universal®230

autocast

Casting System

Instructions for use

DENTAURUM

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The autocast universal® 230 Casting System from

DENTAURUM

General information about the autocast universal® 230 casting concept from Dentaurum

The autocast universal® 230 casting unit combines the for many years proven rematitan® casting system with the feasibility to cover the entire spectrum of castable dental alloys. Especially titanium's attributes have been taken into consideration in order to guarantee the highest quality for casting. Pure titanium, which is sold under the trade name Tritan® or rematitan® M, with a purity grade of > 99.5%. This is in accordance with DIN 17580 for pure titanium.
The especially strong affinity of titanium to oxygen is taken into consideration in the melting and casting process with the from Dentaurum developed autocast universal® 230 casting unit.
In the casting unit, pure titanium is melted with an electric arc by means of evacuation and argon flooding of the chamber. A copper mold is used for a melting crucible, therefore, the titanium is melted without reacting to the crucible.
At the end of the melting cycle, the crucible is tilted and the titanium flows down into the muffle which is made of rematitan® plus, rematitan® Ultra or Trinell® investment materials, especially developed for the titanium casting technique. An outstanding accuracy of fit for all prosthetic work is accomplished.

When casting non-precious or precious metal alloys, the melting is done in a ceramic crucible. Contrary to titanium casting, the output and melting times are individually controlled. The touch/control panel enables a quick change in casting from alloys to titanium.
Please follow the instructions very carefully. Especially with titanium casting, deviations can have negative effects.

universal® 230

autocast

Casting System

Instructions for Dental Use

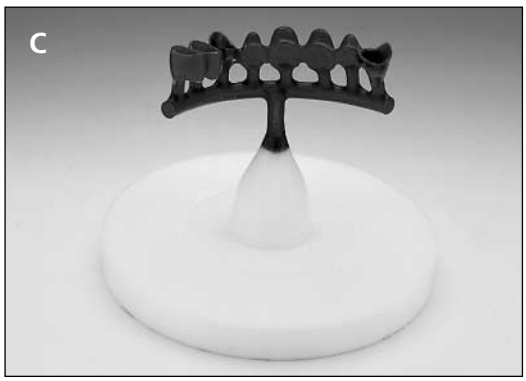
DENTAURUM

A Instructions for the use in Prosthetics

1. Crowns and Bridges made of Titanium

2. Titanium one-piece casting technique

3. Trimming of titanium castings with the *rematitan*® finishing kit



Crowns and Bridges made of Titanium

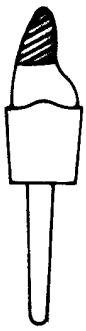
1. Working with *rematitan*® Plus Investment Material

Preparation

Waxing of crowns and bridges can be done with the usual materials.
Crowns and bridges are waxed up in the usual way.
Minimum wall thickness 0,4 mm.

Fitting: Crown and Bridge Technique

Hints for wax up:



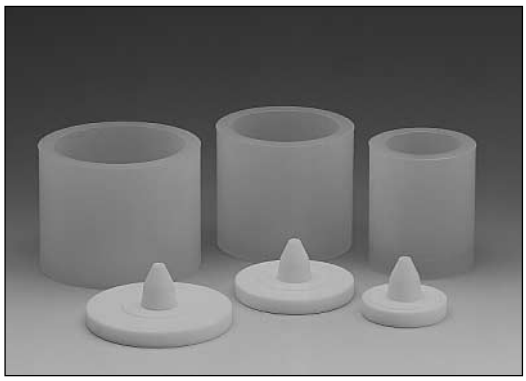
If thermoformed plastic copings are used, it is advisable to remove the shortened spacer foil from the plastic coping just before investing.
If a spacer is used, this should be applied somewhat more thickly in occlusal and incisal region of the stone dies (approx. 0.1 mm). Remove the spacer from the stone dies before fitting the cast.
The quality of the titanium casting depends, amongst other things, on the correct choice of sprues and their positioning.

Spruing System – Single Crowns / Inlays (pictures A and B)

Single crowns and inlays are in principle waxed-up on a runner bar. An individual pattern is also positioned on a runner bar.
T-shaped main sprue, diameter 4 mm. Minimum distance from the sprue cone to the runner bar 10 mm.
Runner bar diameter 4 mm. Main sprue attached to the runner bar between two leads. Pattern leads diameter 3 mm, length 3 mm.
Each single crown must be sprued at the highest point. Larger components, such as full-cast crowns, may also have two sprues. Align the patterns such, that the sprue cone sits centrally in the muffle.

Bridges (pictures C and D)

T-shaped main sprue ∅ 4 mm. Minimum distance from the sprue cone to the runner bar 10 mm. Runner bar ∅ 4 mm. Main sprue connected to the runner bar between two sprue leads. Pattern leads ∅ 3 mm, length 3 mm.
Each bridge component must be sprued to the runner bar at its highest point. Larger components, such as full crowns etc., may also have 2 leads. Align the patterns such that the sprue cone sits centrally in the muffle. Bridges that extend over 8 or more members must have two 4 mm main sprues to the runner bar.



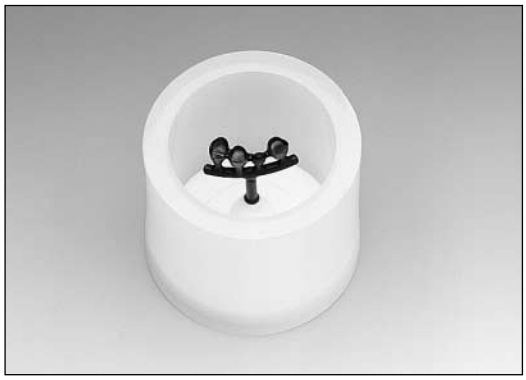
Muffle System

To avoid gas entrapment during casting, the sprue cone must be of a certain shape. Use only the muffle bases belonging to the system with sprue formers.
Muffle base with sprue former:

Size 3	1 piece	**Ord.-No. 106-850-01**
Size 6	1 piece	**Ord.-No. 106-851-01**
Size 9	1 piece	**Ord.-No. 106-852-01**

The base plate must be completely clean.

Distance between wax frame and investment surface: max. 6 mm.



Wax-Up

To achieve a clean and rapid melt flow, joints of the sprue cone and onto the pattern should be smooth and round.
Align the pattern horizontally.
Keep the distance from the edge of the muffle approx. 6 mm. The pattern should lie with its upper edge 6 mm below the edge of the muffle rings. Consequently the length of the main supply sprue will be 15–20 mm.

Wax: Reducing Tension

Before pressing the silicone rings over the base plate spray the wax patterns with Lubrofilm® (Ord.-No. 112-050-00) and blow dry.

Muffle rings, flexible

Size 3	1 piece	**Ord.-No. 106-840-00**
Size 6	1 piece	**Ord.-No. 106-841-00**
Size 9	1 piece	**Ord.-No. 106-842-00**

Use the muffle rings corresponding to the size of the muffle base.

Investing

In order to obtain perfect fitting castings, the handling instructions for ***rematitan*® Plus** investment must be strictly followed.

Required amount of ***rematitan*® Plus** investment:

For muffle size 3	1 x 250 g
For muffle size 6	2 x 250 g
For muffle size 9	3 x 250 g

***rematitan*® Plus** investment should only be mixed with the special mixing liquid Ord.-no. 107-602-00.
Store the mixing liquid in the refrigerator at about 8–10°C/ 46–50°F (not in the freezer compartment).
If outside temperature is high, powder should be cooled also. Working time approx. 3 minutes 15 seconds at about 23°C/73°F.

Mixing ratio: 250 g powder : 40 ml mixing liquid.
Mixing time in the vacuum mixer: 60 seconds.

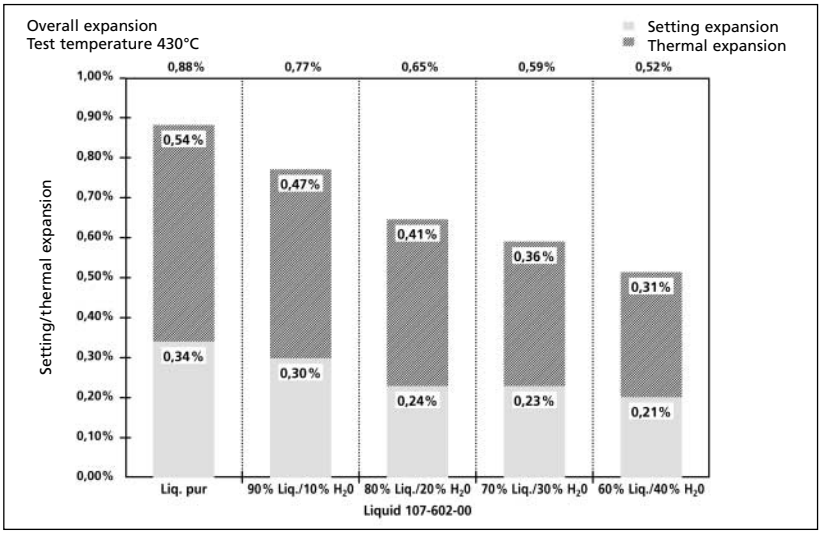
Fill the muffle to the top with investment. Remove from the vibrator immediately. Setting time: 40 minutes.
Pull off from the base/sprue former by twisting and grind the side opposite the sprue, with the dry trimmer.
This promotes gas permeability of the investement in the flow-direction of the titanium. Place the muffle with the opening downwards in the cold oven.

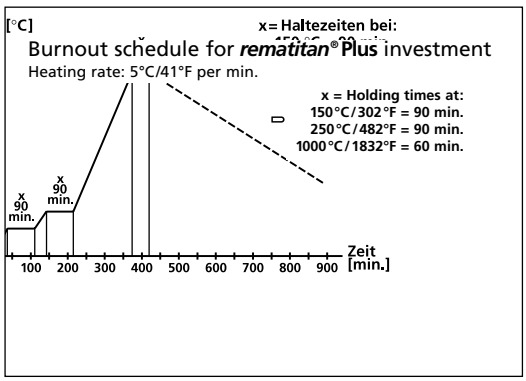
Expansion control for Crowns/Bridges

The adjustment of the expansion for the ***rematitan***® plus investment is exclusively done by dilution of the mixing liquid. (see chart below).

Attention!
The mixing liquid is a concentrate which normally must be diluted:

Recommendation for dilution:
Crowns and bridges:
60% = 6 parts of liquid + 4 parts of distilled water.
Conical and telescopic crowns:
70–100% = dilution related to the desired friction and ways of processing.





Preheating Crowns/Bridges

To achieve optimum expansion values and stable muffles, we recommend 3–4 side-heated circulating air ovens with program control (4 soaking stages) and temperature control (5°C/41°F per min), e.g. Protherm circulating air preheating oven (Ord.-No. 096-180-00).

There is a risk of cracking of the muffle if the oven does not have sufficient insulation and the heating/cooling time is too short. Do not fill the muffle space to capacity.

Overnight operation is recommended.

Holding times:	150°C/302°F	90 minutes
	250°C/482°F	90 minutes
	1000°C/1832°F	60 minutes

Slow reduction of temperature to 430°C/806°F = casting temperature. Avoid temperature shock. Do not hold at final temperature of 430°C/806°F longer than 120 minutes.

1.2 Working with *rematitan*® Ultra Investment Material

Important! The expansion of this investment material cannot be controlled by the mixing liquid.

Never dilute the liquid with water.

The expansion of the material is controlled by the temperature setting of the oven.

Danger

Safety note

Mixing liquid:
If the liquid should contact the eyes, rinse thoroughly with water and if necessary seek medical attention.

Availability

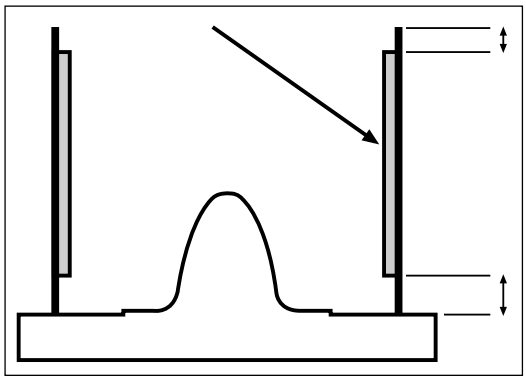
***rematitan*® Ultra** Powder
7 kg **Ord.-No. 107-650-00**
***rematitan*® Ultra** mixing liquid
1 litre **Ord.-No. 107-651-00**

Storage

Both the powder and the mixing liquid should be stored in the **dark at room temperature.**
Do not cool!

Modelling

Use only waxes or resins that leave absolutely no residue.



Ring-making

The investment material must be used with metal rings.

Making the Casting Ring / Investment System

Application: crown and bridge
Ring size ③ = ∅ 48 mm, Ring size ⑥ = ∅ 65 mm

A Muffle rings, stainless steel, 2 sizes (③, ⑥)
1 piece ③ **Ord.-No. 106-801-00**
1 piece ⑥ **Ord.-No. 106-802-00**

B Muffle base with sprue former, 2 sizes (③, ⑥)
1 piece ③ **Ord.-No. 106-850-50**
1 piece ⑥ **Ord.-No. 106-851-00**

C Fixing ring for connecting muffle ring and base, 2 sizes (③, ⑥)
1 piece ③ **Ord.-No. 106-845-00**
1 piece ⑥ **Ord.-No. 106-846-00**

D Kera-Vlies®. Asbestos free liner.
Size: 1,0 x 50 mm
25 m **Ord.-No. 127-250-00**

Fleece lining

Use one dry fleece lining.
Kera-Vlies® (fleece-like ceramic material)
Ord.-No. 127-250-00

Important! It is recommended to shorten the fleece lining to ensure that the investment material is held at the top and bottom by the ring.

Wax: Tension Reducing

It is recommended to use a tension reducing agent such as Lubrofilm® Order No. 112-050-00 for easier investing.

Blow dry thoroughly!

Mixing Ratio

100 g powder : **14 ml** mixing liquid

Quantity required for size 3 ring,
250 g powder : **35 ml** mixing liquid

Quantity required for size 6 ring,
450 g powder : **63 ml** mixing liquid

Mixing

Important!
Use only clean, dry mixing bowls and measuring beakers!

Always keep mixing bowls and measuring beakers away from other investment materials!

After mixing powder and liquid, mix the compound well by hand.

Mixing time in vacuum mixer:
Minimum 60 secs. Recommended 120 secs.

Processing Time

Approx. 6 minutes.

Setting Time / Trimming

1 1/2 - 2 hours, depending on room temperature.

Grinding

Grinding/sanding the ring surface improves its thermal stability.

Waiting Time

***rematitan*® Ultra** investment material is sensitive to dryness. Therefore, it should not be allowed to stand for too long (recommended: less than 5 min.) and should be placed in a cold oven.

If longer holding times cannot be avoided, protect the ring from drying out by placing it in a plastic bag or sealing it with wax.

Preheating Cycle

The expansion of ***rematitan*® Ultra** investment material con only be controlled by the temperature. As it is not possible to calibrate all ovens accurately, the temperature recommended by us may be increased or decreased as required.
In our experience the temperature range is between 880 °C und 910 °C/1,616 °F and 1,670 °F.

Higher final temperature	=> wider fit
Lower final temperatur	=> tighter fit
Longer holding time at final temperature	=> wider fit
Shorter holding time at final temperature	=> tighter fit

If the final temperature is too low, the investment material may be unstable.

Place the ring in the cold oven.

Heat-up speed 3–5 °C/min/37 °F–47 °F per min.

1. Holding time at 250 °C/482 °F	90 mins.
2. Holding time at 880–910 °C/1,616–1,670 °F	10–40 mins.

To obtain a highly accurate fit, the temperature setting should be between **880 °C/616 °F und 910 °C/670 °F** and the holding time between 10 and 40 minutes.

Important: Not all ovens can be accurately calibrated.
It may therefore be necessary to vary our recommended temperature.

Stage 3:
When the final temperature has been reached, allow the temperature to decline to the casting temperture of 430 °C/806 °F with the oven closed.
Allow the ring to adjust to the casting temperature of 430 °C/806 °F for approx. 30 minutes.

Availability

***rematitan*® Ultra** investement material
7 kg container **Ord.-No. 107-650-00**

***rematitan*® Ultra** mixing liquid
1 litre **Ord.-No. 107-651-00**

Quantity of Casting Metal

Single crowns/bridges up to 6 elements	22 g
Bridges of more than 7 elements	31 g
Very large bridges (14 elements)/ extensive supra constructions	36 g

Trinell
Triline ti

1.3 Working with Trinell Investment Material

Trinell is the result of ongoing development of our already proven ***rematitan*® Ultra** Investment Material for the ***rematitan*®** Casting Technique. Trinell, besides the standard work, will expedite the working cycle significantly. With the appropriate casting unit, the casting surfaces are almost oxide-free.

Storage:

Please store powder and mixing liquid at room temperature in a dark area.

Modelling:

Use only residue-free burn-out waxes, such as (Dentaurum Star Wax), or similar products.

Casting Rings:

Use metal casting rings, size 3–9.
Attention: Do not use old and damaged casting rings.

Fleece Inserts:

Use only dry, elastic fleece (no paper fleece).

Shorten fleece so that investment material rests approximately 5 mm, top and bottom, directly against the casting ring.

1 fleece insert 1 mm – dry –
(Kera Vlies® Order No. 127-250-00)

Position of Objects in the Casting Ring:

Cover with approximately 8 mm of investment material. Outer distance from fleece insert at least 5 mm.

Mixing Ratio:

100 g powder : 14 ml mixing liquid or special speed liquid
Size 3 casting ring – 250 g powder: **35 ml** mixing liquid or special speed liquid
Size 6 casting ring – 500 g powder: **70 ml** mixing liquid or special speed liquid
Size 9 casting ring – 750 g powder: **105 ml** mixing liquid or special speed liquid

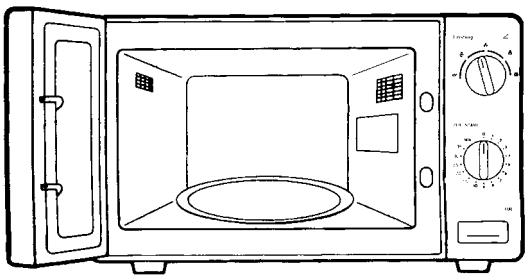
Left over investment material can be stored in the original packaging, but should be closed tightly with the enclosed clip.

Danger

Safety Information:

Should mixing liquid or special speed-liquid come in contact with the eyes, rinse thoroughly with water, and if necessary, contact your doctor.

Attention: Never add water to the mixing liquid or special speed liquid.



Mixing:

Always use clean and dry mixing and measuring utensils!
Attention: Use one particular measuring container only for Trinell liquids.
Mix well manually!
Mixing time in a vacuum mixing unit: 60 seconds
Attention: Do not dilute the slightly thick material.
Due to the moisture content, and the timely processing time, a bubble-free investment is guaranteed.

Working Time: Approximately 6 minutes

Setting Time: 60 minutes

Microwave Drying:

The special feature of this investment material is that it can be dried in a microwave oven. Due to this drying process, the texture of the investment material is greatly improved.

General Information with Reference to the Microwave:
Investment casting rings with metal casting rings can be dried in a **suitable** microwave oven at a low setting.
The best results are achieved when the microwave has a turning plate and a microwave distributor that is located on the inner side wall, with a plastic covering.
The microwave has to have continuous power starting with "0", or the lowest setting (defrost) has to be at approximately 80 Watt. The drying time has to be reduced if the power is above 80 Watt. The less suitable units are the ones with an upper or lower microwave distributor.

Processing:

After investing, and one hour of setting time, cut the surface with a knife (do not use a model trimmer).
Remove the bottom of the casting ring.
Set microwave to lowest setting (defrost).
Place casting ring, with the sprue facing down, into the microwave. Set the unit for approximately 6–10 minutes, depending on size and power of the microwave.
Best results are achieved with units of 800 Watt power and a defrost setting of 80 Watt.

Example with the setting of 80 Watt ("Defrost"):
Size 3 casting ring: 6 minutes
Size 6 casting ring: 8 minutes
Size 9 casting ring: 10 minutes

This pertains to single casting rings. With more than one, the working times have to be adjusted between 8 and 10 minutes.
Microwave drying is necessary with speed operation.
It is recommended with night operation.

Preheating Cycle – Alternatives

Attention: The end temperature of (870–900°C / 1598–1652°F) is very important for a proper fit. Depending on oven size and calibration, the temperature may have to be adjusted, up or down.
Higher end temperature = wider fit
Lower end temperature = tighter fit

Attention: Every package of investment contains a separate instruction sheet that gives recommendations for end temperature and holding time, according to that particular batch.

Night preheating with or without microwave drying:

Attention: For night preheating, use only Trinell Mixing Liquid!
(The Trinell Special Speed Liquid can only be used for reduced and full speed preheating.)

In order to increase stability, we strongly recommend using the microwave!

Place the casting ring, with the sprue facing down into the cold oven, preheat in 2 steps and cool down phase.

Preheating 1. Step (heat acceleration 4 °C / 39 °F)
250°C/482°F 60 min. holding time
Preheating 2. Step (heat acceleration 4 °C / 39 °F)
870–900°C/1598–1652°F
20 min. holding time
(End Temperature)
Cool down 3. Step
400°C/752°F 30 min.holding time
Casting Temperature:
400°C/752°F

We recommend to reduce the end temperature to approximately 10°C/50°F for the telescope and conical crown technique. Additional adjustments to the expansion can be made by extending (higher expansion) or reducing (lower expansion) the holding time at the end temperature.
For the telescope and conical crown technique, use only night preheating not speed preheating.

Weekend Operation:

Attention: For weekend operation, use only Trinell mixing liquid!
(Use Trinell Special Speed Liquid only for reduced and full speed preheating.

When using overnight preheating microwave drying is imperative as it increases ring stability.
After microwave drying, place casting, with the sprue facing down, into the cold oven and program the oven for preset preheating at 2 steps and cool down phase.

Complete Speed Operation with Microwave Drying

⚠ **Attention: At Speed Operation use only Trinell Special Speed Liquid! (The Trinell Mixing Liquid should only be used for night preheating).**

In exceptional cases, the size 3 casting can be placed in the oven at the end temperature. Slight variations in the fit and stability are then unavoidable.
After microwave drying and a 5 minute resting phase, place casting **in the horizontal position** in the 870 – 900 °C / 1598 – 1652 °F / 20 min. holding time preheated oven.
After completed holding time, cool off casting at 700 °C / 1292 °F in a closed oven.
At 700 °C / 1292 °F remove casting and cool at room temperature.
Casting temperature between 200 – 400 °C / 392 – 752 °F.

Reduced Speed Operation with Microwave Drying

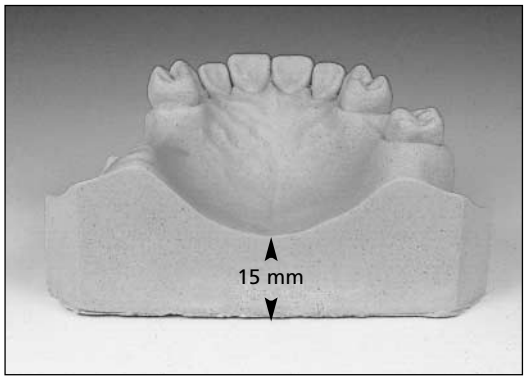
Attention: At reduced speed operation, use only Trinell Special Speed Liquid! (The Trinell Mixing Liquid should only be used for night preheating)
After microwave drying and a 5 minute resting phase, place casting with sprue facing down into a 400 °C / 752 °F preheated oven.
Constant preheating at maximum acceleration rate to 870 – 900 °C / 1598 – 1652 °F and a 20 minute holding time.

Cool Down Variations:

1. Cool down casting at 400 °C / 752 °F with oven closed
2. Cool down casting at 700 °C / 1292 °F thereafter at 400 °C / 752 °F with opened door
3. Transfer castings after cool down of 700 °C / 1292 °F into a preheated oven of 400 °C / 752 °F.

Availability:

Trinell Special Speed Liquid	1000 ml	Ord.-No. 107-655-00
Trinell Mixing Liquid	1000 ml	Ord.-No. 107-653-00
Trinell Investment Material	28 x 250 g	Ord.-No. 107-654-00



Model casting made of Titanium

Preparation

The reactive layer, also called the „alpha case", formed at the contact zone between the ***rematitan***® casting metal and the investment should be kept as thin as possible. Because of the special properties of titanium, such as low specific gravity, high melting point, low contraction and very high affinity for oxygen, all the factors which influence titanium must be dealt with differently than with conventional dental castings.
This includes all the materials and operations intended specifically for the autocast universal® 230 casting unit. Other materials may have an adverse affect on the casting results.

Duplication with *rematitan*® investment

After appropriate preparation, the master model is duplicated with Rema®-Sil silicone (Ord.-No. 108-700-00/ 108-701-00, see processing instructions).

Note! Minimum thickness of the refractory at the deepest part of the palate is 15 mm. If necessary, increase the height of the master model with gumex before duplication. Higher models may be trimmed down to 15 mm.

In the case of split cast models etc., the investment model should be trimmed down to proper size before investing.

After removal of the master model, the silicone mould is degreased with Lubrofilm®. Blow dry immediately.

No sprue former is necessary. Casting is done from the top.

Shake the mixing liquid well before use.

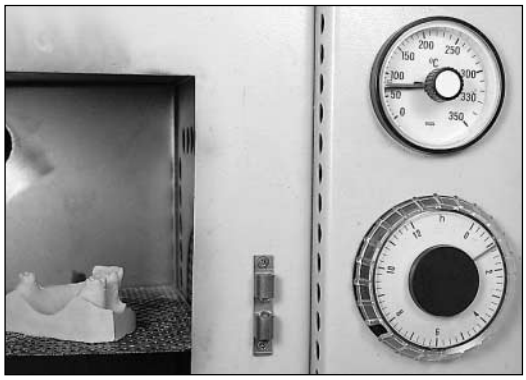
rematitan® Plus is mixed with ***rematitan***® mixing liquid in a ratio of 250 g : 40 ml in a vacuum mixer (Airvac, Ord.-No. 095-060-00/095-070-00) for 60 seconds and the mixture is poured into the silicone mould.

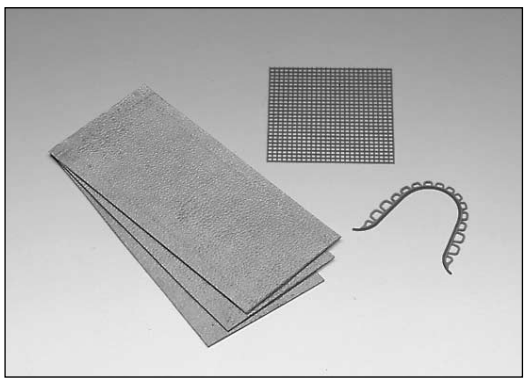
Working time at 23°C/73,4°F: 2 minutes 45 seconds.

A longer working time can be achieved by cooling the mixing liquid.

Note! Due to the high specific gravity of ***rematitan***® Plus investment, heavy particles of the investment may be deposited in the mixing beakers after the mixing operation. After mixing in the Airvac, the investment is briefly mixed manually using a spatula (only for 250 g).

The surface of the investment must be smooth.





Setting time

Setting time is 40 minutes. Refractory should not be placed in a pressure pot while setting.

Drying the model

70 °C/158 °F, for 40 minutes in a circulating air drying cabinet.

Note! Do not use higher temperatures, since this will affect the surface smoothness.
Risk of damage to the surface (pasty).

If the model is dried in the preheating oven, check the temperature and adjust if necessary.

Models with too high a moisture content prevent good attachement of the wax or plastic patterns.

The environmentally compatible cold hardener Ökodur (Ord.-No. 167-300-00) is used as model hardener.
After 40 minutes at 70°C/158°F in the drying cabinet, the thoroughly dried duplicate model is immersed in the cold Ökodur hardener liquid for 5-10 seconds. The hardened model is then subsequently dried for 5-10 minutes in a drying cabinet at 70 °C/158 °F.

The dried, hardened model should be waxed and invested within 6 hours. If it stands for longer, the model surface may absorb moisture from the atmosphere and become soft. The original hardness of the model can be achieved by returning it to the drying cabinet and drying it again (70 °C/158 °F, 10 min).

Recommended waxing

If ***rematitan***® casting metal is used for model casting, the construction of the framework should have thicker dimensions because of the different physical values compared to that to CoCr alloys.

Full palate:	thickness	0,8 mm
Horseshoe:	thickness	0,8 – 1,0 mm
Anterior-posterior palatal bar:	thickness	0,8 – 1,0 mm
Palatal strap:	thickness	0,8 – 1,0 mm

Additionally reinforce lower jaw lingual bars 4.3 x 2.3 mm (Ord.-No. 111-113-00).

All the figures are recommendations. Stabilization can also be achieved by waxing-in reinforcements.

The wax and plastic patterns used should be suitable for titanium casting.

Note! Do not use alien adhesives. To guarantee that the titanium melt flows properly into the mould, be sure the wax/plastic surface is smooth and clean.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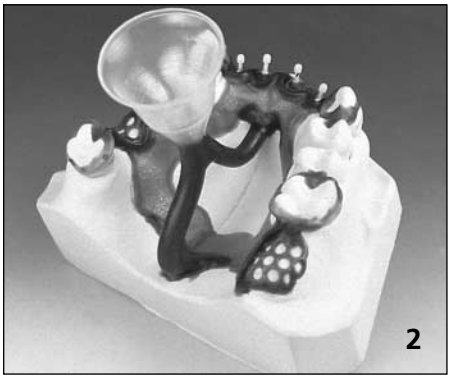
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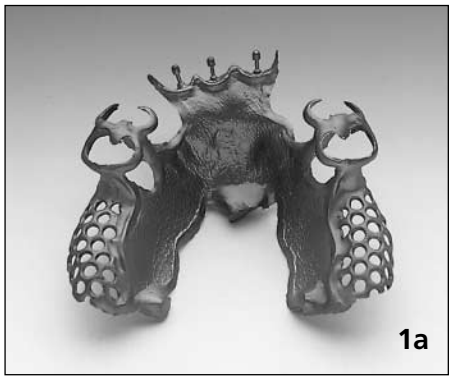
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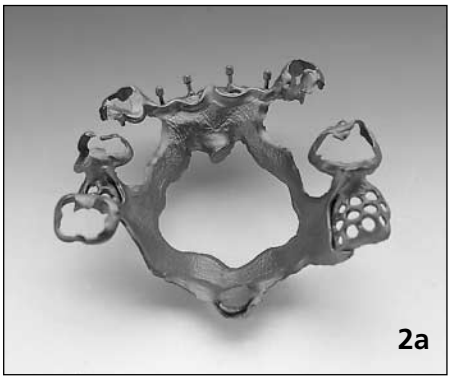
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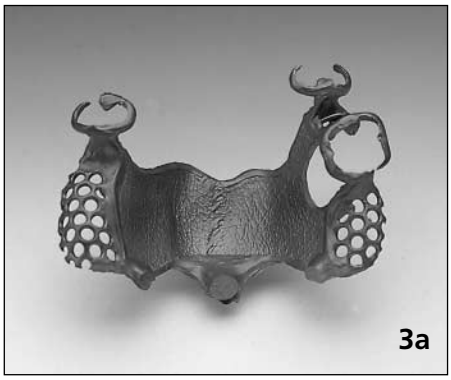
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4

1 Upper horseshoe
1 main sprue ∅ 5 mm
2 auxiliary sprues ∅ 3 mm

2 Upper anterior-posterior palatal bar
1 main sprue ∅ 5 mm
1 auxiliary sprue ∅ 4 mm

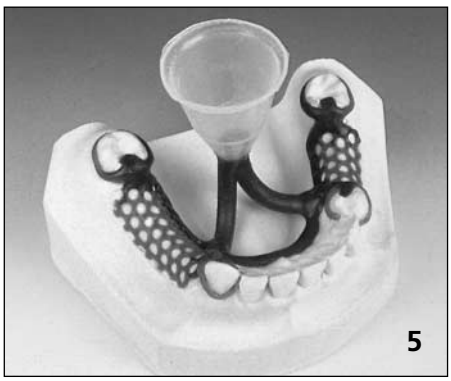
3 Upper palatal strap
1 main sprue ∅ 5 mm
2 auxiliary sprues ∅ 3 mm

4 Upper full palate
2 main sprues ∅ 4 mm, 10–15 mm long
Model at 45°angle.
In case of resin relining of a-line, position sprues within the palatal plate.

5 Lower lingual bar
2 main sprues ∅ 4 mm

1a-5a ***rematitan***® castings sand-blasted, sprues removed.

Attach sprues in delta shape. Do not taper sprues at the joint to the wax up.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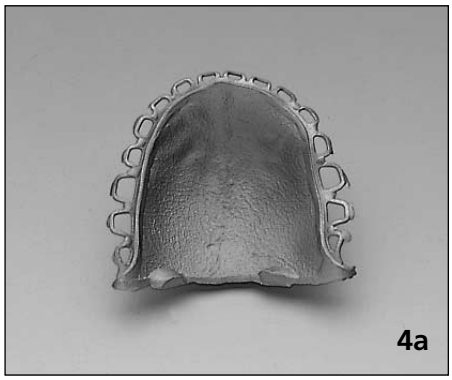
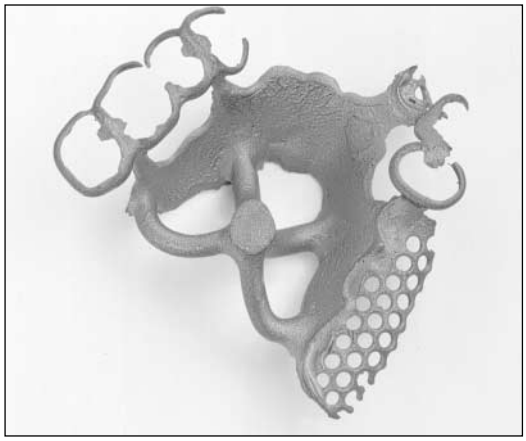
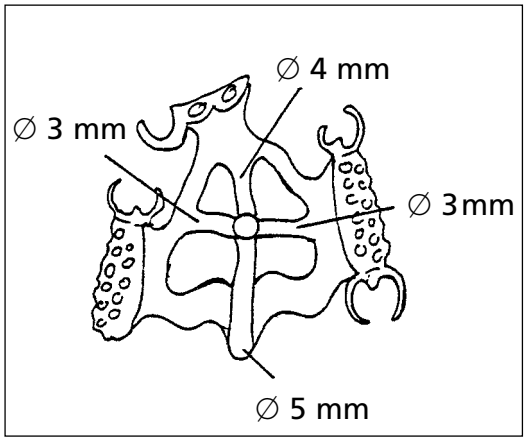

4a


5a





Use of *rematitan*® M-(Ti4)-casting metal

***rematitan*® M** has a higher elongation limit, tensile strength and modulus of elasticity values.

***rematitan*® M** has slightly poorer flow properties than the more commonly used titanium Ti1. However, it is easier to cast than is normally the case when using titanium grade 4.

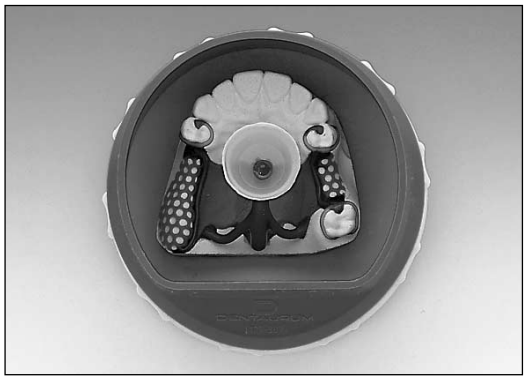
Slight modification of the casting sprues allow the fabrication of very delicate partial dentures.

Casting sprues:
With very delicate model casting structures, 3 or 4 sprues, with a diameter of 3, 4 or 5 mm, are joined to the wax-up from below in the form of a star.

Example: Maxillary partial framework.

Sprue / sprue former

All model castings are cast from the top.

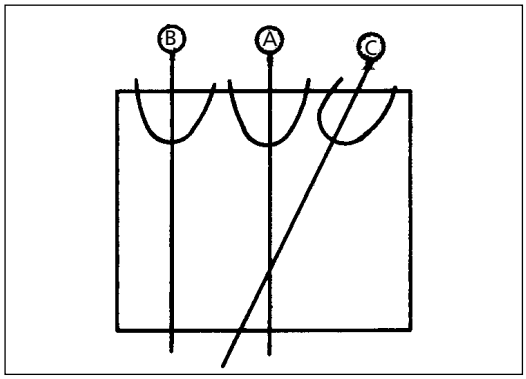


Sprue formers for model casting

Plastic sprue cones should be used.
Note! Do not use other cone shapes than recommended.

The shape of the sprue cone and the position of the sprue channel help the melt to flow cleanly. The funnel must be in the center of the casting ring, so that the muffle can be centered cleanly in the unit.

Attention! The new funnels are equipped with cavity formers for better aligning of the packing rings.



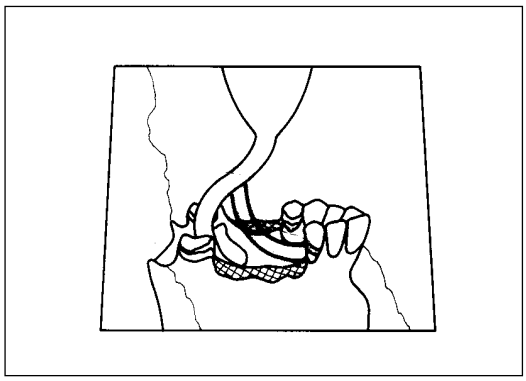
A Correct positioning, **B + C** Incorrect positioning.

Not centered **(B)** or inclined sprue cone positions **(C)** adversely affect the way the melt flows into the hollow cavity of the casting.

C Reduced seal coverage and uneven pressure on the muffle.

Positioning of funnel former

Wax up funnel with bottom edge at occlusion level.
The investment must be filled to the top edge of the funnel former. Avoid air bubbles at the fitting surface.



Preparation for investing

Contrary to the crown and bridge technique, removable restorations are made with a model which has to be invested in a ring. In order to avoid loss of pressure during the casting process, there must be a tight bond between the refractory model and the investment ring. Any deviation form the recommended materials and procedures may result in cracking of the ring due to the expansion characteristics of the investment material.
This will result in miscasts.

Trimming the model before investing

The models are dry trimmed up to the waxed patterns.
The model should be 10–15 mm thick at the lowest point.
Models which are too thick are trimmed flat on the base to dimensions.
For models which are too flat, refer to the section on duplication, page A 9 .
The models for a full upper jaw are trimmed from the front so that the model has a standing surface which is angulated at 45°. Distance between the wax model and standing surface approx. 4 mm.

Muffle ring of plastic (red, blue, green)

Choose the muffle ring according to the refractory model size. The distance to the wax model should be at least 8–10 mm. Spread vaseline thinly over the inside of the muffle.

Do not insert lining tape. Casting is done without the muffle ring.

Place the muffle ring on the base plate and fix the position of the model. **Be sure the sprue cone is in the center of the ring.**

Fixation on the base plate

Seal the wax up refractory to the smooth ring base (Ord.-No. 127-309-00) using sticky wax. Use a thin layer of wax for fixing, in order to keep gap between model and coat small. Full upper jaws are waxed onto the front side of the model, which has been trimmed at an angle of 45°. The sprue former must be centered perpendicularly in the middle of the muffle. Press on the muffle ring.

Investing

For one muffle 2 x 250 g packs of ***rematitan*® Plus** investment (Ord.-No. 107-600-00) are required.
Mixing ratio = 500 g : 80 ml.
Shake ***rematitan*®** mixing liquid (Ord.-No. 107-601-00) before use.
For small models and a red muffle ring, and generally for blue muffle rings, 3 x 250 g packs are used.
Mixing ratio: 250 g : 40 ml liquid.

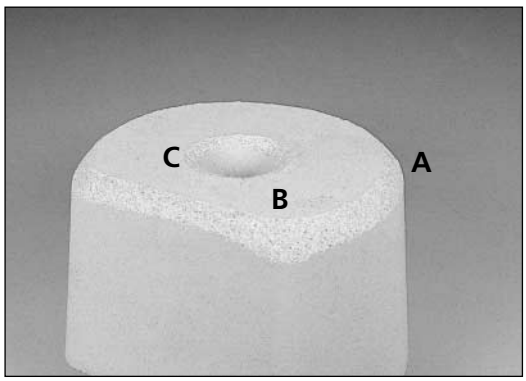
Note:
Process ***rematitan*® Plus** investment at 18–22 °C/64,5–72 °F. Cool the liquid in a refrigerator a 8–10 °C/46,4–50 °F if necessary (not in the freezer compartment). If outside temperatures are very high, also cool the powder.
Mix the ***rematitan*® Plus** investment and liquid in a vacuum mixer for 60 seconds. Use a separate mixing beaker.

Fill the muffle to 1 mm below the edge of the sprue former.

Be sure that the surface is smooth and without bubbles.

For full upper jaws models waxed-up at an angle of 45°, brush the undercut areas of the investment model with ***rematitan*® Plus** investment using a large brush, before mounting the muffle ring. This prevents from undesired bubbles in the wax up.

Setting time 40 minutes. Remove muffle from base and ring.



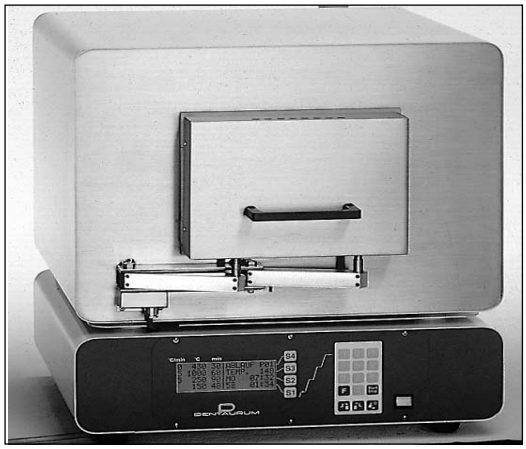
Break investment at the outer muffle edges **A**.

Bevel the sprue cone edge **B** to ensure a flat surface for the seal.

Note C:
Do not trimm the surface with a model trimmer.

Preheating

Place investment mold in the oven with the sprue opening facing down.
Be sure the **base of the oven is clean**.



Preheating oven

The oven should be equipped with a 3- to 4-sided heating chamber and well-insulated (e. g. Protherm preheating oven, Ord.-No. 096-170-00 and 096-180-00).
Required end temperature 1000 °C/1832 °F.
A programmable furnace is imperative. Circulating air is advisable. Do not fill the oven to its capacity.
Furnaces without sufficient insulation or where the temperature increase decrease rate is too high may cause mould cracking.

Preheating the muffle

Heating rate: 5°C/41°F per minute.

150°C	90 min.	->	250°C	90 min.	->	1000°C	60 min.
302°F	90 min.	->	482°F	90 min.	->	1832°F	60 min.

Cooling rate: 5°C/41°F per minute. Slow cooling to 430°C/806°F = remove muffle. Avoid temperature shock.

Holding time at end temperature 430°C/806°F not longer than 120 minutes.

Amount of *rematitan*® casting metal required per casting

Normal framework casting	31 g
Frameworks of large dimension	36 g

2. Titanium one-piece casting technique

One-piece casting for crowns of 2° and 4° taper is possible with the following procedure.
Telescopic crowns are dealt with separately in section II.

I Conical crowns

1. Preparation

Wax up primary crowns on the master model.
Angulation (tapering) 2° or 4°.

2. Duplication

Duplicate the master model with the primary crowns using Rema®-Sil silicone (Ord.-No. 108-700-00/108-701-00).

3. Producing the duplicate model from *rematitan*® Plus investment

Degrease the negative silicone mould with Lubrofilm® (Ord.-No. 112-050-00).
Mix ***rematitan*® Plus** investment (Ord.-No. 107-600-00) and ***rematitan*®** model casting mixing liquid (Ord.-No. 107-601-00) in a ratio of 250 g : 40 ml and fill the silicone mould.

4. Setting time

40 minutes.

5. Drying the model

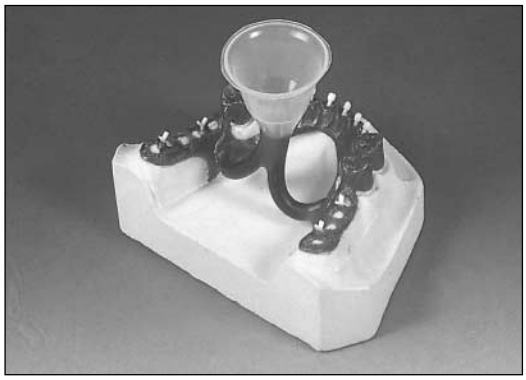
70 °C/158 °F, 40 minutes
Harden the model with Ökodur cold hardener (see page A 15)

6. Recommended waxing

Upper jaw horse shoe	thickness 1 mm
Upper jaw skeletal plate	thickness 1 mm
Upper jaw transversal bar	thickness 1 mm

Additionally reinforce lower jaw lingual bars.

- To ensure complete casting of secondary crowns the minor connectors must be waxed thicker.
- Waxing thickness of the secondary crowns not less than 0,5 mm.



7. Spruing system

In the upper jaw, attach 2 sprue channels of 4 mm diameter in the form of a v in the dorsal region. Length of the sprue channels are approx. 10 mm.
The standard spruing system is used in the lower jaw.
(see page A 11)

8. Preparation for investing

The models are trimmed on the side to the waxed portions. The subsequent standing surface of the model is trimmed at an angle of 45°. Distance from the waxed model to the base surface approx. 4 mm. In contrast to conventional titanium model casting, the upper jaw one-piece casting models are waxed onto the base plate at an angle of 45°.
Lower jaw refractory models are waxed as usual.

9. Muffle ring

The blue muffle ring for all upper jaw models.
The red or blue muffle ring for all lower jaw models.

With models waxed-up at an angle of 45°, the undercut areas on the investment model are filled with ***rematitan®*** **Plus** investment using a large brush before mounting the muffle ring. This prevents from bubbles on the wax model.

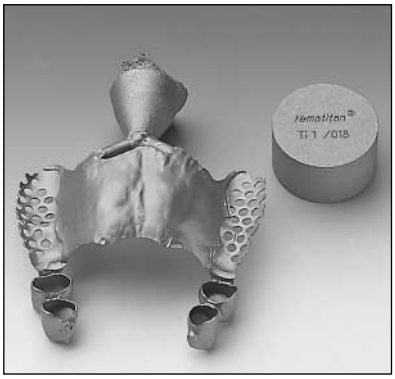
Setting time 40 minutes. Peel off the muffle base.

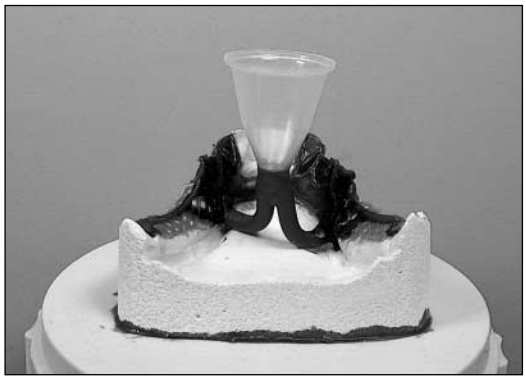
10. Investing

For the upper jaw (blue muffle), 3 x 250 g packs are required.
Mixing ratio = 750 g : 120 ml.

11. Standing times, holding times, temperatures

The parameters for the ***rematitan®*** casting system instructions apply (page A 4 and A 20–21).





II Telescopic crowns

Preparation

1. The tooth arch in the silicone mould is first filled with ***rematitan*® Plus** investment, which is mixed with **diluted *rematitan*® Plus** crown/bridge mixing liquid (Ord.-No. 107-602-00).

   Attention!
   The mixing liquid is a concentrate which normally must be diluted:

   Recommendation for dilution:
   Crowns and bridges:
   60% = 6 parts of liquid + 4 parts of distilled water.
   Conical and telescopic crowns:
   70–100% = dilution related to the desired friction and ways of processing.

2. Before the investment has set, the mould must be filled with ***rematitan*® Plus** investment in the normal consistency of 250 g : 40 ml (partial denture mixing liquid, Ord.-No. 107-601-00).

3. The subsequent operating steps are the same as sections 4. to 11. of the instructions for conical crowns.

Amount of Titanium casting metal required per casting

Minor combination work	31 g
Extensive combination work	36 g

3. Finishing of titanium castings


Danger

Safety advices!

Abraded or separated titanium particles when hot react with oxygen and produce sparks.

Caution: Risk of combustion and explosion. Cool the workpiece with water.

If suction lines are used, change the filter paper regularly. Warning: Otherwise fire hazard.

Warning! Always use trimming materials only for processing titanium. Keep separate!

Cutting of sprues

Warning! Do not overheat the casting when separating. Cool. No red heat.

For recommended separating discs, see page C 6.

Grinding

If possible, use carbide burs and trim in one direction. Tungsten carbide burs are particularly suitable (see page C 6). Grinding points can be used for smoothing surfaces (see page C 6).

Note! Use carbide burs and grinding points only for trimming *rematitan*®. Keep separate!

Preparation for ceramic bonding

Surfaces which are to be blended with ceramic must be finished entirely with carbide burs. The amount of material removed depends on the particular material thickness. Afterwards, blast off the framework surface with aluminum oxide and condition according to the ceramic manufacturer's instructions.

Rubber polishing

When rubber polishing, it is essential to avoid severe heating of the polishing surfaces!

(For recommended rubber polishers, see page C 6.)

Uniform smoothing of the metal surface to be polished is achieved if this has been ground with very fine emery paper (500–1000 grain) in a sandpaper holder.

Acid treatment

Do not place titanium castings in hydrofluoric acid. Titanium is quickly damaged by hydrofluoric acid!

Polishing

Polish and shine with a soft polishing brush and special titanium polishing paste (Tiger brillant, Ord.-No. 190-350-00, see page C 6–7).

Note! To form a passivity layer, leave polished work exposed to air for at least 10 minutes. Only then steam clean or use ultrasonic cleaner.

Trimming of titanium castings with the *rematitan*® finishing kit

Note on safety

Attention

- **Always wear safety goggles when finishing castings.**
- **Always turn on the extractor unit during work.**
- **The maximum rotation speeds of the various instruments must not be exceeded**

Description

Pure titanium is a soft tough material which requires special procedures for finishing and polishing. The Finishing Set (Ord.-No. 135-500-00) contains the most important materials for the efficient finishing and polishing of titanium for dental purposes.

The sequence of use and the most important finishing characteristics of the individual instruments are described below.

General Notes

- Use the finishing materials for titanium only
- The grinding tools must not become clogged. This precludes the use of other types of tool (e.g. diamonds) for finishing purposes.
- In addition, local overheating of the workpiece must be avoided. For this reason, care must be taken when using rubber polishers.
- Do not exert too much pressure and work at low speeds.

Preliminary operation

Titanium castings are always covered by an oxide skin which must be removed carefully before work begins. This is done with the blasting unit and blasting medium of various grades.

Note: Sparks are always created when finishing titanium.

When using ***rematitan*® Plus** investment material:

Model casting: blasting type Al_2O_3 blast (< 250 µm)
Crowns and bridges: blasting type Al_2O_3 blast (< 125 µm)

Important: Do not damage the edges of the crown. Do not exert too much pressure.

When using ***rematitan*® ultra** investment material:
Use Aluminium oxide Al_2O_3 (30 µm – 250 µm)

For very fine parts (inlays) careful blasting with polishing beads is sufficient.

Procedure for finishing titanium

Follow the finishing instructions in the correct sequence. This enables you to achieve an excellent polish on the titanium with very little effort and expense.

Preparation of surfaces for ceramic applications:

– use tungsten carbide burs only

– blast carefully with Al_2O_3 (125 µm – 250 µm) and 2–3 bars of pressure.

Important: After polishing, the workpiece must be allowed to passivate in the atmosphere for 10 minutes before cleaning with steam jet or ultrasonic cleaner.

In addition to the component numbers, observe the order numbers for spare parts on page C 9.

Finishing instructions		
Operation	**Processing material**	**Remarks**
Removing the casting channels	ST cut-off disk (large) **(1)** STM cut-off disk (thick) **(2)** TX cut-off disk (thin) **(3)**	Thick casting channels, ST cut-off disk (quick grinder) or STM (handpiece) Thin casting channels, TX cut-off disk Do not tilt, cool workpiece with water
Finishing (rough)	Tungsten carbide bur, mini **(4)** Tungsten carbide bur, midi **(5)** Tungsten carbide bur, maxi **(6)** Tungsten carbide bur, maxi plus **(7)**	Maximum rotation speed 10.000 /min. Low pressure force
Finishing (fine)	Aloxin stone, B, blue **(8)** Aloxin stone, C, blue **(9)**	Circular motion on workpiece Do not use Aloxin stone material with surfaces for ceramic application
Fine grinding	Emery paper -500- **(10)**	Recommended before rubber buffing
Rubber polishing	Rubber disk (grey) **(11)** Rubber disk (red) **(12)** Rounded rubber polisher (red) **(13)** Rubber cylinders (red) **(14)**	Use sparingly without pressure and at low speeds (do not overheat) grey = preliminary polish, red = fine polish (align cylinders before first use)
Polishing	Polishing brush, large, (polishing motor) **(15)** Polishing brushes, black **(16)** Small brushes **(17)** Tiger brilliant, polishing paste **(18)**	Change direction of polish frequently For high lustre, no addition of polishing paste

4. Casting with Alloys

All customary dental alloys for prosthetics can be cast with the autocast universal® 230 unit. The alloys are melted on a special ceramic crucible. The electric arc is deflected over an electrode that is set in the crucible.
The output of the electric arc is regulated according to the alloy being used. The tipping of the crucible is done manually via the viewing window.

Preparing the casting ring

Prepare casting object as usual, either with a sprue bar or directly.
The use of metal muffle rings is strongly recommended. Depending on the investment material or preheating program, in some cases micro cracks can form in the investment material. Cracks can lead to inferior pressure values when casting and therefore produce a poor casting reaction. When model casting, the stability of the casting muffle has to be considered. If necessary, metal muffle rings can also be used.

Sprue formers

It is essential to use sprue formers from the rematitan casting system, or other bases with sprue formers that have a clean and smooth base.
In order to seal the casting chamber, it is important to have a complete and smooth seal. When model casting, it is also recommended to use the rematitan® sprue formers (see instructions for rematitan®).

Attention! Do not use sprue formers which do not provide a perfect sealing (i. e. BEGO etc.).

Preheating the muffle

The muffles are preheated, independent of the casting process, according to the instructions for the investment material and casting alloy.

Ceramic seal

Only high temperature ceramic seals should be used.
(Ceramic seal C – Order No. 090-012-60)
Multiple uses are only suitable when the muffle base is very smooth. Do not reuse more than three (3) times.

Ceramic crucible and crucible electrode

Two sizes of ceramic crucibles can be used when casting with alloys.
The small crucible Order No. 090-161-00 can be used for up to 36 grams of non-precious metals and for up to 45 grams of precious metal alloys.
The large crucible Order No. 090-161-50 can be used for a maximum of 54 grams of non-precious alloys and a maximum of 95 grams of high gold containing alloys.
Attention: Precious metal reduced alloys have a lower specific weight, therefore, the maximum melting weight is clearly reduced when compared to high gold containing alloys.
Use a separate ceramic crucible for every alloy!
The crucible electrode should also only be used for one alloy.
Repeated use of the ceramic crucible for up to 40 times is possible, depending on the alloy being used.
The ceramic crucible cannot be cooled down in water after casting (danger of breakage). Without cool down, the crucible can be adjusted up to three times by using tongs or tweezers.
The crucible electrode has to protrude slightly from the ceramic pan. Do not sharpen the electrode! Connect the electrode with a wrench with the copper crucible support, and tighten.

Melting electrode

The melting electrode in the upper melting chamber has to be well sharpened (see section B 18). The position of the melting electrode remains the same when casting with alloys or titanium.
The space between both electrodes is 15 mm when casting alloys. Small differences of ± 1 mm do not have an influence on the casting.

Melting process: Controlling the output

The power output of the casting machine is controlled by an inverter from 5% to 100% by use of a potentiometer. The predetermined output setting does not only depend on the melting temperature of the alloy, but also the quantity of the casting metal.
Due to excessive cooling down of the casting muffle, the melting time should not exceed 40–50 seconds. An automatic safety device tips the crucible after a maximum of 90 seconds.
The suggestions that are mentioned with reference to the output settings, and depending on the melting amount, represent rough guidelines. The output may deviate at different melting temperatures. At the same time, the condition of the melting electrode influences the performance of the electric arc.
Electrodes that become dull after many castings decrease the performance.
If necessary, the output can be corrected either up or down during the melting process.

Average setting "non-precious metal": 50%
Average setting "precious metal": 15%

	Melt Quantity	Melt Output
Non-precious alloys	1 casting piece –6 g	approx. 30–35%
	up to 2 casting pieces 6–12 g	approx. 40%
	3 to 6 casting pieces 13–36 g	approx. 50%
	7 to 8 casting pieces 37–48 g	approx. 55%
	9 casting pieces 49–54 g	approx. 60–65%
Precious alloys	up to approx. 10 g	approx. 10%
	10 g – 30 g	approx. 15%
	30 g – 50 g	approx. 20%
	50 g – 70 g	approx. 25%
	70 g – 95 g	approx. 30–35%

Recognizing the point of casting

After igniting the electric arc, the melting process can be monitored through the darkened viewing window.
At low output settings, the second darkened window can be pushed aside in order to improve the visual monitoring.
Attention: At a higher output > 50%, the second safety viewing glass has to remain, otherwise eye damage may occur due to the bright beam of light.

The casting process is manually controlled via the "cast" button when the melt builds a uniform mass. To avoid partially melted ingots, place them in an overlapping pattern and have them contact one another on the crucible. Avoid placing the ingots in the rear area of the crucible, they are obscured from vision behind the electric arc

a) Ensure a good contact of the metal to the crucible electrode

b) Precious and non precious alloys must be cast immediately when the melting point has been reached without any additional temperature soaking.

Cleaning

Melt residues and splatters have to be removed after every casting process. Especially particles in the funnel between both chambers.
The window of the casting chamber has to be cleaned on a regular basis. (In order to observe the melting process).
Both chambers have to be cleaned regularly.

5. Information Service by Telephone

Contact our Prosthetics Department for any questions you might have – ***Hotline +49 7231/803-410***

DENTAURUM
J.P. Winkelstroeter KG
Turnstraße 31 · 75228 Ispringen
Telephone +49 7231/80 34 22
Fax +49 7231/80 34 09

universal® 230

autocast

Casting Unit

Operating Instructions for the autocast universal® 230 Casting Unit

DENTAURUM

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B Operating Instructions for the autocast universal® 230 Casting Unit

Instructions

Correct use

The autocast universal® 230 unit is intended only for melting and casting titanium and other alloys that are used in dental prosthetics.
It is not suitable for any other purpose.
Dentaurum cannot be held liable for any damage caused by incorrect or improper use.
The correct use of the machine also includes:

- Full compliance with the Instructions and maintenance procedures

Guarantee and liability

Our "General Conditions of Sale and Supply" apply in all cases and are available to all customers. Claims for damage or injury under the guarantee or manufacturer's liability will not be accepted if they are attributable to one or several of the following causes.

- Incorrect use of the machine for other than its intended purpose
- Incorrect installation, start-up, operation and maintenance of the machine
- Operation of the machine with defective, incorrectly installed or ineffective safety devices
- Non compliance with the operating instructions regarding transport, storage, installation, start-up, operation and maintenance of the machine
- Unauthorised modifications to the machine
- Inadequate monitoring of machine components which are subject to wear
- Unauthorized and-or incorrect repairs
- Damage caused by foreign bodies or by Act of God.

Safety Regulations

Symbols and Warnings

In these Instructions, possible sources of danger are marked by the following symbols.

Danger

Reference to a possible source of danger to life or limb.

Disregarding these instructions may cause serious injury or danger to health.

Attention

Reference to a potentially dangerous situation.

Disregarding these instructions may cause less serious injury or damage to property.

Important

This symbol gives important information on the correct handling of the equipment.

Disregarding these instructions may cause the equipment to malfunction or impair the working environment..

Note on Instructions

In accordance with current regulations, these instructions contain all the information necessary for safe operation of the machine.
Apart general references to safety regulations which guarantee safe operation of the machine when it is used correctly, these instructions also contain:

References to residual risks

which, in view of the design and conception of the machine, are impossible to remove. References to such residual risks are specially marked (see section on SYMBOLS and MARKINGS).

This machine should be used, maintained and repaired only by persons who have read and understood these Instructions.

Fundamental Safety Instructions

Comments on the Instructions

- Good knowledge of the safety instructions and safety regulations is essential for the safe handling and smooth operation of this machine.
- These Instructions contain the most important information for safe use of the machine.
- These Instructions in particular the sections on safety must be carefully observed by all persons working with the machine.
- In addition, the rules and regulations for the prevention of accidents applicable in the country or place of use must be observed at all times.

Responsibilities of the operator

It is the operators responsibility to allow only persons to work with the machine

- who are familiar with the fundamental regulations governing safety at work and accident prevention, and who have received instructions on the correct handling of the machine,
- who have read and understood the chapter on safety and the warnings in these Instructions.

Personnel must receive periodic training and instructions.

Responsibilities of personnel

Before beginning work, all persons working with the machine are obligated.

- to comply with the fundamental regulations governing safety at work and accident prevention,
- to read the section on safety and warning notices in the Instructions and to acknowledge with their signature.

Dangers in working with the machine

The autocast universal® 230 has been designed and built in accordance with the latest technical standards and generally accepted safety regulations. The use of the machine may however involve serious danger to the user or third parties or otherwise cause damage to property. The machine should be used only:

- for its intended purpose
- when in perfect technical condition.

Defects or malfunctions which affect the safety of the machine must be corrected immediately.

Safety devices

- Before putting the machine into operation, all safety devices must be correctly installed and function perfectly.
- Safety devices should be removed only after the machine has been switched off and secured against accidental starting.

Safety measures

- These Instructions must be kept permanently at the place where the machine is located.
- In addition to these Instructions always comply with the local regulations on accident prevention and environmental protection.

Training of staff

- Only trained and qualified personnel should be allowed to work with the machine.
- Personnel being trained in the use of the machine must be supervised by an experienced and qualified person.

Danger

Electrical hazards

- **Any work on the power supply system of the machine should be carried out only by a qualified electrician or Dentaurum Service personnel.**
- **Keep the machine closed at all times. It should be opened only by authorized personnel.**
- **If work on electrical components or conductors is required, always seek the help of a second person to operate the main switch if necessary**

Danger Points

- When removing the casting rings or the copper melting crucible, there is a risk of serious burns.

Danger of burns
Always use the crucible tongs

- Exercise proper care when working with inert gas cylinders:
  - never throw gas cylinders
  - never heat gas cylinders
  - ensure that gas cylinders are securely fastened to the wall
  - ensure that they do not leak during storage and operation
- Always store the inert gas cylinders in a well ventilated place.

Danger of fire!

- The electric arc and the high temperature in the chamber may cause many materials to ignite.
- Easily flammable materials (e.g. paper, wood, rags etc.), solvents or cleaning agents must not be placed in the melting and casting chambers.
- Always use the tongs to handle hot rings and melting crucibles.
- Do not quench castings or crucibles in plastic containers.

Modifications to the machine

- Do not make changes or modifications to the machine without the authorization of the manufacturer.
- Any proposed modification must be approved in writing by the manufacturer.
- Machines which are not in perfect working condition must be replaced at once.
- Use only replacement parts supplied by the manufacturer of the machine (see page B 38).
- Other replacement parts may not have been designed and produced in accordance with the same high standards of safety as those from the manufacturer.

Cleaning the machine, disposal of waste

- Handle and dispose of all substances and materials in the correct way. This applies particularly to cleaning solvents.

Note on Maintenance

Never work alone when carrying out maintenance or service work:

Danger

Never work alone!

Attention

High voltage!

Danger

All work on electrical components should be done either by our service personnel or a qualified technician.

The autocast universal® 230 has been designed and built in accordance with generally accepted technical standards. These are: EEC Guidelines, EN (European standards), DIN standards and VDE regulations.

The autocast universal® 230 is operated (i.e. ignited) using high voltage, any work on the inverter must be done with special care.

For reasons of safety, measurements on electrical components during operations must be done only at a suitable distance.

Always remember that capacitors remain active, even after the machine has been switched off.

When working with electrical equipment of any kind, always observe the accident-prevention regulations BGV A2 (VBG 4) "Electrical Equipment and Materials".

When working with electrical components, always observe the following five safety rules:

- **Switch off and disconnect**

  Electrical equipment, components and other material are to be switched off or disconnected by separating them from live components (i.e. components which are receiving a supply of electricity) on all poles and all sides.

- **Secure against accidental switching on**

  All electrical equipment which has been switched off or disconnected must be secured against being accidentally switched on e.g. through human error or vibrations.
  Lock the main switch with a padlock or remove the fuses.
  Use all the mechanical locking devices provided.
  Apply a warning notice in a clearly visible area for the duration of work.

- **Check absence of electricity**

  Use measuring instruments or indicators to ensure that components are no longer live. Measure all poles against one another and against the neutral conductor.

- **Grounding and short circuiting**

  Always ground first. In low voltage equipment, short circuit the capacitors. With high voltage equipment, short circuit the high voltage wires and capacitors. Do not forget to remove the grounding and short circuit bridges upon completion of work.

- **Cover and/or isolate neighboring live components**

  If there is any danger of accidental direct contact with unprotected live components during work, or if it is impossible to switch off or disconnect these components, a suitable solid covering of insulating material should be used to secure them against direct contact (rubber or plastic sheets).

Maintenance, repair and troubleshooting

- Always carry out the prescribed maintenance work punctually (see page B 28–31).
- Pull out the power plug before doing maintenance work
- Disconnect the machine and ensure that it cannot be switched on again accidentally.
- Check all screw or bolt connections after re-assembling the machine.
- On conclusion of maintenance work, re-check the function of the safety devices.

Information for the autocast universal® 230 Casting Unit

Casting with Titanium

Due to the high melting point of titanium, the autocast universal® 230 unit is equipped with a highly efficient melting system that supplies the energy necessary for melting the titanium within a very short period of time. When the start button is pressed, the entire melting and casting process takes place automatically.
The complete melting/casting process takes place in an enclosed double chamber system. The melting chamber is filled with argon gas and the casting chamber is under vacuum. The titanium is placed on a copper crucible.
The skull melting process leaves the crucible undamaged because the titanium melt is enclosed within a shell of solid material. An electric arc melts the metal within a given period of time. The melting period depends on the amount of metal to be melted. Once the degree of liquidity for casting has been reached, the melt is tipped under pressure/ vacuum assistance via an argon flush into the muffle.

Casting with Alloys

Contrary to casting with titanium, the output of the electric arc is individually set depending on the alloy used. The alloy is melted on a special ceramic crucible under visual control and then tipped when the right casting moment has been reached.

Requirements for a universal melting and casting unit for use in the dental field, are:

- Safe and reliable casting of titanium and other alloys while retaining all their characteristics.
- Compact size for accommodation in the dental laboratory.
- The autocast universal® 230 has a low energy consumption.

Technical data

Melting process:

DC electric-arc melting with a tungsten electrode in an inert-gas atmosphere (argon) and special copper crucible.

Casting process:

Vacuum pressure casting into a ring flushed with argon.

Connected load:

230 Volt, 1-phase, 50-60 Hz, 4,6 kVA

Fuse protection of socket:

3 x 16 Amp., slow-acting – Neozed fuse –

Electric arc:

220 A, 15–17 V

Casting capacity:

Up to 15 castings per hour

Maximum melt weight:

Titanium	40 g
Non precious metal alloy	45 g
High gold containing alloy	95 g

Argon requirement:

20–25 litres per min.

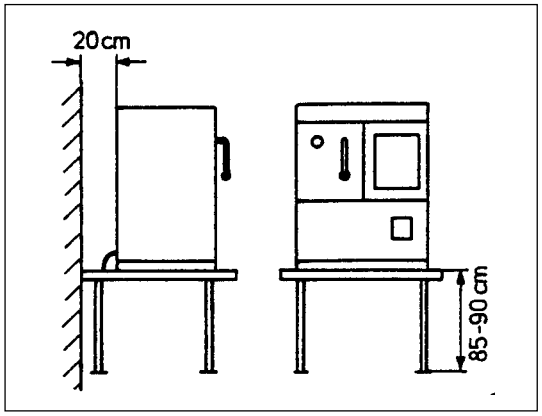
Vacuum pump:

oil-free	220V / 240V
suction power: 4,5 m^3/hour	0.37 kW

Dimensions:

Width:	450 mm/17.7”
Height:	800 mm/31.5”
Depth:	450 mm + 200 mm wall clearance
	17.7” + 7.9” wall clearance
Weight:	80 kg/176 lbs.

Installation



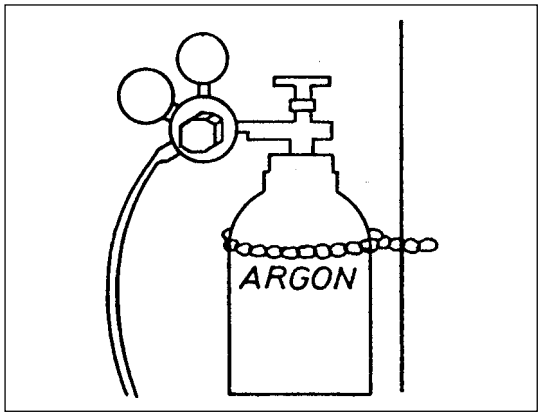
Location

- Locate the autocast universal® 230 in a clean dry room.
- Ensure that the room is sufficiently spacious
- Do not position the autocast universal® 230 close to ovens or other heat generating devices
- The autocast universal® 230 is a bench unit. Bench height, 85–90 cm/33½–35½".
- Ensure that the bench is sufficiently stable and does not wobble (minimum carrying capacity 100 kg/220 lbs.)
- The distance between the wall of the room and the back panel of the machine should be approximately 20 cm/8".
- Align the unit by using a spirit level and the adjustable legs.
- Ensure that the working area is well illuminated.

Electrical connection

The unit is connected to the power supply via a grounded safety socket. Distance from unit is 1 metre.

Connected load:	230 V, 3-phase, 50-60 Hz, 4,6 kVA
Cable length:	2 m
Socket:	protected by 1 x 16 A slow acting Neozed fuse



Argon supply

Use only argon of the following classification:
Argon 4.8 HR 99.998% to DIN 32526 or higher purity
Size of argon cylinder: 10 litres min.

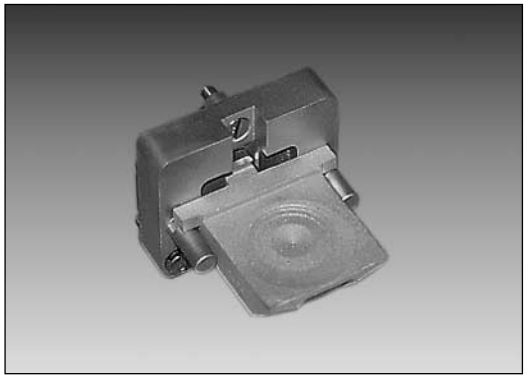
- **Secure the argon cylinder with a chain to prevent it from falling over**
- **the argon cylinder at a maximum distance of 1 metre from the machine**
- **Connect the pressure regulator to the argon cylinder using an open ended wrench**

Push the argon hose onto the coupling (argon) in the back panel of the unit and connect the other end to the pressure regulator using a hose clamp.

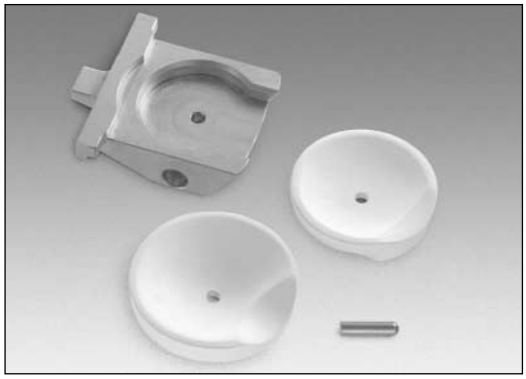
Attention

Always make sure that the valve at the gas bottle is opened and that there is enough gas in the gas container.

Instructions for the autocast universal® 230 Casting Unit



Pure copper crucible



Crucible holder, ceramic crucible and crucible electrode

Start-Up

- Open the argon cylinder and the cylinder pressure regulator at the stop valve (K)
- Set the secondary argon pressure (I) to 5 bars at the cylinder pressure control (J)
- Connect the unit to the power supply
- Turn the unit on at the main switch (D).
  A signal will sound to let you know the unit is ready.
- Open the chamber door (C).

The terms are explained on page B34 and B35.

Positioning the crucible in the crucible holder

- Select the crucible for titanium (pure copper crucible) – or for the selected alloy (combination crucible) support, ceramic crucible and crucible electrode.
  When casting with alloys, a ceramic crucible (Order No. 090-161-00) is inserted into the copper crucible support (Order No. 090-160-00).
  A special crucible electrode (Order No. 090-162-00) is attached to the crucible support with a wrench.
  The rounded point should protrude slightly from the ceramic pan.

Attention:
Use one ceramic crucible and one crucible electrode for each separate alloy.

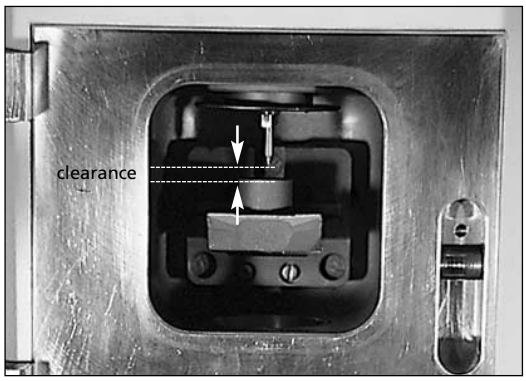
Attention

Do not immerse ceramic crucible in cold water to cool off.

Place the clean and dry crucible (F) with the sprue facing forward, horizontally on the bars of the crucible holder.

- Push the crucible (F) to the back of the melting chamber until its corner support fits into the grooves of the bars, and the nose of the crucible clicks audibly into the crucible holder (G).

For premature removal of the crucible please push the CAST button.



Positioning the melting material (L)

a) Titanium

- Place the required titanium ingot (18 g, 22 g, 31 g, 36 g, 40 g) on the crucible with the flat surface down (F)
- The positioning rings on the crucible determine the exact position of the titanium casting metal on the crucible.

b) Alloys

- **Filling the crucible with metal (alloys):**
  Take notice that there is contact between the metal and crucible electrode, as well as the individual metal pieces. Place the metal pieces in the center and make sure that there is less metal behind the electrode. (During the melting process the metal is not visible behind the light arc).

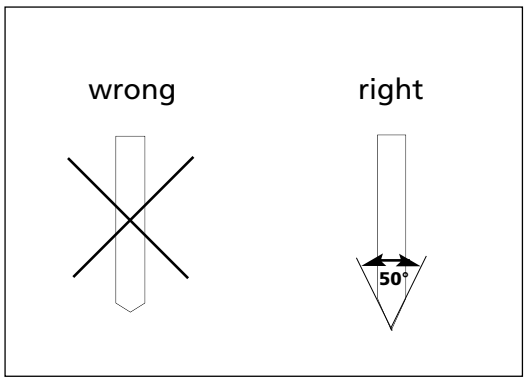
Setting the electrode clearance

a) Titanium

- The distance between the tip of the electrode and the surface of the metal must be 5 mm.
- Open the electrode clamp (M) with a ring wrench (A/F 7 mm).
- Set the electrode clearance to 5 mm using the gauge provided.

b) Alloys

- The distance of the electrode remains the same (when compared to titanium casting).
- The distance between the crucible electrode and the upper melting electrode is 15 mm.



Important: The triangular tip of the electrode (N) must always have an angle of 50°.

- The height of the electrode does not have to be changed when casting titanium or alloys.
- To replace the electrode (N) see page **B 30.**

Location of the ring-support plate

- Switch on the main switch (D).
- An audible signal and the green light (mains power supply) indicate that the unit is ready for operation.
- Open the cylinder pressure regulator to start the flow of argon gas.
- Place the support disk (O) on the mandrel in the casting chamber (B) with the knobs upwards.
- Place the ring-contact plate (P) on the support disk (O).
- The ring-contact plate (P) is moved up and down by the rocker switch (Q).
- When the rocker switch is at the centre position “0” the ring-contact plate remains stationary in its current position.

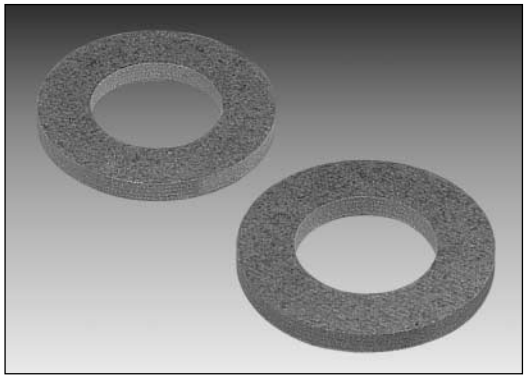
Important:
The "0" position is for positioning the muffel on the contact plate.

Attention

Always move the switch to its upper position for melting and casting.

Ceramic seal

The ceramic seal (R) serves to seal the ring (S) against the melting chamber (A). It provides an effective seal between the ring and the pouring funnel (T) during the entire melting and casting process.
Seals that are dry or have not been damaged can be reused up to 3 times. Ceramic seals are available for high temperature casting (Order No. 090-012-60)



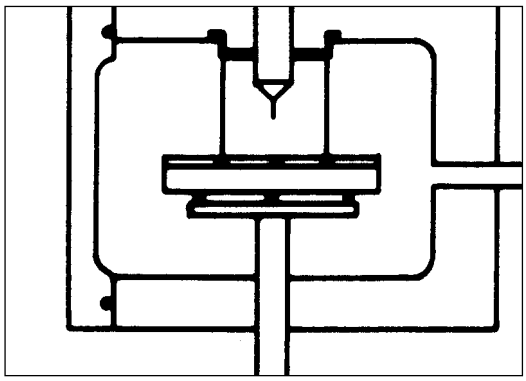
Ceramic seal (R)

Important!
Damaged or wet seals should not be used as these will cause casting failures.

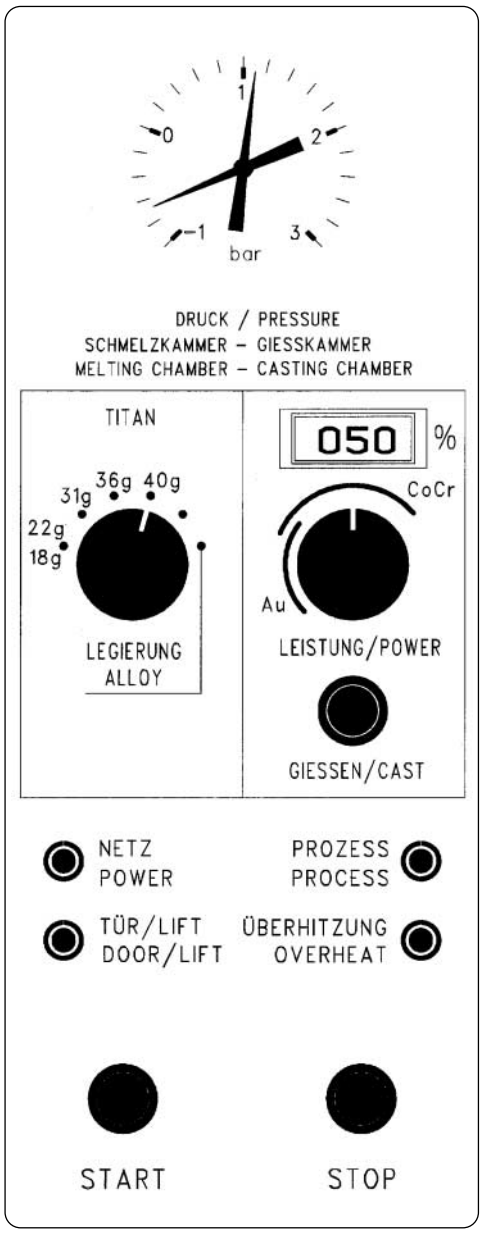
Positioning the muffel

- Remove the muffel from the heating oven.
- Align the seal (R) to the funnel (S).
- Place the casting ring into the casting chamber (B) with its flat side towards the back panel.
- Place the muffel (S) on the centre of the muffel-contact plate (P) so that the downsprue is exactly beneath the pouring funnel (T).
- By switching the rocker switch (Q) upwards, press the muffel against the pouring funnel (T).

Funnel (S) with ceramic seal (R)



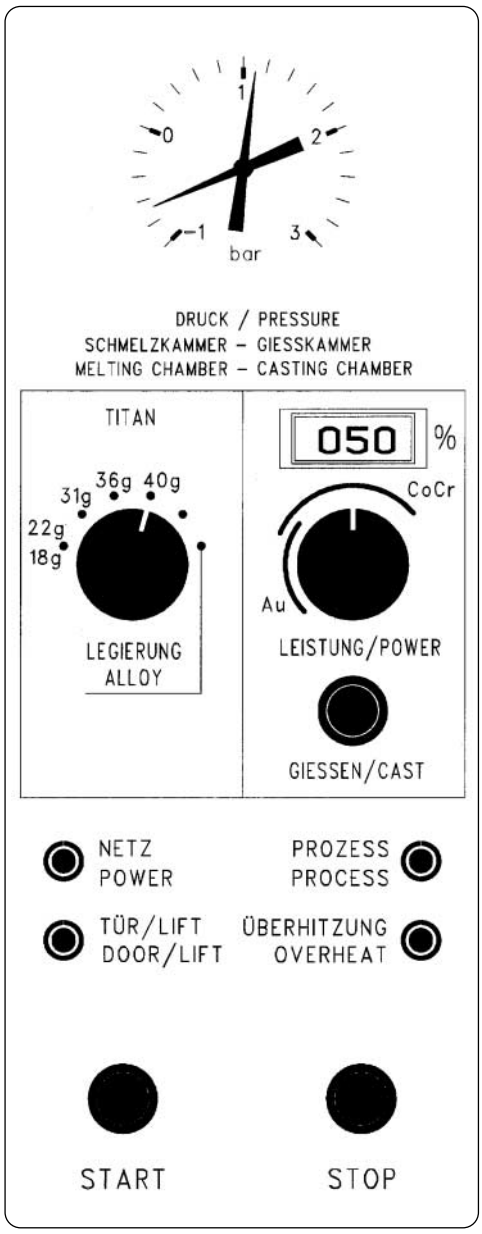
Do not dislocate the seal when inserting the muffel! Do not tilt the muffel during insertion! Leave the rocker switch in the upper position.



Initiation of the automatic melting and casting process when using titanium

- Open the argon valve at the gauge connected to the bottle.
- Ajust the gas pressure at 5 bar.
- Close chamber door (C).
- Set the turnbutton at the selected titanium quantity.
- Press the start button.
- Melting and casting commences automatically.
- The yellow LED indicates the commencing of the process.
  Blinking = *Evacuation of chambers*
  Illuminated = *Melting Casting*
- While casting, pressure and vacuum values may be observed at the pressure gauge on the machine:
  Green needle = Vacuum in casting chamber = – 1 bar
  Black needle = pressure in melting chamber = 0,97 bar.

When casting titanium the inverter value is always 100%. This value is not displayed and cannot be altered.



Sequence while casting titanium

1. The melting chamber in briefly flushed with argon.

2. Both chambers are evacuated.

3. The melting chamber is flooded with argon and the arc ignites while the casting chamber is still being evacuated.

4. After a melting time of:
   t_s = 32 s Ti 18/22 g
   t_s = 43 s Ti 31 g
   t_s = 49 s Ti 36 g
   t_s = 60 s Ti 40 g
   The crucible automatically tilts the melt into the casting chamber.

5. The argon pressure in the melting chamber raises to 1,4 bar.

6. The delay time amounts to 40 seconds.

7. The pressures in casting and melting chamber are relieved.

8. The completion of the process is indicated by a beep.

Danger

Never open the chamber door before completion of the whole process.

Manipulating of the process

1. **Reduction of melting time:**
   Pressing the "CAST" button initiates premature tilt of the melt.
2. **Extension of melting time:**
   Pressing the "START" button at least 5 seconds before elapse of melting time prolongs the melting process for up to 65 seconds.
   For reference: 5 seconds before elapse of melting time, a beep indicates the completion of the process.
3. **Abortion of process:**
   Melting and casting process may be aborted at any time by pushing the STOP button. The crucible does not tilt. All electric proceedings are interrupted and the chambers are relieved.
   After elapse of a safety period (40 s) the end of processes is indicated by a beep.

Danger

Do not open chamber door prematurely!

Prefixed parameters for titanium processing:

– Flushing	4 s
– Evacuation	max. 15 s
– Flooding	60 s

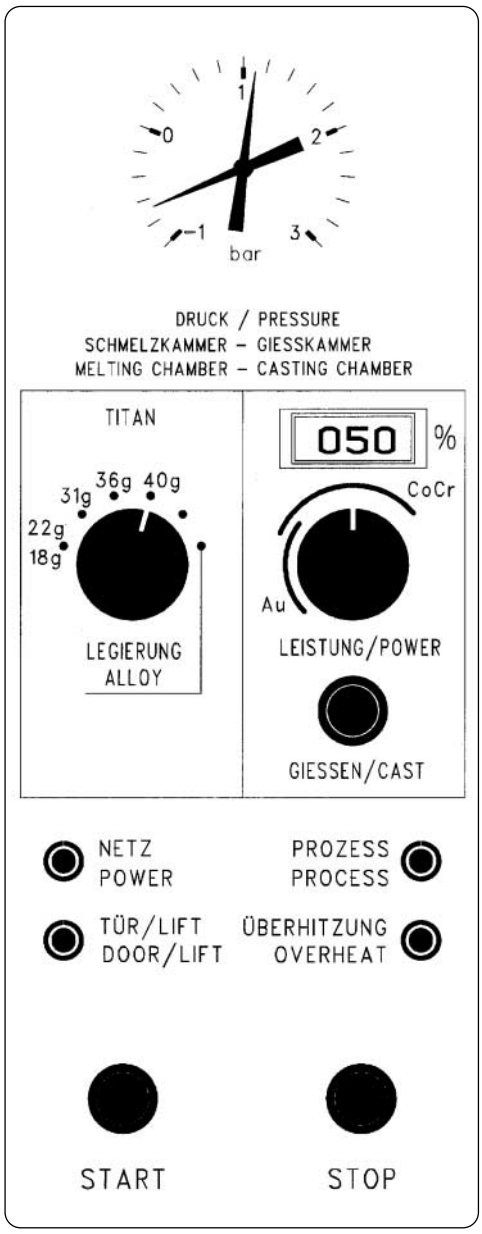
End of process

- After opening the chamber door, the ring is removed by flipping of the rocker switch to the bottom position.
- Remove ring and crucible and quench both in cold water.

Danger

Danger of burns!

- Remove titanium residues from crucible.
- Wipe dry the crucible.

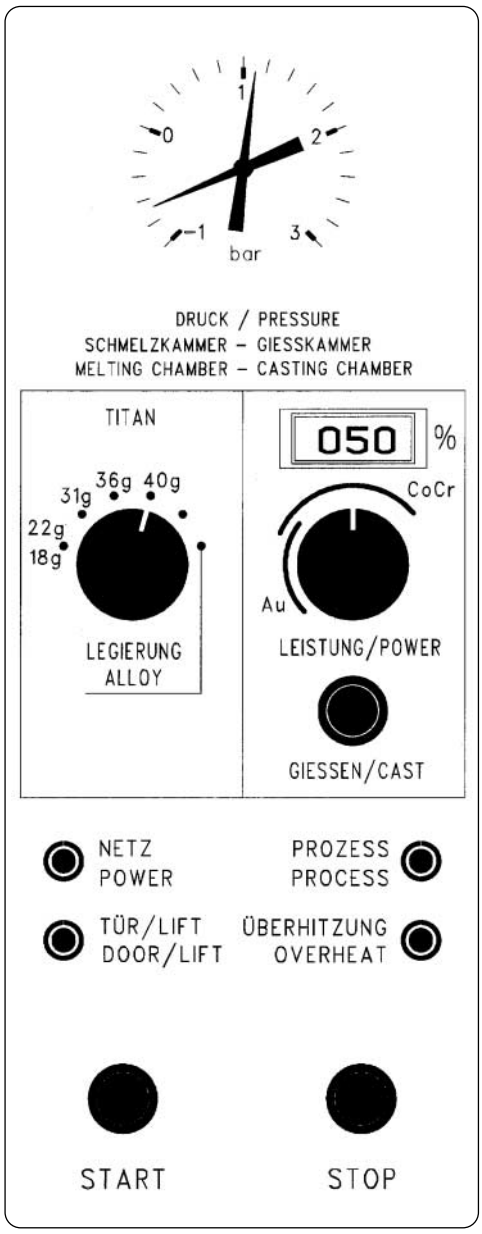


Casting of alloys:

Start of melt and casting process when using alloys

Set the rotary switch to alloys.
The set power of the iverter appears on the LED display.

The setting for different alloys is done manually by rotating the potentiometer marked “POWER” to the desired setting.



Non-precious alloys are generally melted at 50% inverter power. Small amounts can be melted from 30% on up, larger amounts with a maximum of 65% inverter power (vgl. 29–32).

Precious metals are generally melted with 15% inverter power. Small amounts can be melted from 10% on up, larger amounts with a maximum of 35% (see 29–32).

- Preset the inverter power with the rotary switch "POWER".
- After stocking the machine with alloy and positioning of the ring (see B17) press the "START"-button.

  ⇨ The pressure-respectively time – controlled process of melting begins. Pressure- and vacuum-values can be observed during the whole process at the pressure gauge (see B21).
- As soon as the arch ignites, the power can be readjusted at any time by turning the rotary switch to higher or lower settings.
- After all ingots have completely coalesced, press the "CAST" button.

After the electric arc has ignited, the melting process can be monitored through the darkened viewing window. At low output settings, the second darkened window can be pushed aside, thereby allowing better visual control of the melting process.

Attention

In case of non ignition of the arch the melting process may be interrupted by pressing the "STOP"-button, or by turning the main switch. Check contact of the crucible electrode to the alloy!


Danger

At a power output higher than 50%, the second safety glass has to stay, otherwise there is a chance of eye damage due to the bright stream of light.

If after 90 seconds the CAST button is not pressed, the crucible will tilt automatically.

- The remaining sequence is the same as casting with titanium (Page B 22).

Interruption of process:
The melting- and casting-process may be interrupted at any time by pressing the "STOP"-button without tilting the crucible.
All electrical proceedings are cut off and the chambers are flooded with air.
After elapse of a safety block of 40 seconds an acustic signal indicates the termination of the process.


Danger

Do not open the chamber door before termination of the process!


Danger

Crucible holder with ceramic crucible cannot be quenched in water. The sudden cool down could break the crucible.

Parameters for processing alloys:

– Flushing time	4 s
– Vacuum time	max. 15 s
– Cooling time	10 s

Additional function Crucible control

The tilt function of the crucible may be even controlled with open door of the casting chamber, by pressing the "CAST" button. With this function, also a mislocated crucible may be released and removed.

Maintenance and setting

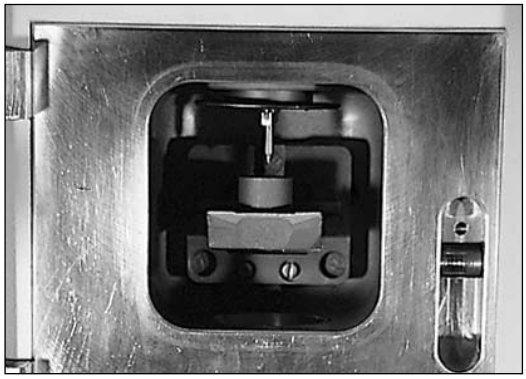
Inspection before every casting process

- Check the funnel between the two chambers for casting residues and clean if necessary.
- Check the tip of the electrode (N) and grind it to the correct shape if necessary.
- Use only a dry clean crucible and dry clean ceramic seals.
- Sand-blast seriously oxidised crucibles and electrodes in the sand blaster.

Clean copper crucibles and electrodes thoroughly after sand blasting.

Danger

If work on electrical components or conductors is required, always seek the help of a second person to operate the main switch if necessary.



Replacing the electrode (N)

- Loosen the electrode clamp with a wrench (A/F 7 mm)
- Remove the electrode from the clamp.
- Grind the tip of the electrode to the correct shape (see page B 18).
- Replace the electrode and tighten the electrode clamp (M).

Removing the funnel (T)

- Using the pin pliers, release the ring nut in ceiling of the casting chamber
- Remove the funnel upwards
- When replacing the funnel, tighten the ring nut. Observe the position of the ring nut. Do not forget the O ring.

Replacing the safety glass

The safety glass can be removed by pressing the tension spring.

Care

- The autocast universal® 230 requires only a minimum of care.
- Use a damp cloth to clean the surface.

Weekly maintenance

- Cleaning the sinter filter:
  Remove radiator from the melting chamber.
  Unscrew filter – if necessary with a fork spanner SW 17 mm from the melting chamber.
  Clean the filter in ultrasonic bath.
  After drying reassemble the filter in the reverse sequence.
- Clean the reflector metal sheets in the casting chamber.
- Remove the safety glass on the inside of the door and clean it if necessary using a paper towel soaked in solvent. If the glass is damaged or soiled by splashes of metal, replace it.

Error signals – causes and remedies

If an error occurs during operation or during the process, it is displayed on the touch panel and a buzzer is heard at intervals of one sec. When the error has been corrected, the signal must be acknowledged by touching Quit.

The following problems may occur:

	Signal	Cause	Effect	Remedy
	Check door / lift	Started with door open Started with casting mould not clamped (toggle switch not up)	Process start prevented. No value in service mode	Flip toggle switch to upper position, close door
	No quantity selected	Started without selecting melt quantity (fig. 2)	Process start prevented. No value in service mode	Select melt quantity
	No arc current	Plasma source does not generate current despite inverter being switched on ● No material in crucible ● Defective electrode ● Defective inverter	Process aborted. No value in service mode	Place material in crucible Check electrode Inverter check only by approved electrician!
	Chamber temperature	Temperature in casting chamber too high	No effect on current process, new process start prevented	Switch unit off and allow to cool
	Ring defective, STOP!	Pressure increase in casting . chamber during melting process due to defective ring	Pressure monitoring system detects continuous excessive pressure (min. 3 sec.) in melting chamber. Melting process aborted. Cool off. No tilting of crucible. No value in service mode.	Replace ring. Check seal.

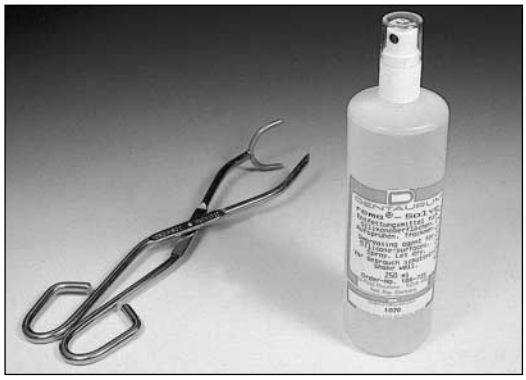
Technical service

Should any other defects or malfunctions occur,
please contact the
Dentaurum Customer Service Dept.

DENTAURUM
J. P. Winkelstroeter KG
Turnstraße 31 · 75228 Ispringen
Telephone +49 7231/80 34 22
Fax +49 7231/80 34 09

We recommend that you subscribe
a maintenance and service contract with us.
Please contact us for details.

Accessories for autocast universal® 230 Casting Unit



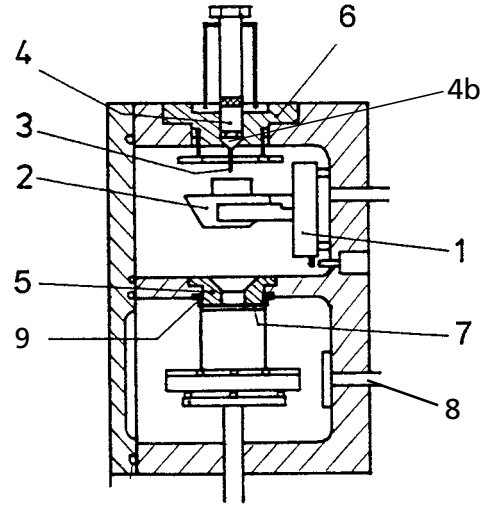
Included with basic unit:

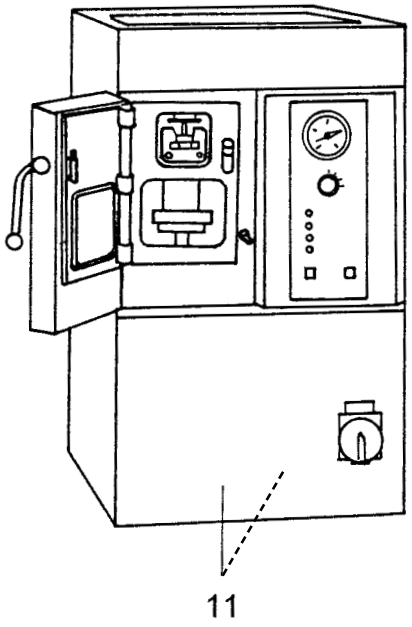
Titanium casting metal (5 x 31 g)
1 melting crucibles
1 receptacle for crucible alloys
5 ceramic crucibles
5 ceramic crucibles (large)
1 package crucible electrodes
1 casting ring plate (907-271-00)
1 support disk
1 test mold
1 hose (2.5 meter in length)
1 cylinder pressure reducer
1 set electrodes (3 pieces) (40mm long)
1 set ceramic seals (100 pieces)
1 tool kit consisting of:
- 1 plate for crucible
- 1 pin-type face wrench
- 1 pair of crucible tongs
- 1 pair of tongs for removing crucible
- 1 ring wrench SW 7

Cleaning agents

for cleaning melting chamber:
Pump spray Lubrofilm 100 ml Ord.-No. 112-050-00

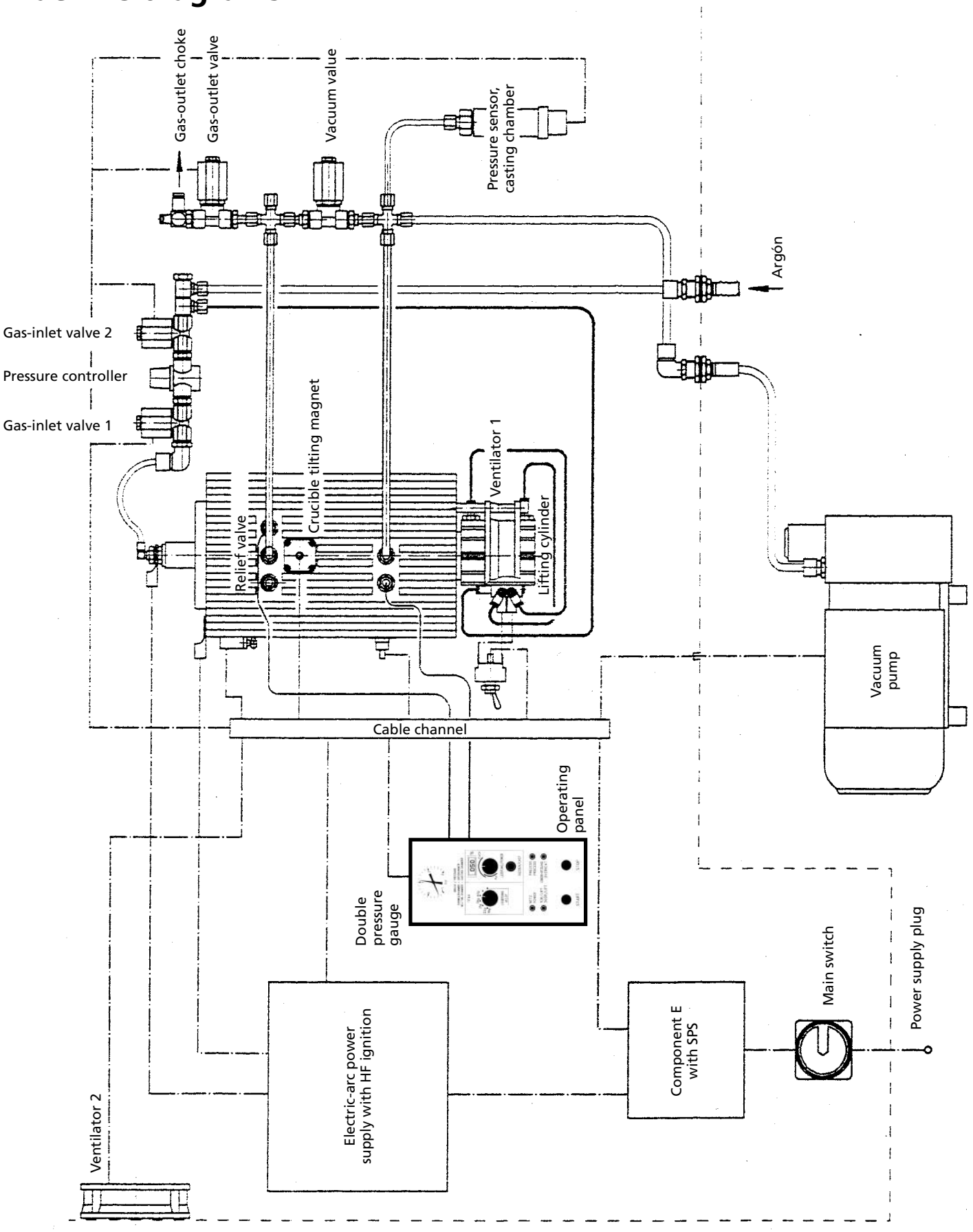
Spare parts list

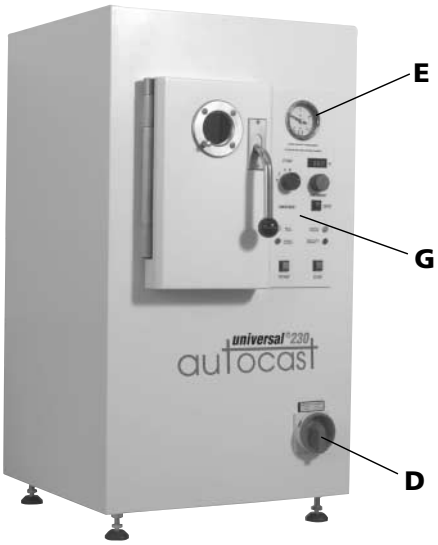




No.	Replacement parts	Order No.
1	Crucible holder	907-001-02
2	Melting crucible	090-110-00
3	Electrode (3 piece)	907-001-03
4	Electrode clamp	907-617-10
4b	Spannhülse mit Spritzschutz	907-617-60
5	Copper funnel	907-571-10
6	Ceramic insulation	907-428-00
7	Ceramic seal (high temperature resistant)	090-012-60
8	Sinter filter	908-324-00
9	Fixation of cast funnel	907-001-17
11	Vacuum pump	907-001-12
	Fuse 2.5 A,t	908-802-00
	Fuse 0.5 A,t	908-909-00
	Pressure gauge	908-940-00
	Claw wrench	907-001-14
	Tongs	907-001-15
	Receptacle for crucible alloys	090-160-00
	Ceramic crucible (10 pieces)	090-161-00
	Ceramic crucible – large (10 pieces)	090-161-50
	Crucible electrode (5 pieces)	090-162-00

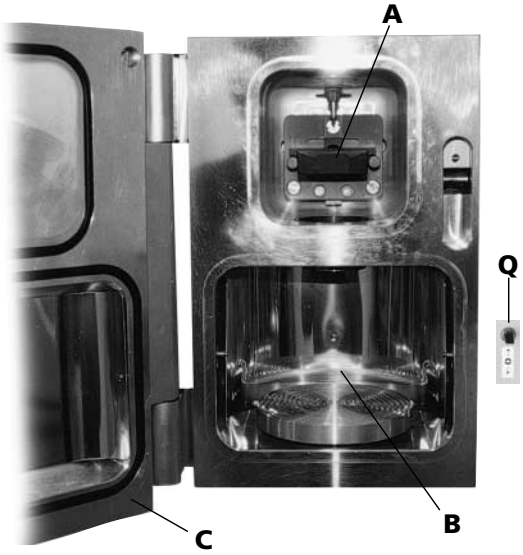
Machine diagrams

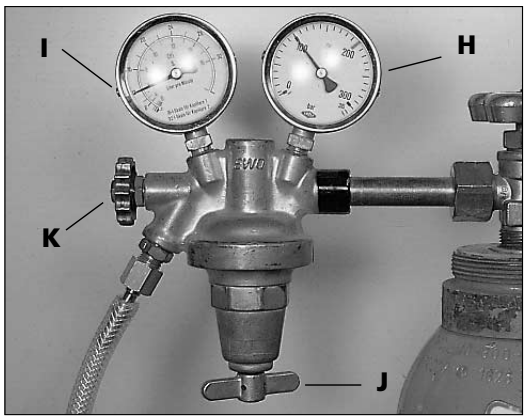




Individual elements of the autocast universal® 230

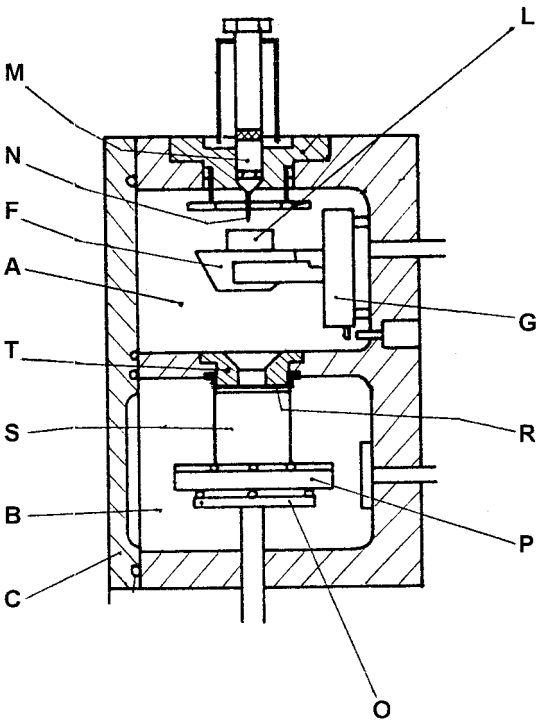
A Melting chamber
B Casting chamber
C Chamber door
D Main switch
E Double pressure gauge
G Touch panel
Q Rocker switch





Pressure gauge

H Primary pressure gauge
I Secondary pressure gauge
J Pressure controller
K Stop valve



Melting and casting chamber

A Melting chamber

B Casting chamber

C Chamber door

F Crucible

G Crucible holder

L Ingot

M Electrode clamp

N Electrode

O Support disk

P Ring contact plate

R Ceramic seal

S Ring

T Funnel

EEC-Declaration of Conformity

Dentaurum J. P. Winkelstroeter KG
Turnstraße 31
D-75228 Ispringen

hereby declares that the design and construction of the laboratory equipment described below, including the version marketed by us, comply with the basic regulations governing safety and health as stated in the EEC Guidelines. This declaration will become invalid if the laboratory equipment is modified or altered in any way without our prior consent.

Description of the unit:	Autocast Universal 230 (090-155-00)	
Type of Unit:	Casting Unit	
Order-No.:	122-001	
EEC Guidelines:	EEC Guideline for machine modified guideline RL 98/79/EG	98/37/EG
	Electical equipment used within certain voltage limits modified guideline RL 93/68/EWG	73/23/EWG
	Electromagnetic compatibility modified guideline RL 91/263/EWG modified guideline RL 92/31/EWG modified guideline RL 93/68/EWG	89/336/EWG
Applied unified standards:	EN 292; EN 55011; EN 60335-1	
Applied national standards and technical specifications:	DIN VDE 0100; DIN VDE 0110; DIN VDE 0544 DIN VDE 0700; DIN VDE 0721; DIN V 19250	

DENTAURUM J. P. WINKELSTROETER KG Tel. (07231) 803-0 75228 Ispringen

Date and manufacturer signature: 09.06.04 .....

Signatory: –i.V.Dipl.Ing.(FH)K.Merkle–
Production Manager

universal®230

autocast

Gießsystem

Operating Instructions
Accessories and replacement parts

DENTAURUM

Index

C Accessories and spare parts

Materials for crowns and bridges of Tritan titanium casting metal CE 0483

Tritan titanium casting metal, Ti 1 (crowns/bridges)

Weight	Ingot ∅	Height		
approx. 18 g	21 mm	11.5 mm	250 g	**Ord.-No. 100-100-50**
approx. 22 g	21 mm	14.3 mm	500 g	**Ord.-No. 100-101-50**
approx. 31 g	25 mm	14.3 mm	500 g	**Ord.-No. 100-102-50**
approx. 36 g	27 mm	14.3 mm	500 g	**Ord.-No. 100-103-50**
approx. 40 g	27 mm	15.8 mm	500 g	**Ord.-No. 100-105-50**

***rematitan*® M – Ti4**

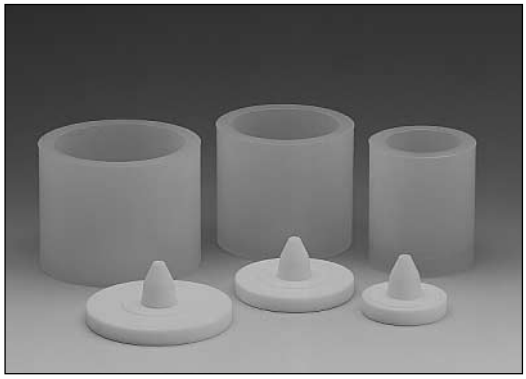
approx. 31 g	25 mm	14.3 mm	1 kg	**Ord.-No. 100-107-00**

***rematitan*® Plus investment**

80 x 250 g	20 kg	**Ord.-No. 107-600-00**
32 x 250 g	8 kg	**Ord.-No. 107-610-00**

Special mixing liquid for crowns and bridges

Concentrate	1 l	**Ord.-No. 107-602-00**



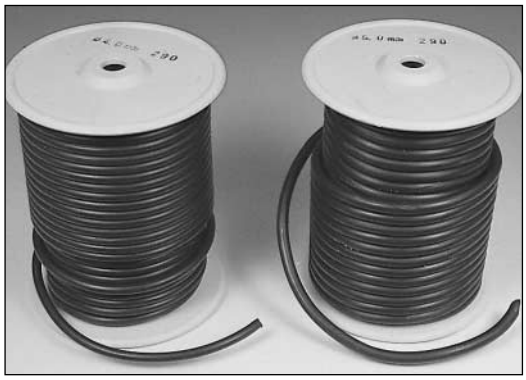
***rematitan*® Plus investment**
Muffle base with sprue former:

Size 3	**Ord.-No. 106-850-50**
Size 6	**Ord.-No. 106-851-00**
Size 9	**Ord.-No. 106-852-00**

Muffle rings, elastic:

Size 3	**Ord.-No. 106-840-00**
Size 6	**Ord.-No. 106-841-00**
Size 9	**Ord.-No. 106-842-00**

Muffle rings to be used in accordance with the size of base.

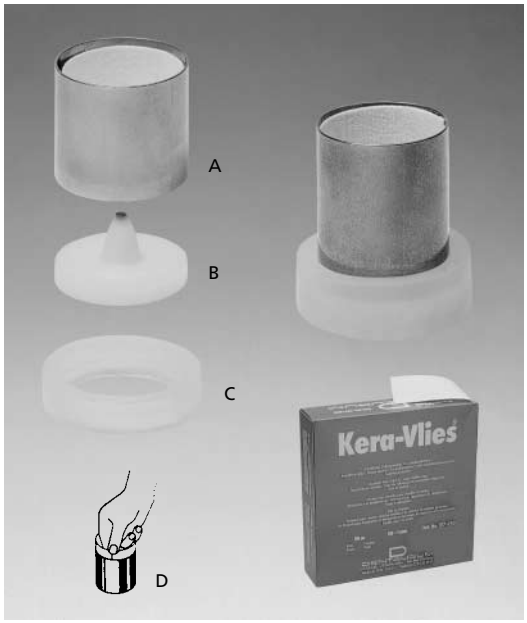


Blue wax wire on rolls

∅ 2.5 mm	250 g	round	**Ord.-No. 111-825-00**
∅ 3.0 mm	250 g	round	**Ord.-No. 111-830-00**
∅ 3.5 mm	250 g	round	**Ord.-No. 111-835-00**
∅ 4.0 mm	250 g	round	**Ord.-No. 111-840-00**
∅ 5.0 mm	250 g	round	**Ord.-No. 111-850-00**

Hard wax wire on rolls

∅ 2.5 mm	250 g	round	**Ord.-No. 111-425-00**
∅ 3.0 mm	250 g	round	**Ord.-No. 111-430-00**
∅ 3.5 mm	250 g	round	**Ord.-No. 111-435-00**
∅ 4.0 mm	250 g	round	**Ord.-No. 111-440-00**
∅ 5.0 mm	250 g	round	**Ord.-No. 111-450-00**



Trinell investment:

Special Speed Liquid	1000 ml	**Ord.-No. 107-655-00**
Trinell Mixing Liquid	1000 ml	**Ord.-No. 107-653-00**
Trinell Powder	28 x 250 g	**Ord.-No. 107-654-00**

***rematitan*® Ultra investment:**

7 kg Container		**Ord.-No. 107-650-00**
Mixing Liquid	1 l	**Ord.-No. 107-651-00**

Investment system especially for Trinell and ***rematitan***® Ultra investment materials.

Application: crown and bridge
Ring size ③ = ∅ 48 mm, Ring size ⑥ = ∅ 65 mm,
Ring size ⑨ = ∅ 88 mm

A Muffle rings, stainless steel, 2 sizes (③, ⑥)

1 piece	③	**Ord.-No. 106-801-00**
1 piece	⑥	**Ord.-No. 106-802-00**

B Muffle base, with sprue former, 3 sizes (③, ⑥, ⑨)

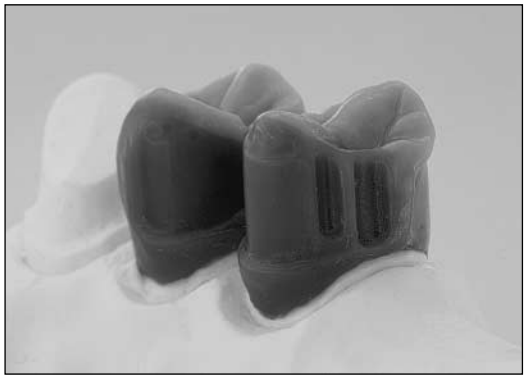
1 piece	③	**Ord.-No. 106-850-50**
1 piece	⑥	**Ord.-No. 106-851-00**
1 piece	⑨	**Ord.-No. 106-852-00**

C Fixing ring for connecting muffle ring and base, 3 sizes (③, ⑥, ⑨)

1 piece	③	**Ord.-No. 106-845-00**
1 piece	⑥	**Ord.-No. 106-846-00**
1 piece	⑨	**Ord.-No. 106-847-00**

D Kera-Vlies. Asbestos free liner.

Size: 1.0 x 50 mm	25 m	**Ord.-No. 127-250-00**



Cervical wax:

StarWax C	50 g	**Ord.-No. 120-212-00**

Modelling waxes:

Star Wax CB green	50 g	**Ord.-No. 120-201-00**

Modelling waxes:

Star Wax CB beige (opaque)	50 g	**Ord.-No. 120-202-00**

Milling wax:

Star Wax M	50 g	**Ord.-No. 120-211-00**

Lubrofilm®

Degreases wax surfaces. Guarantees bubble-free flow of investment.

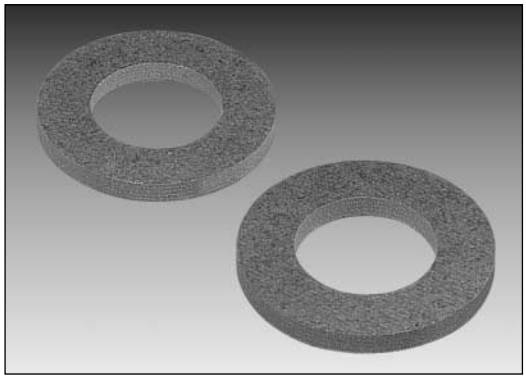
Note! Also can be used as a silicone surface tension-reducing agent.

Pump spray	100 ml	**Ord.-No. 112-050-00**
Refill bottle	1000 ml	**Ord.-No. 112-051-00**

Folident Mini thermoforming unit for plastic foils.

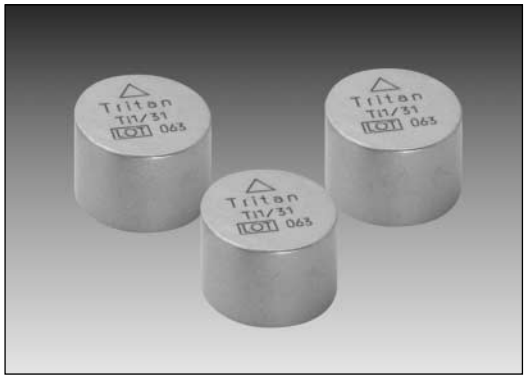
Set includes:
Moulding pot/foil holder
100 foils each of 0.6 and 0.1 mm **Ord.-No. 120-130-00**

Replacement foils:	0.6 mm	100 pieces	**Ord.-No. 120-131-00**
	0.1 mm	200 pieces	**Ord.-No. 120-132-00**



Ceramic seals C

100 pieces **Ord.-No. 090-012-60**



Materials for titanium model casting

CE 0483

Tritan titanium casting metal, Ti 1 (model casting)

Weight	Ingot ∅	Height		
approx. 31 g	25 mm	14.3 mm	500 g	**Ord.-No. 100-102-50**
approx. 36 g	27 mm	14.3 mm	500 g	**Ord.-No. 100-103-50**
approx. 40 g	27 mm	15.8 mm	500 g	**Ord.-No. 100-105-50**

The ingot dimensions are suitable for the ***rematitan***® titanium casting system.

Only ingots of 31 g or more are used for model casting. Use 36 g ingots for more extensive constructions.

rematitan® **M-Ti4**

approx. 31 g 25 mm 14.3 mm 1 kg **Ord.-No. 100-107-00**

rematitan® **Plus Investment**

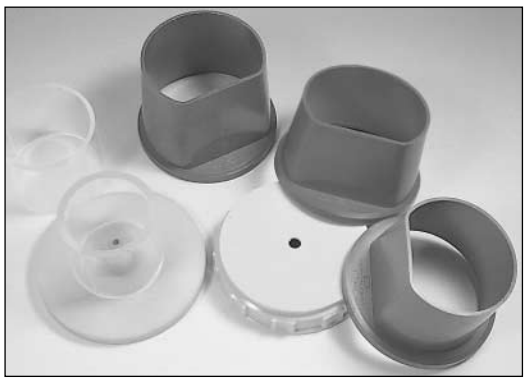
80 x 250 g sachets 20 kg **Ord.-No. 107-600-00**

32 x 250 g sachets 8 kg **Ord.-No. 107-610-00**

rematitan® **model casting mixing liquid**

1 l **Ord.-No. 107-601-00**

Approx. 3.2 litres are needed for 20 kg.



Plastic muffle rings of Rema®-Form

∅ 80.5 mm Height 54,5 mm
red, 1 piece **Ord.-No. 127-307-00**

∅ 71.0 mm Height 54,5 mm
green, 1 piece **Ord.-No. 127-306-00**

∅ 78.0 mm Height 70,0 mm
blue, 1 piece **Ord.-No. 127-308-00**

Base plate for waxing-up models

Rapid fixing of the rings.

Suitable for all rings.

1 piece **Ord.-No. 127-309-00**

Plastic sprue formers

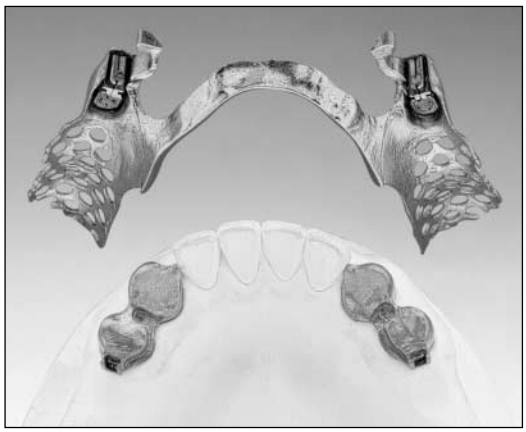
5 pieces **Ord.-No. 090-027-00**

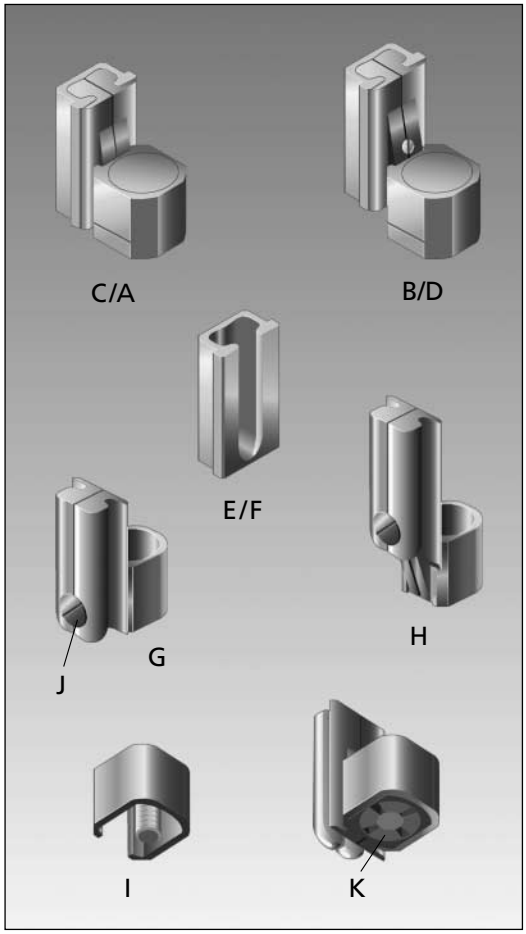
Wax wire for sprue channels

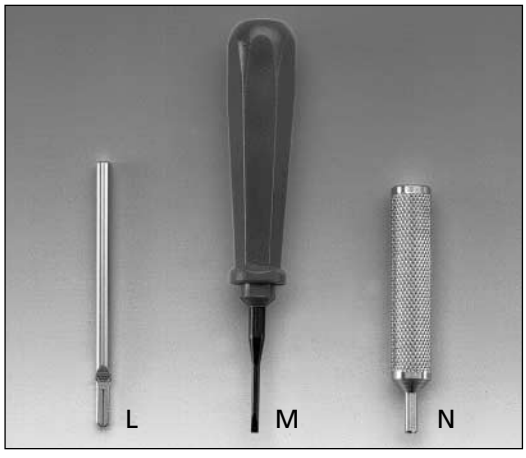
∅ 3.0 mm 250 g	round	**Ord.-No. 111-830-00**
∅ 3.5 mm 250 g	round	**Ord.-No. 111-835-00**
∅ 4.0 mm 250 g	round	**Ord.-No. 111-840-00**
∅ 5.0 mm 250 g	round	**Ord.-No. 111-850-00**

Material

Rema®-Sil	1 kg component A	**Ord.-No. 108-700-00**
	1 kg component B	**Ord.-No. 108-701-00**
	5 kg component A	**Ord.-No. 108-710-00**
	5 kg component B	**Ord.-No. 108-711-00**
Gumex N	Undercut filler 650 g	**Ord.-No. 168-015-50**
rematitan®	Cold model hardener	**Ord.-No. 167-305-00**
Lubrofilm®	Surface tension-reducing agent for wax and silicone	
	100 ml	**Ord.-No. 112-050-00**
	1000 ml	**Ord.-No. 112-051-00**
Septisol	Gypsum-gypsum and gypsum-silicone release agent	
	100 ml	**Ord.-No. 108-720-00**
	1000 ml	**Ord.-No. 108-721-00**







rematitan® attachments

CE 0483

T-Attachment. Easy to activate or exchange. Comes in 90° or 36°. Intracoronal retentive element which can be stress free welded into the cavity of the crown by means of a laser. Both versions also available as burnout plastic preformed females.

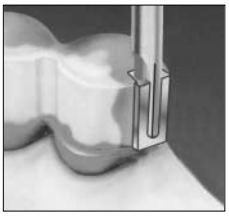
- Attachment made of pure titanium
- Prepared for laser welding
- With screw easy to activate
- Height reductable, approx. 40%
- Easy to place
- Low male boxing
- Replaceable male
- Castable preformed plastic female
- Male boxing can be glued into partial denture
- 2 Attachment shapes for upper and lower jaw
- No alteration of metal structure if laser welding is applied

Availability: ***rematitan***® attachment Starter Set.
Contents: 1 Parallel holder
1 Activation screwdriver
1 Conical nut key

Components **A–N** 1 piece each.

A	90° complete Ti Ti	**Ord.-No. 240–010–00**
B	36° complete Ti Ti	**Ord.-No. 240–020–00**
C	90° complete Ti-plastic-female part	**Ord.-No. 240–012–00**
D	36° complete Ti-plastic-female part	**Ord.-No. 240–022–00**
E	plastic female	**Ord.-No. 240–030–00**
F	titanium female	**Ord.-No. 240–031–00**
G	male 90°	**Ord.-No. 240–015–00**
H	male 36°	**Ord.-No. 240–025–00**
I	male-part casing	**Ord.-No. 240–035–00**
J	activating screw	**Ord.-No. 240–036–00**
K	tapered nut	**Ord.-No. 240–037–00**
L	parallel holder	**Ord.-No. 240–040–00**
M	activating screwdriver	**Ord.-No. 240–041–00**
N	tapered-nut key	**Ord.-No. 240–042–00**
Starter-Set	1 Pack	**Ord.-No. 240–001–00**

rematitan® attachments: Instructions for use 1–6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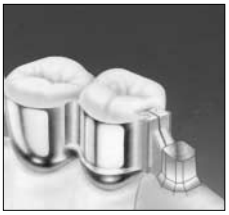
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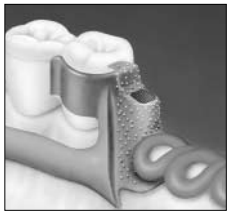
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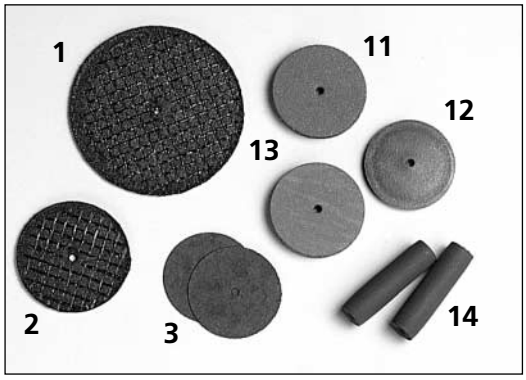
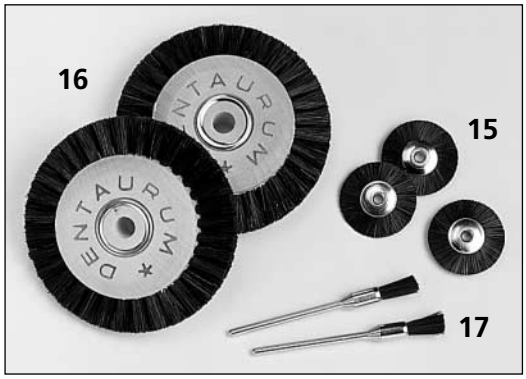
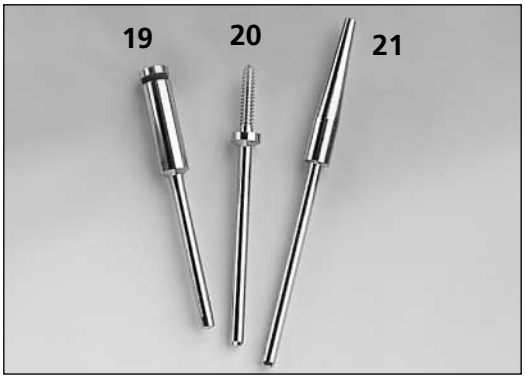




Contents of Finishing Kit **Ord.-No. 135-500-00**

(1)	ST cut-off disk, ∅ 40 mm	1	piece
(2)	STM cut-off disk, mini, ∅ 26 mm	2	pieces
(3)	TX cut-off disk, ∅ 22 mm	5	pieces
(4)	Ti tungsten carbide bur, mini	1	piece
(5)	Ti tungsten carbide bur, midi	1	piece
(6)	Ti tungsten carbide bur, maxi	1	piece
(7)	Ti tungsten carbide bur, maxi plus	1	piece
(8)	Aloxin stone, B, blue	1	piece
(9)	Aloxin stone, C, blue	1	piece
(10)	Emery paper – 500 –	70	cm
(11)	Rubber polisher, grey, disk	4	pieces
(12)	Rubber polisher, red, disk	4	pieces
(13)	Rubber polisher, red, rounded	4	pieces
(14)	Rubber polisher, cylinder	4	pieces
(15)	Polishing brushes, ∅ 20 mm, black	4	pieces
(16)	Polishing brush, ∅ 60 mm, Chungking bristles, double row	1	pieces
(17)	Mini brush, black	1	pieces
(18)	Tiger brilliant, polishing paste	60	g
(19)	Mandrels for cylinders	1	piece
(20)	Mandrels for disks / rounded polishers	6	pieces
(21)	Mandrels for emery paper	1	piece

For information on ordering single set components, refer to the list of "System Components" on page C 12.



X-Control

X-Ray unit for titanium castings. Easy to use with Polaroid-Instant picture-system. A must for quality control.
Size: (W x H x D) 250 x 500 x 300 mm.
1 piece **Ord.-No. 090-140-00**

Polaroid plain film for x-control
20 pieces **Ord.-No. 090-142-00**

Technical data:

Electrical:	220/240 V, 50/60 Hz
Connection:	1.5 kVA

X-Ray stepped wedge
For adjustment of suitable exposure time.
1 piece **Ord.-No. 090-145-00**

System components

Description	Quantity		Ord.-No.
autocast universal® 230 casting unit	1	piece	**090-155-00**
Melting crucible	1	piece	**090-110-00**
Receptacle for crucible alloys	1	piece	**090-160-00**
Ceramic seals	10	pieces	**090-161-60**
Crucible electrode	5	pieces	**090-162-00**
Ceramic seals C	100	pieces	**090-012-60**
***Tritan* casting metal Ti 1** CE 0483			
18 g, ∅ 21 mm, height 11.5 mm	250	g	**100-100-50**
22 g, ∅ 21 mm, height 14.3 mm	500	g	**100-101-50**
31 g, ∅ 25 mm, height 14.3 mm	500	g	**100-102-50**
36 g, ∅ 27 mm, height 14.3 mm	500	g	**100-103-50**
40 g, ∅ 27 mm, height 15.8 mm	500	g	**100-105-50**
***rrematitan*® M** casting metal Ti4 31 g, ∅ 25 mm, height 14.3 mm	1	kg	**107-107-00**
***rematitan*® Investments**			
***rematitan*® Plus** Plus Investment, 80 x 250 g	20	kg	**107-600-00**
***rematitan*® Plus** Investment, 32 x 250 g	8	kg	**107-610-00**
***rematitan*® Plus** mixing liquid	1	l	**107-601-00**
***rematitan*® Plus** special mixing liquid	1	l	**107-602-00**
***rematitan*® Ultra** investment material	7	kg	**107-650-00**
***rematitan*® Ultra** mixing liquid	1	l	**107-651-00**
Trinell Investment	28 x 250	g	**107-654-00**
Trinell Mixing Liquid	1000	ml	**107-659-00**
Trinell Speed Liquid	1000	ml	**107-655-00**
Titanium wires CE			
Titanium wire round, ∅ 0.4 mm, Länge 2 m	1	roll	**528-039-50**
Titanium wire round, ∅ 0.7 mm, Länge 2 m	1	roll	**528-040-50**
Titanium wire round, ∅ 1.0 mm, Länge 100 mm	10	pieces	**528-041-00**
Titanium wire round, ∅ 1.2 mm, Länge 100 mm	10	pieces	**528-042-00**
Titanium wire round, ∅ 1.5 mm, Länge 50 mm	1	piece	**528-050-00**
Titanium wire rolled, height 0.5 mm, lenght 100 mm	10	pieces	**528-043-00**
Titanium wire rolled, height 0.25 mm, lenght 100 mm	10	pieces	**528-044-00**
Muffle base with sprue former size 3	1	piece	**106-850-50**
Muffle base with sprue former size 6	1	piece	**106-851-00**
Muffle base with sprue former size 9	1	piece	**106-852-00**
Muffle ring elastic size 3	1	piece	**106-840-00**
Muffle ring elastic size 6	1	piece	**106-841-00**
Muffle ring elastic size 9	1	piece	**106-842-00**
Casting ring, stainless steel, size 3	1	piece	**106-801-00**
Casting ring, stainless steel, size 6	1	piece	**106-802-00**
Fixing ring, size 3	1	piece	**106-845-00**
Fixing ring, size 6	1	piece	**106-846-00**
Fixing ring, size 9	1	piece	**106-847-00**
Muffle ring for model casting, ∅ 71 mm, green, height 54 mm	1	piece	**127-306-00**
Muffle ring for model casting, ∅ 78 mm, blue, height 70 mm	1	piece	**127-308-00**
Muffle ring for model casting, ∅ 80 mm, red, height 54 mm	1	piece	**127-307-00**
Muffle base for muffle rings 127-306/-307/-308	1	piece	**127-309-00**

Description	Quantity		Ord.-No.
Plastic sprue former	5	pieces	**090-027-00**
Muffle forceps	1	piece	**008-030-00**
Kera-Vlies	25	m	**127-250-00**
rematitan® attachment 90° complete Ti Ti	1	piece	**240-010-00**
rematitan® attachment 36° complete Ti Ti	1	piece	**240-020-00**
rematitan® attachment 90° complete Ti-plastic	1	piece	**240-012-00**
rematitan® attachment 36° complete Ti-plastic	1	piece	**240-022-00**
Plastic female	1	piece	**240-030-00**
Titanium female	1	piece	**240-031-00**
Male 90°	1	piece	**240-015-00**
Male 36°	1	piece	**240-025-00**
Male-part casing	1	piece	**240-035-00**
Activating screw	1	piece	**240-036-00**
Fixing screw	1	piece	**240-037-00**
Parallel support	1	piece	**240-040-00**
Activating key	1	piece	**240-041-00**
Key for fixing screw	1	piece	**240-042-00**
rematitan® allergy platelets	3	pieces	**100-110-00**
Lubrofilm® surface tension-reducing agent for wax and silicone	100	ml	**112-050-00**
	1000	ml	**112-051-00**
Septisol gypsum-gypsum, gypsum-silicone release agent	100	ml	**108-720-00**
	1000	ml	**108-721-00**
Rema® Sil duplicating silicone			
Component A	1	kg	**108-700-00**
Component B	1	kg	**108-701-00**
Component A	5	kg	**108-710-00**
Component B	5	kg	**108-711-00**
Gumex N undercut filler	1	piece	**168-015-50**
rematitan® cold model hardener	1000	ml	**167-305-00**
Wax wire			
Wax wire, round, ∅ 2.5 mm, roll 250 g	1	roll	**111-825-00**
Wax wire, round, ∅ 3.0 mm, roll 250 g	1	roll	**111-830-00**
Wax wire, round, ∅ 3.5 mm, roll 250 g	1	roll	**111-835-00**
Wax wire, round, ∅ 4.0 mm, roll 250 g	1	roll	**111-840-00**
Wax wire, round, ∅ 5.0 mm, roll 250 g	1	roll	**111-850-00**
Wax wire, round, hard, ∅ 2.5 mm, roll 250 g	1	roll	**111-425-00**
Wax wire, round, hard, ∅ 3.0 mm, roll 250 g	1	roll	**111-430-00**
Wax wire, round, hard, ∅ 3.5 mm, roll 250 g	1	roll	**111-435-00**
Wax wire, round, hard, ∅ 4.0 mm, roll 250 g	1	roll	**111-440-00**
Wax wire, round, hard, ∅ 5.0 mm, roll 250 g	1	roll	**111-450-00**
Folident Mini thermoforming unit	1	piece	**120-130-00**
Foils, 0.6 mm	100	pieces	**120-131-00**
Foils, 0.1 mm	200	pieces	**120-132-00**

Description	Quantity	Ord.-No.
Modelling waxes **StarWax** CB green	50 g	**120-201-00**
Modelling waxes **StarWax** CB beige (opaque)	50 g	**120-202-00**
Milling wax **StarWax** M blue	50 g	**120-211-00**
Cervical wax **Star Wax** C red	50 g	**120-212-00**
***rematitan*® finishing set** (for contents see page C 7)	1 pieces	**135-500-00**
Separating discs:		
ST separating discs, ∅ 40 mm	10 pieces	**130-100-00**
STM separating discs, ∅ 25 mm	20 pieces	**130-110-00**
TX separating discs, ∅ 22 mm	100 pieces	**130-512-00**
Ti-hard metal burs, mini	5 pieces	**123-610-00**
Ti-hard metal bur, midi	1 piece	**123-611-00**
Ti-hard metal bur, maxi	1 piece	**123-612-00**
Ti-hard metal bur, maxi plus	1 piece	**135-613-00**
Aloxin points B, blue	12 pieces	**135-852-00**
Aloxin points C, blue	12 pieces	**135-853-00**
Emery cloth –500–	25 m	**140-016-00**
Rubber polisher grey, disk	100 pieces	**138-102-00**
Rubber polisher red, disk	100 pieces	**138-601-00**
Rubber polisher red, rounded	100 pieces	**138-603-00**
Rubber polisher clinders	100 pieces	**138-602-00**
Brushes for polishing, ∅ 20 mm, black	10 pieces	**141-800-00**
Brushes for polishing, ∅ 60 mm, 2 rows of bristles	10 pieces	**141-711-00**
Small brushes, black	10 pieces	**141-810-00**
Tiger, polishing paste, 400 g	1 piece	**190-350-00**
Tiger Starshine Universal Finish, polishing paste, 50 ml	1 piece	**190-301-00**
Mandrels for clinders	10 pieces	**139-100-00**
Mandrels for disk and lentil	10 pieces	**139-300-00**
Mandrels for emery cloth	10 pieces	**139-500-00**

All the use recommendations given in writing, verbally or in instruction manuals result from our own experiences and experiments.
They are not binding, including in respect of any protective rights of third parties. The user himself remains responsible for testing our products and recommandations. Any claims for compensation which nevertheless occur and are based on our use recommandations will always relate only to the value of the goods delivered.

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