



# **INSTRUCTION MANUAL CENTRIFUGAL CASTING MACHINE SUPERCAST 1-2-3**



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# 1 TECHNICAL DATA AND GENERAL INSTRUCTIONS

## 1.1 Power supply

Supply voltage:	1/N//PE AC 230V -15%...+15% 50/60Hz
Maximum current:	15A (supercast 1-2) 18A (supercast 3)
Minimum cross-sectional area of power conductors:	2.5 mm <sup>2</sup>
Short circuit interrupting capacity of the machine overcurrent protective device:	15kA

Mandatory prescriptions for the machine power supply:

in specification with the standard IEC 60364, use of a socket-plug combination in specification with the standard EN 60309-1 and protection against the atmospheric and manoeuvre discharges in specification with the standard IEC 1024.



**CAUTION ! THE CONNECTION MUST BE GROUNDED**

## 1.2 Data of the generator

Rated output power:	3 kW (Supercast 1-2) 4 kW (Supercast 3)
Power regulation:	10-100%

## 1.3 Environmental conditions

Environment temperature:	+5 ... +40 °C
Relative humidity:	30 ... 90% (avoid condense)
Altitude: the machine is able to work full load till 1000 m above the sea level.	

## 1.4 General data

Dimensions LxHxP:	670x1000x560mm
Weight :	about 200 Kg



**CAUTION !**

**READ CAREFULLY THE WHOLE INSTRUCTION MANUAL BEFORE STARTING  
ANY OPERATION ON THE MACHINE.**

## 2 SAFETY WARNING

### 2.1 General directions

- The machine described in this manual has to be considered only for non domestic use.
- The machine has been projected and manufactured in conformity with the applicable technical standards, thus it does not represent any risk for the safety and health of people if the following cautions are followed:
- Read carefully the technical documentation here enclosed before starting any operation on the machine.
- Installation, use and maintenance must be executed by skilled people in conformity with the standard CEI EN 60519-1.
- Installation, use and maintenance of the machine must be in conformity with all the applicable standards and technical data of the machine.
- **Disconnect the electrical power supply before opening any panel of the machine to operate inside it.**
- The capacitors contained inside the electric equipment of the machine are full of dangerous voltage even after the disconnection of the power supply. **Wait 5 minutes before operating** inside the machine;
- The operations on the electric equipment have to be avoided when connected with the electric supply line. In case of necessity, these operations must be done only by skilled people informed on the possible risks.

In the following conditions:

- The machine does not operate correctly even after the execution of the instructions of this manual.
- The machine is visibly damaged.
- The machine has been damaged during the transport.
- Some liquid has got into the machine.
- The machine has been stored in improper conditions for a long time.

Avoid to start the machine, disconnect it from the electric supply and ask for the assistance.

Do not make any modification on the machine. Danger of electric shock and personal injury.

## 2.2 Safety protections

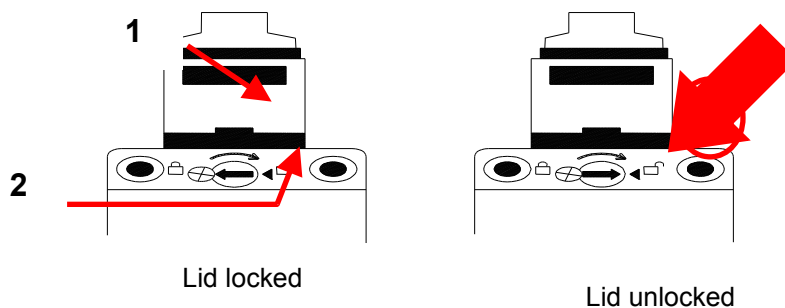
The operator is protected during the operations by the lid of the centrifugation chamber . The working cycle can begin only after the closure and lock of the lid. The protection device stays in the locked position until the end of the working cycle and is then electrically unlocked.

### ATTENTION:

**DO NOT FORCE THE LOCK OF THE PROTECTION LID DURING THE WORKING CYCLE .  
IN CASE THE LID DOES NOT AUTOMATICALLY OPEN AT THE END OF THE WORKING CYCLE,  
DO NOT FORCE TO OPEN THE LOCK.  
ONCE SHUT AND LOCKED THE PROTECTION LID CAN BE UNLOCKED ONLY IF THERE IS  
ELECTRICAL CONNECTION.**

To open the protection lid in case of lack of electric supply, perform the following operations :

1. Remove the left side panel of the machine using the special key supplied with the machine
2. Loosen the crossed screw (1) of pic.1
3. Turn of 180° the screw (2) of pic. 1 with an appropriate screw driver so that the arrows match each other and unlock the lock.
4. Open the lid
5. Turn of 180° the screw (2) of pic. 1 to bring back into use the safety device and then lock it again screwing the crossed screw.
6. Re-assemble again the side panel of the machine.



**Pic. 1: Safety device to lock the lid.**

### 3 INSTALLATION

#### 3.1 Unpacking of the machine

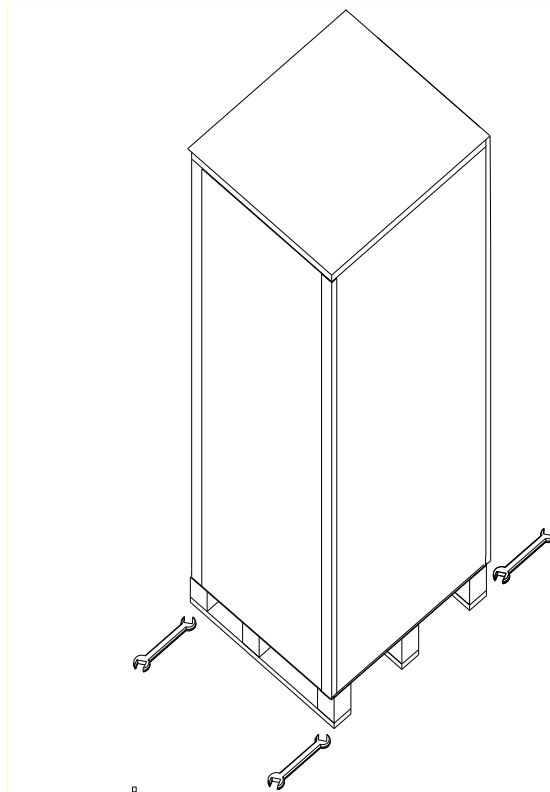
The machine is fixed with bolts to a wooden pallet to grant a safe transport. Use a wrench n. 17 to unscrew the bolts and free the machine from the Pallet before the installation. **ATTENTION: be careful and keep the machine in vertical position.**

Control that the machine has not been damaged during transport. In case of damages , contest it to carrier and give immediate written communication to the manufacturer and reseller.

Open the protection lid and with care free the centrifugal arm. The machine accessories can be found into the centrifugal chamber.

#### **ATTENTION**

**Read the chapter "SAFETY DEVICES" for accessibility to the centrifugal chamber.**



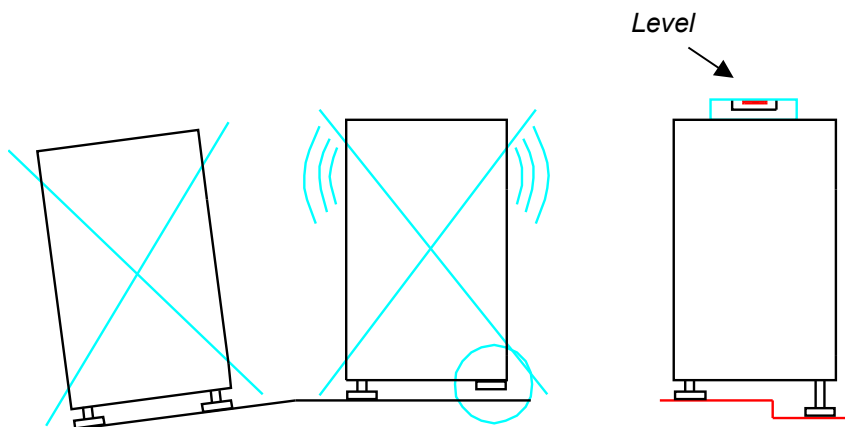
#### **ATTENTION**

**WHEN STARTING THE MACHINE, THE CENTRIFUGAL CHAMBER MUST BE COMPLETELY FREE FROM ACCESSORIES AND PACKING MATERIAL.**

### 3.2 Positioning of the machine

The machine must be located in a well ventilated room for the evacuation of smokes and vapours that are formed during the melting process. To ease the casting procedure and to reduce the risks of handling hot materials it is suggested to install the casting machine next to the preheating oven and to the service sink.

When the machine has been positioned **CHECK THAT IT STANDS STABLE AND IN HORIZONTAL POSITION**. It is absolutely necessary to have an accurate stability during the rotation of the centrifugal arm. Regulate, if necessary, by the supplied feet the correct set-up of the machine. **DO NOT INSERT ANY SHIM BETWEEN THE FEET AND THE FLOOR**. Check with a level the perfect horizontal position of the machine.



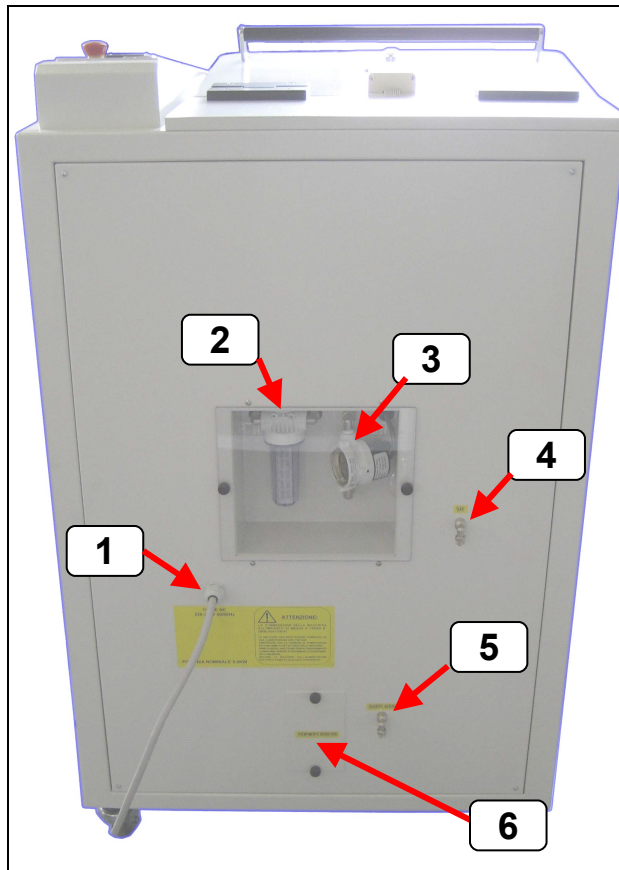
### 3.3 Service connection

Check that the main voltage supply corresponds to the one written on the identification plate set on the back panel of the casting machine. Check that the installed power is sufficient.

**ATTENTION:**  
always remember that grounding is compulsory. Check that the power supply and ground connection are made properly.

### 3.4 Preliminary operations for the installation

- A)** Connect cable (1) of pic. 2 into an intake 220/230 VAC Single-Phase using a 20 Ampere type blue CE plug with compulsory protection ground connection.
- B)** Open panel (5) of pic. 2 unscrewing the two lateral knobs.
- C)** Fill the water tank by opening the plug(4) of pic. 2 with 25 Lt of distilled water. The machine is equipped with an internal closed cooling circuit which is connected with the above mentioned tank. It is then not necessary to replace or add water because there is not a consumption; fill up every 2 or 3 years according to the frequency of use of the machine.
- D)** In case the machine is pre-set for the Argon (SuperCast 2-3), connect the gas bottle to a hose  $\varnothing$  4x6 to the connection (3) of pic. 2. We suggest the use of Argon Gas Air Liquide type N56



**Pic. 2**

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1 Power supply cable             | 4 GAS argon input                 |
| 2 Filter for water cooling       | 5 Water output                    |
| 3 Flowmeter of the water cooling | 6 Panel of the water cooling tank |

If it is necessary to empty the machine from the cooling water, proceed as follows:

- A) Open the back panel (6 fig.2)
- B) Connect a hose  $\varnothing$  6x8 to the connection (5 fig.2)
- C) Locate the cock in correspondence with the connection
- D) Open the cock
- E) Start the machine. The water pump will start working allowing the draining of the tank. To totally drain the tank, lay the machine to the front part and to the back.
- F) Switch off the machine when air comes out from the tube. Turn off the cock and close the back panel.

**SEIT ELETTRONICA S.r.l. is not responsible for damages due to wrong installation procedures.**

### 3.5 Supplied optional

n° 1 plier for crucible and for cylinder L=40cm cod. 03.55.120.0001

n° 4 casting machine feet cod. 03.40.060.0001

n° 1 screwdriver for protection panel cod. 03.55.100.0001

n° 2 blue protection lens

n° 1 support lens cod. 1200686/0 (only support)

n° 1 ceramic crucible 50g for platinum cod. 03.40.180.0033 (supercast1/2)

n° 1 graphite crucible 50g cod. 03.40.180.0006

n° 1 lid for graphite crucible cod. 03.40.185.0001

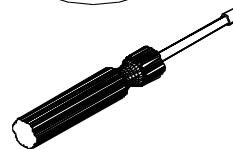
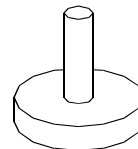
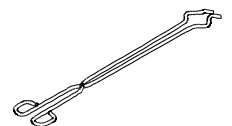
n° 1 zirconium crucible for titanium cod. 03.40.180.0010 (supercast3)

n° 1 sintered crucible cod. 03.40.180.0009 (supercast3)

n° 1 lid for sintered crucible cod. 03.40.185.0005 (supercast3)

n° 1 thickness for saddle cod. 0900910/0 (supercast3)

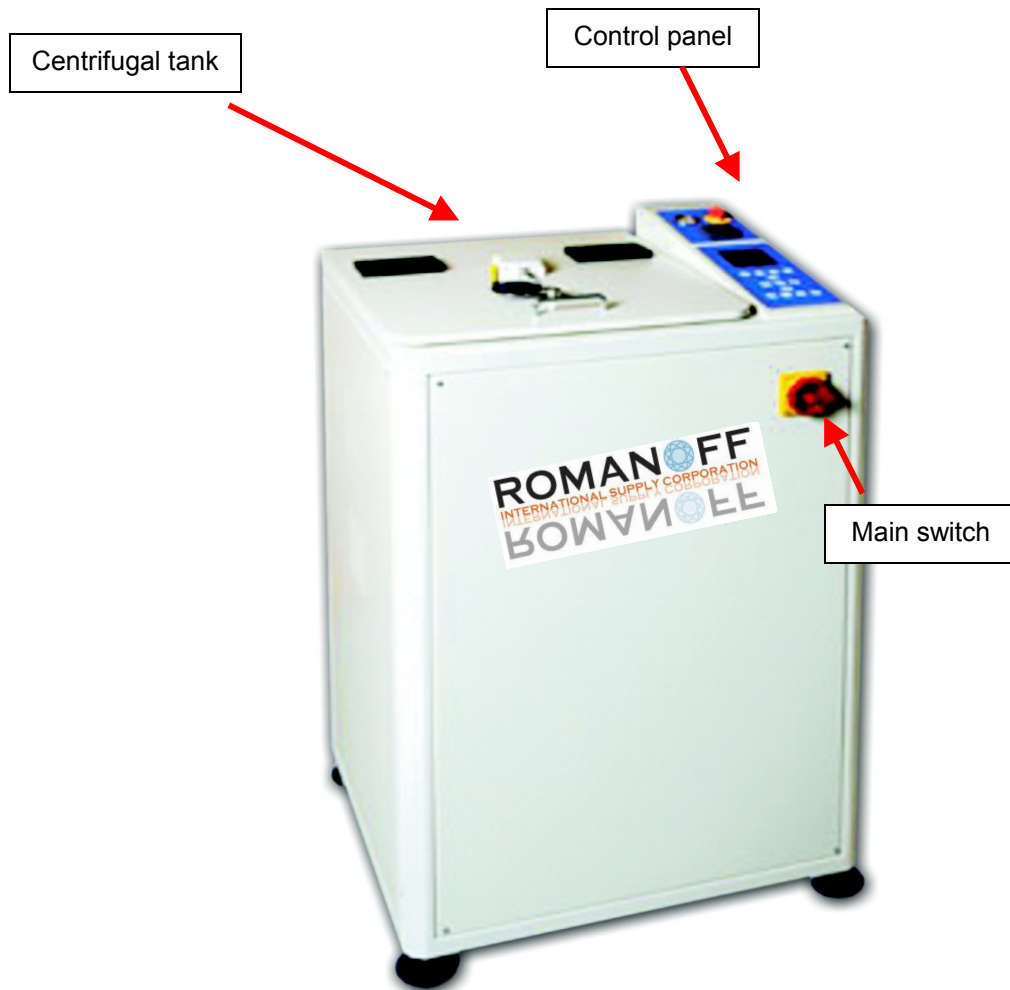
n° 1 counterbalance cod.1000558/0



#### 4 GENERAL DESCRIPTION OF THE MACHINE.

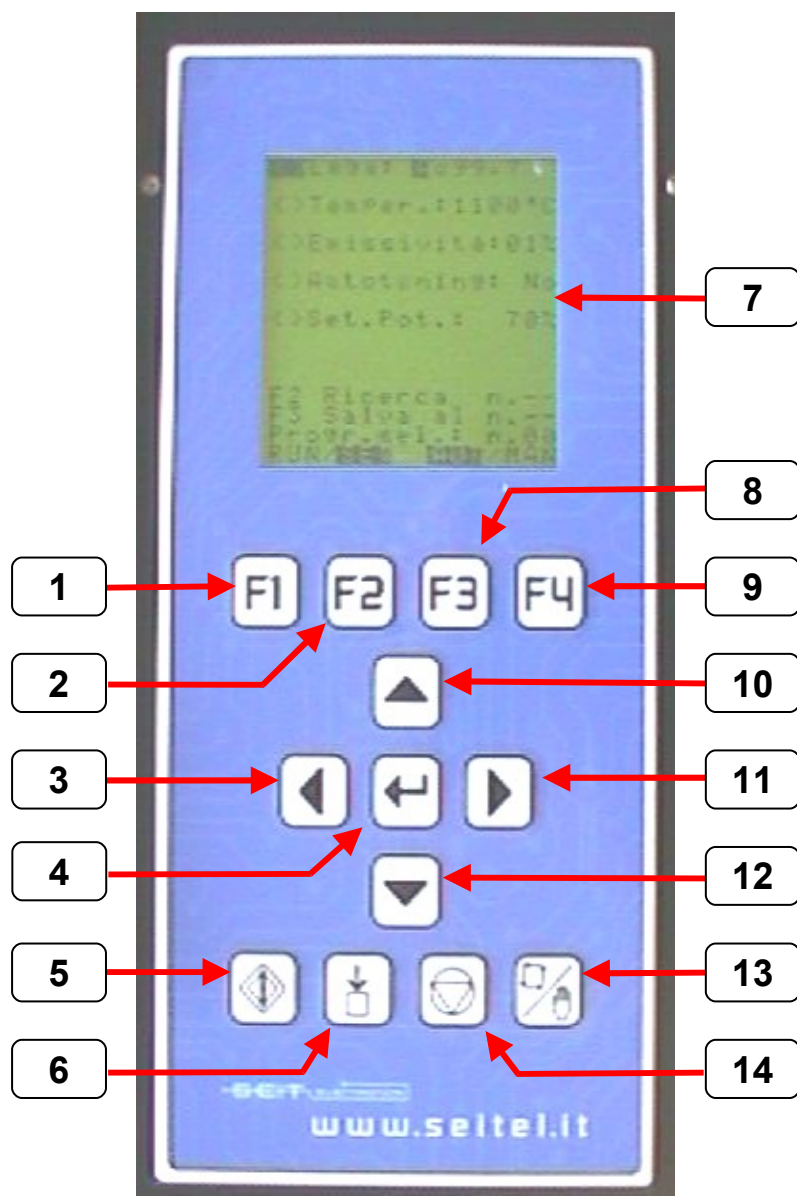
The Supercast is a centrifugal casting machine with induction heating which has been projected to satisfy the demands of the jewellery laboratories , where there is the need to do lost wax casting of different shapes.

The machine is composed of a steel support which holds up the centrifugal tank and of the closing steel sheet panels. On the top panel of the machine there is an opening lid equipped with safety locking to reach the working area.



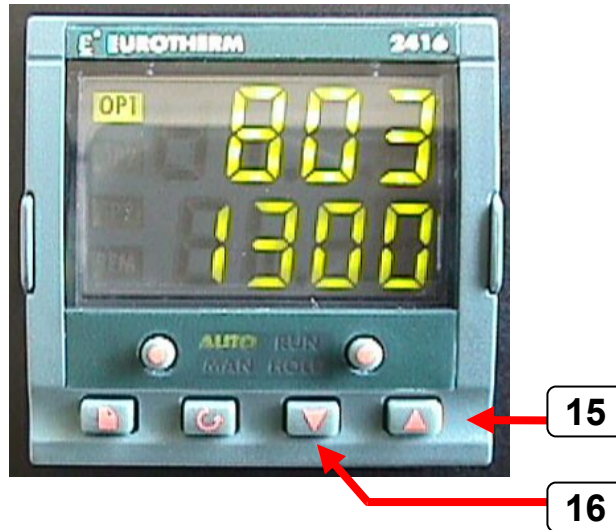
**Pic.3.**

## 4.1 Control panel



Pic. 4

- |   |                     |    |                                      |
|---|---------------------|----|--------------------------------------|
| 1 | Last program access | 8  | Programs save function               |
| 2 | Program search      | 9  | Premelting program / Manual devacuum |
| 3 | Left arrow (reduce) | 10 | Cursor vertical shift (up)           |
| 4 | Enter               | 11 | Right arrow (increase)               |
| 5 | Cycle start         | 12 | Cursor vertical shift (down)         |
| 6 | Centrifuge start    | 13 | Select manual/automatic functioning  |
| 7 | LCD display         | 14 | Automatic cycle stop                 |



**Pic. 5 Thermoregulator**

- 15 Temperature increase button
- 16 Temperature decrease button



**Pic. 6**

- 17 Vacuum gauge
- 18 Emergency stop button
- 19 Thermoregulator

## 4.2 Description of the menu

### First page of the main menu

key	Description
F1	Press to reach the last working program
F2	Press to select any memorised program. Seek the desired program number with the left/right arrows.

### Second page

Parameter	Description	Limit of the parameters
Alloy	Identify the name of the memorized alloy	Max 8 caracters
Temperature	Indicate the casting temperature	From 800° to 2.000° C
Emissivity	Percentage of IR radiation emitted by the metal	From 10 %to 99 %
Power	Indicate the amount of heating power required for melting	From 10% to 99 %
Casting time	Indicate the rotating time of the centrifugal arm	From 2 sec to 3 minutes

### Third page

Parameter	Description	Limit of the parameters
Speed	Indicate the centrifugal speed	From 100 to 500 RPM
Torque	Indicate the centrifugal acceleration	From 10 % to 99 %
Vacuum	Indicate the activation of the vacuum pump	Yes/No
Inert Gas	Indicate the introduction of inert gas (Argon)	Yes/No
washing cycle	Indicate the activation of cleaning cycles (Vacuum-Argon). Only Supercast 3	From 1 to 9 Cycles

### Function Description

Function	Automatic Cycle	Manual Cycle
<b>Start Casting</b>	Press button nr. 5 to start the selected casting program	Press button nr. 5 to start/stop the melting
<b>F1</b>	Press to reach the last working program	Press to make vacuum
<b>F2</b>	Press to activate the program search function	Press to make argon injection
<b>F3</b>	Press to activate the program saving function	Press to make devacuum
<b>F4</b>	Function not given	Function not given
<b>Sel. Program</b>	Shows the selected program	
<b>Run</b>	Activated during casting program execution	
<b>Set</b>	Activated during program editing	
<b>Aut</b>	Activated during automatic operation	
<b>Man</b>	Activated during manual operation	

## 5 INFORMATION ON THE USE

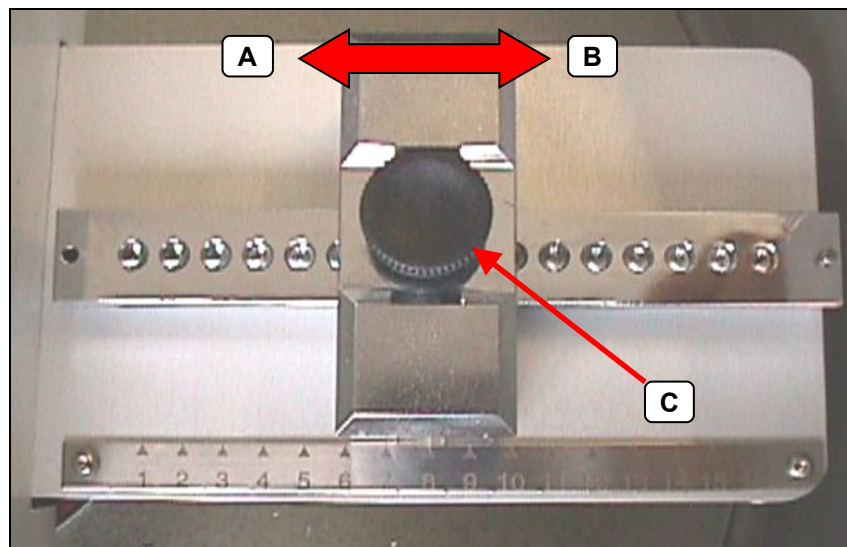
Preliminary check :

- Control that the electric supply is connected.
- Control that the emergency mushroom push-button (18) of pic.6 is not pushed; to release the emergency rotate the button in the direction of the printed arrow.
- Control that the centrifugation well is free from any material or tool.
- Use a crucible in good condition. If necessary, replace the crucible with a new one to avoid its breaking and the further damaging of the casting machine or the results of bad castings
- Subsequently position the counterweights until the balance point has been reached.
- The more accurate the balancing is, the less the machine will vibrate.
- To look at the casting process, use an anti UV ray protective screen placed on the lid.

### ATTENTION:

**The lack of electric energy after the closure of the cover of the centrifuge causes the blockage of the protection device. See the chapter "SAFETY PROTECTION".**

### 5.1 Counterweight regulation



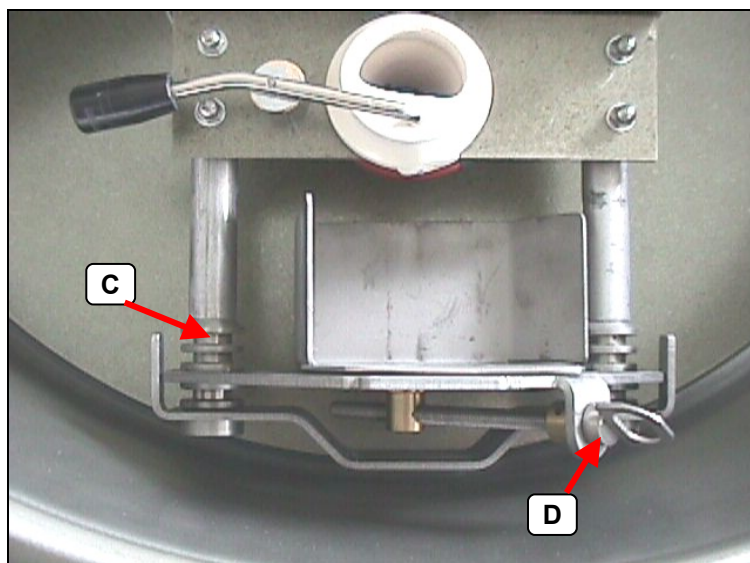
**Pic. 7**

Pull the knob (**C**) for to move the counterweight

**A** - Shift towards the rotation arm to counterbalance low weight (rings 1x-3x)

**B** - Shift towards the outside to counterbalance heavy weight (rings 6x-9x)

## 5.2 Cylinder position regulation



**Pic. 8**

**C** - 4 groove to adjust the distance between ring and crucible (55-60-65-70 mm)

**D** - Knob to adjust the ring diameter

### 5.3 How to make a program

Start the machine by turning the main switch located on the front.

**A)** Push the F1 (1 of pic.4), button on the front panel to enter the last program executed or push the F2 (2 of pic.4), button to enter one of the memorized program. On the LCD (7 of pic.4), display will appear the menu of the program.

**B)** The cursor will be automatically positioned on the **Alloy** parameter. Pushing the right (11 of pic.4), and left (3 of pic.4), arrows, you'll find all letters necessary to compose a new name which you want to memorize. The memory is equipped with a capital letter and a small letter alphabets and with a 0 – 9 figures and a series of use frequency symbols. To move the cursor to the right and pass to the next letter, press the enter button (4 of pic.4),. Once the word required is obtained, pass to the next parameter by pushing the down arrow key (12 of pic.4),

**C)** Now memorize a melting **Temperature** to set on the Thermo regulator (19 of pic.5) to cast the alloy. Move the right (11 of pic.4), and left (3 of pic.4), arrows until you reach the required value. Push the down arrow key (12 of pic.4), to pass to the next parameter.

**D)** **Emissivity:** Percentage fraction of radiation emitted by the metal during the heating in relation to the absolute reference of the black body at the same temperature. To obtain the correct temperature reading during the heating is necessary to set the value (in percentage) of the basic emissivity of the pure metal. After setting the nominal melting temperature of the metal, during the melting we have to adjust the emissivity (moving the horizontal arrows) changing his percentage value to be able to match the real melting point with the nominal set on the thermo regulator. That adjustment are necessary in consequence of the deviation from the basic real value due to the metal composition, the surface oxide or other impurity.

**E)** The **Power** parameter choose the energy for the time unit which will be supplied by the machine to melt the metal. It is expressed in percentage to the maximum value and determines the melting time. The maximum power changes according to the model, please check the technical features of your machine. Find the required value with the right (11 of pic.4), and left (3 of pic.4), arrows. Push the down arrow key (12 of pic.4), to pass to the next parameter.

**F)** The **Rotating Speed** is expressed with turns/minutes made by the centrifugal arm. Find the required value with the right (11 of pic.4), and left (3 of pic.4), arrows. Push the down arrow key (12 of pic.4), to pass to the next parameter.

**G)** Pass to the next page pushing the down arrow (12 of pic.4).

**H)** The **Acceleration (torque)** parameter represent the increase rapidity of the rotation speed of the arm from 0 to the set value and it is expressed in percentage of the maximum value. The maximum acceleration value is equal to a speed variation from 0 to the maximum (500RPM) in 0,1 sec. Find the required value with the right (11 of pic.4), and left (3 of pic.4), arrows. Push the down arrow key (12 of pic.4) to pass to the next parameter.

I) The **Vacuum** parameter allows you to make vacuum casting cycles (this parameter is a optional for supercast 1). Two options are available: YES/NO. To activate or deactivate this option, push the right (11 of pic.4), and left (3 of pic.4), arrow buttons. Push the down arrow key (12 of pic.4), to pass to the next parameter.

J) It is possible to use this parameter after connecting the machine to a **Argon Gas** bottle (this parameter is a optional for supercast 1). To activate or deactivate this option push the right (11 of pic.4), and left (3 of pic.4), arrow buttons. Push the down arrow key (12 of pic.4), to pass to the next parameter.

K) The **Washing cycle (Only for SuperCast 3)** parameter is typical of the Titanium casting. To activate it, just choose though the right (11 of pic.4), and left (3 of pic.4),arrow buttons a value different from zero (the suggested number for the Titanium is 3 washings). On the parameters **Power/Rotation Power/Acceleration/Vacuum and Argon Gas** will automatically appear the writing AUTO. According to the set value, the machine will make a cycle composed by vacuum till a 750 mm/hg value, immediately followed by the introduction of the Argon gas in the casting room till a 0,2 millibar value. This operation will be completed as many times as on the set value. At the end of the set cycles, the machine will automatically start a Titanium melting and casting cycle.

L) Now you have finished the program of a casting cycle. If you want to memorize it push the button F3 (8 of pic.4), on the display will appear a suggested program number, if you want to confirm it push the enter button (4 of pic.4), otherwise change the number by choosing a new one with the left (11) of pic.3 and right arrows (11 of pic.4) and then enter by pushing (4 of pic.4)

**Warning: Without saving with enter the program will not be memorized, could be executed immediately by pushing the starting cycle button (5 of pic.4).**

## 5.4 Manual Cycle

Functions	display	Action
Melting	Y/N	To activate/abort press switch (5)
Power	%	To increase/decrease press arrows (11)/(3)
Output power	-/+	Shows the power during the melting operation
Rotation	Y/N	To activate/abort press switch (6)
Speed	%	To increase/decrease press arrows (11)/(3)
Torque	%	To increase/decrease press arrows (11)/(3)
Vacuum	Y/N	To activate/abort press switch F1
Inert Gas	Y/N	To activate/abort press switch F2
Devacuum	Y/N	To activate/abort press switch F3

### 1. Alloy composition and temperature to be set

The alloy composition determines the temperature to set on the thermo-regulator in order to melt and as you can see from the previous table, it changes according to the presence of precious metals (Gold – Palladium – Platinum – Silver) or non-precious metal (Chrome – Cobalt – Nickel – Titanium). In order to find the right temperature, follow the instructions explained below

Generally speaking, we can say that the casting temperature increase as a function of the decreasing of the presence of Gold and it highly increases with non precious alloys.

### 2. Emissivity

The regulation of the emissivity will let you to find the right melting point of your alloy. Every alloy has his typical emissivity value determinate by the composition. It is impossible for us to tell the exact emissivity value for every alloy unless is not pure metal. This value must be founded by the operator with this simple operation:

Set on the casting machine the base value of the alloy, for example for Cr/Co set 55%

Set on the temperature function the melting point indicated by the alloy manufacturer. Please use the end of the melting interval.

Start the casting process.

If the alloy is melting before reaching the set point, decrease the emissivity value by the left and right arrows.

If the alloy is not melting even after reaching the set point increase the emissivity value by the left and right arrows.

Make a second trial since when you find that the metal is melting at the exact point. The emissivity value that you found with this operation must be memorized for the next casting cycle.

On the table below you will find an indication of the emissivity which will be useful as a starting point.

Type of alloy	Percentage
Precious Alloy with high Gold percentage	35% - 45%
Palladium - Silver Alloys	30% - 40%
Non precious alloy	55% - 75%
Titanium	25% - 40%

### 3. Power

The supplied power determines the heating curves and consequently the melting time.

The precious alloys with high percentage should be cast slowly, the non precious do not have particular problems with fast melting times. We then suggest the following parameters:

Type of alloy	Percentage
Precious Alloy with high Gold percentage	60%
Palladium - Silver Alloys	70%
Non precious alloy	90%
Titanium	90%

### 4. Rotation Speed

The rotation speed determines the metal compaction and changes as a function of the specific weight of the alloy. Change according to the following table:

Type of alloy	Rpm
Precious Alloy with high Gold percentage	400
Palladium - Silver Alloys	450
Non precious alloy	500
Titanium	Automatic

## 5. Torque

Torque value corresponds to the acceleration of the rotating arm and determines the injection speed of the metal and must be changed according to the specific weight of the alloy. It is therefore important to find the right acceleration degree because false ones could cause either a leak of the metal when the acceleration is too high or a lack in the casting when the acceleration is too low.

Adjust according to the following table:

Type of alloy	Percentage
Precious Alloy with high Gold percentage	60%
Palladium - Silver Alloys	70%
Non precious alloy	80%
Titanium	Automatic

## 6. Vacuum (only for Supercast 2-3)

Vacuum consists of the total elimination of the air inside the casting room through a suction pump. This creates an environment without oxidant agents present in the atmosphere. This is suggested for all alloys, especially for the non precious ones.

Change according to the following table:

Type of alloy	Function
Precious Alloy with high Gold percentage	Suggested
Palladium - Silver Alloys	Suggested
Non precious alloy	Yes
Titanium	Automatic

## 7. Argon Gas (Only for Supercast 2-3)

The introduction of Argon Gas in the casting room is suggested after the vacuum. A neutral atmosphere will favour the melting of some metals among which is Palladium.

Change according to the following table:

Type of alloy	Function
Precious Alloy with high Gold percentage	Yes
Palladium - Silver Alloys	Yes
Non precious alloy	No
Titanium	Automatic

**8. Washing cycles (Only for Supercast 3)**

They are compulsory for the Titanium casting. Minimum number suggested is 3 washings, but the machine accepts up to 9 washing processes. By activating the service, the machine recognises a casting cycle has been activated. It will then shift on AUTO the Speed-Acceleration-Vacuum and Gas parameters.

**9. Suggested crucible**

The crucible must be chosen according to the alloy melting point and his physical characteristics. We suggest the following type of crucible:

Precious Alloy with high Gold percentage	Graphite
Palladium - Silver Alloys	Sintered graphite / cerameic
Non precious alloy	Silicium carbide / Ceramic
Titanium	Ceramic with Zirconium

**5.5 How to make a casting with a pre-set program**

Switch on the machine with the main switch.

- A)** Switch on the machine with the main switch.
- B)** Press F2 (2 of pic.4) on the down front panel (Pct. 3). Move the right arrow (7 of pic.4) to increase and left arrow (13 of pic.4) to decrease till when you find the desired program number on the display (7 of pic.4) first page.
- C)** Press the central arrow (14 of pic.4) to confirm the choice. The required program will appear on the display (7 of pic.4)
- D)** Place the metal into the crucible and position it into the crucible holder.
- E)** Place the ring on the arm in the casting chamber.
- F)** Adjust the position in the saddle according to the diameter and the length of the ring.
- G)** Adjust the balance of the arm according to the weight of the ring.
- H)** Press the start casting switch (12 of pic.4) on the down front panel.
- I)** Let the machine to accomplish the cycle you have set.
- J)** Check the metal into the crucible.
- K)** Press the centrifugal switch (13 of pic.4) to start the injection.
- L)** The rotation will stop automatically after 45 seconds, after that time the vacuum will be released.
- M)** Remove the ring.
- N)** Now you are ready for another casting.

## 6 TITANIUM CASTING

The Titanium normally used in Jewellery as well as Industrial application is normally pure metal at 99.750 % in different grade. Like all the pure metal it has not melting interval but just melting point. This melting point is around 1670 °C. To go over this melting point risk to give you a brittle metal so not useful for the purpose.

The SuperCast casting machine has been designed to read and regulate the temperature of the metal (Alloy) which has a melting interval, but to do this operation it requires a time of permanence of the metal in the crucible as well as a short overheating of the metal itself. All this is not good for pure Titanium.

In order to obtain a good Titanium casting we suggest proceeding as follows:

A – Set as a melting point 1.800 °C

B – Emissivity 99%

C – Power: 100%

D – Washing cycle: 3

Start the cycle as previously described

Check the metal into the crucible you will see a uniform and fast metal melting

Push the rotation for the spinning when you see the metal all melted except of the last part of the top (98% of the ingot).

The arm will rotate for 3 seconds and then will stop automatically

Open the lid

Take the flask out

Drop immediately the flask into a large amount of fresh water to stop the Alpha Case production

### 6.1 Warning

**In order to have a good casting and not to break the crucible please use only pre-dosed ingots with the desired weight.**

**Do not put into the crucible scraps of used metal and more then one new ingot. Used metal cannot be remolten.**

**Two ingots will create a problem because: the one which is positioned in the lower part of the crucible will be melting before then the one which is located up, when the second will be also melted the first will be overheated and it will also be the risk of crackling the crucible.**

**In case you need to use a weight which is not available use two ingots welding them together with Laser welding machine. For example you need to cast 60g and you don't have it, put a 40g and 20g ingot together.**

**For a good casting result it is very important the mould preparation.**

**In case you are not able to achieve good result, please contact your dealer to organise training with our demonstrator.**

## 7 ERROR MESSAGES

The SuperCast casting machine is equipped with devices and a software that can signal functioning errors on the display. They make the easier service work.

### 1) Over-temperature of the water cooling:

This signalling indicates that the thermostat inserted in the water cooling input withdrawn by the internal tank (25 litres) has detected a temperature of 65°C. To protect the machine, the operation is stopped until the temperature of the water goes below 60°C.

Possible causes in order of probability and priority of research:

Around 15 consecutive castings have been performed with elevated power of heating and high temperature. In this case, it is necessary to wait until the water cools. External cooling systems are available with greater volume of available water, which allow making a greater number of consecutive castings without stopping the operation.

If the temperature of water in the inside tank is sufficiently below 65°C, the cause is due to a thermostat damage.

### 2) Insufficient flow of the water cooling:

This signalling indicates that the sensor of measure of the water flow to the discharge has detected a flow under to about 2 lt/mins.

To protect the machine, the operation is stopped until a water flow over 2 litres/min is restored.

Possible causes in order of probability and priority of research:

the circulation pump doesn't work correctly

presence of obstacles in the hydraulic circuit of the machine

water's leak along the hydraulic circuit

blocking or damages of the water flow sensor

### 3) Under voltage of the power supply:

This signalling indicates that the control circuit that measures and controls the electric voltage supplied by the power supply net has detected a tension, also temporary, under 180VAC, dangerous for the operation of the circuits and the electric components that are equipped with the machine. Consequently, the operation is completely blocked until the regular working conditions are restored.

Possible causes in order of probability and priority of research:

power supply voltage is reduced compared to the nominal value (220 - 230 VAC)

non suitable power supply net for the loads to be supplied, with notable drop of the power supplied from empty to load.

To identify the cause of the problem, it is necessary to measure the voltage with an AC Voltmeter under all the operational conditions: before starting the machine and also under the conditions of maximum electric load (power at 100% and simultaneously at starting of centrifuge).

#### **4) Over voltage of the power supply:**

This signalling indicates that the electric voltage supplied by the power supply net is over 265VAC: this is a dangerous condition for the functioning of the circuits and electric components that are equipped with the machine. Consequently, the operation is completely blocked until the regular working conditions are restored.

Possible causes in order of probability and priority of research:

- excessive power supply voltage compared to the nominal value (220 - 230 VAC)
- presence of cyclical variations of the voltage due to an unstable power supply net.

To identify the cause is necessary to effect measures of the power supply voltage with an AC Voltmeter under all the operational conditions: before starting the machine and during the running of the machine.

#### **5) KM3 or KM4 contactors with stuck contacts:**

This signalling indicates that the control circuits (which continually check the state of the KM3 and KM4 contactors' contacts that control the power supply of the casting machine) detect the wrong position in closing of one of the two contactors.

To avoid the consequent reduction of the safety level of the machine, the operation is inhibited until the damaged contactor is replaced.

#### **6) Power generator not matched:**

This signalling indicates that the control and protection circuits have detected that the generator oscillation frequency went out of the field admitted for a correct and reliable operation (60... 90 kHz). To protect the machine the operation is stopped until the restoration you/he/she is not effected.

Possible causes in order of probability and priority of research:

- damaged induction melting coil, with two or more turns in short-circuit
- damaged or in short-circuit oscillator circuit (constituted by transformer, capacitors and their interconnection conductors)

The first cause is recognizable through an accurate visual inspection of the melting coil. In case of doubt, replace the melting coil with a new one supplied as spare part.

The second cause is more complex to be identified and it generally needs the technical assistance.

#### **7) Power generator not supplied:**

This signalling indicates that the power generator control circuits are not supplied. To protect the machine, the operation is stopped until the restoration is done.

Possible causes in order of probability and priority of research:

- at least one of the 2 protection fuses of the power generator (FU1, 32A, 10x38 mms) is interrupted
  - 1- the protection fuse of the auxiliary generator supply (FU15, 4A, 5x20mm) is interrupted
  - 2- the protection fuse of the SE720 electronic board (F1, 4A, 5x20mm) is interrupted
  - 3- the auxiliary power supply of the generator has a damaged component

To identify the cause, it is necessary to verify one by one the integrity of the fuses indicated. In case, replace the burnt fuse with a model completely equivalent and try to re-start the machine.

If the problem is not solved, we suggest calling the technical assistance. If the first three tests have given positive results, the fourth possible cause can be checked by measuring the voltage between terminals 3 and 5 of the TC2 transformer of control.

Minimum voltage must be 25VAC.

If this condition is not satisfied, it is necessary to replace the TC2 transformer. Otherwise the SE720 electronic board.

#### **8) Over current of the power generator:**

This signalling indicates that the control and protection circuits have detected that the generator's load current has overcome the limit admitted for a correct and reliable operation.

To protect the machine, the operation is stopped until the restoration is done.

Possible causes in order of probability and priority of research:

- short-circuit to the generator output. Particularly in the interconnections between generator and output transformer, or in the transformer itself.

breakdown in the control circuit of the generator's power devices. In this case the load current is not controllable.

If the condition of short circuit results evident to the outside, it is enough to remove it and then to re-start the machine.

In every other case, the application of assistance is recommended.

#### **9) Damaged SE720 signalling relay:**

This signalling indicates that the signalling relay of the generator's operation is damaged. To protect the machine, the operation is stopped until the restoration is done. In this case, it is necessary to replace the SE720 electronic board.

#### **10) Heating time-out:**

This signalling indicates that the maximum time admitted for the continuous heating has been over passed. This limit avoids the overheating of the metal and of the crucible and of possible dangerous conditions as consequence of insufficient or neglected control by the user. the operation is completely blocked until the regular working conditions are restored by pressing the STOP pushbutton.

#### **11) Open door:**

This signalling appears when centrifuge of the metal to be injected is started and the door of the casting chamber it is not closed and stopped by the safety device that equips the machine.

When the door is closed and blocked correctly, the centrifugation automatically starts.

#### **12) Emergency button pressed:**

This signalling indicates that the stop pushbutton (red coloured) of the machine is pressed. The machine is completely inhibited until the button is restored in the lifted position.

## 8 INFORMATION ON THE MAINTENANCE

### ATTENTION:

**BEFORE MAKING ANY MAINTENANCE OPERATION, DISCONNECT THE MACHINE FROM THE ELECTRIC SUPPLY.**

- Clean carefully inside the centrifugal chamber removing any investment, fragment or metal splinter.
- Check every 6 months that water level in the cooling tank and refill the water evaporated during the use of the casting machine through the appropriate cap, accessible removing the back side panel.
- Check the oil level in the vacuum pump at least once a year.

### Fuses:

Fuses are located in the frontal part of the machine on a proper rack numbered from 1 to 12.

1 – Protection of the power supply circuit of the generator 2x20A /10x38 mm

2/3 - Protection of the power supply circuit of the centrifugal motor 2x20A /5x20 mm

4/5 - Protection of the power supply circuit of the vacuum pump motor 2x10A /5x20 mm

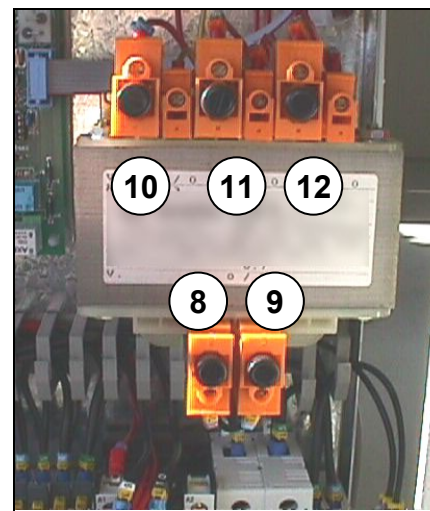
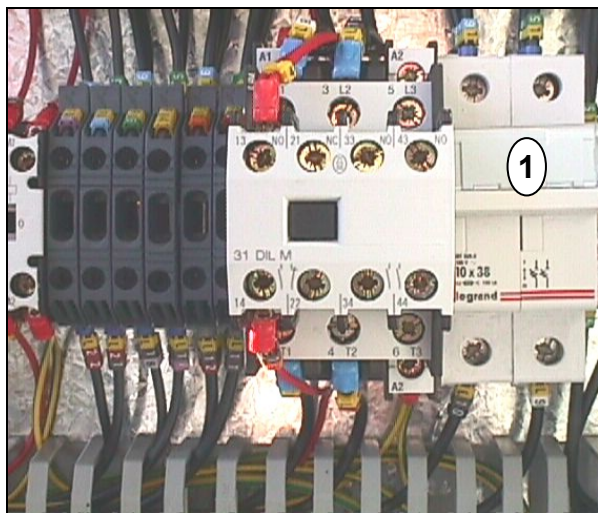
6/7 - Protection of the power supply circuit of the cooling pump motor 2x4A /5x20 mm

8/9 - Protection of the power supply circuit of the primary transformer 2x4A /5x20 mm

10 – Secondary protection of command power supply circuit 1x4A/5x20 mm

11 - Secondary protection of plc power supply circuit (SE791) 1x4A/5x20 mm

12 - Secondary protection of pyrometer and thermoregulator power supply circuit 1x4A/5x20 mm



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