



DESIGN AND COSTRUCTION OF EQUIPMENT
FOR DENTAL TECHNICIANS, DENTISTS AND BEAUTICIANS

**SR 320 TROPICAST
INDUCTION CASTING
MACHINE
USE AND MAINTENANCE**



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1 - GENERAL INFORMATION

1.1 - Aim of the manual

This manual has been written by the manufacturer and it is an integral part of the machine. Its information are addressed to the user and contain all Safety Recommendations. Before using this centrifuge, it is recommended that you read this manual carefully, especially if it is the first time, to ensure you know the control devices, their function and position. It is also advisable to make performance tests. This manual must be kept for future references.

1.2 - Identification of the machine manufacturer

The plate with all the information regarding the machine (Name of manufacturer, Serial Number, Production year, power supply, electrical input and weight) is located on the back of the machine next to the feeding cable.

1.3 - Technical information

Designed in compliance with the EC machine safety directive, the Tropicast induction machine is the result of a painstaking selection of materials and components and it is especially designed to obtain melted metal casts with electromagnetic induction for both dental and goldsmith laboratories. It comes in one version only with cylinder-block carter.

1.4 - Safety Devices

The machine is provided with 3 fixed guards to access the inside of the machine itself and they can be found on the front, left and right side. The fixed guards can be removed only by specialized and personnel authorized by the Manufacturer for extraordinary maintenance and repairs. All interventions must be done when the machine is Off and disconnected from the electrical outlet.

The machine is also provided with an upper movable guard (door that can be opened) through which you access the melting chamber: when the door is open, a safety switch prevents the performance of a melting cycle (coil feeding and centrifuge). During the melting cycle, the door is blocked and it is impossible to open it without stopping the cycle itself.

1.5 - Description of the induction principle

If you place an alloy inside a coil with alternated current at a frequency defined according to appropriate parameters, you will notice that the alloy rapidly heats up. Such heating is produced by the resistance that the alloy produces against the passage of the electrons inside: passage of electrons produced in turn by an electromagnetic field induced by the coil. Such heating is probably the best heating source to be used in metal castings because the material does not come into direct contact with other polluting elements, the temperature can be reached is theoretically endless and the casting speed can be very high. The fact that the casting speed can be really fast represents a plus for this method because long casting times often cause oxidation events due to the fact that the metal at a very high temperature can be easily attacked by the oxygen it catches even if the casting is performed in vacuum conditions (vacuum that can never be 100%). With your TROPICAST Induction machine you can cast up to 35gr of base alloy just in 40 seconds, therefore with such short times the possibility of oxidation is absolutely avoided.

1.6 – Technical Data

Dimensions AxBxH	610Wx510Dx910H mm
Weight	Kg. 83
Power Supply	230V - 50 Hz
Max power	2,2 Kw
Work frequency	85 KHz
Centrifuge rotating speed	420 giri/min.
Useable cylinders	1x : Diam 30 x h 55 mm 3x : Diam 50 x h 55 mm 6x : Diam 65 x h 55mm 9x : Diam 80 x h 55mm
Cooling liquid:	Distilled water

1.6 – Safety information

During the heating and casting phases there are parts inside the machine, such as the inductive coil around the crucible that are at HIGH tension (about 400V), therefore the user must ABSOLUTELY avoid any tampering on the machine safety devices and let the machine operate with an open door.

2 - MOVING AND INSTALLING

2.1 - Loading and unloading

The packaged machine can be moved with a forklift, carts or manually by at least 2 people. While moving the machine avoid absolutely any kind of bumping, dropping or tilting: they could seriously damage the machine. Obviously, the manufacturer is not responsible for damages caused by droppings, improper use and maintenance which are not in strict accordance with the manufacturer's instructions contained in this manual.

Packaging waste disposal must be done with respect to the environment and the law in force.

2.2- Packing and Unpacking

The machine is placed and fastened to a small pallet with 4 anchoring plates fastened to the machine with 4 screws located in the place of the little feet. On the side the machine is covered by a wood reinforced panel with sheet metal corners. On the top part there is a wood lid fastened to the wood panel by a strap. The tools needed to unpack are the followings:

- Medium-large cross screwdriver
- A 17-Hexagonal wrench
- Scissors or cutter

To unpack the machine please follow the instructions hereafter:

A – Cut the strap and remove the upper lid along with the foaming packing material.

B – Unscrew the 6 side screws (3 per side) which fastened at the bottom the panel with the pallet.

C – Remove the side panel lifting it.

D – Unscrew by using the cross screwdriver the 8 screws which fasten the machine to the pallet.

E – Lift the machine by tilting it first to one side and then to the other side and unscrew with the 17 wrench the 4 screws which fasten the anchoring plates to the machine.

F – Once these 4 screws have been removed, place and fasten the 4 little feet given with the machine. The feet must be fully fastened, they are all self-levelling to adapt themselves to different types of floor (maybe not perfectly levelled) and they are supplied with a locknut for the fastening.

Please keep the packing for further handlings and repairs.

2.3 - Place and installation

The machine must be placed in aired and large sites. The floor must be as flat as possible and very rigid. When installing it, please make sure that the machine is well rested on the floor: if necessary, use adjustable feet. Avoid absolutely to install the machine on wooden floorboards, scaffolds or lofts: you would incur in dangerous vibrations endangering its durability.

2.4 - Electric Connection

Connect the power supply plug into a 220V AC outlet. It is duty of the user to ensure that the electric plant is in accordance with the safety laws in force. It is particular important to make sure that the grounding is well efficient. Furthermore, it is important to verify the network voltage: in case the voltage is too low (lower than 220V), the engine will start too slow and it might be necessary to install a voltage stabilizer.

2.5 – Compressed Air Connection

The machine needs to be connected to compressed air. The pressure must be the same as the one normally used in dental labs and goldsmiths. The machine best operates with pressure not lower than 4 bar and not higher than 10 bar.

2.6 – Water-cooling

The machine is delivered without any water-cooling. It is therefore mandatory to load the machine with about 10/12 litres of DISTILLED WATER. The tank capacity is 15 litres. The water can be introduced through the in-put pipe union located on the top right end side of the machine, checking the level (which must be between MIN and MAX) of the tank by looking in the slot located on the side, bottom left end. The level must be about 2 third of the full tank. Since the circuit is a tight one there is no water evaporation, nevertheless please check once in a while that the level remains between the allowed limits (more than half) and that the water remains clear. In case the water becomes murky and unclear it is advisable to change it.

3 – USE INFORMATION

3.1 – Crucible

For the Casting Centrifuge SR 320 TROPICAST only the following crucibles must be used (Pic. 1):



A

B

Pic 1



C

D

A : Ceramic crucible for base alloys, palladium alloys and gold-ceramic

B : GRAPHITE inset to be placed inside the ceramic crucible only for GOLD-RESIN.

C : SR328: COMPLETE Crucible in NORMAL GRAPHITE: to be used for GOLD-RESIN.

D : SR329: COMPLETE CRUCIBLE IN SINTERED GRAPHITE: it can be used for resins gold-ceramic and palladium alloys when the quantity of metal is little (lower than 15 gr.): in this case the induction in ceramic crucible may be difficult and therefore it is preferable to use this type of Crucible. Sintered graphite does not pollute the dental alloy but it wears out fast, so since it is quite expensive, we suggest you use it only when strictly necessary.



3.2- Arm and casting chamber description (Pic. 2)

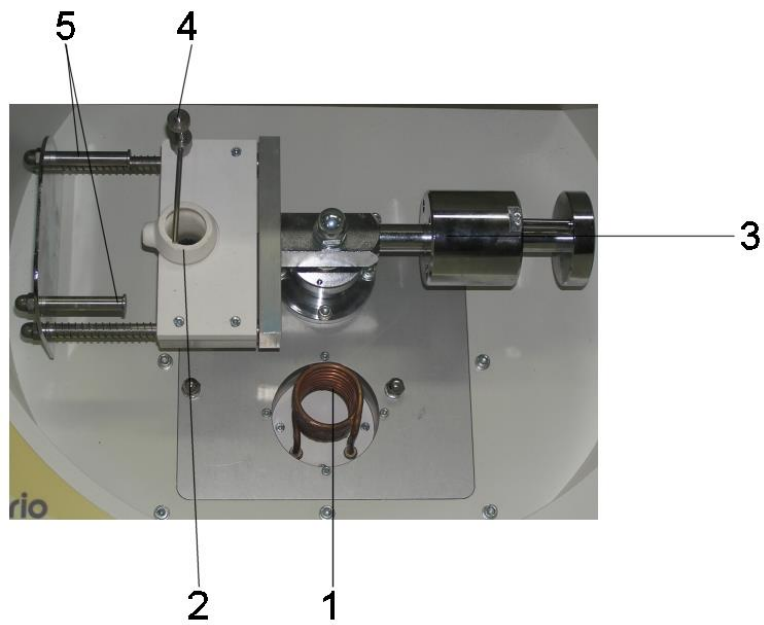


FIG 2

- 1 – Inductive Coil
- 2 – Ceramic Crucible
- 3 – Counterweight
- 4 – Hight lock cylinder regulation handle
- 5 – Support for cylinder (1X, 3X, 6X)

3.3 – Panel description (Pic. 3)

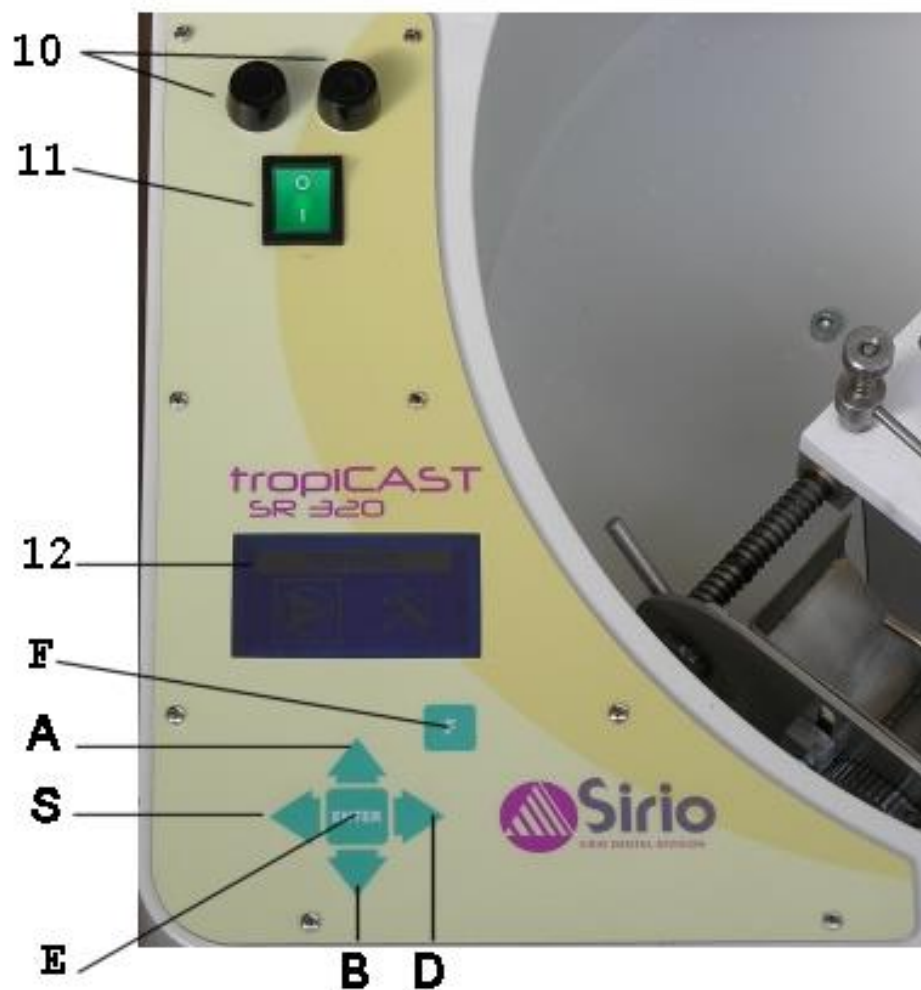


FIG 3

10 – Fuse-holders with 6x32 16° fuses

11 – Light general switch

12 – Display LCD box

F - Button F

A, B, S, D, - Manoeuvre buttons

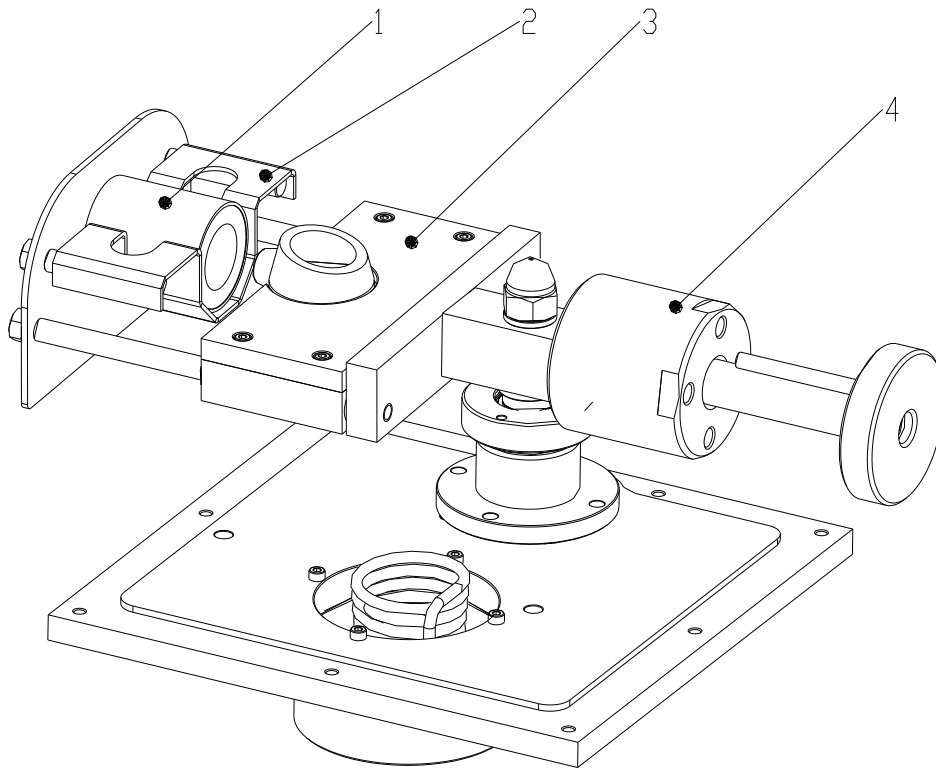
E – Button ENTER

3.4 – Crucible placement

The crucible must be placed as in Pic. 2. Once having placed it please use crucible lock 9 to avoid that the crucible could move during the casting.

3.5 – Cylinder placement

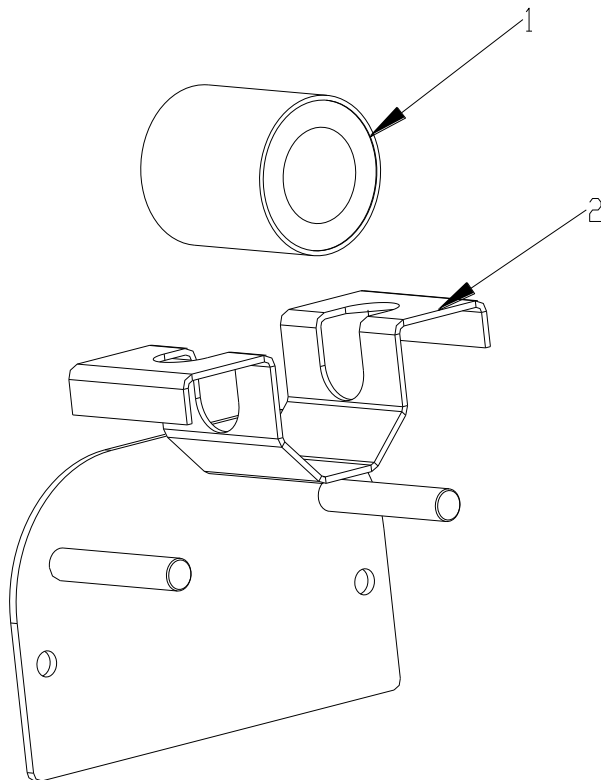
The cylinder must be placed according to the hereafter picture:



FIG/PIC 1.1

The machine is ready for 4 cylinders Degussa Type: 1x, 3x, 6x, 9x.

For each of these cylinders a support, like the one shown in the hereafter picture, is supplied:



1 – Place the cylinder holder 2 on its given support.

2 – When the cylinder is ready, remove it from the furnace and place it on its support.

3.6 - THE COUNTERWEIGHT: place the counterweight so that you can read on the top part the number of cylinder used. The arm of the machine is balanced for type Degussa cylinders (1x, 3x, 6x, 9x). If, for example, you are using a 3x cylinder, push the counterweight towards the centre, by slipping it off its blocking pivot, rotate it so that on the top you can read number 3 and insert it again in its lock. Follow the same procedure for all other types of cylinders.

3.7 – Casting performance

Before placing the hot cylinder in the machine, set up the casting by following these simple steps:

- On turning the machine On the following will appear:



Pic. 4

- press ENTER and the following will appear:



Pic. 5

When the display shows this you can choose between 2 options: START (to begin a casting cycle), SET (to set or modify the casting parameters). To choose one or the other option, that is to go from START to SET and vice-versa, press the buttons S and D (Pic. 3), that is LEFT or RIGHT ARROW.

Let's say that you want to start a cycle and START is shown on the display as per Pic. 5, press ENTER and the following will appear:



Pic. 6

In order to avoid unintentional starts of the machine it is necessary to enter a code. The code is the following:

Press 4 TIMES the button D as per Pic. 3, that is RIGHT ARROW: on the display 4 stars will appear to confirm that the code has been entered. Press ENTER and the following will appear:



Pic. 7

Now you have to set the power that you want to use for the casting. The power used is shown in percentage to the maximum power: in the picture above the power used is 10%. Press the buttons A or B (ARROW UP and ARROW DOWN) and select the power that you want to use. Please be aware to use power values from 60% to 80%, the 100% value can be reached without risking to damage the machine, but we have tested that the machine works at its best on the given values. This value, that is the power used, can also be modified during the casting process because the buttons A and B are always active, so you can start a casting cycle with a high power and when the casting Temperature is about to be reached, you can lower the power to avoid firing of the alloy.

Before placing the hot cylinder in the machine, put the desired quantity of alloy in the crucible. Make sure that the crucible is correctly placed, that is placed on the arm on the opposite side of the cylinder holder. Furthermore verify that the crucible is perfectly aligned with the Induction Coil underneath.

Now you can remove the cylinder from the furnace and place it in the machine paying extreme attention not to get burnt.

Close the door of the machine and press the button ENTER.

The machine will move the arm in its correct position and on the display, instead of STAND BY, the following will appear: TEST, SYNCRO, HEATING. Only when HEATING appears the real heating will start.

The technician must check through the porthole the casting process. As the temperature increases the metal will start turning first red and then gradually white.

If during the casting the technician needs to work inside the crucible to move the metal (this may be necessary when waste remaining material from previous castings get stuck in the crucible in a position higher than the one covered by the induction), you can stop casting or by opening the door and when you close it casting operation will continue or by pressing ENTER and to continue casting you have to press one more ENTER.

When the technician considers that the metal has reached the right casting point, press the button F/START.

The machine will perform the metal casting according to the pre-set modalities.

When the machine stops, you can open the door and remove the cylinder by paying all due attention.

In order to make the best use of the machine we strongly advise to operate as follows:

1 – When the cylinder is ready, prepare the machine, place the crucible in its position and load it with the metal needed for the casting.

2- Leave the cylinder in the furnace and start the heating of the metal according to the explanation given before.

When the metal has reached a high temperature but it is not completely melted, open the door (stopping casting operation). The metal will have high temperature so the time for casting operation will be very short and the cylinder will remain at the right temperature. Then do as follows:

- Remove the hot cylinder from the furnace and place it into the machine
- Close the door and finish casting until the metal is perfectly melted.
- When the metal is well casted press F and spin it.

We advise to heat the cylinder in the furnace at a slightly higher temperature (more than 30/40°C) than the one suggested in the tables, this in order to avoid cooling it too much before the casting.

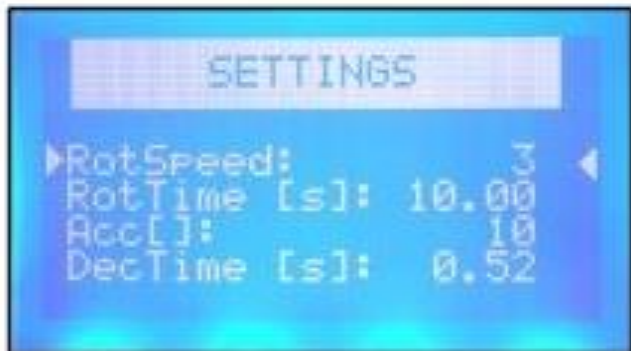
3.8 – Menu SET

If you press the button S (LEFT ARROW) shown as in Pic. 5 the following will appear:



Pic. 8

By pressing ENTER you move to:



Pic. 9

The parameters shown can be modified by pressing ENTER: the parameter indicated by the arrows is highlighted and you can modify its value with the buttons A or B (ARROW UP and ARROW DOWN) and then confirm by pressing ENTER. You can move from parameter to parameter by pressing the buttons A or B (use B to go down and A to go up). The meaning of the parameters is the following:

Rot Speed: it stands for the casting rotation speed. You can choose between 3 increasing values: 1 (low speed), 2 (medium speed) and 3 (high speed). Unless otherwise required we suggest to set value 3.

Rot Time: it stands for the casting rotation time, it can vary from 0 to 20 seconds.

Acc : it stands for the acceleration of the machine. It can vary from 0 to 20 seconds. The acceleration increases with increasing parameter values. For base alloys we suggest the value 20, for precious alloys you can use even lower values.

Dec Time: it stands for the deceleration time: after this time elapses the machine deceleration begins. We suggest to set a value of 3 seconds lower than the Rot Time.

After having confirmed the last value with ENTER, press the button F to exit.

4 – IMPORTANT REMARKS

Follow are some remarks and precautions for fusion.

4.1 “Over Courrent” Error

SR 320 Tropicast machine can cast up to 70 grams of metal. Like all other Induction machines no problem occurs when casting big quantities of metal, while it's necessary to take some precautions in case you need to cast little quantities.

If little quantities of alloy (less than 20 grams) are used the machine can show “OVER COURRENT” Error. It means that metal is not enough. In that case you need to decrease the set power following the below explanatory table.

	20 gr	15 gr	10 gr	Less than 10 gr
GOLD–Ceramic Alloy Palladium alloys	70 %	60%	50%	50 % 45 %
Not precious metals	90%	70%	60%	50%

This is just an indication but lightly different values from the ones suggested before can be requested. This kind of error is , of course , more frequent when gold-ceramic alloy and palladium are cast but it can also occur with not precious metals . The problem can be solved just decreasing the power.

4.2 – Casting of feedheads, scraps and remelting metal waste

When using feedheads, scraps and remelting metal waste (little quantities of metal, flakings of remelting metals) casting process can be more difficult to perform. It can occur that metal overheats and becomes red but without reaching the melting point. We suggest you to put in new alloy in a percentage, which has to be not less than 50% and if not possible, to use some bigger blocs of the other metals so that fusion can start from these.

5 - MAINTENANCE INFORMATION

5.1 - Ordinary maintenance

The machine doesn't need any maintenance.

Please keep it clean by vacuuming the interior from dust and residues left from the castings.

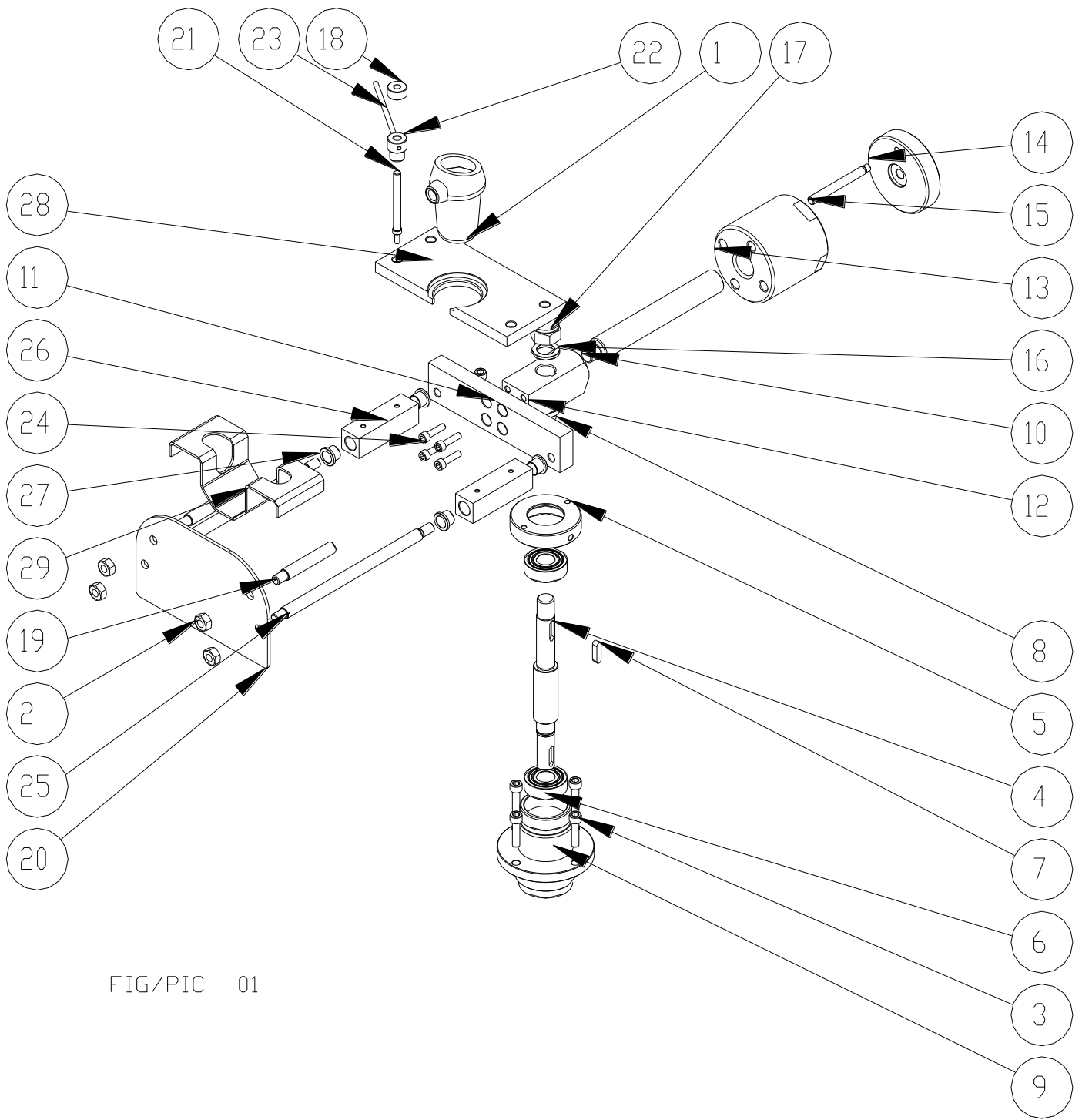
5.2 - Extraordinary maintenance

To repair the machine or replace some of its parts, the user should consult directly the manufacturer or only specialized technicians.

Absolutely avoid to open any of the fixed guards without proper precautions.

Disconnect the power supply plug from the outlet before any extraordinary maintenance operation.

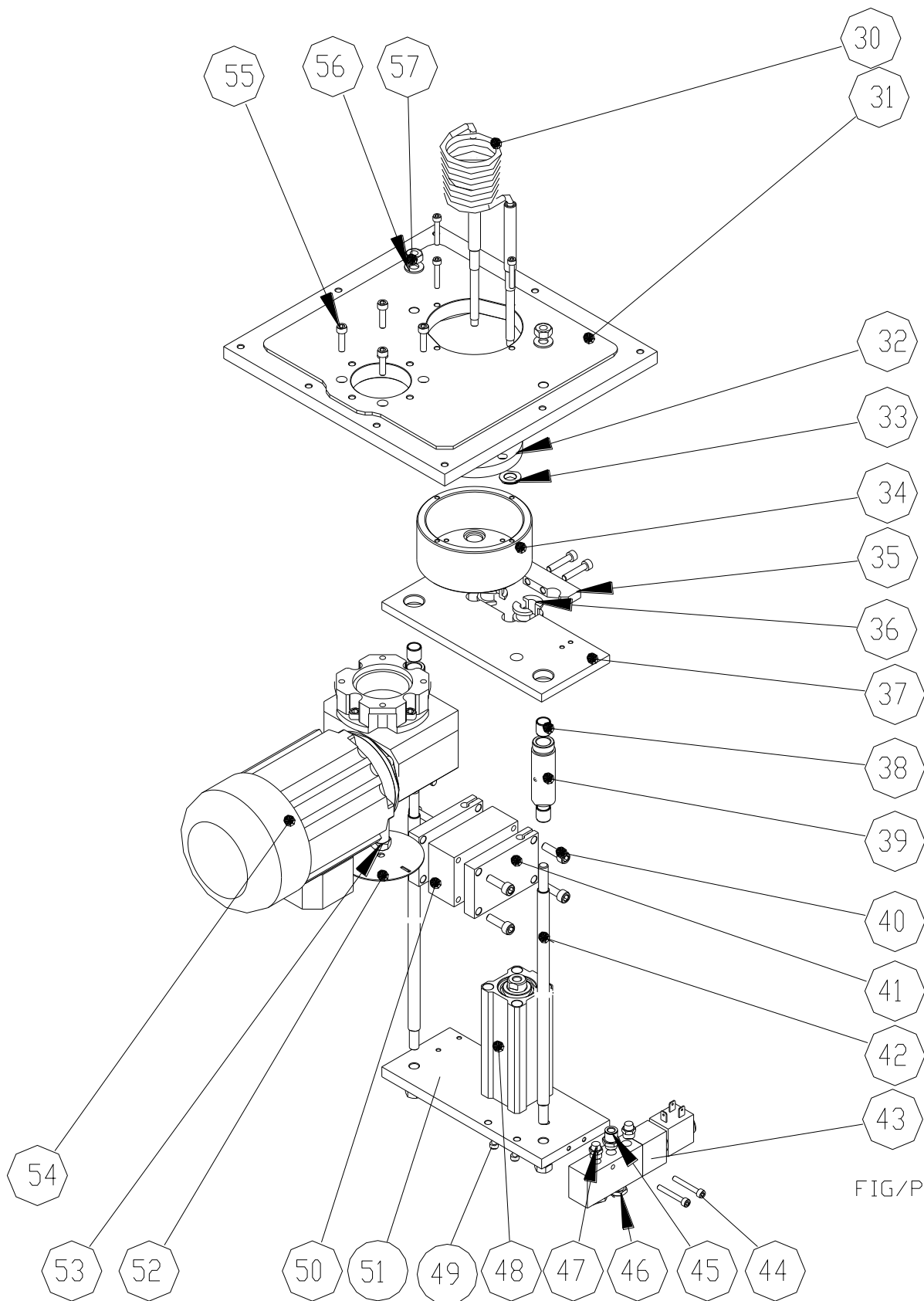
If the user doesn't strictly follow the rules contained in this manual the manufacturer is lifted from any guarantee and responsibility.



FIG/PIC 01

SPARE PARTS LIST PIC. 1

Pos	Code	Description	N°P
1	320 001C	Ceramic Crucible	1
1	320 001G	Graphite Crucible	1
1	320 001S	Sintered rapite Cruciale	1
2	320 002	M8 Nut	4
3	320 003	TCCE M6x25 Screw	4
4	320 004	Main Shaft	1
5	320 005	Main Ring Nut	1
6	320 006	Ball Bearing	2
7	320 007	5x20 Feather Key	2
8	320 008	Sleeve	1
9	320 009	Central Flange	1
10	320 010	Tie Rod	1
11	32° 011	AL Cross Piece	1
12	320 012	Main Arm	1
13	320 013	Counterweight	1
14	320 014	Fastener	1
15	320 015	Bolt Holder	1
16	320 016	Grover D 14 Washer	1
17	320 017	M14 Blind Nut	1
18	320 018	Ring Nut	1
19	320 019	Cylinder Holder Bolt	2
20	320 020	Cylinder Plate	1
21	320 021	Crucible Bolt	1
22	320 022	Crucible Head Fastener	1
23	320 023	Crucible Lever	1
24	320 024	TCCE M5x20 Screw	4
25	320 025	D10 Column Guide	2
26	320 026	Slide Holder	2
27	320 027	D10 Bush	4
28	320 028	Crucible Holder	1
29	320 029 1	1X Cylinder Holder	1
29	320 029 3	3X Cylinder Holder	1
29	320 029 6	6X Cylinder Holder	1
29	320 029 9	9X Cylinder Holder	1



FIG/PIC 02

SPARE PARTS LIST PIC. 2

Pos	Code	Description	N°P
30	320 030	Complete Copper Coil Spira	1
31	320 031	Main Plate	1
32	320 032	Runner Cup Insulatiing Plate	1
33	320 033	Runner Cup Insulator	2
34	320 034	Runner Cup	1
35	320 035	Boss	1
36	320 036	Coil Insulator	2
37	320 037	Moving Plate	1
38	320 038	12x10x10 Sleeve	4
39	320 039	Vertical Guide	2
40	320 040	TCCE M6x20 Screw	8
41	320 041	Copper Plate	2
42	32° 042	Vertical Column	2
43	320 043	3-way Electro-valve	1
44	320 044	TCCE M4x30 Screw	2
45	320 045	1/8 4 Joint	1
46	320 046	1/8 4 Curve Joint	2
47	320 047	1/8 Silencer	2
48	320 048	D32x60 2X Cylinder	1
49	320 049	TCCE M5x120 Screw	1
50	320 050	Condenser	2
51	320 051	Inferior Plate	1
52	320 052	Encoder Disc	1
53	320 053	Encoder Bolt	1
54	320 054	Gear Motor	1
55	320 055	M5x25 Screw	4
56	320 056	D8 Washer	4
57	320 057	M8 Nut	4
58	320 058	Control CPU Panel	4
60	320 060	CPU card	1
61	320 061	PWR Power Card	1
62	320 062	Inverter	1
63	320 063	Ferrite Inductance	1
64	320 064	Main Inductance	1
65	320 065	70 VA 220/20 Transformer	2
66	320 066	24V Pump	1
67	320 067	Safety Switch	1
68	320 068	Micro-switch	2



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DECLARATION OF CONFORMITY

Meldola 01/01/2013

Re: CEE Directives: 2006/42 CE(ex 89/392 CEE) - 2006/95 CE(ex 73/23 CEE)
2004/108 CE (ex 89/336 CEE)

SIRIO DENTAL S.r.l., Via A. Accardi 11, 47014 Meldola FC, in the name of Eng. Antonio Zaccarelli, President, declares that the equipment named
“SR 320 Induction Casting Machine”
and manufactured by Sirio Dental Srl complies with the above mentioned Directives.
This certificate shall not be re-produced except in full without the written approval of Sirio Dental Srl.

SIRIO DENTAL Srl
Ing. Antonio Zaccarelli, Presidente C.D.A

GUARANTEE CERTIFICATE

MODEL: SR 320 “TROPICAST” INDUCTION CASTING MACHINE

SERIAL NUMBER:

GUARANTEE LENGTH: Months 12

- 1 - The guarantee has effect from the date of purchase of the machine, date certified by a sale document released by the seller (such as bill of lading, receipt of sale or fiscal slip) from which they are clearly stated the model and the serial number.
- 2 - The guarantee includes substitution or repair of defective parts of the machine.
- 3 - The guarantee doesn't cover any defective parts due to negligence; improper use; improper maintenance; maintenance performed by non-qualified personnel or transportation damages; that is damages that cannot be considered manufacture defects for which the manufacturer cannot be hold responsible.
- 4 - The guarantee does not cover any case of improper use of the machine.
- 5 - Transportation cost of the machine and relative risks are at user's expense.

Meldola

SIRIO DENTAL Srl
Ing. Antonio Zaccarelli

SIRIO DENTAL Srl

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