Document code:	**90246MAG**
Machine model:	**TRV-08-N-16-90-110/HSK50-HSK63-FMU**
Serial No./Year:	**101196/2017**
Job No.:	**1202**
Manufacturer:	**PORTA SOLUTIONS S.p.A.** Via S. Lorenzo 39 25069 Villa Carcina BRESCIA (ITALY) Tel. +39 - 030 - 8900587 Fax +39 - 030 - 8900531
Customer:	**MAGNETI MARELLI POWERTRAIN USA INC.**

CE

WARNING

All the operators who use the machine must read and completely understand the contents of this manual before using the machine.

TABLE OF CONTENTS

1

1 - INTRODUCTION

TERMS OF GUARANTEE AND SUPPLY

Guarantee is valid if the Customer respects its engagements with *PORTA SOLUTIONS S.p.A.*; possible special conditions have to be expressly written onto the purchase order.

PORTA SOLUTIONS S.p.A. guarantees that the machine corresponds to the laws and Standards being in force in the European Countries and issues the European Declaration.

PORTA SOLUTIONS S.p.A. **engages to repair possible manufacturing defects found** within 12 months starting from machine delivery.

PORTA SOLUTIONS S.p.A. is only responsible of the defects found during the normal use of the machine.
The parts subject to normal wear (gaskets, membranes, springs, etc.) are not covered by the guarantee clause as well as the failures or the abnormal wear which are due to the improper use of the machine.

PORTA PORTA SOLUTIONS S.p.A. **is not responsible of the defects or failures due** to special environment conditions, missing or incorrect maintenance, tampering or precarious repairs, intervention of unqualified personnel or use of products or accessories not suitable to the machine.

To take advantege of the guarantee the Customer must inform the Seller, or directly the Manufacturer, about the defects as soon as they appear.
If the Customer is capable of finding and correctly disassembling the faulty part, he can send it directly to the Manufacturer for its repair or change, indicating machine serial number.
On the contrary, if the repairs or changes have to be carried out in the site where the machine has been installed, labour, travel and lodging freights for the Engineers of ***PORTA SOLUTIONS S.p.A.*** will be at Customer's charge.

PORTA SOLUTIONS S.p.A. **will never be considered responsible of production failure**, except in case this clause is expressely included in the purchase order.

PORTA SOLUTIONS S.p.A. does not give guarantee and does not supply technical documentation for the parts or the components chosen or imposed by the Customer; please refer to KEEPING OUT OF THE SUPPLY.

CONFLICTING CONDITIONS, INFORMATION OR DATA must be timely signalled to: PORTA SOLUTIONS S.p.A. Via S. Lorenzo, 39 - 25069 Villa Carcina (BS) Italy Tel. +39 - 030 - 8900587 - Fax +39 - 030 - 8900531 Using this manual the Customer declares that he approves it and considers it comprehensive and clear

KEEPING OUT OF THE SUPPLY

PORTA SOLUTIONS S.p.A. DOES NOT answer for personal or material damages, or for damages to the machine itself due to a use not corresponding to the description of the technical documentation.

PORTA SOLUTIONS S.p.A. **is not liable** for every kind of damages coming from inappropriate or unwise operations by skilled or unskilled personnel and not corresponding to the description and the instructions of this manual and of all technical documentation supplied.
If necessary, a training for Customer's personnel is possible.
It is unfeasible to foresee all possible situations of machine installation, so the Customer must necessarily inform the Manufacturer about special environment conditions which cannot be estimated when designing the machine.
The table "Keeping out of the Supply" lists possible exceptions or conditions out of the supply.

PORTA SOLUTIONS S.p.A. **is not liable if the Standards for a correct installation are not respected** and does not answer for machinery being installed before the supplied machine or downstram.

PORTA SOLUTIONS S.p.A. **DOES NOT answer for** personal or material damages if machine protections are excluded or tampered.

PORTA SOLUTIONS S.p.A. **DOES NOT answer for disposal of the products** being necessary for machine use or production: exhausted lubrication oil, batteries, accumulators or pressurized containers, paper, rubber, inks, powders, etc.; the Customer must directly provide to dispose of these materials according to the laws valid in the Country where the machine is installed.
N.B. Use the same foresights when demolishing the machine.

The Customer has to use original spare only and to install them correctly according to the instructions. Responsibilities associated to parts from the market have to be ascribed to their manufacturers.

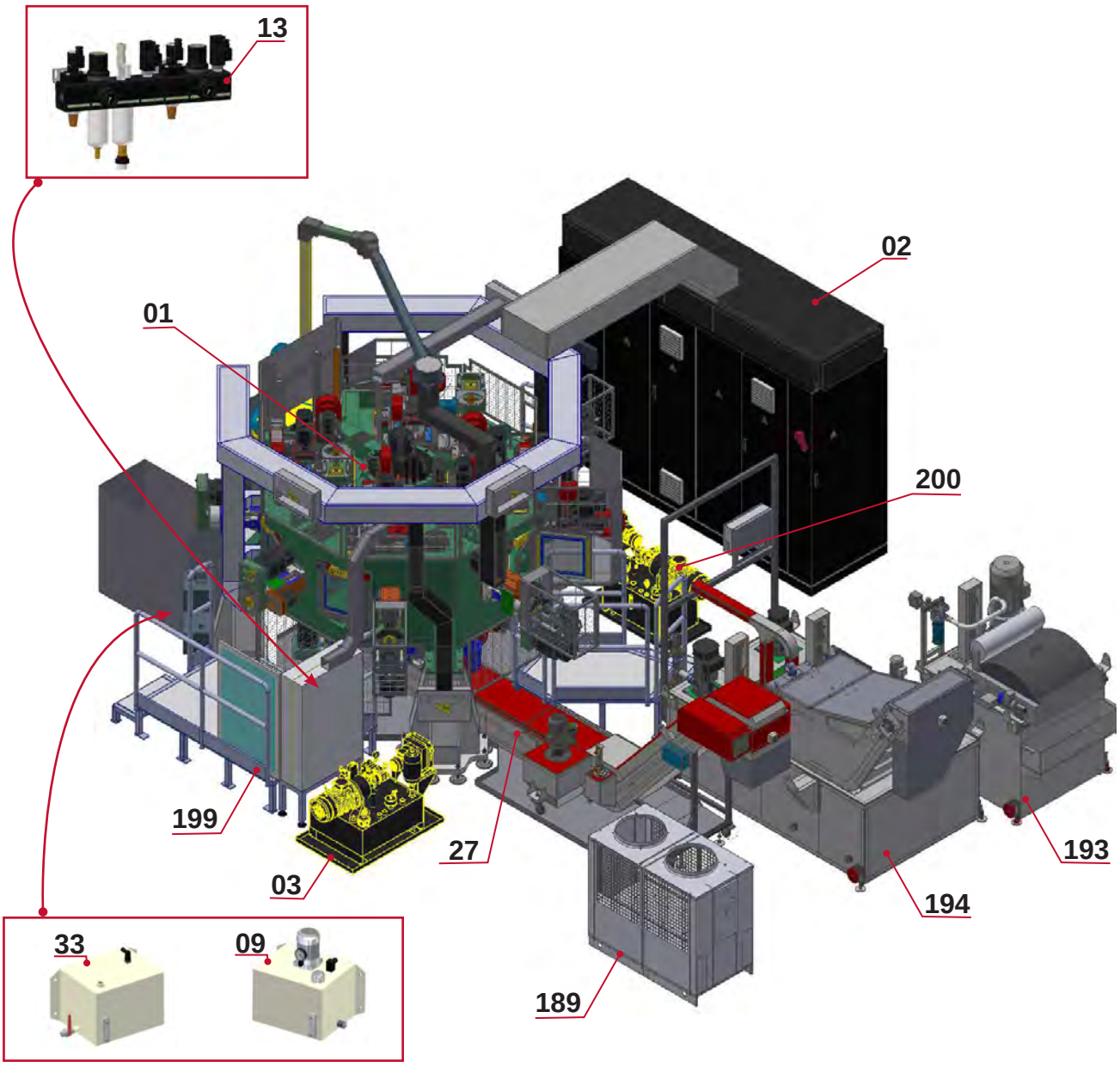
PORTA SOLUTIONS S.p.A. **DOES NOT answer for damages** to the machine or to the personnel when manufacturing workpieces different from those the machine has been designed for or if using unsuitable or damaged tools.

The following table lists the exceptions or conditions kept out of supply ***PORTA SOLUTIONS S.p.A.***, but necessary for the correct and safe use of the machine and consequently to be predisposed by the Customer.

Keeping out of the supply

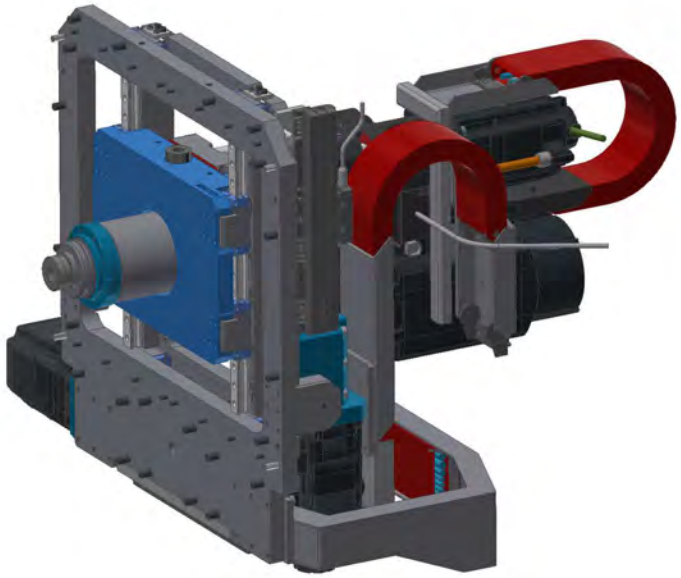
REQUIRED INTERVENTION	WHAT TO DO
Footboard and guards for an easy and safe access to the machine for maintenance and fixturing operations.	To be performed on site by competent personnel or ask for the advice of ***PORTA SOLUTIONS S.p.A.*** engineers***.***
External lighting installation allowing the safe operation on the machine.	To be performed on site by competent personnel or ask for the advice of ***PORTA SOLUTIONS S.p.A.*** engineers***.***
Pedestrian crossing, working area marks, including doors opening.	To be performed on site by competent personnel or ask for the advice of ***PORTA SOLUTIONS S.p.A.*** engineers***.***
Foundations suitable to support the machine and safety distances, ncluding cable laying underground, aerial lines, etc... Ground-floor consistency checking.	To be performed on site by competent personnel or ask for the advice of ***PORTA SOLUTIONS S.p.A.*** engineers***.***
Noise produced when machining workpieces or materials foreseen or not foreseen.	Check on site when machining.
Changes to machine and/or accessories.	NOT ALLOWED without written authorisation of ***PORTA SOLUTIONS S.p.A***.
Antideflagration equipment, suitable to special inflammability.	NOT ALLOWED. To be required when ordering or ask for advice of ***PORTA SOLUTIONS S.p.A.*** engineers***.***
Machining of workpieces or materials different from those the machine has been designed for.	Check compatibility with ***PORTA SOLUTIONS S.p.A***.
Extra personnel training if the basic one supplied by ***PORTA SOLUTIONS S.p.A.*** is not enough or when in case of personnel turnover.	Ask for an extra training to ***PORTA SOLUTIONS S.p.A.***
Anti-accident equipment or clothing for the personnel	Purchase and supply the personnel with suitable equipment and clothing.

REPRESENTATION OF REFERENCES



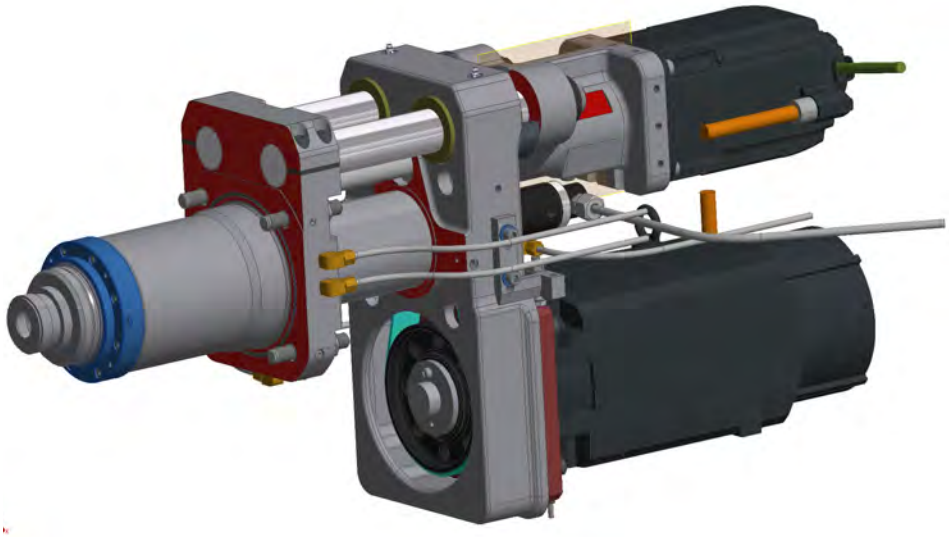
TURNING UNIT FMU 90 XYZ

POSITIONS 1.0 - 1.2 - 1.4 - 3.0 - 3.2 - 3.4 - 5.2 - 7.2

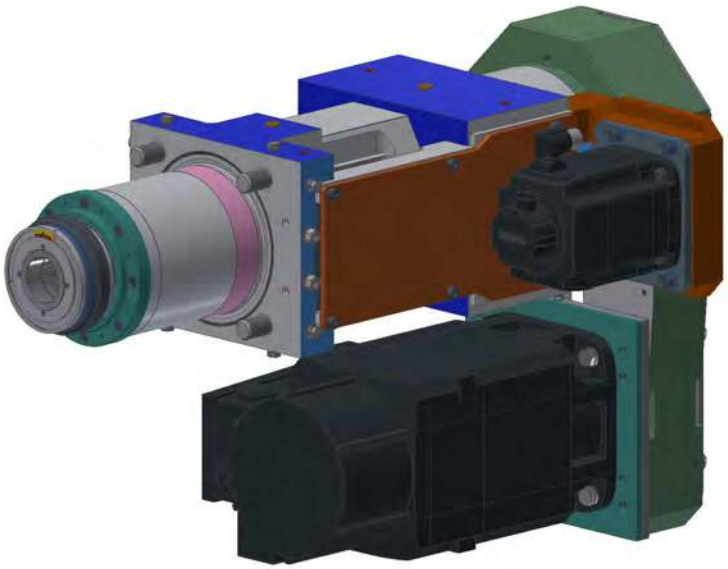


TURNING FIXED UNIT FMU 90

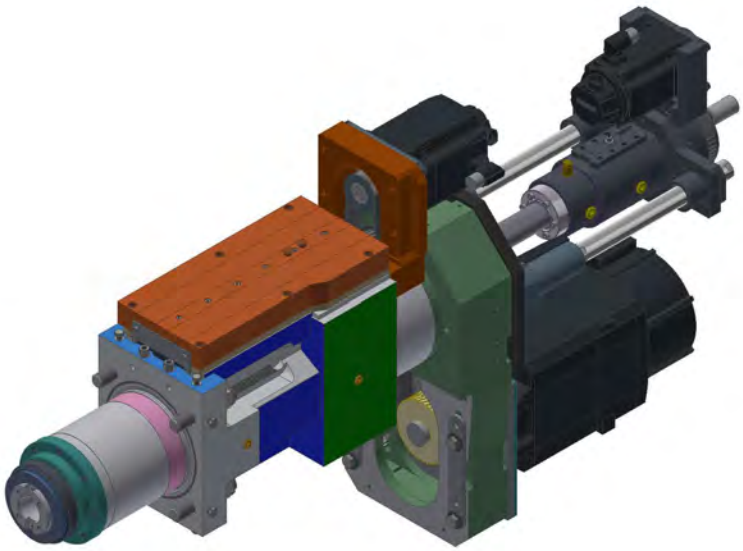
POSITION 4.2



TURNING UNIT FMU 110
POSITION 2.2 - 6.2 - 6.4 - 7.0



TURNING UNIT FMU 110
POSITION 2.0 - 4.0 - 5.0



GLOSSARY

ACCUMULATOR
Device allowing to make up for the immediate pressure fall absorbing the so called water hammer.
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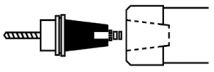
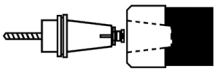
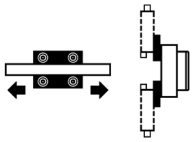
ATTACHEMENT HSK50 - HSK 63
Spindle nose.



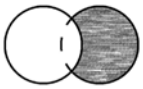
QUILL
Cylindrical group for supporting and guiding the spindle.



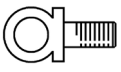
CARRIAGE
System with slide for linear transfer of an element, for instance of the (radial or vertical)unit or of the chuck mobile parts.



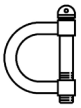
COOLANT
See“coolant”.



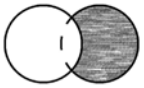
EYEBOLTS
Equipment normally used for lifting; they are directly screwed to the group that has to be lifted.



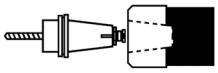
SHACKLES
Equipment normally used for lifting; they can usually be anchored directly to the group to be lifted or to the eyebolts mounted on the group itself.



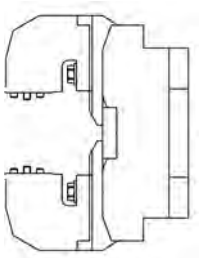
COOLANT
Mix of emulsifying oil and water; suitable for tool refrigeration and used as jet for removing machining residuals. In some cases, the oil is used whole.



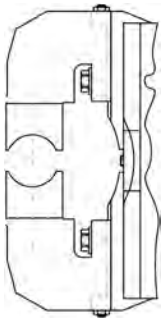
SPINDLE
Tool gripping and rotation group.



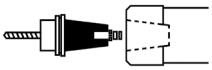
CHUCK
Part clamping system, integral to the table.
Two jaws, having different configuration, are mounted on the chuck. The one represented in the upper part is, in this case, called “bracket”.



JAWS
Shapes or impressions with special configuration to adapt to the part shape or to the machining requirements.



SPINDLE NOSE
Type of tool attachment.



STATION
Working area where more kinds of machining or checks are carried out thanks to more operative units.

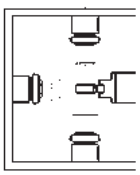
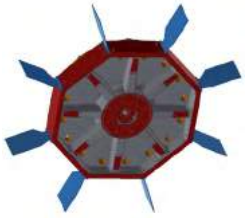
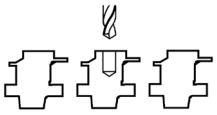


TABLE
Part transfer system among the several stations that is usually circular.
More chucks for part clamping are mounted on the table.



TRANSFER
Machine kind allowing more machining types on more stations.
The part is translated or rotated around the different stations.



UNIT
Group allowing to carry out the followin operations: machinining, check, reaction thrust, clamping, etc.

INTRODUCTION

PERSONS WHO MUST READ THIS MANUAL

This manual is aimed at different types of operators who are listed below.
1 - Handlers (***PORTA SOLUTIONS S.p.A.***, shipper, Customer)
2 - Carriers (shipper, Customer, ***PORTA SOLUTIONS S.p.A.***)
3 - Installation engineers (***PORTA SOLUTIONS S.p.A.***, Customer)
4 - **Users** (Customer)
5 - **Toolmakers** (Customer)
6 - **Maintenance personnel** (Customer, ***PORTA SOLUTIONS S.p.A.***)
7 - Repair personnel (***PORTA SOLUTIONS S.p.A.***, Customer)
8 - Wreckers (Customer)

The expertise and specific experience of personnel are the most important requirements for ensuring the safety of personnel and of equipment.

The Customer must ensure that the operator has the ability and training required to perform the task assigned to him.

The manual CAN NOT substitute the gaps in knowledge or understanding of personnel that use the machine.
The manual must be consulted and correctly followed.
If necessary, additional personnel training must be requested.
This manual DOES NOT contain all the information required to perform every possible operation on the machine **because it assumes that each operator has the basic knowledge required to perform the tasks assigned to him.**
This manual has been written in particular for the user, the toolmaker and maintenance personnel.
Certain general safety regulations may be excessive or even impossible to comply with in certain rare situations (e.g.: starting up for the first time, special maintenance, test runs without workpieces, faults or malfunctions, etc).
In such cases the operator, toolmaker and maintenance personnel may adopt different approaches provided that:
- they know exactly what they are doing;
- they have sufficient knowledge and training;
- they do not behave in a foolhardy manner.

AIM AND STRUCTURE OF THE MANUAL

This document (USER MANUAL) is a useful guide that enables safe working and enables all the operations to be performed that are required to keep the machine in perfect working order. It also provides useful suggestions for all those personnel who are not involved in production.
Personnel dealing with the machine must read this manual carefully and make sure that they understand it.

The manual describes the machine, the control and instrument systems, the fundamental adjustment and operating points, some practical tips for getting the most out of the machine and for correct maintenance, describes the safety systems and contains accident-prevention instructions deemed to be necessary.

The instructions set out in this manual do not replace the safety instructions and technical data on installation and operation that apply directly to the product nor common sense or the safety regulations in force in the country in which the machine is installed.

This manual is divided into **CHAPTERS**, as described in the contents pages.
The chapters and the information that they contain are in order of priority.
In addition to the actual CONTENTS there is:

THE NUMERICAL REFERENCE INDEX
This contains all the references to components mentioned in the manual in numerical order.

ILLUSTRATION OF REFERENCES
All references are illustrated and summarized here in order to standardize terminology and perfect the system of communication.

ALPHABETICAL INDEX
This lists in alphabetical order all references to parts and the terms required for analysis and/or searches in the manual.
N.B. The terms indicated in CAPITAL LETTERS are described in greater detail in the GLOSSARY.

GLOSSARY
Some technical terms are described in detail in the glossary.

INDEX OF SYMBOLS AND SIGNS
Describes the symbols or warning signs used in the manual. Some of them are also found on the machine.

PERSONNEL QUALITIES

N.B.: The Customer must provide personnel with written job descriptions and ensure that they comply with them.

The person who is responsible for running the machine, **i.e. the person who supervises the automatic productive process, must have received specific professional training or must have acquired appropriate experience with machines of this type.**

If, by the time the machine is installed and/or started up, **personnel have NOT undergone training, the Customer must request it** and/or make sure that all the conditions described in this document have been complied with.

WARNING!
In order to prevent personal injury or damage to property we advise the Customer to make operators aware of residual risks arising from the use of the machine.

***PORTA SOLUTIONS S.p.A* has eliminated all general risks but certain operations present intrinsic hazards that can not be eliminated (see ACCIDENT PREVENTION and RESIDUAL RISKS).**
Personnel using or maintaining the machine must be expert, familiar with the described tasks and mature enough to perform them and must be sufficiently reliable to correctly carry out the instructions contained in this manual, to ensure safety and to carry out checks thoroughly.

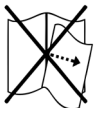
It is forbidden to use NON-qualified personnel, disabled persons, incompetent persons and persons under the influence of alcohol or drugs.
The Customer is responsible for the qualifications and mental or physical state of personnel.
The Customer or employer is liable at law for all injury and damage caused or suffered by the personnel that he has authorized to use the machine.

Personnel coming into contact with the machine must use the personal protective equipment prescribed by the laws of the country in which the machine is used and any other such equipment provided by their employer such as: ear defenders, leather gauntlets, safety boots, goggles, etc.

PORTA SOLUTIONS S.p.A. will be pleased to provide any other technical information and personnel training courses.

INDEX OF SYMBOLS AND SIGNS

On the machine or in some cases only in the manual the hazard zones are indicated by tallies, symbols or icons that represent the hazard or obligation.

The manual must be consulted, must be kept in a safe place for future use and must not be allowed to deteriorate in any way.

General hazard: indicates operations or situations in which personnel must exercise extreme caution.

Operations that require the use of qualified and authorized personnel.

Hazardous voltage: indicates areas with high voltage

Hazard from electromagnetic interference


Zones subject to high temperatures: indicates dangers from heated zones or zones containing very hot parts (danger of burns).

Crushing, cuts or grazes, slipping: indicates hazard zones in which operator might be injured.

Explosions: indicates potential risk of explosions


General prohibition: indicates that access to a zone is prohibited or that an action is prohibited.


Mandatory signs: indicate that the personal protective equipment provided by the employer (helmet, ear defenders, leather gauntlets, safety boots, goggles, etc) must be worn when performing certain tasks.

AFTERSALES CENTERS

PORTA SOLUTIONS S.p.A.
Assistance service
39, Via S. Lorenzo
25069 Villa Carcina
Brescia
ITALY
Tel: 030-8900587
Fax: 030-8900531
www.porta-solutions.com
e-mail: info@porta-solutions.com

ALL THE WORLD
EXCEPT FOR THE COUNTRIES LISTED
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PORTA NORTH AMERICA, Inc.
65A Louis Str.
Newington, CT 06111
U.S.A.
Tel. (001) 860- 665-9996
Fax (001) 860-666-8333
www.porta-solutions.com
e-mail: porta.north.america@snet.net

U.S.A.
MEXICO
CANADA

USE OF THE MACHINE

FORESEEN USE

Usually, the workpiece is defined when ordering.

The machine, subject of this handbook, is produced and tested for a complete machining of parts named:

MACHINED BODY GMET4 AK.0137667.C

BODY TIGERSHARK 64mm AK.0108435.B

EAGLE 80mm AK.0108542.B

Material to be machined:

ALLUMINIUM A360.1

The machine can machine different parts compatibly to the features and adjustments of the different units. (see chapter 2 - SPECIFICATIONS)

DEROGATIONS

The machine can perform operations not foreseen when designing if these operations are compatible with machine capacities and equipment. Machining ranges are listed hereunder.

TABLE OF MACHINING RANGES		Unit FMU 110 TURNING	Unit FMU 90 - XYZ TURNING	Unit FMU 90 TURNING
Maximum permitted torque on the spindle	Nm	150	150	150
Maximum permitted continuous spindle thrust*	N	5000	1200	1200
Maximum permitted spindle RPM*	RPM	6000	15000	15000
Maximum permitted weight for tool/equipment/ push road	Kg	6	1,2	1,2
Minimum work cycle time	sec.	/	/	/
Maximum permitted uninterrupted work cycle time	h	21.6	21.6	21.6
* The simultaneousness of max. thrust and max. number of revolutions are not allowed				

TABLE OF MACHINING RANGES		Unit FMU 110 TURNING
Maximum permitted torque on the spindle	Nm	150
Maximum permitted continuous spindle thrust*	N	5000
Maximum permitted spindle RPM*	RPM	1800
Maximum permitted weight for tool/equipment/ push road	Kg	6
Minimum work cycle time	sec.	/
Maximum permitted uninterrupted work cycle time	h	21.6
* The simultaneousness of max. thrust and max. number of revolutions are not allowed		

ATTENZION

1) it is not possible to rotate the HSK 63 and HSK 50 spindle without tool.

2) It is not possible to use the high pressure through the spindles if the tool is not inserted because the holding components of Guhring collet come out.

NOT ALLOWED USE

The machine and its parts cannot be used for different purpose than that foreseen by ***PORTA SOLUTIONS S.p.A.***

The following operations are absolutely forbidden:
- Machining of soft materials (wood, stone, etc.).
- Using corrosive products and/or lubricant or coolant which may etch parts of the machine or be harmful for operator health.
- Drilling/tapping individually on each unit head without indications by ***PORTA SOLUTIONS S.p.A.*** engineers
- Changing machining parameters protected with a password.
- Using the hydraulic unit and/or systems conncted to other machineries.
- Using the machine after having excluded the safety devices.
- Using the clamping vice, rotary table and/or other mechanical movements to deform or drag extraneous objects.

- It is also forbidden to heat or dry clothes on hot parts of the machine: it is dangerous and compromises the correct ventilation and refrigeration of the parts.

- Do not use the machine or parts of it in particularly inflammable environments.

- Do not use the machine or parts of it without the authorization of skilled personnel.

- Do not use the machine or parts of it without having read and correctly interpreted the contents of use and maintenance manual.

N.B. PORTA SOLUTIONS S.p.A. *refuses every responsibility for whatever damages being caused by an improper use of the machine.*

2

2 - SPECIFICATIONS

GENERAL DESCRIPTION OF THE MACHINE MOD. TRV

The rotary table transfer machines made by ***PORTA SOLUTIONS S.p.A.*** are designed to work continuously just with the routine maintenance.
The model **TRV** is made of the following parts:
- BASIC MACHINE made of a machine body **01** in weld steel sheet with the various stations located around it, easily accessible for tool change.
A vertical axis rotary table **16** supported on both sides by machine body.
Onto the rotary table workpiece clamping devices (vise **17**) are mounted.
Table rotation is controlled by an electric table motor **23.**
Table indexing/positioning is carried out through a toothed crown (HIRTH) located under the table on the same axis. Crown locking/unlocking is controlled by a hydraulic cylinder moving the table on its axis.
Each station consists of one or more unit heads.
According to their fixturing, these units can perform machining or checking operations, torque reaction, cooling, loading/unloading, etc.

In addition, the machine is enslaved by:

- Manual **LOADING STATION** with manual control and photoelectric barrier

- HYDRAULIC EQUIPMENT with general hydraulic unit **03**.

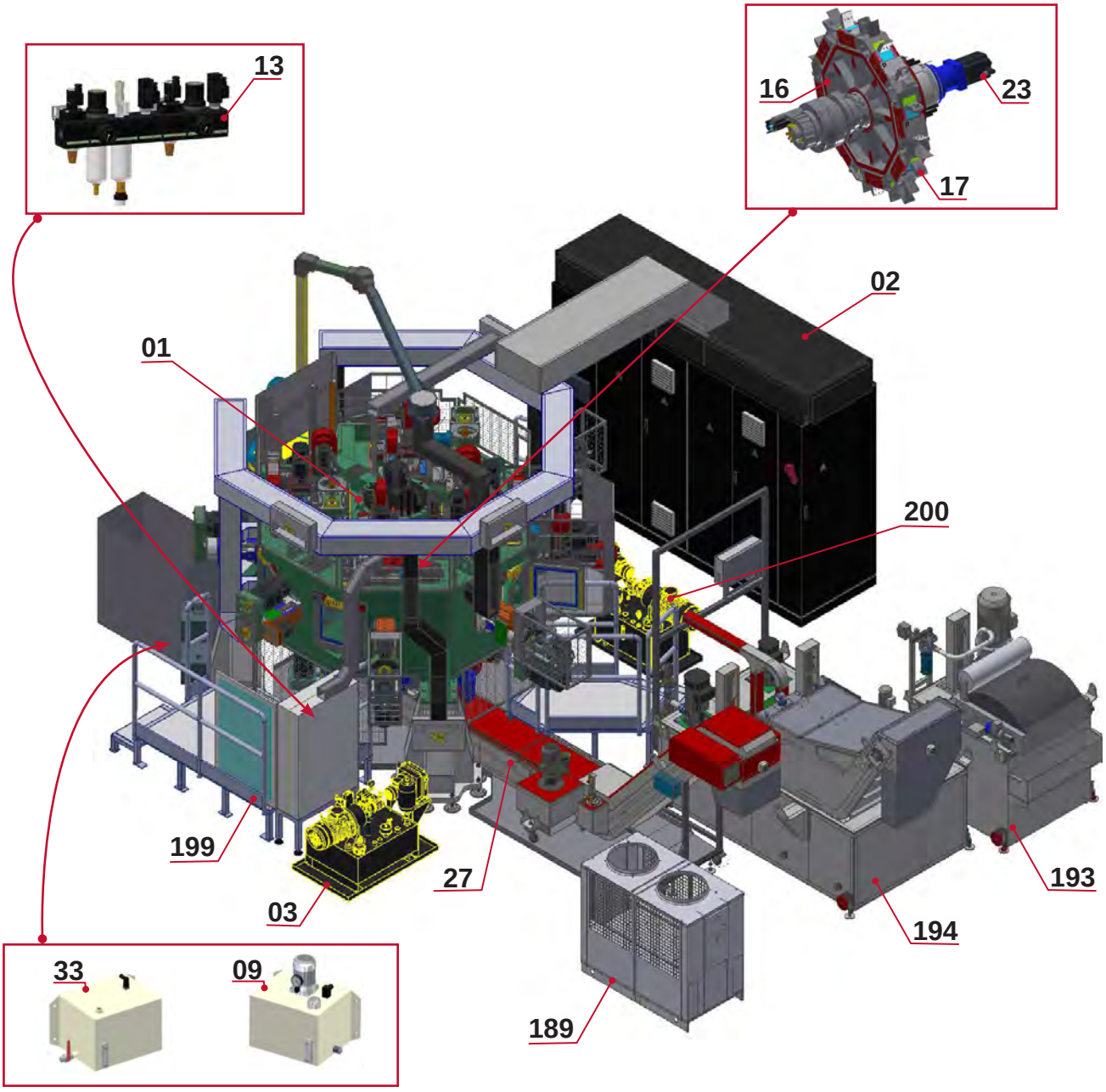
- PNEUMATIC EQUIPMENT with compressed air treatment unit **13**.

- CENTRAL LUBRICATION SYSTEM equipped with lubrication control unit **09**.

- CHIP CONVEYOR SYSTEM with chip conveyor belt **27** and clean tank **194,** a tank with paper filter **193** and a cooler **189**

- ELECTRIC EQUIPMENT with electrical cabinet **02** containing electric power systems, while the controls are located on the personal computer and on remote control panels.

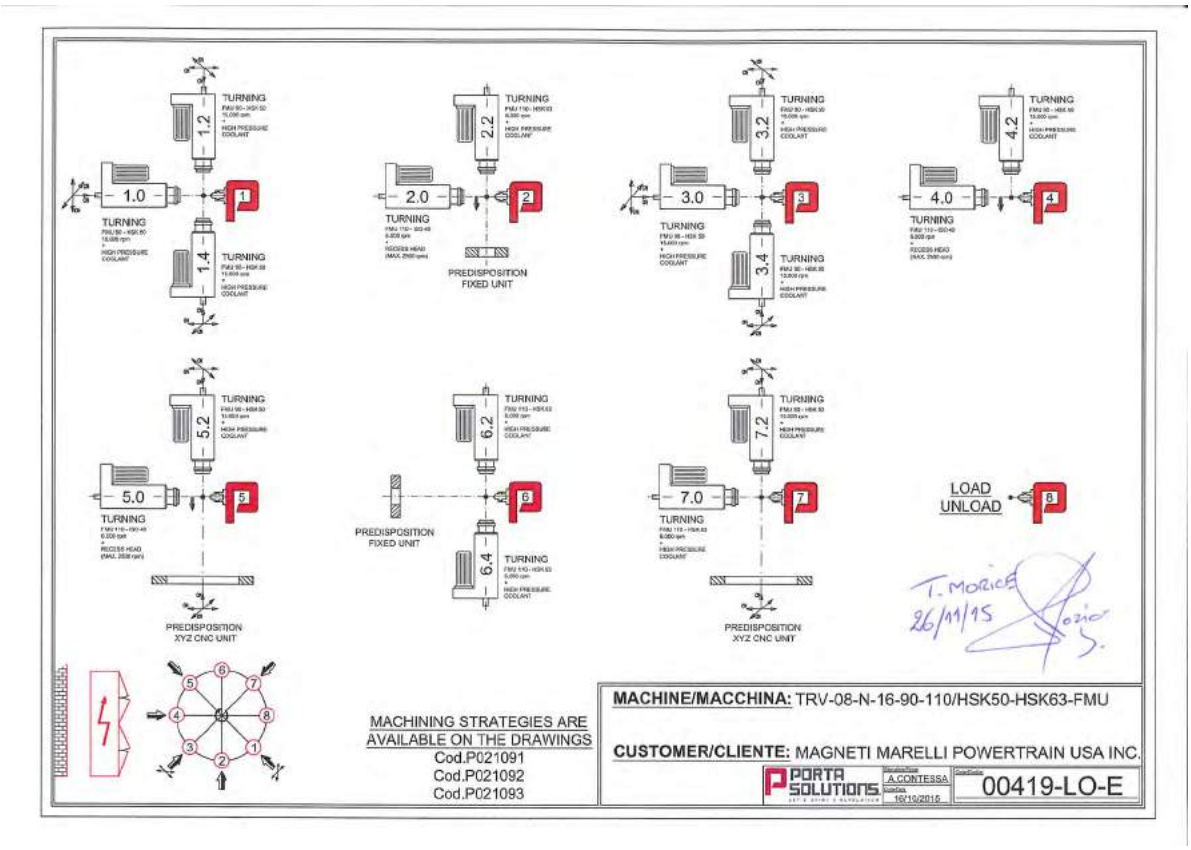
N.B. *How your machine is equipped is described in the paragraph "MACHINE LAYOUT MAP" and the machine layout table; technical specifications are summarized in the "Technical specifications table".*

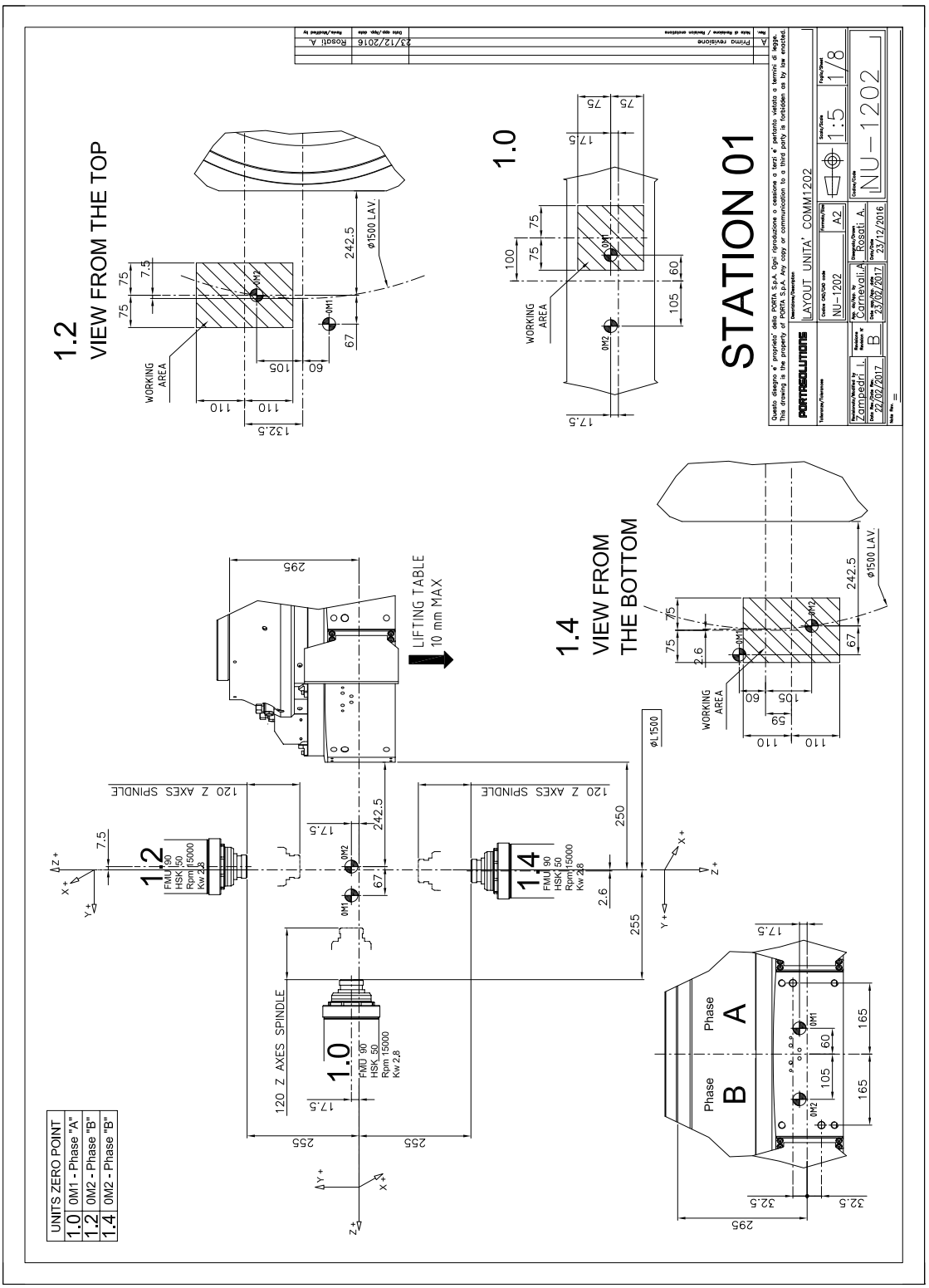


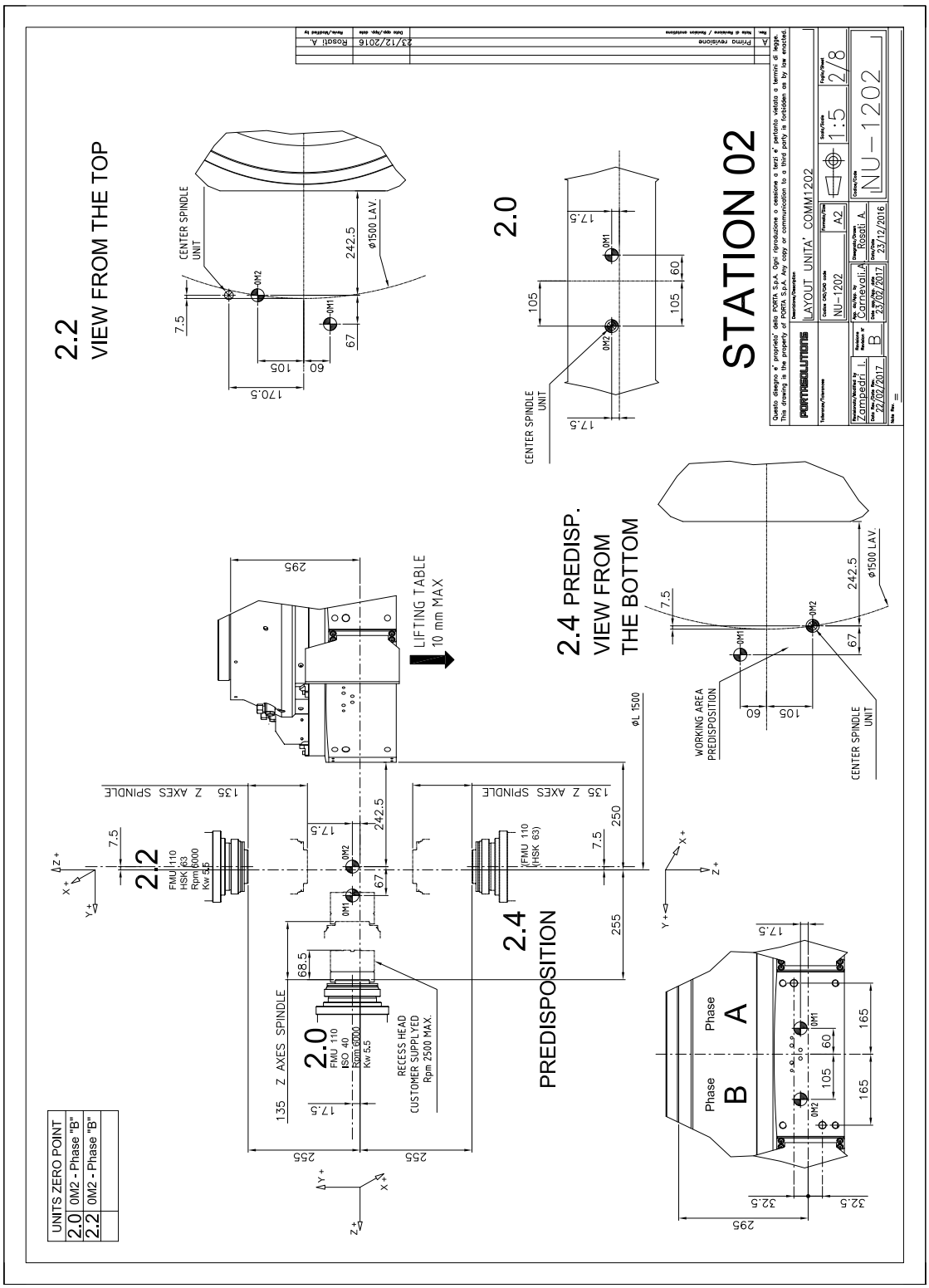
BASIC MACHINE

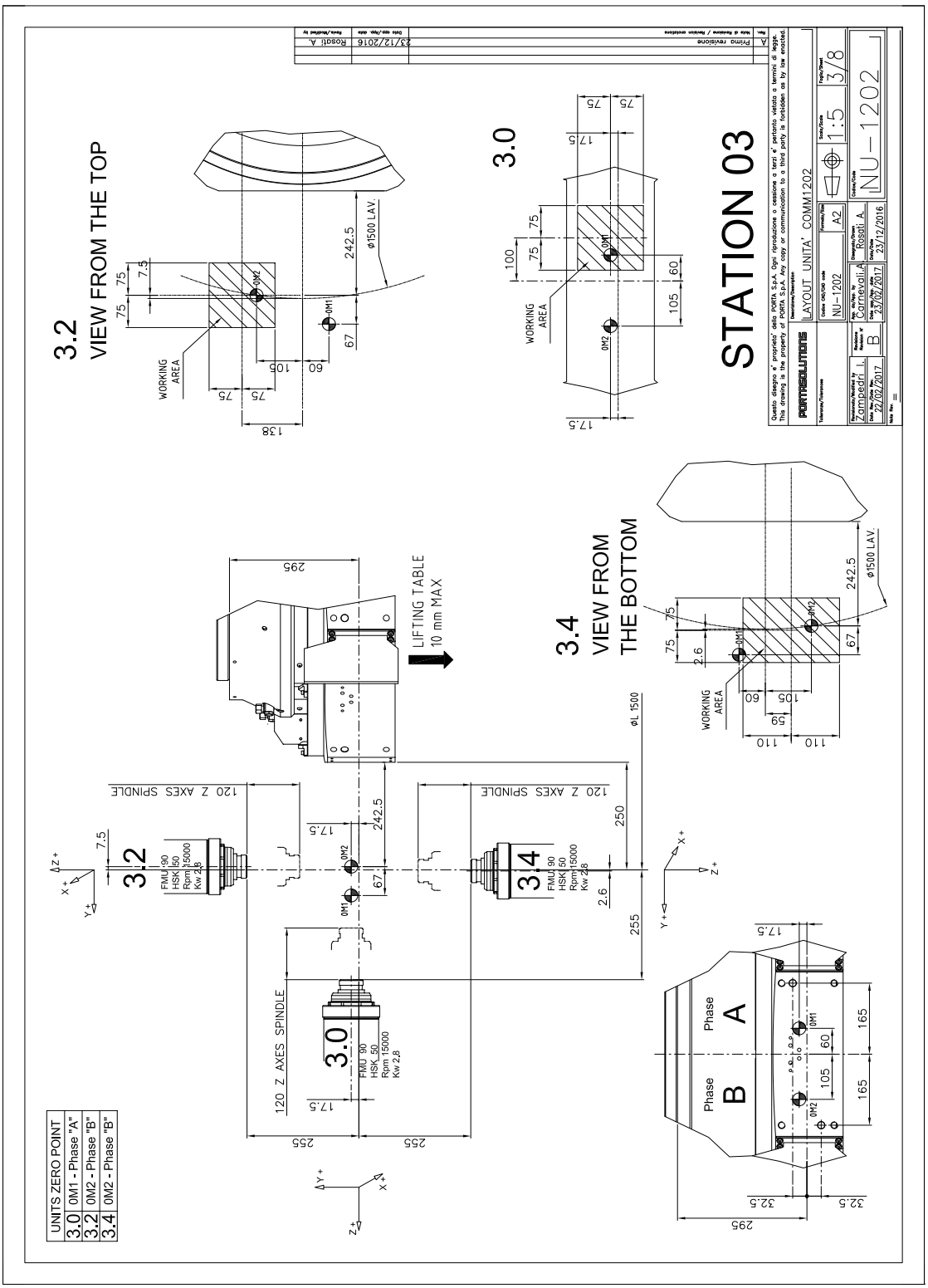
MACHINE COMPOSITION LAYOUT

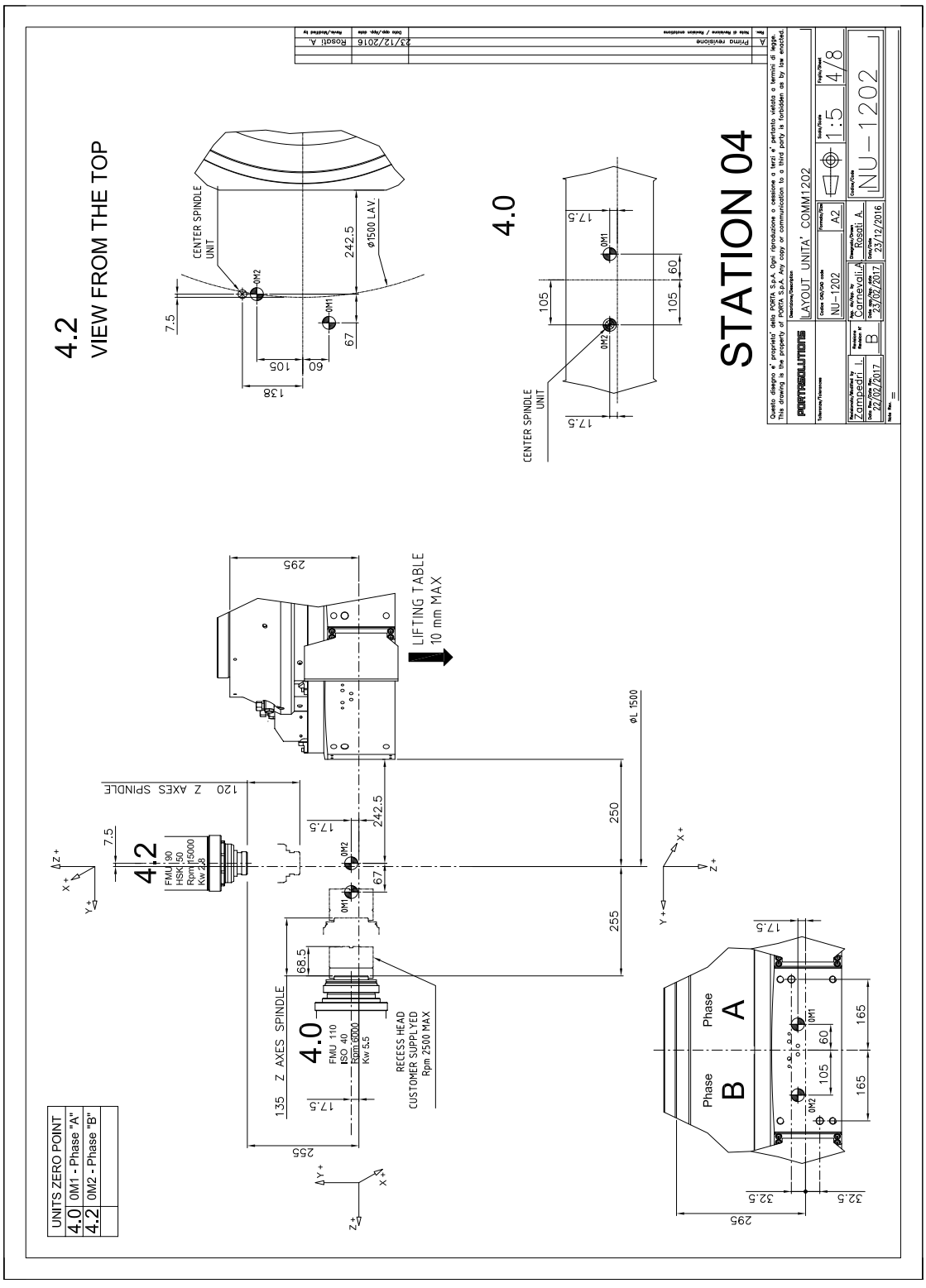
Your machine consists of **8** stations.
Station 8 is the station for part load and unload
The other stations (from **1** to **7**) are fitted with different units.
The LAYOUT shown in this page enables you to identify the different units that will be described in the following pages, regardless of their momentary position and the way that they are pointing.
The ***Machine Composition Table*** shows the important data on your specific equipment; the ***Working Strokes Table*** indicates the operating possibilities.

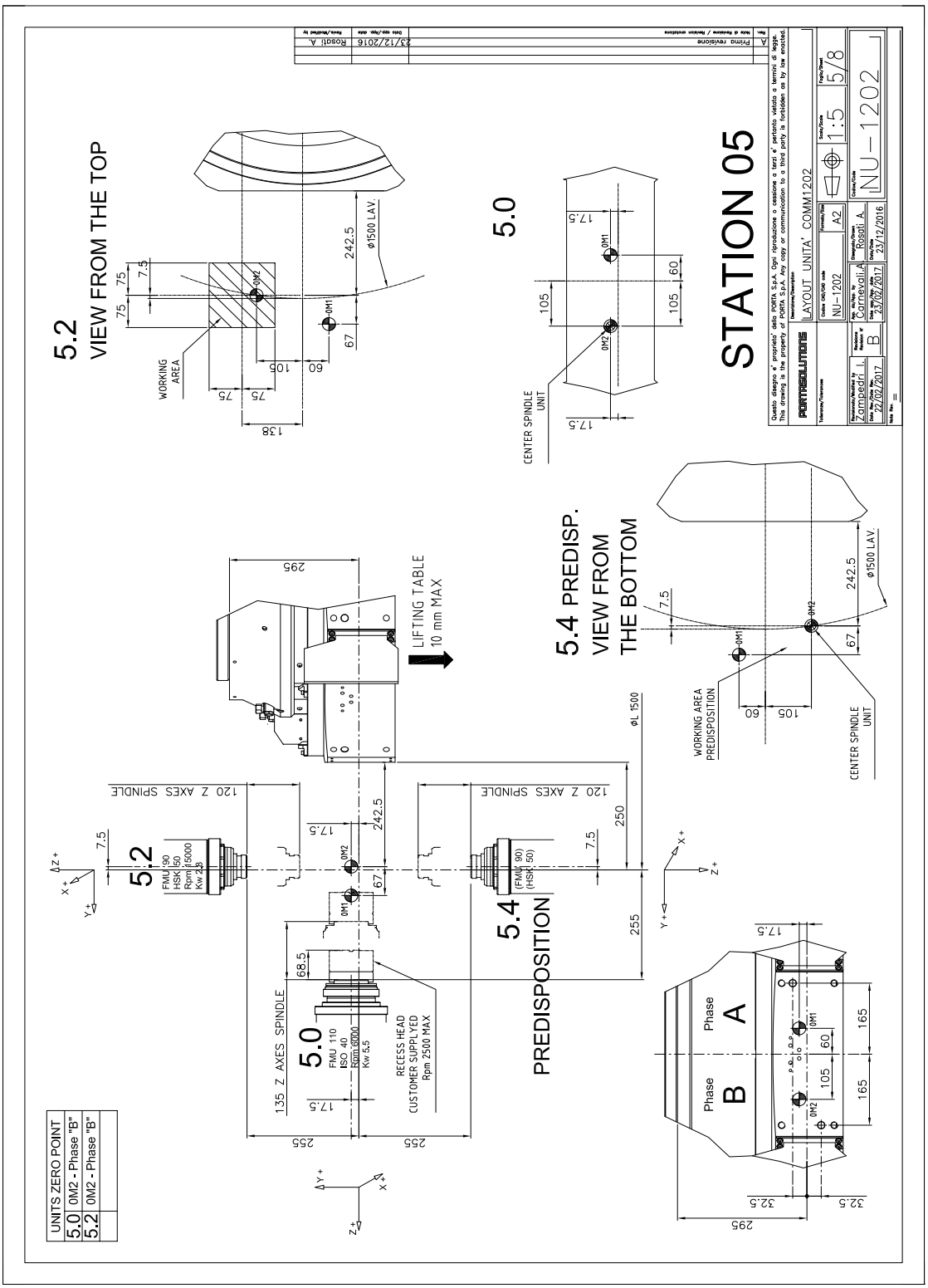


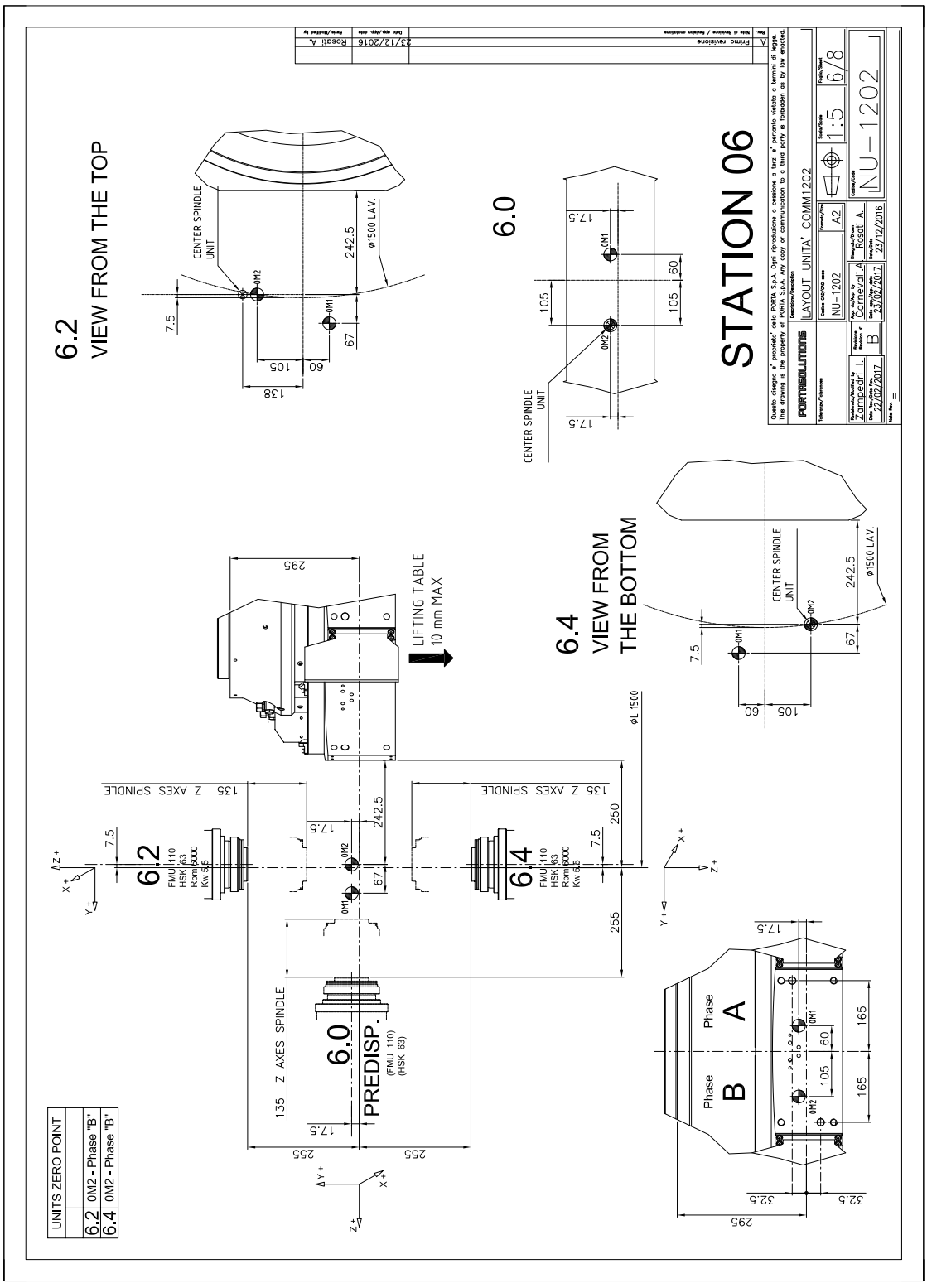


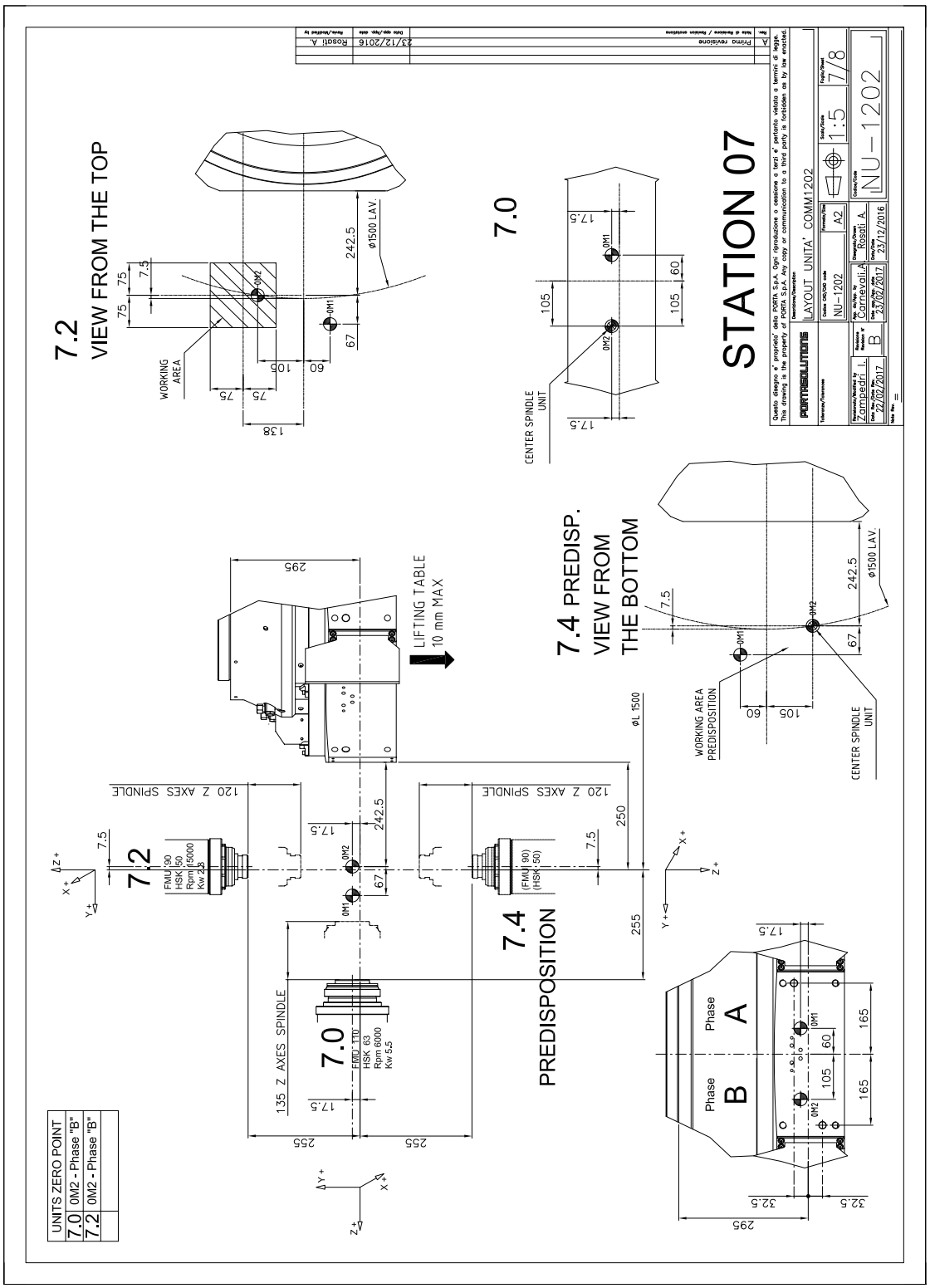


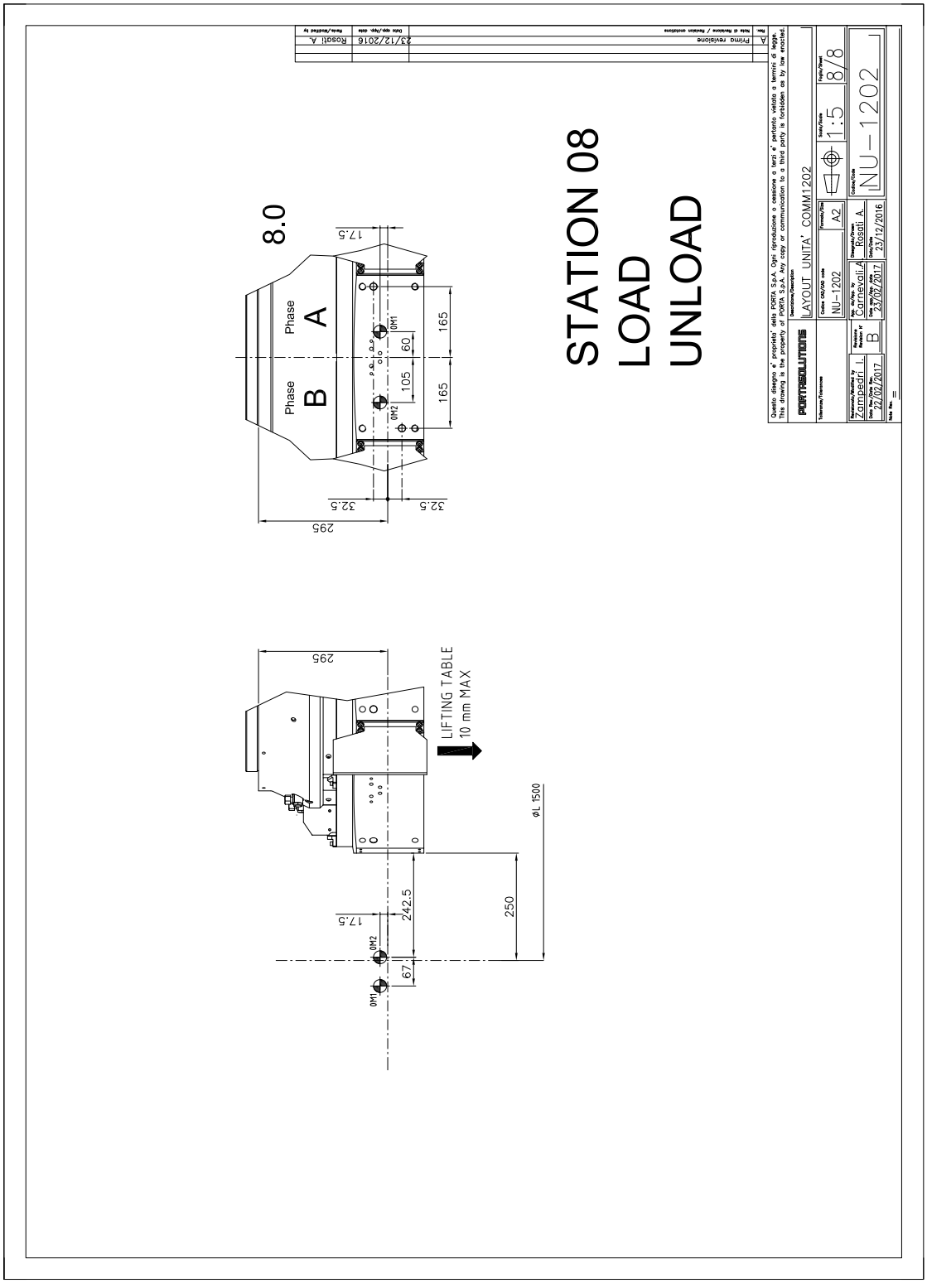












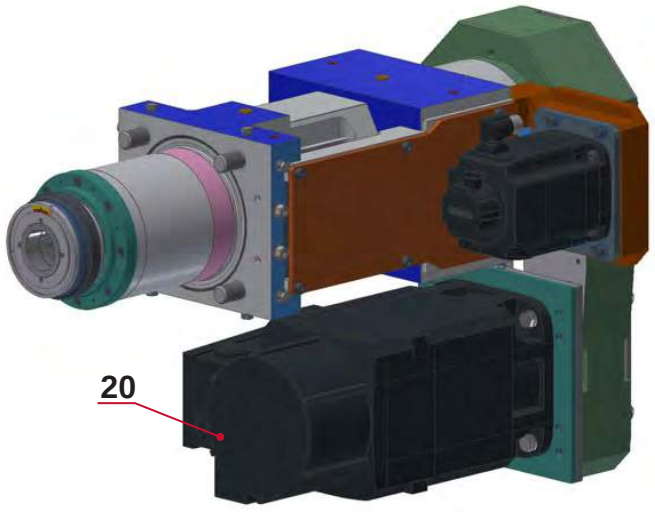
TURNING UNIT FMU 110
POSITION 2.2 - 6.2 - 6.4 - 7.0

Sleeve diameter	mm	110
Max. tool feed stroke	mm	140
Spindle rotation speed	RPM	s.*"Machine composition table*"
Spindle rotation motor **20** power	kW	5,5
Spindle nose connection		HSK 63
Slow movements speed	mm/min	10÷6000
Fast movements speed (**Axis Z**)	m/min	20

ATTENZION

1) it is not possible to rotate the HSK 63 and HSK 50 spindle without tool.

2) It is not possible to use the high pressure through the spindles if the tool is not inserted because the holding components of Guhring collet come out.



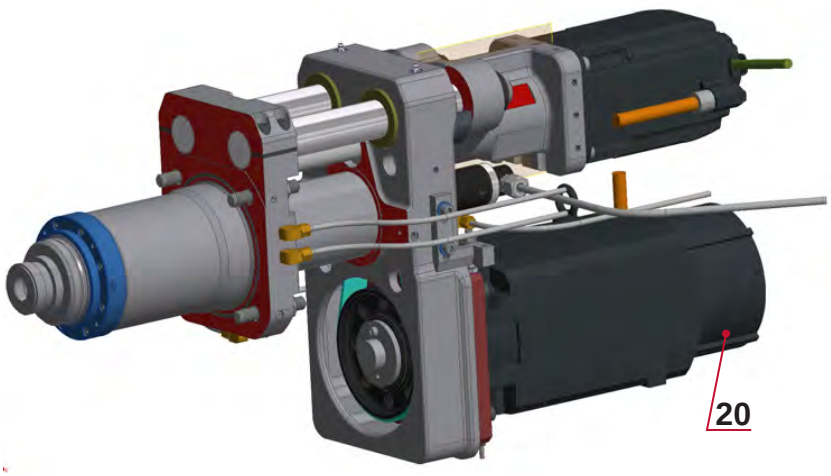
TURNING FIXED UNIT FMU 90
POSITION 4.2

Quill diameter	mm	90
Tool advancement max. stroke	mm	125
Rotation speed of spindle	RPM	s.*"Machine composition table*"
Power of spindle rotation motor **20**	kW	2,8
Spindle nose attachment		HSK 50
Slow movements speed	mm/min	10÷6000
Fast movements speed	m/min	20

ATTENZION

1) it is not possible to rotate the HSK 63 and HSK 50 spindle without tool.

2) It is not possible to use the high pressure through the spindles if the tool is not inserted because the holding components of Guhring collet come out.



TURNING UNIT FMU 90 XYZ

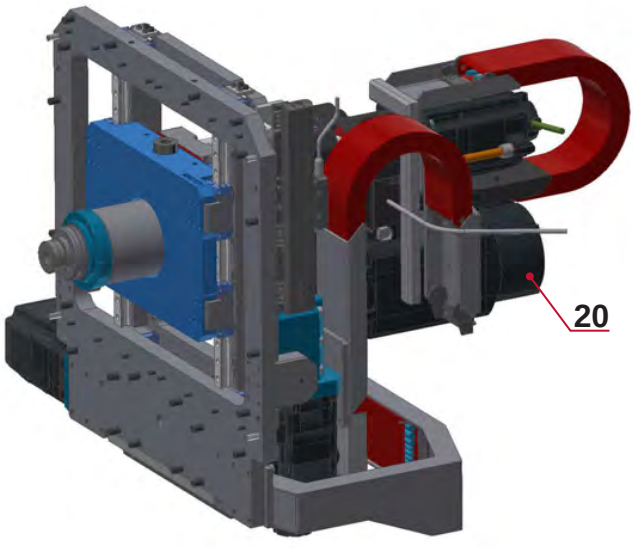
POSITIONS 1.0 - 1.2 - 1.4 - 3.0 - 3.2 - 3.4 - 5.2 - 7.2

Quill diameter	mm	90
Tool advancement max. stroke	mm	125
Rotation speed of spindle	RPM	s.*"Machine composition table*"
Spindle nose attachment	-	HSK 50
Power of spindle rotation motor **20**	kW	2,8
Rapid movement speed (**X axis**)	m/min	30
Rapid movement speed (**Y axis)**	m/min	30
Rapid movement speed (**Z axis**)	m/min	20
Slow movements speed	mm/min	10÷6000

ATTENZION

1) it is not possible to rotate the HSK 63 and HSK 50 spindle without tool.

2) It is not possible to use the high pressure through the spindles if the tool is not inserted because the holding components of Guhring collet come out.



TURNING UNIT FMU 110

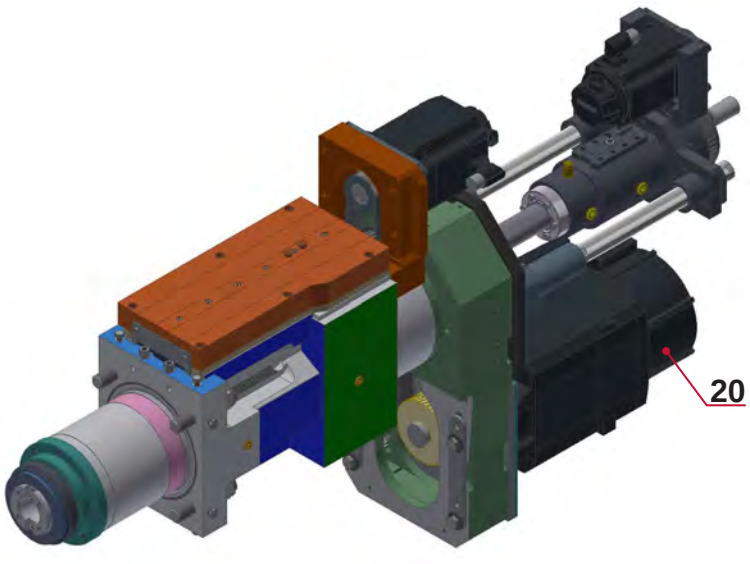
POSITION 2.0 - 4.0 - 5.0

Quill diameter	mm	110
Tool advancement max. stroke	mm	120
Rotation speed of spindle	RPM	s.*"Machine composition table*"
Power of spindle rotation motor **20**	kW	5,5
Spindle nose attachment	-	ISO40
Slow movements speed	m/min	10÷6000
Rapid movement speed	m/min	10
Stroke of the recessing head	m/min	R max=8

ATTENZION

1) it is not possible to rotate the HSK 63 and HSK 50 spindle without tool.

2) It is not possible to use the high pressure through the spindles if the tool is not inserted because the holding components of Guhring collet come out.

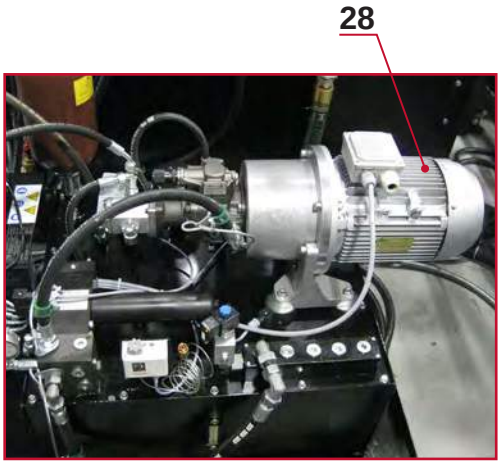


All fluid equipment on ***PORTA SOLUTIONS S.p.A.*** machines are described in the relevant attachments.

All interventions on this kind of equipment has to be carried out by skilled and authorized personnel.

HYDRAULIC SYSTEM

The hydraulic equipment is served by a general hydraulic unit **03**, including the group motor/pump **28**, and part of the valves and distributors.
This unit is also used for the hydraulic clamps positioned on the main table and the axial movement of the main table.
Other solenoid valves are located on the transfer machine, close to the using point.
You can find information about the hydraulic equipment in the chapter MAINTENANCE - HYDRAULIC EQUIPMENT and HYDRAULIC EQUIPMENT START UP.
The devices are pre-set by ***PORTA SOLUTIONS S.p.A.***: pre-setting values are indicated in the attached drawings, whlist the more frequent adjustments are listed in the "*Setting table"*.
OPTIONAL: a heat exchanger can be installed for fluid cooling; the exchanger is normally fluid/air, but a water system slaved by a refrigerator can be installed on request.

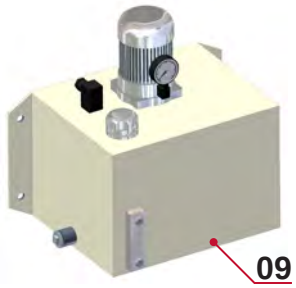


PNEUMATIC SYSTEM

It is served by a group for compressed air treatment unit **13** including a pressure adjusting valve and a nebulization group for the lubrication system.
The solenoid valves are located on the system, close to the using point

LUBRICATION SYSTEM

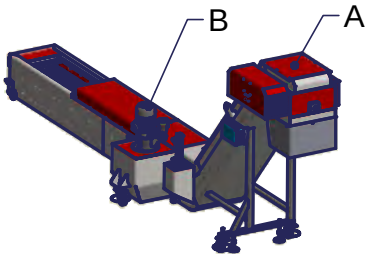
The narrowest and most delicate machine parts are lubricated by a centralized system that is controlled by the lubrication control unit **09**.
Some elements, as for example the table and the chucks, are under pressure with compressed air at low lubricated pressure by means of the nebulization system placed on the group of compressed air treatment **13**.



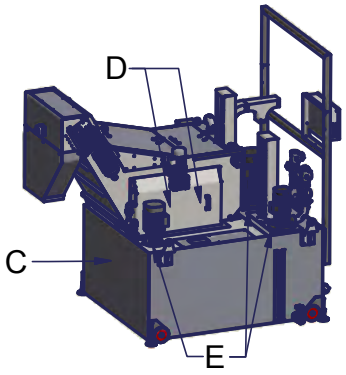
CHIP EVACUATION EQUIPMENT

Mainly the chip conveyor is composed of a chip cpnveyor belt, a “clean tank”, a coolant group and a “high pressure tank”.

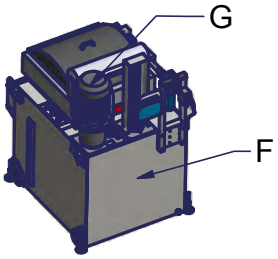
The system allows to evacuate the chips from the machine tool and is mainly composed of:



1) Conveyor (**A**) designed for evacuating aluminum chips. The conveyor belt is composed of a perforated belt moved by a motor by chain transmission. The chip conveyor is supplied with a gearbox without clutch with tilting system with safety micro switch. The conveyor is equipped with an emergency button and a reversing gear of the belt.
There is also a pump (**B**) that reintroduces the coolant in the clean tank (**C**).

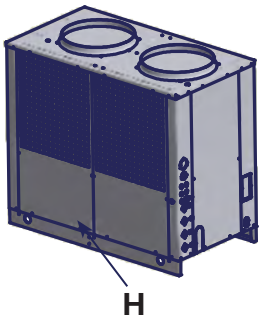


2) The clean tank (**C**) has a capacity of about 2500 liters and is equipped with two rotary filters (**D**) with 100µm filtration range with an integrated system that allows the cleaning of the cloth of the filter itself by a series of nozzles located inside the filter.
The tank is equipped with a pump group (**E**) composed of the following 3 pumps:
Pump for cleaning the rotofilters
Low pressure pump for the inner cleaning of the machine.
Pump for pouring the clean tank to high pressure tank



3) High pressure pump (**F**) equipped with a cloth filter with 20µm filtration range.
On the tank there is a high pressure pump (**G**) used for the injection of coolant through the spindles.
At the exit of the pump there is a cartridge filter with 40µm filtration range**.**

4) Cooler (**H**) for cooling the coolant of the clean tank (**C**) and reinserted in the tank itself.



The circuit is more complex of course (see enclosed documentation) in several cases the filtration is carried out with a different range and circuit for tools or pallet cleaning.

ELECTRIC EQUIPMENT

The electric equipment is illustrated in detail in the attached drawings and, similarly for other parts of the machine, interventions on it have to be performed by skilled and authorised personnel.

On your machine the main system features are:

- auxiliary circuits, 24Vdc;

- Multipolar cables which are channelled into metallic conduits;

- Computer system protected by software key

- Protection degree of the electric cabinet **02** IP55;

hielding against low electromagnetic interferences, normally present in industrial environments;

- The machine electrical system is preset with a three-phase feed tension of 480Vac, 60Hz;

- Max. installed power is 190 kW;

- Max. absorption is 295A;

- Service temperature can be +5° C (41 F) to +40° C (104 F);

- Max. possible relative humidity is 80%.

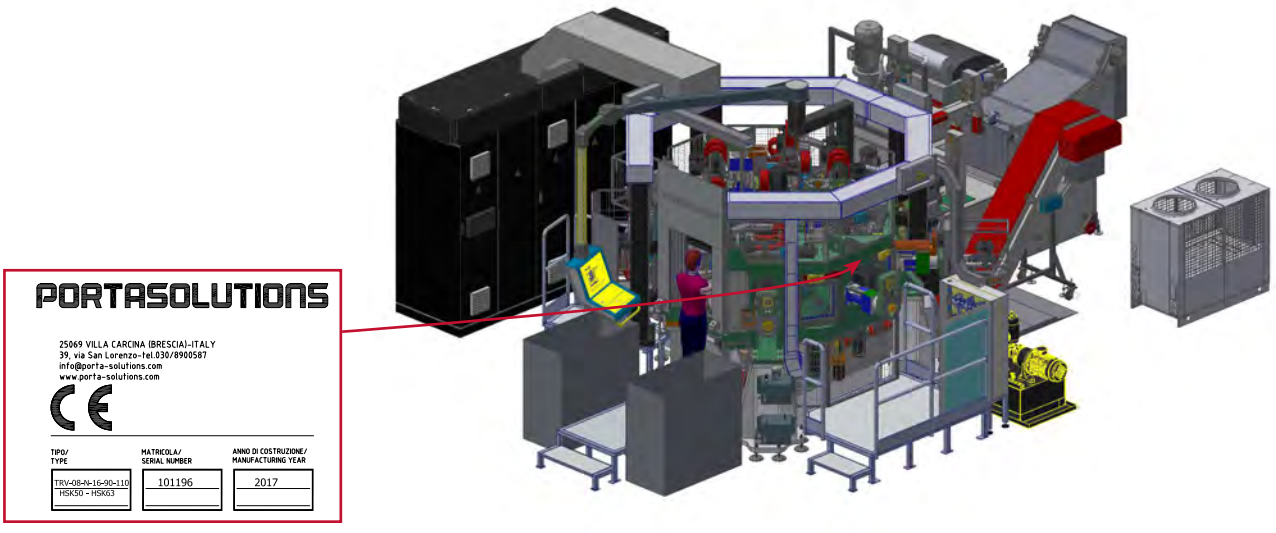
MACHINE IDENTIFICATION

The identification markings on the machine must NOT be removed, damaged, dirtied, hidden, etc.

The identification markings must be cleaned regularly and always be clearly in view. In other words they must NOT be hidden by objects and foreign bodies (rags, boxes, equipment, etc.).

CE identification markings guarantee that the machine conforms to European Union safety regulations.

The technical data in this manual do not replace the data on the machine's rating plates.



OVERALL DIMENSIONS DRAWING

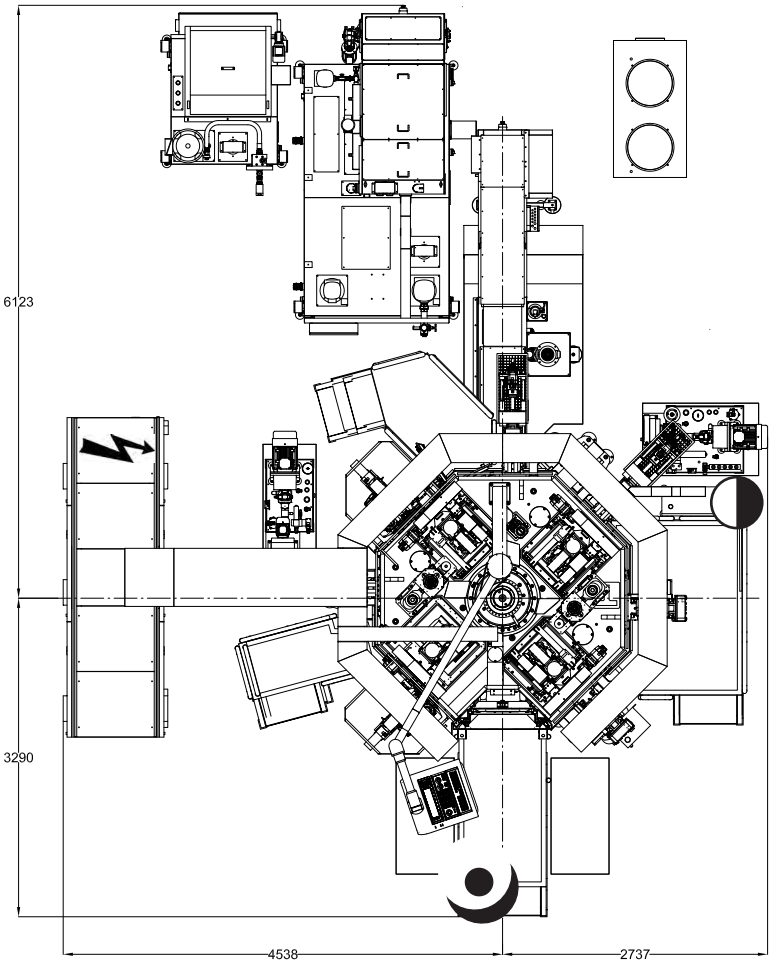
Dimensions are expressed in mm. The manual gives the approximate dimensions. The exact measurements are set out in the enclosed layouts.
Rating-plate data: electric power, power intake, consumption, etc, are shown on the *'Technical Specifications Table'*.

Electric power intake

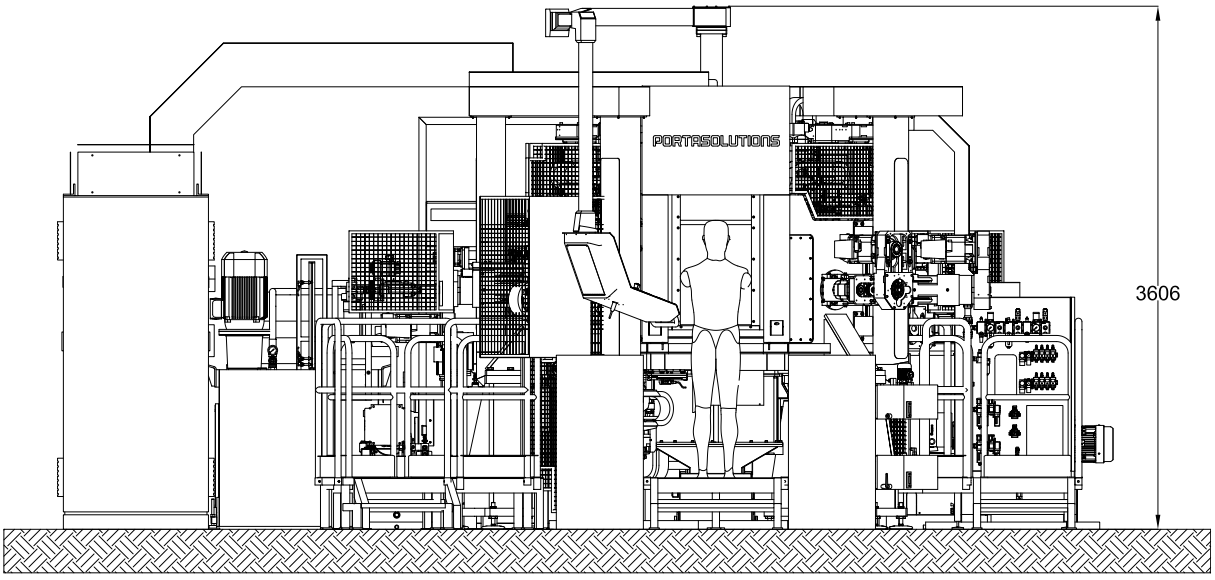
Compressed-air intake

Operator position for loading/unloading work piece

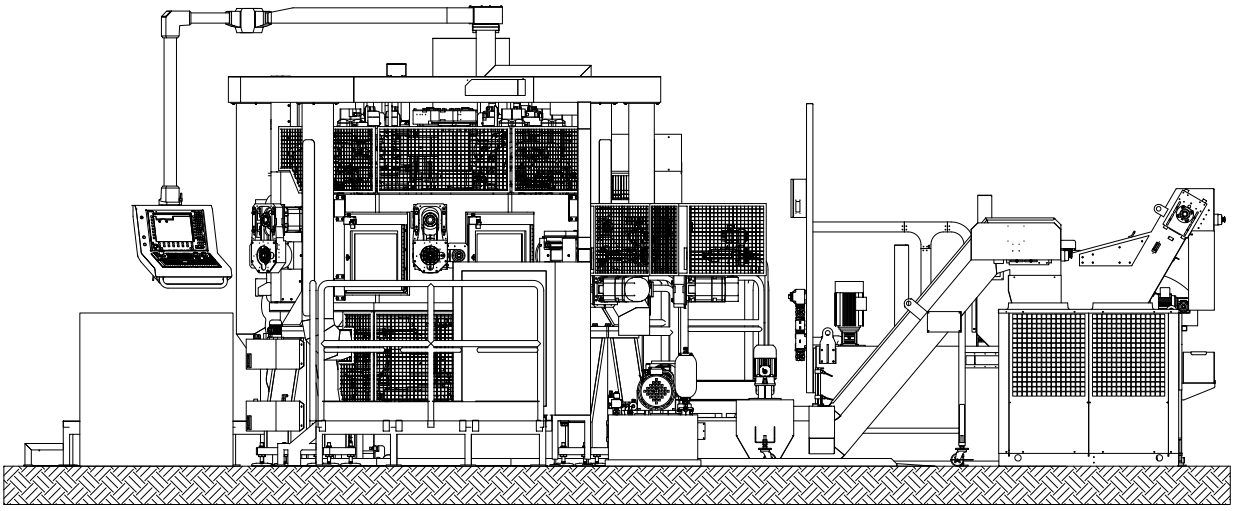
PLAN VIEW



FRONT VIEW



SIDE VIEW



TECHNICAL SPECIFICATIONS TABLE		
Technical specifications table model	**U.M.**	**TRV-08-N-16-90-110/HSK50-HSK63-FMU**
Number of operating stations	n°	8
Piece load/unload station	-	Loading: manual Discharge: manual
Station equipment	-	*see "Machine layout table"*
Document code (CE user's manual and maintenance)	n°	90246MAG
Serial number	#	101196
Work order	#	1202
Manufacture date	#	2017
Measurements	mm	see SIZE DIAGRAM
Weight	kg	*see "Hoisting table"*
Power voltage	V/Hz	480Vac 60Hz
Auxiliary controls voltage	V	24Vdc
Maximum absorbed power	kW	190
Maximum absorbed power	A	295
Average consumption compressed air at 6 bar	Nl/min	3350
Number of machine operators	#	1
Maximum allowed room temperature	°C °F	da +5° a +40° da +5° a +104°
Maximum allowed relative humidity	%	80%
Maximum allowed production time without pause*	h	21,6

*Verify and eventually free the inner machine areas from machining chips where their accumulation may cause a NOT-planned interruption (NOT FORESEEN MACHINE STOP).
These areas, for example, can be sliding areas of front guards, part clamping areas on fixtures, etc.
These operations must be carried out whenever it is considered necessary.

3

3-ACCIDENTPREVENTION

DANGEROUS AREAS OR OPERATIONS

GENERAL REMARKS

The machine is equipped with all necessary safety devices and designed according to the most severe standards for accident prevention;
Anyway, it is unfeasible to foresee all possible situations of machine installation, so the Customer must necessarily inform ***PORTA SOLUTIONS S.p.A.*** about special environment conditions or ask for a supervision of the installation site

PORTA SOLUTIONS S.p.A. **is not liable if the Standards for a correct installation are not respected** and does not answer for machinery being installed before the supplied machine or downstram.

The information included in this manual do not replace the safety rules and the technical data directly labeled on the machine, or the Safety standards valid in the Country where the machine is installed as well as the common sense rules.

It is necessary **to give correct information to the operators. So they must read and respect the technical indications given in the manual and in the attached documentation.**

The manufacturer is available to train the User's personnel, both in his Factory and in installation site, accordin to the conditions set by a contract.

Handling and/or lifting heavy machine parts (over 30 kgs) must be carried out using suitable lifting means. Respect the indications given by the employer.
Fluid toxicity must be signaled by suitable warning messages on the fluid container. It is supposed tha nobody can draw and ingest hydraulic oil, lubricants, or coolant even if it, sometimes, may look as milk.

Do not use the machine in case of malfunctions.
Do not carry out any precarious repairs, and use original spare parts only, to be installed according to the foreseen use. Responsibilities associated to parts from the market have to be ascribed to their manufacturers.

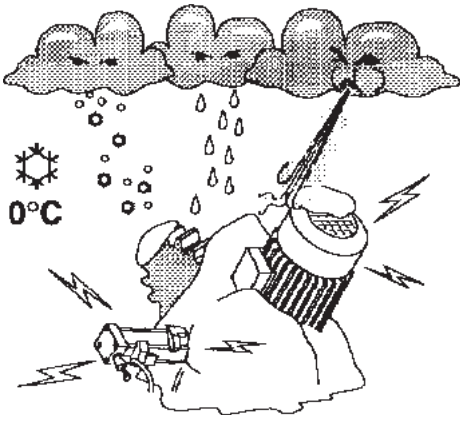
SIGNALIZATION

The machine is equipped with all necessary safeties for a total protection of the operators, but the absolute safety does not conciliate to the various exigencies during installation. **That's why the Customer must adequately instruct the operator by enhancing, with a warning or other means, the dangerous areas** or operations: dangerous voltage, generic danger, for example.

Signals must be kept readable and clean, as the whole instrumentation and namely the safety devices.

ENVIRONMENTAL CONDITIONS AND RISKS

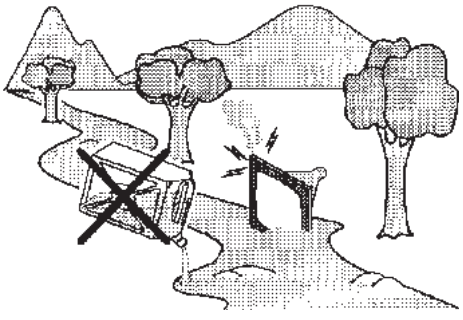
Be sure that the machine is not exposed to atmospheric agents: sun, rain, snow, wind, too high or too low temperatures, etc.



The current machine is not equipped to work in environment having peculiar risks of inflammability or explosion; the antideflagration equipment is supplied upon request.

Check possible electromagnetic interferences which may alter the operation of the electronic devices.

PORTA SOLUTIONS S.p.A. DOES NOT answer for disposal of the products being necessary for machine use or production: exhausted lubrication oil, PLC buffer batteries, accumulators or pressurized containers, paper, powders, etc.; the Customer must directly provide to dispose of these materials according to the laws valid in the Country where the machine is installed.
N.B. Use the same foresights when demolishing the machine.



THERMAL DANGER

Some machine areas may hafe hot surfaces (motors, coils, transformers, hydraulic oil, tools, etc). Pay attention before touching the machine.

***N.B.** Also the workpiece under machining could be overheated. When manually loading/unloading the operator must be provided with suitable protections.*




NOISE AND WORK ENVIRONMENT

The steady state machine, with a correct maintenance, **generates a noise level** over 70 d BA.

N.B. Noise level can change according to the material and to the workpiece under machining.
In case, due to unforeseeable installation possibilities, the threshold of noise admitted by the laws of the Country of destination, **the Customer has to remove the relevant causes** or to supply the operators with adequate protections (headsets) taking care to sensitize about their use an encouraging periodical hearing examinations.
Work environment must be correctly iluminated and clean to ensure that all work and maintenance operations can be carried out in safe conditions.
Lighting must avoid stroboscopic, glare, stress effects or shadow areas.

PERSONNEL CLOTHING

Personnel does not wear clothing with long arms, laces or belts which may compromise his safety.

The personnel DOES NOT access the machine or its equipment barefoot or with wet hands.
The personnel must wear clothing and protections the employer puts at his disposal.





MACHINE IN MOTION

The machine in motion represents a potential danger, so it is absolutely forbidden to remove pieces or chips, or clean the machine itself.
All extraneous objects (wrenches, screwdriver, nuts for example) placed on moving elements and not part of the machine have to be removed before starting the machine up.
The machine is protected by anti-intrusion devices, so it is theoretically impossible to undergo damages. These devices (gates, microswitches, photoelectric cells. etc) CANNOT be removed, otherwise there is squashing danger.
The operator always has to pay attention to the environment **for being sure to have space enough for a possible way of flight.**

MACHINE STANDSTILL AND/OR TURNED OFF

The machine could be dengerous also when it is standstill: there are transoms, cases, columns, edges, so it is suggested to pay attention when accessing the working area and handling parts of machine;

Avoid dangerous equilibrations when loading/unloading workpieces, tools, vices, etc. DO NOT go on the machine or on its groups without the necessary precautions (footboard, stairs, slings, etc.).
When starting the compressed air system, if any, parts of machine may move even if the machine itself is turned off: please stay at a safe distance.

MAINTENANCE PRESCRIPTIONS

Maintenance operations have to be carried out with machine standstill, at the intervals suggested, in respect of general maintenance conditions.
It is forbidden to take safety devices or parts of them away in a permanent way.

Permanent removing of safety devices or of part of them makes responsibility and guarantee clause void.
Removing safety device or part of the is only allowed for maintenance interventions by skilled personnel, with standstill machine or with machine running at reduced speed; after the intervention, the responsible personnel must verify that the protection devices have been remounted and are correctly operating.
Maintenance operators must signal whatever irregularity or deterioration due to wear or aging, in order to reset the correct safety conditions.

Machine cleaning must be carried out by adequate means and detergents which do not etch machine components; it is absolutely forbidden to wash the machine with bolts of water.

RESIDUAL RISKS

Despite of the various warning and the safety systems adopted by ***PORTA SOLUTIONS S.p.A.*** there are residual risks the Manufacturer cannot eliminate.
These risks are listed in the table below, with some suggestion for preventing them.

TABLE OF RESIDUAL RISKS

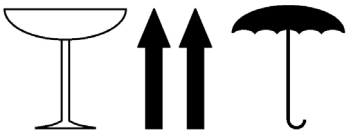
RISK ANALYSIS AND DESCRIPTION	SUGGESTED REMEDY
Dripping or blow-by causing skidding danger	Clean carefully work environment.
Pollution due to dripping and bow-by.	Clean carefully work environment.
Noise pollution due to the kind of machining.	Soundproof or change work speed.
Fluid aggressiveness and toxicity: hydraulic oil and coolant may etch skin or mucous membranes.	Use protections or immediately wash the parts exposed to the contact.
Cutting pieces, as chips, possible burrs on the workpiece during the machining, tools, possible chip protections or broken tools.	Use protections and handle with care.
Trapping between the gates protecting the machining area of robot.	Do not access the area without the necessary precautions system of the Factory.
Hot surfaces: motors, coils, transformers, hydraulic oil, tools, workpieces, etc.	Use protections and handle with care.
Fumes of gas/steam during machining, according to the material to be machined	Provide to connect the foreseen attachment on the machine the fumes suction
The insufficient cleaning does not allow to read controls and safety labels.	Carefully clean the instrumentation, the labels and the work environment.
Atmospheric agents such as water infiiltrations, low temperature, high humidity, etc	Maintain envoronmental conditions suitable to the machine.
Accumulation of energy inside the electric cabinet on the hydraulic accumulators, on hydraulic and pneumatic using points.	Be sure that all de systems have ischarged their power before intervene.

ANALISI DEL RISCHIO E DESCRIZIONE	RIMEDIO SUGGERITO
Impossible access due to lack of footboards, guards, stairs, etc...	The Customer has to install suitable devices to facilitate the interventions.
Obstacles: steps of the footboards provided by the Customer.	Pay attention.
Missing or insufficient lighting.	Correctly lighten the working area.
Coolant reservoir with wheels; danger situation if it is free on inclined surfaces or floors.	Bloccarla tramite le apposite viti o tiranti di livellamento.
Errors when changing format or SET UP with serious damages to the machine	Provide to SET UP with skilled personnel.
Insufficient training of the personnel or personnel turnover.	Ask for an integrative training to **PORTA SOLUTIONS S.p.A.**
Relaxation of the NC unit support with consequent danger situation for the operator.	Do not overload NC support.

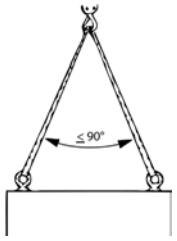
4

4 - LIFTING

GENERALITIES

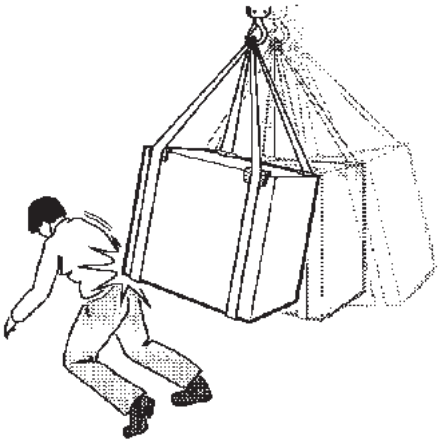


- Machine lifting and transportation has to be carried out only by skilled personnel (hook up men, crane operators, forwarders, etc.) by means of adequate lifting devices suitable to support the weight of the various machine parts.
It is suggested to carry out lifting operations by 2 persons, one person for the manoeuvres, the second one for signalling, and this namely for the very heavy parts.



- **For machine transportation on the road the most suitable means have to be used,** to protect machine parts (namely the electronic componetns) against crashes, humidity, vibrations, etc.

Lifting facilities (cables, polyester tapes, chains) must be suitable to support heavy loads, and must create an angle less or equal to 90°.



To move the suspended parts use a suitable facility (crane or bridge crane) with capacity **higher than the part weight written on the packages: in fact, during handling operations there is a certaint extra dynamic load due to the oscillations.**
Do not lift more groups or machine parts together.

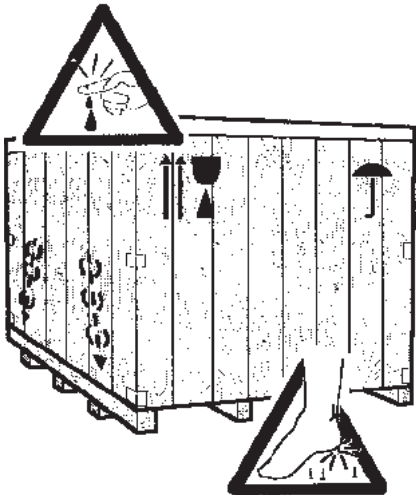
*During handling, check the correct distribution of the loads on the cables and **do not move suddenly or too quickly to avoid dangerous oscillations.***
Take care that the lifting cables do not damage or compromise the machine, if necessary protect it with clothes or cartons.

PORTA SOLUTIONS S.p.A. usually protects each part of the machine and foresees suitable facilities (eyebolts, brackets, etc.) to facilitate the transport ant the further handling; anyway, it is better to use the experience of the skilled personnel charged of these operations.
Where possible, some eyebolts have been foreseen: you can directly apply a hook of some crickets, as represented in the picture.

On the packages of machine parts, and in the LIFTING TABLE, **some information about weights** are written. Considering that machine parts are numerous and disassembled, act carefully and correctly evaluate how to handle them.

All the reservoirs (hydraulic unit, coolant reservoir, etc.) are dispatched empty. For possible further displacements, please provide to empty them before moving.

UNPACKAGINGANDCOMPONENTCLEANING



- Please remember that **packaging components (wood, nails, paper, cellophane, metallic clips, adhesive tape, straps, ropes, etc...) may cut or injure, if they are not handled with care**. Remove them with adequate means and do not leave them to the care of unresponsible persons; the same for the tools used to unpackage the machine (scissors, hammers, pincers, knives, ecc...).

Furthermore, packaging parts have to be disposed according to the Standards of the country where the machine has to be installed.

Sometime you may found extraneous elements (brackets, ties, flanges, etc...) just used **to clamp the machine during transportation**; These elements, which are not part of the machine, have to be removed before installation.

The various components are carefully located, with sage holding points and duly clamped to prevent from possible dispalements or collisions during handling.

When opening the pachaging please check machine integrity and throughness.

In case you find some damage, please stop unpackaging operations and immediately inform the forwarder and also the manufacturer.

The fulfillment of this rule is essential to obtain the indemnity for damages by the Insurance Company covering the transport.

After having opened the packaging, the first operation to carry out is a rough checking of each and every part of the machine: check the presence of all machine parts and their conditions.

Put the machine and its parts near thE point of installation and provide to carefully clean them with suitable detergents, according to the kind of the surface. Do not use petrol, tricloroetilene, solvents or abrasive detergent.

Do not use direct spouts of water or other liquids: their infiltration may cause short circuit.

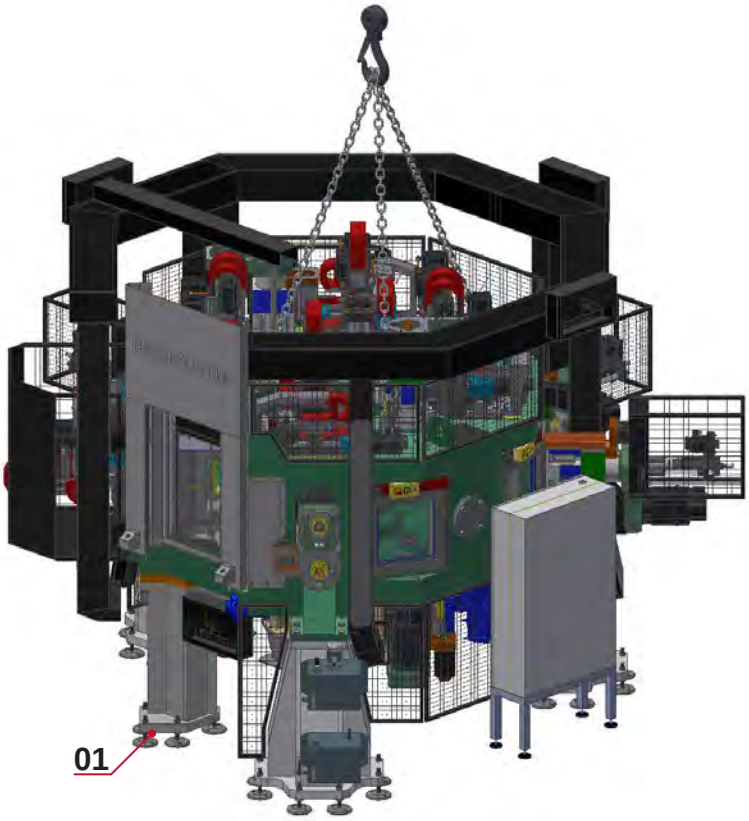
OK

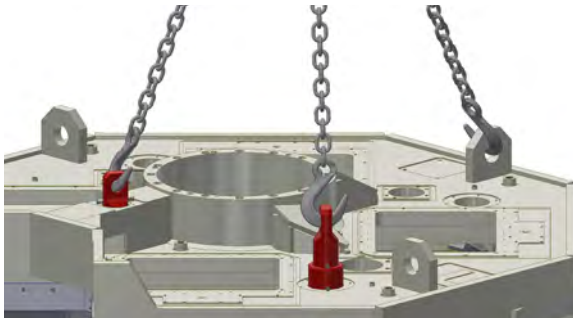
NO

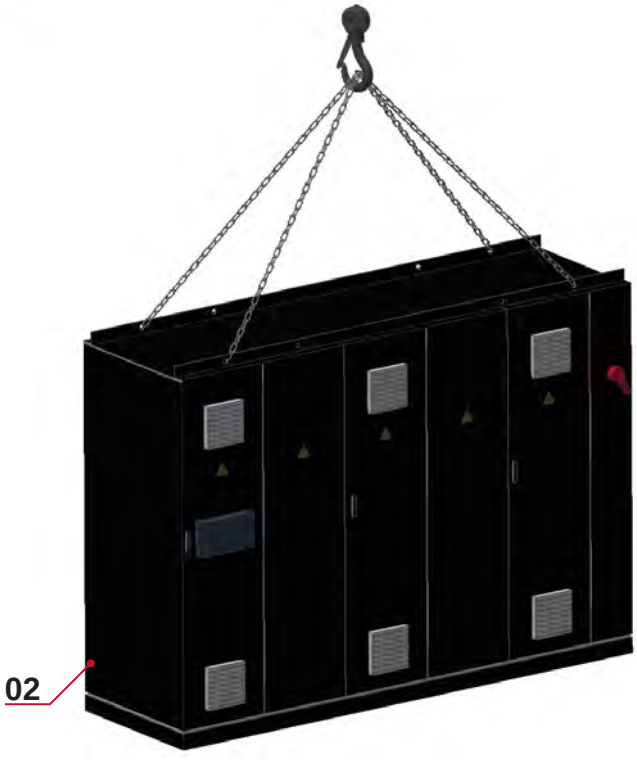
LIFTING

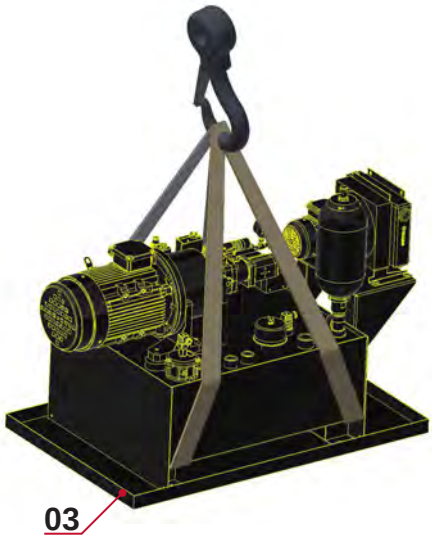
The machine is divided into some subassemblies, connected each other by means of mechanical fixing devices, cables and pipings.
These subassemblies have to be handled separately.
The following table lists the weight and other data about lifting system of each subassembly.

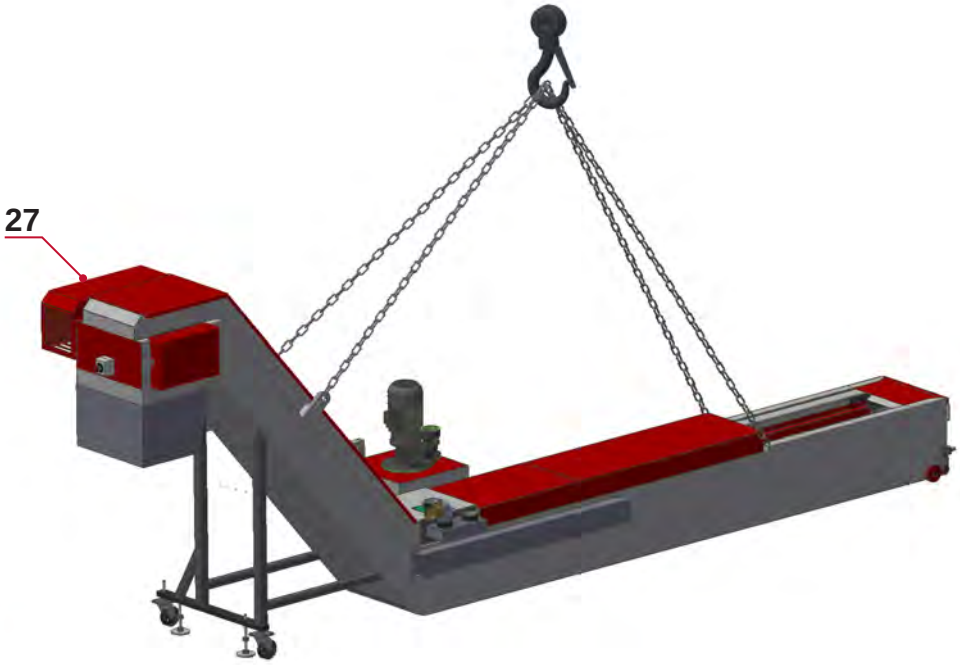
LIFTING TABLE	Weight kg. kg	Lifting points N°#	Min.distance of ropes	Eyebolts UNI 2947	Crickets UNI 1947
Machine body **01**	17900	4	2000	-	30
Electrical cabinet **02**	1680	4	1500	-	20
General hydraulic unit **03**	240	4	1500	-	15
Chip conveyor belt **27**	633	4	1500	-	20
Clean tank **194**	1555	4	1500	-	20
Hydraulic unit table **200**	210	4	1500	-	15
High pressure tank **193**	500	4	1500	-	20
Coolant **189**	340	4	1500	-	20
Stairs + platform **199**	105 (A)	-	1000	-	-
	140 (B)	-	1000	-	-
	120 (C)	-	1000	-	-
	196 (D)	-	1000	-	-

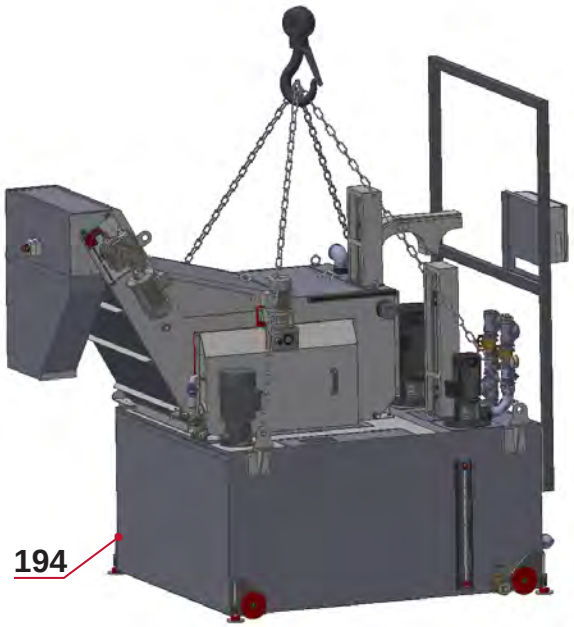


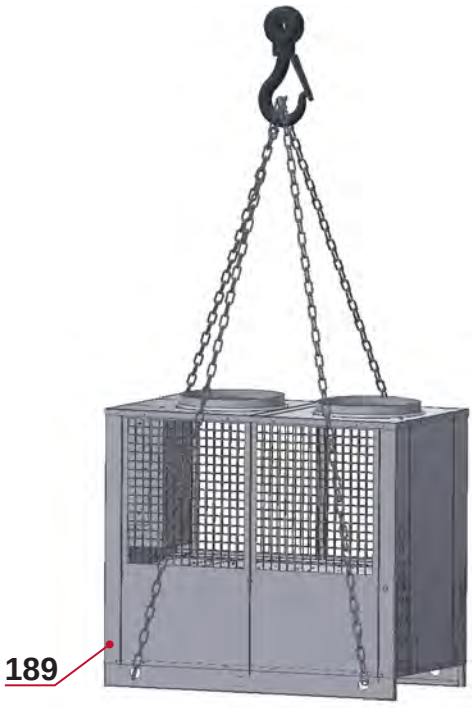


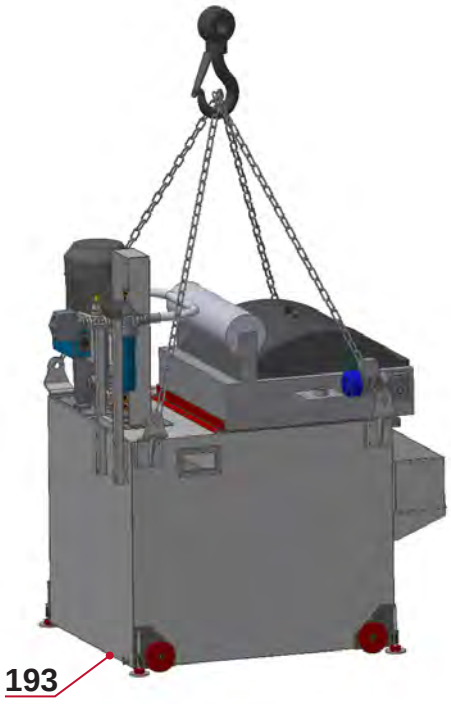






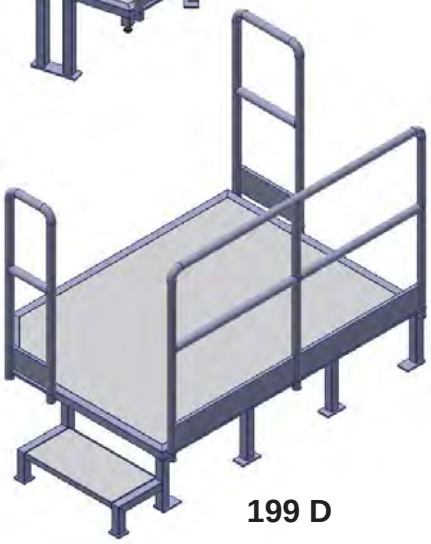






199 A

199 B



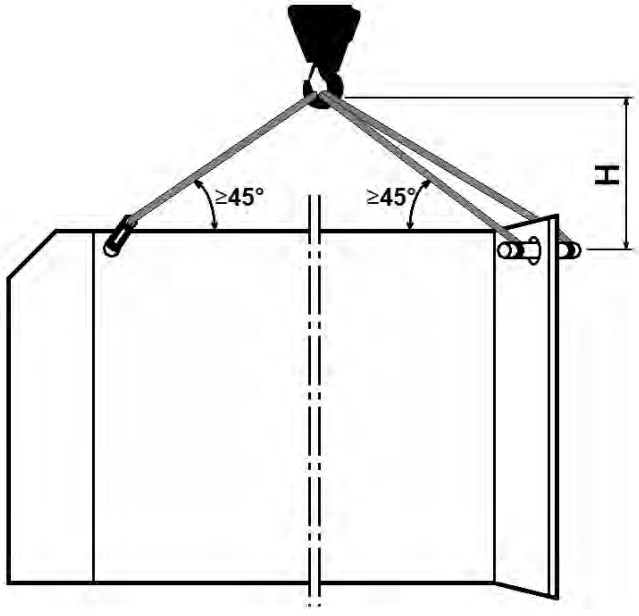
199 C

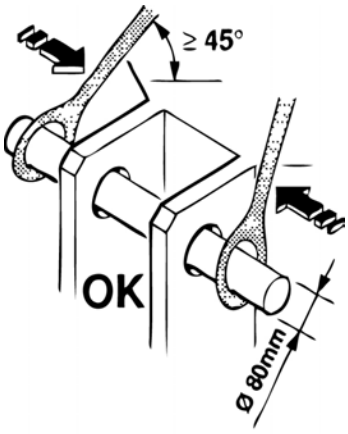
199 D

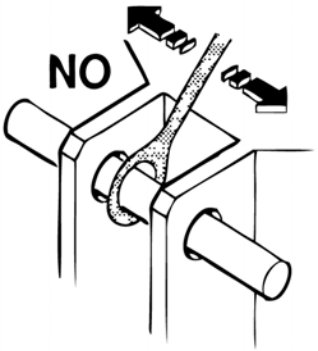
LIFTING OF MACHINE BODY

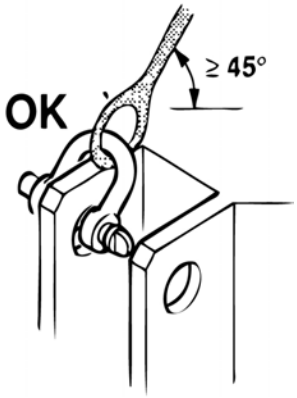
Machine body **01** is complete with a certain number of lifting point (see "*Lifting table*", where are also suggested possible tools

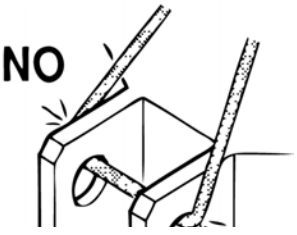
When preparing the sling, be sure that all the parts of the rope are stretched.
To avoid possible movements of the ropes you can use one cricked or one steel bar Ø80mm (UNI 469) for each point, as represented in the pictures.
Weight and dimensions of the machine body requires facilities and personnel usually not available.
Min. H dimension of the ropes is indicated on the package and listed in the "*Lifting table*", anyway it has to be compatible with general rules and as vertical as possible.





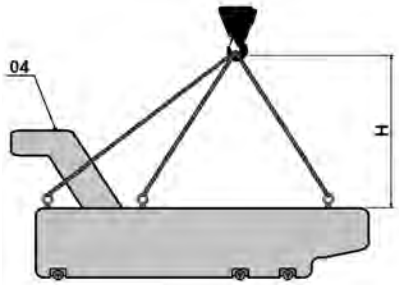






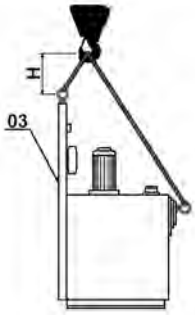
LIFTING OF COOLANT TANK AND HYDRAULIC UNIT

Both the coolant tank **04** complete with the chip conveyor belt **27** and the Hydraulic unit **03** foresee various slifting points (see "*Lifting table*", where are also suggested possible tols).



Both groups have to be lifted and moved empty, so empty them bevore moving.

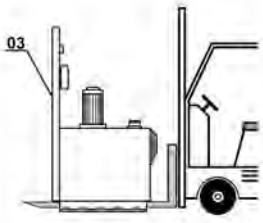
Min. H dimension of the ropes is indicated on the package and listed in the "*Lifting table*", anyway it has to be compatible with general rules and as vertical as possible.



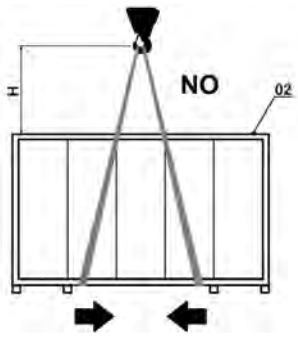
Hydraulic unit **03** can be lifted by means of ropes (with suitable eyebolts) or by lift truck.

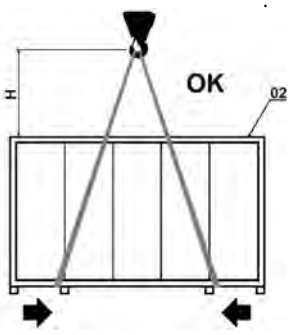
LIFTING OF ELECTRIC CABINET

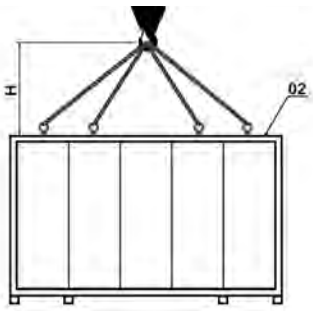
Electric cabinet **02**, if equipped with eyebolt holes (see "*Lifting table*") has to be lifted by using suitable crickets.



If the electric cabinet is not equipped with eyebolt holes, sling it as shown in the picture.

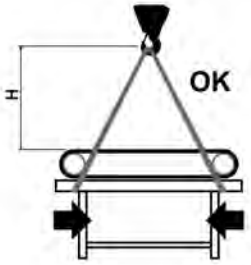






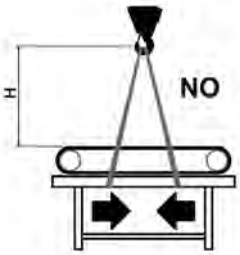
LIFTING OF BELT CONVEYORS

Ribbon conveyers (OPTIONAL) of transfer machines are used for feeding workpiece loading or unloading station.
This equipment is usually of Customer's supply, according to machine position.
They are not heavy, but anyway they have to be handled with care.



LIFTING OF SAPARATE PARTS

Many parts of the machine are disassembled to facilitate trasportation and handling of the main groups; they can be lifted in various way. Keep to the already described rules and to common sense.



5

5 - INSTALLATION

GENERAL CONDITIONS

OUR INSTALLATOR'S GUARANTEE

Usually ***PORTA SOLUTIONS S.p.A.*** sends one supervisor for machine mounting, installation, first start up: in case the Customer do not require this or **if the machine is moved to another position**, remember that:

This operation must be carried out by skilled personnel; however, it is necessary to follow the contents of this manual as well as the attached drawings and documentation.

If the operation is not supervised by our installator, the personnel charged by the Customer must be skilled and experienced for this job; he must have received an adequate training on machine of this kind.

The installator must inspect the integrity of the packings and of the machine, to check that they have not been damaged due to impacts, wrong handling or atmospheric agents.

The installator must verify the correct execution of buildings and of al structures prearranged for machine installation, then he will supervise machine mounting and installation.
The installator will also simulate possible emergency situations, checking that the personnel has correctly understood the position of quick and emergency stop.

Machine installation will be performed according to Customer exigencies and to the conditions of the site where the machine has to be installed; for this purpose the Customer will inform the Manufacturer about special situations (environmental conditions, limits of dimensions, etc.): that's why before machine delivery the manufacturer has to supply the Customer with all detailed installation drawings including technical data about connections, which, anyway, have to respect the standards of the Country where the machine is installed.

Finally, the installator will give the necessary information about the correct machine cleaning and maintenance, **making sure that this manual is at personnel's disposal.**

Every situation presents peculiar problems which sometimes cannot be foreseen, so the Customer must provide to the following:

ENVIRONMENT INSPECTIONS

- **check environment conditions** (explosive atmosphere, excessive ventilation or high degree of humidity);

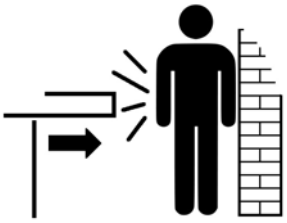
- **check that the machine is not exposed** to atmospheric agents such as sun, rain, wind, etc.;

- **avoid electromagnetic interferences** which could compromise the correct operation of the electronic equipments, with consequent dangerous situations.

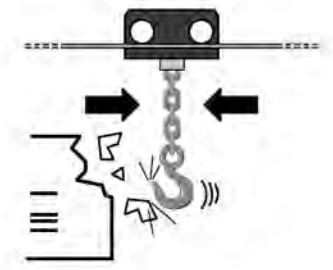
STRUCTURAL AND LOGISTIC INSPECTIONS

- **check that the ground is solid and suitable to support the dynamic load of the machine**, in safe conditions and with the necessary foundations built workmanlike;

- **the machine must be positioned taking care to maintain the suitable distances allowing the performance of work/maintenance operations.** Namely, it sould be space enough to allow transport facilities circulation and to allow all possible maintenance operations, also the most improbable ones.
Machine position will not create discomfort or stresses (dazzling windows or lamps, air streams, narrow space full of obstacles, etc.) to the various professional figures interacting with the machine;



- **check possible collision with other machines or fixtures in motion (bridge crane, for example).**



FEEDING INSPECTIONS

- be sure that the feeding voltage corresponds to that written on the labels on board the machine;

- be sure that the compressed air pressure will not pass over 10 atm;

- check the correct rotation direction of the gearmotors and of the hydraulic unit pump. if any.

OBLIGATIONS AND PRECAUTIONS

- the installator, and furtherly the maitenance operator, must signal possible faults or deteriorations which may compromise the safety of the machine. **do not perform any precarious repair** and use original spares only.

N.B. *The installation must be carried out with feeding off and/or compressed air off (if any); keep safety distance when feeding the machine.*

During installation operation put warnings, transennas and signals of "WORK IN PROCESS".

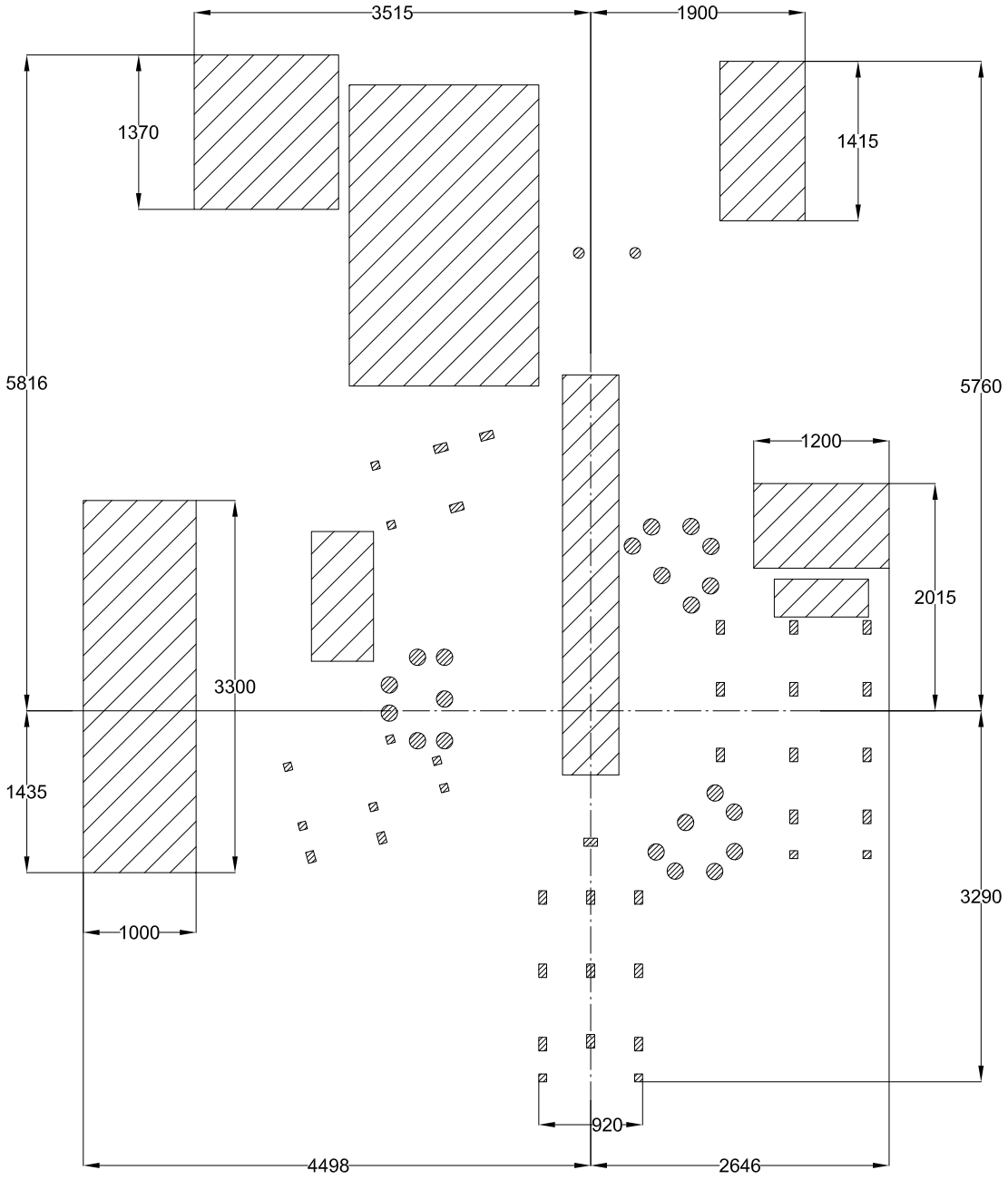
POSITIONING AND LEVELLING

The groups that compose the complete system are equipped with a certain number of support points, indicated in the Support points schedule. In particular the machine support points are usually previously expected with detailed lay-out sent to the Customer.

FEET DETAIL

SUPPORT POINTS

The support points are indicated in the drawing by a dotted line. To calculate the load on the points, take into account the weight of components specified in the *Lifting Table.*

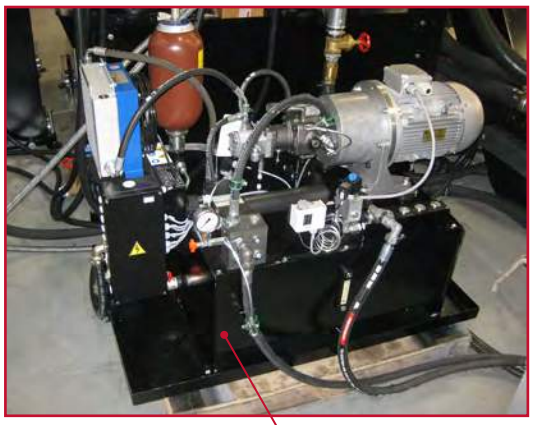


TANK AND SYSTEM FILLING

The operations described below appear simple but must be performed or checked by specialized and authorized personnel.

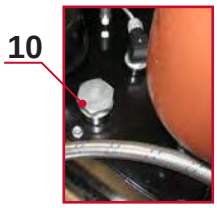
For the fluids used see chapter on MAINTENANCE and the *'Lubrication and Maintenance Table'*.

The machine can be equipped with one or more of the following components:



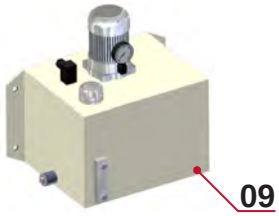
- **General hydraulic unit 03**

The hydraulic unit has a solenoid valve unit, an oil inlet plug **10** and an oil drain tap.
Fill through the oil-filling cap and check the level on the gauge.
About 110 liters of hydraulic oil are required.
N.B. The hydraulic system must be started up by expert personnel who must check that the pump is started up and that the circuits are filled to the inlet ports and/or the machine's discharge port. The procedure is summarized in the chapter MAINTENANCE - START-UP OF HYDRAULIC SYSTEM.



- **Lubrication control unit 09**

The lubrication control units must also have a filling and a discharge port and a filling gauge.
About 15 liters of oil for guides are required (see MAINTENANCE - LUBRICATION SYSTEM).
After the first filling up, run the pump to fill the circuits as far as the inlet port.



- Clean coolant tank **194**

The chapter MAINTENANCE - COOLANT SYSTEM contains the main required information to maintain the system

Clean coolant tank can hold about 2500 liters of coolant. The level can be checked di-rectly and must be constantly topped up to compensate for eva-poration and depletion due to coolant sticking to borings.

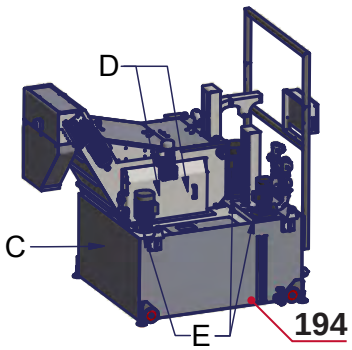


TABLE OF TANK CAPACITY

TANK	QUANTITY OF FLUID
General hydraulic unit **03**	110 lt.
Lubrication control unit **09**	15 lt.
Clean coolant tank **194**	2500 lt.
Hydraulic unit table **200**	100 lt.

CONNECTIONS

The connections of this kind of machines are very complex and ARE NOT described in this manual.

The connections must be executed by skilled and authorized personnel, capable of reading and interpreting the drawings attached to this manual or supplied to the Customer previously.

Usually, the following operations have to be completed:
- Connection to the electric main
- Connection to the compressed air net
- Electric connections of the groups each other
- Connection of lubrication system
- Connection of coolant systems
- Connection of the fumes suction systems (according to the materials to be machined, OPTIONAL)

In the chapter SPECIFICATIONS - OVERALL DIMENSIONS DRAWING you can find the connection points, thati is where the feeding line has to arrive.
The following symbols mean:

connection-input of the electric energy

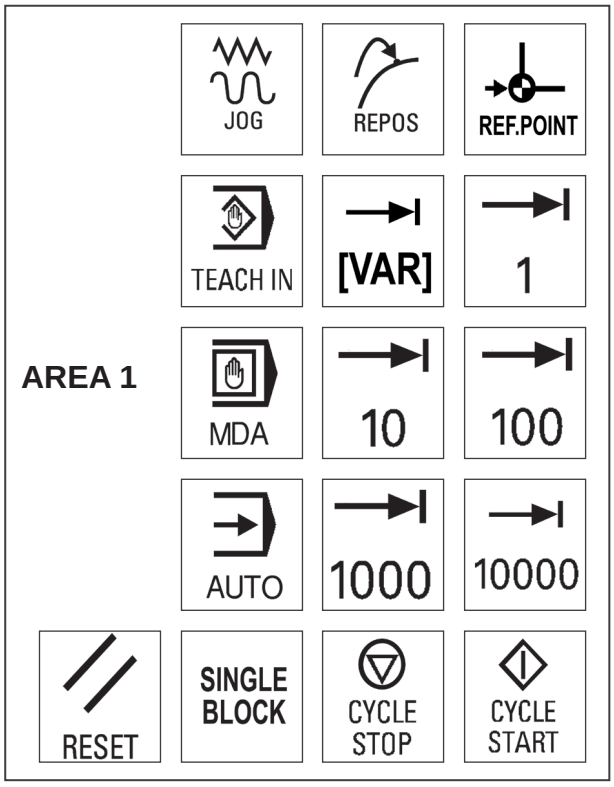
connection-input of compressed air

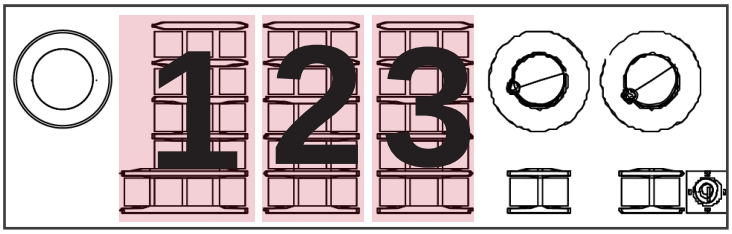
Operator position

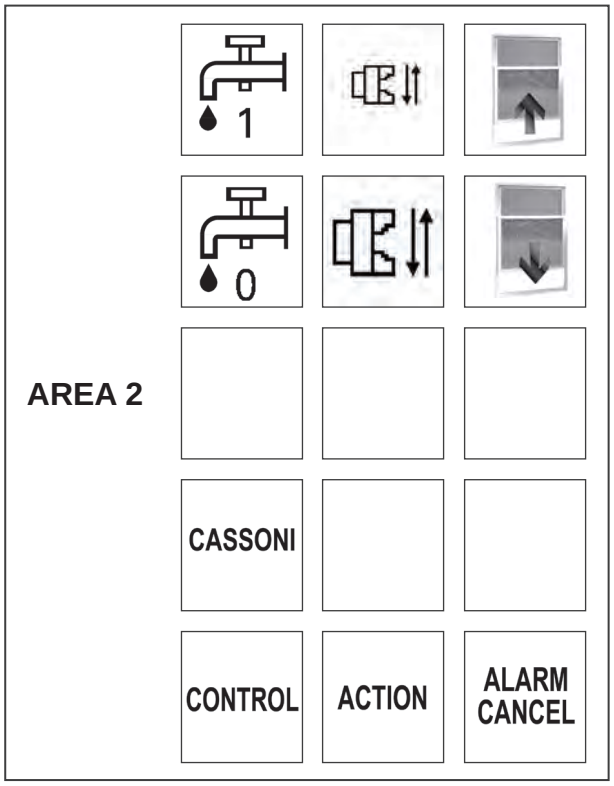
6

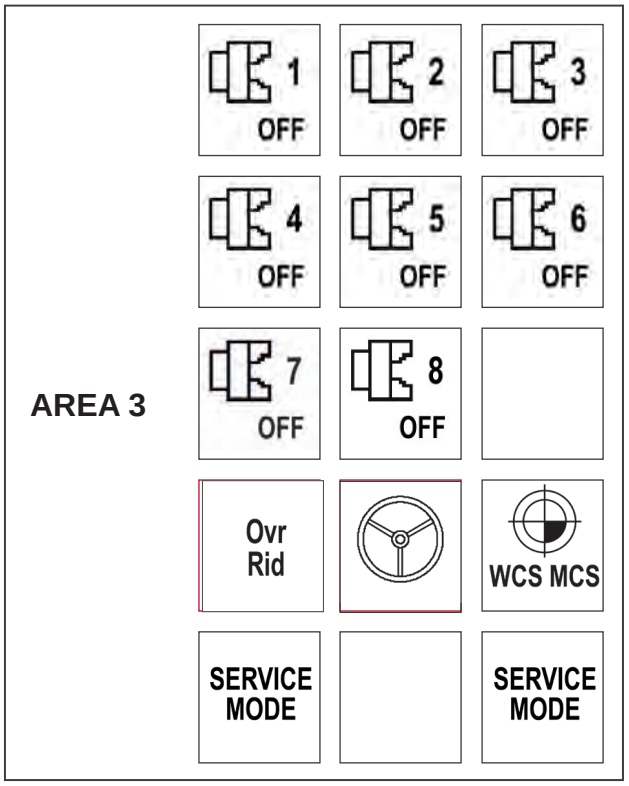
6 - INSTRUMENTS

CONTROL PANEL









The machine teach pendant has 3 areas of buttons

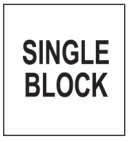
AREA 1

This button allows to switch the machine over Jog modality; in this modality the manual teach pendant can be activated by turning the key. By pressing the button “Reset” when the teach pendant is not activated, the machine comes back automatically in MDA modality.

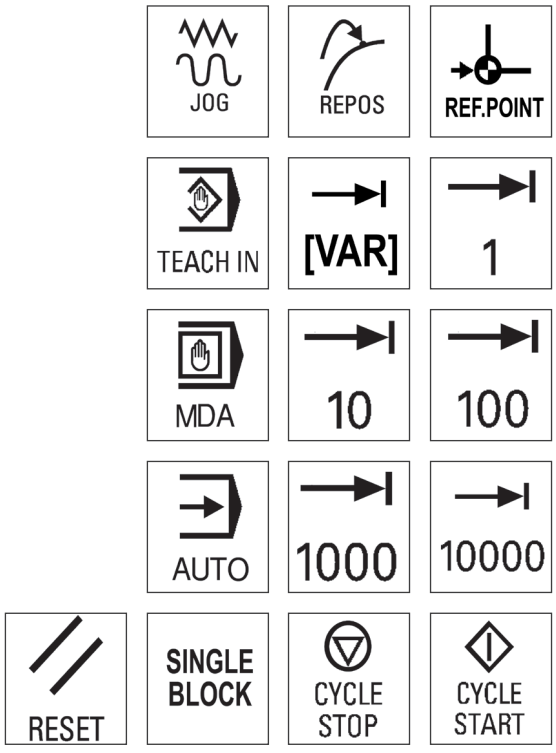
This button allows to switch the machine over Jog Ref modality; in this modality, used in case of service, the axes, that lost the machine origin, can be set to zero.

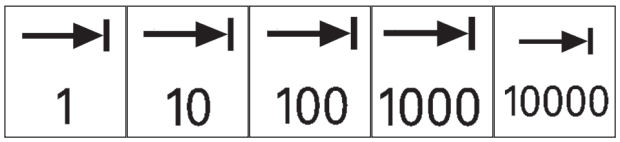
This button allows to switch the machine over MDA modality; in this modality it is not possible to carry out the program instructions unless the machine is started in “Service” modality.

This button allows to switch the machine over AUTO modality; the button is active only in “Service” modality. During standard functioning the machine switches over automatically in AUTO modality when the automatic cycle or the single cycle are started.



This button allows to activate the program execution in single cycle; during the machining in automatic cycle the button has no effect.

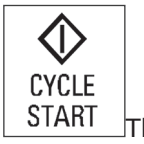




These Buttons, which are active only when the machine is in JOG modality, allow to activate the incremental controls (in micron of millimeter). The buttons are mutually exclusive, i.e. only one at time can be active and the activation of one, disables the other one. In order to disable the incremental modality, press the button.

With the active hand-wheel only the increase of x1, x10 e x100 can be activated

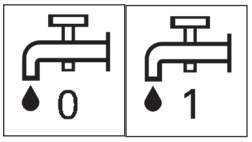
This button allows to reset the CN channels. By pressing this button you carry out the following operations: reset channel
- Immediate interruption of the machining cycle (then a zero setting is required in order to re-activate the cycle)
- Deletion of eventual active controls that require ACTION
- Alarm deletion

This button allows to interrupt for a while The execution of the machining program; by pressing 

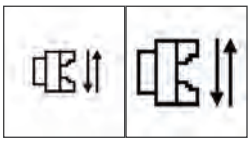
The execution of the program re-starts

This button allows to activate the CN channels.tIn case of automatic or single cycle, this activates the cycle execution. If the machine has been switched on in “Service” modality and it is in MDA modality, by pressing this button all the instructions in the MDA window only of the visualized channel will be carried out.

AREA 2



These buttons allow to switch on the Washing system of the pallets independently from the machining conditions.

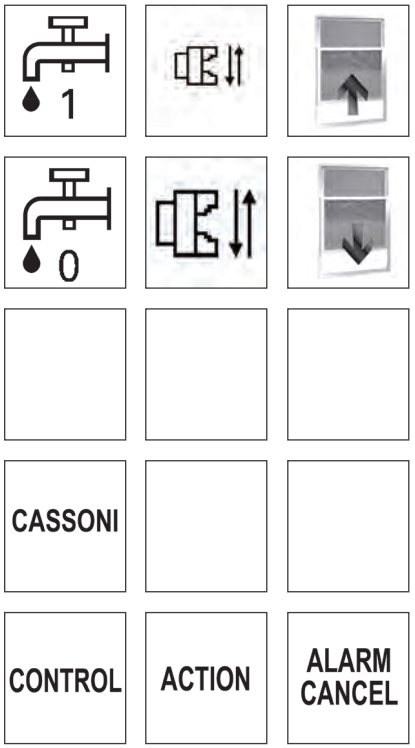


These buttons allow the manual opening and closure of the chucks in the loading station. The opening is carried out at the same time on both chucks while the closing is sequential (firs chuck 1 and after some seconds, chuck 2). The hand push buttons activate the load/unload cycle.

These buttons allow the opening and Closure of the front safety guard when the machine is not machining.

This button allows to request the unlock of the Locks of the side caissons. The unlock is carried out only if all machine axes are still and the channels are in Reset.

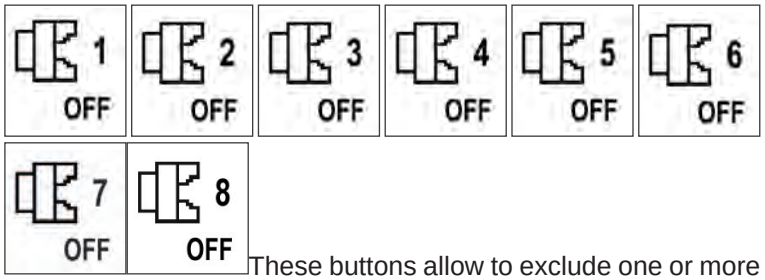
This button allows to switch on the machine.



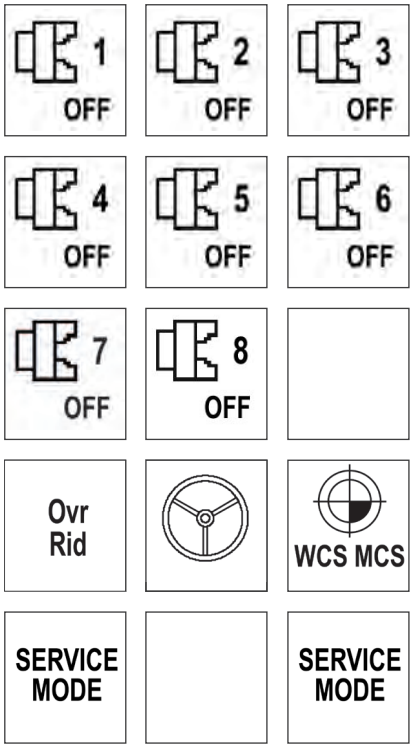
This button allows the execution of the controls That require ACTION (example: main table rotation, tool magazines refreshment activation, etc.)

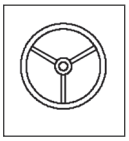
This button allows to silence the alarms if the Conditions, that generated them, faint without interrupting the machining cycle.

AREA 3



These buttons allow to exclude one or more fixtures in case of mechanical failure. Each station does not carry out the machining when the fixture is excluded. If seven fixtures are excluded and the automatic cycle is carried out, it will be like the machining of only one part is carried out.

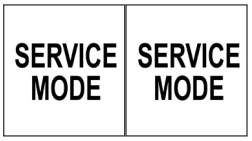



This button allows to activate the hand-wheel on the Manual teach pendant. The activation is enabled only if there are the following conditions:
- JOG modality
- Manual teach pendant active
- Inc1, Inc10 or Inc100 selected

By pressing again this button or deselecting Inc1, Inc10, Inc100, the hand-wheel disables automatically.

This button allows to limit the override of the Rapid movements (movements in G0) at 30%; this function is very useful during the test of a program since it does not act on the feeds during the machining and limits the rapid approaches.

This button allows to switch the visualization of the Axes dimension over the dimensions referred to machine zero and dimensions referred to part zero.



These buttons, pressed at the same time, At the moment of the machine switch-on, activate the “service” modality that allows to:
- Switch over the CN modalities freely
- Lock he instruction in MDA in the visualized channel

To disable the “Service” modality it is necessary to switch off the machine.

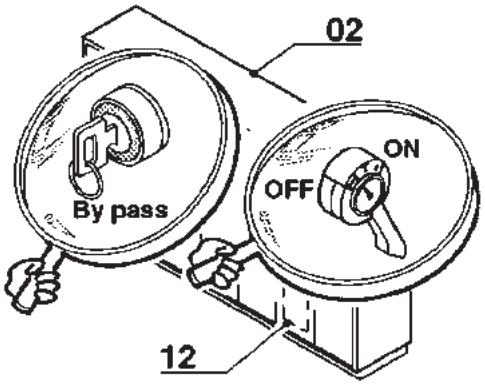
ELECTRIC CABINET

ON/OFF
Power switch on the main circuits of the machine.

BY-PASS
This button, located on the electrical cabinet **02**, makes it possible to the assigned personnel (having the necessary key and correctly trained), to neutralize the interlock between electric cabinet doors and the power switch ON-OFF.
When extracting the key, this button cannot be activated so the doors of electric cabinet cannot be opened if the cabinet itself is live

This button can be activated only by skilled and authorised personnel.
It is timed between 0.3 to 30 secs, is programmed by **PORTA SOLUTIONS S.p.A** engineers and cannot be tampered.

After having activated this button, you have of 0.3 to 30 secs to open the doors and deactivate the protection limit switches. Now the machine is always live even if the electric cabinet doors are open to allow possible alarm diagnosis and/or calibrations.



REMOTE BUTTONS

The access to the machine is only possible in 3 points, provided with suitable protections. By these protections there are some buttons, generally used for tool change operations.

E1 EMERGENCY
Red mushroom push-button for the immediate machine stop; when stopping the machine with this button all machinings immediately stop. To restart the machine release the button by turning it and RESET the machine.

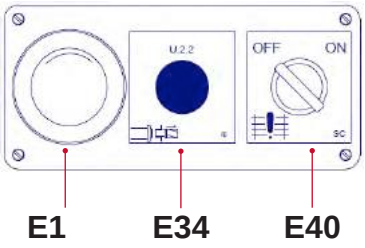
E32 TOOL LOCK/UNLOCK
Black button that allows the tool change of the unit selected with the selector **E33**. With the pressed button the axis Z of the correspondent unit is controlled so that the spring compression allows the tool unlock. When the tool is replaced, release the button so that the axis Z can go back to the machining position.

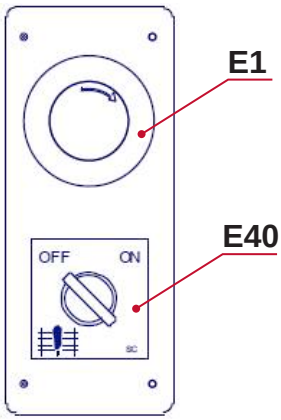
E33 UNIT SELECTION
Selector to select unit U6.2, U6.4 or U7.0. After having selected the unit, press the button **E32** in order to unlock the tool of the selected unit.

E34 TOOL LOCK/UNLOCK
Black button that allows the tool change of unit U2.2. With the pressed button the axis Z of the correspondent unit is controlled so that the spring compression allows the tool unlock. When the tool is replaced, release the button so that the axis Z can go back to the machining position**.**

E40 REQUEST OF SAFETY GUARD OPENING
Selector for the request of opening of the safety guards. With selector (ON) it is possible, if the axes are still, to open the safety guards even if the machine is on without putting the machine in EMERGENCY since the SAFETY INTEGRATED is active.
Conditions for the request of opening of the safety guards:
- Machine in emergency,
- Machine in reset,
- Machine in Cycle Stop and Jog selected.

N.B. If the switch is **(ON) IT IS NOT POSSIBLE** to perform machiningoperations with open protections, it is only possible to move the axes at reduced speed through the portable teach pendant **48** to check possible collisions between the tool, the workpiece and sometimes the workpiece clamping vice.
Once the protection has been opened, axes movement can only start through the portable teach pendant **48** and with the button **E50 OPERATOR PRESENCE** pressed.





PORTABLE TEACH PENDANT

The manual teach pendant can be activated when the CN is in JOG modality. In order to activate it, it is necessary to act on the key (see image 1) in vertical position.

Image 1

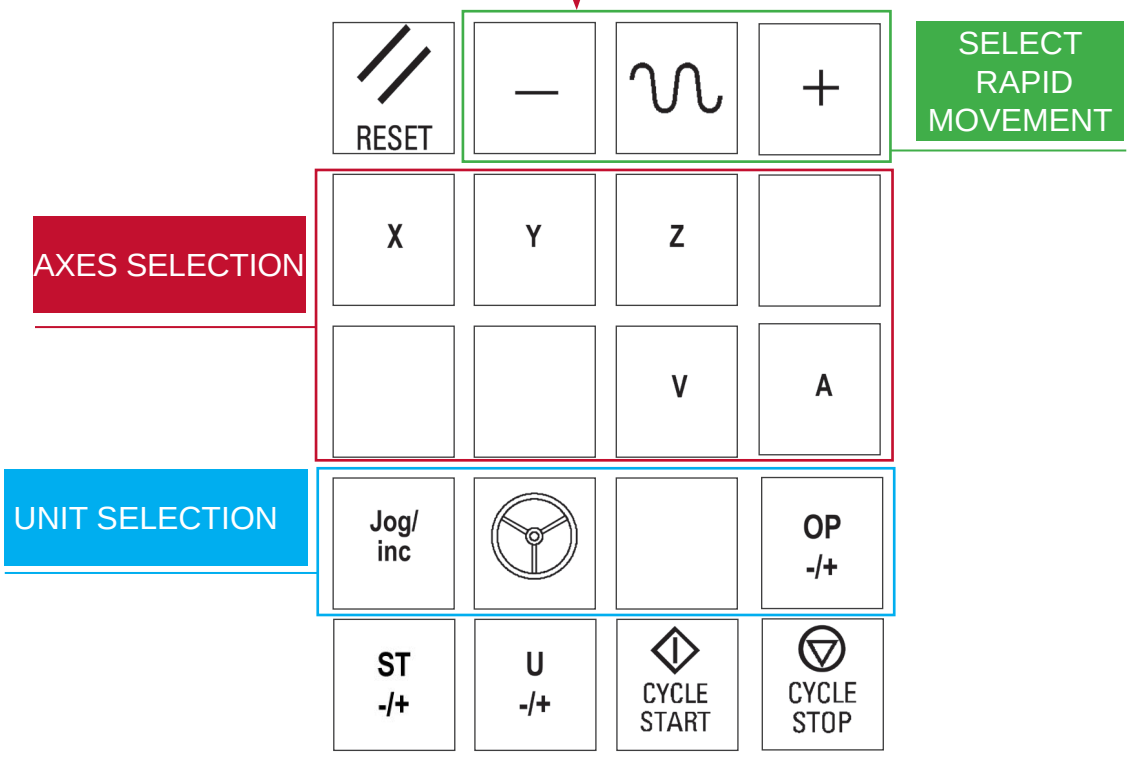
If the machine is switched over in JOG modality when the key is already turned, the teach pendant will not activate since it needs the signal of key rotation (in order to avoid accidental activation of the teach pendant). In this case turn the key in horizontal position and then bring it back to vertical position for the activation. In order to disable the teach pendant. Turn the key in horizontal position.
If the teach pendant is active, by pressing button reset

MDA modality will not be activated.

With the teach pendant is possible to carry out the following operations:
- Axes moving
- Manual pneumatic/hydraulic controls
- Start automatic cycle/single cycle

AXES MOVING

In order to move an axis, it is necessary to select the unit where it is located; when on the display appears the correct unit number, select the axis to move.



When on the dispaly appears the name of the correct axis, use buttons “+” and “-“ to control the movement back and forth of the axis. The speed of the axis can be adjusted by the override mounted on the teach pendant. The hand-wheel allows to carry out the movements of the axis without pressing “+” e “–” only if one among the modality inc1, Inc10 e Inc100 is selected.

MANUAL CONTROLS

To select the manual controls, press [OP -/+] and press [+] o [—].By pressing the two buttons, you can switch over the different available operations, then press buttons "+" and " –" in order to carry out the step of the operation indicated on the display
example: lock and unlock.

By pressing this button [U -/+] And pressing [+] o [—] You switch over he different units.

By pressing this button [ST -/+] And pressing [+] or [—] You switch over the different stations.

Here it is the list of the controls and the way of execution..

Main Table	+unlock the main table - lock the main table
Loading chuck	+ controls the opening of the chucks in the load/unload area - controls the closing of the chucks in the load/unload area

Front door	+controls the opening of the front door - controls the closing of the front door
Chip conveyor	+ enables the movement of the chip conveyor (carried out by its proper selector located on the chip conveyor) - cancels the enabling

START AUTOMATIC CYCLE/SINGLE CYCLE

When a single cycle or the automatic cycle is Selected and the machine is waiting for “CYCLE START”, it is possible to give the command also with the main teach pendant. If the selected cycle is the automatic one, the active override remains the one of the teach pendant; if the selected cycle is the single one, the active override becomes the one of the manual teach pendant.

The control has the same function of the one on the Main teach pendant and it is always active at the same time.

The control has the same function of the one on the Main teach pendant and it is always active at the same time

7

7 - OPERATION

MACHINE PUTTING INTO SERVICE

GENERALITIES

Before checking machine movements and functions it is necessary to carry out some primary inspections and to examine the instrument systems, the functions controlled by the various commands and the position of stop button and of emergency devices.

About this matter, please see the attached documentation and ask for the assistance of the skilled and authorized personnel.

- **Check** that all connections, mechanical, electrical, pneumatic, etc., have been correctly executed;

- After this check the machine can be powered through the switch ON-OFF located on the electric cabinet **02**;

- Immediately **check** the correct rotation direction of the motors. If the motor/pump **28** on the hydraulic gearcase **03** turns in the correct direction, also the rotation of the other motors is correct;

- **Check** the correct operation of all safety devices (see the chapter ACCIDENT PREVENTION) and the possible residual risks;

- **Check** that no extraneous persons are inside the working area;

- **Check** that compressed air pressure is enough to ensure machine component operation;

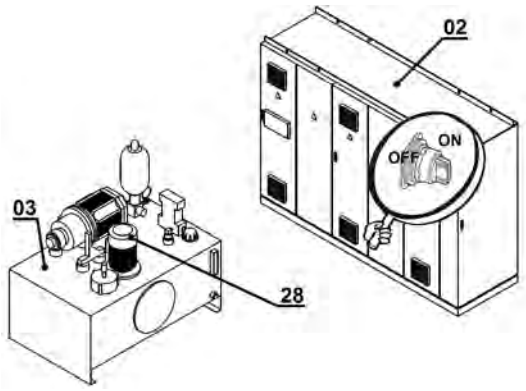
- **Check** that no extraneous objects or persons are inside the working area;

- **Check** all fluid levels;

- **Check** the calibration of all pressurized devices;

- **Go on** with the procedure of MACHINE CONFIGURATION and with the relevant adjustments

At machine power on, some unexpected movement of the machine may occur, so keep an adequate distance and proceed only when all collision possibilities can be excluded.
This precaution is necessary for possible damages of the machine during transportation.



TOOL CHANGE

Tools may be changed or replaced for the following reasons:
- **Production change**: change from the production of one piece to the production of another piece, different from the previous one.
- **Worn tools** and blade detected by the operator or toolmaker or by the CNC tool's wear program.
- **Broken tools**. Detected by the operator or toolmaker or by the CNC tools' wear program.

The procedures for the replacement of the tool in the spindle of unit U2.2 is the following:

On the control PC, after having brought the machine to Home position, access to the procedure of tool change enabling by selecting the icon "Tools".

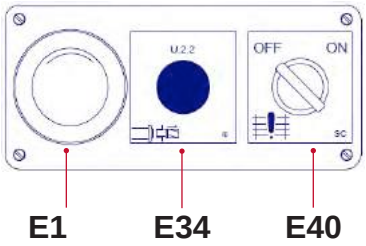
- Turn the selector **E40** and open the door
- Press button **E34** and wait for axis z to be positioned at the dimension for the removal of the tool (all backwards)
- remove the tool and insert a new one, if necessary
- release button **E34**
- Close the door to carry out a new selection, if necessary.

The same procedure for the replacement of the tools of units U6.2, U6.4 and U7.0, but using the selector **E33** in order to select the desired unit and the button **E34** for the axis movement.

N.B. You can carry out only a tool change at time.

The tool is hot and sharp; provide suitable protection means before the removal (gloves, glasses, shoes, etc.)

In order to end the operation of rapid tool change, it is necessary to carry out the zero setting and then the machine will be ready for production.



8

8 - MAINTENANCE

GENERALITIES

Maintenance and lubrication operations have to be carried out by skilled personnel, charged of this service.
IThe personnel must respect the following prescriptions:
- Maintenance and lubrication operations have to be carried out with machine standstill and without voltage, except for different indication;
- quantities and/or types of oil must correspond to the suggested ones;
- never mix oils of different quality or make;

- For cleaning, DO NOT use filamentous clothes or products which could contaminate the fluids or alterate their specifications;

- Do not carry out precarious repairs, and use original spare parts exclusively;

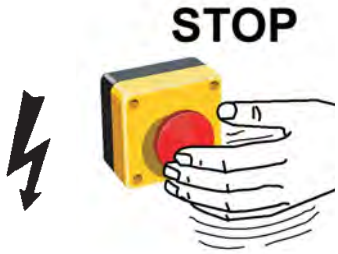
- always use the protection clothing (gloves, overalls, shoes, etc...).

Please remember that the machine can cause damages also when it is standstill: **Inevitably, maintenance operator can knock machine corners (carefully read the chapter ANTI-ACCIDENT).**
- maintenance operator must immediately signal whatever irregularity: dripping, scoring, etc...;

DO NOT permit the use of the machine in case of malfunctions of every kind and provide to restore the normal machine conditions (or be sure that this will be made).

- *PORTA SOLUTIONS S.p.A.* refuses all responsibilities if the correct maintenange cycles are not respected as indicated in this manual and in the attached documentation, or if maintenance operations are committed to unprofessional personnel, or if procedures or unsuitable lubricants (with specifications incompatible with those indicated in the documentation) are used.

Please remember that hydraulic oil, greases and lubricants may be dangerous (see the chapter ACCIDENT PREVENTION).



ROUTINE MAINTENANCE

MACHINE

MAINTENANCE DESCRIPTION AND INSPECTIONS	SYMBOLS AND INTERVALS
- **Every day** provide to clean work environment; signal possible detected leakages or irregularities. Especially clean technical and anti-accident labels as well as signalling devices installed by the Customer.	 **24 h**
- **Every day** visually check all safety devices.	 **24 h**
- **Every month** provide to check the operation of all safety systems: doors opening, intervention of photoelectric barriers, floats, levels, etc.	 **200 h**
 *- By consulting the attached documentation, provide to carry out the suggested maintenance interventions for parts, accessories and/or fictures supplied by third parties.*	
 - Provide to a complete and accurate revision of the whole machine. Please consult the manufacturer or its customer service centers.	 **12000 h**

ELECTRIC EQUIPMENT

- **Every six months** check integrity and operation of buttons and switches, as well as the integrity, operation and excitation distance of all sensors, microswitches and photoelectric cells.

1000 h

- **Every day,** at the end of the last shift, check the efficiency of all safety devices and of the power switch on the main electric cabinet, and also of the power switch installed by the Customer.

24 h

- **Every six months** check the tightening of the screws on the remote control switches, which carry out many intervention cycles; check service temperature and the operation of motors and transformers; check the calibration of thermal valves; check integrity of feed cables and gaiters; check fastening of cable terminals, of terminal boards, of contactors, etc. and/or possible oxidations.

1000 h

- **Every day**, or when necessary, provide to clean the instrumentation.

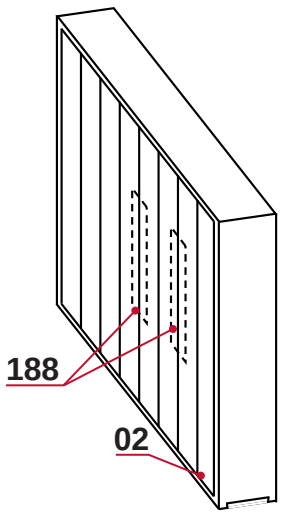
24 h

- **Every year** check integrity of feed cables and gaiters; check fastening of cable terminals, of terminal boards, of contactors, etc. and/or possible oxidations

2000 h

1000 h

- **Every six months**, check that both the devices and the conditioners **188** condensate discharge pipes on the doors of the electrical cabinet **02** are not clogged.

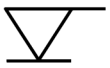


HYDRAULIC EQUIPMENT

One of the most efficient diagnosis for hydraulic equipments is to pay attention to the noise generated during the operation and to the service tenperature (which does not pass over 60° C (THERMOSTAT CALIBRATION). When 60°÷ 65° Celsius degrees are reached, the machine stops. In any case it is appropriate to carry out the following operations.
During the functioning the oil has to be checked and changed at intervals which depend on the type of oil, quantity and conditions of machine functioning. Recurrent withdrawals and relative analysis of samples carried out with the oil supplier allow to follow the behaviour of the fluid and to consider when it has to be changed (*for the table unit see chapter filling of tank and system*)

Hydraulic units

Check daily the oil level in the general hydraulic unit **03** and in the table hydraulic unit **200**, top up if necessary with the correct oil (see *"Table of lubricants and maintenance interventions"*).



24 h

- **Every year**, or more frequently if necessary, change all the hydraulic oil (see *"Table of lubricants and maintenance interventions"*). In this case actuate the procedure HYDRAULIC EQUIPMENT START UP.
Introduce filtered oil at 10 micron only.

2000 h

- **Every year,** or when signaled by the obstruction indicators of submerged filters, change or clean the filters. In case of replacement, employ with high filtering efficacy.(ß).

2000 h

- Check calibration value of safety valves, of reducing valves, of nonreturn valves, etc., as indicated on the hydraulic drawing; also check the efficiency of pressure gauges for service pressure measuring (see *"Table of calibrations"*).
.

1000 h

- Check that there are no leakages from pipings and connections. Tighten the nuts and if leakage does not stop, change the connection or the gasket (if any).

24 h

- **Every month** check possible overheating of the oil exceeding the suggested service temperature, max. 60°÷ 65°C.

200h

- **Every year** remove the accumulator **14** for a check and a new calibration (see *"Table of calibrations"*).

2000 h

HYDRAULIC EQUIPMENT START UP

When the hydraulic oil is changed and hydraulic equipment is empty, a special procedure for equipment start up must be followed; here under a synthetic description.

The operations described hereunder have to be carried out by skilled and authorized personnel.

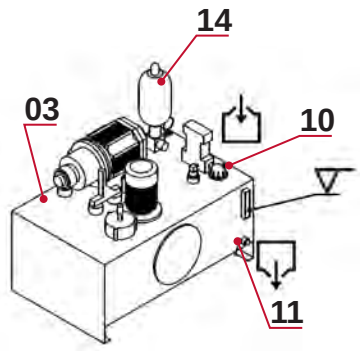
At first start up or when changing all the oil in the hydraulic control unit **03** it is necessary:

- to empty the reservoir (it is already empty in case of first start up) through an oil drain tap **11**.

- to carefully clean by means of an outside pump to eliminate deposits or residuas.

Pay attention because when the pump runs without oil it may seize.

- fill the reservoir through the oil inlet plug **10** equipped with suitable filter, and check the level. It is compulsory to introduce only filtered oil at 10 micron.
(Important for the unit of the table see chapter filling of tanks and systems)



- reduce the pressure on the valves at the minimum value and open all them.

start the motor in impulse mode to load the pumps without seizing them (a loaded pump produces no noise).

- start the motor in continuous mode and go on with pressure adjustments according to the using points (see *"Table of calibrations"*).

- check that oil does not go under the minimum level; if necessary, top it up.

- provide to the bleeding of the higher parts of the equipment paying attention not to bleed the cylinders under pressure.

- The **hydraulic solenoid valves** are capable of operating for millions of cycles.

They are fit on a base to make their removing and installation easy and quick.

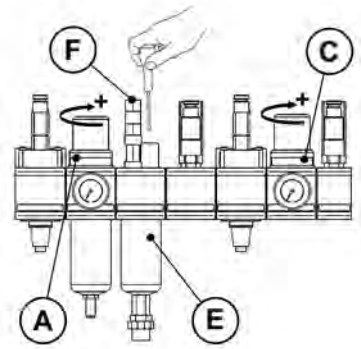
That is why it is very useful to keep on stock a complete set of solenoid valves for a turnover of those installed on the machine (which have to be reconditioned).

Reconditioning consists in checking that there are no oil dripping in all operation conditions, (energized or de-energized valve). In case of dripping, replace all the gaskets.

PNEUMATIC SYSTEM

- **Every month**, check the pressure on the gauges of the compressed air treatment unit **13** against the '*Settings table'.*
Use knob **A** to adjust the pressure of main compressed-air supply.
Use knob **C** to adjust the pressurization system pressure of the coolant. Read the pressure on the gauges underneath.

200 h



- **Every month**, check that there is coolant (see *'Maintenance Coolant Table'*) in the container (**E**). The oil is topped up automatically. Check the frequency of drops (1 every 2 minutes) through the transparent cap (**F**). Use a screwdriver to turn the screw to adjust the frequency of drops.

200 h

- **Every year**, clean the transparent containers with soap and water (WARNING: do not use alcohol, diluents or acetone as they could damage them).

2000 h

- Every year, clean or replace the filter cartridge.

2000 h

- Every day, check for leaks or losses.

24 h

Pneumatic solenoid valves
The pneumatic solenoid valves can run for many millions of strokes.
Installing them on a base makes dismantling and assembly very fast and simple.

It is therefore a good idea to keep a complete set of solenoid valves handy that can replace the ones removed from the machine for servicing.

Servicing consists of checking that there are no oil leaks during operations (excited or de-excited valve). If the valves leak, replace the entire set of seals.

CENTRALIZED LUBRICATION SYSTEM

The machine can be equipped with a central lubrication control unit **09** feeding, further to the more delicate devices, also the pressurization system. The unit contains about 15 liters of oil for guideways.

The pressurization system purpose is to avoid the infiltration of dust, chips and coolant into the internal parts of the machine components being subject to this risk, especially the rotary table **16**. The pressurization is obtained through the compressed air treatment unit **13**

- **Every month** check if there is lubricant (see *"Table of lubricants and maintenance interventions"*) and top it up if necessary.

- **Every month** check the compressed air treatment unit **13** and adjust the pressure of the pressurization system (consult PNEUMATIC EQUIPMENT and the *"Table of calibrations"*).

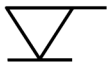
- **Every day** check if there are dripping or blow-up.

- **Every month** check the level of the lubricant into the lubrication control unit **09** and into the oil recovery tank **33**.
The oil contained in the lubrication unit is disposable so it is necessary to continuously top it up, whilst recovery unit has to be periodically emptied according with the laws of the Country where the machine is installed.

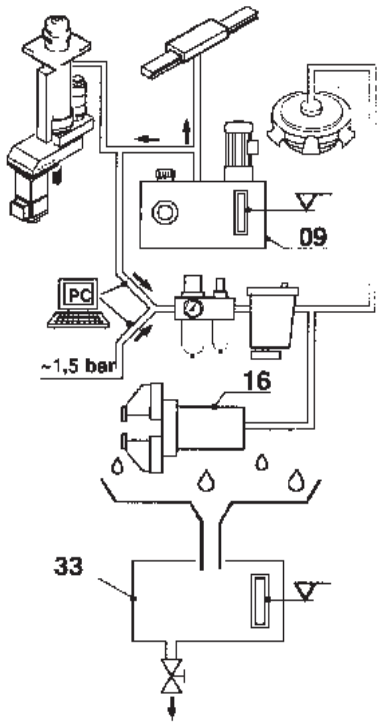
200 h

200 h

24 h



200 h

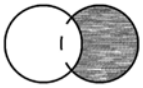


COOLANT SYSTEM

The mixture for the coolant tank must be set by the Customer to suit machining and material requirements.
Porta Solutions S.p.A. recommends to use an original BLASER fluid that has been emulsified with 10% water (see *'Lubricant and Maintenance Table.*
In addition it is recommended to use additives in order to avoid the forming of foam.

The compatibility of the coolant and the lubrication oil must be checked in order to ensure that the coolant keeps its properties.

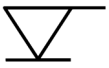
- **Every month**, check the mixture to ensure that it is sufficiently concentrated to protect against corrosion and that the concentration is appropriate to the intensity of the tasks performed by the machine in order not to waste coolant by supplying it in too concentrated a form.



200 h

- Measure pH with litmus paper to measure the pH alkalinity value, which should always be between 8 and 9.
Values below 8 = rust, unpleasant smells, instability.
Values above 9 = foam, alkaline corrosion of the aluminum and aluminum alloys, corrosion of machines and injury to skin.

- **Every day**, check the level of coolant in the tank to top up loss through evaporation and adhesion to swarf and machined workpieces. Top up the level regularly with a previously emulsified mixture of the appropriate concentration.
In order to regularly change the coolant and clean the tank remove one or more of the removable pieces of metal sheeting. Then use a pump or vacuum cleaner.



24 h

- Remove all the old coolant through aspiration.

- Collect all the microswarf from the bottom.

- Fill the tank with the correct level of coolant.

- Replace the sheeting that was previously removed.

N.B. The emulsion must be checked by refractometers.
It is NOT sufficient to mix oil and water. It must be emulsified in the manner prescribed by the supplier of the product.
After emulsion the drop of water (the vehicle) must be covered by minute drops of oil (pulverized).
Emulsified products should not be stored at high or low temperatures because they easily deteriorate and thus adversely affect machining and tool durability.

Make sure that the acquired product does not contain antioxidant nitrites or other substances that are harmful to the health of the operator. Dispose of products in compliance with legal requirements.

- **Every six months**, clean the pipes, tanks and filters.

- **Every month**, check that the chains of the swarf conveyor belt **27** are correctly tightened; also verify the motor absorption.

- **Yearly** lubricate the conveyor belt transmission chain, by using some grease .

1000 h

200 h

2000 h

CALIBRATION OF THE PRESSURIZED DEVICES

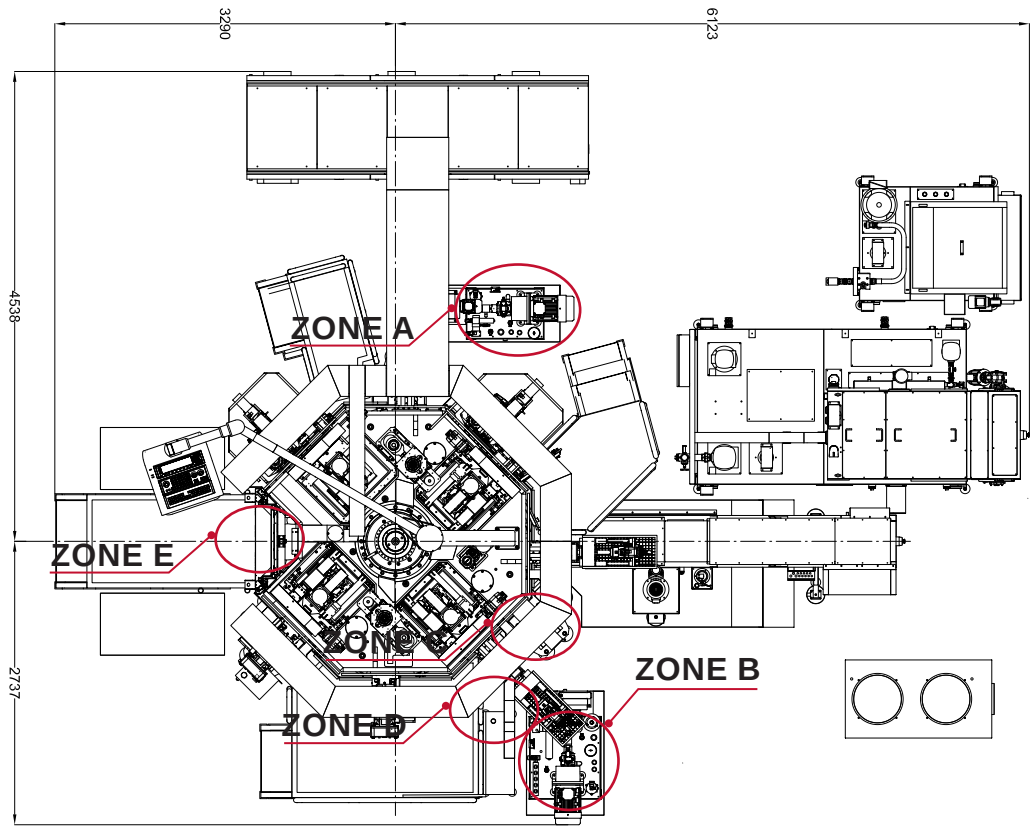
The pressure gauges are normally protected by a needle valve; to read the pressure value of the various groups let the pressure stabilize, provide to possible calibrations and close the valve.

Calibrations must be executed by skilled personnel consulting the attached drawings.

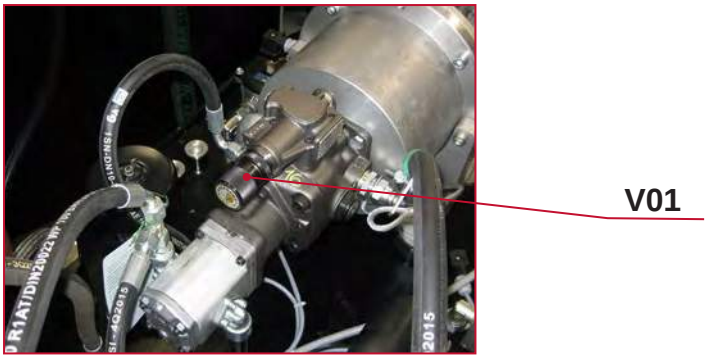
The following drawing illustrates the areas where the various flow control valves are located; actual values can be found on the table of calibrations and/or on the attached drawings.
Some calibrations have to be carried out also when changing the workpiece: experience will give the best suggestions.
Calibrations must be checked at least **every month**.

200 h

CALIBRATION DEVICES LOCATED ON THE MACHINE

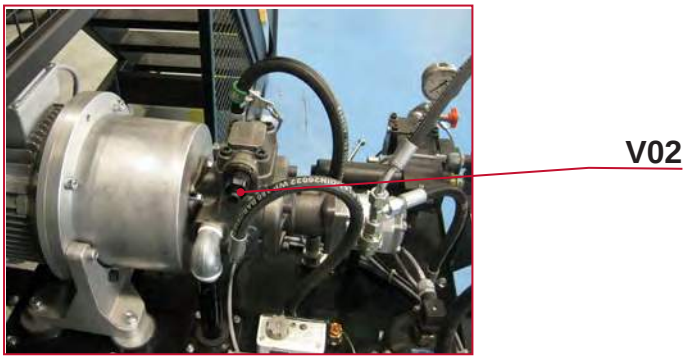


Zone “A” – main hydraulic unit (V01)



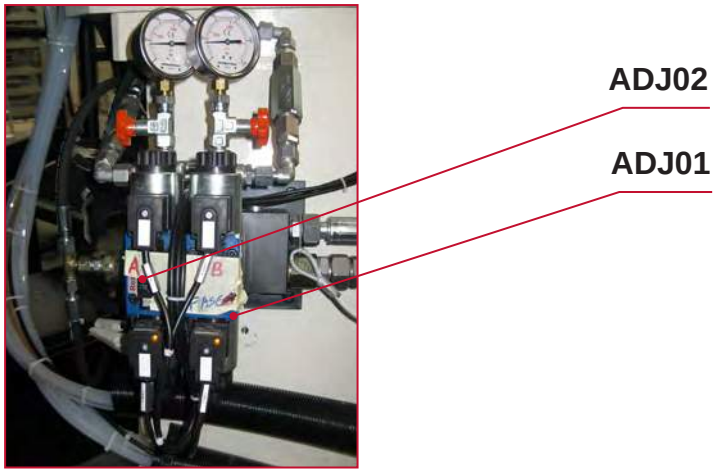
V01
Description: regulating pressure screw of main hydraulic unit
Scheme: hydraulic (code 301207)
Calibration value: 130 bar (max 150 bar)

Zone “B” table hydraulic unit (V02)



V02
Description: regulating pressure valve of table hydraulic unit
Scheme: hydraulic (code 3012907)
Calibration value: 210 bar (max.250 bar)

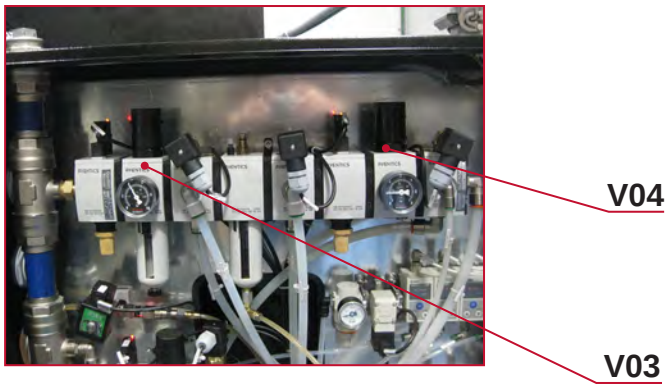
Zone “C” (ADJ01 - ADJ02)



ADJ01 - ADJ02

Description: regulating pressure and flow valves for closing of part clamping chucks
Scheme: hydraulic (code 3012907)

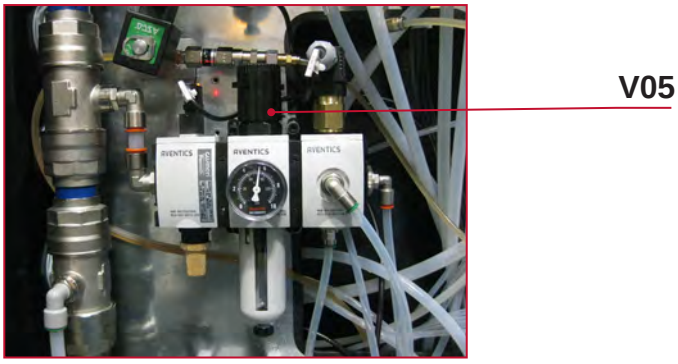
Zone “D” (V03- V04)



V03 - V04

Description: regulating pressure valves of machine main system
Scheme: Pneumatic (code 3012910)
V03 - Calibration value: 5bar
V04 - Calibration value: 1÷1,5 bar

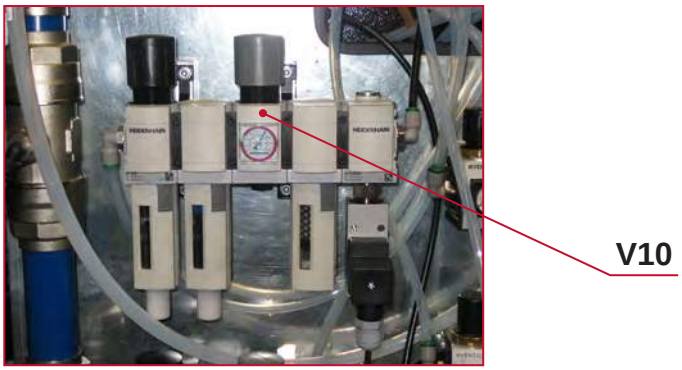
Zone “D” (V05)



V05

Description: regulating pressure valve for pressurization system of unit labyrinths
Scheme: Pneumatic (code 3012910)
Calibration value: P1=5bar

Zone “D” (V10)



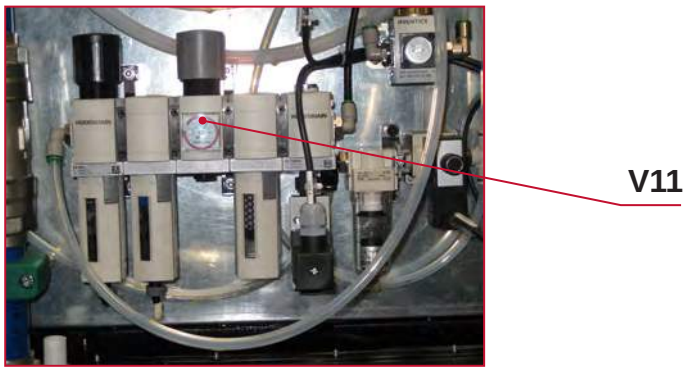
V10

Description: regulating pressure valve for pressurization of linear scales of unit 1.2 - 3.2 - 5-2 - 7.2
Scheme: Pneumatic (code 3012910)
Calibration value: 2,5 bar

Zone “D” (V06)

V06
Description: regulating pressure valve for pressurization system of unit labyrinths 1.2 - 3.2 - 4.2 - 5.2 - 7.2
Scheme: Pneumatic (code 3012910)
Calibration value: P1=2 bar

Zone “D” (V11)

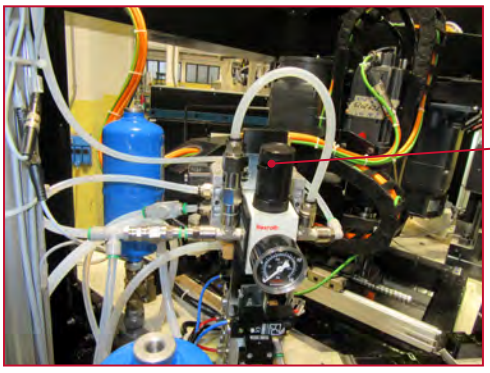


V11
Description: regulating pressure valve for pressurization of linear scales of unit 1.0 - 1.4 - 3.0 - 3.4
Scheme: Pneumatic (code 3012910)
Calibration value: 2,6 bar

Zone “D” (V07)

V07
Description: regulating pressure valve for pressurization of unit labyrinths 1.4 - 3.4 - 6.4
Scheme: Pneumatic (code 3012910)
Calibration value: 2 bar

Zona “E” (V12)



V12
Descriptione: reducing pressure valve for front safety guard closing
Scheme: Pneumatic (cod. 3012910)
Calibration value: 2 bar

MANUAL LUBRICATION TABLE

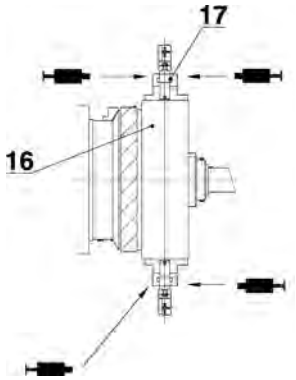
The rotary table **16** has pressurized internal parts and is controlled by the CENTRALIZED LUBRICATION SYSTEM. This system prevents the entry of foreign bodies.

Lubricate these points **each year:**

2000 h

- the two opposite grease nipples (one on each side) on each vise **17** fitted to the machine.

N.B. If the machine is subject to heavy duty these points should be lubricated more frequently.



*While the machine is not in use because it is being lubricated, clean **each year** the accessible parts of the vise and clamps by means of a low-pressure jet of water or coolant, brushes and rags.*

2000 h

MANUAL LUBRICATION OF UNITS

The stations can be equipped with different types of units and can be laid out differently from the manner described below.
In order to identify the position of the unit on the machine see the *'Machine Composition Table'* in chapter 2 - SPECIFICATIONS

The same unit may be located in several different places on the machine.

Some parts of the units need to be lubricated manually through the grease nipples or directly by means of a brush.

For the lubricants, see *'Lubricants and Maintenance Table'.*

UNIT 110 LUBRICATION

The maintenance operations have to be be carried out with machine standstill, by respecting the indicated times and the general maintenance directions.
It is absolutely forbidden to permanently remove the protection devices or part of them.

If the technician who carries out the operations is NOT one of our technicians, the personnel authorised by the Customer must be specialised and skilled to perfom this kind of operations; he must moreover have attained a specific training course on machines of this type.

Attention!! Any kind of operation must be performed by specialised personnel

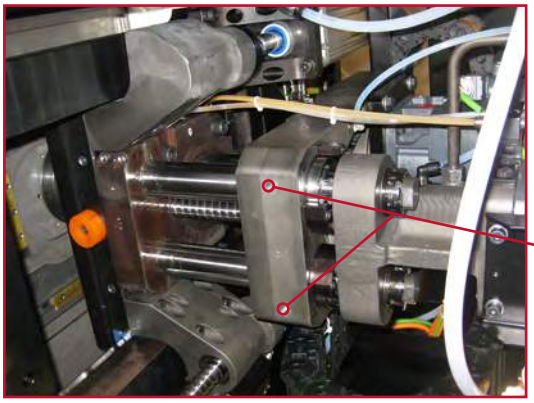
Grease the areas shown in the pictures by using a paintbrush *(see chapter "Lubricant and Symbols")*.

1000 h

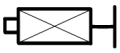
ATTENTION: *A very dusty environment could seriously damage scrapers, fans, filters and other parts of the machine. Carry out the cleaning and maintenance operations more frequently.*

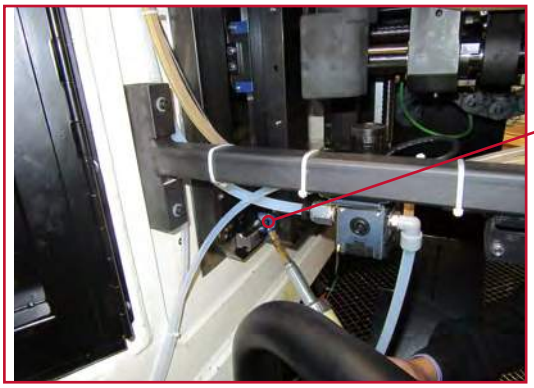
UNIT FMU 90 LUBRICATION

Introduce grease in the greaser (see chapter lubricants and symbols).

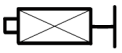


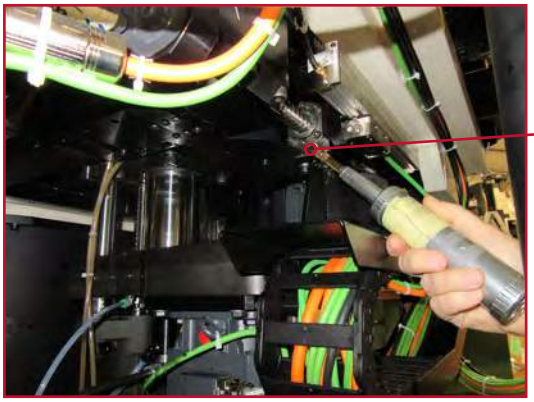
1000 h



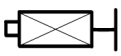


1000 h





1000 h



DISTRIBUTOR SUPPORT LUBRICATION

Introduce some grease *(see chapter "Lubricant and Symbols")* into the proper nozzle **A**.

1000 h

ATTENTION: *A very dusty environment could seriously damage scrapers, fans, filters and other parts of the machine. Carry out the cleaning and maintenance operations more frequently.*

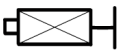
UNIT LUBRICATION + X-Y AXIS

The maintenance operations have to be be carried out with machine standstill, by respecting the indicated times and the general maintenance directions.
It is absolutely forbidden to permanently remove the protection devices or part of them.

If the technician who carries out the operations is NOT one of our technicians, the personnel authorised by the Customer must be specialised and skilled to perfom this kind of operations; he must moreover have attained a specific training course on machines of this type.

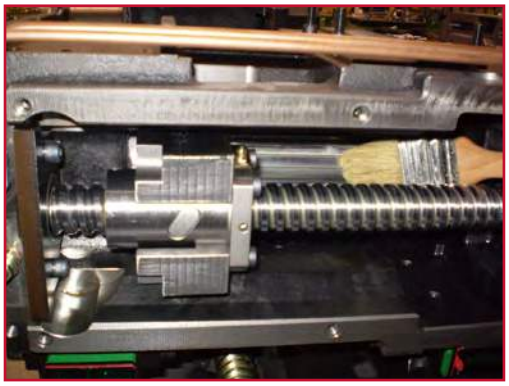
Attention!! Any kind of operation must be performed by specialised personnel

1000 h



LUBRICATION OF THE CONTROL LEADSCREWS

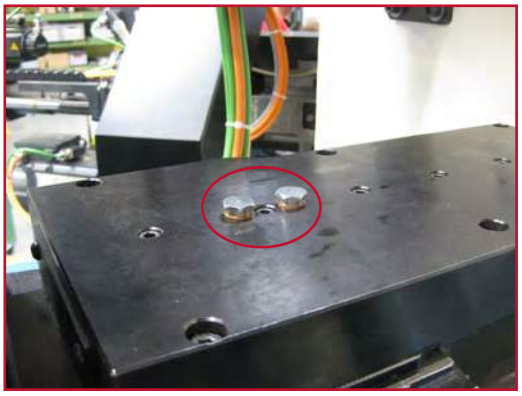
Axis Z, with the portable teach pendant position the greasing point of the leadscrew (Picture **A**).



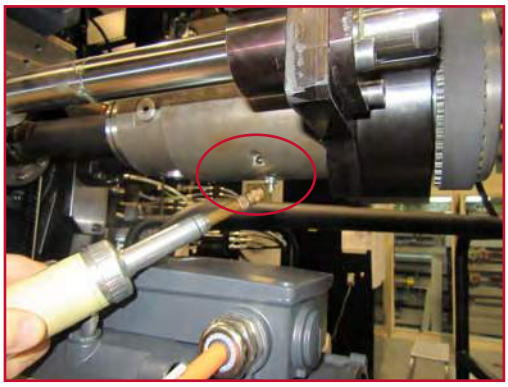
PICTURE A

Through the pump greasing lubricate with **RHEOLUBE 368 AX-1 (NYE LUBRIFICANTS**), so get the axis to do some strokes with slow speed in order to uniform the lubricant.

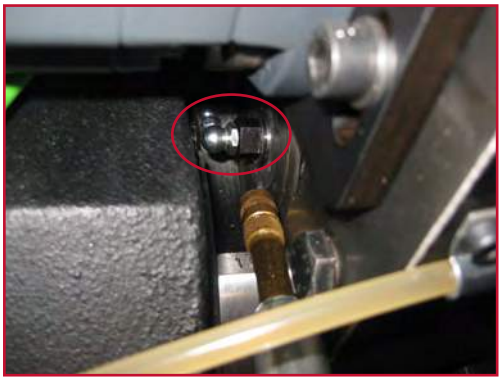
1000 h



PICTURE B



PICTURE C



PICTURE D

With the portable teach pendant position the greasing point of the leadscrew of the axis in order to help the clutch of the greaser (Picture **D**)

SCHEDULED MAINTENANCE

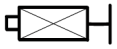
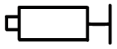
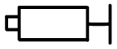
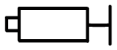
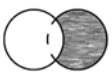
Planned maintenence schedule

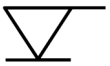
OPERATION DESCRIPTION	FREQUENCY OPERATION
- Clean work environment, namely labels and signals - Check all safety devices - Check the power switch ON/OFF on the electrical cabinet **02** - Clean the instrumentation: Control PC,two-hand control switches **39**, portable control panel **48** - Check oil level in the hydraulic control unit **03** - Check the level in the coolant tank - Check that there is no blow-by from hydraulic system - Check that there is no blow-by from pneumatic system - Check that there is no blow-by from coolant system - Check that there is no blow-by from lubrication system	**24 h**
- Clean every week the radiant grid of the air/oil exchanger on the hydraulic control unit (where present)	**50 h**
- Check the intervention of safety devices - Check possible blow-by on the unit heads equipped with pusher - Check possible overheating of hydraulic oil - Carefully clean tools, plugs or templates - Check possible overheating of hydraulic oil and the operation of heat exchanger **34** (if any) - Check pressure values on the two compressed air groups - Check if there is lubricant on the compressed air treatment unit **13** - Check oil level in the lubrication control unit **09** and in the oil recovery tank **33** - Check the concentration and the quality of the coolant in the coolant tank - Clean each spindle and the reachable parts of the rotary table **16** as well as each vise **17** - Check chain stratch of the swarf conveyor belt	**200 h**

OPERATION DESCRIPTION	FREQUENCY OPERATION
- Lubricate FMU unit (Z axis) - Lubricate axes X-Y (if present) - Check operation of push buttons, switches, microswitches, photoelectric cells, etc. - Tighten the screw for cable fixing on remote switches and terminals - Check service temperature of motors, transformers, etc. - Check possible oxidation of electric cable ducts - Check the calibration of pressurized systems (see *"Table of calibration"*) - Lubricate the points equipped with oilers - Grease, through the suitable oilers, the flanges of the central distribution pipe of the table - Clean coolant tank , ducts and filters	**1000 h**
- Clean the base and all inside parts of the machine - Check the integrity of the feeding cables and the protection sheats - Lubricate the transmission chain of the swarf conveyor belt - Replace the oil in the hydraulic control unit **03*** - Replace the filter immersed in the hydraulic control unit **03*** - Dismount, check and re-calibrate the accumulator **14** - Clean the transparent cups of the compressed air treatment unit **13** - Replace the filtering elements of the compressed air treatment unit **13** - Carefully clean the accessible parts of each clamping fixture - Verificare l'integrità e lo stato di usura delle piattaforme e delle scale (controllare se ci sono evidenti segni di usura o danneggiamento) ***Important:** introduce filtered oil only into the unit (according to ISO 4406<13/10). At replacement of the two filters, it is recommended to emply exclusively items PORTA code 6110756-6110757, which have high filtering efficacy (ß).	**2000 h**
 - *Overhaul the whole machine completely and carefully*	**12000 h**

LUBRICANTS AND SYMBOLS

Table of lubrificants and maintenance interventios

DESCRIPTION	LUBRICANT	STAN-DARDS UNI 7164 ISO 3498	SYMBOL DIN30600 ISO 7000	SYMBOL ICON
GREASE Synthetic multipurpose	**RHEOLUBE 368 AX-1 NYE LUBRIFICANTS**			
GREASE Antigripping Splined shaft	**DIAMOND GREASE 1010**			
GREASE Ballscrew lubrication	**RHEOLUBE 368 AX-1 NYE LUBRIFICANTS**			
GREASE Linear guide lubrication	**RHEOLUBE 368 AX-1 NYE LUBRIFICANTS**			
GREASE Bearing lubrication	**RHEOLUBE 363 AX-1 NYE LUBRIFICANTS**			
OIL Idraulic	**MOBIL OIL DTE 25 SHELL TELLUS 46**	**HM46**		
OIL Lubrication	**MOBIL VACTRA 2 SHELL TONNA T68**	**G68**		
OIL Coolant	**BLASER BLASCUT 2000UNIVERSAL**			
OIL satellite table lubrication, angular driving gear, tool magazine	**MOBILGEAR 600 X P 150**			
CLEANING			**DIN 484 ISO 423**	

DESCRIPTION	LUBRICANT	STAN-DARDS UNI 7164 ISO 3498	SYMBOL DIN30600 ISO 7000	SYMBOL ICON
LEVEL CHECKING			**DIN 691 ISO 159**	
CHECK POSSIBLE DRIP OR BLOW UP			**DIN 257 ISO 29**	
CHECK THE FILTERS			**DIN 668 ISO 114**	
GENERAL INSPECTION FOR POSSIBLE MALFUNCTIONS			**DIN 1279 ISO 421**	
ACCUMULATORS			**ISO 870**	
GENERIC DANGER			**DIN 1008 ISO 434**	
LOCTITE Use Loctite liquid to fix screws, nuts, bolts on mechanical components which are subject to vibrations.	**IMPLEMENTATION OF SAFETY MEASURES WITH LOCTITE 243.**			
WARNING! DO NOT DAMAGE OR DESTROY ANY PART OF THIS DOCUMENT	Maintenance interventions must be carried out with machine turned off, by the authorised personnel, except of different indication **of the operating and maintenance manual, always to be consulted.**		**DIN 1667 ISO 81**	
SAFETY MEANS OR CLOTHING				

EXTENDED STOPOVER, DISMANTLING OR SCARAPPING

MACHINE STOCKING

If the machine is not used immediately at the delivery, or if it has to be stocked for long periods. check its correck packing and get in touch to ***PORTA SOLUTIONS S.p.A.*** for the preservation instructions.

It is understood that the machine must be stocked in a closed, well ventilated environment suitable to protect its components, namely the electronic ones, against possible damages.

Protect the unpainted parts with suitable greases or spray products against corrosion; if necessary, stock the machine with dehydrating salts.

However, after long periods of inactivity, the machine requires special checkings and inspections which cannot be described in this manual: if necessary ask for technical assitance from ***PORTA SOLUTIONS S.p.A.***.

Hydraulic system
In case of long stopover of the machine take the following precautions:
No precaution for a short stopover (less than two months).
In case of long stopover it could be useful to activate the system, without pressure, for a few minutes and at regular intervals, to ensure the lubrication.
Cylinder stems must be in backward position or covered with anti corrosion products.
Before restarting after a long stopover check the quality of the fluid in the hydraulic control unit **03** and if necessary change it with new lubricant (See HYDRAULIC SYSTEM START-UP).

Coolant system
Coolant tank and all the equipment must be empty even for short stopover (1 month) because the mixture, consisting of water above all, evaporates rapidly.
For very long stopover it should be better to make the system run 5/10 minutes with an oil compatible with the mixture used. Before the new start-up that oil must be removed.

MACHINE DISASSEMBLY, DISMANTLING OR SCRAPPING

If the machine has to be dismantled, to dispose the products being part of it. The laws in force in the Country of destination have to be respected; anyway, take the maximum care to avoid whatever kind of contamination or pollution.
- Disconnect all the electric, hydraulic, pneumatic feeding lines.
- Completely empty the pneumatic, hydraulic and coolant reservoirs and the circuits .
- Discharge the pressurized systems to make them harmless.
- Discharge possible voltage accumulations and/or electrostatic charge or residual energy.
- Clean the machine removing possible chips and/or lubricants, paper, cellophane, PP, LDPE, HDPE, PVC, etc.

- The various materials must be disposed in suitable dump areas:

N.B. PORTA SOLUTIONS S.p.A. *refuses all responsibility for possible damages to the environment and for the procedures used to dispose the products: parts of the machine, lubricants, coolants and whatever has to be disposed according to the law.*

Table of product disposal

MACHINE PART	MATERIAL
Buffer battery	Nickel/Lithium/Lead/Acids
PC Monitor	Glass/Copper/Gas under pressure
Frame	Welded steel FE37
Case	Steel /Painted plate/Polycarbonate
Paint	RAL
Motors	Steel /Cast iron/Copper
Reducers	Steel /Cast iron
V Pulleys	Aluminium/Cast iron/Stee
Toothed pulleys	Aluminium/Cast iron/Stee
Belts	Rubber+teflon/Polyurethan
Chains	Steel
Pinions	Cast iron/Steel
Bronze bushes	Bronze/Brass
Supports	Cast iron/Steel /FE52
Bearings	Steel
Gaskets	Rubber/teflon/Viton/Vulkolan/Kevlar
Electric cabinet	Plate/FE37
Cavi elettrici	Copper/Rubber
Hoses (low pressure)	Nylon
Hoses (high pressure)	Steel /Rubber
Resistors	Copper/Steel /Ceramic
Printed boards	Copper/Tin/Acids/Resins
Lamps	Glass/Gas mixtures
Antifriction	Teflon / Silicone

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9 - LIST OF ATTACHMENTS

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The Customer must be sure to receive, together with the manual, also the following attachments:

- Declaration of conformity

- Machine plant view
(code 0001202)

- Plant view of the electrical cabin and disposition of the components (code 2011202)

- Electrical plans EL1202

- Hydraulic plan
(code 3012907)

- Pneumatic plan
(code 3012910)

- Lubricating plan
(code 3012909)

- Coolant plan
(code 3012895)

- Handbook for CNC programming
(code 90247MAG)

- Layout
(code 00419-LO-E)

- Spindle nose positions
(NU-1202)

- (Meta) User and maintenance handbook chip conveyor and clean the tank

- (Tosoni) Use and maintenance handbook of hydraulic unit

- (RMC) Use handbook Spindle cartridge