G. MONDINI
DOSATRICI - CONFEZIONATRICI AUTOMATICHE

CE

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Via Brescia, 5-7
25033 COLOGNE (BS) – ITALIA

CLOSING MACHINE
TYPE CV/VG-S

User and Maintenance Manual

Construction year: 11/2010

Serial number: A/10/A-00164

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CHAPTER 1

FOREWORD

1 FOREWORD

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1.1 OVERVIEW

This handbook contains all the information needed for correct installation and use, and appropriate maintenance of the line involved.

G.MONDINI S.p.A. insists that this document be read by the persons assigned to the running and the maintenance of the machine, as well as by the persons executing the transport and assembly operations.

This document is the instructions handbook for the **CLOSING MACHINE CV/VG-S** and has been drawn up in conformity with directive EEC 98/37 annex I paragraph 1.7.4. The Use and Maintenance Handbook is to be considered an integral part of the line and is to be kept until the final dismantling. The handbook is to be kept by the person in charge of the system after its installation.

The handbook reflects the technical state at the time of the line marketing and shall not be considered inadequate if later versions are updated on the basis of new experience, furthermore G.MONDINI S.p.A. reserves the right to update production and handbooks with no obligation to update previous production or handbooks.

The drawings and other documents that accompany the system are the property of G.MONDINI S.p.A. that reserves the rights and underlines that these documents are not to be handed over to third parties. It is therefore forbidden to duplicate them in any way, either electronically or mechanically, for any type of use, without first receiving the written permission from G.MONDINI S.p.A.

G.MONDINI S.p.A. shall not be held in any way liable for any direct or indirect damage to persons, goods or animals caused by the use of this documentation and/or the line under any conditions that differ from those foreseen.

1.1.1 Spare parts

It is recommended to use only ORIGINAL SPARE PARTS.

To order spare components send a form like that shown in figure A to G.MONDINI.

The system is marked with a code and a serial number, indicated on the ID plate.

The component description and code, as well as the number of the assembly and the table the component belongs to can be traced in the lists attached to the handbook.

MODULO ORDINAZIONE RICAMBI

Spett.le: **G.MONDINI S.p.A.**

Dosatrici - confezionatrici automatiche
- 25033 COLOGNE (Brescia) ITALIA, Via Brescia 5/7 -
Tel. +39 030 705600 - Fax +39 030 7056250
E-mail: - **info@gmondini.com** - **www.gmondini.com** - **spare_parts@gmondini.com.**

Richiediamo la spedizione dei seguenti ricambi:

Nº MATRICOLA: ☐ **TIPO DI MACCHINA:** ☐

Q.tà	Nº codice pezzo	Nº gruppo	Nº tavola	Descrizione pezzo

DITTA: ..... p.I.V.A. Nº:.....

Via: ..... Nº: .....

Loc.: ..... Città: ..... C.a.p.:..... Prov.: .....

INVIO A ½: ☐ Corriere ☐ Corriere espresso ☐ Posta
☐ .....
PAGAMENTO: ☐ Contrassegno ☐ Bonifico bancario (v. ricevuta allegata)
☐ .....

La richiesta è stata compilata da: COGNOME ..... NOME .....

In qualità di: .....

Le richieste non saranno evase se mancanti di tutte le indicazioni della ditta richiedente nonché delle generalità complete e di firma del compilatore. La merce viaggia a rischio del committente. Non si accettano restituzioni di materiale in caso di errori di compilazione del modulo.

TIMBRO e FIRMA

Figure A: Spare parts order form.

1.1.2 How to request services

For any type of information or explanations regarding the use, maintenance , installation etc., the G. MONDINI S.p.A. technical department is always at the disposal of the Customer.

With regard to requests, the questions should be set out in clear terms , with reference to this handbook and always indicating the data found on the ID plate of the line.

Any request for after-sales service in the Customer's plant, or questions regarding technical aspects of this document are to be addressed to:

G.MONDINI S.p.A.

Dosatrici – confezionatrici automatiche

25033 COLOGNE (Brescia), ITALIA, Via Brescia 5/7
Tel. +39 030 705600 Fax. +39 030 7056250
E-mail: info@gmondini.com – www.gmondini.com –
spare_parts@gmondini.com

1.1.3 "CE" Declaration of Conformity

"CE" Declaration of Conformity

(in conformity with Machines Directive, annex II letter A)

The Manufacturer	**G.MONDINI S.p.A.**
Address	Via Brescia, 5-7 – 25033 COLOGNE (BS) – Italy
Tel.	+39-030-705600
Telefax	+39-030-7056250

HEREBY DECLARES THAT THE FOLLOWING MACHINE

Machine type	CLOSING MACHINE CV/VG-S
Serial number	A/10/A-00164
Product handled	FOOD PRODUCTS
G. MONDINI S.p.A. job number	A/10/A-00164
Year of built	11/2010

COMPLIES WITH THE LEGAL REQUIREMENTS ENACTING MACHINERY DIRECTIVE 2006/42 AND SUBSEQUENT AMENDMENTS AND WITH WORK EQUIPMENT DIRECTIVE 89/655/EEC AND SUBSEQUENT AMENDMENTS

The manufacturer strictly prohibits the use of the above machine/fixture in any manner other than that indicated in the Instructions for Use Handbook.
The manufacture declares that the machine conforms to these other European directives (where applicable): 2006/95/EC, 2004/108/EC, E N ....

Representative: Patrizio Chiari

Office: Responsible of production **Signature** **.....**

Cologne, dated 29/10/2010

1.1.4 System marking

CE Marking **Manufacturer**

Identification data

Figure B: CE Plate.

1.1.5 Reference standards

DIRECTIVE/ STANDARD	EDITION	TITLE
2006/42	29-12-2009	Machines Directive
2004/108/EEC	DEC. 2004	Concepts relating to electromagnetic compatibility problems.
2006/95/EEC	JAN 2007	Low voltage Directive
UNI EN ISO 12100-1	DEC. 2009	Safety of machinery – Basic concepts: general principles for design. Basic terminology, methodology.
UNI EN ISO 12100-2	DEC. 2009	Safety of machinery – Basic concepts: general principles for design. Technical principles and specifications.
UNI EN ISO 13857	MAY 2008	Safety of machinery – Safety distances to prevent danger zones being reached by the upper limbs .
UNI EN349	NOV. 2008	Safety of machinery – Minimum gaps to avoid crushing of parts of the human body.
UNI EN ISO 13850	FEB. 2007	Safety of machinery – Emergency stop equipment - Functional aspects – Principles for design.
UNI EN547-1	MAR. 2009	Safety of machinery – Human body measurements – Principles for determining the dimensions required for opening for whole body access to machinery.
UNI EN547-2	MAR. 2007	Safety of machinery - Human body measurements- Principles for determining the dimensions required for access openings.
UNI EN842	MAR. 2009	Safety of machinery – Visual danger signals. General requirements, design and testing.
UNI EN953	MAY 2009	Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards.
UNI EN13849-1	NOV. 2008	Safety related parts of control systems. Part 1: General principles for design.
UNI EN981	MAR. 98	Safety of machinery. System of danger signals with sound or light.

Foreword

DIRECTIVE/ STANDARD	EDITION	TITLE
UNI EN983	JULY 1997	Safety of machinery. Safety requirements for fluid power systems and their components. Pneumatics.
UNI EN 999	NOV. 2008	Safety of machinery. The positioning of protective equipment in respect of approach speeds of parts of the human body .
UNI EN1037	SEPT. 2008	Safety of machinery. Prevention of unexpected start-up.
UNI EN 14121-1	DEC. 2007	Safety of machinery. Principles for risk assessment.
UNI EN1088	NOV. 2008	Safety of machinery. Interlocking devices associated with guards. Principles for design and selection.
UNI EN ISO 11161	OCT. 2007	Industrial automation systems. Safety of integrated manufacturing systems. Basic requirements.
UNI EN ISO11202	OCT. 1997	Acoustics – Noise emitted by the machines and equipment – Measurement of sound pressure levels at the work place and in other specific positions – Checking method on site.
IEC EN60204-1	SEPT. 2006	Safety of machinery – Electrical equipment of the machines. Part 1: basic requirements.

1.2 SAFETY STANDARDS CONTAINED IN THIS HANDBOOK

The instructions, indications, standards and safety notes described in the various chapters of the handbook have the purpose of defining how to behave and the obligations to be respected when carrying out the various activities. They form the methods of use for the line, so as to operate under safe conditions for the personnel, the fixtures and the surrounding environment. The safety standards contained are directed to all the skilled persons who are authorised and assigned to carry out the various operations that include:

- transport
- installation
- operation
- use
- management
- maintenance
- cleaning
- putting out of service and dismantling

that constitute the methods of use foreseen for the system.

IMPORTANT NOTE

The system must not be modified in any way and the safety guards must not be removed or disactivated without first informing the Manufacturer. If these instructions are not complied with, the Manufacturer DECLINES ALL RESPONSIBILITY for any situations that might occur. The Manufacturer cannot be held liable for:

A) THE USER'S SAFETY.
B) PROPER OPERATION of the machine supplied.

- IMPORTANT: If the system supplied is to be linked to an existing installation, the costumer must - unless agreed otherwise - provide adequate protection for the area where the two systems are linked. Mondini S.p.a. declines all liability if damage or injury is caused bacause this protection has not been provided.

1.3 SYMBOLS USED IN THIS HANDBOOK

This handbook uses certain symbols to call the attention of the reader and point out some particularly important features.

The table below contains a list of the different symbols used in the handbook and describes their meaning.

SYMBOL	MEANING	NOTES
	Danger	Indicates a hazard with accident risk, even death, for the user. Pay very careful attention to the texts indicated by this symbol.
	Warning	A warning of possible downgrading or damage to the line, and/or the fixtures. Pay attention to the texts indicated by this symbol.
	Warning Note	A warning or note regarding key functions or useful information. Pay attention to the texts indicated by this symbol.
	Additional information	Texts that contain additional information are indicated by this symbol. This information does not relate directly to the description of an operation or to the development of a procedure.. It may give reference to other supplementary documentation such as attached instructions for use handbooks, technical documentation or other sections of this handbook.
	Avoid damage to material	Indicates there is a high risk of damaging a part, for example using a wrong tool or assembling following an incorrect procedure
	Special tool	Indicates that for this operation a special tool or fixture is necessary.
	Visual check	Informs the reader that a visual check is to be made. This symbol will also be found in the instructions for use. The user is told to read a measure value, to check an indication, etc.
	Sound check	Informs the reader that a sound check is to be made. This symbol will also be found in the instructions for use. The user is told to listen to an operating noise.
	See the maintenance charts	Indicates that a special maintenance chart is to be consulted.

1.4 RESPONSIBILITIES OF THE MANUFACTURER

G. MONDINI S.p.A. shall not be held liable for situations deriving from the incorrect or improper use of the system described herein or any damage caused by the use of spare parts other than those recommended, by maintenance operations not carried out correctly or by tampering with circuits, components and/or system software.

The responsibility to ensure that the safety instructions indicated in this handbook are applied is assigned to the technical supervisor responsible for the foreseen activities on the line. He shall ascertain that the operatives authorised to carry out the required activities are qualified , that they respect and are aware of the requirements contained in this handbook and the general safety standards applied to the system.

Not observing the safety standards could cause injuries to the personnel and damage to the fixtures.

1.5 GUARANTEE

For the construction of the system G. MONDINI S.p.A. has used materials deemed most suitable in their final judgement.

G. MONDINI S.p.A. guarantees that the system is free of machining flaws and ensures the quality of the material for a period of time and in accordance with the conditions agreed upon when drawing up the con tract with the customer.

1.6 LINE MANAGEMENT

The system management is only allowed to authorised operators who have received sufficient instruction, or who have appropriate technical experience.

The operators assigned to the running and the maintenance of the system are to be aware that the knowledge and application of the safety standards is an integrating part of their job.

Operators who are not assigned to activities on the system are not to have access to the operating area and/or the control panels.

Before starting up the system carry out these operations:

- read this handbook carefully
- know which protections and emergency stop devices are installed on the line, where they are located and how they function.

It is forbidden to remove, even only partially, protections and safety devices installed to safeguard the personnel in the system hazardous zones.

The same regulation applies to the warning plates.

It is strictly forbidden to open the doors of the electric cabinet when the system is running and immediately after it has stopped.

The protections and safety devices are to be kept in perfect order to ensure the correct functioning. In the case of malfunctioning or failure on these devices, they are to be immediately repaired or replaced.

The use of commercial components that are not those specified for safety devices and protections could cause malfunctioning or the generation of hazardous situations for the operators working on the line.

1.6.1 Plates on the system

PLATE 1	
	Use gloves to protect from cuts and burns.
PLATE 2	
	Wear safety shoes.
PLATE 3	
	See the use and maintenance handbook.
PLATE 4	
	**Warning!** Mechanical parts in motion.
PLATE 5	
	**Warning!** In this zone of the system parts are operating that could cause deep cuts and serious amputations.
PLATE 6	
	**Warning!** Hazardous voltages present; Danger of fulguration.

PLATE 7	
	**Warning!** In this zone there are parts that work at high temperatures.
PLATE 8	
	Do not remove the safety devices and protections.
PLATE 9	
	Do not operate on moving parts.
PLATE 10	
	This symbol indicates the direction of rotation of the part .
PLATE 11	
	**Warning!** Danger of limbs being crushed.
PLATE 12	
	Constant hazard pay attention when handling.
PLATE 13	
	This indication is usually placed near the closing zone of the protective casing, where its closure affects the resumption of production.

1.6.2 Glossary and symbols

Some terminology and symbols are used in this handbook to call the attention of the reader and to emphasise certain aspects of particular importance .

The tables that follow list them and describe their significance.

Table 1 - Glossary

Term	Description
Emergency stop function	Function to: - prevent, upon occurrence, hazards for persons, damage to machines or machining in progress, or otherwise reduce them. - be activated by a single human action when the normal stop function is inadequate for the purpose. In accordance with this standard, the hazards are those that could arise from: - operation irregularities (machine fault, inadequate processing material, human error, …) - normal operation Note – *Functions such as inversion, limiting movements, deviation, shielding, braking, sectioning, etc, may be part of emergency stop functions. This standard (EN 13850) does not cover these functions.* (Item 3.1 of EN 13850)
Machine actuator	A power mechanism used to start the movement of a machine. (Item 3.3 of EN 13850)
Control circuits	Circuit used to control the machine operation and to protect the power circuits.
Manual control (actuator)	The component of the control device that, when activated, activates the actual control device, and is designed for actuation by a person (see item 4.4.1 of EN 13850). (Item 3.2 of EN 13850)
Customer/ Purchaser	The person who orders and/or purchases.
Machines directive	The machines Directive is the ruling indicated with the Executive Order of the President of the Republic 459/96.
Emergency stop device	Together with the components designed to execute the emergency stop (see fig. 2 of EN 13850, that shows the parts of a machine to which these components may belong). (Item 3.2 of EN 13850)
Enable device (control	Additional control device activated manually and used together with a start command, to permit the machine to operate permanently when activated. (Item 3.26.2 of EN 12100-1)

Term	Description
Control device	Component of the emergency stop device that generates an emergency stop signal when the associated manual control (actuator) is activated. (Item 3.2 of EN 13850)
Interlock device (interlock)	Mechanical, electrical or other type of device that has the purpose of preventing machine parts operating under certain conditions (usually before the guard is closed). (Item 3.26.1 of EN 12100-1)
Safety device	Device (not a guard) that eliminates or reduces the risk, either alone or associated to a guard. (Item 3.26 of EN 12100-1)
Limiting device	Device that prevents the machine or its parts from exceeding the set limit (distance, pressure, etc.). (Item 3.26.8 of EN 12100-1)
Bill of Materials	List of the components that are part of the mechanical assemblies, fluidic or electrical systems, indicated with the quantity, code and name of supplier.
Manufacturer	Manufacturer of the machine
Supplier	Body (for example, manufacturer, installer agent, system integrator) that supplies the equipment or associated services of the line (the user may also act as his/her own manufacturer).
Automatic operation	Mode in which the entire system executes its operations autonomously, with gates and barriers closed and inserted in the safety circuits.
Manual operation	Operating mode that cuts out automatic running and that allows manual handling activities under the control of the operator.
Installation	Installation is the mechanical and electrical integration of the machine in a production system, in conformity with the Directive safety requirements.
Instructions for use	Safety measures that consist of a set of information, such as texts, words, signs, symbols or diagrams that are used either separately or in combination, to convey the instructions to the user. They are intended for professional and/or non professional users. Note – *Item 6 of EN 12100-2 deals with instructions for use.* (Item 3.21 of EN 12100-1)

Term	Description
Machinery/ Machine	A group of parts or components, of which at least one is movable, connected together with appropriate actuators, control and power circuits etc. of the machine, integrally connected for a specific application, in particular for conversion, treatment, handling or packaging of a material. The term ”machinery” also covers a group of machines that, to obtain the same result, are arranged and controlled so as to have an integrated operation. Appendix A of EN 12100-1 contains a general schematic diagram of a machine. (Item 3.1 of EN 12100-1)
Maintenance and Repair	Maintenance and repair operations are periodical checking activities and/or replacement of mechanical, electrical parts, software or machine components that serve to identify the cause of a fault, that terminate with the machine being returned to the project functioning condition.
Marking	Signs or writing that identify the type of component or equipment, applied by the manufacturer of the component or equipment.
Commissioning or Putting into service	Commissioning is the functional checking activity on the installed system.
Safety measures	A means that eliminates or reduces a hazard.
Operator	Person or persons assigned to the installation, operation, regulation, maintenance , cleaning, repairing or transport of the machine (EN 12100-1).
Exposed person	Any person that is completely or partially in a hazardous zone (Annex 1 - 1.1.1.2. .Executive Order. DPR 459/96).
Skilled person	A person with sufficient technical knowledge or experience to be able to avoid hazards that could be present.
Protections	Safety measures that consist in the use of specific technical measures called protections (guards, safety devices) to protect persons against hazards that cannot be reasonably eliminated or sufficiently limited by design. Note – *Item 5 of EN 12100-2 deals with protections.* (Item 3.20 of EN 12100-1)
Contact person	Person responsible for the running of certain operations or assessments that could arise during work or maintenance .
Redundancy	Application of more than one device or system, or part of a device or system, so as to ensure that in the case of a failure in the functioning of one of them, another is available to execute that function.

Term	Description
Guard	A part of a machine used in a specific manner to give protection by means of a physical barrier. According to its construction, a guard may be called hood, cover, shield, screen, door, fencing, enclosure, etc. Note 1 – *A guard may act:* - *alone; it is therefore effective only when it is closed,* - *associated to an interlock device with or without locking of the guard; in this case the protection is insured whatever the position of the guard.* Note 2 – *"Closed" means, for the fixed guard, "kept in position".* (Item 3.25 of EN 12100-1)
Fixed guard	Guard kept in position (closed): - either permanently (by welding, etc.), - or by fastening elements (screws, bolts, etc.) that make it impossible to remove/open it without the use of tools. (Item 3.25.1 of EN 12100-1)
Movable guard	Guard usually mechanically connected to the frame of the machine or to a fixed element nearby (for example by hinges or guides), and that can be opened without the use of tools. (Item 3.25.2 of EN 12100-1)
Interlocked guard	Guard associated to an interlock device (see item 3.26.1 of EN 12100-1), so that: - the hazardous functions of the machine "involved" with the guard cannot be carried out until the guard has been closed, - if the guard is opened while machine hazardous operations are running, the order to stop is given, - the closing of the guard allows the machine to run the hazardous operations with which the guard is "involved", but does not give the start commands. (Item 3.25.4 of EN 12100-1)
Risk	Combination of probabilities and seriousness of possible injuries or harm to health in a hazardous situation. (Item 3.11 of EN 12100-1)
Machine safety	Capability of a machine to carry out its functions, to be transported, installed, adjusted, serviced, dismantled and removed under the foreseen use conditions (see Item 3.22 of EN 12100-1) specified in the instructions handbook (and, in some cases, in a certain time indicated in the handbook) without causing injuries or harm to health. (Item 3.19 of EN 12100-1)

Term	Description
Dismantling	Dismantling is the demolition and disposal of the parts constituting the machine.
Protected space	Protected space is the area limited off by the protection barriers and assigned for the installation of the machine.
Environment temperature	Temperature of the air or other agent where the equipment is used.
Transport	The series of operations to transfer the work centre from the assembly site of the manufacturer to the final work site of the customer .
Foreseen use of a machine	Use for which a machine has been designed, in conformity with the indications supplied by the manufacturer, or that is considered standard in relation to its design, construction and function. Foreseen use implies also the observance of the technical instructions contained in the instructions handbook (see Item 6.5 of EN 12100-2), and taking into consideration the incorrect use that it is feasible to foresee. Note – R*egarding incorrect use in the assessment of risks, these types of behaviour should be given particular consideration:* - *incorrect behaviour that results from normal negligence and not a deliberate intention to use the machine improperly,* - *the instinctive reaction of a person during use, in the case of malfunctioning, accidents, failures, etc.* - *behaviour that derives from "the line of least resistance" when performing a task,* - *probable behaviour of some persons, such as children or disabled persons for certain machines (especially those not for professional use).* *See also* Item *3.21 of EN 12100-1.* (Item 3.22 of EN 12100-1)
Incorrect or improper use	Use of the machine out of the limits specified in the technical specifications .
User	Body that uses the machine and the associated equipment.
Hazardous zone	Any zone inside and/or near to a machine in which a person is exposed to the risk of injuries or harm to health. Note – *The hazard that causes the risk considered in this definition:* - *permanent presence during the foreseen use of the machine (motion of hazardous moving parts, electric arc during welding, etc.), or* - *that can unexpectedly occur (sudden /unexpected start, etc.)* (Item 3.10 of EN 12100-1)

CHAPTER 2

USE AND MAINTENANCE

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2.1 GENERAL DESCRIPTION

Our CV Tray Sealers are engineered for tray heat-seal functions using sealing film reels, where the tray lid is outlined, blanked and sealed onto the tray itself.

The Semi-Automatic Tray Sealers are available in two models:

1) CV/MB-S	Electro-pneumatic tray sealer, ideal for heat-sealing plastic, aluminium and cardboard containers, with wholly automatic work cycles.
2) CV/VG-S	Electro-pneumatic tray sealer, ideal for heat-sealing or heat-sealing with vacuum flush and gas functions, of plastic, aluminium and cardboard containers, with wholly automatic work cycles

The tray sealer framework structure is composed of:

- a stainless steel and anodised aluminium structure;

- a bottom tool carrier trolley;

- a top tool assembly unit integrating a resistance unit and a cutting jig for lid outlining and blanking;

- a reel-support arm;

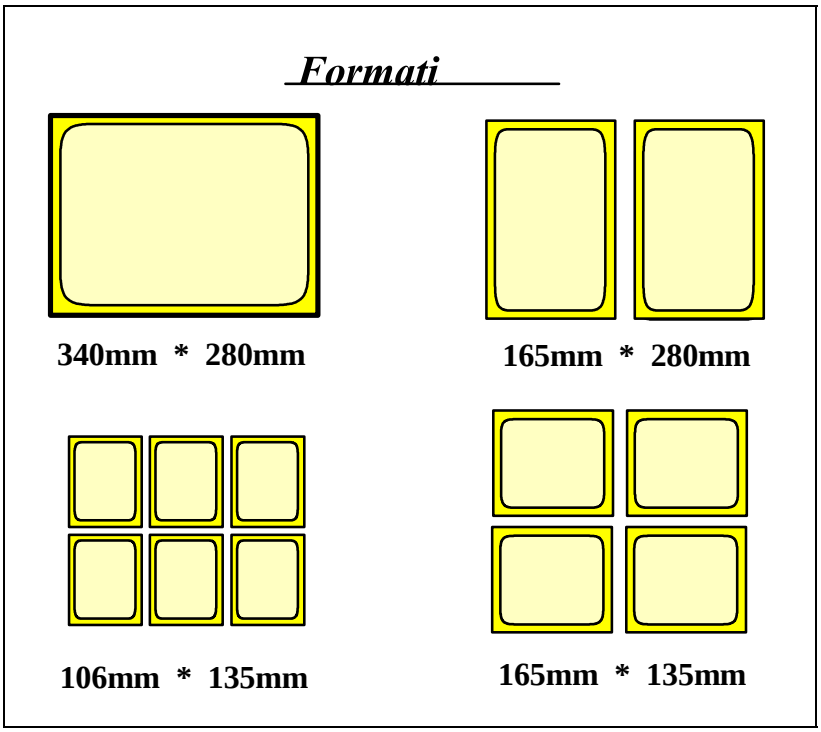
- a film unwinding system;

- a film rewinder arm;

- a control panel integrating a PLC for sealing-time, vacuum, gas and film unwinding programming and control functions, according to the model in use;

- a vacuum pump for the CV/VG – S machine version;

- the machine can either be equipped with a single-cavity tool which must be maximum 325mm by 265mm, or with a multi-cavity tool, where the cavities are multiples of the basic tray size.



Tool shapes

Production	**CV/MB-S** **CV/VG-S**	5 / 6 cycles per minute; 3 / 4 cycles per minute, with a 0.5 to 1.4 % oxygen residue, based on the type of product being sealed;
Power consumption	**CV/MB--S** **CV/VG-S**	2.5 kW per hour; 4 kW per hour;
Compressed air consumption		15 NL per minute at 6 atm.

Hereunder is a closer view of the CV/VG-S version layout.
G. Mondini hereby notifies that some of the technical and construction details shown on this layout may differ from those on the machine that is actually supplied. To assess and analyse said information, kindly consult the relative Mechanical Diagram and Wiring Diagram.

2.2 LIST OF HAZARD SOURCES

1) Electrical voltage.

2) Maintenance and cleaning operations with the machine at complete standstill.

3) Tool temperature.

4) Tool closing.

5) Cutting jig.

6) Handling the reel.

2.3 HAZARD ANALYSIS AND ASSESSMENT

2.3.1 Electrical panel voltage

The machines and devices produced by G. MONDINI S.p.a. are powered by electrical energy sources. For what concerns this Semi-automatic Tray Sealer, the points in which there may be electrical voltage contact hazards are: the main electric control panel, in the film-reel unwind and film-waste rewind assembly units and in the sealing tool contact area.

- Solution: The machine has been engineered, constructed and equipped in order to totally prevent all hazards arising due to electrical energy sources. All our machinery is guaranteed to comply with protection class IP65 covering dust and water hazards and no operator hazards whatsoever have ever been encountered. A very important recommendation here is that: OPENING THE ELECTRICAL PANEL IS STRICTLY PROHIBITED WHEN THE POWER IS SWITCHED TO ON. Said electrical panel can be opened only when the power is completely **OFF**.

- Residual risks: No residual risks are involved if the given directions are observed and if the machine guards are not bypassed in any way.

2.3.2 Maintenance and cleaning operations with the machine at complete standstill

This Tray Sealer machine needs to be accurately washed at the end of every production cycle. Working with food that is often kept at ambient temperature leads to rapid food substance wasting and decay. Inactive substance leftovers internally to the tray sealer may lead to serious hygienic issues.
The machine must be totally cleaned, both internally and externally. Due to the presence of moving mechanical parts and electrical mains voltage, cleaning operations must strictly be conducted only when the machine is totally powered off. The same rule goes for all maintenance operations.

- Solutions: Prior to beginning any maintenance or cleaning operations, simply ensure you press the emergency stop pushbutton and turn the general mains power switch to "**O**".

- Residual risks: The above hazards will not involve any residual risks if the above warnings are accurately observed and if the machine guards are not bypassed in any way.

2.3.3 Tool temperature

During operation, the sealing tool will reach the temperatures set by the operator that depend on the type of reel, on the type of container and on the type of sealing that is required. Said temperatures can vary from 120°C up to 240°C.
This section of the machine is located in an area where there is no need for the operator to perform any type of intervention. No problems are therefore involved with adjusting Tray Sealer operations. It is anyway necessary to watch out and see whether one of the following interventions may be required:
(1) changing the sealing tool in order to be able to seal different types of containers;
(2) cleaning the sealing tool;
(3) insertion of the film reel;
(4) repositioning the film waste reel whenever it breaks.

- Solution: The sealing tool is located internally to what is called the machine's "Sealing" assembly unit. Said assembly unit is in turn located in the centre of the tray sealer machine and is completely surrounded by the "vacuum" bell frame.

- Residual risks: The only residual risk arising when an intervention to the sealing tool is required while the machine is working, is that THE TOOL OPERATION TEMPERATURE IS EXTREMELY HIGH!

2.3.4 Tool closing

The tool closing phase takes place when the top tool approaches the bottom tool for sealing, i.e. when the bottom carriage has reached its set position and is exactly under the top tool. At this point, the top tool is left to travel slowly and freely downwards until it touches down in the bottom tool: only then all the force that is necessary to seal the tray and to complete the sealing cycle is applied to the bottom tool.

- Solution: The whole tray sealing assembly unit is protected on the side by safety coverings that prevent the operator from possibly contacting the sealing area. The machine is furthermore equipped with a safety device on the operating pushbuttons that prevent the operator from contacting the sealing element in question during the packaging phase, thus eliminating any possible hazard or danger.

- Residual risks: In the operative conditions described above there is absolutely no chance of having any objects and/or upper limbs crushed in the tool. There is only one residual risk: When the tool is in waiting position and/or for any other possible requirement, such as removing any stuck containers, putting the sealing film reel back into its correct position or for a format change or whatever, kindly beware that:

1) the tool has a very high temperature, capable of causing very serious skin burns;
2) a very sharp cutting jig is positioned INSIDE the tool.

2.3.5 Cutting jig

The film reel cutting jig is housed in a position that can only be accessed during cleaning, maintenance or sealing tool replacement operations.

It is actually a very sharp, cutting element and needs to be handled with the utmost care in order to:

1) avoid the appearance of small surface cuts and scrapes;

2) avoid ruining it so that its performance is not compromised.

- Solution: The cutting jig is housed in an internal sealing tool section. It is furthermore protected by the Tray Sealer's main protection coverings.

- Residual risks: No residual risks are involved if the machine guards are not bypassed in any way.

2.3.6 Handling the reel

This unit assembly is located in an area that is not protected by safety coverings. It is therefore possible for the operator to come into contact with this moving section of the machine.

Because this section moves really slowly there are no problems or hazards involved; the only hazardous section is constituted by the unroll rollers that are however provided with a safety covering that is shaped to allow for insertion of the film reel: it may thus be possible for finger crushing hazards to arise. The only warning here is:

* *the insertion of the film reel must be done by hand, without unwinding the film reel automatically;*

* *when the sealing film is fed in under the tool, beware that it may be very hot. It is also necessary to be very careful with the cutting jig.*

* *the insertion of the film reel must be done by hand, with the machine at a complete standstill.*

2.4 TYPES OF SAFETY AND PROTECTION SYSTEMS

This Tray Sealer is equipped with fixed safety guards, designed so that tools are needed in order to open them. It is also equipped with mobile protections provided with lock devices that prevent any moving parts from starting up until all the safety coverings and guards are in position, as necessary for standard machine operations.

IMPORTANT NOTE

The overall unit cannot in any way be altered and neither can any of the safety and protection systems and devices be removed or ignored, without first contacting us, in our capacity as the machine Manufacturers, accordingly. Failure to do so will TERMINATE each and every RESPONSIBILITY and/or LIABILITY by us as the machine Manufacturers for any event subsequently and consequentially occurring. We would no longer guarantee:

A) OPERATOR SAFETY

B) OPTIMISED OPERATION of the unit supplied.

- WARNING: In the event that the unit supplied is intended for combination with pre-existing customer units already on site, unless otherwise stipulated, the customer is hereby committed to ensuring that the area reserved for connecting up the units is adequately safe and protected. G. Mondini S.p.A. hereby declines any liability whatsoever arising in the event of third party damages, injuries or accidents arising due to non fulfilment of this warning.

The machine is equipped with the following safety guards and coverings:

I) FIXED AND MOBILE COVER CASINGS BOTH IN PLEXIGLAS AND IN METAL, PROTECTED BY SAFETY MICROSWITCHES.

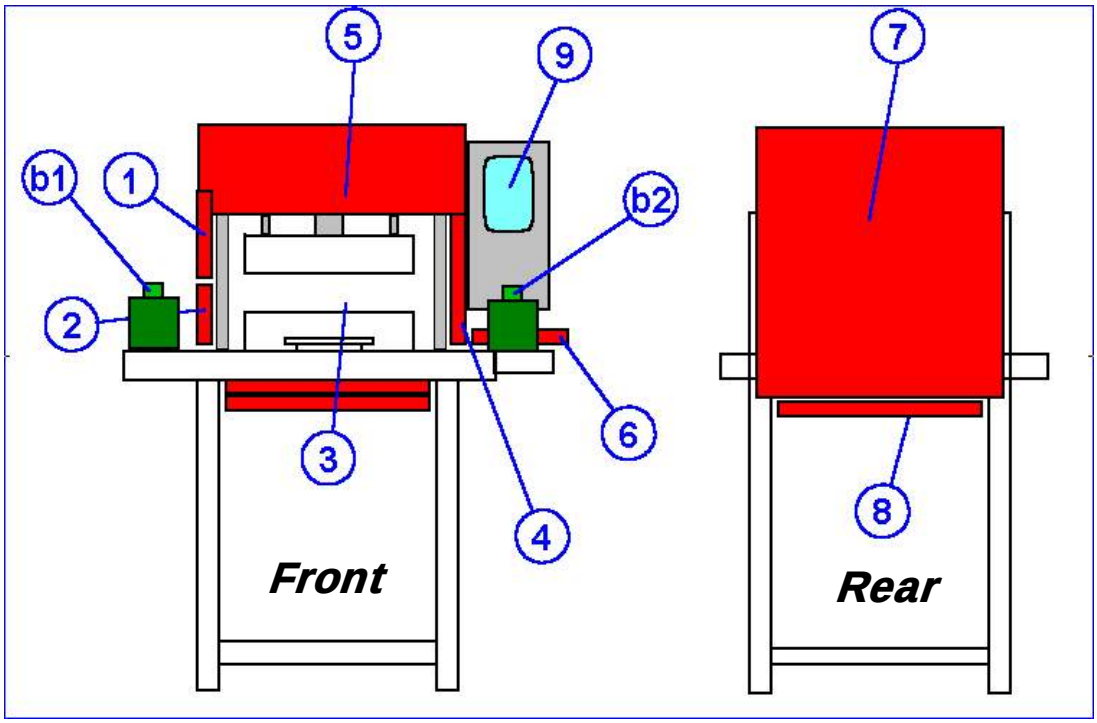
Positioned along the welding section in order to avoid the risks under sections 1.3.3, 1.3.4, 1.3.5 and around the machine, as shown in the figure.

II) All the motion drive elements are covered by metal coverings and cannot therefore be accessed unless said cover casings are removed.

III) The power supply panel is equipped with an interblock device. It is also possible to fit on a lock, etc.; to prevent it from being opened by strangers.

IV) All the electrical devices are classified under IP 65 protection class.

V) All the motors are protected via magneto-thermal trip switches.



1) Fixed covering that encases the top left side, in the sealing area.

2) Fixed covering that encases the bottom left side, in the sealing area. The sealing film reel passes between these two cover casings.

3) This area is not provided with any safety coverings so that machine cycles and operations are speedier and easier to perform. To make this area relatively safer, it is mandatory to press both the "b1" and "b2" start pushbuttons simultaneously for the machine to be able to start operating.

4) Fixed Plexiglas covering that encases the machine's right side, in the sealing area.

5) Fixed stainless steel covering located in the front-top area of the machine, to prevent contacts, even if accidental, with the machine's pneumatic and operating mechanical elements.

6) Fixed Plexiglas covering that encases the machine's lower-right side, in the sealing area, i.e. where the sealing film waste is re-wound.

7) Fixed Plexiglas covering that encases the machine's rear end (where it is possible to perform maintenance operations).

8) Fixed metal covering, preventing anyone from placing their hands under safety covering or casing No. 7.

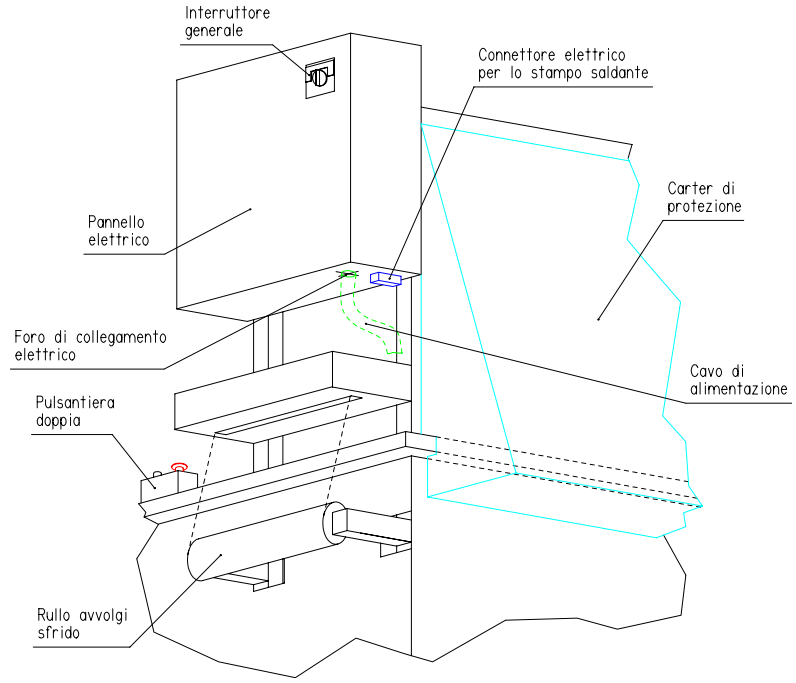
9) Operative Control Panel.

2.5 OPERATING INSTRUCTIONS

Likewise to all the G.MONDINI S.p.a. products, upon delivery the Semi-automatic Tray Sealer has already been checked and factory-tested therefore only a few and simple operations are required, after which the unit can immediately be used for production. Prior to taking the unit's purely technical aspects into account, straight after unpacking it is necessary to position the machine onto its work surface. Assemble the support feet on under the system, then proceed with levelling it to the floor surface.

2.5.1 Connection to the electrical power mains

The connection of the machine to the electrical power mains must be performed by one of the G.MONDINI S.p.a. Technicians, or by specialised and appropriately qualified personnel. The Tray Sealer's hook-up point is located inside the main or general electrical panel.



(Fig. 5.a)

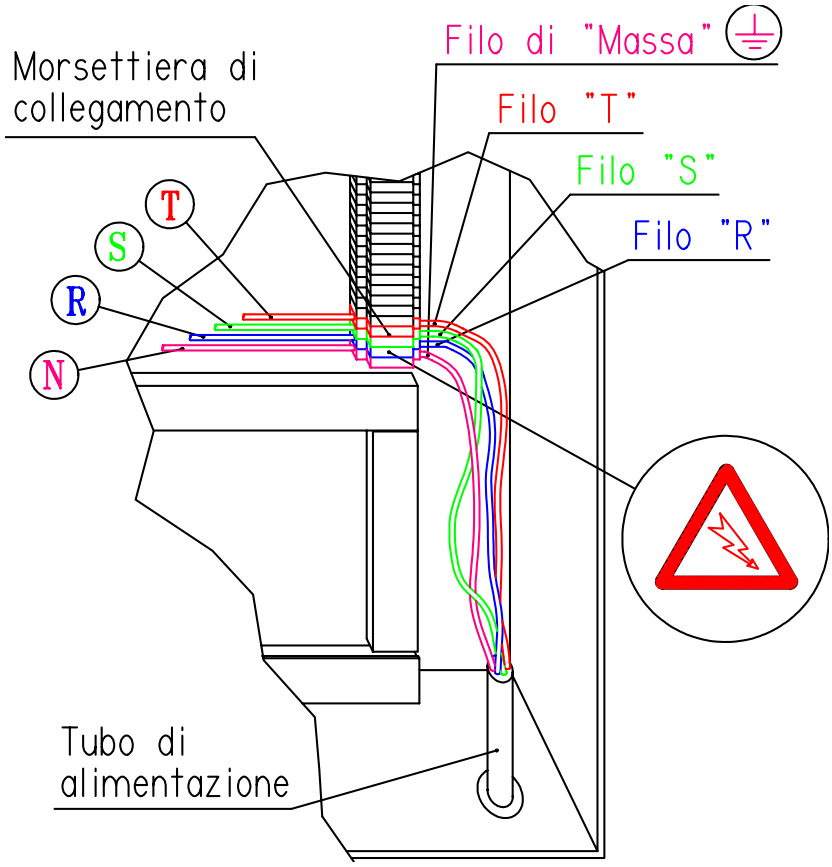
Legenda	Legend
Interruttore generale	Main switch
Connettore elettrico per lo stampo saldante	Sealing tool power supply connector
Pannello elettrico	Electrical panel
Carter di protezione	Safety covering
Foro di collegamento elettrico	Power supply connection hole
Cavo di alimentazione	Power supply cable
Pulsantiera doppia	Double pushbutton unit
Rullo avvolgi sfrido	Film waste winding roller

To access said connection point, we recommend that you reach it through the hole provided for the purpose in the bottom section of the machine's electrical panel, as illustrated in figure (5a).
This position ensures:

safety against moving, mechanical machine parts and secondly, it will not alter the insulation level of the electrical panel and of all the elements that are connected up to it.

(Power supply voltage is not mentioned here. For consumption and operating values, please consult the "MECHANICAL INSTRUCTIONS" manual, relative to the specific equipment for each individual order).

Power supply hook-up must then be performed internally to the main electrical panel, by hooking the power supply cable up to the hook-up terminal box so that each wire is respectively matched up to its correct housing, i.e. "T", "S", "R", "N" or "Earthing" (see Fig. 5b).



(Fig. 5.b)

Legenda	Legend
Morsettiera di collegamento	Hook-up terminal box
Filo di Massa / Filo N	Earthing / N wire
Filo T	T wire
Filo S	S wire
Filo R	R wire
Tubo di alimentazione	Power supply wire tube

Once the hook-up operations are finished, it is recommended to check whether they have been done and work correctly. To do so, simply power up any one of the machine motors and check to make sure that the direction the motor is turning in, is correct.

For an immediate check that is quick and easy to perform, start up the film waste winding shaft by pressing in the lid forming cycle pushbutton, as follows:

1) Remove each and every object and/or element that has been placed on and/or does not belong to the Tray Sealer;

2) Close all the protection coverings and guards;

3) Activate the main switch on the electrical panel by switching it into selection position "1";

After performing these steps the machine is operative, all its motors are running and some of its alarm signals are active, such as: Insufficient pressure, Inadequate temperature.
At this point, observe the direction the motors and the most visible machine elements, are running in.

4) Press in the "Manual cycle lid unrolling" key, and observe the direction the reel unwinding shaft is running in. If the shaft is running in the direction that the sticker that has been placed alongside it is pointing in, then the power supply connection has been performed correctly.

If the shaft is not running in the direction the shaft is pointing in, turn the machine OFF by switching the main switch back into its "0" position, then invert the position or the order that wires "R", "S" and "T" had initially been connected up in.

2.5.2 Connection to secondary power sources

By secondary power sources we mean all the additional types of power or "energy" that are required and used by the machine during its sealing phases, which are:

- 1 - GAS

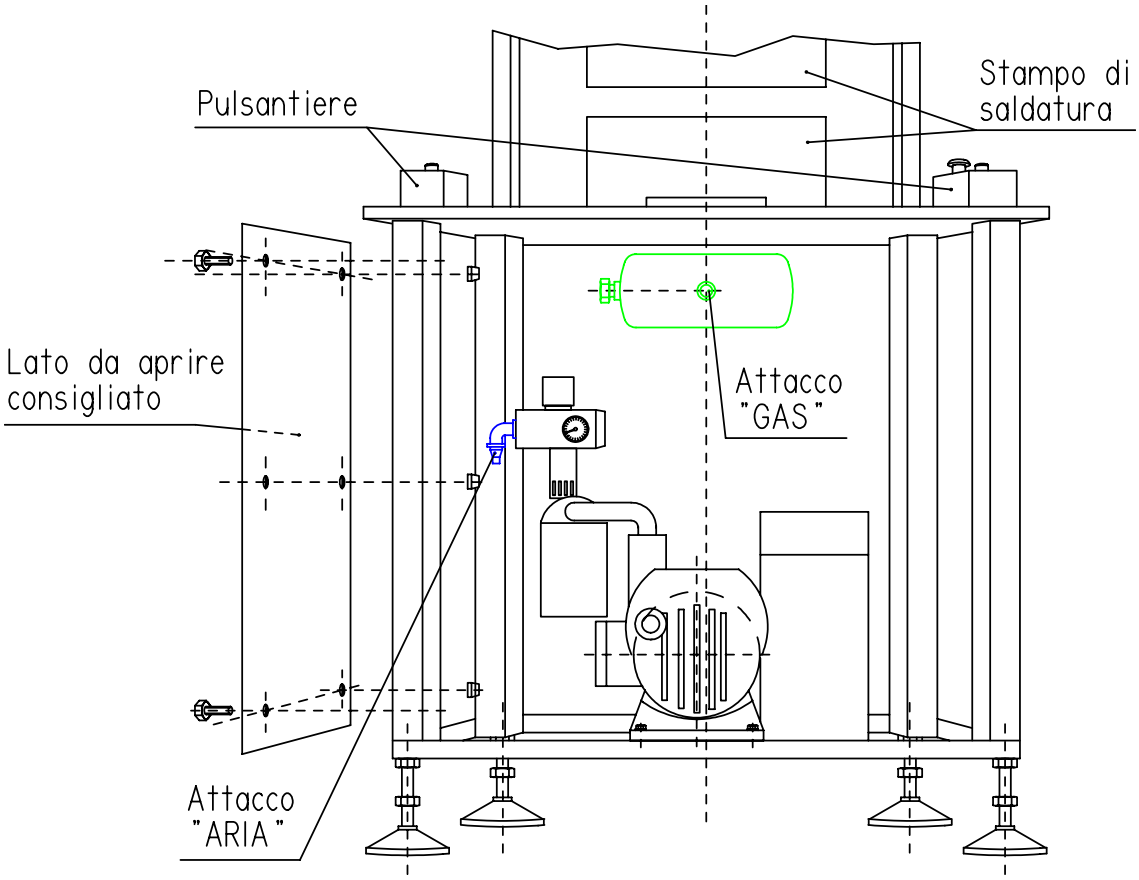
- 2 - AIR (Pneumatic power supply)

Hooking the machine up to these two additional types of energy or power sources is simply performed by inserting the relative external supply tubes into the appropriate connection joints located in the bottom end of the Tay Sealer.

For better access to these areas if the machine is fitted with side coverings or safety guards, face the machine front-wards and unscrew the lock-on screws from the left-hand side covering to remove them, as illustrated in Fig. (5.c).

2.5.2.1 "GAS" supply connection

A "GAS" supply is necessary when the Tray Sealer is equipped to work with tools capable of producing modified atmospheres with the addition of inert gasses, or vacuums, inside the tray. The hook-up point is located in the bottom section of the Tray Sealer, as illustrated in Figure (5.c).
Changes in atmosphere inside a tray are necessary, depending on the type of product that is being packed and based on the length of time the packaged product is required to be stored for.
The gasses used to modify the atmosphere inside the trays are so-called "INERT" as they are not harmful to the packaged foods.
The addition of oxygen and gas mixes, in various percentages, ensures that the product is perfectly conserved or that at least no reactions take place in the food over time.
The gasses added during machine operation comply with accurate percentage and gas filling conditions that are set into the machine system during the initial machine testing phases.



(Fig. 5.c)

Legenda	Legend
Pulsantiere	Pushbutton unit
Stampo di saldatura	Sealing tool
Lato da aprire consigliato	Recommended opening side
Attacco “GAS”	“GAS” supply connection
Attacco “ARIA”	Pneumatic “AIR” supply connection

2.5.2.2 Pneumatic "AIR" supply connection

The pneumatic air supply connection is located and thus performed in the bottom section of the machine.
For connection, simply hook-up the supply tube to the connection joint.
(As already mentioned on page 3, the machine's production pressure must not fall under 5 atm). If the machine is equipped to perform both gas and vacuum functions, this area will be provided with two connection joints, as already specified, for air and gas supply respectively. When both options are present, they are positioned as illustrated in Fig. (5.c) on the previous page.
Once the electric and pneumatic supply sources are hooked up to the machine, it is necessary to go onto the machine setup or rigging phase i.e. the phase in which all the machine elements are setup and readied for the subsequent operations.

2.6 MACHINE PREPARATION AND SETUP

The following set of operative steps are performed to enable the machine to begin its production cycles. Performance of some of these steps will also be necessary during standard production operations. It is therefore recommended that careful attention is paid here if the machine is expected to frequently undergo different production changes . The steps in question are:

- 1.6.1 – Trays / containers;

- 1.6.2 – Assembly and disassembly of the sealing film and relative waste;

- 1.6.3 – Tool.

2.6.1 Trays / containers

Whatever the production cycle involved and apart from the type of product being packaged, the trays and/or containers being used is one of the most important elements. In as far as the Tray Sealer is concerned, the trays are positioned and removed from the sealing area only by hand. The CV/VG-S machine version, likewise to all the other G. Mondini products, is engineered and rigged to process trays or containers in a number of different shapes and sizes, simply by replacing small-sized machine parts. Replacement is normally very quick to perform and in any case, prior to starting any production cycle, check to ensure that the Tray Sealer has been equipped correctly.

2.6.2 Assembly and disassembly of the sealing film and relative waste

Assembly and disassembly of the sealing film and relative waste during a production cycle can be performed and repeated a number of times over. It is therefore necessary to be knowledgeable of how each one of said devices is installed.

2.6.2.1 Manual assembly of the sealing film reel (i.e. by threading the film under the sealing tool by hand)

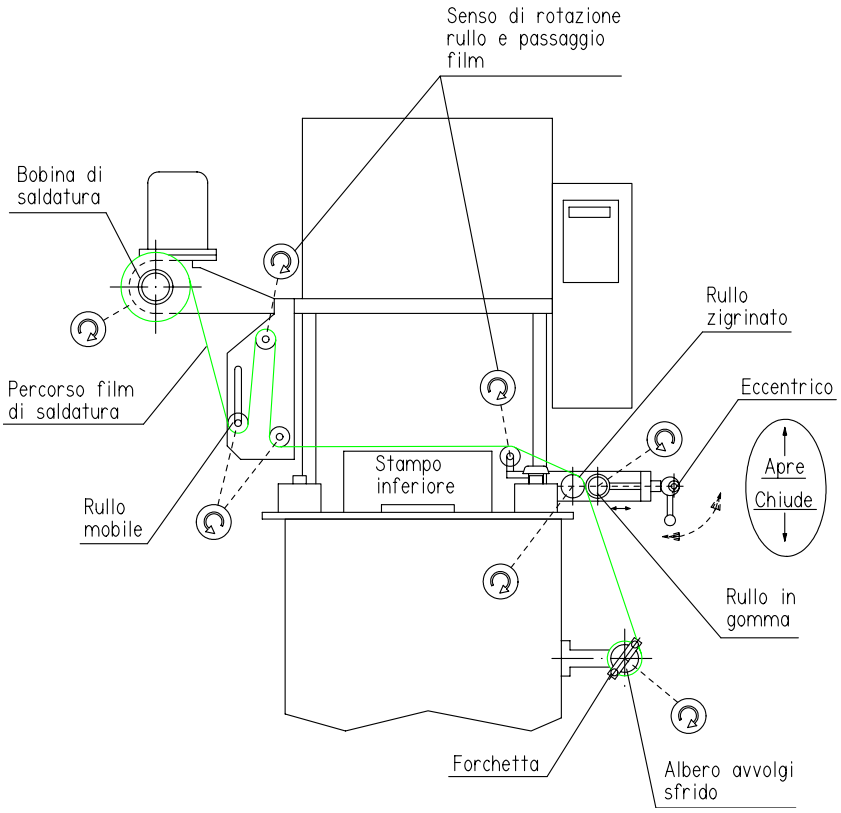
The assembly steps are as follows (Fig. 5.h):

1) Remove the threaded lock bushing from the sealing film support shaft;

2) Position the sealing film reel onto the film reel support shaft, being careful to follow the correct assembly direction as shown by the direction arrows that are located alongside each one of the shafts;

3) Place the threaded bushing back on and lock it on tightly so that the conical section of the bushing joins up against and adheres against the hole in the reel;

4) Thread the film in by pulling the band on the reel through according to the directions provided on each individual shaft;



(Fig. 5.h)

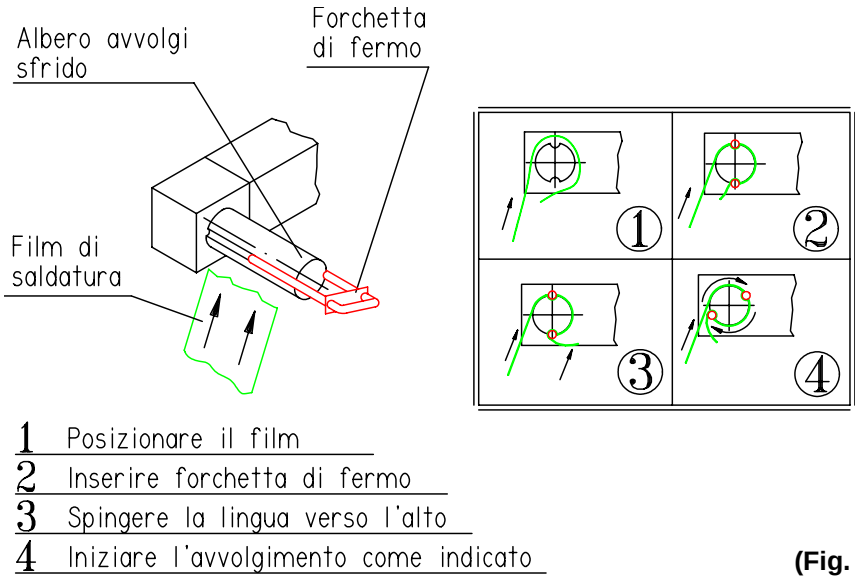
Legenda	Legend
Senso di rotazione rullo e passaggio film	Roller rotation and film travel direction
Bobina di saldatura	Sealing film reel
Percorso film di saldatura	Sealing film path
Rullo mobile	Mobile roller
Stampo inferiore	Bottom tool
Rullo zigrinato	Knurled roller
Eccentrico	Cam lever
Apre / Chiude	Film waste winding roller
Rullo in gomma	Rubber roller
Forchetta	Lock fork
Albero avvolgi sfrido	

5) Once the film is under the sealing tool, lift the cam lever located under the waste winding shaft upwards, to make the passage of the film between the two rollers easier and to reset the waste rolling selector "2b" back to zero (if not already back on zero);

(**WARNING:** If the film reel is being changed during production, beware of the sealing tool that is extremely hot and also beware of the cutting jig that is very sharp).

6) Thread the film in through the last steps then fix it onto the waste winding shaft;

7) Remove the lock-fork from the waste winding shaft, roll the end section of the film onto the shaft then put the lock-fork back in again and ensure it is facing the direction the film is being wound in, as illustrated in Fig. (5.i).



1 Posizionare il film
2 Inserire forchetta di fermo
3 Spingere la lingua verso l'alto
4 Iniziare l'avvolgimento come indicato

(Fig. 5.i)

Legenda	Legend
Interruttore generale	Main switch
Connettore elettrico per lo stampo saldante	Sealing tool power supply connector
Pannello elettrico	Electrical panel
Carter di protezione	Safety covering
Foro di collegamento elettrico	Power supply connection hole
Cavo di alimentazione	Power supply cable
Pulsantiera doppia	Double pushbutton unit
Rullo avvolgi sfrido	Film waste winding roller

8) Lower the cam lever located under the waste winding shaft downwards so that the film is held still;

9) Close any possible protection covering and/or guard that had been opened;

10) Press in the "Memory Reset" pushbutton (green-light pushbutton);

11) Press in the relative pushbutton to run at least two lid-forming cycles. If the pushbutton is held pressed in, subsequent follow-up cycles are performed until the pushbutton is not released again;

12) Resume machine operations by holding the “start” pushbutton pressed in;

To centre the reel, simply check the cone elements on the unwinding shafts and position them correctly.
Whenever the film waste breaks during machine operations, repeat the above steps starting from step (4) over again, so that normal working conditions are reinstated.

2.6.2.2 Quick assembly of the sealing film

By quick assembly of the sealing film, it is meant that the reel is replaced without having to perform all the steps required for manual assembly of the sealing film.
Quick assembly of the sealing film will instead take advantage of the fact that the film reel being used is nearly finished. The process is as follows:

- Before the film reel being used is actually finished, stop the machine operations;

- Loosen the threaded, reel-lock bushing and pull the nearly finished film reel out;

- Place a new film reel onto the sealing film support shaft;

- Cut the sealing film on the nearly finished film reel without removing the film from its current position in the machine;

- Use some adhesive tape to glue the end of the finished film reel to the start of the new film reel;

- Press in the lid forming cycle pushbutton so that the new reel is unwound for a few cycles and until the joint with adhesive tape is wound onto the film waste winding shaft;

- Resume machine operations by pushing in the “start” pushbutton.

2.6.2.3 Removal of the waste reel

Removal of the waste reel is an operation that is often necessary during a production process and whenever it is, proceed as follows:

- Stop production;

- Unwind the waste to be removed, then cut off the film in the vicinity of the waste winding shaft;

- Remove the lock-fork from the waste winding shaft, then remove the waste reel.

- Wind the loose, cut-off end of the reel onto the waste winding shaft (see Fig. 5.i);

- If not already in place, put the lock-fork into its working position;

- Press in the lid forming cycle pushbutton so that the sealing film is unwound for a few cycles;

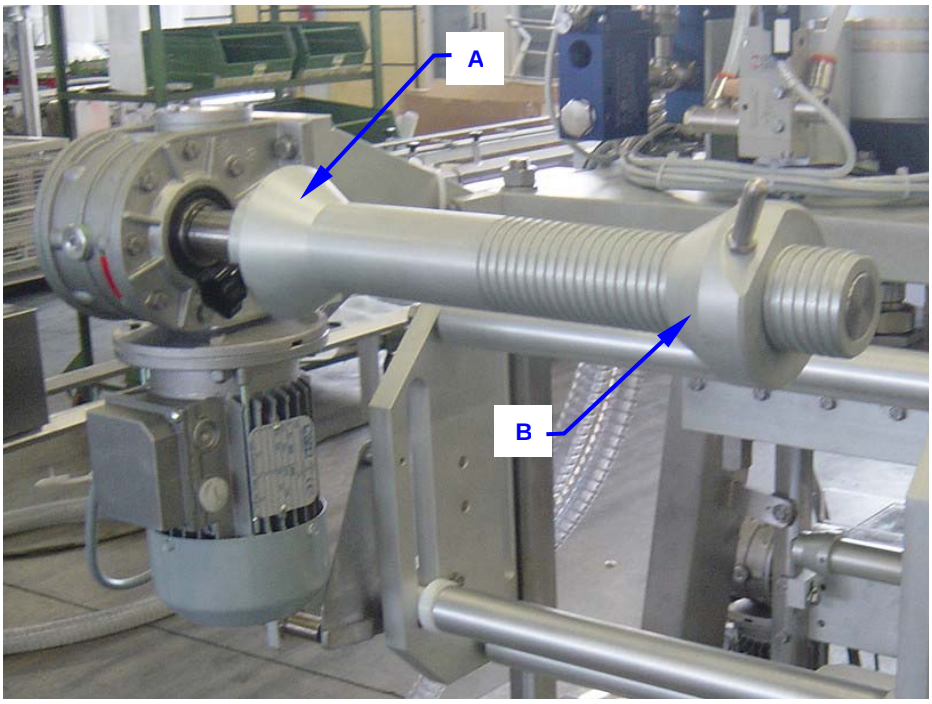
- Resume machine operations by pushing in the “start” pushbutton.

2.6.2.4 Centring the sealing film

During first-time assembly of a film reel or during assembly of a film reel that is totally different in size to the previous one, it is necessary to perform a few adjustments aimed at centring the sealing film into its centre-position to ensure it works correctly.

The required working position is that the film reel must be exactly centred so that the film too is exactly centred under the sealing tool. To centre the film position, proceed as follows:

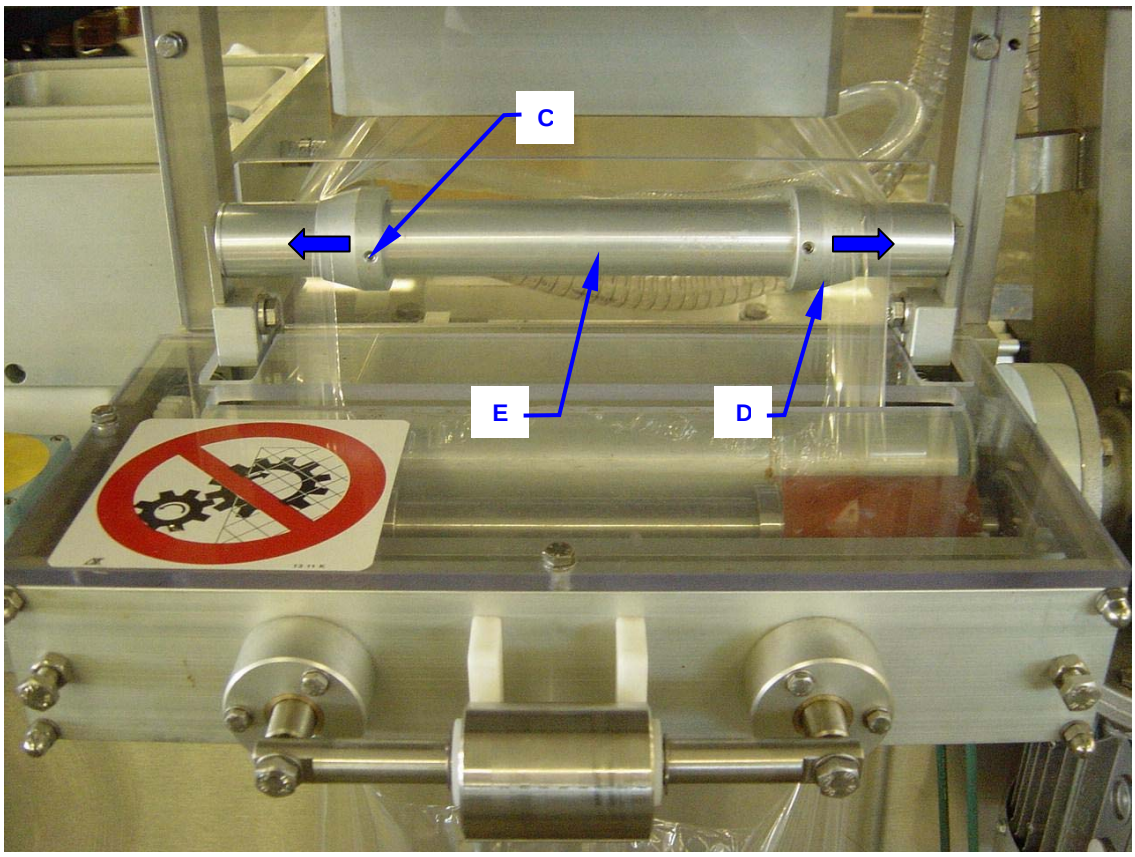
1) After having placed the new reel onto the unwinding shaft, do some initial centring by acting on the position bushings (**A**) and (**B**) located on the shaft itself.



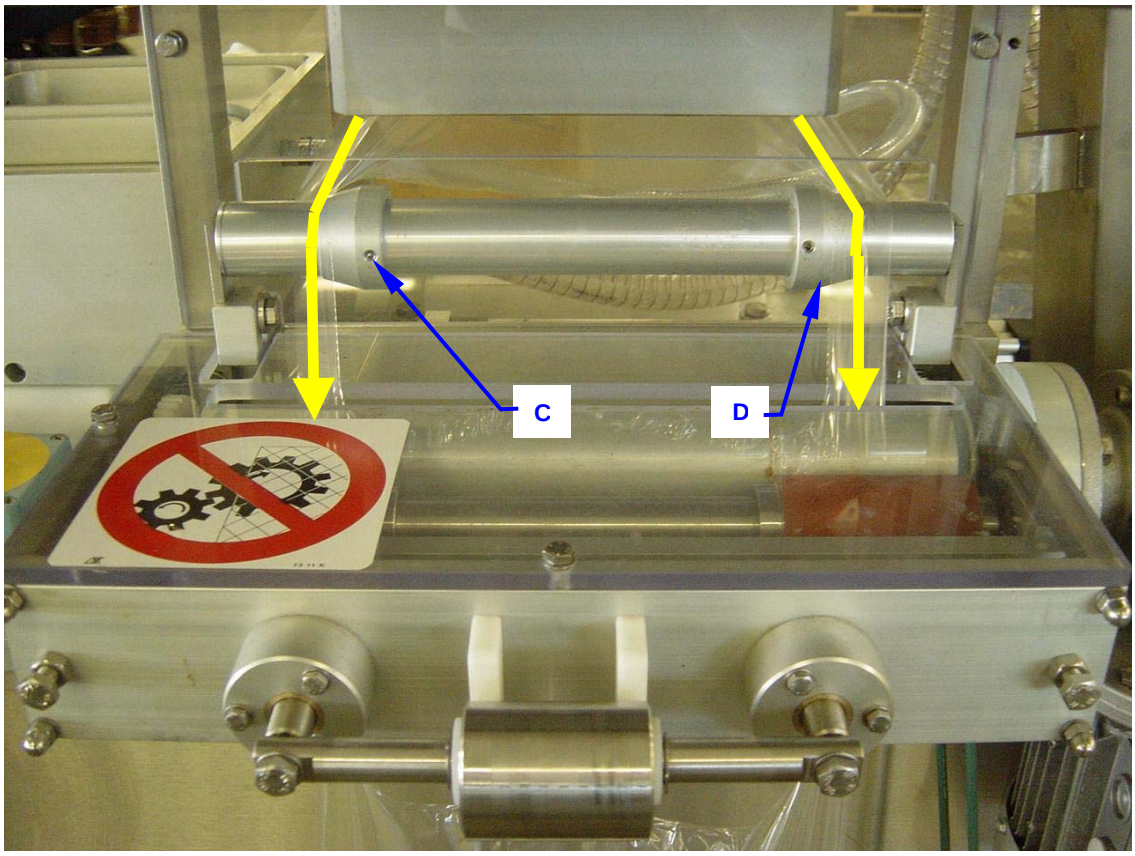
2) Loosen the lock screws (C) on the guide-cones (D) and position them in the points furthest-apart of the roller (E).

3) Thread the sealing film in as directed until it is wound onto the waste winding shaft.

4) Then check to ensure that the sealing film is centred under the sealing tool accurately enough. If it is not, correct the centre-position by acting on the position bushings (A) and (B).



5) At this point, if the centre-position is correct, position the guide cones (D) that had previously been widened so that the sealing film waste rests onto the sloped sections, then lock them in place by tightening in the lock grubs (C).



6) Close the safety coverings;

7) Switch the mains power on via the electrical panel, then start up the machine;

8) Position the “Manual – 0 – Automatic” operation mode selector switch into the “Automatic” position.

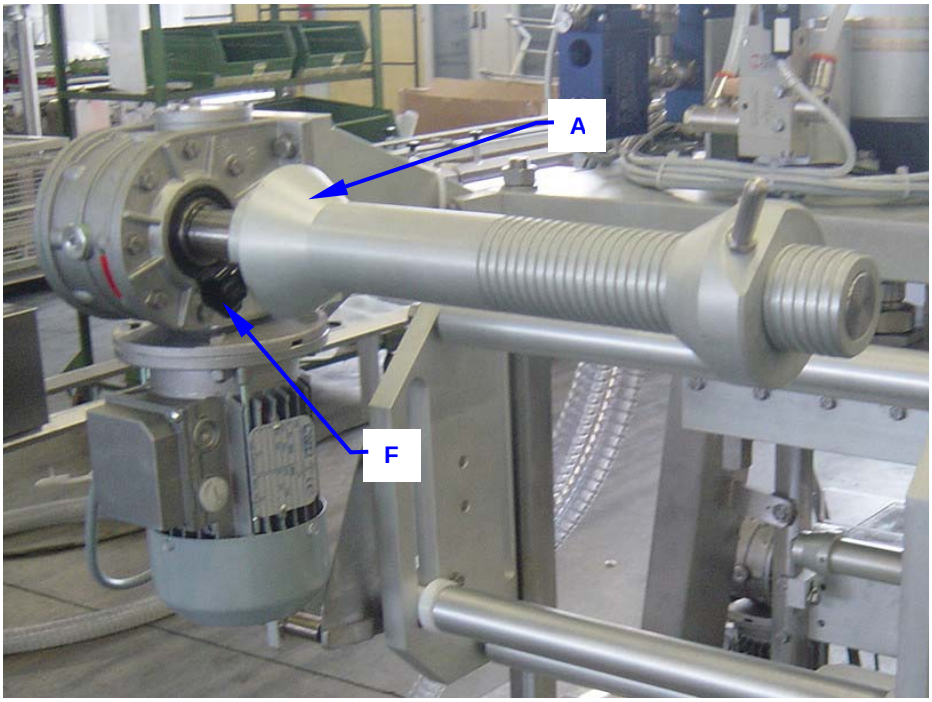
9) Position a few empty containers on the line;

10) Press the “Alarms Reset” pushbutton;

11) Press the "Start" pushbutton;

12) Run at least two sealing cycles and check the cutting outline on the exiting film waste;

13) If the cutting outline is not centred, loosen the stopper bushing (B) and adjust to correct the position accordingly via the rear adjustment bushing (**A**). To be able to make these adjustments it is necessary to loosen the positioner flywheel (**F**).



14) Once the required corrections have been performed, repeat the tray sealing test runs.

15) When all the adjustments have been performed, machine operations can be started.

2.6.2.5 Centring the packaging print on the sealing film reel

Another case that requires an adjustment process is when the sealing film has a packaging print, which must necessarily be positioned in a set position when the container is sealed.

When this type of packaging print is in use, what is known as a "CENTRING" assembly unit is installed onto the machine, the fundamental part of which is a photocell that detects the position of the packaging print based on coloured notch-marks printed into the surface of the sealing film.

Intervention by this assembly unit only serves to make adjustments to the film reel print positioning advance or delay errors and it will not allow for centring adjustments to be performed. Said adjustments need to the performed as specified in the previous section herein.

To make film reel print positioning advance or delay adjustments, simply loosen nut (**A**) and move the photocell support pin until, by trial and error at each adjustment, the required position is reached.

2.6.3 Tool

The final machine setup check is performed on the tool that has been positioned into the Tray Sealer. The tool of course needs to match up with the tray that all the previous adjustments steps have been based and performed upon.

For the tray and for all subsequent production purposes, then check all parameter values relating to:

- Sealing temperature (setting via thermostat adjustments - please consult the relative annex hereto);

- Sealing time (as related to tray typology, working temperature and sealing method);

- Gas time (time gap necessary to form the required atmosphere);

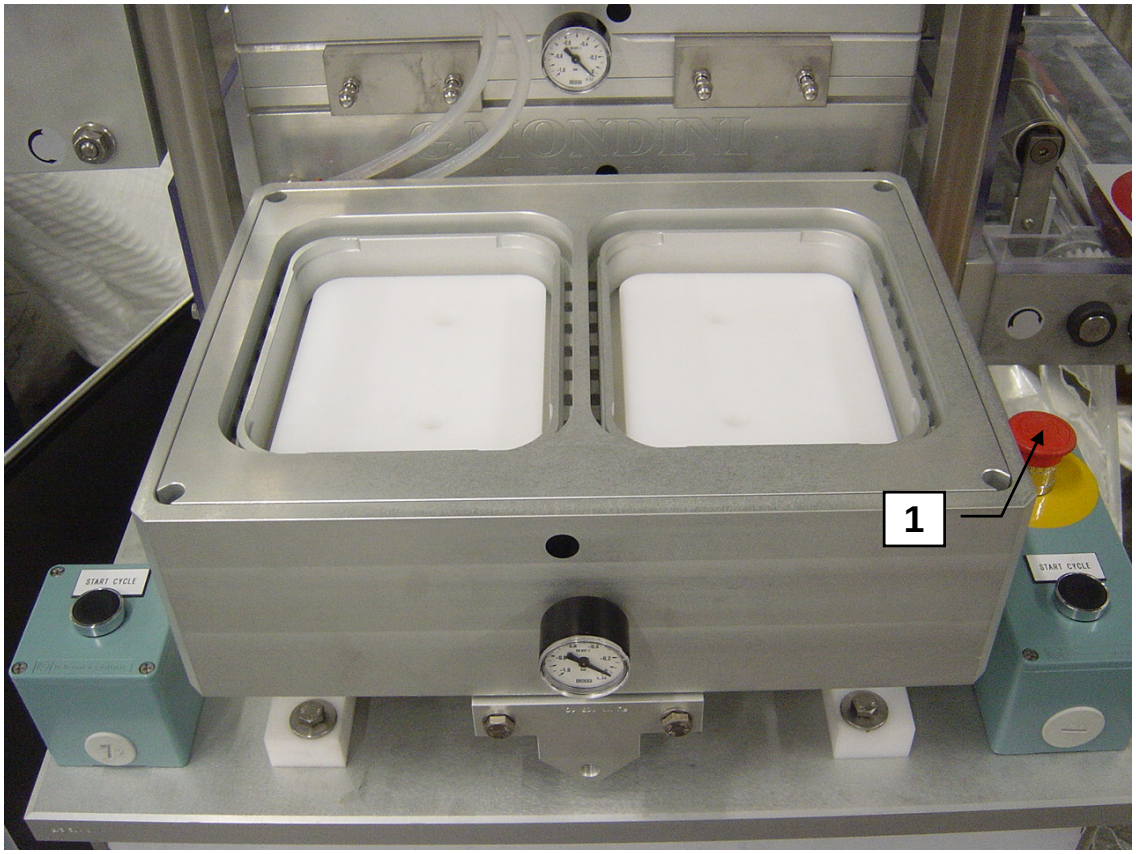
- Vacuum time (time gap necessary for vacuum formation);

In the event of any changes, these parameters can be set via the mini operator panel located on the main control panel, as described in the relative annex hereto.

2.6.4 Installation of the skin cycle tool

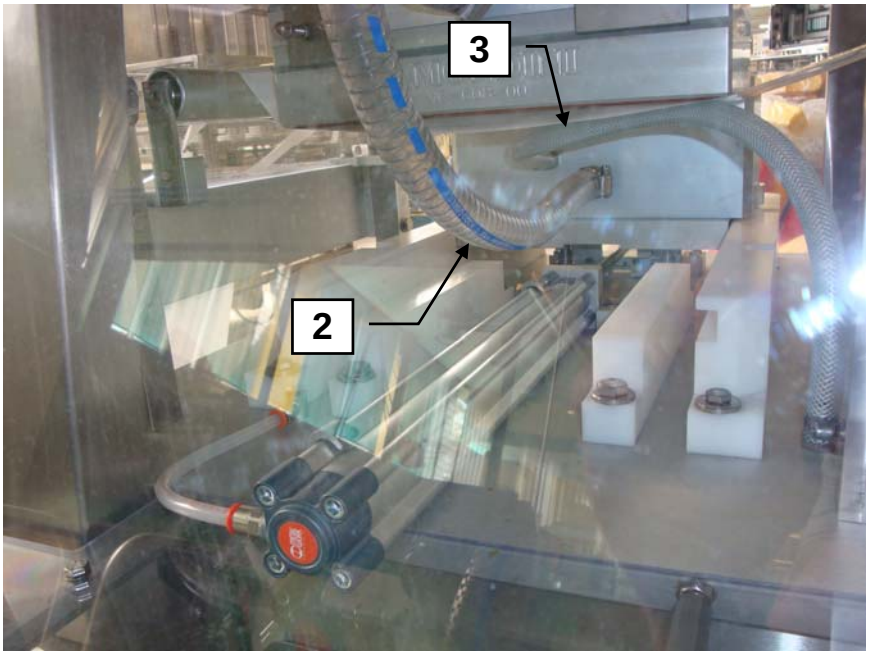
Should production changes be required where use of the skin cycle is necessary, the machine needs to be setup with the appropriate film and tool types.

To replace a “vac/gas” tool with a “skin cycle” tool, first of all put the machine into its safety mode by pressing on the “emergency” pushbutton “1”.

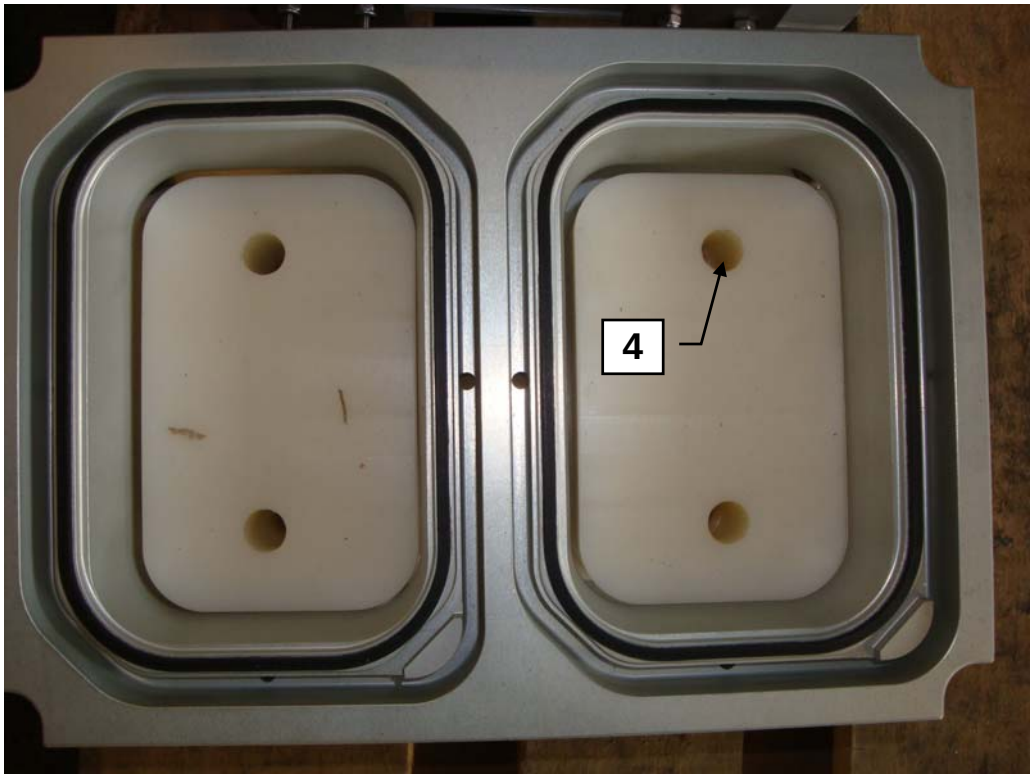


BEFORE REMOVING THE TOOL THAT IS ALREADY ASSEMBLED ONTO THE MACHINE, **ALWAYS CHECK TO ENSURE** THAT IT IS NOT TOO HOT – THIS TO PREVENT SERIOUS SKIN BURNS IF THE TOOL’S SURFACE TEMPERATURE IS TOO HIGH!

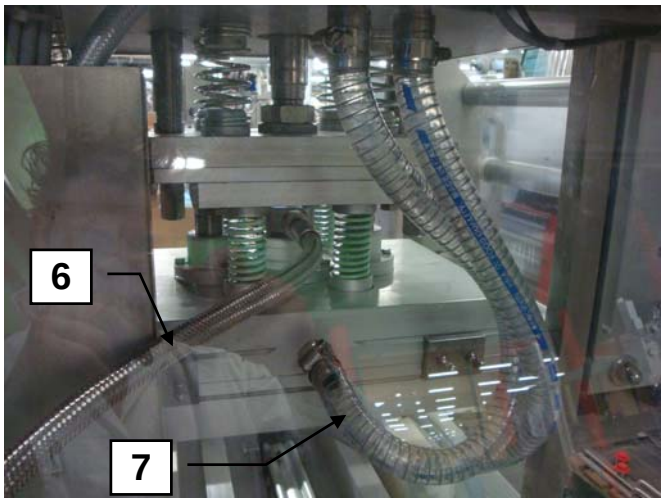
Remove the machine's rear cover casing and disconnect the machine's vacuum connection tube "2" and the bottom tool's gas connection tube "3".



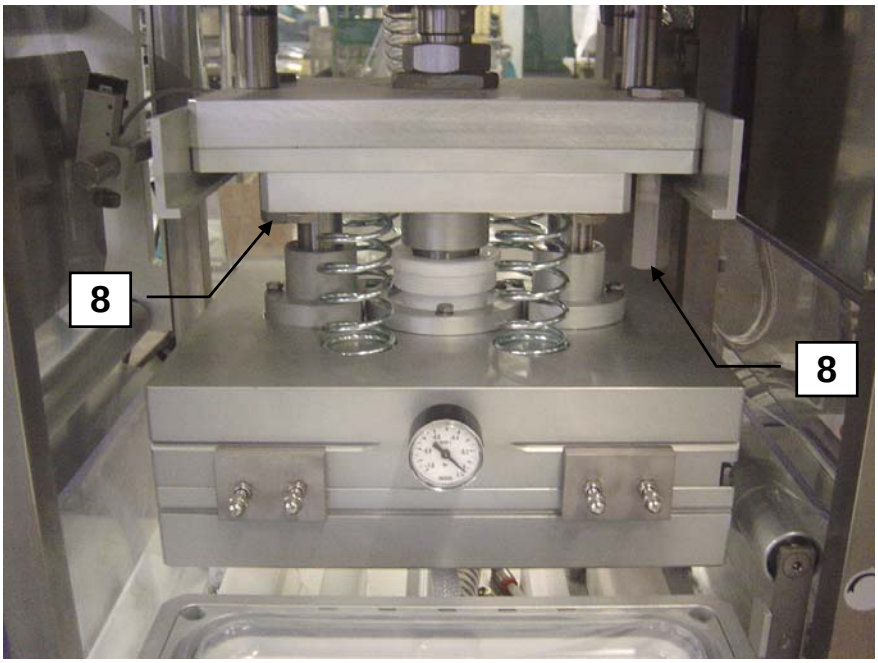
Loosen the screws on the tray lifting plates "4", to detach them from the bottom tool carriage, then release it by pulling it upwards.



Rotate the “HEATING” selector switch “5” into its “0” position and disconnect the resistance cable “6” and the vacuum pipe from the top tool “7”.

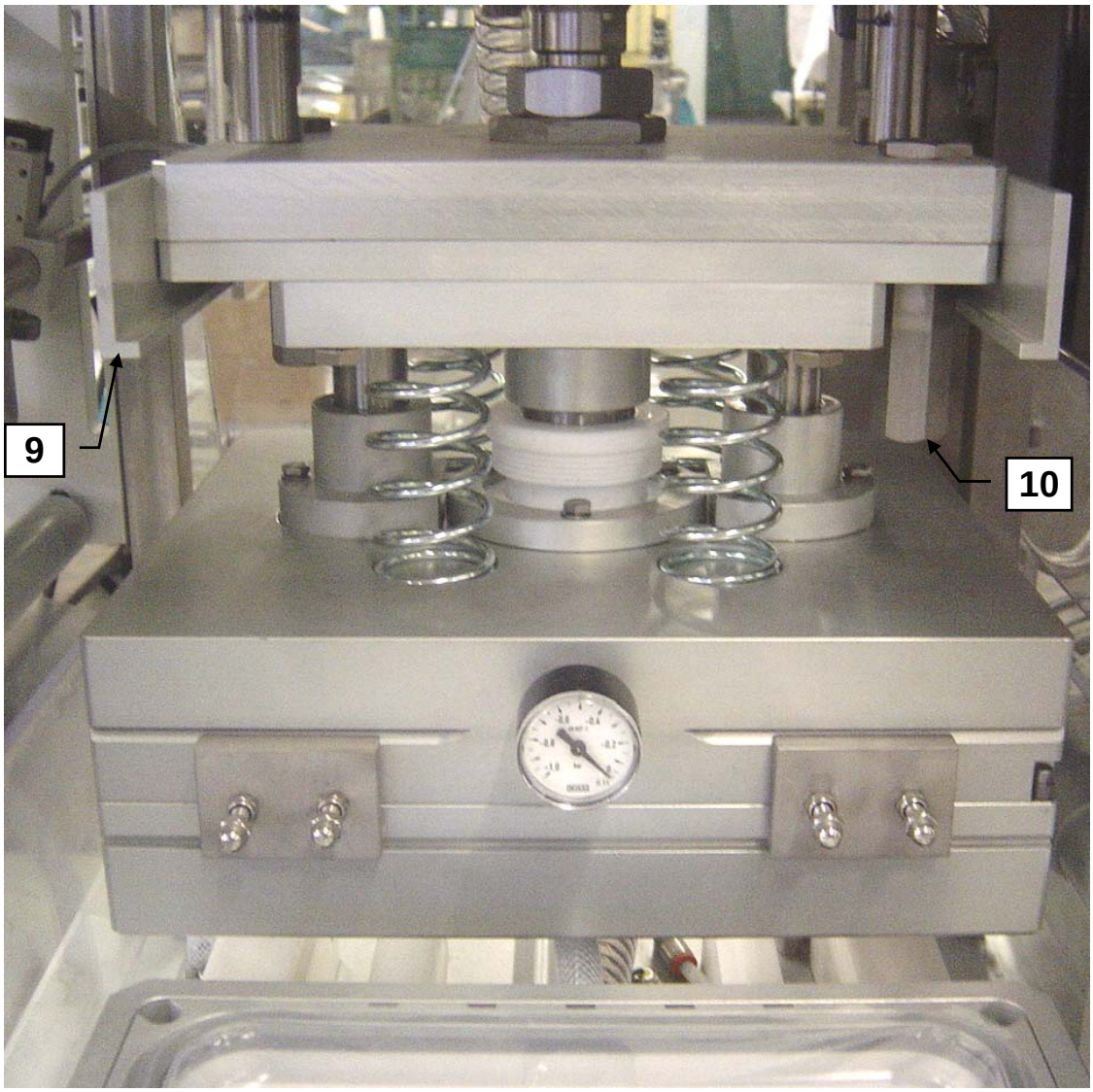


Loosen both screws “8” and extract the top tool.

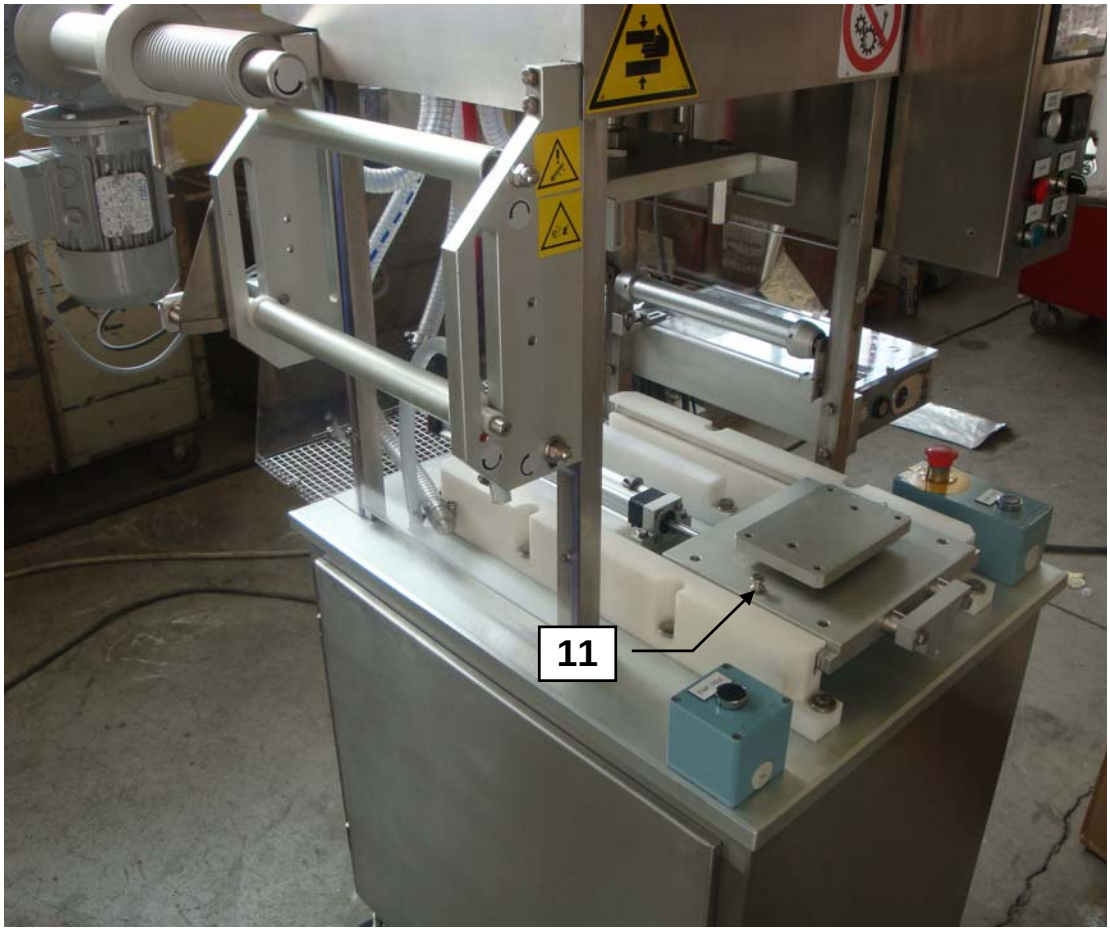


Replace the sealing film as described under the specific sealing film replacement section herein.

Position in the new “skin” top tool, using the appropriate guide elements “9”, then lock it in using two screws “10”.

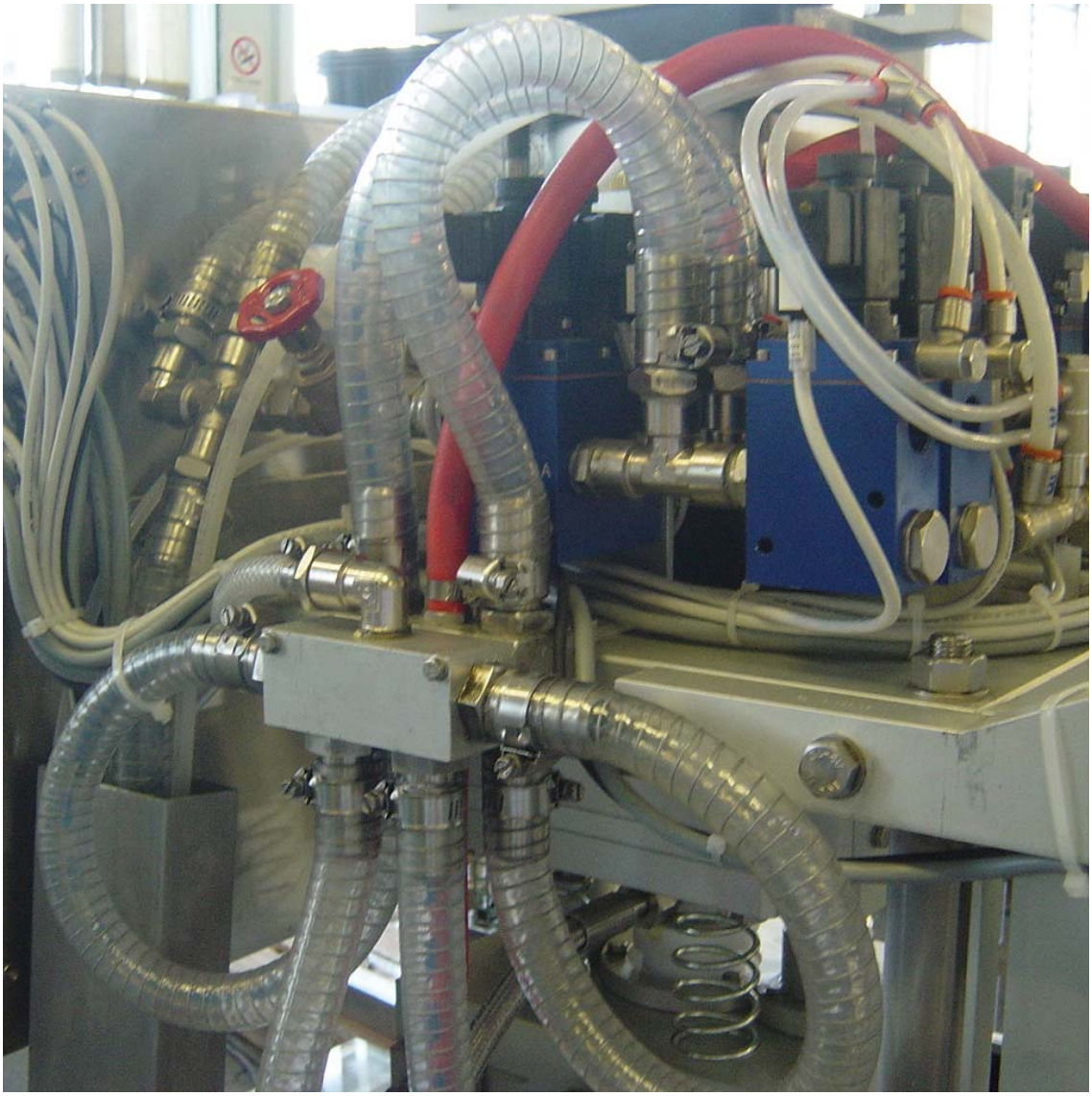


Reassemble the “skin” bottom tool by positioning it onto the respective centring pins “11”.

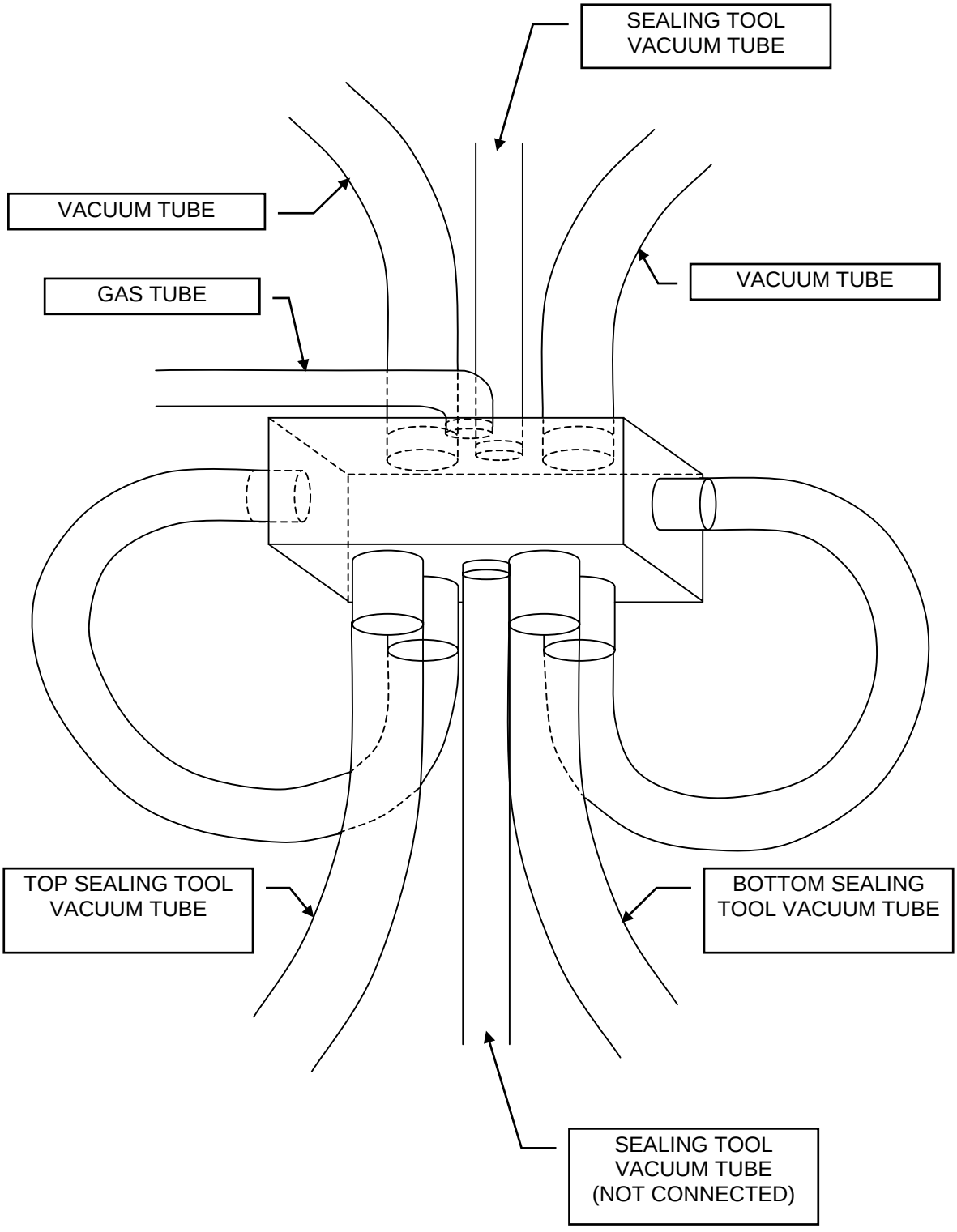


To go from the “vac/gas” cycle to the “skin” cycle, it is necessary to change the position of the vacuum tubes as specified in the following images.

“VACUUM/GAS” CYCLE CIRCUIT CONNECTION

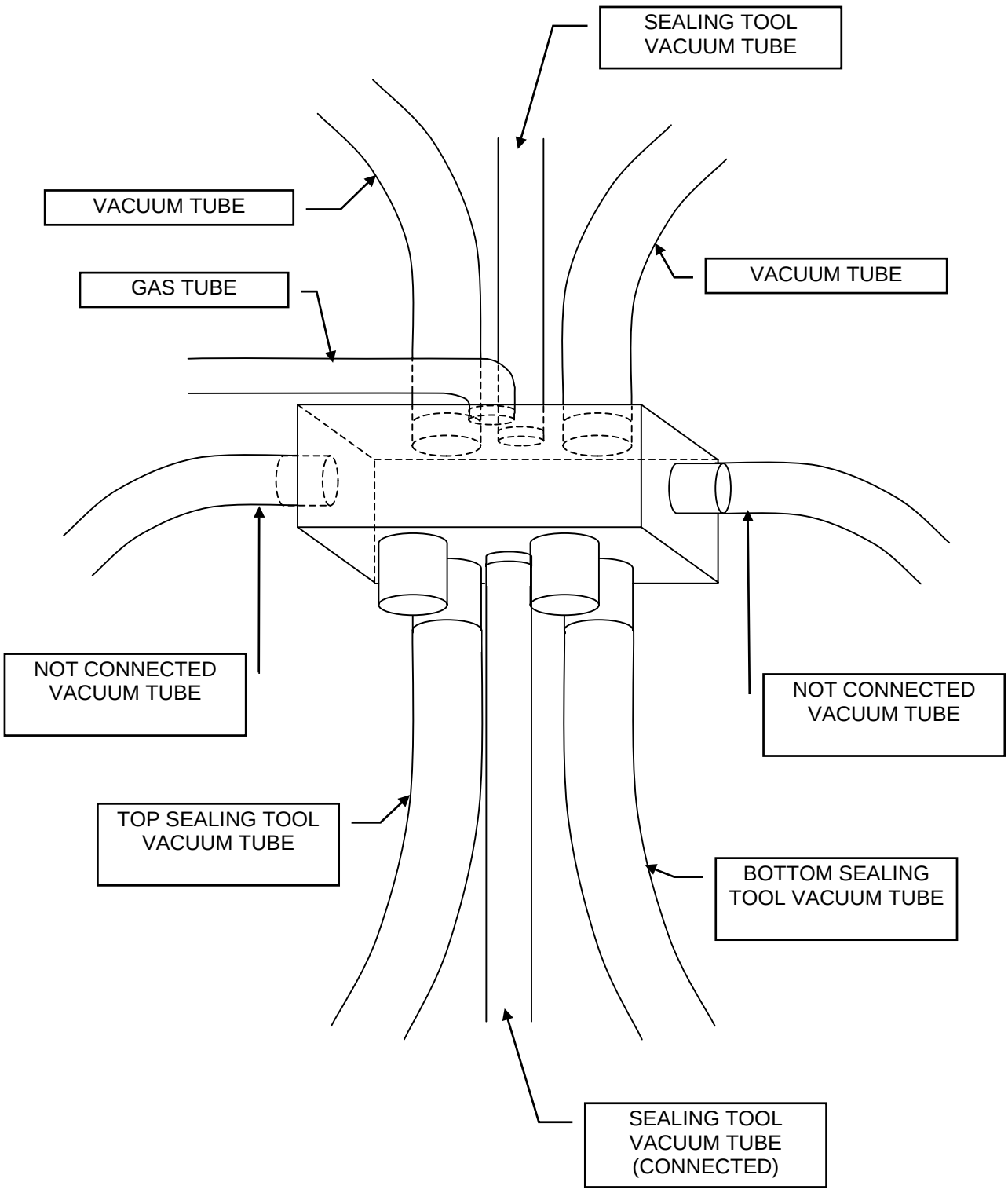


"VACUUM/GAS" CYCLE CIRCUIT CONNECTION



"SKIN" CYCLE CIRCUIT CONNECTION

"SKIN" CYCLE CIRCUIT CONNECTION



After having assembled in the correct film and tool, having changed the position of the “vac/gas” circuit tubes and after having **reassembled on the machine’s rear cover guard**, it is necessary to activate the “skin” cycle through the machine’s operator panel.

To activate the “skin” cycle from the machine’s operator panel, it is necessary to access the “MACHINE STATUS” page by pressing on the “F5” function key. When in the “MACHINE STATUS” page, enter either parameter value “1” or “2” relative to the “skin” cycles, into the appropriate entry fields.

To change the “skin” cycle parameters, press on the “F6” function key, “SKIN CYCLE DATA”, on the main menu page.

G.MONDINI SPA
MACHINE CHECK
LID CYCLE
(0=standard)
(1=notched)

MACHINE CYCLE
(0=standard)
(1=Skin)
(2=Skin)

Piston Timeout
[999.9] sec.

Partial Tray counter
[9999999999]
Total Tray counter
[9999999999]

Machine Check

MMMMMMMMM

G.MONDINI SPA
Skin Data
Recipe Number CC

Forming vacuum ret.
[999.99] [RRR.RR] sec.
Forming vacuum time
[999.99] [RRR.RR] sec.
Bottom forming air time
[999.99] [RRR.RR] sec.
Top vacuum ret.
[999.99] [RRR.RR] sec.
Bottom vacuum ret.
[999.99] [RRR.RR] sec.
Sealing compens. time
[999.99] [RRR.RR] sec.
Skin sealing ret.
[999.99] [RRR.RR] sec.
Sealing time
[999.99] [RRR.RR] sec.
Tool up-travel time gap
[999.99] [RRR.RR] sec.
Lid unrolling time
[99.99] [RR.RR] sec.
Tool temperature
[RRRRR] °C

To activate production with the “skin” cycle, release the “EMERGENCY STOP” pushbutton and press the green “START” pushbutton twice.

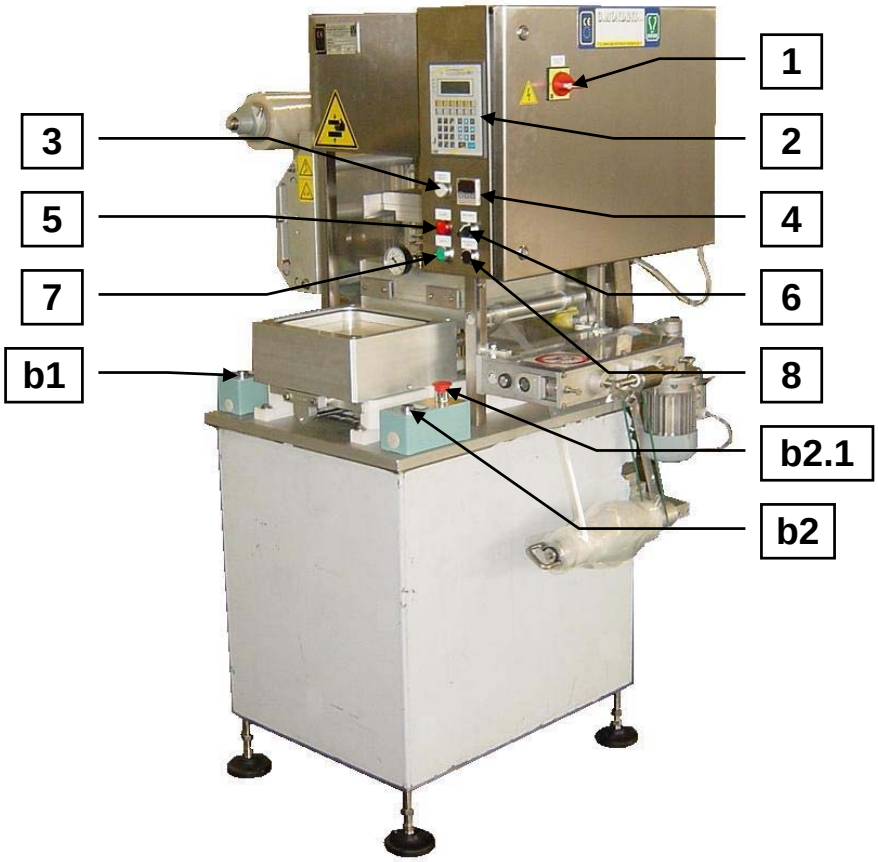
PRIOR TO RESUMING PRODUCTION, REASSEMBLE ALL THE COVER CASINGS AND SAFETY GUARDS BACK ON AGAIN IN ORDER TO TOTALLY PREVENT ANY POSSIBLE CONTACT WITH MOVING MACHINE PARTS.

2.7 GENERAL INFORMATION

Should the Semi-Automatic Tray Sealer machine ever need to have its operating program reset o its system EPROM replaced, before starting operations it is necessary to perform a complete lid forming cycle by pressing on the relative pushbutton. This is necessary, otherwise the machine will not start working.

2.7.1 Electric controls panel

The Tray Sealer's electric control panel features the following commands:



1)	Main switch	When switched into position "1", the main switch powers up the unit and locks the main electric control panel to prevent it from being opened. When switched into position "0", the power supply to the whole machine is cut off.
2)	Mini Operator Panel	This mini operator panel is connected up to a PLC module through which all necessary and required production parameters are set and entered (for operation, adjustment and the relative operative measures, please consult Annex No. 1).
3)	White "**Power On**" signal light	When it lights up, this white lamp signals that the machine is powered on.
4)	Thermostat check-device	This device controls and adjusts the resistance check-heater located inside the Tray Sealer's sealing tool.

5)	Red **"ALARM"** signal light	When it lights up, this lamp signals that an alarm has gone off. You can tell the seriousness of the alarm based on how this red lamp light up. - When it comes on and stays on continuously, the alarm is serious. When it comes on and keeps flashing, the alarm is less serious. In order to know which type of alarm has gone off, simply read the relative message on the operator panel display providing a description of what has caused the alarm.
6)	Two-position black selector switch for **"HEATING O / 1"** selection	When in position "1", this selector switch activates the resistance check-heater in the resistance carrier-plates inside the sealing tool. When in position "0" this selector switch deactivates the resistance check-heater.
7)	Green-light **"START"** pushbutton	This green-light pushbutton's function is to start up the machine when it is ready for production. Pressing this pushbutton when any one of the alarms has been triggered, will NOT move the machine in any way. When an alarm has been attended to and is no longer active, pressing this pushbutton will totally reset the relative alarm message. When the green lamp is on, it signals that the machine is actively operating. When the green light stays on continuously, the machine is active and ready for operation.
8)	Black **"MANUAL LID-FORMATION CYCLE"** pushbutton	Holding this pushbutton pressed in continuously will execute a complete cycle by the film unwinding and waste rewinding roller shafts, that will come to a stop in cycle-start position. A complete cycle here consists in pulling the sealing film for a set distance, sufficient to cover the whole sealing tool.

b1 - b2)	Black **"MANUAL TOOL-CLOSING CYCLE"** pushbuttons	These two black manual cycle tool closing pushbuttons will only activate the machine's manual cycle mode if they are pressed in simultaneously and if they are kept pressed in for the whole duration of the packaging cycle. Holding these pushbuttons pressed in continuously will execute a complete cycle by the sealing tool, that will come to a stop in cycle-start position. **WARNING:** *If these pushbuttons are not kept correctly pressed in together while the machine is running the sealing cycle, or if one hand is taken off one of the pushbuttons for any reason whatsoever, machine production and tool operation functions will immediately stop, leaning that the tray is not perfectly closed.* Therefore, a tray that is sealed during an interruption in the tool sealing cycle due to one of the two pushbuttons being released must be considered as useless, due to the alterations occurring in the relative sealing time, gas filling or vacuum formation processes, etc.
b2.1)		Pressing this pushbutton will instantly stop all operations and movement of the tray sealer's in-line elements, regardless of the position they are in. For production to resume operations after this pushbutton has been pressed, please consult the relative section (Emergency stop, 5.7).

Cycle "Start" pushbuttons "b1" and "b2" as well as the "Emergency Stop" pushbutton b2.1, are positioned on the horizontal base plate. For the machine to actively perform operations, pushbuttons b1-b2 need to be pressed in simultaneously.

2.8 START-UP

1) Connect up the 3 phase + neutral power supply cable to the machine, taking care that the total rated power may vary, depending on the model version.

- 2.5 kW for the CV/MB - S version (with only heat seal functions);

- 5 kW for the CV/VG - S version (with heat seal and vacuum pump functions);

2) Connect the air supply facilities up to the machine, which need to have a 6 atm pressure level.
A reading of the air pressure is displayed at the compressed air inlet, where the connection itself is located;

3) Connect the compensating gas supply facilities up to the machine (i.e. the gas tanks and mixers, to the joint connection located in the lower section of the machine);

4) Switch the main power switch into position [1];

5) Switch the tool heating switch into position [0];

6) Access the vacuum time on display and set the timer to zero.

7) Press the green “Start” pushbutton in. If it were already pressed in, press it in again to release it, then press to reinstate its working position;

8) Press in the black pushbutton that serves to unwind the film, so as to check the direction the motors are running in. If necessary, invert the relative two power supply wires.

9) Assemble the sealing film reels onto their relative rollers then get the film ready by unwinding it according to Fig. 5h.

2.9 STANDARD MACHINE OPERATION

1) Connect up the power supply cable to the machine;

2) Connect the compressed air supply facilities up to the machine;

3) Connect the compensation gas supply facilities up to the machine;

4) Switch the main power switch into position [1].

At this point: - the " ***Power Supply ON*** " signal light [3] must still be ON;

- the " ***Alarm*** " warning light [5] must be ON;

5) Activate the "Include Heating" selector switch [6].

At this point: - the " ***Alarm*** " warning light [5] must be ON;

- The operating panel will display that the thermostat control device has been activated;

6) Wait for the tool to reach the required, set temperature;

7) Reset the alarm by pressing in the start pushbutton [7];

At this point: - the " ***Alarm*** " warning light [5] must be OFF;

- the operator panel must display that the machine is ready to start up its work cycle;

8) Based on packaging requirements, adjust the operating parameters (sealing time, gas time, vacuum time; if a > 0.01 sec vacuum time is set, the vacuum pump will power up automatically);

9) Press in the "Manual Lid Formation" pushbutton [8], in order to get the sealing film ready for the sealing cycle. Check what type of operating mode is set, whether timer mode or photocell detection mode;

10) The machine is now ready to receive the tray in its appropriate sealing position, in automatic cycle mode.

2.10 AUTOMATIC CYCLE

1) Position the trays that need to be sealed into their sealing positions;

2) Press in both the [b1] and [b2] start pushbuttons simultaneously and hold them pressed in position until the sealing cycle is complete.

NOTE: To ensure that the sealing cycle is performed correctly, beware that the [b1] and [b2] start pushbuttons need to be pressed in simultaneously and must not be released until the sealing cycle has been completed.

- IMPORTANT -

If one of the two pushbutton are released, the machine's sealing cycle is instantly interrupted and correct sealing operations are compromised. After a machine sealing cycle has been blocked, production can be resumed by pressing the two start pushbuttons in simultaneously again. In this case, the tray being sealed during interruption will not have been sealed to warrant the standard sealing characteristics set by production, in that the constancy of the packaging functions was interrupted. When a cycle is interrupted, one of the following functions may be influenced: modified atmosphere formation timer operations, gas formation timer operations, as well as the sealing timer operations. Therefore, by blocking or suddenly interrupting the cycle and, consequentially, the various timer functions, the ideal, required packaging conditions are compromised. This is the reason why **it is hereby recommended that any trays caught in cycle interruption are either eliminated or sealed once again.**

3) In order to be able to observe a step-by-step progress of the packaging cycle, press function key F5 to access and display the MACHINE STATUS page on the operator panel.
As the sealing cycle progresses, the numbers relative to the various phases that make up the complete sealing cycle are shown up on screen.

4) At this point the sealing cycle will end according to the parameters set into the system and the sealing tool will travel into its “up” position, in order to enable the bottom tool carrier slide element to travel back.

5) When the slide element reaches its home position at the end of its stroke run, it will automatically start a lid formation cycle, in order to get the machine ready for the next cycle.

At this point the machine has completed a complete tray sealing cycle and is ready to start a new one. It is only at this point that the two [b1] and [b2] start pushbuttons can be released

(***N.B.:*** *The phase that is currently being run is shown up on display. In the event of an interruption, the moment in which an operating problem has occurred will be recorded on display).*

2.11 POSSIBLE OPERATING HAZARDS

For correct use of the machine and for high-performance product results, it is hereby recommended that all of this manual is read through very carefully.
During machine operation:

1) Check to ensure that the reel from which the tray lids are unwound is positioned so that the sealing edge faces the tray. This is important to prevent the sealing tool from getting soiled and so that the tray is sealed as required.

2) Position the tray in its housing, to ensure good vacuum cycle operations.

3) During the sealing cycle the pushbutton must never be released i.e. the operator must never take his/her hands off, to prevent incorrect or incomplete termination of the sealing cycle and to avoid any possible hazards.

4) Machine operations must always be carried out by one individual and the presence of non-authorised personnel or individuals during machine operations and during the sealing cycle phases is prohibited.

2.12 FAILURE TROUBLESHOOTING AND SOLUTIONS

Failure or Anomaly	Possible Solution
The sealing cycle is interrupted after the bottom carriage has reached its position and the top tool has travelled down.	Check whether, in this position, the magnetic control function is activated (b13). If it were not activated, check to ensure that there are no obstacles for the tool travelling downwards. (**Please recall that in this case, the tray that has been sealed cannot be considered as acceptable and must be rejected**).
The vacuum and the gas cycles are not performed correctly.	1) Check to ensure that the sealing tool is clean and that all the tool's gas passages are clear and unclogged. They must be perfectly free of anything that may prevent the gas from flowing in freely. 2) Check to ensure that the tray falls freely into the tool, i.e. into the relative sealing housing.
Pressure is insufficient	1) Check to ensure that the air pressure being supplied is not less than 5 atm - check the reading on the appropriate indicator display. 2) Check to ensure that there are no air leaks due to the air supply tubes not having been connected up tightly enough into their relative quick-coupling joint connections. Reset the alarm by pressing in the start pushbutton.
Bubbles or burn marks on the film's top surface.	The gas inlet pressure is too high. 1) Act on the pressure adjuster to decrease the pressure or act on the two regulators that disperse the gas into the top and bottom bell frames, in order to increase the amount of gas fed into the top bell frame that pushes the film reel downwards.
Sealing film cutting defects	1) Check whether the cutting jig is worn – if it is, replace it.

Sealing defects	1) Check the gaskets, if present. 2) Check to ensure that the sealing tool is clean. 3) Check to ensure that the temperature and the set time is correct. 4) Check to ensure that the type of tray and sealing film are suited to one another.
Vacuum pump magneto-thermal switch "MGT"	1) Check the motor current absorption, compare it with the rating plate data. 2) Check the magneto thermal switch settings. 3) In case of abnormal consumption DO NOT correct the magneto thermal switch settings but check on the possible reasons for abnormal operation. 4) Reset the alarm by pressing in the start pushbutton. .
Thermostat control device - ALARM	1) Check that the temperature settings and alarms are compatible with correct machine operations. 2) Check the automatic heating circuit safety protection switch. 3) Check to ensure that the tool connector is hooked up to the electric power supply socket. 4) Check the thermostat control device display and consult the instructions provided in Annex No. 2, to ensure that there are no temperature detection problems. 5) After having reset and reinstate the machine operating conditions and after having checked the status of the various machine components, reset the alarm by pressing in the "start" pushbutton.
Wrinkles and creases on the sealing joint.	Position and centre the tool exit cone elements as shown in the diagram in Fig. (5.o) at page 23.

Reel unrolling magneto-thermal switch "MGT"	1) Check the motor current absorption, compare it with the rating plate data. 2) Check the magneto thermal switch settings. 3) In case of abnormal consumption DO NOT correct the magneto thermal switch settings but check on the possible reasons for abnormal operation. 4) Reset the alarm by pressing in the start pushbutton.
The tray does not stay in position but sticks to the sealing tool	1) Temperature is too high. 2) The sealing plate is dirty. 3) The film reel has been assembled in with the sealing edge turned upwards.

2.13 MAINTENANCE AND CLEANING

Following is a table indicating the checks or inspections that need to be performed at regular time intervals.

Vacuum Pump	Check the oil level. Replace the oil every 400 hours.
Vacuum pump filter	Clean the filter once a year, depending on the product being processed.
Compressed air filter	Every now and again check and clean.
Cutting jig	Check the jig frame whenever it appears not to be cutting correctly

The top and bottom tools are removable for regular cleaning operations.

2.13.1 Top Tool

1) Unplug the power supply connector;

2) Disconnect the suction tubes;

3) Remove the two screws holding the tool in position, so that it rests on the support guides;

4) Remove the tool.

2.13.2 Bottom Tool

1) Unscrew to remove the tray discharge plate;

2) Detach the tubes;

3) Remove the tool by lifting it.

For better cleaning of the tool gas passages, it is possible to unscrew the top gasket support ring.

- IMPORTANT NOTE: If the bottom tool is removed and said tool is shaped to form a lid removal tab, take care during the reassembly phase that it must be positioned so that it is specular compared to the top tool shape.

CHAPTER 3

OPERATOR PANEL

CHAPTER 4

TEMPERATURE CONTROL DEVICE

3 OPERATOR PANEL CV/VG

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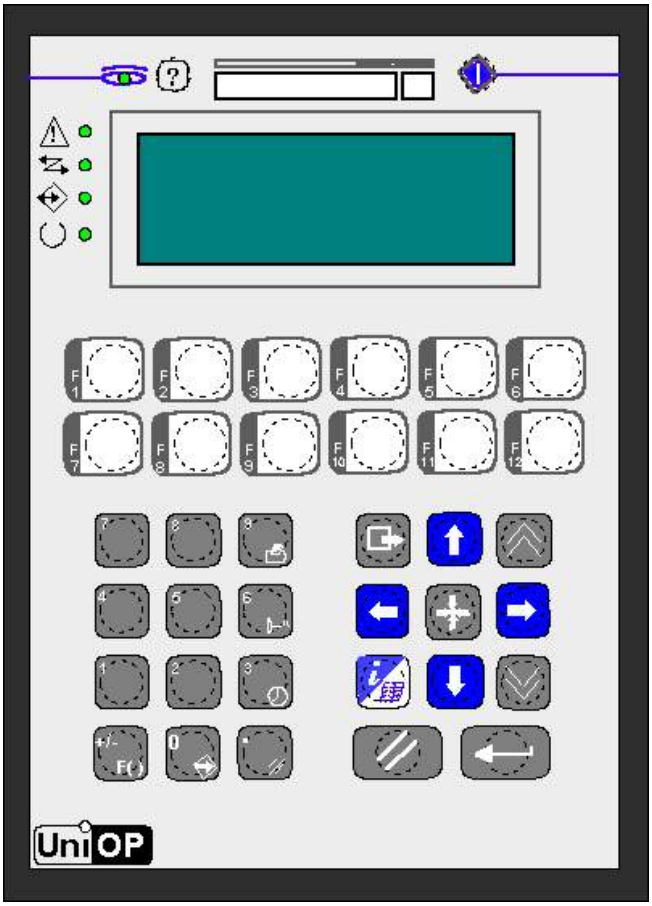
3.1 DESCRIPTION OF THE OPERATOR PANEL FUNCTION



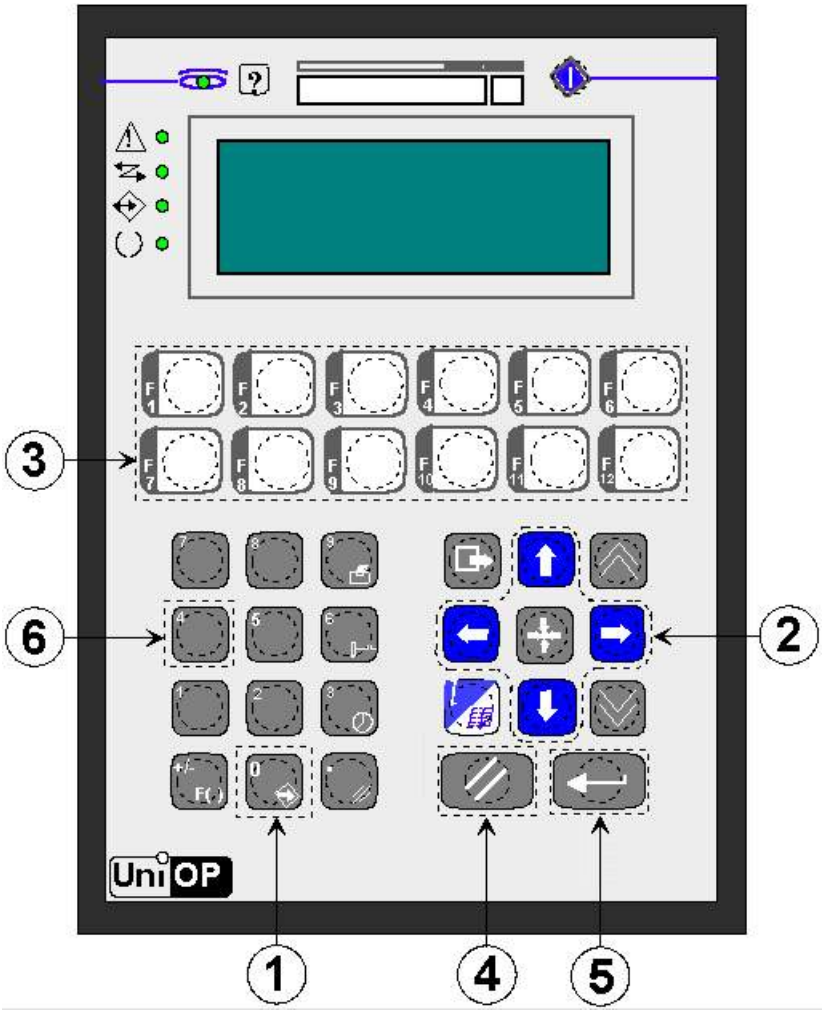
The UniOP operator panel is very easy to use. It is comprised of three basic parts. The left-hand section holds the function keys. The right-hand section holds the numerical keys for modifying data entered. The central section contains the display and the other keys used to modify work parameters.

- IMPORTANT -

The description below refers only to the method of using the operator panel and not to actual programming, so specific information on this may be lacking.

3.1.1 Keys and functions

The keys used to enter data or recipes are shown in the diagram. A full description is given below.



The keys marked 1-6 are used to enter the parameters and sizes required for the production process.

(1) - The INS key is used whenever you need to enter a value or size when modifying a recipe.

(2) - The arrow keys are used to move the cursor during programming or to scroll through displayed lists.

(3) - The function keys [F] are associated with operational functions or associated pages containing operational functions. For access to a particular function or its associated page, merely press the relevant function key. Whenever a function key is activated, a green light comes on at the top of the button.

Operator panel

(4) - The CLEAR key is used to eliminate a value or indication from the display. When you press this key with an alarm signal displayed, the signal is erased.

NOTE - Alarm signals remain active as a reminder even when the cause of the alarm has been removed.

(5) - The ENTER key is used to confirm. Press it whenever you modify a work parameter to confirm it before recording, and whenever prompted to do so on the display.

(6) - These keys are used to enter numerical values.
They also show letters but they are not used in this type of programming.

3.1.2 Lights and functions

On the UniOP operator panel there are several lights associated with certain working indications. There are various colours. Red indicates a problem or alarm and green indicates certain states during operation. Below is a list of the lights on the operator panel and their meanings.

 **- ALARM - (RED color)**: This is a led of system and it lights whenever every the panel it notices an alarm.

- OFF Led, Any alarm.

- BLINKING Led, Active alarm with recognition.

- Led acceso (ON), Active alarm.

 **- COM - (GREEN color)**: This is a led of system and it lights whenever every communication error it is verified between external panel and internal PLC.

- Bli lampeggiante (BLINK), Communication error.

- LIGHT Led, Regular communication.

 **- RUN - (GREEN color)**: This is a led of system and it points out the perfect operation of the PLC.

- OFF Led, Non functional equipment.

- ON Led, Functional equipment.

 **- (Color RED / GREEN)**: This is a led of system that can be or in the red color or in the green color. If it lights of red color the led it points out the presence of an anomaly to the hardware of the equipment, if contrarily it lights of green color the led it points out a pressed key.

- RED LED OFF, Any hardware problem found.

- BLINKING RED LED, Batteries of backup discharges.

- RED LED ON, Serious problem to the equipment.

- GREEN LED OFF, Any key pressed.

- GREEN LED ON, Key pressed (visual feedback).

- F... - (GRREN color): This light is found positioned on every key function and if turned on it points out active, therefore usable function.

- OFF Led, Function doesn't activate therefore not usable;

- ON Led, Active and usable function;

3.1.3 Description of function keys and work pages

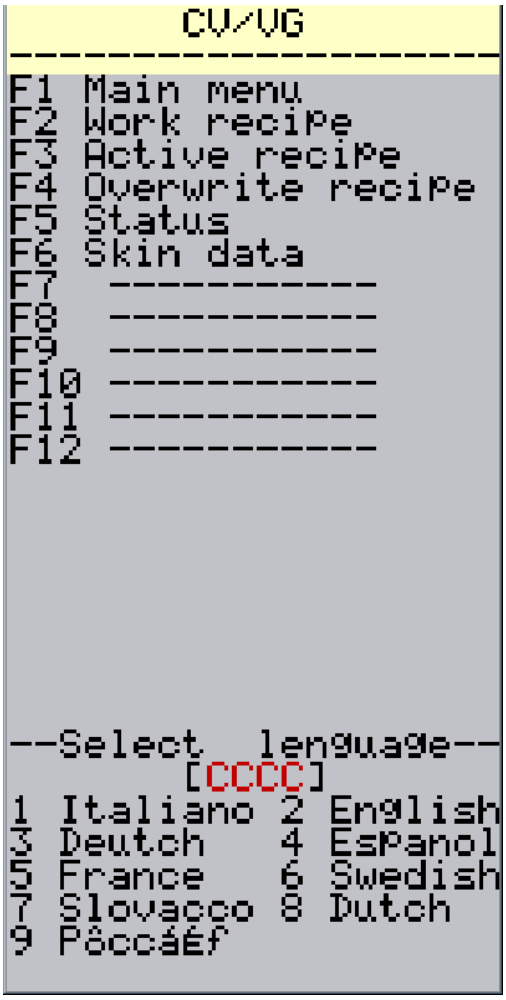
As already said, each function key corresponds either to a system page or a particular work function. For this type of operator panel and production, the function keys have a variable function as specified from time to time on the screen.

NOTE -1: To modify a value on the panel, it is first of all necessary to display the parameter in question. To do this, find the system page containing the parameter and then modify it as described on page 8.

NOTE -2: To display a system page, press the F... function key relating to the required page.
Refer to the diagram on the previous page for further details of the system pages and the main parameters.

3.2 DESCRIPTION OF THE STARTING PAGE (F1)

The starting page is the first one displayed as soon as the machine is turned on. With this particular machine the page is as follows.



This page makes six function keys available: (F1- F6). Each function key is connected to a green indicator light. When it is on, the function is active and can be used.

NOTE -1: A "WORK RECIPE" is a series of data and settings characterizing a set production procedure. So there is a set recipe for each type of production.

NOTE -2: This operator panel can record up to 25 recipes.

Operator panel

Function key (**F1 = MAIN MENU**) is always active. It is used to display the starting page at any time. This page is already displayed on start up so it is not necessary to select the function key indicated.

Function key (**F2 = WORK RECIPE**) gives access to the corresponding page showing all the data and values relating to the current recipe and useful for correct operation of the filler.

Function key (**F3 = ACTIVE RECIPE**) records all data entered, which replaces previous data from the recipe used. When this data has been recorded, it becomes operational and replaces previous values definitively.

Function key (**F4 = OVERWRITE RECIPE**) downloads current recipe values into the column, where they can be modified.

Function key (**F5 = STATUS**) allows to visualize the page in which there are the counters refering to the partial and total production of the machine.

Function key (**F6 = SKIN DATA**) allows to visualize the page containing the parameters that allow to command the operation of the cycle skin

Function key (**F7 = PREFORMED CYCLE**) allows to enable the preformed cycle. This cycle disable the unrolling film motor and draw film motor.

3.2.1 Description of the function page (F2 = Work Recipe)

The description below refers to the page displayed when (F2 = Work Recipe) is pressed.
The following work page is displayed:

Operator panel

When this page is active, the following function keys can be used:

F1	**Main Menu**	**F3**	**Active recipe**
F4	**Overwrite recipe**	**F5**	**Status display**

(**F1 = MAIN MENU**) - to return to the starting page.

(**F3 = ACTIVE RECIPE**) - records all data entered, which replaces previous data from the recipe used.

(**F4 = OVERWRITE RECIPE**) downloads current recipe values into the column, where they can be modified.

(**F5 = STATUS DISPLAY**) gives access to the corresponding page showing data and operations that are supplementary to those that can be activated via the control panel keys.

Below is a description of the data listed when the page is opened.

- Sealing time: the work time of the sealing tool (the part that seals the film onto the tray), meaning the actual time the tool remains on the tray to complete the seal (measured in seconds).

- Delay start V/G: This parameter refers to the time of delay that determines the start of the vacuum gas cycle (measured in seconds).

- Vacuum time 1, 2, 3: the time set to create a vacuum inside the chamber of the sealing tool during sealing (measured in seconds).

- Gas time cycle 1, 2, 3: the time set to pump gas inside the chamber of the sealing tool during sealing (measured in seconds).

- Time total compensation: the time the atmosphere compensation valves of the sealing tool open during the skin cycle (measured in seconds).

- Delay stop bobin: the time the reel unwinder operates. This function is directly linked to the reel unwinding delay (measured in seconds).

- Unrolling film time: the time lid unwinder operates. It must be less than the overall tray sealing time, or this would cause a malfunction or generate a cycle alarm.

- Tool temperature: This parameter allows to modify the temperature of the sealing tool.

3.2.2 Description of the function page (F6 = Skin data)

The description below refers to the page displayed when (F6 = Skin data) is pressed.
The following work page is displayed:

Operator panel

When this page is active, the following function keys can be used:

F1	**Main Menu**	**F3**	**Active recipe**
F4	**Overwrite recipe**	**F5**	**Status display**

(**F1 = MAIN MENU**) - to return to the starting page.

(**F3 = ACTIVE RECIPE**) - records all data entered, which replaces previous data from the recipe used.

(**F4 = OVERWRITE RECIPE**) downloads current recipe values into the column, where they can be modified.

(**F5 = STATUS DISPLAY**) gives access to the corresponding page showing data and operations that are supplementary to those that can be activated via the control panel keys.

Below is a description of the data listed when the page is opened.

- Delay vacuum film: the delay before the vacuum valves open inside the sealing elements. This allows the film to be formed during the skin cycle (measured in seconds).

- Vacuum film time: the time the vacuum valves open inside the sealing elements of the sealing tool (measured in seconds).

- Lower air time: the time the compensation valves open in the lower chamber of the sealing tool to help form the film inside the sealing elements (measured in seconds).

- Delay upper vacuum: the delay before the vacuum valves open in the upper chamber of the sealing tool during the skin cycle (measured in seconds).

- Delay lower vacuum: the delay before the vacuum valves open in the lower chamber of the sealing tool during the skin cycle (measured in seconds).

- Sealing head compensation: the time the atmosphere compensation valves open in the sealing elements of the sealing tool during the skin cycle (measured in seconds).

- Delay tool slope skin: This parameter refers to the time of delay that regulates the departure of the sealing tool to execute the sealing cycle (measured in seconds).

- Sealing time: the work time of the sealing tool (the part that seals the film onto the tray), meaning the actual time the tool remains on the tray to complete the seal (measured in seconds).

- **Pause descent tool:** This parameter refers to the pause time of the sealing tool that allows the compensation of the atmosphere inside the chamber of the sealing tool (measured in seconds).

- **Unrolling film time:** the time lid unwinder operates. It must be less than the overall tray sealing time, or this would cause a malfunction or generate a cycle alarm.

- **Tool temperature:** This parameter allows to modify the temperature of the sealing tool.

3.2.3 Description of the function page (F5 = Status machine)

The page described below is displayed by pressing (F5 = Status machine).

Description of the parameters listed on this page

- Lid unwinding cycle: this parameter is used to select the type of cycle. Enter 0 for normal film (not printed) or 1 for printed film (with mark).

- Machine cycle: this parameter is used to select the type of sealing cycle. Enter 0 for the “normal” sealing cycle, 1 for the “skin 1” sealing cycle or 2 for the “skin 2” sealing cycle.

- Piston timeout: indication of a malfunction of the sealing tool and slide pistons, detected by the photocells or sensors (measured in seconds).

- Partial counter: This counter allows to visualize the partial number of trays produced by the machine beginning from the last zero resetting.

- Total counter: This counter allows to visualize the total number of trays produced by the machine beginning from the last zero resetting.

- Status display: This parameter allows to visualize the position of the machine inside the sealing cycle. To each number corresponds a position of the machine. This data allows to check in which moment of the cycle of welding is verified a malfunction.

3.3 HOW TO ENTER DATA

Here is an example of how to enter a value to modify the operating conditions of the system. Before making any modification, you have to display the work page by pressing the relevant function key. We will use the " WORK RECIPE " page (F2) in this example.
When you press (F2) from " WORK RECIPE ", the following work page is displayed:

G. MONDINI S.p.A.
Work Recipe, Recipe Nº 99
Closing time
[999.99] [RRR.RR] Sec.
Vacuum time cycle 1
[999.99] [RRR.RR] Sec.

You can now enter general modifications as follows:

1) Use the arrow keys to move to the line to be modified, e.g. **Closing time**, which has the set value (00.50).

Closing time
[00.50] [000.0]

2) Press INS to modify the value (00.50).

3) At this point, a flashing cursor will appear as follows:

Closing time
[00.50] **[000.0]**

4) The cursor flashes below the right-hand numerical value. Enter the required value usign the numerical keys on the operator panel (e.g. 00.80).

Closing time
[00.50] **[00.80]**

5) Then press ENTER to confirm.

Closing time
[00.50] **[00.80]**

6) The cursor disappears and the value is displayed in brackets but the modification has not yet become effective, i.e. if the filler continues to operate, it will still use the previous value [00.50].

7) To enter this value as a definitive modification, press F3 (ACTIVE RECIPE). This stores the value in the current recipe as can be seen below (the cursor disappears after recording).

Closing time
[00.80] [00.80]

NOTES:

- As we have said, the values stored and used by the filler are the ones between the left-hand brackets.

- Any recipe value that is modified as above is lost.

- If you press F4 (DOWNLOAD RECIPE), all values between the left-hand brackets are transcribed into the right-hand ones where they can be modified.

- A stored recipe can be displayed in the same way as for entering a modification value.

3.4 ALARM MESSAGES

During operation there might be some malfunctions preventing production from continuing. These malfunctions are called "ALARMS" and are immediately signalled by the machine, which turns on the red and green lights and, if provided, signals the malfunction on the operator panel display with the ALARM light flashing.

3.4.1 Restarting production

After each stop caused by an alarm, the machine stops and production is interrupted.
In order to restart production, first remove the cause of the alarm and proceed as follows:

- Press the yellow memory reset button (ALARM RESET).

- Press the green run button (RUN).

- If the alarm signal continues to be displayed, first solve the problem and then press (CLEAR).

In this case, there is no need to use other buttons or selectors because the machine automatically stops the line and resets at the start of cycle, which means it does not need any start-of-cycle positioning.
Any adjustment and positioning required to restart production will be made automatically.

3.4.2 Alarm messages and relevant description

Below is a list of the possible alarms and relevant intervention indication for quick production restart.

WORDING DISPLAYED	DESCRIPTION
EMERGENCY STOP	**Red light on.** - This emergency stop alarm is generated when a safety guard has been opened or the relevant button has been pressed. - Release the stop button. - Press the memory reset button to reset the alarm. - Check operation of the safety relay inside the panel.
PUMP MOTOR	**Red light on.** The magnetothermal switch of the vacuum pump motor generates an alarm. - Reset the magnetothermal switch - Check motor absorption. - Check there are no obstacles preventing the motor from running. - Check the motor terminals are powered.
LID BOBBIN MOTOR	**Red light on.** Bobbin motor alarms. - Restart turning on the automatic switch. - Verify the absorption of the motor. - Control that no obstacles on the motor cycle of work. - Check the supply on the board of motor terminal.
LID UNROLLING MOTOR	**Red light on.** Lid unrolling motor alarm. - Control the alarm code on the inverte drive. - Check the automatic switch feeding. - Verify the absorption of the motor. - Control that no obstacles on the motor cycle of work. - Check the supply on the board of motor terminal.

Operator panel

LOW AIR PRESSURE	**Red light on.** Air pressure alarm. - Verify the air pressure not under 5.5 bar. - Control the consumption of air is not greater then the generator.
THERMOCONTROLL	**Red light on.** Closing tool temperature alarm. - Check the tool temperature. - Verify the alarm set point. - Control that the regular is made on. - Check the thermoresistance working well.
INS/EXIT PISTON TIME **CLOSING PISTON TIME**	**Alarm light flashes.** This alarm indicates that the microswitch or sensor controlling the position of the piston considered does not read properly or indicates the wrong piston position at the start of the cycle. Determine the cause of the malfunction: - Check that the piston is in the start- or end-of-cycle position. - Check there are no foreign bodies or anything else preventing the piston from working properly. - Check the piston feed pipe connections. - Check the position of the microswitch. - Check that the microswitch is connected and reads properly. When the problem has been solved, restart production as indicated.

CHAPTER 4

TEMPERATURE CONTROL DEVICE

4 TEMPERATURE CONTROL DEVICE

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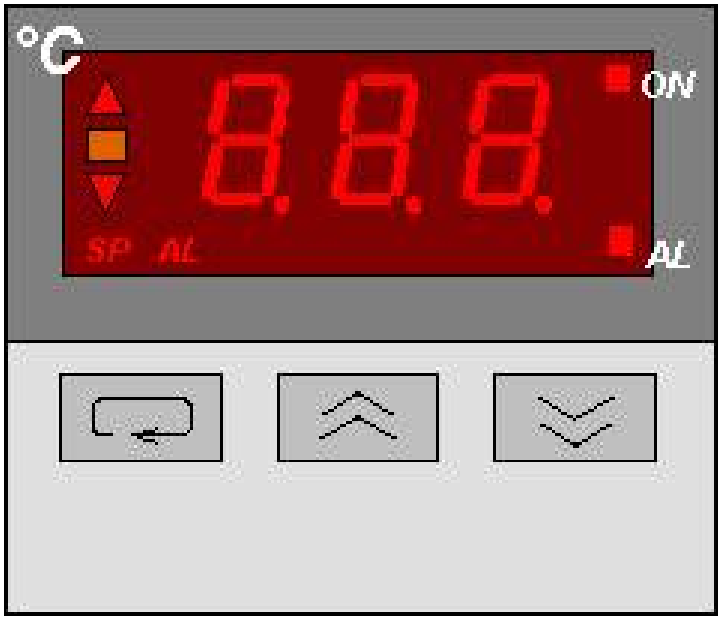
4.1 DESCRIPTION OF THE OPERATOR PANEL FUNCTIONS

4.1.1 Setting and operation of the temperature control device



The above panel constitutes a direct link between the operator and temperature adjustment of the thermal resistance that heats the elemetns connected to it.

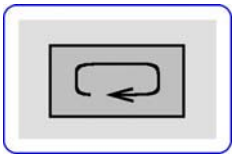
This easy-to-use panel has a visual part at the top with a display, and interactive or manual part with the function buttons at the bottom.

The display at the top enables the operator to monitor the process and check the various indications.

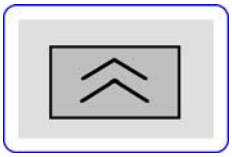
The bottom part contains the buttons used to modify the temperature control device parameters.

If no buttons are pressed, the display shows the current temperature of the controlled element.

4.1.2 Description of the buttons



- To modify parameters - called SP (Set Point).



- To increment the numerical value - called Arrow Up.

- To decrement the numerical value - called Arrow Down.

4.1.3 Setting the working temperature

The display shows the current temperature of the thermal resistance. To modify the working temperature, proceed as follows:

a) Press button SP once. The set temperature is displayed and SP lights up. Use the up and down arrows to enter the required value, then press SP again to confirm. The new value of the controlled element is now displayed.

b) When SP is pressed twice, the admissible deviation (usually +/- 10°C) from the set temperature is displayed after the temperature value, and AL (Alarm) lights up. The numerical value of this deviation appears separately without a + or - sign, which indicates that it is valid for positive or negative deviations.

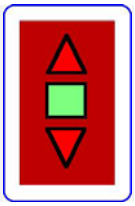
Example:

If 10 is displayed, it means the set temperature can vary 10°C more or less without the temperature control device intervening for an emergency machine stop.

If the deviation does not comply with the working requirements, the value can be altered by pressing the up and down arrows as indicated in point a).

c) When SP is pressed a third time, the current temperature of the controlled element is displayed again.

After the temperature has been altered by hand (see point a), one of the arrows at the side may be highlighted to indicate that the ideal working temperature has not yet been reached.



- If the down arrow is highlighted, it means the temperature of the controlled element is less than the set value.

- If the up arrow is highlighted, it means the temperature of the controlled element is higher than the set value.

In both cases you must wait for the red arrow to go off and the green box between the arrows to light up.
After a machine setting, an alarm may be generated, in which case the machine stops.
This occurs when the correction made is outside the tolerance range set in function AL.

Example:

If after a correction the temperature is changed from 120° to 135°C, the thermoresistance must come on to increase the temperature of the controlled element by 15°C.In this case an alarm is generated and the machine stops because the usual deviation (see point b) is 10°, which means this is an unacceptable condition.

When the green light comes on, it means that the working temperature has been reached and production can start.
During operation, the red light on one of the arrows may come on because the temperature tends to drop with successive cycles.
This is not serious in itself, but if it is not borne in mind, a machine alarm will be generated and the machine will stop for the above reasons.

The tolerance range (point b) can be altered to solve this problem. If the problem persists, refer to table 6) PROBLEMS AND POSSIBLE SOLUTIONS in the machine instruction handbook. Lastly, there are two red lights on the display called ON and AL.

- **ON** = indicates that the thermoresistance is in operation.

- **AL** = indicates that there is a possible alarm condition due to a significant temperature variation.

When AL is on, it is good practice to wait a few moments for the temperature to return to the ideal value.

NOTE: *When AL is active, ON is usually active as well.*

CHAPTER 5

RECOMMENDED CLEANING PRODUCTS

5 RECOMMENDED MACHINE CLEANING PRODUCTS

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5.1 GENERAL DESCRIPTION

G. MONDINI S.p.a. manufacture machinery for packaging various types of food and derivatives.

This involves strict compliance with definite standards of hygiene to prevent the numerous inconveniences that otherwise are likely to arise.
As well as these specific production rules, it is necessary to comply with specific laws on the use of this type of equipment.

The cleaning and hygiene of these machines during operation is a vital factor. Below is a list of products we recommend for cleaning and washing, depending on the type of product handled and the production method used.

- 1 - P3 TOPAX L 67. (Liquid detergent producing free chlorine, an excellent degreaser and disinfectant).

This alkaline product is an excellent washing product and also acts as a disinfectant. The excellent degreasing property is provided by a special mixture of sequestrants and surface active agents. Active chlorine also exerts a germicidal action.

P3 TOPAX L 67 can be used with the following materials as indicated:

- Steel.

- Iron.

- Plastic.

- Enamel.

- Enamelled iron.

[**For all information to chimical and fisical caracteristic of this product call to company:** HENKEL CHIMICA S.p.A. - DIVISION P3 (Via G.Barella 6 - 20157 Milano tel. 02.35.792 - telex 314216 CHEMSEI)].

- 2 - SU 388. (Sanitizing acid with an oxidizing effect, containing active oxygen).

SU 388 is a sanitizing liquid used widely in the food industry. It is active at low temperatures.
SU 388 contains a stabilized mixture of paracetic acid and hydrogen peroxide. It is does not produce a foam and is mainly used in circulation treatments (C.I.P.).

- 3 - SU 321. (Disinfectant/detergent with excellent germicidal action).

As SU 321 is a mixture of various compounds, it contains the following active ingredients:

- Bactericide
- Detergent - emulsifier
- Sequestrant
- PH buffer

As SU321 is non toxic and completely odorless, which makes it indispensable for applications in the food industry.
Being a powerful bactericide and bacteriostatic, it is one of the most commonly used disinfectants in the food industry in Europe.

[**For all information to chimical and fisical caracteristic of SU388 product and SU321 product call to company:** LEVER INDUSTRIALE (Via N.Bonnet 10, 20154 Milano Tel.02/6233. 2727-2748)].

5.2 CLEANING THE MAKROLON GUARDS

The clear guards on Mondini equipment are panels of **281 colourless MAKROLON and 286 colourless MAKROLON L**, 2 to 4 mm thick, depending on the application.
The description below details the features of this type of material and which substances, to a greater or lesser degree, affect the resistance and soundness of the molecular structure of colourless MAKROLON panels.

- Behaviour to food and chemical substances.

The special quality of colourless MAKROLON makes it suitable for the production of the items listed under sub-section 5, line no. 1 of the German food law of 15.8.1974 (BGBL 1 page 1945) as it corresponds to recommendation XI' – polycarbonate and compounds of polycarbonate with polymers and copolymers – issued by the German Department of Health (update 01.08.78).
Makrolon does not contain any extraneous substances, which under operating conditions are dissolved by the plastic material and do not even affect the smell or taste of delicate food. Furthermore, it is resistant to natural and synthetic colouring.

MAKROLON is **soluble** in a vast number of industrial solvents.

- The following are appropriate solvents: methyl chloride, ethylene chloride, trichloroethane, chloroform, m-cresol and pyridine.

- The following are less appropriate: dioxone, cyclohexanone and dymethylformamide.

- The following solvents cause the material to swell: benzol, chorobenzol, tetrahydronaphthalene, acetone, ethyl acetate, acetonitrile and carbon tetrachloride.

MAKROLON is resistant to mineral acids, even in high concentrations, many organic acids, oxidating and reducing agents, neutral and acid saline solutions, many fats, waxes and oils, saturated aliphatic and cycloaliphatic hydrocarbons, and alcohols excluding methyl alcohol.

MAKROLON has a good resistance to water up to a temperature of about 60°C. Chemical breakdown gradually takes place at higher temperatures, the extend and speed of which depend on the length of exposure and the temperature of water. MAKROLON is therefore not suitable for unlimited use with water at high temperatures. It behaves more favourably when the contact with very hot water is repeated but of short duration.

MAKROLON is chemically destroyed by alkaline substances, ammonia gas and its solutions, and amines.
The following tables contain a list of chemical substances and how MAKROLON reacts to them. The symbols preceding the products refer to how MAKROLON reacts in contact with them.

+ = resistant
❍ = only slightly resistant
- = not resistant

Table 1 – (Chemical Products)

1. Chemical products			
- Acetaldehyde	- Dibutyl phthalate (plasticising)	+ Gas for illumination	+ Sulphur
- Acetone	+ Diglycolic acid, sat. sol. in water	+ Ligroine (hydrocarbon compound)	o Sulphur dioxide
+ Acetylene	o Dinonyil phthalate (plasticising)	+ Magnesium chloride, sat. sol. in water	- Carbon sulphide
- Acrylonitrile	o Dioctyl phthalate (plasticising)	+ Magnesium sulphate, sat. sol. in water	+ Sulphuric acid, 50%
- Alum	- Dimethylformamide	+ Manganese sulphate, sat. sol. in water	o Sulphuric acid, 70%
o Allyl alcohol	- Dioxane	- Methyl ester of methacrylic acid	- Sulphuric acid, conc.
+ Aluminium chloride, sat. sol. in water	- Diphyl 5.3	+ Methane	- Sulphuric acid, 10%
+ Aluminium oxalate	+ Ferric sulphate (Eisen-II-sulfat)	- Methanol	+ Hydrogen sulphide
+ Aluminium sulphate, sat. sol. in water	+ Ferric chloride (Eisen-III-chlorid), sat. sol. in water	- Methyl ethyl ketone	+ Soda
o Formic acid, 30%	+ Acetic acid, up to 10%	- Methyl amine	+ Ethyl alcohol, pure
- Ammonia	- Ether	- Methylene chloride	- Styrene
- Ammonia liquor	+ Ethyl alcohol, 96% pure	+ Lactic acid, 10% solution in water	+ Sublimate, sat. sol. in water
+ Ammonium chloride, sat. sol. in water	- Ethyl amine	+ Sodium bicarbonate, sat. sol. in water	- Sulphuryl chloride
- Ammonium fluoride, sat. sol. in water	- Ethyl bromide	+ Sodium disulphate, sat. sol. in water	- *sym*-tetrachloroethane
+ Ammonium nitrate, sat. sol. in water	- Ethylene chlorohydrin	+ Sodium bisulphite, sat. sol. in water	- Tetrahydrofuran
+ Ammonium sulphate, sat. sol. in water	- Ethylene chloride	+ Sodium carbonate, sat. sol. in water	- Triophen
- Ammonium sulphide, sat. sol. in water	+ Ethylene glycol	+ Sodium chlorate, sat. sol. in water	- Toluol
- Amyl acetate	+ Hydrofluoric acid, 5%	+ Sodium chloride, sat. sol. in water	- Trichlorethylamine
+ Antimony chloride, sat. sol. in water	- Hydrofluoric acid, conc.	+ Sodium hypochloride, 5% solution in water	- Trichlorethylene
+ Arsenic acid, 20%	+ Formalin, 10%	+ Sodium sulphate, sat. sol. in water	o Trichlorethylphosphate (plasticising)
- Potassium hydroxide	+ Glycol	o Sodium sulphide, sat. sol. in water	o Acetic acid of trichlorine, 10%
- Caustic soda	o Glycerol	- Concentrated solution of sodium hydroxide (sodium lye)	- Tricresyl phosphate (plasticising)
- Benzaldehyde	+ Urea, sat. sol. in water	- Nitrobenzene	+ Water
- Benzoic acid	+ Heptane	- Nitrous gases, dry	+ Hydrogen peroxide, 30%
- Benzol	+ Hexane	+ Oxalic acid, 10% in water	+ Tartaric acid, 10%
- Benzyl alcohol	o Isobutyl carbinol	+ Ozone	- Xylene
+ Benzene (non-aromatic solvent)	o Isopropyl alcohol	+ Pentane	+ Zinc chloride, sat. sol. in water
o Tetraethyl lead, 10% in benzene	- Iodine	- Perchloric ethylene	+ Zinc oxide
+ Borax, sat. sol. in water	- Potassium lye	+ Perchloric acid, 10% in water	+ Zinc sulphate, sat. sol. in water
+ Boric acid	+ Potassium aluminium alum, sat. sol. in water	o Perchloric acid, conc.	+ Citric acid, 10%
- Bromine	+ Potassium dichromate, sat. sol. in water	+ Perhydrol, 30%	
- Bromobenzol	+ Potassium bromide, sat. sol. in water	o Petroleum ether (hydrocarbon compound)	
+ Butane (liquid and gas)	+ Potassium carbonate, sat. sol. in water	o Petreleum	
- Butyric acid	+ Potassium chloride, sat. sol. in water	- Phenol	
- Butyl acetate	+ Potassium nitrate, sat. sol. in water	- Phenethyl alcohol	
+ Butanol	+ Potassium metabisulfite, 4% in water	- Phosphorus oxychloride	
+ Butylene glycol	+ Potassium rhodanite, sat. sol. in water	+ Phosphoric acid, conc.	
+ Calcium chloride, sat. sol. in water	+ Potassium perchlorate, 10% in water	+ Phosphorus trichloride	
+ Calcium nitrate, sat. sol. in water	+ Potassium permanganate, 10% in water	+ Propane gas	
+ Pure calcium soap fat	+ Potassium sulphate, sat. sol. in water	+ Propargyl alcohol	
o Chlorine gas, dry	- Potassium cyanide	+ Propionic cdi, 20%	
- Chlorine gas, wet	o Milk of lime, 30% water suspension	- Propionic acid, conc.	
- Chlorobenzene	+ Fluosilicate acid, 30%	+ Propyl acid	
+ Bleaching powder, pasty	+ Carbon monoxide	- Pyridine	
+ Bleaching powder solution, 2% in water	+ Carbon dioxide, wet	+ Mercury	
- Chloroform	- Cresol	+ Mercury chloride, sat.	
+ Chrome alum, sat. sol. in water	+ Copper chloride, sat. sol. in water	+ Resorcinol solution, 1%	
+ Chromic acid, 20% in water	+ Calcium hypochlorite, sat. sol. in water	+ Oxygen	
o Cyclohexanol	+ Copper Chlorate, sat. sol. in water	+ Nitric acid, 10%	
- Cyclohexanone	+ Copper sulphate, sat. sol. in water	o Nitric acid, 10-20%	
- Cyclohexane		- Nitric acid, 20%	
+ Decaline		+ Hydrochloric acid, 20%	
- Diethyl ether		- Hydrochloric acid, conc.	
+ Diethylene glycol			
- Diamyl phthalate			

Table 2 – (Disinfectants).

2. Disinfectants	
+ Baktol ®, 5%	+ Perhydrene
+ Chloramine	+ Resorcinolo solution, 1%
- DDT	o Sagrotan ®, 5%
+ Delegol®, 5%	+ Ethyl alcohol, pure
o Dimamin T, 5%	+ Sublimate
o Tincture of iodine	+ Troslin G extra, 1.5%
- Phenic acid	+ Hydrogen peroxide
+ Lisoform, 2%	o Zephirol ®
- Lisoform TB	
+ Maktol ®	
+ Merfen ®, 2%	
+ Oktozon ®, 1%	

Table 3 – (Pharmaceutical products).

3. Pharmaceutical and cosmetic products
+ Plasma
+ Delial® suntan milk
+ Idroplex
o Tincture of iodine
+ Monks' balm
+ Lanolin
o Menthol, 90% in alcohol
- Nail varnish
- Nail varnish remover
+ Odol ® - mouthwash
+ Periston ® - blood surrogate
+ Vaseline
+ Vick's Vaporub®

Table 4 – (Food and luxury items).

4. Food and luxury items		
+ Apple juice	+ Liqueur	+ Beetroot syrup
+ Orange juice	+ Maggi®	+ Rum
+ Beer	+ Margarine	+ Olive oil
+ Butter	+ Milk	+ Chocolate
+ Cognac 38%	+ Mineral water	o Lard
+ Fish	- Nutmeg	+ Mustard
+ Meat	- Cloves	+ Syrup
+ Fruit syrup (lemon)	+ Fruit juice	+ Table salt
+ Squeezed vegetables	+ Grapefruit juice	+ Table vinegar
+ Cucumbers	+ Capiscum	+ Tobacco
+ Coffee	+ Pepper	+ Tea
+ Kitchen salt	+ Vegetable oil	+ Tomato (pulp)
+ Cod liver oil	- Pimento	+ Tomato (juice)
+ Linseed oil	+ Beef	+ Glucose

Table 5 - (Detergents).

5. Detergents + Ajax ® + Bleach + Calgonit S®, 1% - Calgonit D®, DM, DA, R - Calgonit washing-up liquid ® + Calgonit descaler ® + Dor ® + Fewa ® + Horolith M ® o Impact ®, 0.2% + Info®, window cleaner + Hard soap + Natril® o Omo® + Parifex®, 2%	O Persil® + Pril® - P3 Asepto® o Rapdosept® + Rei® + Riseptin® + Liquid soap + Sidolin® + Silicone oil emulsion o Somat W® 731 + Suwa® + Trosilin F® extra, 2% o Tuba – dry foam, conc. + WK 60® (by Kron-Chemie)

Table 6 – (Industrial oils and greases).

6. **Industrial oils and greases** + Aral BG® 58 + Babysilon ®, silicone oils - Drill oil + BP Energol HL 100 ® + BP Energol EM 100 ® + BP HLR 65 ® - Brake fluid (ATE) + Brunofix® Burnishing oil + Fat for calcium soap o Gasoil o Fuel for jet engines JP4 JP4 (kp 97 –209°C) + Esso Estic 42-45 ® o Varnosj + Icthiol	+ Fatty fish oil o Fuel oil + Hydraulic oil VAC LP16 + Cable ins. oil IG 1402 + Cable ins. oil KH 190 - Camphor oil + Contact oil 61 + Mobil DTE Oil Light® + Mobil Special oil 10 W 30 ® + Molikote ® paste + Molikote ® powder + Oil for sewing machines + Oil for turbines 0-250, as used by NATO	+ Naphthene lubricant + Grease for sodium soap + Paraffin lubricant + Paraffin oil + Polyran® MM 25 (lubr.) + Rhenocalor N® + Castor oil + Rape oil + Lubricating grease R 2 Darina® + Shell Spirax 90 EP® o Shell Tellus 11-33® + Shell Tellus 33®	+ Silicone oil - Skydrol 500 A® + Surrogate turpentine o Turpentine essence + Texaco Regal Oil BRUO® + Texaco Regal Oil CRUO® + Oil of turbines TURBO-OEL 29 o Valvoline WA 4-7 + Oil for switches

Table 7 – (Binding and sealing products).

7. Binding and sealing products.
o All-purpose glue + Cellux® adhesive sheet + Window putty + Plaster + Rubber (without plasticizers) + Insulating tape + Perbunan® + Terostat® + Tesafilm® self-adhesive tape + Tesamol®

Table 8 – (Detergent and antistatic products).

8. Detergent and antistatic products.
- Antistatik C, 5%
o Antistatikum 58
o Arquad 18®, 50%
+ Delu® antistatic solution
+ Persoftal®, 2%
+ Perspex Polish 3®
+ Plexiklar®
+ Polifac® polishing paste
+ Statexan AN®

Table 9 – (Indian and other inks).

9. Indian and other inks.
- Indian ink S
+ Indian ink T
+ Ink for stamps GEHA
o Biro paste Othello
o Biro paste Diplomat
+ Biro paste V 77 (Linz)
o Multi-marker (Faber Castell)
+ Pelikan Königsblau 4001
+ Ink for registers DIA, Type U red
+ Visor Pen 7 blue

Table 10 – (Miscellaneous).

10. Miscellaneous			
+ Exhaust gas, cont. acids	+ Frigen® 113, R 113 (active mix)	+ Natural rubber	+ Castor oil
+ Acid for accumulators	+ Freon® TF (active mix)	+ Nekal BXR, 2% (wetting sol.)	- Shell IP 4 (fuel)
+ Basilit® UAK, 20% in water (for wood protection)	+ Freon® T-WD 602 (active mix)	+ Neutol photographic developer, normal conc.	+ Perspiration, acid (pH 4.7)
o Petrol, normal grade	+ Tanning acid	+ Oleic acid, conc.	o Perspiration, alkaline (pH 9.5)
- Petrol, premium	+ Plaster	+ Orthozid® 50, 0.5%	o Lye
+ Blood	+ Insulating tape	+ PLK 4 (for wood protection)	+ Starch
+ Floor wax	+ Kaltron® 113 MDR (active mix)	+ Polyamide	o Tanigan® CV
+ Chrome-green polishing paste	- Kerosin® (aircraft fuel)	+ Polythene	o Tanigan® CLS, 30%
+ E605 ®, 0.5% anti-parassite	+ Gas for illumination	o Polymer plasticizer	- Benzene, solvent
- E 605®, conc.	+ Marlon®, 1% (wetting sol.)	+ Polyvinyl chloride	+ Cement
+ Final developers (photo), normal concentration	+ Seawater	o Polyvinyl chloride (cont. plasticizers)	
	- Metasystox®, 0,5% anti-parasite	+ Benzene, cleaning fluid	

The resistance of MAKROLON resistance depends on the type, the concentration and the contact temperature of the substance, the exposure time, and the stress conditions of the part being moulded. This means that with a short contact time, MAKROLON is sufficiently resistant to a series of chemical products classified as “hazardous” following laboratory tests.

5.2.1 Electrical features

Since changes in temperature and humidity have very little effect on the main electrical features, MAKROLON panels can be considered to have sufficiently insulating properties.

5.2.2 Flame resistance

Colourless MAKROLON panels 2 to 4 mm thick have excellent flame resistance according to DIN 4102-B1 for indoor use.
With greater thicknesses and outdoor use, these panels are classified as "normally flammable" according to DIN 4102-B2.
The flash point of MAKROLON panels is around 570°C, according to DIN 51794.

5.2.3 Resistance to moisture and water

The low-water absorption – 0.19% at room temperature with 60% relative humidity – does not affect the physical and technological features. The change in size due to water absorption is negligible for the majority of applications.

Limits are encountered when MAKROLON panels are used continuously in water at a temperature of over 60°C, and sterilized in water vapour. Both these situations lead to slow chemical breakdown and hence a reduction in resilience.
The coefficient of permeation to water vapour is approximately as follows:

$$2\text{-}4 \cdot 10^{-10} \frac{g \cdot cm}{cm^2 \cdot h \cdot Pa}$$

5.2.4 Resistance to atmospheric agents

The resistance of MAKROLON panels to atmospheric agents is very good, considering that it is a highly resilient plastic material. Tests show that when MAKROLON is exposed to atmospheric agents, the transmission index drops by about 7% in seven years.
With high UV radiation levels (tropical or sub-tropical climate) or high pressure mercury vapour lamps, or under very heavy-duty applications, it is advisable to apply an anti-UV lacquer to prevent yellowing.

(The above technical data supplied by BAYER MAKROLON are merely indicative).

Cleaning products