TECNO-GAZ
industries

ORIGINAL INSTRUCTIONS FOR USE

AUTOMATIC CASTING

ASM30

Art. 6185F
Art. 6185FA

EN-ENGLISH

0ZPFI0001

"TECNO-GAZ" thanks you for purchasing a product of its range and invites you to read this booklet thoroughly.

This booklet contains all of the information necessary to use the machine correctly.

Please fully comply with contained instructions and keep the booklet unchanged within the operator's reach.

The contents of this manual can be changed, without warning or additional obligations, so that the manufacturer can include variations and improvements. It is prohibited to copy or translate any part of this booklet without the written permission of "TECNO-GAZ".

HELP US TO IMPROVE OUR PRODUCTS!
send any advice or errors you may have found in this manual to the fax number +39-0521-833391 or e-mail address tp@tecnogaz.com.

TRACEABILITY

To report defects or transport damage,
send the following information:

INCOLLARE LA TARGHETTA

Sec. 2 DECLARATION OF CONFORMITY

This device fulfils the CE conformity criteria as it complies with

Directive 2006/42/EEC regarding machinery.

Directive 2006/95/EEC regarding electrical materials.

Directive 2004/108/EEC regarding Electromagnetic Compatibility

Directive 97/23/EEC regarding pressure equipment.

The original declaration of conformity is furnished as an annex to the manual.

DICHIARAZIONE CE DI CONFORMITÀ
CONFORMITY CE DECLARATION - DECLARATION CE DE CONFORMITE
KONFORMITÄTSERKLÄRUNG -DECLARATION CE DE CONFORMIDAD

Modulo: TPM999 (ref. ISO/IEC 17050-1)

Nome del rilasciante - Manufacturer's Name - Nom de la Société délivrante - Name des Herstellers - Nombre de expedidor

TECNO-GAZ S.p.A.

Strada Cavalli n. 4, 43038, Sala Baganza, Parma, ITALY

Oggetto della dichiarazione - Subject of declaration - Objet de la declaration - Betreffvon Erklärung - Objeto de la declaración

REF: 6185F **FONDITR. TECNO-GAZ S/ARGON**

L'oggetto della dichiarazione sopra descritto è conforme ai requisiti dei seguenti documenti:
The object of the declaration described conforms to the requirements of the following documents:
L'objet de la déclaration décrit ci-dessus est conforme aux exigences des documents suivants :
Der Gegenstand dieser Erklärung entspricht den Anforderungen folgender Unterlagen:
El objeto de la declaración se ha descrito anteriormente se ajusta a los requisitos de los siguientes documentos:

Direttiva 2006/95/CE del Parlamento europeo e del Consiglio, del 12 dicembre 2006 , concernente il ravvicinamento delle legislazioni degli Stati membri relative al materiale elettrico destinato ad essere adoperato entro taluni limiti di tensione
Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
Directive 2006/95/CE du Parlement européen et du Conseil du 12 décembre 2006 concernant le rapprochement des législations des États membres relatives au matériel électrique destiné à être employé dans certaines limites de tension
Richtlinie 2006/95/EG des Europäischen Parlaments und des Rates vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen
Directiva 2006/95/CE del Parlamento Europeo y del Consejo, de 12 de diciembre de 2006 , relativa a la aproximación de las legislaciones de los Estados miembros sobre el material eléctrico destinado a utilizarse con determinados límites de tensión

Direttiva 2004/108/CE del Parlamento europeo e del Consiglio, del 15 dicembre 2004, concernente il ravvicinamento delle legislazioni degli Stati membri relative alla compatibilità elettromagnetica e che abroga la direttiva 89/336/CEE.
Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.
Directive 2004/108/CE du Parlement européen et du Conseil du 15 décembre 2004 relative au rapprochement des législations des États membres concernant la compatibilité électromagnétique et abrogeant la directive 89/336/CEE.
Richtlinie 2004/108/EG des Europäischen Parlaments und des Rates vom 15. Dezember 2004 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit und zur Aufhebung der Richtlinie 89/336/EWG.
Directiva 2004/108/CE del Parlamento Europeo y del Consejo, de 15 de diciembre de 2004, relativa a la aproximación de las legislaciones de los Estados miembros en materia de compatibilidad electromagnética y por la que se deroga la Directiva 89/336/CEE.

Direttiva 2006/42/CE del Parlamento europeo e del Consiglio, del 17 maggio 2006, relativa alle macchine e che modifica la direttiva 95/16/CE.
Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC.
Directive 2006/42/CE du Parlement européen et du Conseil du 17 mai 2006 relative aux machines et modifiant la directive 95/16/CE.
Richtlinie 2006/42/EG des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG.
Directiva 2006/42/CE del Parlamento Europeo y del Consejo, de 17 de mayo de 2006, relativa a las máquinas y por la que se modifica la Directiva 95/16/CE.

Direttiva 97/23/CE del Parlamento Europeo e del Consiglio del 29 maggio 1997 per il ravvicinamento delle legislazioni degli Stati membri in materia di attrezzature a pressione.
Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.
Directive 97/23/CE du Parlement Européen et du Conseil du 29 mai 1997 relative au rapprochement des législations des États membres concernant les équipements sous pression.
Richtlinie 97/23/EG des Europäischen Parlaments und des Rates vom 29. Mai 1997 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Druckgeräte.
Directiva 97/23/CE del Parlamento Europeo y del Consejo de 29 de mayo de 1997 relativa a la aproximación de las legislaciones de los Estados miembros sobre equipos a presión.

CEI EN 60204-1

EN 50081-1

EN 50081-2

EN 61000-3-2

EN 61000-4-2

EN 61000-4-3

EN 61000-4-4

Si autorizza a costituire il FASCICOLO TECNICO:
It is authorized to constitute the TECHNICAL ISSUE:
On autorise à constituer le DOSSIER TECHNIQUE:
Die Sammlung von TECHNISCHEM HEFT ist erlaubt:
Se otorga la constitución del LEGAJO TECNICO:
Berlozzi Paolo
Strada Cavalli n. 4, 43038, Sala Baganza, Parma, ITALY

Sala Baganza (PR), 13/12/2010

CE

Sec. 3 WARRANTY CONDITIONS

1) DURATION: the product is covered by warranty for a period of 12 (twelve) months.
2) EXCLUSIONS: the following elements are not covered by the warranty:
a) any malfunctions due to lack of routine maintenance, negligence or improper use of the product ;
b) periodic inspections and maintenance ;
c) the repair or replacement of fragile parts, consumables or parts with unforeseeable durations, unless any defects are found at the time of delivery ;
d) any malfunctions requiring labour, transport and/or travel on behalf of technicians ;
e) any malfunctions or damages deriving from improper or incorrect use;
f) any malfunctions or damages deriving from impurities within the water and air supply systems or unforeseen chemical or electrical events ;
g) any malfunctions or damages deriving from the use of detergents, disinfectants or sterilizing substances or processes which have not been expressly indicated in the user and maintenance manual ;
h) natural colour alterations of the plastic parts.
3) INSTALLATION AND TEST REPORT: In order to allow for any claims to be made under warranty, the purchaser is required to return the appropriate installation and test report to the manufacturer, duly filled out in all of its parts and signed by the User and the Installation Technician. The report must be returned to the manufacturer within 15 days of installation in order to maintain the validity of the warranty.
4) LIMITATIONS: The warranty grants the purchaser the right to have any defective components repaired or replaced free of charge. The warranty, however, does not grant the user the right to the replacement of the entire machine. With regards to any applied or integrated components furnished with their own warranty certificates, whether produced by the manufacturer or by third parties, the conditions, limitations and exclusions indicated on their relative certificates shall be retained valid.
The performance of one or more repair or replacement interventions during the warranty period does not alter the expiration date of the same.
5) CLAIMS: In the event that the purchaser should make any claims with regards to the application of the warranty or the quality and/or conditions of the delivered equipment, the purchaser may not in any case suspend and/or delay any payments.
6) DISPUTES: In the event that any disputes should arise with regards to the application and interpretation of this warranty certificate, the law courts of Parma (Italy) shall have complete jurisdiction over the matter, regardless of the location in which the device's purchase contract was stipulated.
7) EXCEPTIONS: Any special exceptions conceded in relation to these warranty conditions shall not imply the recognition of any right on behalf of the purchaser and shall be considered as granted in relation to the specific case in question.

8) MISCELLANEOUS : Any matters not expressly foreseen within this Warranty Certificate shall be governed by the provisions contained within the Italian Civil Code and the applicable Italian Laws.

Sec. 4 ANNULMENT OF THE WARRANTY

The warranty shall be annulled in the event that:
a) The equipment shows signs of damage due to impact, exposure to flames, liquid spills, electrical shocks, natural disasters, atmospheric events or any other causes which cannot be directly attributed to manufacturing defects ;
b) The installation is not performed in compliance with the manufacturer's instructions and/or is performed by unauthorized personnel ;
c) The equipment is repaired, modified or tampered with by the purchaser, or by any third party, without the manufacturer's authorization ;
d) At the time in which the request for intervention under warranty is made the product’s serial number has been removed, erased, counterfeited, etc. ;
e) The duly filled out and signed installation and test report is not returned to the manufacturer within 15 days of the installation ;
f) The purchaser should, for any reason, suspend and/or delay the payment of any amount due for the purchase and/or maintenance of the equipment ;
g) The scheduled periodic maintenance interventions, or any other requirements foreseen within the user and maintenance manual, are not respected.

Sec. 5 METHODS OF RETURN

1. All returns must be carried out with the products packed inside their original packaging. For products returned without their original packaging, the customer will be charged for the cost of the packaging itself ;
2. All returns must be made CARRIAGE FREE ;
3. The customer must provide advance notice of the return by requesting written authorization from the manufacturer's sales offices to complete the “Customer Returns Management Form”, in compliance with the manufacturer’s Quality Management System.
4. The return document must include:
• The product code ;
• The number of the invoice or delivery note ;
• The product’s serial number and lot number ;
• The reason for the return ;
• The ticket number of the “Customer Returns Management Form” or an attached copy of the form itself ;
5. Returns shall only be accepted after the manufacturer has visually inspected the material. In the event that any nonconformities are encountered, at the manufacturer’s own discretion, the returned material may be sent back to the customer ;
6. For all returns, the customer will be charged for product’s restoration and testing.
7. Components replaced under warranty must be returned carriage free.
8. The customer shall be charged the cost of any components which are not returned to the manufacturer.
9. The manufacturer shall not accept any returns from final users.
10. Product returns for repair purposes are handled in the same manner as definitive product returns.

ATTENTION PLEASE

The casting machine ASM30 ref. 6185F and 6185FA are complete with vacuum pump ref. 6180F. The vacuum pump has its own package.
When you are sending back the casting machine, please bear in mind to send back also the vacuum pump.

Sec. 6 GENERAL AND SAFETY PRECAUTIONS

ⓘ	Make sure that the device is powered with the correct voltage, indicated on the data plate.
ⓘ	Do not remove the data plate
ⓘ	Make sure that the system is equipped with a proper grounding connector.
ⓘ	Clean the machine with a dry cloth.
ⓘ	Disconnect the power cable from the electrical socket before performing any interventions.
ⓘ	Only use original spare parts

Failure to observe the indications above will exonerate the manufacturer from any form of responsibility.

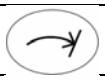
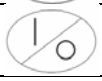
Sec. 7 CONTACT INFORMATION AND USEFUL ADDRESSES

Any requests for technical assistance must be sent to the warehouse from which the specific device was sold, or else directly to:

TECNO-GAZ S.p.A .
Strada Cavalli 4–43038 Sala Baganza– Parma – Italy
Tel. +39 05218380 - Fax +39 0521833391
e-mail : info@tecnogaz.com
Website : http://www.tecnogaz.com

Sec. 8 SYMBOLOGY

	Manufacturer TECNO-GAZ S.p.A. Strada Cavalli 4–43038 Sala Baganza– Parma – Italy
	Pursuant to DIRECTIVE 2002/96/EC, this symbol indicates that, at the end of its working life, the product must not be disposed of as urban waste.
	General warnings and information for the recipient.
	Pay close attention to the indications associated with this symbol.
	Compliance with the 2006/42/EC Directive
PE	Protezione esterna.

	External protection.
	Protective GROUNDING connector.
~	Alternating current
	Attention! High Voltage! Danger of electrocution!
	Read the Instruction Manual carefully
	Press the indicated button.
POS.	Position (the number to which the component in the diagram or scheme corresponds).
Fg.	Figure.
Ω	Ohm (unit of measure for Electrical Resistance).
s	Seconds (unit of measure for time).
W	Watts (unit of measure for power).
Hz	Hertz (unit of measure for frequency).
mm	Millimetres (unit of measure for length).
A	Amperes (unit of measure for electrical current).
V	Volts (unit of measure for electrical voltage).
Bar	Unit of measure for pressure.
°C	Degrees Centigrade (unit of measure for temperature).
kg	Kilograms (unit of measure for weight).
	Furnace rotation (Cast)
	Start / Stop
I	ON
O	OFF

Sec. 9 PRODUCT DESCRIPTION

The ASM30 automatic casting machine is intended for use exclusively within the Dental Industry.
It is a machine designed for melting and casting small amounts of, noble, semi-noble and non-precious metal alloys according to the instructions contained within the following manual.

Any other use of the machine is to be considered improper and could result in personal injury and/or damage to the surrounding environment.
In order to carry out the casting process, the machine must be electrically and pneumatically connected to a vacuum pump "art. 6180F ".
This pump is an integral part of the casting machine itself and is supplied separately.

The ASM30 is made up of:
- A frame for supporting all of the other components (Pos.1 Fig.1).
- A removable cabinet (Pos.2-Fig 1), equipped with a lateral hatch (Pos.3-Fig.1) for inspecting the electrical and pneumatic components and an upper hatch (Pos.4-Fig.1) for protecting the operator during the automatic cycle.
- A furnace (Pos.6, Fig.1) equipped with a cover and a relative locking mechanism (Pos.7, Fig.1).

The electrical equipment, the pneumatic components, the compressed air tank and the pneumatic motor which rotates the furnace are all housed on the left-hand side of the furnace itself.
The left-hand side of the casing contains a control panel (Pos.27, Fig.1), which includes the electronic boards, the start and stop buttons, the function management controls, the colour display and the SD card slot.
The following elements are found at the rear of the machine:
The electrical power cable (Pos.15, Fig.2)
The tube for the compressed air connection (Pos.16, Fig.2)
The tube for connecting to the vacuum pump (Pos.17, Fig.2)
The tube for connecting to the argon gas cylinder (Pos.18, Fig.2)
The socket for powering the vacuum pump, along with the relative protection devices (Pos.20, Fig.3).
The main electrical switch with the circuit breaker (Pos.22, Fig.3).
The 6185FA model comes furnished with the argon equipment, which allows for the metal to be melted in an inert atmosphere.

Sec.10 TECHNICAL CHARACTERISTICS

Mechanical:

Dimensions (H,L,D)	650, 610, 570 mm
Weight	140 kg
Packaging dimensions (H,L,D)	900 x 700 x 700 mm
Material	Iron

Electrical:

Power Supply voltage	230 Vac
Phases	1
Frequency	50 Hz
Line protection: differential circuit breaker	16 A – 10 mA
Vacuum pump power supply protection	6 A
Max power consumption	3.5 Kw
External grounding protection	PE
Class	1
2 m power cable	2 x 2.5 mm^2 + ground
Plug connector	16 A + ground
Vacuum pump electrical socket	16 A + ground

Pneumatic:

Input –non-lubricated dry air	7 – 10 bar
Consumption 50 Nl x cycle	0.05 m3 x cycle
Safety valve - calibration	7 Bar
Supply tube with quick connector	Diam. 8x6mm

Functional:

Maximum casting temperature	1590 °C
Maximum crucible capacity	150 g (reported to gold)

Acoustic:

Sound power level Lwa (with vacuum pump)	**68.3 dB (A)**
Sound power level Lwa (with fan)	**63.6 dB (A)**
Sound power level Lwa (with with pressure relief and buzzer)	**88.0 dB (A)**

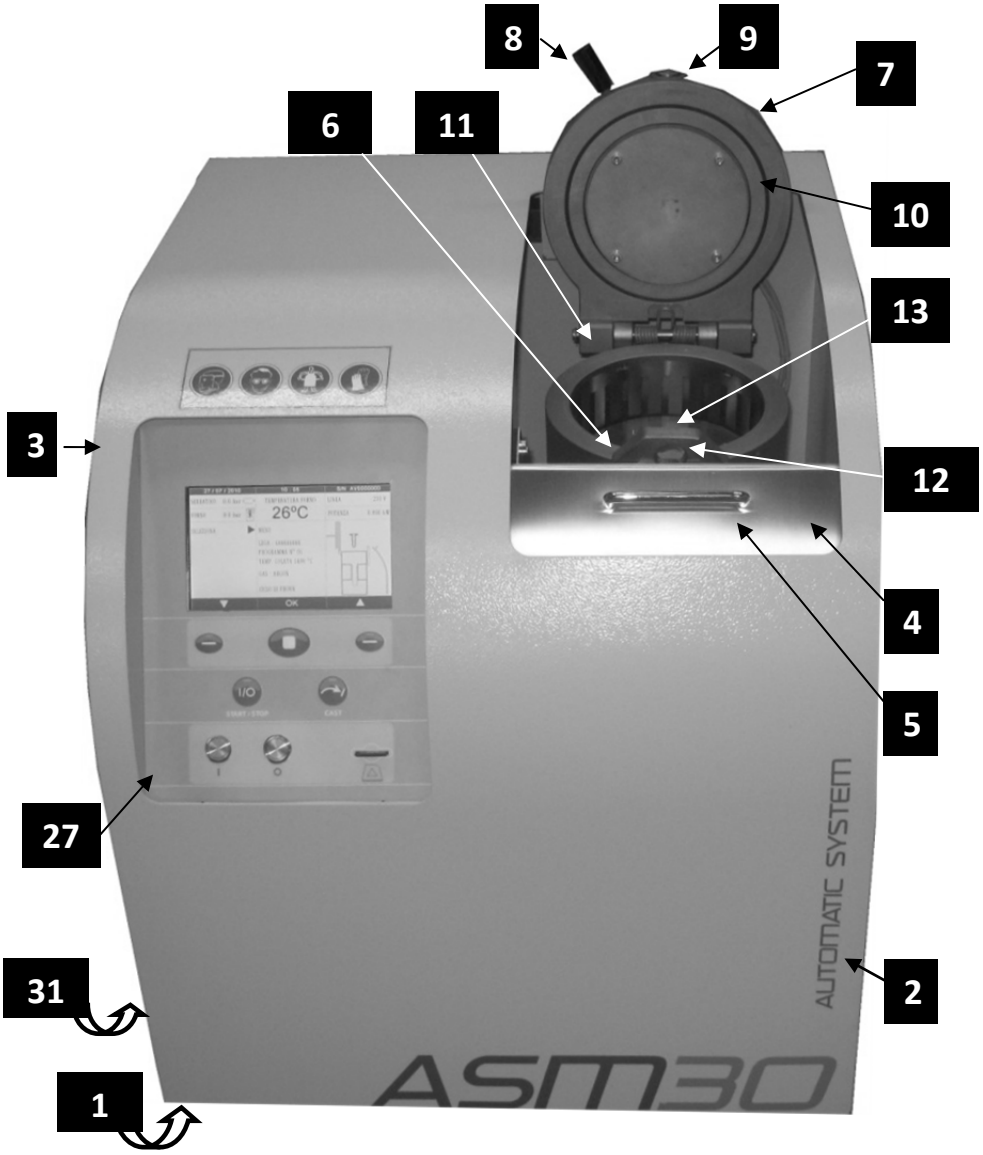


Fig. 1

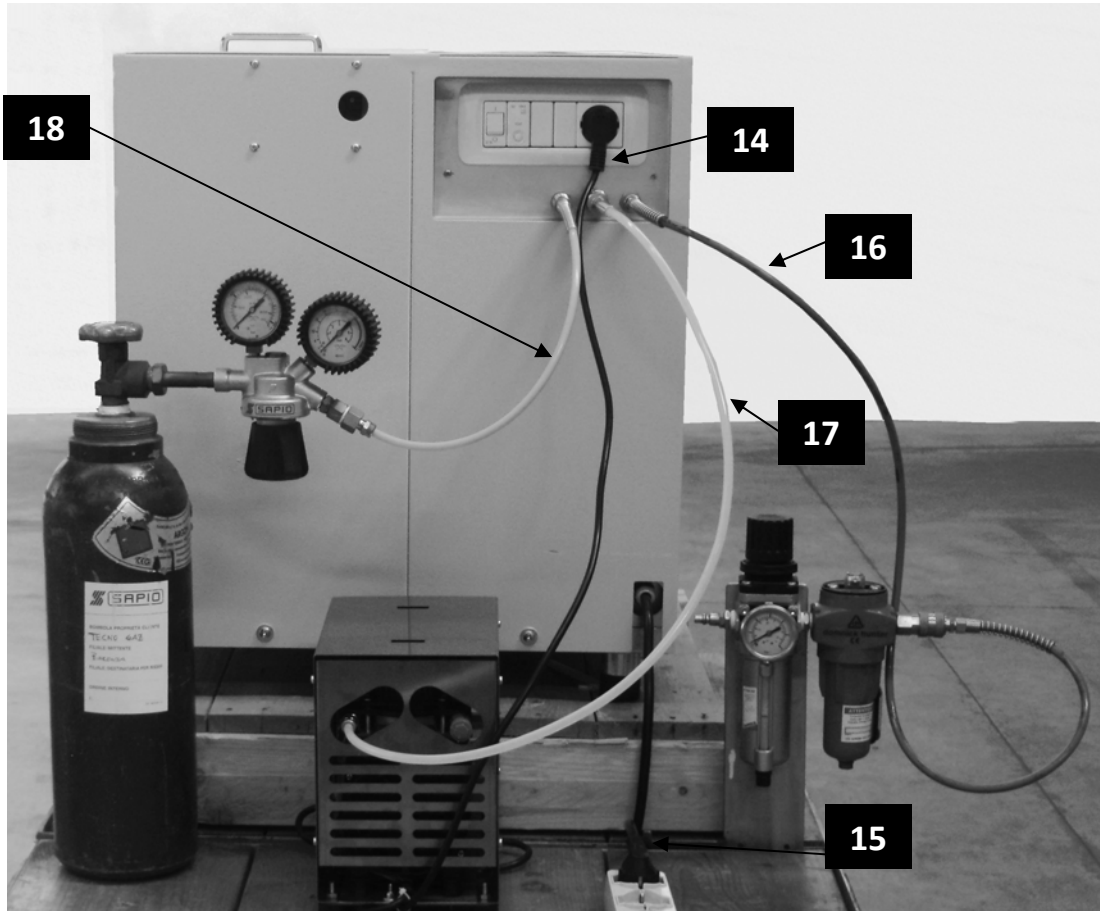


Fig. 2

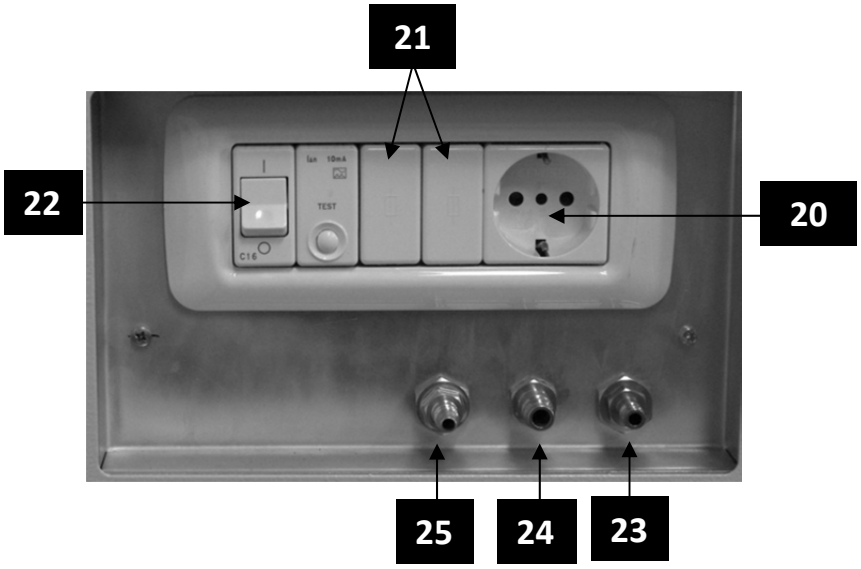


Fig. 3

Sec. 11 PACKAGING, TRANSPORT AND STORAGE

1) PACKAGING

Placed on a wooden pallet and anchored so that it can not slip, the machine is then lined with sheets of polystyrene foam and enclosed within a corrugated cardboard box.
The cardboard is stapled to the pallet and further secured with packing tape.
The casting machine is packaged with its heating block preinstalled.
The machine's serial number is indicated upon the packaging.

2) TRANSPORT

The packaged machine (150 kg) must be lifted mechanically (Fig.4)
Its transport must be carried out:
a) Smoothly, without jolts or impacts.
b) Without tipping or overturning the unit.
c) Without exposing the unit to humidity.

3) STORAGE

The machine must be kept in a dry place at a temperature between -10°C and +40°C.
The machines must not be stacked one upon another.

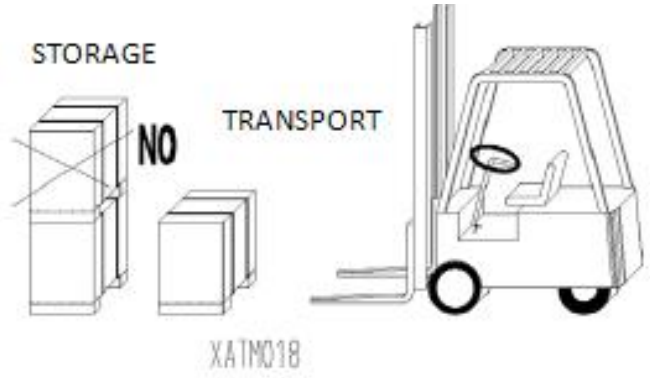


Fig. 4

Par. 12 INSTALLATION

The machine must never be used in potentially explosive atmospheres.

Remove the device from its packaging and verify its integrity.
If any damage is encountered resulting from transport, notify the manufacturer immediately.

The packaging must be kept for the entire duration of the warranty period.
The manufacturer does not accept returns without the original packaging.

1) The machine's installation must be carried out by authorized personnel.

The removal of the machine from its packaging must be carried out by the installation technician, who must also verify the integrity of the received merchandise.

The packaging components must be kept for the entire duration of the warranty period; the same packaging materials must be used in the event that the machine is to be transported.

The machine must be lifted mechanically and with the use of two belts, with a minimum safe load capacity of 150 kg each. These belts, inserted within the appropriate lodgings beneath the machines frame (Fig.5), must wrap around the machine in equal measure and be fastened to the hook of the mechanical lifting equipment. Keep at a safe distance during transport operations in order to avoid making involuntary contact with the machine itsel.

Fig. 5

In order to obtain optimal use of the casting machine without posing any unnecessary risks to the operator, people in the vicinity and the surrounding environment, the machine must be positioned in the following manner.

Place the machine up on a perfectly level pedestal (bench) of 50-70 cm in height.

The bench must be stable (not wobbly) and must be capable of sustaining a minimum load of 200 kg.

The casting machine cabinet, art.6044F – 6047F, which comes complete with an accessory drawer and a vacuum pump compartment, allows for optimal positioning.
It is recommended to avoid positioning the machine in tight spaces in order to allow for freedom of movement during use, as well as to facilitate access to the machine's various parts.
The space above the machine must not contain cupboards or shelving; the hot air that comes out of the furnace during heating operations could damage such elements.
Do not store flammable substances or any heat sensitive materials/objects (pressurised containers or spray cylinders) near the machine.
Position the machine within an environment which is sufficiently ventilated or equipped with an extraction system.
The proximity of the cylinder preheating furnace is indispensible in order to prevent the temperature of the same from decreasing during transfers from the furnace to the machine.
Calculate the proper height for the work surface before positioning the machine.
The operator must be able to see inside the crucible without assuming unstable positions.
If the height of the bench cannot be adjusted, use a shorter bench or a solid spacer to adapt the work surface so that it is of a suitable height for the operator.
Do not use platforms or steps as these could pose a tripping hazard.

The lighting of the installation site must comply with the current standards.

2) Connecting and commissioning the machine:
As the criteria and methods by which this operation is carried out are of significant interest to the user as well, all of the procedures which must be performed for proper installation are described below.
1) Before positioning the machine, calculate the proper height for the work surface based on the operator's height.
Position the bench in a spacious, ventilated and well-lit environment, near the preheating furnace if possible.
Position the machine after making sure that it is perfectly level.
2) Make sure that the main switch (Pos.22, Fig.3) is in its "0" position (off);
Insert the electrical plug (Pos.15, Fig.2) into an electrical outlet with the following characteristics:
A) Single phase voltage 230 V + ground
B) Frequency 50 Hz.
C) Minimum current 16 A with differential circuit breaker.
The electrical outlet must be located next to the machine, within reach of the supplied electrical cable.

The machine's maximum power consumption is 3.5 W.
Therefore, based on the system's overall power, check whether or not there is a sufficient margin for simultaneously operating other machinery.
If the network's power is at its limit, make sure that no other utilities are in function while using the casting machine.
Overloading the electrical network will cause the electrical power supply to cut off, with serious consequences for the quality of the work in progress.

3) Connect the supplied blue tube to a compressed air outlet (dry and non-lubricated) with a minimum pressure value of 7 Bar, a maximum pressure value of 10 Bar and a minimum flow rate of 100 n l / min. ;
when finished, apply the tube's female quick connector (Pos.16, Fig.2) to the male connector (Pos. 23, Fig.3) .

4) Connect the white tube (Pos.17, Fig.2) to the vacuum pump's suction fitting and the female quick connector to the male connector (Pos. 24, Fig.3) .

5) Insert the vacuum pump's plug (Pos.14, Fig.2) into the outlet on the casting machine (Pos. 20, Fig.3) .

6) If the unit is equipped with argon gas functionality, connect the yellow tube (Pos. 18, Fig. 2) to the ARGON gas cylinder's pressure reducer and set it at a pressure value of 3 Bar. When finished, apply the tube's female quick connector to the male connector (Pos.25, fig.3).

7) **ATTENTION: The positioning of the cables and pipes must not pose a tripping hazard for the operator and/or personnel.**

3) Activating and adjusting the machine:

After having performed the connections as described in Fig.2-3, check to make sure that the upper hatch and furnace cover are open and activate the main switch (Pos.22, Fig.3).
Press the "ON" button. The display will light up and the manufacturer's logo will appear for a few seconds (screen A). Afterwards, the machine's status will appear on the display, with the last cycle performed (screen B0).

If the message "FURNACE NOT IN POSITION" appears, this means that the furnace is not vertical.
In fact, if the pressure within the air tank is not sufficient the furnace can rotate and align itself in an intermediate position. In this situation, the main solenoid valve, not being stimulated, will not allow the input air to load into the tank.
It will therefore be necessary to shut the machine off, by pressing the "OFF" button, and manually rotate the furnace to the end of its stroke so that the cover is aligned in a horizontal position.
After performing this manoeuvre, the message will disappear and the tank will begin to load.

4) Language selection.

Before activating the machine, select the preferred language by accessing the "MENU'" as described in Par. 15 point 8.

Sec.13 FUNCTIONALITY DESCRIPTION

As described in the previous section, the casting machine allows for small amounts of metal to be melted and subsequently cast by following a pre-established automatic cycle.

1) The metal product is melted in a crucible by means of an electric resistance controlled by a microprocessor (FIG. A in Figure 6).

Once the melting has taken place, the operator closes the furnace and initiates the subsequent metal casting phase.

The casting phase is carried out automatically with three operations:

2) The creation of the vacuum inside the furnace: the removal of the air and the fusion gases impedes the formation of blowholes and facilitates the pouring of the liquid metal into the mould (FIG. B in Figure 6);

3) Rotation of the furnace: the metal is poured into the cylinder in a controlled fashion (FIG. C in Figure 6);

4) Pressurisation of the furnace: Once the rotation has been completed, compressed air is emitted into the furnace. The metal, which is still in a liquid state, is pressed into the mould, overcoming any resistances encountered during pouring, and is made to fill even the tightest spaces (FIG. D in Figure 6).

The pressurization phase has a duration of eighty seconds, which is sufficient to allow the metal to solidify.

Once the 80 seconds have passed, the furnace will automatically return to its original position and the operator can remove the piece.

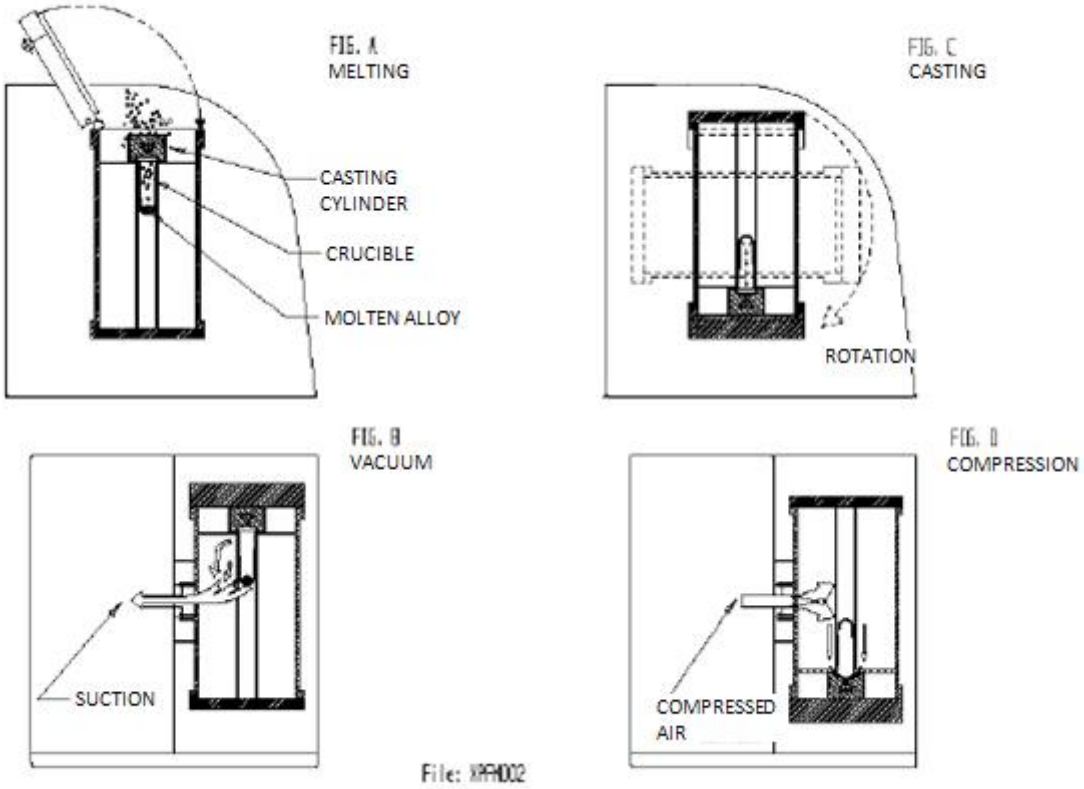


FIG. A
MELTING
CASTING
CYLINDER
CRUCIBLE
MOLTEN ALLOY
FIG. C
CASTING
ROTATION
FIG. B
VACUUM
SUCTION
FIG. D
COMPRESSION
COMPRESSED
AIR
File: XPPH002

Fig. 6

Sec.14 OPERATOR SAFETY

1) THE OPERATOR'S WORKING POSITION

The melting process is made up of three phases:
1) The heating of the furnace (automatic)
2) Melting (visually controlled)
3) Casting, pressurisation and cooling (automatic)

The operator's presence is not required during the first phase. The heating cycle takes place automatically and, once the set temperature has been reached, an acoustic signal will sound to indicate that the machine is ready for the next phase.

During the melting process, the operator must remain standing in front of the machine, with all of the necessary personal protection equipment, in order to monitor the melting of the metal.

The operator's vantage point must allow him/her to see (using black protective goggles) the status of the metal inside the crucible.

If the machine's regular operator has been replaced by another who is shorter in stature, before starting any work activities make sure that the new operator's working position will allow for the operations to be carried out in a normal fashion.

As the casting and cooling operations take place automatically, no operator intervention is required.

During this eighty second phase, however, it is a good idea for the operator to remain in front of the machine, with all of the necessary personal protection equipment, so as to be able to remove the cylinder and the crucible once the cycle has been completed, as well as to cool the machine by opening the cover.

2) HARMFUL SUBSTANCE EMISSIONS DURING FUNCTION

As previously stated, the heated graphite crucible reacts with the oxygen in the air to create carbon oxides.

These gases are produced in extremely small amounts which are not harmful to the operator.

IT IS RECOMMENDED THAT THE MACHINE BE POSITIONED WITHIN AN ENVIRONMENT WHICH IS SUFFICIENTLY VENTILATED OR EQUIPPED WITH AN EXTRACTION SYSTEM.

THE INSERTION INTO THE FURNACE OF FOREIGN MATERIALS NOT RELATED TO THE PROCESSING ACTIVITIES MAY LEAD TO THE PRODUCTION OF HARMFUL OR POLLUTANT GASSES.

THE MANUFACTURER SHALL BEAR NO RESPONSIBILITY FOR ANY DAMAGES RESULTING FROM THE IMPROPER USE OF THE MACHINE.

3) OPERATOR SAFETY DURING THE AUTOMATIC CYCLE

The door (Pos.4, Fig.1) must be closed in order to initiate the casting and pressurization phase.

While the vacuum pump is in function, the atmospheric pressure inside the furnace will prevent the cover from opening.

Do not attempt to open the cover by force; in the event of an emergency, press the "OFF" button to shut off the machine and wait for the pressure of the furnace to return to normal.

The door cannot be opened once it has been closed. It is locked by means of the safety device and will remain in this state until the automatic cycle has been completed (See fig.9 Pos.30).

If the machine should need to be shut off due to poor functionality, malfunction or any other reason, press the "OFF" button; the machine's electrical power supply will be immediately interrupted.

If the furnace is rotating or is upside down, it will immediately return to its resting position and the air pressure will be released.

The door will only be able to be opened once the furnace has returned to its resting position and **once the machine has been powered back on by pressing the "ON" button**.

4) ELECTRICAL PARTS WITH POTENTIAL RISKS

IT IS NOT POSSIBLE TO IMPEDE FOREIGN OBJECTS FROM BEING INSERTED INTO THE CHAMBER OF THE FURNACE INSTEAD OF THE CRUCIBLE.

INSERTING FOREIGN OBJECTS INTO THE MUFFLE CAN CAUSE ELECTRICAL SHOCKS AND/OR DAMAGE THE HEATING COMPONENT.

THE MANUFACTURER SHALL BEAR NO RESPONSIBILITY FOR ANY PERSONAL INJURIES OR DAMAGE TO THE MACHINE ITSELF RESULTING FROM SUCH OPERATIONS.

MANUAL OPERATIONS THAT MAY CAUSE DAMAGE

5) MANUAL OPERATIONS THAT MAY CAUSE DAMAGE

All of the manual operations regarding the preparation of the machine for use, the use of the crucibles, the use of the cylinders and the melting process could lead to accidents of a thermal nature.

It is not possible to protect the operator against these risks as the use of barriers would impede the use of the machine itself.

In order to avoid or limit these risks, the operator is required to always wear the necessary personal protection equipment (Fig.7).

The crucibles and cylinders must be handled using the appropriate supplied tongs, see Fig.7A.

THE MANUFACTURER SHALL BEAR NO RESPONSIBILITY FOR ANY PERSONAL INJURY OR PROPERTY DAMAGE RESULTING FROM THE PERFORMANCE OF THE MANUAL OPERATIONS.

Sec.15 PERSONAL PROTECTION EQUIPMENT (PPE)

1) ACCESSORIES FOR THE PROTECTION OF THE OPERATOR

The use of the casting machine requires the following accessories for the effective protection and safety of the operator: a face protection mask, an oro-nasal mask, thermal protection gloves, a thermal protection apron, dark glasses and pincers.
With the exception of the dark glasses and pincers Fig 7A, which are furnished along with the machine, the remaining accessories cannot be provided by the manufacturer and must be supplied by the customer.
Contact a specialized reseller.

Fig. 7

2) PINCERS FOR CYLINDER AND CRUCIBLE HANDLING

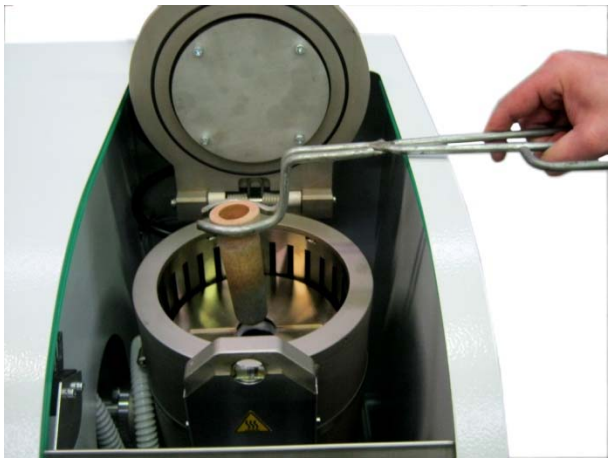


Fig.7A

Sec.16 ACCESSORIES

1) Supplied accessories

The accessories listed below are indispensable for operating the casting machine:

Qt.	Description	Code
1	Cylinder internal diam. 27 mm height 50 mm	1X *SARA236*
2	Cylinder internal diam. 45 mm height 60 mm	3X *SARA237*
2	Cylinder internal diam. 57 mm height 60 mm	6X *SARA238*
1	Cylinder internal diam. 69 mm height 60 mm	7X *SARA239*
1	Cylinder internal diam. 86 mm height 60 mm	9X *SARA240*
1	Cylinder base	*SARA246*
2	Cylinder base	*SARA242*
2	Cylinder base	*SARA243*
1	Cylinder base	*SARA244*
1	Cylinder base	*SARA245*
1	Cylinder base (*frame*)	*SNCA140*
1	Capping base for cylinder (*frame*)	*SARA289*
1	Cylinder adapter 1X (*See Fig10 Pos. C*)	*SARA241*
2	Graphite crucible	*SARA279*
1	Graphite crucible holder	*SARA278*
2	Alumina crucible	*SARA276*
1	Carborex crucible	*SARA277*
1	Pack of HERA SP99 tablets	*SARA231*
1	Pair of Pincers	*SARA232*
1	Dark glasses	*CM61005*
mt.2	Blue Rislan hose	*CPRG016+SATA441*
mt.2	White Rislan hose	*CPRG015+SATA442*
mt.2	Yellow Rislan hose (for argon gas)	*CPRG018+SATA443*

Fig. 8

2) Accessories available upon request

SATA901 free expansion kit comprised of:

Qty.	Description	Code
1	Base 1X	*SATA904*
1	CYLINDER ADAPTER 1	*SARA241*
1	Base 3X	*SATA905*
1	CYLINDER 1X	*SATA914*
1	Base 6X	*SATA906*
1	CYLINDER 3X	*SATA915*
1	Basea 9X	*SATA907*
1	CYLINDER 6X	*SATA916*
1	Base frame	*SATA908*
1	CYLINDER 9X	*SATA917*
5	Frame capping base	*SARA289*
1	CYLINDER FOR FRAME	*SATA918*

IMPORTANT!
The SARA 289 capping base can only be used for one lining.
The 1X cylinder adapter must also be used for the 1X free expansion cylinder.

Sec. 17 OPERATING INSTRUCTIONS

1) OPENING AND CLOSING THE COVER AND THE DOOR

The door of the furnace rotates around the pin (Pos.11, Fig.9).
In order to open it, perform manoeuvres A, B, C and D indicated in Fig.9:
A) Turn the bolt handle (Pos.10) in the direction indicated by arrow A (upwards)
B) Press the lateral handle (Pos.8) downwards as indicated by arrow B
C) Use the handle (Pos.10) to slide the bolt (Pos.9) in the direction indicated by arrow C
D) Use the lateral handle (Pos.8) to lift the cover, as indicated by arrow D.

Always use the heat-insulated handles indicated; do not touch the cover or the furnace.
Danger of burns.

The door (Fig.10, Pos.4) serves to protect the operator during the furnace rotation phase.
It slides along two lateral guides; in order to open it, pull the handle (Pos.5-Fig.10) in the direction indicated by the arrow.
A key-action safety device , Pos.30,Fig.9, keeps the door locked during the rotation phase.
If this safety device should malfunction, the machine will be impeded from functioning and the door will be impeded from opening.
In such cases, technical assistance must be requested in order to unlock the door and, above all, to repair the safety device.

ATTENTION:
Tampering with the door locking mechanism could lead to serious risks for the operator. TECNO-GAZ shall not be held liable for any personal injury or property damage due to tampering with the device.

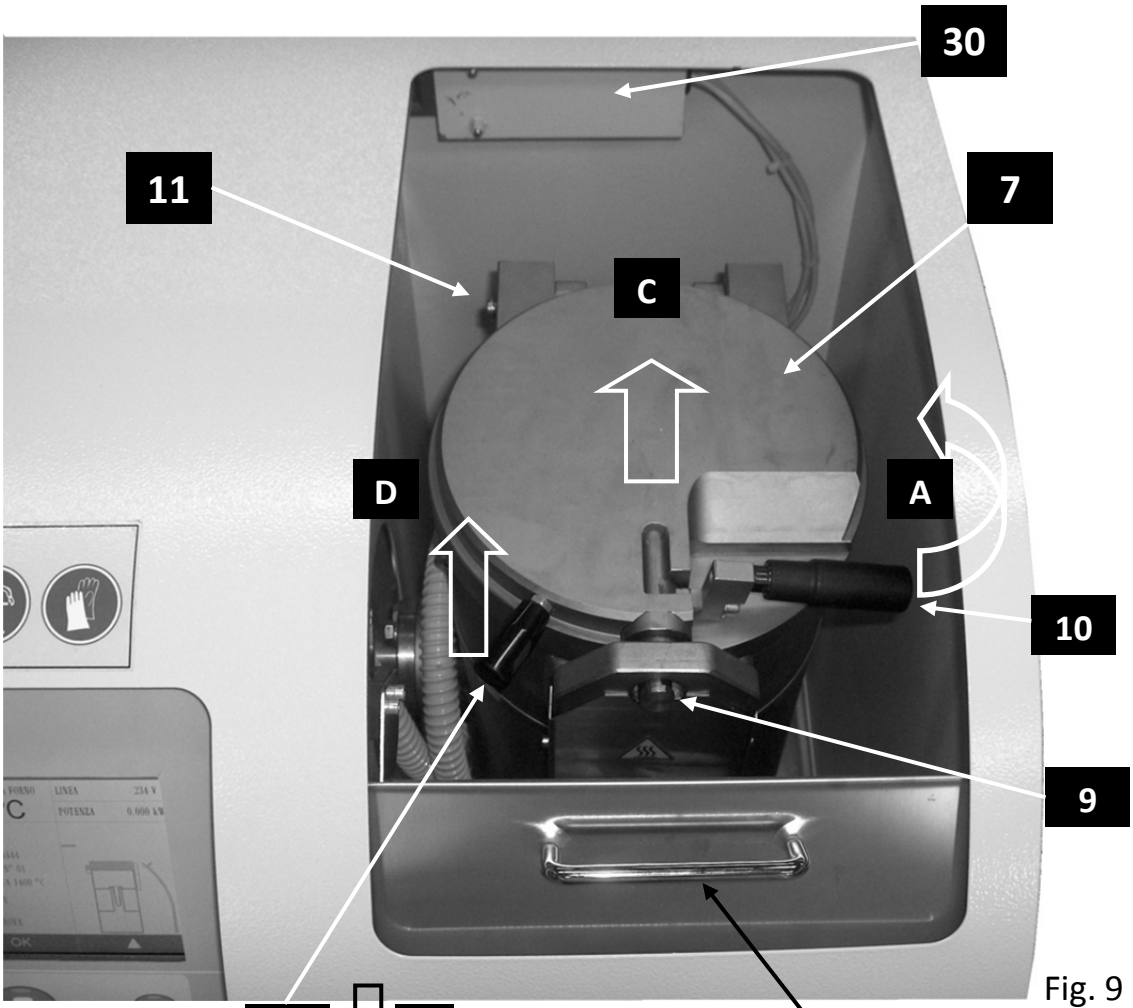


Fig. 9

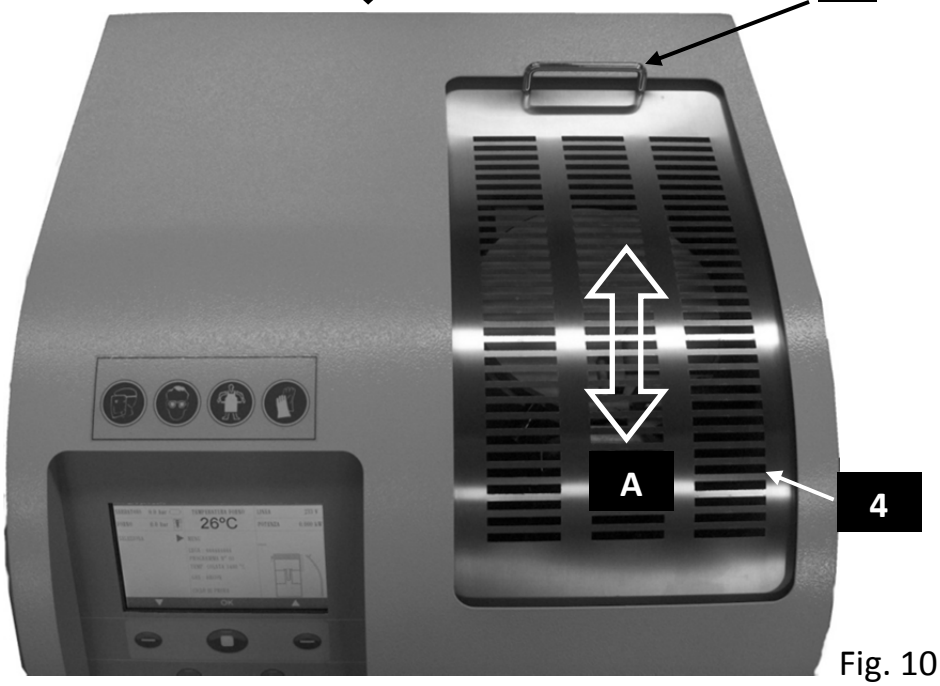


Fig. 10

2) DESCRIPTION OF THE CONTROL PANEL:

As previously stated, the control panel (Fig.11) is made up of:

A colour display, which shows the machine's various situations in real time during processing, as well as the available programming and self-diagnosis menus for use in the event of malfunctions.

An "ON" button (Pos.A) which serves the purpose of activating the machine's electrical power supply. When this button is pressed, the display will light up and the manufacturer's logo will be displayed.

An OFF button (Pos. B). for deactivating the electrical power supply.

A two-function "START/STOP" button (Pos.C): "START" for activating the process and "STOP" **(to be held down for three seconds)** for interrupting the process.

A "CAST" button (Pos.D) which activates the casting phase.

An "UP" button (Pos.F), bearing the symbol above which is shown on the display.

This button moves the cursor on the display upwards to select the desired function.

The "DOWN" control (Pos.G), for moving the same cursor downwards.

An "OK" control (Pos.H), which serves to confirm the selected function and move on to the next screen.

A slot for inserting the "SD card" (POS.E), which allows the user to:

Export and save the process data and print it from an external computer.

Communicate the machine's status via email to the manufacturer in the event of any malfunctions and receive a real time diagnosis.

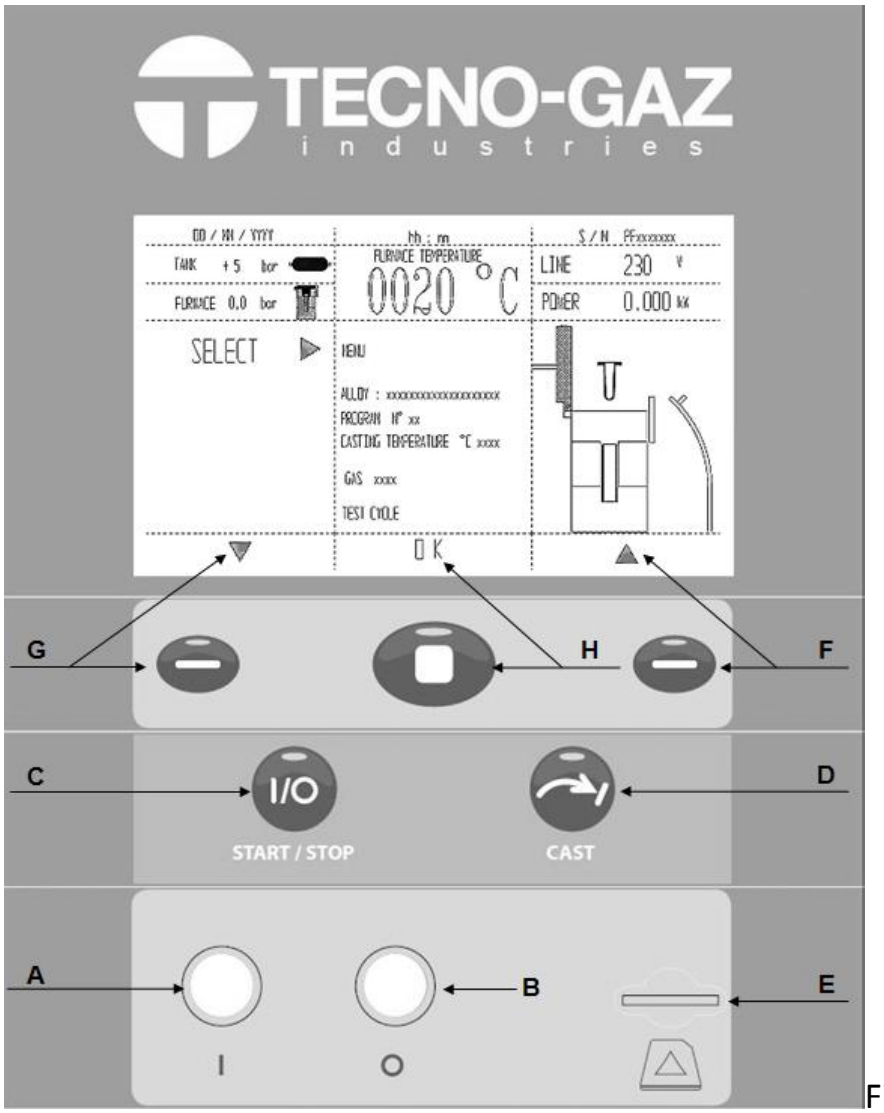


Fig. 11

3) DESCRIPTION OF THE DISPLAY:

The “ON” button (Pos.A) activates the machine's electrical power supply. When this button is pressed, the display will show screen “A”, which contains the manufacturer’s logo and the software version.

VIDEO A

The first screen “B0”, the main screen, which appears immediately after the manufacturer’s logo, is divided into four zones (see figure 12).
Each zone contains icons, which represent the machine’s status during the process, or else text elements that can be used to select or configure the various available functions.
Zone “A” is divided into three areas. The area on the left displays the data, the area in the middle displays the hours and minutes and the area on the right displays the machine's serial number.
Zone B is divided into five areas, each of which displays a process parameter. The message “TANK” appears on the right, followed by the pressure value of the air contained inside it and the tank symbol. If the tank symbol is blue, this indicates that it is at the operating pressure. When the pressure level is insufficient, the tank symbol will flash blue and its value will also be shown flashing. When the pressure value is less than two bar, the tank symbol will turn grey.
The furnace pressure status indicator is located just below the tank symbol. The message “FURNACE” is shown, followed by the pressure value of the air contained inside the furnace itself. The symbol will be grey when the furnace’s pressure is equal to that of the external atmosphere, will be yellow under vacuum conditions and will be blue under compression conditions.
The furnace’s temperature value, displayed in large lettering, can be found at the centre of zone B followed by the relative unit of measure. The machine’s power supply voltage value is displayed on the right. This value will flash if it goes below 200 Volts.
The value of the power consumed by the machine in the various process phases is shown just below.
Zone C is made up of three areas: the first, on the right, displays the message “SELECTION” next to the cursor symbol, which indicates the function to be selected from the central area.
The central area displays four options in the following order:
“MENU”: provides access to all the functions.
“PROGRAM”, with the number of the last melting cycle performed, described with the name of the alloy and the melting temperature: this option allows the user to scroll through all the saved programs.
“GAS”: allows the user to enable or disable argon gas dispensing.
“TEST CYCLE”: allows the user to perform a work cycle without heating the furnace in order to verify the machine’s correct mechanical and pneumatic functionality.
An image of the furnace with all of its components is shown on the left. This image changes during the process and synoptically represents the status of the furnace.
Zone “D” is divided into three areas: The area on the left contains a “DOWN” symbol, which can be activated by pressing the button below (Pos.G), for moving the selection cursor downwards.

The message "OK" appears at the centre and allows for the selected function to be confirmed by pressing the button below (Pos.H).
The area on the right contains an “UP” symbol, which can be activated by pressing the button below (POS.F), for moving the selection cursor upwards.
Zones A and D are always visible on all of the screens.

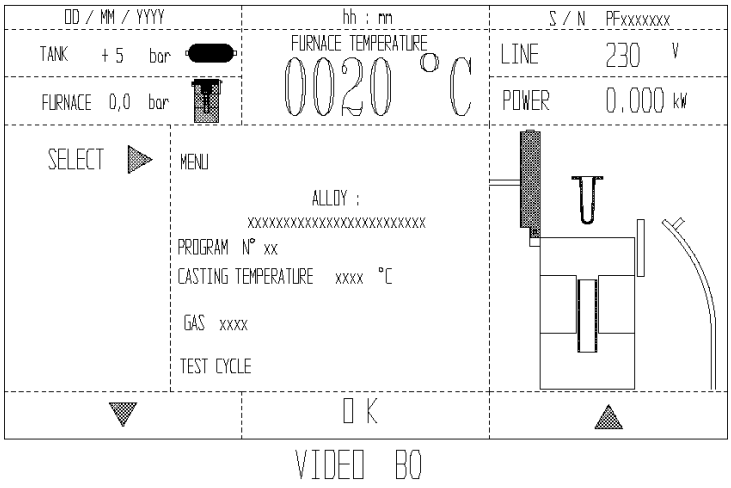
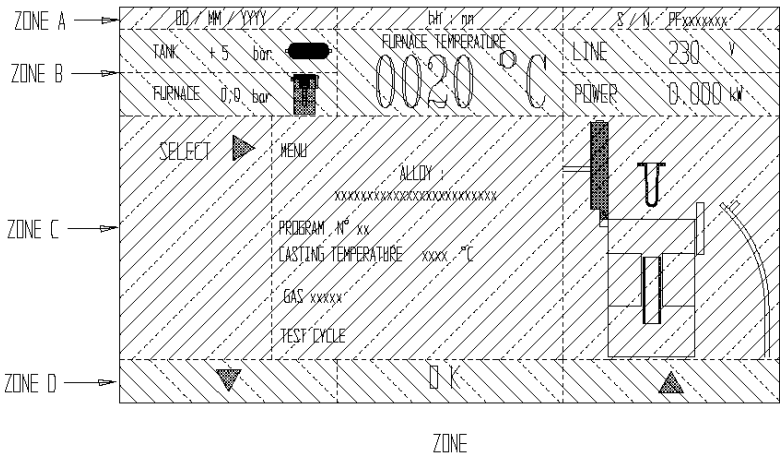


Fig. 12

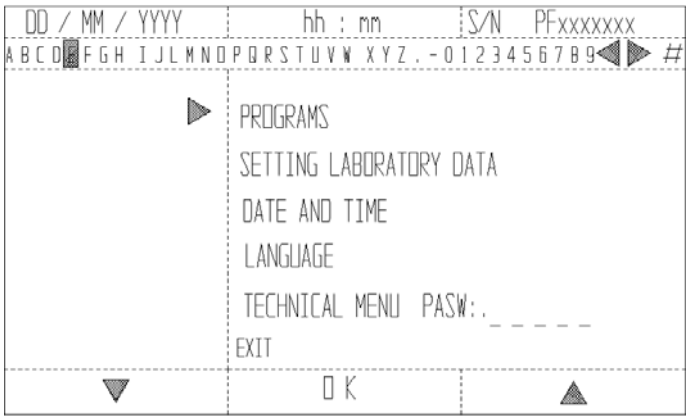


4) DESCRIPTIONS OF THE AVAILABLE FUNCTIONS:

The main screen for selecting a function is that which is described above.
Use the “UP" and "DOWN" controls to position the cursor on the desired option.
1) To access the menus, just position the cursor on the “MENU” item and confirm by pressing “OK” below.
Screen C will appear on the display; main menu.
2) Position the cursor on “PROGRAM” and press “OK” to confirm. The program number will be highlighted. Use the “UP” and “DOWN” controls to scroll through all of the saved programs.
3) After having selected the desired program, press “OK” to confirm. By positioning the cursor on the "GAS" item and pressing “OK” to confirm, the user can use the “UP” or “DOWN” controls to activate or deactivate argon gas dispensing.
In both cases, a casting cycle can be initiated using the program shown on the screen by pressing the “START” button.
4) Move the cursor farther down and position it on the "TEST CYCLE” item. Press “OK” to confirm”. The message “CLOSE THE COVER AND THE DOOR, PRESS “OK” TO ACTIVATE THE PUMP” will appear on the display. These instructions can be used to initiate a test cycle, which is performed without heating the furnace and serves to verify the mechanical and pneumatic functionalities of the cycle itself.

5) MENU DESCRIPTIONS:

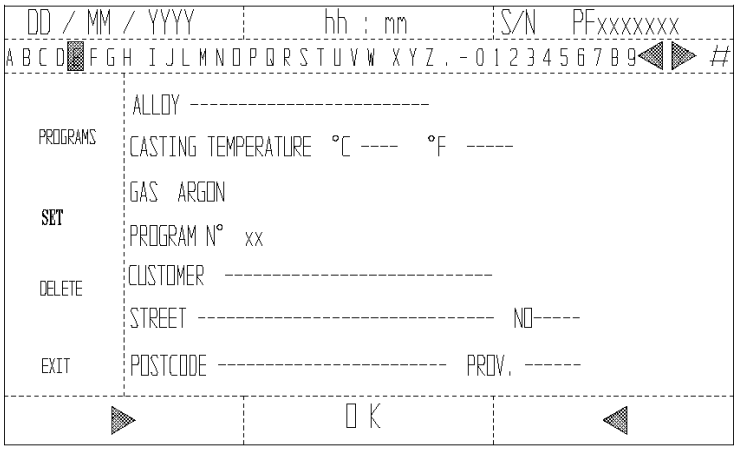
As previously stated, the menus can be accessed by positioning the cursor on the “MENU” item and pressing “OK” to confirm.
Screen “C” will appear on the display.



VIDEO C

This screen displays zone “A”, containing the date, the time and the serial number, and zone “D”, containing the control symbols.
Zone “B” contains an area with alphanumeric characters and two cursors (right and left) and can be used to fill out the data in relation to the options shown on the screen.
Zone “C” lists the available options which can be accessed by selecting them with the cursor.

5.1) PROGRAMS :
Position the cursor on the “PROGRAMS” item and press “OK” to confirm. Screen “D” will appear on the display.



VIDEO D

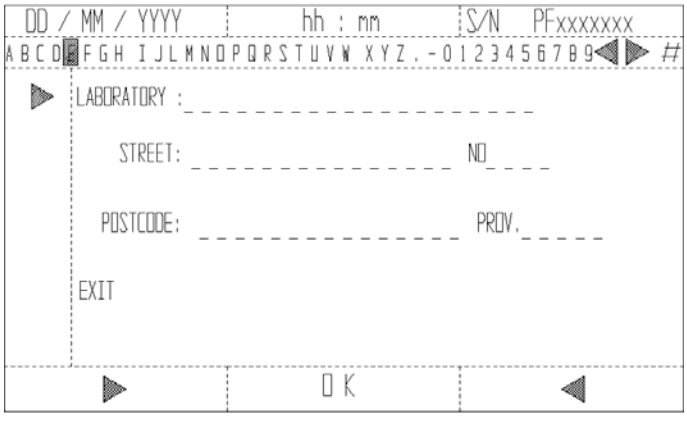
Zones A, B, C and D are same as on the previous screen. Zone “C” is divided into two areas. A menu can be found on the left, which allows for the selection of the following three functions: “PROGRAMS”, “SET”, “CANCEL" and “EXIT”
Use the “UP" and "DOWN" controls to select the desired function and press “OK” to confirm and apply the function to the contents of the area on the right.
This area displays the program’s characteristic data. If the program in screen “D” has not been filled out, only the program number will be displayed.
The user can fill out and save up to ten programs. The programs are automatically numbered from 1 to 10.
Position the cursor on the “PROGRAMS” item and press “OK” to confirm. The program number will be highlighted on the screen. Use the “UP" and "DOWN" controls to scroll through all the saved programs; after having selected the desired program, press "OK" to confirm.

5.1.1) FILLING OUT THE PROGRAM DATA:
After having selected a program, use the following procedure to fill out the required data: Use the "DOWN" control to select the "SET" item and press “OK” to confirm.
The first character of the name of the alloy will appear highlighted on the screen and the cursor symbol (right arrow) will be shown in the typing characters area.
At the same time, the “UP” control symbol will be aligned to the left, while the “DOWN” symbol will be aligned to the right.
Use the “UP" and "DOWN" controls to move the cursor left and right in the typing characters area. Once the cursor has been positioned over the desired character, press “OK” to confirm. The selected character will be inserted as the first character in the name of the alloy and the position of the second character in the name of the alloy will be highlighted.
Use the “UP” and “DOWN” controls to select the second character in the name of the alloy in the typing characters area and press “OK” to confirm. The selected character will be inserted as the second character in the name of the alloy and the position of the third character will be highlighted.
After having completed the name of the alloy, hold down the "OK” button for a few seconds. The cursor will move to the second line “CASTING TEMPERATURE”.
Use the “UP" and "DOWN" controls to increase or decrease the value of the casting temperature. Once the desired temperature value has been reached, press "OK” to confirm. The cursor will move to the “GAS” item.
Use the “UP” and “DOWN” controls to select either “ARGON” or “ABSENT”. This option determines whether the cycle is to be performed with gas dispensing or not. Press “OK” to confirm. The cursor will move to the first character of the name of the “CUSTOMER”.
Use the same writing method to fill out the customer’s name. When finished, press "OK" to move on to the “STREET” field, which will subsequently be followed by the “HOUSE NUMBER”, “POSTAL CODE” and “PROV.” fields.
When finished, hold down "OK" for two seconds to save the inserted data.

5.1.2) DELETING A PROGRAM:
Use the "DOWN" control to select the “DELETE” function and press “OK” to confirm.
The message "PRESS OK TO CONFIRM" will appear on the display; by confirming, all of the program’s contents will be deleted.
Select “EXIT” and confirm by pressing "OK” to return to the previous screen.

5.1.3) EDITING THE PROGRAM:
Select “SET” to edit the contents of a saved program. As previously described, the first character in the name of the alloy will appear highlighted.
If the data to be modified is found on a line further down, hold down “OK”. The cursor will move to the next line.
Every time "OK” is pressed, the cursor will move on to the next field.
Once the field to be modified has been reached, the first character of the field will be highlighted and the cursor in the typing characters area will be in the "right arrow" position; in order to delete the data, use the "DOWN" control to move the cursor in the typing characters area to the pound (#) symbol and press “OK”.
The highlighted first character will be deleted and the cursor will move to the second character.
Press “OK” again to delete the second character and move to the third character.
Repeat this operation until all of the characters have been deleted.
To fill out the field again, use the procedure for completing the fields described above.

6) SETTING THE LABORATORY DATA:
Position the cursor on the “SET LABORATORY DATA” item and press “OK” to confirm.
Screen “E” will appear on the display with the laboratory data to be filled out.

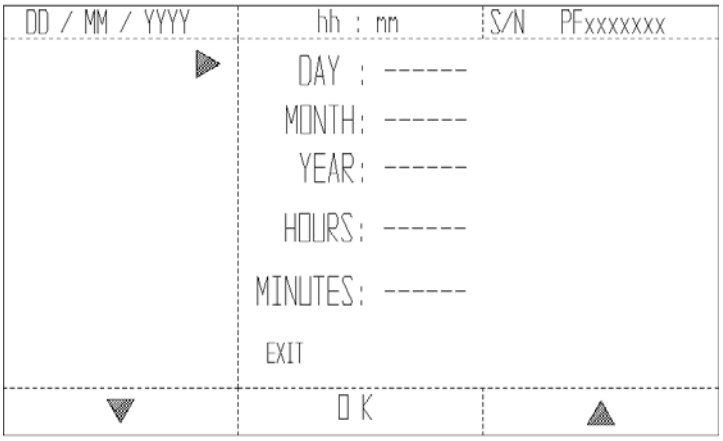


VIDEO E

The fields can be filled out in the same manner as described for the previous screen. This data, along with that of the customer and the relative program parameters, are sent to the SD card during the casting cycle. At the end of the cycle, the user can extract the SD card from the machine and insert it into a computer to view or print the contents.
Position the cursor on the “SAVE” item and press “OK” to confirm. The text will be saved.

7) DATE AND TIME:

Position the cursor on the “DATE AND TIME” item and press “OK” to confirm. Screen “F”



VIDEO F

will appear on the display. Use the cursor to select the field to be modified and press “OK” to confirm. The field will be highlighted.

Use the “UP" and "DOWN" controls to modify the data and press “OK” to confirm.

Position the cursor on the “SAVE” item and press “OK” to update the date and time to the values displayed in zone “A”. The machine’s serial number is set from the technical menu, which cannot be accessed by the user.

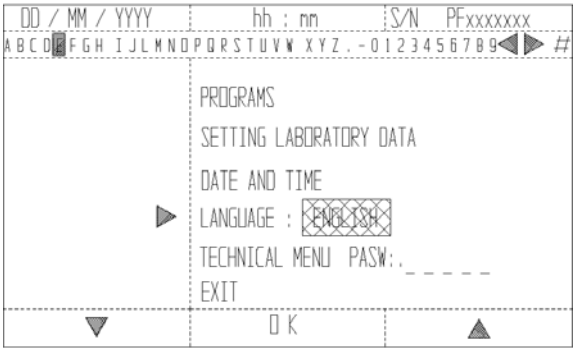
8) LANGUAGE.

Position the cursor on the “LANGUAGE” menu item. The preset language will be shown highlighted screen “G”.

Use the “UP" and "DOWN" controls to scroll through all of the available languages.

After having selected the desired language, press “OK” to confirm.

The screen text will immediately be displayed in the selected language.

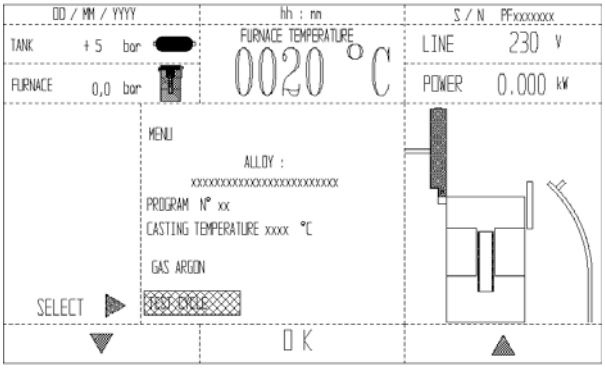


VIDEO G

9) TECHNICAL MENU:
Position the cursor on the “TECHNICAL MENU” item and press “OK” to confirm. The password insertion field will be displayed.
The user does not have access to this menu.

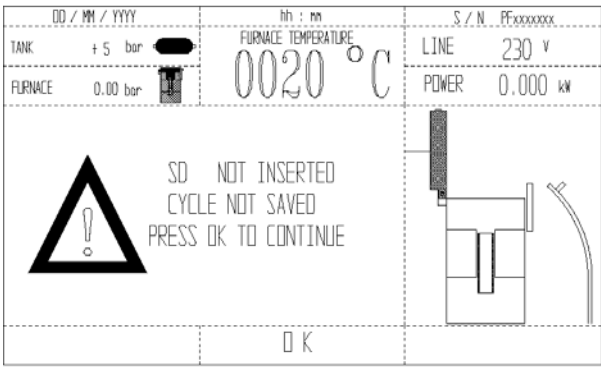
10) EXIT:
Position the cursor on the exit item and press “OK” to return to the previous screen.

11) TEST CYCLE FUNCTIONALITY.
As previously described, the test cycle serves to verify the machine’s mechanical and pneumatic functionality. From screen “B0”, position the cursor on the “TEST CYCLE” item and press “OK” to confirm and activate the cycle.



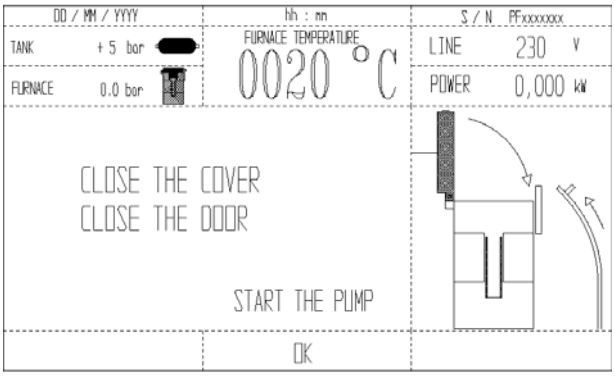
VIDEO B0

If the SD card has not been inserted, screen “R14” will be displayed.



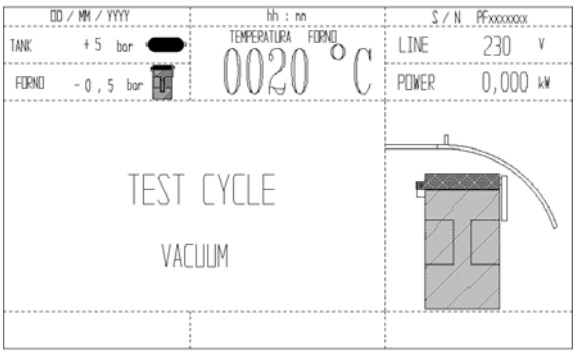
VIDEO R14

Once the SD card has been inserted, screen “P2” will be displayed.



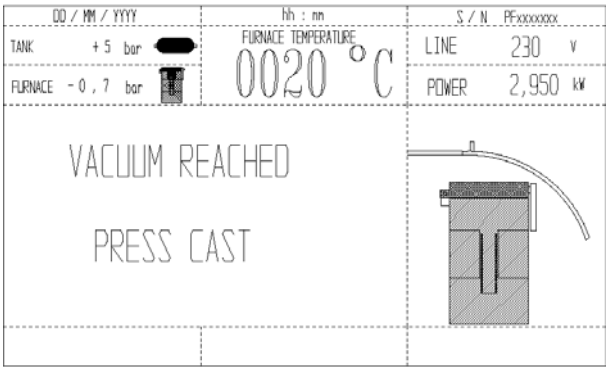
VIDEO P2

Once the instructions on screen “P2” have been performed, screen “P3” will be displayed.
The vacuum pump will activate, the image of the furnace in zone "C” will flash yellow and the furnace symbol in zone “B” will flash yellow while displaying the decreasing pressure value.



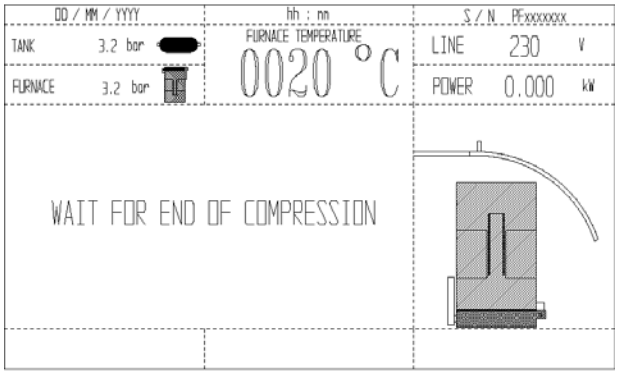
VIDEO P3

Once the programmed value (-0.7 bar) has been reached, the yellow elements will stop flashing, an acoustic signal will sound to indicate that the set vacuum level has been reached and screen “P4” will appear on the display.



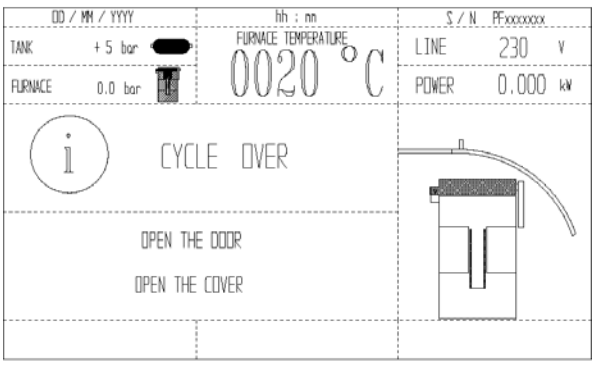
VIDEO P4

By pressing the "CAST” button, the furnace will rotate, as will the image on the screen.
Once the rotation has been completed, compressed air will be emitted into the furnace and the symbols will turn blue. Screen “P5” will be displayed.



VIDEO P5

Once the compression time of 80 seconds has passed, the compressed air will be released.
The furnace will return to its upright position, as will the image on the screen. At this point the furnace image on the screen will turn grey.
Screen “P6” will be displayed.

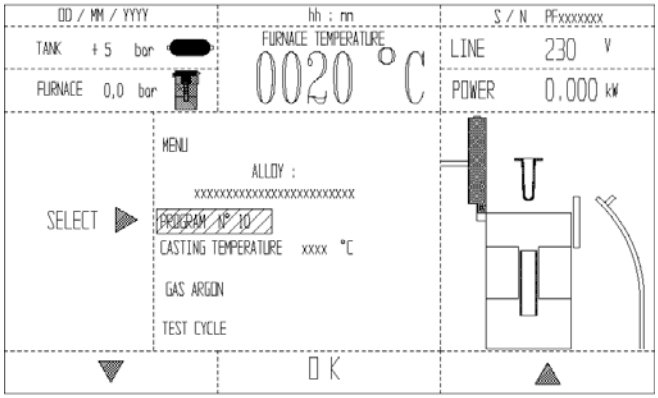


VIDEO P6

Once the compression time of 80 seconds has passed, the compressed air will be released.
The furnace will return to its upright position, as will the image on the screen. At this point the furnace image on the screen will turn grey.
Screen “P6” will be displayed.

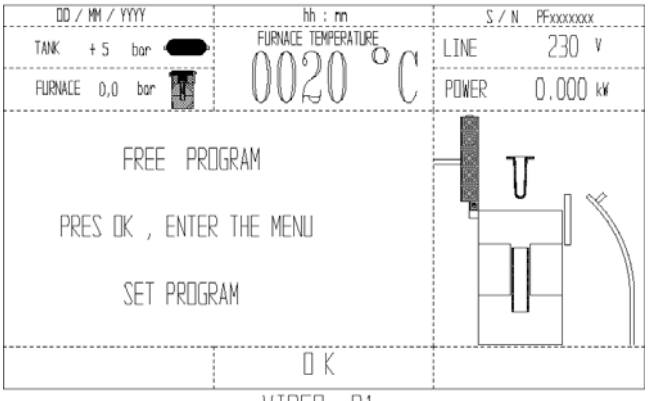
14) FUNCTIONALITY OF THE CYCLE WITH HEATING ENABLED:

Once the desired program has been selected and confirmed from screen "B0", the "START" button must be pressed in order to activate it.



VIDEO B0 SELECT PROG.

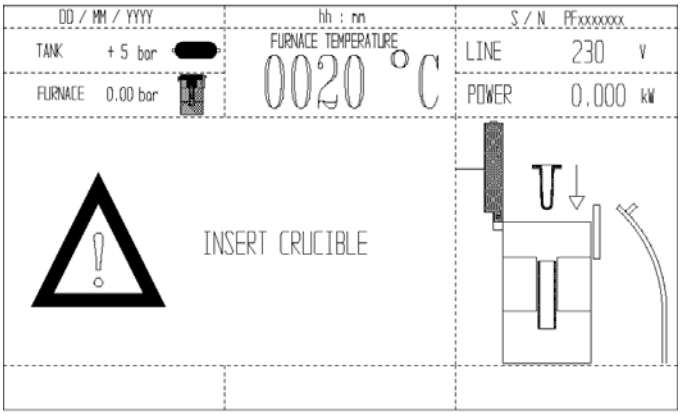
If a non-configured program (empty) is selected by mistake, screen "B1" will appear on the display



VIDEO B1

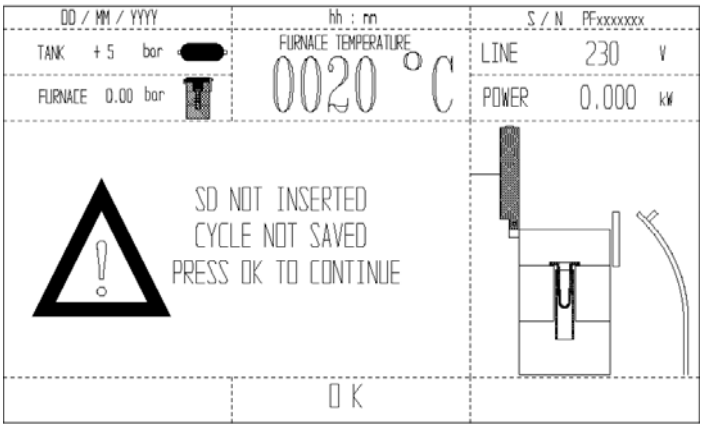
In this case, a configured program must be selected or else the empty program must be configured.

If the selected program has been configured, screen "B2" will appear on the display.



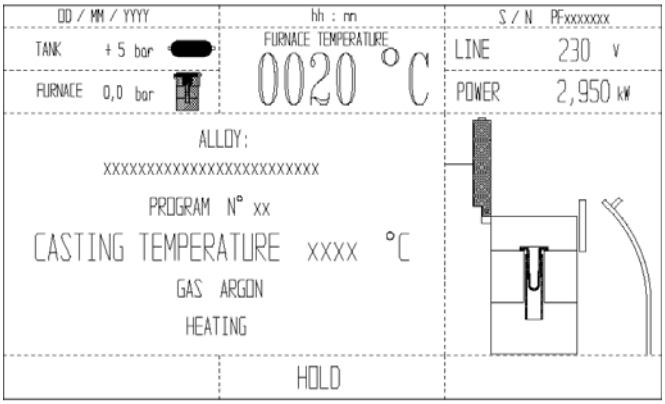
VIDEO B2

Heating must only be initiated with the crucible already inside the furnace.
Insert the crucible and press "OK" to confirm. If the SD card has not been inserted, screen "R14" will appear on the display.



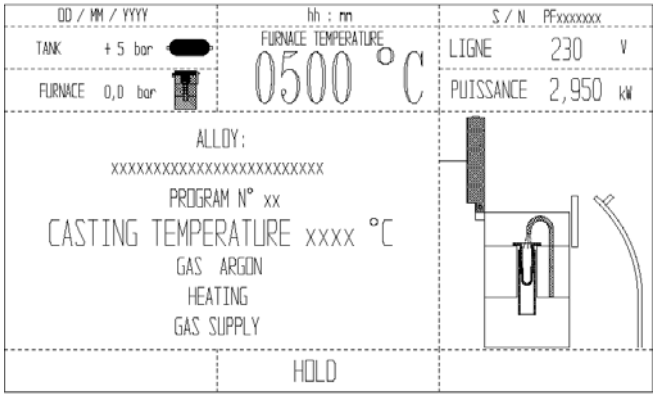
VIDEO R14

Once the SD card has been inserted, or “OK” has been pressed to confirm, screen “B3” will be displayed.



VIDEO B3

Once this screen is displayed the heating of the furnace is initiated. The image of the furnace shows the crucible inserted and the red resistance flashing.
In zone “D”, the message “HOLD” appears in place of “OK”.
In the example, the selected program includes the use of argon gas, as can be seen on the screen.
The gas is dispensed once the temperature of the furnace has reached 500 °C.
Once the temperature of 500 °C has been reached, screen “B4” will appear on the display.

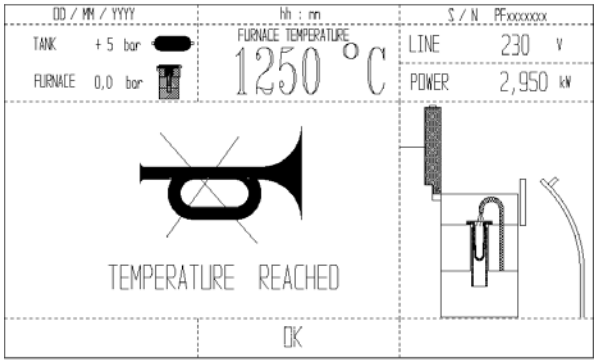


VIDEO B4

The message “GAS SUPPLY” will appear on the display and the pink gas dispensing nozzle will be shown in the image of the furnace.
The temperature of the furnace will continue to increase until the set temperature is reached.

HOLD FUNCTION:
During the heating phase and while the temperature is being maintained, the user can use the button beneath the “HOLD” message to modify the set casting temperature value.
Press "HOLD” to highlight the casting temperature and use the “UP" and "DOWN" controls to adjust the value. When finished, press “HOLD” again to confirm the new setting.

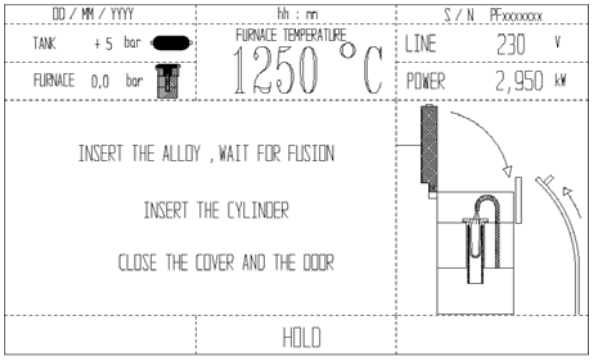
Once the programmed temperature has been reached, screen “B6” will appear on the display.



VIDEO B6

An acoustic signal will advise the user that the temperature has been reached and that the melting of the metal can begin.

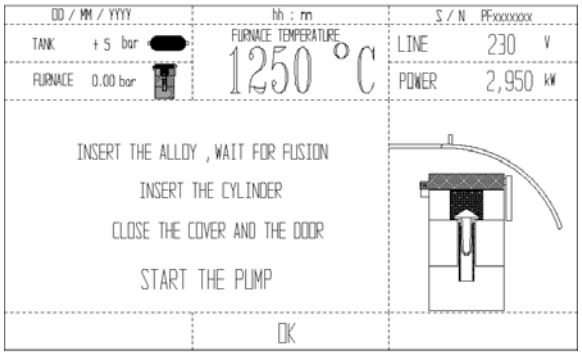
Press “OK” to silence the acoustic signal. Screen “B7” will appear on the display.



VIDEO B7

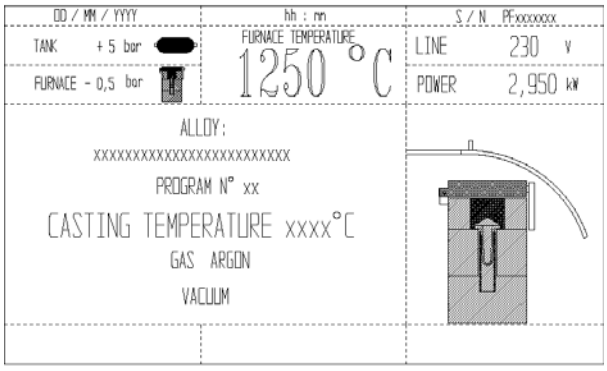
In the image of the furnace, the red resistance will stop flashing and the cover and the door will begin to flash. The dispensing of the gas continues.

Once the metal has been melted, close the cover and the door to stop the gas dispensing. Screen “B7A” will appear on the display.



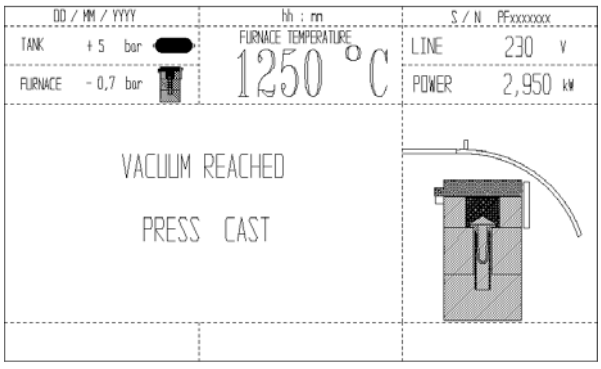
VIDEO B7/A

Press “OK” to confirm. Screen “B8” will appear on the display.



VIDEO B8

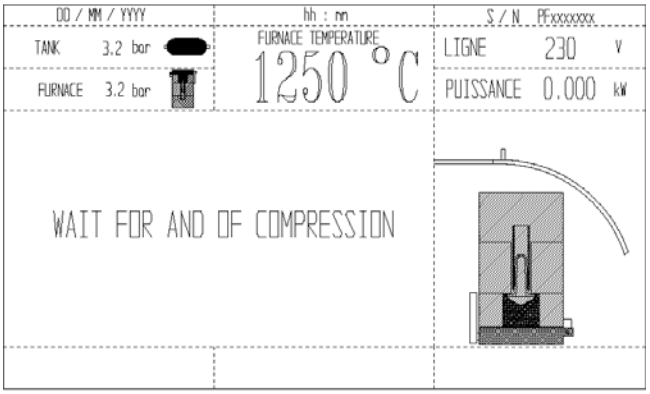
The vacuum pump will activate, the image and symbol of the furnace will flash yellow and the message “under vacuum” will appear in the adjacent area.
Once the vacuum inside the furnace has reached the value of -0.7 bar, screen “B9” will appear on the display.



VIDEO B9

The flashing yellow image of the furnace will stop flashing and the instructions for continuing the process will appear on the side.

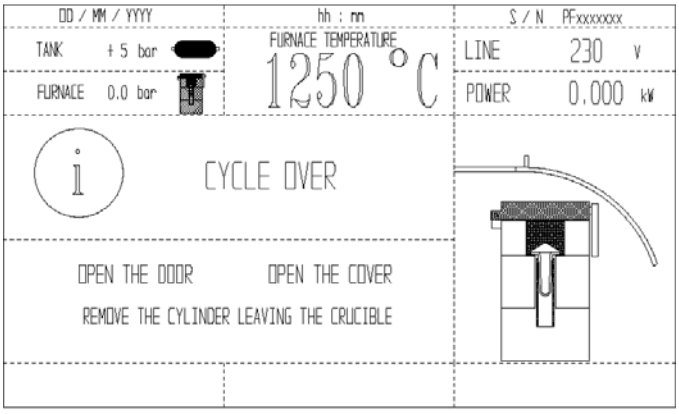
Press the “CAST” button to rotate the furnace. Screen “B11” will appear on the display.



VIDEO B11

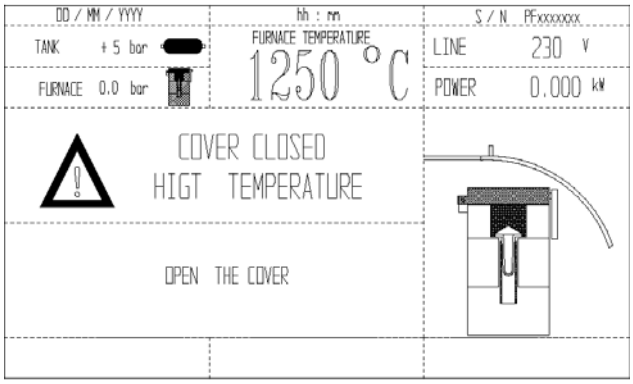
The compressed air in the tank will be emitted into the furnace. The image of the furnace will be displayed upside down and will turn blue, as will its symbol. The heating is stopped.
The furnace symbol also turns blue and the pressure value shown on the side drops due to the effect of the transfer with the furnace.

Once the compression time of 80 seconds has passed, the compressed air is released, the furnace returns to its upright position and an acoustic signal indicates that the process has been completed.
Screen “B12” will appear on the display.



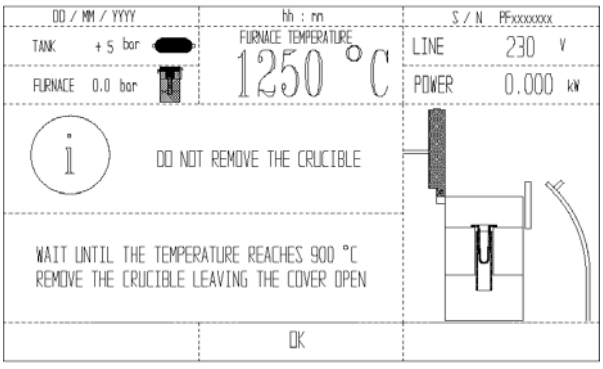
VIDEO B12

The image of the furnace on the screen will return to its upright position and will turn grey, as will the symbols.
The compressed air tank will be reloaded and its pressure value will appear next to its symbol.
The operator must perform the indicated operations within fifteen seconds or else an alarm screen (R7) will appear on the display accompanied by a continuous alarm. See the alarms section.



VIDEO R7

Press “OK”. Screen “B13” will appear on the display.
Removing the crucible while the temperature of the furnace is above 900°C produces a chimney effect which reduces the efficiency of the resistance.
Allowing the furnace to cool completely with the crucible inserted can result in the crucible bonding to the resistance, with the risk of damaging the resistance itself. In fact, as described in the maintenance section, the removal of the crucible must be performed with the utmost care.

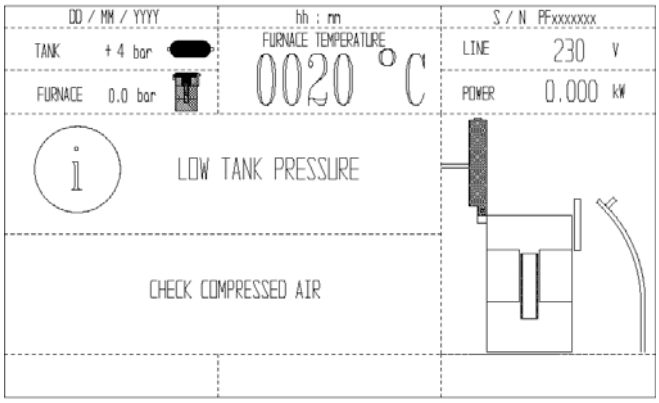


VIDEO B13

The cycle is saved on the SD card, if inserted. Otherwise it will be lost.
The cycle is saved to a text file, which appears as follows.

```
-
TECNO-GAZ INDUSTRIES

ASM30  S/N PFxxxxxxx
VERSION xxx


LABORATORY:xxxxxxxxx
      STREET:xxxxxxxxx
    POSTCODE:xxxxxxxxx
       PROV.:xxxxx

CUSTOMER DATA:
       NAME:xxxxxxxxx
     STREET:xxxxx
    POSTCODE:xxxxxx
       PROV:xxxxx

      DATE:xx-xx-xxxx

     ALLOY:xxxxxxxxxxxxxxxxxxxxxxxx

   HEATING:
      START xx:xx   xxxx C
        END:xx:xx   xxxx°C

MAINTENANCE:
      START: xx:xx   xxxx °C
        END:xx:xx   xxxx °C

    VACUUM:
  SET VACUUM:-0.7  Bar
      START:xx:xx
        END :xx:xx
 CAST VACUUM :-xxxx  Bar

COMPRESSION:
      START :xx:xx
        END :xx:xx
     P. MAX :xxx Bar

      CYCLE OK
-
```

15) SITUATIONS WHICH MAY OCCUR DURING FUNCTION ERRORS AND ALARMS, CAUSES AND SOLUTIONS



VIDEO R1

CAUSES:

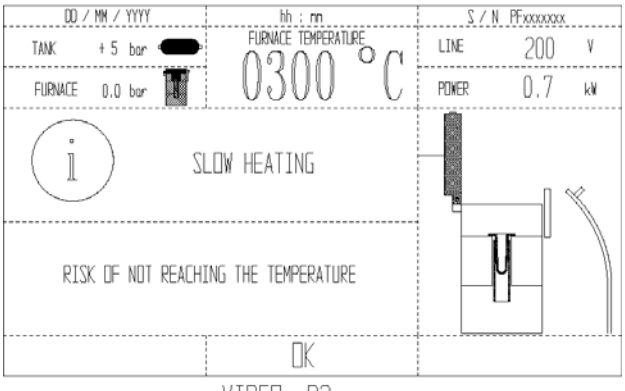
This warning appears when the cycle is activated ("START") and throughout the entire phase prior to the "CAST" command if the pressure in the tank is less than 5 bar.

If the pressure decreases after the "CAST" command, the warning will not be displayed and the cycle will continue.

SOLUTIONS:

Check the compressed air line's connection and the line pressure.

This warning automatically disappears once the minimum pressure value (6 bar) has been restored.



VIDEO R2

CAUSES:

This situation occurs if the power supply voltage is less than 200 V or if the resistance is burnt out when the cycle is activated.

SOLUTIONS:

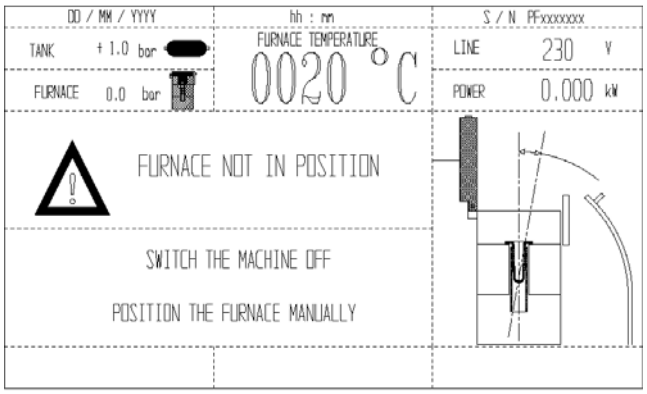
Do not interrupt the heating. The phenomenon disappears when the heating is greater than 0.5°C per minute.

Check the voltage of the mains electrical network; shut off other utilities in function within the laboratory; verify the characteristics of the electrical system.

Press “OK” to view screen B3 or B4.

If the power supply voltage meets the requirements, contact our technical assistance service and send the contents of the SD card by e-mail.

If the furnace has not reached its set temperature after 30 minutes of heating, the heating process will be interrupted and screen R9 “HEATING INTERRUPTED TEMPERATURE NOT REACHED” will appear on the display.



VIDEO R3

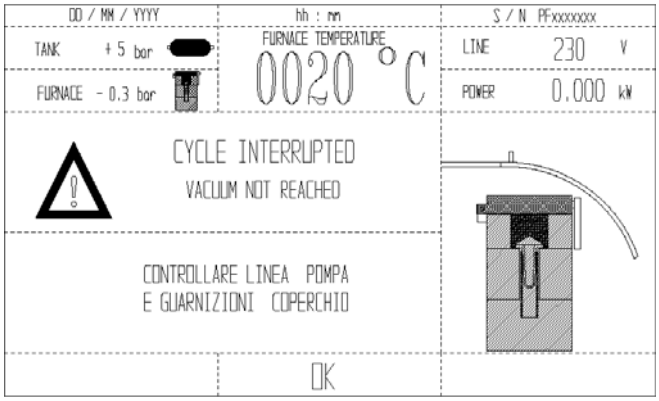
CAUSES:

This alarm occurs if the furnace is not in vertical position.

it often occurs during the START UP phase or whenever the base of the furnace is moved from its vertical position when releasing the air from the tank.

SOLUTION:

Use the "OFF" command to shut off the machine and position the furnace manually. With this operation, the compressed air is fed into the tank and the furnace is kept in position.



VIDEO R4

CAUSES:

This screen appears when the pressure of the furnace has not reached the value of -0.7 bar after 60 seconds from the pump's activation.

An acoustic signal will indicate that the cycle has been interrupted.

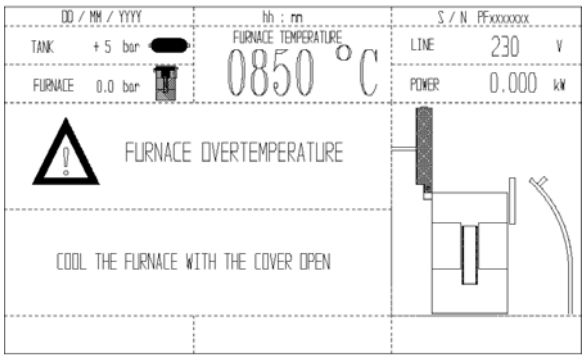
SOLUTIONS:

Press "OK". Screen R6 "COVER CLOSED" will appear on the display. Open the door and the cover.

Remove the cylinder, allow the furnace to cool, remove the crucible and check the cover seal.

Before repeating the cycle, run a test cycle and check to make sure that there is no leakage from the pump or its connections.

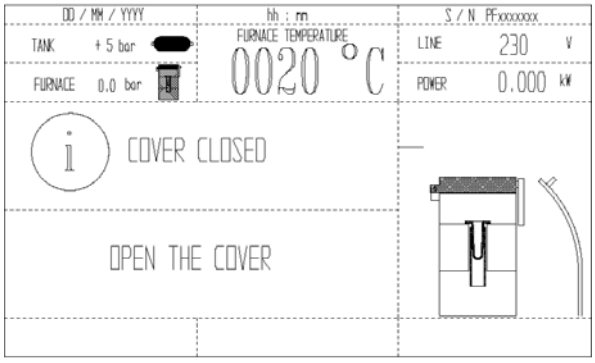
If the defect should persist, contact our technical assistance service and send the contents of the SD card by e-mail.



VIDEO R5

CAUSES:
This screen appears after the "START" command has been given whenever they furnace's external temperature exceeds the value of 100°C.

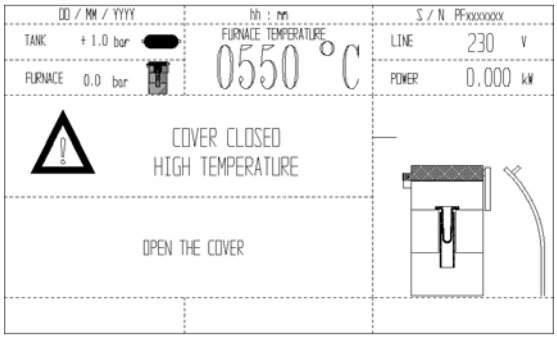
SOLUTIONS:
The machine must be left on in order to allow the fan to cool the furnace.
In this situation, all of the controls are inhibited. Once the furnace has cooled and the temperature has reached the value of 40°C, video B0 will appear on the display.
It is also possible to shut off the machine using the "OFF" command. In this case, the fan will remain in function and will shut off automatically once the furnace has cooled.
ATTENTION: Do not disconnect the main power supply (switch pos. 22 Fig.3) .
If the main power supply is disconnected, the fan will stop and the accumulated heat will not be eliminated.
The alarm does not appear while the cycle is in progress, even if the furnace is overheating, and the cycle continues.



VIDEO R6

CAUSES:
This screen appears when the cover is closed while the furnace is heating up.

SOLUTIONS:
Open the cover. The screen will disappear and screen B3 or B4 will appear on the display.
If the cover is not opened within 10 seconds of the warning, the heating phase will be interrupted.
Open the cover. Screen B0 will appear on the display. Press "START" to restart the cycle.



VIDEO R7

CAUSES:

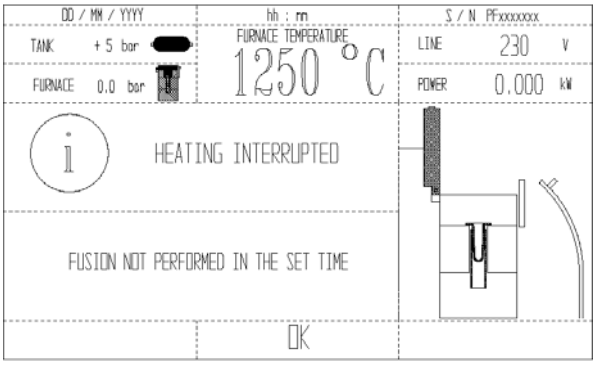
If the cover is not opened within 10 seconds from the end of the cycle, screen R7 will appear on the display.

If the cover is closed while the temperature of the furnace is above 500°C, screen R7 will appear on the display after 10 seconds.

The image of the furnace will flash and will be accompanied by a continuous acoustic signal.

SOLUTIONS:

Open the cover. Screen B0 will appear on the display.



VIDEO R8

CAUSES:

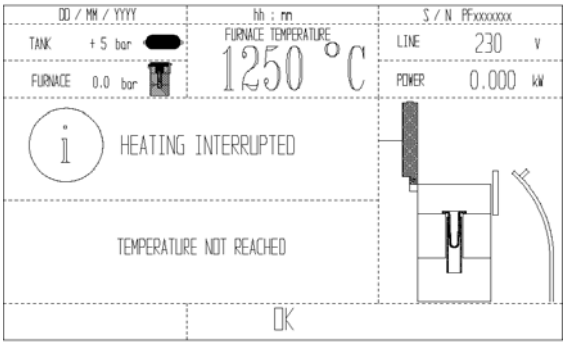
This screen appears on the display if the operator has not performed the manual work and has not closed the cover within 10 minutes once the melting temperature has been reached.

SOLUTIONS:

The cycle has been interrupted. The portion of the cycle which has been carried out will be saved on the sd card along with the message "CYCLE INTERRUPTED".

Another cycle must be performed.

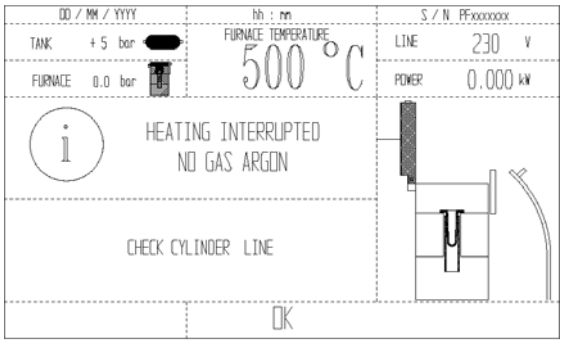
Press “OK”. Screen “B0” will appear on the display. Press "start" to activate the same cycle.



VIDEO R9

CAUSES:
As stated in the description of the screen R2, if the heating process takes place slowly and the furnace has not reached its programmed temperature after 30 minutes, the heating process will be interrupted.

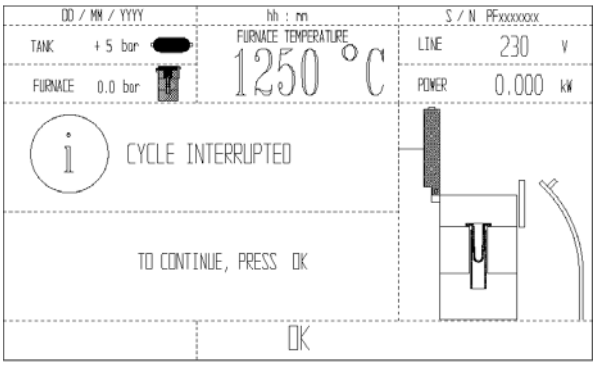
SOLUTIONS:
See screen R2



VIDEO R10

CAUSES:
If the melting program requires the use of argon gas and the gas is not present once the temperature has reached 500°C, the heating process will be interrupted and screen R10 will appear on the display.

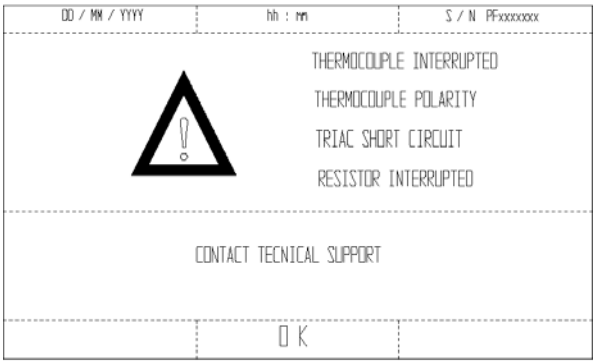
SOLUTIONS:
Check : the connection of the gas cylinder, make sure that the tap is open and make sure that the cylinder is full.
The cycle must be repeated. Press "OK" to return to screen B0 and press "START" to restart the cycle.
The message "CYCLE INTERRUPTED LACK OF ARGON GAS" will appear on the SD card.



VIDEO R11

CAUSES:
This screen appears when the operator interrupts the cycle by holding down the "START/STOP" button for three seconds.

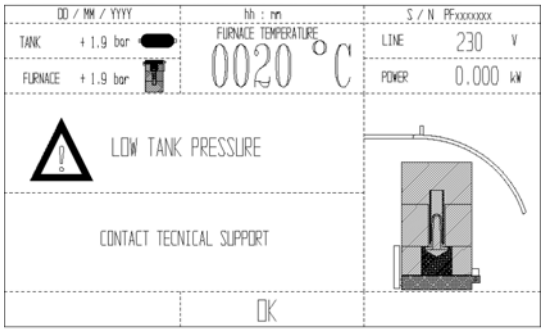
SOLUTIONS:
Press “OK”. if the cover is closed, screen R6 or R7 will appear on the display. open the cover. screen B0 will appear on the display.
Press “START” to restart the cycle. the message "cycle interrupted" will appear on the SD card.



VIDEO R12

CAUSES:
The causes that lead to the listed malfunctions are numerous and cannot be managed by the user.

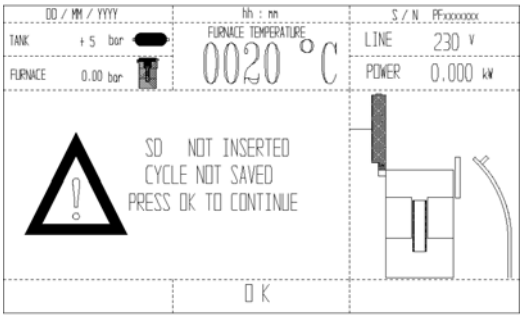
SOLUTIONS:
Press "OK", contact our technical assistance service and send the contents of the SD card by e-mail.



VIDEO R13

CAUSES:
Significant leaks in the compressed air circuit.
This screen appears whenever a leak takes place during the heating phase and the pressure in the tank drops below five bar, or else whenever the value of the pressure in the tank is less than two bar during the "cast" phase.

SOLUTIONS:
As the malfunction involves the machine's internal components, the user is required to contact technical assistance.



VIDEO R14

CAUSES:
Sbsence or irregular insertion of the SD (secure digital) card.

SOLUTIONS:
Insert or check the proper insertion of the SD card within the appropriate slot.

Sec.18 MAINTENANCE AND SPARE PARTS

1) ROUTINE MAINTENANCE

The casting machine does not require any special maintenance operations.
The components which are most vulnerable to wear and dirt include:
a) the seal of the furnace's cover Fig. 1, Pos.10 , Cod. CM50062
b) the cover of the muffle Fig. 1 , Pos.13
c) the crucibles
d) the vacuum pump. Fig. 14

Before performing any maintenance operations, use the main switch (Fig.3, pos.22) to shut off the electrical power supply and make sure the furnace is cool.

The seal of the furnace's cover serves to ensure the air-tightness of the vacuum and pressurisation within the furnace.
Before each melting operation, make sure that the seal is in its proper lodging and check that it is not dirty and does not show signs of wear.
The seal must be periodically removed from its lodging, using a small PLASTIC TOOL with rounded edges in order to avoid cutting the seal and scratching the lodging.
Clean the seal's lodging, check its integrity, lubricate it with silicone spray and reinstall it.
After melting operations, the cover of the muffle may have traces of residues upon it;
These residues must be removed with the suction unit without allowing them to fall into the muffle.
If the residues should fall into the muffle it is unlikely that they will damage or compromise the functionality of the machine; excessive accumulations, however, must be avoided.
ATTENTION: perform this operation with the oven cold. Do not insert the vacuum into the crucible chamber as this could damage the resistance.

If the crucibles are not removed while the furnace is hot, they must be removed with particular care as they could bond to the furnace's resistance during the cooling phase.
In these situations, the crucible must be removed with extreme care in order to avoid damaging the resistance; do not force it.
If the crucible cannot be extracted freely, it has either bonded to the resistance or there is excessive interference.
In order to extract it without damaging the resistance, reheat the furnace and gently move the crucible until it is able to be extracted.
If the crucible should have bubbles on its external surface, these must be scraped away.

The above operation should only be performed if the crucible is still reasonably new and in good condition; otherwise it should be replaced.
The vacuum pump does not require maintenance.

2) SPECIAL MAINTENANCE

THESE OPERATIONS MUST BE CARRIED OUT BY AUTHORIZED PERSONNEL.

THE MACHINE MUST UNDERGO AN INTERNAL CLEANING AND A GENERAL OVERHAUL EVERY SIX MONTHS, IF SUBJECTED TO HEAVY WORK LOADS, OR ONCE A YEAR IF USED IN A LIMITED MANNER.
THESE INTERVENTIONS ARE MANDATORY IN ORDER TO GUARANTEE THE MACHINE'S SAFETY AND PROPER FUNCTIONALITY.

FAILURE TO RESPECT THE ABOVE REQUIREMENTS WILL AUTOMATICALLY VOID THE MACHINE'S WARRANTY. "TECNO – GAZ" SHALL BEAR NO RESPONSIBILITY FOR ANY PERSONAL INJURIES OR DAMAGES RESULTING FROM LACK OF MAINTENANCE.

IT IS FORBIDDEN TO OPEN THE MACHINE'S LATERAL DOOR, TO REMOVE ITS CASING AND TO PERFORM ANY INTERVENTIONS UPON THE MACHINE, WHETHER INTERNAL OR EXTERNAL.

UNAUTHORIZED INTERVENTIONS SHALL BE CONSIDERED AS TAMPERING AND WILL AUTOMATICALLY VOID THE MACHINE'S WARRANTY. "TECNO – GAZ" SHALL BEAR NO RESPONSIBILITY FOR ANY PERSONAL INJURIES OR DAMAGES RESULTING FROM SUCH INTERVENTIONS.

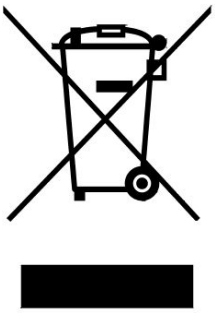
3) SPARE PARTS.
All of the included and optional accessories can be supplied as spare parts.
The mechanical, electrical and electronic spare parts are only available for repairs to be carried out by authorised personnel.
As previously stated, any unauthorised maintenance work shall be considered as tampering and will be subject to the relative consequences (see warranty).

Sec. 19 DEMOLITION AND DISPOSAL

Directive regarding waste deriving from electrical and electronic equipment (RAEE)

Pursuant to DIRECTIVE 2002/96/EC, this symbol indicates that, at the end of its working life, the product must not be disposed of as urban waste.

The machine may be delivered to a specialized centre for the recycling of electrical and electronic equipment or else returned to the reseller when purchasing an equivalent product.



The owner of the equipment is responsible for delivering it to an appropriate waste disposal facility.

For more detailed information regarding waste collection systems, contact your local waste disposal service.

The proper disposal of unused equipment serves to prevent negative consequences for the environment and human health.

Any violations will be prosecuted according to law

The casting machine is made up of metallic materials and inert electromechanical components. **The muffle's thermal insulation is a ceramic fibre composite and contains no asbestos or derivatives. As the product is classified as a potential health risk, it must be handled under conditions of complete operator safety (personal protection equipment with respiratory mask). Once removed, the muffle must be inserted into a plastic bag and sealed in an airtight fashion.**

In addition to the electronic components, the electronic board also contains a mini battery. For the disposal of the machine's components, contact an authorised waste collection facility and dispose of the materials in compliance with the current laws in the machine's country of use.

DO NOT LEAVE THE MACHINE IN UNATTENDED AREAS OR IN UNSTABLE OR DANGEROUS POSITIONS.

Sec. 20 COMPRESSED AIR TANK

1. Read the data engraved upon the tank or contained on its data plate. The tank may not be used with pressure (PS), maximum temperature (Tmax) and minimum temperature (Tmin) values beyond those which are indicated on the data plate.
2. The user must take care to maintain the container's efficiency and integrity.
3. This document must be kept on file and must always accompany the tank so that it may be produced if requested by the competent authorities.
4. In case of fire, the user is responsible for ensuring that the tank will be depressurized as soon as the fire has begun.
5. It is strictly forbidden to perform welding operations upon the parts of the tank which are subject to pressure.

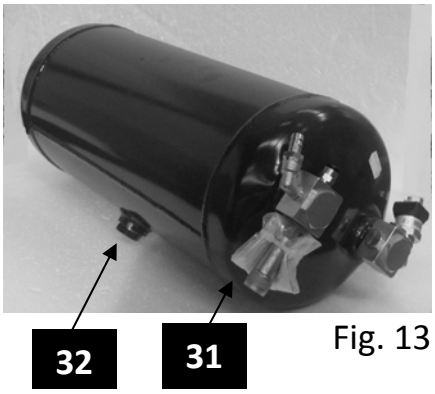


Fig. 13

6. The user must keep the tank properly purged: The condensation must be drained once a year by unscrewing the drain cap beneath the tank Fig 1- Fig.13 pos.32. This operation must be carried out after the tank has been depressurised.
7. The tank is designed for storing compressed air. The calculation has been performed based on the tank alone, with no additional loads.
8. Declaration of Conformity.

PERIODIC INSPECTION OF THE SAFETY VALVE (Fig.13 pos.31)

The safety valves must be tested periodically in order to ensure that their proper operating efficiency is maintained. To this end, they must be opened manually using the lever or the opening ring;

This test must be carried out with the protected device being maintained at a pressure value of 80% to 90% of the valve's calibrated value.

The valves must open decisively, with abundant fluid leakage, and must close again tightly once the lever has been released or the ring has been screwed back in. The manoeuvre must be brief and must not be performed repeatedly. The intervals at which this operation should be performed depend on the conditions of the system (the likelihood that the valves may become dirty or the salts contained in the water or various fluids may be deposited).

Upon the system's initial activation, the tests should be performed more frequently (on a daily basis) and can gradually be performed less frequently as long as the system shows no signs of problems.

The original certification document is attached to the valve itself.

Sec.21 VACUUM PUMP

ART.6180F

Fig. 14

THE VACUUM PUMP “ART. 6180F” FURNISHED BY “TECNO-GAZ” IS AN INTEGRAL PART OF THE ASM30 CASTING MACHINE.
IT CAN BE ADAPTED FOR INSERTION WITHIN THE CASTING MACHINE’S SUPPORT STRUCTURE, ART. 6044F OR 6047F .
THE USE OF OTHER PUMPS IS FORBIDDEN.

TECHNICAL CHARACTERISTICS

1) ELECTRICAL:

POWER SUPPLY VOLTAGE	230 V ~
PHASE	1 + Neutral
FREQUENCY	50 Hz
POWER SUPPLY	405 W
POWER CABLE	2X1 mm² + t
CONNECTOR PLUG	16 A + t

2) PNEUMATIC:

MAX VCACUUM	-0.914 bar
SUCTION ATTACHMENT “rilsan tube”	Ø 6/8

3) MECHANICAL:

HEIGHT	250 mm
LENGTH	260 mm
WIDTH	165 mm
WEIGHT	12 kg

FOR THE INSTRUCTIONS REGARDING THE PUMP ART. 6180F, SEE THE SUPPLIED USER AND MAINTENANCE BOOKLET.

Sec. 22 WARNINGS SUMMARY

1) OPERATING PRECAUTIONS:

01)	Check the status of the furnace cover's seal before each melting operation.
02)	The heating of the furnace must take place with the cover open and the crucible inserted.
03)	Do not insert cold crucibles into the hot furnace.
04)	Once the casting has been completed, do not remove the crucible from the furnace until the temperature has dropped below 900°C.
05)	Do not use defective crucibles.
06)	Use the supplied bases for lining the cylinders.
07)	Follow the instructions to determine the casting temperature.
08)	Perform the melting operations immediately once the furnace has reached its programmed temperature.
09)	When placing the metal inside the crucible, avoid dropping it from high above.
10)	Cool the furnace with its cover open.
11)	**Only use original spare parts.**

2) OPERATOR SAFETY PRECAUTIONS:

01) Only use the machine in a well lit area.
02) The machine must only be used by responsible adults.
03) Do not place objects on the machine while it is in function.
04) The machine is designed for use by one operator only.
05) Do not install the machine in restricted and/or poorly ventilated areas.
06) The operator must not interfere with any third parties during the work phases.
07) Always use the necessary personal protection equipment.
08) Keep flammable substances and/or potentially explosive containers at a safe distance from the machine.
09) Do not use the machine in locations at high risk of explosion.
10) Do not touch the high temperature surfaces indicated with the warning "hot surfaces".
11) The heating and cooling operations must take place with the cover open. Beware of the hot air and thermal radiation emissions.
12) The hot objects used in the process must be stored in safe locations and indicated with appropriate signs.
13) Do not wash the machine with water or other detergents: “risk of electrical shock”.
14) Never open the lateral door before having disconnected the machine’s electrical plug.
15) Do not insert any other objects besides the crucible into the furnace.
16) If the upper door does not open at the end of the cycle, do not force it; press the "off" button to shut off the machine and call the assistance service.
17) Do not disconnect the plug while the machine is in function.
18) When moving the machine, use the following procedure: turn off the main switch, disconnect the electrical cable and the vacuum pump’s plug; disconnect the air tubes.
19) the excessive overheating of the molten metal will cause it to burn and to emit sparks and toxic gases.

Sec. 23 USE OF THE CRUCIBLES

1) DESCRIPTION:

As previously indicated, the heating of the furnace must take place with the cover open, the door open **and the crucible inserted within the appropriate compartment**.
The crucible must be inside the furnace for two fundamental reasons:
1) the temperature of the crucible must increase gradually, without subjecting it to thermal shock.
2) without the crucible, due to the chimney effect, the furnace dissipates more energy to reach the programmed temperature and the resistance can deteriorate more rapidly, especially at high temperatures.
If the furnace is already hot and a new crucible must be inserted, the crucible must first be heated in another furnace and then inserted into the casting machine.
The crucibles which are supplied along with the casting machine include the following:
a) Graphite crucible with crucible holder.
b) Alumina crucible.
c) Carborex crucible.

a) GRAPHITE CRUCIBLE
The graphite crucible impedes the oxidation of the metal and is therefore **used to melt gold resin and white alloy**. Graphite is a carbon state which, when heated, reacts with the oxygen in the air to create oxide and carbon dioxide. As both of these elements are heavier than air, they remain stagnant within the crucible above the molten metal, thereby protecting it against contact with the air itself.
Carbon monoxide CO reduces the metallic oxides which are already present within the alloy.
Carbon dioxide CO2 is an inert gas which does not react with its surrounding substances and protects them. Once the melting process has been completed, remove the graphite crucible from the crucible holder and put it in a safe place to allow it to cool. As the crucible remains in contact with the oxygen in the air while cooling, it continues to react with it and deteriorate unnecessarily. In order to reduce this phenomenon, the cooling process should be performed in the absence of oxygen by placing the crucible under a small cover. **DO NOT COOL THE GRAPHITE CRUCIBLE IN WATER**.

b) ALUMINA CRUCIBLE
Used for melting **gold ceramic with or without palladium**.

c) CARBOREX CRUCIBLE
Used for melting **non-precious alloys**; **cobalt-chromium (stellite) and chromium-molybdenum-nickel.**

2) VITRIFICATION OF THE CRUCIBLES

In order to improve the flow of the molten metal in **new** alumina and carborex crucibles, a vitrification process can be performed upon the internal surfaces in the following manner: 1) Purchase a packet of boric acid from a pharmacy (or pulverize 2 HERA tablets)

2) Mix it with a few drops of ethyl alcohol (food grade alcohol)

3) Use a flat brush to spread the mixture onto the internal surface of the crucible, including the rim.

4) Gradually heat the furnace from room temperature to 1000°C and maintain it at this temperature for 10 minutes.

⚠ Excessive quantities of borax will decrease the quality of the melting process. Deposits on the bottom of the crucible can also compromise the outcome of subsequent melting processes.

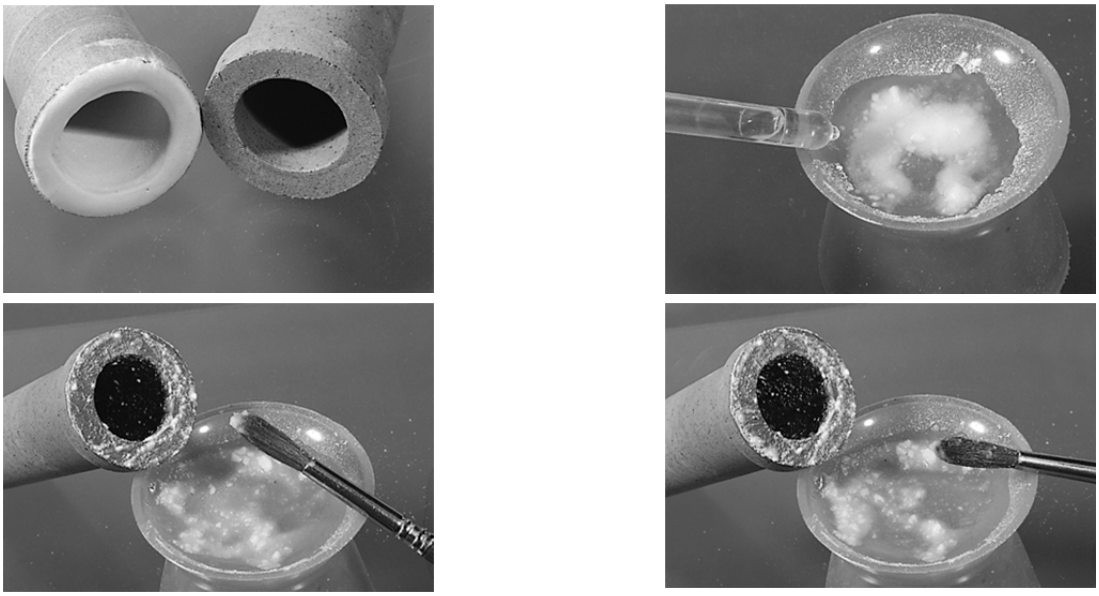


Fig. 13

3) PRECAUTIONS FOR THE USE OF THE CRUCIBLES

1) Each crucible must only be used for one type of alloy.

2) The crucible must not remain in the hot furnace beyond the time required to carry out the process.

⚠ 3) Prolonged exposure to heat will deteriorate the crucible; bubbles may form which could interfere with the furnace's resistance and even damage it. Remove any bubbles with fine sandpaper or another similar tool.

Before each melting operation, make sure that the crucible is not deformed, swollen or cracked.

5) Do not use defective or altered crucibles. The rupture of the crucible and subsequent leakage of metal can seriously damage the machine's heating components; such damage will not be covered by warranty.

6) Replace the crucible after a reasonable number of melting operations have been performed.
7) Once the melting process has been completed, remove the crucible, shut off the machine and allow it to cool with the cover open.

4) DISPOSAL OF THE CRUCIBLES.

The materials used for manufacturing the crucibles are inert.
Their disposal must be carried out in compliance with the current laws.

Sec. 24 INSTRUCTIONS FOR THE PREPARATION OF THE WAX MOULD

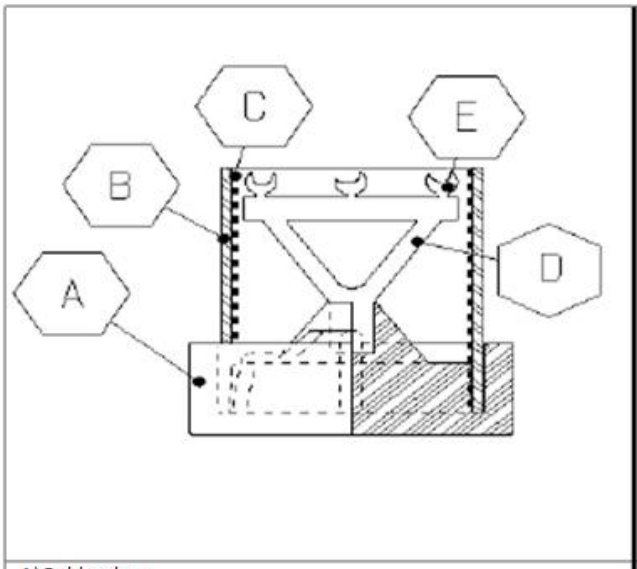
In order to perform optimal loading operations with the casting machine, the operator must know: It is not important that sprueing be performed with the stabiliser bar, with the handwheel, with the "S" sprue or with the straight sprue, as long as the passages allow the molten metal to flow freely.
The types of sprues with which we have seen the best results include: Stabiliser bar, handwheel and "S" sprue typologies (Fig.B). For these types of sprues, we recommend passages with diameters of **3.5 to 4 mm**.
The diameter of the passage varies according to the fluidity of the alloy and the thickness of the object.
Naturally, large passages provide for improved fluidity of the alloy, as well as an ideal compensation for any occlusive thickness in the elements to be produced (Figure C).
Another reason for which we recommend casting sprues with the diameters indicated above is thermal holding, which allows for the improved fluidity of the alloys.

⚠ Only use the bases supplied along with the machine for lining the cylinders.
The special shape of the cone provides for perfect coupling with the crucible.
Do not make vent channels for the gases.
Do not make the liner protrude from the cylinder.

LINING

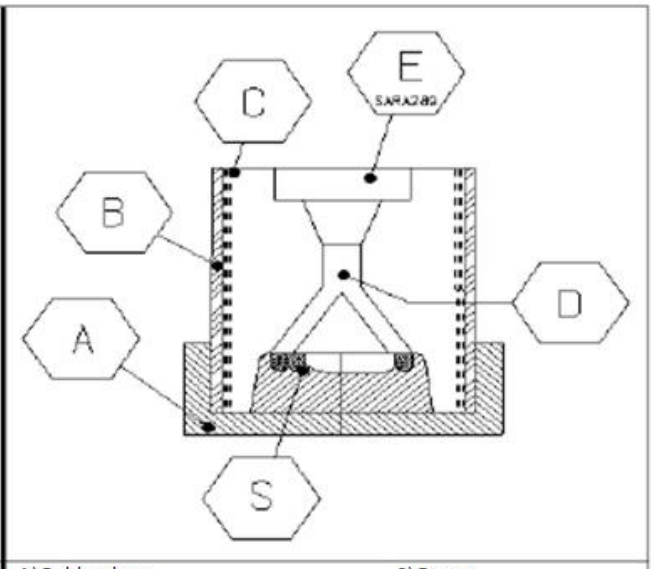
Fig.A

Elements



A) Rubber base
B) Cylinder
C) Liner
D) Casting sprues
E) Elements

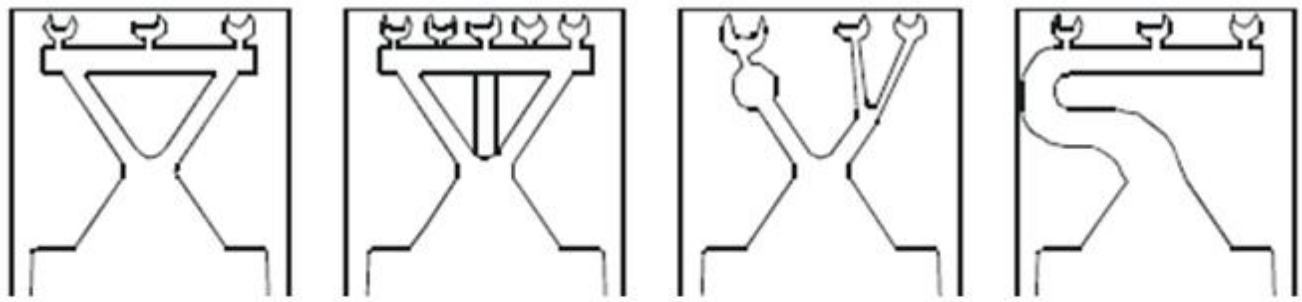
Frame



A) Rubber base
B) Cylinder
C) Liner
D) Casting sprues
E) Capping base
S) Frame

KNOWN AND USEABLE SPRUEING TECHNIQUES

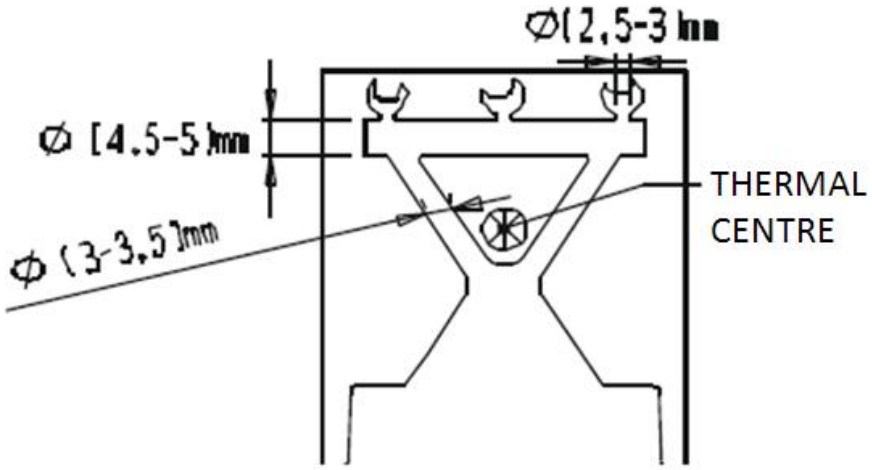
FIG.B



BAR HANDWHEEL STRAIGHT PIN "S" PIN

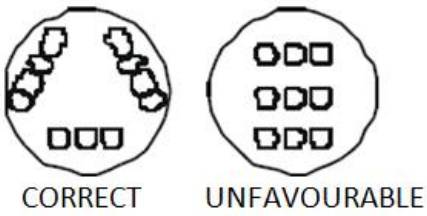
CYLINDER CROSS-SECTION WITH THE RELATIVE DIAMETER MEASUREMENTS RECOMMENDED FOR THE CONNECTION SPRUES

FIG.C



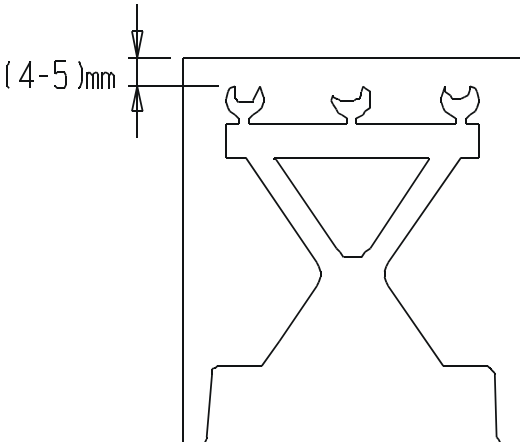
The elements to be obtained must be located in the coldest portion of the cylinder, or rather away from the thermal centre, as shown in FIG.D

FIG.D



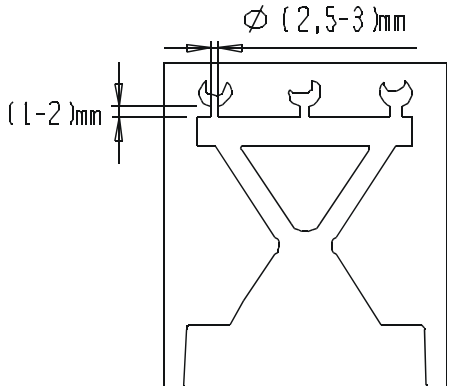
The elements to be obtained must be 4-5mm from the top of the cylinder, as indicated in FIG.E

FIG.E



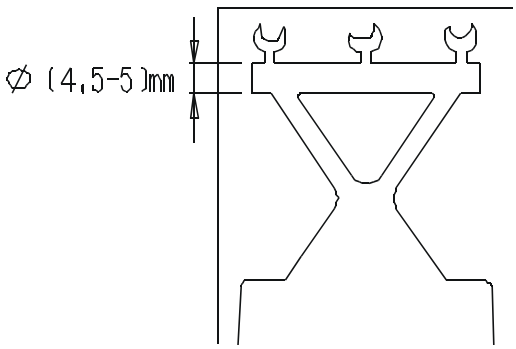
The connection channel between the elements to be obtained and the compensation reserve (stabilizing bar) must be as short as possible (recommended length 1 - 2 mm), so as to allow the molten metal to continue to supply the element during the resolidification phase and the subsequent extraction phase.
The ideal diameter of the element/reserve connection channel is 3.5-4 mm, as shown in FIG.F

FIG.F



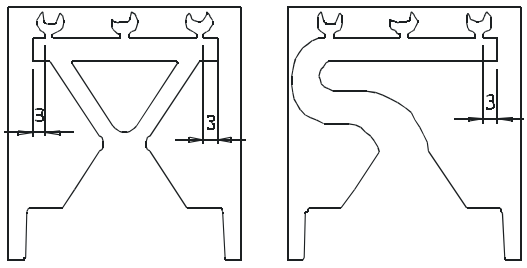
The bar or the sprue must have a diameter of 4.5-5 mm, so as to provide a uniform supply for the extraction of the elements during cooling (see FIG.G).

FIG.G



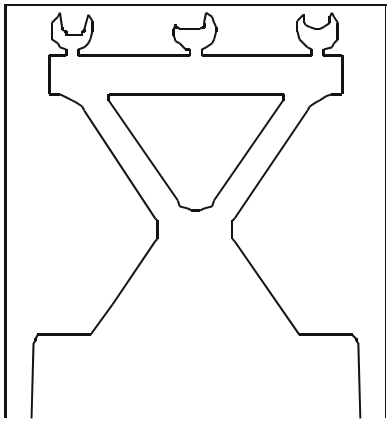
A detail which should be observed in the sprueing is the continuing of the stabilizing bar or sprue for 2 – 3 mm beyond the last element/reserve attachment, so as to also provide this last element with the necessary compensation during the cooling phase (see FIG.H).

FIG.H



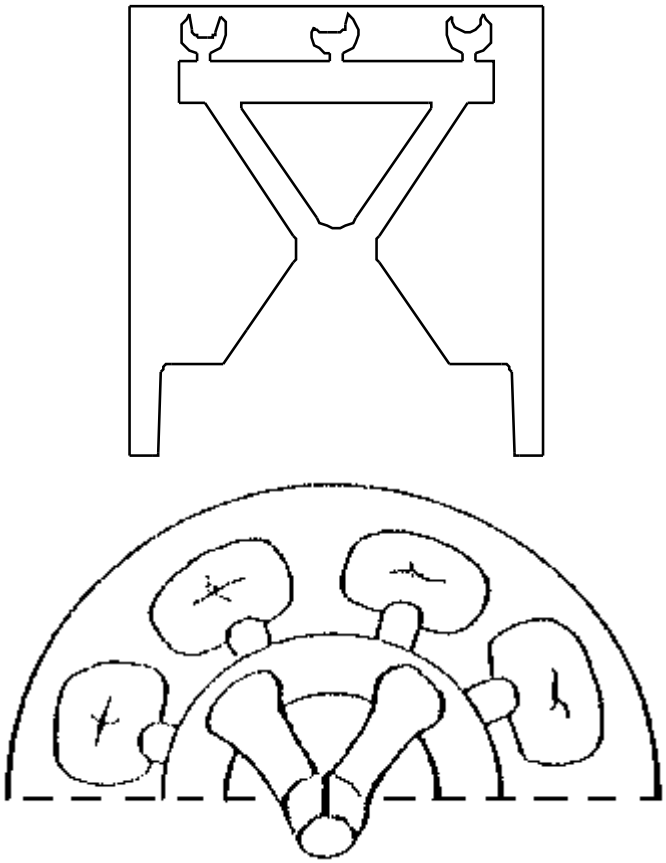
Round off the contact points of the various passages so as to avoid creating turbulence in the various connections and to prevent pieces of liner from becoming detached and entering the melting structure, thus damaging its compactness (see FIG.I).

FIG.I



Connect all of the supply channels to the casting cone, (see FIG. L).

FIG.L



CONCLUSION

In modern dental mechanics, high precision molten elements are of fundamental importance.

It is not always possible to provide valid information for every situation, because each wax model requires appropriate sprueing.

With the casting machine, however, the casts can finally be controlled electronically and the dental technician is only required to follow these instruction to obtain dental prostheses and elements of superior quality.

HOW TO DETERMINE THE CASTING TEMPERATURE

An alloy's casting temperature is established empirically and represents the temperature value at which the metal reaches its maximum fluidity, while maintaining unaltered its characteristics.

Once the melting range of an alloy is known, we recommend using the following procedure to determine the appropriate casting temperature:

a) GOLD RESIN; the melting range is provided by the alloy's supplier and a maximum of +70°C +100 °C can be added to the maximum value (LIQUID POINT).

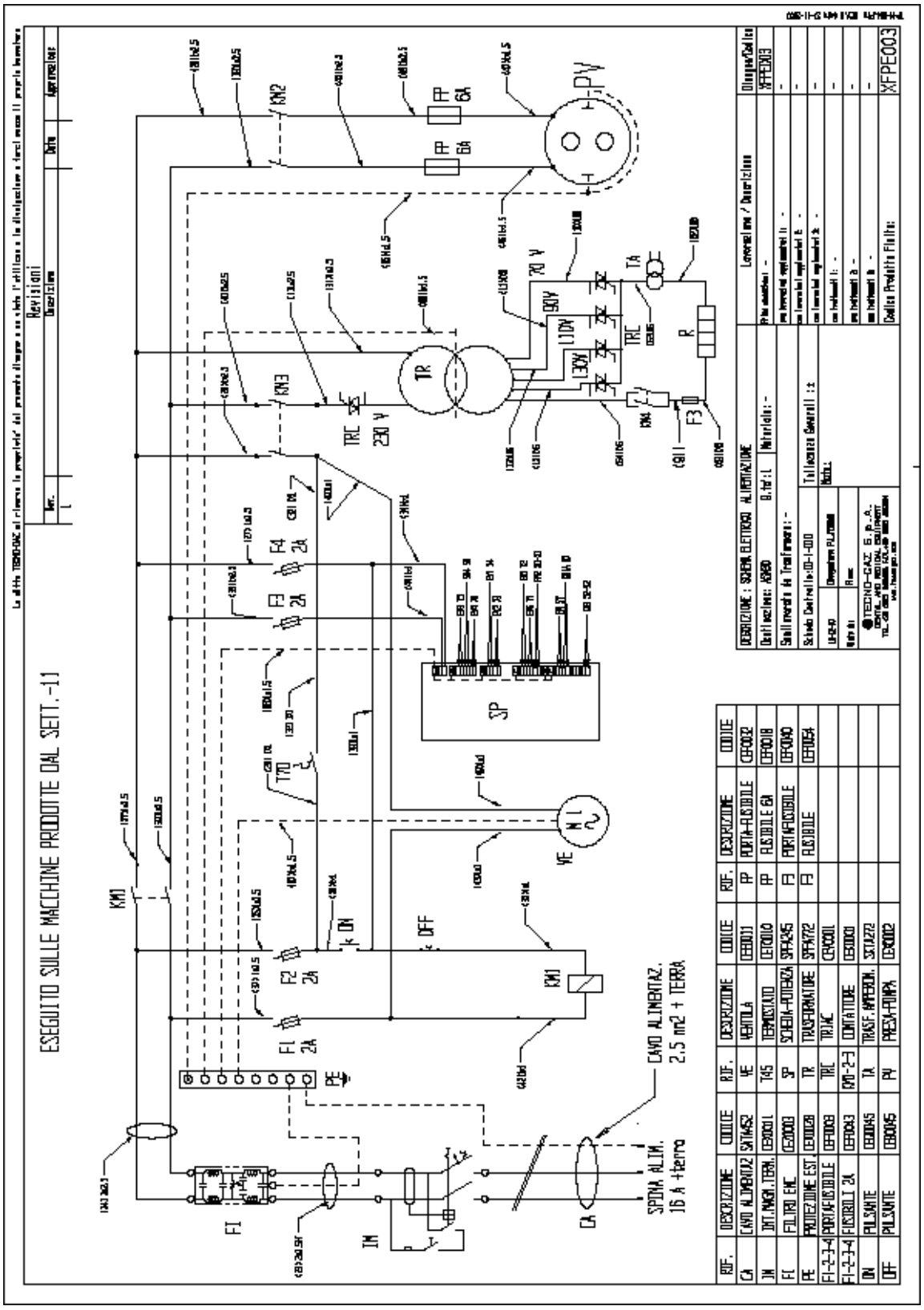
b) GOLD CERAMIC; the melting range is provided by the supplier and a maximum of +150°C can be added to the maximum value (LIQUID POINT).

c) FOR ALL OTHER NON-PRECIOUS ALLOYS, the casting temperature is approximately 1500°C.

THE EXCESSIVE OVERHEATING OF THE MOLTEN METAL WILL CAUSE IT TO BURN AND TO EMIT SPARKS AND TOXIC GASES.

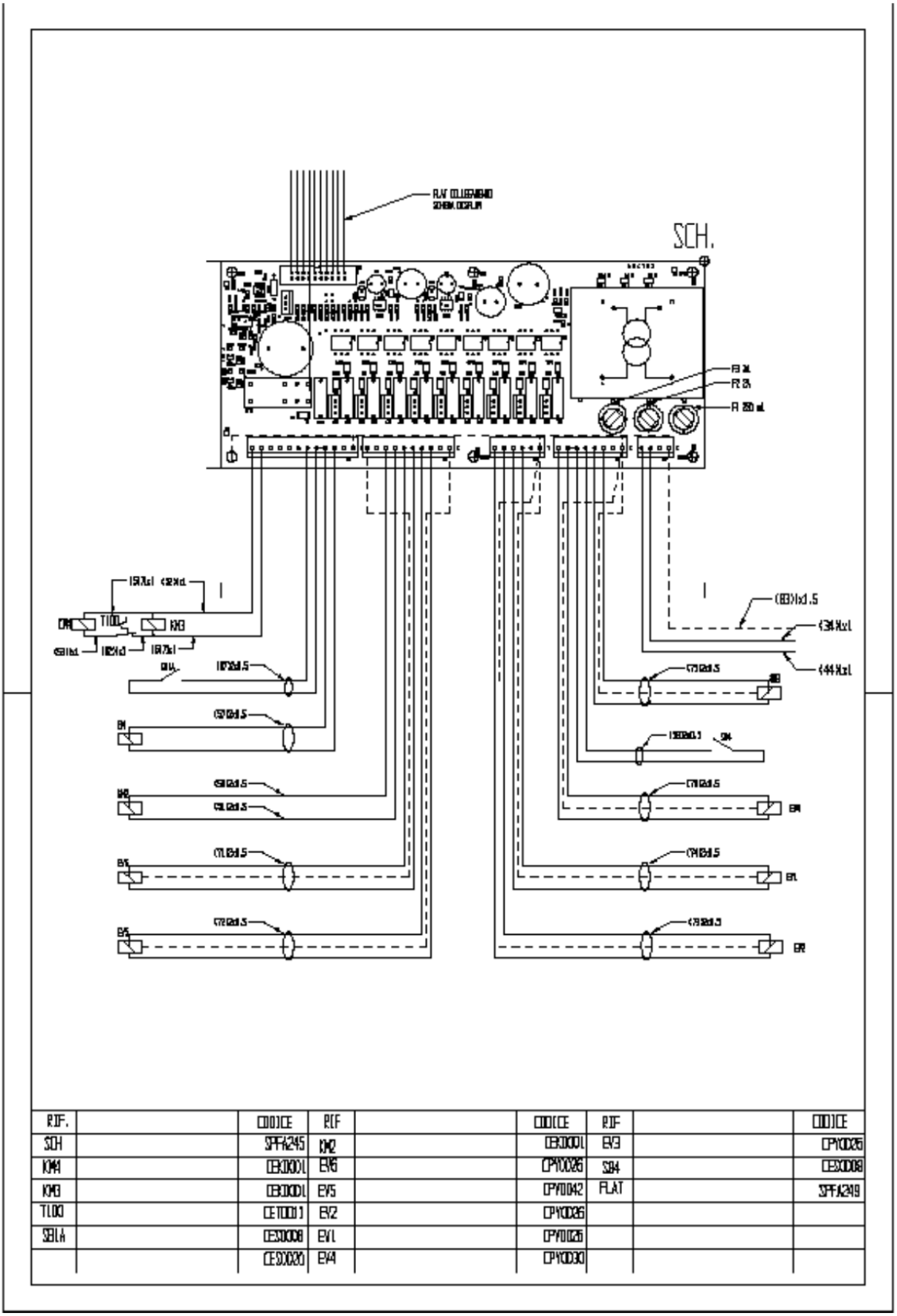
Sec. 25 DIAGRAM – EXPLODED VIEW .

1) ELECTRIC POWER SCHEME.



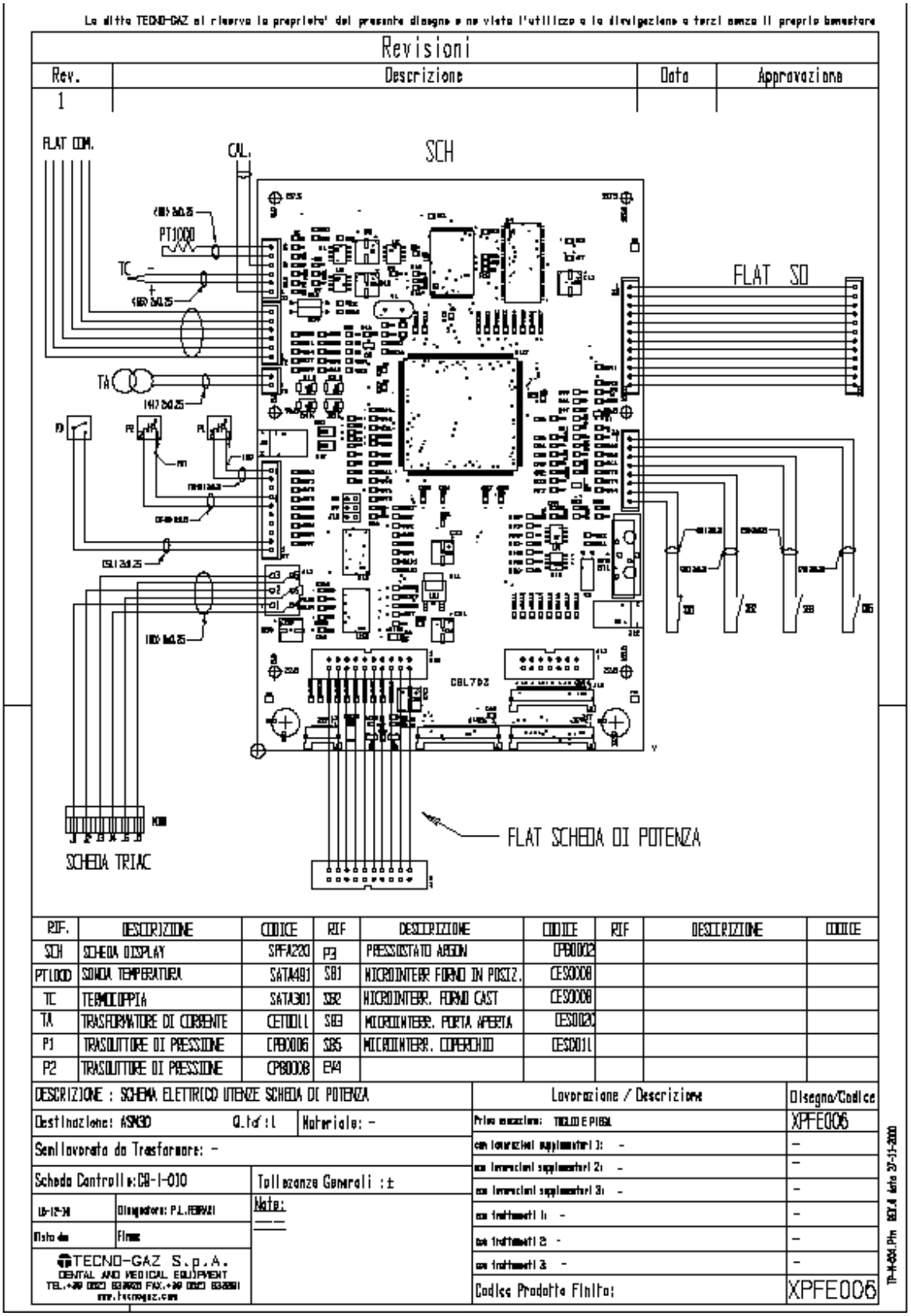
RIF.	DESCRIZIONE	CODICE	RIF.	DESCRIZIONE	CODICE	RIF.	DESCRIZIONE	CODICE
CA	CAVO ALIMENTAZ	SKTA452	VE	VENTOLA	CEB0011	PP	PORTA-FUSIBILE	CEP0032
IN	INT.MAGN.TERM.	CEB0011	T45	TERMOSTATO	CEP0010	PP	FUSIBILE 6A	CEP0018
FI	FILTRO EMC	CE20003	SP	SCHEDA-POTENZA	SPK2345	F3	PORTAFUSIBILE	CEP0040
PE	PROTEZIONE EST	CEB0028	TR	TRASFORMATORE	SPK4772	F3	FUSIBILE	CEP0054
F1-2-3-4	PORTAFUSIBILE	CEP0038	TRC	TRIAC	CEK0001			
F1-2-3-4	FUSIBILI 2A	CEP0043	DW-2-3	CONTATTORE	CEB0001			
IN	PULSANTE	CEB0045	TA	TRASF. AMPEROM.	SKTA272			
DFF	PULSANTE	CEB0045	PV	PRESA-POMPA	CEB0002			

2) POWER BOARD ELECTRICAL CONNECTIONS SCHEME.



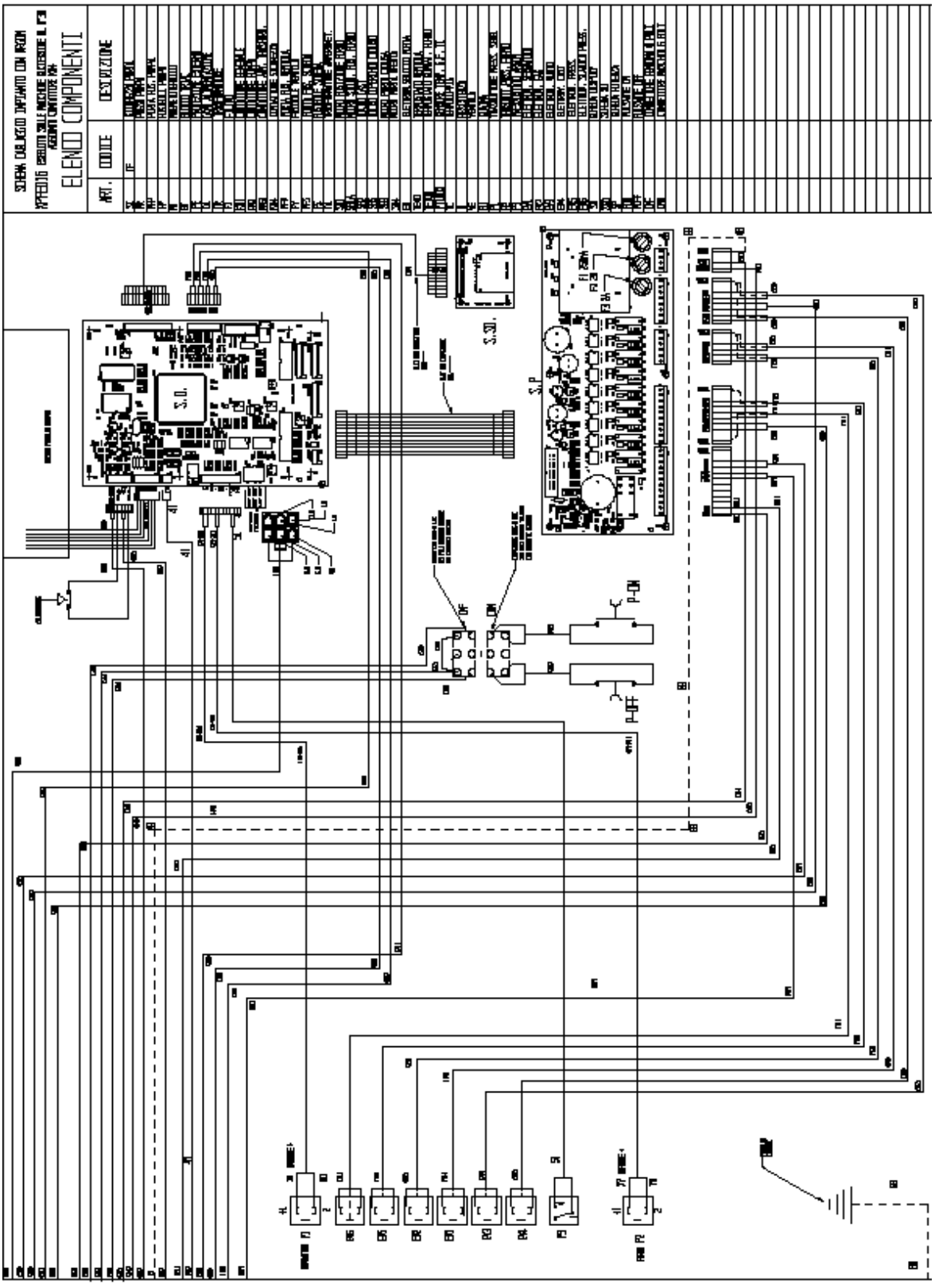
RIF.		CODICE	REF		CODICE	RIF		CODICE
SCH		SPFA245	KM2		CE30001	EV3		CPY0026
KM1		CE30001	EV6		CPY0026	SB4		CE30008
KM3		CE30001	EV5		CPY0042	FLAT		SPFA249
TL00		CE70001	EV2		CPY0026			
SBLA		CE30008	EV1		CPY0026			
		CE30030	EV4		CPY0030			

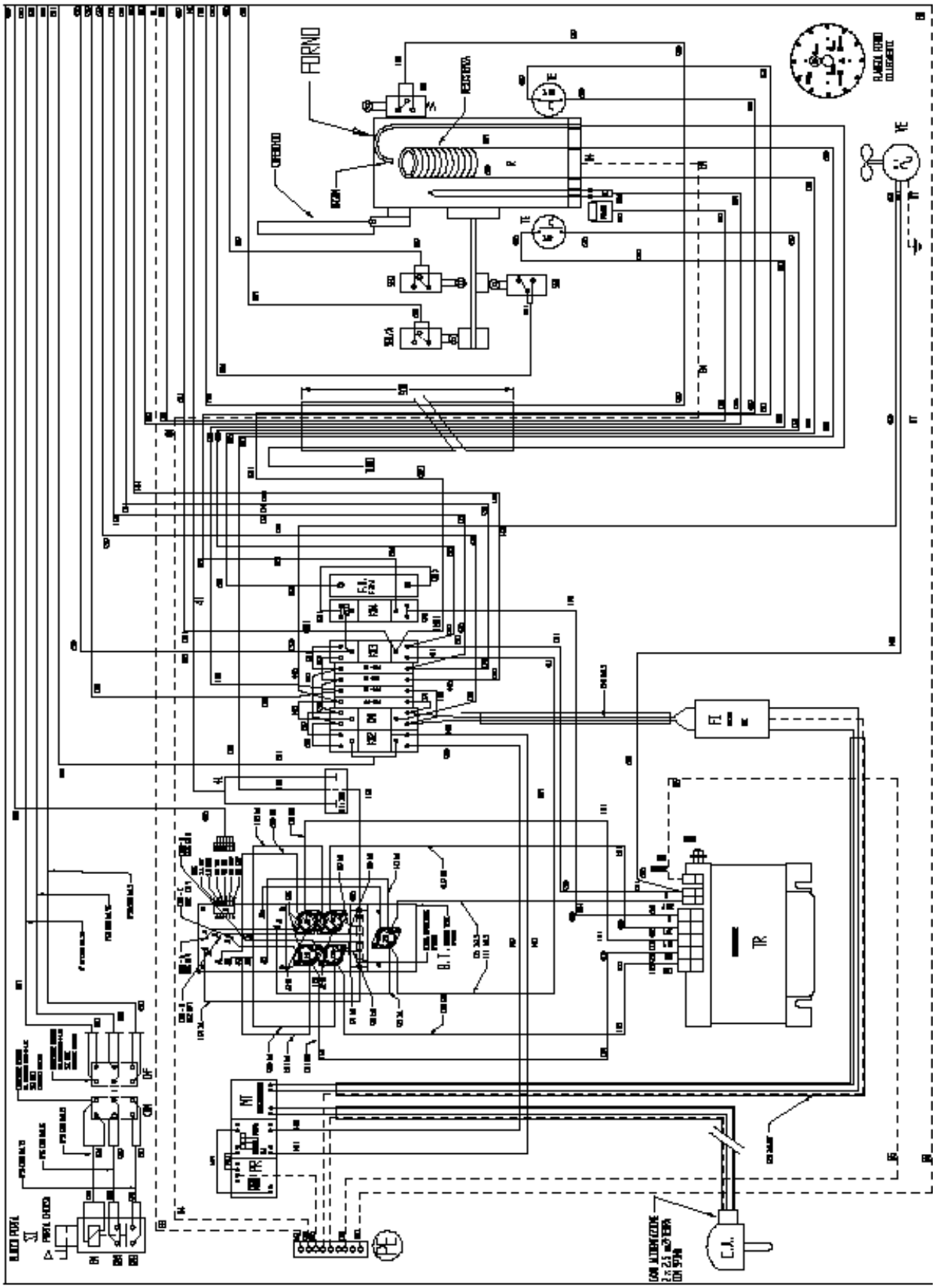
3) DISPLAY CARD ELECTRICAL CONNECTIONS SCHEME.



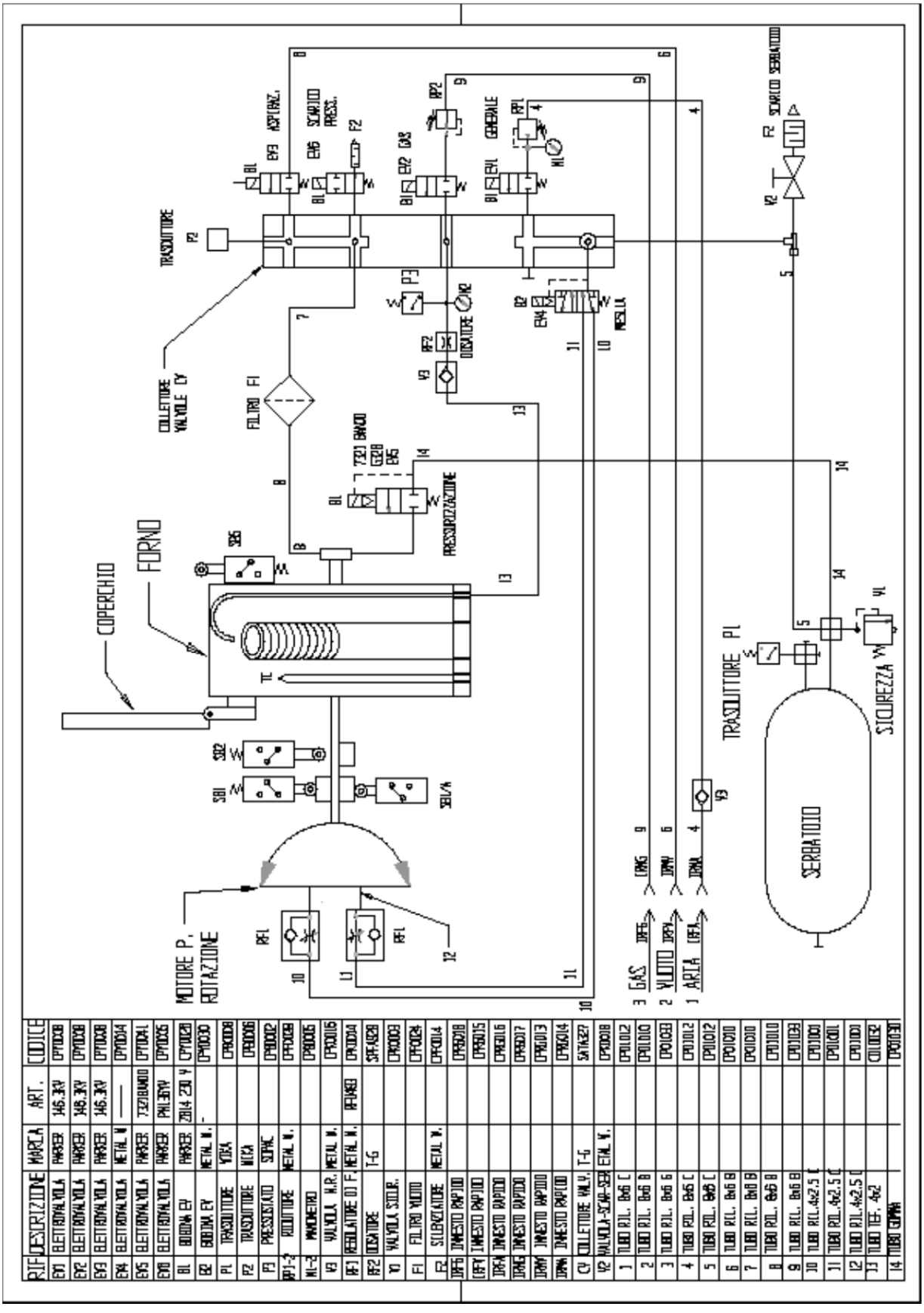
4) GENERAL SYSTEM SCHEME.

-

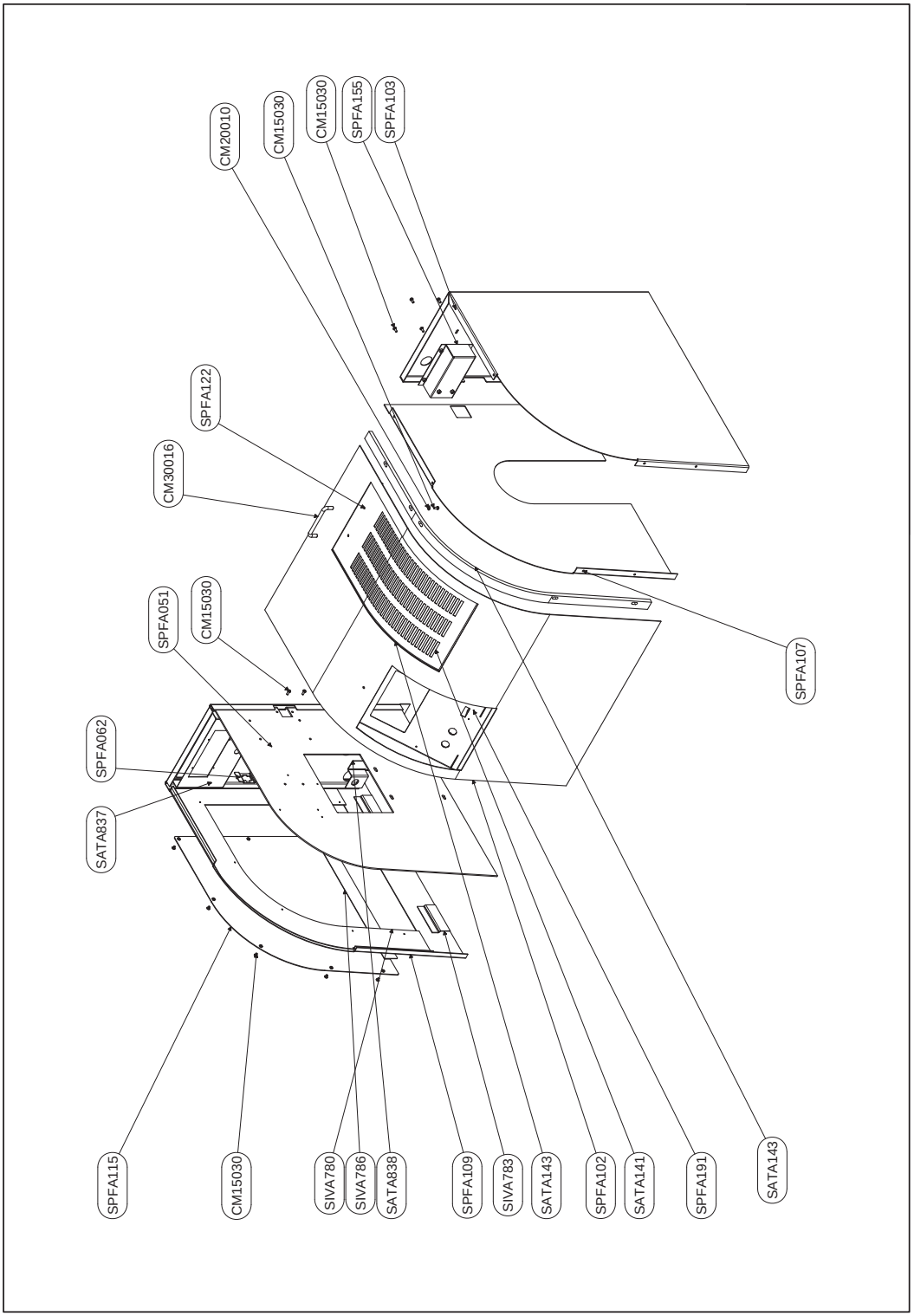



FORNO
TR
C.A.

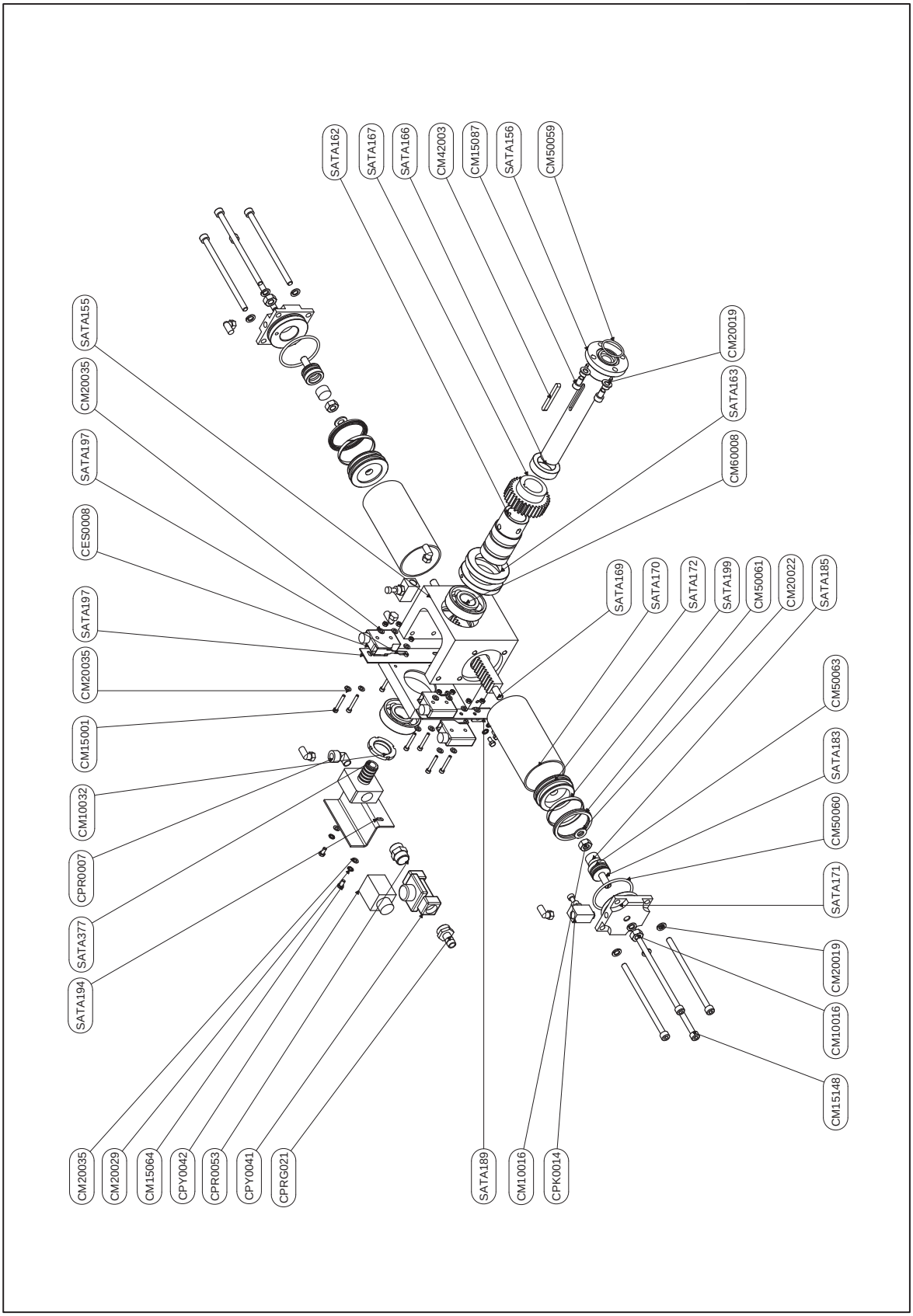
5) PNEUMATIC SCHEME



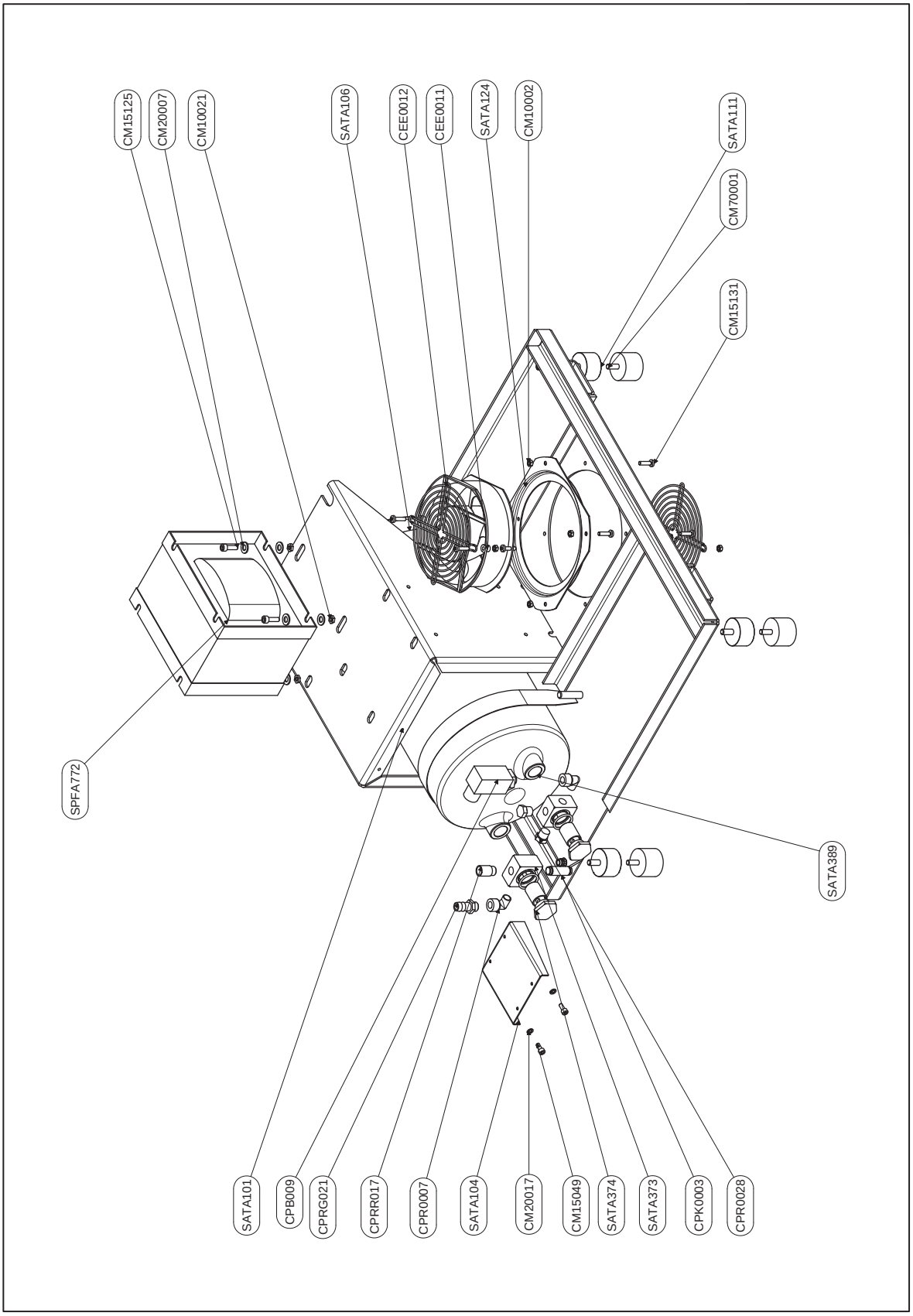
6) CABINET


CM20010
CM15030
CM15030
SPFA155
SPFA103
SPFA122
CM30016
SPFA051
CM15030
SPFA062
SATA837
SPFA107
SPFA115
CM15030
SIVA780
SIVA786
SATA838
SPFA109
SIVA783
SATA143
SPFA102
SATA141
SPFA191
SATA143

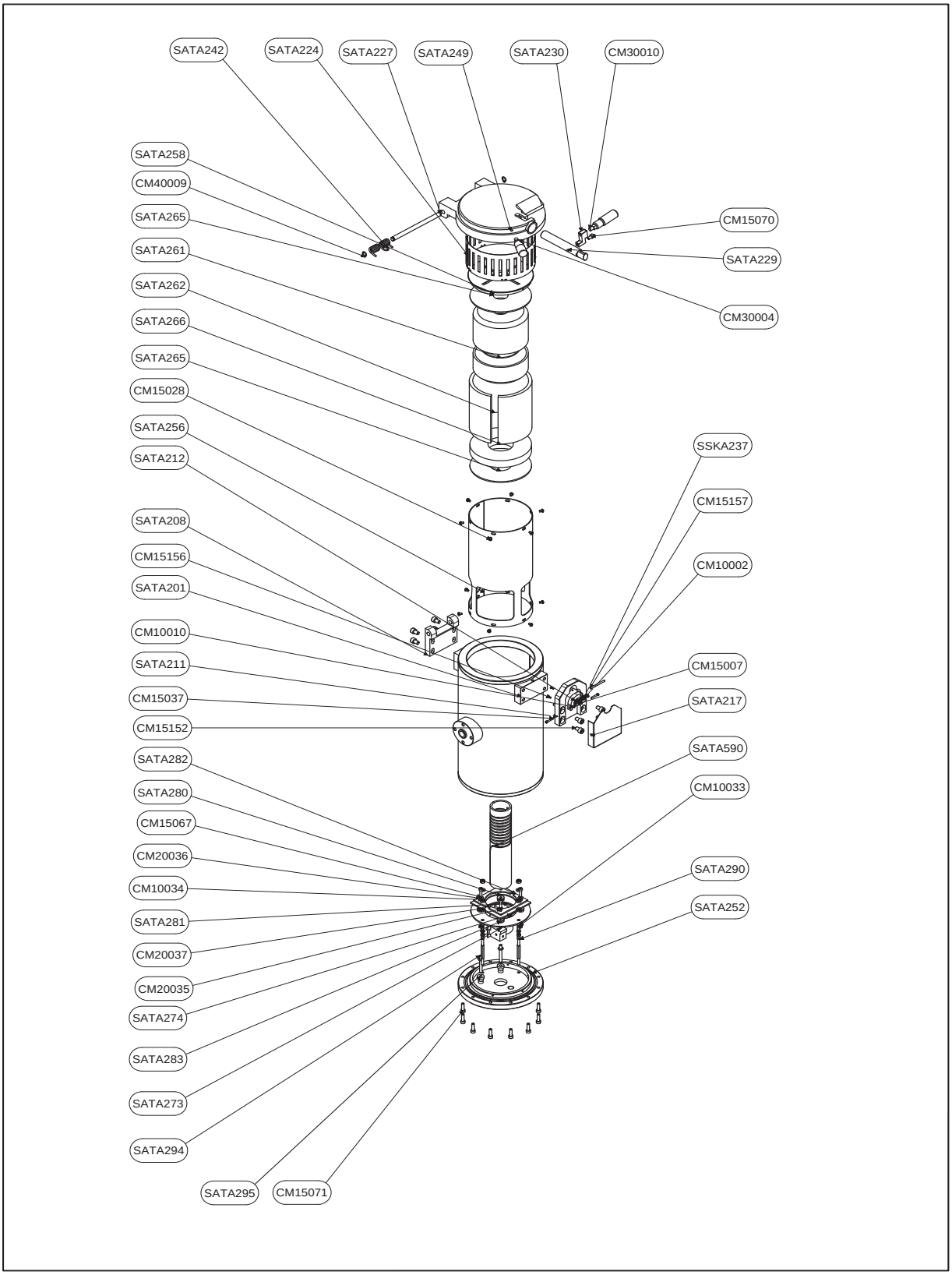
7) SPIN BLOCK


SATA162
SATA167
SATA166
CM42003
CM150087
SATA156
CM50059
SATA155
CM20035
SATA197
CES0008
SATA197
CM20035
CM15001
CM10032
CPR0007
SATA377
SATA194
CM20035
CM20029
CM15064
CPY0042
CPR0053
CPY0041
CPRG021
SATA189
CM10016
CPK0014
CM20019
SATA163
CM60008
SATA169
SATA170
SATA172
SATA199
CM50061
CM20022
SATA185
CM50063
SATA183
CM50060
SATA171
CM20019
CM10016
CM15148

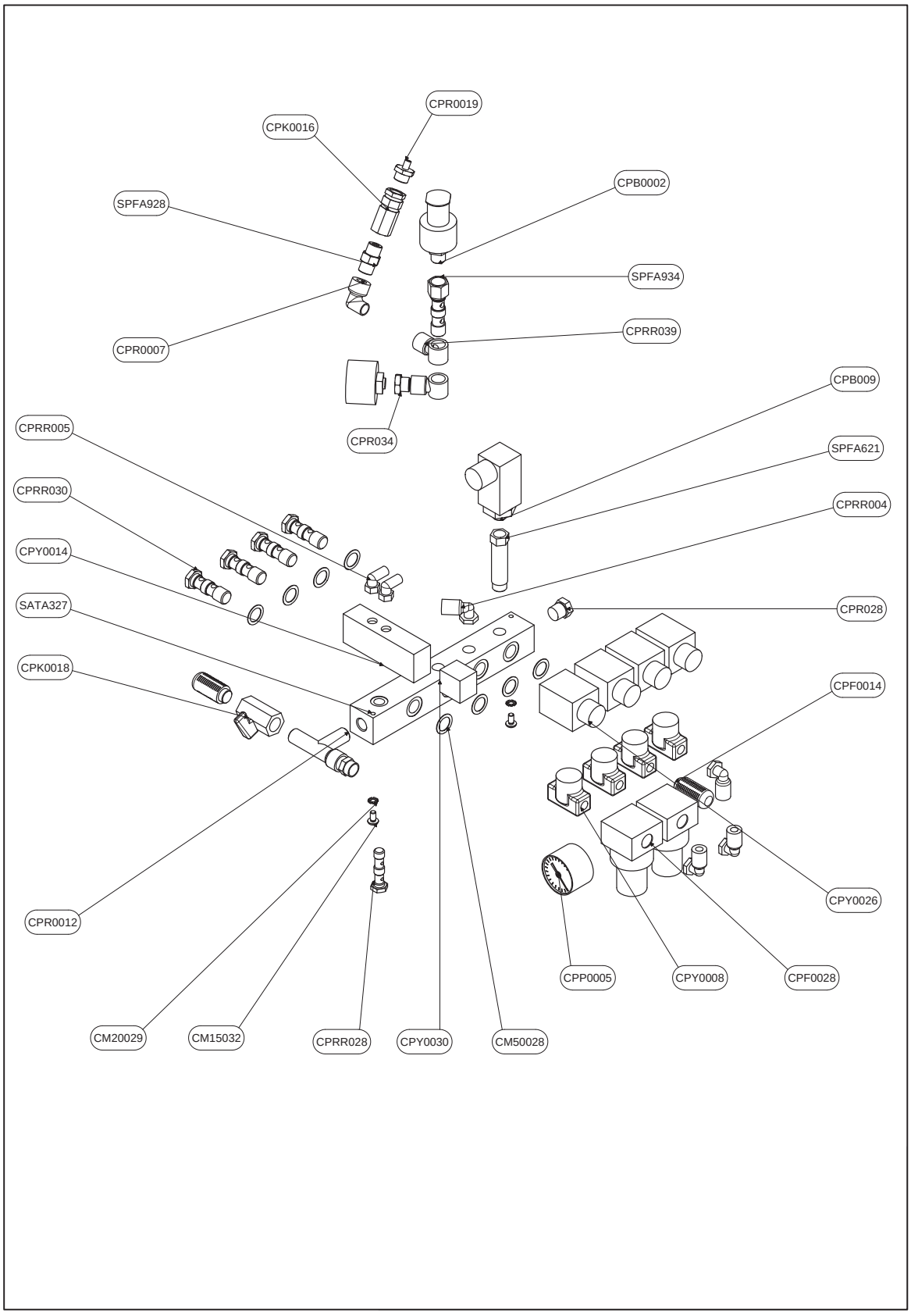
8) MOUNT


CM15125
CM20007
CM10021
SATA106
CEE0012
CEE0011
SATA124
CM10002
SATA111
CM70001
CM15131
SPFA772
SATA389
SATA101
CPB009
CPRG021
CPRR017
CPR0007
SATA104
CM20017
CM15049
SATA374
SATA373
CPK0003
CPR0028

9) FURNACE


SATA242
SATA224
SATA227
SATA249
SATA230
CM30010
SATA258
CM40009
SATA265
SATA261
SATA262
SATA266
SATA265
CM15028
SATA256
SATA212
SATA208
CM15156
SATA201
CM10010
SATA211
CM15037
CM15152
SATA282
SATA280
CM15067
CM20036
CM10034
SATA281
CM20037
CM20035
SATA274
SATA283
SATA273
SATA294
SATA295
CM15071
CM15070
SATA229
CM30004
SSKA237
CM15157
CM10002
CM15007
SATA217
SATA590
CM10033
SATA290
SATA252

10) SOLENOID VALVES BLOCK



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This manual must always be kept with the product, in complying with the Directives of European Community.