

Heracast® iQ



Operating instructions
Casting Machine Heracast® iQ

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Operating instructions

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1 Scope of applicability

1.1 General

Combilabor® is a registered trademark of Heraeus Kulzer GmbH.
Author 42415SCH

These working instructions apply to:

Order No.	Type Features	Date
66004331	Heracast iQ integrated water cooling and vacuum pump	05.2012

1.2 Designation and type of machine

Designation of the machine:	Type of machine:	Serial number.:
Induction casting machine Heracast iQ	Heracast iQ	from 2093

1.3 EU Statement of conformity

Herewith we, Heraeus Kulzer GmbH, Grüner Weg 11, 63450 Hanau (Germany), confirm that the following unit due to its intended use and the version marketed by us corresponds to the relevant basic safety and health requirements of the EC guideline.

This statement will become invalid in case of any modification of the unit that is not co-ordinated with us.

Heraeus

**Konformitätserklärung
Declaration of Conformity**

Hersteller/Manufacturer: Heraeus Kulzer GmbH
Grüner Weg 11
63450 Hanau / Germany

Hiermit wird bestätigt, dass das Gerät
It is herewith confirmed that the unit

Heracast iQ

Induktives Gießgerät zum Schmelzen und Gießen von zahntechnischen Legierungen
Induction heated melting and casting unit for dental alloys


den grundlegenden Anforderungen / complies with the essential requirements of


- der Maschinenrichtlinie 2006/42/EG
- the machinery directive 2006/42/EG
- der Richtlinie über elektromagnetische Verträglichkeit (EMV) 2004/108/EG
- the Directive concerning electromagnetic compatibility 2004/108/EC
- der Niederspannungsrichtlinie 2006/95/EG
- the low tension Directive 2006/95/EG

mit deren Änderungsrichtlinien entspricht / including their amendments.

Angewandte Normen / Standards applied:
DIN EN 61326-1:2006; DIN EN 50178:1998-04

Hanau, 4.3.2010
Ort und Datum
Place and Date









Fr. Dr. Hecker
Clinical Research & Regulatory Affairs


St. Schmid
Technical Manager

Konformitätserklärung Heracast iQ 25.02.2010.doc Version 1 Seite 1 von 1

1.4 Instructions on using the unit safely

1.4.1 Explanation of Symbols

Symbol	Accompanying word(s)	Explanation
	CAUTION!	Safety-relevant chapters and sections in these working instructions have been marked with this symbol.
	NOTE!	Information within the working instructions on the optimum use of the unit.
	HOT SURFACE!	Hot surface risk of getting burned.
	HIGH FREQUENCY!	Caution high frequency. Not to be used by persons with pacemakers.
	WARNING!	Warning: Caution High frequency.
	CHANGE!	Important: Changes have been made to this paragraph. Please read carefully.
	CERTIFICATE	Registration certificate according to the ministry of health of the Russian federation.

1.5 Warning pacemakers



WARNING!

Not to be used by persons with pacemakers Read working instructions prior to use! We cannot accept any guarantee claims or assume liability if the machine is used for other purposes as stated or for damage resulting from non-compliance with these working instructions!

1.6 Transport damage

Please check the unit for transport damage and, if necessary, report the damage to the forwarder within 24 hours after receiving the unit. **Under no circumstances, work with a damaged machine.**

1.7 Operator's obligations

In addition to complying with the statutory regulations specified by the manufacturer, the operator must ensure the statutory obligations are observed and implemented in the workplace, i.e. he must train his personnel and comply with industrial safety legislation and any other regulations or laws in force.

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For working on and with the machine, the operator must draw up written instructions in understandable form and give these to his employees in their own language. These instructions must be based on the operating manual and written in light of the work to be performed.

1.8 Unit book

We recommend you keep a unit book. All tests as well as all essential works (e.g. repair work, modifications) must be documented in this book.

1.9 Safety information

With these laboratory units the safety concerning the protection of persons, the environment and the material to be processed mainly depends on the behaviour of the persons operating the unit.

Prior to operation read the working instructions carefully, adhere to the information provided in order to avoid errors and damage, in particular damage to the health.

In addition to the information in these working instructions, relevant national laws and guidelines must be observed for setting up and operating this unit (technical connection requirements of the electrical supply companies, etc.).



HOT SURFACE!

The metal surface around the casting chamber heats up during continuous operation.

Do not touch this surface.

When casting and in particular when handling melted metal face guards, gloves and aprons must be worn. Cleaning must always be carried out when the unit is cool.



NOTE!

Due to the waste gases released during working, adequate ventilation must be provided.



WARNING!

This symbol warns of the dangers of electric voltage. In the case of non-compliance the result of an electrical shock with all known effects can be death. When inspecting the housing cover this safety symbol is visible on the free surface on the operating unit. Please observe the safety instructions when carrying out servicing.

Works at the electrical equipment of the unit must only be performed by the authorised Heraeus service and in the safe condition (voltage cleared).



CAUTION!

Power cable and plug must be checked for damage prior to operation.

If any damage exists, the unit must not be connected to the mains.

A damaged mains connecting cable may only be replaced by a mains connecting cable of the same type by the authorised Heraeus service.

Works at the electrical equipment of the unit may only be performed by **adequately trained service companies** and in the safe condition (voltage cleared).

Only permissible original spare parts must be used. The use of different parts holds unknown risks and must be avoided at any rate.

Proper function and safety of the unit are only guaranteed if the required tests, maintenance and repair work have been performed by **Heraeus Kulzer service agents** or by **personnel adequately trained** by the manufacturer.

Heraeus Kulzer GmbH will **not accept** any liability for damage to the unit resulting from inexpert repair which has not been performed by **Heraeus Kulzer service agents** or if no original spare parts/accessory parts have been used during the exchange of these parts.

**CAUTION!**

It is essential that the following safety instructions are adhered to

- Fully close the locking lever before the start (push into the end setting). If the closed lever is not closed over dead centre there is a risk that the lever could flip open if pressurised. This gives rise to the risk of impacts and the danger of hot gases or melted metal splashing out.
- When casting and in particular when handling melted metal face guards, gloves and aprons must be worn. Cleaning must always be carried out when the unit is cool. The unit must always be supervised when in operation.
- Theoretically a control error can accidentally start a rotation. This can lead to crushing via the locking lever.

Switch off the unit when not in use!

A self test also initiates an automatic rotation cycle.

Do not work in the area of the locking lever when the unit is switched on. Always keep this closed.

- **Don't place any objects under the chamber!**

2 Use in accordance with specifications

The induction casting machine Heracast iQ is a laboratory unit for casting all precious metal and almost all non-precious and CoCr alloys for dental applications with a liquidus temperature of 500 °C up to > 1600 °C.

The unit is not suitable or intended for casting pure titanium or beryllium-containing alloys!

**CAUTION!**

Processing of beryllium-containing alloys is hazardous to health!

Casting of these alloys is performed at the user's risk! Heraeus Kulzer GmbH will not accept any liability for any health damage that may have been caused by casting such alloys!

Casting of titanium- or aluminium-containing alloys is performed in special working steps. See paragraph 10.4 "Titanium and aluminium-containing alloys".

Precision castings with alloy quantities of up to 130 g in the graphite crucible and 100 g in the ceramic crucible are possible. Alloy quantity for CoCrMo and non-precious metal bonding alloys in the ceramic crucible: up to 60 g.

**NOTE!**

We recommend the exclusive use of original Heraeus Kulzer crucibles which are especially matched with this type of application. The use of other materials leads to the exclusion of guarantee claims in case of damage to the unit or the molten material. In view of the various causes for faulty castings, we do not grant any guarantee for such cases.

- Normally, the unit is suitable to be set up and operated in the following fields: Commercial and industrial laboratories, schools, universities, hospitals, etc. The unit has been designed for continuous operation.
- The pressure control is technically set to 3.5 bar on the unit and by means of a safety valve set to a pressure of 3.7 bar.

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2.1 Working rules



CAUTION!

- Personal protective equipment such as hand, face and body protection must be worn; jewellery must be taken off prior to working.



CAUTION!

Do not use the unit for the following activities:

- The unit must not be used for melting and casting beryllium-containing alloys (hazardous to health!).
- Do not use the unit for melting, drying or thermal treatment which may lead to the release of combustible gases and vapours which burn with air or which may form a hazardous, injurious or explosive mixture.
- The unit is not suitable for thermal treatment of hazardous or health-hazardous materials (e.g. dusts, fibres, liquids, solids).
- The unit must not be used to heat up food.

3 Description (of the unit)

3.1 Features

- Reliable and material-appropriate melting and casting under vacuum.
- Temperature control via electronic power control and time.
- Long lifetime of ceramic and graphite crucibles.



NOTE!

In order to avoid errors and problems during working we would like to ask you to read these working instructions carefully and store them at a place ready to hand. Additional information on vacuum pressure casting can be obtained upon request. Phone No. of Customer Service, see paragraph 19 „Service“

4 Scope of delivery / original equipment

Check that all components are in perfect condition on delivery of the machine.

If you wish to make a complaint, contact your supplier.

4.1 Scope of delivery

- 1 x Heracast iQ, working instructions, test certificate
- 1 x Filling hose with connector and container
- 1 x Muffle holder
- 1 x Pressure hose 13 mm, incl. 2 hose clamps and a socket 13 mm
- 2 x Door signs Caution! High frequency. "Not to be used by persons with pacemakers"



HIGH FREQUENCY!

Attach the supplied adhesive pictorial symbols "Not to be used by persons with pacemakers" to all entrances to the unit service room.

4.2 Original equipment

- 1 x Small alloy spoon
- 1 x Box cont. small melting powder pellets
- 1 x Spruing aid - plexiglass half-pressing
- 1 pack 6 pcs ceramic crucibles for CL-IG/IM/I95/Heracast iQ/EC
- 1 pack 6 pcs ceramic crucibles NPM-crucibles for CL-IG/IM/I95/Heracast iQ/EC
- 1 x Crucible box CL-IG/IM/I95/Heracast iQ/EC
- 1 pack 10 pcs graphite inserts for CL-IG/IM/I95/Heracast iQ/EC
- 3 x each Casting ring (X3, X6, X9)
- 1 x each Cone former (X3, X6, X9)

5 Structure and function

5.1 Control and display elements



5.1.1 Description “Total view Heracast iQ”

- 1 Front panel with control elements
- 2 Viewing glass casting chamber
- 3 Front limit switch chamber lock
- 4 Locking lever – casting chamber (with carrying handle) and bow
- 5 Viewing glass for oil level of the pump
- 6 Holder for special tool muffle lift
- 7 Filter cover air supply

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5.1.2 Description “Front panel with control keys and display”

- 8 Display
- 9 Adjustment knob
- 10 Keyboard
- 11 Main switch



5.1.3 Description “Interface”

- 12 Port (RS 232 is used only for servicing)



5.1.4 Description “Supply connections“

- 13 Mains connection
- 14 Compressed air connection
- 15 Graduated viewing glass for cooling water level
- 16 Connection to fill/empty the cooling water tank
- 17 Fans
- 18 Rear limit switch

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5.1.5 Description “Partial view open chamber”

- 19 Viewing glass casting chamber
- 20 Ceramic crucible
- 21 Graphite insert
- 22 Shielding plate
- 23 Mould support
- 24 Chamber gasket
- 25 Mould
- 26 Adjustable screw for size of mould
- 27 Clamping device, guide and snap-in locking device for fixation of the mould

6 Location and installation

6.1 Transport

Carefully transport the unit horizontally to prevent the pump oil from leaking and damaging the unit. **Packings and units must not be stacked!** Shocks must be avoided! If there is a risk of frost during the transportation of the unit, all of the cooling water must be removed from the unit. This is not to be carried out using a plastic bottle. Please notify the service technicians.

For dimensions and weight refer to paragraph 15 “Technical data”.

6.2 Unpacking

Remove straps. If required, screw in the carrying handles at the corners of the unit.

6.3 Set-up

Please screw one of the handle on the casting chamber.

Location: Table with load bearing capacity of at least 80 kg.

Table area: (w x h x d) 100 x 50 x 60 cm.

The casting machine must be placed on a solid, skid-proof surface (laboratory desks, racks) so that a horizontal safe position is ensured. The surrounding temperature may amount to 40 °C.

Air inlet and outlet openings in the housing of the unit (rear and lower surface) must not be covered or blocked. Minimum distance to the wall: 100 mm.

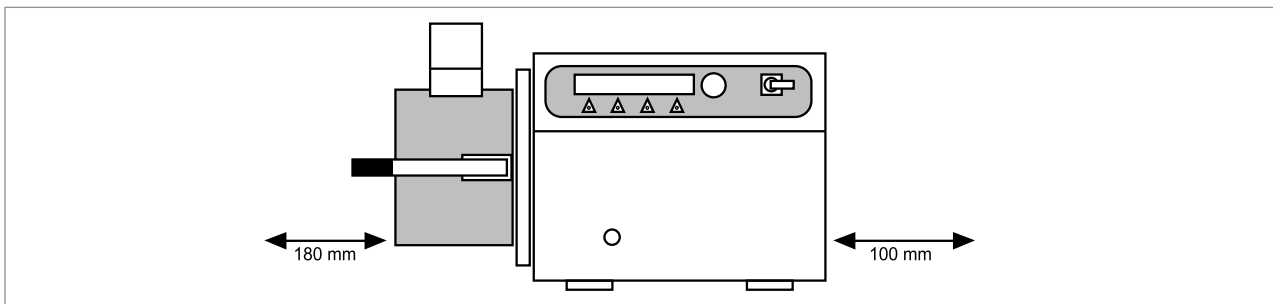


CAUTION!

Follow the instructions below absolute

- The rear side of the unit must be at least 100 mm away from the wall to avoid blocking the air outlet of the built-in fan.
- There must be no combustible materials, e.g. newspapers and similar, present near the casting machine and in particular under the unit.
- Do not lean on the chamber.
- There must not be any objects within the turning range (horizontal and vertical) of the chamber.
- During turning movement do not touch / operate / hold chamber and lock.
- During operation – turning movement of the chamber 90° downwards!
- Do not reach under the chamber with your hand or arm when the unit is switched on.
- Do not place flammable material underneath the casting chamber.
- To transport the unit, leave the carrying handle under the chamber. Do not lift the unit at the chamber!
Risk of damaging the unit!
- Risk of damage and injury in case of non-adherence!

Minimum distances to adjacent areas or pieces of equipment:



6.4 Mains connection

Mains: 200 – 250 V (AC), 1 P/N/PE, 50/60 Hz, according to VDE requirements and those of your local electricity board.

Mains fuse: Separate safety fuse 16 A inert or safety cut-out fuse C 16 A.

Mains connection: The unit should not be connected via a connection fault current circuit breaker. If the use of a fault current circuit breaker is specified by the local electricity board, type 30 mA should be used.

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6.5 Compressed air supply



NOTE!

The compressed air must be clean and dry!

- Line pressure min. 4 bar, max. 7 bar! Higher line pressure (even short-term) can result in damage to the inner valves! To avoid this, an optional pressure reducer filter combination must be used. Order No. 66005499. The pressure reducer includes accessories for unit mounting or wall mounting.
- In case of moist compressed air a water separator/filter must be interconnected. Order No. 66005499.
- Line cross-section (inner) min. 10 mm.
- Rapid pressurisation (< 1.5 sec.) is essential for the mould filling behaviour. Non-compliance can result in faulty castings. The use of a separate compressed air tank (< 10 mm) in the direct vicinity of the casting machine is recommended for small line cross-sections. Order No. 66008921.



NOTE!

Any guarantee claims shall be excluded in case of malfunctions or damage resulting from inadequate compressed air supply!

6.6 Filling the cooling system

For safety reasons the inner cooling system is only prefilled with a small quantity of antifreeze and anticorrosion agent. To fill the system completely, the enclosed bottle must be used! For this purpose open the cap of the bottle and fill the container with tap water (do not use distilled water). Connect the hose to the connection piece at the rear side of the unit. Hold the bottle well above the unit. Press the plastic bottle slightly and shortly. Due to the difference in height the unit will be filled automatically; if required, make a hole in the container! Wait until the bottle is empty and remove the hose from the fill-in connection piece. Screw the lid off the bottle and fill the bottle with water again. Connect the bottle to the filling hose and continuously check the filling level of the reservoir (pos. 15 paragraph 5.1.4 „Description “Supply connections”) on the right side during filling up. If the water level has reached the value „MAX.“, stop filling and remove the filling hose. For this purpose activate the unlocking lever above the connection with a tool, if required.



CAUTION!

Do not fill over the „MAX.“ marking. Risk of damaging!

After initial operation, the cooling water level must be checked again and the unit must be filled up with pure tap water. For maintenance work it has turned out to be helpful to reuse the **empty plastic bottles** to empty the cooling water tank; please do not discard these bottles.

6.7 Room ventilation

The room in which the unit is operated must have sufficient technical ventilation. The unit must not be operated in recesses that can not be ventilated. If several units are to be placed in one room, special ventilation measures may be required (e.g. zone ventilation).

7 Operations

The following pages are to provide basic information and hints which are essential for successful and error-free working. Please observe the order of the working steps. Mostly, casting errors can not be attributed to the machine.

Normal production mode

The staple is monitored for safety during closing, the closing lever must thereby be closed over dead centre. A self opening is therewith ruled out. With a position before dead centre, the pressure reservoir can in event of an error not be fully flipped open by the pressurisation, as this is retained by a clamp.

7.1 Putting into operation

■ The locking lever is checked for function when it is switched on. If this request does not appear on the display or an automatic start of the test cycle is triggered after the main switch is switched on, errors have occurred in the safety inspection. Do not continue to operate the unit, switch it off and notify the service technicians immediately.

1. Turn on the compressed air supply for the unit
2. Main switch "On" (I)

When the machine is switched on the request "Safety check chamber locking mechanism – Please open and close chamber by hand!" appears after welcome display.

If the chamber was open then it must be closed.

If the chamber was closed it must be opened and then closed again.

The vacuum pump evacuates the chamber. Then the chamber is turned automatically and pressurisation is started. Prior to turning back the chamber into the basic position, the chamber is deaerated automatically.

In case of a defect or an error, a respective message is displayed. Once the test run has been successfully completed, the unit is ready for operation.



CAUTION!

If an error can not be eliminated, please contact the responsible service agent. The addresses can be found on the paragraph 19 "Service" of these instructions.

Unauthorised opening of the machine include unknown risks and are not permissible.

7.2 Putting out of operation

- Remove crucible and mould from the chamber.
- Let the unit cool down for approx. 3 min. before switching it off (then turn off the cooling water supply).
- Switch off the unit; unplug the unit if it is not to be operated for longer periods.
- Remove contamination from the crucible and the chamber.

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7.3 Errors and causes

If a malfunction occurs during the test run or during operation, the error is shown in the display:

Error resp. warning message	Warning	Error	Time delay
UDC too high	> 210 V	> 212 V	50 ms
IDC too high	> 16.5 A	> 17 A	50 ms
Internal temp. too high	> 50 °C	> 60 °C	500 ms
Internal temp. too low	< 10 °C	< 5 °C	500 ms
Oscillator temp. too high	> 65 °C	> 70 °C	500 ms
Oscillator temp. too low	< 10 °C	< 5 °C	500 ms
Coolant temperature too high	> 55 °C	> 60 °C	500 ms
Coolant temperature too low	< 10 °C	< 5 °C	500 ms
PDC too large	> 2050 W	> 2100 W	1 s
15V supply too high	> 15.90 V	> 15.99 V	1 s
15V supply too low	< 13.50 V	< 13.00 V	1 s
Deviation of set-actual power	If – after 3 s – deviation > 5 % conditions: ● if graphite crucible ● if chamber in basic position	If – after 3 s – deviation > 5 % conditions: ● if graphite crucible ● if chamber in basic position ● if in self-test	3 s
Vacuum is not reached	Vacuum > 500 mbar after 15 s	Vacuum > 500 mbar after 25 s or if in “automatic test mode” vacuum > 50 mbar after 45 s	Various time windows
Check compressed air	Additional message with vacuum error	Additional message with vacuum error	
Pressure too high	If pressure > 3.5 bar after 4 s and after completing the pressure startup phase	If pressure > 3.7 bar after 4 s and after completing the pressure start-up phase	4 s
Pressure too low	If pressure < 2.9 bar after 4 s and after completing the pressure startup phase	If pressure < 2.7 bar after 4 s and after completing the pressure start-up phase	4 s
Chamber movement		Chamber has not reached target position after 4 s (difference more than 15 digits from the set end pos.)	4 s
Chamber open		Chamber open (caused by limit switch), displayed only under following conditions: ● vacuum or ● pressure or ● chamber movement	
Check of crucible	For graphite crucible only: if after 3 s UDC > 180 V (graphite crucible weight < 7 g)		3 s
Pressure build-up too slow	Pressure < 2.9 bar after 4 s		4 s
Error while reading the EEPROM		EEPROM does not respond	
EEPROM checksum error		CRC checksum error while reading the EEPROM	
EEPROM data error		Incorrect data while reading the EEPROM	
Error ADC	If no reply of A/D converter for more than 20 ms		20 ms
Error memory overflow	More warnings available than can be displayed	More errors available than can be displayed	

Error resp. warning message	Warning	Error	Time delay
Monitoring (control) of energy		Automatic deactivation after 300000 Ws = 300 kW (e.g. 2 KW ✱ 2:30 min)	Calculated by formula
Check pressure sensor	If during self test or in automatic test mode, an ambient pressure of < 700 mbar or > 1200 mbar is measured		
Self-test not successful	If changeover to casting menu is intended and self-test is not successful		
Memory test	Error while checking the program memory		
Chamber position		If chamber position exceeds permissible adjustment range (+/- 15 digits)	
Watchdog		Unauthorised abortion of program	
Water flow		Conditions: <ul style="list-style-type: none"> ● error continues > 4 s ● level 0, no monitoring ● level 1, if flow < 200 ml ● level 2, if flow < 450 ml ● level 3, if flow < 600 ml 	4 s
Pressure release too slow		If air-pressure inside chamber > 0.2 bar 4 s after pressure release	4 s
Leakage		If at pre-set vacuum level at least 30 mbar drop within 5 s or during pressurisation at least 0.3 bar drop within 5 seconds	5 s
Non-symmetric start of power supply units	Output difference (voltage): power supply 1 / 2 > 10 V		2.5 s
No start of power supply unit		Output UDC 1 < 10 V (e.g. 0V) and UDC2 > 20 V (e.g. 100 V) or converse	2.5 s

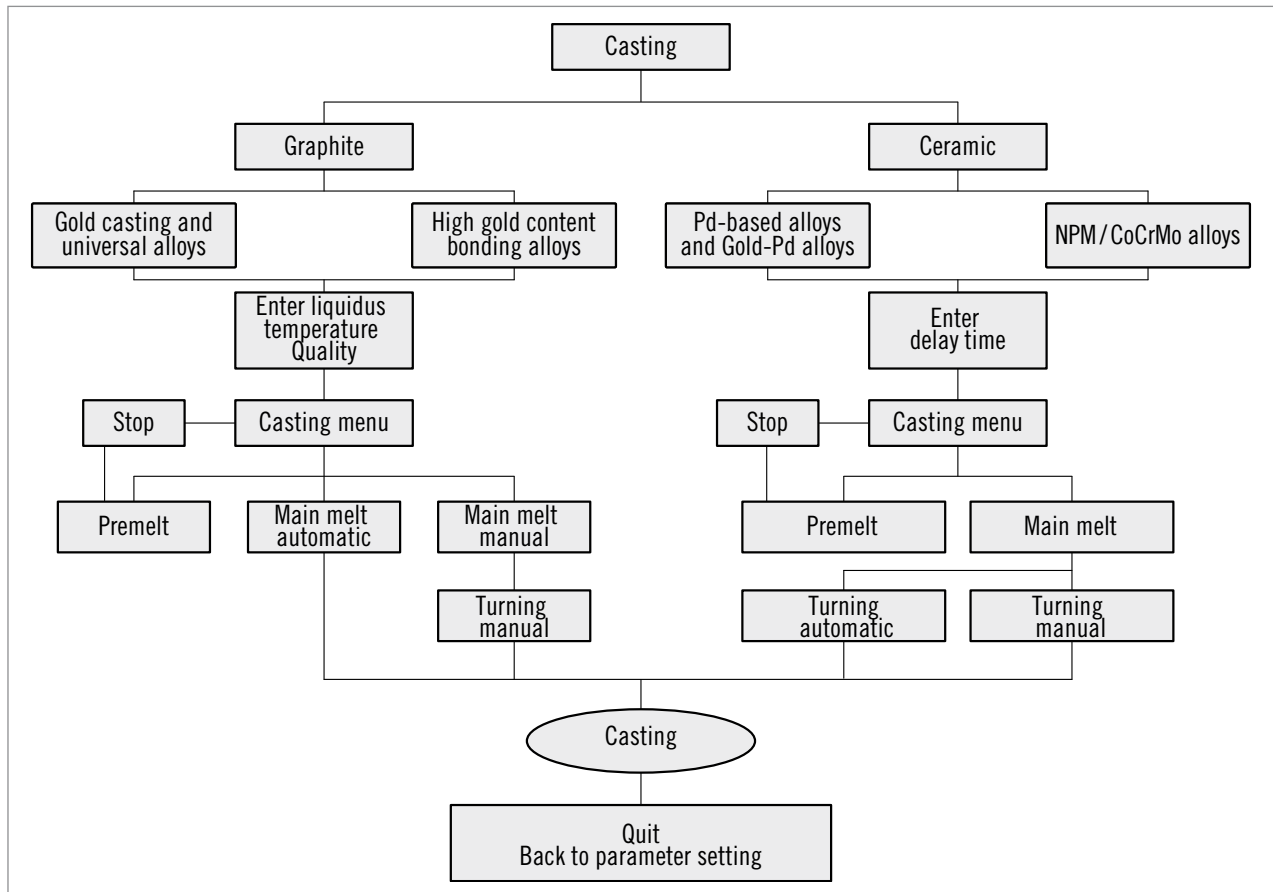
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8 Working with the Heracast iQ

After switching on and successful completion of the Auto-Test, the user is automatically directed to the main menu. In this menu additional options are available. For alloy entry see paragraph 10.5 “Description of alloy database” to paragraph 10.5.3 “Deleting datasets”.

8.1 Setup main menu – casting (diagram)



8.2 Description main menu – casting (diagram)

The crucibles “**graphite**” or “**ceramic**” can be selected with the adjustment knob. For this purpose turn the knob to the left or the right until the marking “*****” marks the desired value.

Confirm your selection by slightly pressing the adjustment knob (action point).

Proceed identically in the menu „Enter quantity/liquidus temperature“. The values can be increased or lowered by turning the adjustment knob to the left or right. The values are also confirmed here by pressing.

All pre-set data are displayed in the “**Casting menu**”. To adjust a different vacuum value, also turn the knob to the left or the right (without pressing).

Start the premelt now by pressing the key under the menu item “**VS**”. Press “**Stop**” key after finishing the premelt.

The main melt can always be carried out automatically or manually.

- Automatic main melt / automatic turning chamber is motor-driven turned (after a given or calculated delay time).
- Manual main melt / manual turning chamber is turned motor-driven (decision of the operator).

The decision for automatic or manual operation mode depends on various factors and is finally made by the operator depending on the alloy that is used.

8.3 Setup menu (diagram)

Table 1. Setup

Language	Temperature	Weight	Vacuum	Contrast	Currant signal	Port
German	°C	g	mbar	xx %	ON OFF	Modemconfig.
English	°F	Dwt	mmHg		ON OFF	Modemconfig.
French			in Hg			
Spanish						
Italian						
U.S.A.						

8.3.1 Description Table 1. "Setup"

The settings in the Setup menu allow individual configuration of the user surface with country- and user-specific conditions and are mainly performed using the adjustment knob.

The individual menus can be selected one after the other by turning the adjustment knob. The current menu item is marked by "✱". To select the options of a menu item, the adjustment knob must be pressed slightly.

Values can now be adjusted according to your wishes. If you want to end the settings of a menu item, press the adjustment knob again. By turning the adjustment knob to the left or right, you can select another menu item.

The Setup menu can be quit in two ways:

- **Save**

All your Setup changes will be saved and run.

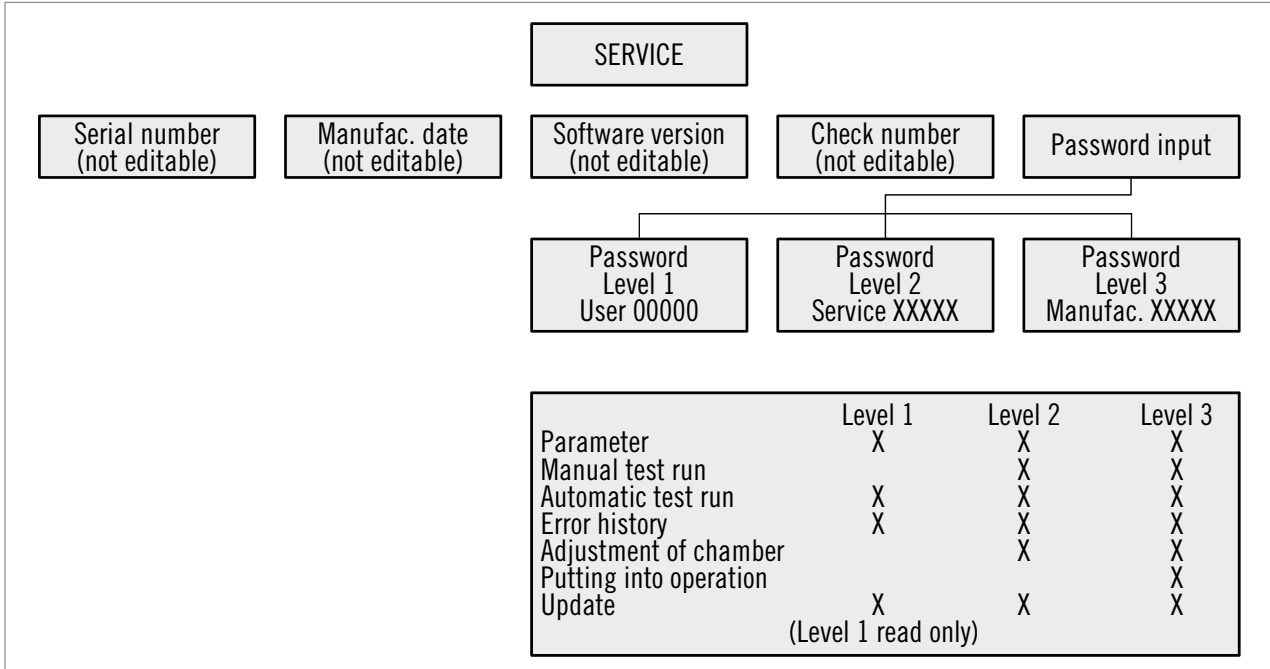
- **Cancel**

The Setup changes you have made will be deleted and the unit maintains its previous settings.

Operating instructions

Casting Machine Heracast® iQ

8.4 Service menu (diagram)



8.5 Description Service menu (diagram)

The password is also entered with the adjustment knob (press after each individual number). The user password is "00000". It has been prestored and needs only to be confirmed by pressing the "OK" key.

Current menus are marked with "*". Scrolling through the individual options is possible by turning the knob to the left or the right. Press the knob to select an option. Rights concerning your password can be taken from the table above.



CAUTION!

Customers do not have access to levels 2 and 3 since the settings performed in these levels might affect the proper function of the unit so that damage in case of maladjusting can not be excluded.

Table 2. Service

Parameter	Manual test mode	Autom. Test mode	Survey of errors	Adjust	Putting into operation	Update
Operating hours	P-scheduled	Auto-Test	Survey of errors	Basic position	Serial number	Update
Counter total	V-scheduled			Casting position	Manufact. date	
Counter since	Pressure			PDC:W	Software version	
Min. pressurisation	Chamber			UDC 1:V	Checksums	
Max. pressurisation	Cooling			UDC 2:V	Operating hours	
Max. oscill. temp.				IDC:A	Counter total	

8.5.1 Description Table 2. “Service”

Parameters

In the menu parameters some unit-specific values are included that are relevant for the user or service technician, e.g. the total operating hours, a counter for the total number of castings and a counter that registers castings from a certain date (e.g. last service) on.

The pressurisation times and the max. oscillator temperature are particularly useful for service technicians since they allow to conclude on connection conditions of the laboratory and possible faulty castings. These values can only be reset by service technicians.

Manual test mode

Only service technicians have access to the manual test mode. All individual steps of the Auto-Test which is run when the unit is switched on can be tested manually.

Automatic test mode

This menu has only one selectable function “**Auto-Test**”. The Auto-Test can be started or interrupted with this key.

Error history

This item provides the user with a survey of the last 15 error messages displayed by the casting machine. The adjustment knob is used to scroll through the messages.

Adjustment of the chamber

This option is only available for service technicians. The upper and lower stop of the chamber can be corrected electronically. Incorrect adjustment results in error messages and might even damage the mechanic system for turning the chamber!

Putting into operation

Serial number and manufacturing date have been stored in this menu.

They can only be entered or changed by the manufacturer. The software version and the checksums depend on the current software version used in your machine and can not be edited. If changes or manipulations performed by the customer should be determined, any liability claim and guarantee shall lapse.

9 Melting and casting

The technical procedure is described in the following.
For alloy-specific application information, see paragraph 10 “Alloys”.

9.1 General



NOTE!

Please request information brochures on casting according to the Heraeus system.

9.2 Heraeus spruing system



NOTE!

Information can be found in paragraph 11 “Spruing system” of these working instructions.

9.3 Suitable investment materials



NOTE!

No graphite-containing investment materials must be used. The graphite content can result in degassing or in damage to the alloy. We recommend to use our graphite-free, phosphate-bonded Heravest investment materials.

9.4 Premelting

In order to obtain uniform casting conditions, all alloys are pre-melted. The mould is placed into the casting chamber after pre-melting the alloy

Exception: titanium- and aluminium-containing alloys, see paragraph 10.4 “Titanium and aluminium-containing alloys”.



CAUTION!

The alloys must be observed continuously during pre-melting. Generally, each melt may only be observed through the blue glass because of the high luminous intensity. **Risk of getting blinded!** The pre-melting process may only be interrupted when all the alloy has melted! The alloy has a spherical shape; there are no protruding edges of the molten material. Splitting up of the oxide layer is without any relevance during melting in the graphite crucible.

When melting large quantities (more than 50 g), small individual portions must be pre-melted. The metal should only be melted so that filling in of the next portion is possible. Only in the last pre-melt all the alloy is melted.

Exception: CoCrMo alloys (see paragraph 10.3 “CoCrMo and non-precious metal alloys”).
Titanium- or aluminium-containing alloys, paragraph 10.4 “Titanium and aluminium-containing alloys”.

9.5 Casting

After premelting, the mould is rapidly placed in the casting chamber and locked in place (ideally approx. 20 – 40 seconds); the chamber is closed and the melting process is started by pressing the key “**HS auto.**” or “**HS man.**”



NOTE!

The interruption between pre- and main melt should not exceed one minute to prevent the melt and the mould from cooling down too much. Each crucible should only be used for one alloy to avoid mixing of alloys. Use a felt pen to mark the crucibles according to the intended use.

9.5.1 Graphite insert



NOTE!

When using graphite inserts, the alloy is heated under continuous observation by the user up to the set point of time. After the set time is reached, the chamber is turned automatically or manually.

If – in case of manual turning – casting is not started immediately after the set time is reached, the alloy may be damaged through overheating.

- If graphite inserts lose some of their height or the upper border becomes thin and brittle, they must be exchanged → minimum weight of graphite insert approx. 7 g.
- If a lot of melting powder has accumulated in the graphite insert, no melting powder should be added for the next casting.
- Prior to each casting blow out graphite insert (cleanliness!)

9.5.2 Ceramic crucible

When using ceramic crucibles, ceramic bonding resp. palladium-based alloys are heated until the oxide layer splits open. When casting CoCrMo and NPM alloys, melting is continued until the shadow disappears (see “Premelt Phase 3” in paragraph 11.2 “Melt characteristics of Heraenium CE and Heraenium EH”) and, depending on the alloy, casting is performed with or without delay time. When casting titanium- and aluminium-containing alloys, the premelt is sometimes omitted completely and premelt and main melt are carried out in a single working step with the muffle being placed in, see paragraph 10.4 “Titanium and aluminium-containing alloys”.

- The sprues and the casting buttons must be cut prior to melting. When filling the crucible, make sure that the alloy is placed in the crucible as far down as possible to obtain optimum and even melting power.
- When melting CoCrMo alloys, the correct position of the cylinders must be ensured.

10 Alloys



CAUTION!

During the melting process it is essential to adhere to/carry out the following instructions.

- Under no circumstances must the machine be left unattended!
- The melt must always be observed!
- The viewing glass must be used for each melting process!
- Risk of getting blinded due to the high luminous intensity of the melt.
- No hot melting crucible must remain in the coil after working.



HOT SURFACE!

The boiler surface (see symbols on the unit) and the surrounding components are heated up as a result of the process. To avoid the risk of being burned, always wear protective gloves when working.

10.1 Gold casting and high gold content ceramic bonding alloys Universal and silverpalladium alloys

Processing: Alloy quantities: 5 g to 130 g.

Gold casting alloys: Use ceramic crucible with graphite and melt with melting powder pellet (small)!

Ceramic bonding: Use ceramic crucible with graphite alloys: insert!
Melt without melting powder pellet!

In the Heracast iQ the melting powder pellets are used in exactly the reverse order as in the CL-G, CL-G 77, G 94, G 97 and Heracast RC S/L, since the alloys are melted under vacuum which leads to reduced formation of protective gas.

10.2 Reduced precious metal ceramic bonding and palladium-based alloys

Processing: Use ceramic crucible without melting powder pellet.

Alloy quantity: 15g to 100g (Min. quantity of 20 g for reduced precious metal content bonding alloys).

10.3 CoCrMo and non-precious metal alloys

Processing: Use NPM ceramic crucible without melting powder pellet.



NOTE!

The NPM ceramic crucibles are exclusively suitable for casting NPM alloys and feature a longer lifetime than normal ceramic crucibles.

If NPM crucibles are used for precious metal alloys, the silicon might be damaged.

Alloy quantity: 10g to 60g

10.4 Titanium and aluminium-containing alloys

Generally, it is possible to cast such alloys in the Heracast iQ.

The alloy components titanium and aluminium exhibit a strong tendency towards oxidation on the surface during the melting process which is intensified through the oxygen supply when inserting the muffle. The oxide layer may impede or even prevent the alloy from filling.

The following measures (working steps) are suitable to reduce the formation of oxide and to support the filling behaviour:

- Increase the preheating temperature of the muffle by 50 °C.
- Minimum quantity of alloy: 15 – 20g.
- Use ceramic crucible type “C” (Order No 66001901).
- Programming: Ceramic, NPM, delay time after casting shadow “0” sec (not relevant since process is started manually), reduce the given vacuum from 250mbar to 50mbar (reduce residual air-eliminate oxide behaviour).
- No premelt.
- The muffle is placed and fixed in the holder immediately before starting the main melt and casting processes.
- Melting powder pellet can be added.
- Melt until the casting shadow has disappeared and the melt is moving most strongly. This moment varies with all alloys concerned and must be determined previously!
- As soon as this moment is reached, casting is started by pressing “Casting man.”.

10.5 Description of alloy database

The new Alloy menu item in the start menu gives you access to a databasedatabase. Up to 100 datasets can be entered and saved in this database.



Free memory is displayed via Memory and the subsequent no., e.g. “001” and “500°C”.

Operating instructions

Casting Machine Heracast® iQ

10.5.1 Enter new alloys

For this purpose turn the adjusting knob to the left or the right until the marking “*” marks the desired dataset.
To enter a new dataset press the “Edit” key.



For this purpose turn the adjusting knob to the left or the right until the marking “*” marks the desired option.
Confirm your selection by gently pressing the adjustment knob.



“Cancel” The changes you have made are not taken over.

“Save” All the changes you have made are saved. The database is sorted in alphabetic order.
(Empty datasets “memory xxx” are attached to the end of the database.)

Enter alloy names

For this purpose turn the adjusting knob to the left or the right until the desired symbol is displayed.

Available font :

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
* + , - . / 0 1 2 3 4 5 6 7 8 9

Confirm your selection by gently pressing the adjustment knob.



“Confirm” Confirm the entered alloy name; entry finalised

“<--” Back a space

“-->” Forward a space

“|->” Insert a space

Once an entry is finalised the program automatically jumps to the next option.

Enter alloy type

The alloy type can be changed by turning the adjustment knob to the left or right.

Press the adjustment knob to confirm the selected value.

Depending on the alloy type selected the dependent options also change.

(delay time or liquidustemp, melting pellet, crucible).

Enter liquidus temperature or delay time

The corresponding liquidus value or delay time is changed by turning the adjustment knob.

Enter melting pellet

The automatic presetting can be changed, if necessary, by turning the adjustment knob.



Enter crucible

The automatic presetting cannot be changed.

Operating instructions

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10.5.2 Casting of alloys

For this purpose turn the adjusting knob to the left or the right until the marking “*” marks the desired alloy.

Pressing the adjustment knob confirms your selection and guides you to the “Casting menu”.

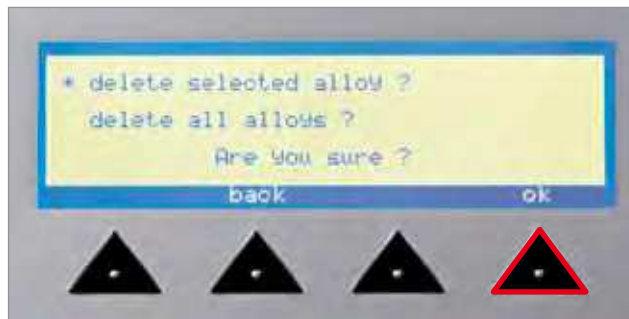


10.5.3 Deleting datasets

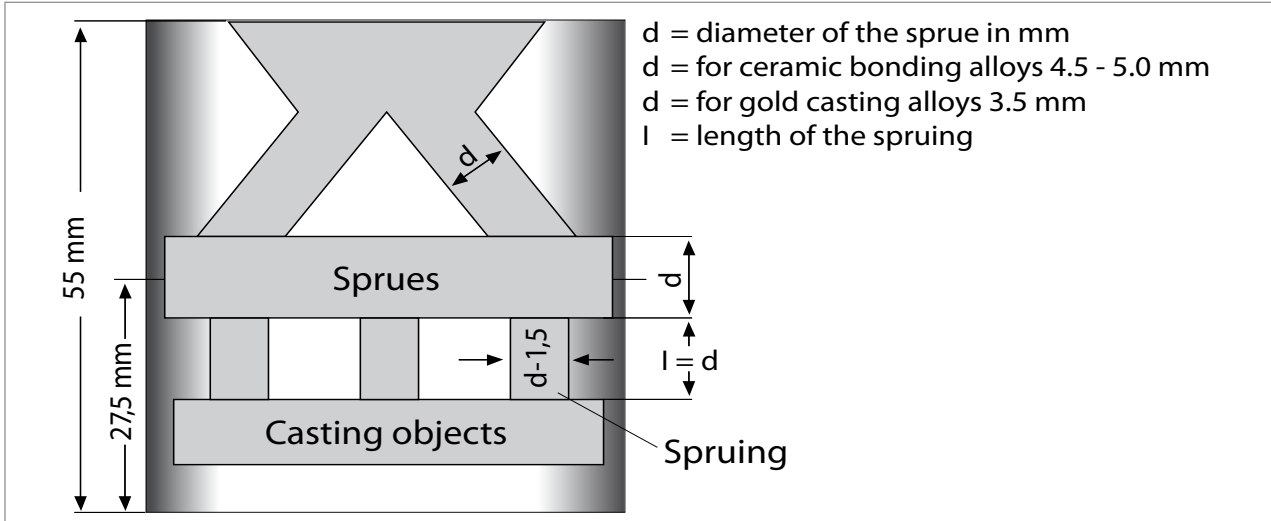
For this purpose turn the adjusting knob to the left or the right until the marking “*” marks the desired alloy.

By turning the adjustment knob to the left or right you can select between options “Delete selected alloy” or “Delete all alloys”.

Erasing process will be executed by pushing button “OK”.



11 Spruing system



11.1 Melt characteristics of Heraenium alloys

11.1.1 Preparations:

- Place ceramic crucible into the coil
- Fill alloy into the crucible
- Close chamber

11.1.2 Premelting (phase 1, 2, 3)

- Press key "pre melt"
- Vacuum between 250 mbar
- Observe heating process of the alloy (phase 1, 2, 3)
- When phase 3 sets in press "Stop/back" key

11.1.3 Insert the casting mould

- Open chamber
- Position the casting mould
- Close chamber

11.1.4 Main melt

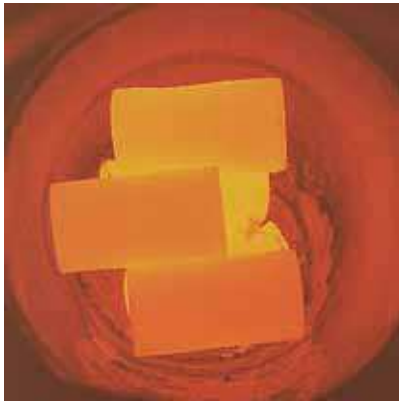
- Press key "main"; permanent observation of melting process by eyes (see phase 4, 5)!
- Then select between "GS auto." or "GS man." (GS = casting)
- In "GS auto" mode the delay time expires and the chamber is turned automatically
- In "GS man." mode the delay time expires, beep sound at "0", timer continues counting until pushing the button "turning", which executes manual casting process
- **Heraenium CE:**
Immediately turn casting chamber after reaching phase 6 (disappearance of the shadow) – key „turning“

Operating instructions

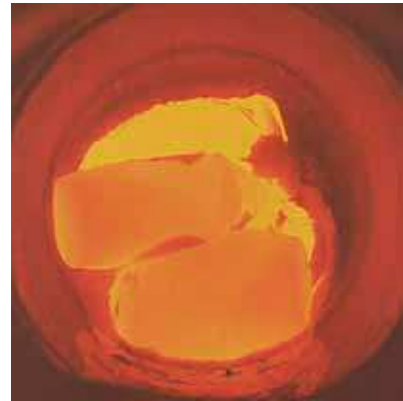
Casting Machine Heracast® iQ

- **Heraenium EH:**
3 seconds after phase 6 has been reached, turn chamber key “turning”
- **Heraenium NF:**
see alloy chart, paragraph 10 “Alloys”

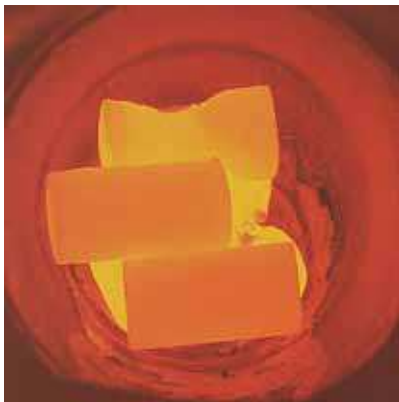
11.2 Melt characteristics of Heraenium CE and Heraenium EH



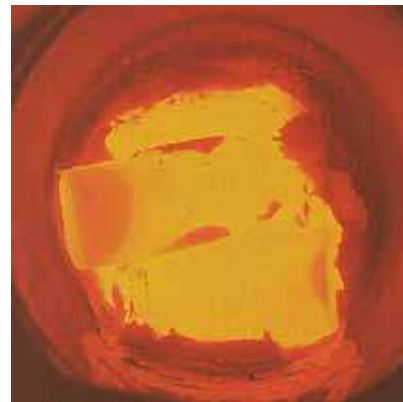
Premelt Phase 1



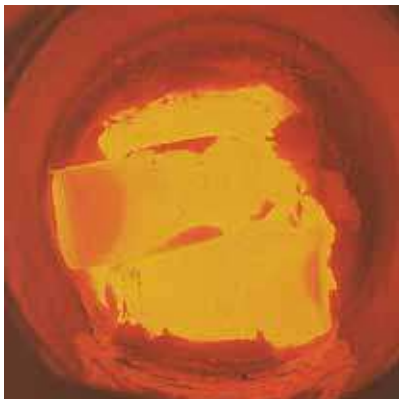
Main melt Phase 4



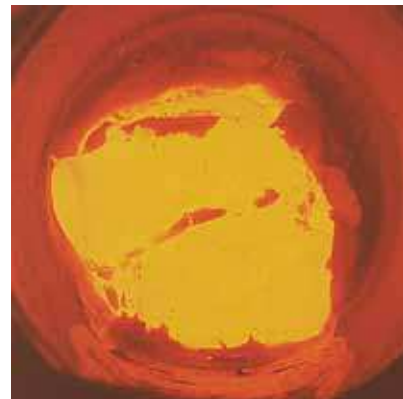
Premelt Phase 2



Main melt Phase 5



Premelt Phase 3



Main melt Phase 6

12 Instandhaltung

Proper function and operational reliability of the unit are only ensured if the required tests, maintenance and service work are performed by Heraeus Kulzer service agents or personnel instructed by Heraeus Kulzer.

Heraeus Kulzer GmbH will not accept any liability for damage – in particular personal injury – resulting from improper maintenance or repair work which has not been performed by Heraeus service agents or adequately trained personnel or if no original spare parts or accessory parts have been used during the exchange of parts.

We recommend to conclude a maintenance contract with our service agents; an offer can be requested there (see paragraph 19 “Service”).

12.1 Maintenance and care



CAUTION!

Prior to maintenance and service work the unit must be switched off and unplugged!

Strict adherence to the maintenance intervals is recommended to avoid faulty castings and damage to the unit.

Maintenance work types:

12.1.1 daily

- Check water level.
- Check oil level and remove contaminations (e.g. milky consistency).
- Clean the inside and the outside of the viewing glass using a soft cloth.
- Remove alloy residues, etc. from the rubber seal of the casting chamber (vacuum cleaner or blow out with compressed air).
- In case of moist compressed air: empty the water extractor of the optional pressure reducer through the release valve on the bottom of the casting machine.

12.1.2 weekly (or after 100 castings)

- Clean the inside of the casting chamber, the mould holder and the rubber seal when the unit has cooled down.
- Check function and proper activatability of the chamber lock. Adjustment and cleaning may only be carried out by adequately trained personnel.

12.1.3 annually (or after 3.000 castings)



CAUTION!

The following work includes interventions into the unit and may only be performed by adequately trained service personnel!

- Change oil of the vacuum pump.
- Clean oil mist filter of the pump, if required, exchange them.
- Check casting chamber lock and support, check welding seams.
- Check circulation of cooling water and flow control instrument (manual test program). If required, change cooling water.
- Change filter for vacuum and compressed air in the valve box.
- Check pressure and vacuum hoses.

Operating instructions

Casting Machine Heracast® iQ

- Check activatability of the turning mechanism, wear and firm seat of the gears.
- Performance check (manual test run) with graphite crucible (2000 W).
- Clean filter mat (bottom surface) (see Fig.: 1 “Total view” pos. 7), if required, exchange them.

12.1.4 after 30.000 casting or after 3 years

- Exchange locking handle and chamber lock.

12.2 Tests

Works at the electrical equipment of the unit must only be performed by the authorised Heraeus service agents or adequately trained personnel and in the safe condition (voltage cleared). Only permissible original spare parts must be used.

12.3 Maintenance

Permissible parts and accessories:

Proper function and operational reliability of the unit are only ensured if permissible original spare parts are used.

The use of different parts holds unknown risks and must be avoided at any rate.

12.4 Disposal

The unit is designed to be operated for 10 years.

For the disposal of spare parts or of the unit in Germany, please contact Heraeus Kulzer GmbH in Hanau, Service department, directly. For all other countries, please contact your appropriate local representation. (See paragraph 19 “Service”.)

12.4.1 Disposal of old equipment according to WEEE

Electrical and Electronic Equipment Act (ElektroG)

This Act sets out requirements for electrical and electronic equipment pursuant to directive 2002/96/EG issued by the European Parliament and the European Council of 2005-05-03. Its main purpose is to prevent waste from electrical and electronic equipment and to promote reuse, recycling and other forms of recovery to reduce both the volume of waste for disposal and the inclusion in waste of harmful substances from electrical and electronic equipment.



For detailed information on professional disposal of disused old devices please contact your dealer or Heraeus Kulzer subsidiary directly in your country.



IMPORTANT!

Marked equipment must not be brought to local waste disposal centres!

13 Repair / Maintenance work

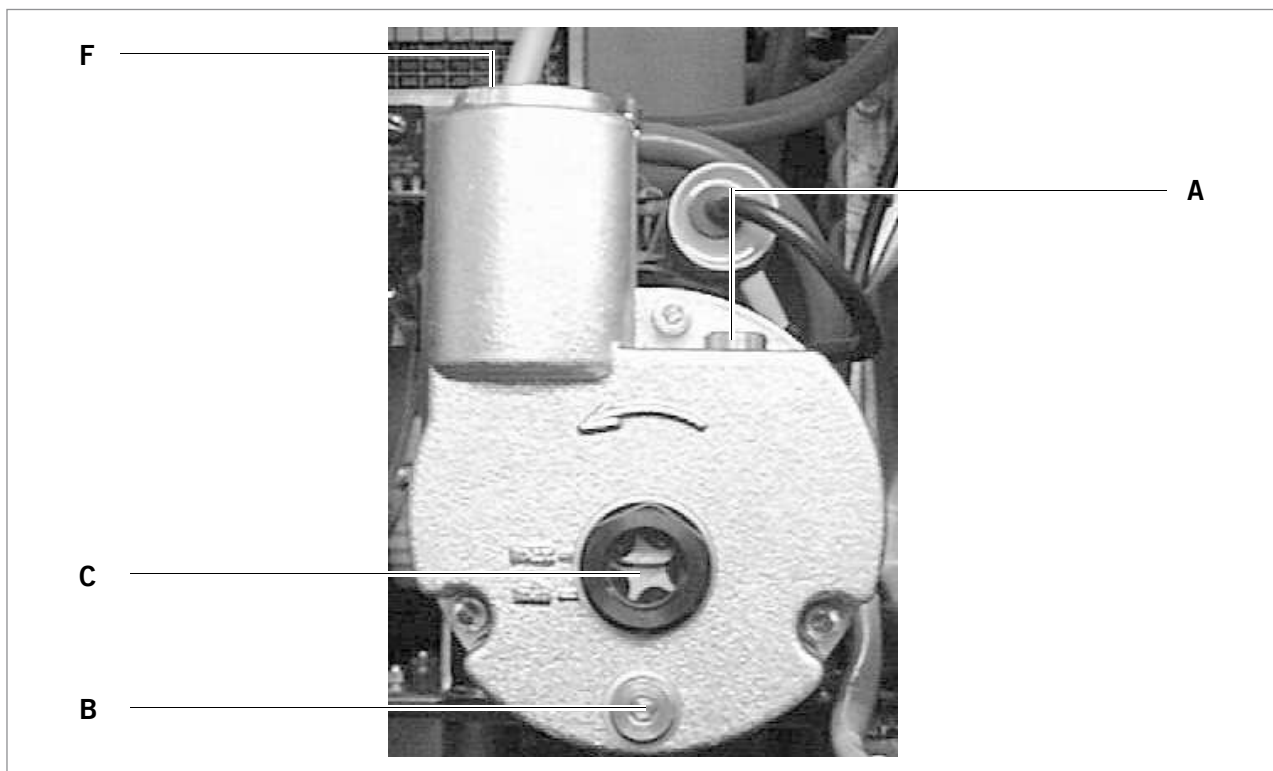


CAUTION!

The following work includes interventions into the unit and may only be performed by adequately trained service personnel!

13.1 Exchanging the pump oil

The unit must be switched off and unplugged before filling in or filling up oil! Open the unit.



- Place paper towel underneath the pump head to absorb leaking oil.
- Loosen oil discharge screw (B) using an Allan key.
- Hold cup under the oil discharge opening, empty the pump.
- Tighten the oil discharge screw.
- Loosen the oil filling screw (A) using an Allan key.
- Fill in the required quantity (max. 60 ml), tighten the screw.
- Check oil level in the viewing glass (C).

Operating instructions

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13.2 Exchanging the pump filter

The unit must be switched off and unplugged to exchange the pump filter (F)! Open the unit.

- Carefully remove the pump filter by using pliers (turn to the left).
- Place O-ring over the thread, screw in new filter (clockwise), do not overturn!

13.3 Exchanging the filter in the valve box

The unit must be switched off and unplugged to exchange the filter in the valve box!
Disconnect compressed air supply! Open the unit.

- Carefully open the unit using an Allan key.
Take care of all required o-rings!
- Change prefilter element (D) and main filter element (E).



14 Exchanging the cooling water

- Connect the hose of the bottle to the respective socket (see Pos. 16 paragraph 5.1.4 “Description Supply connections”) at the rear of the casting machine
- Remove the adhesive strip from the deairing hole of the bottle.
- Press the plastic bottle once and seal the small hole with the adhesive strip again.
- Hold the bottle clearly lower than the casting machine, the tank is emptied automatically.
- For filling, see paragraph 6.6 “Filling the cooling system”.

15 Technical data

Mains connection	200 – 250 V ($\pm 10\%$)
Rated frequency	50/60 Hz
Rated power	2.6 kVA
Generator power	2.0 kVA
Compressed air supply	4 – 7 bar
Minimum cross-section of compressed air supply	Inner 10 mm
Vacuum	< 50 mbar
Noise level	< 70 db (A)
Protective measures- protection class	1
Protection type	IP 32
Dimensions (w x h x d)	660 x 500 x 550 mm
Required table area (B x H x T)	1000 x 500 x 600 mm
Weight	65 kg

Fuse protection:

For the connection to the mains the electrotechnical rules and the technical regulations of the local Electricity Board have to be observed. Cut-out fuse 16 A or automatic circuit breaker C16 A.

15.1 Rating plate

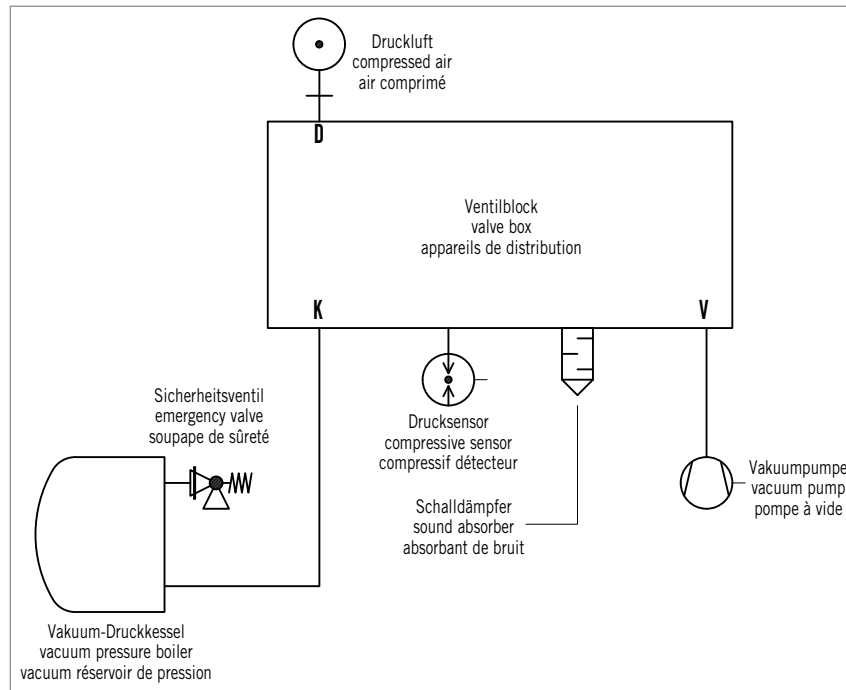
Heraeus		63450 Hanau	
TYPE: HERACAST IQ	Nr.: 24033331-010-007/010011		
MAINS VOLT: 230 V / N PE	ART.-NR.: 954434		
MAINS FREQ.: 50/60 Hz	VACUUM: min. 50 mbar		
POWER CONSUM.: 2.6 kVA	GENERATOR POWER: 2.0 kVA		
MAINS CURRENT: 11.5 A	PRECIOUS: 130 g		
PRESS. AIR: 4.0 – 7.0 bar	NON PRECIOUS: 60 g		
COOLING WATER: 1.6 L	WEIGHT: 65 kg		

Operating instructions

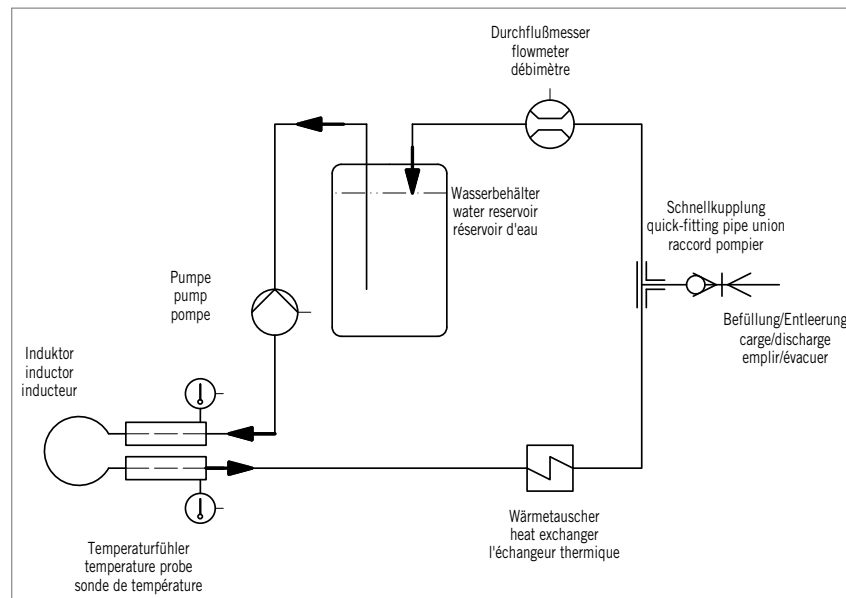
Casting Machine Heracast® iQ

16 Circuit diagrams

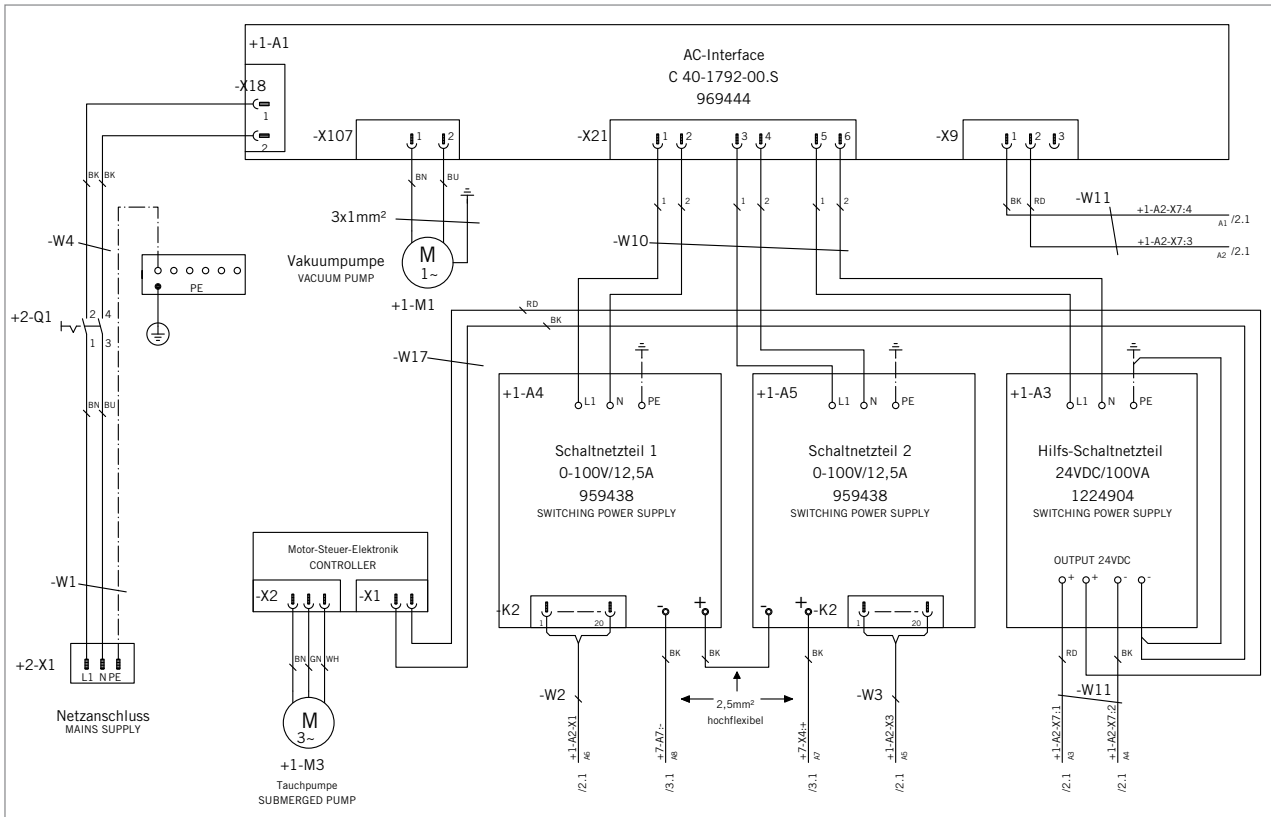
16.1 Compressed air



16.2 Water circulation



16.3 Terminal assignment



Operating instructions

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17 Alloys

Table 3. Alloy chart

Name of alloy	Crucible	Alloy type	Liquidus	Delay time
Hera PF	Graphite + SP	Gold casting / Universal	890 °C	
Hera SG	Graphite + SP	Gold casting / Universal	895 °C	
Bio Maingold SG, Hera GG	Graphite + SP	Gold casting / Universal	920 °C	
Maingold SG, Bio Maingold IT	Graphite + SP	Gold casting / Universal	930 °C	
Maingold MP	Graphite + SP	Gold casting / Universal	960 °C	
Maingold Premium	Graphite + SP	Gold casting / Universal	970 °C	
Mainbond A, Maingold OG, Bio Maingold TK	Graphite + SP	Gold casting / Universal	990 °C	
Mainbond EH	Graphite + SP	Gold casting / Universal	1010 °C	
MainbondSun	Graphite + SP	Gold casting / Universal	1030 °C	
Bio Maingold I, Bio Heranorm	Graphite + SP	Gold casting / Universal	1035 °C	
HeranormSun, Hera Eco Bond	Graphite + SP	Gold casting / Universal	1040 °C	
AureaSun, Keramikgold N	Graphite + SP	Gold casting / Universal	1045 °C	
Maingold I, Keramikgold, PKF, Herastar	Graphite + SP	Gold casting / Universal	1050 °C	
Herabest	Graphite + SP	Gold casting / Universal	1060 °C	
Heradent	Graphite + SP	Gold casting / Universal	1065 °C	
Hera KF	Graphite + SP	Gold casting / Universal	1070 °C	
BioCeram Plus	Graphite	High gold content / silver palladium	1100 °C	
AlbaSun	Graphite + SP	Gold casting / Universal	1105 °C	
Bio Herador GG, Herador EC	Graphite	High gold content / silver palladium	1110 °C	
Herador GG	Graphite	High gold content / silver palladium	1125 °C	
Bio Herador SG / N	Graphite	High gold content / silver palladium	1130 °C	
Herador C	Graphite	High gold content / silver palladium	1135 °C	
Bio Herador MP / CN, Herador MP	Graphite	High gold content / silver palladium	1140 °C	
Herador S / SG	Graphite	High gold content / silver palladium	1150 °C	
Herador PF	Graphite	High gold content / silver palladium	1160 °C	
Alba KF	Graphite	High gold content / silver palladium	1165 °C	
Bio SupraCeram	Graphite	High gold content / silver palladium	1175 °C	
Herador G / H	Graphite	High gold content / silver palladium	1200 °C	
Herador NH	Graphite	High gold content / silver palladium	1260 °C	
Albabond / E / EH / A / B / C, Heralight	Ceramic	Red. prec. met. cont./palladium-based		6 sec. after splitting up
Herabond N / Herabond, Heraloy G	Ceramic	Red. prec. met. cont./palladium-based		6 sec. after splitting up
Heraenium CE	Ceramic	COCrMo / NPM bonding		0 sec. after shadow
Heraenium EH / Laser	Ceramic	COCrMo / NPM bonding		3 sec. after shadow
Heraenium P	Ceramic	COCrMo / NPM bonding		8 sec. after shadow
Heraenium Pw	Ceramic	COCrMo / NPM bonding		6 sec. after shadow
Heraenium Sun	Ceramic	COCrMo / NPM bonding		4 – 6 sec. after shadow
Heraenium NF (end premelt after alloy has completely melted)	Ceramic	COCrMo / NPM bonding		6 sec. after shadow

SP = melting powder pellet

18 Control information Heracast iQ

Table 4. Control information

Putting unit into operation			
Check compressed air supply, if required, open	Switch on main switch	Auto-Test	Unit is ready for casting

Casting gold casting and universal alloys	Casting high gold content bonding alloys	Casting Pd-based alloys and Gold-Pd alloys	Casting NPM/CoCrMo alloys
Select menu graphite crucible and gold casting	Select menu graphite crucible and high gold content bonding alloy	Select menu ceramic crucible and Pd-based alloy or Gold-Pd alloy	Select menu ceramic crucible and NPM
Enter liquid. temp. and	Enter liquid. temp. and quantity	Enter delay time 6 sec	Enter delay time depending on the alloy
Place ceramic crucible with graphite insert in the coil	Place ceramic crucible with graphite insert in the coil	Place ceramic crucible in chamber	Place ceramic crucible in chamber
Adjust muffle size and height	Adjust muffle size and height	Adjust muffle size and height	Adjust muffle size and height
Add metal in small pieces into the crucible	Add metal in small pieces into the crucible	Add metal in small pieces into the crucible	Ensure horizontal, parallel placing of metal cylinders
Close chamber	Close chamber	Close chamber	Close chamber
Press key "VS" (pre melt)	Press key "VS" (pre melt)	Press key "VS"	Press key "VS"
Check vacuum and change, if required (recommendation approx. 100 mbar)	Check vacuum and change, if required (recommendation approx. 100 mbar)	Check vacuum and change, if required (recommendation approx. 100 mbar)	Check vacuum and change, if required (recommendation approx. 250 mbar)
Observe melt, interrupt pre melt with "Stop" key after the alloy has completely melted	Observe melt, interrupt pre melt with "Stop" key after the alloy has completely melted	Observe melt, after splitting up of the oxide layer interrupt pre melt with "Stop" key	Observe melt, depending on alloy type interrupt pre melt with „Stop“ key
Open casting chamber and add melting powder pellet	Open casting chamber (no melting pellet)	Open casting chamber (no melting pellet)	Open casting chamber (no melting pellet)
Place muffle in chamber and lock in place, close chamber	Place muffle in chamber and lock in place, close chamber	Place muffle in chamber and lock in place	Place muffle in chamber and lock in place
Press key "GS auto"	Press key "GS auto"	Press key "HS"	Press key "HS"
When the time has expired, the chamber is turned	When the time has expired, the chamber is turned	After splitting up of the oxide layer press key "GS auto."	After shadow disappears, press key "GS auto."
After approx. 60 sec the chamber is turned back, open chamber and remove casting mould	After approx. 60 sec the chamber is turned back, open chamber and remove casting mould	When the time has expired, the chamber is turned	When the time has expired, the chamber is turned
		After approx. 60 sec the chamber is turned back, open chamber and remove casting mould	After approx. 60 sec the chamber is turned back, open chamber and remove casting mould

Putting unit out of operation		
Remove crucible after casting	The unit can be switched off after 5 minutes	Turn off compressed air supply

Operating instructions

Casting Machine Heracast® iQ

19 Service

19.1 Service agents / Contact in the countries

LAND / COUNTRY	NAME / ADDRESS
Australien / Australia	Heraeus Kulzer Australia Pty. Ltd., Rydecorp, Unit 6, 2 Eden Park Drive, 2113 Macquarie Park N.S.W. Tel. / Phone +61 2-8422 6100, Fax +61 2-9888 1460
Brasilien / Brazil (America Sul / America del Sur / South America)	Heraeus Kulzer South America Ltda., Rua Cenno Sbrighi, 27-Sala 42, 4° andar, Água Branca 05036-010 São Paulo – SP Tel. / Phone +55 11 3665-0506, Fax +55 11 3665-0521
China / China Shanghai	Heraeus Kulzer Dental Trading Co. Ltd., 1585 Gu Mei Road, 200233 Shanghai Tel. / Phone +86 21 64 95 84 88, Fax +86 21 64 95 17 32
Frankreich / France	Heraeus S.A.S., Parc Silic – Bat.i.2, Villebon – BP 630, 12, Avenue du Québec, 91945 Courtaboeuf Cédex Tel. / Phone +33 169 18 48 48, Fax +33 169 28 78 22
Großbritannien / United Kingdom	Heraeus Kulzer Ltd., Heraeus House, Albert Road / Northbrook Street, RG14 1DL Newbury, Berkshire Tel. / Phone +44 163 53 05 00, Fax +44 163 53 06 06
Italien / Italy	Heraeus Kulzer S.r.l., Via Console Flaminio 5/7, 20134 Milano Tel. / Phone +39 022 10 09 41, Fax +39 022 10 09 42 83
Japan / Japan	Heraeus Kulzer Japan Co. Ltd., 2F TSK Bldg., 8-13 Hongo 4-chome, Bunkyo-ku, 113-0033 Tokyo Tel. / Phone +81 358 03 21 53, Fax +81 358 03 21 50
Mexiko / Mexico	Heraeus Kulzer Mexico S.A. de C.V., Homero 527 – 301 y 302, Col. Pol., 11560 Mexico, D. F. Tel. / Phone +52 55 31 55 49, Fax +52 55 52 55 16 51
Niederlande / The Netherlands	Heraeus Kulzer Benelux B.V., Fustweg 5, 2031 CJ Haarlem Tel. / Phone +31 235 43 42 50, Fax +31 235 43 42 55
Nordamerika / North America	Heraeus Kulzer, LLC, 300 Heraeus Way, South Bend, IN 46614-2517 Tel. / Phone 1 57 42 99 54 10, Fax 1 57 42 99 66 31
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Singapur / Singapore	Heraeus Dental, Heraeus Materials Singap. Pte.Ltd., #07-01 TechPlace II, 569881 Singapore Tel. / Phone +65 65 71 75 69, Fax +65 65 71 75 77
Skandinavien / Scandinavia	Heraeus Kulzer Nordic AB, Hammarbacken 4B, 19149 SOLLENTUNA Tel. / Phone +46 8 58 57 77 55, Fax +46 86 23 14 13
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Ungarn / Hungary	Heraeus Kulzer Hungary Kft., Stefania ut 101-103, 1143 Budapest Tel. / Phone +36 17 88 42 22, Fax +36 17 88 42 33

20 Document history

- 15.01.2001 First edition
- 09.09.2003 Document changed and new layout
- 19.01.2004 Alloy chart, errors and causes and service-addresses updated
- 05.04.2004 Correction in maintenance and care, correction in alloy chart
- 24.06.2004 Changes in paragraph 1.5; 2; 2.1; 3.1; 9.4; 9.5.2; 10.4; 12.4
- 17.02.2005 Changes in paragraph 1.5; 1.10; 2; 2.1; 4.1; 6.1; 6.3; 7; 7.1; 8; 10.5 to 10.5.3; 17
- 11.11.2005 Changes in paragraph 1.4; Paragraph 12.4.1 enclosed
- 27.02.2006 Number F enclosed in paragraph 13.1; Alloys enclosed in paragraph 17; new address spain enclosed in paragraph 19
- 03.11.2006 Sentence delete in paragraph 7.1, update addresses in paragraph 19.1, paragraph 20.2 cleared, sentence cleared in paragraph 12.4
- 06.06.2007 First edition CI
- 21.05.2008 Some grammatical corrections
- 12.10.2009 Heraeus declaration of conformity enclosed, paragraph 1.3 till 1.5 cleared
- 12.10.2010 New declaration of conformity enclosed, new illustration in paragraph 5.1.3, some changes to the alloy table 3
- 2011-05 Version 00 New layout. Editorial modifications technical data.
Complete Service agents and update contacts in the countries
- 2012-05 Version 01 Editorial modifications paragraph 12.4.1, paragraph 17.
Paragraph 19.1 cleared, update addresses in paragraph 19.2 and change to 19.1



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