INSTRUCTIONS MANUAL
FOR USE
AND MAINTENANCE

FILLING CAPPING MACHINE

Model: FC1

Machine in compliance with:

DIRECTIVE 2006/42/CE (MACHINE DIRECTIVE)
DIRECTIVE 2004/108/CE (ELECTROMAGNETIC COMPATIBILITY DIRECTIVE)
DIRECTIVE 2006/95/CE (LOW VOLTAGE DIRECTIVE)

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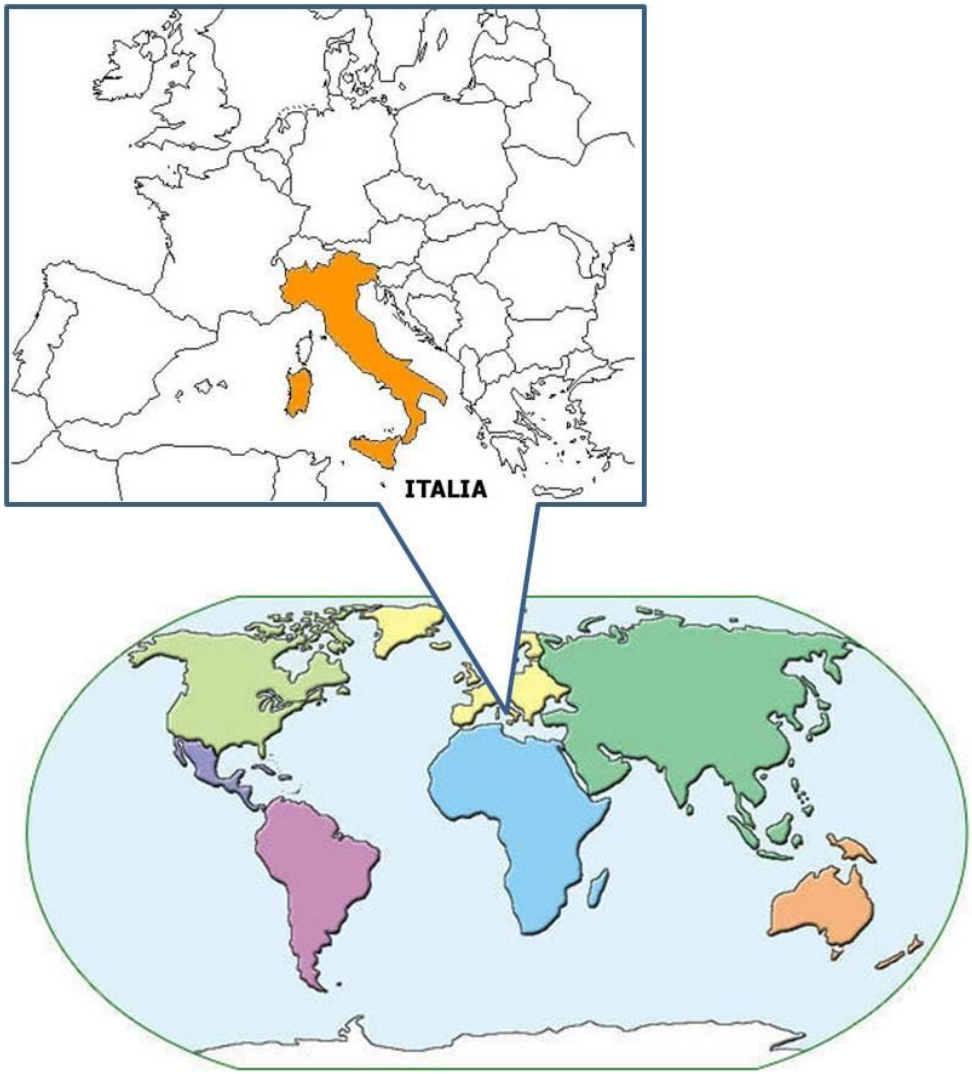

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MANUAL FOR USE AND MAINTENANCE

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1. INTRODUCTION

1.1 PRESENTATION

Thank you for choosing **TECNOMACO ITALIA**. We are happy to welcome you among our clients.
The **FC-1** Filling capping machine works with alternate movements, with the possibility of a quick change of parts.
Please read this book carefully, in it are described all mechanical and electrical parts and the regulations to follow to assure the best maintenance and conservation of the machine.
Tecnomaco is always available for its clients to give them clarifications to achieve the best performance of the machine.

Descriptions and illustrations given in this manual are not binding. Without changing the essence here described and illustrated, **TECNOMACO ITALIA** retains the right to change at any given time the parts it finds necessary, for technical betterment or for other construction or commercial demands, with no commitment to update this publication.

1.2 SAFETY REGULATION

This manual contains the necessary information for a correct use of the Filling capping machine (model **FC-1**).
To prevent risky situations for the operators and the machine, it is necessary to follow carefully the instructions in this manual. Different use of the machine than what is declared in this manual can be hazardous to the operating personnel and the machine itself.
The builder will not take responsibility for damages and accidents due to improper use of the machine or disregard of safety regulations and maintenance indications present in the manual and in the associated documentation.

1.3 WARNING

The machine was designed and constructed abiding by the maximum job safety regulations.
The machine has anti-accident protections that need to be maintained to their utmost efficiency.
The use of the machine with even only one protection removed or tampered with or not controlled correctly, automatically puts the personnel and the machine at risk.
The operator responsible for the use and maintenance of the machine must have all the necessary protections provided by the job safety regulations.
The personnel must be taught how to intervene on the machine, with indications given by the constructor through documents associated to the machine, training courses, etc.
All maintenance indications, and particularly those of periodic and preventive maintenance, will have to be closely respected to preserve the machine in its best operating state.

1.4 PREDICTED USE

The machine here described packs pharmaceutical, cosmetic and herbalist products. The installation and the correct use of the machine are those described by the constructor.
Any other use of the machine, different than that indicated by the constructor, and any other modification or disposal of any parts of the machine, nulls the responsibility of the constructor and may be a source of risk for the operator not using it correctly or third parties.

1.5 USE OF THE MANUAL

The manual is divided in chapters, the first three are dedicated to the operator and the last two are dedicated to the maintenance personnel and installers. The contents of this manual consists in synthesis of the following:

- GENERAL INFORMATIONS

Chapter contains information on the use of the manual, on the constructor, on assistance and warranty.

- DESCRIPTION OF THE MACHINE

This chapter describes the machine in its whole to better identify parts and functions. The reading and consultation of this chapter will be an essential preface for the comprehension of the subsequent chapters.

- INSTALLATION

Chapter dedicated to the operator who will need a more profound knowledge. This has detailed description of all the machine controls, their appropriate use and their effects. This chapter is an essential guide for maintenance personnel to learn the logic of the functioning of the machine. A paragraph is dedicated to the residual risks to which the maintenance personnel is subjected to and is an essential reference to the security personnel of the manufacturing plant.

- MAINTENANCE

This chapter is about the necessary maintenance of the machine and interests both the operator for the small daily and weekly maintenance and the maintenance operator for the big ordinary and extraordinary maintenance.

ATTENTION
The user is responsible of the management of this manual and of all its associated documentation and must be kept in good state throughout the life of the machine and must always be available for consultation, near the machine. It can be destroyed only at the disposal of the machine.

1.6 IDENTIFICATION OF THE MACHINE

The specifications and the technical card, present in paragraph 3-3, identify the version and the serial number of the machine that was supplied.

The serial number of the machine, which by definition identifies one and only one machine, is also available in this manual, so it is valid only for this one machine.

The machine has a nameplate, like shown on paragraph 2-5, that besides the serial number, has the model and type of machine with letters and numbers indicating the version.

2. GENERAL INFORMATION

2.1 SAFETY REGULATION

This manual has information necessary for a correct use of the Filling capping machine (model **FC-1**). The manual has all the procedures to which the technical and operative personnel must abide by for an effective and correct installation, use and maintenance of the machine, to insure the best working conditions of the personnel and the machine.

The machine was designed and constructed by **TECNOMACO ITALIA S.R.L.** in compliance to the most recent dispositions regarding safety, and particularly of the **2006/42/CE** (machine directive).

As far as the electrical parts, reference was made to the following regulations:

- 2004/108/CE directive (Electromagnetic Compatibility directive - EMC)
- 2006/95/CE directive (Low Voltage electrical equipment directive - LVD)

In particular the design was oriented on the base of the following reference points:

- Protection through mechanically fixed containment structures and delimitation of the working areas.
- Protection through containment structures and delimitation of the motion working areas (sliding or oscillating), with devices controlling their state of closure (microswitches). These microswitches supervise the functioning of the machine, interrupting the cycle when the protections (to which they are connected) are not placed correctly.
- Access to the machine related to the loading of the components, are made to satisfy the safety regulations regarding the operator's arms and legs.
- The position of the operator is clearly identified and has been thought in a way that there should be no one other than the operator/s near the machine when in function.
- Through appropriate command (JOG) to be connected into the socket on the operator panel, you can run the step by step working cycle (during set up of the machine). When the machine runs with JOG command remind that operating control devices are disconnected but safety control devices (emergency button, safety guards doors etc.) are active.

2.2 WARNINGS AND DEFINITIONS

TECNOMACO ITALIA S.R.L has carefully evaluated every interaction between machine and operator throughout the lifetime of the machine.

The operators can be divided due to their assignments and their abilities in:

Conductor / Operator:
Is the person qualified and authorized by the buyer to operate the machine through the controls on the operating panel with protections activated.

Maintenance mechanic:
Is the technician qualified and authorized by the buyer, capable of installing, repairing, and doing ordinary and extraordinary maintenance, and doing mechanical set-ups on the machine.

Electrical maintenance:
To be done by a qualified technician authorized by the buyer, who is capable to do ordinary and extraordinary maintenance and do electrical set-ups on the machine.

2.3 ASSISTANCE

The constructor gives its clients a valid technical assistance, assuring the duration and the efficiency of its own machines.
The life of the machine is tightly related to the respect of its use and the correctness with which the periodic and extraordinary maintenance are executed.

Respect the indications given in this manual means to increase the duration and the efficiency of the machine.
Interventions of extraordinary maintenance are not foreseen in this manual and must be done exclusively by highly qualified personnel with a good knowledge of the machine.

All after-sales assistance is done by the constructor.

The assistance is done accordingly directly by the constructor or by partners on site, connected to the sales net.
In the assistance requests it is necessary to specify the following:

-
- Serial number of the machine (seen on the constructor's nameplate);
- Plant where the machine is installed;
- Telephone number;
- Fax number and/or e-mail;
- Reference person;
- Detailed description of the problem;
- Functioning conditions of the machine, and how and when the problem presented or presents itself;
- Tests that have been done and their outcome;
- In case of request of spare parts, identify the parts.

2.4 MANUFACTURER'S DATA

The machine here described was designed and made by:

TECNOMACO ITALIA S.R.L.

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Cap. 04011 Aprilia (Latina)
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e-mail: *tecnomaco@tecnomaco.it*

2.5 CE CERTIFICATION

All the machines are made in compliance to "Community directive for the safety of the machines 2006/42/CE" of the European Community Market. The marking **CE** and the declaration of conformity certify to the conformity of the Communitarian regulations applicable. The safety of the machine is guaranteed only by respecting the instructions manual, by the state of efficiency and by observing the safety regulations

The constructor is exempt from responsibility of damages caused to people or things caused by inobservance of the safety regulations, and of the modifications done to the machine.

2.6 WARRANTY REGULATIONS

- DURATION.

The beginning of the warranty period coincides with the date the machine is ready for shipment.

The duration of the warranty is:

- **12 months for the mechanical parts and nonetheless not more than 14 months from the date the machine is ready for shipment**
- **12 months for the electrical and electro-mechanical components and nonetheless not more than 14 months from the date the machine is ready for shipment.**

- CONDITIONS.

Substitution of defective material is included in the warranty. Shipment and customs charges are due by the client, as well as technical intervention – if needed.
Warranty does not include substitution of parts or technical interventions for damages caused by the lack of maintenance activities foreseen in the User's Manual given with the machine.
In the same way the warranty does not cover damages caused by Client's inexperience or damages done by improper use of the machine.
Warranty does not cover damages caused by non-compliance of the specific requests for the installation and connection to electricity, gas, steam, pressurized air, water and drainage by the User's Manual and by the attachments at the order confirmation.

- WARNINGS.

When substituting parts of the machine, original spare parts must be used. Non original or non approved spare parts could have physical-chemical characteristics and dimensions not satisfying what was established during the designing phase: the use of these particular materials could create inconveniences with heavy consequences.

We advise to test the equipment before putting it in a full productive cycle.

Finally we remind you that long periods of inactivity can also be cause of deterioration to the machine, avoidable with regular maintenance.

3. DESCRIPTION OF THE MACHINE

3.1 MACHINE DESCRIPTION

The Filling capping machine **FC-1**, described in this manual, was designed and constructed to dose creams in to jars and then close them with the screw cap. The machine is apt to work in pharmaceutical environments.

It consists of a strong structure covered by stainless steel panels which contains the working stations and it is completed with two feeding groups for jars and caps.

Structure is covered by safety guards with aluminium frame and glass doors with microswitches.

3.2. WORKING CYCLE

The machine has different working groups, which all together perform the "Working cycle" briefly described as below:

- Prefeeder with hopper transfers plastic jars into unscrambler through the lifting conveyor. Unscrambler feeds jars to the rotating table;
- Rotating table, apt to receive plastic jars from unscrambler or glass jars manually loaded, feeds the jars to the infeed conveyor belt of the machine;
- Intermittent motion starwheel receives jars from conveyor belt and transports them under the filling station to be dosed;
- Prefeeder with hopper transfers plastic caps into vibrating bowl through the lifting conveyor. Plastic caps are then transferred on the conveyor belt from which a pick and place arm takes and inserts them onto jar mouth;
- Starwheel moves jars under the capping station where a screwing head, equipped with servomotor with torque control, performs the final tightening of the plastic caps.
- After the capping station a sensor detects the presence of cap on the jar mouth. Jars without cap are rejected on the dedicated conveyor belt. Regular jars are transferred on a conveyor belt to complete the packaging cycle.

The Filling capping machine **FC-1** has one control panel on board and this corresponds to the normal working position of the operator who survey the production. The control panel will be described in the chapter 7.

3.2 OPERATING FLOW AND LAY OUT

1. Prefeeder with hopper (a), lifting conveyor (b), uncscrambler (c) for plastic jars
2. Rotating table (a) for plastic and glass jars and conveyor belt (b)
3. Star wheel
4. Dosing station
5. Prefeeder with hopper (a), lifting conveyor (b), vibrating bowl (c) for plastic caps
6. Conveyor belt for caps
7. Pick & Place
8. Capping station
9. Conveyor belt for regular jars
10. Conveyor belt for faulty jars

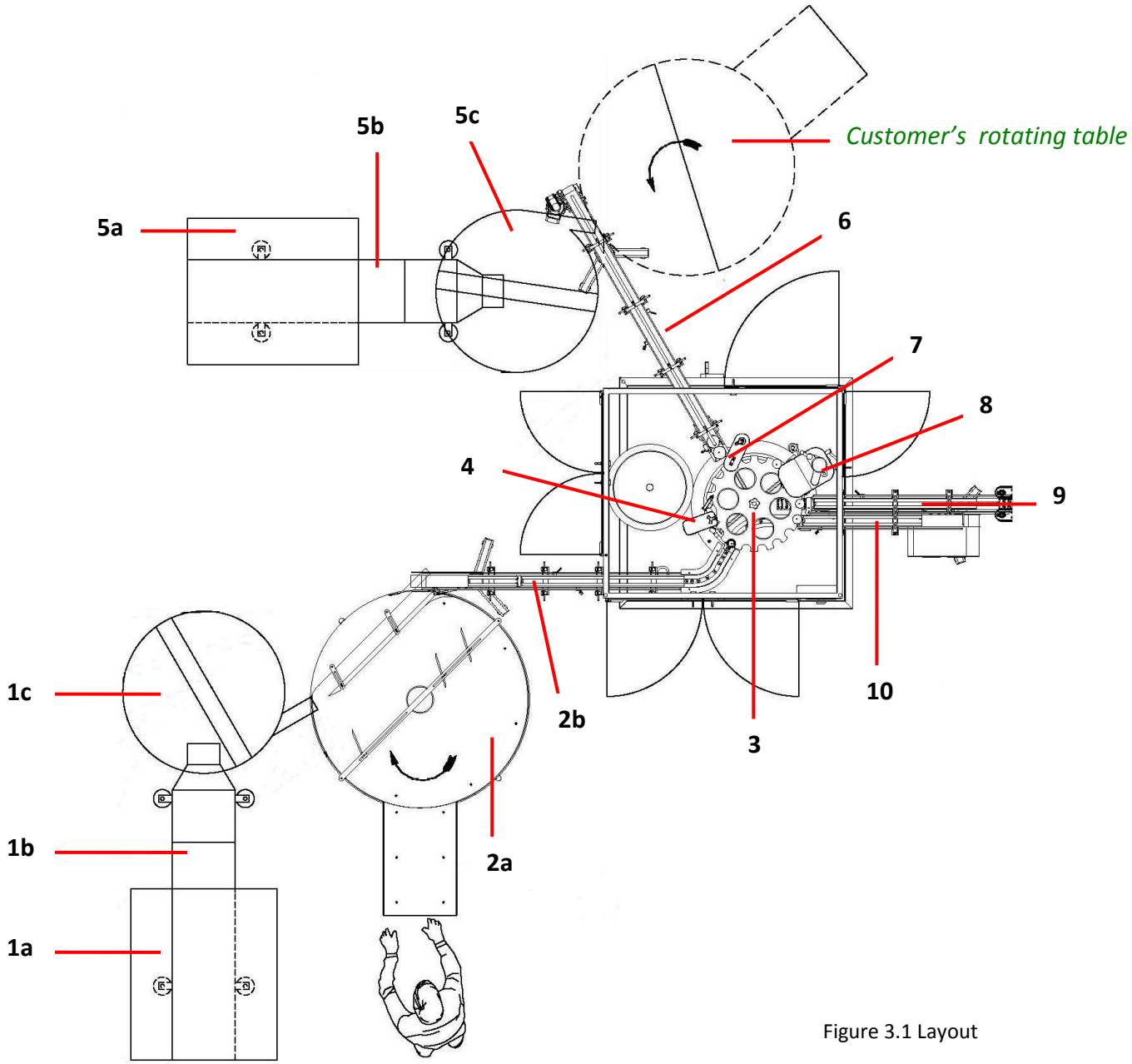

Figure 3.1 Layout

3.3 TECHNICAL DATA.

The machine is adequate to work in pharmaceutical environments. The technical characteristics of the FC-1 Filling capping machine are listed in table 3-1. The upper and lower part of the table shows respectively:

- Machine data on the identification plate;
- Functional characteristics.

CHARACTERISTICS	VALUE
Machine:	**Filling Capping Machine**
Model:	**FC-1**
Serial n°:	**1100**
TECHNICAL CHARACTERISTICS	
Product dosage	**Cream**
Capping station:	**Plastic cap**
Feeding tension:	**400 V + 3F + N + PE, 50 Hz**
Auxiliary tension:	**24 V**
Operative side:	**Front side of the machine**

Table 3.1 Technical characteristics.

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3.4 MAIN COMPONENTS

The machine shown on fig. 3-2, was designed and manufactured exclusively to dose cream into jars and then cap them with plastic caps.
The Filling capping machine (model **FC-1**), is the result of many years of experience.
The cream dosage is precise and electronically performed. The size parts change over is quick.
The design of all machine parts is made to allow an accurate and easy cleaning at the end of the working cycle.
The machine is made with the following main groups:

Legend
1. Control panel
2. Prefeeder with hopper, lifting conveyor, uncscrambler for plastic jars
3. Rotating table for plastic and glass jars
4. Conveyor belt
5. Star wheel
6. Dosing station
7. Prefeeder with hopper, lifting conveyor, vibrating bowl for plastic caps
8. Pick & Place
9. Capping station
10. Outfeed conveyor belts
11. Electrical cabinet
12. JOG command

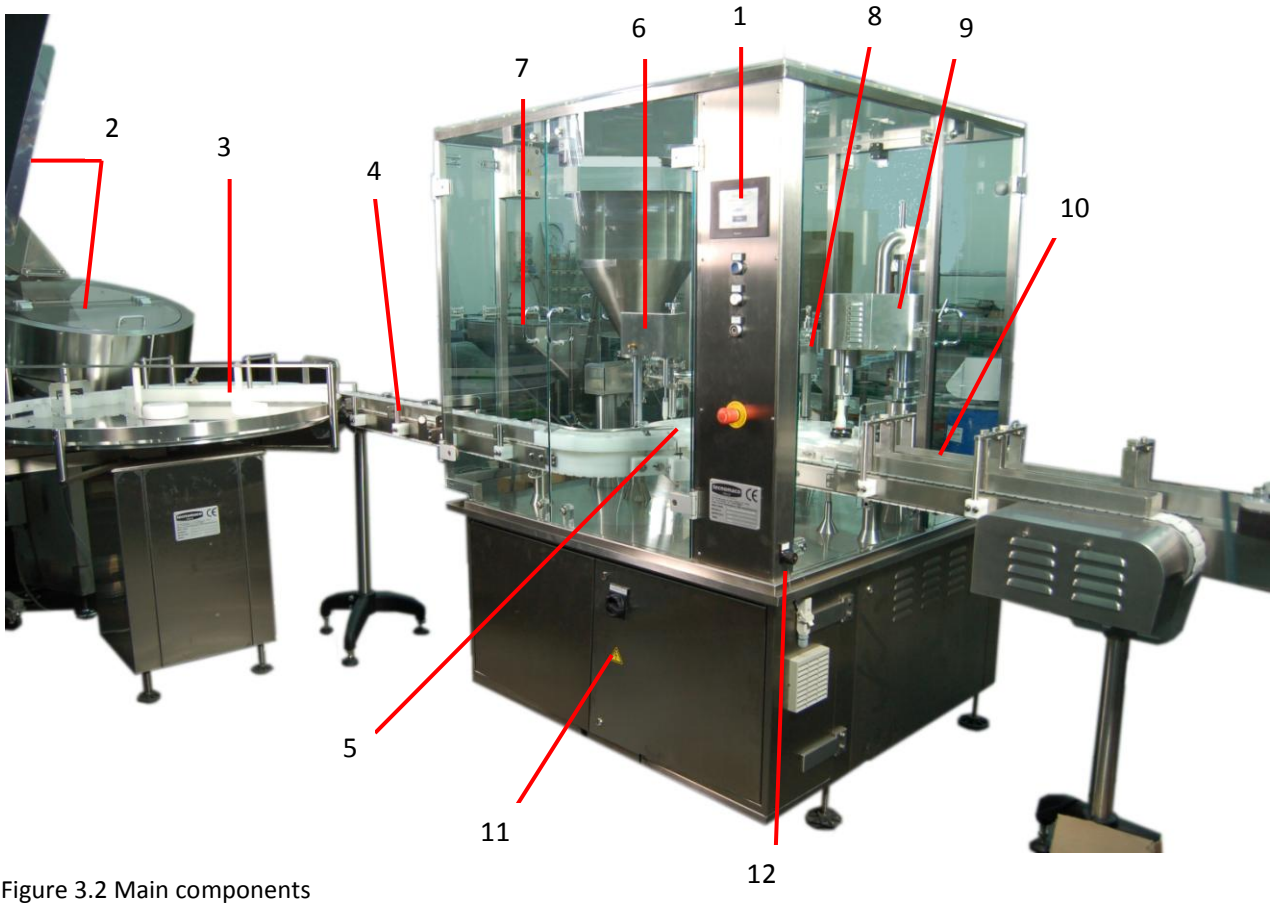


Figure 3.2 Main components

3.5 MECHANICAL SPEED.

It is possible to set on the operating panel PANASONIC GT32 the frequency of the inverters managing the machine main motor and conveyor belts (as explained in chapter 7.8)

The mechanical speed of the machine varies accordingly in a range from 20 to 50 pieces per minute.

The inverter 1 (OMRON V1000) manages the main motor of FC-1, inverter 2 (OMRON J1000) manages the conveyor belts motor, inverter 3 (OMRON J1000) manages the cap conveyor belt. They are showed below (fig. 3-3) .

For more details see attachments of this manual.

The production speed of the FC-1 machine mainly depends from the cream characteristics and volume of it to be dosed into the jars as well as from type of jars and caps the machine deals with.

Legend:
1 – Main motor inverter
2 – Conveyor belts inverter
3 – Cap conveyor belt inverter

Figure 3.3 Machine speed

3.6. FEEDING STATION FOR PLASTIC JARS

This station feeds jars to the rotating table and it's composed by:
- Prefeeder with hopper
- Lifting conveyor
- Unscrambler

3.6.1 Prefeeder with hopper

The group consists of a hopper (1 Fig. 3.4) held by a strong structure with wheels to move it easily and is equipped with antinoise hoods. The operator introduces plastic jars into hopper. A photocell detects the minimum load and a signal appear on the control panel if the set jars level inside the hopper decreases.

3.6.2 Lifting conveyor

The lifting conveyor (2 Fig.3.4) has a vertical chain with fixed buckets that lifts jars from hopper to the unscrambler. The structure is manufactured in stainless steel with plexiglass panel.

3.6.3 Unscrambler

This unit (3 Fig.3.4) has a stainless steel structure and antinoise hoods. It receives jars coming from lifting conveyor and has a proper protection inside to avoid damage to jars.
Jars are driven by a pneumatic circuit with air pressure in a tunnel and then are released on the rotating table.
A sensor detects the minimum load of jars inside the unscrambler and commands start and stop of the lifting conveyor. There is also a sensor which detects low air pressure inside the unscrambler and a sensor for unscrambler stuck.

Figure 3.4 Feeding station for plastic jars.

3.7 ROTATING TABLE

The rotating table feeds jars to the machine through conveyor belt into the star wheel.
It receives plastic jars by the unscrambler while glass jars are manually fed by operator.
The rotating table has adjustable exit guides, stainless steel structure and stainless steel glass jars loading tray. It has a proper protection inside to avoid damage to jars.
A sensor detects the maximum load of plastic caps inside the table to stop feeding from the unscrambler.

The speed is adjustable by mean of potentiometer connected to the inverter. Rotating table motor and inverter are situated inside the electric panel.

Legend:
1. Exit guides
2. Loading tray
3. Base with electric panel
4. Main switch
5. Potentiometer

Figure 3.5 Rotating table.

3.8. CONVEYOR BELT

The conveyor belt **1** takes the incoming jars to the starwheel and takes the regular filled and capped jars away from the machine. The sensor **5** detects jars minimum load on the conveyor belt.
The conveyor belt **2** receives the rejected jars and moves them into the rejection unit.
The sensor **5** detects jars minimum load.
The sensor **6** detects jars maximum load.
Conveyor belts move by means of one single motor with speed adjustable by control panel.
The frame is in stainless steel AISI 304, with lateral guides that can be regulated to adapt to the dimensions of the jar in use.

Legend:
1. Conveyor belt
2. Conveyor belt for faulty jars
3. Lateral guides
4. Stainless steel AISI 304 frame
5. Sensor for jars minimum load
6. Sensor for jars maximum load

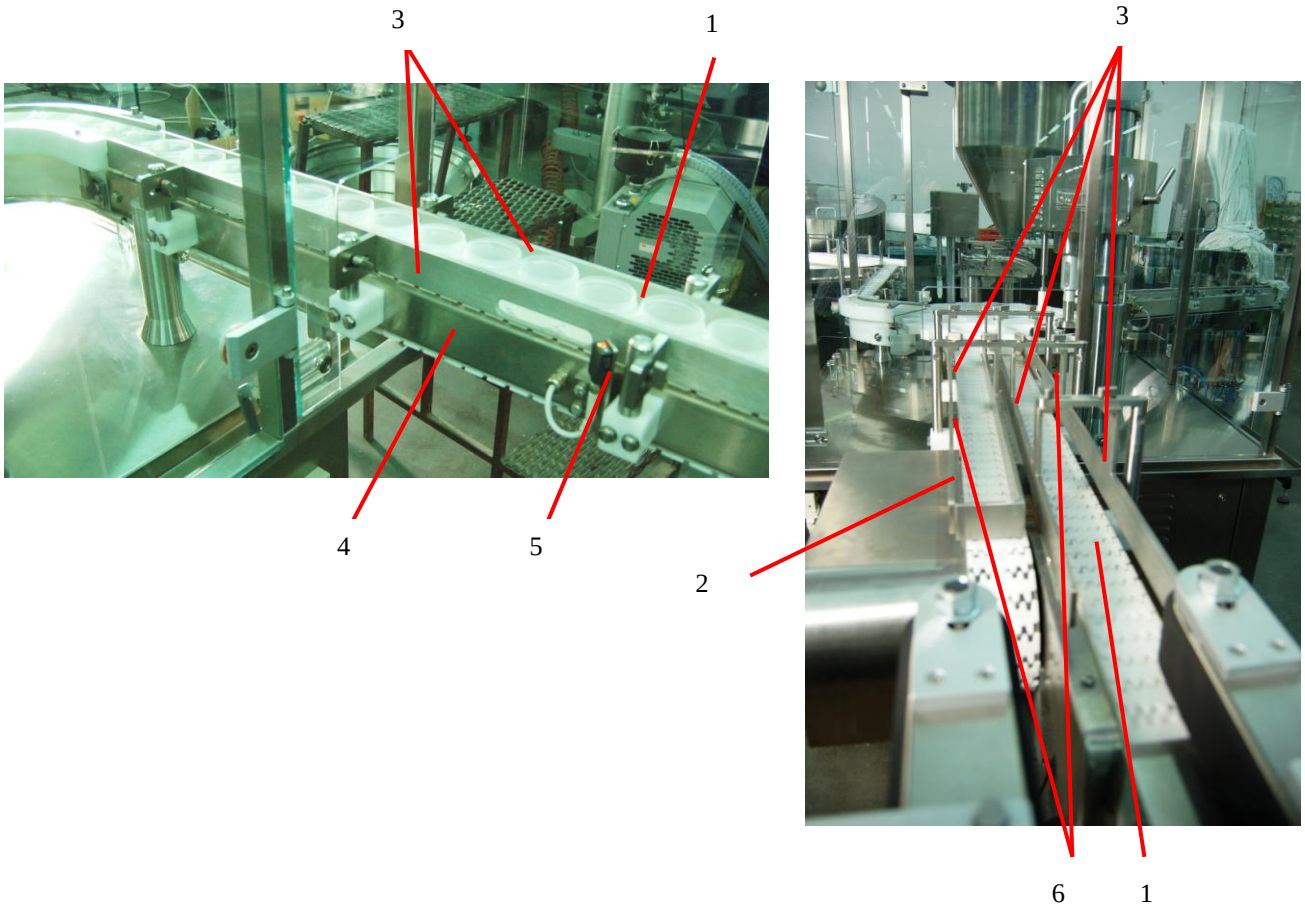


Figure 3.6 Conveyor belt.

3.9. ENTRANCE GUIDES AND STAR WHEEL

The infeed conveyor belt moves jars to the star wheel through the entrance guides.
The entrance guides are manufactured in PVC in according with jar dimensions. On the right side of the guide is placed a sensor that detects the presence of jar at the first pit and a lever ensures the correct location of the jar into starwheel pit.
Just before the filling station it is located a sensor that detects if the jar is upside down.
The star wheel and its contrast are manufactured in according with jar dimensions. The star wheel carries jars with intermittent motion under the working stations.
When the cycle is finished, it releases them onto the outfeed conveyor belt.

Legend:
1. Infeed conveyor belt
2. Entrance guides
3. Sensor+Lever
4. Star wheel
5. Contrast
6. Filling station
7. Capping station with Pick & Place
8. Screwing station
9. Outfeed conveyor belt for regular jars
10. Outfeed conveyor belt for faulty jars

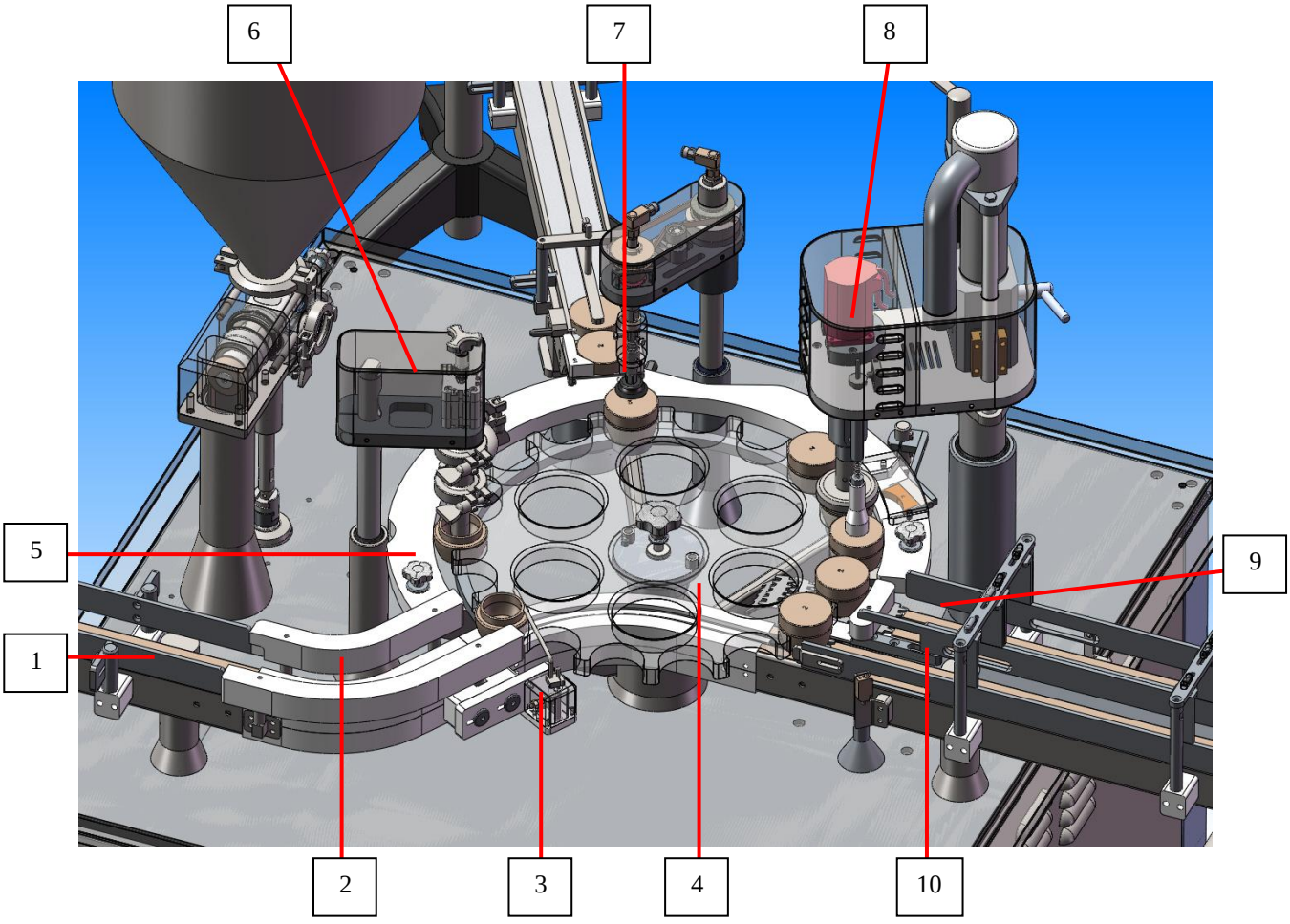


Figure 3.7 Entrance guide and Star wheel

3.10 FILLING STATION

Filling station consists of:

- Hopper
- Syringe group with valve
- Nozzle dosing group

Legend:

1. Sensor for jars upside down
2. Hopper
3. Syringe
4. Valve
5. Nozzle
6. Blow or suction valve

Figure 3.8 Filling station

3.10.1. Hopper

The hopper is manufactured in stainless steel and contains the cream to be dosed. An ultrasonic sensor placed in the hopper top detects if the filling product is going to finish and a signal appears on the control panel.

3.10.2. Syring group

This group, by mean of one syringe, made in stainless steel, provides the right dose of cream product into jars during the working cycle of the machine.
The syringe is connected to the rotating valve.
The **rotating valve** allows the cream flow from the hopper to the syringe when it is sucking and from the syringe to the nozzle when it is sending cream.

The volume of the product to be dosed into the jar and the dosing speed are electronically set by the control panel.

3.10.3. Nozzle dosing group

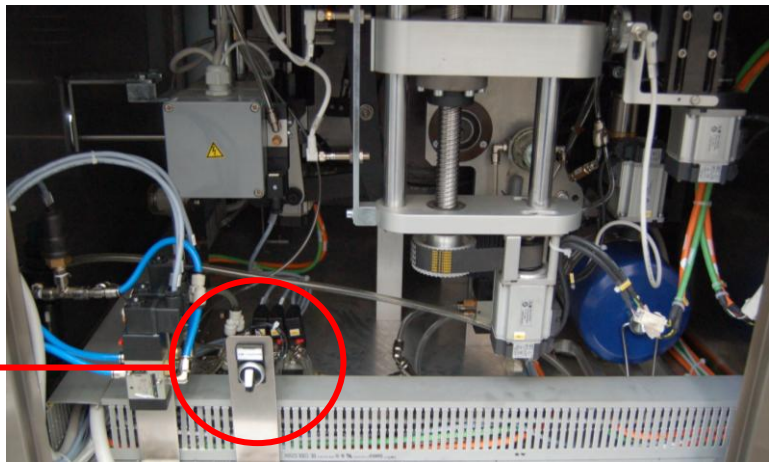
This unit ensures up and down intermittent motion of nozzle (while dosing). The cream is dosed into the jars when the nozzle goes up while jars are positioned below this station.

When the dosing is performed a piston closes the nozzle to avoid cream leak and adjusting the valve **6** it is possible to avoid that the cream still in the nozzle may fall down.

To optimize filling condition with different products, on the machine has been fitted a switch (**1**) inside the frame, that allows to pass from air blowing to sucking in the nozzle.

Selecting the switch the customer can choose the working conditions of the nozzle.

The nozzle is manufactured in stainless steel.



3.11 FEEDING STATION FOR PLASTIC CAPS

This station feeds plastic caps to conveyor belt and it's composed by:
- Prefeeder with hopper
- Lifting conveyor
- Vibrating bowl

3.11.1. Prefeeder with hopper

The group consists of a hopper (1 Fig. 3.9) held by a strong structure with wheels to move it easily and is equipped with antinoise hoods. The operator introduces plastic caps into hopper.
A photocell detects the minimum load and a signal appear on the control panel if the set jars level inside the hopper decreases.

3.11.2. Lifting conveyor

The lifting conveyor (2 Fig. 3.9) has a vertical chain with fixed buckets that lift caps from hopper to the vibrating bowl. The structure is manufactured in stainless steel with plexiglass panel.

3.11.3. Vibrating bowl

This unit (3 Fig. 3.9) has a stainless steel structure and antinoise hoods. It receives caps coming from lifting conveyor and drives them by frequency vibrations on the conveyor belt (4 fig. 3.9).
The frequency vibrations of the bowl is adjustable on the control panel.
The unit is held by a pedestal with worm screw ad rotating flange that allows its adjustment in height. This adjustment is necessary during the phases of fine tuning of the machine.
A sensor detects the minimum load of caps inside the bowl and commands start and stop of the lifting conveyor.

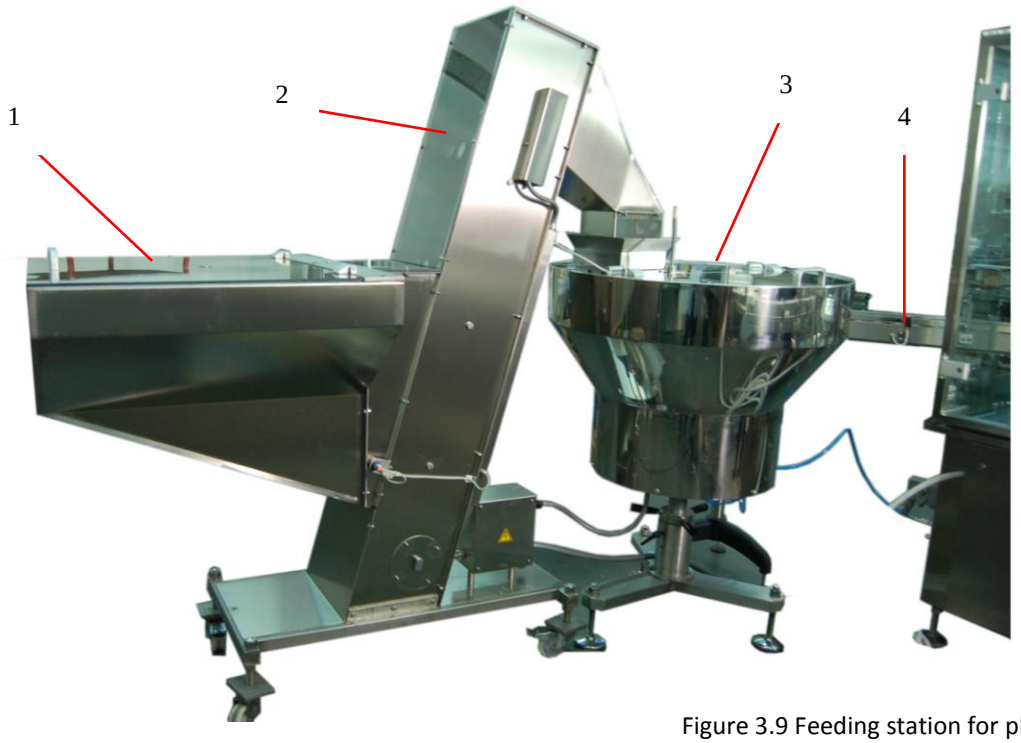


Figure 3.9 Feeding station for plastic jars.

3.12. CONVEYOR BELT FOR PLASTIC CAPS

The conveyor belt has transfer guides (1 Fig. 3.10) that may be adjusted depending on the dimensions of plastic caps the machine has to deal with. The conveyor terminal release is manufactured in according with plastic caps dimensions.
The conveyor belt leans on a pedestal adjustable in height and on a support in the terminal part. This support is adjustable in height by mean of a hand wheel located under the work plate. Adjustments may be necessary during the phases of fine tuning of the machine or during the change of size parts.
On the conveyor belt there is a sensor that commands start and stop of the vibrating bowl. When this sensor detects the absence of plastic caps for a set time, a signal is sent to the PLC and vibrating bowl starts. When the sensor detects newly plastic caps the vibrating bowl stops and the signal disappears.

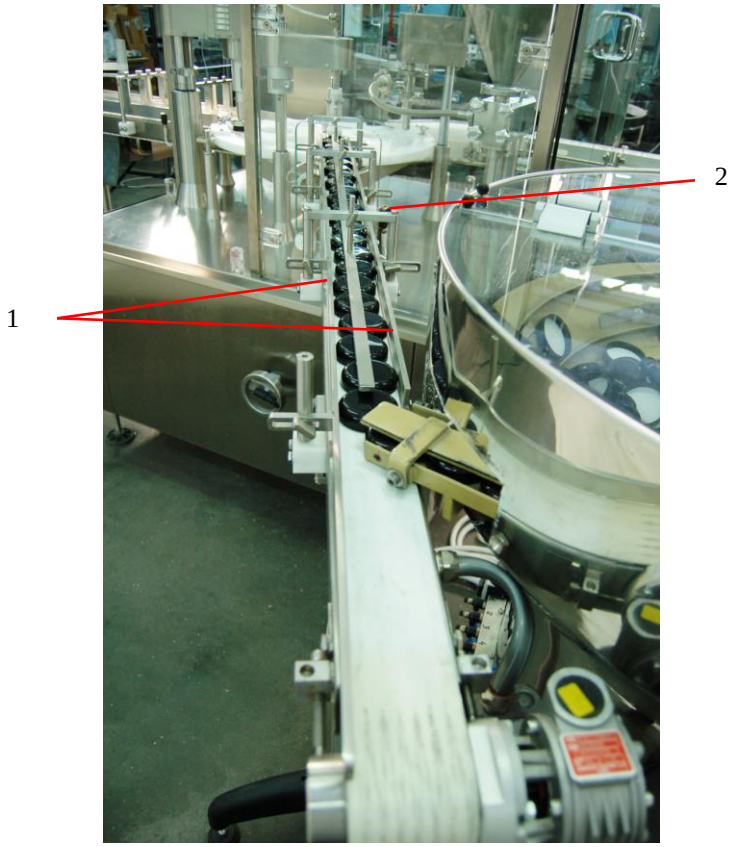


Figure 3.10 Conveyor belt for plastic caps.

3.13. PICK & PLACE

The Pick & Place system (1 Fig. 3.11) takes plastic cap with vacuum from conveyor terminal release and with a rotating motion inserts it onto the jar mouth and performs also the prescrewing of cap.
During the cap insertion a device (2 Fig. 3.11), located in the contrast of star wheel, blocks the jar and prevents it from rotating. This part is made according to the jar size and it is already incorporated in the contrast which refers to that kind of jar size.

The Pick & Place system is adjustable in height in according with plastic caps size.

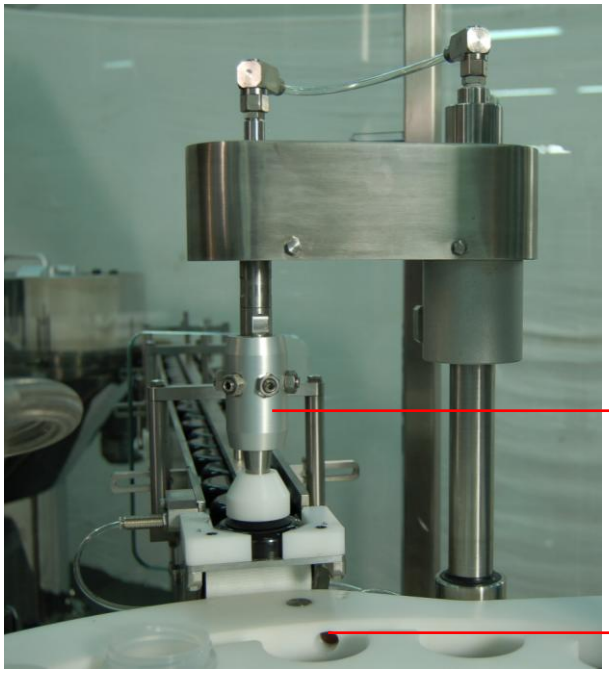


Figure 3.11 Pick & Place.

3.14. SCREWING STATION

The capping unit has a stainless steel structure on which a screwing head is placed. The machine has a size part screwing head, to be substituted according to the plastic caps to be treated, moved by a brushless motor allowing for the control of the torque strength.

While the group screws the jar during transit, a rotation blocking device prevents it from rotating. This part is made according to jar size.

Once the jar is closed, a mechanical sensor checks for the presence of the cover cap on the jar. Jars without cap are rejected on the dedicated conveyor belt. A flap closes the entry on conveyor belt for regular jar so rejected jar goes directly on the rejection conveyor belt. This flap is made according to jar size.

Legend:
1. Screwing head
2. Jars rotation blocking device
3. Sensor detects cap presence
4. Flap for rejected jars outfeed

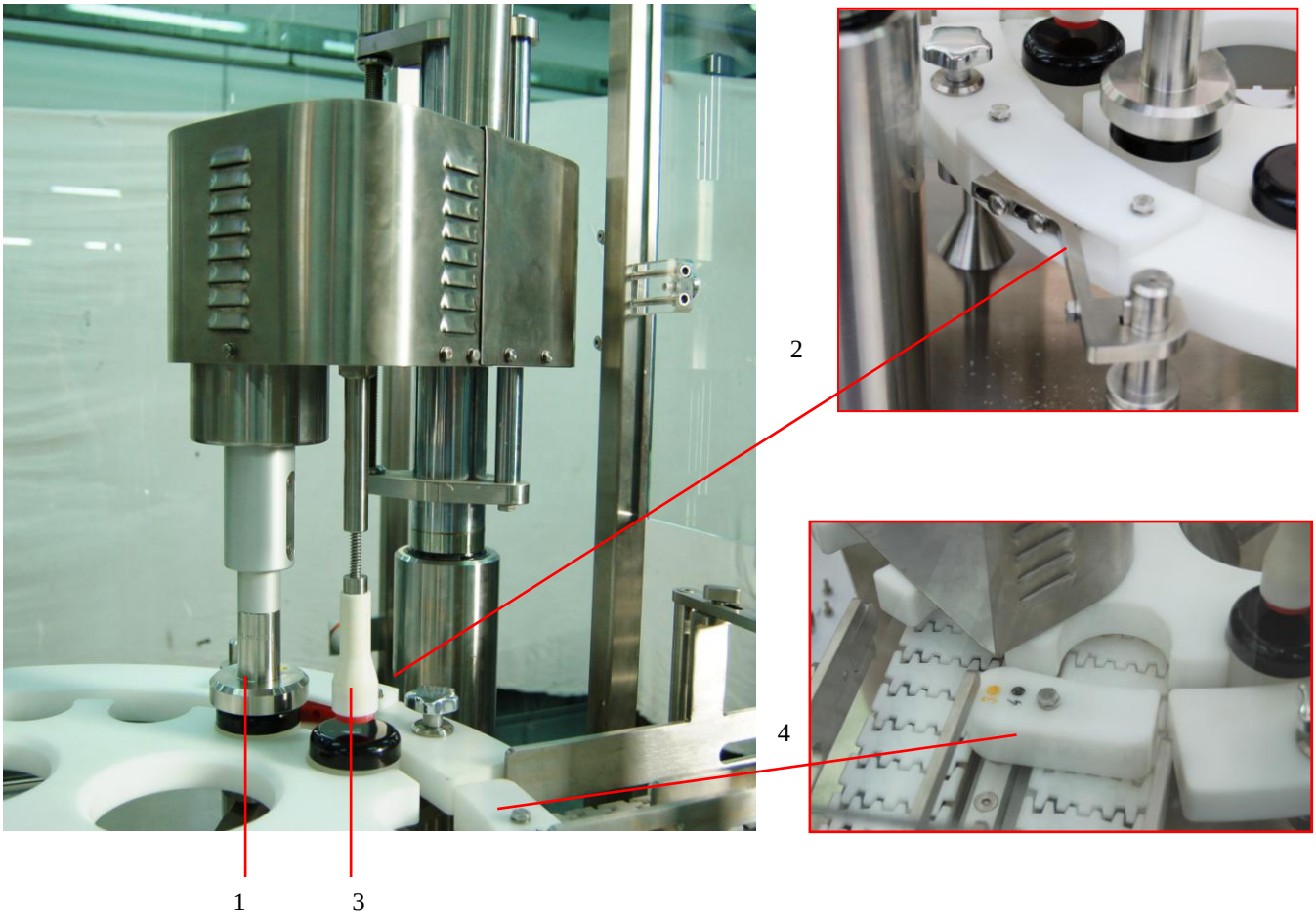


Figure 3.12 Capping station.

3.15. MECHANICAL PHASE AND ELECTRICAL PHASE

Phase notch on cam allows to put the machine in phase if the incremental encoder's joint brakes. By means of the "JOG" command (impulse gear), turn the main axel aligning the red notch to the arrow on the cam.
Manually turn the encoder axel taking it to "0" impulses, tighten again the incremental encoder's joint and restart the machine for a trial cycle.

Legend:
1. Phase notch on cam
2. Indicating arrow
3. Encoder value

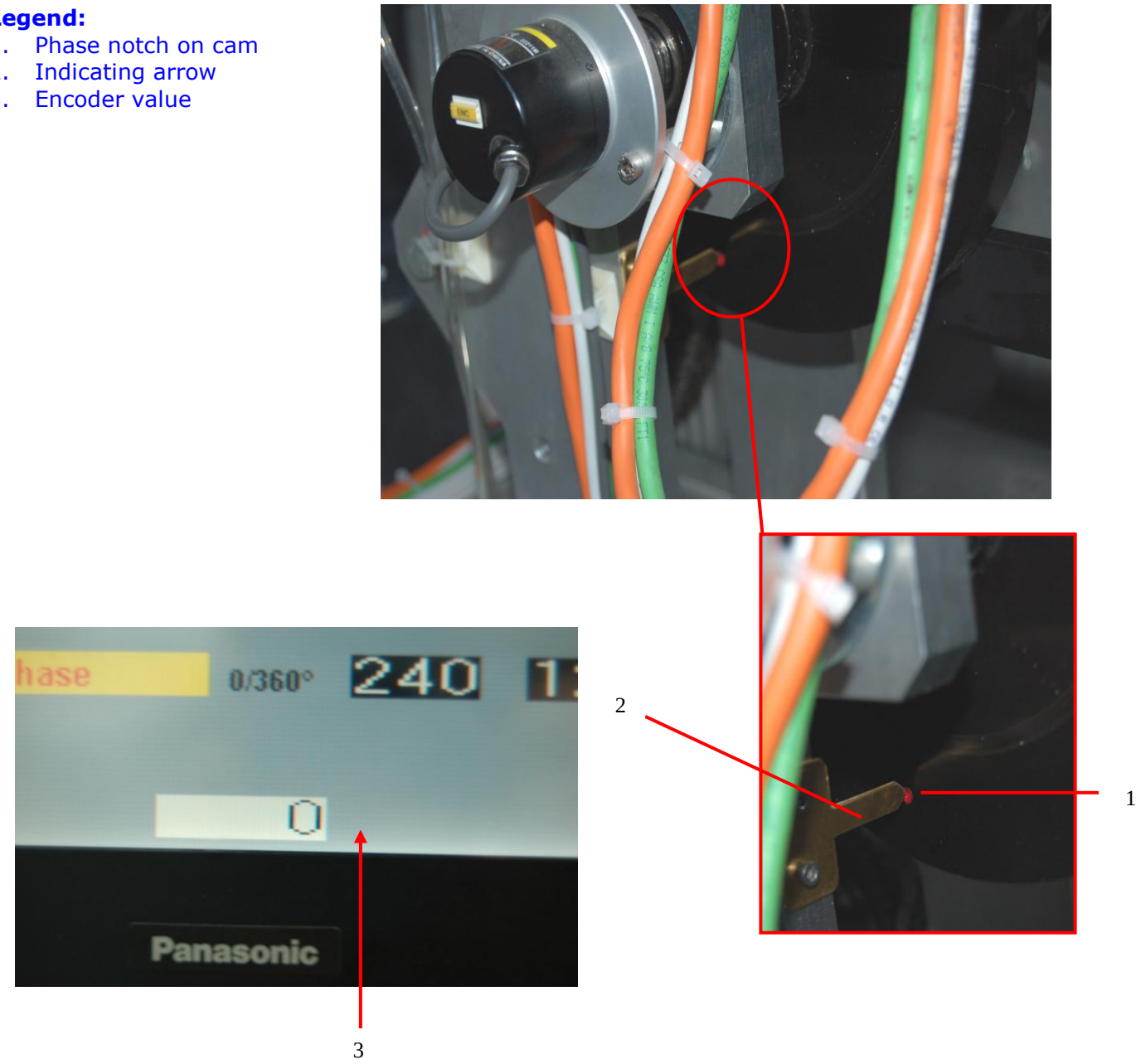


Figure 3.13 Phase-cam

3.15.1. Incremental encoder

Generally the encoder is a revolving transducer that changes an angular movement in a series of digital electric impulses. These impulses are used to control angular movements or linear movements if associated to gauge lines. The electric signals are then elaborated by PLC's.

The incremental encoder gives information about the revolving speed and the revolving sense (clockwise or counter-clockwise), based on the sequence produced by the two signals.
The measuring unit to define the precision of an encoder is the electric grade, this determines the division of an impulse generated by the encoder. In fact 360° electric correspond to the mechanic rotation of the axel necessary to make a complete cycle at the exit signal.

The **FC-1** filling capping machine has an Omron incremental encoder E6C2 CWZ5B with a range of 0÷360 impulses.

Figure 3.14- Incremental encoder.

4. SAFETY

4.1 WARNINGS FOR THE OPERATOR

The machine must be used by qualified personnel, adequately prepared.
The "**operator**" is the person responsible and authorized to use the machine.

The machine must always be used "**within limits of use permitted**" by norms and laws in use.

The machine was designed for safety during all working phases for the personnel in charge of its use, from the operations of fine tuning, production and those of maintenance. For this purpose the dangerous parts of the machine, particularly the moving parts, have protections.
These protections have, when necessary, micro-switches that must be controlled and maintained in full efficiency.

ATTENTION: In zones and during operations with residual risks, all precautions and protective means must be taken.

The operator must respect the main safety obligations here described:

- Respect arrangements and instructions given by the person in charge and those given by the safety norms in force.
- Use the machine correctly, its utensils, its substances, the work equipment and the safety devices and comply with all the warnings given in this manual and on the machine.
- Use, if required, all necessary individual protections.
- Refer immediately the machines failings, those of its devices and possible danger situations.
- Do not remove or modify safety devices, signals or control systems of the machine.
- Do not do of own initiative operations or manoeuvres that do not apply to own tasks and competences.

4.2 ACQUIRER'S DUTY

The acquirer has the obligation to:

- give the operator the necessary and appropriate means of protection: gloves, anti-accident shoes, and appropriate clothing;
- Take appropriate measures so only operators that have received adequate instruction access the working zone;
- Lay out the machine so as to reduce risks for operators.

Make sure:

- There is enough space for emergency interventions;
- There are appropriate fire security systems;
- There are appropriate electrical discharge security systems;
- Anti-explosion and anti-intoxication protections if solvents are used.

4.3 TRAINING OF PERSONNEL

The user is obliged to train the personnel qualified to operate the machine through an accelerated course on the following:

- points of danger;
- functioning of the machine;
- emergency systems;
- operations allowed during the functioning of the machine;
- operations that are not allowed while the machine is in function.

4.4 PROTECTIVE CLOTHING

DANGER!
The first rule to avoid useless risks is to wear suitable clothing.

The employer must make available to employees appropriate protective clothing, when in presence of processes or operations or environmental settings that present dangers.
The personnel in charge of the use or maintenance of the machine must respect the prevention laws in force and the following instructions:

- During maintenance verify the existence of an inter-block that prevents the start of the machine by other people;
- The clothes worn must be close-fitting and free of loose or free-flying parts;
- Never use unbuttoned jackets or shirts (especially at the wrists);
- Avoid using watches and rings;
- Use non-slipping shoes, and when required, gloves, eyeglasses, masks, etc.
-
-

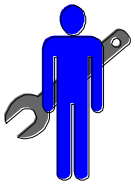
4.5 VISITORS AND INSPECTIONS

The company is advised, when visitors are taken to the working areas, to respect the security laws in force in the given country.

4.6 WARNINGS FOR THE MAINTENANCE AND REPAIRS

ATTENTION!
Beware of the danger signs posted on the machine.
Remember that the maintenance and repairs operation have a higher grade of danger with respect to normal conditions of work.

To reduce risks to a minimum, observe the following:



- Disconnect the energy sources not necessary for the operations to be followed;
- Disconnect the safety devices only if necessary, indicating visibly it is non-functional;
- Perform necessary maintenance and repair operations abiding by what is illustrated by this manual;
- Abide closely to the programmed maintenance instructions.

4.7 ELECTRICAL DANGERS

- Electrical cabinet.

There are electromechanical and electronic devices with high electric tension inside the electrical cabinets.
Electrical and mechanical interblocks prevents the opening of the cabinet with the general switch off, but the bars and clamps at the head of the general switch are still under tension.

The condensers inside the inverter keep the circuits in tension for 10 or 12 seconds after the disconnection.
Caution must be used even after disconnecting tension. The exclusion of the end-line that electrically interblock the doors of the cabinet is allowed only to specialized maintenance technicians, authorized to work over devices in tension.

- Junction boxes

All the junction boxes of the machine are closed and mechanically sealed. A tag senses the presence of dangerous tension inside.

It's opening is allowed only to specialized maintenance personnel, who when necessary, will turn on the main switch on the electric cabinet.

FORBIDDEN!
Don not have people, with generic preparation or with no specific preparation, go through electric equipment.

ATTENTION:
With the electrical cabinet open there is a tension zone inside the cabinet. To isolate the machine completely, it needs to be disconnected from the electrical net.

4.8 PROTECTION AGAINST CONTACT WITH TENSION

The choice of the protection device at the beginning of the electrical distribution, must be done to guarantee a secure intervention of the automatic general switches, which can be integrated with differential devices.

4.9 SAFETY PROTECTIONS

The safety protections present on the machine are made essentially by:

- mechanical barriers (panels, carters, coverings, etc.);
- control devices for the correct operative state of the machine, for automatic intervention and through visible and acoustic signals;
- Emergency stop device;
- Visible signs (placed on the machine) of the residual risks.

DANGER!
The protections must not be removed. Whenever it is necessary to disable a protection (only with machine stopped with no possibility of it starting), this will have to be re-enabled as soon as the reasons for disabling it are gone, and always before restarting the machine.

4.10 RESIDUAL RISKS

The **FC-1** filling capping machine has parts and components that have risks for the operator:

- **parts in movement**, with mechanical protections;
- **parts with high electrical tension**, dangerous for man, with electric protection devices.

Besides the normal protections, the residual risks are pointed out on the machine with safety signals.
The personnel's clothing must respect all the requirements of the laws in force for on the job safety.

The machine was designed with safety standards. With them in mind a many parts of the machine, particularly those with moving parts, have systems of passive and/or active protection.

It is not always possible to eliminate all risks, sometimes for construction limits, sometimes so as not to compromise the normal operations of the machine.

Some "**RESIDUAL RISKS**" remain that should be known to whoever works the machine.

In the zones where residual risks remain, the machine must be operated with careful attention, taking in consideration all the information and all the suggestions in this manual.

For better comprehension of what is exposed, the definitions of the "Machine Directives" CEE 2006/42/CE:

- DANGEROUS ZONE:
  Any zone inside or near the machine in which the presence of one exposed person brings a risk for the safety and wellbeing of that person.

- PERSON EXPOSED:
  Any person who is in whole or in part in a dangerous zone.

- OPERATOR:
  The person or persons in charge of installing, adjusting, maintaining, cleaning, repairing, transporting or making the machine work.

4.11 SIGNALS

On the manual there are several graphic character signals that must not be removed.
The signals are divided in:

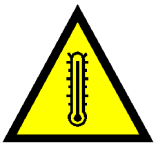
- danger signals;
- forbiddance signals;
- obligation signals.

The following indicated symbols comply to the DPR 493 (14/08/96) acting on the directive 92/58/EEC.

4.11.1 Danger signals

The following **danger** signals are used in the manual (in black with yellow background and triangularly shaped).

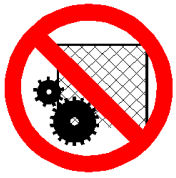
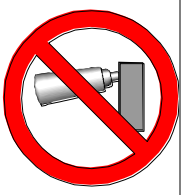
Table 4-1. Danger signals.

	**GENERIC DANGER** **Generic danger for personnel and for the machine's commands.**			**MECHANIC DANGERS** **Risk due to revolving mechanical parts.**
	**DANGER** **Danger in presence of delicate instruments.**			**DANGER OF ELECTRICAL DISCHARGE** **Danger due to presence of energy voltage.**
	**DANGER OF CRUSHING** **Danger of having a bodily part crushed by two mechanical parts drawn together.**			**DANGER** **Danger signal indicates presence of moving parts.**
	**ERGONOMIC DANGER** **Risk due to bad positioning or incorrect actions, undue strain, incompatibility with human anatomy, misuse of protections and supports, scarce illumination of the area.**			**DANGER** **Danger signal indicates there are heavy loads in mid air.**
	**DANGER GENERATED BY MATERIALS OR SUBSTANCES** **Risk due to the possibility of contact with dangerous substances or inhaling of dangerous fluids.**			**DANGER** **Danger signal for presence of high temperature.**

4.11.2 Forbiddance signals

The manual uses the following **forbiddance** signals (in black with white background, red border and circular form).

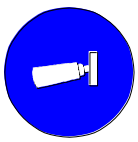
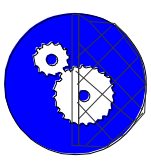
Table 4-2. Forbiddance signals.

	**FORBIDDEN** **To operate on moving parts.**			**FORBIDDEN** **To put out fires with water.**
	**FORBIDDEN TO REMOVE PROTECTIONS** **Due to the dangers that may arise with lack of protections and safety devices and the non-compliance of the danger signals.**			**FORBIDDEN** **To work with energy voltage on.**
	**FORBIDDEN** **To smoke.**			**FORBIDDEN** **Access forbidden – high risk zone!**

4.11.3 Obligation signals

The manual uses the following **obligation** signals (in white with blue background and circular form).

Table 4-3. Obligation signals.

	**OBLIGATION** **Immediately signal device defects and safety protection defects.**			**OBLIGATION** **Protect hands with gloves.**
	**OBLIGATION** **Disconnect energy voltage before doing maintenance.**			**OBLIGATION** **Guarantee efficiency of safety protections and devices.**

4.12 NOISINESS

The machine was constructed respecting the limits provided of the sound pressure allowed.

Nevertheless, the noise of an environment is determined by various factors like:

- The position of the machine in the area;
- The presence of a non-absorbent wall close to the machine;
- The presence of two converging walls close to the machine;
- The presence of two converging walls in a low area;
- The background noise of the area.

The acoustic level detection norms have precise procedures and environmental conditions to measure the sound pressure Lpa.
The buyer must do the necessary measurements of the sound pressure in the working area and provide the fit protections (noise absorbing barriers, etc.) to reduce the sound pressure to the lawful levels. Specific measures can be taken for the personnel (i.e. headphones, etc).

4.13 PREVENTION AND RELIABILITY

The safety norms applied to the machine are the basis for the prevention of accidents and the reliability of the machine.
The person responsible for production and personnel in charge of the use, maintenance and repair of the machine must consider the following:

- The machine must be used only for that which it was made for, absolutely avoiding any other use (see generalities of the machine).
-
- In case of defective functioning with risk to the operator, **immediately stop the machine**.
-
- **Do not make changes, external mountings or transformations** that may compromise the safety function, without first consulting the manufacturer.
-
- All the visual - acoustic signaling in the machine must be in perfect state of efficiency.

5. TRANSPORT HANDLING AND STORAGE

This paragraph provides the general directives to be followed for handling, packaging and transportation of the machine.

Abide by what's here described during each operation, keeping in mind that the loads of the machines require necessarily the use of suitable lifting and moving means (block and tackle, forklift truck, rope, strap, etc.) and that all safety norms for the movement of loads in mid air must be respected.

5.1 PACKAGING (IF REQUIRED)

Appropriate packaging must be used for the transport of each machine (wooden boxes, pallets with protective cage, etc.) to protect it from blows and form atmospheric agents (rain, humidity, etc.).

It is advisable to transport the machine dismantled, placing the parts on the pallet of the cage.

To prepare the packaging follow these indications:

- Make a wooden box (closed or as a cage), able to securely hold the weight of the machine stated on the nameplate with the identifying data;
- The drawing shown is an example of a packaging suitable for transport of the machine;
- The packaging must have anchoring points to lift with forklift and with block and tackle.

Indicate on the package the following characteristics of merchandise transported:

- Dimensions and encumbrance;
- Gross weight;
- Net weight;
- Address of sender and receiver;
- Signal the correct way to lift and transport the package.

5.1.1 Weight and dimensions

Find below the dimensions and weight of the machine and packaging (if required) for its transport.

DIMENSIONS AND WEIGHTS							
NOT PACKAGED				WITH PACKAGED			
LENGTH (mm)	WIDTH (mm)	HEIGHT. (mm)	WEIGHT (Kg.)	LENGTH (mm)	WIDTH (mm)	HEIGHT. (mm)	WEIGHT (Kg.)
1200	**1030**	**1800**		/	/	/	/

ATTENTION!
Before moving the load make sure that the areas where the machine will be moved in and where the machine will be placed are free and clear from obstructions.
Comply with available laws in force for lift-up and transport means.

Legend
1 Arrangement for forklift.
2 Nut and bolt.
3 Fastening holes on the machine's frame.
4 Reinforcing plate.
5 Screw.

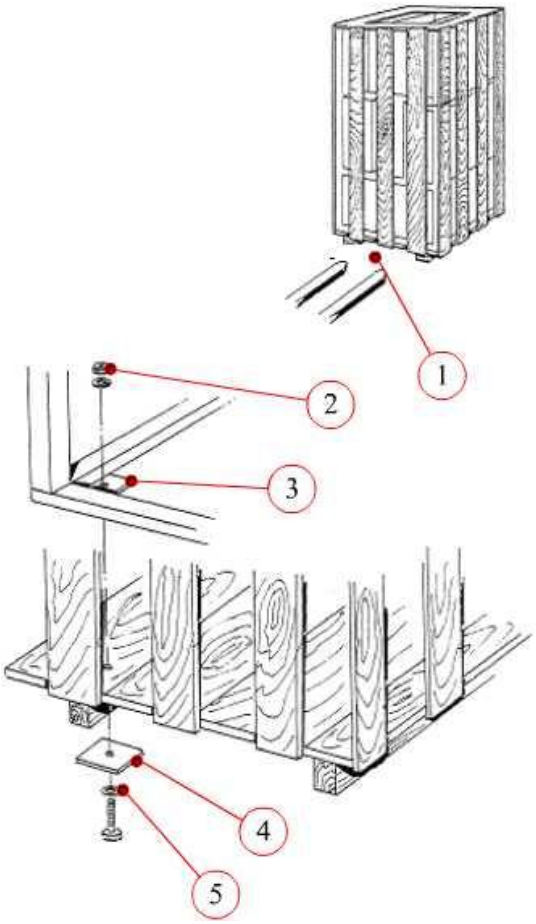
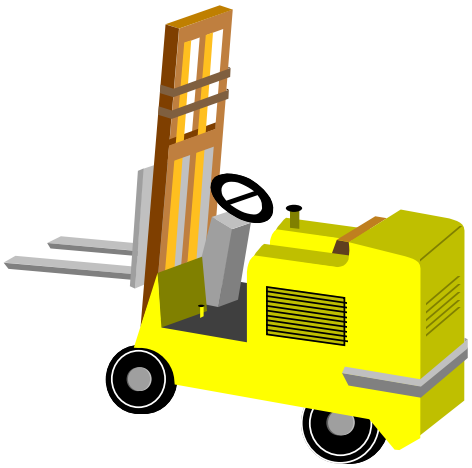


Figure 5-1 Typical packaging for transport.

5.2 TRANSPORT AND SHIPMENT

The machine is shipped in a box or directly inside a truck.
For the transport and shipment of the machine abide by the following:



- Make sure the machine was correctly packaged as described in the previous paragraph;
-
- Make sure all the machine's data are shown on the packaging and in the documents that accompany it;
-
- Make sure the packaging has all the safety signals (lifting and moving) and the lifting points are identified.
-

When receiving the machine check:

- The packaging must be undamaged;
- The machines match what was specified in order;
- Make sure there were no damages.

If damaging occurred or there are missing pieces, inform TECNOMACO Italia immediately and in detail.

ATTENTION
Use qualified and specialized personnel when using forklifts with a person on land to give the driver the necessary indications during the phases of loading, unloading and moving of the machine.

ATTENTION
Always use appropriate protections like gloves, anti-accident shoes, protective helmets, etc., during the loading, unloading and moving of the machine and accessories.

5.3 STORAGE

Store the machine in a protected area from:

- Environmental agents like water and humidity;
- Accidental bumps and violent blows that could cause breaks;
- Tampering by unauthorized personnel.

Generally, before storing the machine make sure:

- The machine is disconnected from electricity and all switches are off;
- The machine is clean, solvents or inks, etc. or parts of products are not jammed inside or jamming the machine;
- To check the conservation state of the machine and particularly signs of humidity (oxidation, rust, etc.);
- Immediately clean or paint the parts of the machine showing signs of oxidation or rust.

5.4 MOVING THE MACHINE

In all the moving and installation phases there is the obligation to use the adequate tools (cranes, tow trucks, etc.), suitable for the maintenance, assembly and installation of the machinery with the necessary requirements for the safety of the operator.

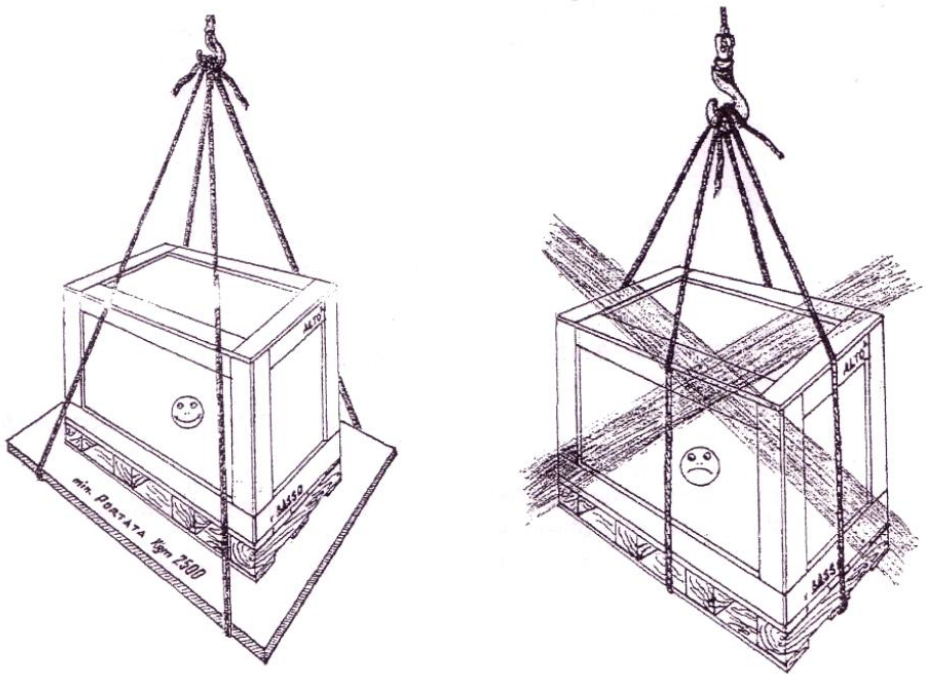


Figure 5-2 Lifting scheme.

5.5 UNPACKING

WARNING: The machine should be taken from its packaging only at the moment of installation, to reduce damage risks to the machine during storage.

The unpacking can be done at the moment of positioning the machine, to reduce lifting and transport operations. Of course, before positioning the machine make sure all the connection arrangements (fixings, energy connections, etc.) are positioned correctly.

To remove the machine from the package:

- Transport the machine in the package as close to the place of installation;
- Open the wooden box;
- Remove the fasteners that secure the machine to the pallet;
- Check that the contents of the package match what was declared by the constructor in the transport documents;
- Lift the machine from the pallet with adequate tools, chords fit for the weight of the machine, and whatever necessary for the safe movement of the machine;
- Put the machine in the place it will be installed;
- Dispose of the packaging.

ATTENTION
Use the utmost caution during the lifting and moving!
Danger of heavy loads in mid-air.

5.6 ACCESSORIES

As in previous paragraph, check that all accessories mentioned in the transport document are present.

Any differences are to be immediately communicated.

5.7 PLACEMENT

The **FC-1** Filling capping machine is structured to have the maximum rigidity; it is therefore not necessary to prepare the laying ground. It is nevertheless suitable that the base leans uniformly on the ground.

An appropriate placement assures greater stability and avoids vibrations and noises.

5.8 CLEANING

To clean well the machine before putting it to work, all the surfaces in contact with the product need to be washed with petrol, then with alcohol or solvents.

Clean with appropriate solvents the parts protected with paint and dry well with clean rags.

During cleaning make sure the liquid used does not go in contact with the motors and the micro switches because in that case they could produce short-circuits.

If compressed air (without humidity) should be used to clean the machine, avoid having foreign objects ending up between the working parts of the machine.

5.9 NORMAL FUNCTIONING OF THE MACHINE

For the filling capping machine **FC-1** to work well:

- During the normal operations the machine must be in a dry, covered place;
- The room temperature must be from 0°C to 45°C and the humidity must be under 90% (without condensation);
- The machine must not come in contact with corrosive vapours or be near excessive heat.

5.10 WORKING CONDITIONS IN CONFINED AREAS

Work with extra care to avoid risks during the fine tuning and adjustment of the machine in the areas that are usually confined.

It may be necessary to work in normally confined areas in the following cases:

- During fine tuning of the machine;
- During the change of parts;
- To solve blockings of the machine;
- During ordinary and extraordinary maintenance;
- During the cleaning stages.

ATTENTION
Since various persons can work on the machine during the fine tuning, it is necessary to always signal in advance any type of operation to be executed.

Any type of operation to be executed in normally confined areas is to be signalled in a visible position.

6. INSTALLATION

6.1 QUALIFIED PERSONNEL

It is recommended to have competent and qualified personnel using the machines for lifting like cranes or forklifts, especially when operating in small areas.

6.2 ADVICE FOR GENERAL SAFETY

Remember to use all the individual protections to guarantee the safety of the machine's operator during the mounting and installation phases.

ATTENTION
Pay the utmost attention during the moving and lifting operations!
Danger of heavy loads in mid-air.

ATTENTION
During the lifting and moving operations use only the holding points indicated in this manual.

6.3 CONNECTIONS TO POWER SOURCES

6.3.1 Generalities

The pipelines for the various installations of the machine to which this manual refers (electrical) must be adequate to support the maximum absorptions of the machine as seen on the chart of technical data in this manual.

The connections between the various organs and components of the machine are the quick connecting type, to help during the assembly at client's workshop.

ATTENTION
The installation is to be done by qualified personnel attaining carefully to the dimensioning data indicated in the documents of the machine.

ATTENTION
Do not modify the machine or its components without consulting and having written consent from TECNOMACO Italia who will otherwise deny all responsibility that may arise from these modifications.

6.3.2 Electric connections and preliminary controls

After putting the machine in place and cleaning it, connect it to the distribution net. Before connecting, check that the tension and frequency from the distribution net correspond to those indicated in the instruction manual and on the nameplates of the electrical devices.

Connect the cables and the ground wire to the L1, L2, L3, N clamps and the door block.

Legend
1. Door block switch.
2. General switch.

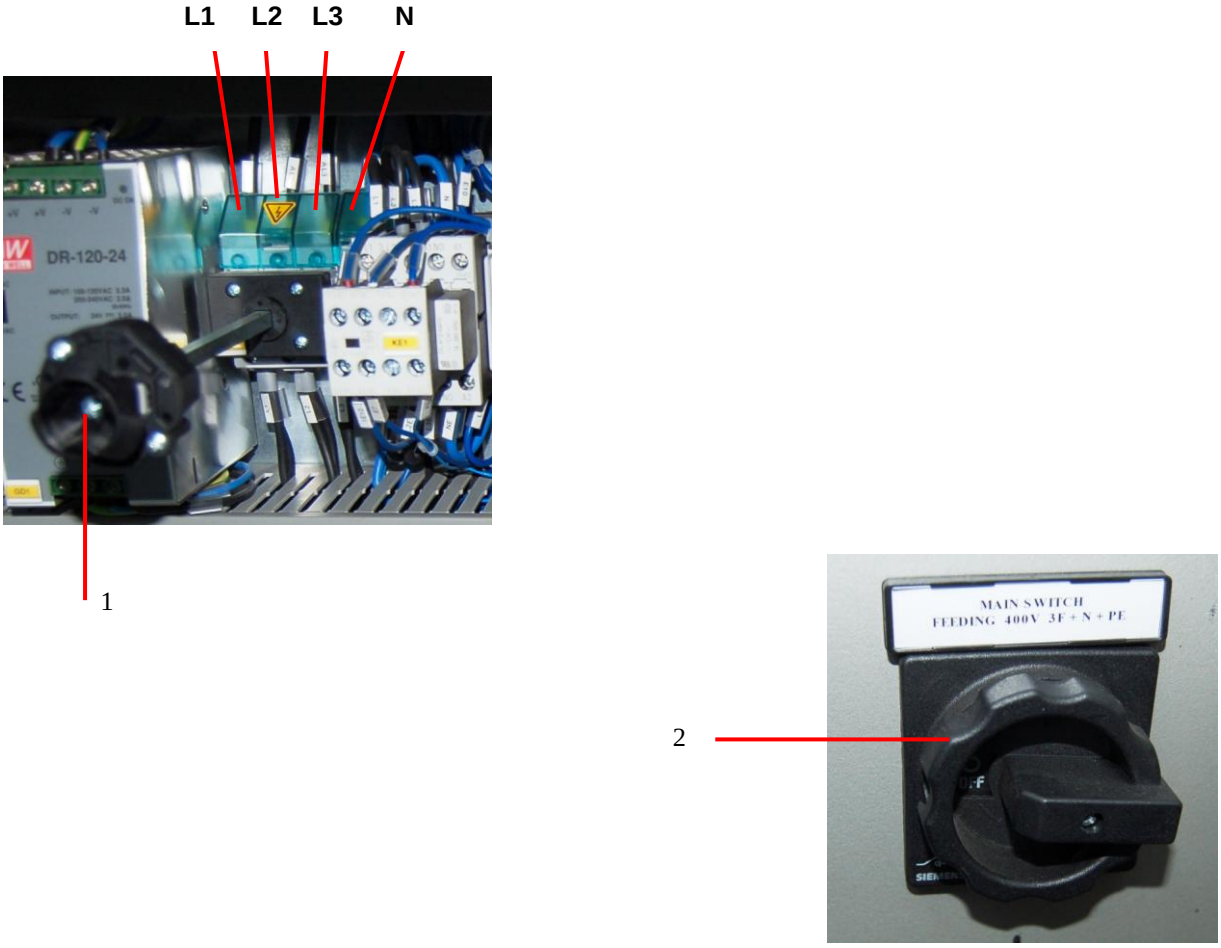


Figure 6-1 Electric connections.

6.4 PNEUMATIC CONNECTION

Some devices are pneumatically activated (for example jar anti-rotation) the net pressure must be aprox. 5 - 6 atmospheres. The machine must be connected to the plant's pneumatic installation.

When the set pressure lowers beneath the minimum (3 atmospheres), the machine stops and gives an alarm signal.
It is then necessary to adjust the pressure so as to increase incoming air flow.

Figure 6-2 Pneumatic connection

6.5 CONTROLS

Once the machine is set with its accessory groups, the necessary adjustments must be performed according to what is described in this manual.

In particular:

-
- Once the machine is set in the production line, the various machines must be adjusted to synchronize the work of the line.
- Do all necessary adjustments on the machine.
-

6.6 PROTECTIONS CONTROL

Carefully control the efficiency of the **protections** and the **securities** of the **emergencies**, testing functionally each one.
By means of microswitches, the machine should stop immediately when the mobile protections are open (glass, lexan, plexiglass, etc.).

7. PRODUCTION

7.1 PERSONNEL QUALIFICATIONS

Operators in charge of the machine can be divided into three categories:

- Conductor/Operator
- Maintenance mechanic
- Electrical maintenance

according to the characteristics described in section 2.2.

7.2 START-UP OF THE MACHINE

After installation operations and before starting the machine in production cycle, a series of preparations and control operations are necessary.

These are in chronological order:

- General cleaning,
- Verification of connections,
- Mechanical verifications,
- Calibration verifications,
- Functional verifications,

ATTENTION!
Before start up (at the beginning of the working shift or after any machine stop) verify the well functioning of the machine.

ATTENTION:
It is very important at every change of shift operator's pass along information regarding anomalies or calibrations done during the previous shifts.

7.3 CLEANING THE MACHINE

Free the machine of all residual packaging material, inside and outside the machine.

ATTENTION!
Pay particular attention in removing nuts, bolts, washers, chips, etc. from inside the machine and its equipment because they can be potentially very dangerous.

Follow a general cleaning of the machine with careful attention on the moving parts.

7.4 VERIFICATIONS

Before turning start the machine, during activation phase or after a maintenance period, make sure:

- Carefully inspect the machine to verify there are no visible damages that could compromise start-up operations;
- Check that all electrical connections from general control board to local control have been done correctly following the marks and numbers;
- Check that all electrical connections are correctly sealed;
- Check that the electrical grounding of the machine and it's metallic structure have been well done and have no signs of wear or damage;
- Make sure that protections are functioning correctly and are well inserted.

7.5 MACHINE START-UP PHASE

Before starting up the machine for manufacturing, some preliminary adjustments are necessary according to the process to be done. Through the supervising system, on the terminal, all functioning parameters are arranged (machine speed, etc.).
The machine should have the equipment installed according to the size part to work.

The operative sequence is as follows:

- Power the machine with the general switch;
- Close all protections that might be open;
- Connect the Jog command into the appropriate socket on the operator panel
- Push all Reset buttons to cancel pre-existing alarms.
- Load plastic jars on the prefeeder with hopper (or glass jars directly on the rotating table)
- Switch on the prefeeder and the unscrumbler by the control panel
- Switch on the rotating table and the conveyor belt by the control panel
- Verify that jars are correctly fed to the infeed conveyor belt
- Make the machine run by jog until jars arrive into the starwheel
- Load caps inside the prefeeder with hopper
- Switch on the feeding groups for caps by the control panel
- Verify that caps are correctly fed to the linear guide
- Switch on the dosing group by control panel
- Switch on the prescrewing and screwing group by control panel
- By Jog make the machine run for few cycles and check that filling and capping phases are correctly performed.
- When the setting phase is completed unplug the Jog button and proceed with the automatic working cycle by control panel.
- Push RESET button to cancel all pre-existing alarms, then press START. To stop the machine press STOP button.

7.6 GENERAL OPERATIONS

After connecting the machine to the power line and ascertaining the well functioning of the mechanical parts of the machine, it can be put in production.

To start production push the Reset button and then the Start button, press Stop button to stop the machine.

Legend:

1 – Reset button.
2 – Start button.
3 – Stop button.

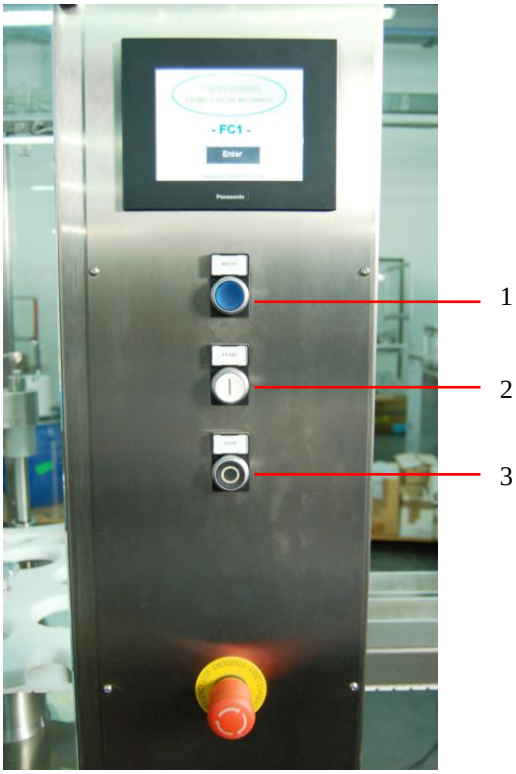


Figure 7-1 Buttons.

During the function cycle the machine may stop for simple anomalies, it is necessary to remove these anomalies to restart production.

7.7 COMMAND PANEL

The command panel (fig. 7-2) is a touch screen **PANASONIC** model **GT-32** installed on board of the machine. The Panasonic terminal has a control display (see paragraph 7-8).

ATTENTION!
Personnel in charge of the machine must know well the correct use of each command present on it to be able to operate and intervene rapidly and securely even during emergency situations.

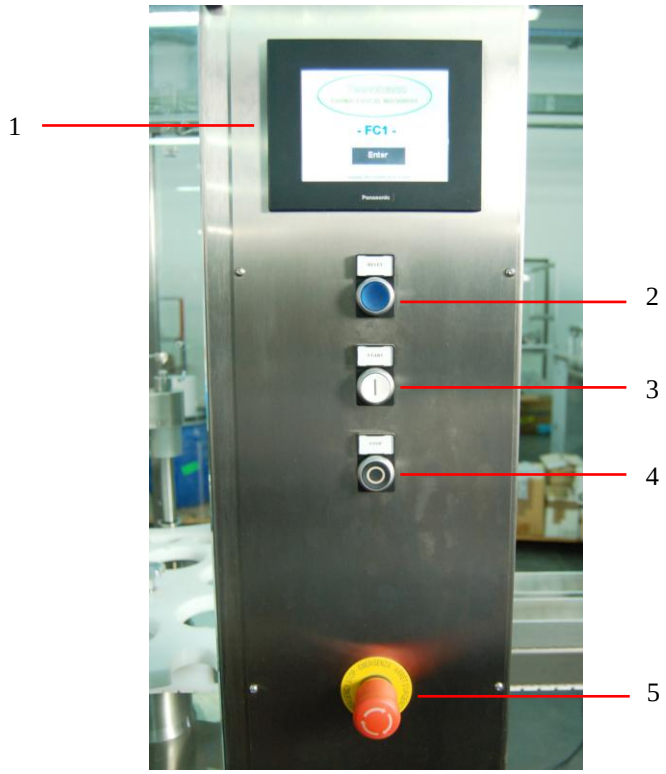


Figure 7-2 Command panel.

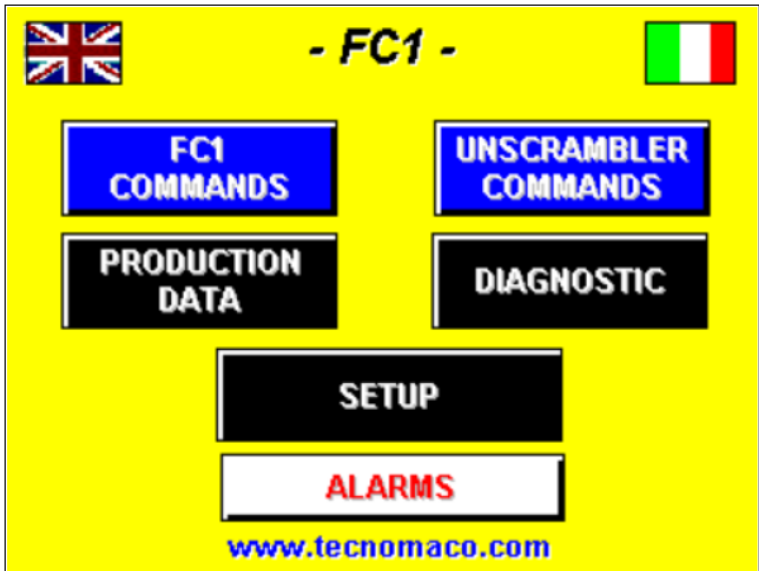
REF. FIG. 7-2	COMMAND	EMPLOI
1	*TERMINAL*	Touch screen PANASONIC GT32
2	***RESET***	Lights up when the emergency button is pressed or a safety device intervenes. It must be pressed when re-starting the machine.
3	***START***	Starts the machine.
4	***STOP***	Must be pressed to stop the machine.
5	***EMERGENCY***	Stops the machine instantly.

Table 7-3. Description of operator's command panel.

7.8 PANASONIC GT-32 TOUCH SCREEN

When turning on the machine the initial screen of the Panasonic GT-32 terminal goes to the main page shown in fig. 7-3 below.

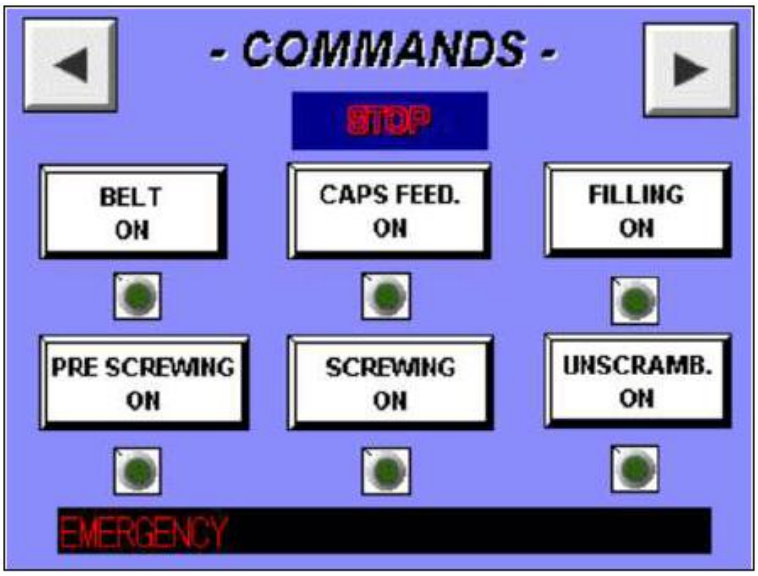
By touching ENTER the operator enters into the main page (following image).



Starting from the top, there are the following keys:

- Two flags for language settings (English, Italian)
- FC1 COMMANDS, Principals commands page for the automatic running of the machine
- UNSCRAMBLER, jar feeding settings page
- PRODUCTION DATA, visualization of production data
- DIAGNOSTIC, Functionalities checking with synoptic view
- SETUP, general setup page
- ALARMS, alarms page

FC1 COMMANDS 1/2

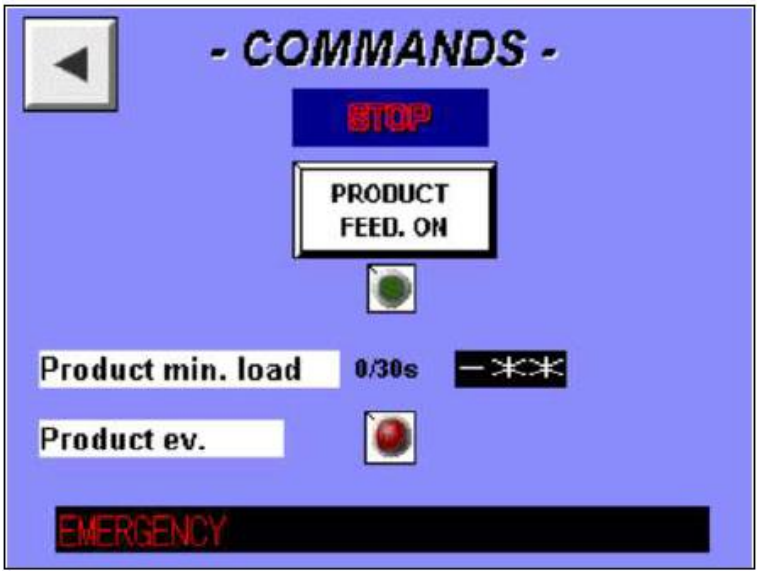


Into the commands page, in the top centre there is a field in which the machine status is shown (Running, Stop, Manual), then there are six keys for the following functionalities:

- Belt on, to activate the belt
- Caps feed on, to activate the caps feeding (caps belt and P&P)
- Filling on, to activate filling
- Pre screwing on, to activate pre screwing during the releasing of caps
- Screwing on, to activate caps screwing
- Unscrambl. on, to activate jar feeding (guider & lifter)

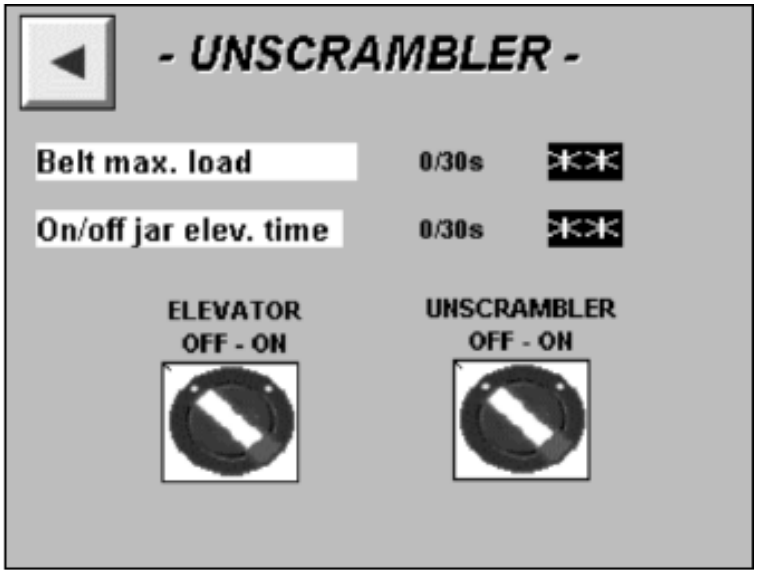
In the bottom an alphanumeric field the last active alarm; by touching the key ◀ it is possible to go back to the previous page, instead by touching the key ▶ it is possible to go back to the next page.

FC1 COMMANDS 2/2



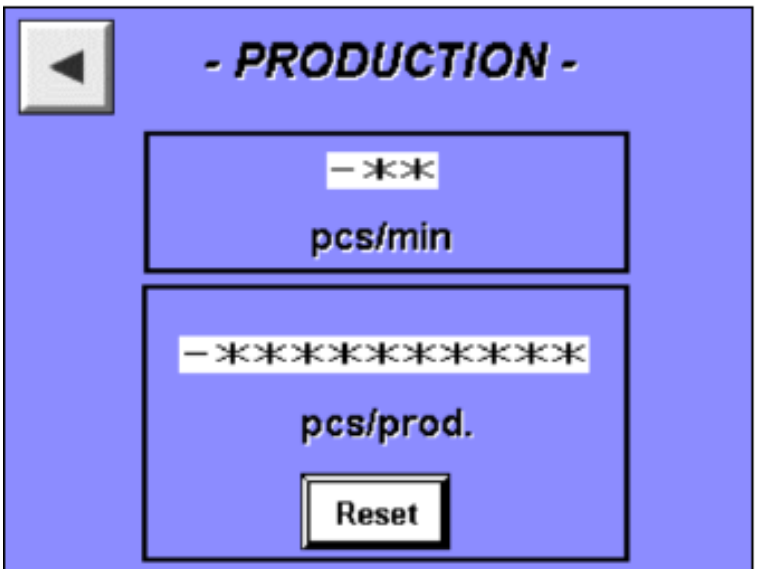
Into the commands page, in the top centre there is a field in which the machine status is shown (Running, Stop, Manual). The main button activate the product level control; into the numeric field it is possible to set the intervention time of the automatism. In the bottom an alphanumeric field the last active alarm; by touching the key ◄ it is possible to go back to the previous page.

UNSCRAMBLER COMMANDS



Into the unscrambler commands page there are two numeric fields in which, respectively, the on/off action time of the elevator and the asction time of the minimum load on the infeed conveyor belt; moreover, there are two soft switches that activate manually the elevator and the unscrambler. By touching the key ◄ it is possible to go back to the previous page.

PRODUCTION DATA

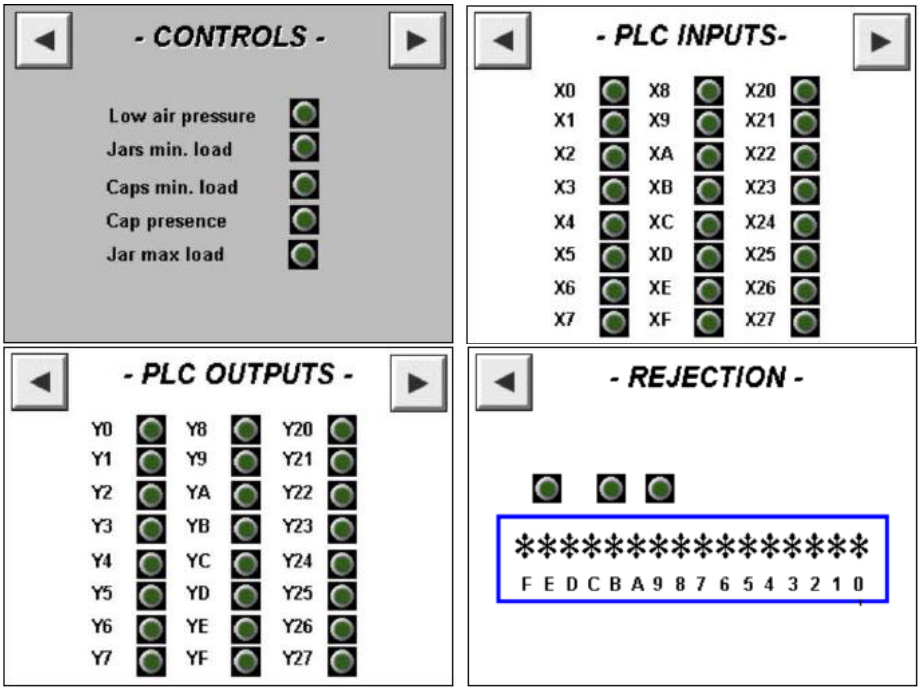


Into the production data there are two fields:

- Speed production of the machine in running (pieces per minute)
- Number of produced pieces with also a reset key

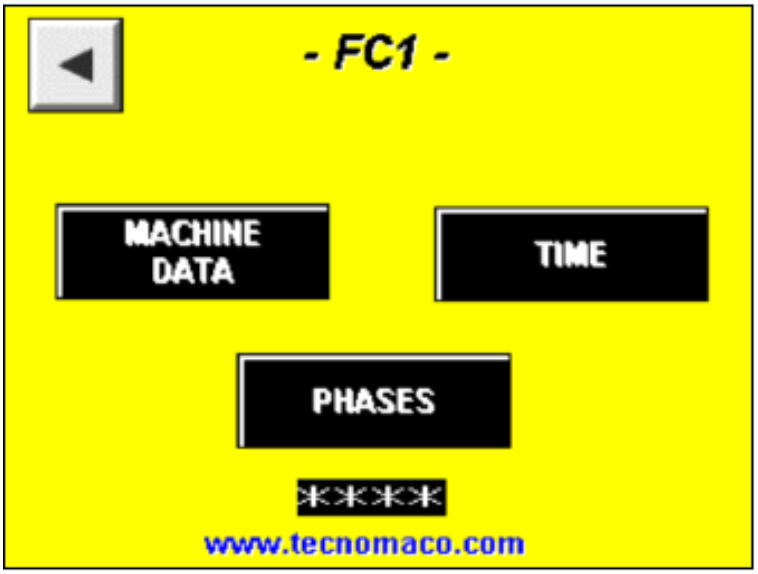
By touching the key ◄ it is possible to go back to the previous page.

DIAGNOSTIC



The Diagnosis pages are set like a synoptic anda give informations about the activation of some functionalities and devices working on the machine
By touching the key ◄ it is possible to go back to the previous page, instead by touching the key ► it is possible to go back to the next page.

SETUP

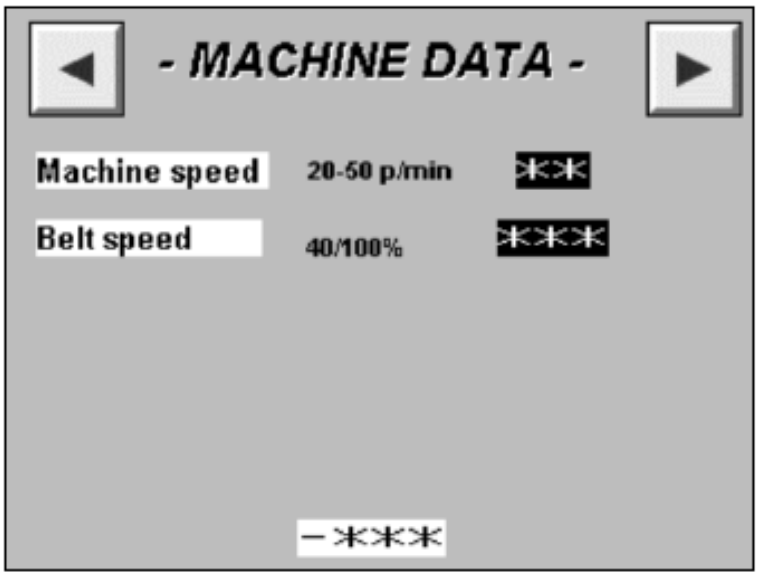


Into the setup page there are three keys:

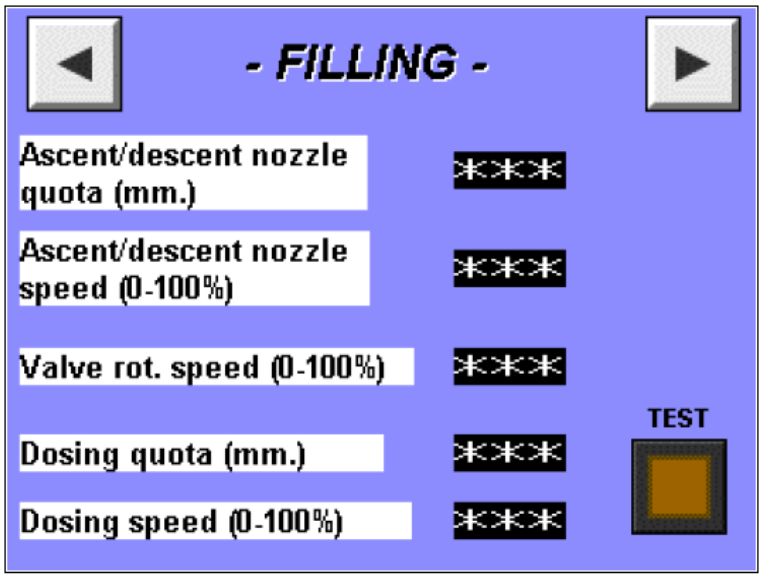
- Machine data, to access the settings of each machine functionality

- Time, to modify timings in automatic running
- Phases, to modify the phases of the machine motions; this key is accessible only if the correct password is typed correctly into the correspondent field below (psw = 3110)

MACHINE DATA



The first setting page has two fields, the former is the machine speed, the latter is the belt speed; in the bottom the encoder value is visualized. By touching the key ◄ it is possible to go back to the previous page, instead by touching the key ► it is possible to go back to the next page.

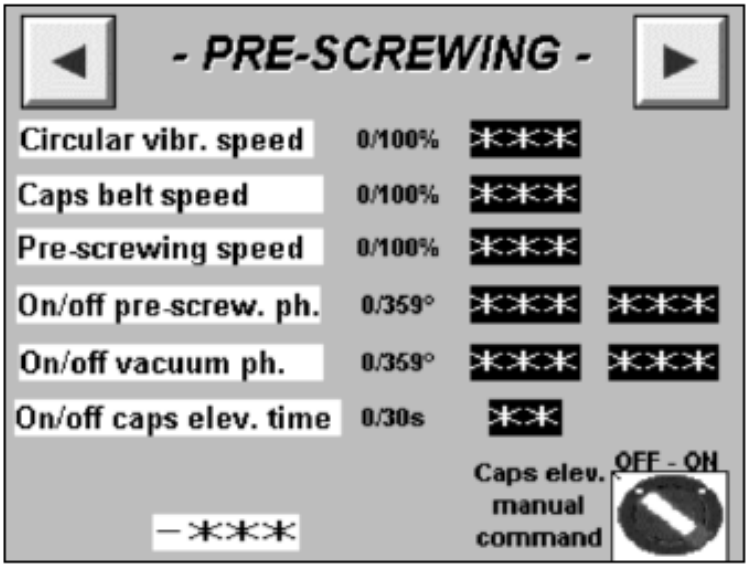


In this page is possible to regulate the dosage of machine:

- Stroke in millimeters of the nozzle
- Speed of the nozzle stroke
- Rotation speed of the three-way valve

- Course in millimeters of the piston during the dosage
- Movement speed of the piston during dosage
- By touching TEST, the machine make one dosage (jog remote must be inserted and the filling must be activated into the commands page)

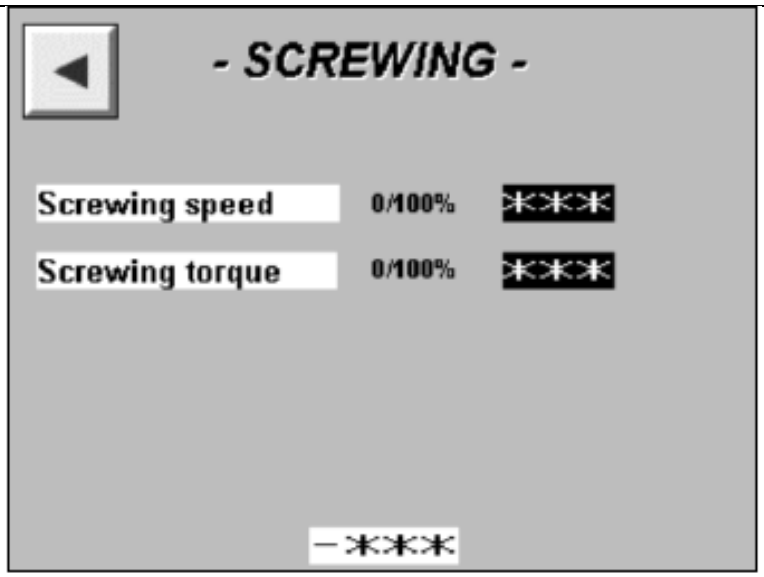
By touching the key ◄ it is possible to go back to the previous page, instead by touching the key ► it is possible to go back to the next page.



In this page there are modifiable fields by which the operator can manage the caps feeding:

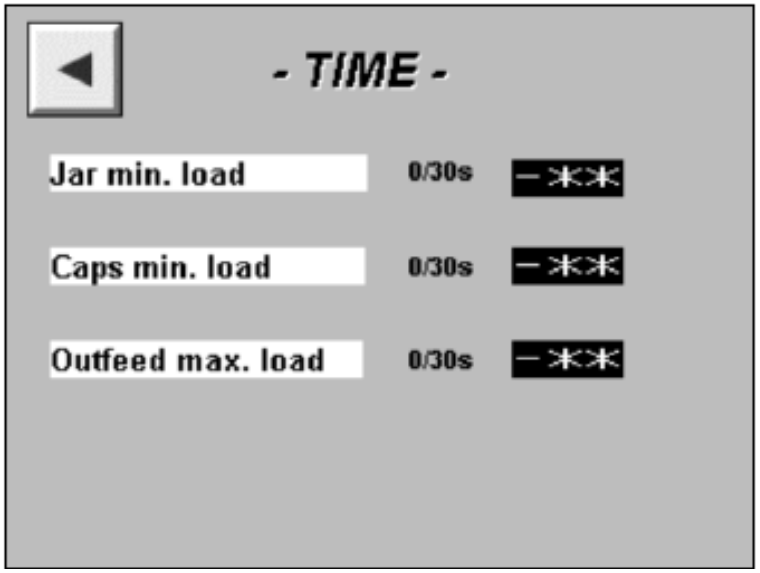
- Circular vibrator speed
- Feeding caps belt speed
- Pre screwing speed
- On and off screwing phase
- On and off vacuum picking phase
- On/off caps elevator time

In the bottom there is a field with the actual encoder value and a manual switch for the caps elevator. By touching the key ◄ it is possible to go back to the previous page, instead by touching the key ► it is possible to go back to the next page.



In this last settings page it is possible to modify the capping head action, in particular, the rotation speed and the deadlock couple. By touching the key ◄ it is possible to go back to the previous page.

TIMES

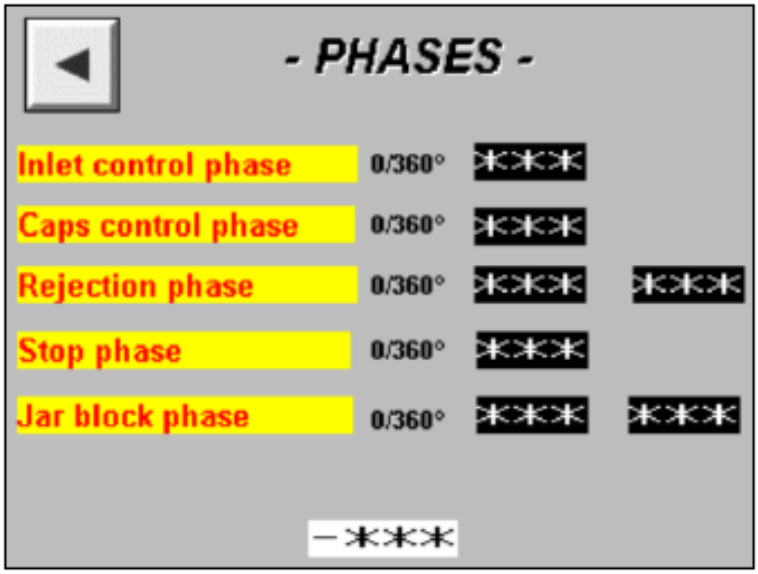


In this page the characteristic timings of the machines during running, can be modified:

- Minimum infeed load action time
- Minimum caps infeed load action time (on caps belt)
- Maximum outfeed load action time

By touching the key ◄ it is possible to go back to the previous page.

PHASES

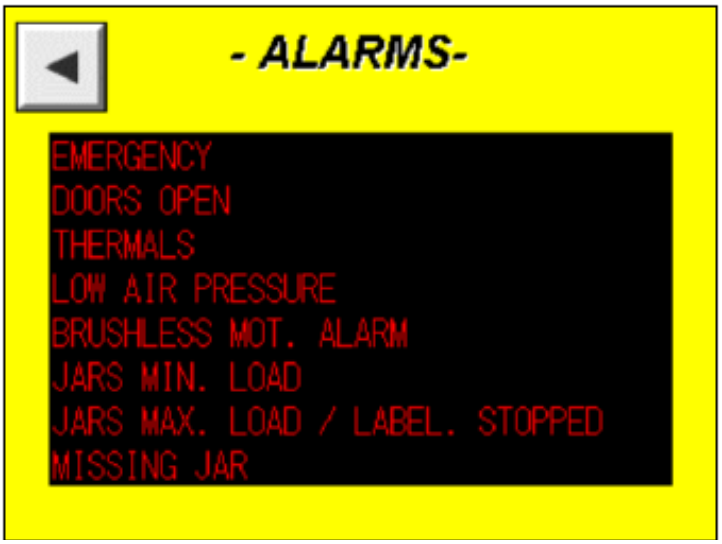


In this page it is possible to modify the action phases of the following functionalities (phases referred to the main encoder position):

- Jar inlet control phase
- Caps control phase
- Rejection phase (on & off)
- Machine stop phase
- Jar block for pre screwing/screwing phase

In the bottom there is a field with the actual encoder value. By touching the key ◄ it is possible to go back to the previous page.

ALARMS



This is the page of the active alarms. The possible ones are:

- *Emergency*
- *Doors open*
- *Thermals*
- *Low air pressure*
- *Brushless mot. Alarm*
- *Jars min. load*
- *Jars max. load/label. Stopped,*
- *Missing jar*
- *Caps min. load*
- *Brushless not positioned*
- *Belt not activated*
- *Caps elevator min. load*
- *Jar elevator min. laod,*
- *Unscrambler low air pressure*
- *Unscrambler safety*
- *Consecutive errors*
- *Product min load*
- *Jar upside down*

By touching the key ◀ it is possible to go back to the previous page.

7.9 ALARMS

During the working cycle in AUTOMATIC CONDITION two types of alarms can go on, the OPERATIVE and the SAFETY alarms. These are generated by the operative and safety control devices.

As far as the OPERATIVE alarms, when these go on the machine stops in the working position (in phase). When the SAFETY alarm goes on the machine stops immediately not in phase generally.

The ALARMS can be classified in OPERATIVE ALARMS or SAFETY ALARMS.

For any ALARMS before restart the machine the cause of the alarm (when necessary) must be removed, then press Reset Button and Start Button.

OPERATIVE ALARMS	DESCRIPTION
JARS MINIMUM LOAD	The machine stops in phase in case there are not enough jars in the infeed conveyor belt. The machine restart automatically when jars arrive newly.
JARS MAX LOAD/ LABEL STOPPED	The machine stops in phase in case there are too many jars on the outfeed conveyor belt (it could be that the labelling machine is stopped) or on the rejection belt. It restarts automatically when there is no more jars queue out of the machine.
MISSING JAR	The machine stops in phase for missing jar at the first pit of the star wheel. The machine restart automatically when jars arrive newly.
CAPS MINIMUM LOAD	The machine stops in phase in case there are not enough cover caps on the caps conveyor belt. The machine restarts automatically when caps arrive newly.
BELT NOT ACTIVATED	In case the start button on the machine is pressed and conveyor belts are off the machine doesn't start and this alarm appears. Switch on the conveyor belt by pressing the button on the control panel. Then press RESET button and then press START.

CAPS ELEVATOR MINIMUM LOAD	The machine stops in phase in case there are not enough caps in the prefeeder hopper. The machine restarts automatically when caps arrive newly.
JARS ELEVATOR MINIMUM LOAD	The machine stops in phase in case there are not enough jars in the prefeeder hopper. The machine restarts automatically when jars arrive newly.
UNSCRAMBLER LOW AIR PRESSURE	This alarm stops the machine in case of low air pressure inside the jars unscrambler. To remove the alarm recover the air pressure in the infeed pipe, than press RESET button and then press START.
CONSECUTIVE ERRORS	This alarm stops the machine after three consecutive errors during screwing and/or missing cap. To remove the alarm verify and remove the cause of errors. Then press RESET button and then press START.
PRODUCT MINIMUM LOAD	This alarm appears when the filling product inside the hopper is going to finish. To remove the alarm restore the product inside the hopper.
JAR UPSIDE DOWN	In case one jar is upside down just before the filling station this alarm appears and consequently the machine stops. Remove this jar then press RESET button and then press START.

SAFETY ALARMS	DESCRIPTION
EMERGENCY PUSH BUTTON	This alarm goes on immediately in case of the emergency button pressed. To restart the machine remove the eventual jar or cap jam and cream fallen, turn the emergency red button clockwise, put in phase the machine (if necessary), press RESET and then press START.
THERMAL PROTECTION	The thermal protections of motors go on when the electrical engines are stressed over their maximum power. This alarm stops the machine immediately (not in phase). To restart the machine, first recognize the alarm, RESET the correspondent thermal protection, put in phase the machine (if necessary) and press START.
DOORS OPEN	In case of doors opening, this alarm stops immediately the machine (not in phase). To restart the machine close the doors, reset the alarm, remove the eventual jar or cap jam and cream fallen, put in phase the machine (if necessary), and press RESET and then press START.
LOW AIR PRESSURE	This alarm stops the machine in case of low air pressure. To remove the alarm recover the air pressure in the infeed pipe, than press RESET button and then press START.
BRUSHLESS MOTOR ALARM	This alarm goes up if one of the brushless motors (product injection, prescrewing, screwing) is in alarm. Check and remove the cause, then RESET button and then press START.
BRUSHLESS NOT POSITIONED	This alarm appears when brushless motors involved into dosage are not in their zero position. Verify and position them correctly. Then press RESET button and then press START.
UNSCRAMBLER SAFETY	If the unscrambler is stuck for any reason, the system shows this alarm. Remove the cause, then press RESET button and START.

7.10 OPERATIVE PROCEDURE WITH MACHINE WORKING

After starting the machine the operator's intervention is limited:

Check the operative state of the machine, ensuring there are no anomalies, visible on the terminal display or through light or acoustic signals.

These anomalies will have to be removed according to what is described in this manual.

7.11 CONTROLS DURING WORK

ATTENTION!
If the line were obstructed (ex. stuck caps) immediately stop the work before intervening.

During normal working period of the machine check the production flow. This operation is done through the supervising system which highlights on the terminal display the main operative parameters, the alarm conditions and the presence of emergencies (alarms or active emergency buttons).

See the PANASONIC GT-32 manual for instructions. The control of the correct flow of the machine or jars can be done visually, making sure there are no interruptions or obstructions during the work process.

DANGER!
For any intervention of product in the machines the work process MUST be blocked momentarily and the machine must be worked upon while on STOP.

7.12 MACHINE TEST

After adjustments, a first test of the machine working is suggested to determine its correct functioning. During this phase it is possible to fine anomalies and make the necessary adjustments.

If all the operations have been done correctly and all the protections and accessories of the machine (signals, protections of the associated energy sources, etc.) have been started correctly and verified, the machine can be considered suitable for use.

ATTENTION!
Personnel authorized in the use of the machine must be previously instructed on the operative procedures and on the possible operations of the machine. They must know all commands and controls, particularly all safety devices, location and intervention mode of each one, as well as all emergency intervention procedures.

DANGER!
The machine must be used with all the securities on and functioning correctly. It MUST NOT work if any protection has been removed or tampered with.

DANGER!
Around the machine's working area only the authorized personnel is permitted to pass to the operative areas. Unauthorized personnel is not permitted passage near the machine or in areas not delimited as operative.

8. MACHINE SAFETY

To guarantee the right and regular packaging process and avoid every possible element of danger to the operators, the machine has electrical and mechanical safeties that intervene when they sense an anomaly in the functioning.

If the machine stops suddenly, the first thing to do is check all safety devices to see if the stop was caused by one of these devices. If this were the case, the cause that determined the intervention must be eliminated before restarting the machine and returning to production.

The electrical safety that intervened is displayed on the monitor.

8.1 EMERGENCY STOP OF THE MACHINE

The **FC-1** filling capping machine has emergency devices and buttons (big red button).

When pressing the emergency button the machine stops instantly in the position of the stop and cuts electricity supply to the machine.

To restart the machine remove from the machine any products that may be stuck or out of position.

After an emergency **STOP**, the functions of the machine need to be reset, rotating and extracting the emergency red button then pressing the blue **RESET** button and finally the green **START** button.

Keep in mind that emergency stopping of the machine can leave some parts still at risk (ex. some parts inside the electrical cabinet).

ATTENTION!
Remember that improper use of the red emergency button must be avoided. The emergency button must be pressed ONLY WHEN THE SAFETY OF THE OPERATOR IS IN DANGER.

Never use the **EMERGENCY BUTTON** to make a simple stop of the machine.

8.1.1 Stop and emergency buttons

It's important to clarify the difference between the **STOP** and the **EMERGENCY** buttons:

- The **STOP** button stops the machine in phase, only when it has finished the work cycle;
- The **EMERGENCY** button blocks the machine instantly in the position it is in.

It is therefore necessary to use the **STOP** button when you want to end the working cycle, freeing the mechanical devices and the accessories from each operative position.

After using the **EMERGENCY** button (which blocks all devices and mechanical organs instantly) it may be necessary to clean the machine's components to unblock the pieces to be worked upon still present on the machine. This button has to be used only in emergency conditions.

8.2 SAFETY PROTECTIONS THAT CAN BE OPENED

The operative zone of the machine, where the operator's intervention is necessary during the production phases, fine tuning or maintenance have safety protections that can be opened with safety microswitches. To go inside the machine it is necessary firstly stop the machine with the stop button, and then open the protections.

Whenever the protections are opened while the machine works, it stops immediately, as if the emergency button had been pressed, causing the same effects.

To restart the machine do as follows:

- Remove from the machine product stuck or out of position;
- Close the safety protections that are open;
- Press the Reset button;
- Press the Start button;

8.3 SAFETY SENSOR'S POSITIONS

The machine has a series of safety sensors able to control the safety of those who work on the machine. They are connected in a way that bring about the blocking of the machine.

ATTENTION!
It is absolutely forbidden to tamper or exclude the safety devices, it may result in severe risks for the operator.

8.3.1 Microswitches

These microswitches are present in correspondence with all the protection screens that can be opened to get in the machine during maintenance, and/or during production when needed (ex. Jar or cap stuck).

8.4 FIRST AID OF AN INJURED PERSON

If used correctly the machine does not have high risks. In case of injury the probable causes are due to the removal of safety protections, that is, the injured probably followed a wrong procedure.

Not knowing beforehand the cause of the injury, the persons on site will have to determine what will be the best way to give first aid to the injured person.

In any case the machine must be stopped in emergency, the injured person must be given first aid and removed from the danger source which could be due to:

- Contact with power sources (electrical source);
- Crushing of a body part in the mechanisms of the machine;
- Crushing of a person under suspended loads, fallen accidentally or by erroneous operations;
- Contact or nearness to heat sources;
- etc.

Immediately after removing the injured person from the source of risk, **call medical assistance for the necessary aid**. In many cases (as in electrocution) the first-aider must be able to intervene with specific practices (mouth to mouth resuscitation, cardiac resuscitation, etc.).

Workers must take periodic first aid courses with specialized medical personnel.

8.5. MOTOR THERMAL PROTECTION

When during start or during the closing phase, there should be anomalous functioning conditions of the motor, the thermal protection goes off and the machine stop is displayed on the PANASONIC terminal of the filling capping machine.
The motor thermal protections are two (fig. 8-1) and are inside the electrical cabinet of the FC-1 filling capping machine.

Legend
1 – QMF thermal protection for main motor.
2 – QM10 thermal protection for caps elevator motor.

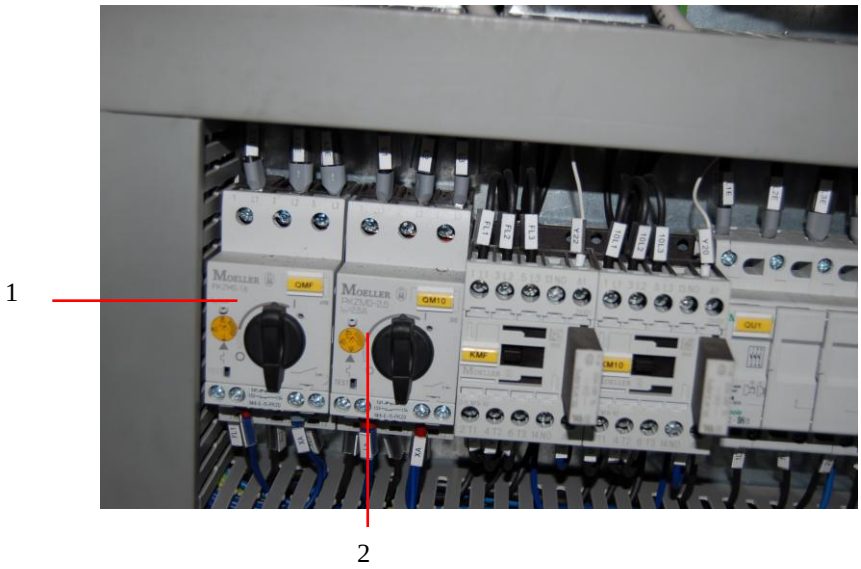


Figure 8-1 Thermal protection.

8.6 TORQUE LIMITER MAIN MOTOR.

The mechanical torque limit in (1 fig. 8-2), protects the machine from overloads that could break some organs, like a foreign object between the organs, blockings, or other functional anomalies that cause major resistance.

In case of anomalies that set off the torque limiter the machine stops but the motor still runs.

To restart the normal function cycle, the causes of the inconvenience must be eliminated.

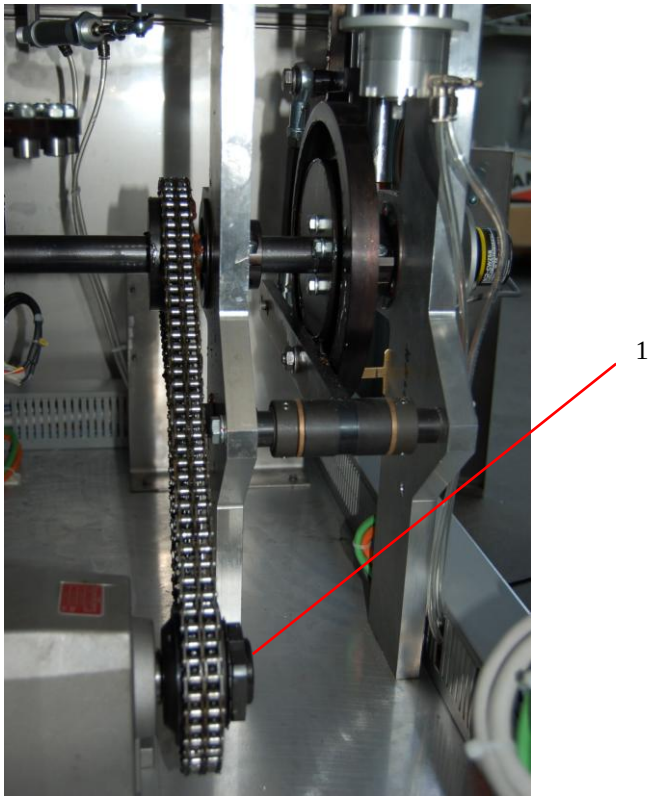


Figure 8-2 Torque limiter main motor.

9. SIZE PARTS CHANGE

9.1 OVERVIEW

The change of parts operation of the different products to use on the automatic machine, is without a doubt one of the most delicate and important operations to make, to have the machine function at its best.
The change of parts is the substitution and the adjustment of those parts of the machine that were constructed according to jars and caps dimensions.

The change of parts is needed every time there are relevant differences in jars to be closed.
When the differences are small the changes are reduced.

The change of parts of the automatic filling capping machine **FC-1** is very simple and is done adjusting with marked references and in some cases, substituting parts.

Before starting the change of parts, dismantle the parts that must be substituted and put them away.

At each change of parts, before making adjustments, check which adjustments are necessary to avoid time loss.

9.2 SIZE-CHART INSTRUCTIONS

To make the size change-over easy all parts are marked with a color that refers to the relevant size of jar.
Some mechanical parts are common to all sizes and are not to be replaced.
To change from one size into another one, it is necessary replace all the parts bearing a different reference color.

9.3 SIZE-CHART OVER CHARTS

	SIZE N° 1	SIZE N° 2	SIZE N° 3	SIZE N° 4
JARS SIZE	Ø 50 mm	Ø 70 mm	Ø 60 mm	Ø 60 mm
COLOR MARKS	GREEN	RED	YELLOW	BLACK

9.4. CHANGE OF PARTS OPERATIONS

To do this change of parts proceed as follows:

9.4.1. Contrast and starwheel for jars.

Substitution:

1. Loosen up the knobs that block the starwheel and the contrast;
2. Disconnect the cable on the contrast just below the Pick & Place;
3. Remove the starwheel and its contrast;
4. Place the new starwheel and contrast enable to deal with the new jar size;
5. Connect the cable on the contrast just below the Pick & Place;
6. Tighten the knobs of the starwheel and the contrast.

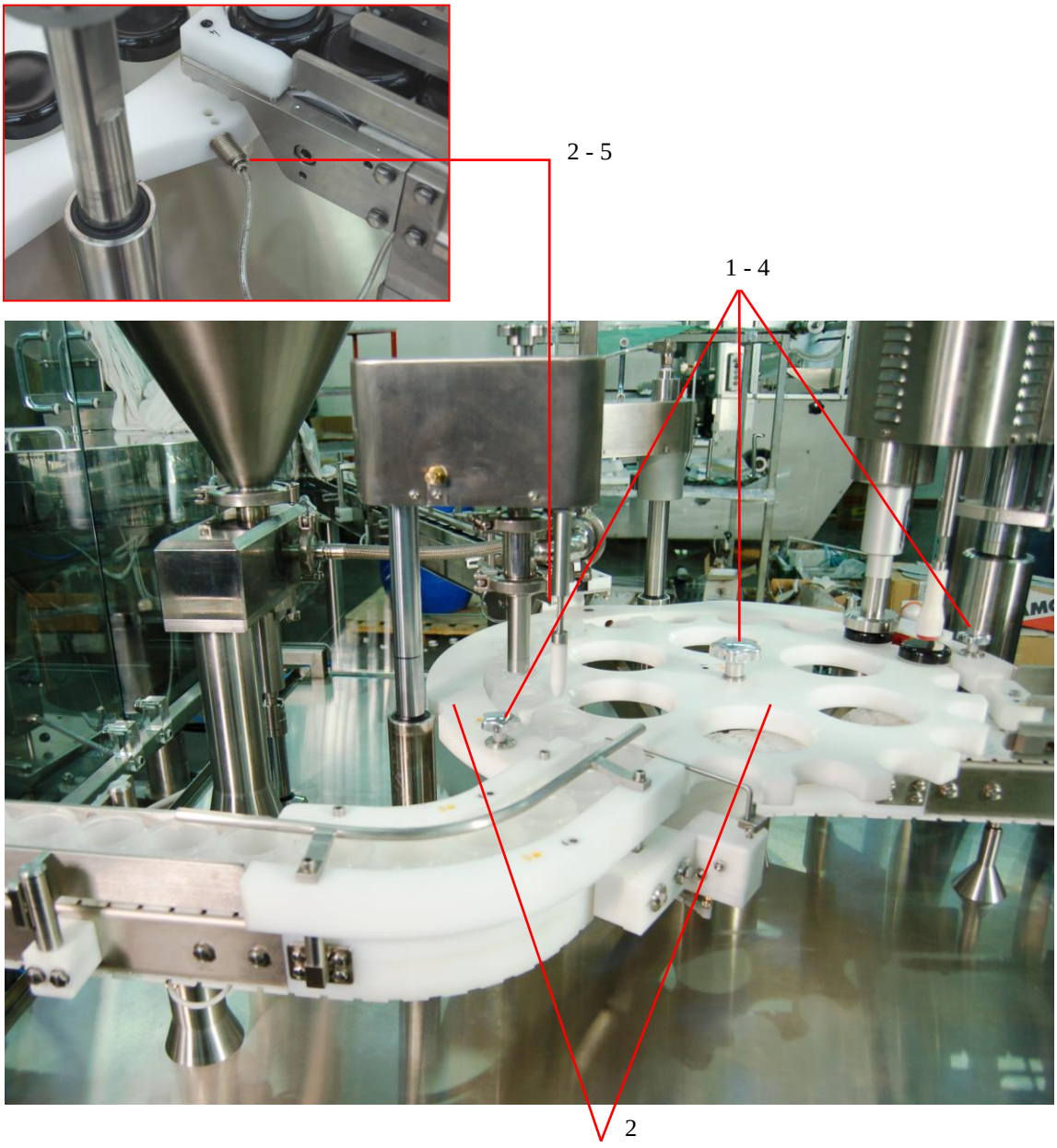


Figure 9-1 Size parts change: star wheels.

9.4.2. Feeding and outfeeding conveyor belts

Adjustments:

1. Loosen up knobs blocking jars aligning guide of the feeding and outfeeding conveyor belt;
2. Align guides of the conveyor belt, placing between them a certain amount of jars of the new size, making sure that it allow jars to introduce freely in the pit of the star wheel;
3. Tighten again the knobs that clip the guide;

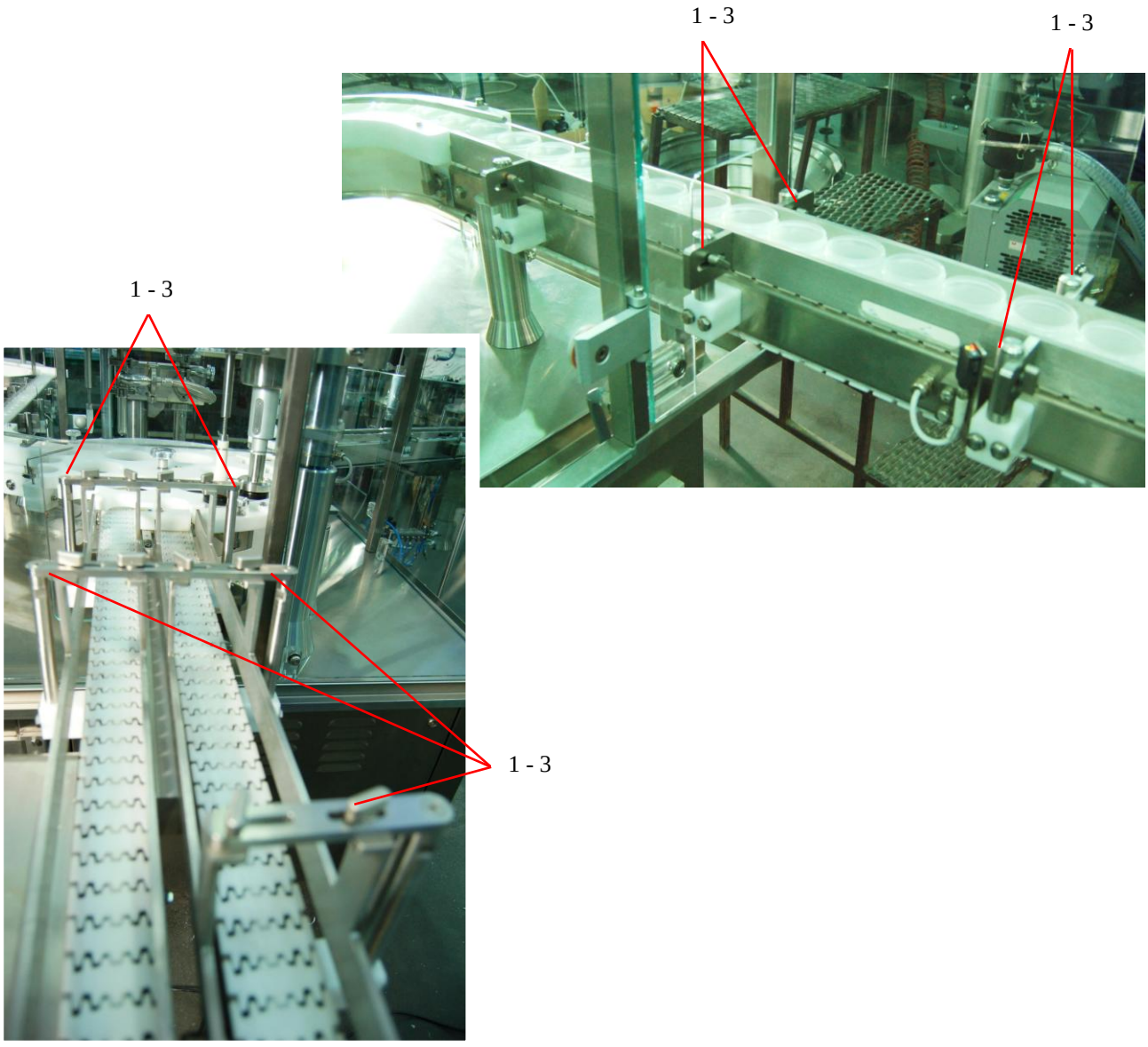


Figure 9-2 Size parts change: conveyor belt.

9.4.2.1 Entrance guide

Substitution:

1) Lift up the entrance guide;
2) Place the entrance guide enables to deal with the new jar size.

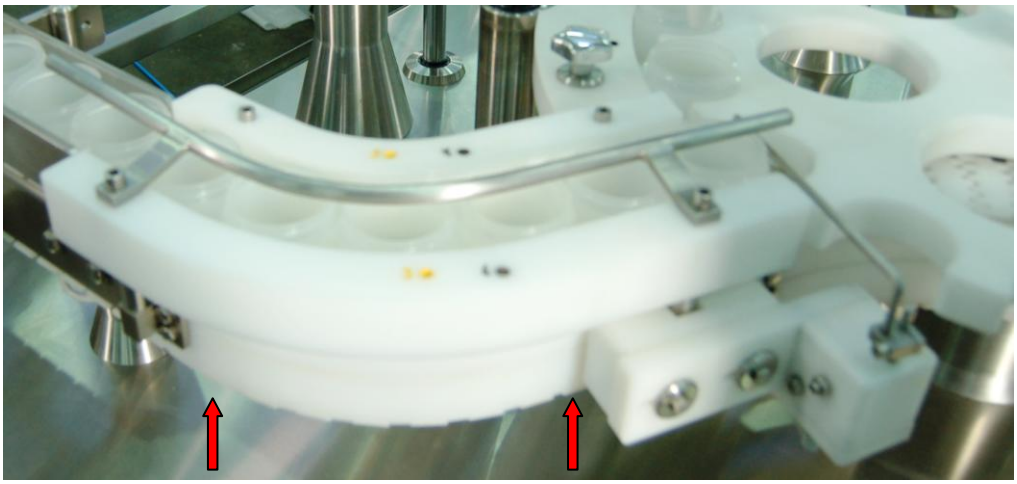


Figure 9-3 Size parts change: Entrance guide.

9.4.3. Jar filling station.

By control panel it is possible to adjust speed and stroke of dosing station and the quantity of product to dose.
It is possible to make also a manual adjustment as follows:

1. Loosen the screw inside the knob;
2. Loosen the screws and displace the carter
3. Make adjustments turning the screw located in the low side on the back
4. Place the carter and tighten all screws and knob.

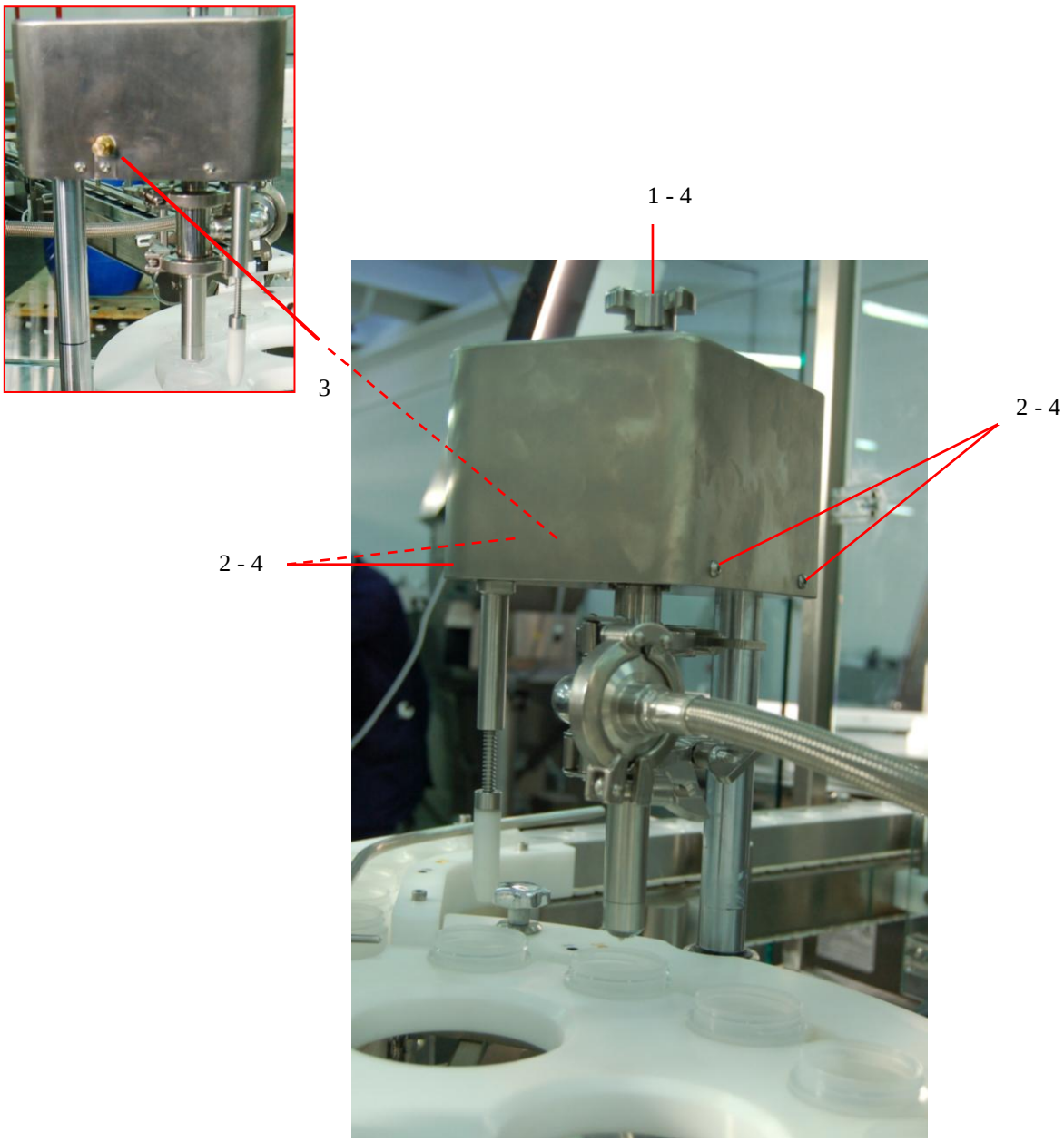
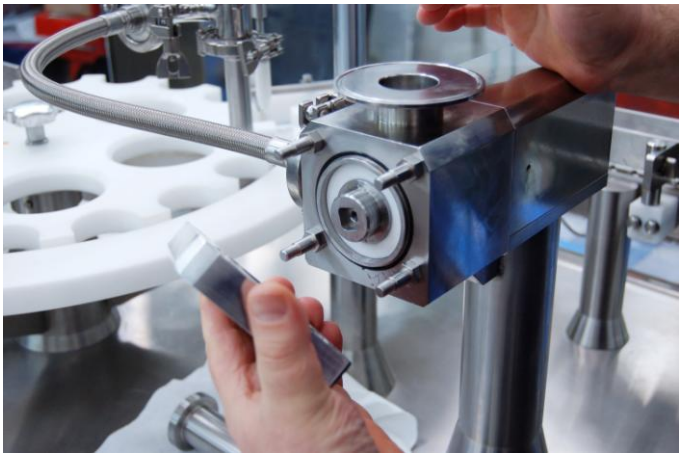


Figure 9-4 Size parts change: jar filling station.

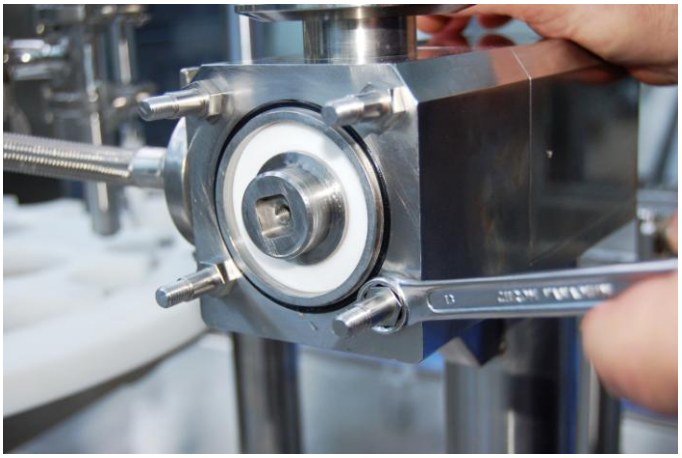
9.4.3.1. Pictures sequence for dosing group cleaning

1) Loosen the nuts of the support that holds the syringe.

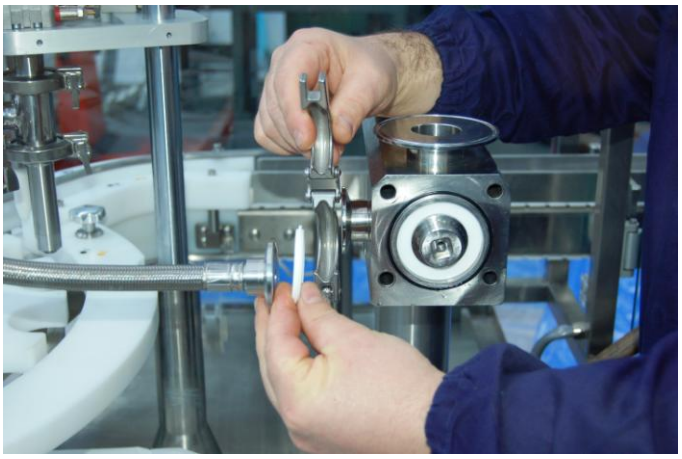
2) Loosen the shown knobs and remove the part.



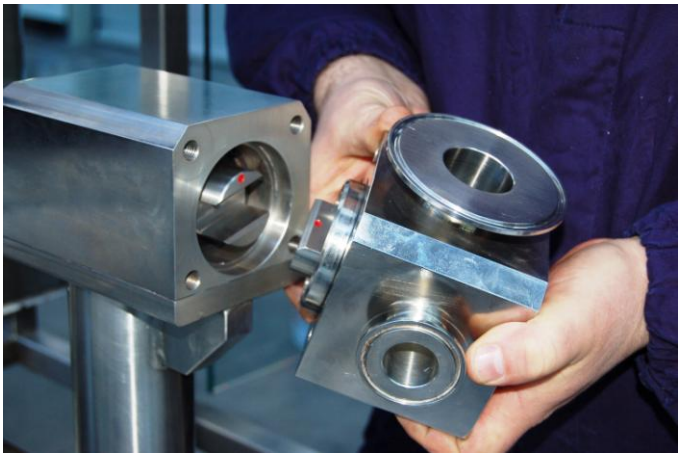
3) Loosen the screws with wrench n° 13 and remove them.

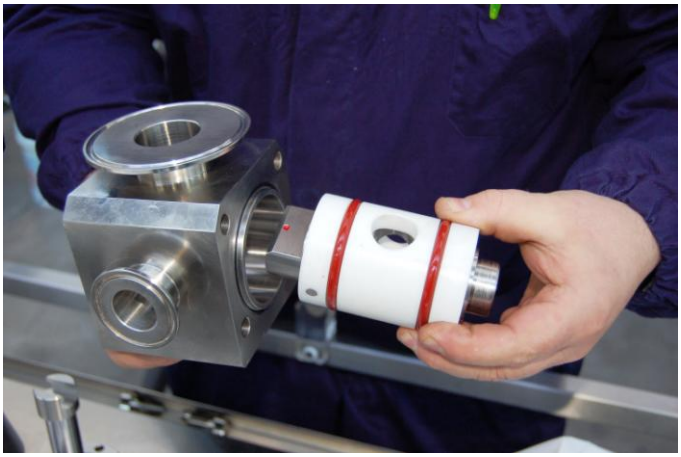


4) Disassemble the pipe that connect the syringe group with the dosing nozzle and clean all parts.



5) Disassemble the valve group and clean all parts.





6) Remove the final part of pipe feeding product.

7) Loosen the dosing nozzle support with wrench n° 8 and clean all parts.

Repeat the sequence in backward to reassemble the parts.
Make attention that the parts relative to the point 5) are assembled aligning the side marked by red point of reference.

9.4.4. Caps size parts change

9.4.4.1 Caps vibrating bowl

Adjustments:

1. Loosen blocking lever and adjust height of circular vibrator support column;
2. Turn the ring nut (with knob) until the caps outgoing lane of the vibrating bowl is in line with the entrance of caps conveyor belt, permitting a free passage from the vibrating bowl to the conveyor belt;
3. Tighten the column blocking lever;

4. When the machine has to deal with the smaller cap it is necessary to adapt the exit guide of vibrating bowl by locating a proper part made in stainless steel.

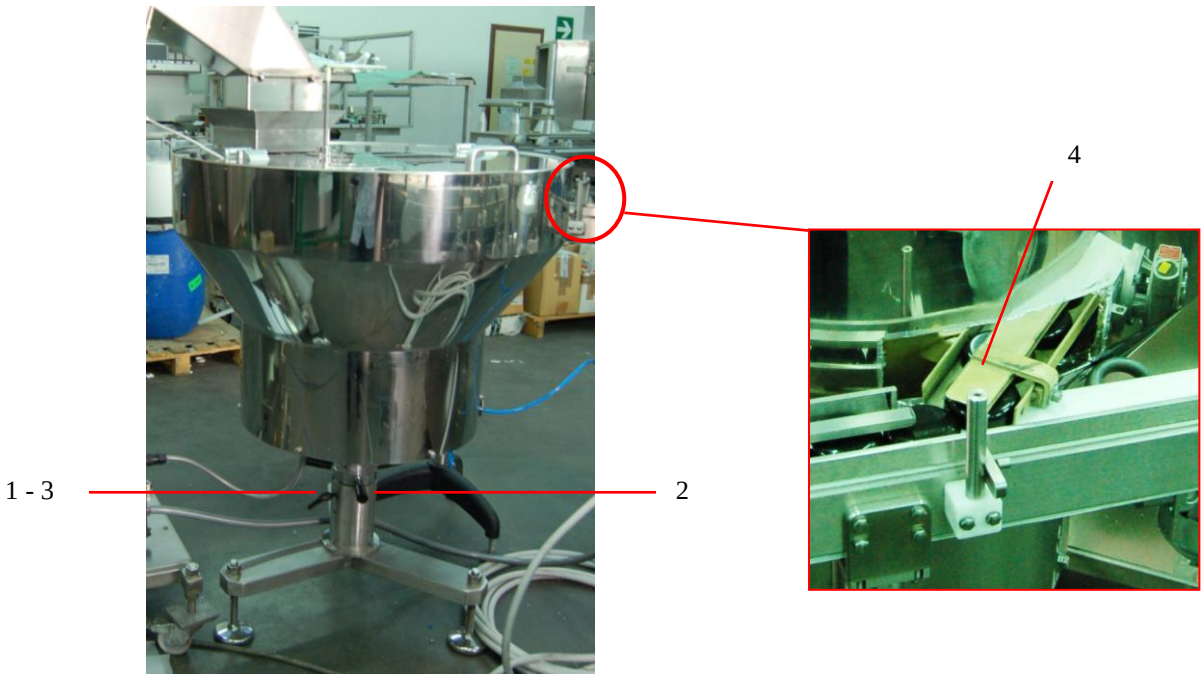
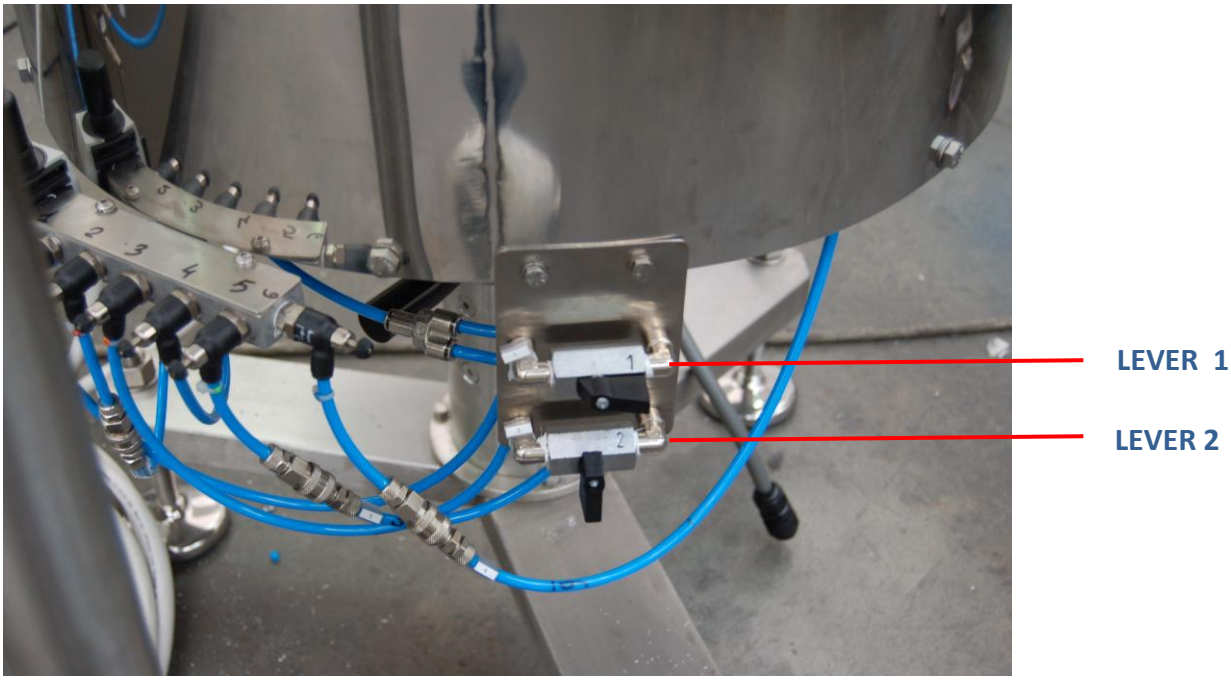


Figure 9-5 Size parts change: caps vibrating bowl.

9.4.4.1.1 Air pressure regulation for vibrating bowl



JARS SIZE	LEVER 1	LEVER 2
Size n° 1 Ø 50 mm	**OPEN**	***CLOSED***
Size n° 2 Ø 70 mm	***CLOSED***	**OPEN**
Size n° 3 Ø 60 mm	**OPEN**	***CLOSED***
Size n° 4 Ø 60 mm	**OPEN**	***CLOSED***

Table 9.1 – Air pressure regulation for vibrating bowl

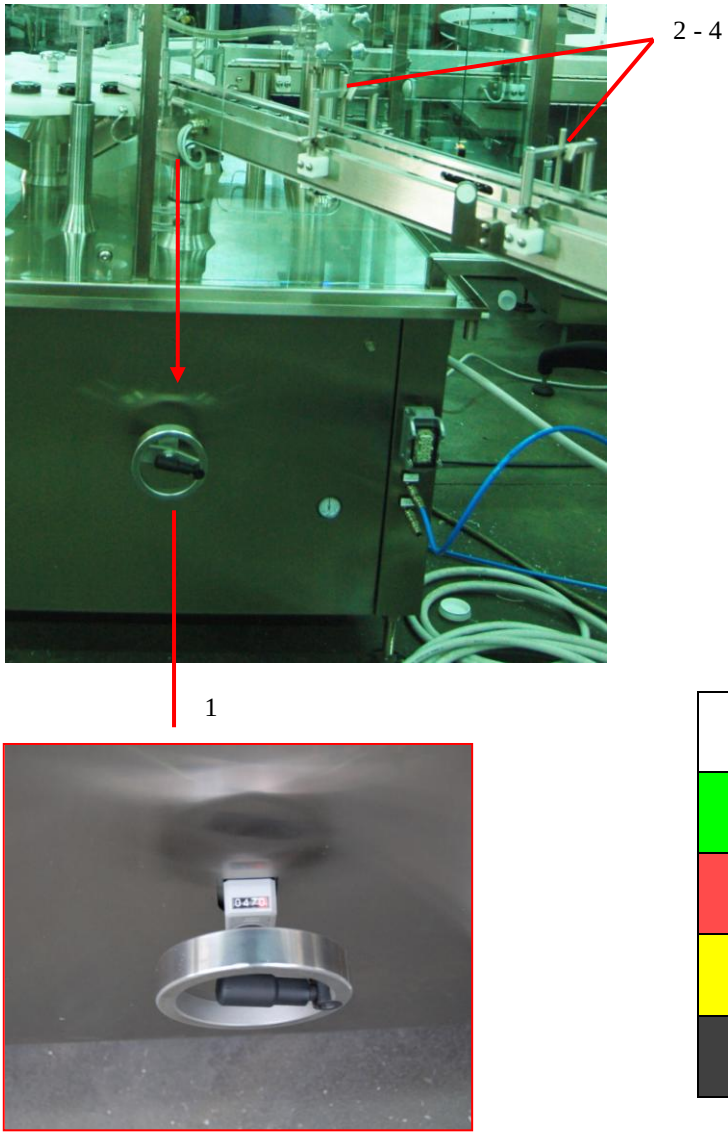
9.4.4.2 Conveyor belt for caps

Adjustments:

1. Turning the hand wheel to adjust in height the support on which the caps conveyor belt leans. Behind the hand wheel there is a rev counter to make easier the setting. In the table 9.2 are indicated the setting value for each jar size.
2. Loosen up knobs blocking caps aligning guide of the conveyor belt;
3. Align guides of the conveyor belt, placing between them a certain amount of caps of the new size, making sure that they move freely in the conveyor;
4. Tighten again the knobs that clip the guide;

Substitution:

5. Lift up the conveyor terminals release and substitute it in according with plastic caps dimensions;



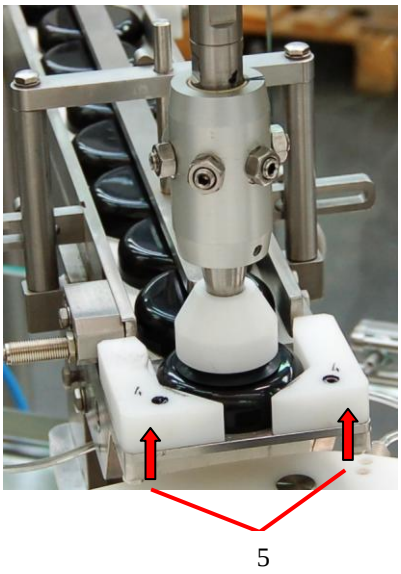


Figure 9-6 Size parts change: conveyor belt for caps.

JARS SIZE	CAPS CONVEYOR BELT HEIGHT
Size n° 1 Ø 50 mm	88
Size n° 2 Ø 70 mm	38
Size n° 3 Ø 60 mm	35
Size n° 4 Ø 60 mm	35

Table 9.2 – Adjusting height for caps conveyor belt

9.4.4.3 Pick & Place

Adjustments:

1. Loosen central screw that blocks the lever;
2. Displace the unit up or down in correspondence to the relevant color marks present at the top of group and referring to the size part change the machine as to deal with.

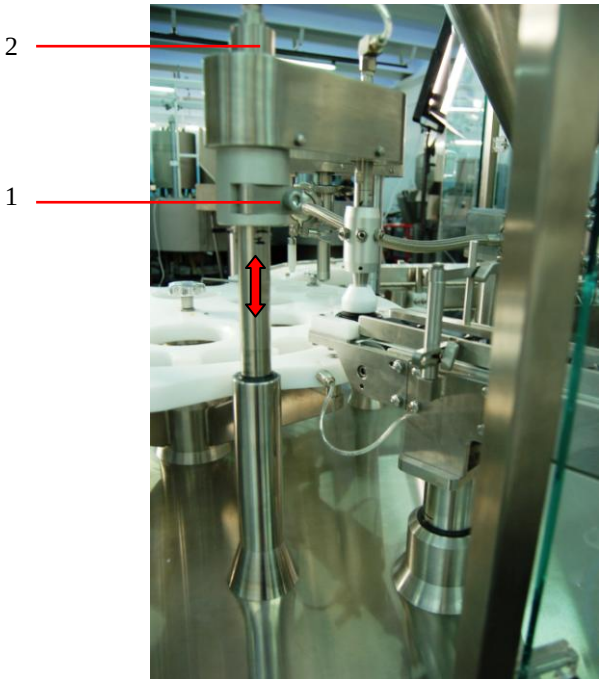


Figure 9-7 Size parts change: Pick & Place

9.4.5 Capping station

Substitution:

1. Unscrew the screwing head by turning it counter clockwise and change it according to the size part;
2. Unscrew the screw that holds the rotation blocking device in place and change it in according to the new jar size. Retighten the screws.

Adjustments:

3. Turn the lever of the vertical movement block of the screwing group support column;
4. Place vertically the samples referring to the size part in the space between the group and the support of the screw adjusting height;
5. With the steering wheel adjust the capping group height according to the sample size;
6. Place a jar in the starwheel pit and with the manual command (jog) make it move under the capping station, checking the cap is correctly screwed on the jar mouth;
7. Block again column block screw;
8. Displace the lever that separates rejected jars run and change it in according to the new size part:

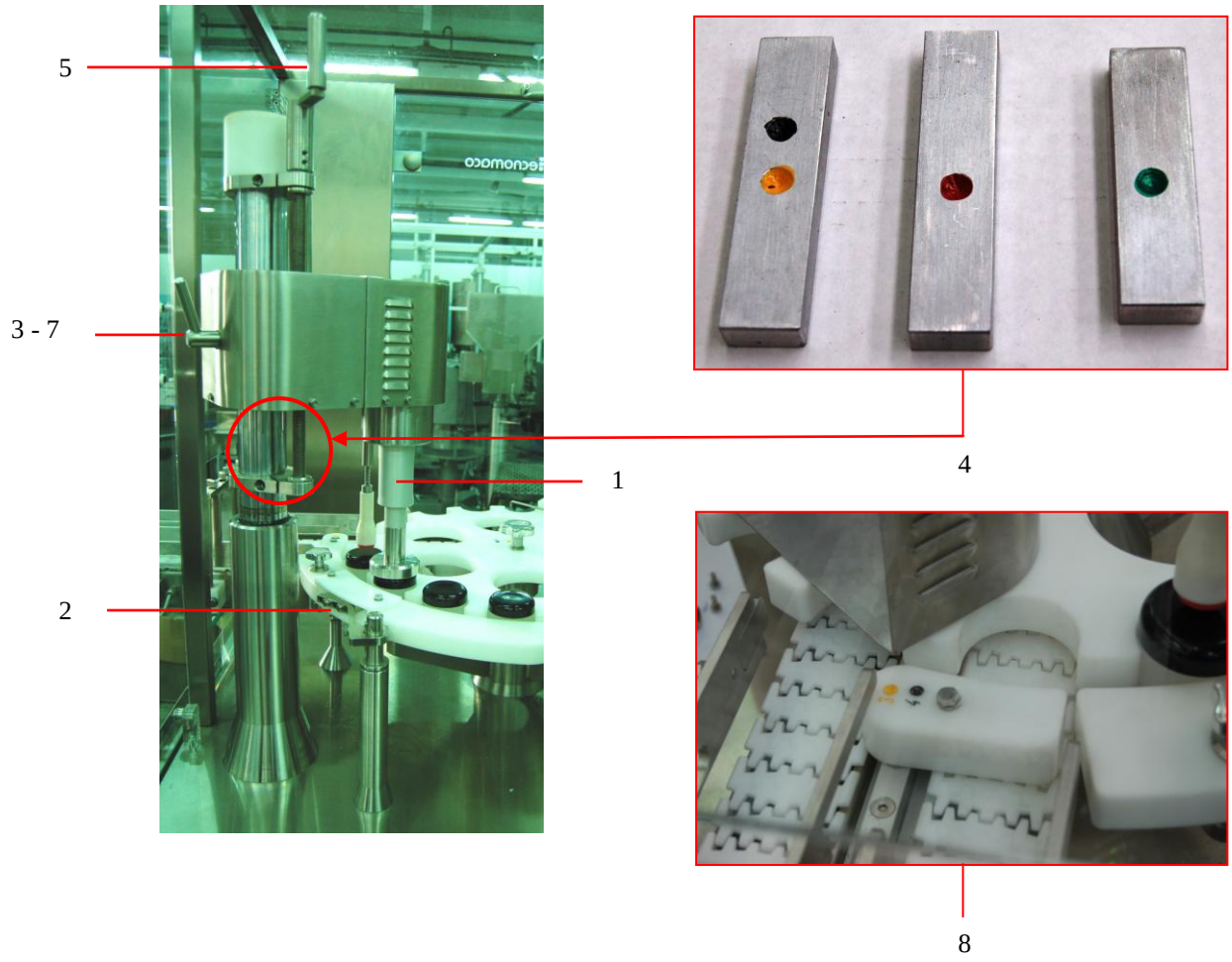
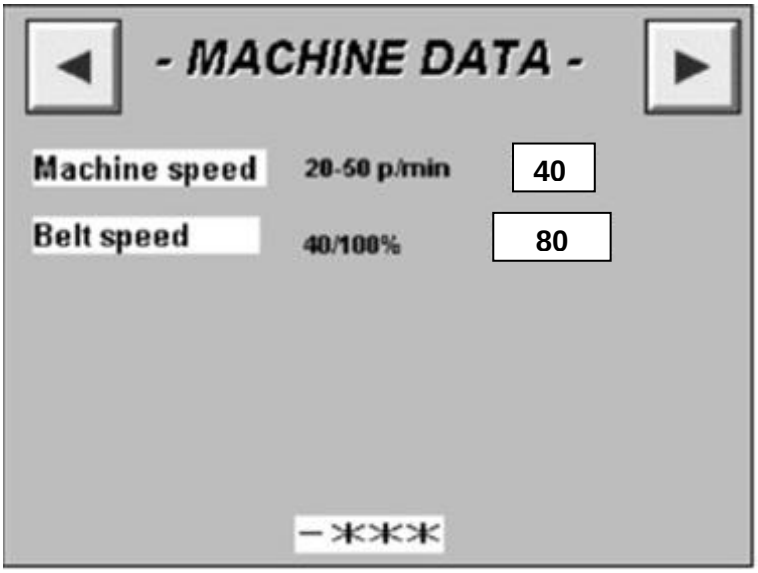


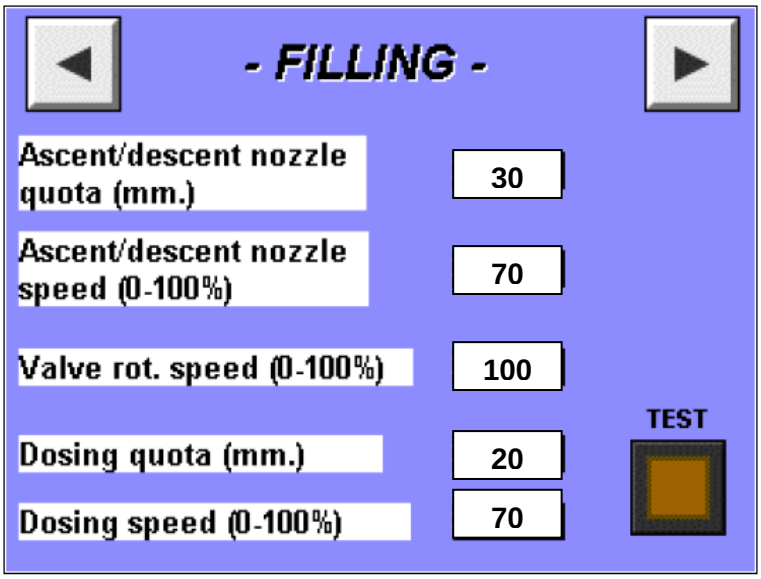
Figure 9-8 Size parts change: cap insertion group.

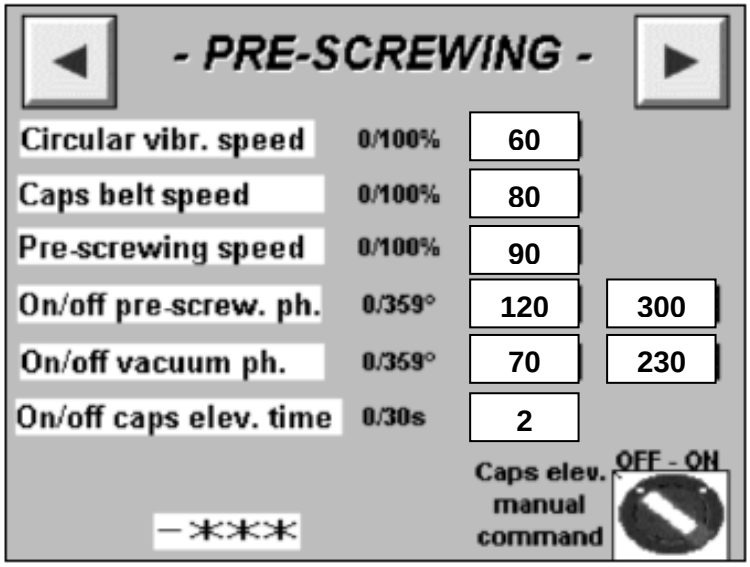
9.5 SIZE CHANGE-OVER: CONTROL PANEL SETTING

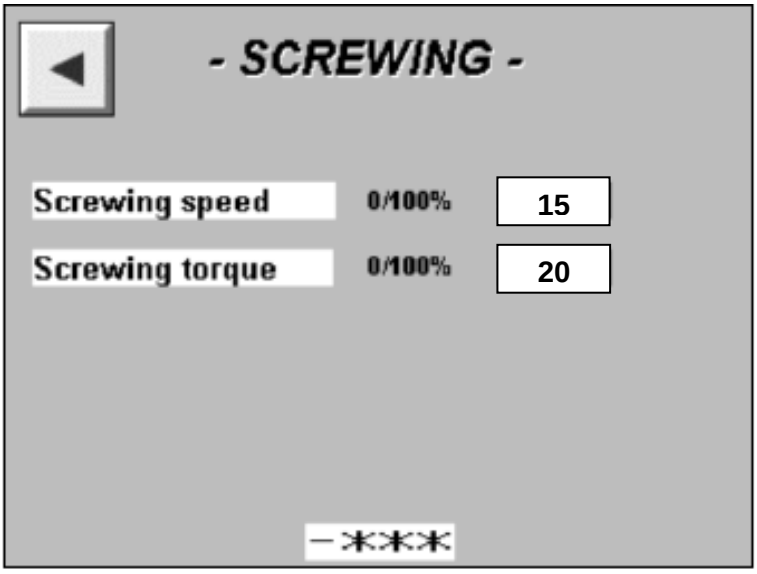
To make the control panel setting easy for each jar size, the machine data are listed in the following pages.

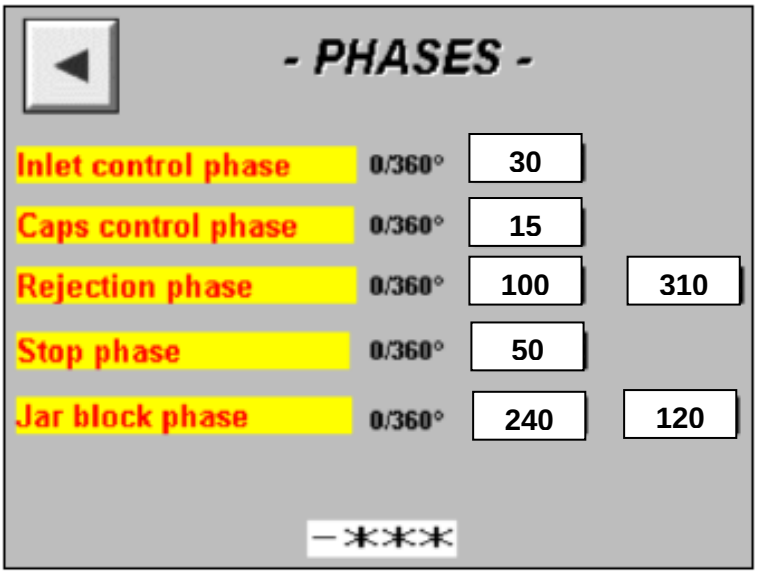
9.5.1. JARS SIZE: Size n° 1 (Color marks: GREEN)



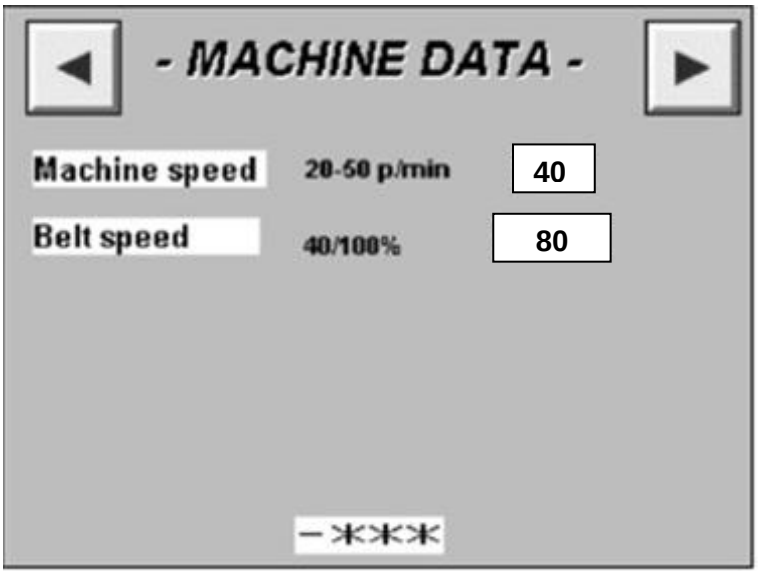


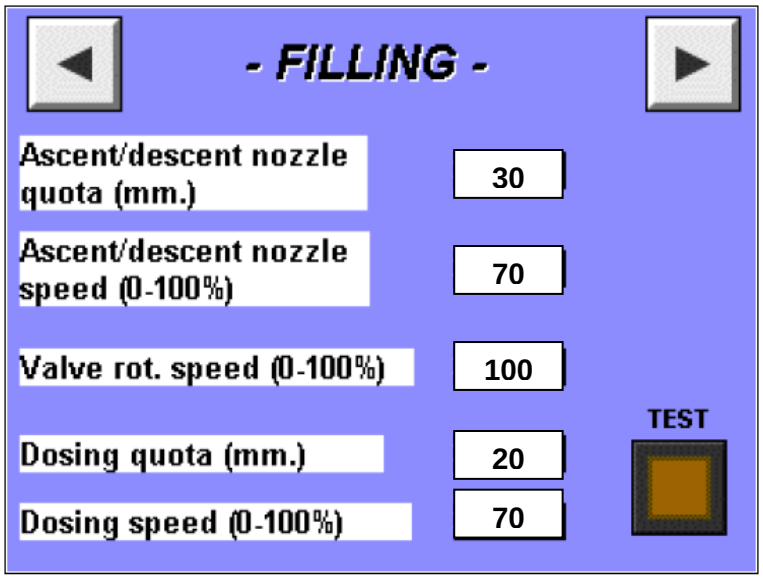

- PRE-SCREWING -
Circular vibr. speed
0/100%
60
Caps belt speed
0/100%
80
Pre-screwing speed
0/100%
90
On/off pre-screw. ph.
0/359°
120
300
On/off vacuum ph.
0/359°
70
230
On/off caps elev. time
0/30s
2
Caps elev. manual command
OFF - ON

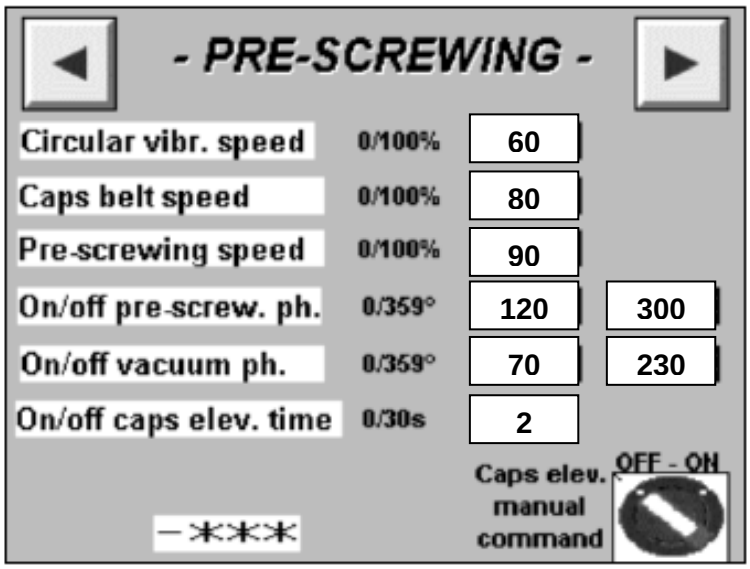

- SCREWING -
Screwing speed
0/100%
15
Screwing torque
0/100%
20

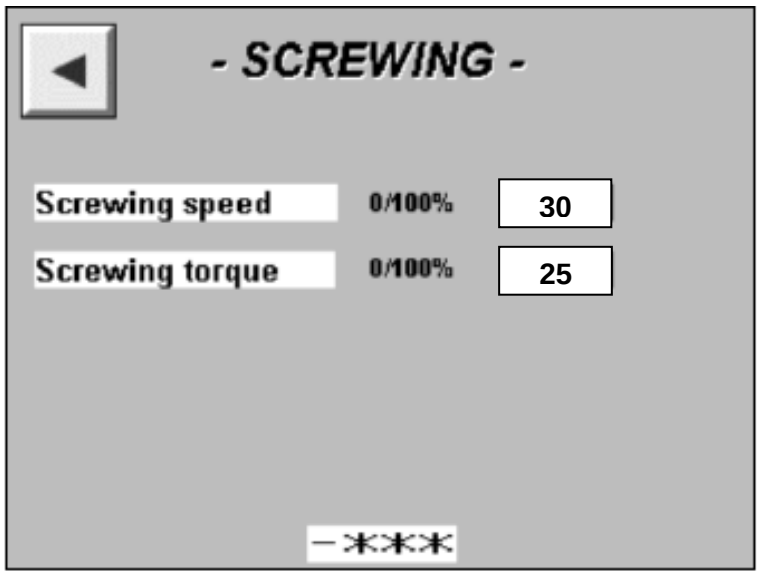

- PHASES -
Inlet control phase
0/360°
30
Caps control phase
0/360°
15
Rejection phase
0/360°
100
310
Stop phase
0/360°
50
Jar block phase
0/360°
240
120

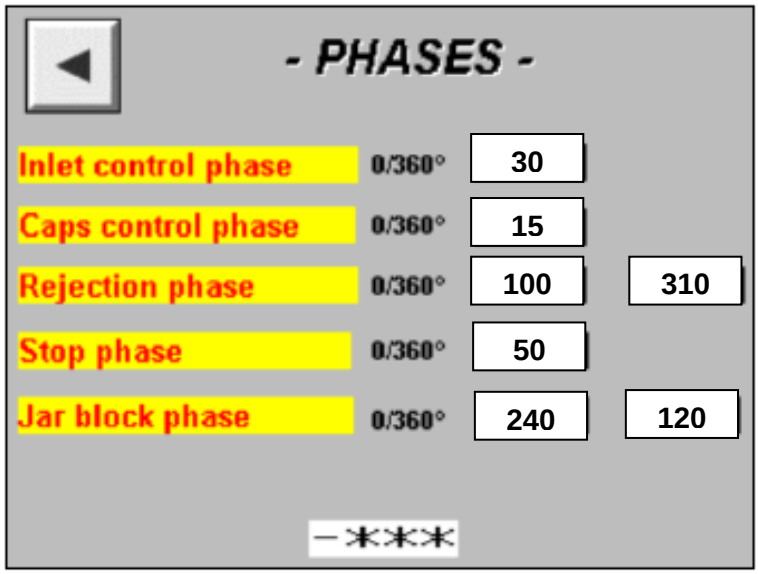
9.5.2. JARS SIZE: Size n° 2 (Color marks: RED)



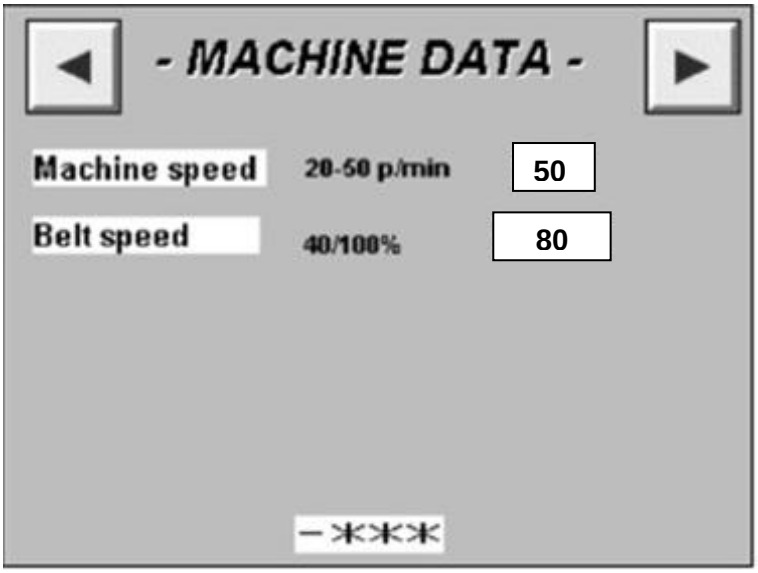


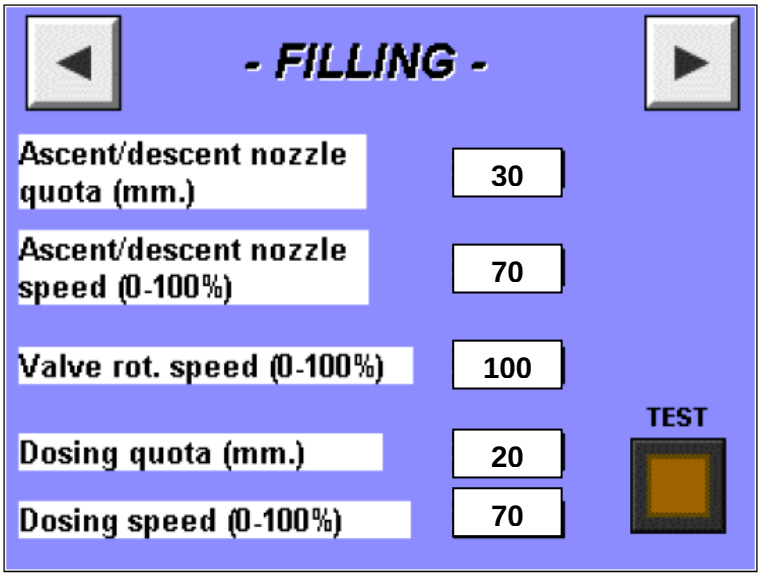

- PRE-SCREWING -
Circular vibr. speed
0/100%
60
Caps belt speed
0/100%
80
Pre-screwing speed
0/100%
90
On/off pre-screw. ph.
0/359°
120
300
On/off vacuum ph.
0/359°
70
230
On/off caps elev. time
0/30s
2
Caps elev. manual command
OFF - ON

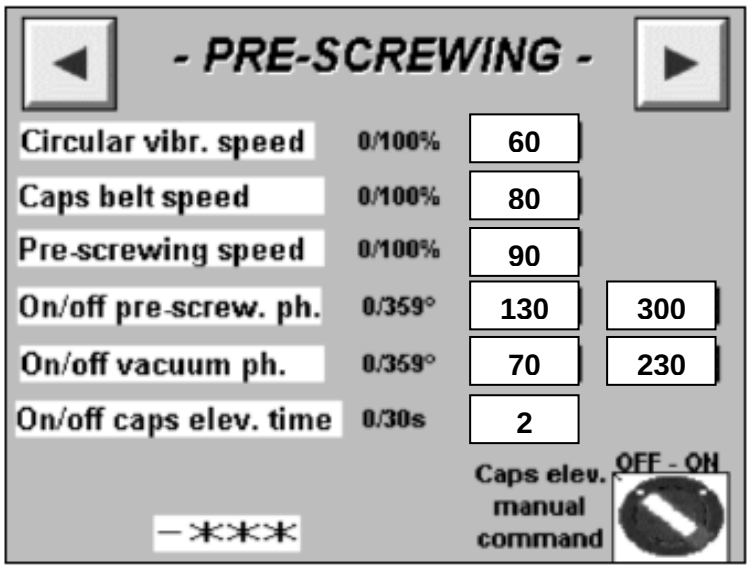

- SCREWING -
Screwing speed
0/100%
30
Screwing torque
0/100%
25

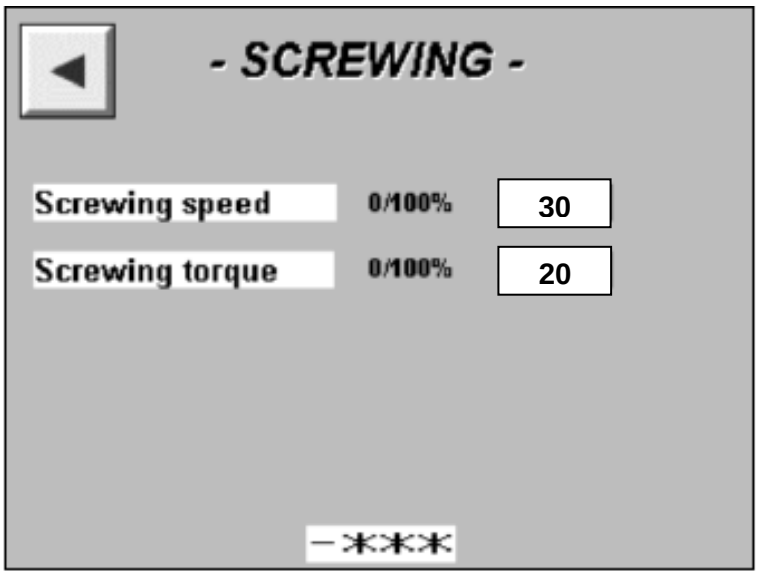

- PHASES -
Inlet control phase
0/360°
30
Caps control phase
0/360°
15
Rejection phase
0/360°
100
310
Stop phase
0/360°
50
Jar block phase
0/360°
240
120

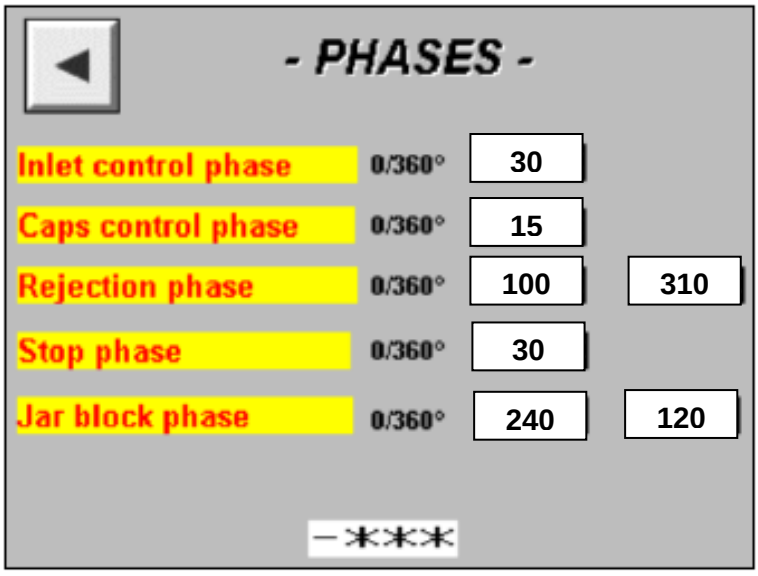
9.5.3. JARS SIZE: Size n° 3 (Color marks: YELLOW)



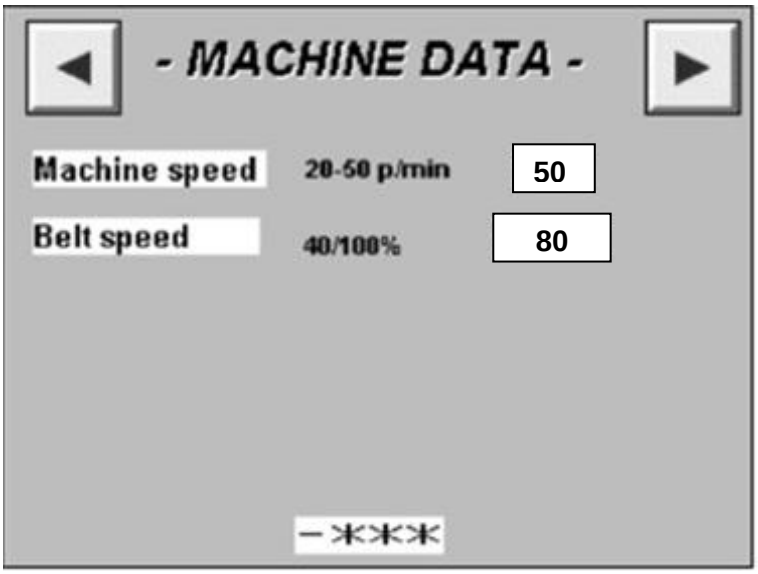


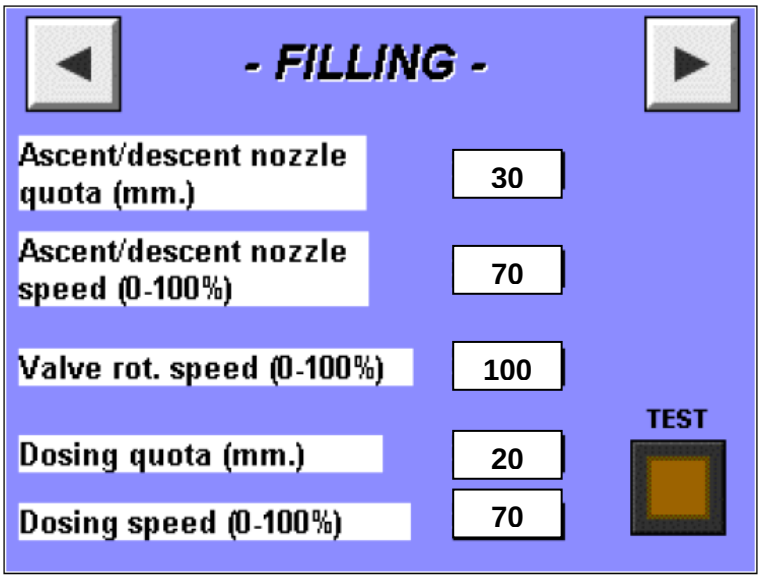

- PRE-SCREWING -
Circular vibr. speed
0/100%
60
Caps belt speed
0/100%
80
Pre-screwing speed
0/100%
90
On/off pre-screw. ph.
0/359°
130
300
On/off vacuum ph.
0/359°
70
230
On/off caps elev. time
0/30s
2
Caps elev. manual command
OFF - ON

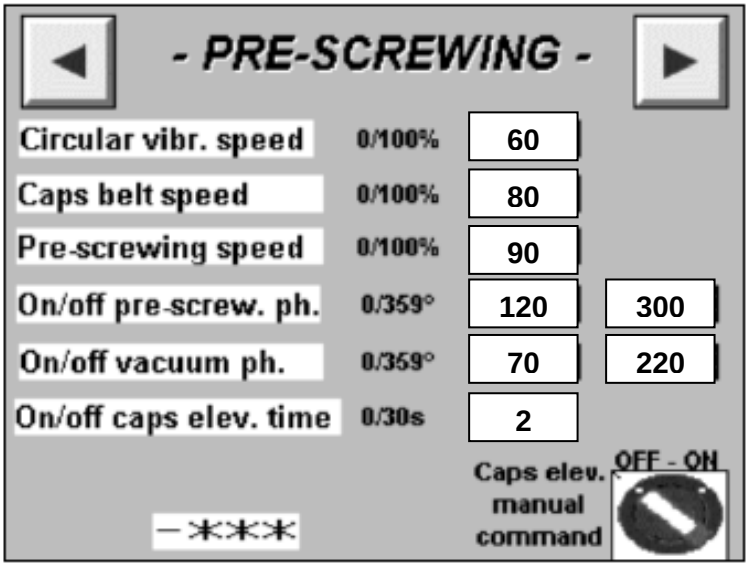

- SCREWING -
Screwing speed
0/100%
30
Screwing torque
0/100%
20

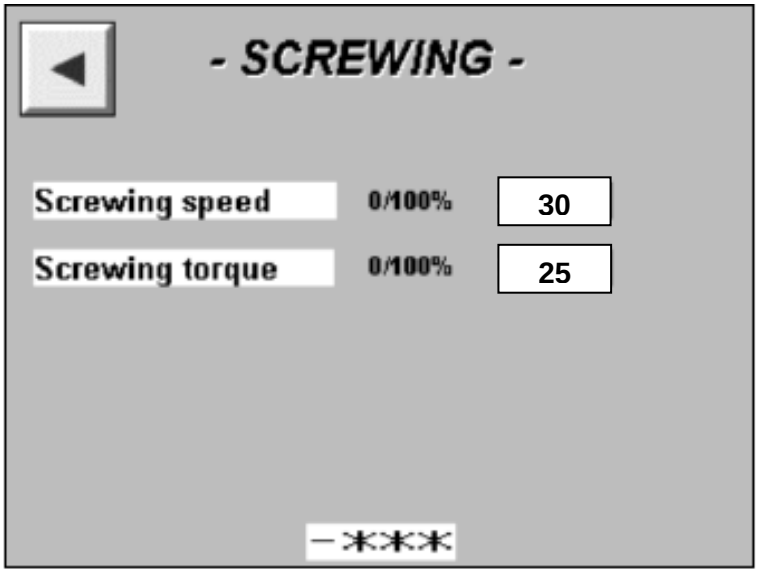

- PHASES -
Inlet control phase
0/360°
30
Caps control phase
0/360°
15
Rejection phase
0/360°
100
310
Stop phase
0/360°
30
Jar block phase
0/360°
240
120

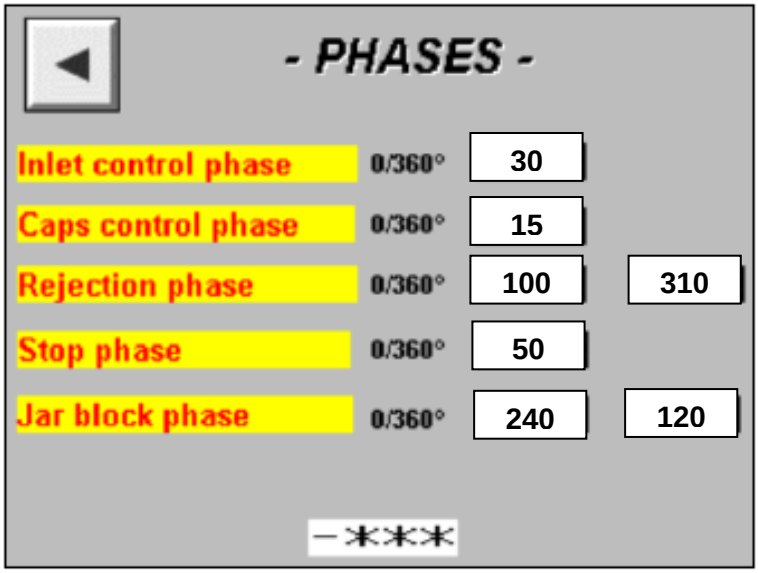
9.5.4. JARS SIZE: Size n° 4 (Color marks: BLACK)






- PRE-SCREWING -
Circular vibr. speed
0/100%
60
Caps belt speed
0/100%
80
Pre-screwing speed
0/100%
90
On/off pre-screw. ph.
0/359°
120
300
On/off vacuum ph.
0/359°
70
220
On/off caps elev. time
0/30s
2
Caps elev. manual command
OFF - ON


- SCREWING -
Screwing speed
0/100%
30
Screwing torque
0/100%
25


- PHASES -
Inlet control phase
0/360°
30
Caps control phase
0/360°
15
Rejection phase
0/360°
100
310
Stop phase
0/360°
50
Jar block phase
0/360°
240
120

10. MAINTENANCE

10.1. OVERVIEW

The operations described below are the user's duty. They can be done by **TECNOMACO ITALIA S.R.L.** under explicit request by the user.
These operations must be done only by experienced technicians to prevent compromising the machines' and the operators' safety.

When the user is ready to intervene on the inside maintenance of the machine, be sure the job is assigned to expert and qualified personnel, able to evaluate the probable causes and consequences of a break and capable of re-enabling completely the safety protections before permitting the starting of the machine.

During the maintenance phase, the machine must be marked with a sign on its front indicating the state of maintenance.

	**ATTENTION!** **Maintenance operation underway...**	

The following indications for ordinary maintenance are fundamental rules for keeping the machine always in perfect efficiency. For the more important interventions and for the extraordinary maintenance always ask for a **TECNOMACO Italia s.r.l.**'s technician, otherwise warranty conditions end.

ATTENTION!
Any maintenance, repair or cleaning intervention is to be done with the machine disconnected from electrical sources, disconnected from the compressed air and in well illuminated conditions (minimum required illumination: 300 lux).

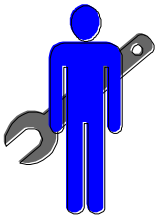
10.2 PRELIMINARIES

To render maintenance of the machine simple and limited the most modern solutions were taken when designing and constructing the automatic filling capping machine (model **FC-1**).

Axels and revolving organs are mounted on watertight ball bearings or on self lubricating journal boxes.

It is nevertheless advisable to periodically lubricate the parts of the machine under most stress using a molybdenum disulfide based grease or an oil with viscosity between 40 and 60 SAE, depending on the room temperature.

Besides avoiding breaks, blockings and noises, a good lubrication allows for a longer duration and a safer functioning of the machine.



Due to its construction system, the lubrication is done in simple operations that the personnel in charge of the functioning of the capping machine can do.

Periodic maintenance keeps the machine in perfect efficiency. Correct management of the necessary maintenance reduces machine-stops and increases machine's performance.

To reduce risks during maintenance operations, before you start make sure to:

- disconnect energy sources that are not necessary for the operations to be performed;
-
- disable safety devices only if necessary, signalling to all the out of service with indications "**DANGER: OUT OF SERVICE, MAINTENANCE IN PROGRESS – DO NOT APPROACH**";
-
- perform the maintenance operations according to the procedures described in this manual;
-
- closely follow the programmed maintenance instructions described in this manual;
-
- use ONLY lubricants suggested by the constructor and original parts.

Not respecting these measures can jeopardize the correct functioning of the machine, risking personnel's safety. **Wrong maintenance automatically nulls warranty and constructor's responsibility for harm to persons or things**.

ATTENTION!
Ordinary and extraordinary maintenance interventions must be done ONLY by QUALIFIED and AUTHORIZED personnel.

During maintenance operations the use of the "**JOG**" button is suggested. It permits testing the machine with the control devices disabled, safety guard devices remain active. Access to usually off-limit zones to the operator are permitted when removing the structure and fixed protections. In this case the operator must work with great caution.

During maintenance interventions, there must be visible signals fixed stating that the machine is undergoing maintenance and must not be started.

ATTENTION!
Maintenance and repair operations bear a greater risk than during normal working conditions. Abide by the danger signal placed on the machine.

10.3 LUBRICATIONS

After removing the structure of the machine that prevents access to the related organs, continue on the basis of the indications in the present manual.

Lubrication on parts of the machine must be done only with lubricants authorized by the constructor.

When lubricating avoid soiling the parts excessively, being particularly careful not to soil parts in contact with rolls and products.

Periodically control the state of lubrication and greasing of the movement system (cams, tie rods, springs, etc.) inside the machine. To do so, dismantle the structure around the machine.

10.3.1 Bearings lubrication

You can find the following types of ball bushings in the machine:

-
- Exposed bearings which need periodic lubrication;
- Water proof bearings.
-

All bearings of the machine are delivered with the correct amount of lubricant required for the normal functioning.

10.3.2 Grease lubrication

-
- Grease lubrication is indicated in those cases in which the part is prone to normal speed and temperature.
- The grease is characterized by a high viscosity and greater adhesion than oil so it has the following advantages:
- Does not require complicated and costly application systems;
- Protects the part against humidity and contaminants in the work environment;
- Protects the part for a longer period of time than oil does due to its high adhesiveness.
- If necessary lubricate with grease the main chain that transfers movement from the motor axle to the main driveshaft, the secondary chain that transfers movement from the main axle of the encoder.

10.3.3 Oil lubrication (if required)

Oil lubrication is required when speeds are elevated and functioning conditions (high temperatures) make it impossible for the use of grease.

Oil with respect to grease has greater fluidity and a greater resistance to high temperatures.

Oil lubrication is necessary when:

- the part to lubricate is subject to high speed;
- the part to lubricate is subject to high temperatures or excessive heating due to friction (in which case the oil also dissipates heat from the part);
- the associated parts to the part to lubricate need themselves lubrication, as gaskets, gears, bushes, etc.

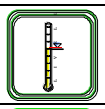
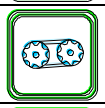
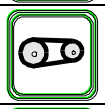
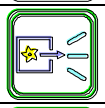
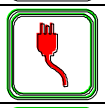
In the cases mentioned above, specific qualities need to be used (fluidity, viscosity, temperature resistance, etc.).

ATTENTION!
Carry out these operations only with the machine disconnected from energy sources.

Table 10-1. Symbols used in maintenance cards lubrificants.

SYMBOL	OPERATION	TYPE OF LUBRICANT SUGGESTED
	Oil lubricant	Esso - Spartan Ep 320 IP - Hadrja Oil 150 Kleber - Kr 29 B Soluzione
	Oil lubricant	Agip - Sic 46 / Oso 46 BP - Emeree Energol L 46/Hpl46 Castrol - Perfecto Ee Esso - Nuto H 46 / Esstic 46 IP - Hidrus 32 / Erzia 32 Shell - Tellus Oel 46 / Oelc46
	Grease lubricant	BP - Energrease LS2 Esso - Multipurpose Grease H Shell - Retinax
	Grease lubricant	Esso - Beacon 3 IP - Athesia 2 Mobil - Mobilux 3 Shell - Alvanta 3 SKF - LGTM 2
	Grease lubricant	IP - Grease LZ
	Check oil levels Discharge condense from reducer filter	Agip - 035 35 Castrol - Perfecto EE Esso - Teresso 43 IP - Bantia 32 Mobil - DTE Light Shell - Tellus 27

Table 10-2. Symbols used in maintenance cards: periodic operations.

SYMBOL	OPERATION
	Check oil level and refill if needed.
	Check and adjust chain tension.
	Check and adjust belt.
	Carefully clean with compressed air.
	Clean carefully.
	Wash using product to remove limestone.
	Check the electric components are not loose.
	Check levelling of the machine.

10.4 PERIODIC MAINTENANCE

After the machine has worked the first few hours, check that all the screws are tightly fit.

Abide by the periodic maintenances to be performed on the machine according to what is described in the manual. Periodic maintenance include cleaning, lubricating and calibrating.
Each operation is represented by the appropriate symbol as described in the **table 10.1** (lubricants) and **10.2** (periodic operations). In the lubricating operations it is necessary to use the specific lubricant as specified in the chart.

Exposed ball bearings need constant and periodic lubrication. After the first period of testing where the ball bearings (if exposed) must be lubricated every week, the interval between lubrications depends on the number of revolutions and the size and type of the ball bearing.

The ball bearings used in electric motors are usually associated to their appropriate grease guns. In motors with no grease gun, watertight ball bearings are used, with lifelong lubrication and don't require periodic lubrication.

10.4.1 Every seven days

Clean the machine perfectly eliminating production residues.
The following are the intervention points and the actions to take for the ordinary maintenance of the machine.

ATTENTION: unless clearly specified, all operations must be carried out with the machine stopped and disconnected.

1) **All daily maintenance operations.**

2) **Electric motors.**
   Clean with compressed air, grids and fans of the motors. During this operation, avoid dirt and hair to be blown in the motor.

3) **Trasmission belts.**
   Check and adjust the correct tension of the belts, and change if worn.

ATTENTION!
After the first week of production, the machine must be accurately inspected. At this time all the nuts and bolts of supporting parts, those that connect rotating organs, those subject to hard vibrations, and those which pose danger when loose have to be re-tightened carefully. Refer to the list of these types of controls in this chapter for annual maintenance.

10.4.2 Every fifteen days

Follow these lubricating operations: gears and cams, command connecting rods, pulling heads, etc.
Carefully clean machine's air filter and any filters of supplemental groups.

10.4.3 Every month

Check tension of transmission chain dismantling the protection structure. Tighten the chain using the regulating screw.

10.4.4 Tension of the transmission chain

Once a month check tension of transmission chain dismantling the protection structure. Tighten the chain using the regulating screw.

10.4.5 Moving groups under the machine

Check periodically the state of lubrication and greasing of the moving systems (cams, tensors, coils, etc.), to do this you have to remove the structure around the machine to get under it. Refer to the chart for the type of lubricants to be used.

ATTENTION
These operations are to be done always with the machine disconnected from power sources.

10.4.6 Every six months

- Check machine phase;
- Check nuts and bolts;
- Check the worn out state of the moving parts;
- Check the cams;
- Check the worn out state of the self lubricating journal boxes;
- Grease the command gears.

10.4.7 Every year.

The following points are the actions and interventions to be carried out annually for ordinary maintenance .

ATTENTION TO PRECAUTIONARY MAINTENANCE

Substitution of components for precautionary maintenance must always be carried out, even if they appear undamaged. Not doing so could compromise the safety of the operators and of the machine.

ATTENTION: unless clearly specified, all operations must be carried out with the machine stopped and disconnected.

1) **All weekly maintenance operations.**

2) **Tightening of critical nuts and bolts.**
Check and if needed tighten nuts and bolts of the following organs, of which the loose nuts and bolts could seriously jeopardize the safety of persons and the machine:

- Supports of the protection devices,
- Fixing systems of the motor speed reducer,

3) **Check the integrity of the microswitches**

Check the safety microswitches are efficient, undamaged and well fixed. Miss-functioning of these devices could seriously jeopardize the safety of persons and the machine. If uncertain, always choose to substitute the device.

ATTENTION (precautious maintenance):
Every five years change all microswitches on the machine, even if even if they appear undamaged.

ATTENTION:
Not fixing signals on the machine warning of the maintenance in progress, breaks the laws in force and creates severe danger for the people nearing the machine occasionally and who therefore don't know it.

4) **Supports and bearings**

5) **Motor speed reducers**
Check the level of the lubricant and refill to specified levels if needed see table 10.1.
Never mix types and/or brands. Every 3 years make a complete change of oil. Check for leaks of lubricant or strange noises.

The well functioning and the duration of the machine depends on the way it is cleansed, the way it is lubricated and the way the moving parts are carefully cared for.
If during control operations anomalies or worn out parts were found, the parts must be substituted, contact our assistance.
After intervention on parts of the machine it's of utmost importance to verify the correct phase before restarting the operating cycle.

10.5 EXTRAORDINARY MAINTENANCE

All interventions necessary for maintenance due to expected or unexpected malfunctioning, to solve situations of undo wear, including those in warranty, are defined as extraordinary maintenance.

For maintenance interventions that require dismantling and assembling of noteworthy parts of the machine, refer to explanations in chapter 3, dedicated to assembly and particularly to paragraphs concerning assembling and disassembling and start and testing of the machine.

This chapter contains a collection of all the parts that make up the machine, essential when intervention is needed. Never forget to return the machine to it's original working and security states, see previous chapters.

11. RETIRING THE MACHINE, DISPOSING OF WASTES

11.1 DEMOLISHING THE MACHINE

Demolishing the machine does not require particular procedures because it has been constructed entirely in non-polluting material (metallic carpentry).

Nevertheless we suggest you abide by the following rules:

- Components in good state can be recuperated for a second-hand use.
- Metallic parts can be recycled.
- Parts in plastic and rubber (typically in electric plants) must be treated separately.
- Parts used for packing (mostly in wood) can be recovered to be reused.
- Parts in contact with pollutants (oils, solvents, etc.) must be treated according to laws in force in the place of installation of the machine before they are disposed of as non polluting materials.

11.2 DISPOSAL OF MATERIALS

Disposal of leftover used materials (resins, solvents, oils and lubricants, etc.) and products (paper, cloth, finished products, etc.) must be classified by toxicity. Toxic materials must be disposed of respecting the norms in force at the place of installation of the machine, through specialized industries, officially authorized to dispose of wastes.

ATTENTION
It is absolutely forbidden to dump toxic wastes in drains. Materials to be disposed without certification can be taken to the town dumping grounds.

12. SPARE PARTS

12.1 SPARE PARTS

To order spare parts, contact the constructor directly, indicating the part required (axel, support, bearings, etc.) along with all data on the identification plate of the machine.

Before contacting the constructor prepare the following information:

- Type of product
- Model number
- Serial number
- Relationship to damage registration
- Parameter of installation
- Data on the identification plate of the motor.

We suggest to keep a supply of certain types of parts (ex. bearings) to reduce periods of "machine stop for repairs".

A chart and drawing have been done to show codes and quantities of the parts that make the machine.

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