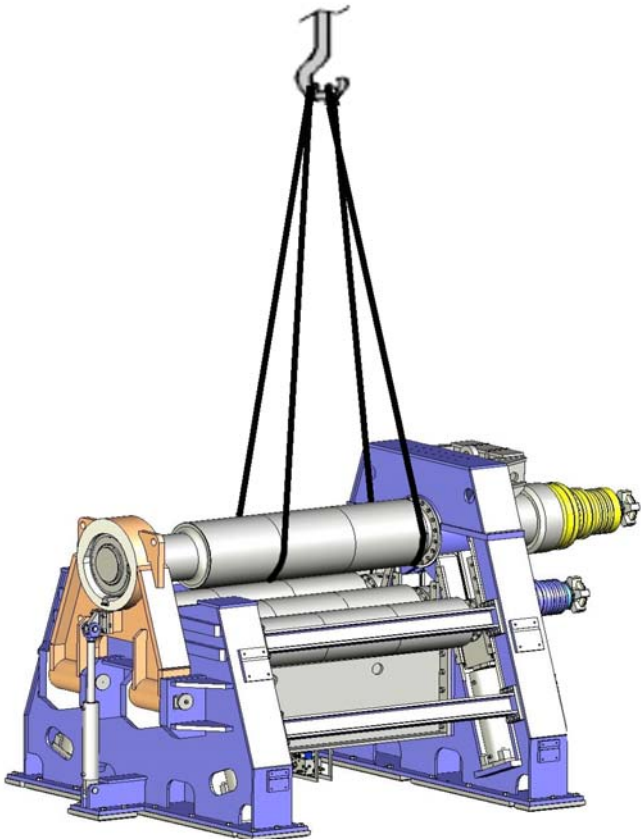
Handling of the unpacked machine or machine parts, from the unpacking area to the installation area MUST be carried out exclusively using appropriate lifting devices.

The machine can be handled through bridge crane or self-movable crane, which have the capacity suitable to handle the structure weight, written in the Packing List attached to this Technical Handbook. (Please see [Chapter 12.2](#))

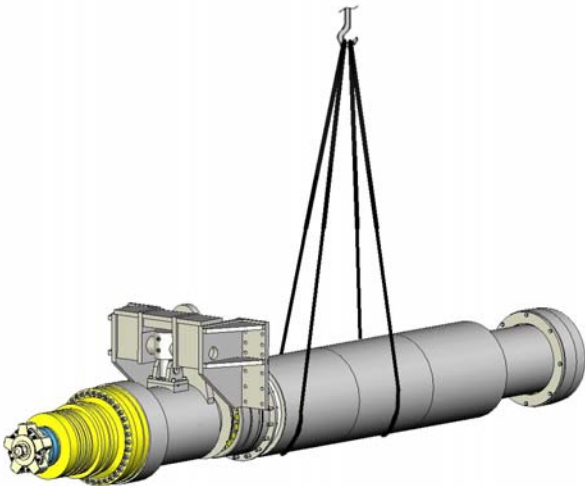
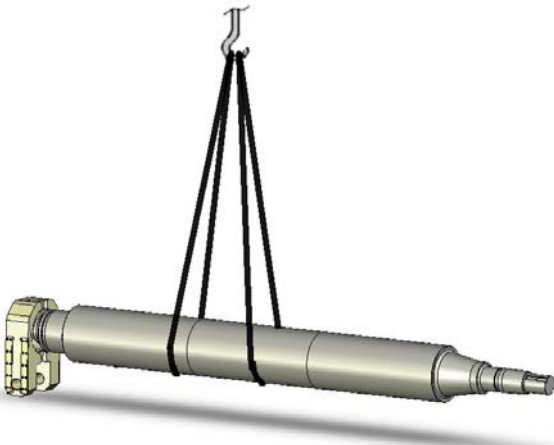
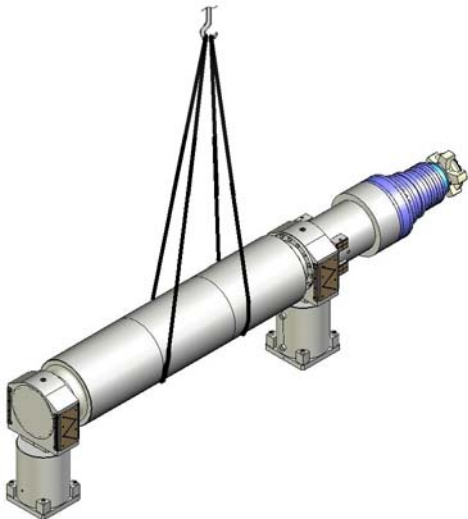
The handling system of each and single parts is shown in the following Figures, where you can find the lifting indications and the length of the cables required for this operation and the required capacity.

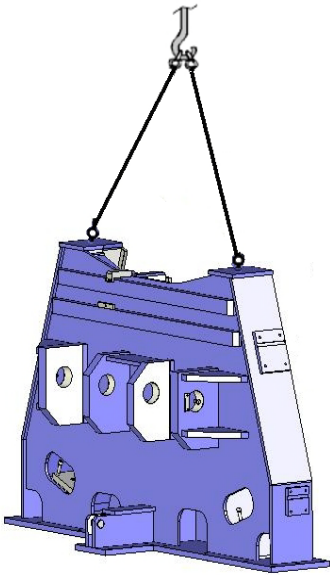
	CAUTION! IMPORTANT
	The machine must not be hooked up in any points other than those indicated, but it must be hooked up through the suitable lifting means.

Table 5.2: Lifting examples

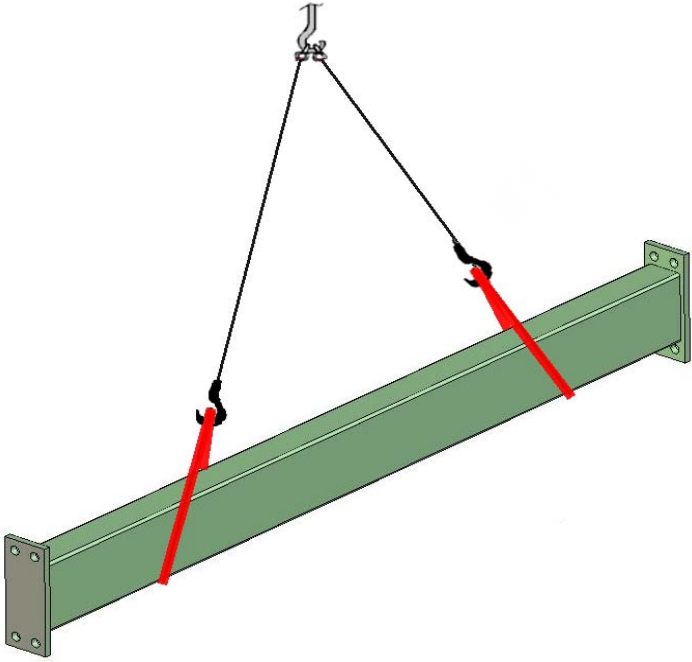
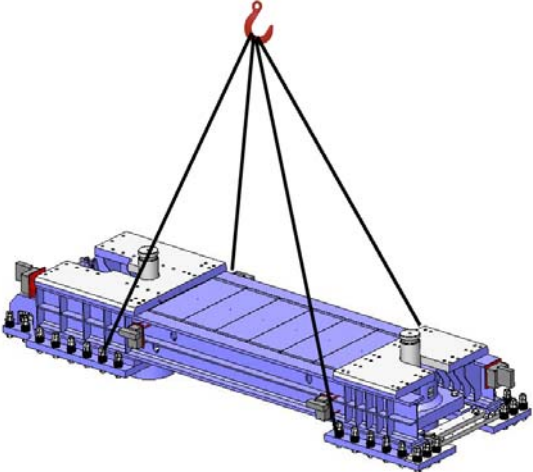
DESCRIPTION	NECESSARY EQUIPMENT
COMPLETE MACHINE 	Nr 2 bands L= 4000 mm

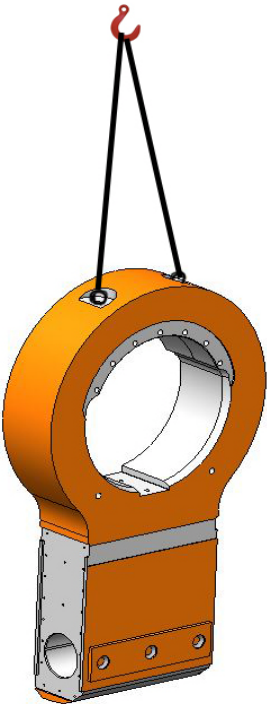
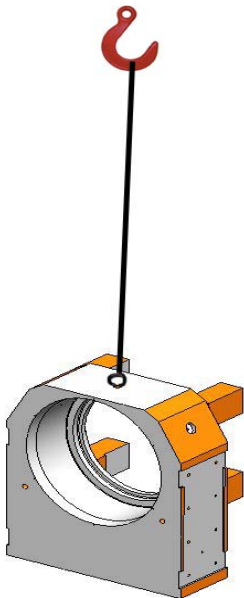


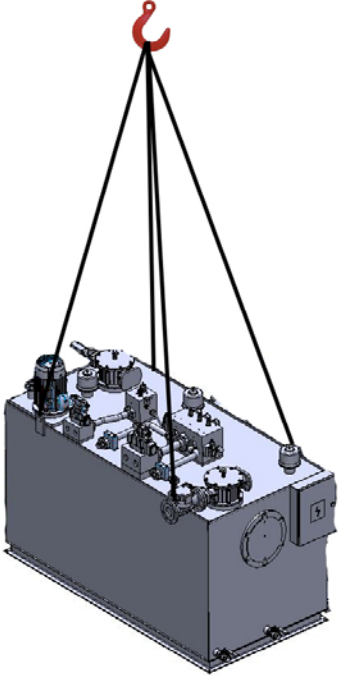
DESCRIPTION	NECESSARY EQUIPMENT
TOP ROLL 	Nr 2 bands L= 4000 mm
SIDE ROLLS 	Nr 2 bands L= 4000 mm
PINCHING ROLL 	Nr 2 bands L= 4000 mm

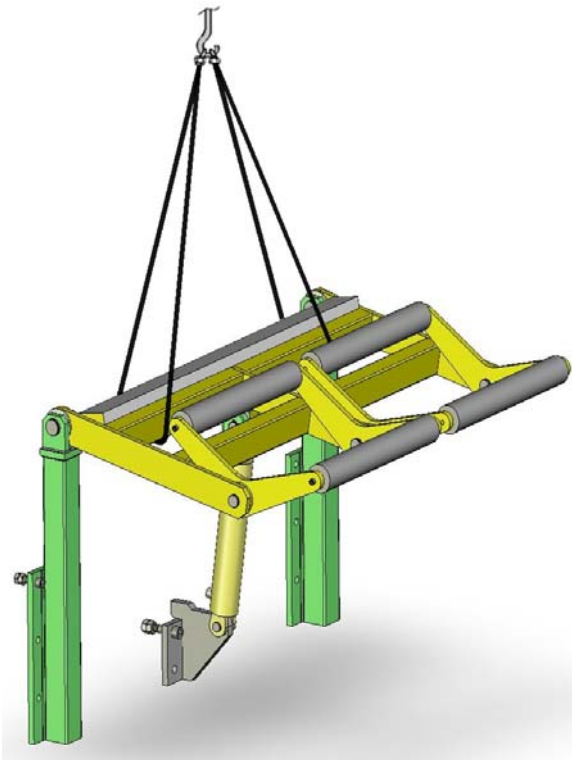
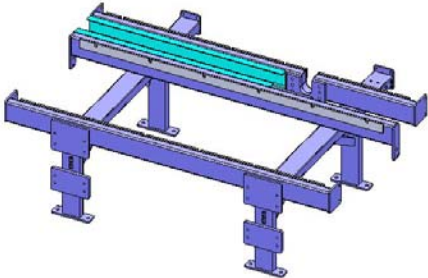
DESCRIPTION	NECESSARY EQUIPMENT
FRONT SHOULDER 	Nr 2 ropes with hook L=2500 mm Nr 2 eyebolts
REAR SHOULDER 	Nr 2 ropes with hook L=2500 mm Nr 2 eyebolts



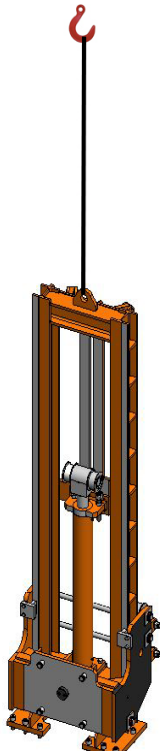
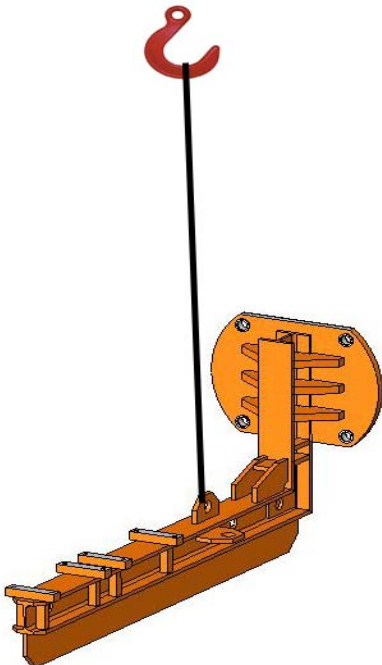
DESCRIPTION	NECESSARY EQUIPMENT
BED CENTRAL BEAM  The diagram shows a long, green, rectangular metal beam (the bed central beam) being lifted by two black ropes. Each rope is attached to a red hook on the beam and a silver hook at the top. The ropes are shown in a triangular configuration, indicating the beam is being hoisted.	Nr 2 ropes L=4000 mm
 The diagram shows a large, blue, rectangular metal structure (the bending machine bed) being lifted by four black ropes. Each rope is attached to a red hook on the structure and a red hook at the top. The ropes are shown in a triangular configuration, indicating the structure is being hoisted.	N°4 ropes L.4000mm

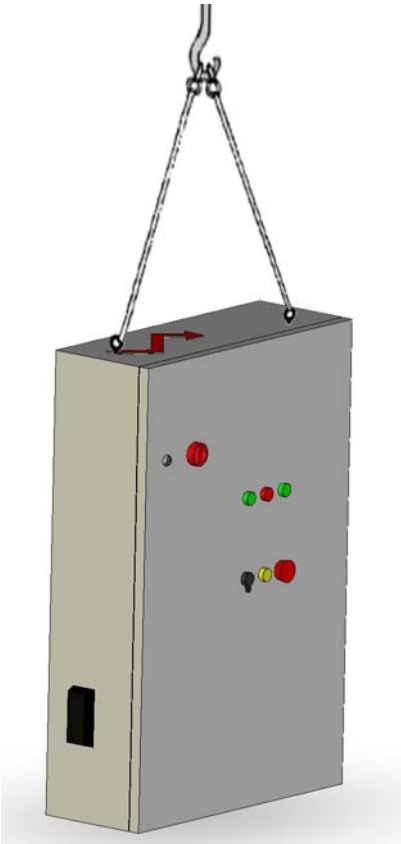
DESCRIPTION	NECESSARY EQUIPMENT
DROP -END GROUP 	Nr 2 ropes with eyebolts L=2500 mm
	Nr 1 rope with eyebolt L.2500mm

DESCRIPTION	NECESSARY EQUIPMENT
HYDRAULIC TANK  The diagram shows a rectangular hydraulic tank with various valves and ports on top. It is being lifted by four black ropes that are attached to a red hook at the top. The ropes are spread out to support the tank evenly.	Nr 4 ropes with hook L=2500 mm
 The diagram shows a motor assembly consisting of four electric motors mounted on a common base. It is being lifted by four black ropes that are attached to a red hook at the top. The ropes are spread out to support the motor assembly evenly.	Nr 4 ropes with hook L = 4000mm

DESCRIPTION	NECESSARY EQUIPMENT
SIDE SUPPORT 	Nr 2 ropes with hook L=4000 mm
CONVEYOR SYSTEM 	Nr 2 ropes with hook L=4000 mm



DESCRIPTION	NECESSARY EQUIPMENT
CENTRAL SUPPORT (FLAG) 	Nr 1 ropes with hook L=2500 mm
FLAG 	Nr 1 rope with hook L=2500 mm

DESCRIPTION	NECESSARY EQUIPMENT
CONTROL CABINET 	Nr 2 ropes L=2.000 mm Nr 2 eyebolts

	CAUTION! IMPORTANT
	Transport and handling operations must be carried out by trained personnel qualified for using cranes and bridge cranes and using integral lifting ropes and of the length required for the whole machine.
	CAUTION! IMPORTANT
	To avoid dangerous fraying, protect those parts in contact with the ropes.
	CAUTION! IMPORTANT
	Electrical control cabinet, if not integrated with the machine, must be positioned nearby the machine, without being an obstacle for bending operations and plate handling operations.



5.2.2 POSITIONING AND ANCHORAGE

Machine fixing to foundations can be carried out through anchor bolts or through screws as previously shown. (Please see [Figure 5.2 on page 5.5](#)).

Lift up the machine or its parts as shown at previous paragraph, place to the support appropriate holes the fastening screws (1), connect it to the fixing cramps (2). As to some machines and accessories it is enough to fix them through brackets or screw anchor.

Put the machine on the foundations adequately to the pit and make a preliminar leveling on both directions.

Pour the concrete into the wells where the anchor cramps are placed.

After concrete will be set up in the wells, loose anchor cramps nuts, tight up the leveling screws until its sit on the plates (the screws are not included in the machine delivery), to make accurately machine level.

When the foundation is set up, tight up to the end the anchor cramps nuts, checking if didn't appear any displacements caused by foundations sink.

During installation phase verify that all nuts, screws, cramps and bolts are tightened as per parameters indicated in this user's handbook. (Please see [Table 8.1 on page 8.8](#)).



Screws, cramps, anchoring plates and counterplates to be welded (where required) are NOT INCLUDED in machine supply.

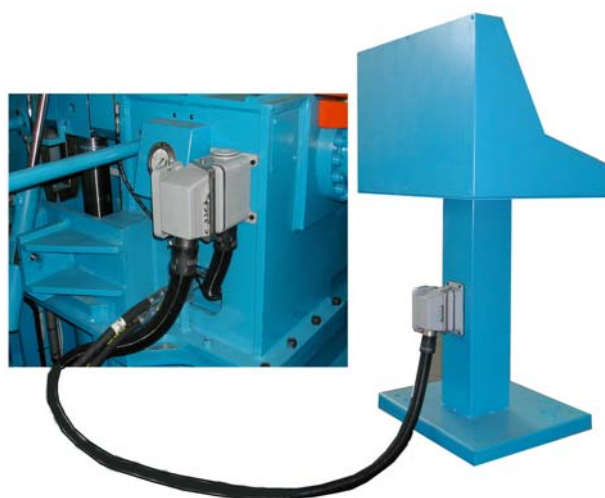
	CAUTION! IMPORTANT
	The leveling must be carried out before anchoring the machine to the foundation, according in this user's manual. (Please see Chapter 8.6 on page 8.10). Efficiency and correct functioning of the machine depend on exact leveling.
	CAUTION! DANGER
	The screws must be tightened when the machine is at rest and completely cold.



5.3 WIRINGS AND CONNECTIONS



The interface cables of the bending machine must be connected to the terminal boards on the box as indicated in the general electrical diagram enclosed in this user's handbook.



EXAMPLES OF ELECTRICAL AND HYDRAULIC CONNECTIONS



Wiring and all electrical, pneumatic, hydraulic connections, connections to peripheral units as well as calibration of sensors and limit switches are carried out by Sertom M.M. S.p.A. technical personnel.

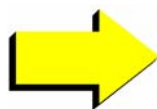


**CAUTION! IMPORTANT**

Only when the connections have been correctly carried out the machine can be fixed to the ground as indicated in this user's handbook. (Please see [Chapter 5.2.1 on page 5.7](#)).

**CAUTION! IMPORTANT**

Tightening of all the screws must be carried out as indicated in this user's handbook. (Please see [Table 8.1 on page 8.8](#)).



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5.4 POWER SUPPLY

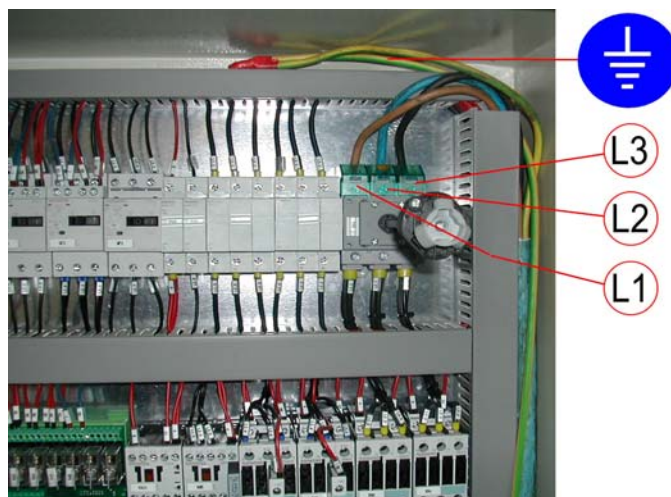


The machine must be connected to the electric network and filled with all the fluids required for regular operation.

5.4.1 CONNECTION TO ELECTRIC NETWORK

The customer must provide the cable to connect the electrical control cabinet to the electric network. Its features must guarantee that voltage drops are lower than the max. admissible voltage variation of 10% at delivery point. It is necessary to use cables of suitable cross section for the installed power and appropriate to the feeding tension and typology.

The following photograph illustrates the cable connections to the terminal board in the electric equipment box.



A differential switch should be installed on the feeding line.

It is important that the connections are correctly carried out to obtain the exact phase cycle and motor rotation.

	CAUTION! DANGER
	Connection to the electric network, pre-arranged safety devices and earthing systems are the customer's responsibility who must carry them out in accordance to existing regulations.



	CAUTION! DANGER The electric connection between Bending machine RIMI 4RV Bull control cabinet and peripheral slave devices must be carried out according to the instructions of the electrical diagram. All the electrical connections must be correct and very carefully made. In the case of the control board being located separately from the machine it must be situated in such a manner as to ensure the correct cycle observance and entire sequence control from the control panel. All the operations regarding electrical equipment, must be done with the machine arrested and by the qualified persons. In the case of machine use in the island work, check carefully the interface'connections shown on the electrical diagram, particularly: ● emergency line; ● fence protection interlock.
---	---



5.4.2 FLUID SUPPLY

After installation and connection to the electric network, to water network and methane network, the machine must be supplied with the necessary fluid for its operation.

5.4.2.1 HYDRAULIC FLUID IN HYDRAULIC STATION

(Please see [Chapter 2.2.1 on page 2.5](#))

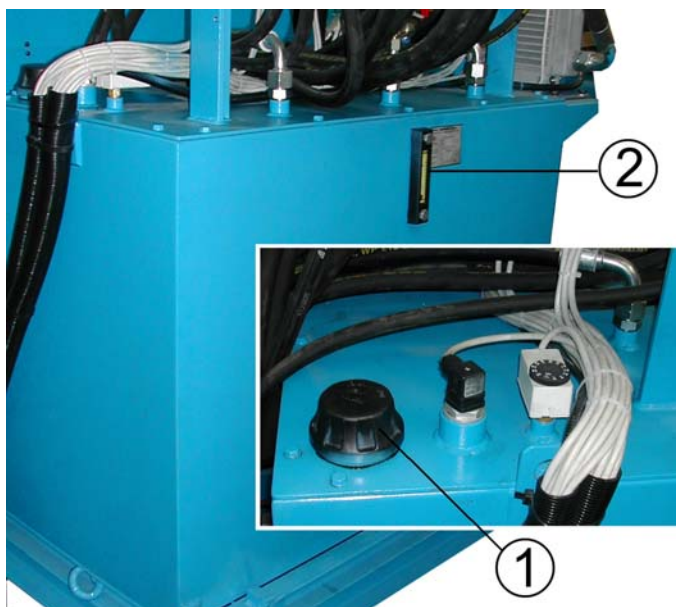
Fill the hydraulic station tank to the maximum level indicated by appropriate level indicator (2), with the quantity and quality of hydraulic fluid indicated in this user's manual for the type of operation foreseen.

	CAUTION! IMPORTANT Hydraulic fluid type to be utilised in accordance with the environmental conditions is regulated by occupational health and safety regulations in force. Therefore we recommend using only suitable fluids.
---	---

The supply must be carried out through the appropriate loading opening (1) on station tank, using a transfer pump with filter to guarantee introduction of clean fluid.

To this concern it is pointed out that commercial drums are not to be considered clean for the hydraulic use foreseen.

	CAUTION! IMPORTANT The minimum features of the transfer pump are: Delivery: 40 l/1' Filtration degree: 10µ
---	--



**CAUTION! IMPORTANT**

After the preliminary controls and trial runs for the machine operation, all hydraulic cylinders should be retracted, power supply switched off and oil level checked in accordance with the instructions of this user's handbook. (Please see [Chapter 9.1.2 on page 9.5](#)). If necessary, refill to the maximum level as indicated, using recommended products.

5.4.2.2 LUBRICATING OIL IN THE CENTRALIZED LUBRICATING SYSTEM

a) Tank filling

Fill the tank of the centralised lubricating device, to maximum level indicated by level indicator (2), with the quantity and quality of lubricating oil indicated in this user's manual. (Please see [Chapter 2.2.2 on page 2.6](#)).

Filling is carried out through the loading connector (1) using an electrical or manual transfer pump.

Remember to use lubricating oil free of impurities as foreign substances present, of any kind, can cause damage to the pump gears and internal components of the station.



b) Pipe filling. (Please see [Chapter 12.9 LUBRICATING SYSTEM](#))

With the first tank filling and after every maintenance service where the lubricating lines are dismantled, the lubricating system pipes must be filled.

In order to carry out the operation all the exit flanges on the distributors must be unbolted, then operate the pump manually until the lubricant comes out uniformly and without air bubbles. The lubricating lines and the dispensers are illustrated and quantified on the enclosed lubrication diagram.



5.4.2.3 CONNECTION TO THE WATER NETWORK (For machine with heat exchanger water-oil only)

To guarantee correct thermal exchange for the heat exchanger of the hydraulic station, inlet water temperature in the cooling circuits on the machine must be between 20°C and 25°C.

If the user cannot guarantee water at the right temperature from the water network, use of circulating water from a closed circuit cooling station is necessary. The use of unsuitable water can damage the functioning of the machine, therefore it is necessary to use:

- ◆ Clean, unpolluted water. If necessary is better to install a filtering system, upstream of the exchanger.
- ◆ Lime-free water (Hardness < 4°E). Should the water be particularly hard install an appropriate softening system upstream of the exchanger.
- ◆ Carbon dioxide-free water. Rainwater is too aggressive towards non-ferrous metals.
- ◆ Ammonia-free water and having a low chlorine content (< 100 mg/l).

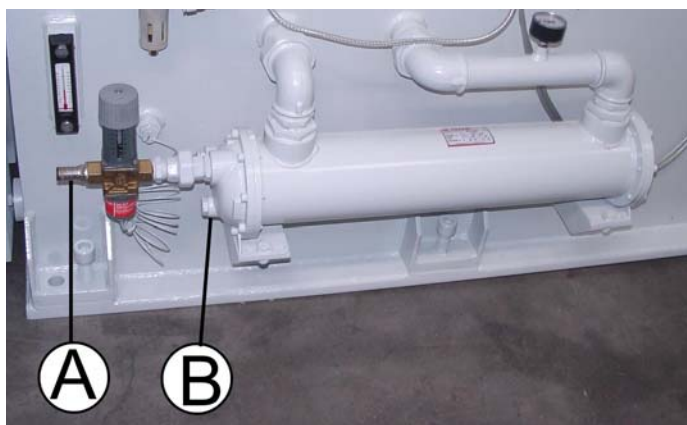
	CAUTION! IMPORTANT For the correct operation of the cooling system soft clean and not calcareous water must be used.
---	--

Inlet connection (A) and outlet (B) of the machine parts, indicated and illustrated on figure is carried out with a hose clamp, a suitable feeding and return flexible pipe.

All flexible piping must be connected to the distribution network with the interposition of an interception valve.

Every flexible pipe with reflux must discharge into the appropriate wells.

When connecting the system to the water network, ensure that there is no dirt or material fragments in the connection pipes.



5.5 COLD TRIALS

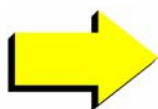


Sertom M.M. S.p.A. technicians inspect the machine in the plant before delivery, and it is here that all necessary parameters for its optimal operation are set.

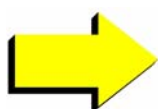
Before the plant start-up it is necessary to carry out a series of preliminary controls to guarantee that all parts can begin working without inconveniences and with particular care towards the operator and machine safety devices.

Preliminary checks, first start-up and cold trial are normally carried out by **Sertom M.M. S.p.A.** technicians and no particular procedure is required by the customer.

The following table lists checking operations to be carried out every time the machine is in service, repaired or under revision including dismantling, repair and/or parts replacement.



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Sertom M.M. S.p.A. DECLINES ANY RESPONSIBILITY FOR POSSIBLE DAMAGE TO THINGS OR INJURY TO PEOPLE CAUSED BY TAMPERING, INCORRECT USE OF LACK OF MAINTENANCE ON INSTALLED SAFETY DEVICES.

ITEM	INTERVENTION DESCRIPTION
1)	Operation check of the electrical system . See Chapter 9.3.2
2)	Operation check of the hydraulic system. See Chapter 9.1.3
3)	Operation check of the cooling system. See Chapter 9.2.1
4)	Operation check of the lubricating system. See Chapter 9.3.1
5)	Operation check of the safety devices installed. See Chapter 9.5.2

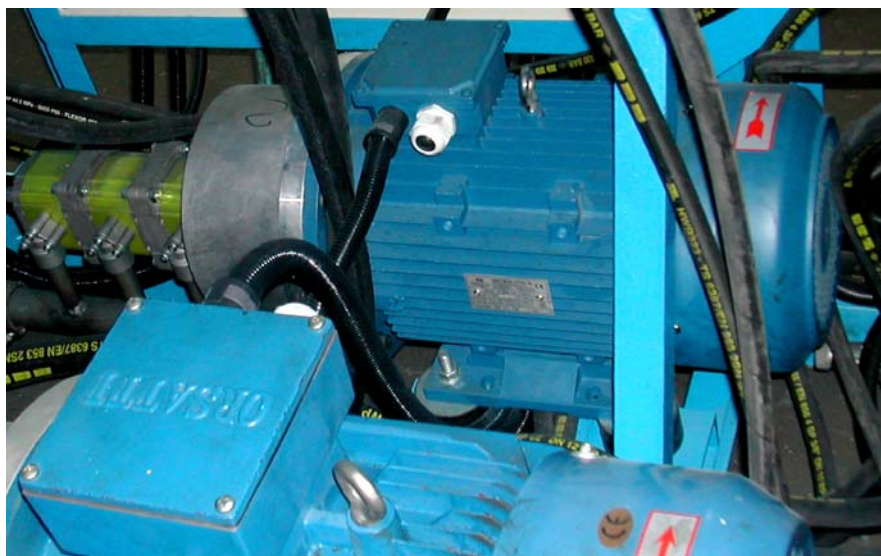
Let the machine repeatedly idle run, manually controlling the different movements (right/left rotation, rolls translation, front support tilting and top roll lifting), observing that they are smoothly and softly carried out, without faults.



5.5.1 PREPARATION FOR COLD TRIALS

Before carrying out machine tests, proceed as follows:

- Unloose fixing screws and brackets previously used for transport.
- Tighten all the tube joints, flanges, fittings, lubrication pipes, etc.
- Block all electrical connections in the control cabinet, in the terminal boards and in the electric users. Blow the terminal boards to remove foreign matters, if any.
- Check that the connections carried out by the customer are perfectly made.
- Check that the main pump motors have the correct rotation sense, shortly switching them on and then switching them off. The rotation must be carried out according to the sense indicated by the arrow on the cooling fan cover. Otherwise reverse the two phases on the terminal board where the cables of control cabinet are positioned. By this way the rotation sense of all machine electrical motors will be regular.
- Be sure that the working area nearby the machine is free.
- Verify that there are no foreign objects by accident leaning against mechanical parts.
- Verify that emergency cables are arranged according to the instructions previously explained.
- Check the alignment of front rolls referring to the top roll or vice versa, remembering that the final check will be carried out during the bending of the first plate.



5.5.2 FIRST START-UP OF THE MACHINE



Description and use of the controls are shown and described in this user's handbook. (Please see [Chapter 6.1](#)).

To carry out the cold trials the following requirements are necessary:

1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	

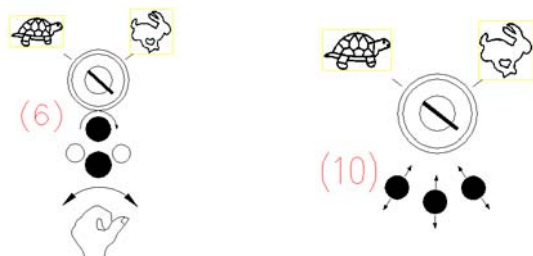
CAUTION! IMPORTANT	
	Upon start-up of the main pump do not panic if there is a strange noise for a short period. If the machine is not equipped with a oil pre-heating system, when the machine is cold and environmental temperature is $< 16 \div 20$ °C, you must let the pump idle run for ~30 minutes before starting any operation. This phase is useful to let the hydraulic fluid heat in the central tank, as it has its best functional characteristics at working temperature.



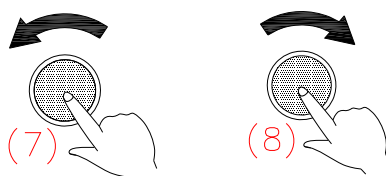
5.5.3 USE OF THE MOST IMPORTANT CONTROLS

All machine movements can be manually controlled through the corresponding push buttons or selectors of manual operation located on the control panel. The operations functionality comply with all provided mechanical safeties.

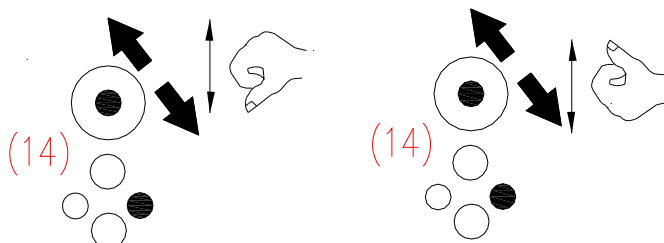
For initial idel movements of the machine you must select the low translation speed (Selector (10) and rotation Selector (6), positioning the corresponding selectors as shown in the following figure.



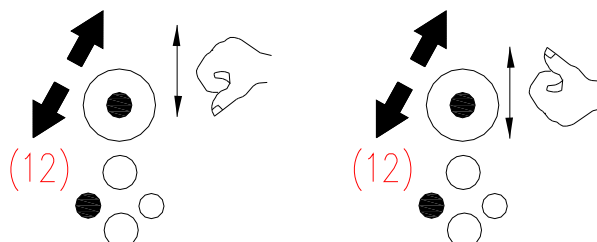
The rotation clockwise/anticlockwise of the rolls, at the selected speed, is reached by pressing the black push button (7)/(8). When you release the black push button the rotation immediately stops.



The translation of right lower roll, at the selected speed, is reached through joystick (14) in up/down direction. When you release the joystick the movement immediately stops.



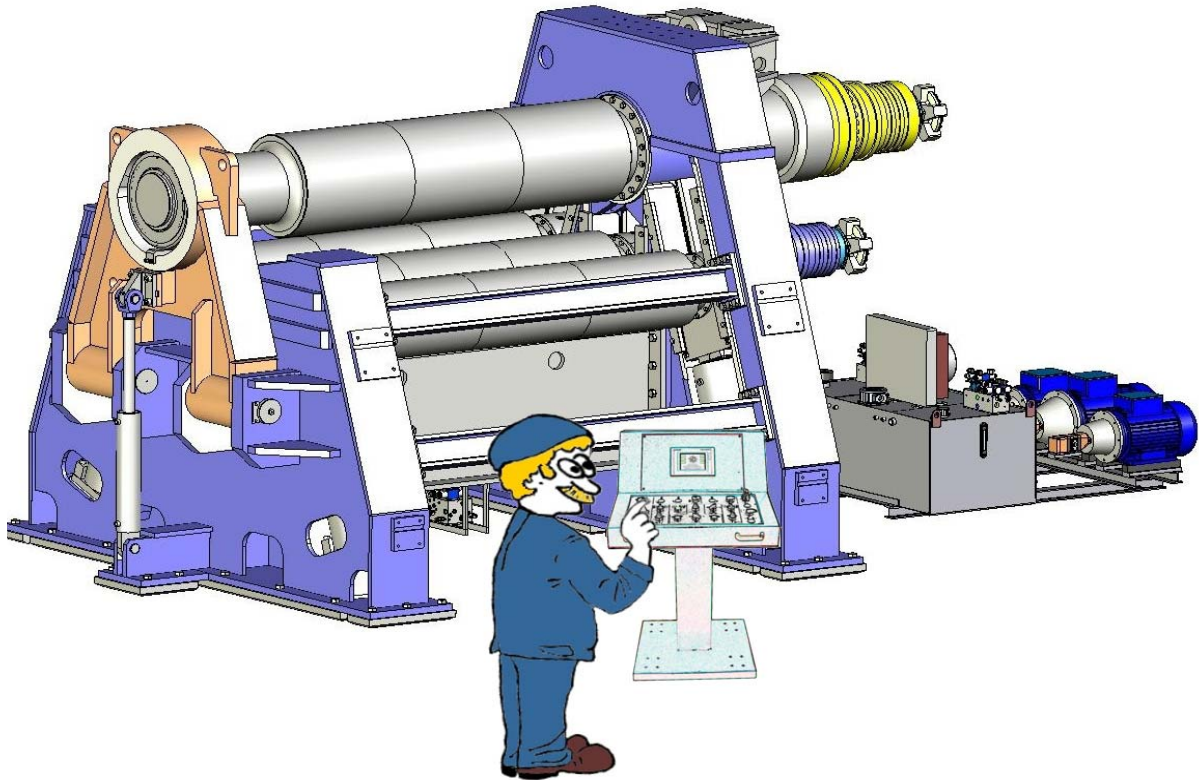
The translation of left lower roll, at the selected speed, is reached through the joystick (12) in up/down direction. When you release the joystick the movement immediately stops.







chapter 6: USE OF THE MACHINE



-
- Description of machine controls
 - Operation of the machine: work cycle
 - Use of the machine
-





6.1 DESCRIPTION OF MACHINE CONTROLS



Substantially all the machine controls are located on:

- 1) Control cabinet;
- 2) Control console.

6.1.1 CONTROLS ON CONTROL CABINET

The following figures show the controls on control cabinet .

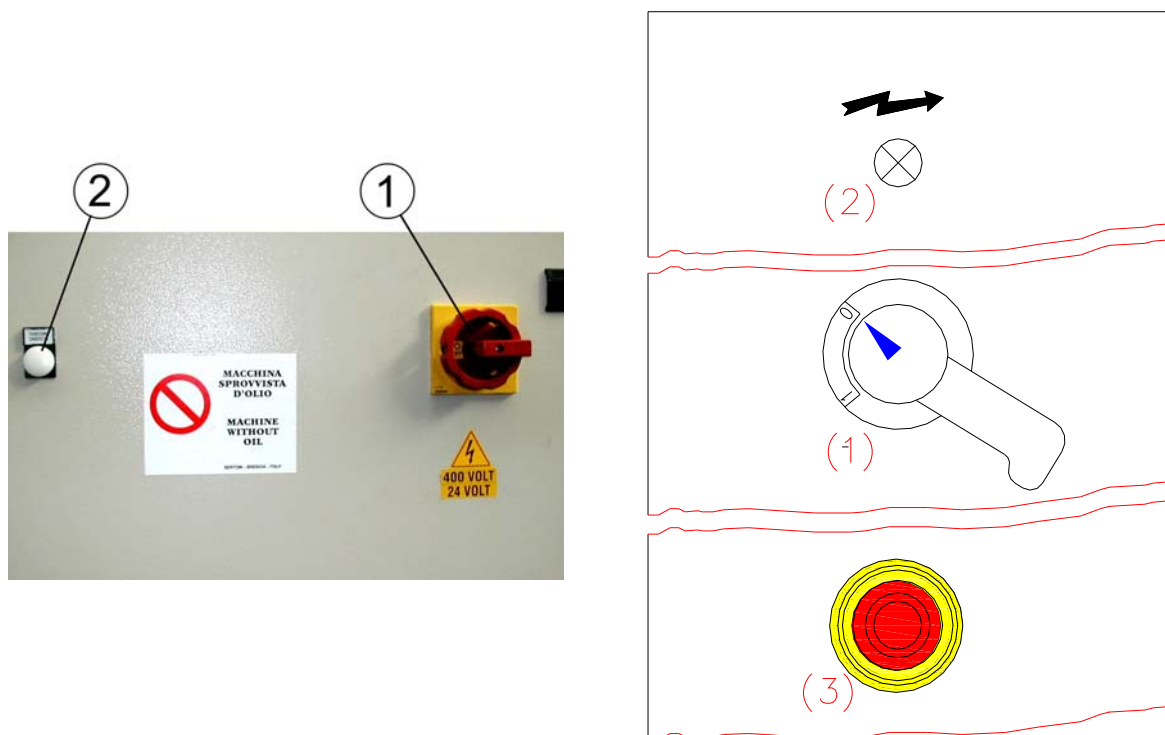
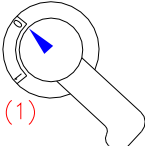
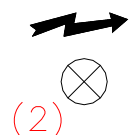
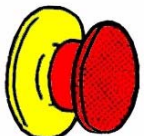


Figure 6.1: Control cabinet push-button panel



The following descriptions refer to standard machine complete with accessories listed in the catalogue.

On customer's request machines can be customised, therefore they could be fitted with controls which are not predictable a priori. Anyway we explain these controls on Electrical Diagram attached to this Technical Handbook (please see [Chapter 12.8 ELECTRICAL DIAGRAM](#)).

POSITION	COMPONENT	STATE	FUNCTION OR SIGNAL
	Main switch of line	1	Live control cabinet Live control console
		0	Dead control cabinet Dead control console
	White pilot lamp	On	Live control cabinet
	Emergency Mushroom-head push button	Pressed	All machine motors stop



6.1.2 MAIN CONTROL PANEL



Machine push button panel and programming panel (touch panel) - optional item - are included into a control console fitted with wheels and electrically connected to main control cabinet. This allows the operator to choose the most suitable point to carry out bending operations and to insert the pieces into the machine.

Through the push button panel it is possible to control all machine functions and auxiliary devices under safe conditions. Specific symbols and push buttons with different colours help the operator to identify the different controls.

Programming panel allows to gather several manual operations together in simple guided executions, to monitor instantaneous movements of machine members and to control machine state through alarms and diagnostic.

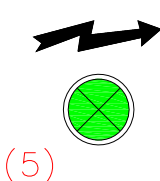
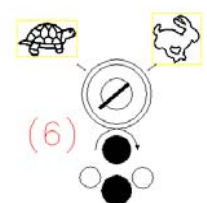
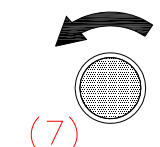
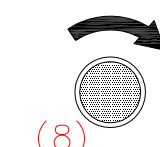
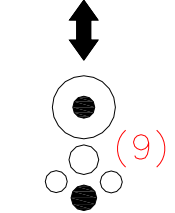
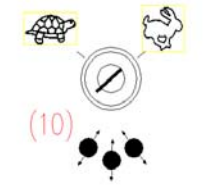
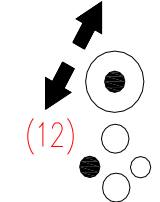


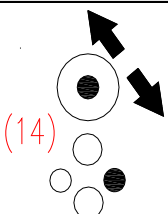
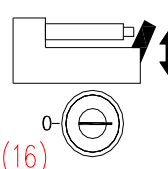
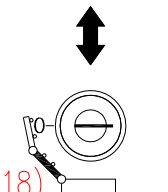
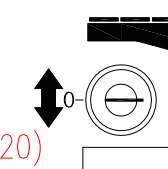
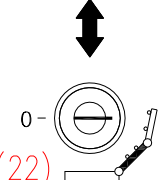
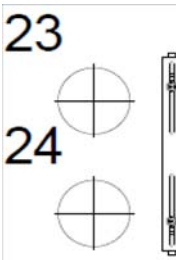
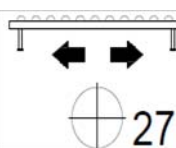
1) Push button control panel

2) Programming panel (optional)

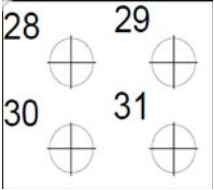
Figure 6.2: Machine push button panel

6.1.2.1 MACHINE PUSH BUTTON PANEL

POSITION	COMPONENT	STATE	FUNCTION OR SIGNAL
	Green Luminous Push button	Switched OFF	Hydraulic Power Unit pump motors stopped
		Pressed	Starting up Hydraulic Power Unit pump motors
		Blinking	Hydraulic Power Unit pump motors in starting phase
		Lighted	Hydraulic Power Unit pump motors operating
	Selector with two fixed positions		Select top roll rotates at lower speed
			Select top roll rotates at highest speed
	Black Push button	Pressed 	Rolls anticlockwise rotation
	Black Push button	Pressed 	Rolls clockwise rotation
	Joystick		Pinching roll moves upward at the selected speed through selector (10)
			Pinching roll moves downward at the selected speed through selector (10)
	Selector with two fixed positions		Selection of rolls translation minimum speed
			Selection of rolls translation maximum speed
	Joystick		Side left roll moves to up/right at the speed selected through selector (10)
			Side left roll moves to down/left at the speed selected through selector (10)

POSITION	COMPONENT	STATE	FUNCTION OR SIGNAL
 (14)	Joystick		Side right roll moves to up/left at the speed selected through selector (10)
			Side right roll moves to down/right at the speed selected through selector (10)
 (16)	Selector with two unstable positions with return to the centre		Drop -end device closing
		0	All functions stop
			Drop -end device opening
 (18)	Selector with two unstable positions with return to the centre (Optional)		Left side arm closing
		0	All functions stop
			Left side arm opening
 (20)	Selector with two unstable positions with return to the centre (Optional)		Higher top support arm
		0	All functions stop
			Lower top support arm
 (22)	Selector with two unstable positions with return to the centre (Optional)		Right side arm closing
		0	All functions stop
			Right side arm opening
 23 24	Selector with two unstable positions with return to the centre (Optional)	Left Center Right	Alignment device on side arms moves to left All functions stop Alignment device on side arms moves to right
 27	Selector with two unstable positions with return to the centre (Optional)	Left Center Right	Plate conveyor forward movement All functions stop Plate conveyor backward movement



POSITION	COMPONENT	STATE	FUNCTION OR SIGNAL
	Selector with two unstable positions with return to the centre (Optional)	Left Center Right	Plate conveyor alignment device ahead All functions stop Plate conveyor alignment device back



6.1.2.2 PROGRAMMING PANEL (TOUCH PANEL) - OPTIONAL ITEM

Please refer to CNC manual attached to this manual



6.1.3 OPERATOR SAFETY PUSH BUTTON PANELS



The position of the control cabinet and of the operator push button panels with emergency mushroom-headed buttons is not binding. According to the operating needs, in the plant-engineering context, control cabinets and operator panels can be installed in a different position, but it must be suitable both from logistic point of view and safety point of view.

According to the operating needs, emergency controls such as mushroom-headed push buttons (1) and cord-pull switches (2) fitted on the machine can be located in positions which must be easily reachable by the operator, as showed by the following figure.

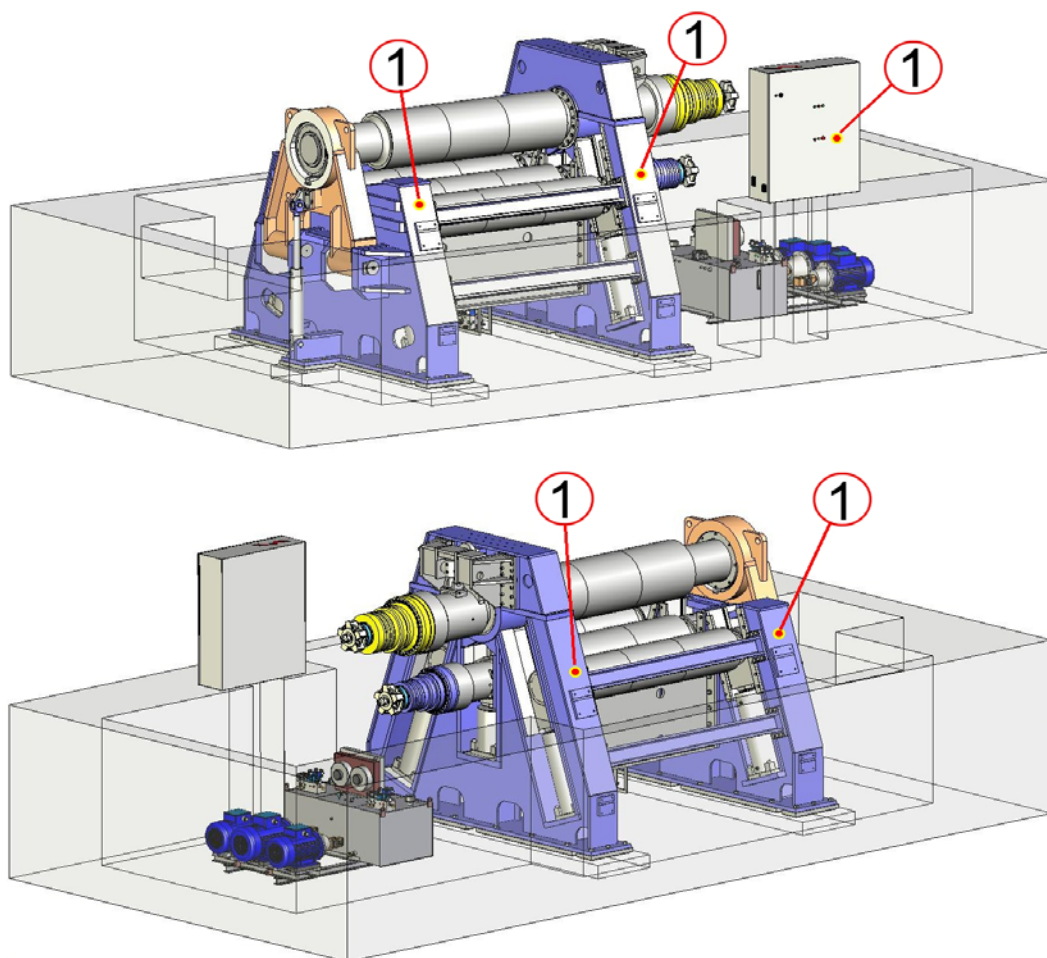
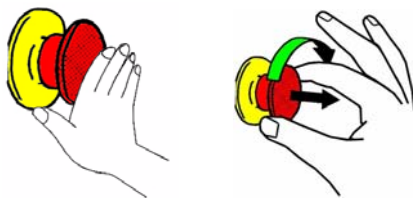
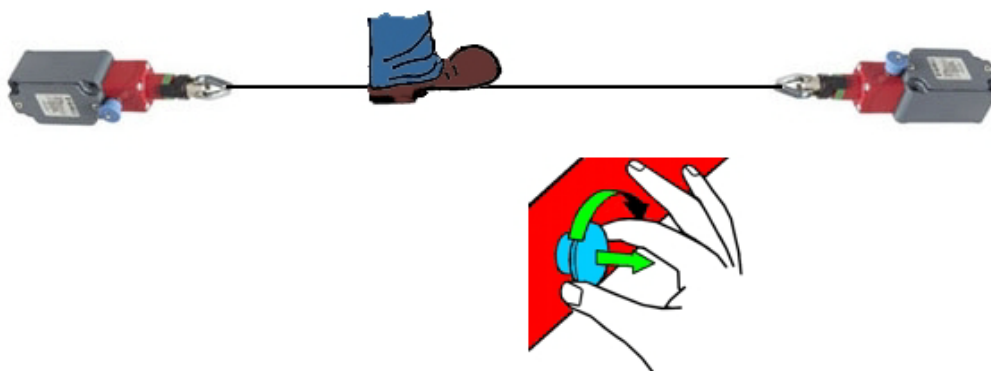


Figure 6.4: Operator Safety Push button Panels

- 1) A light press on mushroom-shaped emergency push buttons, which are located in different parts of the machine, (*), must cut the current and immediately stop all the motors. A clockwise rotation of push button restores its original state.



- 2) An interference with the rope which connects the two ends of rope-pull safety switches, located on machine front and rear side (*), must cut the current and immediately stop all the motors. A clockwise rotation of push button restores its original state.

**OPTIONAL**

This device is fitted only if required for particular logistic requirements.

(*) Please see [Figure 4.4 on page 4.10](#)



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6.2 MACHINE OPERATION: STANDARD WORK CYCLE

6.2.1 BENDING START CONDITIONS

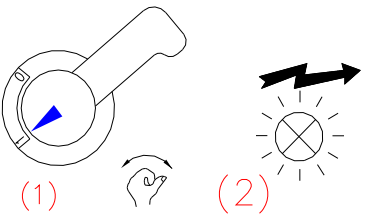
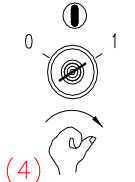
- Side rolls in "0" position.
- Pinching roll in "0" position.
- Central support completely in uppermost position.
- Side arms completely opened.

In order to correctly understand the following explanation you need to refer to the indicated figures to which correspond the Positions in the brackets.

Figure 6.1: Control cabinet push-button panel

Figure 6.3: Operator push button panel

To be able to activate any operating mode of the machine the following conditions must be satisfied:

1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	



6.2.2 OPERATING

All the movements of the machine can be manually controlled through the relevant push buttons or selectors on the Main Control Panel. The drives operating according to safety standard in force comply with the mechanical safeties:

- at the end of each movement, in order to start the next one, it is necessary to press or select the push button or selector corresponding to the desired movement.
- The bending machine operating requires that the protections are correctly fitted, and that the corresponding limit-switches, which control the position, correctly work. It is forbidden to use the bending machine if a protection guard is not fitted.

On manual mode the possible movements are the following:

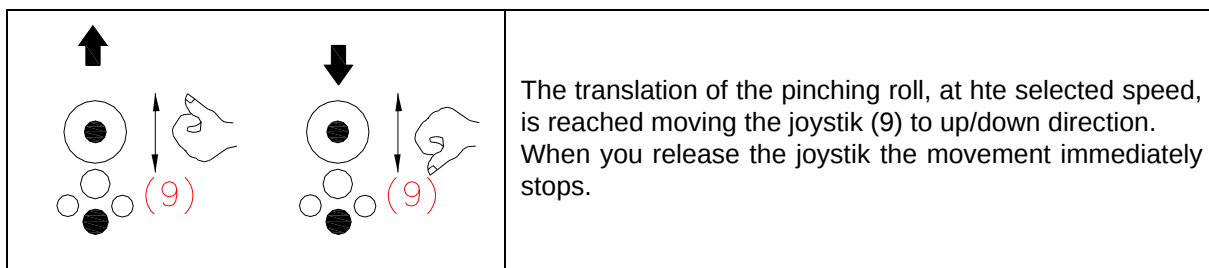
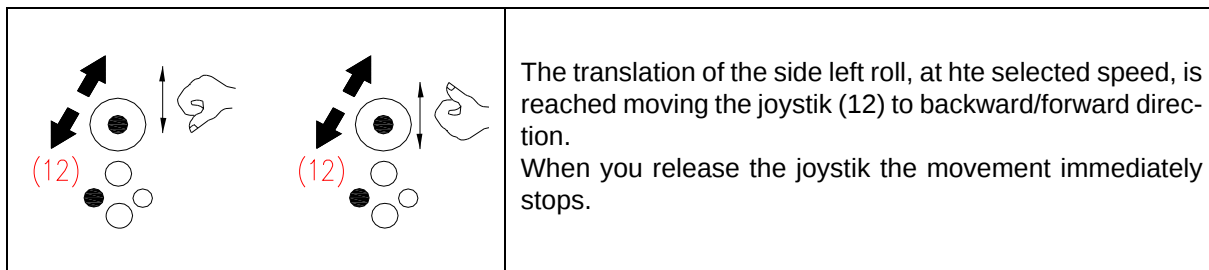
ROLLS TRANSLATION

All the rolls movements can be carried out at normal or slow speed.
The speed is set on the selector (10), as shown in the figure.



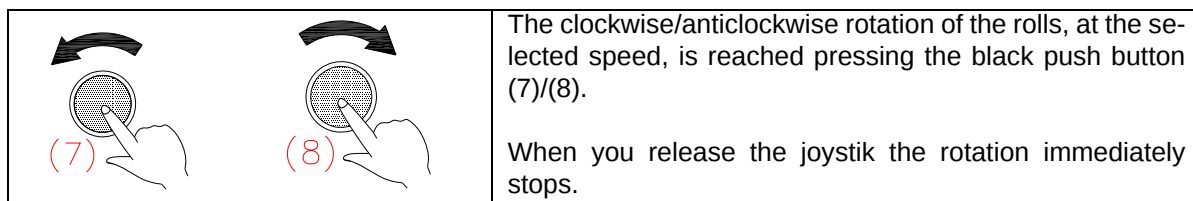
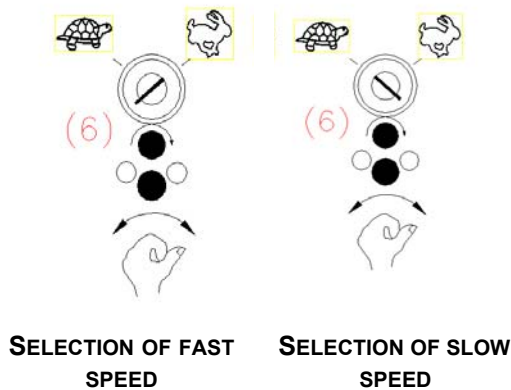
	The translation of side right roll, at selected speed, is obtained moving the joystick (14) to backward/forward direction. When you release the joystick the movement immediately stops.
--	--





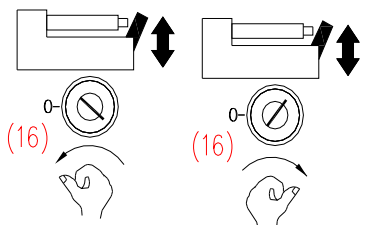
ROTATION OF TOP AND PINCHING ROLLS

The rotation of top roll and of the pinching roll can be carried out at fast speed or slow speed. The speed is set on selector (6), as shown by the figure.

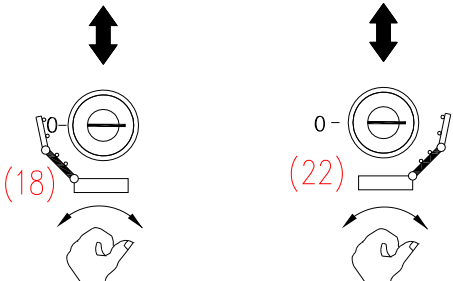


DROP-END OPERATION

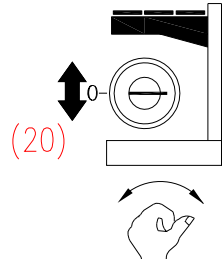
To allow the extraction of bended plate you need to loosen the front end of top roll, opening the drop-end of its support.

	By keeping the selector (16) in position, it is possible to activate the drop-end opening: ↓ By keeping the selector (16) in position, it is possible to activate the drop-end closing: ↑ When you release the selector the movement immediately stops.
---	--

SIDE SUPPORTS OPERATION (OPTIONAL)

	The opening of right/left support primary arm is carried out by keeping the selector (18)/(22) in position: ↓ The closing of right/left support primary arm is carried out by keeping the selector (18)/(22) in position: ↑ When you release the selector the movement immediately stops.
--	--

CENTRAL SUPPORT OPERATION

	The lifting of top support is carried out by keeping the selector (20) in position: ↑ The lowering of top support is carried out by keeping the selector (20) in position: ↓ When you release the selector the movement immediately stops.
---	---



6.2.3 **ALARM AND EMERGENCY CONDITIONS**

Control and safety devices exist to guarantee the proper running of the operating cycle and to safeguard people and the machine in case of breakdown.

The following tables list all the conditions that cause alarm or emergency situations and the relative consequence on the operating cycle.

ALARMS

ITEM	DESCRIPTION	COMPONENT	CONSEQUENCE
1)	Top roll tilting fault	Potentiometer	Signalling of abnormal operation on control panel
2)	Potionometers Faults	-----	
3)	Thermal cutout of power unit motor ON	-----	
4)	Insufficient oil level in tank	Level switch	Pump motors stop and signalling of abnormal operation on control panel
5)	Excessive temperature of hydraulic oil in tank	Thermostat	
6)	Blocked filter on exhaust	Pressure switch on filter	Signalling of abnormal operation on control panel
7)	Lubricant level at minimum in unit tank of lubricating unit.	Level indicator	

EMERGENCIES

ITEM	DESCRIPTION	CONSEQUENCE
1)	Emergency mushroom-head push button pressed	Immediate stop of all motors and emergency signalling.
2)	Rope-pull safety switches located on machine sides	

- All emergency conditions automatically stop the motors.
- All alarm conditions activate the signalling of abnormal operation on control panel (if it exist).



6.3 USE OF THE MACHINE



Our purpose is to give some suggestions about how to better use the machine, in order to avoid that a incorrect use of the same leads to damages which will affect machine good operating and life.

For a correct interpretation of the subjects treated in the following pages you need to refer to the following Figures to which the positions in the brackets are referred.

Figure 6.1: Control cabinet push-button panel

Figure 6.3: Operator push button panel

6.3.1 REGULAR MACHINE STARTING

At the beginning of each working day, after carrying out preventive maintenance operations, described in **Chapter 8** and in **Chapter 9**, start the machine arranging the selectors in the following way.

1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	

Let idle run for some minutes power units. In facts hydraulic oil has the best operating performance at 40°C.



6.3.2 **WORK**



Before starting any operation you must:

- Be sure that the working area nearby the machine is free.
- Verify that there are no foreign objects by accident leaning against mechanical parts.
- Verify that emergency cables are arranged according to the instructions previously explained.
- Check the alignment of front rolls referring to the top roll or vice versa, remembering that the final check will be carried out during the bending of the first plate.
- Let various machine movements repeatedly Idle run (right and left rotation, rolls translation, front support tilting and top roll lifting), being sure that they are correctly and smoothly carried out without faults.

	CAUTION! IMPORTANT If you weld the metal tubes when they are on machine board, you must connect earth cable only to the sheet to be welded. <u>IT IS ABSOLUTELY FORBIDDEN TO CONNECT EARTH CABLE TO THE MACHINE.</u>
--	--

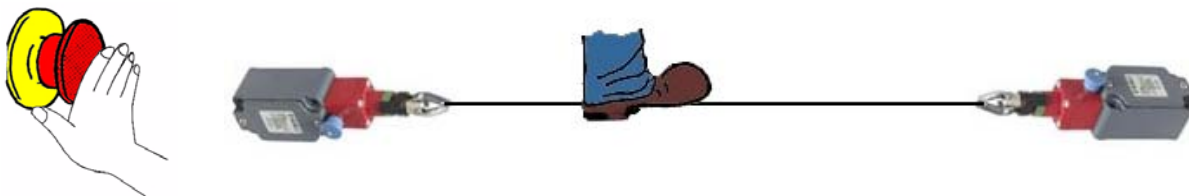


6.3.3 INSTRUCTIONS FOR MACHINE STOP



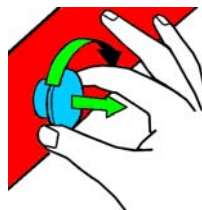
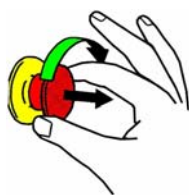
6.3.3.1 ONGOING EMERGENCY STOP

Pressing one of the red mushroom-headed push buttons or pulling the cord of safety (if any) cutouts you get the immediate stop of all motors for emergency situation.



To re-start machine operation you need:

- To restore safe conditions by removing the causes of emergency.
- To restore to a serviceable condition the red mushroom-headed emergency push buttons and/or safety cutouts cord by pulling the push button toward the external part.



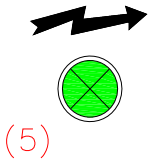
- Restore the start conditions and re-start the machine.

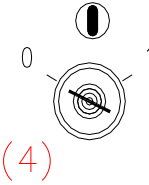


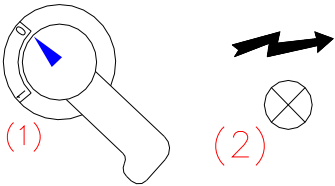
6.3.3.2 MACHINE STOP FOR INTERRUPTION

6)	Before stopping the machine bring the side rolls and side support arm in completely lowest position.
----	--

Machine stop for interruption can be reached:

7)	by switching off the pumps of hydraulic unit, pressing the green lighted push button (5) which will switch off	
----	--	---

8)	by turning off the machine power and control panel power through the key selector (4)	
----	---	---

9)	And then turning off control cabinet power. [Main Line Disconnecting Switch (1) positioned to [0] and white lighted indicator (2) switched off]	
----	---	---

Operators of Bending machine RIMI 4RV Bull must work according to the rules described in this Handbook.

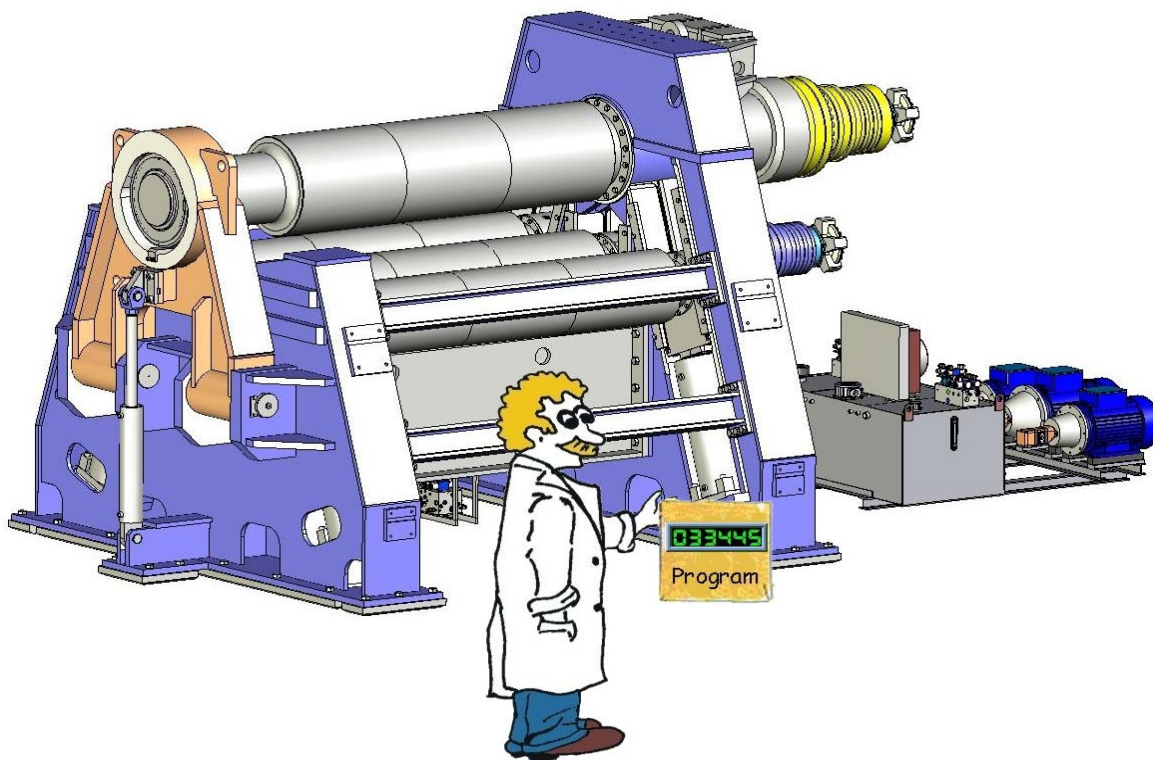
	Sertom M.M. S.p.A. ACCEPT NOI RESPONSIBILITIES FOR POSSIBLE DAMAGE TO THINGS OR PERSONS CAUSED BY CARELESSNESS OR TOTAL DISREGARD OF USE RULES.
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SERTOM M.M. S.p.A.



chapter 7: PREVENTIVE MAINTENANCE PROGRAM



-
- Preventive maintenance program
-





7.1 PREVENTIVE MAINTENANCE PROGRAM



Table 7.1: Preventive maintenance program

MAINTENANCE INTERVENTIONS DESCRIPTION		HOURLY INTERVAL				INSTRUCTIONS	
		24	200	400	2000	HANDBOOK	PAGE
MECHANICAL STRUCTURE	General cleaning	●					8.3
	Manual lubrication		●				8.6
	Bolt and nut tightening check				●		8.8
	Rolls parallelism check				●		8.9
	Rolls sliding check				●		8.10
	Machine levelling check				●		8.11
HYDRAULIC SYSTEM	Hydraulic fluid leakage check	●					9.3
	Hydraulic fluid level check		●				9.5
	Flexible piping integrity check				●		9.6
	Hydraulic system operation check			●			9.6
	Replacement of filtering elements into the tank air filters				●		9.8
	Replacement of filtering elements, oil suction filters				●		9.9
	Replacement of filtering elements, oil pressure filters (Optional)			●			9.11
	Replacement of filtering elements into the oil filters on the exhaust			●			9.13
	Nitrogen pre-load test of the accumulators			●			9.15
	Hydraulic fluid replacement and tank cleaning				●		9.20
LUBRICATING SYSTEM	Lubricant leakage check along lubricating line		●				9.27
	Lubricant level check in unit		●				9.27
	Lubrication system operation check	●					9.28
	Flexible piping integrity check				●		9.28
COOLING SYSTEM	Water supply check		●				9.23
	Water leakage check along the line	●					9.23
	Hydraulic fluid temperature check	●					9.23
	Cooling system operation check		●				9.23
	Heat exchanger cleaning				●		9.25



MAINTENANCE INTERVENTIONS DESCRIPTION		HOURLY INTERVAL				INSTRUCTIONS	
		24	200	400	2000	HANDBOOK	PAGE
ELECTRICAL SYSTEM	Isolation test				●		9.31
	Tightening of electrical connections				●		9.31
	Touch panel operation check				●		9.31
SAFETY DEVICES	Checking the operation of operator safety devices	●					9.34
	Checking the operation of the machine safety devices			●			9.35

Suitable maintenance is a determining factor for the machine long life along with efficient and optimal operating conditions.

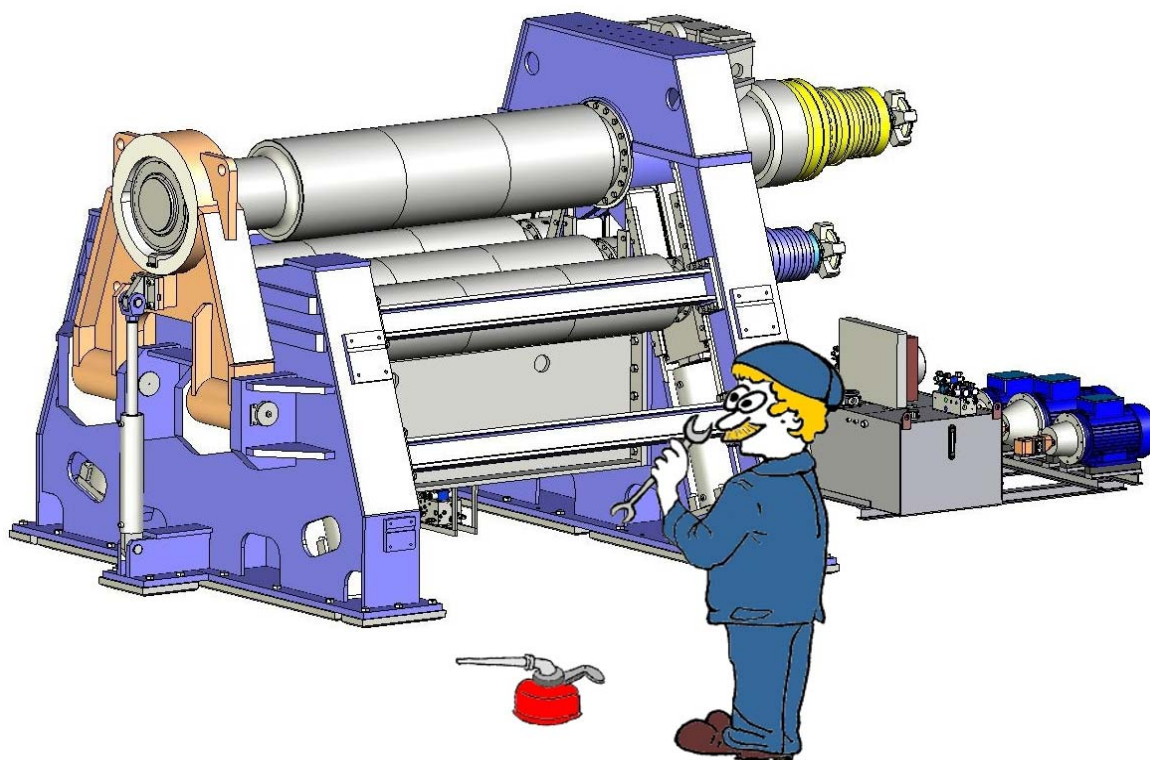
- Bending machine RIMI 4RV Bull use and maintenance interventions require the use of normal tools only.
- All maintenance interventions must be carried out by specialised personnel, with the machine at rest and power disconnected from the electric control panel and key removed.
- Operators responsible for maintenance the Bending machine RIMI 4RV Bull must work in accordance to the instructions described in this user's handbook and in conformity of existing occupational safety regulations.

	CAUTION! IMPORTANT
	Only original spare parts or commercial parts completely compatible with those installed on the machine should be used.

	CAUTION! IMPORTANT
	All maintenance personnel must read and understand the Chapter concerning safety.



chapter 8: MAINTENANCE OF THE MECHANICAL STRUCTURE



-
- General cleaning
 - Manual lubrication
 - Nuts and bolts tightening check
 - Rolls parallelism check
 - Rolls sliding check
 - Machine leveling check
-





8.1 GENERAL CLEANING



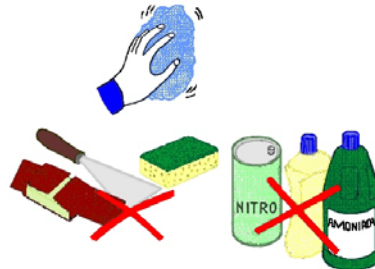
At programmed intervals (*) it is recommendable to effect an accurate cleaning of the machine:

- ❖ By suction in the rolls sliding area, hydraulic unit and control cabinet.
- ❖ By blowing in cases, guards and mechanical structure outside.

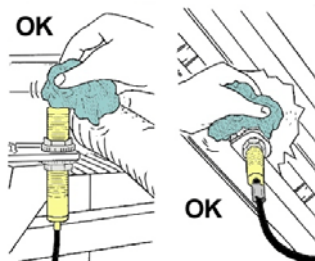
	CAUTION! IMPORTANT
	Never use compressed air in the working area because chips, metal scales and other dangerous elements could adhere to the grease on the sliding guides and lead to early wear of shoes. Before cleaning the whole machine, you need first to take chips away from the machine itself.

- You must keep clean the sliding guides of roll blocks and of front tilting support periodically removing the scales produced during plate bending and excess of grease.
- Clean the machine linings, the panels and controls with soft cloths either dry or slightly dampened with a detergent liquid avoiding the use of any type of solvent, such as alcohol or gasoline to avoid damaging the surface.

..



- Eliminate all the fouling or metal spatter on protection devices and safety doors. Keep the photoelectric cell and proximity always clean, wiping the reading surfaces with non-tready rags or with a light blow of compressed air.



- Keep clean the hydraulic unit removing slags, dust and oily residuals.

	CAUTION! DANGER
	All the operations of evacuation of waste materials or residues of work must always be carried out with the machine off; whenever it is necessary to intervene inside the danger area, this must be done using suitable equipment and individual safety equipments.

PARTS TO BE CLEANED	CLEANING METHOD
Painted steel	Wipe with a clean cloth, slightly saturated with Diesel oil or kerosene oil and then blow air.
Mechanical parts	
Motors	Use a vacuum cleaner.
Electric parts	
Electric controls and sensors	Use a soft and dry cloth.
Limit-switches	Use a blow of compressed air.
Filters of control cabinet of hydraulic unit	Dry clean or wash in warm water with neutral detergent.



Should you have any doubt or request, please contact the After Sales Service Department of Sertom M.M. S.p.A.

(*) Frequency of the services is indicated in [Table 7.1](#).



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8.2 OIL LEVEL CHECK IN REDUCTION GEARS

(Please see [Chapter 2.2.3 on page 2.7](#))



At programmed intervals (*) check the oil level in the reduction gears and, if necessary, top up the oil with the recommended lubricating fluid.

To check, unloose the level cap, located in the middle of the box, verifying if the oil came out or not.



1



All the operations described must be carried out with pumps at a standstill position and the machine stopped with all cylinders in the retracted position.



CAUTION! IMPORTANT

Reduction gears operation when the lubricant is not enough can cause mechanical parts overheating and irreversible damage.

(*) Frequency of the services is indicated in [Table 7.1](#).

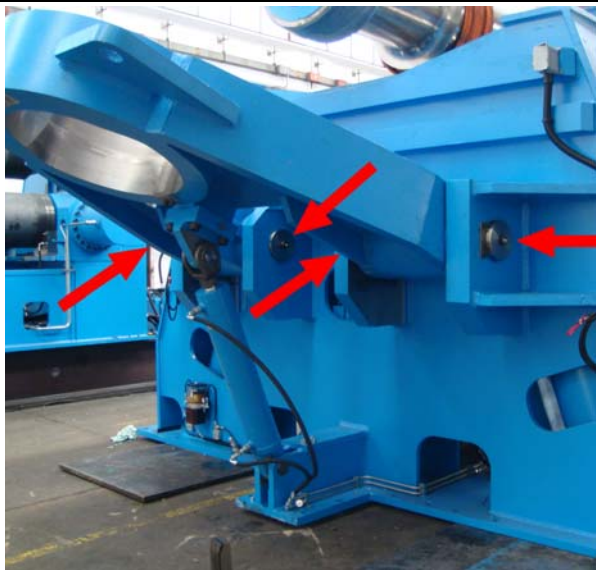
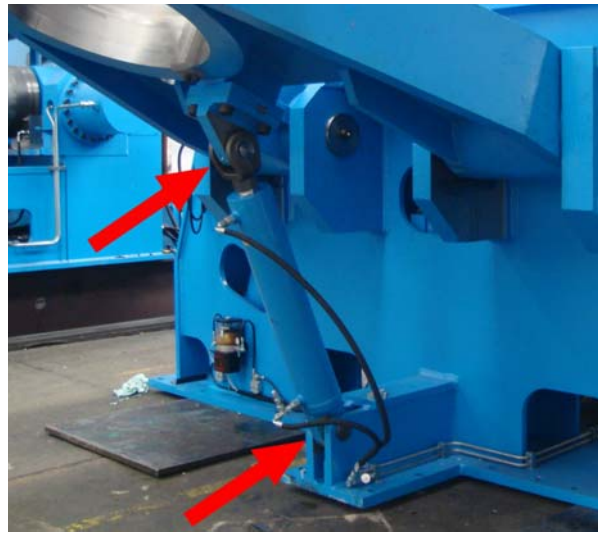


8.3 MANUAL LUBRICATION



Machine parts which require lubrication are reached by the centralised lubrication system, except the pins of articulated joints and spherical joints of drive cylinders of drop-end device and of all the optional devices, as shown in the following table.

At programmed intervals (Please see [Table 7.1](#)) manually lubricate by using pump and suggested lubricant. (Please see [Chapter 2.2.2 on page 2.6](#) of this technical handbook).

POS.	DESCRIPTION	IMAGE
1)	Articuled joint of drop -end (No 4 lubricators)	
2)	Drop -end cylinder (No 2 lubricators)	



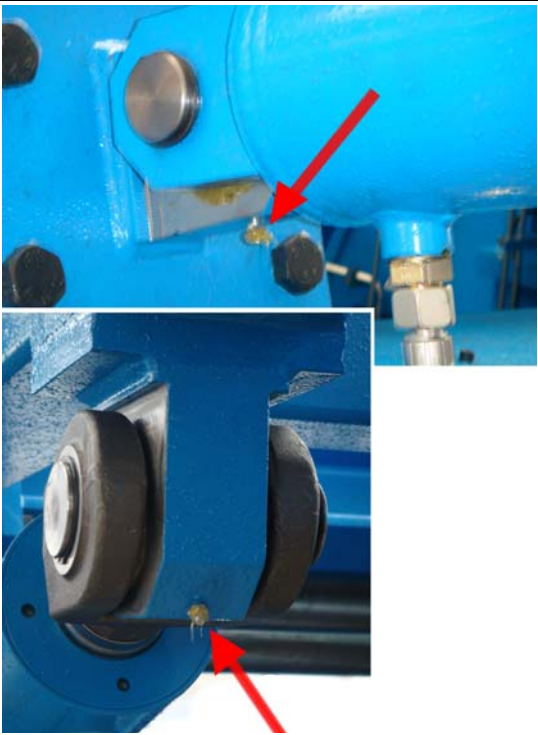
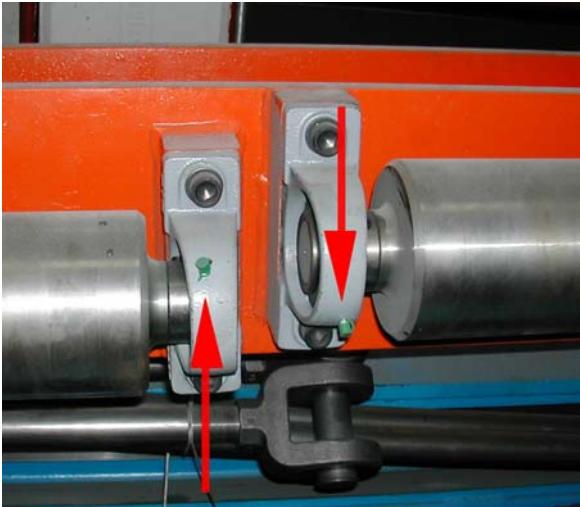
POS.	DESCRIPTION	IMAGE
3)	Articulated joints of side support (if any)	
4)	Central support rolls brackets (if any)	
5)		
6)		

Figure 8.1: Manual lubrication

	CAUTION! IMPORTANT
	All lubricators are marked in an evident way on the machine.



8.4 NUTS AND BOLTS TIGHTENING CHECK



After the first 100 working hours and, subsequently, at programmed intervals (*) the locking level of nuts and bolts in the machine must be checked and the screws must be tightened as per parameters indicated in the following schedule.

Particular care must be paid with screws subject to vibration and/or temperature changes like those used in fixing pipe brackets and pipe connection flanges.

	CAUTION! DANGER
	The screws must be tightened when the machine is switched off and completely cold.

Table 8.1: Nuts and bolts tightening values

SCREW SIZE	STRIPPING STRENGTH CLASS 8.8		STRIPPING STRENGTH CLASS 12.9	
	FA [N]	Ms [N,M]	FA [N]	Ms [N,M]
M4x0.7	2340	1.5	2340	2.2
M5x0.8	3810	3.0	4830	4.0
M6x1	5400	5.0	6840	7.0
M8x1.25	9900	11.0	12540	17.0
M10x1.5	15750	21.5	19950	32.0
M12x1.75	22950	36.5	29070	55.0
M16x2	43200	78.5	54720	120.0
M20x2.5	67800	155.0	85880	230.0
M24x3	97200	265.0	123120	400.0
M30x3.5	156000	493.5	197600	740.0
M36x4	228000	825.0	288800	1240.0
M42x4.5	315000	1275.0	399000	1920.0
M48x5	414000	1870.0	524000	2800.0

VALUES ARE CALCULATED WITH A FRICTION COEFFICIENT $\mu = 0,10$



The indicated tightening values are calculated by **Sertom M.M. S.p.A.** technicians according to the yield load of the materials onto which the screw is fitted and the number of engaging threads (not according to the screw yield load).



Different locking values can be used for the fixing bolts of reduction gears and main cylinders.

(*) Frequency of the services is indicated in [Table 7.1](#).



SERTOM M.M. S.p.A.

8.5 ROLLS PARALLELISM CHECK



For the machine to be in perfect working condition, it is extremely important to keep the rolls parallelism within the indicated tolerances.

At programmed intervals (Please see [Table 7.1](#)), it is necessary to carry out the following checks:

- 1) **Check that the rolls surface is not damaged, worn and that there is no roughness.**
- 2) **Check that rolls parallelism is correct using the following procedure.**
The machine must be stopped, lower rolls must be completely opened and top roll in the uppermost position; then you must repeat it with lower rolls completely closed and top roll in the lowest position, carrying out the following instructions. The test must be carried out in different points along the whole length of the machine.

TEST.

Using a large centesimal inside micrometer gauge measure the distance between:

- Side right lower roll and side left roll
- Pinching roll and top roll
- Left lower roll and top roll

in different points along the whole length of the rolls.

If there are parallelism errors of more than 10% of permissible tolerances, () the first thing that must be checked is the machine correct leveling following indications described. (Please see [Chapter 8.7 on page 8.11](#) of this technical handbook). With the machine leveling done, if there are still some alignment platens errors of more than 10% of permissible tolerance, check rolls sliding devices integrity as described in the following Chapters and see to replacement of worn parts.

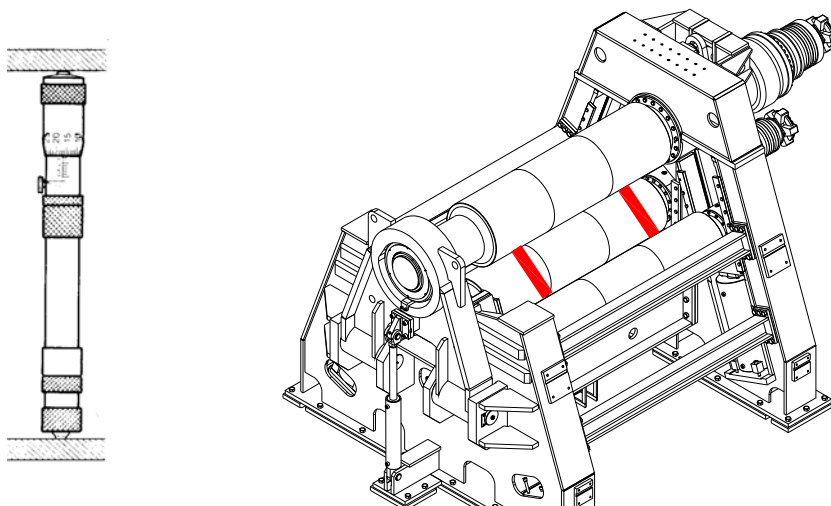


Figure 8.2: Rolls parallelism check

8.6 ROLLS SLIDING CHECK



For the machine to be in perfect working condition, it is extremely important to keep the vertical and horizontal strokes on shoulders perfectly efficient.

The check must be accurate and careful, keeping in mind that irregular wear on one of the sliding areas will degenerate rapidly and cause a lack of balance in the alignment of the rolls with permanent damage to the machine.

At programmed intervals (Please see [Table 7.1](#)) , or anyway before each production change, you need to verify the integrity of sliding bushings and shoes. If you find roughness, or excess of wear, re-place them.



Rough movements, vibrations or noise are signs of excessive wear in the pins of articulated joints.



Should you have any doubt, please contact the technical service of Sertom M.M. S.p.A.

ALL WEARING PARTS ARE NOT INCLUDED IN THE WARRANTY.



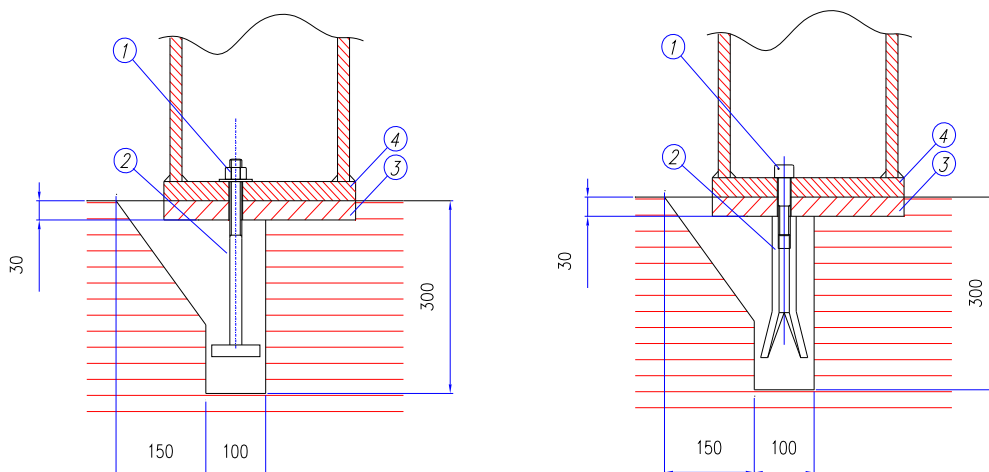
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8.7 MACHINE LEVELLING CHECK



At programmed intervals (Please see [Table 7.1](#)) check the machine levelling as described below. The positions mentioned in the text are referred to following drawing.

- To verify the longitudinal levelling, position a precision level on the top roll (sensitivity: 0,02 mm/m) . To verify the transversal levelling, position a precision level on lower rolls (sensitivity: 0,02 mm/m) . The following figure (Please see [Figure 8.3](#)) is a sketch of precision level positioning.
- Unloose the fixing screw (1) of the part to be adjusted.
- Search for the correct levelling in both senses with a maximum tolerance of 0,5 mm/m. inserting shims between machine foot (4) and plate (3)
- When the machine is perfectly leveled, tighten the fixing screws (1) according to the quoted tightening torques. (Please see [Chapter 8.4 on page 8.8](#) of this technical handbook).



After tightening the nuts of the anchoring bolts, it is necessary to check the level of the base once more.



CAUTION! IMPORTANT

The spirit level must not be used on guards, protections or unworked surfaces, but on structural parts of the machine that have undergone mechanical working and are extremely important to the functioning, for example, of rolls and sliding guides . Please see [Figure 8.3](#).



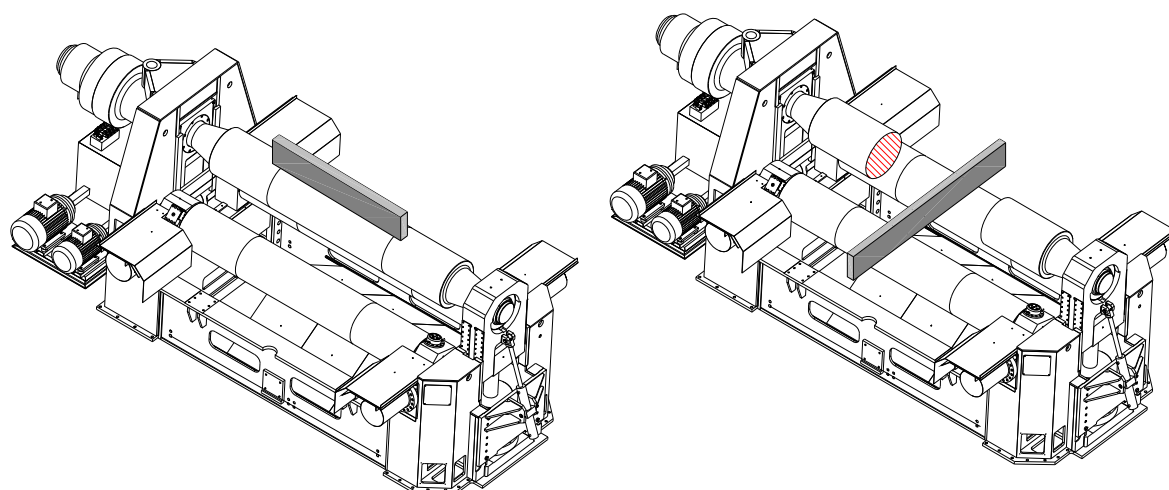
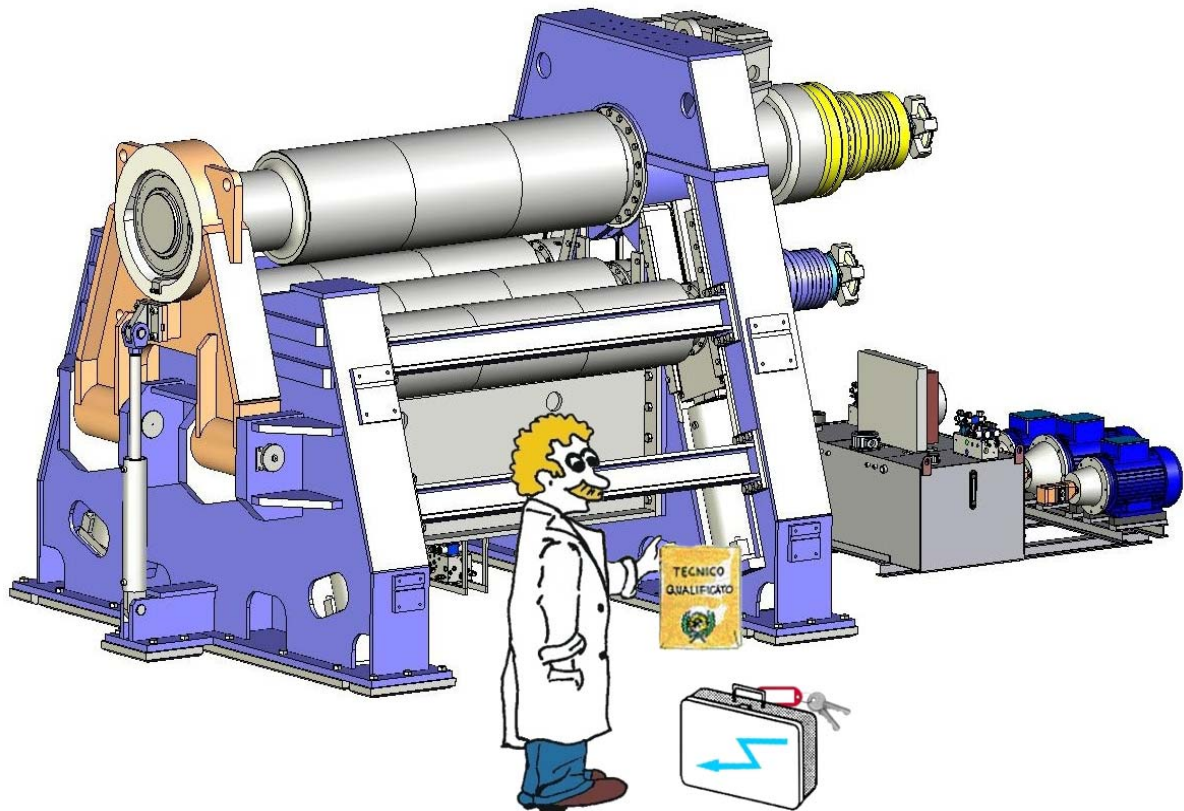


Figure 8.3: Machine levelling



chapter 9: MAINTENANCE OF THE SYSTEMS



-
- Hydraulic system maintenance
 - Cooling system maintenance
 - Pneumatic system maintenance
 - Lubricating system maintenance
 - Electrical system maintenance
 - Safety devices maintenance
-





9.1 MAINTENANCE OF THE HYDRAULIC SYSTEM

9.1.1 CHECK OF THE HYDRAULIC LEAKAGE ON PIPES



At programmed intervals (*) that there is no hydraulic fluid leakage along the pipes and in the hydraulic unit.

Should any leakage be found, before proceeding with any other operation it is necessary to find the source and eliminate the leakage as hereafter indicated.

The control must be accurate and careful, checking for the absence of fluid on all the connections present on the pipes, on the bottom and on the cylinder front flanges.

	CAUTION! IMPORTANT
	Leakage occurring with the machine at rest, in the circuit part under pressure (at the bottom of the pump) is destined to increase during operation. Leakage occurring in the suction part of the circuit (in front of the pump) during operation allows air suction by the pump, which could consequently be damaged.

a) Sealing by OR seals

To eliminate the leakage it is necessary to replace the seal, checking that the slot does not present trimmings, sharp edges or excessive roughness that could damage the new seal.

During the installation make sure that the seal is not damaged. In order to keep the seal in position, fill the slot with grease.

b) Sealing by biconical bush

Further bush tightening can eliminate the leakage.

c) Sealing by flat joints

The leakage can be eliminated by removing the contact parts, properly cleaning the surface and replacing the airtight element.

d) Sealing by packing joints

In the case of leakage in the hydraulic cylinders the entity must be closely evaluated:

- ❖ A slight leakage from the cylinder rod side is normal and depends on the hydraulic fluid scraper by the scraping ring.
- ❖ Increasing the packing pressure can eliminate an increased leakage, if there are no dents or scratches on the rod.



	CAUTION! IMPORTANT Operations of fluid leakage elimination must be carried out with the machine at rest and completely cold.
---	--

	CAUTION! DANGER To tread on oil left on the floor can cause dangerous falls from slipping.
---	--

(*) Frequency of the services is indicated in [Table 7.1](#).



9.1.2 CHECK OF THE HYDRAULIC FLUID LEVEL

(Please see [Chapter 2.2.1 on page 2.5](#))



Check the hydraulic fluid level in the unit tanks with the appropriate level indicator (2) and, if necessary, top up the hydraulic fluid through the appropriate loading filler (1) with the recommended hydraulic fluid.

The filling is carried out with a transfer pump equipped with filter with lower retention power to 10µ to guarantee the introduction of clean fluid, and flow rate 40 l/min. In regard to same, it must be noted that the fluids contained in commercial drums are not deemed to be clean enough for hydraulic operation.

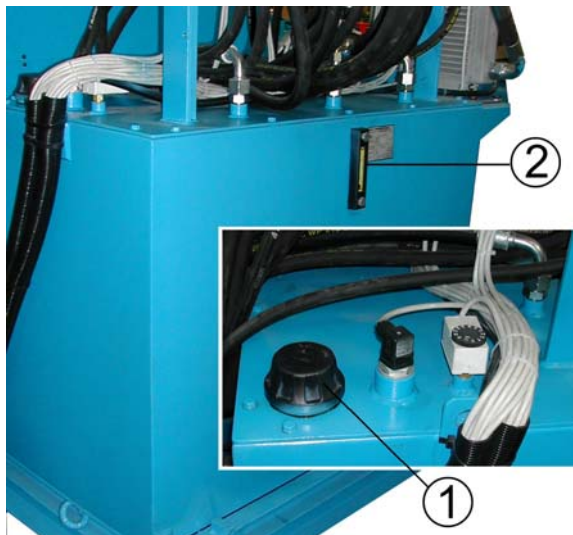


All the operations described must be carried out with pumps at a standstill position and the machine stopped with all cylinders in the retracted position.



CAUTION! IMPORTANT

Operating the air suction pumps may cause irreversible damage to the mechanical parts and the introduction of air in the main system circuit.



CAUTION! IMPORTANT

Machine operating with insufficient hydraulic fluid causes a situation of alarm with immediate machine stop and indication on the monitor of the control system.



9.1.3 OPERATION TEST OF THE HYDRAULIC SYSTEM



At the first start-up after major servicing including the dismantling and/or replacement of the hydraulic unit parts, or in the case of abnormal operation, a check of the hydraulic system functioning is necessary.

To carry out checks on correct operation of the hydraulic system, the following requisites are necessary:

1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	

If the machine is not equipped with a oil pre-heating system, when the machine is cold and environmental temperature is $< 16 \div 20$ °C, you must let the pump idle run for ~30 minutes before starting any operation. This phase is useful to let the hydraulic fluid heat in the central tank, as it has its best functional characteristics at working temperature.



1)	Activate each manometer Mn, indicated in the picture, by moving the suitable cut out E. Carry out some manual operations of hydraulic actuators and check on the corresponding manometer that the pressure trend during operation is the same as the one in the project. Particular care must be paid to the maximum working pressure. The correspondence between actuator and manometer is clearly indicated in the hydraulic diagram attached to this Technical Handbook.	
2)	Check that there is no hydraulic fluid leakage as described previously in this user's handbook and check the integrity of the flexible pipes. Please remember that flexible tubes using is established by the following standards: Standard VG 95.294. The tube assembled duration time is 40 terms (10 years); after this period the tube has to be replaced with the homologate tubes. Date is engraved on the mechanic parts. Standard SAE 517 C. The tube has to be marked with the company name, standard reference number and nominal diameter. (For example: SAE 100R6 Size 3/8"). Homologation datas must be visible along tube ax.	
3)	Retract all the hydraulic cylinders, switch off the electrical power supply and check the hydraulic fluid level according to the instructions previously described. If necessary, reset the maximum level according to the methods previously explained.	
4)	Check the pumps noise level and the hydraulic fluid temperature in the tank.	



The identification plate marks of the valves stamped on the machine, can be found on the enclosed hydraulic diagram.

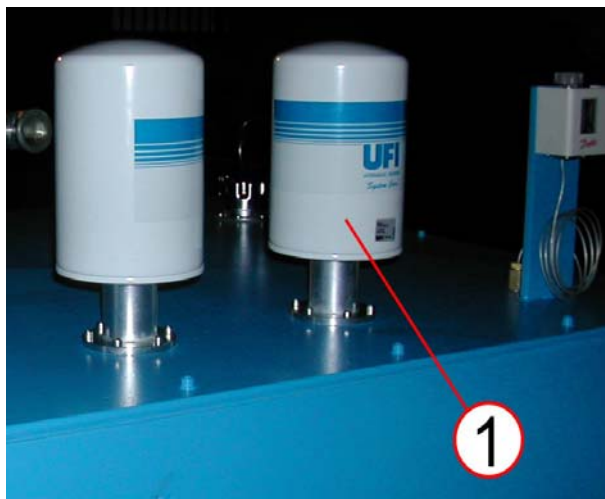
	CAUTION! IMPORTANT
	Working pressure values, Max high delivery and Max low delivery are programmed upon machine general test and inspection and cannot be changed for any reason or altered by the user.



9.1.4 MAINTENANCE OF THE TANK AIR FILTER



At programmed intervals (*) it is necessary to replace the cartridge of the air filter for the hydraulic system tank as described hereinafter:



a)	Unscrew the cartridge (1) removing it from its support.
b)	Reinsert the new cartridge, tightening it with the hands.



CAUTION! IMPORTANT

The cartridges and their seals must be replaced exclusively with original spare parts.

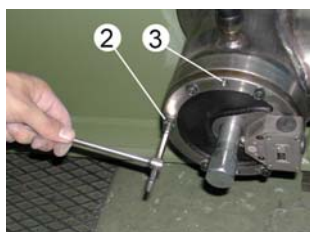
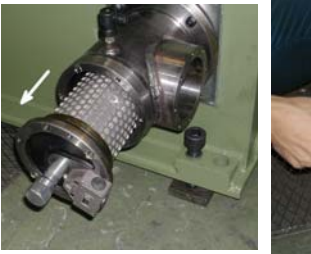
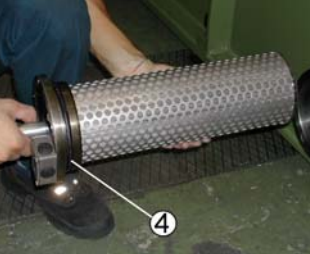
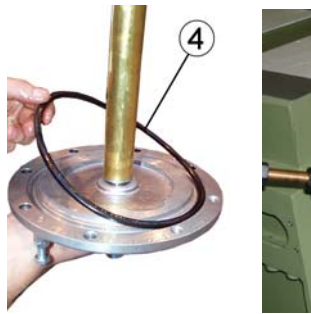
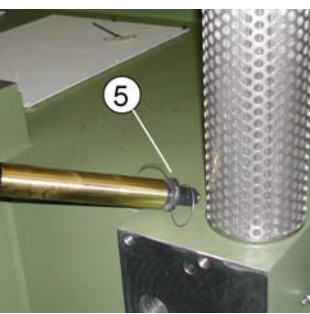
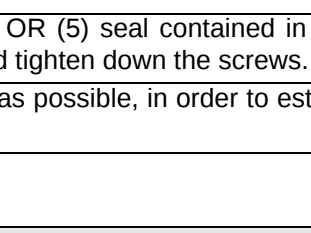
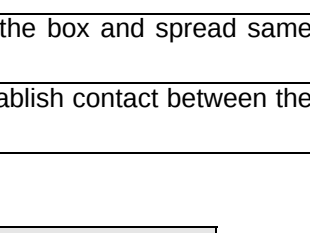
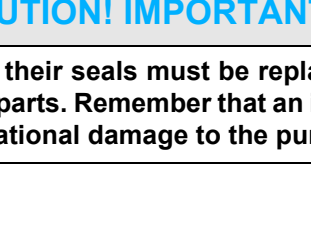
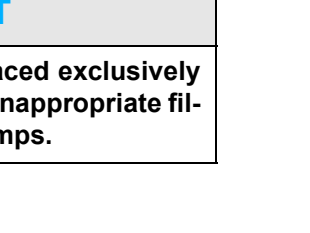
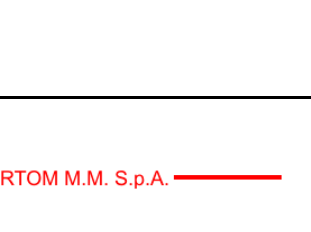
(*) Frequency of the services is indicated in [Table 7.1](#).



9.1.5 MAINTENANCE OF THE SUCTION FILTER



At programmed intervals (*) or in alarm situations for "BLOCKED FILTERS" it is necessary to stop the machine and to immediately regenerate or replace the suction filter intervening as described herein-after.

a)	Rotate the screw (1) anticlockwise as far as possible , in order to section the cartridge from the tank.		
b)	Unscrew and remove the screws (2) of filter lid anchorage.		
c)	Remove the lid of the filter casing. If necessary intervene on the extraction screws (3).		
d)	Extract the filter cartridge from the filter casing taking care not to jolt or hit it against anything.		
e)	Replace the cartridge with a new one.		
f)	Remove the OR seal (4) on the lid and accurately clean the area.		
g)	Reinstall a filter cartridge, replace the OR (5) seal contained in the box and spread same grease on the area. Reinsert the lid and tighten down the screws.		
h)	Rotate the screw (1) clockwise as far as possible, in order to establish contact between the cartridge and the tank.		



CAUTION! IMPORTANT

The cartridges and their seals must be replaced exclusively with original spare parts. Remember that an inappropriate filter can cause cavitalional damage to the pumps.



To better understand the geometry of the suction filters, refer to the following figure.

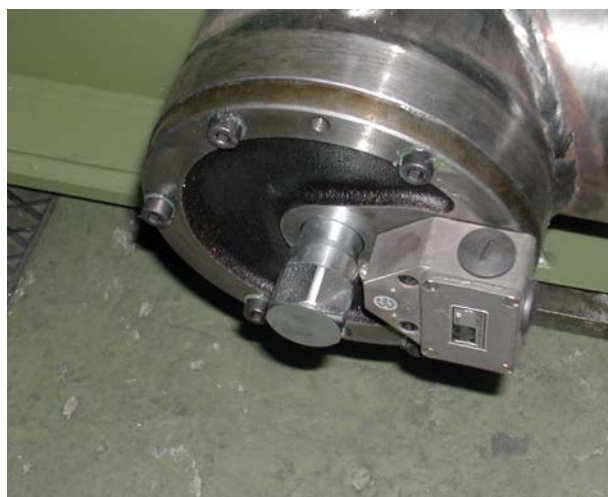
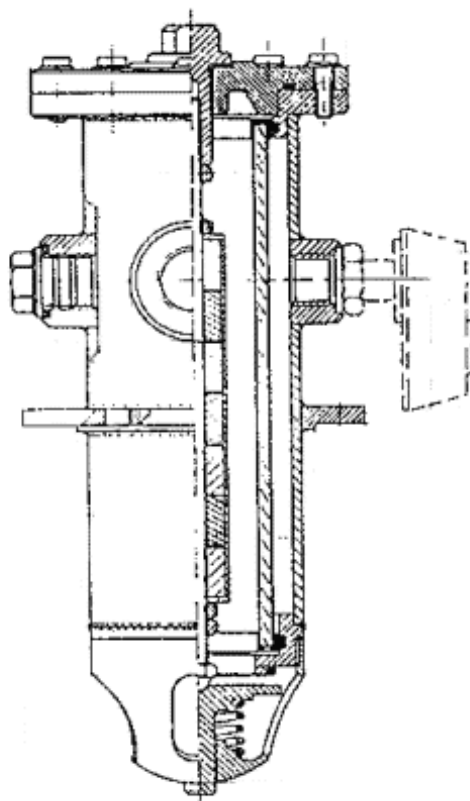


Figure 9.1: Suction filter.

(*) Frequency of the services is indicated in [Table 7.1](#).



9.1.6 MAINTENANCE OF THE OIL FILTER UNDER PRESSURE

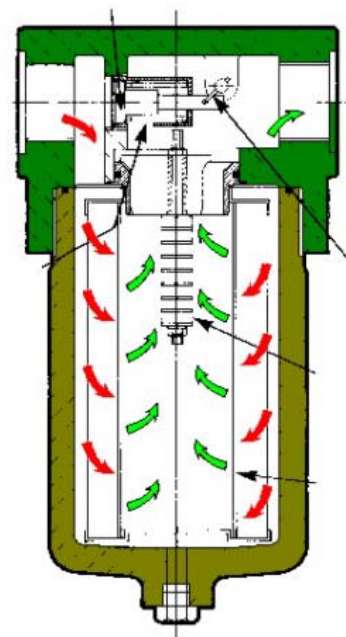
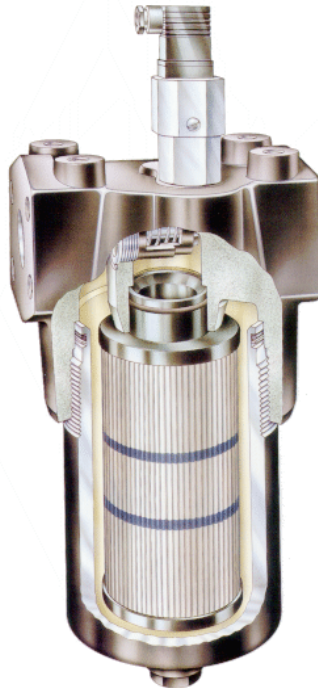
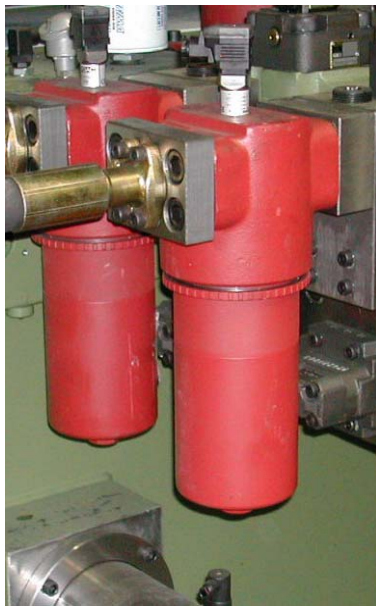


Figure 9.2: Filters under pressure

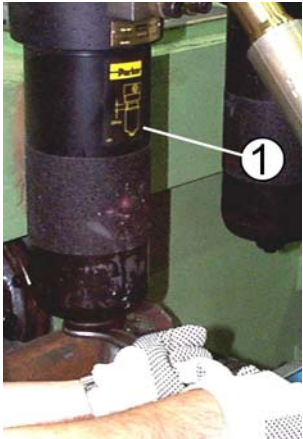
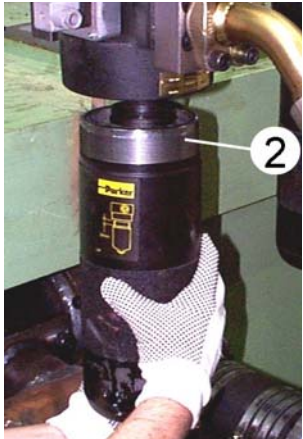
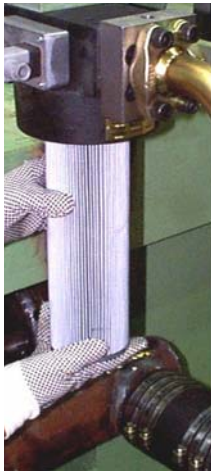
At programmed intervals (*) or in alarm situations for "BLOCKED FILTERS" it is necessary to replace the cartridge with a new one or regenerate it .



The localisation and quantification of the filters under pressure is possible, but first consult the hydraulic diagram enclosed in the chapter "Technical documentation" of this user's handbook.

To replace the filter cartridge follow these steps:

- 1) Make sure that the oil to filter supply lines are closed and decompressed (at atmospheric pressure).
- 2) Place a container under the filter to collect the draining oil.
- 3) Empty the oil filter by removing the drainage cap found at the bottom of the bowl.

4)	Using an appropriate hexagonal wrench unscrew the bowl (1) from the filter unit and remove the annular area (2) from the filter element.		
5)	Remove the cartridge (3) from the bowl.		
6)	Remove the OR seal (4) from the edge of bowl and clean the area carefully.		
7)	Reassemble the element (2) onto a new filter cartridge and insert the OR seal contained in the package making sure to grease the area first.		
8)	Insert the complete cartridge into the filter unit taking care that the annular area of the cartridge goes into place and then screw the bowl back on.		



CAUTION! IMPORTANT

The cartridges and their seals must be replaced exclusively with original spare parts.

(*) Frequency of the services is indicated in [Table 7.1](#).



SERTOM M.M. S.p.A.

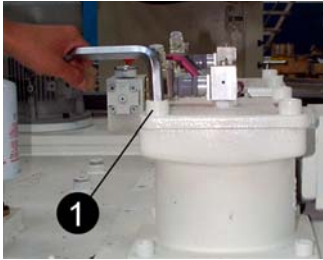
9.1.7 MAINTENANCE OF THE OIL FILTER ON THE EXHAUST



At programmed intervals (*) or in alarm situations for "BLOCKED FILTER" it is necessary to replace the filter cartridges on the discharge filters in the following way.

The localisation and quantification of the filters is possible upon consulting the enclosed hydraulic diagram..



a)	Uncover the filter by removing the screws (1) and removing the upper lid (2).	
b)	Extract the filter cartridge (3) from the filter casing taking care not to jolt or hit it against anything.	
c)	Remove the OR seal (4) from the lid and accurately clean the area.	
d)	Reinstall the new filter cartridge, replace the OR seal contained in the box and spread grease on the area. Reinsert the lid and tighten down the screws.	



CAUTION! IMPORTANT

The cartridges and their seals must be replaced exclusively with original spare parts.

(*) Frequency of the services is indicated in [Table 7.1](#).



SERTOM M.M. S.p.A.

9.1.8 MAINTENANCE OF THE SACK ACCUMULATORS



	CAUTION! DANGER Any and all maintenance operations carried out on the accumulator must be effected exclusively by trained experts with the machine stopped, the electric current switched off from the control panel, any inserted keys removed and the main switchboard locked.  Any and all maintenance operations on the accumulator must be effected exclusively when the accumulator is separated or the circuit is decompressed.
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The pre -load of accumulators installed on the machine (See enclosed hydraulic diagram) require periodic checking of the Nitrogen (N₂) preload to guarantee that the hydraulic activated actuators work properly..

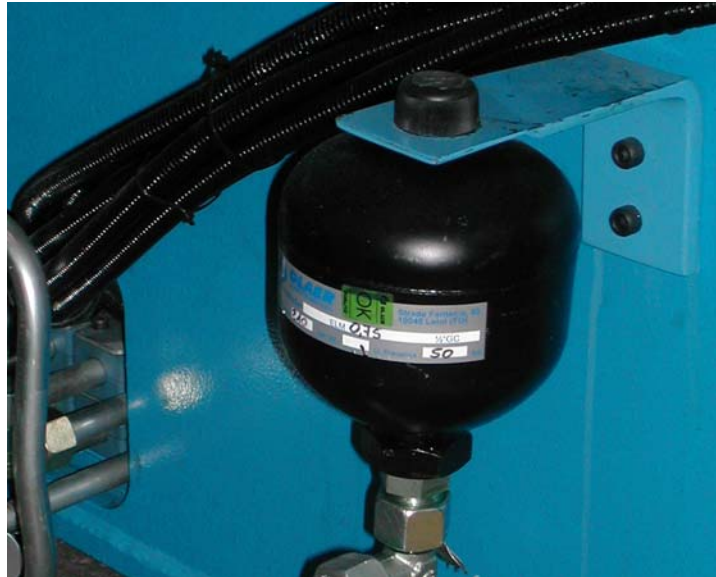
The pre -load pressure test is important for the actuators to run well and for safety reasons. It must be done in the following way:

- ❖ Before operating make sure the pre -load pressure is right for the job the actuator must do.
- ❖ At programmed intervals (Please see [Table 7.1](#)), in order to find any gas leaks that may be produced during operation, in which case it is necessary to re-establish the initial pre -load pressure.

	CAUTION! IMPORTANT The pre -load pressure test of the Nitrogen (N₂) must be carried out only when the accumulator is separated or the circuit is decompressed.
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9.1.8.1 CHECK OF ACCUMULATOR NITROGEN PRE -LOAD



This operation is simple, but must be carried out as indicated below and by referring to the following figure.

- Isolate the accumulator from the system and drain the fluid contained under pressure.
- Remove the valve protection cap and the inflation valve protection cap.
- Before assembling the testing and inflation equipment that the cap is unscrew, the breather pipe closed and the check valve cap screwed on.
- Using a knurled ring nut, screw the equipment onto the valve by hand.
- Gently turn the knob until pressure reading is obtained.

If the value corresponds to the one prescribed, remove the instrument by unscrewing the ring nut taking care to:

- Unscrew until it stops, without forcing the knob.
- Open the breather pipe.



Figure 9.3: Test instrument for pre -load sack accumulators

PRE-LOAD INCREASE AND RESET

If the pre-load is below the set value (or if the sack has to be inflated after repair) the procedure is the following (the equipment is placed as in figure):

- a) Apply the connector to the nitrogen bottle.
- b) Connect one end of the flexible pipe to the connector.
- c) Remove the cap and connect the other end of the flexible pipe to the small valve.
- d) Slowly open the cylinder tap and keep it open until a value slightly higher than the one needed is reached, then close the tap.
- e) Turn the knob and decompress the instrument with the breather pipe.
- f) Disconnect the flexible pipe from the check valve.
- g) Close the breather pipe, put the cap back on the valve and wait a few minutes for the pressure to stabilise.
- h) Screw the knob (A) back on and read the pressure, which should be slightly higher relating to the required one
- i) Adjust the breather pipe, the pre-loading value and proceed to dismantle the instrument as previously indicated.
- j) Using soapy water, check for leaks from the accumulator inflation valve.
- k) Screw the cap of the small valve and the external protection back on.

At this point the accumulator is ready to be used.

PRE-LOAD DECREASE

If the pre-loading value is higher than the desired one, it can be released by acting on the release valve until the right value is reached.

It is advisable to release the pressure slowly and wait a few minutes before taking the final reading and then instrument can be removed as previously indicated.

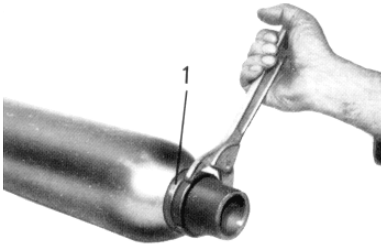
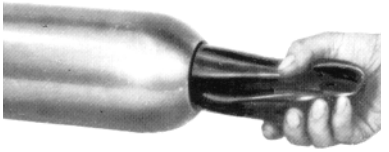
9.1.8.2 DISASSEMBLY AND MAINTENANCE OF THE SACK ACCUMULATORS

	CAUTION! IMPORTANT
	Any maintenance operation which includes the removal of the accumulators must be carried out on the work bench, that is, after the accumulator has been removed from the machine.



 	CAUTION! DANGER
	Before removing the accumulator from the machine, it must be depressurised and the hydraulic fluid and the nitrogen drained from it. Any attempt to remove the pressurised accumulator, either from the oil or the Nitrogen (N₂) side, constitutes a potential danger both for the maintenance personnel directly involved and for all those present in the working area.

ACCUMULATOR DISASSEMBLY

1)	Isolate and decompress the accumulator or decompress the hydraulic circuit	
2)	Place the accumulator in horizontal position, steady it with a vice and protect the casing to avoid damaging it	
3)	Remove the lead seal if necessary, unscrew the cap or caps of the air valve and release the nitrogen from inside the sack using an inflation tester	
4)	Unscrew the threaded ring nut, remove the bush and push the casing valve inside the casing	
5)	Remove the toric gasket and the washer, pull out the internal bush from the valve casing, and then remove itself	
6)	Pull out the sack from the air valve	

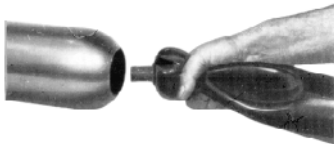
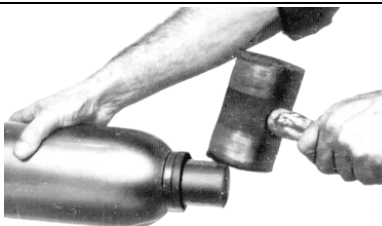


CLEANING, INSPECTION, REPAIR

Carefully clean every metal piece of the accumulator with an appropriate cleanser. Blow dry every piece.

- 7) Check that the internal protective lining of the accumulator is intact.
- 8) Make sure that the anti-recovery of the casing valve slides well in its guide.
- 9) Check that the toroidal gaskets do not have signs of wear and tear.
- 10) Check that the sack is not excessively worn from rubbing and that the circuit fluid has not damaged it.
- 11) Replace the worn or deteriorated pieces. **Do not try to repair the sack**

RE-ASSEMBLY.

12)	Make sure that no foreign objects remain in the accumulator, lubricate the sack and the accumulator casing in order to more easily replace the sack inside the casing.	
13)	Insert the sack by squeezing the upper cap and making sure it is not bent or positioned incorrectly	
14)	Re-assemble the valve assembly, the internal bush, the washer, the toric gasket and the external bush. Screw the threaded ring nut back on taking care to centre the pieces by tapping the valve assembly in various points with a rubber hammer	
15)	Finalise the re-assembly by using new gaskets and firmly blocking the treaded ring nut. Before placing the connector, inflate the sack with pressure of 1÷1.5 bar and with a small bearing check the valve clamp, then proceed to inflate the accumulator as previously described	

	CAUTION! IMPORTANT
	Before putting the circuit under pressure, release the air from the pipes by acting on the release screw until all the air bubbles are completely removed. Set the circuit to maximum pressure and check the seals of the gaskets and connectors.



9.1.9 **GUIDE FOR FINDING IRREGULAR PUMP OPERATIONS**

Table 9.1: Guide for finding irregular pump operations

INCONVENIENCE		PROBABLE CAUSE	INTERVENTION
TOTAL LACK OF DELIVERY	PUMP DOES NOT SUCK	Closed or clogged suction line	Remove the obstruction
		Suction line leakage	Tighten pipe fittings, replace seals, repair pipe
		Suction line too small or oil level too low	Replace suction line or add oil
		Air pressure drop too high on the suction line	Reduce the suction height, clean the filter, use a larger tube, clean the pipe.
		Rotation in wrong direction	Eliminate
		Closed or clogged delivery line	Repair or bypass suction line
		Fluid viscosity too high or fluid temperature too low	Replace or warm hydraulic fluid
	PUMP DOES NOT TURN	Coupling pump broken or defective.	Reconnect
		Pump mast broken	Send pump back to manufacturer for repair.
		Faulty suction line	Tighten pipe fittings, replace seals, repair pipe
		Fluid level too low	Top up fluid
LACK OF PRESSURE		Drawing air in suction	Tighten pipe fittings, replace seals, repair pipe or top up fluid
		Exhaust valve open	Clean valve or replace faulty parts
		Closed valve on delivery	Open valve
		Faulty pipe on delivery	Repair pipe or join
		Damaged pump	Send pump back to manufacturer for repair.
PUMP MAKES TOO MUCH NOISE.		Pump sucks air	Tighten pipe fittings, replace seals, repair pipe or top up fluid
		Damaged seals	Replace
		Pump causes cavitation	Reduce the suction height, clean the filter, use a larger tube, clean the pipe, use a less viscose hydraulic fluid.
		Motor coupling damaged or not aligned.	Replace or align
		Damaged bearings	Replace
		Faulty pump	Send pump back to manufacturer for repair.
PUMP DRAWS		Damaged seals	Replace
		High pressure inside the pump.	Inside drainage blocked or pump is defective. Send pump back to manufacturer for repair.
		Drainage tube not connected or blocked.	Check or connect



9.1.10 REPLACEMENT OF HYDRAULIC FLUID AND CLEANING OF THE TANK



To safeguard and guarantee the efficiency of the hydraulic parts the hydraulic fluid must always be in excellent condition, therefore it is necessary to:

- 1) Protect it from possible contamination every time maintenance and other interventions require direct contact.
- 2) Replace it after the **first 1000 working hours** and afterwards **every 2000 working hours** or when, after testing, the chemical-physical characteristics have been altered. When replacing keep in mind that:
 - Draining the tank must be done through the drain tap with the machine shut down and the cylinders retracted.
 - Refilling must be carried out following the steps indicated previously in this user's manual.

Every time the hydraulic fluid is replaced, make sure the tank is thoroughly cleaned in the following way. The replacement or regeneration of the suction and discharge filters must be done with original spare parts.

	CAUTION! IMPORTANT Spent oils are special waste and must be eliminated by scrupulously following the legal norms.
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9.1.10.1 TANK CLEANING

The presence of dirt in the hydraulic system causes the system to malfunction and reduces the life of the equipment, in particular, the pumps.

To wash the tank the following steps must be taken:

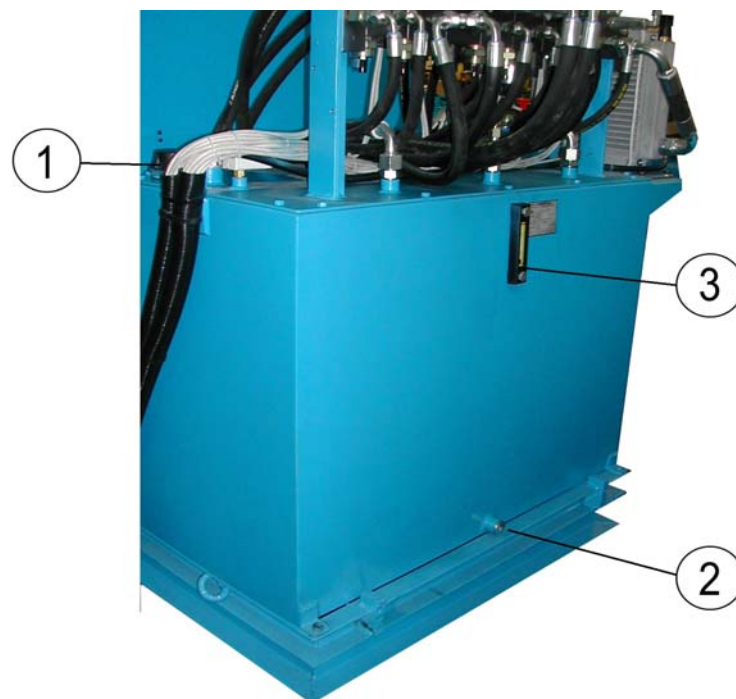
- a) Short-circuit the cylinders or hydraulic motors by connecting the delivery to the exhaust.
- b) The exhausts have to go through a filter before reaching the tank.
- c) Lightly tap on the entire pipe to detach the particles.

The exhausts have to go through a filter before reaching the tank.

Lightly tap on the entire pipe to detach the particles:



- a) Put a fluid into the tank with a viscosity equal to 2,5-3,5 °E a 38 °C., compatible with the fluid normally used. Special solvent may be added to the fluid (depending on existing laws) that help to remove rust and paint film.
- b) Isolate the other accumulators from the rest of the circuit.
- c) Open all the taps or chokes that may prevent dirt from coming out.
- d) Begin to circulate the washing fluid, 8-10 hours are needed to do this, but it depends mostly on the amount of deposit in the filters, which have to be checked for clogging periodically.
- e) When the operation is finished, drain the fluid from the system.
- f) Open and carefully clean the tank.
- g) Remove and clean the suction filters and/or change the cartridge of the pressure filters and clean the shell of the container.



- 1) Filler
- 2) Drain tap
- 3) Level indicator



9.1.11 FINDING OF IRREGULAR OPERATIONS IN THE HYDRAULIC CIRCUIT

Table 9.2: Finding of irregular operations in the hydraulic circuit

INCONVENIENCE	PROBABLE CAUSE	CHECK	INTERVENTION
Total lack of pressure in 1 of more manoeuvres.	Lack of electrical contact in max. high pressure and max. low pressure valves.	Check regular movement of valve piston during operation.	Reset electrical function as indicated on enclosed electrical diagram.
	Pipe leakage.	Check for leakage as instructed.	Repair.
Partial lack of pressure in 1 of more manoeuvres.	Lack of electrical contact in max. high pressure valves	Check regular movement of valve piston during operation.	Repair or replace.
	Slight leakage in pipes.	Check for leakage as instructed.	Repair or replace faulty component.
	Faulty cylinder sealing.	Check cause as instructed.	Replace faulty seals.
Lack of speed in 1 or more manoeuvres.	Lack of electrical contact in max. low pressure valves	Check whether max. low pressure valve moves regularly.	Reset electrical function as indicated on enclosed diagram
	Faulty or uncalibrated Max. high and Max. low pressure valves.	Check calibration as instructed.	Correctly calibrate and eventually dismantle, clean and reinstall.
	Pressure switch uncalibrated of faulty.	Check calibration as instructed.	Correctly calibrate and eventually replace
	Faulty cylinder sealing.	Check cause as instructed.	Replace seals.
Excessive absorbency by 1 or more motors.	Incorrect calibration of max. high pressure and max. low pressure valves or of pressure switch	Check calibration as instructed.	Correctly calibrate and eventually dismantle, clean and reinstall.
Excessive heating of hydraulic fluid	Lack of operation or of calibration of thermostat in heat exchanger.	Check the functioning.	Correctly calibrate and eventually replace
	Lack of functioning of the heat exchanger.	Check the functioning.	Repair or replace.
Over-heating or excessive noise or 1 or more pumps.	Insufficient fluid level in tank.	Check level	Top up fluid level to maximum.
	Loss of suction fluid.		Eliminate the loss.
	Irregular fluid flow in the pump for lack of filtering surface (dirty filter).	Check the suction filters	Regenerate or replace the-filtering element.
	Pump operating with excessive pressure.	Check calibration of max. valve and pressure switch.	Correctly calibrate and eventually replace
	Worn pump.	Verify regular capacity flow.	Repair or replace.
	Mechanical vibrations for faulty anchorage.	Check the protection devices of pump hoses and anchoring screws	Tighten down protection devices and anchoring screws.
The piston does not carry out the run with manual manoeuvres.	Mechanical block of moving element.	Verify cause of blocking.	Stop the machine and remove the obstacle.
	Blocked distributor and out of use.	Check the functioning.	Replace the distributor.
The pump over-loads the motor.	Entry conducts blocked or with excessive resistance.		
	Excessive pressure at pump exit.		



9.2 MAINTENANCE OF THE COOLING SYSTEM

9.2.1 OPERATION TEST OF THE COOLING SYSTEM



To carry out the check of the correct operation of the cooling system the following requisites are necessary:

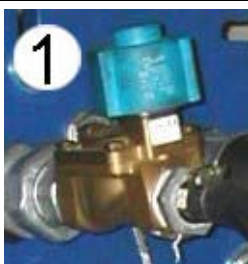
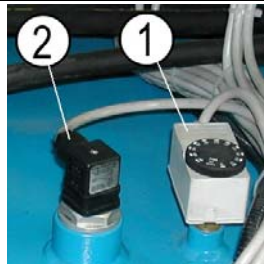
1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	

	CAUTION! IMPORTANT
	Reaching the excessive working temperature of the hydraulic fluid in the tank creates an alarm situation with visualisation of abnormal operation and setting at work of the cooling system. If, after a set time, the temperature does not decrease, also the pump stops.

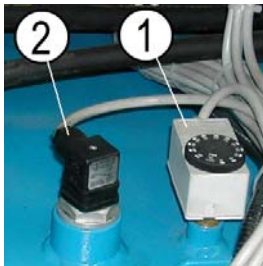


And proceed as indicated below.

WATER -OIL HEAT EXCHANGER

1)	Check the water presence at the correct temperature on the feeding line.	
2)	Verify that the cooling water recycling electrovalve (1) correctly starts, according to the changes of the temperature set on the thermostat (1) in the tank.	 
3)	Check that there are no water leakages in the cooling circuit..	

AIR -OIL HEAT EXCHANGER

4)	Verify that, according to the changes of the temperature, set on the thermostat (1) in the tank, the heat exchanger regularly starts and correctly operates.	 
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CAUTION! IMPORTANT

The checks above must be carried out also when the machine undergoes special maintenance operations which imply parts dismantling.



9.2.2 MAINTENANCE OF THE HEAT EXCHANGER



At programmed intervals (Please see [Table 7.1](#)), or after alarm situation for hot oil, it is necessary to clean the heat exchanger.

9.2.2.1 AIR -OIL HEAT EXCHANGER

Blow air into the heat exchanger in the the opposite direction with respect to regular operating direction, removing dirt and impurities from air passages. Do not use air jets or metal brushes.

9.2.2.2 WATER TUBE TYPE HEAT EXCHANGER

A) Generality

For every heat exchanger a scheduled and systematic maintenance is recommended since a lower level of performance is usually due to the deposits formed on surfaces which are in contact with oil and water.

The use of unsuitable water can damage the functioning of the machine, therefore it is necessary to use:

- ◆ Clean, unpolluted water. Install a filtering system upstream of the exchanger if necessary.
- ◆ Lime-free water (Hardness < 4°E). Should the water be particularly hard install an appropriate softening system upstream on the exchanger.
- ◆ Carbon dioxide-free water. Rain water is too aggressive towards non-ferrous metals.
- ◆ Ammonia-free water with a low chlorine content (< 100 mg/l).

Maintenance times vary on the basis of the chemical-physical characteristics of the fluids circulating in the heat exchanger and on the basis of the function thermodynamic values. Therefore it is advisable to check the state of the internal surfaces of the pipes at programmed expiry term and also to establish from one time to the next the intervals for cleaning purposes.

B) Maintenance and Cleaning

To clean the exchanger, empty the fluids contained by means of the special plugs, disconnect it and carry out the cleaning operations as follows:

Oil side

Any deposit and/or oil mud accumulated can be eliminated by filling the container with a solvent, which must act for half an hour. Then, rinse first with a solvent and then with a hydraulic fluid.



Water side

To clean the cooling pipes inside and remove any deposit, use an aqueous solution with 50% of hydrochloric acid. In case of harder deposits, use a nylon brush with a long handle.

Then, rinse with clean water.

	CAUTION! IMPORTANT
	The use of metal brushes can damage the surface of pipes and cause premature corrosion.

	CAUTION! IMPORTANT
	Before using the above-mentioned products, read the technical note supplied by the manufacturer, which indicates the use and disposal procedures.

Before assembling the heat exchanger again, replace all the gaskets, and check that no trace of solvent and/or detergent are in the exchanger in order not to contaminate the hydraulic fluid in the tank; the fittings must be well tightened.

	CAUTION! IMPORTANT
	It is advisable to use only original spare parts.



9.3 **MAINTENANCE OF THE LUBRICATING SYSTEM**

9.3.1 **TEST OF THE LUBRICATING LEVEL**



At programmed intervals (Please see [Table 7.1](#)), check the lubricating fluid level in the tank of the lubricating unit and, if necessary, top up with the recommended products. (Please see [Chapter 2.2.2 on page 2.6](#)).

Filling is carried out through the loading connector (1) using an electrical or manual transfer pump.

Remember to use lubricating oil free of impurities as foreign substances present, of any kind, can cause damage to the pump gears and internal components of the station.



CAUTION! IMPORTANT	
	The possible lack of lubricating fluid in the tank creates a situation of emergency with the machine stop and signalling on the control system monitor. In this case the tank must be re-filled immediately. Empty pump operation can cause irreversible damage to the mechanical parts and introduction of air in the main system circuit.

9.3.2 OPERATION TEST OF THE CENTRALIZED LUBRICATION SYSTEM



To carry out the check of the correct operation of the centralized lubrication system the following requisites are necessary:

1)	Electric feeding available on the electrical equipment box of the bending machine. [Main switch of line (1) positioned at [1] and white pilot lamp (2) on].	
2)	Re-set Emergency push buttons (3).	
3)	Live auxiliary circuits. [Key selector (4) positioned at "1"].	
4)	Hydraulic station motors functioning. [Green luminous push button (5) pressed and on].	
5)	Absence of emergency situation with the electric panel inserted and machine prearranged for manual operating.	

	CAUTION! IMPORTANT
	The checks above must be carried out also when the machine undergoes special maintenance operations which imply parts dismantling.

	CAUTION! IMPORTANT
	Check that there is a even film of lubricant on the rolls sliding shoes.





SLIDING GUIDE OF THE SIDE ROLLS

And carry out the indicated operations.

1)	Check the lubricant presence in the tank and top up as previously described if necessary.	
2)	Check the absence of lubricant on the lubricating circuit being careful with the flexible pipes and checking their integrity. Should you find any leakage, you must immediately eliminate it by replacing the damaged seal elements with new ones. Please remember that flexible tubes using is established by the following standards: Standard VG 95.294. The tube assembled duration time is 40 terms (10 years); after this period the tube has to be replaced with the homologate tubes. Date is engraved on the mechanic parts. Standard SAE 517 C. The tube has to be marked with the company name, standard reference number and nominal diameter. (For example: SAE 100R6 Size 3/8"). Homologation datas must be visible along tube ax.	
3)	Start up the lubricating pump manual operation. [Touch the "Start" push button on the menu "Lubricating pump" of the touch panel.] Check that the pump operates in a continual manner.	
4)	Start up the lubricating pump automatic operation. [Touch the "Automatic" push button on the menu "Lubricating pump" of the touch panel.] Check that the lubricating system operates in a automatic manner according to the operating/rest times programmed.	



**CAUTION! IMPORTANT**

The check must be carefully carried out, checking on the enclosed lubrication diagram, the dislocation of the spacing block and possible lubricating fluid leakage caused by rupture or squeezing of the feeding lines.



9.4 **MAINTENANCE OF THE ELECTRICAL SYSTEM**



At programmed intervals (Please see [Table 7.1](#)) it is recommendable to carry out the following maintenance services.

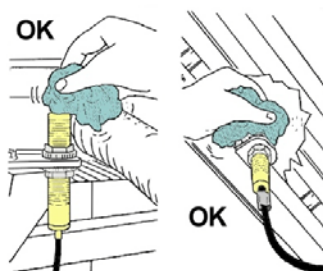
9.4.1 **ISOLATION TEST**

Check the efficiency of the equipotential connections.

9.4.2 **CLEANING**

Clean thoroughly the air conditioner of the control cabinet, if present. For this purpose, proceed as described in user's handbook of the air conditioner enclosed in the chapter "**Tecnichal documentation**" of this user's handbook.

Keep the photoelectric cell always clean, wiping the reading surfaces with non-tready rags or with a light blow of compressed air. Keep the limit switches always clean.



9.4.3 **CHECK OF THE CONNECTION TIGHTENINGS AND LINE INTEGRITY**

Check the efficiency of all electrical connections on the machine and on the control cabinet and all clamp screws must be tightened down. In addition check that:

- There are no exposed wires in the whole circuit, bended, broken or damaged sheaths.
- All the covers are in positions.
- All the doors and covers of junction boxes are closed and sealed.
- All potentiometers, encoders, sensors such as limit-switches, proximity limit-switches and photoelectric cells are firmly fixed and the corresponding electric connection is efficient.
- Cables holder chains do not show wear or interruption.
- Sheathed cable which connects the machine to the control console is well fixed to its connectors and is not damaged.



9.4.4 OPERATION TEST OF THE TOUCH PANEL



At each work program change the program efficiency must be checked as well as all machine movements which should continue to be regular, soft and without uncertainty.

Check that all the part related to the control and operation of the working cycle are in optimum condition.

9.4.5 REPLACEMENT OF THE BATTERY

All the data inserted into the panel are then stored in the PLC, which, having a RAM memory, is not able to keep them if the current is cut out for a long time. In order to keep the data we use a buffer battery which has an average life of one year, then after this time expiry we recommend to replace it.

The battery change does not present any particular problem, except that of strictly following the warnings:

- 1) Leave the tension inserted into the electrical equipment.
- 2) Remove the cover from the chamber on the rear of the panel and extract the battery.
- 3) Insert a new battery and replace the cover.

	CAUTION! DANGER
	During the replacement do not touch the integrated circuits.

	CAUTION! IMPORTANT
	Flat batteries are polluting. Check regulations in force regarding their disposal.



9.5 MAINTENANCE OF THE SAFETY DEVICES

9.5.1 CONDITIONS OF ALARM AND EMERGENCY



Control and safety devices exist to guarantee the proper running of the operating cycle and to safeguard people and the machine in case of breakdown.

The following tables list all the conditions that cause alarm or emergency situations and the relative consequence on the operating cycle.

ALARMS

ITEM	DESCRIPTION	COMPONENT	CONSEQUENCE
1)	Top roll tilting fault	Potentiometer	Signalling of abnormal operation on control panel
2)	Potionometers Faults	-----	
3)	Thermal cutout of power unit motor ON	-----	
4)	Insufficient oil level in tank	Level switch	Pump motors stop and signalling of abnormal operation on control panel
5)	Excessive temperature of hydraulic oil in tank	Thermostat	
6)	Blocked filter on exhaust	Pressure switch on filter	Signalling of abnormal operation on control panel
7)	Lubricant level at minimum in unit tank of lubricating unit.	Level indicator	

EMERGENCIES

ITEM	DESCRIPTION	CONSEQUENCE
1)	Emergency mushroom-head push button pressed	Immediate stop of all motors and emergency signalling.
2)	Rope-pull safety switches located on machine sides	

- **All emergency conditions automatically stop the motors.**
- **All alarm conditions activate the signalling of abnormal operation on control panel (if it exist).**

Check the efficiency of the safety devices as described in this technical handbook. (Please see [Chapter 9.5.2 on page 9.34](#))



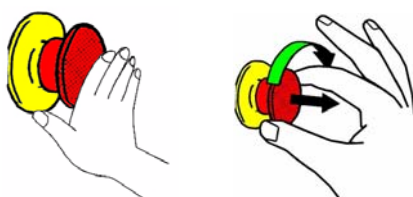
9.5.2 OPERATION TEST OF THE SAFETY DEVICES.

To guarantee safety to the operator and to the machine, it is compulsory to check the correct operation of all the safety devices installed on the machine.

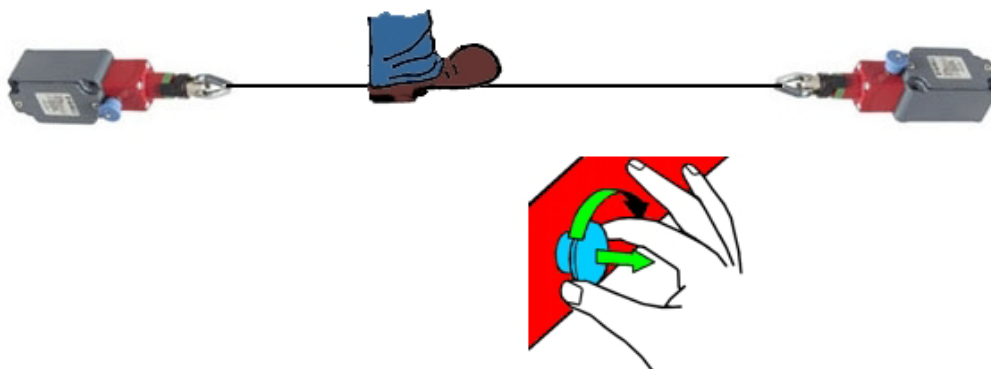
9.5.2.1 OPERATOR SAFETY

At programmed intervals (Please see [Table 7.1](#)) check that :

- 1) A light press on mushroom-shaped emergency push buttons, which are located in different parts of the machine, (*), must cut the current and immediately stop all the motors. A clockwise rotation of push button restores its original state.



- 2) An interference with the rope which connects the two ends of rope-pull safety switches, located on machine front and rear side (*), must cut the current and immediately stop all the motors. A clockwise rotation of push button restores its original state.

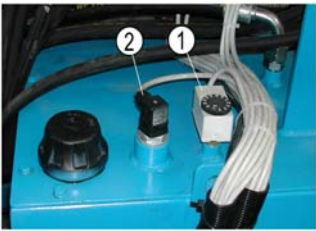
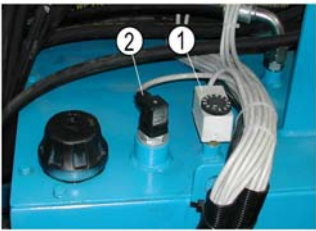


(*) Please see [Figure 4.4 on page 4.10](#)



9.5.2.2 MACHINE SAFETY

AT PROGRAMMED INTERVALS (PLEASE SEE [Table 7.1](#))

1)	While the hydraulic unit is operating, disconnect the electrical connection on the pressure switch (1) of the filter on the exhaust to simulate a situation of alarm for "BLOCKED FILTER". The machine should stop it self with consequent stop of the hydraulic station motor. To start the machine again, reset the connection and repeat the start-up procedure.	
2)	While the hydraulic unit is operating, disconnect the electrical connection on the level switch (2) on tank to simulate a situation of alarm for "INSUFFICIENT FLUID LEVEL". The hydraulic unit motor should stop it self. To start the machine again, reset the connection and repeat the start-up procedure.	
3)	Acting on the thermostat (1), simulate an increase in the max. temperature of the hydraulic fluid in the tank. A situation of alarm for too hot fluid must come about with cooling system ON and, after a programmed time, the pump stops.	
4)	Disconnect the electrical connection on the end of line pressure switch of the lubricating system. While the machine is operating in automatic cycle, a situation of alarm for "LACK OF LUBRICATING" must come about with visual signalling of the abnormal operation. Disconnect the electrical connection of the level switch (2) on the lubricating system unit. While the machine is operating in automatic cycle, a situation of alarm for "INSUFFICIENT LUBRICATING FLUID LEVEL" must come about with visual signalling of the abnormal operation.	
5)	During the simulation of the emergency situations, check the correct operation of the optical signalling and warning bell.	



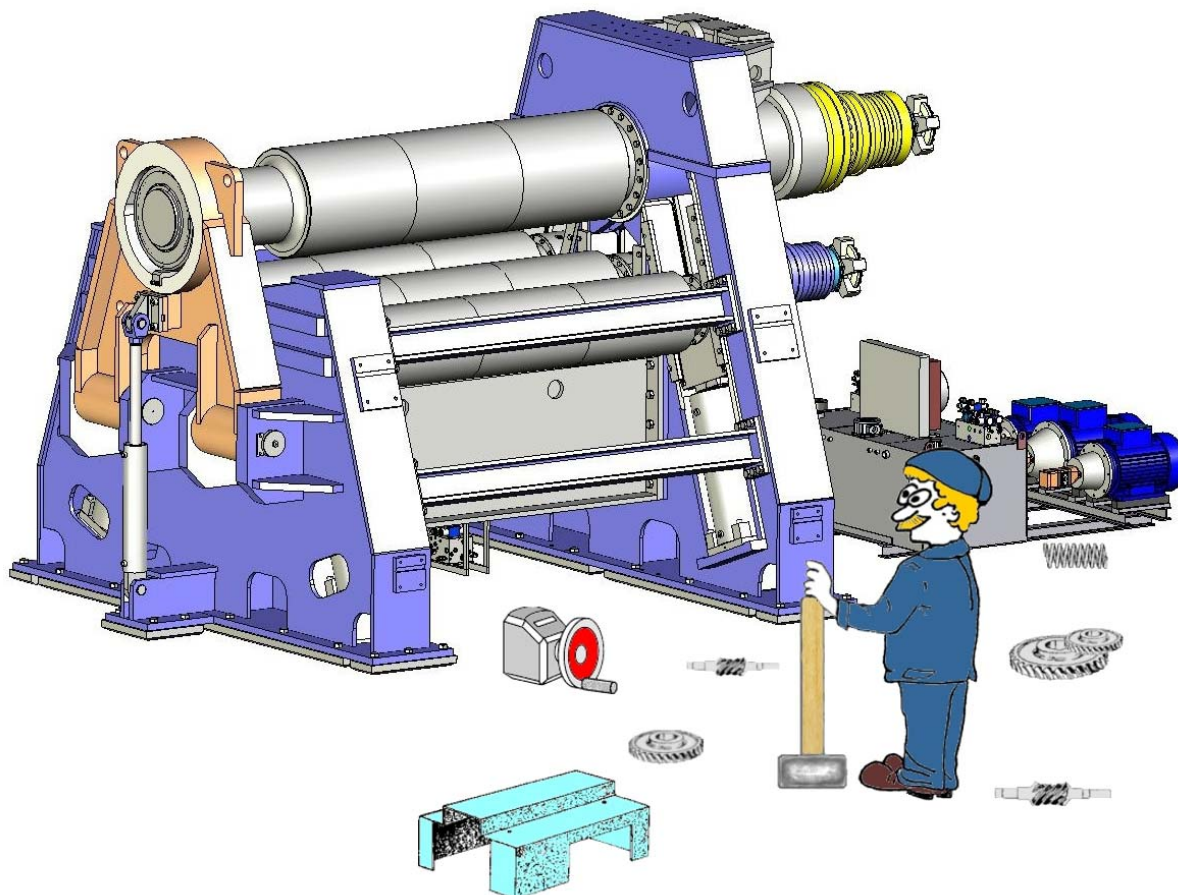
CAUTION! IMPORTANT

The checks above must be carried out also when the machine undergoes special maintenance operations which imply parts dismantling.





chapter 10: OUT OF ORDER OF THE MACHINE



-
- Temporary out of order of the machine
 - Dismantling of the machine
-





10.1 TEMPORARY OUT OF ORDER OF THE MACHINE



If the Bending machine RIMI 4RV Bull is not to be used for a long period the following operations must be carried out:

- a) Disconnect the electrical feeding by rotating the main switch to the "OFF" position.
- b) Dismantle any equipment fitted to the machine.
- c) Empty the hydraulic station tank.
- d) Carry out an accurate cleaning of the machine and manually lubricate all the parts foreseen. (Please see [Chapter 8.3 on page 8.6](#) of this technical handbook).
- e) Accurately lubricate the machine parts that are not painted or machined as machine tools.
- f) Cover the machine with a protective material (for example plastic film) paying particular care to the push button and control panels.



10.2 DISMANTLING OF THE MACHINE

Dismantling of the Bending machine RIMI 4RV Bull at the end of the production cycle does not require any particular intervention except for:

1) Separating of the electrical parts.

This operation involves preventive disconnection of all the cables of the control panels paying attention to the references on every cable with the enclosed electrical diagrams.

	CAUTION! DANGER
	Pay particular attention to the disconnection of the conductors under tension even with the main switch open.

	CAUTION! IMPORTANT
	Flat batteries are special waste and must be disposed of by strictly following provision in force.

2) Emptying of the lubricants and fluids in the machine reducers, units and tanks.

	CAUTION! IMPORTANT
	Used oils are special waste products and must be disposed of by strictly following provision in force.

3) Dismantling of the pneumatic and hydraulic systems with reference to the relative drawings enclosed.

Particularly caution is recommended for the containers under pressure (gas cylinders and accumulators) which require the accurate pressure released or making it empty before any other disassembly operation. Check the instructions in this technical handbook (Please see [Chapter 9.1.8 on page 9.14](#)).



4) Disassembly of the mechanical parts.

For easier handling the machine can be dismantled in transportable parts as described in the packing-list of consignment. Necessary information regarding the dismantling are available in:

Chapter 2: TECHNICAL SPECIFICATIONS AND MACHINE DESCRIPTION

Chapter 5: INSTALLATION AND START-UP of this technical handbook.

For the removal of the machine body from the plant it is necessary to remove the floor anchorage devices and lift the body as indicated in this technical handbook (Please see **Chapter 5: INSTALLATION AND START-UP**).

Every dismantled part must be accurately washed and packed with adequate packaging for the weight and to the features of each part. On the outside of the packaging a plate indicating the weight, description of contents and other necessary information for the transport must be affixed.



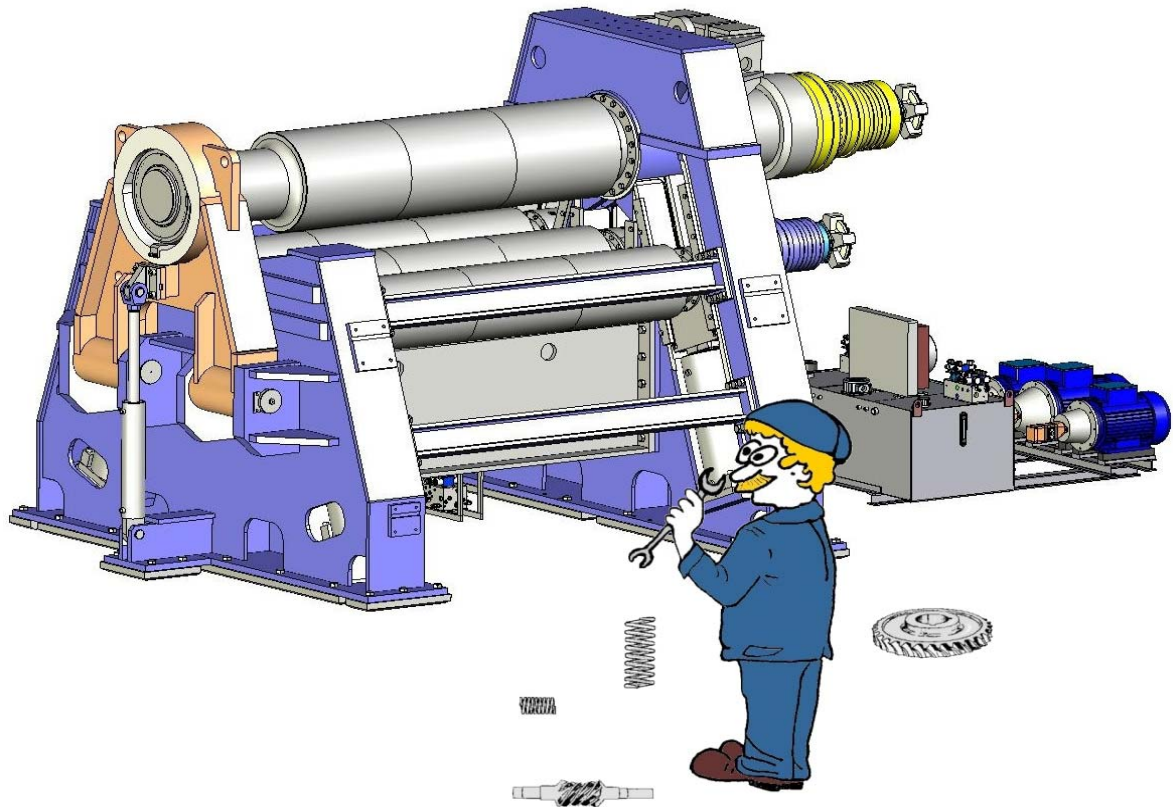
CAUTION! IMPORTANT

For waste disposal it is necessary to respect the provision in force of the country in which the machine to be dismantled is present.





chapter 11: SPARE PARTS LISTS



-
- Spare parts lists for one working year
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11.1 LIST OF RECOMMENDED SPARE PARTS

The technical documents of standard components is collected in a CD-Rom attached to Chapter 12 of this Instructions Handbook. It includes the documents related to all standard components mounted onto the machine.

Upon request a complete list of recommended spare parts for one working year can be supplied.

