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USE AND MAINTENANCE MANUAL

Molded Sponge Production Plant

RELEASE 3.5

Index

1 INTRODUCTION

The present manual does include instructions about use and maintenance (ordinary and particular) of the machine. When not specified, both operative and maintenance interventions have to be understood as "specialized technical service" and therefore to be performed by duly instructed technicians.

WARNINGS

Before starting any operation it is mandatory to read carefully this manual, paying particular attention to chapter 5 "Use and maintenance instructions".

1.1 DEFINITIONS

The most important definitions reported in this manual are listed hereinafter.

1.2 QUALIFIED STAFF

Qualified personnel means staff having knowledge in how to install, assemble, repair, do maintenance to the machine and having specific technical knowledge, such as:

- Technical training authorizing to operate according to the safety standards in relation to the hazards being present, such as electricity, pressurized circuits, etc.
- Technical training or specific instruction concerning the machine safety use and maintenance procedures.
- Training to basic first aid manoeuvres.

1.3 SIGN DEFINITIONS

WARNING

This sign indicates the possibility of a very dangerous event that could lead to death, bad injuries or heavy material damages. In order to avoid such events, please adopt adequate precautions.

CAUTION

This sign indicates the possibility of an accident and material damages, please adopt adequate precautions in order to avoid such events.

SUGGESTION

This sign indicates an important information and must be read with attention.

2 Description

Taking knowledge of the technology involved in the machine.

2.1 GENERAL NOTES

The R.M.P.A. "HP 10, HP60, HP100" is a machine with high pressure pumps suitable for non-abrasive and non-corrosive raw materials, like, for example, components for polyurethane foams.

Our machines dose the two components through axial pistons. The pumps are controlled by electric thriphase motors driven through an inverter. The variation of motor's speed rotation, and so of the pumps, allows to obtain a variation of the mixing ratio between components and the variation of the capacity of the mixinged product.

The HP serie machines (letters that indicate the family of high-pressure machines) are included in the global quality project pursued by R.M.P.A. as product and organization with high quality standards, suitable to satisfy the client's needs.

Research, technology and production standards applied to HP family machine enable R.M.P.A. to reach its global quality target and the customer to own a foaming unit with performances, flexibility and reliability at the top in its field.

NOTE: the mixing phase is indicated with the terms of "pouring" thus indicating the action of foam polyurethane leak from the mixing chamber.

2.2 MAIN FEATURES

2.2.1 Dosing and Mixing unit

The components are dosed through two pumps (one for each components) which rotates thanks to two electric motors (one for each pumps). We can obtain a different dosing by varying the rotation speed of the motors. In particular:

- Varying the speed of only one motor we have a change of the ratio of the mixing of the two components and a change of the foam rate of flow.
- Varying the speed of both motors so that the speed ratio does not change, only the foam rate of flow changes but not the mixing ratio.

Flexible pipe are connected on pump feeders.
The two stage gear type metering pumps are assembled on a mechanic group and connected to motors through joints.

Pump axial seal is achieved through gaskets assembled on the transmission shaft.
Component pumps send the relevant fluids in flexible high pressure pipes. The fluids flow through the pipes to the foaming device (mixing head). In the mixing head, the two components can be mixinged among themselves (if we are in pouring phase) or continue to remain separate and coming back in the tanks through the return circuit in low pressure.

2.3 RETURN CIRCUIT AND THERMIC CONTROL

Heating exchangers are mounted on the mixing system return streams. Heat exchangers are made by stainless steel tube nests inside a shell, in which circulate the component and by an external cap fed by thermo-regulated water. Their task is making a thermic exchange between the thermo-regulated water and the component. In this way we obtain the thermic control effect that allows to keep constant the component temperature.

2.3.1 Tank group

The tank group, with its two coupled tanks assembled on machine frame, is made to contain the raw materials (POLYOL and ISOCYANATE).
The Polyol tank is yellow coloured, the Isocyanate one, in red.

2.4 INJECTION HEAD

The injection head also called “Mixing head” made of a high resistance steel block. Has n. 2 cylindrical chambers: the mixing chamber in which the 2 nozzles inject with high speed the components (Polyol and Isocyanate), the collision of which, causes the accurate mixing and the down flow chamber through which the reacting polyurethane flows down in the mould.
At the end of every injection the 2 chambers (mixing and down flow) are perfectly cleaned by spools that scrape away the reacted polyurethane residuals.

The mixing spool has grooves to allow the component recycle when in closed position. The spools are operated by hydraulically-driven pistons.

The mixing head has 2 main moods;

- Injection mood, with open spools and foam pouring.

- Recycle mood with closed spools. In high pressure mood, the 2 components go through the nozzles and then back, towards tanks. The closed spools do not let materials out as they are perfectly coupled with the head body and sealed by some reacted material.

During the low pressure recycle the materials stay motionless inside the head and relevant pipes.

NOTE: the mixing phase is indicated with the terms of “pouring” thus indicating the action of foam polyurethane leak from the mixing chamber.

3 Machine technical features

General features
Airborne noise
Summarizing tables

In this chapter are disclosed some technical information related to the HP series machine.

3.1 GENERAL CHARACTERISTICS

In the name of the product, the number that follows the letters HP indicates the (approximate) maximum capacity you can gain form the machine expressed in Kilos/m, that is:

Model Machine	Capacity (Kilos/ minutes)
HP40	40
HP60	60
HP100	100

You can reach the maximum capacities expressed above for a unitary mixture ratio that is for a volume ratio between the two components even to one (the maximum capacity is obtainable by making both pumps rotate at the maximum speed allowed. If the two pumps are of the same type, at the same speed, they will deliver the same volume of material in the time unit. This means having a volume ratio of mixture even to 1).

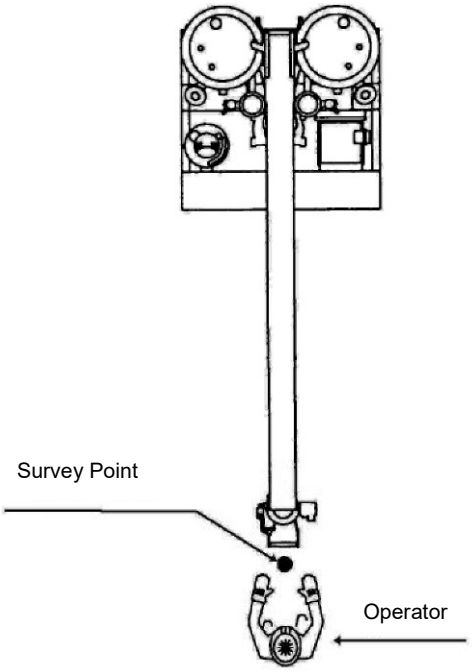
NOTE: For the conversion from cc/sec to gr/sec multiply for the specific gravity (average : Polyol 1,08 – Isocyanate 1,23)

3.2 AIRBORNE NOISE EMISSION

The acoustical pressure level survey point is the one shown in the following picture (operator working position) .

The indication refers to a machine working on high pressure cycle and at the maximum speed.

Model	Acoustical pressure (dB)
HP40	81.0
HP60	82.2
HP100	83.2



3.3 SUMMARY TABLES

In the following tables, you can find the most important technical characteristics for the different types of machine.

Model HP machine	**HP40**	**HP60**	**HP100**
Total capacity – Min/Max [Kg/min]	7,8 – 39,6	12,8– 64,1	19,8– 95,8
ISO Capacity –Min/max [Kg/min]	1,0 - 19,8	1,6 – 32,0	2,5 – 47,9
POL capacity – Min/Max [Kg/min]	1,0 – 19,8	1,6 – 32,0	2,5 – 47,9
Input [KW]	26	32	38
Compressed air consumption [Nl/Pouring]	80	80	100
Tank capacity (each) [liter]	300	300	300
Machine weight with empty tanks [Kg]	-	-	-

NOTE: total capacity is calculated with ISO ratio even 1:1 and with density even to 1,23 Kg for Isocyanate and to 1,08KG for Polyol. Input refers to a 20 Bar pressure.

The value above can be changed because of customer's specific requests and because of technologic variations made by RMPA.

4 Machine conformity

Our machines are made respecting the requirements of Directive 2006/42 CEE, Low Voltage Directive 2006/95 CE, and Electromagnetic Compatibility Directive 204/108 CE. RMPA gives the declaration of conformity along with the machine.

4.1 EC MARKING

Our machines are given an EC Marking. Each model has a small identification metal plate (see Picture 2), usually fixed on one of the switchboard side.

For each machine it is given the model (HP fpr high-pressure machines), the type (for example 40), the part number and the production year.

The part number marks in univocal way the machine you bought. If you need assistance from us, make reference to that number to specify for which machine you need assistance.

Fac Simile of a EU plate

4.2 ELECTRICAL DATA MARKING

In addition to EU plate, the machine ha another small plate RIF.89/392/CEE with the value, the number of phases and the voltage frequency. Moreover, on the same plate we have the value of the current intensity absorbed in full load.
This plate is near the EU one that we saw in the last paragraph.

Before connecting the machine to the electric network, please verify the consistency between your mains voltage (amplitude and number of phases) and the values indicated on the plate; make sure that the feeding cables section is enough to hold the current intensity at full load absorbed by the machine.

5 Use and Maintenance Instructions

To prevent accidents during work session

In this chapter are shown prescriptions, recommendations and precautions to be adopted when using the equipment and during its ordinary and supplementary maintenance procedures.

Preface
Chemical components
Individual protection devices
General warnings
Instructions on machine maintenance procedure
Testing operations in manual cycle
Manual valves
Component storage
Emergency procedures

WARNING

In relation to the materials characteristics, before starting any operation on the machine, it is mandatory to carefully read the full operative manual with particular attention to this chapter. The instructions contained in the present chapter must be disclosed to all working people operating on the equipment and have to be exhibited in the workplace in a visible and accessible manner.

5.1 PREFACE

The machine designing and manufacturing are performed according to the requirements of the 2006/42 CE Directive Machine taking into consideration the normal functioning and the use that can be reasonably foreseeable.
The machine has been realised to mix and pour Isocyanate and Polyol. For no reason it is allowed to use the machine for any other purpose different from the ones for which it has been manufactured, nor use it in any way other than those stated in the present manual.
The gaskets used on this unit are “Asbestos Free”.

SUGGESTION

5.2 CHEMICAL COMPONENTS

The two basic chemical components used by this foaming machine are Polyol and Isocyanate. Both these components are included in **toxic** product ranges, are harmful when swallowed or touched, cancerous and inflammable.

As in commerce there are different formulations of these components, the user is obliged to **ask to the raw material supplier for technical and safety specifications concerning the materials used and to set a visible label on the machine tanks stating the characteristics and the class of hazard of the relevant materials.**

For the use of components different from the ones stated above, **it is necessary to obtain the constructor's written approval.**

5.3 INDIVIDUAL PROTECTION DEVICES

WARNING

For transport and handling of chemical components, according to their level of hazard, as well as during use and maintenance of the machine, it is necessary to wear goggles, special gloves, helmet and clothes completely covering the skin.

Should the environmental analysis detect the presence of exhalations higher than what foreseen in local calibrations or in the specifications of the materials used, a protective mask should be worn.
In case of contact with components, immediately wash with water! A suitable device to wash eyes or similar devices should always be available.

Operators, maintenance men and all personnel working or passing near the machine should not wear large-sleeved clothes, nor shoe-laces or belts which should be dangerous. Long hair should be tied so to avoid any danger.

The area for the operators' activity have to be kept free from objects not connected with the work and the floor have to be treated with a non-slip treatment (at client's expense). It is also possible to use non-slip mats.

The operator should always wear shoes with rubber soles.

If machine uses also one motor-pump magnetic coupling using and standing near the machine is forbidden for peacemaker carrier. Minimal respect distance is 3 meters.

You should remind these rules to the operators by using near the machines these signals:

SIGNAL	MEANING
	Obligation of wearing an helmet and protective goggles
	Obligation of wearing shoes with rubber soles
	Obligation of using special gloves
	Using a protective mask when the environmental analysis detect the presence of exhalations higher than what foreseen in local calibrations.
	Using and standing near the machine is forbidden for peacemaker carrier. Minimal respect distance is 3 meters.
	Do not use water to extinguish a fire but only powder or carbon dioxide extinguisher.

5.4 GENERAL WARNINGS

- The machine should be maintained and used according to the instructions contained in this manual and the patterns suggested from time to time.

- Operators working on the machine should be properly instructed through training and updating courses.

- The operating area should be provided with suitable aeration and suction systems. These systems should be activated at least ten minutes before the beginning of the working process.

- The wiring of the machine (and of any other additional device) should always be grounded to discharge electrostatic potential.

- Polyurethane burrs should be removed at the end of the work. In addition, machine and workstation should be kept perfectly clean.
Dirt residuals should be carried far from the working area.

- Toxic wastes, such as bottoms, lubricants, etc., or toxic/harmful wastes, such as unused chemical components, solvents, release agents, etc., should be collected in containers properly labelled and disposed according to the local calibrations.

Please remind that it is absolutely forbidden to discharge chemical substances, lubricants, etc. in drainages and rain pipes.

- In handling Polyol and pre-polymer (Isocyanate) pay particular attention to avoid any contact between the two substances, as they could start an esothermic reaction.

- It is strictly forbidden to store combustible materials near electric panels.

- Plant control panels have to be kept always locked and the access has to be allowed only to properly instructed personnel.

- Only operate inside the electric panels after having disconnected the main switch of the electric supply and electrically sectioned the supply line to the machine.

- It is strictly forbidden to intervene on any part of the machine if this is still running. Only when the machine has come to a complete stop, mechanics and workers can perform maintenance and repairing works.

- Do not operate outside the area protected by the active and passive safety devices. The operator, during the working cycle, has to keep the position shown in paragraph “Airborne noise” in Chapter 3.

- Do not remove safety devices or elude signals, alarms and warnings, both automatically transmitted or through labels attached on the plant.

- Do not operate the machine if have been removed from it metallic protections of connections (dosing pumps), racks (calibration head) etc.

- Using and standing near the machine is forbidden for peace-maker carrier. Minimal respect distance is 3 meters.

5.5 MACHINE MAINTENANCE PRECAUTIONS

WARNING

All maintenance operations, both ordinary and extraordinary, should be performed with machine turned off and with electric panels disconnected.
Must be disconnected any source of energy to the machine, (electric, hydraulic, pneumatic) Each residual energy present on the machine, such as hydro-pneumatic accumulators, hydraulic unit , etc., should be dissipated.
Ventilation systems should always remain connected.

- Each maintenance operation should be performed according to the calibrations and the standards stated in chapter "Maintenance" and according to the indications suggested from time to time.

- The access to the machine for any maintenance operation should be only allowed to specialized personnel, suitably instructed for this purpose.

- If machine uses also one motor-pump magnetic coupling maintenance operations and standing near the machine is forbidden for peacemaker carrier. Minimal respect distance is 3 meters.

- During the intervention time, "**work in progress**" signs should be displayed in the room, so to be visible from all admission areas.

- The use of solvents (for example cleaning the moulds) should be performed very carefully so to avoid the damage of electrical cables. Even during this operation, workers should wear all individual protection devices.

- Each activity involving the use of potentially dangerous solvents or of chemical compounds (ex. release agents) will be allowed only if suction and aeration system have been activated at least ten minutes before the beginning of the operation.

- Ask the supplier for the specifications concerning raw materials, chemical compounds used (solvents, release agents, etc.), lubricants etc. and use the products according to the instructions stated in these specifications.

- In any case, it is not allowed to modify, handle or alter the machine frame, the installed devices, the operating sequence, etc. without previously check the R.M.P.A. Technical Service. Any change to the machine has to be communicated in written form to R.M.P.A. S.r.l.

- All maintenance operations, both ordinary and supplementary, have to be reported on an appropriate register, stating date, hour, type of intervention, name of the operator and all other necessary information.

WARNING

Any removal of the hydraulic unit, installed on the machine, or the removal of the motor/ pump group, causes a shifting of the barycentre in machine with suspended boom, with subsequent loss of stability of the machine with possible capsize of it.
In case this operation should be required, fix the machine to the floor or fasten the boom to steady parts.

- Once the maintenance operations are finished, carefully check that there are no tools and/or other material left near the machine and in particular near the moving parts, before resetting the electrical supply.

5.6 CHECK OPERATION IN MANUAL CYCLE

The subsequent warnings have to be followed in case of inspection of the machine which necessarily implies a manual movement of the same.

Please remind that no maintenance operations, both ordinary and supplementary, are allowed in manual cycle, with the machine in operation or if there are power sources on the devices.

WARNING

During the normal functioning, the operation sequence and the supervision of the process controls and of the relevant protections depend on machine logic. This doesn't happen When operating in manual mode (for example performing override cycles on the digital exits controlling the different devices) and the responsibility of the operations and relevant consequences fall completely on the operator. Therefore the operator must operate only with the necessary safety precautions.

- The access to the machine for any control operation should be allowed only to specialized and skilled personnel.

- Before starting the machine through the main switch, make sure that there are the conditions to do it and that no one is passing near or is standing in dangerous places.

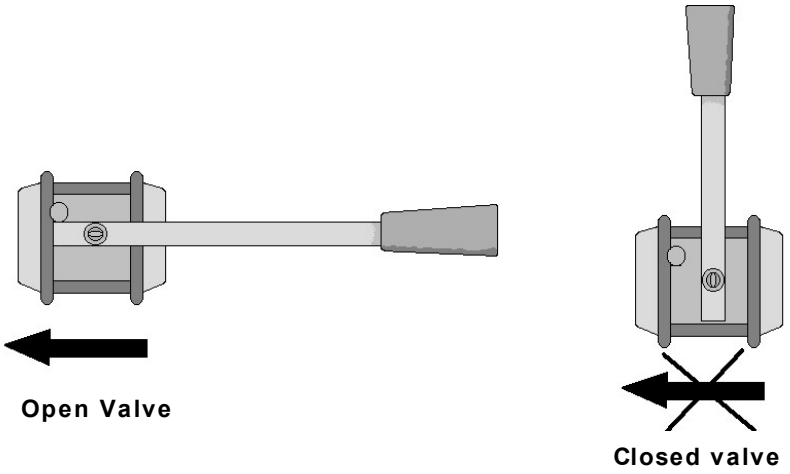
- During the control operations and in particular during the override operations of digital exits, the operator should pay the utmost attention and check that no one is passing or is standing near the machine.
Similar precautions should be taken for other additional units coupled to the foaming machine (cooler, unit for automatic loading of components, etc.).

- Call the attention on these operations in the workshop through special signs, visible from every access.

5.7 MANUAL DRAIN VALVES

The driving of the ball valve intercepting the components on the machine, **with particular reference to those installed on the Isocyanate line**, should be performed taking into consideration what follows:
- The valve control lever should be operated through a simple actioning by the operator.

- Before operating the valve control lever, check its condition (open/ closed).
A valve is open when its lever is positioned in parallel to the sense of direction of the fluid.



WARNING

Operate these levers with the machine off and with no pressure in the circuits. If the functioning is difficult or if the valve seems blocked, do not force the opening with auxiliary devices or with other empiric systems (objects used as levers or other things).

A difficult or even hindered movement can be due to anomalies or problems on the plant. In this case call an R.M.P.A. technician or a specialized technician.

In order to avoid any valve locking, in particular for valves installed on the Isocyanate side, it is advisable to operate them periodically, for example once every week (with all due precautions).

Possible deposits can thus be avoided. After some time in fact, they could cause problems to the operation of the device and become a danger for the operator in case of release of pressurized material.

WARNING

Before operating the levers of these valves, in addition to paying attention as usual and using the individual safety devices described in paragraph 4.3, also make sure that possible crystallization of material, in particular Isocyanate, do not hinder the material outflow.

In particular, operating the three-way lock used for calibration, in addition to completely stop the machine, also mechanically check that, by disassembling it, there are no crystals of Isocyanate hindering its flow, thus increasing the pressure inside the heat exchangers. When operating the valve levers, if the material doesn't flows immediately, return the levers in the initial position, stop the machine and using the precautions required for maintenance operations disassemble and clean the valve.

5.8 COMPONENT STORAGE

WARNING

With reference to the hazardous level of the material used, it is necessary to carefully stock them in compliance with the technical and safety specifications provided by the raw material suppliers.

In general, it is recommended to stock the materials at a temperature of about 20°C with changes not higher or lower than 4°C.

5.9 EMERGENCY PROCEDURE

- In case of fire never use water to extinguish it, only use powder or carbon dioxide extinguishers.

- In case of contact with the components used, immediately wash with water. For this reason, store near the machine special devices to wash eyes, if you don't have these devices, at least make sure that there are suitable water dispensers available.

- Do not reset the emergency conditions signalled by the machine without having carefully checked the relative cause. Before resetting the machine, and in any case before starting the operation again, the problem must be identified and removed.

6 Machine unpacking and positioning operations

Remove the machine packing, position and prepare it for the installation.

Machine displacement with disassembled suspended boom
Machine displacement through fork lift

Suspended boom assembling

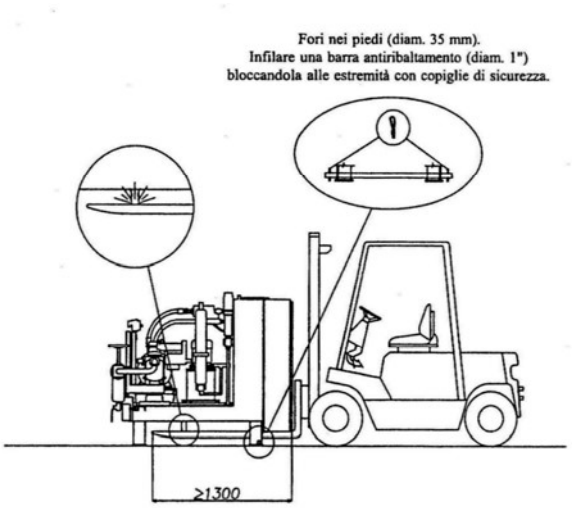
Machine displacement with assembled suspended boom
Blocking of the suspended boom
Machine displacement through fork lift
Machine displacement through pallet truck

6.1 MACHINE DISPLACEMENT WITH DISASSEMBLED SUSPENDED BOOM

To lift and move the machine, you can use a fork lift or a pallet truck.

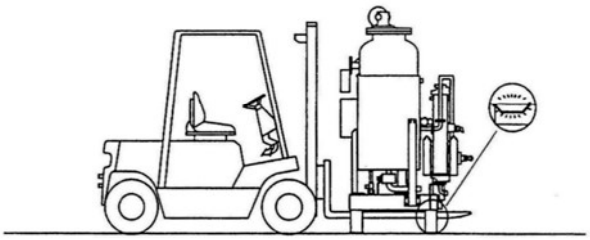
6.1.1 Machine displacement through fork lift

To lift the machine, place the forks of the lift truck transversally under the frame. Make sure that the points of the forks of the fork lift go out on opposite side to those of forking.



Picture 1 machine displacement with fork lift and disassembled boom

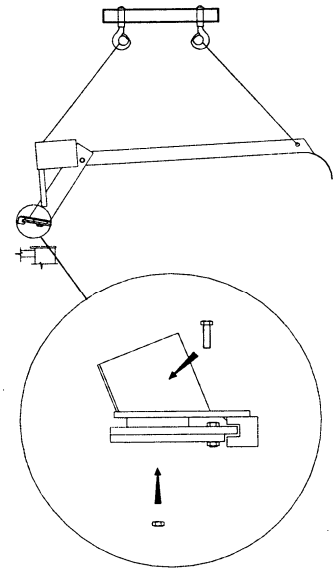
Make the same manoeuvre for the frame of the tank group as shown in the picture below.



Picture 2 Tank group displacement with fork lift and disassembled suspended boom

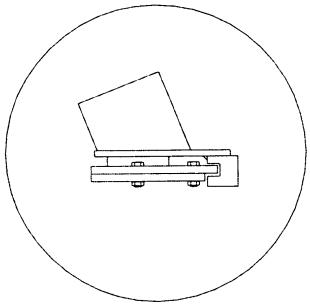
6.2 SUSPENDED BOOM ASSEMBLING

Place the boom in a position corresponding to the holes on the fixing plate. Insert four fixing screws in the holes on the fixing plate. Fasten the four screws with the corresponding nuts.



Picture 3 Boom positioning and bolts inserting

Insert the four fixing screws in the holes on the support plate.
Tighten the screws with their nuts. At the end of the assembling, you should have the configuration shown in the picture below.



Pict. 4 Situation at the end of the assembling

6.3 MACHINE DISPLACEMENT WITH ASSEMBLED SUSPENDED BOOM

SUGGESTION

We advise you against moving the machine with a boom already assembled, since, with the boom, the centre of mass position and the encumbrance put at risk the operations safety. However, if you still want to go on that way, please follow the instructions below.

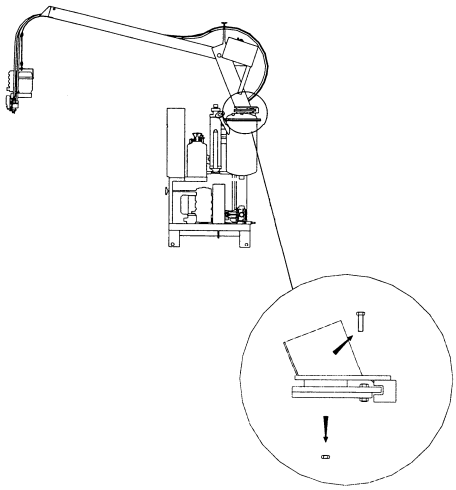
6.3.1 Blocking of the suspended boom

Before moving a machine with assembled boom, you have to block the boom so to prevent it form rotating. To do so, follow the instructions below.

WARNING

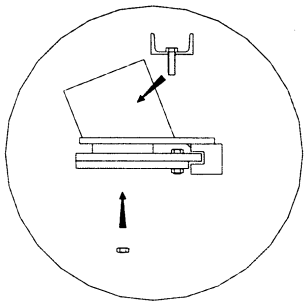
This operation is potentially dangerous for fingers. Make sure that, during the following operations, the boom can not rotate. The ideal condition would be making this operation with two people. One will execute the following operations, the other keep the boom steady.

Assembly the apposite boom fixing bracket. For this operation it is necessary removing one of the 4 screws that fix the boom to the plate, as shown in the following picture.



Picture 5 Phase1 blocking of the suspended boom

Insert the screw you have just removed in the fixing bracket. Then insert the group screw-fixing gasket in their hole placed on the plate in the place left vacant by the disassemble screw. See the picture below.



Picture 6 Phase 2 blocking of the suspended boom

Tighten it using the nut you unscrewed from the screw during phase 1. Once finished the operation, you will have the following situation

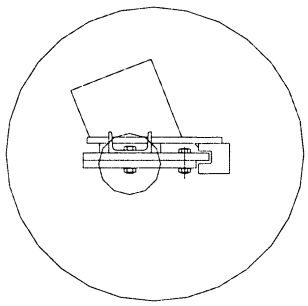
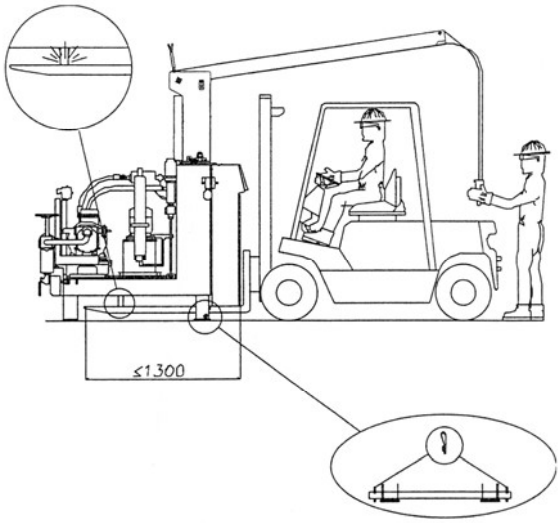


Fig. 7 Final configuration for the blocking of the suspended boom

After having finished the displacing operation and having placed the machine in the desired position, you have to remove the boom fixing bracket repeating the last three operations in inverse sense.

6.3.2 Machine displacement with fork lift (with blocked suspended boom)

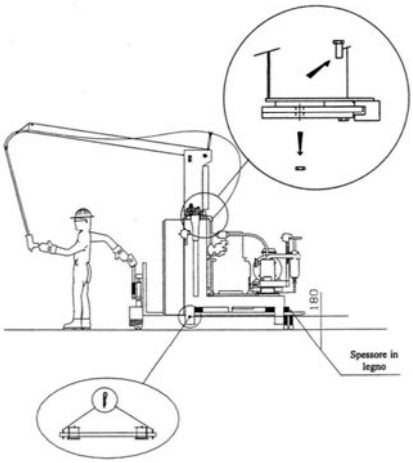
If you use a fork lift, fork the machine frontally, as shown in the picture below. Make sure that the points of the forks of the fork lift go out on opposite side to those of forking.



Picture 8 Machine displacement with fork lift and suspended boom

6.3.3 Machine displacement through pallet truck

If to move the machine a pallet truck is used, fork the machine and use wood pieces to be put under the frame on the sides of the machine as shown in the picture below.



Picture 9 Machine displacement with pallet truck and suspended boom

7 Machine connection

Attaching the machine to the floor
Suspended boom assembling
Electrical, air-operated, hydraulic connection
Electrical connection
Air-operated connection
Hydraulic connection

WARNING

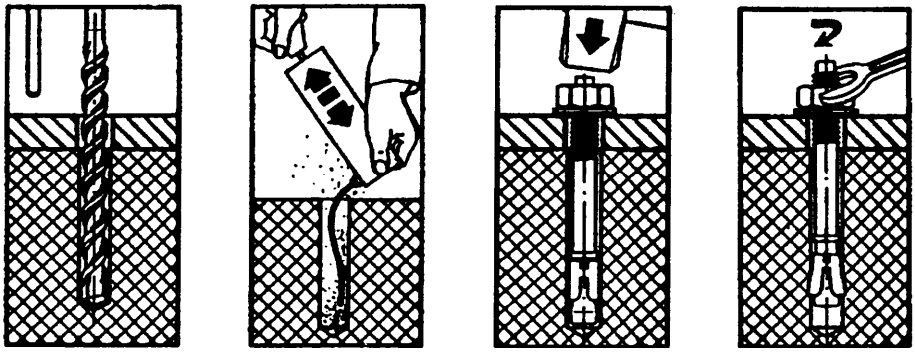
Before installing the machine, read carefully the chapter "USE AND MAINTENANCE INSTRUCTIONS" and act as prescribed. Pay great attention to the paragraph "INDIVIDUAL PROTECTION DEVICES"

7.1 ATTACHING THE MACHINE TO THE FLOOR

Attaching the machine to the floor is not compulsory. If you decide so, please follow these instructions.

Position the machine in the chosen place and check if it is at level. The chosen place must be well ventilated and with antiskidding floor. Free space around the machine must not be less than 1,5 m. For the machine encumbrance, please see the previous chapter.

On the floor mark the position of the holes in the front feet. Then move the machine so you can make the holes on the floor. To attach it use threaded bosses. The attachment operations are shown in the picture below.



Picture 1 Machine attachment operation to the floor

7.2 SUSPENDED BOOM ASSEMBLING

If the machine has been shipped with suspended boom disassembled, attach it to the machine as described in paragraph 5.2. Once attached the boom, put in its cave part the flexible pipes that connect the mixing head to the machine and hook the motor's sustaining snap ring on the mixing head to the apposite hole at the end of the boom.
On the contrary, if the machine has been shipped with the boom already assembled, it will be necessary o unblock it as told in the previous chapter.

7.3 ELECTRIC, AIR-OPERATED, HYDRAULIC CONNECTION

Once the machine is fastened, make the electric, air-operated and hydraulic link.

7.3.1 Electric connection

Make sure that the size of your electric supply (voltage, phase number and frequency) are the same written on the machine's metal plate placed on the side of the switchboard, indicating the type of voltage for the machine driving.

Use a wire that can be crossed by a current strength at least even to the one absorbed by the machine at full load. Also this value is written on the same metal plate indicating the right values of driving voltage. Link the machine switchboard to the feeding network.
Make the earthing connection, following the electric scheme given along with the machine.

SUGGESTION

An effective earthing connection is a fundamental characteristic in security terms. The earthing connection have to be made by specialized staff.

7.3.2 Pneumatic connections

Connect the pneumatic feeding to apposite quick fastening on the back of the machine. The air pressure must be encompassed between 6 and 8 bar. It is advisable using dried air.

7.3.3 Hydraulic connection

The machine uses an hydraulic circuit ran trough water for the temperature calibration of chemical components. For this aim, on the back of the tanks group we find two hose adapters which are the point of enter and exit of the temperature calibration circuit. If possible, use transparent rubber so you can verify by sight the water effluent.

If the machine ha equipped with a conditioning station (chiller or thermoregulator) connect the flexible pipe between the machine and the conditioner, fill it also adding to the water the antifreeze in the right percentage.

NOTE: the machine is equipped with heat exchangers, placed near the components tanks and the resistances that heat the water contained in the temperature calibration circuit. So, from this point of view, the machine is already prepared for the chemical components heating. Their cooling can be made only using an external source of cold water (for example a conditioner).

The affluent of cold water coming from the cooling and directed to the heat exchangers will be automatically driven by two solenoid valves placed near the exchangers; they will open when the component temperature decrease to desiderate value.
Also the components heating is automatic through the resistances placed in the exchangers. These will be supplied when you wish to increase the component temperature and put off when the temperature is reached.

WARNING

An excessive heating of resistors (with the classic smell of burnt) could be caused by a lack or low level of water in the temperature calibration circuit. In fact, in this case, the heat developed from resistances is not given to the water and, as a consequence, the resistances temperature increases too much but not those of components (since it lacks the "mean" of heat transfer, that is water). So make sure that the temperature calibration circuit is full of water and, if not fill it. The action of filling will be described in the chapter "START UP".

8 Switchboard and push-button panel

Indication and control device
Command push-button panel
Remote control push-button panel
Time-switch Calibration Test Duration
Pressure reducer and manometer
Time-switches internal to the board
Usage of the touch screen panel
Automatic screen
Automatic synoptic screen
Statistics screen
Production report/Consumptions
Diagnostics and error messages

8.1 INDICATION AND CONTROL DEVICES

The following image depicts the control panel installed on the machine. The panel is composed of a frontal part containing the touch-screen control panel POWER1000 and of a lectern part containing the command push-button panel.

Symbol	Function
LCCA	Light Automatic self-cleaning inserted. When on, it indicates that the automatic cycle of cleansing through is working.
PAM	Key of Manual Self-Cleaning – when pressed, with stopped pumps, it makes the self-cleaning piston lift.
TTT	Timer Calibration Test – used to set the duration of the calibration test

8.2 COMMAND PUSH-BUTTON PANEL

The following image shows the Push-Button Panel on the lectern of the machine control panel. In the legend is present the function of each button.

Symbol	Function
F1	Emergency mushroom with self-retaining. When pressed, it puts the machine in emergency. To unblock it, rotate anticlockwise and pull onward.
L1	Light presence network. When it is on, it indicates that the machine is electrically supplied.
PL1	Light button reset emergency. When on, it indicates that the machine is in emergency condition. To restorate, eliminate the cause of the emergency and push the button. The restoration makes the light turn off.
PL2	Light button Reset Head. When on, it indicates that the head generated an anomaly. It restores the condition of normality after an alarm of malfunctioning mixing head.
PL3	Light button Reset Hydraulic junction box. When it is on, it indicates an anomaly in the hydraulic junction box. To restore, eliminate the anomaly and push the button. The restoration makes the light turn off.
SC	Key selector. When it is ON, insert the automatic cycle of head cleaning.
S1	Pouring, recirculation selector. It allows to insert the functioning in pouring or in recirculation mode.
P1	Key for beginning calibration cycle. When pressed, it begins the calibration cycle.
P2	Button Alarm Silencing. When pressed, it silences the alarm siren.
L2	Minimum level Polyol. When on, it indicates that the level of Polyol in the tank has reached the minimum.
L3	Minimum level Isocyanate. When on, it indicates that the level of Isocyanate in the tank has reached the minimum.

8.3 REMOTE CONTROL PUSH-BUTTON PANEL

The machine is equipped with a remote control push-button panel that allows to start the pouring, to select a preset recipe of working and to put the machine in emergency condition from a position far from the switchboard. Usually, this push-button panel is placed near of the mixing head so that the machine could be run by the same operator who orients the foam flux towards the mould. On the remote push-button panel, you can see a green button to start the pouring, the red mushroom-shaped button to put the machine in emergency, the two buttons UP and Down used to increase or decrease the number of the working recipe used. The number of the chosen recipe is shown on a display on the same push-button panel. In some type of machine, instead of the two UP and DOWN buttons, we have two rotative commutators that allow to select a working program from the memory of the operator panel.

8.4 SWITCH FOR CALIBRATION TEST DURATION

On the control board we have a time switch (see picture on the left) used to set the duration of the calibration test.

The 3-digits time switch is equipped with 3 time scales indicated with A, B, C. To set the pouring times, select the letter:

A if you want to set a time between 0 and 9,99 seconds
B if you want to set a time between 10 and 99,9 seconds
C if you want to set a time between 100 and 999 seconds

Once set the time scale, set the three digits according to the desired calibration time. Generally, the calibration test last few seconds (usually 4 seconds).

EXAMPLES of setting of the time-switch calibration test

Duration of Calibration Test 5,50 Seconds.
Since the duration is comprised between 0 and 9,99 seconds set the time scale on A and select the numbers 5 5 0

Duration of Calibration Test 31,8 Seconds
Since the duration is comprised between 10 and 99,9 seconds set the time scale on B and select the numbers 3 1 8

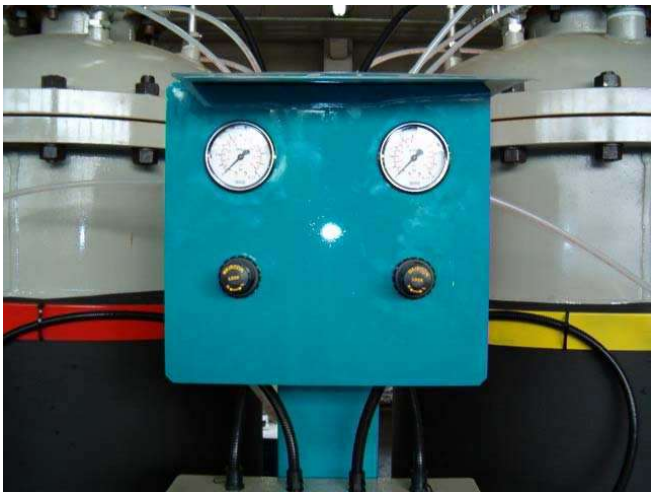
Duration of Calibration Test 142 Seconds
Since the duration is comprised between 100 and 999 seconds set the time scale on C and select the numbers 1 4 2

Note that the time of 5,5 seconds can be also set using the time scale B, instead A, and inserting the digit 0 5 5 instead of 5 5 0.
In the same way the duration time of the calibration tests of 31,8 seconds can be also set using the time scale C, instead of B, and inserting the values of 0 3 2 instead of 3 1 8 (but in this case the time would be even to 32,0 seconds since with scale C it is not possible defining the tenths of seconds).

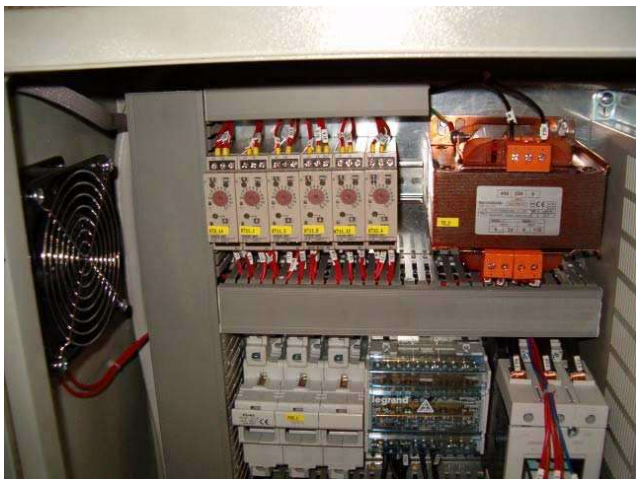
In general we can say that scale A allows a resolution of a hundredth of second, scale B of a tenth of second and scale C of one second. The advised time interval values allow to have a "right" resolution for the chosen value in each of the three scales A, B.C.

8.5 PRESSURE REDUCERS AND MANOMETERS

The machine, as shown in the picture, is equipped with two pressure reducers and two manometers placed on the back of the tank group. The pressure reducers are used to regulate the pressurization pressure in the two components tanks. The set pressure is shown in the manometers. This pressure is used to push the components towards the high-pressure pumps entry. The setting value must be about 2,5 bar. Note that without line pressure the pressurization air present in the tanks is immediately discharged through the apposite discharge valves placed on the tanks lids.



8.6 TIMING RELAYS INTERNAL THE PANEL



Inside the switchboard, we have 6 time switches shown in the picture on the left. The setting of these time switches must not be changed since their calibrations is made during the machine test. Below there is a list of the functions of there time switches so in case of necessity you can change their setting. We remind you that before gaining access to the switchboard it will be necessary deprive of electric supply the machine.

WARNING

The eventual calibration of the time switches must to be made with a machine without electric supply.

TIME SWITCHES

KT 9.14 delay time start pouring from disconnector closing at the beginning of pouring

KT 11.1 time interval between the two cycles of automatic cleaning of the head

KT 11.3 waiting time opening head for eventual alarm of blocked head

KT 11.9 time of recirculation before the pouring

KT 11.12 memorized time of stopping for pumps

KT 12.4 time of end recirculation after the pouring

8.7 MACHINE COMPONENTS AND SAFETY MACHINE DEVICES

The design and manufacturing of the Machine have been made in accordance with the requirements of the Machine Directive 2006/42/EC, taking into account the standard and the irregular reasonably predictable
It is not allowed for any reason to use the Machine for different purposes than those which it was designed for, or use it in ways different from those reported in this manual.

8.7.1 Fixed Guards

The term refers to a part of the machine specifically used to protect by a material barrier.
The machine uses as fixed guards the Carter to protect the areas where there are joints between inducer's exit shaft and pumps shaft. These Carters are fixed to the base went of the machine by suitable screw. The access to the transmission parts is therefore possible only after having removed these

WARNING

It 'absolutely forbidden to remove the guards when the machine is running. Before their removal it's necessary to stop the machine and disconnect it from the electric power source.

WARNING

It's' absolutely forbidden to switch on the machine without the guards mounted and fixed.

8.7.2 Emergency Stop Buttons

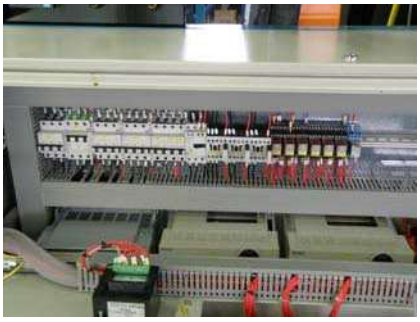
The machine is equipped with emergency stop buttons placed on the electrical panel and on the remote keyboard . These buttons are used only on emergency and not to stop the machine.

The mushroom – shaped emergency buttons are with holding type, that means that following their pushing, remain in the emergency position until the next unlock that happens turning the button in clockwise as shown in the picture

8.7.3 General Door Lock Switch

This switch is located on one of the two doors of the electric panel. This device prevents the opening of the electric panel when ther's voltage. To open this part it's necessary to turn the switch counterclockwise. This action will cause the lowering of voltage inside the electric panel and all electrical parts of the machine.

8.7.4 Magnetothermic Switches



Switches these are located inside the electric panel used as protective devices. Following a short circuit or an overload of current, these switches , involve opening and disconnecting the circuit branch in which they are installed the intervention of at least one of the magnetothermic switch creats an alarm condition that will be then signed by an orange lights placed on the door of the main switchboard

8.7.5 Emergency Unit

Inside the electrical panel a safety emergency unit is inserted and it's used to drive the emergency of the machinery.
Every time the machine circuit is switched on, or, following an emergency(like for example the mushroom shaped emergency button), the machine goes to an emergency condition that is indicated by a light inside the "Start System" blue button positioned on the control panel area.
on this condition any part of the machine can be set in motion without first make a recovery action. The emergency recovery action occurs through the pushing of the same "Start System" bright blue button.

On button pushing the unit will verify that there are no active emergency conditions and, in this case will allow the recovery operation following to which will enable the functionality of the machine will be on again. The success of recovery action will cause the blue light inside the Start System" button switching off.

A missing recovery of the condition of emergency, or the missing switch-off of the blue light inside the "Start System" button indicates that least one emergency (like one of the mushroom-shaped emergency stop button is still on). Before trying another recovery identify and remove the cause that keeps the emergency condition still on.

8.8 USAGE OF THE TOUCH SCREEN CONTROL PANEL

The machine is equipped with a touch screen control panel that allows to set the working parameter (capacity, temperatures, weight of the single pouring), get in motion some machine organs (pumps, stirrers, hydraulic junction box).

Through the same panel you can also see the operative condition of the machine (pressure of its components, their temperatures, level of components in the tanks ect.).

Moreover, the panel has to possibility of memorizing 80 working recipes that can be recalled, not only through the apposite buttons placed on the touch screen, through two rotary selectors on the remote touch-button panel. This possibility allows to begin a working already memorized without having to insert again all the necessary data.

On the top, in the right and left angle, the touch screen has 2 black arrows in a yellow field that allows the operator to flip trough the different pages available from the panel.

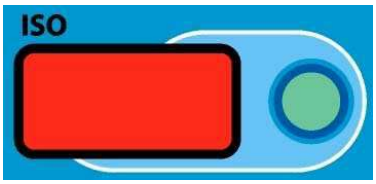
8.8.1 Automatic video page

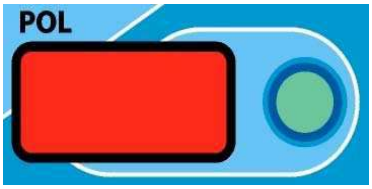
In the automatic screen, the touch screen shows the screenshot you see below. Data can be set pushing on the green-coloured ring on the right side of each of the present fields.

The pressure on this button makes appear a touch-screen numeric keypad. Through it will possible to set the value of a new data that will be acquired by the machine when the button enter (present in the same keypad) will be pushed.

You can gain access to the AUTOMATIC environment by using the arrow buttons on the top of the screen, flipping through the environments of normal working until the screen of the chosen environment.

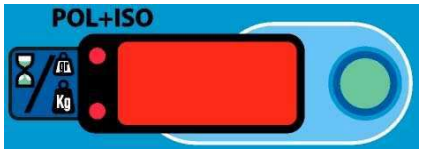
You can find here the meanings of the various symbols present on the screen:



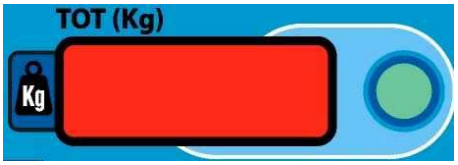


POL Specific Weight and ISO specific weight: it is possible to set the specific weights of the single chemical elements, that will be used to determine the parameters of execution of the programme. It is possible insert data only when the cycle is stopped. When it is in course you can only see the weight of each of the two elements.

Ratio: it is possible setting the ratio between the used chemical elements, according the modality indicated by the green led placed on the top of the button. To select the type of ratio to use (ISO/POL or POL/ISO) you have to press the touch screen near the green circle and keep pressing till the change of the setting, signalled by the lighting of the led in the wished modality.



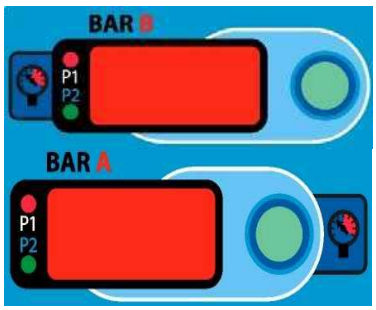
Capacity: it is possible to set the finished product capacity outgoing from the machine. This data, along with the ratio between the used chemical elements, establishes the POL and ISO capacity to use for the program execution.



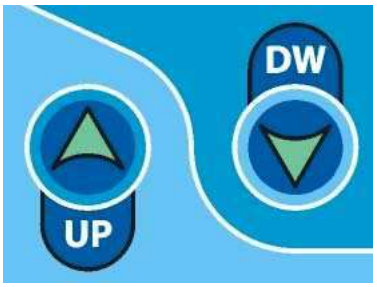
Weight: it possible to set the total weight of the product to work. This data contributes to determine the capacities of the single elements used and the time needed to execute the program.

POL and ISO temperatures: through the pressure of this button it is possible to inserting the data of the working temperature for each chemical element. During the machine functioning they show the temperature values of the POL and ISO components.

When the machine is on, the indication UP indicates that the component's temperature is higher than the wished one (and therefore the machine is going to cool the component). When the machine is on, the indication DW indicates that the component's temperature is lower than the wished one (and therefore the machine is going to heat the component).

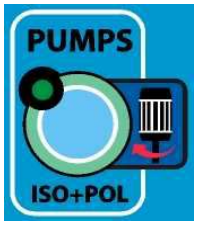


Pressures: if you press this button once, you can see and change the maximum working pressure; pressed twice, it makes you see and change the minimum working pressure.
Pressed thrice, it ends the data inserting and the display will show the real pressure noted by analogical inputs.



Formula: through the pressure of the "UP" and "DW" buttons it is possible selecting the recipe to do/program.

Formula Number: it shows the number of the recipe in progress/ being programmed. The recipe can be chosen through the two rotatory selectors on the remote control push-button panel as well as the UP and DW buttons seen above.



Pumps ignition: through the pressure of the "Pumps" button we have the pumps ignition.

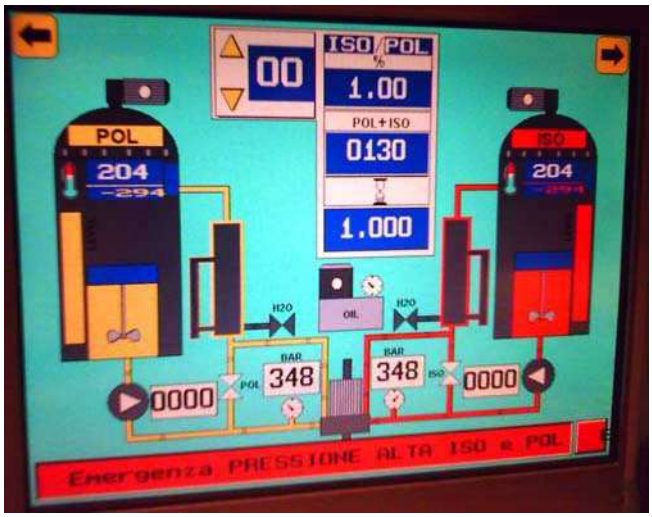
Oil ignition: through the pressure of the "Oil" button the hydraulic junction box is turned on.

***Run/ Program*:** through the pressure of the "Run/program" button, it is possible selecting between the execution or programming modality. The selected modality is indicated by the corresponding green led. This button is shown only if machine parameter "Program selection" has "BCD" value.

Stirrer ignition: through the pressure of the "Agit" button, the stirrers are turned on.

8.8.2 Automatic synoptic page

In the Automatic Synoptic Screen, touch screen shows the screen seen in the picture below.



You can access the Synoptic AUTOMATIC environment using the arrows buttons on the top of the screen, flipping through the environments of normal working until the screen of the wished screen.
The screen shows the synoptic of the foaming plant and, near the plant's more important points, pressure, temperatures and levels values are shown. Also the valves condition (open or closed) of the temperature calibration circuit is shown.
In case of alarm or emergency condition, in bottom of the screen it is shown their cause.
In this environment it is possible only changing the working program in progress using the relative arrows. All the active visualizations are the same used in the screen of Automatic type.

8.8.3 Statistics Page

You can access the STATISTCS environment using the arrows button on the top of the screen, flipping through the environments of normal working until the screen of the wished environment.
The POURING STATISTICS environment allows to keep track of the executed programs with their correspondent characteristics.
In the screen, the touch screen shows the screen shown in the picture below.

For each executed pouring, the following data are recorded:
Date an hour

Program number

Active head

ISO specific weight

POL specific weight

Real ratio measured

Total capacity measured

Measured ISO capacity

Measured POL capacity

Measured supplied ISO quantity

Measured supplied POL quantity

ISO temperature

POL temperature

ISO pressure

POL pressure

Description of the window of the pouring statistics environment:
Watch: through the button "Watch" it is possible to set the POWER1000's internal watch inserting the data in the apposite screen DATE AND TIME SETTING.

Statistics management:
In the environment POURING STATISTICS it is possible to manage the statistics shown through the pressure of the buttons in the POWER1000 keyboard:

With the pressure of the UP button it is possible to see preceding page of statistics

With the pressure of the DOWN button it is possible to see the next page of the statistics

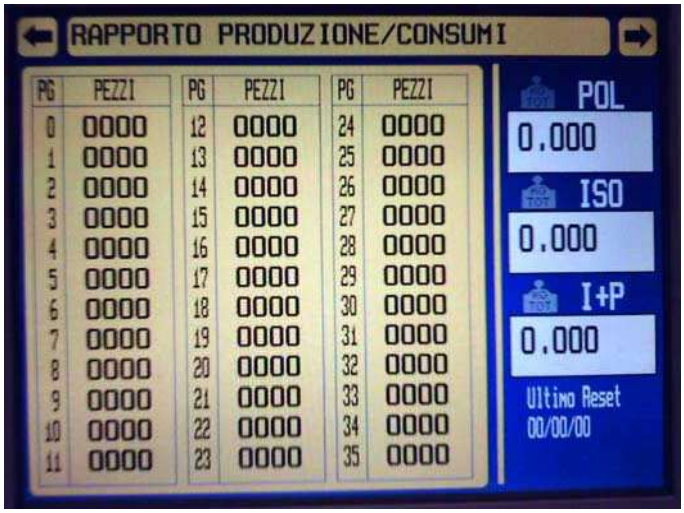
With pressure of the CLEAR button for five seconds it is possible resetting to zero the memorized statistics.

DATE AND TIME SETTING window:

This window allows the inserting of the present time and date, that will be used in the memorization of the executed programs in the POURING STATISTICS environment. Pressing the single fields it is possible the relative data.
The POWER1000 internal watch will be updated at the exit from this environment.

8.8.4 Production/ Consumptions Page

You can access the PRODUCTION/CONSUPTION REPORT using the arrows button on the top of the screen, flipping through the environments of normal working until this screen. The environment PRODUCTION/CONSUPTION REPORT allows to see the number of pieces executed per program, the statistics on the total consumption for each chemical component and the global consumption.
From a graphic point of view, this is how this environment presents itself:



Description of the window of the production/ consumption report environment:

- *Pieces meters:* next to each program identifier it is shown the number of pieces made. Pressing the touch screen in correspondence to each meter and keeping the pressure for few seconds, the meter is resetted to zero.
- *Total POL Consumption, Total ISO Consumption and Total ISO+POL Consumption:* they show the total consumption form the last reset of each chemical elements and their sums. Pressing one of the area of visualization and keeping it pressed for few seconds, the meter is resetted to zero.

In the PRODUCTION/CONSUPTION REPORT environment it is possible to manage the statistics seen through the pressure of the buttons in the POWER1000 keyboard:

With the pressure of the UP button, it is possible to see the page of the pieces meters per program preceding to the present one.

With the pressure of the DOWN button, it is possible to see the page of the pieces meters per program following the present one.

Keeping pressed the CLEAR button for five seconds it is possible resetting to zero the pieces meters for all the programs.

8.8.5 Diagnostic and error messages

Each time the machine is in emergency, a message of warning is shown. This message remains on the screen until the emergency is not solved. After the emergency is solved, if an automatic cycle was in progress, controller asks the operator if he/she wants to continue the interrupted operation or not.
Press START to continue the processing
Press STOP to annul the cycle
In the following table there is a list of the error messages and for each of them their probable cause.

Message	Cause
Emergency button STOP	The STOP button has been pressed on the programmer keyboard.
MUSHROOM emergency	The machine's emergency mushroom has been pressed.
ISO HEAT PROTECTION emergency	It was detected the number 6 entry activation
POL HEAT PROTECTION emergency	It was detected the number 7 entry activation
JUNCTION BOX HEAT PROTECTION emergency	It was detected the number 8 entry activation
STIRRER HEAT PROTECTION emergency	It was detected the number 15 entry activation
HEAD HEAT PROTECTION emergency	It was detected the number 16 entry activation
ISO HIGH PRESSURE emergency	It was detected an ISO pressure higher than the arranged limit
POL HIGH PRESSURE emergency	It was detected an POL pressure higher than the arranged limit
ISO and POL HIGH PRESSURE emergency	It was detected a POL and ISO pressure higher than the arranged limit