Nautilus® CC plus

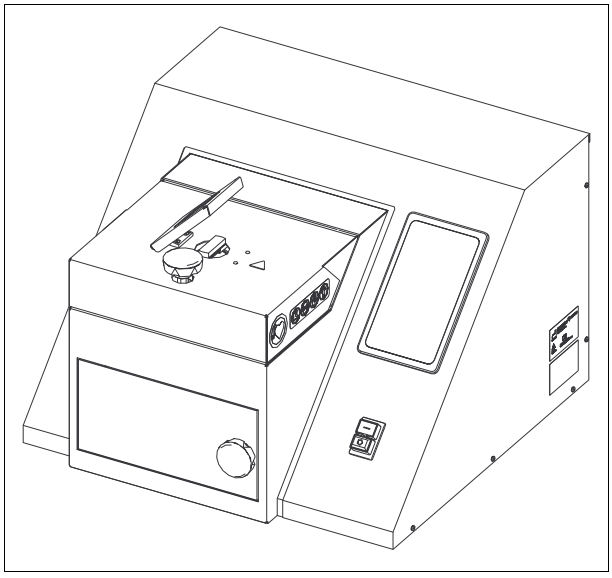
Nautilus® T

DOC 86105-en / 00 en

NAUTILUS® CC plus
39800101

NAUTILUS® T
39700101

86105 DB-en/00



This device documentation is part of the device and must be enclosed when selling or transferring the device.

- The device has been designed solely for use in dental laboratories and comparable institutions for research, commercial and training purposes. The device must only be operated by dental professionals; trainees and other persons operating the device must be supervised..
- The operating instructions must be read and understood before the device is used. This applies, in particular, to **Safety Instructions**. Damage caused by non-compliance with these operating instructions will invalidate any and all warranty claims. We will also not accept liability for any resulting consequential damage.

Table of contents

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Symbols on the device


This symbol indicates very important information. Failure to comply with it may result in personal injury.


This symbol warns of hot surfaces.


No persons with pacemakers.


This symbol indicates that safety gloves have to be worn.


Use eye protection (protective glasses against mechanical hazards).


This symbol indicates that a protective apron must be worn.


Use protective footwear.


Read the operating instructions carefully.


Pull the power plug.

Symbols used in the display


WLAN-connection activated


LAN connection activated


Service


"Casting with pyrometer" activated


"Manual casting" activated


"Casting with camera" activated


"Automatic casting" activated


Fast mode activated

General Information

Importance of the operating Instructions

These operating instructions includes all information required in accordance with the relevant rules for the safe operation of the device described herein.

The operating instructions are a part of the device. The operating instructions must therefore

- always be kept in an easily accessible location near to the device until it is disposed of.
- be passed on with the device when it is sold, transferred or rented/leased out.

Contact the manufacturer if you are unsure about anything stated or described in the operating instructions.

We welcome any suggestions or contributions; please feel free to contact us. Your effort will help us make the operating instructions more user-friendly and respond more effectively to your wishes and needs.

Target group

This document is directed toward everyone working with this device or performing service tasks that are described in this document.

Contact information

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Service-Hotline Phone: +49 421 2028-270
www.bego.com

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Conventions

These operating instructions contain references to residual hazards, important user tips and handling instructions that are identified with the following symbols and signal words.

1. Sequential actions are described in sequentially numbered paragraphs.

→ Cross-references are identified with this symbol.

⚠ DANGER

This reference identifies hazards, which will result in serious injury or death if the relevant hazard warning is not observed or not observed properly.

⚠ WARNING

This reference identifies hazards which could result in serious injury or death if the relevant hazard warning is not observed or not observed properly

⚠ CAUTION

This reference identifies only those hazards that are potential damaging to property and the environment.

NOTICE

This symbol identifies user tips and particularly useful information. It helps you to take full advantage of all the functions of your device.

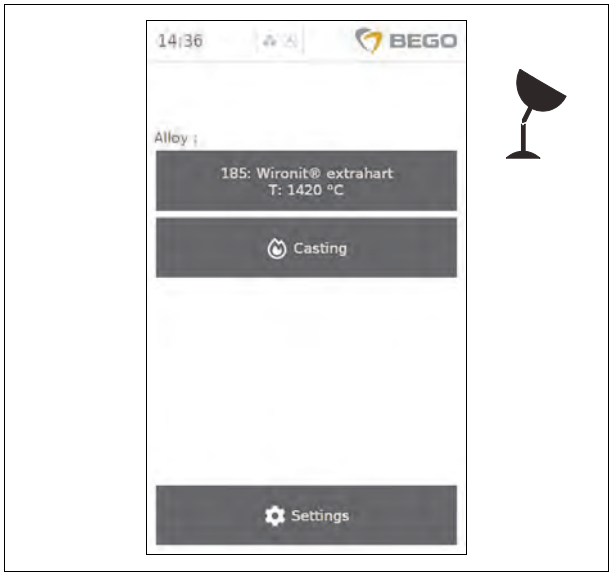
Warranty and Liability

Our "General terms and conditions of sale and delivery" apply. These terms and conditions are available to the operating company upon conclusion of the contract, at the latest. Warranty and liability claims for personal injury and property damage are excluded if these are attributable to one or more of the following:

- Improper use of the device
- Improper installation, commissioning, operating and maintenance of the device;
- Operating the device with safety installations/ safeguards that are defective, improperly installed or inoperable;
- Failure to observe the notes contained in these operating instructions regarding the transport, storage, installation, commissioning, operation, service and maintenance of this device;
- Unauthorized structural modifications to this device
- Inadequate monitoring/inspection of device components that are subject to wear;
- Improperly performed repairs
- Catastrophic events beyond human control and force majeure.

Important notes

Touchscreen



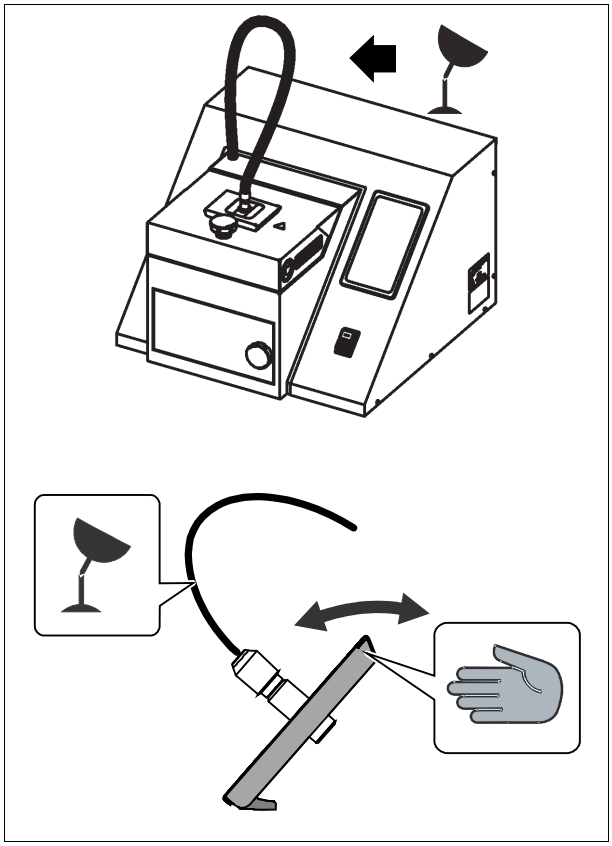
The touchscreen (screen for input of commands) can be damaged by pointed or sharp objects!

⚠ WARNING

Any liquid leaking from the screen as a result of damage is toxic and corrosive!

- Avoid contact with skin, swallowing or inhaling it!
- Only touch the touchscreen with the fingertips! Do not use pens or fingernails!

Fiber optic cable - only NAUTILUS® CC plus



The fiber optic cable (the cable above the device) is sensitive to bending and heat!

⚠ CAUTION

Bending and/or touching the cable with hot objects must be avoided!

If necessary, grab a hold of the recessed grip on the front flap, not the fiber optic cable!

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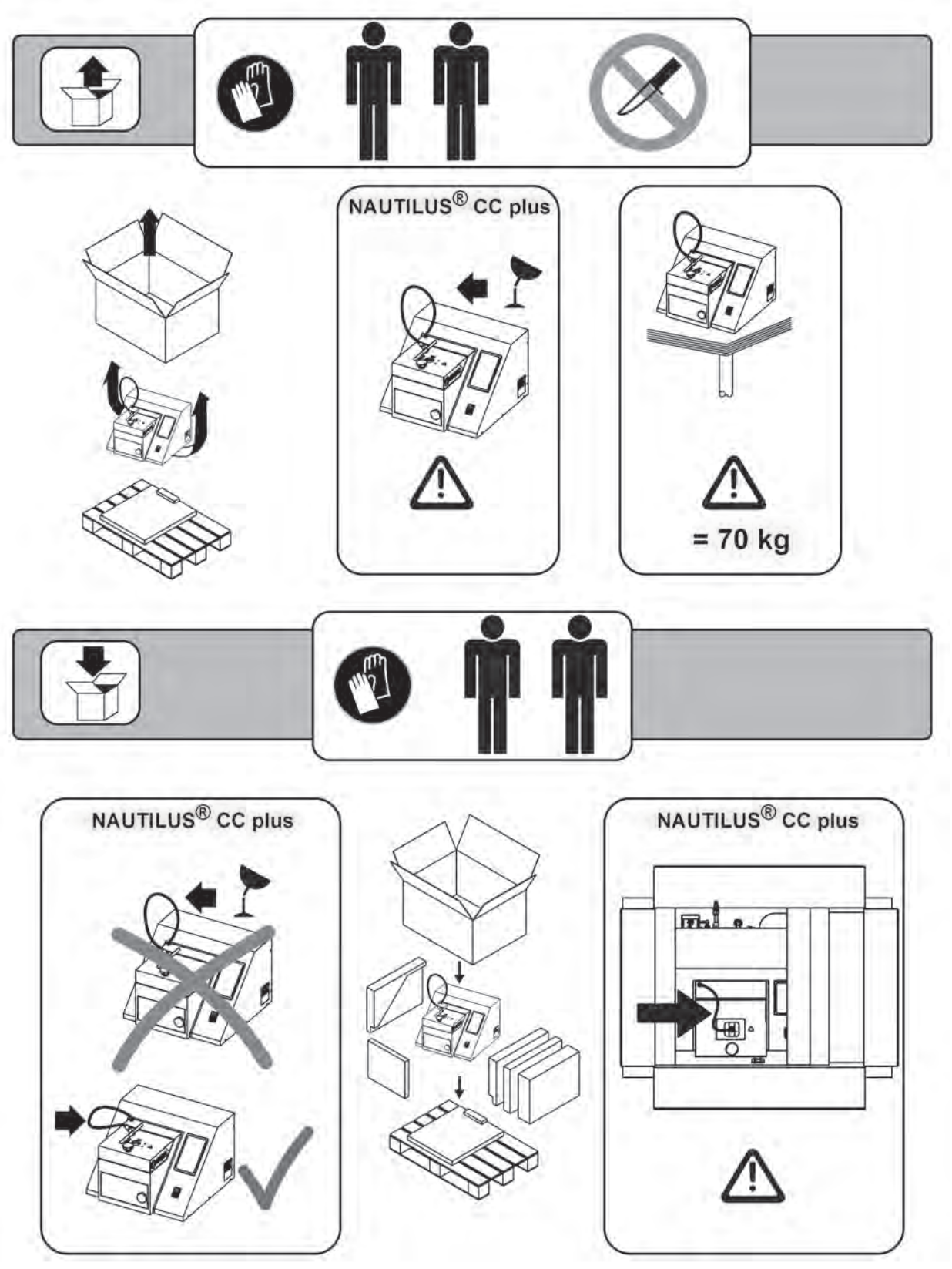
Unpacking / Packing



Safety instructions

The NAUTILUS® vacuum pressure casting device is designed exclusively for casting dental alloys, with the exception of titanium.

Any other use is deemed to be improper. We shall not be liable for any damage resulting from improper use.

ATTENTION! Casting titanium is not permissible! Risk of personal injury and damage to the device!

Alloys containing beryllium produce strong oxides during the melting process, cause substantial wear to the crucibles and significant amounts remain inside the crucible. **ATTENTION!** Carcinogenic particles are released when beryllium is processed! Cast and finish only while taking suitable protective measures!

Aluminum and titanium (< 0.5 %) contained in non-precious metal alloys without beryllium may produce strong oxides, which could cause significant parts of the melt to remain inside the crucible. Such alloys can also not be casted with the NAUTILUS®.

The safety instructions must be followed in order to prevent personal injury and damage to the device. We shall not be liable for damage due to failure to comply with the safety instructions.

General safety instructions

Place of installation

The device has been designed solely for use in dental laboratories and comparable establishments for research, commercial and training purposes.

The device may only be installed on a sufficiently stable surface.

The unit must only be used in dry rooms.

Operating company and operating personnel

The device must only be operated by dental professionals; trainees and other persons operating the device must be supervised..

Wear the protective clothing and comply with the practices required in dental laboratories.

The device must only be operated by employees, who are familiar with and follow the instructions of this operating manual.

The operating manual must be easily accessible when the device is operated.

Observe the national accident prevention regulations in addition to this operating manual.

Handling the device

Prior to connecting the device to the power supply, check and make sure that the specifications on the rating plate correspond to the power supply network. Consult an electrician in case of uncertainty.

The device is subject to the provisions of protection class I and must only be connected to properly earthed power sources (outlet sockets with earth contact).

Modifications of the device are not permitted. Signs and labels must always be maintained in legible condition. They must not be removed.

Check the device and the supply lines for signs of damage regularly. The device must not be operated if it has any defects that may pose a risks for the employees or third persons.

Protect the supply lines against heat, oil and sharp edges.

Supply lines must not be used to carry the device or to pull out the mains plug.

Servicing and Maintenance

Switch off the device and pull out the mains plug before performing any servicing, cleaning or maintenance work.

Only use dry or slightly damp cloths for cleaning. Do not spray the device with water or immerse it in water.

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Repairs

Repairs must only be carried out by BEGO customer service personnel or by persons authorized by the BEGO customer service department.

Metallic housings must be properly grounded to prevent them from carrying electric current.

If not properly grounded, the housing may become live in case of a damage inside of the device and thus may pose a danger to life. Only trained and qualified electricians must be allowed to open the device as exposed, conductive parts are subject to mandatory inspections for the absence of voltage after repairs (Germany: Inspection in accordance with DIN VDE 0701-1)!

Only BEGO spare and wear part must be used.

Installation

The device is subject to the provisions of protection class I and must only be connected to properly earthed power sources (outlet sockets with earth contact).

When laying cables and hoses, make sure that they are protected from hot components (e.g. moulds).

The cooling water temperature must never drop below 10°C (50°F). Otherwise, condensation water may drip on the hot moulds and vaporize explosively.

Danger of burns when draining the cooling water! The water can reach temperatures up to 70° C if the device was used for casting beforehand.

Maintenance of safety-relevant components

The device has been designed for a service life of 10 years from the date of manufacture. No liability is accepted for damage arising from the operation of the device after this period.

Safety-relevant components must be checked regularly and replaced as required. This work must only be carried out by BEGO customer service personnel or by representatives that have been authorized by the BEGO customer service department. For that purpose, regular maintenance, including annual inspections and an inspection after five years, carried out by personnel authorized by BEGO is recommended.

Special safety instructions regarding this device

⚠ DANGER

Risk of electric shock

- The device is subject to the provisions of protection class I and must only be connected to properly earthed power sources (outlet sockets with earth contact).

⚠ WARNING

Hazards from electromagnetic radiation!

- Persons with electronic implants (e.g. pacemakers) must are not permitted in the same room with the ready-to-operate device.
- The supplied warning signs (symbol: "pacemaker") are to be placed at the entrances to the room in which the ready-to-operate device is located!

⚠ WARNING

Burn hazard from hot surfaces!

- Wear protective clothing (protective apron), safety shoes, safety goggles and heat-resistant protective gloves.
- Wear heat-resistant gloves when touching the crucible handles.
- Open the lower chamber only to move the moulds. Keep it closed all other times.
- Always use mould tongs to move moulds and hot crucibles.
- Only touch hot crucible inserts and hot cast metal parts with tongs.

⚠ WARNING

Risk of deflagration

- Ensure that alloys, crucible and crucible inserts do not become soiled. Residual oil or grease may evaporate explosively during the casting process.

Danger from exhaust gases

- Ensure there is adequate ventilation when casting dental alloys as exhaust gases are produced during this process.

Dangers from the touchscreen

- Any liquid leaking from the screen as a result of damage is toxic and corrosive! Avoid contact with skin, swallowing or inhaling it!

NOTICE

Important!

Never operate the NAUTILUS® CC plus without monitoring it, not even in automatic mode!

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Device description

NAUTILUS® CC plus and NAUTILUS® T - compact table casting devices with integrated cooling and user-friendly touch-screen

Both devices use the tried-and-tested HF vacuum pressure casting process with a split crucible and come with integrated cooling as well as user-friendly touch-screens.

Special emphasis was placed on redundant safety systems. A double closing sounds indicates that both flaps are closed.

Both of the devices have an "eco-mode" to lower energy consumption when they are not in use for a while; eco-mode is automatically activated after 3 minutes and stops 10 minutes after the touch-screen lighting has turned off. During this time, the NAUTILUS® only uses 10 W. To end the energy saving mode, simply tap on the touch-screen and the device will be ready for operation within a few seconds.

New software versions can be transmitted via one of the two UBS interfaces on the back of the device. NAUTILUS® CC plus and NAUTILUS® T casting devices can thus be updated.

NAUTILUS® CC plus comes with a pyrometer, which does not only measure the temperature of the melt without direct contact but - in combination with specially developed software - enables the casting process to be automated to a large extent. This allows for a reproducible quality of the casting process, which can be documented and archived in form of casting logs via the USB interfaces. In the event of malfunctions, it is also possible to call up diagnostic protocols and send them to the BEGO Service.

NAUTILUS® T comes with an integrated camera to monitor the casting process. A casting video is available for subsequent inspection/examination.

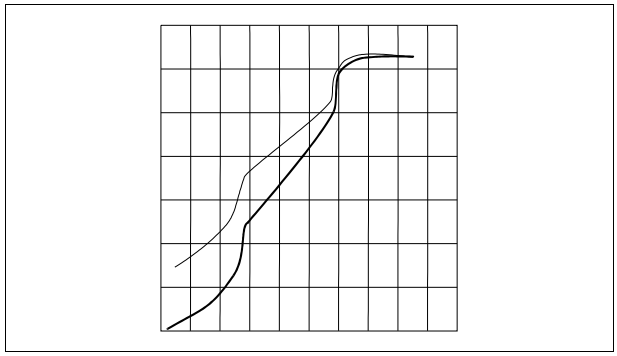
Determining the casting temperature for dental alloys with the NAUTILUS® CC plus

The flowability of the melt and thus the casting temperature are of decisive importance for the quality of the cast object. The problems that can arise when melt is casted at a temperature that is either too high or too low, are known in practice and described in the relevant literature so it will not be discussed in detail here

Dental alloys have the property of not having a fixed melting point, but a melting interval. Within the melting interval alloys occur in viscous as well as in crystalline form.

The melting interval is easily identified by the characteristic cusps in the melting and solidification curve, which are the result of irregularities in the temperature progression.

When an alloy is melted, the first cusp in the curve is the so-called solidus, the second one is referred to as liquidus; the liquidus specifies the point at which the alloy is completely liquid. NAUTILUS® CC plus uses this behavior in the temperature progression by means of an analytical thermal method.



To ensure optimal flowability of the melt in the dental casting mould, the melt is heated beyond the liquidus point. Depending on casting method and alloy, a temperature increase between 100°C and 180°C has proven to be optimal in practice. Corre-

sponding recommendations on these casting temperatures are given by the manufacturers of alloys and casting equipment, which generally have been verified by empirical tests. With most casting devices the accuracy for achieving the recommended casting temperature through visual assessment of the developing temperature still depends on the individual skills of the user.

In contrast, the new NAUTILUS® CC plus casting device uses an automatic measurement method to determine the right time to cast, which facilitates an exact determination of the casting temperature within a very short period of time and even with only small amounts of alloy. At the same time the light information of the melt is evaluated by means of an optical system and a so-called pyrometer with a multichannel measuring system and converted into temperature values. The melting process is monitored on the basis of the data captured in this way and casting can be triggered automatically (on request also manually) after the alloy-specific casting temperature is reached. The measuring method applied is able to compensate for influences due to fluctuations in the light emission of the melt, such as those occurring when the oxide skin opens during melting.

This innovative technology inside of the NAUTILUS® CC plus has been used to determine the perfect casting temperatures of BEGO alloys and are stored in special casting programs for the control system. Thanks to the new measuring technique, it is now possible to determine the casting temperatures very reliably and on a reproducible basis. The standard values recommended thus far for the casting temperatures of BEGO alloys have consequently been adapted to the newly defined values in some cases and are summarized in the casting table of this operating manual.

If third party alloys are used with the NAUTILUS® CC plus, the casting program of a BEGO alloy with the closest match with regard to alloy composition and alloy characteristics can be copied. Now only the casting temperature and the name of the non-BEGO alloy have to be adapted according to the respective manufacturer's specifications. Users can manually cast non-BEGO alloys, without specified casting temperatures, according to their visual impression and then utilize the displayed temperature to create their own casting programs for automatic operation with these alloys. A casting program for a non-BEGO alloy in the program memory of the NAUTILUS® CC plus can be set up in just a steps and is described in the operating instructions.

NOTICE

Tip: Non-BEGO alloys should first be casted manually with a pyrometer to check if the casting temperature specified by the manufacturer is correct.

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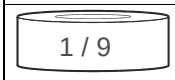
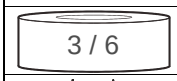
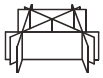
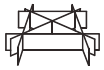
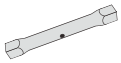
Scope of delivery and extras

Scope of delivery

Please specify REF, quantity and SN on orders.

	REF	Quantity	Designation
	86105	1	Translation of the original operating instructions
	52488*	1	Ceramic crucible
	52436*	2	Plastic handles for ceramics crucible
	52467*	2	Ceramic handle for crucible
		2	Graphite insert
		1	Glassy carbon insert
	30002	1	Tweezers
	15932*	1	Protective gloves
	30259	1	Mould mounting plate
	12257	1	Mould mounting Size 1/9
	13362	1	Mould mounting Size 3/6
	37618	1	Mould mounting
	10073	1	Mould mounting
		1	Mould former, size 3*
		1	Mould former, size 6*
		1	Mould former, size 9*
	52068*	1	Universal funnel former
	14990*	1	Air filter cartridge
	14994	1	Hook wrench
	16232*	1	Maintenance grease for O-ring
	16092	1	Symbol "Pacemaker"
	-	1	Power supply cable (country specific)

Only NAUTILUS® CC plus

	16237	1	Socket wrench
	16371*	1	Glass insert with o-ring
	19773	1	USB stick
	20604	1	WLAN-USB adapter

* Wear part. Consumables and wear parts are neither subject to the warranty nor the guarantee.

Wear Parts

	REF	Quantity	Designation
	18856	1	O-ring, set

Accessories

	REF	Quantity	Designation
	39754 11599	1 1	Mould tongs 55 cm Mould tongs 64 cm
	52066	1	Funnel former for partial denture
	52525	65 g	Auromelt
	52526	80 g	Wiromelt
	52468	1	Graphite insert
	52473	1	Glassy carbon insert
	52627	1	Mould former, size 3
	52628	1	Mould former, size 6
	52629	1	Mould former, size 9
	16260	1	Compressed air reservoir for NAUTILUS® T / CC plus
	52477	100 ml	Lolipot
	17800	1	Transformer

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Technical data

NAUTILUS® CC plus

Height max.	480 mm
Width	606 mm
Depth	676 mm
Weight	64 kg
Nominal voltage	230 V AC ±10 %, 50 / 60 Hz
Nominal output	3680 VA (Eco 10 VA)
short-time operation	max. 5 min
Compressed air	1/4 ", 5 .... 8 bar (0.5 .... 0.8 MPa), (72.5 .... 116 psi), ≥ 100 l / min
Noise emission	< 70 dB (A)
Ambient temperature (max.)	10… 30 °C (50…86 °F)

230 V AC ±10 %, 50 / 60 Hz, 3680 VA.. REF 26475

NAUTILUS® T

Height	418 mm
Width	606 mm
Depth	676 mm
Weight	63 kg
Nominal voltage	230 V AC ±10 %, 50 / 60 Hz
Nominal output	3680 VA (Eco 10 VA)
short-time operation	max. 5 min
Compressed air	1/4 ", 5 .... 8 bar (0.5 .... 0.8 MPa), (72.5 .... 116 psi), ≥ 100 l / min
Noise emission	< 70 dB (A)
Ambient temperature (max.)	10… 30 °C (50…86 °F)

230 V AC ±10 %, 50 / 60 Hz, 3680 VA.. REF 26470

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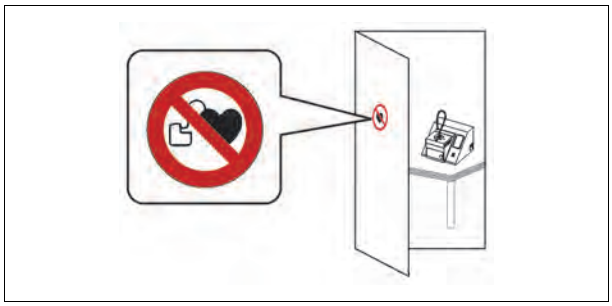
Installation



⚠ WARNING

The warning signs provided (symbol: "pacemaker") are to be placed at the entrances to the room in which the ready-to-use device is located!

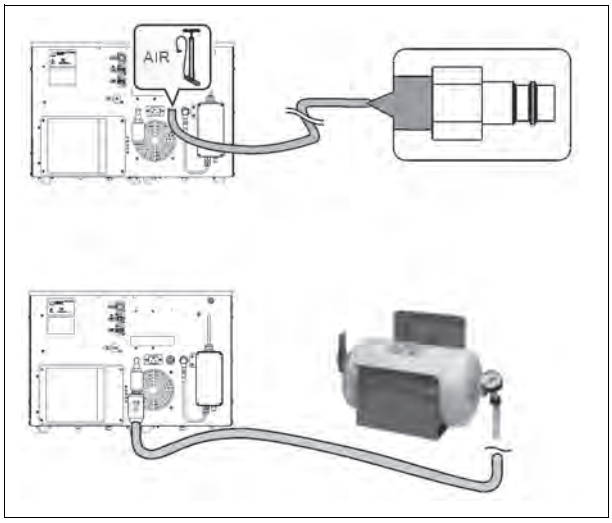
Cooling water

NOTICE

After initial commissioning, run the device for at least 2 minutes to allow for the cooling water to circulate and check the water level again.

Adding cooling water (see page 72).

Compressed air



1/4 "

5 .... 8 bar (0.5 .... 0.8 MPa) (72.5 .... 116 psi)

≥ 100 l / min

Insufficient supply of compressed air during pressure casting (warning message W011) can be compensated with the compressed air reservoir (REF 16260).

Insufficient supply of compressed air during evacuation (warning message W002, W013) cannot be compensated with the compressed air reservoir.

Important! Remove protective cap!

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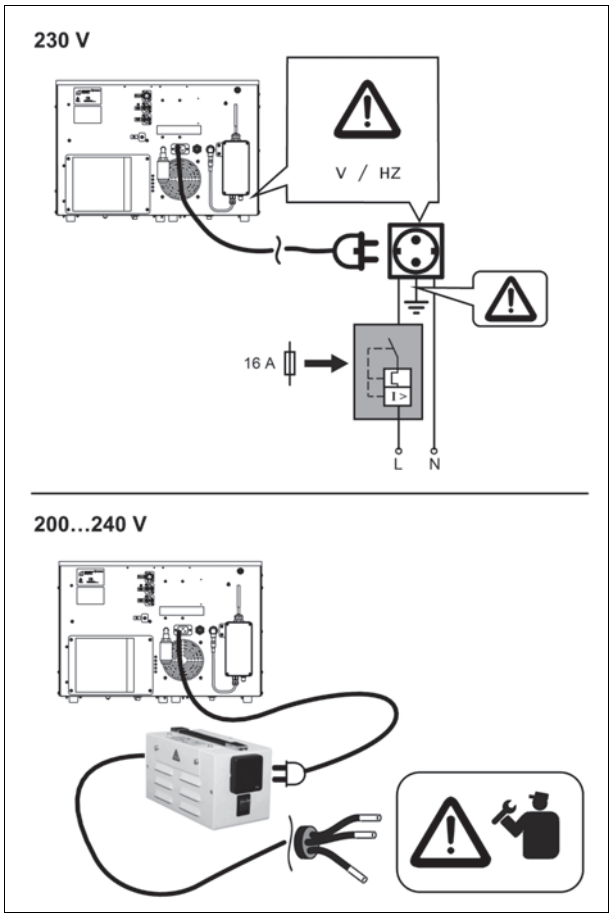
Electricity



Prior to connecting the device to the power supply, check and make sure that the specifications on the rating plate correspond to the power supply network. Consult an electrician in case of uncertainty.

The device is subject to protection class I and must only be connected to properly grounded and fused power sources.

Recommendation: Always operate the device in a single power circuit (min. 16A fuse).

Installation in countries without 230 V network:

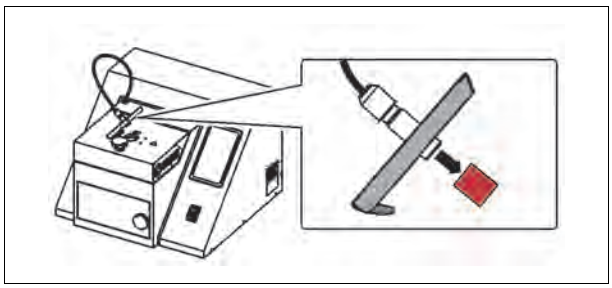
The electrical installation must only be carried out by a qualified electrician!

Use the transformer (REF 17800) for connection.

1. Adapt the power connection of the transformer to local circumstances.
2. Insert the Nautilus®-power plug into the transformer.

The device is subject to the provisions of class of protection I and may only be connected to properly grounded power sources.

Pyrometer



Remove the cover of the precision optics before initial commissioning (NAUTILUS® CC plus only)

Switching the device on

⚠ WARNING

Risk of injury

Wear suitable protective equipment when operating the device!

⚠ WARNING

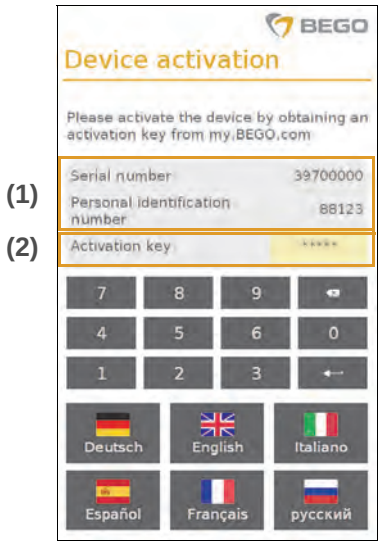
Only touch the touchscreen with the fingertips! Do not use pens or fingernails!

Any liquid leaking from the screen as a result of damage is toxic and corrosive! Avoid contact with skin, swallowing or inhaling it!

1. Open compressed air supply.
2. Switch the device on.
   The device initializes the measurement system. After 2 - 3 minutes (cold device) the device is ready for operation.
3. Wait until the main menu appears on the screen.
   When the device is turned on for the very first time, the device activation screen will appear instead (see page 19).
4. Select the desired task by pressing on it.

Initial commissioning

Registering the NAUTILUS® with myBEGO



Before the device is used for the very first time, it must activated and enabled on the customer portal "my.bego.com". Take advantage of the various services available on my.bego.com. Upon activation of your device, we will extend your 24-months warranty for an additional 3 months.

1. Remove the cover of the precision optics before initial commissioning (NAUTILUS® CC plus only, see see page 16).
2. Switch the device on and select the display language. The following languages are available:
   - German
   - French
   - English
   - Spanish
   - Russian
   - Italian
3. Follow the prompts on the display afterwards.
4. Write down your personal identification number and the serial number displayed on the device activation screen (1).
5. Register on the my.bego.com using your personal data. After registering, you will receive an e-mail at the specified address.
6. Add your device on my.bego.com under the menu item "Add new device". Select your device model and your dealer. You device-specific activation key will be displayed after the activation process has been successfully completed. You will be always able to access your activation key later on under the menu item "my devices" on my.bego.com.
7. Enter your activation key in the corresponding field on the NAUTILUS® start screen (2).
8. Click on "next" The main menu will open up.

Services on my.bego.com

You can call up an individual casting log for every casting process you have carried out from the my.bego.com customer portal. In order to transfer the files to my.bego.com, the device must be connected to the internet, see paragraph "Setting up a network connection". The device will automatically connect with the my.bego.com customer portal.

If it is not possible to connect the device with the internet, you can download the casting log to a USB flash drive by accessing the "Export" menu item in "Settings".see page 38

In online mode and with an established internet connection, the device will also transfer the process data to the my.bego.com customer portal to facilitate fast support and a more efficient error analysis for service purposes in case of need. It is also possible to contact the customer service directly by using the contact form provided on my.bego.com.

Setting up a network connection

After initial commissioning (see page 19), NAUTILUS® CC plus and NAUTILUS® T can also be operated without a network connection. **Network connections are optional.** However, a network connection is required in order to link your device with myBEGO and receive the desired support.

NOTICE

Connect the device either via LAN or WLAN; otherwise the hostname cannot be clearly assigned. Contact an IT specialist, if needed.

Network connection via LAN cable

1. Switch the device off.
2. Connect the LAN cable with the ethernet socket on the back of the device and the "LAN" socket of the router / network connection.
3. Switch the device on. The BEGO software will be loaded. If your network supports DHCP, the device will connect with your network automatically.
4. If it is not possible to establish a connection between the device and the network, the device will display an error message. Go to "Settings" > "System" > "Internet".
5. Check if LAN (<···>) and DHCP are activated (see illustration).

   Button 1: Selection „LAN“ and „WLAN“
   Button 2: Selection „DHCP“ and „Static“

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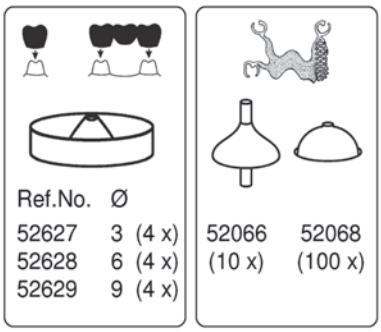
6. If DHCP is not supported by your network, use the expert mode "Static". Contact an IT specialist, if needed.

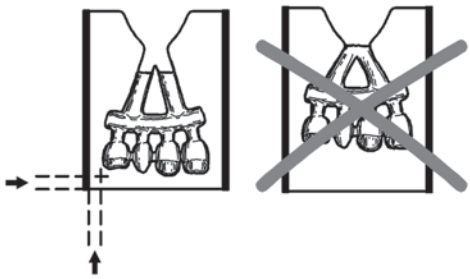
Network connection via WLAN

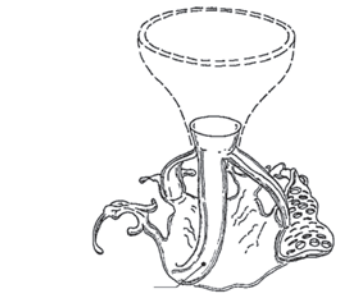
1. Switch the device off.
2. Insert the WLAN USB adapter on the back of the device.
3. Switch the device on. The BEGO software will be loaded.
4. Go to "Settings" > "System" > "Internet".
5. Press the WLAN button (see illustration).
6. Select the WLAN network.
   If the WLAN network is invisible, select SSID and the encryption type (WEP, WPA2, etc.).

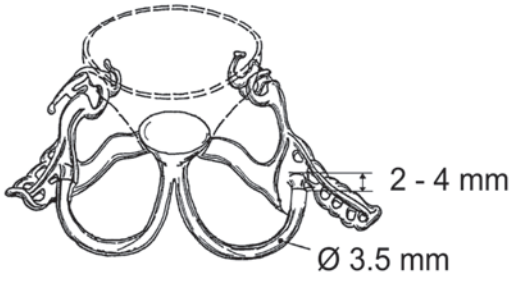
7. Enter the password.
8. Switch from "Static" to "DHCP", if necessary (see illustration).
9. Press the "Connect" button.
10. If DHCP is not supported by your network, use the expert mode "Static". Please consult an IT expert to that end.

Basic principles: Wax-up









After the crucible is opened, the melt flows into the mould through gravity and immediately fills the sprues. With the aid of compressed air, the entire mould cavity will instantaneously be filled with hot melt immediately afterwards. The object should first harden and must be able to suck liquid melt from the reservoir of the sprues. The following rules must be strictly observed for this purpose.

NAUTILUS®-crucibles should be used as the mould formers by BEGO are specially designed for melt flowing from those crucibles.

Do not use vent sprues that reach up to the casting funnel or to the outside of the mould. Air vents cause the compressed air to be supplied incorrectly during press process.

The object should first harden and enable subsequent suction of the liquid melt from the heat centre of the mould.

For this reason keep the spacing between the object and the mould bottom and mould wall small (5 mm). Arrange bridges in a ring shape at the mould wall.

Partial denture

Follow the illustrations and the instructions of the alloy manufacturer when dimensioning the sprues.

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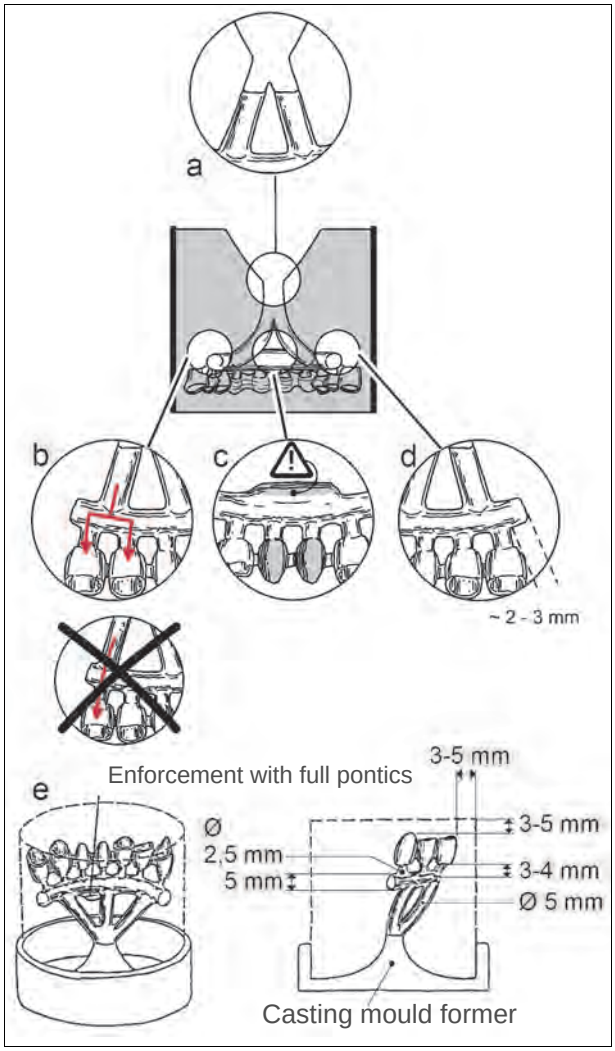


Bridges

a) A casting cone can be dispensed with.

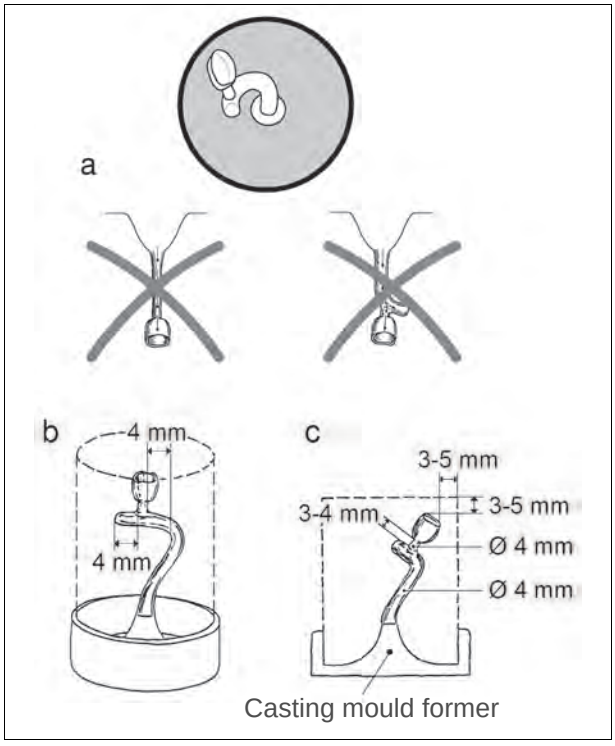
b) Use an indirect sprue system so the melt does not flow directly into the object, but first fills the distribution channel.

c) Reinforce distribution channel for full pontics (the volume of the reinforcement must correspond at least to the volume of the full pontics).

d) Dimension the distribution channel generously and allow it to project to enable subsequent suction of liquid melt.

e) Keep the distance between the object and the mould bottom and mould wall small (5 mm).

Follow the instructions of the alloy manufacturer with regard to dimensioning sprue systems and sprues.



Crowns

a) Prevent the melt from flowing in directly through sinuous sprue system.

b) Extend the distribution channel beyond the sprue system of the crown.

c) Keep the distance between the object and the mould bottom and mould wall small (5 mm).

Follow the instructions of the alloy manufacturer with regard to dimensioning sprue systems and sprues.

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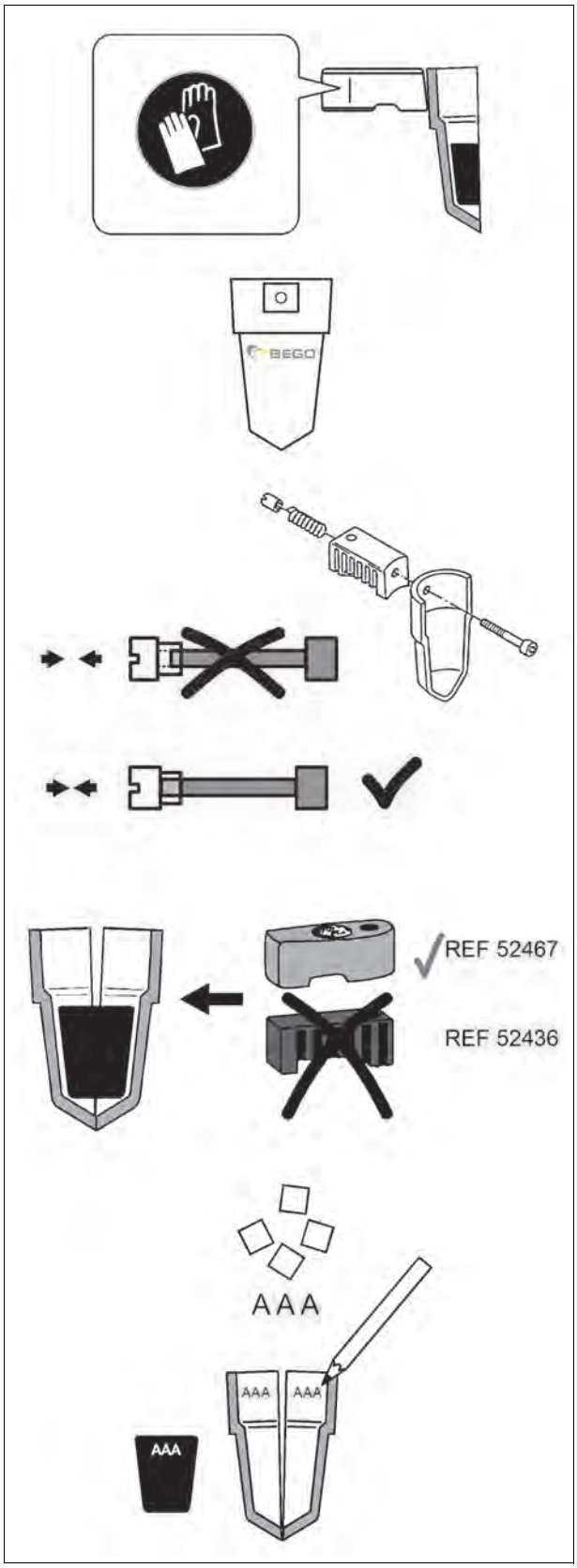
Basic principles: Crucible



⚠ WARNING

Burn hazard from hot surfaces!

- Only touch crucible handles with safety gloves.
- Always use mould tongs to move crucible inserts!

NOTICE

Recommendation: Only use BEGO crucibles (identifiable by the BEGO logo)! Crucibles of other manufacturers frequently have incorrect dimensions. This will lead to faulty casts when the crucible opens too late of if the melt flows out of the crucible too early.

Screw the handles tightly onto the crucible.

⚠ WARNING

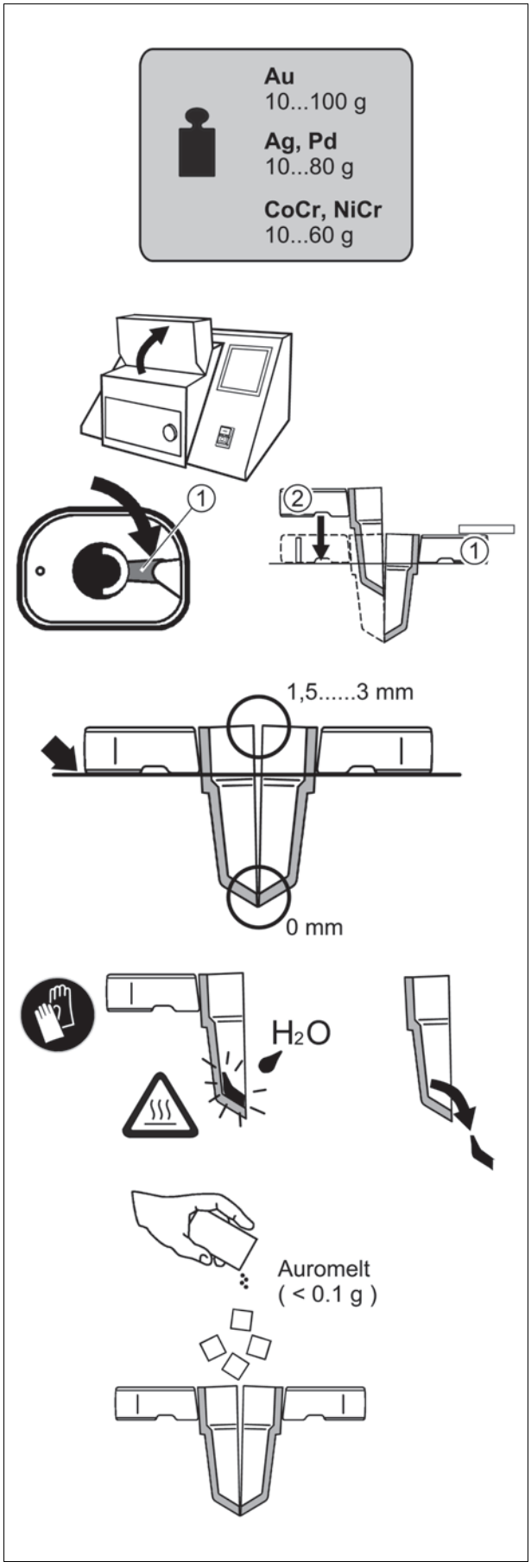
When inserts are used, the handles become extremely hot: plastic handles would melt!

Inserts (made of graphite or glassy carbon) require ceramic handles!

Always use crucible and inserts for the same alloy. Crucibles can be marked with a pencil.

NOTICE

Graphite inserts are subject to wear and must be replaced in time! Used inserts can be identified through their weight (**graphite ~6 g, glassy carbon ~5 g**) and also by the fact that the temperature increase during the melting process slows down from one casting process to the next. The casting temperature can no longer be reached with worn graphite inserts!



NOTICE

Observe minimum and maximum quantities!

Insert both crucible halves.

⚠ WARNING

ATTENTION (check before every casting process)

- The handles must lie on the base surface.
- The crucible halves must close/seal on the bottom (*) and leave a gap between 1.5 to 3 mm at the top.
- Do not use damaged crucible halves.
- CoCr / NiCr only: do not use crucible halves with alloy residue on the bottom.

(*): Uneven crucible tips that do not close can be smoothed out by pulling them over fine sandpaper (grit size ≥ 80).

NOTICE

Alloy residues can be easily removed if a drop of water is added while they are hot.

For special alloys, sprinkle a pinch of BEGO Auromelt HF melting powder on the alloy (see program table on page 34).

Melting powder made by other manufacturers may impair the casting result!

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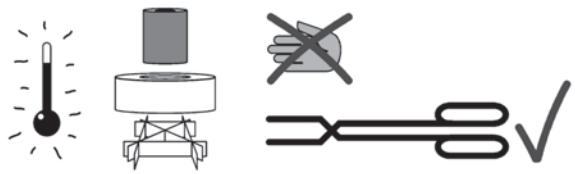
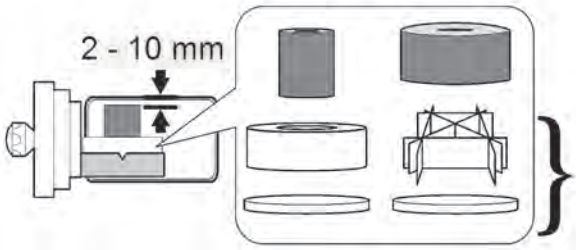
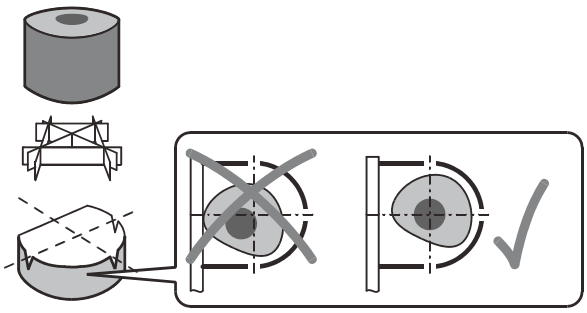
Basic principles: Moulds





Mould holders



Align the mould so that the casting funnel is positioned in the center of the "cross hairs".

⚠ WARNING

Burn hazard from hot surfaces!

- Always use mould tongs to move moulds and mould holders.
- Wear suitable protective equipment when operating the device!

Select suitable mould holders (see scope of delivery) so that the moulds are positioned as high as possible.

⚠ CAUTION

Mould temperatures above 1050°C may cause the device to overheat.
Never use damaged or cracked moulds.

Basic principles: Work

BEGO alloys can be selected on the start screen. A selection is necessary to set up the correct casting parameters.

Third party alloys can be stored on additional program memory locations and be deleted, as needed.

Casting and preheating temperatures

The casting temperatures indicated for BEGO alloys in the program tables apply to the standard wax-ups described in this operating manual. Because of the numerous parameters that influence the casting result, these casting temperatures can only be regarded as reference values.

It is very important to provide for an adequately preheated mould, which is placed in the device immediately before the melting process in order to minimize cooling. The preheating temperatures specified in the operating instructions should be complied with, even if casting has been carried out successfully thus far at low mould preheating temperatures. While a mould, that is too cold could During automatic casting*) at optimal temperature, a mould that is too cold may result in the melt to solidify prematurely; this could be counteracted with manual casting at a higher casting temperature.

*) Only NAUTILUS® CC plus

Crucible inserts

Special alloy groups require a ceramic crucible with either a graphite or glassy carbon insert for melting (see program tables). A glassy carbon insert can be generally used instead of a graphite insert. It has a significantly longer service life than the graphite insert. The alloy is then indirectly heated via the hot insert. To ensure that all alloying components have reached the casting temperature, preheating is carried out up to the liquidus point (the melt becomes liquid). Furthermore, the casting temperature is maintained for a certain time during the melting process before readiness for casting is message appears.

NOTICE

- Graphite inserts are subject to wear and must be replaced in time! Used inserts can be identified through their weight (**graphite ~6 g, glassy carbon ~5 g**) and also by the fact that the temperature increase during the melting process slows down from one casting process to the next. The casting temperature can no longer be reached with worn graphite inserts!
- Graphite inserts are sensitive to impact and must only be used in flawless condition. Cracks, in particular, will lead to the casting process to be aborted.

Alloys with a high palladium content are generally casted without a crucible insert. A glassy carbon insert can be used if the alloy chips rise during the heating process and thus do not have the proper temperature (failed "incorporation" in the induction field):

- a graphite insert for palladium contents of up to 30%,
- a glassy carbon insert for palladium contents over 30%, which reliably prevents carbon from being absorbed by the alloy.

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Melting precious metal without graphite crucible insert

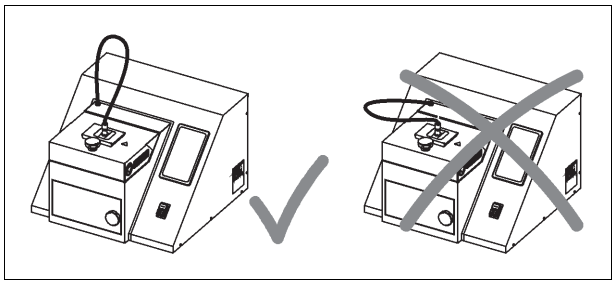
With small alloy quantities, in particular, individual alloy chips may position themselves in the induction field in such a way that they are not adequately heated and remain unmelted in the crucible or casting cone. This behaviour is process-related and usually has no influence on the casting result. If all alloy chips are to be melted, ensure that they have contact with each other inside the crucible ("pile up" alloying chips).

Pyrometer (only NAUTILUS® CC plus)

The temperature is recorded by a precision optical system that is fixed to the hinged screen.

The hinged screen must fully rest on the surface! The optics must not be turned/swivelled away during operation.

Look through the protective lens next to the optical system to observe the melt.



⚠ CAUTION

The fiber optic cable (the cable above the device) is sensitive to bending and heat! Bending and touching with hot objects (moulds!) must always be avoided!

Crucible coating Lolipot

BEGO-Lolipot includes a coating material that has been specially designed for BEGO ceramic crucibles for the BEGO casting devices NAUTILUS® and Fornax. The coating results in an extended service life of the crucible and ensures casting with nearly no residue, especially with alloys having a high gold content. It is equally suitable for CoCr and NiCr alloys. Lolipot has no influence on the properties of the alloy. When the effect starts to decline, Lolipot can be reapplied.

Camera (only NAUTILUS® T)

With the integrated camera system of the NAUTILUS® T the melting process (premelting and melting) can be monitored on the display, starting at a certain temperature (radiation). To monitor the melt directly, look through the protective sight glass next to the camera - the camera image is only provided for additional support.

The casting process still needs to be triggered manually by the operator.

Casting non-BEGO alloys

Before non-BEGO alloys can be casted automatically, the specific alloy values need to be determined and a corresponding program needs to be set up. See paragraph "Creating programs for non-BEGO alloys" for detailed information. **Automatic casting is only possible with the NAUTILUS® CC plus.**

Own programs can also be created for manual casting of non-BEGO alloys. This is, for instance, necessary to specify the alloy names in the casting protocols. The preheating and final heating processes during manual casting must be stopped by the operator, see paragraph "Manual casting without pyrometer" on page 56!

NOTICE

Alloys with a high **palladium content** are generally casted without a crucible insert. An insert can be used if the alloy chips rise during the heating process and thus do not have the proper temperature (failed "incorporation" in the induction field):

- a graphite insert for palladium contents of up to 30%,
- a glassy carbon insert for palladium contents over 30%, which reliably prevents carbon from being absorbed by the alloy.

Should the specifications made by the alloy manufacturer differ from the above, those specifications must be followed.

⚠ WARNING

Casting titanium is not permissible!

Risk of personal injury and damage to the device!

⚠ CAUTION

Aluminum (> 0.5 %) contained in non-precious metal alloys without beryllium may produce strong oxides, which could cause significant parts of the melt to remain inside the crucible. Such alloys cannot be be casted with the NAUTILUS®.

⚠ CAUTION

Alloys containing beryllium produce strong oxides during the melting process, cause substantial wear to the crucibles and significant amounts remain inside the crucible.

Carcinogenic particles are released when beryllium is processed!

Cast and finish only while taking suitable protective measures!

Creating programs for non-BEGO alloys

New program memory locations can be set up for specific alloys, when such non-BEGO alloys are used regularly. In order to cast non-BEGO alloys automatically, the respective alloy must first be casted manually to harmonize the casting temperature and the device parameters.

First, a BEGO alloy with a comparable composition and casting temperature must be found*). The program location of this alloy is then copied in order to apply the device parameters (e.g. use of the crucible insert). The following steps are required to do this.

*) See BEGO precious metal alloys table, BEGO catalog or the information on alloys available in the download center at www.bego.com.

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Preparation

1. Determine the following values from the manufacturer's specifications (processing instructions, data sheet):
   - the three most important alloying components,
   - casting temperature,
   - processing requirements (melting with graphite inserts, use of melting powder, etc.)
2. Find the BEGO alloy that corresponds most closely. Sources:See BEGO precious metal alloys table, BEGO catalog or the information on alloys available in the download center at www.bego.com.
3. Determine the program number of the suitable BEGO alloy from the program table on page 34.

NOTICE

Programs 181 to 186 should be used for non-BEGO alloys without precious metals, which tend to splatter when heated under vacuum, because with these programs the alloys are casted with reduced vacuum. Programs 191 to 193 use the maximum vacuum and are thus not suited for such alloys.

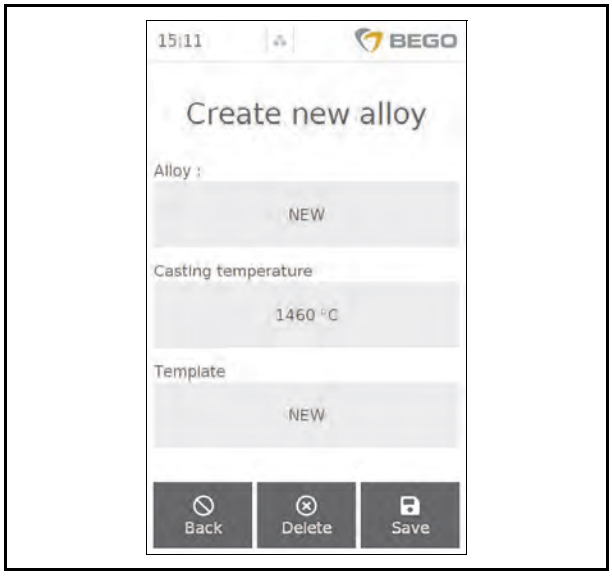
Casting

1. Cast the non-BEGO alloy manually with pyrometer (see page 35 ff). Use the program number of the identified BEGO alloy for that purpose.
2. If necessary, adapt the casting temperature displayed on the screen to the manufacturer's specification. Select the highest casting temperature of the recommended casting ranges.
3. Observe the specifications provided in the operating instructions starting on page 35, like holding times during the melting process, etc.
4. Note the casting temperature indicated when casting is triggered. It is required for setting up the program for the non-BEGO alloy.

Creating programs

1. Press the button with the preselected alloy in the main menu.

   The alloy selection menu will be called up.
2. Press "New" to create/set up a new casting program.
3. Press the "Find alloy" button.



4. Select the alloy with the previously determined values (see paragraph "Alloy selection" on page 41).

   or

5. Select an alloy my means of the alloy finder (see illustration).
   - The "alloy finder" button calls up a comparison table to assist you with determining a comparable alloy. First, select the melting interval specified by the manufacturer of the non-BEGO alloy.
   - Then select the alloy group based on the basic components.
   - Select the use of the graphite insert if required for the casting process.
   - Press the "Enter" button first, then confirm by pressing "OK". A comparable alloy will be suggested.

   An entry mask will appear on the screen where the data of the new non-BEGO alloy can be edited.

6. Enter the desired name and the casting temperature. The comparable alloy may be modified, if needed.

7. Press the "Save" button to set up the alloy program.

   The newly set up alloy program is now available as a favourite in the alloy selection list (see page 41).

Deleting non-BEGO alloys programs

1. Press the "New/Delete" button.

NOTICE

- Only non-BEGO alloys can be deleted.
- If no new program has been set up so far, the button will only read "New"

2. Select the alloy to be deleted-
3. Press "Delete".

Explanation of the foot notes on page 34:

LFC = Low Fusing Ceramic

✓ /- = yes/no

* Symbol for "bonding"

1 A glassy carbon insert may be used instead of a graphite insert (see page 28).

2 Only use BEGO Auromelt HF as melting powder. Melting powder from other manufacturers may impair the casting result. If no melting powder is used, large alloy residues remain inside the crucible and the casting result may be impaired. Use Auromelt HF very sparingly (only a pinch)!

3 The higher the scrap metal content and/or the lower the modulation thickness, the higher the preheat temperature should be.

4 Use the glassy carbon insert if the alloy chips rise and do not "mix".

5 Use programs 181 to 186 if the alloys tend to splatter when heated under vacuum.

Program table (BEGO alloys)

Group	*	Alloy	Program location	Casting temp. (°C)	Mould temp. (°C)	Crucible insert	Melting powder
Au	LFC	Bio PlatinLloyd®	118	1250	700	Graphite[1]	Auromelt[2]
	✓	Bio PontoStar®	154	1270	850	Graphite[1]	
	✓	Bio PontoStar® XL	155	1270	850	Graphite[1]	
	-	InLloyd® 100	115	1200	700	Graphite[1]	
	LFC	PlatinLloyd KF	111	1200	700 - 750	Graphite[1]	
	-	PlatinLloyd M	113	1020	700	Graphite[1]	
	-	PlatinLloyd 100	114	1050	700	Graphite[1]	
	✓	PontoLloyd® G	158	1370	850	Graphite[1]	
	✓	PontoLloyd® L	157	1430	850	Graphite[1]	
	✓	PontoLloyd® P	156	1380	850	Graphite[1]	
	LFC	Pontonorm	119	1150	700	Graphite[1]	
	LFC	PontoRex® G	117	1150	700	Graphite[1]	
	✓	PontoStar® G	151	1320	850	Graphite[1]	
	✓	PontoStar® H	152	1320	850	Graphite[1]	
Au	LFC	AuroLloyd® KF	121	1230	700	Graphite[1]	
	-	AuroLloyd® M	123	1100	700	Graphite[1]	
	✓	BegoCer® G	162	1500	850 - 950[3]	-	Auromelt[2]
	LFC	BegoLloyd® LFC	126	1250	700	Graphite[1]	
	-	BegoLloyd® M	125	1050	700	Graphite[1]	
	✓	BegoStar®	163	1420	850	Graphite[1]	
	-	Midigold®	128	1030	700	Graphite[1]	
Pd	✓	BegoPal®	164	1430	850	Glassy c.[4]	Auromelt[2]
	✓	BegoPal® S	165	1450	850	Glassy c.[4]	Auromelt[2]
	✓	BegoPal® 300	166	1390	850 - 950[3]	Glassy c.[4]	Auromelt[2]
	✓	BegoPal®	171	1430	850	-	Auromelt[2]
	✓	BegoPal® S	172	1450	850	-	Auromelt[2]
	✓	BegoPal® 300	173	1390	850 - 950[3]	-	Auromelt[2]
Ag	- / LFC	Silver-gold-palladium	131	1300	800	-	Auromelt[2]
	LFC	BegoStar® LFC	142	1300	700	Graphite[1]	Auromelt[2]
	LFC	ECO d'OR	132	1200	700	Graphite[1]	
Eco	✓	BegoStar® ECO	167	1430	850	Glassy c.[4]	Auromelt[2]
	✓	BegoStar® ECO	174	1430	850	-	Auromelt[2]
NiCr	✓	Wirocer plus	197	1450	900 - 950	-	
	✓	Wiron® 99	191[5]	1450	900 - 1000	-	
	✓	Wiron® light	199[5]	1350	800	-	
CoCr	✓	Wirobond® C	192[5]	1500	900 - 1000	-	
	LFC	Wirobond® LFC	193[5]	1480	900 - 1000	-	
	✓	Wirobond® SG	196	1480	900 - 1000	-	
	✓	Wirobond® 280	195	1500	900 - 1000	-	
	-	Wironit®	184	1460	950 - 1050	-	
	-	Wironit® extra-hard	185	1420	950 - 1050	-	
	-	Wironit® LA	186	1450	950 - 1050	-	
	-	WIRONIUM®	181	1440	950 - 1050	-	
	-	WIRONIUM® extra-hard	182	1450	950 - 1050	-	
	-	WIRONIUM® plus	183	1440	950 - 1050	-	

Explanation of the foot notes see page 33.

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Table of holding times / further heating times

Group	Alloy	Program	For manual casting*	
			with pyrometer: Holding times**	without pyrometer: add. heating times
Au	Bio PlatinLloyd®	118	15	14 to 17
	Bio PontoStar®	154	15	15 to 18
	Bio PontoStar® XL	155	15	17 to 22
	InLloyd® 100	115	16	17 to 20
	PlatinLloyd KF	111	16	10 to 13
	PlatinLloyd M	113	19	10 to 13
	PlatinLloyd 100	114	19	10 to 13
	PontoLloyd® G	158	13	22 to 25
	PontoLloyd® L	157	11	12 to 15
	PontoLloyd® P	156	12	18 to 22
	Pontonorm	119	17	12 to 15
	PontoRex® G	117	17	12 to 15
	PontoStar® G	151	13	17 to 20
	PontoStar® H	152	13	17 to 20
Au	AuroLloyd® KF	121	15	17 to 20
	AuroLloyd® M	123	18	17 to 20
	BegoCer® G	162	10	12 to 18
	BegoLloyd® LFC	126	17	17 to 20
	BegoLloyd® M	125	19	17 to 20
	BegoStar®	163	12	22 to 25
	Midigold®	128	19	17 to 20
Pd	BegoPal®	171	10	13 to 16
	BegoPal® S	172	10	13 to 16
	BegoPal® 300	173	10	13 to 16
	BegoPal®	164	10	13 to 16
	BegoPal® S	165	10	13 to 16
	BegoPal® 300	166	10	13 to 16
Ag	Silver-gold-palladium	131	approx. 14	17 to 20
	BegoStar® LFC	142	14	17 to 20
	ECO d'OR	132	14	17 to 20
Eco	BegoStar® ECO	174	10	3 to 7
	BegoStar® ECO	167	10	3 to 7
NiCr	Wirocer plus	197	0	6 to 12
	Wiron® 99	191	0	7 to 10
	Wiron® light	199	0	3 to 7
CoCr	Wirobond® C	192	0	7 to 10
	Wirobond® LFC	193	0	4 to 8
	Wirobond® SG	196	0	2 to 4
	Wirobond® 280	195	0	2 to 4
	Wironit®	184	0	7 to 10
	Wironit® extra-hard	185	0	6 to 9
	Wironit® LA	186	0	6 to 8
	WIRONIUM®	181	0	2 to 4
	WIRONIUM® extra-hard	182	0	6 to 8
	WIRONIUM® plus	183	0	6 to 8

* Specified in seconds.

** During the holding time the selected casting temperature is maintained.

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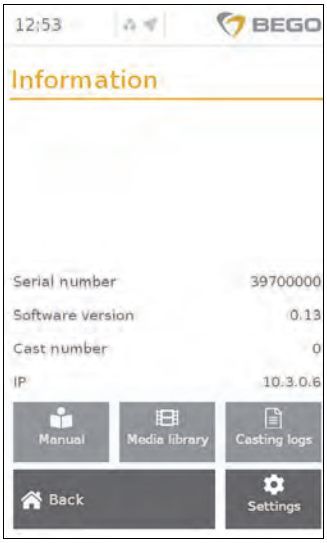
Settings

Pressing the "Settings" button on the main screen calls up a screen where the device settings can be edited This paragraph describes device-independent setting. The casting program settings for models NAUTILUS® CC plus and NAUTILUS® T differ. The respective settings are specified in the model-specific paragraphs:

- NAUTILUS® CC plus see page 45,
- NAUTILUS® T see page 61.

The "Back" button calls up the menu that was opened last or the main screen.

Information



The specific device information such as serial number, software version, IP address and number of casts can be called up in the "Settings" > " Information" menu. The number of total castings is, for instance, important for regular maintenance (see page 71).

This menu also provides access to the submenus "Manual", "Media library" and "Casting log".

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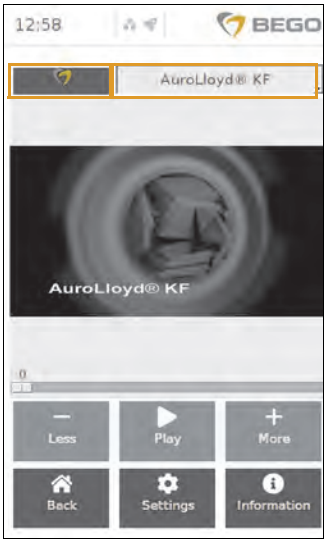
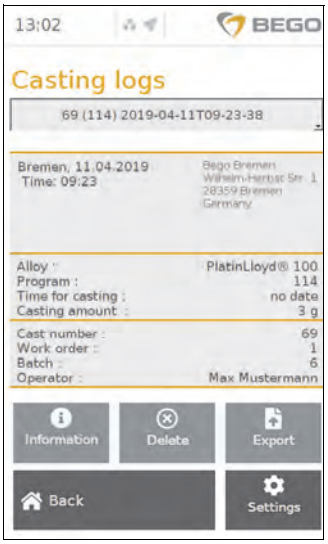
Manual: The manual contains brief instructions for the most important subject areas related to maintenance and operation.

Media library: The NAUTILUS® CC plus media library contains casting videos of the BEGO alloys to provide an insight into melting behaviour and casting time.

The BEGO alloys can be selected by pressing the arrow above the video.



Only with NAUTILUS® T: Pressing the BEGO symbol above the video allows you to select casting videos you have recorded yourself or casting videos from the media library (see paragraph "Casting with camera" on page 63).



Castings logs: If this function is activated, the casting log files can be called up (see page 40).

A log can be selected by pressing the arrow next to the log number.

Pressing the "Delete" button will delete the selected log.

Pressing the "Export" button will download the log to the connected USB flash drive. The USB flash drive can then be used to print out or archive the casting log on a personal computer (see page 78).

If the NAUTILUS® is connected to the internet, the files will automatically be transmitted to myBEGO and can subsequently be accessed via the portal. You may also use the extended customer service support in case of errors and/or malfunctions (see page 20).

System

The system settings "O-rings", "Internet", "Date/ Time", "Language" and "Log Setup" can be called up by pressing the "System" button. The display brightness can also be adjusted with the slider.

The submenu "Service" is reserved for BEGO authorized customer service personnel.

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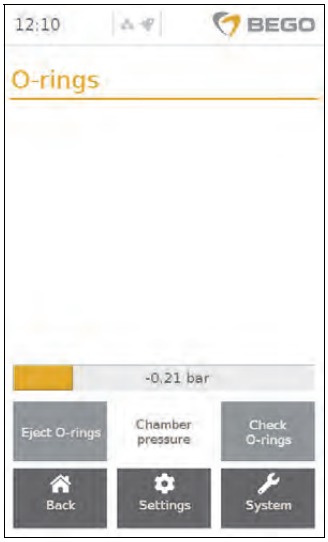
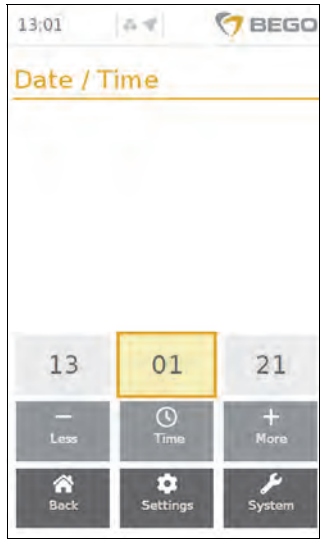


O-rings: O-rings can be ejected with compressed air (see page 74.

During the test the chambers are filled with compressed air. If no air escapes (generation of noise!), the O-rings function properly. If an air leak is present, the O-rings must be cleaned (see page 74).

Internet: Setting up a network connection see page 20.

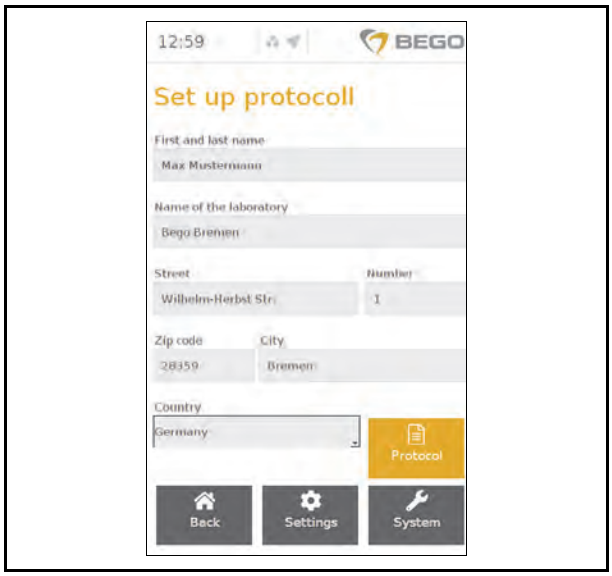


Date/Time: The time and date are necessary for the casting protocols.

Press the "Time" or "Date" button to access the corresponding time and date settings. Select a field (e.g. minutes) to adjust the setting by using the "+" and "-" buttons.

Language: Pressing a button will change the device to the corresponding language. The following languages are available:

- English
- English
- Italian
- Spanish
- French
- Russian



Setting up the protocol: This menu is used to maintain the necessary laboratory and address data for protocol content.

The "Protocol" button activates (orange) or deactivates (gray) logging. If logging is activated, an input mask will open before casting where the alloy batch, order number and cast quantity (see paragraph "Casting" in model-specific chapters) can be entered.

Program

The casting program settings for models NAUTILUS® CC plus and NAUTILUS® T differ. The respective settings are specified in the model-specific paragraphs:

- NAUTILUS® CC plus see page 45,
- NAUTILUS® T see page 61.

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Alloy selection

In order to cast an alloy, the corresponding casting program needs to be selected. Every program contains additional heating times, holding times, vacuum volume, pressure, etc.

The programs for all BEGO alloys are stored in the device. Additional alloy programs can be set up and stored for non-BEGO alloys.

1. Press the button with the preselected alloy in the main menu.

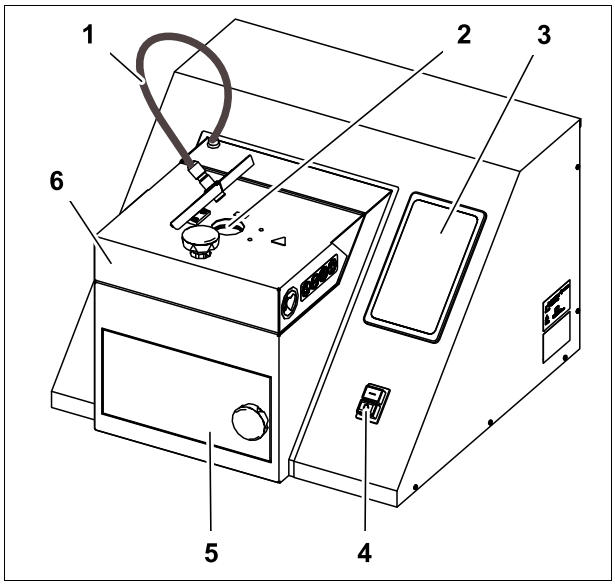
   The alloy selection menu will be called up.
2. Pressing the "Back" switches back to the main menu without making a selection.
3. The selection can be limited as follows:
   - The "All alloys" button switches between non-precious metal, precious metal, other alloys, all alloys and favourites. The list of favourites is generated automatically based on the used alloys. If more than 15 different alloys have been used, the alloy that had been entered first, will be deleted so that the newly selected alloy can be added to the table (ring buffer).
   - The buttons "+" more and "-" less are used to navigate to additional pages, provided that there are more than 15 alloys.
   - The list can be sorted by program number (0-9) or by program name (A-Z).
4. Select the desired alloy.

   The main menu will be called up with the selected alloy.

Nautilus® CC plus

en English

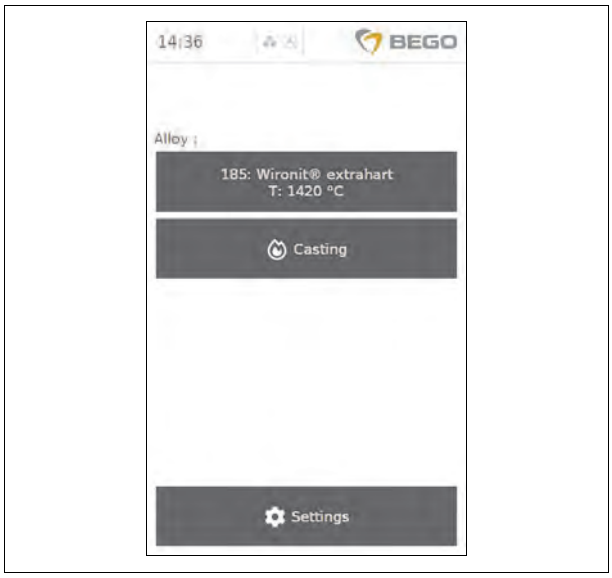
Device description



NAUTILUS® CC plus (CC = Cast Control) is a compact table device for vacuum casting with induction heating for use in dental laboratories. Sophisticated software and non-contact temperature measurement with the help of a so-called multichannel pyrometer enable automatic casting and at the same time optimal, reproducible casting results.

1 Fiber optic cable to the pyrometer
2 Protective glass
3 Touchscreen
4 Main switch
5 Mould door
6 Crucible door

Overview



The following functions can be called up on the touchscreen after the device has been switched on:

Automatic casting

In automatic mode, casting is carried out automatically at the optimal casting moment without any action on the part of the operator. Only the alloy program location needs to be called up, which can be found in the program tables.

In automatic mode it is also possible to intervene manually, if desired, for example to trigger casting before the machine would do it.

Manual casting

In manual mode, the alloy is casted at the push of a button. With the aid of the pyrometer, the temperature is also measured in manual mode and additionally alerts the operator with acoustic signals that the proper casting temperature has been reached.

Manual casting generally only serves to set up a program for a non-BEGO alloy (with pyrometer, see page 30) or is used as a back-up/ emergency casting option in the event that the pyrometer is defective.

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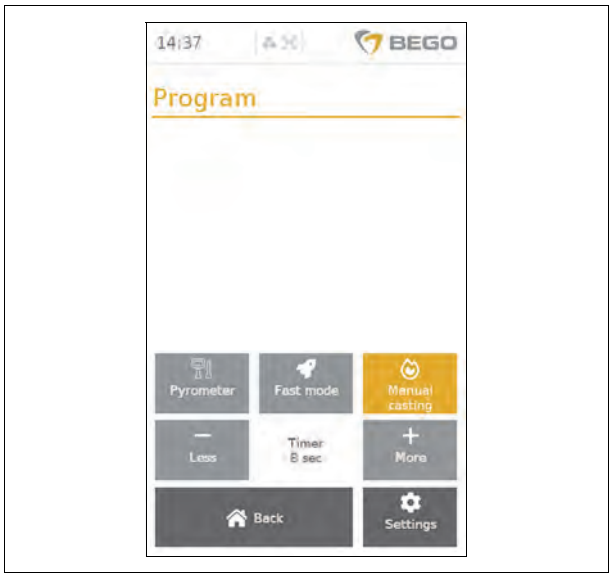
Settings

- **Information**: The information button will call up specific device information such as serial number, software version, cast counter and IP address. This screen also provides access to the submenus "Manual", "Media library" and "Casting log" (see page 36).
- **System**: The "System" button provides access to the system settings "O-rings", "Internet", "Date/Time", "Language" and "Log Setup" (see page 38).
- **Casting program**: This is where new program locations for non-BEGO alloys are set up (see page 45).

Casting process settings

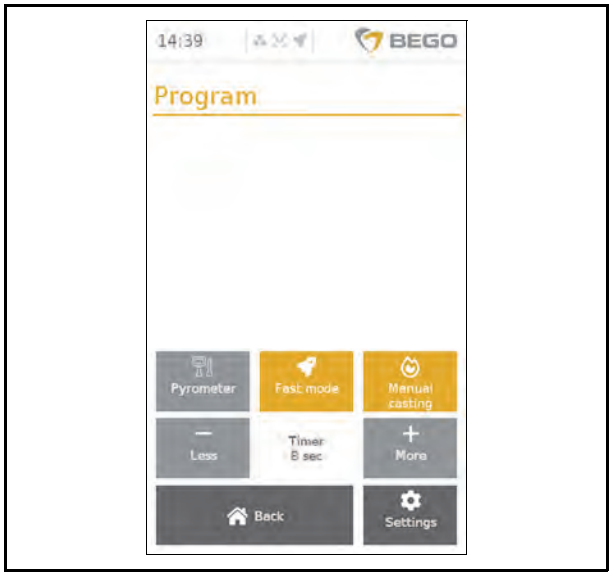
Program

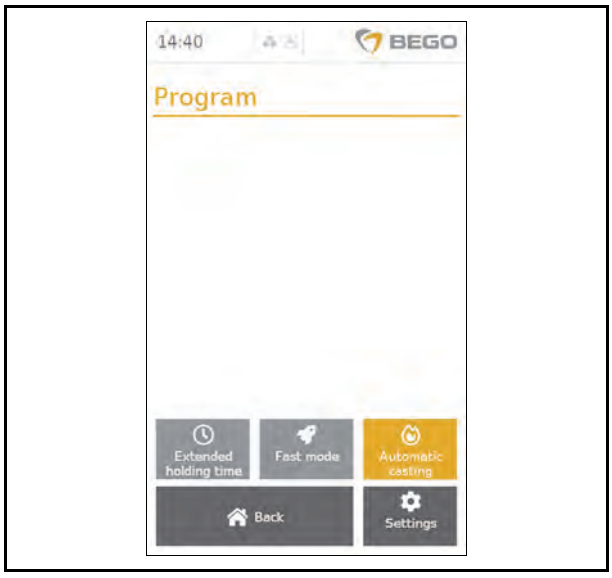


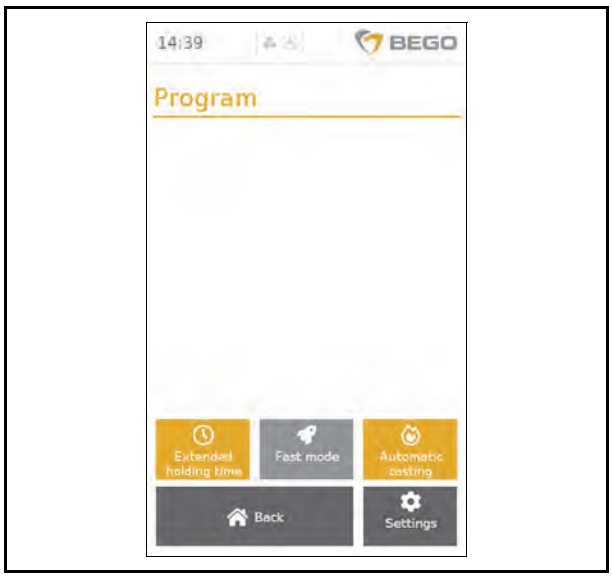
Specific settings related to the casting process with the NAUTILUS® CC plus can be chosen from the "Program" menu.

The "Back" button will call up the main screen.

The "Settings" button will call up the "Settings" menu.







Fast mode: In fast mode, the casting process between the steps "Insert alloy" and "Preheat" as well as the steps between "Insert mould" and "Melt" are not started through operator input on the screen but are instead detected and subsequently triggered upon locking the doors/hinged panels.

The mode is activated (orange) and/or deactivated (grey) by pressing the "Fast mode" button. A symbol in the header of the screen indicates that the mode is activated (see page 3)

⚠ CAUTION

Stay with the device and finish the preheating and melting processes manually as described in paragraph "Manual casting"!

Automatic/Manual casting: The NAUTILUS® CC plus can be operated in automatic and manual casting mode.

Pressing the "Automatic casting" button activates (orange) or deactivates (grey) the automatic casting mode. A symbol in the header of the screen indicates that the mode is activated (see page 3)

⚠ CAUTION

The temperature cannot be measured and thus not be limited without the pyrometer!

Stay with the device and finish the preheating and melting as described below manually!

Extended holding times (automatic casting mode): Extended holding times during preheating and final heating are an option when casting of precious metal alloys in inserts. Longer holding times prevent that alloying components are not melted completely.

Holding times are extended especially for alloys with a high content of gold, which require a comparatively low casting temperature. Due to a very high heat conductivity, the preset standard times may not suffice to fully melt all alloying components. The heat loss is compensated by extending the holding times.

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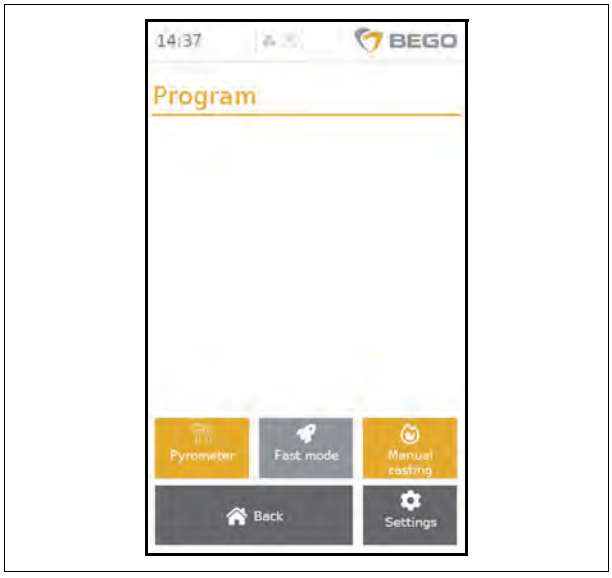
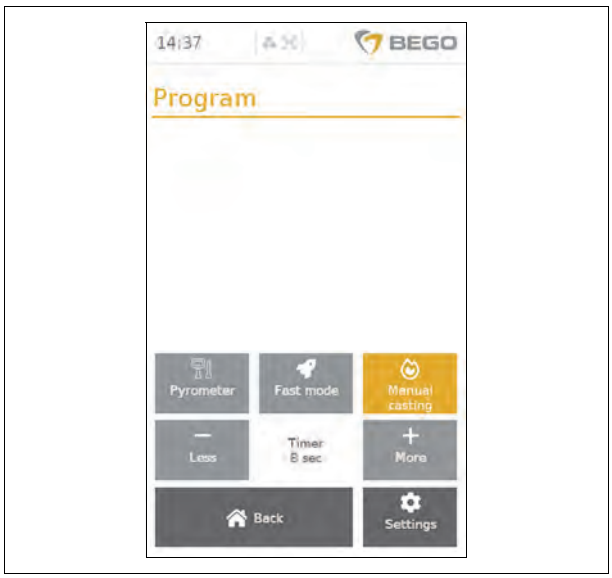
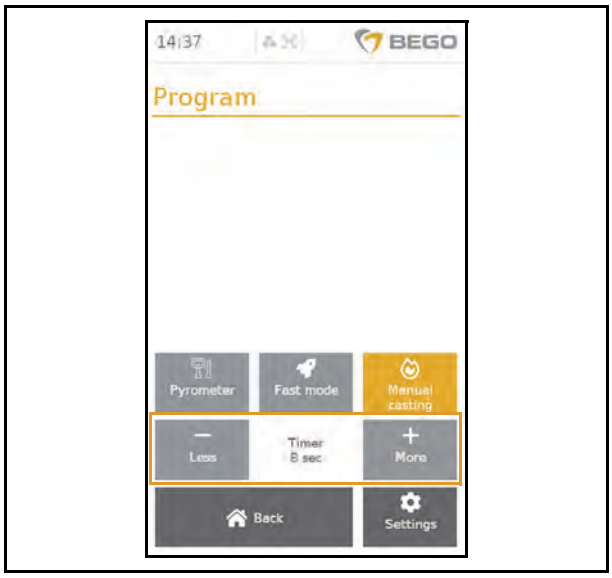


Pyrometer (manual casting mode): The manual casting mode can be supported by selecting the pyrometer.

The temperature will be displayed in the main menu during the casting process. When the pyrometer is not used, the menu for setting the additional heating time will be displayed instead.



Manual casting without pyrometer: With the NAUTILUS® CC plus, manual casting without pyrometer is used as an optional "emergency operation", in case the pyrometer is malfunctioning/ not available.



Timer: After activation, the counter will count the entered seconds down. This will indicate the time to cast.

Casting

⚠ WARNING

Risk of injury

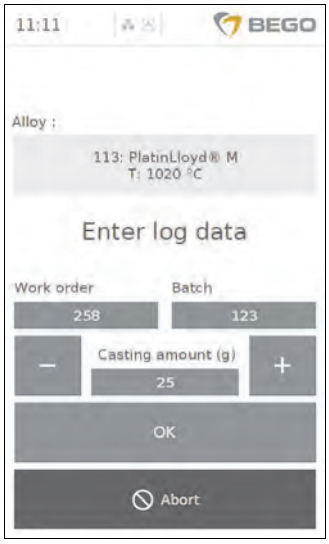
Wear suitable protective equipment when operating the device!

⚠ WARNING

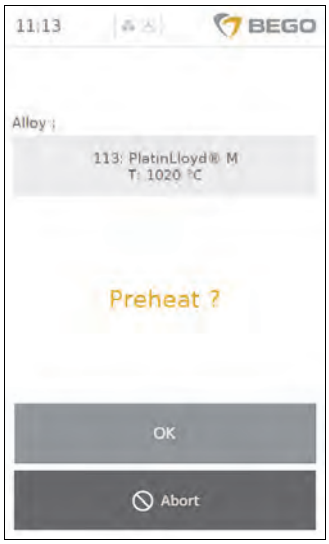
Only touch the touchscreen with the fingertips! Do not use pens or fingernails!

Any liquid that leaks as a result of damage is toxic and corrosive! Avoid contact with skin, swallowing or inhaling in!

Automatic casting

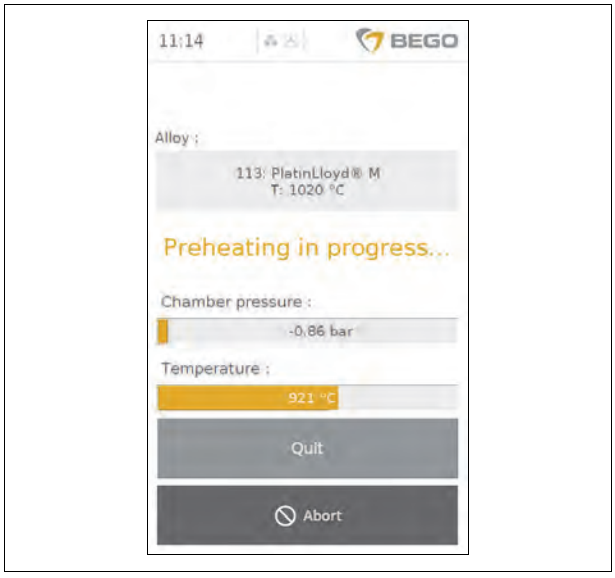


1. Select the alloy (see page 41).
2. Go to Settings > Program > Automatic casting.
3. Optional: Enter log data (see "Setting up the protocol" on page 40). This data appears in the casting protocol that is stored on the connected USB flash drive.
   - Enter work number, batch and casting quantity and confirm the entry with "OK" or
   - Skip the data entry with "Abort".
4. Insert the alloy.
5. Close the crucible door.



6. Confirm the preheating process with "OK".

   For some alloys, the preheating process may be skipped with a second button.



The chamber is evacuated during preheating.

The preheating may last for up to 60 seconds.

NAUTILUS® alerts the operator with an acoustic signal and a message on the display that the preheating process has ended.

7. Have the mould readily available before pressing the "OK" button to prevent the alloy from cooling down unnecessarily. Preheating temperature and vacuum are maintained until then.

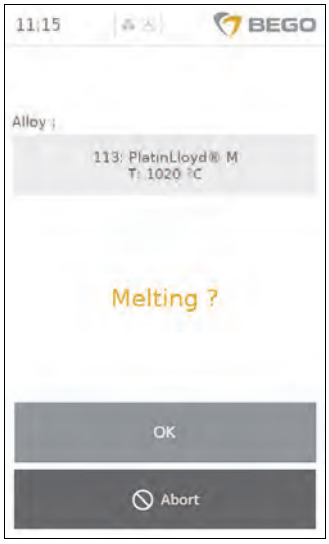
⚠ WARNING

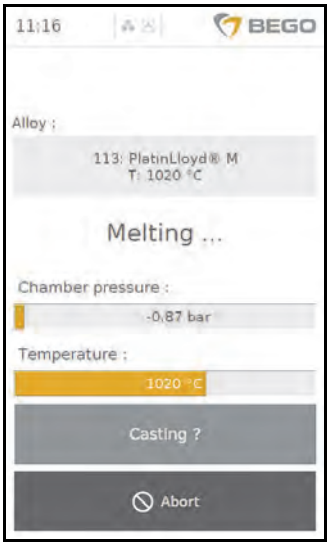
Risk of burns!

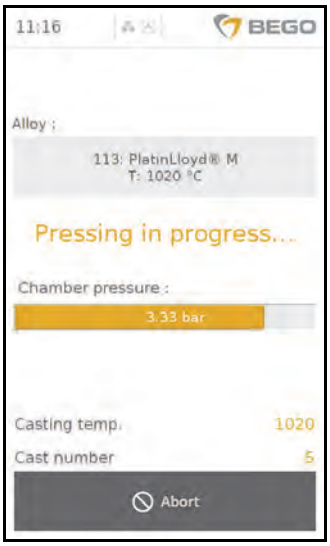
Use mould tongs!

8. Close the mould door.

   The next display is shown when the mould door is closed.







⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

9. Confirm the melting process by pressing the "OK" button or skip it by pressing the "Abort" button.

   The actual temperature as well as the casting temperature are automatically displayed as soon as the casting temperature has been reached. With crucible inserts, the display will not appear until the "Holding time" has elapsed to ensure that the melt is thoroughly heated.

   The subsequent process is carried out automatically; however, manual interventions are possible (see next step).

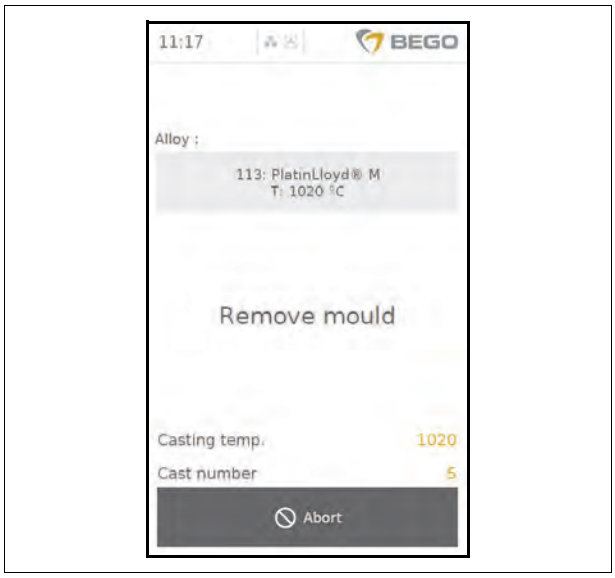
   The casting process will be triggered automatically once the proper casting temperature has been reached. Manual interventions are possible, as needed:

10. The casting process can be triggered manually by pressing the "Casting" button any time after the alloy has been melted.

⚠ CAUTION

The casting process may fail when triggered manually!

The casting is carried out with overpressure. Alloy, chamber pressure, casting temperature and casting number will be displayed during that process.



⚠ WARNING

Risk of burns!

Use mould tongs!

11. Remove the mould.
12. Close the mould door. The casting process is completed.

Manual casting with pyrometer

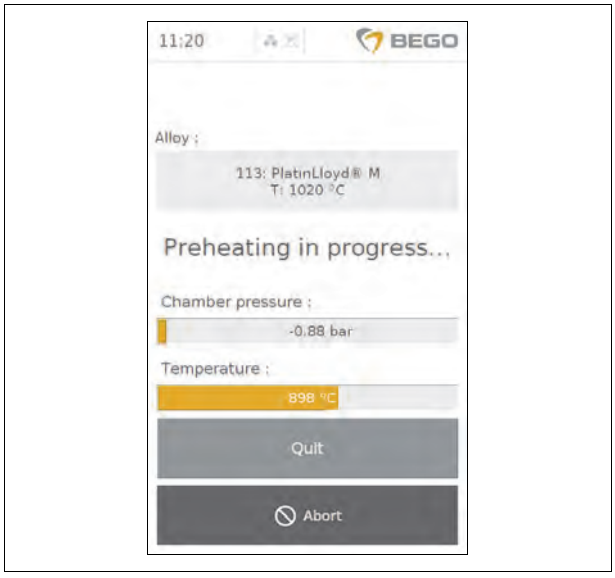
Manual casting (with pyrometer) is usually only needed to check and correct preheating and casting temperatures. This is, for instance, required when setting up new programs for non-BEGO alloys (see page 30).

1. Select the alloy (see page 41).
2. Go to "Settings" > "Program" > ""Pyrometer".
3. Optional: Enter log data (see "Setting up the protocol" on page 40). This data appears in the casting protocol that is stored on the connected USB flash drive.
   - Enter work number, batch and casting quantity and confirm the entry with "OK" or
   - Skip the data entry with "Abort".
4. Insert the alloy.
5. Close the crucible door.

6. Confirm the preheating process with "OK".

   For some alloys, the preheating process may be skipped with a second button.

   In fast mode, the preheating process starts upon closing the crucible door.



The chamber is evacuated during preheating.

The preheating may last for up to 60 seconds.

NAUTILUS® alerts the operator with an acoustic signal and a message on the display that the preheating process has ended.

7. Have the mould readily available before pressing the "OK" button to prevent the alloy from cooling down unnecessarily. Preheating temperature and vacuum are maintained until then.

⚠ WARNING

Risk of burns!

Use mould tongs!

8. Close the mould door.

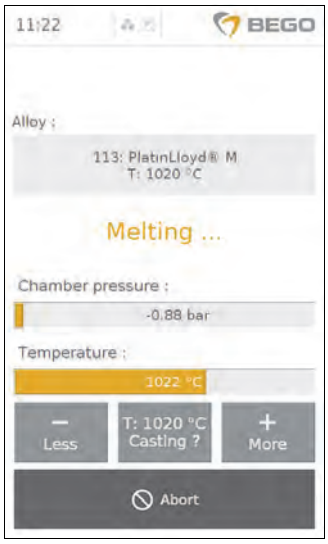
   The next display is shown when the mould door is closed.

⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

9. Confirm the melting process by pressing the "OK" button or exit the program by pressing the "Abort" button.

   In fast mode, the preheating process starts upon closing the mould door.



NOTICE

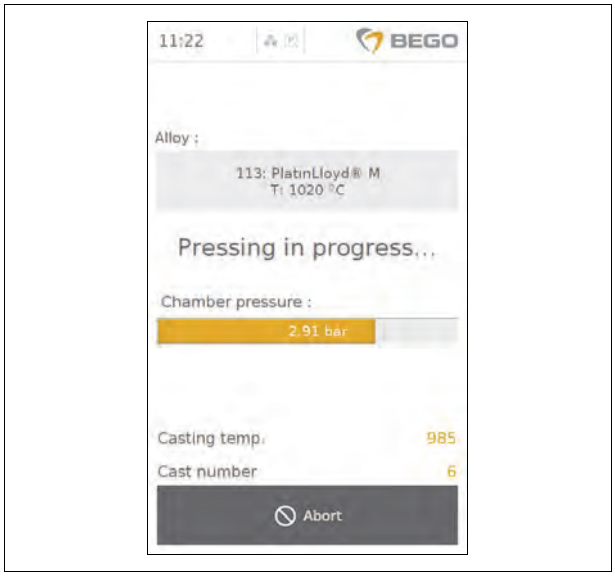
The melt is moved by the magnetic field, not by heat. The moving melt is therefore not a boiling melt. The automatic starting and stopping of the generator ("clocking") does not cause the casting temperature to be exceeded.

10. Apply the program-specific casting temperature.
11. Alternatively, the casting temperature may be adjusted individually. Adjust the casting temperature by pressing the "+" and/or "-" buttons once the actual and the casting temperature are above 700°C.
    - If the ideal casting temperature is higher than the temperature that is being displayed, it must be increased. The temperature is increased by 10°C every time the "+" button is pressed.
    - If the ideal casting temperature is lower than the one that is being displayed, it needs to be reduced by pressing the "-" button. With unknown alloys, the process is started at a lower temperature
12. When the melt appears to be ready for casting, press the "Casting" button to trigger the process. Observe the following notes.

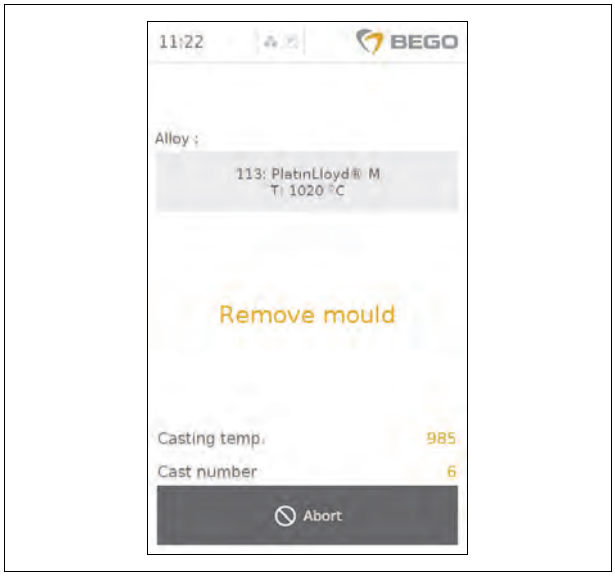
EMF (non-precious) alloys without crucible inserts: Trigger the casting process when the casting temperature is reached and the alloys melt appears ready for casting after visual evaluation.

Pd-based alloys without crucible insert : When the casting temperature is reached, wait for 10 seconds before triggering the casting process.

Precious-metal alloys with crucible insert:
When the casting temperature is reached, it must be maintained for several seconds before the casting process is triggered (see table on page 35). This holding time is absolutely necessary to optimize the flow behaviour of the alloy! Trigger the casting process when the holding time has elapsed and the actual temperature has reached the casting temperature.



The casting process is carried out with overpressure. Alloy, chamber pressure, casting temperature and casting number will be displayed during that process.



⚠ WARNING

Risk of burns!

Use mould tongs!

13. Remove the mould.
14. Close the mould door. The casting process is completed.

Manual casting without pyrometer

⚠ CAUTION

The temperature cannot be measured and thus not be limited without the pyrometer!

Stay with the device and finish the preheating and melting as described manually!

With the NAUTILUS® CC plus, manual casting without pyrometer is used as an optional "emergency operation", in case the pyrometer is malfunctioning/not available.

1. Select the alloy (see page 41).
2. Go to "Settings" > "Program".
3. Deactivate all settings.
4. Optional: Enter log data (see "Setting up the protocol" on page 40). This data appears in the casting protocol that is stored on the connected USB flash drive.
   - Enter work number, batch and casting quantity and confirm the entry with "OK" or
   - Skip the data entry with "Abort".
5. Insert the alloy.
6. Close the crucible door.

7. Confirm the preheating process with "OK".

   For some alloys, the preheating process may be skipped with a second button.

   In fast mode, the preheating process starts upon closing the crucible door.

The chamber is evacuated during preheating. The preheating may last for up to 60 seconds.

⚠ CAUTION

The temperature cannot be measured and thus not be limited without the pyrometer!

Stay with the device and finish the preheating and melting as described manually!

8. Have the mould readily available before pressing the "OK" button to prevent the alloy from cooling down unnecessarily. Preheating temperature and vacuum are maintained until then.

⚠ WARNING

Risk of burns!

Use mould tongs!

9. Close the mould door.

   The next display is shown when the mould door is closed.

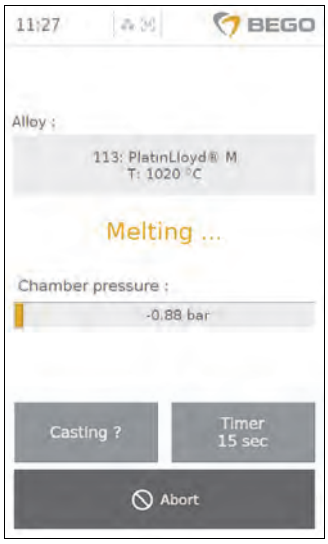
⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

10. Confirm the melting process with "OK".

    In fast mode, the next step will be triggered immediately upon closing the mould door.

    The process can be aborted by pressing the "Abort" button.

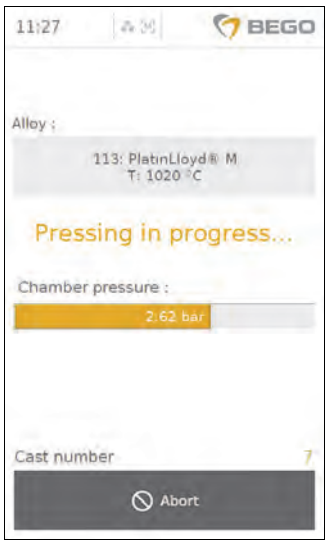


11. The additional heating time for melting (see the table on page 35) will be shown on the screen.
12. The timer for the additional heating time can be customized for a specific program (see page 47). The timer counts down the entered seconds and thus determines the time to cast.

⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

13. Once the timer has run down and the alloys melt visually appears to be ready for casting, press the "Casting" button to trigger the casting process.

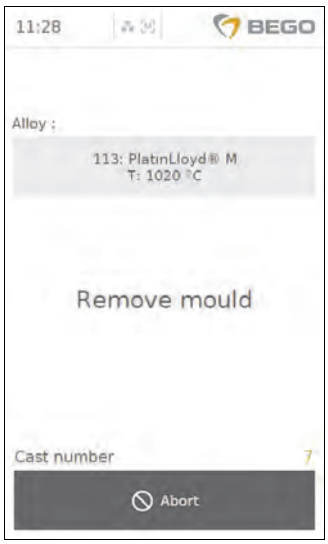


⚠ CAUTION

The temperature cannot be measured and thus not be limited without the pyrometer!

Stay with the device and finish the preheating and melting as described manually!

The casting is carried out with overpressure. Alloy, chamber pressure, and casting number will be displayed during that process.



⚠ WARNING

Risk of burns!

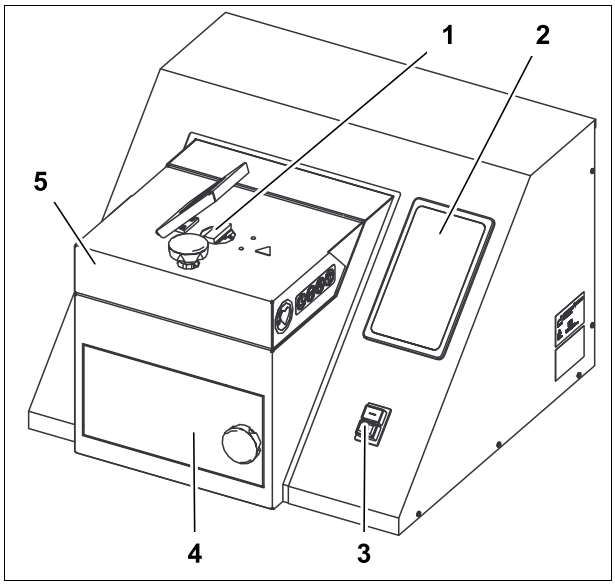
Use mould tongs!

14. Remove the mould.
15. Close the mould door. The casting process is completed.

Nautilus® T

en English

Device description



NAUTILUS® T does not come with a pyrometer and thus no temperature measurement. The casting process must be carried out manually while observing the melt. Casting and diagnostic protocols without a specification of the casting temperature are not conclusive and, thus, not possible. However, the device can be updated with the aid of a USB flash drive (not included in scope of delivery).

1 Camera
2 Touchscreen
3 Main switch
4 Mould door
5 Crucible door

Overview

After the device has been switched on, the following functions can be called up via the touchscreen:

Casting

"Casting" can be started once the alloy has been selected.

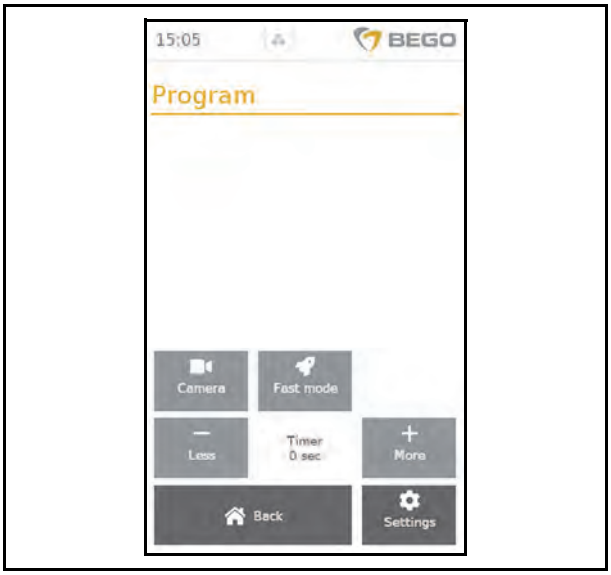
Settings

This is where, for instance, new program locations for non-BEGO alloys are set up.

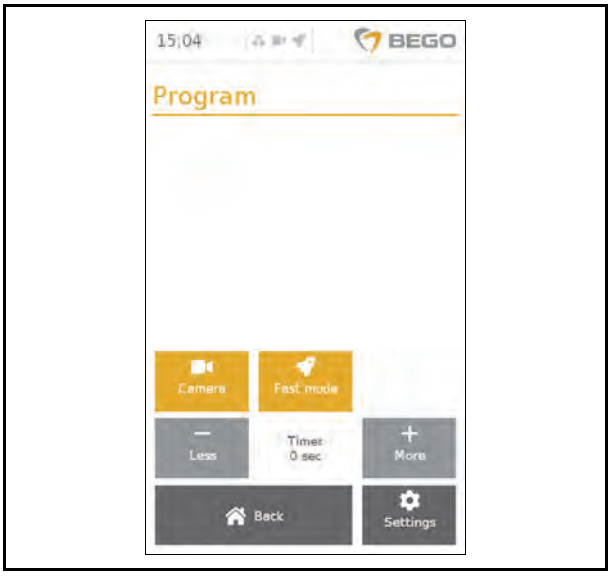
86105 BA-en/00

Casting process settings

Program



Specific settings related to the casting process with the NAUTILUS® T can be chosen from the "Program" menu.

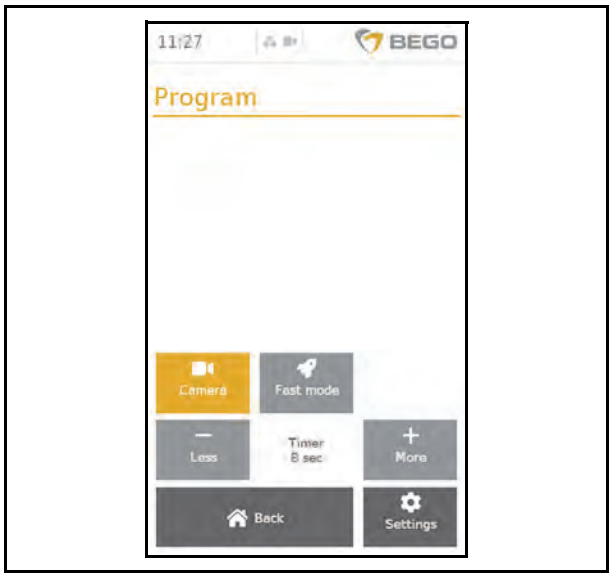


Fast mode: In fast mode, the casting process between the steps "Insert alloy" and "Preheat" as well as the steps between "Insert mould" and "Melt" are not started through operator input on the screen but are instead detected and subsequently triggered upon locking the doors/hinged panels.

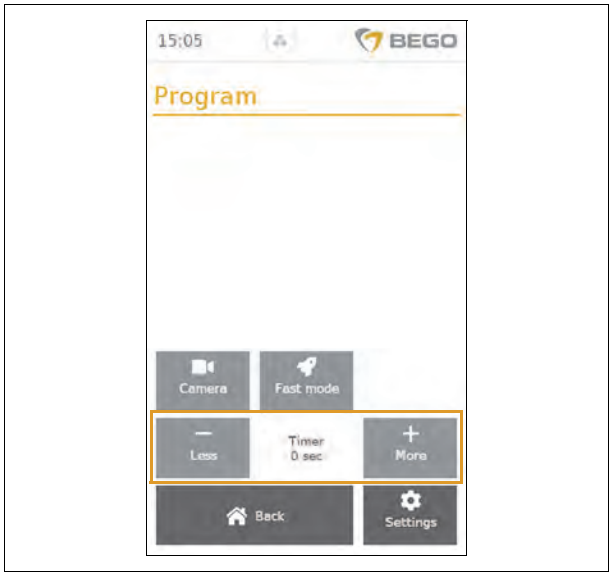
The mode is activated (orange) and/or deactivated (grey) by pressing the "Fast mode" button. A symbol in the header of the screen indicates that the mode is activated (see page 3)

⚠ CAUTION

Stay with the device and finish the preheating and melting processes manually as described in paragraph "Casting"!



Camera: The NAUTILUS® T comes with a camera to monitor the pressing, preheating and melting processes. Pressing the "camera" button will either activate process monitoring (yellow) or deactivate it (gray).



Timer: Once activated, the timer will count down the entered seconds and thus determines the time to cast.

Casting

⚠ WARNING

Risk of injury

Wear suitable protective equipment when operating the device!

⚠ WARNING

Only touch the touchscreen with the fingertips! Do not use pens or fingernails!

Any liquid that leaks as a result of damage is toxic and corrosive! Avoid contact with skin, swallowing or inhaling it!

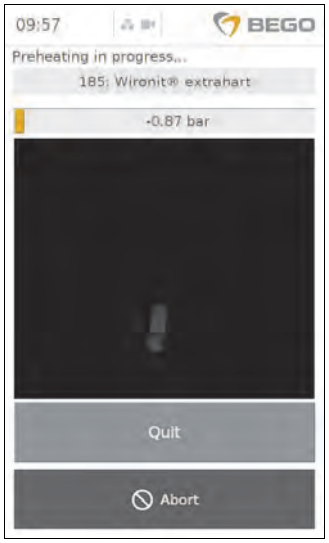
⚠ CAUTION

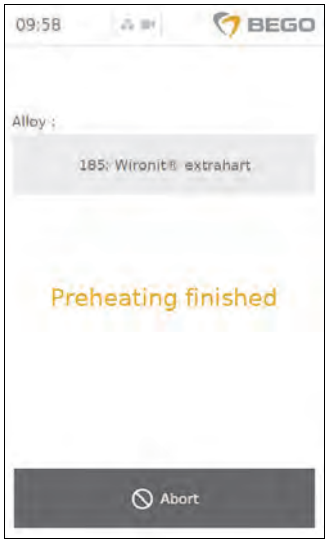
The device cannot measure the temperature and thus not limit the temperature!

Stay with the device and finish the preheating and melting as described manually!

Casting with camera

1. Go to "Settings" > "Program" > "Camera".
   A symbol in the header of the screen indicates that the mode is activated (see page 3)
2. Optional: Enter log data (see "Setting up the protocol" on page 40). This data appears in the casting protocol that is stored on the connected USB flash drive.
   - Enter work number, batch and casting quantity and confirm the entry with "OK" or
   - Skip the data entry with "Abort".
3. Insert the alloy.
4. Close the crucible door.





5. Confirm the preheating process with "OK".

   For some alloys, the preheating process may be skipped with a second button.

NOTICE

Please note:

- Preheat precious-metal and Pd alloys with / without crucible insert until the first alloying components deform, but do not melt.
- Preheat CoCr and NiCr alloys until the alloying components glow bright red; the alloying components are still solid.

Important: Do not preheat for too long as the alloy will melt otherwise. The moment the last solid alloying component is sinking into the melt is important for starting the timer!

The chamber is evacuated during preheating.

The preheating may last for up to 60 seconds.

The NAUTILUS® T shows a video of the process on the screen.

NOTICE

If no video image is shown on the screen, the message "Temperature too low" will appear. As soon as the camera detects an image, it will be transmitted to the screen.

NAUTILUS® T will display a "Preheating process completed" window to indicate the end of the preheating process.

6. Insert the mould as quickly as possible after the preheating process has been completed.

⚠ WARNING

Risk of burns!

Use mould tongs!

7. Close the mould door.

   The next display is shown when the mould door is closed.

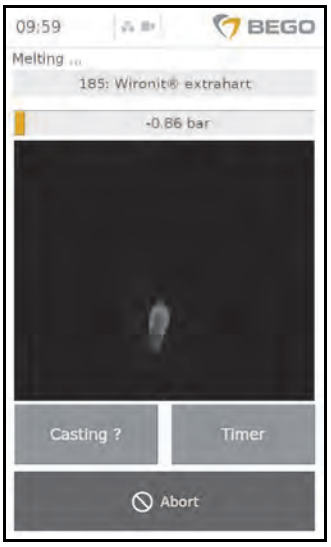
⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

8. Confirm the melting process by pressing the "OK" button or skip it by pressing the "Abort" button.

NOTICE

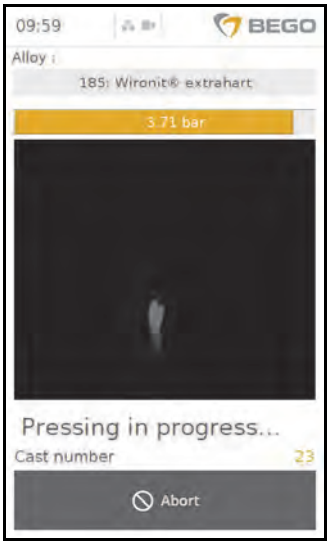
If no video image is shown on the screen, the message "Temperature too low" will appear. As soon as the camera detects an image, it will be transmitted to the screen!



The NAUTILUS® T shows a video of the process on the screen.

9. Enter the additional heating time for melting (see the table on page 35) using the "+" and "-" buttons.

   The timer counts down the entered seconds and thus determines the time to cast.



⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

10. Once the timer has run down and the alloys melt visually appears to be ready for casting, press the "Casting" button to trigger the casting process.

    The casting is carried out with overpressure. Alloy, chamber pressure, and casting number will be displayed during that process.

NOTICE

Important: The movement of the melt is caused by the magnetic field, not by the heat. The moving melt is, therefore, not a boiling melt!

⚠ WARNING

Risk of burns!

Use mould tongs!

11. Remove the mould.
12. Close the mould door. The casting process is completed.

Casting without camera

With the NAUTILUS® T, casting without camera serves as an "emergency operation" in case the camera is malfunctioning/not available.

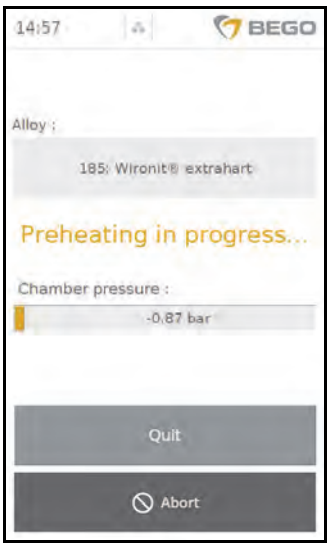
1. Go to "Settings" > "Program".
2. Deactivate the camera.
3. Optional: Enter log data (see "Setting up the protocol" on page 40). This data appears in the casting protocol that is stored on the connected USB flash drive.
   - Enter work number, batch and casting quantity and confirm the entry with "OK" or
   - Skip the data entry with "Abort".
4. Insert the alloy.
5. Close the crucible door.
6. Confirm the preheating process with "OK".
   For some alloys, the preheating process may be skipped with a second button.

NOTICE

Please note:

- Preheat precious-metal and Pd alloys with / without crucible insert until the first alloying components deform, but do not melt.
- Preheat CoCr and NiCr alloys until the alloying components glow bright red; the alloying components are still solid.

Important: Do not preheat for too long as the alloy will melt otherwise. The moment the last solid alloying component is sinking into the melt is important for starting the timer!



The chamber is evacuated during preheating. The preheating may last for up to 60 seconds.

NAUTILUS® T displays the end of the preheating process on the screen.

7. Stay with the device and complete the preheating process by pressing the "Complete" button.

8. Insert the mould as quickly as possible after the preheating process has been completed.

⚠ WARNING

Risk of burns!

Use mould tongs!

9. Close the mould door.

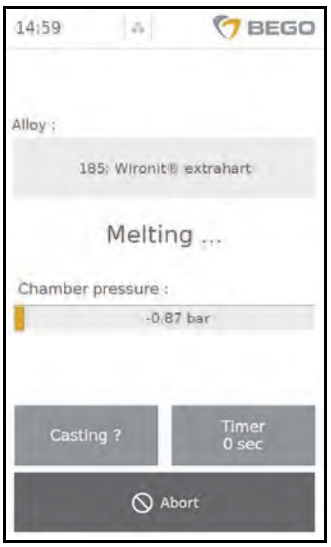
   The next display is shown when the mould door is closed.

⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

10. Confirm the melting process with "OK".

    The process can be aborted by pressing the "Abort" button.



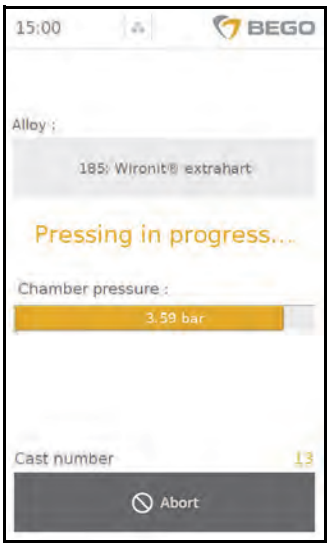
11. Enter the additional heating time for melting (see the table on page 35) using the "+" and "-" buttons.

    The timer counts down the entered seconds and thus determines the time to cast.

⚠ WARNING

Never look into the melt without protective glass and protective eyewear!

12. Once the timer has run down and the alloys melt visually appears to be ready for casting, press the "Casting" button to trigger the casting process.



The casting is carried out with overpressure. Alloy, chamber pressure, and casting number will be displayed during that process.

NOTICE

Important: The movement of the melt is caused by the magnetic field, not by the heat. The moving melt is, therefore, not a boiling melt!

⚠ WARNING

Risk of burns!

Use mould tongs!

13. Remove the mould.
14. Close the mould door. The casting process is completed.

Service and Maintenance

Service

⚠ DANGER

Warning of electric shock! Danger to life!

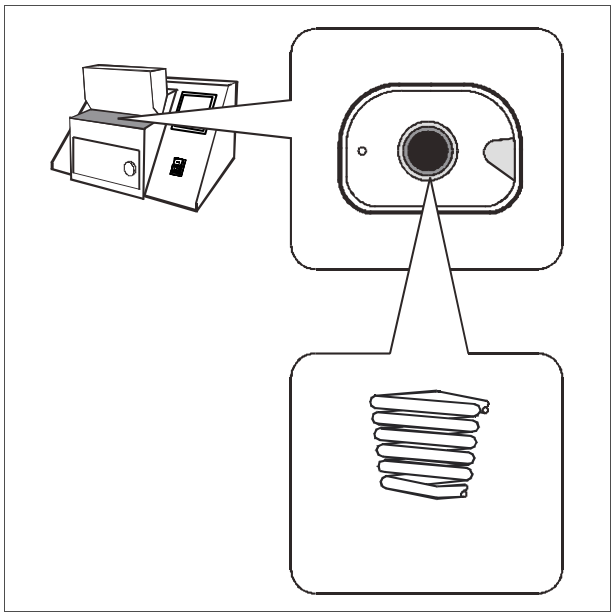
Switch the device off and disconnect it from the power supply before carrying out any service or maintenance work!

(for power connection without mains plug: remove fuses, secure the devices against restart and make sure that it is not live)

⚠ WARNING

Burn hazard from hot parts!

Carry out maintenance and cleaning work before casting or after the device has cooled down.



If necessary, clean the device on the outside with a dry or slightly damp cloth.

Check the casting chamber daily for contamination (casting pearls) and if necessary clean with cloth or vacuum cleaner.

Do not use abrasive cleaning agents as they may damage the coating of the induction coil (see illustration). The coating reliably prevents short-circuits in case of any contamination between the coil windings (casting pearls).

The coating can wear off through regular use. This is unavoidable and does not constitute any reason for complaints. The operation of the device is guaranteed regardless of the condition of the coating.

Maintenance

⚠ DANGER

Warning of electric shock! Danger to life!

Switch the device off and disconnect it from the power supply before carrying out any service or maintenance work!

(for power connection without mains plug: remove fuses, secure the devices against restart and make sure that it is not live)

⚠ WARNING

Burn hazard from hot parts!

Carry out maintenance and cleaning work before casting or after the device has cooled down.

Any opening of the housing that is not described in these operating instructions must only be carried out by Customer Service staff or persons designated by Customer Service!

Metallic housings must be properly grounded to prevent them from carrying electric current. If not properly grounded, the housing may become live in case of a damage inside of the device and thus may pose a danger to life.

Only trained and qualified electricians must be allowed to open the device as the device must be checked for the absence of voltage at exposed, conductive parts* after it has been opened.

* Germany: Testing in accordance with DIN VDE 0701-1.

Maintenance of safety-relevant components

The device has been designed for a service life of 10 years from the date of manufacture. No liability is accepted for damages arising from operation of the device after this period.

Safety-relevant components must be checked regularly and replaced as required. This work must be carried out solely by BEGO customer service personnel or by representatives that have been authorized by the BEGO customer service department. For that purpose, regular maintenance, including annual inspections and an inspection after five years, carried out by personnel authorized by BEGO is recommended.

Regular maintenance

Regular maintenance is required to ensure proper and faultless operation.

See see page 36 to display the total number of casts.

Every 100 casts:

- Clean the crucible and mould chamber (vacuum clean)
- Clean the sight glass (see page 73),
- Clean the seals (see page 74).

Every 500 casts:

- Drain the pressure reducer (see page 75).

Every 3.000 casts:

- Clean the ejector (see page 76),
- Replace the air filter (see page 77).

Every 8.000 casts (or annually):

- Inspection of safety-relevant components by BEGO Customer Service

After 10.000 casts (or after 5 years):

- Replacement of safety-relevant components by BEGO Customer Service

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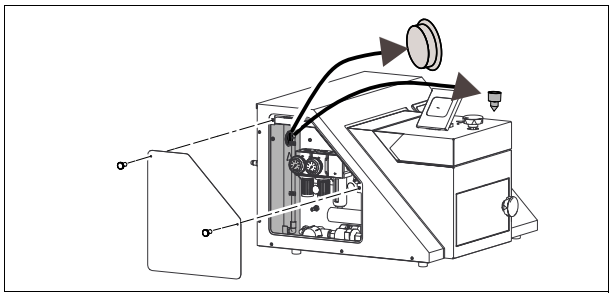
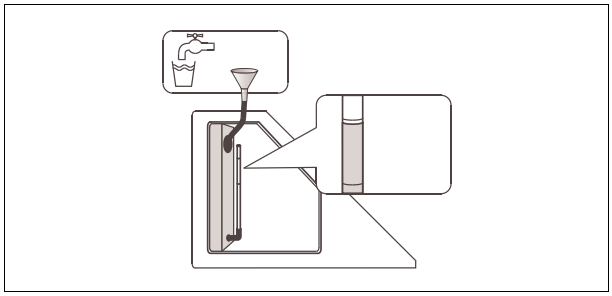
Adding cooling water

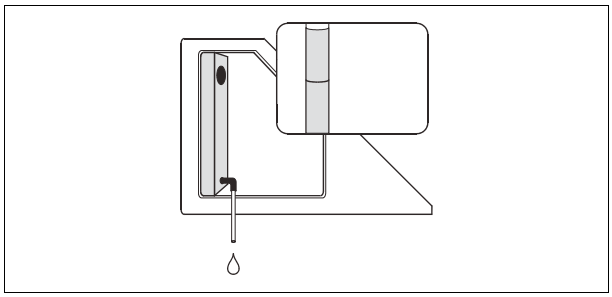


The internal device cooling facilitates more than 50 quick successive castings. If the E 020 message is issued, switch off the device and let it cool.

1. Remove the cover on the left side (loosen the slotted screws).
2. A shown in the illustration, remove both stoppers and take out the funnel.



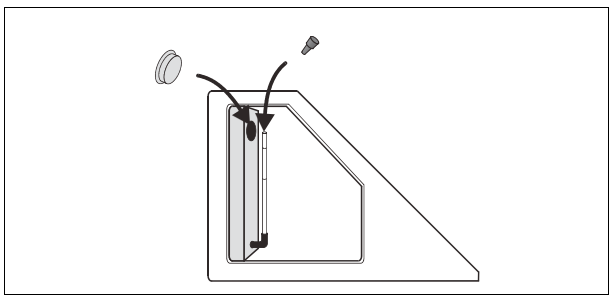
3. Add approx. 1.5 liters of potable water up to the "max" marking.



4. Drain excess water as shown!

⚠ WARNING

Risk of burns!
The water can reach temperatures up to 70° C if the device was used for casting beforehand!



5. Replace both stoppers.
6. Switch the device on and press the "Automatic casting" button. Run the device for 2 minutes to allow for the cooling water to circulate.
7. Switch the device off.
8. Remove both stopper again and check the cooling water level. Top off with potable water until it reaches the "max" marking, if necessary.
9. Finally, replace both stoppers and stow the funnel.

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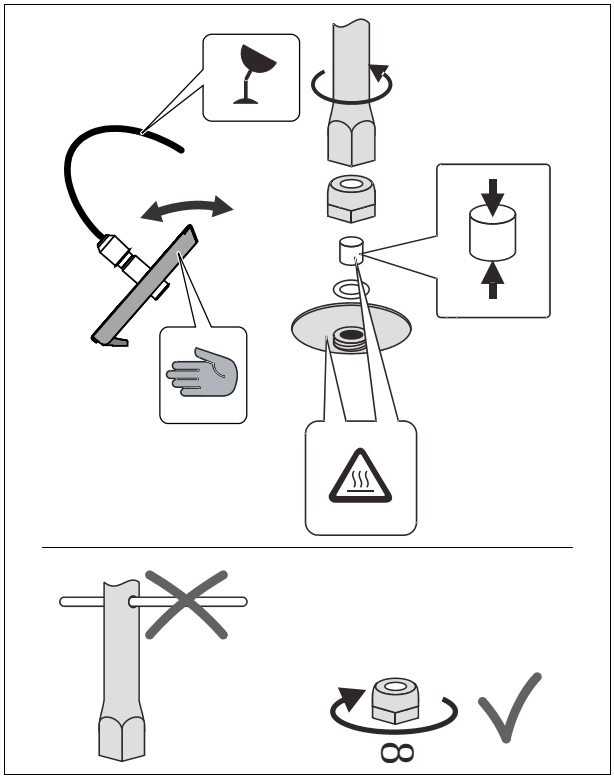
Cleaning the sight glass

⚠ DANGER

Warning of electric shock! Danger to life!

Switch off the device and pull out the mains plug. (For power connection without mains plug: remove fuses, secure the devices against restart and make sure that it is not live)



⚠ WARNING

Burn hazard from hot parts!

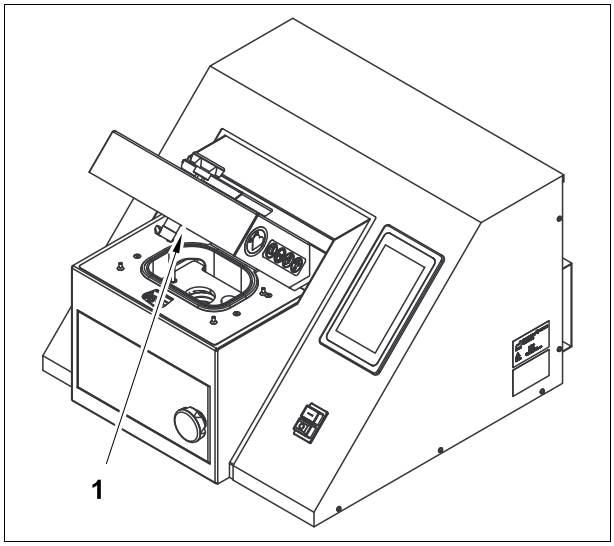
Clean the sight glass only after it has cooled down; use a cotton cloth (never use cloths made of synthetic fibres!).

NAUTILUS® CC plus: Clean the internal and external protective glass, the internal and external heat protection glass as well as the sight glass system regularly, but no later than when the the message E 041 ("clean glass") appears on the display.

1. Hold the hinged panel on the front on the recessed grip and move it upward. The fiber optic cable is very sensitive and must not be used to pull the on the hinged panel nor must it be bend.
2. Loosen the nut with the socket wrench (included in the scope of delivery) and remove the sight glass.
3. Clean the front with a dry cotton cloth (see illustration). Check that it is clean against the light.

⚠ CAUTION

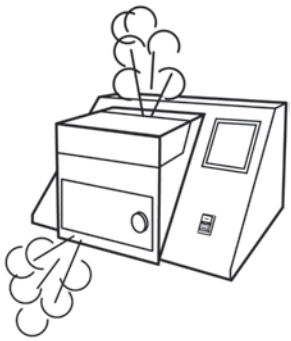
During assembly turn the socket wrench by hand only and do not use any other tools! The nut may still turn when in lock position.



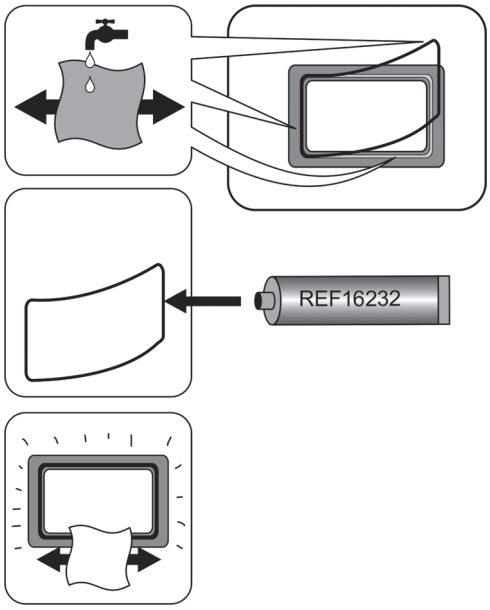
NAUTILUS® T: Clean the internal and external protective glass and the internal heat protection glass regularly.

Dirt on the sight glasses (1) may impair the quality of the camera image. Clean the sight glass from the side with a dry or slightly damp cloth, if necessary.

Ejecting and cleaning the seals



(1)



Dirty O-rings on the openings to the casting chamber (e.g. residual investment material) may lead to leaks that would create some noise. Moreover, the vacuum and pressure values may change, which could lead to faulty casting results. O-rings can be ejected with compressed air.

⚠ WARNING

Burn hazard from hot parts!
Carry out maintenance and cleaning work before casting or after the device has cooled down.

1. Open the mould flap.
2. Go to Settings > O-rings > Eject O-rings (1).
   The O-ring will be released with compressed air.
3. Remove the O-ring.
4. Clean the O-ring, grooves and sealing surfaces with a cloth and isopropyl alcohol.
5. **Slightly** grease the O-rings with seal grease (REF 16232).

⚠ CAUTION

The grease is difficult to remove from skin and clothing.
Wear the protective clothing and gloves prescribed for use in dental laboratories!

6. Remove surplus grease with a dry cloth!
7. Insert the seal again

NOTICE

- Do not overstretch the seal when cleaning and inserting!
- Do not interchange the seals, they have different sizes! A seal with a poor fit leads to leakage.

8. Repeat the process with the crucible flap.
9. Check the seals, see page 75.

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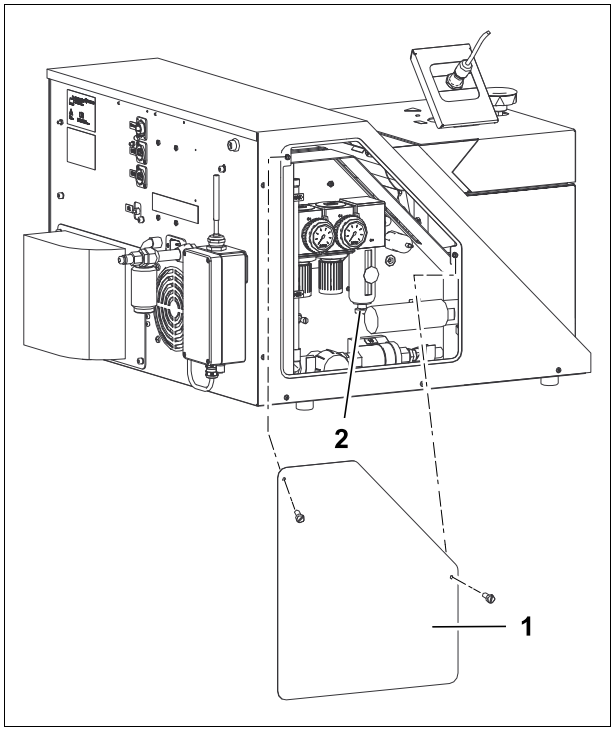
Checking the seals

You can check the tightness of the seal after the O-rings have been cleaned.

During the test the chambers are filled with compressed air. If no air escapes (generation of noise!), the O-rings function properly.

1. Go to Settings > O-rings > Check O-rings, see page 74.
2. If air escapes, the O-ring need to be cleaned.

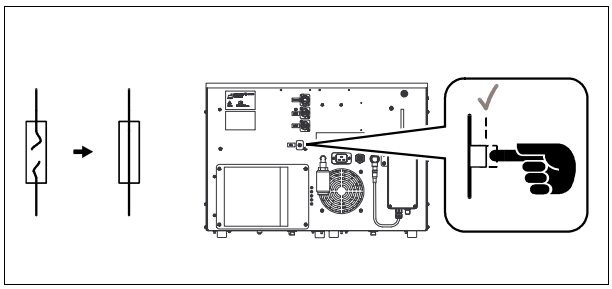
Draining the pressure reducers



The pressure reducer must be drained every 500 castings.

1. Switch the device off and pull out the mains plug.
2. Remove the cover (1) on the left side (loosen the slotted screws).
3. Have a container or a cloth at hand to collect the water.
4. Turn the bottom screw (2) counterclockwise until it stops to drain the water.

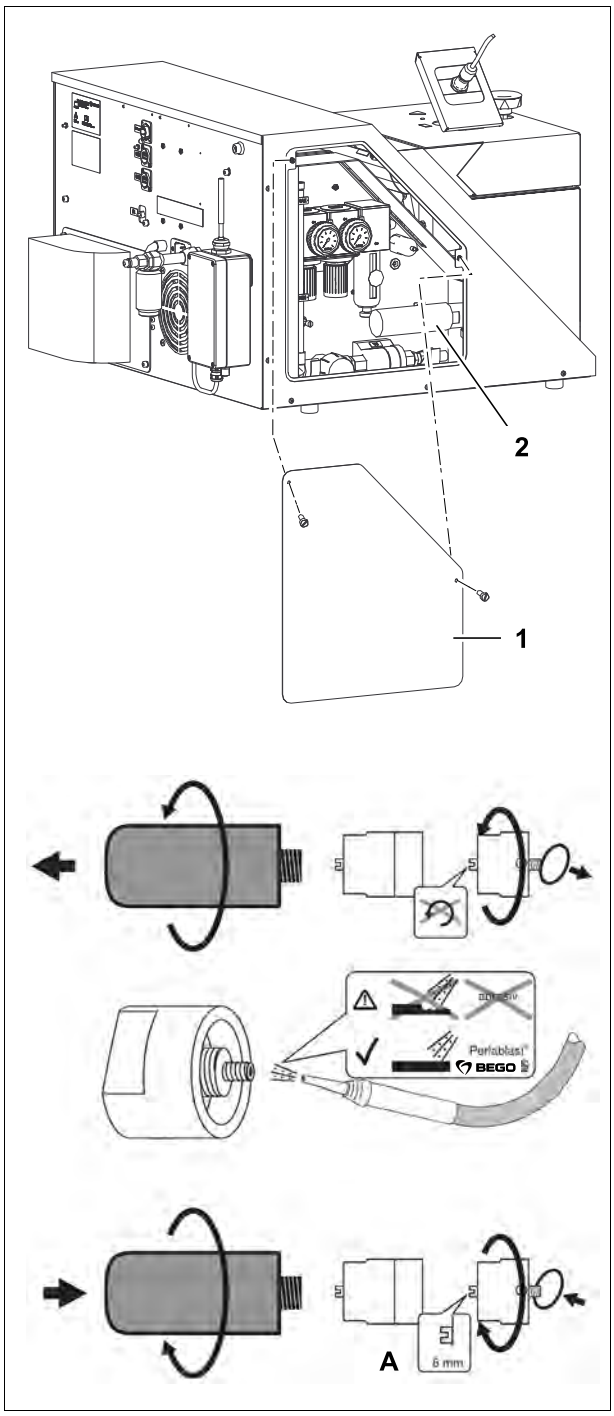
Reactivating fuses



Circuit-breakers against overcurrent are located on the rear side of the device (see circuit diagram).

1. Wait for approx. 1 minute after the device has been switched off.
2. Reactivate fuses that have been tripped by pushing them back in place.
3. If fuses are triggered repeatedly, notify Customer Service.

Cleaning the ejector



If error message "W 013" id displayed on the screen, the so-called ejector must be cleaned.

1. Switch the device off and pull out the mains plug.
2. Remove the cover (1) on the left side (loosen the slotted screws).
3. Unscrew and remove the sound absorber (2) and ejector.

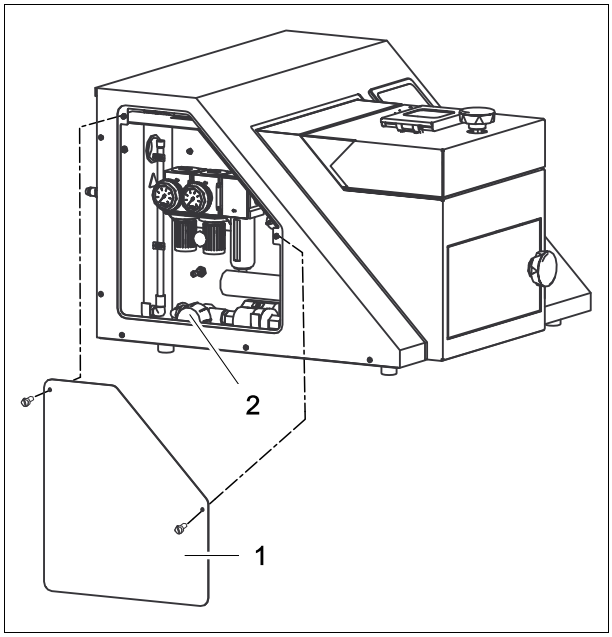
4. Clean the ejector by blasting it.

⚠ CAUTION

Only use polish blasting agents that do not remove material.
(recommended: BEGO Perlablast).

5. The nozzle in the ejector must not be moved. It must protrude 8 mm (see A).

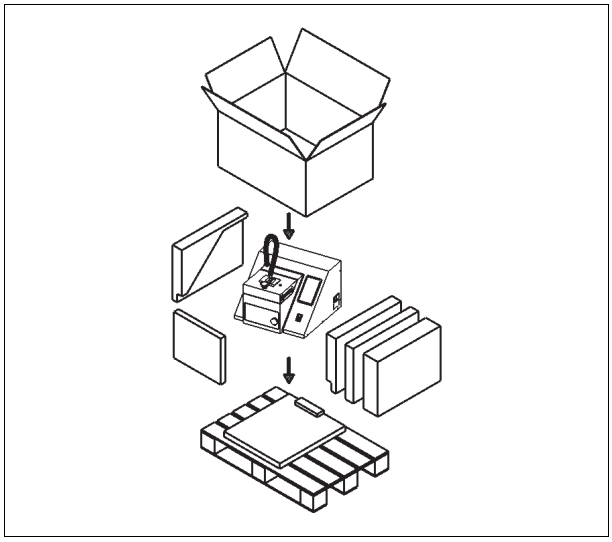
Changing the air filter



You know that the air filter is soiled when the pressure values during the preheating and melting processes are no longer reached.

1. Switch the device off and pull out the mains plug.
2. Remove the cover (1) on the left side (loosen the slotted screws).
3. Open the acrylic glass screw connection (2) by turning it and clean the air filter seat.
4. Replace the dirty air filter.
5. Install acrylic glass screw connection and tighten it.

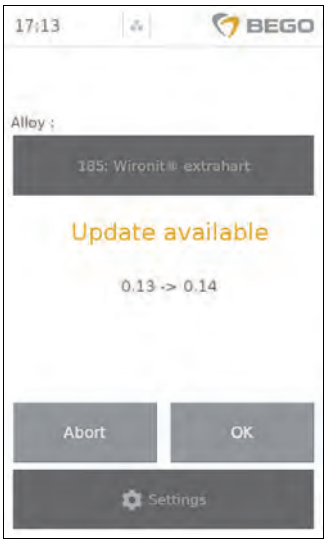
Request transport packaging



1. For safe transport in case the device needs to be shipped for service purposes, the proper transport packaging (REF 17909) should be requested from BEGO.

   +49 421 2028-274
2. For proper packaging of the device see page 7.

Updating the software/firmware



Automatic firmware update: The NAUTILUS®-devices automatically update the device software to the latest firmware version via my.BEGO.com. Upon every restart of the device, the system checks if new firmware versions are available and can be installed.

Do not switch the device off while an update is being installed!

The device will restart after an update has been installed.

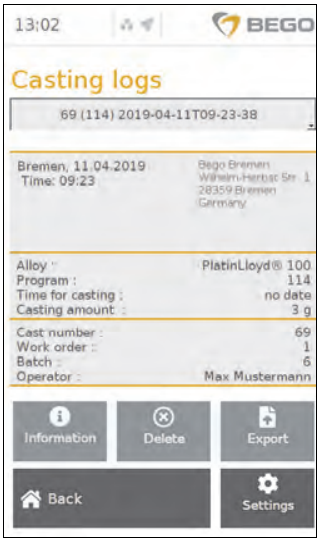
Firmware update from USB flash drive: The currently installed software version can be seen in "Settings" > "Information" (see page 36).

1. Download the latest software version to a USB flash drive from my.BEGO.com.
2. Insert the USB flash drive into the device.
3. Start the update.

   Do not switch the device off while an update is being installed!

   The device will restart after an update has been installed.

Exporting casting logs via a USB flash drive



The NAUTILUS®-device can generate casting logs. Saving casting logs must be activated in "Settings" (see page 38).

1. Insert the USB flash drive into the rear side of the device.
2. Press the "Export" button to download the log to the USB flash drive.

For diagnostic purposes, the data stored in the device for the last 10 casts can be copied to the connected USB flash drive. After connecting the USB flash drive to the PC, this data can be transmitted to the BEGO Service.

NOTICE

Any casting logs that have been previously stored on the USB flash drive will be overwritten during this process. They should be copied to the PC beforehand, if needed.

Troubleshooting

The NAUTILUS®-devices issue three types of messages.

- **Error messages** indicate significant errors, which will abort the casting process.
- **Warnings** will not abort the casting process; after clearing the message (OK button), the process can be continued. Exception: W001 (insufficient cooling water) and W002 (insufficient compressed air).
- **Notes** refer to general service and maintenance tasks. They are displayed before or after casting.

General notes on troubleshooting:

1. Switch the device off (exceptions: see *).
2. Eliminate the malfunction.
3. Switch the device on.
4. Notify Service if messages appear repeatedly. Service must only be carried out by authorized BEGO repair shops!

Malfunction	Cause	Remedy
Main switch is on, display is blank	Device has no power.	Check power supply connection; Check fuses (→ p. 75).
There is a hissing sound during operation.	Sealing surfaces on crucible and/or mould door are soiled/ dirty.	Caution! Components are very hot! Clean seals and sealing surfaces (→ p. 74).
No vacuum and/or compressed air.	Air filter is dirty.	Replace the air filter (→ p. 77).

Error messages

Error message	Cause	Remedy
E001	No water	Add water (→ page 72).
E002	No compressed air	* Ensure compressed air supply ≥ 5 bar (100 l/min) or switch off other compressed air loads. Install compressed air reservoir, as needed (→ page 16). Clean seals (→ page 74).
E003	Lock not activated	* Close doors properly.
E010	Generator malfunction	Switch the device off! Check fuses (→ p. 75). Check induction coil (→ p. 70): Remove any dirt that has collected between the coil windings Notify Customer Service.

Error message	Cause	Remedy
E013	Insufficient amount of water	Switch the device off, risk of pump damage! Add water (→ page 72).
E014	Maximum pressure not reached	Check compressed air supply ≥ 5 bar (100 l/min). Install compressed air reservoir, as needed (→ page 16). Clean seals (→ p. 74).
E020	Overheating	* Allow device and cooling water to cool down while the device is turned on. Check water level.
E021 E022	Generator malfunction	Switch the device off! Check fuses (→ p. 75). Check induction coil (→ p. 70): Remove any dirt that has collected between the coil windings Notify Customer Service.
E030	Melting > 5 minutes	Switch the device off! Notify Customer Service.
E040	Pyrometer malfunction	Switch the device off! Notify Customer Service. Cast without pyrometer, if needed
E041	Sight glass dirty	Clean sight glass (→ p. 73).
E042	Pyrometer malfunction	* Close hinged panel (p. 29). Check fiber optic cable for signs of damage.
E050	Safety circuit malfunctioning.	Notify Customer Service.
E300	Invalid IP address	Check the network connection (page 20).
E301	Invalid gateway	Check the network connection (page 20).
E302	Invalid DNS server address	Check the network connection (page 20).
E303	Invalid net mask	Check the network connection (page 20).
E304	Check the manual network settings	Check the network connection (page 20).
E305	Network name missing	Check the WLAN settings (page 21).
E306	WLAN password missing	Check the WLAN settings (page 21).
E307	Access point not found	Check the WLAN settings (page 21).
E308	Connection could not be established	Check the WLAN settings (page 21).

Warnings

Error message	Cause	Remedy
W 001	Lack of cooling water	Switch the device off, risk of pump damage! Add water (→ page 72).
W 002	No compressed air	Switch on compressed air supply
W 003	Insufficient amount of water	Switch the device off, risk of pump damage! Add water (→ page 72).
W 004	Crucible has not opened completely.	* Check crucible and its handles for correct seating (→ p. 25).

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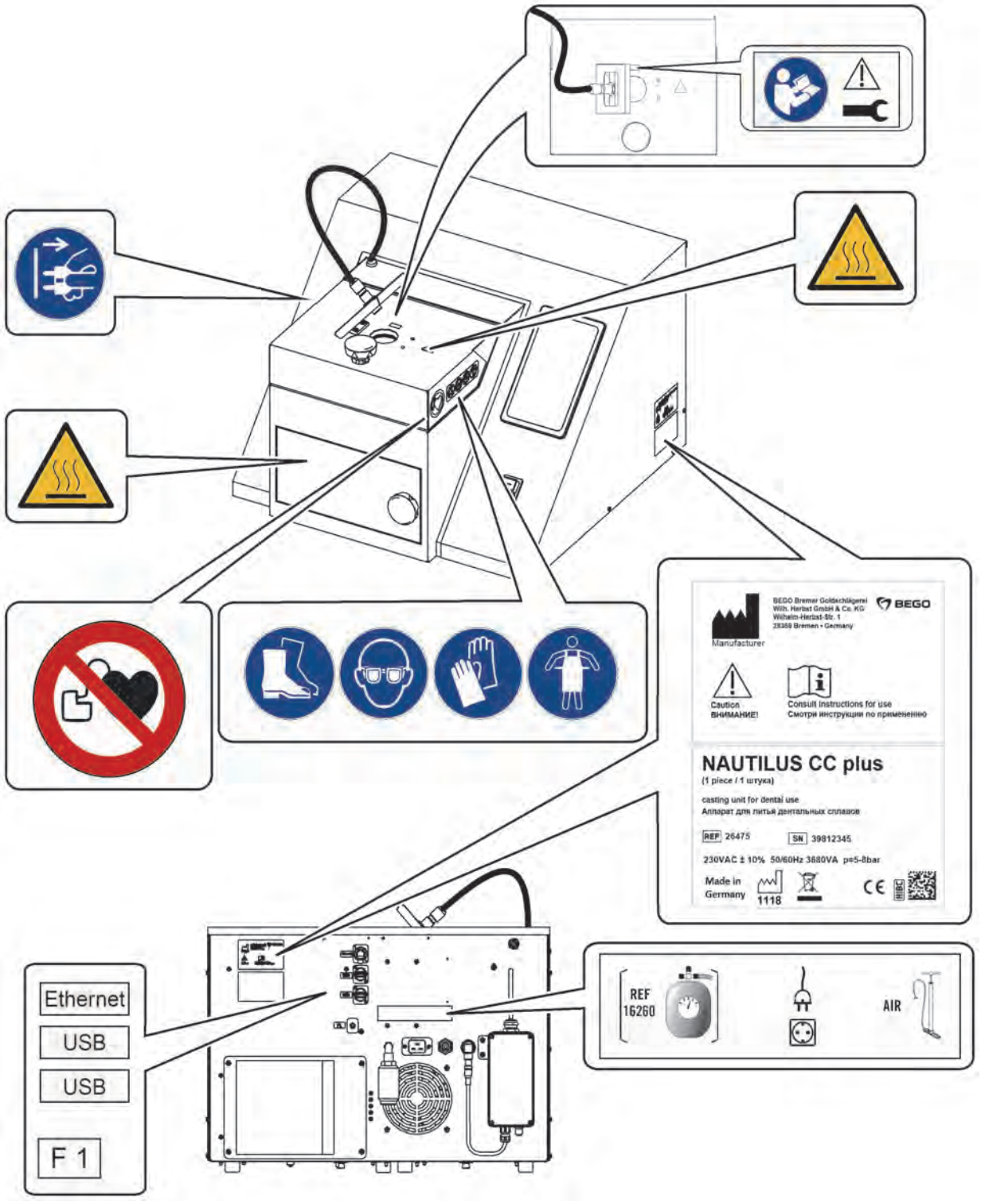
Error message	Cause	Remedy
W 005	Internal battery empty	Notify Customer Service.
W 010	Chamber leak	Clean seals (→ page 74).
W 011	Pressure increase too slow	Check compressed air supply ≥ 5 bar (100 l/min). Install compressed air reservoir, as needed (→ page 16). Clean seals (→ page 74).
W 012	Pressure increase too fast	* Notify Customer Service.
W 013	Maximum vacuum was not reached	Check compressed air supply ≥ 5 bar (100 l/min). Clean the ejector nozzle (→ p. 76). Replace the air filter (→ p. 77).
W 014	Maximum mould pressure was not reached	Check compressed air supply ≥ 5 bar (100 l/min). Install compressed air reservoir, as needed (→ page 16). Clean seals (→ p. 74).
W 015	Critical cooling water temperature	* Allow cooling water to cool down while the device is on.
W 016	Chamber not tight	Clean seals (→ page 74). If the service message still persists, notify Customer Service.

Note

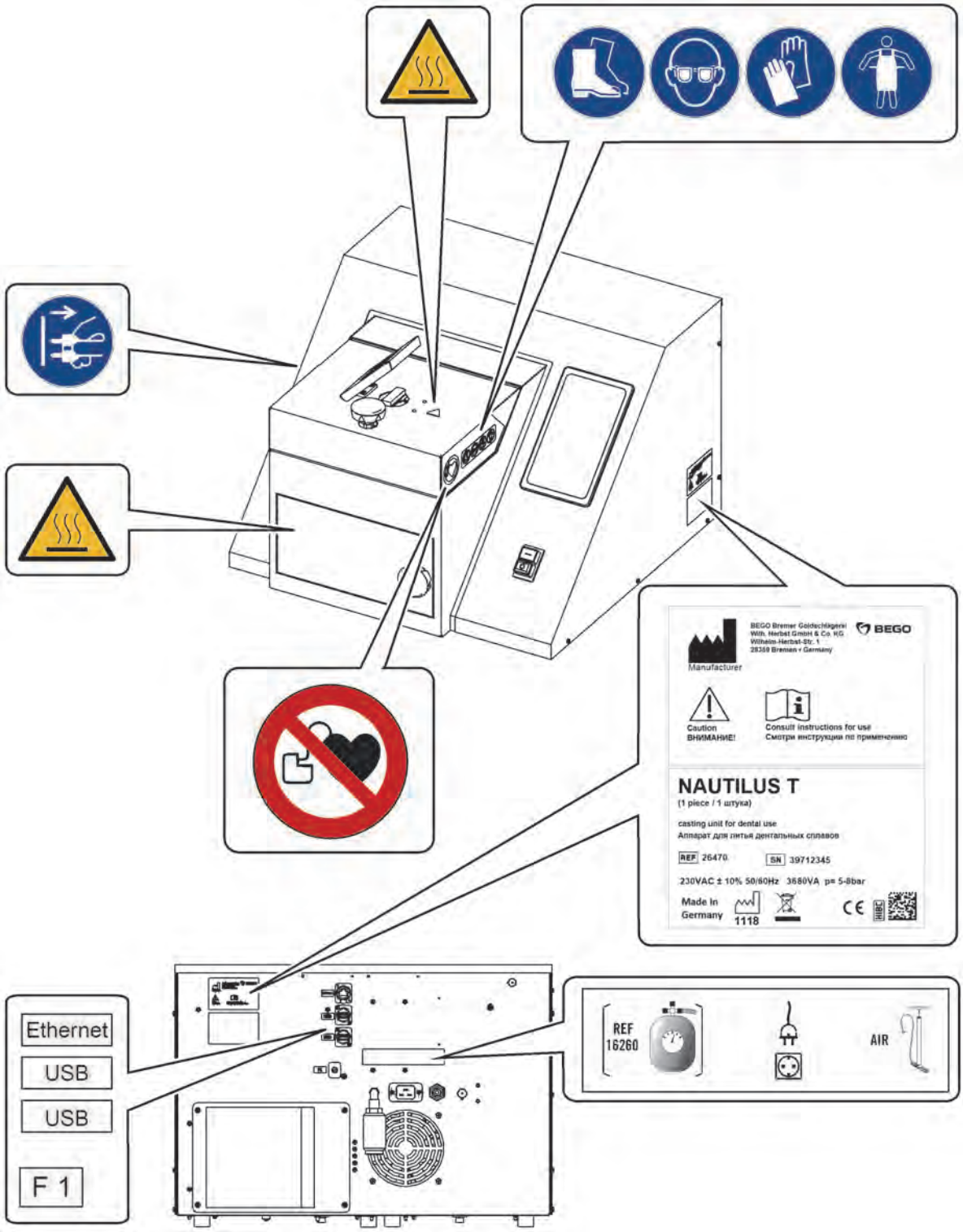
Error message	Cause	Remedy
H 001	Initialization of the internal USB flash drive	–
H 077 (every 8,000 castings)	Service required	Notify Customer Service.
H 099 (after 10,000 castings)	Service required	Notify Customer Service.

Signs, labels and stickers

NAUTILUS® CC plus



NAUTILUS® T


BEGO Bremer Goldschlägerei
Wilh. Herbst GmbH & Co. KG
Wilhelm-Herbst-Str. 1
28359 Bremen • Germany
BEGO
Manufacturer
Caution
ВНИМАНИЕ!
Consult instructions for use
Смотри инструкции по применению
NAUTILUS T
(1 piece / 1 штука)
casting unit for dental use
Аппарат для литья дентальных сплавов
REF 26470
SN 39712345
230VAC ± 10% 50/60Hz 3680VA p= 5-8bar
Made in Germany
1118
Ethernet
USB
USB
F 1
REF 16260
AIR

Disposal

Instructions for the disposal of the device

(Applicable only within the European Union)

The adjacent symbol on the ID plate of the BEGO device indicates that the device, in accordance with the European directive on waste electrical and electronic equipment, may not be disposed of as normal domestic waste.

As a customer, you contribute to the protection of the environment when you dispose of the device correctly.

Disposal in Germany

BEGO offers you a disposal solution for all BEGO devices sold and put into operation in Germany subsequent to August 13, 2005. Please contact us when it is time to dispose of the device.

Disposal in other countries of the European Union

Please contact the company from which you purchased the BEGO device when it is time to dispose of it. They will provide you with information concerning correct disposal in your region.

86105 BA-en/00

DECLARATION OF CONFORMITY

- **Manufacturer**: BEGO Bremer Goldschlägerei
  Wilh. Herbst GmbH & Co. KG
  Wilhelm-Herbst-Str. 1
  28359 Bremen
  Germany
  T. +49 421 2028-0
  F. +49 421 2028-100
  www.bego.com

- **Name of products**: NAUTILUS T
- **REF**: 26470
- **Serial numbers**: 397xxxxx
- **Description**: vacuum pressure casting machine for dental use

The products named above conform to the following Directives upon delivery.

- **Directives**: **2006/42/EC of 17 May 2006**
  2014/30/EU of 26 February 2014

- **Authorized to compile the technical file**: Alexander Joneit
  BEGO Bremer Goldschlägerei
  Wilh. Herbst GmbH & Co. KG
  Wilhelm-Herbst-Str. 1
  28359 Bremen
  Germany

Bremen, 21.3.18

Place, Date

Signature
Managing Director

Signature
Managing Director

- **Česky**
  Společnost BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, tímto prohlašuje, že tato Nautilus T splňuje z ákladní požadavky a další příslušná ustanovení směrnice 2006/42/ES, 2014/30/EU.

- **Dansk**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, erklærer herved, at følgende udstyr Nautilus T overholder de væsentlige krav og øvrige relevante krav i direktiv, 2006/42/EF, 2014/30/EU.

- **Deutsch**
  Hiermit erklärt BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, dass sich dieses Gerät Nautilus T in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 2006/42/EG, 2014/30/EU befindet.

- **Eesti keeles**
  Käesolevaga kinnitab BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, et see Nautilus T vastab Euroopa Nõukogu direktiivi 2006/42/EÜ, 2014/30/EL põhinõuetele ja muudele olulistele tingimustele.

- **Ελληνικά**
  ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ , BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, *ΔΗΛΩΝΕΙ ΟΤΙ ΑΥΤΟ* Nautilus T *ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ* 2006/42/ΕΚ, 2014/30/ΕΕ.

- **Español**
  Por medio de la presente, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, declara que Nautilus T cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva, 2006/42/CE, 2014/30/UE.

- **Français**
  Par la présente, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, déclare que les appareils du type Nautilus T sont conformes aux exigences essentielles et aux autres dispositions pertinentes de la directive 2006/42/CE, 2014/30/UE.

- **Italiano**
  Con la presente , BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, dichiara che questo Nautilus T è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2006/42/CE, 2014/30/UE.

- **Latviski**
  Ar šo BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, apliecina, ka šī Nautilus T atbilst Direktīvas 2006/42/EK, 2014/30/ES pamatprasībām un citiem atbilstošiem noteikumiem.

- **Lietuviškai**
  Šiuo BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, skelbia, kad Nautilus T tenkina visus svarbiausius 2006/42/EB, 2014/30/ES direktyvos reikalavimus ir kitas svarbias nuostatas.

- **Magyar**
  A gyártó BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, kijelenti, hogy ez a Nautilus T megfelel az 2006/42/EK, 2014/30/EU irányelv alapkövetelményeinek és a kapcsolódó rendelkezéseknek.

- **Malti**
  Hawnhekk, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, jiddikjara li dan Nautilus T jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2006/42/KE, 2014/30/UE.

- **Nederlands**
  Hierbij verklaart, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, dat Nautilus T in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2006/42/EG, 2014/30/EU.

- **Polski**
  Niniejszym firma BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, oświadcza, że Nautilus T spełnia wszystkie istotne wymogi i klauzule zawarte w dokumencie „Directive 2006/42/WE, 2014/30/UE".

- **Português**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, declara que este Nautilus T está conforme com os requisitos essenciais e outras disposições da Directiva 2006/42/CE, 2014/30/UE.

- **Slovensky**
  Výrobca BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, týmto deklaruje, že táto Nautilus T je v súlade so základnými požiadavkami a ďalšími relevantnými predpismi smernice 2006/42/ES, 2014/30/EÚ.

- **Slovensko**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, s tem potrjuje, da je ta Nautilus T skladen/a z osnovnimi zahtevami in ustreznimi določili Direktive 2006/42/ES, 2014/30/EU.

- **Suomi**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, vakuuttaa täten että Nautilus T tyyppinen laite on direktiivin 2006/42/EY, 2014/30/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

- **Svenska**
  Härmed intygar, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, att denna Nautilus T står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2006/42/EG, 2014/30/EU.

DECLARATION OF CONFORMITY

- **Manufacturer**: BEGO Bremer Goldschlägerei
  Wilh. Herbst GmbH & Co. KG
  Wilhelm-Herbst-Str. 1
  28359 Bremen
  Germany
  T. +49 421 2028-0
  F. +49 421 2028-100
  www.bego.com

- **Name of products**: NAUTILUS CC plus
- **REF**: 26475
- **Serial numbers**: 398xxxxx
- **Description**: vacuum pressure casting machine for dental use

The products named above conform to the following Directives upon delivery.

- **Directives**: **2006/42/EC of 17 May 2006**
  2014/30/EU of 26 February 2014

- **Authorized to compile the technical file**: Alexander Joneit
  BEGO Bremer Goldschlägerei
  Wilh. Herbst GmbH & Co. KG
  Wilhelm-Herbst-Str. 1
  28359 Bremen
  Germany

Bremen, 07.12.15
Place, Date

Signature
Managing Director

Signature
Managing Director

- **Česky**
  Společnost BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, tímto prohlašuje, že tato Nautilus CC plus splňuje z základní požadavky a další příslušná ustanovení směrnice 2006/42/ES, 2014/30/EU.

- **Dansk**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, erklærer herved, at følgende udstyr Nautilus CC plus overholder de væsentlige krav og øvrige relevante krav i direktiv, 2006/42/EF, 2014/30/EU.

- **Deutsch**
  Hiermit erklärt BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, dass sich dieses Gerät Nautilus CC plus in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 2006/42/EG, 2014/30/EU befindet.

- **Eesti keeles**
  Käesolevaga kinnitab BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, et see Nautilus CC plus vastab Euroopa Nõukogu direktiivi 2006/42/EÜ, 2014/30/EL põhinõuetele ja muudele olulistele tingimustele.

- **Ελληνικά**
  ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ , BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, *ΔΗΛΩΝΕΙ ΟΤΙ ΑΥΤΟ* Nautilus CC plus *ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ* 2006/42/ΕΚ, 2014/30/ΕΕ.

- **Español**
  Por medio de la presente, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, declara que Nautilus CC plus cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva, 2006/42/CE, 2014/30/UE.

- **Français**
  Par la présente, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, déclare que les appareils du type Nautilus CC plus sont conformes aux exigences essentielles et aux autres dispositions pertinentes de la directive 2006/42/CE, 2014/30/UE.

- **Italiano**
  Con la presente , BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, dichiara che questo Nautilus CC plus è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2006/42/CE, 2014/30/UE.

- **Latviski**
  Ar šo BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, apliecina, ka šī Nautilus CC plus atbilst Direktīvas 2006/42/EK, 2014/30/ES pamatprasībām un citiem atbilstošiem noteikumiem.

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- **Magyar**
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- **Malti**
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- **Nederlands**
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- **Polski**
  Niniejszym firma BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, oświadcza, że Nautilus CC plus spełnia wszystkie istotne wymogi i klauzule zawarte w dokumencie „Directive 2006/42/WE, 2014/30/UE".

- **Português**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, declara que este Nautilus CC plus está conforme com os requisitos essenciais e outras disposições da Directiva 2006/42/CE, 2014/30/UE.

- **Slovensky**
  Výrobca BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, týmto deklaruje, že táto Nautilus CC plus je v súlade so základnými požiadavkami a ďalšími relevantnými predpismi smernice 2006/42/ES, 2014/30/EÚ.

- **Slovensko**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, s tem potrjuje, da je ta Nautilus CC plus skladen/a z osnovnimi zahtevami in ustreznimi določili Direktive 2006/42/ES, 2014/30/EU.

- **Suomi**
  BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, vakuuttaa täten että Nautilus CC plus tyyppinen laite on direktiivin 2006/42/EY, 2014/30/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

- **Svenska**
  Härmed intygar, BEGO Bremer Goldschlägerei Wilh. Herbst GmbH & Co. KG, Bremen - Germany, att denna Nautilus CC plus står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2006/42/EG, 2014/30/EU.