

INSTRUCTIONS MANUAL OPERATION MANUAL





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1. INTRODUCTION

GENERAL INFORMATION

The information on this leaflet belongs to Servicio Industrial de Electrónica, SA (henceforward SIDE, SA); their unauthorised public communication or reproduction, either totally or partially, is strictly forbidden.

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This manual contains the necessary information to install the machine model 5001xl and to use it to produce PET (polyethylene terephthalate) preform bottles.

In order to make the most out of the machine and to prevent accidents, defects or malfunctions, we recommend customers to read the instructions in this manual carefully, and to keep it always handy in order to solve any doubts that might arise.

The machine has been designed according to the Machinery Directive issued by the EU Council.

It is important to read this manual through in order to prevent serious damage on the machine due to wrongful use.

PURPOSE AND CONTENTS OF THE MANUAL

This manual is intended to provide the necessary information and instructions to install and operate the SIDE Mould blowing machine correctly.

The manual is divided into three main sections:

Operation: Including Operation stages, Screen and Format Change. These sub-sections describe the characteristics of the Mould blowing machine and its components and also how to operate it.

Blowing adjustments: This section explains the elements that must be adjusted and the parameters that must be set in order to produce superior quality containers.

Maintenance manual: This section deals with the necessary maintenance works on the machine and its components and it also explains when and how to implement them.

The issues are dealt with in different sections and the sections are divided into numbered parts and subsections. Each section includes charts, figures, diagrams and pictures in order to help understand the contents.

TIPS ON THE USE AND PRESERVATION OF THIS MANUAL

This manual is intended for operators using or monitoring the SIDE Mould blowing machine on a daily basis.

The manual does not replace the specific training of operators, who must have worked with SIDE Mould blowing machines in the past or have taken part in a specific training course on this machine taught by the SIDE, SA staff.

This manual is an important part of the machine and must be preserved for future reference during the operating life of the machine.

It must always be kept in a safe place, away from dust and damp and it must be available for whoever needs to take a look at it; if the manual gets damaged and this impairs reading, even partially, users must apply for a new copy to the machine manufacturer.

SIDE, SA reserves its right to modify the data and technical features of this manual without previous notice, as part of its continuous improvement programme concerning blowing machines and parts.

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SIDE, SA is at the disposal of its customers and it will be willing to listen to any improvement proposals concerning this manual, provided they serve to enhance the fulfilment of the purposes for which it was written in the first place or to correct any mistakes in it.

TECHNICAL ASSISTANCE

The SIDE Technical Assistance Service has been conceived to provide its customers with information, spare parts or on site assistance concerning the Mould blowing machine on demand.

Technical Assistance Service:

Servicio Industrial de Electrónica, SA C/ Llinars s/n - Polígono Industrial Monguit, 08480 L'AmetlladelVallés Spain Phone no. +34 93 846 30 51 Fax no. +34 93 849 22 11 E-mail. Jordi.claramunt@side.es

The document to apply for technical assistance or spare parts should include machine ID data, which appear on its ID plate.

These data consist of information about the machine model and the FM number (see figure 1).



You should use original SIDE, SA spare parts only

CE MARK

The 5001xl machine has been awarded the CE approval, as stipulated in Council Directive 89/392/CE. The mark is in the ID plate on the machine (Figure 1).

The original, signed "CE Declaration of Conformity" is handed in together with the Mould blowing machine; the owner must keep this document and hand it in to the new owner should the machine be sold.

2. GENERAL FACTS

INTRODUCTION

This section contains the essential information of the machinery directive for the observance of the safety norms in general, the assessment of the risks deriving from the use of the machine and the determination of the environmental requirements.

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Failure to comply with the indications in this section or in other sections of this manual might impair the efficiency of the safety devices on the machine, provoking accidents and damaging the operators.

REFERENCE STANDARDS

The TMS 1002e machine and its components have been designed in consonance with the CE standards in force and also according to the European and national standards concerning this sector as listed in the Council machinery directive (law 2006/42/CE).

The main harmonised standards applied to this project have been included next:

EN 422 2009 EN 954 2007

TEMPERATURE AND HUMIDITY

The SIDE Mould blowing machine should only be used in places with a 15°C to 45°C room temperature range and with a relative humidity below 70%. The storage temperature must range between 5°C and 50°C.

OPERATING TEMPERATURE

The Mould blowing machine must be preserved from atmospheric agents (rain, hail, snow, fog, etc.).

Warning: in a corrosive atmosphere the maintenance methods and the frequency of the revisions must be scheduled accordingly so as to avoid the excessive wear of the components.

This machine has not been designed for use in explosive or partially explosive atmospheres: thus, it is strictly forbidden to use it under such conditions.

LIGHTING

Lighting in the workplace in which the machine has been installed must allow the identification of the buttons and keys as well of the commands and emergency stop devices.

It must also guarantee safety during common maintenance works; the owner remains the sole responsible for complying with the lighting levels established by the standards in force.

VIBRATIONS

Under normal operating conditions and provided the indications in this manual are met, the machine vibrations will not provoke dangerous situations. If anomalous vibrations are noticed, stop the machine immediately and call SIDE, SA technical assistance service.

WASTE AND ENVIRONMENTAL POLLUTION

Users should comply with the European standards and directives in force concerning the treatment and disposal of the pneumatic oil and lubricants used on the machine.

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MACHINE NOISE LEVEL

The noise emitted for the machine is 85dB. For this, all the operator into the machine area must use obligatory audition protection.

GARMENT STANDARDS

The staff operating the machine or carrying out maintenance works on it should observe the essential national safety requirements in force concerning clothing.

In general terms, safety slip resistant shoes and wearing moccasins, clogs, slippers and any other shoes hindering the mobility of operators is banned.

Clothing should match each task: overalls or aprons must be made in natural fibre materials (such as cotton) with a low ignition temperature and they should not be stained with lubricant.

When working in heat-radiating areas the protection gloves should be used. Splash proof goggles must be worn in those areas in which molten material splash risks or chipping hazards may occur.

Note: while at work, operators should not wear bracelets, watches, rings or chains that might hinder their mobility or get hooked in the machine components. When working near movable parts, operators must make sure neither their clothes nor their hair is caught by them.

WARRANTY

The warranty terms and conditions and its duration have been set out in the purchase agreement subscribed by the purchaser and SIDE, SA

COVERAGE

It will cover all the broken parts or those presenting an excessive wear due to the amount of operating hours.

Once a component under the warranty period has been replaced, it will have to be sent to SIDE, SA should the latter ask the machine owner to do so for verification purposes.

The warranty concerning any peripheral equipment supplied through SIDE, SA and purchased from other manufacturers will be that provided by the latter, but it will not exceed the terms and conditions of the warranty set out and agreed on by the Seller and the Purchaser.

WARANTY EXCLUSION PROVISION

Machine failure due to natural wear (washers, detent bridles, belts...), wrongful manipulation, wrongful use, collision, meteorological reasons, voltage changes or lack of maintenance according to the stipulations in this manual will not be covered by the manufacturer during the warranty period.

In order to benefit from the warranty, it is a must to comply with the maintenance stipulations in the Mould blowing machine manual.

The grease for the lubrication circuit must be KLUBER UH 1 14-1600 GREASE, in order to guarantee the good operation of the system.

Repair works implemented by the Owner or by third parties without the previous explicit authorisation of the Manufacturer will always fall within the responsibility of the Owner and it will void the Owner's right to present any claims against the Manufacturer.

Repair works implemented by technicians other than those appointed by the Manufacturer or without the Manufacturer's explicit authorisation will void the warranty.

The Manufacturer will only be liable for those issues concerning the Mould blowing machine described in this Manual and any subsequent claim for damage or for any harms caused by the flaws or defects detected on the machine.



3. TECHNICAL DATA

3.1

BLOW MOULDING MACHINE SPECIFICATIONS

MAINS

Input voltage (+ground +neutral): Admissible volt drops: Frequency: Admissible variation: Total installed power capacity (Kw): Average power consumption (Kw): (Other optional voltages and frequencies).	Three phase 380 V + / - 5% 50 / 60 Hz + / - 5% 150 (1) 80 (2)
HIGH AIR PRESSURE	
High air pressure (bar): Air quality: Dry, cold, oil free (food processing quality).	40
LOW AIR PRESSURE	
Low air pressure (bar): Necessary flow rate (m3/h): Air quality:	7 50 Dry
COOLING WATER	
Cooling water pressure (bar): Cooling water temperature (^e C): Cooling power (Kcal/h).	10 (máx) 8-10 16000
GENERAL DATA	
Workplace temperature (^e C) Premises: Relative humidity (%): Noise level:	15 / 45 Indoors 25 / 70 85 dB
HEATING OVEN	
Total heating power capacity (Kw): Number of heating modules: Number of heating areas: Number of bulbs per module: Voltage adjustment range:	102(3) 5 5x16 16 0 to 220 V

PRESS UNIT

Number of cavities: Minimum distance between the trays	1
(Closed mould): Maximum distance between the trays	480 mm
(Open mould):	905 mm
CONVEYOR SYSTEM	
Number of units conveyed: Size:	50/25 80 mm
STRECHING-BLOWING UNIT	
Mould stretching course (mm): Mould stretching strength (Kg):	800 1750
Impervious strength (Kg) (at 10 bars): Pre-blowing pressure adjustment	4500
Range (bar):	0 to 10
MIN / MÁX BOTTEL DIMENSIONS	

Minimum volume	10 litres
Maximum volume	30 litres
Maximum volume	50 litres for XL

* Ask for further capacities

MACHINE DATA

Mechanical speed (cycles/hour):	950
Maximum height (preform elevator):	3350
Weight (Kg):	9500
Mould weight (Kg):	258
Tool for mould colocation weight (Kg):	43

(1) These may vary depending on the machine options.(2) These parameters will vary according to bottle format and size, as well as to environmental conditions.(3) Maximum power allowed by law.

3.2. GENERAL INSTALLATION GUIDELINES

On receiving the SIDE blow moulding machine, the owner must check the packaging (if any); if it has suffered any damaged during transport or if the consignment is not complete, the owner should contact SIDE, SA technical assistance services immediately.

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INSTALLATION, MAINTENANCE AND DISMANTLING

The blow moulding machine must be installed by the owner. The operation tests and the initial start-up must be implemented by SIDE, SA technicians, except if otherwise stated in the purchase agreement.

It is the user who must plan, project, build up and check the operation of the facilities required for the machine to function, namely: power feeding and distribution, air and water supplies for the cooling system.

The owner will have to replace both the blow-moulding machine and the auxiliary devices taking the indications, recommendations and specifications provided in this manual into account and pursuant to the sector directives and laws in force.

The following general indications are intended to facilitate the installation of the blow moulding machine pursuant to the safety standards in force.

- Read this manual carefully.
- Make sure the facilities observe the corresponding safety standards.
- Make sure the facilities do not hinder the safety of the blow moulding machine.

- Make sure that the facilities that must be connected to the blow moulding machine meet the manufacturer specifications.

- Make sure that the installation and maintenance staff – be it your own or outsourced – is specialised and has received specific training.

REQUIREMENTS OF THE INSTALLATON PREMISES

The TMS 1002e blow-moulding machine must be placed upon a flat, solid surface able to support its weight (see technical data).

The installation premises must allow the free circulation around the blow moulding machine and the implementation of the different operation tasks. Make sure, in particular, that there is enough room to implement mould change operations as well as to access the switch plate and the interior of the machine.

3.3 SAFETY

The machine has a series of devices to prevent occupational accidents that could harm the operators or facilities.

All components of the line characterised as having inherent risks, either due to their structure or the processes involved, have been analysed according to the directive 2006/42/EC and EN 422 2009. In each case, the most appropriate measures to eliminate or reduce the risks for operators have been taken.

All process drivers should read the following information carefully, which describes the areas of risk and the corresponding preventive measures, as well as the areas in which there is a degree of "**residual risk**".





3.3.1 RISK AREAS

Operating the machine during the normal production cycle does not present a risk to personnel as the protective cabins prevent accidental access to moving parts.

If maintenance must be carried out on parts located inside the cabin, the various "**risk**" areas must be analysed, which are classified by functional groups in the following table.



THE RISK AREAS ARE CONSIDERED TO BE THE PARTS OF THE MACHINE IN WHICH THERE IS A RISK OF DEATH, SERIOUS INJURY OR ACCIDENT FOR THE OPERATOR OR PERSONNEL IN GENERAL, IF THEY ARE EXPOSED DIRECTLY AFTER HAVING REMOVED OR DISABLED THE SAFETY PROTECTIONS AND DEVICES.

3.3.2 GROUP

FUNCTIONAL GROUP	RISK AREA	DESCRIPTION
Press	Press Area	- Moving parts: risk of impact,
		entrainment or crushing.
Transport	All the areas of displacement	- Moving parts: risk of impact,
		entrainment or crushing.
		- Risk of falls from the walkways.
Blow mould	Blow mould area	- Moving parts: risk of impact,
		entrainment or crushing.
Nailing	Nailing area	- Moving parts: risk of impact,
		entrainment or crushing.
Furnace	Lamp holder area.	 Risk of burns by direct contact
		with the furnace containers.
Stretching/blowing	Press area blowing.	- Parts of the blowing press and
	Mould area blowing.	moulds in motion: risk of
		entrainment or crushing.
Loading	Upper platform loading area.	- Risk of falls from the upper
		platform loading area.
Unloading	Bottle unloading area.	- Moving parts: risk of impact,
		entrainment or crushing.
Electrical cabinet	Cabinet area.	- Current: risk of electric shock.
Boilers	Baseplate area.	- Compressed air: risk of explosion.
Leads	Press area	- Compressed air: risk of whiplash.
Preforms Elevator	Entrapment area	-Rotatory parts: risk of entrapment
Expulsion system	Entrapment area	-Moving parts: risk of entrapment



TO REDUCE OR ELIMINATE THE RISK OF AUDITION DISEASE OR BURN WHEN MANIPULATE THE OVEN SEE THE SECTION 3.4.6

3.3.3 AREAS OF RESIDUAL RISK

Since all the process operations are automatic the machine has no residual risks; even when operating in manual mode it is fully fitted with safety devices and guards.

However, despite the measures taken, a certain hazard level is inevitable if the functionality of the line is not reduced.

Therefore, this section details a series of general criteria to identify the areas of "residual risk".



THIS CATEGORY INCLUDES THE AREAS IN WHICH THE OPERATOR IS EXPOSED TO A RISK OF DEATH, INJURY OR ACCIDENT IF THE DANGER SIGNS ARE IGNORED AND THE SAFETY MEASURES DESCRIBED

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IN SECTION 02 AND 2.6 ARE NOT APPLIED AND IF THE WORK IS NOT DONE WITH CAUTION.

1. The control panel area must be considered as one of residual risk because the operator cannot see the entire machine from this area: Before sending a movement instruction the operator must ensure that no one is working on the machine or close to it.

2. In addition the entire machine must be considered as a residual risk area due to the presence of electric and pneumatic energy and high temperature parts.

3. For the same reasons the furnace area also presents a residual risk of burns.

4. The electrical cabinets are areas of residual risk because even when the cabinet doors are open and the safety devices are activated, high voltage still passes through the terminals where the cabinet is connected to the external network: if the operator touches **these contacts they can die from electrocution.**

5. The pressure accumulator (40bar) and both the high pressure (40 bar) and low pressure (10bar) lines are under pressure when the machine is ready to start the blowing cycle. If an emergency stop is activated these are emptied automatically.

Before performing any operation, the isolation valves must be closed and the 40bar and 10bar lines depressurized through the respective valves, verifying that the pressure gauges indicate "0".



3.4 SAFETY DEVICES

3.4.1 GENERAL INFORMATION

The machine has a series of built-in protections for the operator or other people exposed to inherent or residual risks and hazards during the normal work cycle.

There are two types of safety devices:

- **Passive safety devices:** These are those that prevent the operator contact moving parts of the machine or entering hazardous areas when the machine is operating automatically. (e.g. protective shell, fixed screens, etc.).



The coordination between both types of devices ensures compliance with the safety requirements needed to protect personnel from possible risks and hazards.



SIDE S.A DOES NOT ACCEPT ANY RESPONSIBILITY IN CASE OF AN ACCIDENT WHERE A SAFETY DEVICE IS ALTERED BY THE USER OR ANY OTHER DESIGNATED PERSON, THE USER BEING SOLELY RESPONSIBLE BEFORE THE INSPECTION BODIES.

3.4.2 CABIN SAFETY DEVICES



ANY ALTERATION OF A SAFETY DEVICE BY THE USER EXEMPTS SIDE S.A FROM ANY RESPONSIBILITY AND MAKES THE USER SOLELY RESPONSIBLE BEFORE THE COMPETENT INSTITUTIONS



IF THE MACHINE DOOR LIMIT SWITCHES FAIL THE EMERGENCY STOP IS ACTIVATED

REFERENCE	DESCRIPTION	PURPOSE
1	Anti-intrusion screens (Typical)	- Panels of fixed screens on the machine frame. Mechanical protection located in areas where there is a risk to people.
2	Hinged doors.	- Hinged doors and limit switches are activated when the door is closed.
3	Discharge valves (40bar) Discharge valves (10bar)	- Valves responsible for emptying the air from the machine in case of an emergency stop.
4	Accumulator safety valve.	- Prevents overpressure within the accumulator.
5	Blowing block switch.	-



OPENING THE DOORS WHEN THE AUTOMATIC CYCLE IS OPERATING CAUSES AN INMEDIATE EMERGENCY STOP

3.4.3 EMERGENCY PUSH BUTTONS

These switches are located in different areas of the machine to allow the operator to immediately stop the operation of the machine at any time:

- Cabin emergency push buttons.

- Internal emergency push buttons.

An emergency stop push button is a self-latching, red mushroom-headed button which transmits the emergency stop command to the control system. When this button is activated the machine stops working immediately.

Specifically, when activating an emergency stop push button:

- The electrical power is immediately disconnected.
- The upstream and downstream air supply circuit is interrupted.

While an emergency push button remains pressed it is not possible to carry out any operation; to restore normal operation it must be unlocked by turning it in the direction of the arrow and pressing the "EMERGENCY RESET" button located in the control panel.



• A full description of the selectors can be found in section 6.1



3.4.4 ELECTRICAL CABINET SAFETY DEVICES

3.4.4.1 ELECTRICAL CABINET DOOR SAFETY DEVICES

These safety devices interrupt the power supply to the entire machine in case of opening one of the master cabinet doors.

The cabinet has a limit switch and a hardware device that automatically trigger the mains switch when a door is opened.

3.4.4.2 FLASHING VOLTAGE INDICATORS

These indicator lights are located above the master and slave cabinet doors; they allow detecting if there is a voltage in the cabinet when the door is open by remaining lit intermittently.

3.4.4.3 MAINS ISOLATION SWITCH WITH DOOR LOCK

It is located inside the cabinet and is activated from the outside using a control panel located on the cabinet door.

It has two positions, "0" (closed) and "1" (open); the cabinet can only be opened when the switch is set to "0", i.e., when the cabinet is not energised.

• The full description of the selectors can be consulted in section 6.2.1



3.4.4.4 KEY SELECTORS

Some selectors, such as those which allow the machine to operate manually or which disable the cabin door safety devices, can only be operated with a key; this safety measure prevents unauthorised personnel from accessing the functions controlled by the selector.

• A full description of the selectors can be found in section 6.1

3.4.4.5 COLUMN LAMPS AND AUDIBLE SIGNALS

REFERENCE	DESCRIPTION	PURPOSE
1	Column Lamp	Flashing red - turned on to signal a
		machine alarm condition.
		Fixed green - turned on to signal the start of
		machine cycle.
2	Indicator Light	- Machine alarm buzzer.
		- Machine cycle start buzzer.

3.4.4.6 SECURITY KEYS SYSTEM

To achieve a succesful security procedure to protect to the operator from any posible accident or injury when he needs to ge tinto the machine.

MUST FOLLOW THE NEXT PROTOCOL:



IT IS NECESSARY TO TURN OFF ONE OF THE TWO SECURITY KEYS (A OR B) TO SWITCH OFF THE MACHINE AND GET INTO IT SAFELY.

IT IS A MANDATORY REQUIREMENT THAT THE OPERATOR TAKES WITH HIM ONE KEY (A OR B) TO GUARANTEE THAT THE MACHINE DOESN'T WORK. IN THIS ACTION YOU CAN ENSURE THAT ANY OTHER OPERATOR CAN'T TURN ON THE MACHINE WHILE ANOTHER OPERATOR IS INSIDE IT.









3.4.5 WARNING, PROHIBITION AND MANDATORY SIGNS

Warning or prohibition signs designed according to ISO standards are placed to signal line areas in which work should be done with caution or when it is considered that there is a residual risk.



IF USER REMOVES THESE SIGNS OR DOES NOT REPLACE THEM WHEN THEY ARE DAMAGE, THEN, THEY BECOMA RESPONSIBLE FOR ANY DAMAGE ARISING FROM FAILURE TO COMPLY WITH THE SAFETY MEASURES PROVIDED BY THE MANUFACTURER

3.4.5.1 WARNING SIGNS

The following warning signs are placed on the machine and on the tool for mold colocation:



-ELECTRIC CURRENT-THERE IS HIGH VOLTAGE IN THE AREAS MARKED AND THEREFORE RISK OF ELECTRICAL SHOCK, INJURY OR DEATH, THIS SIGN MAY INDICATE THE SUPPLY VOLTAGE VALUE



-MOVING MECHANISMS / PARTS-INDICATES THAT THERE IS A DANGER OF INJURY OR DEATH DUE TO THE PRESENCE OF MOVING MECHANISMS IF IT IS OPERATED WITHOUT SAFETY DEVICES AND PROTECTIVE ELEMENTS OR IF SUCH DEVICES ARE NOT EFFICIENT

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3.4.6 OBLIGATORIES SIGNALS

Required signals are designed according to ISO standards are placed to signal line areas in wich work should be done using a specific protection obligatori



-IS REQUIRED TO USE THE AUDITION PROTECTION WHEN THE MACHINE IS WORKING



-IS REQUIRED TO USE GLOVES RESISTANCE HOT SURFACES WHEN THE OPERATOR WORKS TOUCHING THE OVEN

MACHINE





TOOL FOR MOULD COLOCATION





4. INSTALLATION ON THE USER'S PREMISES

4.1. UNLOADING THE BLOWER

As has already been said, the machine must be installed following the indications provided by SIDE, SA in the installation dossier. The instructions in this chapter are merely informative.

Maintenance tasks on the machine and its components must be implemented according to the following indications:

- Prepare appropriate load lifting equipment with the capacity to provide the safest working conditions.

- A crane, gantry crane or fork-lift truck must be used to move or unload the blower.

- The blower has lifting points prepared for fixing hooks. - When fitting fasteners (chains or strops), they must be positioned so that the machine is always parallel to the ground when being raised. Otherwise, loads at the joints would exceed specifications, which could cause damage to the machine.







4.2. PLACING THE FEET ON THE MACHINE

The machine must be placed upon the adjustable feet, which will be placed in advance making them coincided with the supports of the machine frame.



LEVELLING

order	color
1	
2	
3	





1)





















DOWN and LEVEL



DOWN and CONTACT



2)



DOWN and CONTACT



CONNECTING THE FUNCTIONAL UNITS

In order to facilitate transport, it is necessary to dismantle some of the components of the blow moulding machine. This section explains how to reassemble the dismantled units.

4.3. PLACING THE FEEDING HOPPER – LEAD IN CONVEYOR

This should comply with the following:

- The retainer cylinder must be centred
- Frontal height fitting. -
- Levelled according to the base.





4.4. DRAWING FITTING

This should be fitted respecting the locating pins.



4.5. CONNECTION THE WATER AND AIR PIPES

The supply plugs are on a cross-arm placed upon the machine frame. These plugs can be accessed from the upper part of the machine protection frame in order to avoid obstacles (such as cables and pipes on the floor) that may hinder mobility around the machine.

Between the fixed facilities in the plant and the machine, a flexible 500mm sleeve (minimum length) should be placed in order to facilitate alignment and avoid pipe rupture due to the vibrations.

It is advised to use safety-fixing systems (chains) for high-pressure flexible pipe couplings at all times.

See connection details on the general plan

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5.1. STRECHTING / BLOWING

OPERATION STAGES

5.

The stretching/blowing unit stretches the preforms in the blowing mould vertically in order to guarantee the uniform distribution of the material in the moulded bottle during the preblowing stage.

5.2. IMPREVIOUS CYLINDER

The impervious cylinder unit and the blowing nozzle seal the preform carrier during the blowing stage.

5.3. PRES

The blowing press opens and closes the blowing moulds producing simultaneously the necessary reaction to balance the pressure in the blowing moulds.

5.4. MOULD

The mould-blowing unit and the stretching/blowing unit form the containers. The blowing moulds are placed between the front and middle mould carrier plates in the blowing press.











5.4.1 UPLOADING AND UNLOADING MOULD

When the production needs to change the mould to manufacture another bottle, the operator must to change it using the a cran comply with the next condition:

- Prepare appropriate load lifting equipment with the capacity to provide the safest working conditions.

- A crane, gantry crane or fork-lift truck must be used to move or unload the mould.

- A crane must to support the mould weight (see the technical data, page 9)



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5.5. MOVEMENT OF THE BOTTLE MOULD BOTTOM PIECE

The Bottle mould bottom piece unit combines with the movement of the press plates to form the bottom piece of the mould container.



5.6. OVEN

The Oven unit heats the preforms by means of infrared bulbs placed on the preform carrier unit.





5.7. OVEN TRANSMISSION

The oven transmission system rotates the preform holder units on their axis while the transport system takes them through the heating phase.



5.8. PREFORM HOLDERS

The nozzle-cooling unit consists of an air-cooling tunnel through which the preform carriers pass once the container has been extracted.

5.9. DELIVERY

The delivery system consists of an integral system including different stages that range from picking the containers from the preform carrier units to placing them in a vacuum belt conveyor.





Once the preform has been heated in the oven, the press feed conveyor takes the preform carriers to the mould for the blowing stage.

5.11. LOADING AND NAILING

The loading and nailing unit consists of an integral system that places the preforms on the preform carriers and then fixes them to the nozzles.



5.12. HOOPER AND FEEDER

The hopper and feeder unit place the preforms in the right position and takes them to the loading and nailing unit.





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5.13. PREFORM CARRIER

The preform carriers move through the blow moulding machine conveyor circuit and it is there that the preforms are placed.



6. SCREEN

Machine's structure and screen's philosophy.

The TMS 2005xL machine is divided in the following parts:



1. OK Button: Used to verify the blower safety features (primarily Emergency mushrooms and Doors) and, if everything is operational, it enables the machine's electrical power supply and the operating air intake. When the pilot lights up, it means that the power and the air inlet are enabled and the security features are activated.

2. USB slot: Export and import recipes and alarms.

3. MANUAL or AUTOMATIC: Selector that lets us choose between either manual or automatic features.

4. EMERGENCY button: which like the others installed around the machine, stops all movement instantly, and releases the pressure from the low-pressure pneumatic and hydraulic circuits and cuts off the electrical circuits.











M C

🚯 OK

SCREEN SWITCHERS

6.2.1 SCREEN STRUCTURE

The screen is formed by two fixed areas (top and bottom toolbars) that we find in all screens and that give easy access to any point in the program.

The central area of the screen varies depending on the operating mode and function selected. Many of the functions are restricted according to the level of access to the machine screens.

ATTENTION	\triangle	

If you press on a particular function on a screen, and it does not occur, you do not have sufficient access to perform this function.

06/11/2017 14:33:43	AUTO	Data Config	Format Name
Cycle Transport Press Load Extraction Oven		Machine Preform in Machin N° Pref. Machine	e. •
Operation Total Bottles Loaded Total Bottles Blown Total Bottles Not Blown Part. Bottles Blown	0 b. 0 b. 0 b. 0 b.	Oven Oven Temp. Cameras Temp. Module Compensation	 Ok Pre-heat 1 Pre-heat 2 40.0 40.0 oc 107.0 109.0 oc 1 2 3 4 5 +0 +0 +0 +0 +0 %
No Initial Position (Homing)	Lion Auxiliary		Operation(b/h) Operation(b/h) 0 Total N° Bottles 0 0

TOP BAR TOOLS (left to right):

SIDE

13/02/2017 14:05:52 Data Config

1. SIDE logo / **Current time**: pressing the SIDE logo we access the start-up system. The current date and time can be set in the "Setup" screen.

MANUAL

Man

2. Operating mode indicator: Manual/Automatic operating mode. To change mode, we use the key selector push button on the front of the machine.

3. Current screen name: informs us which screen we are in and its name. By clicking on this point from any screen, we go to the main screen of the active operating mode.

4. "Data" screen access and "Config."(setup): accesses the screen for managing the recipe parameters of container format in progress. On the setup area, access to the program set up screen where we can configure the machine options and settings, language preference, change date and time, and access to special and advanced features.

5. Format name: displays the name of current container format. Clicking on this point, we access the screen for editing the format name and description field. The recipe and blowing process data parameters will also be saved under this name.

6. Indication and access to Access Level screen: displays the current access level (U-BAS-Basic user, U-ADV-Advanced User, U-SAT-Maintenance User, U-MAN-SIDE Manufacturer User). On pressing, we access the Password input screen to change access level and other functions.





Auto

Man



MANUAL



Format Name





Format Name

LOWER BAR TOOLS (left to right):

1. Pilot / Push alarms: "Alarm" light (Primary and Process Alarms) and "Warning" (Secondary Alarms). "Reset" alarms button (alarm acknowledgment and deletion). This switch has the same function as button located on the machine keypad. By

HOMING

HOME

2. RESET button: For enabling and resetting, the machine alarms. Pressing once will cancel the audible alarm. Pressing a second time resets the alarms and enables the servomotors. When the pilot lights up, it indicates that there is some kind of alarm or warning pending recognition.

3. Home and Machine OK Lights/Buttons: the "Home" light indicates that the various elements and machine devices are in their initial position and suitable for operating the machine cycle. The "Machine OK" light indicates that the machine meets all operational conditions (Home includes additional conditions). By pressing on the light, we access the OK conditions for running the cycle.

Finally, we have the "Homing" button that runs the Home function, or function in which all mechanical, pneumatic and electrical machine devices are reset to the correct starting position for running the machine cvcle.

4. Bottle production Start/Stop button: It only works when all conditions are met for preform blowing. To stop container manufacture, press the button again. The blower will continue to operate until the last containers are ejected from the blowing stage.

5. Oven heating lamps on and off switch buttons: This button is only operative when the machine is in automatic mode.

6. Button to trigger the preform feed from the hooper chute to the feeder: This button will only operate when the blower oven is at the optimum working temperature.

7. Production Parameters: shows the machine's basic production parameters: bottle production in units of bottles per hour, the total number of bottles produced (total count). By pressing on the parameters, we access to the "Production".

8. Back: button to go back to the previous screen.













Operation(b/h)

552

Total N° Bottles 225



6.2.2 OPERATIONS

Preform loader: the module that loads the preforms into the machine. This comprehends the whole feed system from the device that transports and sets the preforms in the preform holder (belt, roller inverters, feed chute, splitters and clamp system for locating the preforms in the machine). It also includes pinning them.

Bottle and/or container extractor: module that extracts bottles and/or containers from the preforms holders and removes them from the machine using a conveyor belt or other devices.

Preform holder or container carrier: this module carries preforms or container holders. It includes the servomotors that advance and restrain the holders, the oven entry piston and the restraining systems at different points of the machine. It also includes the preform guidance system (optional).

Press-Stretch: module responsible for preparing the blowing process, by opening and closing the blow press, stretching motion, floating bottom and closure gasket. The press movement and the stretching are performed using servo motors.

Blower: module for blowing the preforms. Manages blow valves, pre-blowing and the parameters of the process (Pre-blowing, blowing and decompression).

Oven: module that manages and controls the oven for heating the preforms. Includes all temperatura profiles and their cooling control parameters.















6.3 Manoeuvres

6.3.1 VOLTAGE CONNECTION

1. Connecting the blow moulding machine to the mains.

2. Place the master switch in position "1".

6.3.2 COMMISSIONING



For commissioning, we must first press the **"OK" button** on the keypad until it lights. Then we press the **"Reset"** button until the pilot light turns off. At this point, the blower is in service and ready to work. Once these two operations have been completed, the machine is ready to work in manual or automatic mode according to the position of the **"Manual / Automatic"** Selector on the keypad.



6.3.3 OPERATE IN AUTOMATIC MODE

With the "Manual/Automatic" switch in the automatic position, we press the preform holder carrier start-up button. Then we press the lamp ignition button and finally the preform load button. After these three operations, the blower is operational and waiting for the oven to reach the optimum working temperature to begin loading preforms.


Nomenclature:

Work Modes	The machine has three main modes: Manual Mode, Auto Mode and Alarm. The first two are selected by selector key pushbutton located on the front, as long as we are not in alarm status.
	Manual Mode: Preparatory mode for the machine where there are a series of displays for moving, adjusting and configuring all the machine's features. We can also run the various machine cycles. We cannot produce bottles or containers.
	Automatic or Auto mode: machine production mode. By using the push buttons located on the machine keypad, we can put the machine into production.
Machine Cycle.	This is the complete machine cycle for producing one or more cylinders according to its mould cavities; it is repeated periodically. Within one machine cycle are the following processes: preform loading, transport of preform holders or bottle holders, preform blowing, bottle extraction.
Homing	Initial positioning function. This function positions all mechanical, electrical and pneumatic systems to the correct position for starting the cycle. In older machines, it was called "reset".
EV	Short for pneumatic or hydraulic solenoid.
FC	Short for photocell or photoelectric cell.
Machine OK	Machine prepared for production start-up.
Primary Alarm	Alarm occurring due to any severe cause (for example, emergency mushroom opening the machine doors). Primary Alarms shut off dangerous power sources (electric, pneumatic and hydraulic). Whenever a primary alarm is triggered, the machine alarm sounds continuously.
Process Alarm	This alarm occurs when the various machine cycles are running and they cannot continue because of an event (for example, waiting for a detector of a given element). Whenever a Process Alarm is triggered, the machine alarm sounds continuously.
Secondary Alarm	Warning of an event (for example, Greasing Alarm). This does not shut down the production cycle of the machine. Whenever a Secondary Alarm is triggered, the machine alarm sounds intermittently.
Reset Alarms	Used by the operator to acknowledge alarms and clear them.
Password	Password to access menus and/or advanced program options, or to determine the different levels of access according to type of machine operator.
Access Level	According to operator type, the machine program defines the access to the various functions. Access Level refers to the level of the operator to manage the machine. Access levels are (from most basic to advanced): U-BAS-Basic user, U-ADV-Advanced User, U-SAT-Maintenance User, U-MAN- SIDE Manufacturer User).
Preventive Maintenance	The machine provides periodic warnings (weekly, monthly, quarterly, annual and bi- annual) for the maintenance of the various elements to prevent possible problems and production stoppages.



Change of access level

1						
SIDE 13/02/2017 14:08:12	Man PASSWO	DRD	Config	Form	at Name	U-ADV
		Password				
Password Current Access Lev U-ADV - Adva Access level time 26	rel anced User 30 min.	Reset Passwo	ord			
Machine Alarm - Primary Alarm or A	SET HOME HOMING	MAN F1 F2			Operation(b/h) 0 Total N° Bottles 0	

By pressing the icon in the top right-hand corner of the screen, we access the machine program's access level screen. At the same time, this displays the current access level.

The various access levels are (in order of priority):

Basic User
Advanced User
User Maintenance
SIDE Manufacturer User

With a keyword or Password we can move from one access level to another for a specified time. The basic access level (U-BAS) requires no password, and is the baseline for the production operator. Advanced access level (U-ADV) is designed for the machine operator or technician; from this level we can modify the operating parameters of the machine or process. This level is also required for using the machine in manual operating mode.

Finally, there are two levels for maintenance personnel (U-SAT) and in which the machine manufacturer can alter the parameters.

Keywords or passwords have a limited duration, after which the system automatically activates the basic access level.

There is a standard, 4-digit password for advanced use of the machine that will be provided to the end user when SIDE personnel set up the machine.

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On the screen, we find:

- Entry field for password or keyword (the entry will be displayed as "*")
- Current Access Level
- Access Level Times: access time and total time remaining for the selected access.

If it were necessary to provide a password to access certain internal data or special functions, the SIDE manufacturer would provide temporary passwords and provide information on specific features or functions.

FORMAT NAME

Format Na	me					
SIDE 13/02/2017 14:08:12	Man	PASSWORD	Data	Config	Format Name	U-ADV
		GL	irrent Format Nan	ie		
Format Name		1				
romacivanie						
Description						
Description 1						
Description 2						
Description 3						
Description 4						

We access this screen by clicking on the name of the format found in the header at the top of the screen.

This screen is used to define the format name of the bottle or container to be produced by the blower.

It should be a logical name and one that serves to identify the work format, while offering the possibility of saving a description or additional information that will be saved in the format data and parameters.

Changing the name of the format, automatically changes the name that appears at the top of the screen, and the name by which the information is stored in the data screen.

6.3.4 MAIN SCREEN (AUTOMATIC MODE)

AUTO screen



Cycle

Indicator bars showing execution of the various machine modules:

- Transport: preform holder carrier
- Press: opening and closing cycle of the press, stretching and blowing
- Load: preform loading cycle
- Extraction: containers and/or bottles extraction cycle
- Oven: cycle that controls the oven module

Machine

Basic machine data

- Preforms loaded into machine
- Number of preforms loaded into machine.

Production

Bottles and/or containers counter:

- Total bottles loaded
- Total bottles blown
- Total bottles NOT blown (rejected)
- Partial N° of bottles blown (partial counter)

TMS 5001



Machine

Basic parameters of the oven:

- Oven OK (desired temperature reached) and pre-heating indicators
- Current oven temperature (temperature probes)
- Current temperature infrared cameras
- Active temperature compensation indicators and compensation rate of each module

PRODUCTION SCREEN (production)



Production indicator dials

- Production dial: indication of current production in bottles/hour.
- Efficiency dial (%): percentage of blown bottles over bottles loaded.
- Rejection dial (%): percentage of bottles NOT blown over bottles loaded.

Parameters

Bottles and/or containers counter:

- Total bottles loaded.
- Total bottles blown.
- Total bottles NOT blown (rejected).
- Partial bottles blown (partial counter).

Machine Counters.

- Time machine active: total time machine is connected to mains.
- Time machine cycle: total number of machine transport cycles.
- Time machine operating: total time machine is producing bottles.
- Nº Machine Cycles: duration of a machine production cycle in seconds.
- N° Bottles Machine: total number of bottles blown.

Buttons.



- Part. Res: Reset or zeroing of partial bottle counter.
- Tot. Res: Reset or zeroing of total bottle counter.

AUX. SCREEN (AUXILIARY)

Counter reset button:



SIDE Man AUX 13/02/2017 14:12:05 D	ata Config Format Name
Grease	Water
Grease Motor Motor Level/ Pressure switch ○ Level Press. Greasing Cycle Counter 0 Cyc. 0.0 N° Greasing Cycle 1000 Cyc.	Water Pressure / Min. Xater Temp. / Max. 20.0 25.0 oC
Air	Alarms
Low-Press Air Press.	Emergency Doors
High-Pressure Air / Min. 25.0 20.0 bar	Thermal cut-out Alarn 🔘 Inverters Alarm 🔘
Cavity Pressure NC O NO O Press.	En. Inf. Sinamics 🔘 Alar. Inf. Sinamics 🔘
Boiler RecPressure Air 0.0 bar Sd.	Sinamics Error 0
Grease Maint. Line Information General Alarm Assembly-line Keg Blower In Operation or Emptying	Keg Blower Assembly Line Start Conveyor Request Ack Calls For Keg Ack Request
Machine Alarm - Primary Alarm or Active Process Alarm	Operation(b/h) 0 Total N° Bottles 0

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The auxiliary screen has the machine's basic auxiliary features, for example, lubrication, air and water control, and the status of the primary alarms that cause the machine to stop immediately.

<u>Grease</u>

- Grease motor: displays the greasing motor status (running or stopped).
- Level/Pressure switch: displays status the level of grease in the tank and the grease circuit pressure indicator.
- Grease Cycle Counter: current counter of the number of machine cycles to run before a full greasing cycle is run. On the right is the duration of the grease pump.
- Nº Greasing Cycle: number of cycles to run before the greasing cycle. This value can be changed depending on the user level set.

Greasing Cycle:

- Once the number of greasing cycles has been exceeded, the grease pump is activated.
- The system waits for the circuit pressure switch signal (on each side). If the signal does not appear, a warning will be displayed on screen.
- Once the pressure switch is activated, a 10-second delay occurs and the greasing motor stops.
- A 30-second delay occurs and the system begins counting the machine cycles before greasing again.
- The level of grease in the tank is also monitored. If it is low, the appropriate message will be generated.
- If 48 hours passes with pressure-switch or grease-level fault alarms active, the machine stops loading preforms.
- On starting up the machine, a greasing cycle is forced to verify greasing is working properly.
- We have strictly followed the greasing system manufacturer's recommendations for programming this device.

Water

- Water Pressure/Min: shows the current water pressure and the minimum pressure for correct operation.
- Water Temp./Max: shows the current water temperature and the maximum temperature allowed for correct operation.

<u>Air</u>

- General Pressure: displays the pressure of the low air pressure system or operating pressure.
- High-Pressure Air/Min.: displays the current air pressure and the minimum pressure for correct operation.

<u>Alarms</u>

- Emergency: Emergency stop mushroom buttons activated
- Doors: closed door safety detectors activated (that is, the doors are open).
- Thermal cut-out Alarm: thermal magneto-electric alarm located inside the control cabinet due to overconsumption or short circuit.
- Inverters Alarm: variable speed motors alarm. Variable speed drives are electrical devices located inside the electrical cabinet. Their function is to gradually vary the speed of the motors they control. Like any electronic device, they may trip internal alarms that are displayed in this alarm system.
- En. Inf. Sinamics: Indicator of correct operation of the servomotor power supply. The active state indicates that the servomotors are enabled and ready to work.
- Alar. Inf. Sinamics: Alarm on the Siemens servomotor power supply.
- Sinamics Error: Identification code of servomotor Power Supply error.





SIDE 13/02/2017 14:12:34		Man	AUTO LOAD 1/2	Data	Config	For	mat Name	U-ADV		
Loader 1							0	0.0 s.		
Step by Step 4 - SBS2: Step by Step 3 - SBS2i Step by Step 2 - SBS1:	Output Input Output	Input • Output • Input •	Hopper Be Ascent Sp	elt Speed eed Belt Vibra	tor	25.0 % 75.0 %	Cycle Counter	0		
Step by Step 1 - SBS1i O Table 1 O Pref. Position Gripper O Movement "Y" O	Input Elev. No Det. Open Lower	Output Mach. Detec. Close Raise	Elev. Spee Preform P	ed Belt Position. Rollers	Speed	65.0 % 75.0 %	Pref. Counter			
Rotative T. RightORotative T. LeftOMovement "X"OLoad elevatorOFix preform:O	0° 0° Output Raise Fix.	90 -90 Input Lower Free	Reject S Reject E Cycles wit	Start End :hout Min. Lvl		0 b. 0 b. 2 c.				
Load Extractor Extractor Fress Blown Oven										
Machine Alarm - Primary Alarm or		HOME	MING				Operation(b/h) 0 Total Nº Bottle 0			

The Load screen in Automatic Mode is basically divided into three zones: on the left-hand side, we have an indication from the elements that control the preform loader. In the centre, we can configure the times and the parameters that control the loader. On the right-hand side, we can modify the optional elements of the loader. On the upper part, there is a bar which indicates the progress of the loading process, together with the state number and process time in seconds.

Load Control Elements (1/2)

- Step by Step 4: indicates the state of the SV of the pneumatic cylinder in charge of opening the path of the downspout so that the preform loading cycle can begin. It also shows the state of the detectors that identify the end of the process.
- Step by Step 3: indicates the state of the SV of the pneumatic cylinder in charge of opening the path of the downspout so that the preform loading cycle can begin. It also shows the state of the detectors that identify the end of the process.
- Step by Step 2: indicates the state of the SV of the pneumatic cylinder in charge of allowing a preform to pass through from the downspout to the loading system. It also shows the state of the detectors that identify the end of the process.
- Step by Step 1: indicates the state of the SV of the pneumatic cylinder in charge of opening the path of the downspout so that the preform loading cycle can begin. It also shows the state of the detectors that identify the end of the process.
- Table 1: indicates the state of the SV of the Table 1 pneumatic cylinder in the preform loader's positioning system and the detectors that identify the end of the process.
- Preform Position: indicates the state of the solenoid valve of the preform position detector pneumatic cylinder.
- Gripper: indicates the state of the SV of the clip pneumatic cylinder in the preform loader's positioning system.

- Movement "Y": indicates the state of the SV of the "Y" Movement Table pneumatic cylinder in the
 preform loader's positioning system and the detectors that identify the end of the process.
- Rotative T. Right: indicates the state of the SV of the Rotating Right Turn pneumatic cylinder in the preform loader's positioning system and the detectors that identify the end of the process.
- Rotating T. Left: indicates the state of the SV of the Rotating Left Turn pneumatic cylinder in the preform loader's positioning system and the detectors that identify the end of the process.
- Movement "X": indicates the state of the SV of the "X" Movement Table pneumatic cylinder in the preform loader's positioning system and the detectors that identify the end of the process.
- Load elevator: indicates the state of the SV of the loading system's pneumatic elevation cylinder and the detectors that identify the end of the process.
- Fix Preform: indicates the state of the SV of the loading system's pneumatic preform fixing cylinder and the detectors that identify the end of the process.

Parameters of the loader (1/2)

- Hopper Belt Speed: The speed is introduced as a percentage of the maximum speed allowed by the variable-speed drive to the minimum.
- Ascent Speed Belt Vibrator: time taken (in seconds) for the pneumatic vibrator, installed in the base of the preform loading belt in chute 2, to move.
- Elev. speed Belt: speed of the preform loading belt. The speed is introduced as a percentage of the maximum speed allowed by the variable-speed drive to the minimum.
- Preform Position. Rollers Speed: speed of the roll that loads all the preforms on the elevator.
- Cyc. without Min. Lvl.: number of cycles without a minimum level of preform before a loading alarm is triggered.

Options of the Loader (1/2)

- Cycle Counter: it counts the number of loading cycles. This option and the associated parameter are used to programme a certain amount of production. Once the programmed number of cycles has been completed, the loading system is automatically deactivated. It also indicates the current number of cycles to stop the preform loader.
- Pref. Counter: it activates and deactivates the preform photoelectric cell counter at the exit of the loading area. If it is deactivated, there will be no real control over the preforms that are being loaded or of their presence.





SIDE 13/02/2017 14:13:00	Man	AUTO LOAD 2/2	Data	Config	Forr	nat Name		U-ADV
Loader 2 Hopper belt Ascent Pref. Position. rollers Vib. Ascent Belt Hopper Levels O Hop. Ascent Pref. Levels Low Step by Step 1 Levels Min. Step by Step 2 Levels Min.	Motor Motor Motor 1 Hop. 2 • Min. • . Max. •	Hopper Bo Ascent Sp Elev. Spee Preform P	elt Speed weed Belt Vibra ed Belt Position. Rollers	tor	25.0 % 75.0 % 55.0 % 75.0 %	C) 0.() s.
Machine Alarm - Primary Alarm or Active Pr	ocess Alarm		Load	Extractor	Transport	Press	Blown	Oven
	HOME HO	OMING				Operation(0 Total N° Bo 0	b/h) ottles	

The Load screen in Automatic Mode is basically divided into three zones: on the left-hand side, we have an indication from the elements that control the preform loader. In the centre, we can configure the times and the parameters that control the loader. On the upper part, there is a bar which indicates the progress of the loading process, together with the state number and process time in seconds.

Load Control Elements (2/2)

- Hopper belt: activation of the motors of belts 1 and 2 of the chute. The speed of the belts is controlled by a variable-speed drive (see parameter "Speed Belt 1 Chute 1" and "Speed Belt 2 Chute 1").
- Ascent. Pref.: activation of the motor of the preform incline belt. The speed of the belt is controlled by a variable-speed drive (see parameter "Ascent. Speed Belt").
- Position. rollers: activation of the motor for the roll that load all the preforms on the elevator.
- Hopper levels: indication from the level detection photoelectric cells in the preform hopper.
- Ascent Pref. Levels Low: indication from the level detection photoelectric cells of the preform positioner
- Step by Step 1 Levels: indicates the state of the SV of the Step by Step 1 pneumatic cylinder of the preform loader's positioning system and the detectors that identify the end of the process.
- Step by Step 2 Levels: indicates the state of the SV of the Step by Step 2 pneumatic cylinder of the preform loader's positioning system and the detectors that identify the end of the process.

Parameters of the loader (2/2)

- Hopper Belt Speed: The speed is introduced as a percentage of the maximum speed allowed by the variable-speed drive to the minimum.



- Ascent Speed Belt Vibrator: time taken (in seconds) for the pneumatic vibrator, installed in the base of the preform loading belt in chute 2, to move. Elev. speed Belt: speed of the preform loading belt. The speed is introduced as a percentage of the -
- maximum speed allowed by the variable-speed drive to the minimum.
- Preform Position. Rollers Speed: speed of the roll that loads all the preforms on the elevator. -

SIDE AUTO Man Format Name EXTR. 13/02/2017 14:14:48 Data U-ADV Confic 0 0.0 s Rejection 1 Out Inside **Output Bottles Belt Speed** 100 0/0 Out Inside Reject All Rejection 2 Not Reject Bottles **Output Bottles Belt** Motor Extractor Blown Press Transport Operation(b/h) HOME HOMING Total Nº Bottles

The Extractor Screen in Automatic Mode is divided into three areas: on the left are the preform extractor control indicators. In the central part are time and parameter settings for controlling the extractor. On the right, we can modify the extractor's optional features. At the top is a bar showing the extraction process, along with the status number and process time in seconds.

Extractor controls

- Rejections: indicates the state of the SV of the elevation pneumatic cylinder of the extractor system and the detectors that identify the end of the turning process.
- Output Bottles Belt: status of bottle detection photocell at the end of the output belt. If the photocell is enabled during the scheduled time (see Extractor, "Output Jam Time"), then preform loading is automatically disabled and a secondary alarm is generated. In turn, the output jam solenoid is activated for a while (see Extractor parameters, "Sol. Act. Time ") and the system waits until jammed bottles photocell signal is deactivated, and then starts the process again.

Extractor parameters

- Output Bottles Belt Speed: speed of bottle output belt. The speed is entered as a percentage of the maximum allowed by the speed adjuster.

Extractor Options

- Reject All: to discard all the blown preforms.
- Not Reject Bottles: not to discard all the blown preforms.



TMS 5001



13/02/2017 14:		Man A	UTO ISPORT	Form	nat Name	U-ADV
Transport					0	0.0 s.
+0.00	Axis Transport	+579.00	Clamp time	0.600 s.		large
Omside	+0.00	Out	Time Trans. In		Bottle	
+0.0	Axis Oven	+80.0	Time Trans. Out	0.500 s.	F	ormat
OMin.	+0.0	Max.	Advance Speed Oven	25.0 mm/	min	
Oven Clamps	 Close 	Open 🔾	Max. Cycle time			
Press Clamps	Close	Open 🔾				
Oven Elevator	Down	Up 🔾	Preforms Turn Speed:	65.0 %		
Fix preform	 Free 	Fix. 🔿	0	- MC		
			Oven Exit Sarety Mould Entrance Safety	MC FC		
Turn preforms	Motor		Mould Exit Safety	• FC		
			Mould Exit Salety			
				-)[篇]		
			Load	Extractor Transport	Press Blown	Oven
Machine Alarm - Prin	hary Alarm or Active Proce	ss Alarm				
((-))	DECET				Operation(b/h)	
(-)	RESET	HOME			Total Nº Bottles	
					0	

In Automatic Mode, the Transport Screen is divided into three areas: on the left are the preform transport control indicators. In the central part are the time and parameter settings for controlling the preform holder transport. On the right, we can modify the optional features. At the top is a bar showing the transport process, along with the status number and process time in seconds.

The preform-carrier transport system is based on the progress of the Heater Line (mechanical drive commanded by servomotor). This enables rapid preform holder movement, but their momentum is always under control during movement.

Transport Controls

- Axis Transport/Oven: indicates the state of the transport and Heater servomotors where we can find the starting and final movement coordinates, current coordinates, and detection of the final movement through route limits of the servomotor (not physical detectors).
- Oven Clamps: indication from the solenoid valve of the clamp's pneumatic cylinder in the heater area, in charge of moving the preform from the heater to inside the press.
- Press Clamps: indication from the solenoid valve of the clamp's pneumatic valve in the press area, in charge of moving the preforms from inside the press to the extraction area.
- Oven Elevation: indicates the state of the SV of the elevation cylinder located at the exit of the heater, and of the detectors that identify the end of the process.
- Fix Preform: indicates the state of the SV of the preform fixation/release cylinder at the exit of the heater, and of the detectors that identify the end of the process.
- Turn Preforms: indicates the state of the preform turning engine.

Transport Parameters

- Clamp Time: time taken (in seconds) to activate the extractor clips.

- Time Trans. In: time take (in seconds) for the transport line to return to its starting position at the heater extraction area. The movement is defined using the starting and final progress coordinates, and using the time that this process should take. The line control system internally defines the adequate speed and necessary accelerations to comply with the specified time.
- Time Trans. Out: time taken (in seconds) for the transport line to move the preform from inside the press to the extractor system. The movement is defined using the starting and final progress coordinates, and using the time that this process should take. The line control system internally defines the adequate speed and necessary accelerations to comply with the specified time.
- Advance Speed Oven: maximum speed of the movements of the Heater line in the automatic cycle in mm/s.
- Max. Cycle time: maximum duration of a complete machine cycle. If the machine, for any reason, should take longer than this specified time, a process alarm is triggered (Surpassed Maximum Cycle Time). This time will be adjusted once we have correctly defined the machine cycle and process.
- Preform Turn Speed: speed of the preform rotation engine. The speed is introduced as a percentage of the maximum value permitted by the adjustable-speed drive.

Transport Options

- Large Bottle Format: if this option is activated, the distance of the Heater Line is 140 mm and not 70 mm, allowing a larger preform to be blown.

2 SII 13/02/2017 14	DE	Man	AUTO PRESS	Data	Config	Forn	nat Nam	e		U-ADV
Press								0	0.0	s.
-214.00 ● Open	Axis Press 1 +0.00	+0.00 Close.	Delay S	Stretch Return	ו יי ו י	2.000	s.			
			Time A	Achieve Press.	tightness	0.000	S.			
-214.00	Axis Press 2	+0.00	Press (Close Time 1		1.200	5.			
Open	+0.00	Close.	Press (Open Time 1		0.800	s.			
+170.00	Avis Stretch	+400.00	Press (Close Time 2		1.200	s.			
Up	+0.00	Low	Press (Open Time 2		0.800	s.			
-			Stretch	n Rod descent	speed	1400	mm/min			
Press Closed	0 1	<mark>O</mark> 2	Stretch	n Rod ascent s	speed	1000	mm/min			
Pressure tightne	ess Low	Up 🔿								
				Load	Extractor	Transport	Press	Blown		Oven
Machine Alarm - Prin	nary Alarm or Active Proc	cess Alarm				-	[
	RESET	HOME HOM					Operal Total N	tion(b/h) 0 I ^o Bottles 0		

The Press Screen in Automatic Mode is divided into three areas: on the left are the press control indicators. In the central part are time and parameter settings for controlling the press. On the right, we can modify the press' optional features. At the top is a bar showing the press process, along with the status number and process time in seconds.

The press' control process covers everything related to the movement and closing the press halves and the control of all devices involved in achieving the airtight seal of the blow cavity (floating bottom action and seal and closure). The blowing process itself is configured in another screen (see "Blowing" screen).

Press Controls

- Axis Press 1 / 2 and Stretch: indicates the state of the servomotor of Press 1, Press 2 and stretch. Here we can find the starting and final movement coordinates, current coordinates, and detection of the final movement through route limits of the servomotor (not physical detectors). The position limits of Press 2 Line are the same as those for Press 1 Line.
- Press Closed: indicates the state of the security detector of Press 1 and Press 2 when they are closed. These detectors are used to ensure that the two presses are closed before starting the preblowing and blowing processes.
- Pressure tightness: Air Tightness: indicates the state of the SV of the pneumatic cylinder in charge of the air tight closure movement. It also shows the state of the end of the line detector of the air tightness when it is in an upper position (rest).

Press Parameters

- Delay Stretch Return: time taken to return from the stretch. This ensures that the stent remains in position for the time that we have programmed. When this time is over, the stent returns to its starting position.

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- Time Achieve Press. tightness: waiting time, within the press process, for the air tight cylinder to reach the lower part of its cycle.
- Press Close/Open Time 1/2: time taken (in seconds) for Press Lines 1 and 2 to open/close. The movement is defined by the starting and final progress coordinates, and by using the time that this movement should take. The line control system internally defines the adequate speed and accelerations to comply with the specified time. Due to the need to synchronise the movements of Press 1 and 2, the values for Press 2 are the same as the values for Press 1. time taken (in seconds) for Press Lines 1 and 2 to open/close. The movement is defined by the starting and final progress coordinates, and by using the time that this movement should take. The line control system internally defines the adequate speed and accelerations to comply with the specified time. Due to the need to synchronise the movements of Press 1 and 2 to open/close. The movement should take. The line control system internally defines the adequate speed and accelerations to comply with the specified time. Due to the need to synchronise the movements of Press 1 and 2, the values for Press 2 are the same as the values for Press 2 are the same as the values for Press 2 are the same as the values for Press 3.
- Stretch Rod descent/ascent speed: Maximum speed of the stretch in going up/down (mm/s). The
 movement is defined by the starting and final progress coordinates, and by using the speed of the
 movement. The line control system internally defines the adequate accelerations in order to reach
 the assigned speed.

BLOW SCREEN



In Automatic Mode, the Blow Screen is divided into three areas: on the left are the preform blow control indicators. In the central part are time and parameter settings for controlling the blowing. On the right, we can modify the blower's optional features. At the top is a bar showing the blowing process, along with the status number and process time in seconds.

The blowing process includes stretching preforms with low-pressure pre-blowing, high-pressure blowing and decompression of cavity-pressure for removing the blown bottles.

Blowing Process Controls

- Axis Press 1/Stretch: indicates the state of the servomotor of Press 1 and stretch where we can find the current movement coordinates, and detection of the final movement through route limits of the servomotor (not physical detectors) and the intermediary signals that they use, in the case of the stretching process, such as starting positions for the pre-blowing of preforms.
- Pre-Blow: indicates the state of the low pressure pre-blowing SVs for each blowing block.
- Blown: indicates the state of the high pressure blowing SV for each blowing block.
- Decompression: indicates the state of the decompression SV for each block and of the auxiliary decompression SV.
- Pneumatic Pad: indicates the state of the SV of the pneumatic cushion for each section of the mould.
- Mould sensors: indicates the state of the DT of each section of the mould. These detectors carry out a security function in order to avoid carrying out the blowing process without a mould.
- Pres. Pneum. Pad: pressure indicator for inside the pneumatic cushion.
- Mould Pressure: cavity pressure indicator.
 - NC: Activated NO: Deactivated

Blow Process Parameters.

- Pre-blow Position: position of the stretch line from which the low pressure pre-blowing will be activated.
- Press. Pre-blow 1: position of the stretch line from which the low pressure pre-blowing will be activated.
- Pre-blow Ext. Time: extra activation time (in seconds) of the pre-blowing SV.
- Blow time: time taken (in seconds) for the activation of the high pressure SV to generate a bottle.
- Decompression Time: time taken (in seconds) for the activation of the decompression SV to remove the air from inside the mould.

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- Prod.: Blowing Time Adjustment: Automatic adjustment of the blowing time in order to reach the desired level of production.
- Decompression Time: Time taken (in seconds) for the bottle to decompress. A yellow value means that it has not been updated.

Blow Process Options

- Pre-Blow: activates/deactivates the low pressure SVs. It is used for testing.
- Blown: for the correct control of the blowing process, the preforms are only blown if their temperatures (read by the infrared cameras at the exit of the heater) are between the minimum and maximum blowing temperatures (see "Heater" screen). This option deactivates this function so that the preforms are blown, independently of what the infrared cameras read.
- Discard Bottle (Pressure): activates / deactivates the detection of an exploded bottle during the blowing time. With this function activated, the inside cavity pressure is verified once the time "Blowing Stop Time" has passed. If the interior pressure is inferior to the pre-determined pressure, the blowing SVs are deactivated in order to minimise air loss.
- Air reclamation: enables/disables the high-pressure air during recovery function during the decompression process.





The Oven Screen in Automatic Mode is divided into three areas: on the left are the preform heater control indicators. In the central part are time and parameter settings for controlling the oven. On the right, we can modify the optional process features. At the top is a bar showing the heating process, along with the status number and process time in seconds.

The oven temperature control process is managed firstly by the temperature sensors located at the outlet of each oven, and secondly with infrared cameras that directly focus on the preforms that leave the oven. Each oven consists of separate modules, and each module has a number of lamps. Each lamp is controlled independently. All these parameters and data are controlled from the oven screens.

Oven Controls

- Oven Power: on/off status of ovens module power.
- Ventilator: indicates on/off status of ovens module fans.
- Water intake: indicates the status of the inlet water solenoid for cooling the ovens and press.
- Pre-Heat: pre-heating status of the oven (for each oven). The oven is preheated when the temperature of the probes is lower than the pre-heating temperature (see oven control parameters).
- Oven OK: status of the oven OK signal. Oven OK is when the oven is turned on and its temperature is higher than the preheating temperature.
- Oven Temp.: temperature reading of the oven using temperature probes.
- Cameras Temp.: preform temperature reading using the infrared cameras positioned at the oven output.
- Average Temp.: average temperature of the last five camera readings. This is the temperature used for dynamic temperature compensation.
- Compensation: current value of the temperature compensation, in percentile values compared to the values programmed in the temperature profile.

Oven Control Parameters

- Cycles Pre-Heating: oven pre-heating temperature. If the temperature reading of the probes is lower than this parameter when starting up the oven, the pre-heating process will start until the temperature we have entered for this parameter is reached.
- Percentage Pre-Heat: Percentage of pre-heating on the temperature profile scheduled to be implemented during oven pre-heating.
- Max/Min. Temp. Blow 1: maximum and minimum temperatures that define the temperature range in which the machine will blow the preforms.
- Min. Temp. Stretch: minimum temperature below which the preform is not stretched.
- Desired Pref. Temp.: preferred temperature for each of the cavities. This value serves as a reference temperature during dynamic temperature compensation. The oven control will apply the compensation necessary to achieve and maintain the desired temperature.
- Ventilator Speed: Speed of the fan in each control module. The parameter is a percentage relative of the maximum fan power regulated by speed adjuster.
- Pref. Neck Vent Speed: Speed of the fan in each control neck. The parameter is a percentage relative of the maximum fan power regulated by speed adjuster.
- Oven Modulation: percentage applied on the programmed temperature profiles. It will be applied once the heater reaches the Pre-Heating temperature.

Oven Control Options

- Pre-Heat.: Enables or disables oven pre-heating.
- Compens.: enables/disables the dynamic temperature compensation process for each of the cavities. (x1 / x2).
- Oven Simulation: For testing. It allows you to simulate a working heater in order to carry out adjustments and checks without turning on the heater lamps. It also turns off the minimum water and air temperature process alarms.
- Power Reduction Module: Enables or disables power reduction module.



6	
• ~~~	
• ~~~ •	
• ~~~ •	
• ~~~ -	_

CS 06/11/201	IDE 7 17:14:35	Auto	AUTO OVEN 2/3	Data	Config	Form	nat Name	U-ADV
Oven							0	0.0 s.
B. Pref. CM 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	N. Pref. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0							-140
0.0	0.0	ni ni	1					100
			en 1 Oven 2	Load	Extractor	Transport	Press Blown	Oven
No Initial Positi	on (Homing)							
((1))		ESET HOME	HOMING				Operation(b/h) 0 Total N° Bottles 0	

If we press the Heater screen in Automatic Mode a second time, we will access a second heater control screen where we are able to see a temperature graph of the heaters and the cameras.

We can also see a register of the evolution of the temperatures during the preform blowing process in an attached table.

Camera Temperature 1 Camera Temperature 2 Desired Temperature 1 Oven Temperature 1 Oven Temperature 2





Ove	en 2							0 0.0	5.
	0	1	0		1		0		1
	0	2	0	_	2		0		2
	0	3	0		3		0		3
	0	4	0	-	4		0		4
	0	5	0		5		0		5
	0	6	0		6		0		6
(%)	0	7 70			7	(%)	0		7
e 3	0	8	0		8	e 5	0		8
odul	0	9 70	0		9	npo	0		9
Σ	0	10	0		10	Σ	0		10
	0	11	0		11		0		11
	0	12	0		12		0		12
	0	13	0		13		0		13
	0	14	0		14		0		14
	0	15	0		15		0		15
	0	16	0		16		0		16
			2 Ouen 2		Evtractor			Riour	
		Oven 1	Oven 2	LOad	Exuactor	Transport	Press	biown	Oven

From the Oven control screen, we can access the screens Oven 1 and Oven 2.

On these screens we will define the temperatures. This is the power of each one of the lamps for each height of the preform. This is repeated for each module in each heater. The power value of the lamps is introduced as a percentage of the maximum power. The numbering of the lamps is carried out in the following way: the main lamp is number 1, counting upwards until we reach the least powerful lamp which is given the number of the total maximum amounts of lamps in the oven.

The graphical profile of each heater involved in the process is shown on the same screen.

On the TMS5001 XL, all of the lamps are normally 1000W apart from the main lamp (Nº 1) which is 2000W.

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6.3.2 MAIN SCREEN (MANUAL MODE)

MANUAL SCREEN



SIDE 13/02/2017 14:02:59	Man	MANUAL	Data Config	Form	at Name		U-ADV
Loader	F1	F2	Extractor		F1	F2	
Load elevator	Lower	Raise 🔿	Rejection 1	0	Output	Enter	•
Fix preform:	Free	Fix. 🔾	Rejection 2	0	Output	Enter	•
Load Cycle	Cycle		Extractor Cycl	e	Cycle		
Transport	F1	F2	Press		F1	F2	
Oven Elevator	Lower	Raise 🔾	Pressure tight	iness	Lower	Raise	0
Fix preform:	Free	Fix 🔿					
Transport Cycle	Cycle		Press Cycle		Cycle		
		Auxiliary		or Transport	Press	Blown	Oven
Machine Alarm - Primary Alarm or A	active Process Alarm			I			
		HOMING			Operatio 55: Total N° 22:	n(b/h) 2 Bottles 5	$\boldsymbol{<}$

In Manual mode, there are screens and options for manual operation of the various electric, pneumatic, and mechanical devices involved in the operation of the machine.

From this screen, we access the same screens as in automatic mode, but adapted for manual mode tests and adjustments.

We can also run partial cycles of the various functions of the machine (Loader Cycle, Extractor Cycle, Transport Cycle, Press Cycle, Press Cycle with Blowing, Oven Cycle).





SIDE 13/02/2017 14:22:18	Man	DATA
Loader	F1	F2
Load elevator	• Lower	Raise O
Fix preform:	Free	Fix. O
Lateral Scroll	Enter	Output 🔾
Step by Step 2	Raise	Lower O
Load Cycle	Cycle	

Screen operation is common in all cases: a blinking cursor that selects the manual function to be moved:

This cursor can move directly selecting the function on the touch screen or by using the + and - buttons on the screen:

Using the F1 and F2 buttons on the operator panel, we can activate/deactivate the selected function:

In the same screens, we also find the necessary parameters to execute certain functions.



6.3.5 SAVING FORMATS



DATA SCREEN



From the data display, we manage format storage. All data necessary to reproduce the production of a bottle or container is stored in so-called formats. These include data for the blowing process, but also the configuration data of the machine elements such as parameters of servos, oven temperatures, production, description of the format ...

This data is stored in a computer file in an internal screen memory. We can keep as many formats as necessary (very many). Each data file has a name (usually the name of the format of the bottle to be produced).

The storage (Save) and loading the disc is always done from the current format workspace in use.

The screen is divided into four parts:

- Save Current Format on Disk: save the current work format (with the current name) to disk. We can confirm or change the name, and on pressing the button "Save to Format to Disk", it is copied.
- Load Format from Disc: from a drop-down list, we select the format to upload, and click "Load Format from Disc" to load it.
- Delete disc Format: delete stored format. From the drop down list, select the format to delete.
- Import/Export Formats: options for importing/exporting formats to external memory media (USB or MMC Card). Export means copying the formats stored on Disk to USB memory or MMC. Import means copying the formats from USB or MMC memories to disk. The transfer of information is done using a CSV format file.



Save Current Format to Disc:

SIDE Man 13/02/2017 14:22:18 Man	DATA	Data Config	Format Na	me U-ADV
Save Current Format	on Disc		Delete disc form	at
Current Fromat Name	Save Format on Disc	Disc formats	•	Delete disc format
Load Format from	Disc	1	import/Export Forn	nats
Disc formats	Load Format from Disc	Export f MMC Ca Import f MMC Ca	rom In ard	xport to USB 1port from USB
	Syst	em function was	s successfully co	mpleted

Step 1: check and/or change name of the format to be saved. Step 2: Press "Save Format on Disc" to save data

ave the format on the Disc? Disc it will be overwritten!!!
No

Step 3: The control system asks us if we are sure that we want to save the current format because, if it already exists, it will be over-written, and therefore we will lose the one previously saved on the disk.



Load Format from Disc:

SIDE Man 13/02/2017 14:22:18 Man		Data Config	Format Nar	ne U-ADV
Save Current Format	on Disc		Delete disc forma	at
Current Format Name Format Name	Save Format on Disc	Disc formats	•	Delete disc format
Load Format from	Disc	I	mport/Export Form	nats
Disc formats	Load Format from Disc	Export t MMC Ca Import fr MMC Ca	rom Im ard	xport to USB port from USB
	Syst	em function was	s successfully co	Advanced

Step 1: Press the arrow icon to view drop-down list of stored formats on the disk. Select the desired format. Step 2: Press "Load Format from Disc" to load the selected format.



Step 3: The control system asks us if we are sure we want to load the format selected in the work area because the process data with which we are working will be overwritten, and therefore we will lose the current work data.

Delete Disc Format:



Step 1: Press the arrow icon to view drop-down list of stored formats on the disk. Select the format we want to delete.

Step 2: Press "Delete Disc Format" to delete the selected format.



Step 3: The control system asks us if we are certain that we want to delete the selected format from the disk. Whatever happens, we will not lose the current job data.

6.3.6 ALARMS AND MESSAGES



ALARMA SCREENS



SIDE Man 13/02/2017 14:23:06 Man	ALARM	Data	Config	Form	nat Name	U-ADV
Nº Time Date Status A 242 14:06:25:7 13/02/2017C AXIS: Oven Axis Activation Error A 36 14:06:25:7 13/02/2017C RESET: Error Axis NOT Activated A 9 14:06:25:7 13/02/2017C AXIS: Press 2 Axis Activation Error A 23 14:06:25:7 13/02/2017C AXIS: Stretch Axis Activation Error A 23 14:06:25:7 13/02/2017C						
A 22 14:06:25:713/02/2017C AXIS: Transport Axis Activation Error A 20 14:06:25:713/02/2017C AXIS: Press 1 Axis Activation Error A 400 14:02:21:213/02/2017C ALARM: Open Door Alarm - Load						
E-Stop Doors Siren Alarm Pri Alarm Machine Alarm - Primary Alarm or Active Process Alarm	Pilot Reset	Reg.	Manual	Auto	Del. Reg> USB	Register
	HOMING				Operation(b/h) 0 Total N° Bottles 0	

The Alarms screen may appear automatically when any type of alarm is triggered on the machine.

There are three types of alarms:

- **Primary Alarm**: Alarm occurring due to any severe cause (for example, emergency mushroom, or opening the machine doors). Primary Alarms shut off power sources (electric, pneumatic and hydraulic). Whenever a primary alarm is triggered, the machine alarm sounds continuously.
- <u>Process Alarm</u>: This alarm occurs when the various machine cycles are running and they cannot continue because of an event (for example, waiting for a detector of a given element within the cycle ...). Whenever a Process Alarm is triggered, the machine alarm sounds continuously.
- <u>Secondary Alarm</u>: Warning of an event (for example, Greasing Alarm). This does not shut down the machine production cycle. Whenever a Secondary Alarm is triggered, the machine alarm sounds intermittently.

When the "Alarm" light on the screen is red, it indicates a Primary or Process Alarm. The yellow "Warning" light indicates that there is an active secondary alarm or warning.

Once an alarm of any kind has been triggered, pressing the RESET button on the control keypad or screen (bottom left) **once** will cancel the audible alarm. Pressing a **second time**, means the alarm is considered resolved, and the screen automatically adopts its current working mode.

In the centre of the screen is a list of the alarms that may occur. There may be one or several primary, secondary and process alarms, and some of them are occasionally the product of the others.

A	477	11:00:26	26/09/2014	CD	OVEN: Error Module 6 Lamp 2 - output without load
A	412	11:00:17	26/09/2014	CD	REG: Start of Auto Cycle
A	412	11:00:16	26/09/2014	C	REG: Start of Auto Cycle

The alarm texts display the alarm identification numbers, and the date and exact time at which they occur. The alarm descriptive text will normally start with an identifier of the function and location the machine was doing when the alarm occurred (LOADER, EXTRACTOR, TRANSPORT, RELEASE, HOMING, ALARM, MAINT ...). We can see the meaning of each one in the alarm list.

	No.	Time	Date	Status	Text	-
A	709	11:01:13	26/09/2014	C	REG: Change Access Level U-ADV	Ť
\$	70011	11:01:12	26/09/2014	С	Date/time could not be set, error code: 1314,1.	
A	708	11:00:54	26/09/2014	CD	REG: Change Access Level U-BAS	
A	708	11:00:53	26/09/2014	С	REG: Change Access Level U-BAS	
A	701	11:00:35	26/09/2014	CD	REG: Start Oven	
A	701	11:00:33	26/09/2014	С	REG: Start Oven	
A	483	11:00:26	26/09/2014	CD	OVEN: Error Module 6 Lamp 8 - output without load	
A	477	11:00:26	26/09/2014	CD	OVEN: Error Module 6 Lamp 2 - output without load	
A	412	11:00:17	26/09/2014	CD	REG: Start of Auto Cycle	
A	412	11:00:16	26/09/2014	С	REG: Start of Auto Cycle	
\$	70011	11:00:12	26/09/2014	С	Date/time could not be set, error code: 1314,1.	
A	687	11:00:00	26/09/2014	CD	REG: End Homing	
A	687	10:59:59	26/09/2014	С	REG: End Homing	
A	686	10:59:22	26/09/2014	CD	REG: Start Homing	

All alarms are recorded in a master file, where a list of the last 10,000 alarms is stored.

Functions:



- **<u>E-STOP:</u>** indicates the status of emergency mushrooms (Emergency Stop)
- **Doors:** indicates the status of the machine's safety doors.
- **Siren:** status of the acoustic signal that warns of an alarm state.
- **Pilot Reset:** indicates status of the signal lamp that indicates resetting of (Reset) alarms.
- Alarm Pri / Pro / Sec: Indicates the Primary / Process / Secondary alarm status.
- Reg: button that forces a complete logging of parameters and data for analysing a possible fault.
- Manual: direct access to the manual mode screens if the machine is in alarm status.
- Auto: direct access to the auto mode screens if the machine is in alarm status.
- **Del. Reg.:** Clear alarm log of the machine.
- -> USB: Copying the alarm log to a USB memory to analyse the problems occurred.
- Register: Alarm Log Display Registro: visualización del registro de alarmas

6.3.7 PREVENTIVE MAINTENANCE SCREEN





From the preventive maintenance screen, we manage and visualize the preventive maintenance of the machine.

The buttons on the left provide access to a basic list of preventive maintenance tasks for the selected period. This list is a brief overview of the complete maintenance of the blowing machine. For full maintenance, review the maintenance section of this manual.

Parameters:



- 1- Number of hours worked since the last maintenance day.
- 2- Number of hours scheduled for maintenance.
- 3- Number of days worked and planned before the next service.

The maintenance warning can be activated in two cases:

- The number of hours worked exceeds the number of hours scheduled.
- The number of days since the last maintenance day is higher than programmed.

If working hours are higher than those programmed, or the number of days since the last maintenance day is higher than programmed, a maintenance warning is triggered



Where machine maintenance becomes necessary, one of the buttons on the left will light. If we press the button, the display will activate with key checkpoints.

The Maintenance light at the bottom will light red to show maintenance is necessary.

The Maintenance light at the bottom will show if machine maintenance is necessary.

- 1. Number of hours worked since the last day maintenance work was done on the blowing machine.
- 2. Number of hours scheduled for maintenance work on the blowing machine.
- 3. Number of days worked since the last day maintenance work was done on the blowing machine.

Buttons

Counter reset button:

- Weekly Res.: Weekly hours worked counter reset.
- Monthly Res.: Monthly hours worked counter reset.
- Quarterly Res.: Quarterly hours worked counter reset.
- An. Res.: Annual hours worked counter reset.
- Bi-A. Res.: Bi-Annual hours worked counter reset.

This value can be changed depending on the user level set.

7. FORMAT CHANGE

7.1 PREVIOUS PROCEDURES

Following the order in the picture, it is necessary to have: A set of nozzle couplings, a set of Allen keys, a set of spanners.



7.2 FORMAT CHANGE START-UP

1. Before starting to change the format, make sure that you close the water inlet valve, in the first place, and then the water outlet valve.

2. Follow the order explained in this manual in order to carry out the different tasks so as to prevent ruptures due to the interference between parts of different formats during the format change process.



7.2.1 TAKING THE MOULD OUT OF THE MACHINE

1. Remove the blast tubes from the bottom of the mould.



2. Remove the fixing bolts from the bottom of the mould and remove the bottom of the mould.



3. For maximum format moulds, fitthe safety fixing flanges on the machine. Then open the press to access the fastening screws.





4. Then access each half-mould and remove the fastening screws.



5. Safety flanges cannot be fitted for normal format moulds. First, you must open the press to loosen the fastening screws. All but two on the front should be loosened. Do the same for the other half.



6. Close the mould, removing the fixing flanges for the maximum format moulds, or the 4 remaining screws for standard moulds. Fit the mould joint flanges:





7. Bring the mould transporter base close. Centre and attach the wheels. Then pull the mould and fit it on the base.



8. To assemble the mould, proceed in the same manner but in reverse order. Observe the tightening torque of 250Nm for the M16 12.9 mould fastening screws and 60Nm for the M10 12.9. basefastening screws.

7.2.2 LIFT ADJUSTMENT

First, adjust lift speed so that the preforms are correctly loaded into the machine. In order to change the speed of the lift belt, it is necessary to regulate the variator frequency, adjusting it to heavier or lighter loads.

The variator is placed in the switchboard, marked with the sign U2. To modify the speed, turn the wheel marked on the picture around.

Note: this is an optional operation.



7.2.3 ADJUSTING THE LEAD IN CONVEYOR


Once the lift adjustment process is over, adjust the lead in conveyor rollers. Use the preforms of the new format or a gauge with the measure for the format intended.

1. Loosen the bolts marked in the picture, two on each end, and open or close the rollers DEPENDING on the format intended.



2. Place the two preforms on each end and adjust the position of the rollers so that the body of the preform passes through the two rollers and so that the preform wing prevents it from falling. Depending on the dimensions of the preform wing, leave more or less space between the roller and the preform ("X" measure).



3. Once the rollers have been adjusted, tighten the bolts marked in the picture. Repeat these steps for each pair of rollers.



7.2.4 LEAD IN HOPPER ADJUSTMENT

1. Adjust the upper guides. To adjust the rollers, use a new preform format as a guide or a gauge set to the dimensions of the format you want to use. This is similar to adjusting the rollers. To begin, loosen the screws shown.

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2. Leave enough room between the rails and the preform so that the latter may pass through them. Depending on the size of the preform wing, leave more or less room between the rails and the preform ("X" measure). Values advised: never below 0.5mm.



3. Once the rails of the lead in conveyor and the divider have been adjusted, adjust the roofs that prevent the preforms from raising when they are coming down the lead in conveyor. In order to adjust them, loosen the nuts as shown in the pictures. With the regulating screws, adjust the roof height.



4. Leave the roof at 3mm from the preform, placing the latter upon the wing of the next one, as shown in the picture. It is very important to observe the parallelism between the preform support rail and the roof.

Depending on the preform type, the 3mm parameter might vary, thus, this value should be taken as an informative one when adjusting it for the first time.

Write down the final value of the adjustment for future reference, for format changes with the same preform neck take must be implemented.



5. Once the whole unit has been adjusted, put its protections back in place.

7.2.5 CAMBIO DE FORMATO

1. To change the preform holder unit nozzles, we must first detach the preform protectors. To do so, we unscrew the M6 screws (x^2) that hold them in place.



2. Once we have extracted the guard, we can see the two "O" rings that hold the nozzle. To replace it by the new nozzle format, we remove the upper ring upwards so that the nozzle loosens at the top and we can extract it properly.



3. Then assemble the new nozzle format, performing the above procedure in reverse. We place the new nozzle in the preform holder, easing it from the top. Once inserted, we slide the ring to hold the neck of the nozzle that we had previously withdrawn.

4. Finally, we assemble the preforms guard. We tighten the M6 screws (x2) to 14 Nm.

5. We repeat the process for the other nozzles.

When we want to change nozzles format with a diameter greater than 60 mm, we must arrange the preform holder units in such a way that the preform holders are fitted in the transport every two places; that is one occupied and the next empty.



7.2.7 SETTING THE OVEN



Before manipulating the ovens, make sure the machine voltage is off and the ovens are cold. Do not touch the bulbs and the grease deposits with unprotected hands





1. First, adjust the protections of the preform neck to the new format. Loosen the screws shown in the picture both at oven entrance and exit.

2. Place a preform inside the nozzle on each end of the oven.

3. By regulating the slotted brackets, we can set the optimal distance.

4. Then check whether measure "Y" equals 25mm approximately. This measure is also an approximate one and before modifying the position of the bulbs you are advised to define the thermal profile, modifying their voltage parameters. Still, if you are working with very little or very big preforms, you might have to bring the bulbs closer to the preforms or separate them instead.

5. In order to modify the position of the bulbs it is necessary to remove the oven modules from the machine. First, turn the electric switch off.









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6. Then remove the lateral hold down nuts and remove the oven.

7. Place the oven upon a workbench and loosen the lateral fixing bolt of the bulb support. Do the same thing with the other bulb support.



8. Take the bulb with the hand by its two ends and move it towards the desired measure and then fix the lateral bolt.



9. Depending on the type of bottle, it might be necessary to move the bulb vertically.





10. In order to regulate it, access the rear fixing bolt, loosen it and move the bulb support vertically.



7.2.8 FEEDER ADJUSTMENT

1. Loosen screws and adjust front guides.



2. Regulate photocell and mirror to the desired height.





3. Leave 3mm between the cover and the top of the preform, which should rest on the following preform's flange, as shown in the illustration. It is very important that the support guide and the cover are kept parallel.

It is possible that, depending on the type of preform, a distance of 3mm may not be suitable;therefore, this value should be treated as the default value when making the first adjustment.

4. Adjust side carriages to meet the 53 mm dimension. Then regulate the front stops so that the preform is aligned with the cylinders.



7.2.10 STRETCHING CALIBRATION

1. After changing the mould, retune the machine so that it comes into position.

2. Once the machine has come into position, go to the manual screen, press "close press mould" to lower the bottom and keep pressed until the opening of the press reaches 5mm, in order to calibrate the stretching correctly.

3. Enter the manual screen then, and choose from a range of stretching rods.

4. Exit the manual screen and go to the main screen again, press the stretching position, right by the press.

5. Place a preform upon the cannula, press key F1, the stretching cannula starts moving up. When the preform hits the bottom, press the stretching calibration key, which is placed in the bottom left side; the stretching position overlaps with the adjusted position.

6. After calibrating the stretching, lower the cannula down to its zero position and open the press from the control screen in order to take the preform out.

7. Retune the machine.

8. Turn the key to the "automatic" position and start the machine.

8. BLOWING ADJUSTMENT

IN CASE OF ADJUSTMENT OPERATIONS:



IT IS NECESSARY TO TURN OFF ONE OF THE TWO SECURITY KEYS (A OR B) TO SWITCH OFF THE MACHINE AND GET INTO IT SAFELY. IT IS A MANDATORY REQUIREMENT THAT THE OPERATOR TAKES WITH HIM ONE KEY (A OR B) TO GUARANTEE THAT THE MACHINE DOESN'T WORK. IN THIS ACTION YOU CAN ENSURE THAT ANY OTHER OPERATOR CAN'T TURN ON THE MACHINE WHILE ANOTHER OPERATOR IS INSIDE IT. (See the chapter 3.4.4.6)

8.1 PARAMETERS OF THE THERMAL FIXATION PROCESS

8.1.1 PREFORM PRODUCTION ENVIRONMENT AND CONDITIONING

- Production environment:

Process stability demands a controlled-climate environment. Under ideal conditions, the room temperature should range between $+25/-2^{\circ}C$, with 25% to 40% relative humidity.

- Preform storage and use:

Preforms must be stored in a low-humidity environment at controlled temperature. Before using them, they must be allowed to adapt to the production room temperature. This process usually takes 12 to 24 hours, depending on the temperature difference between the storage and the blowing rooms. A first in/first out system should be implemented and observed in order to use the preforms.

The preforms from different manufacture dates and presses might respond differently to a specific process configuration. Try to store preforms so that you can work with boxes from similar dates and produced by the same injection machines (presses) subsequently. This will reduce any process variations, which usually cause mechanic and quality problems. If preforms from different dates and presses are used, you might have to manipulate the mould-blowing machine constantly in order to guarantee the integrity of the containers.

- Effects of environmental conditions upon preforms:

The age and the humidity content of preforms affects container elaboration to a great extent. The higher the humidity content in the preform, the faster it will crystallise, and it will be necessary to reduce the general preform temperature in order to avoid a cloudy aspect on the surface.

Humidity also makes preforms stretch easily under high preform temperature, for polyethylene terephthalate (PET) plasticises or softens by the action of water. This affects the stability of the process and it might make it necessary to reduce preform temperature and the speed of the mould blowing machine so as to control the distribution of the material and the resistance of the containers. As the reduction of the preform temperature affects negatively its resistance during the filling process, humidity accumulation on the PET preforms should be avoided.

8.1.2 PREFORM HEATING

- Heating method:

Preforms are heated by passing through a series of ovens, each of them provided with eight 1, 2 and 0.5 kw infrared bulbs, depending on the area and/or type of oven.

- Configuring the bulbs:

The number of oven rows and heating bulbs depends on the platform of the blowing machine and on the application of the container. The bulbs are placed horizontally in the oven and their height and closeness can be regulated (depending on the blowing machine model). To guarantee a uniform heating, preforms rotate upon the preform carriers depending on the speed of the blowing machine.

- Controlling the bulbs inside the oven:

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The use of infrared bulbs to heat the preforms allows a uniform distribution of the temperature throughout the preform in order to optimise the vertical distribution of the material. In general, heating an area reduces the thickness of the wall in the corresponding part of the container, while cooling an area makes the thickness of the wall increase. It must be possible to regulate, connect, switch off, bring near and separate each bulb individually.

- Area localisation:

Preform planning is a usual technique to determine which areas affect directly certain parts of the blown container. An adequate use of this processing tool allows processors shape the blown container thermally in an efficient way. Using the nozzle of an altimeter, shape several preforms horizontally each 15mm or 19 mm (depending on the oven configuration) following the central horizontal line of each oven bulb. The first mark should match the central line of the first bulb and it should be approximately 6mm above the clamp. The shaped preforms are identified by marking the end and loading them in the oven. Then the containers are blown and they are recovered when the bottle is delivered. Marks are written down in the blown container, the first line of the container matches the first line of the oven bulbs, the second one matches the second line of the oven bulbs and so on.

8.1.3 PREFORM TEMPERATURE

- Meaning:

Preform temperature is a critical process parameter and it must be controlled. As preform temperature rises, the orientation of the container established during the stretching stage decreases, which makes the viscoelastic memory decrease too. As the viscoelastic memory decreases the shrinking potential decreases. Yet, as preform temperature decreases, the shrinking potential at high temperatures increases.

8.1.4 PRE-BLOWING STAGES

- Purpose of pre-blowing:

Pre-blowing air is used to inflate partially the heated preform to slow down the stretching speed and prevent the preform from touching the stretching rod during the stretching process, cooling the material down. The preblowing is a primary process parameter that makes it possible to control material distribution.

- Electric stretching encoder position:

Each function of the blowing cycle starts by using encoder points that blow the valves. The position of each encoder point can be separately moved from the screen, using times.

In general, the pre-blowing encoder point is placed in such a way that pre-blowing air is activated with the stretching rod comes into contact with the base of the preform: this is called ZERO POINT. To determine the zero point we will show how to adjust it further on, in the practical example section.

- Pre-blowing pressure:

The speed and the volume of the pre-blowing flow are reduced by means of a fixed-diameter hole placed in the pre-blowing supply line. The pre-blowing pressure is controlled by means of a regulator controlling the magnitude of the variable flow. The parameterizations of the pre-blowing pressure range between 7 and 15 bars. Pre-blowing pressure affects the distribution of the material in a similar way as the situation of the pre-blowing encoder point. Usually, when the pressure is lower the amount of material stretched down to the base of the container increases. Yet, when the pressure is higher, the amount of material remaining in the upper part of the container is higher too. Parameterizations of too high pressure may make the preform injection point stick out from the end of the rod, causing misaligned openings. Parameterizations of too low pressure may make the preform touch the stretching rod, cooling the material down and creating folds in the base or causing problems with material distribution.

- Pre-blowing checking:

In order to assess the size and texture of the preform aneurysm, a pre-blowing test can be made. The control screen makes it possible to carry out this test as the pre-blowing function remains active while the high pressure blowing function is switched off. The removal of pre-blown containers will make it possible to assess the efficiency and texture of the pre-blowing process. When placed side by side, the pre-blown containers should have a similar shape and size. Important variations show differences between the blowing units which might include leaks, uneven hole restrictors or poorly adjusted flow valves.

- Pre-blowing as a process option

Sometimes, containers may be processed without pre-blowing. This usually produces containers with less variations as far as material distribution is concerned and hence more consistent loads. This method is not recommended for preforms with a reduced interior diameter, since these preform take less time to touch the stretching rod and thus the material cools down faster, which makes stretching more difficult. When preblowing is not used, it is important to start the high pressure blowing right during or after point number ten so as to guarantee that the opening is fixed and remains closed (see section 8.1.5)

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PRE-BLOWING KEY POINTS:

. Pre-blowing starts later > More material towards the base >Too late > Base folds.

. Pre-blowing starts sooner > More material in the upper part >Too soon > Misaligned openings.

. Increase of pre-blowing pressure >More material in the upper part >Too high >Misaligned openings.

. Decrease of pre-blowing pressure >More material towards the base >Base folds.

8.1.5 HIGH PRESSURE BLOWING

- High pressure blowing

High pressure air is used to push the heated preform against the walls of the mould, making it adapt to the mould walls. Besides, the close contact between the hot plastic and the cold mould (if kept for an adequate time) facilitates the fixation of the oriented molecular structure and the subsequent resistance increase in the walls of the blown container.

- Positioning the high pressure blowing encoder points:

The high pressure encoder points are placed so as to let high pressure air work when the stretching rod has reached its highest peak, fixing the lower part of the preform between the mould base and the stretching rod, guaranteeing the alignment of the preform opening. This is called point number ten. This adjustment is made when the rod is calibrated.

The optimisation of the container might demand a relocation of the encoder point. If during the stretching calibration for the blowing process they are positioned too soon, the openings of the bottle might be misaligned, for the air is activated before the stretching rod reaches the lower part of the preform or fixes the base opening. If during the stretching calibration they are positioned too late, the bottle base might have folds, for the stretching rod has already fixed the preform and the material accumulates around the stretching rod, cooling it and preventing stretching.

Usually, a later blowing process start guarantees the stretching of more material towards the base of the container; while, a sooner blowing process start guarantees more material in the upper parts of the container. Reset the stretching calibration if necessary to obtain the desired material distribution.

- High blowing pressure:

Usually, high pressure air is introduced through the blowing nozzle, 30 - 40 bars, and it is adjusted by means of a high pressure reducing valve. High pressure should be regularly controlled in order to guarantee a constant air supply to the blowing mould.

HIGH PRESSURE BLOWING KEY POINTS:

. Late blowing start > More material towards the base>Too late > Base folds. . Soon blowing start > More material in the upper part >Too soon > Misaligned openings

8.2 LIST OF SHAPING DEFECTS AND SOLUTION

8.2.1 ASPECT

DEFECTS	CAUSE	SOLUTIÓN
White stains or bottom	Too low preform temperature	- Find out reason and increase temperature progressively
	Failure in the decompression valves	 -Check the operation of the decompression electro-valves - Check static relay. - Control the different parts of the pneumatic facility.
Total opacity	Too high preform temperature	-Find out the reason and reduce temperature progressively. - Check oven air fan.
	Crystallised preform material	-Control preform quality and temperature.
Partial opacity		-Make sure all necks turn around unhindered.
Porosity	Dirty blowing air	-Control blowing air quality
(orange peel)	Environmental humidity	-Control operation of air drier and condensation removal.
	Dirty mould cavities	-Clean mould cavities as explained in the maintenance manual
	Impurities on PET during the process	-Control preform quality

8.2.2 FORM

DEFECTS	CAUSE	SOLUTIÓN
Corrugation	Lack of primary air during the	- Check the presence of primary
(Rings towards the inside)	blowing stage	air and pressure.
		 Check primary electro valve
		feeding.
Longitudinal malformation of	Dirty outlets in blowing cavity	- Clean air outlets
the container	Low preform temperature	 Increase preform temperature progressively
	Mould opening during blowing	 Check mould closing
	process	adjustment.
		 Check stress of the posts.
Vertical seam marked	Incorrect mould closing	 Check mould closing.
		 Check stress of the posts.
	Lack of press parallelism	 Check parallelism between the
		press and the rods.
	Impurities inside the mould	- Clean residues on the mould.
Ovalisation	Too short high pressure lapse	 Increase secondary air blow
		lapse.
	Lack of low pressure (primary)	 Check operation of primary air
	pre-blown air	valve
	Few air outlets in the mould	- Clean mould exits.
Perpendicularity	Too much material in the bottom	 Control cavity cooling and water
	hinders cooling process.	cooler operation.
		 Lower temperature in the upper
		part.

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- Increase secondary air blow lapse. Perpendicularity Misaligned neck after -Check primary air valve embossing. operation. - Check diameter of blowing mould semiarid in the necks. - Control preform quality. Uneven thickness - Increase temperature in the External corrugation Faulty preform conditioning preset area. - Reduce primary air blow delay Excessive delay in low pressure blowing. It started too soon Too low primary air pressure - Increase primary air pressure. Internal corrugation Bad conditioning shape Bring temperature down to optimum point - Reduce bottom temperature. Faulty heating of preform bottom Excessive delay of secondary air - Change secondary air delay. Too low primary air pressure - Increase primary air pressure. Stain formation (none or Too low secondary air blowing Activate secondary air blow partial) earlier. - Increase application lapse. - Check electro valves. Dirty bottom - Clean air outlets. - Reduce the activation of primary Lenticulation (too much Primary air blow lapse too late material) air delay. - Increase primary air pressure. Too low primary air pressure Misalignment High pressure too soon - Delay primary air (Shrink) (see also container - Control the different parts of the perpendicularity) pneumatic facility of primary air. Check the stretching rod speed. Too much distance between the - Check distance between rod and bottom (3mm) rod and the bottom -Adjust stretching unit Stretching unit off axis Uneven preform thickness - Check lip temperature, if it is too high, removal may deform the upper part of the preform. The stretching rod might be bent.

8.2.3 CONSISTENCY

DEFECTS	CAUSE	SOLUTIONS
Fracture by falling	Incorrectly bi-oriented bottom	Check preform injection point. Misaligned point.
	Incorrect heating of preform bottom	Check preform and resin quality (PET).
	Too low primary air pressure	Increase primary air pressure.
	Excessive low-pressure activation time	Reduce primary air blow.
	Fragile preform on injection point	-Check preform injection point.
		-Check cooling water temperature.
	Low quality resin (PET)	Check preform and resin quality (PET)
Explosion on opening the mould	Decompression did not take place	Check operation of decompression electro valve.
Volume changes after some time	Too low secondary air pressure	 Increase secondary air pressure. Increase application lapse.



9.1 CHECKING THE MACHINE

IN CASE OF MAINTENANCE OPERATION:



IT IS NECESSARY TO TURN OFF ONE OF THE TWO SECURITY KEYS (A OR B) TO SWITCH OFF THE MACHINE AND GET INTO IT SAFELY. IT IS A MANDATORY REQUIREMENT THAT THE OPERATOR TAKES WITH HIM ONE KEY (A OR B) TO GUARANTEE THAT THE MACHINE DOESN'T WORK. IN THIS ACTION YOU CAN ENSURE THAT ANY OTHER OPERATOR CAN'T TURN ON THE MACHINE WHILE ANOTHER OPERATOR IS INSIDE IT. (See the chapter 3.4.4.6)

List of elements to be checked and/or replaced (TMS- 5001e)		Frequency (Hours worked or time passed, whichever finishes first)				Fatimated
		Client			Side (Recommended)	
The table shows the list of tasks, the time required, as well as the material that is needed in order to make replacements on some occasions.	Weekly (80 hours)	Monthly (400 hours)	6months (1,200 hours)	12 months (4,400 hours)	24 months (8,800 hours)	(hours)
Control the lack of preforms and/or foreign bodies throughout the starter motor and after every subsequent stoppage as a result of a defect.	0	0	0	0	0	0.5
Visual control of the following parts of the machine in order to detect possible broken parts (ascending conveyor belt, preforms, transport, rails, loading and unloading system, oven, etc.) and clean them of grease, dust, preforms and bottles.	ο	0	0	0	ο	1
Clean the excess grease in the press and the stretching units.	0	0	0	0	0	0.5
Grease and control central cones of the mould. Check for excessive wear and tear.	0	0	0	0	0	0.5
Cleaning the flat edge of the mould gaskets (area of air outlet).	0	0	0	0	0	1
Check the control of the water and compressed air leaks in the machine.	0	0	0	0	0	0.25
Clean the photocells, the mirrors and the infrared chambers (temperature probes) of the preforms. With a smooth damp cloth. Do not use abrasive products.		0	0	0	0	0.5
Revision of the condition and turning on of the oven lights.	0	0	0	0	0	0.5
Revision of the safety systems, doors and emergency stops.	0	0	0	0	0	0.5
Verification of the tension, alignment and cleaning of the elevator belt	0	0	0	0	0	

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	1					
Alignment and tension of the elevator belt	0	0	0	0	0	
Cleaning the descending tracks of the preform.		0	0	0	0	0.5
Cleaning the loading area of the preforms (divisor, attached).		0	0	0	0	0.25
Cleaning all the parts of the SBM machine.		0	0	0	0	1
Greasing of the oven chains with grease.		0	0	0	0	0.75
Control of the position of the pneumatic cylinders, check if the detectors work properly (RITS) and if they correctly detect their position.		0	0	0	0	1
Adjust the hydraulic shock absorbers in all of the cylinders that have them.		0	0	0	0	1
Check groups of pneumatic maintenance and fill up the greasing glasses with oil.		0	0	0	0	0.25
Check the stretching system (on standby and stretching), tension of the belt, alignment of the belt, stretching rods, rollers and ball-and-socket gaskets.		0	0	0	0	0.5
Check, and change if appropriate, the gaskets and scrapers of the stretching cannulas and the air tightness system.		0	0	0	0	0.25 / 1.5
Check, and change if appropriate, the belts for: (stretching, entrance to the press, loading hopper).		0	0	0	0	0.25 / 1.5
Checking the continual rotation of the preforms holder inside the oven, adjusting or tightening the chain if necessary.		0	0	0	0	0.5
Check if there is water in the air entrance filter of the pneumatic maintenance groups. Clean if necessary and check the proper functioning of the dryer if it has one.		0	0	0	0	0.5
Check the automatic greasing system, level of lubrication grease of the pump.		0	0	0	0	0.25
Check pipes and lubrication injectors of the press and the rest of the equipment.		0	0	0	0	2
Check all nozzles and if necessary, replace the O-ring seals and damaged nozzles.		0	0	0	0	0.5
Check the condition of the grippers and cylinders of the loading and unloading system.		0	0	0	0	0.2
Check the loading hopper belt for loading preforms.		0	0	0	0	0.2
Check the tightening torque of the screws of the mould.		0	0	0	0	0.5
Check and tighten terminals of the push button panel and screen.			0	0	0	0.5
Check cleaning of the control cabinet, filters and grates. Clean if necessary.			0	0	0	0.5
Check the system of the bottom of the mould, the alignment of movements, highest and lowest points, and the rails.			0	0	0	0.25
Cleaning of the mould, procedure: It can be carried out with the moulds assembled in the SBM machine, but for deep cleaning, it is recommended that you dismantle them. Open the press, gradually remove the moulds. Take the slots out of the mould (cut the water off). Place a drop of paste to polish every 5cm.			0	0	0	1

With a dry cloth, scrub the slots until they have a mirror-like finish.					
Check condition of the cones by the carrying pallets preforms.		0	0	0	1 / 4
Clean the lights of each oven module. Process: Always be sure to do so once the oven has cooled down. Open the oven doors (cut the electricity first), take out the oven modules to start cleaning the lights. With a cloth dampened with alcohol, clean the transparent part of the light (ONLY the front face). WARNING: Never clean the rear face, as doing so would deteriorate the lights. Do not touch the lights with bare fingers in order to avoid depositing grease.		0	0	0	8
Clean the oven reflectors. Always use a fine and dry cloth.					
Check, and change if necessary, the columns of the moulds. Be careful, the mould may not belong to SIDE.			0	0	1
Change the stretching cannulas, shells and scrapers of the air tightness screw.			0	0	3
Check the movement and the condition of the shafts and pinions of the oven transmission chain. Replace if necessary.			0	0	4
Tighten the terminals and electric contacts in the control cabinet and in all of the parts of the machine.			0	0	6
Check, and if necessary replace or clean, ventilation filters of the control cabinet and the functioning of ventilation or air conditioning.			0	0	1
Clean the valves of the SBM machine and steering, and if necessary replace them and any damaged parts.			0	0	4
Parts of the air/water radiator.			0	0	1
Clean the transportation rails.			0	0	1
Change oven chains and check bearings of the oven transmission.			0	0	4
Change the stretching belt.			0	0	2
Tighten and adjust the transportation belt of the preforms loading system.			0	0	0.5
Check all of the pneumatic actuators of the machine (cylinders and grippers), and replace them if necessary.			0	0	1
Check, and if necessary change the escape silencer devices.			0	0	2
Change the o-rings of nozzles			0	0	2
Change the shafts and pinions of the oven transmission chains.				0	6
Change the set of gaskets of the air tightness cylinders.				0	4
Check the pinions and shafts of the pallets preform holders.				0	2
Change the rails of the chain in the oven.				0	6
Replace the set of gaskets of the valves of the SBM machine block.				0	4
Check spaces, wear and tear in all parts of the lock and connecting rods of the press.				0	1

Dismantle the reflectors of the oven and polish with paste for stainless steel.			0	1
If the machine has an air recovery system installed, change the gaskets of recovery.		0	2	
Dismantle the air/water exchanger and clean.			0	2
Change de bushings of the bottom holder			0	2
Change de bushings of charge / discharge machine			0	3

9.2 LUBRICATION THE MACHINE

9.2.1 CENTRALISED LUBRICATION

In order to lubricate the movable parts of the machine, the automatic, pump-actuated lubricating system has been implemented; it guarantees a minimum intermittent flow to the lubrication points by means of distributors.

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The lubricant (grease) is propelled by an "engine-pump" unit and then transferred to the distributors through a main line. It goes from the distributors to the different lubrication points through different ducts.

9.2.2 LUBRICATION PUMP

It is placed in an accessible part of the mould-blowing machine, behind a door.

The pump consists of different parts, it is provided with a deposit to store the **grease**. The deposit is on the upper part of the unit.

The pump has two alarms: absence of lubrication pressure and low level of grease.

The former informs us that the circuit does not have enough pressure, which means that we are not lubricating the movable parts correctly. The latter informs us that the grease level in the deposit is below the minimum level and we will have to refill it. Both alarms are visualised on the screen.

In order to refill the pump it is necessary to have a fast plug connector, which is supplied with the blowing machine. This connector and the filling pump introduce the grease in the deposit. It is essential to use this type of pumps in order to guarantee that not oil gets into the deposit.





9.2.3 LUBRICANT FEATURES

The lubricants recommended are NSF H1 food industry lubricants, hence, they are adequate for occasional contacts with food (**NSF H1**), which are technically unavoidable, and they have been produced observing strictly the FDA 21 CFR § 178.3570 standard.

GREASE

Name	Klüber, Klübersynth UH1 14-1600
Colour	Light yellow
Structure	Homogeneous, oily
Density, DIN 51 757 at 20°C [g/cm3]	0.85
Drop melting point, DIN ISO 2176, [ºC]	>220
Penetration at 25ºC, DIN ISO 2137; [0.1mm]	From 400 to 430
Consistency Type NLGI, DIN 51818	0
Usage temperature range [ºC]	From -45 to 120

9.2.4 MANUAL LUBRICATION

SYMBOL	DESCRIPTION	PERIOD
۸1		Weekly and/or after 80 production
		hours
۸۵	Lubrication with Klübersunth UH1 14-1600	Monthly and/or after 320 production
AZ	grease	hours
٨٥		Yearly and/or after 7,000 production
AJ		hours



Transport lubrication



Press linear bearings (x8)



BOOTER LUBRICATION DETAILS

The lubrification shown below has to be done with the booster dolly in the upper position, so in manual mode put the booster dolly up and open the mold to keep the booster dolly up when air supply shut down.



The lubrification shown below has to be done with the booster dolly in the lower position, so in manual mode put the booster dolly down.



9.3 MECHANIC LINING-UP

9.3.1 BLOWING UNIT MAINTENANCE

The steps that must be followed in order to dismantle the blowing valve in order to replace damaged parts or to clean and/or inspect it have been listed next.

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Before manipulating the valve, make sure the system voltage has been cut off and there is no air pressure. Let air out.

1. Loosen the fixing bolts in all the connecting sockets. Remove connecting sockets from the valve gear.



2. Loosen fixing bolts in the valve unit using an Allen key.



3. Turn the unit upside down. Remove the valve of ring P1 from its base:

Fix the ring inserting the Seeger pliers in the lateral holes of the base. Turn the ring from left to right and pull towards you.



4. Remove the valve of ring P1 from its base: Fix the ring inserting the Seeger pliers in the lateral holes of the base. Turn the ring from left to right and pull towards you.



5. Remove non-return valves from operation valves P1 and P2.



6. Remove retention ring of the relief valve.



7. Remove retention ring of valve P2.





8. Remove retention ring of valve P1



9. Remove valve P1 of the piston in the covered part:

Press the Allen key against the piston valve inside the unit. Check the movement of the removed parts with your hand.



10. Remove valve P2 of the piston in the covered part:

Press the Allen key against the piston valve inside the unit. Check the movement of the removed parts with your hand.



11. Remove the relief valve of the piston in the covered part:

Press the Allen key against the piston valve inside the unit. Check the movement of the removed parts with your hand



12. Remove the rings of the caps manually.



13. Clean the interior of the unit using a soft solvent.



Do not use hot water to clean the valve unit or the inside of the unit! Work in well-ventilated places and use protection gloves to clean the components.

14. After cleaning, apply a fine layer of grease (Ref. OE 0101-020) upon the areas shown in the picture (see arrow indications).

15. Do not remove the valve control pistons. Clean the external valve control pistons using a soft solvent.

Check (visually) the seals to see whether there are any defects or whether they have suffered any damage. If the seals are damaged, replace them. They are lubricated by default and they should not be lubricated again.

Otherwise, apply a fine layer of grease with your hand (Ref. OE 0101-020) around the seal (see arrows).

16. Apply with your hand a fine layer of grease in the "0" rings (Ref. OE 0101-020)

Insert the "0" rings in the covered area with your hand. Make sure the "0" rings fit the rim of the hole (see arrows).

17. Insert valve P1 separating the piston from the carcase:

Tighten with your hand the parts introduced in the unit. Check the movement of the parts introduced by pressing the Allen key against the valve piston inside the unit.









18. Insert valve P2 separating the piston from the carcase:

Tighten with your hand the parts introduced in the unit. Check the movement of the parts introduced by pressing the Allen key against the valve piston inside the unit.



19. Insert the relief valve piston:

Tighten with your hand the parts introduced in the unit.

Check the movement of parts introduced by pressing the Allen key against the valve piston inside the unit.



20. Insert the relief valve retaining ring.





21. Insert the P2 valve retaining ring.





22. Insert P1 valve retaining ring.





23. Cleaning the retaining valves.Do not apply grease at all on the components.Check (visually) whether there are signs of damage in the flat end. If the non-return valve is damaged, replace it.

P1 valve seat ring

P1 valve seat ring



24. Check (visually) whether the inner valve seat ring (see arrow) is damaged.

If the ring is damaged, replace it.

25. Apply a fine layer of grease (Ref. OE 0101-020) in the outer side of the "0" seat rings (see arrow).

26. Turn the unit upside down and insert the non-return valves of function valves P1 and P2. The flat end must be oriented towards the ring seat, which will be inserted next.



27. Insert valve P1 in the ring seat:

Pick the ring by inserting the Seeger pliers in its lateral holes. Turn the ring from left to right and tighten it down into the unit.



P2 valve seat ring



P2 valve seat ring



28. Insert valve P2 in the ring seat:

Pick the ring by inserting the Seeger pliers in its lateral holes. Turn the ring from left to right and tighten it down into the unit.



29. Insert the fixing bolts into the valve unit manually. Tighten the bolts with a 25 Nm torque using an Allen key.



30. Place the connector sockets for the valve gear. Tighten the fixing bolts of all the connector sockets with an 60 Ncm torque.



9.3.2 REPLACING THE STRETCHING BELT



This element, under correct operation conditions, should not show signs of wear and it should not be necessary to tighten the belts during its useful life.

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Special attention should be paid during uncontrolled stops. The stretching might remain in up position with preforms in the mould. Should this happen, the belt might be damaged as when the preforms cool down they may clamp the stretching rods and hinder the movement of the whole system.

An excessive stretching of the belts might result in belt tearing. If the belt is not sufficiently stretched, the cogs might be torn out.

The steps that must be followed to replace the stretching belt have been included next. Below are the steps for replacing the stretch belt.

1. In this order, loosen the tensioner pulley shaft M24 (x1), and the M16 tensioning screws (x3)



- 2. Check whether the belt has loosened.
- 3. Remove clamp fixing bolts (M8x8) and belt clamps.





4. Remove the belt pulling from the engine pulley area. Replace by a belt of the same length taking into account the pulley circuit.



5. Place belt and fixing clamps. Tighten the screws progressively at 20Nm by cross-clamping (both clamps).



6. Tighten stretching screws as shown in the picture until reaching the adequate tension. Do not stretch excessively or leave the belt loose. Holding the rod support on one end, check whether the belt can move 10 - 15 mm with your hand on the central part.



7. Tighten the M16 12.9 quality fastening nuts and screws (x3) to 105Nm. Screw M24 screw should be tightened to 25 Nm.



9.3.3 TIGHTENING THE OVEN CHAIN Exert force on it.

9.3.4 STRETCH RODS

1. Loosen screws and ball holder and disassemble the stretch rods.



2. Once outside the machine, loosen the nut and replace the rod. Then we repeat point 2 in reverse.



9.3.5 CYLINDER SEALING GASKET

Below are the steps for removing the airtight cylinder, to replace damaged parts or for cleaning and / or inspection.

The elements in this blower assembly subject to wear are those subjected to movement of the cannula. These are shown in the following figure in red and green.



Before manipulating the cylinder, make sure the system voltage has been cut off and there is no air pressure. Let air out.





1. Remove supply hoses of the two blowerunits. Then dismantle their electrical connections.



2. Push with your hand in the direction of the arrow so that the shaft moves downwards.



3. Loosen the nozzle and remove it. Then, remove the screws and remove the cylinder.





4. Replace the seals, bushing guides and scraper. Place the seal in the same position.



5. Reassemble the parts in reverse order.

6. Below are details on how to adjust the height of the airtight cylinder. For this purpose air pressure and electricity must be connected.

7. Place a preform in the nozzle and in manual, close the mould.

8. Actuate the cylinder (using the screen) check that the nylon cap does not jam (it can rotate). If it does, further loosen the adjusting nut.



9. Tighten the adjusting screw locknut until the nylon cap hits the cylinder, and then tighten the jam nut.

10. Now the impervious cylinder is adjusted. To check whether it has been correctly adjusted, place new preforms in again, close the mould and activate the impervious cylinder 2-3 times. Remove the preforms and check whether they are OK, making sure the wing is not deformed.

9.3.6 Checking the tension of the lift belt

- 1. Stretch the belt from the support structure.
- 2. Check that the distance is h = 10/30 mm for a correct tension. See Figure 1.

NB.: High ambient temperatures will affect the tension of the belt. Therefore, in places where the temperature might affect the belt, its tension must be checked strictly and regularly.

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9.3.10 Adjusting the alignment of and tightening the lift belt

Perform the following steps to correctly centre the belt:

- 1. Completely empty the hopper.
- 2. Centre the belt on the upper roller, by visual inspection, leaving each side the same distance from the metal plates. *See Figure 2.*
- 3. Start the operation of the belt manually. To do so, access the machine screen menu, as follows:
 - i) Manual
 - ii) Load
 - iii) Preform lift belt \rightarrow 100%
 - iv) ON / Belt in operation
- 4. View the lower roller while it is working \rightarrow observe whether it is centred or if it moves. See Figure 3.
- 5. If the belt is not centred, tighten the roller on the same side towards which the belt tends to move, in order to move it in the opposite direction. *See Figure 4. Perform the following steps:*

i) I a a a un tha la aluquit

- i) Loosen the locknut.
- ii) Tighten the belt by tightening the screw (this will lower the height of the roller).
- 6. Once the belt has been centred on the lower roller, check the position of the belt on the upper roller once more. If it is not centred, readjust it by repeating the steps of the procedure.

NB.: After centring, check that the belt is stabilised. Perform visual checks every hour during the first four hours after performing the procedure.



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if A>B \rightarrow then

