



Blue Power.



SOLUTIONS FOR METAL CASTING AND POWDER PRODUCTION

INDUTHERM
CASTING AND POWDER
PRODUCTION SYSTEMS
A HOFMANN GROUP COMPANY



INDUTHERM. YOUR PARTNER FOR INNOVATIVE METAL CASTING AND METAL POWDER PRODUCTION SOLUTIONS

Indutherm is a family-run company based in Walzbachtal – close to the technology region of Karlsruhe and Pforzheim, the “Golden City,” center of the German jewelry and watch industry.

Indutherm – the name says it all

The **INDU**ctively generated **THERM**al treatment of metals, the inductive melting, is the basic principle on which all our machines and production solutions have been based since the company was founded. We originally developed our induction technology specifically for the investment casting of precious metals. Today, we can offer you a wide range of systems for many applications. Our portfolio can be divided into two main areas:

Metal casting and metal atomization

In the field of casting technology, we offer innovative solutions for vacuum/pressure investment casting, melting and pouring into open molds, and producing semi-finished products or granules. We have seen the development of additive manufacturing technologies based on metal powders not as competition for investment casting but as an additional opportunity. We began designing and manufacturing systems for producing and classifying metal powders more than ten years ago.

INDUTHERM and BLUE POWER

Our systems are used in many different industries that require in-depth industry-specific know-how from our employees. That is why our machines are sold under two different brands, which are backed by appropriately specialized employees in the areas of advice and sales:

Under the name **INDUTHERM**, we supply the watch, jewelry and precious metals sectors.

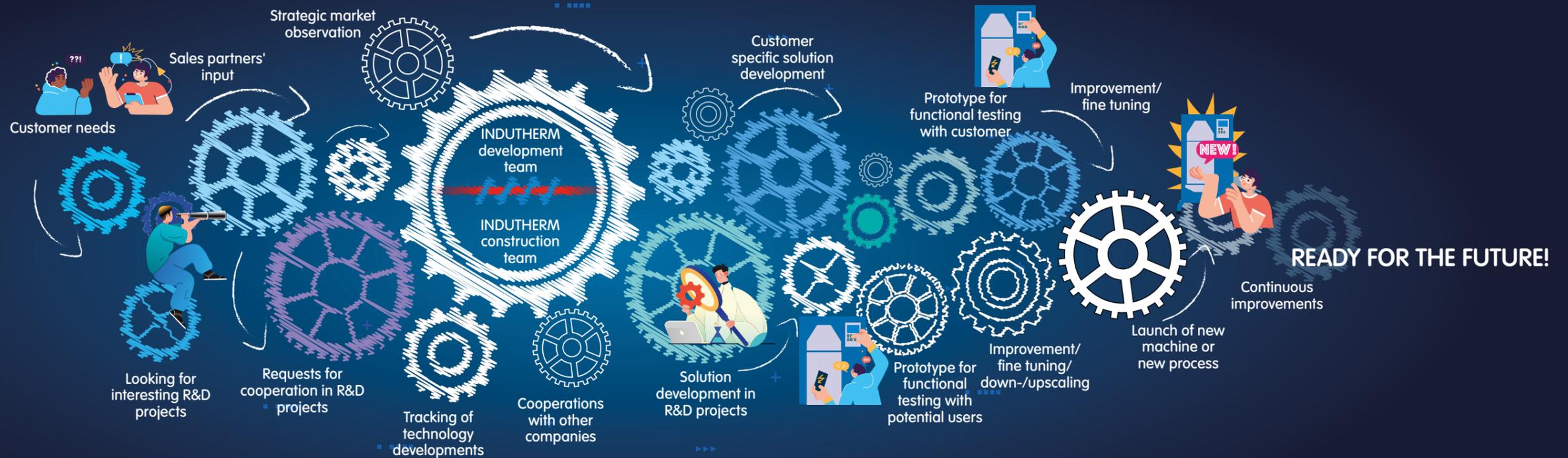
Our subsidiary, **BLUE POWER CASTING SYSTEMS**, is responsible for all other applications, such as automotive and its suppliers, medical technology, mechanical engineering, and apparatus engineering. In North America, all sectors are served under the BLUE POWER label.

Every product is only as good as the customer service supporting it.

Our sales and service partners provide professional support around the world. You can find the distributor for your country on our website, www.indutherm.de, in the “About Us” section.

OUR PHILOSOPHY: ALWAYS RECEPTIVE TO CUSTOMER NEEDS, ALWAYS LOOKING FORWARD

YOUR CHALLENGES AND OUR VISIONS: OUR PATH TO MUTUAL SUCCESS!



First, listening, then engineering

For us, it is fundamental always to be receptive. Talking to users, understanding their needs, and discussing ideas and visions are the best basis for creating sustainable solutions. That's why, from the very beginning, we develop and test our machines in close cooperation with customers from various industries, such as jewelry designers, goldsmiths, foundries, and dental technicians. These different requirements have led to the wide range of solutions we can offer our customers today. Most of our systems can be highly customized to your processes – with multiple tooling and sizing options and numerous optional accessories. Even customized machine setups are possible thanks to our in-house software development.

Complete engineering and design in-house at Indutherm

The core competence of INDUTHERM is the development of the machines from R&D to marketability. The electronics, software, control systems, mechanics, and everything else are designed in-house and made in Germany.

Continuously engaged in R&D projects

The INDUTHERM development team has been involved in national and international research projects for many years. We cooperate with renowned research institutes and universities.



Sharing our know-how

Our customers benefit from the experience gained in these projects through high consulting competence and innovative products that continue to set new standards in their segments. Feel free to contact us for advice on process optimization or to attend one of our casting seminars. And who knows, maybe we'll meet at one of the international symposia we regularly attend.

Our latest R&D projects

"ZIM" and "BMBF" projects

"ZIM" projects (Central Innovation Program for SMEs) are cooperative R&D projects funded by the German Federal Ministry for Economic Affairs and Energy, specifically for small and medium-sized enterprises. The German Federal Ministry of Education and Research ("BMBF"), on the other hand, funds "BMBF" projects. Within the scope of these research initiatives, we develop new processes, alloys, and equipment and work with research partners such as the University of Bremen, the Freiberg University of Mining and Technology, and several other research institutes and partners.

– Atomizer StaVari

The aim was to develop an end-to-end process chain for the additive manufacturing of complex, multi-variant, and highly functional products made from innovative steel materials (funding code 02P15B056).

– Atomizer Lhasa

Development of an explosion-proof powder atomization plant for aluminum alloy powder

IGF projects (industrial collective research)

– LeichtbauBW

A business and science promotion program in Baden-Württemberg, probably the largest lightweight construction network in the world.

– Frigesco

Powder atomization and laser additive manufacturing of magnetocaloric materials

– Amorphous metal powders

Manufacture and use of amorphous metal powders (Bulk Metallic Glass)

– IDAK

"Isothermal Digital Single Cell Amplification for the Detection of Antibiotic-resistant Pathogens in Hospitals" (Ag powder development for antibacterial applications among others)

– OpP3DP

"Optimized Powders for 3D-Printing": powder development and manufacture of innovative Cu base powders for laser additive manufacturing of high-strength, high-conductivity components

– Gold powder

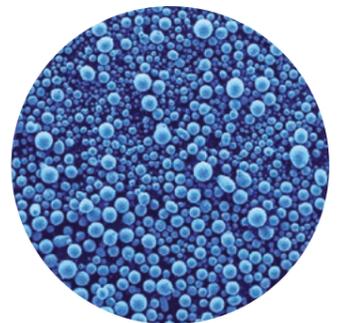
Powder development and powder atomization technology for gold powder

– CuBe alternative

"Alloy Development and Characterization of Materials to Replace Copper-beryllium Alloys"

– Titanium casting

Development of precision casting technologies for titanium components (jewelry, medical technology etc.)



ALWAYS IN FOCUS: THE MOST ECONOMICAL SOLUTION FOR YOUR DEMANDS



OUR DIGITAL PROCESS MANAGEMENT

FEATURES	BENEFITS
Process data output and visualization	Analytics, live views, evaluation
Report output	Documentation, quality assurance
Script control Remote control	Production control, process control, process monitoring
Statistics	Evaluations, efficiency analysis, optimizations
Flexible data access / cloud communication	Process monitoring, process statistics, process documentation
Software updating	Maintenance, service

Cost-effective through quality

Achieve the perfect result in the shortest time and at the lowest cost

Four factors are critical to cost-effective casting:

- Speed and, ideally, no costly testing for high quality casting results
- Casting processes that can be reproduced at any time
- The higher the casting quality, the less post-production work and the lower the costs
- Minimal material loss

This is why our motto is "Cost-effectiveness through quality" – reflected in every detail of our machine design.

Durable and reliable

Your production equipment must run perfectly from day one for many years. Our internal quality management ensures high standards from the first screw to the last. In the event of revisions, updates, or problems, we provide detailed documentation for each machine, including pictures, software backups, and more.

Easy to service

Easy replacement of all major components guarantees quick and easy service, minimizes the risk of long production interruptions, and ensures long-term reliability. All INDUTHERM machines with induction generators can be equipped with a GSM modem for remote service.



Energy efficient

Our proprietary power generators with integrated PLCs are specially designed for high efficiency, reliable induction heating, and the melting of various metals. The oscillating circuit is available in various designs and concepts:

Indirect induction heating: The eddy current is primarily transmitted into a susceptor (e.g., graphite crucible). The metal in the crucible is heated by thermal conductivity and radiation from the crucible wall. Due to the low/medium frequency, a significant portion of the electromagnetic field creates a strong mixing effect that ensures a homogeneous alloy. Our special pulse modulation can increase this mixing effect (skin effect, a stirring effect of the melt is ensured).

This concept is used for metals that do not react with carbon or a reaction with carbon is tolerated.

Direct induction heating: It completely excludes carbon from the melt. Eddy currents are generated directly in the metal. This concept requires a certain solidity of the workpiece to allow its electromagnetic coupling with the induction coil (material, quantity, shape, position). However, in the case of more or less sound metal in the crucible, it improves the thermal efficiency of the process and allows the melting of materials with higher melting points or affinity to carbon in a very efficient, economical, and safe way.

Both concepts guarantee the user maximum efficiency and flexibility, reduce power consumption, increase

maximum temperature, increase heating speed and reduce electromagnetic emissions in terms of EMC.

Efficient insulation ensures that the generated induction loses as little energy as possible for the rapid melting of the metal. Thermal insulation around the inductor and crucible effectively reduces heat radiation.

Efficient energy use also reduces energy consumption for re-cooling water in the machine and the potential need for air conditioning in the foundry.

Save power with peripherals!

The mold lift allows you to use flangeless molds. These are much less expensive and take up less space in your furnace. In other words, you can fire ~50% more molds with the same energy consumption or work with a smaller furnace.



Digital process management for more safety, more control, and higher productivity:

Remote control capabilities allow the operator to conveniently monitor and control the process from the office or any other location at a safe distance. We use sophisticated control electronics and existing sensors on our machines for data acquisition. This allows us to collect and process numerous parameters via sensors, such as power output, temperatures, compression ratios, and many more. Each process can be analyzed and stored in detail. The system consists of individual modules that can be configured according to customer requirements.

Different user interfaces are available for control and management depending on the application.

Original Indutherm consumables: Quality pays off!

Our high-quality consumables, such as crucibles, molds, and sealing rods, are specially designed for INDUTHERM and BLUE POWER machines. Each machine comes with a free starter consumable set to get you started. For larger sets of consumables to ramp up your production, please contact us and benefit from attractive volume discounts. Using only original INDUTHERM/BLUE POWER consumables makes sense for several reasons:

- Compact graphite ensures greater durability for crucibles and sealing rods
- Higher-quality casting results
- Less contamination from extraneous material like lead, etc.
- Less graphite contamination in alloys and castings
- Less gas porosity => reduced post-production costs, less material loss
- Less stress for the casting machines
- Lower power consumption
- Our crucibles have lower electrical resistance, meaning that there is less stress on the inductor, condenser assembly, transformer, and generator – resulting in greater durability for these components
- **An additional two years of warranty free of charge if you use only original Indutherm consumables and have a valid service contract.***

* Please contact your Indutherm representative for this offer.



DMS-software: remote service via modem



Easy to service: replacing the generator by opening only two screws



YOUR PROJECT...

OUR SOLUTION...

Gold, silver, copper, brass, zinc, aluminium casting

- Jewellery, electronics industry, ...
- From filigree to large parts
- Rapid prototyping
- Arts, handicraft, models



Vacuum Pressure Casting Machines MC, MTC and VC Series

- One or two chamber differential pressure systems
- Casting into investment molds, also suited for shell casting
- Up to 25,000 ccm crucible volume



MC Series for small parts, small batches and quick casts

10

MTC Series especially for high-temperature casting, e.g. Pt

16

VTC Series for all kind of metals

18

VC Series for jewellery and other fine parts

22

VC Series for large parts

30

MU / MUV / MUVV Series for melting and handpouring

32

TF Series for melting and casting large quantities

34

CC / VCC Series for semi-finished products

36

GU Series for granulating

42

SU Series for sintering / diffusion bonding

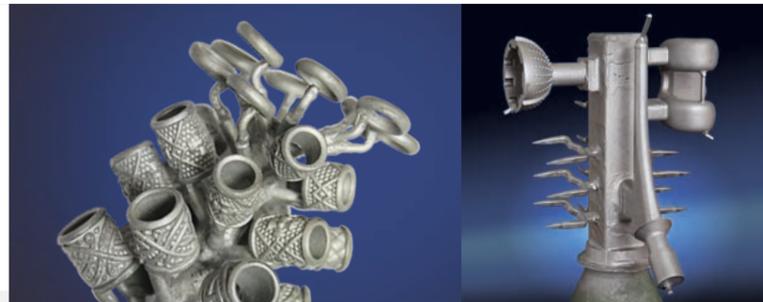
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AU / AC Series for the production of metal powder

46

Steel, titanium, platinum, palladium casting

- Jewellery
- From filigree to large parts
- Dental and medical technology
- Metallurgic R & D
- Molds



Vacuum Pressure Casting Machines MC, MTC and VTC Series

- One or two chamber differential pressure systems
- Tilting casting principle
- Casting into investment molds or into ingot molds, also suited for shell casting



High Temperature Melting Machines with ceramic crucibles

- MU/MUV/MUVV (C Series) for hand pouring into molds

Melting and pouring of different metals

- For metals developing a lot of smoke and oxides during melting
- For large quantities of metal (recycling or own alloys)
- For casting large, heavy components



Open Melting Machines and Tilting Furnaces MU and TF Series

- MU/MUV/MUVV Series for hand pouring into molds, shell molds or ingot molds
- TF Series for tilting pouring into molds, shell molds or ingot molds, up to 28,000 ccm crucible volume



Production of semi-finished material

- Multi-coloured rings
- Wires and tubes
- Strips, sheet and bars
- Granules
- Micro granules



Continuous Casting Machines CC Series Granulating Units GU Series Sintering Unit SU Series

- CC Series Continuous Casting Machines also available as VCC versions with vacuum function for de-gassing of the metal
- GU units for the productions of granules or micro granules
- SU sintering unit for the productions of multi-coloured rings and bangles



Production of metal powders

- Metal powders for SLM, MIM and other Additive Manufacturing process
- Metal powders for recycling/refining process, press & sinter process and others



Metal Powder Production Plants AUG, AUW and AUS Series Metal Powder Air Classifiers AC Series

- AUG Series (gas atomization) for production of metal powders for Additive Manufacturing process and others
- AUW Series (water atomization) for production of metal powders for recycling/refining process, press & sinter process
- AUS Series (ultrasonic atomization), very compact solution for fast metal powder production
- AC Series for metal powder classification and separation



MC SERIES PROGRAM CONTROLLED TABLETOP CASTING MACHINES



From model to casting within 1 hour!

The compact MC Series has been designed to provide jewelry designers, goldsmiths, R&D departments, and dental laboratories with an affordable yet highly professional caster. Our most important goals were an extremely short processing time from mold making to finished casting, simple, safe operation, high quality, reproducible casting results, and low operating costs. The overwhelming global success of the MC Series in numerous industries – including some not originally envisaged – is a strong endorsement of the MC concept.

For more than just investment casting

The MC Series machines are also used – for analytic purposes where material samples need to be melted, homogenized and cast into a defined

shape (for example also metal powder samples) – for the production of small quantities of cast semi-finished material like rods or sheet

Ingeniously simple = simply ingenious

With the MC machines, you can easily pour by hand from the crucible into your mold and feel what you are doing – just as it has been done for thousands of years. To make this work consistently and safely, the entire melting/casting unit is tilted together at a 90° angle. In order to achieve perfect balance and have as few moving parts as possible, almost the entire machine moves during the tilting process: the cylindrical design allows the entire moving section to rotate like in a half-pipe – ingeniously simple and stylishly designed on high-quality rollers. However, unlike manual casting, the process takes place in an enclosed chamber under a vacuum or inert gas

atmosphere to prevent air pockets and oxidation. You can monitor the melting and pouring-off process through the sight glass.

Full text LCD display for fine adjustment and serial programming

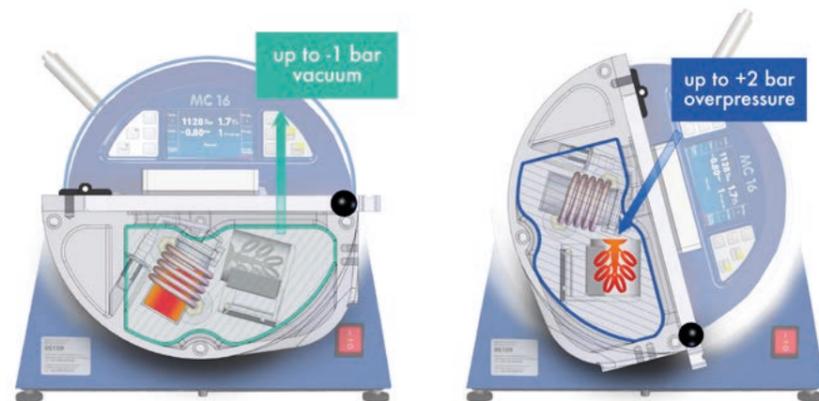
The operating system allows you to customize parameters to get the most out of each model and alloy. Thanks to the transparent menu structure and full-text display, all settings can be programmed quickly and easily. Of course, all process parameters can be saved for repeated castings.



Vibration technology for excellent casting quality

The MC machines with the "V" suffix are equipped with the INDUTHERM vibration system (see page 24). Vibration switched on directly after casting is a decisive factor in enhancing mold filling with very filigree parts. It prevents porosity, ensures a finer grain structure and allows greater and more constant density. Parts have measurably higher elasticity, significantly increasing the scope for further processing.

Vibration technology is a compelling alternative to the commonly used and relatively delicate centrifugal systems, especially when casting platinum or palladium.



After pouring, the MC series automatically switch to overpressure in order to optimise the mold filling even for delicate parts. Alternatively it is also possible to keep the vacuum.

Using the mini casting system is extremely simple:

- 1) Fill in the material and heat up.
- 2) Define your considered process parameters e.g. atmosphere: vacuum, inert gas atmosphere, overpressure
- 3) Take the mold from oven and insert it into the machine. The device itself looks after all additional functions – until we get to the stroke of genius.
- 4) Pouring off takes place using a 90° rotation of the casting unit. After pouring, the MC machine automatically switches to overpressure in order to optimise the mold filling even for delicate parts.

MC SERIES – CHOOSE THE VERSION PERFECTLY FITTING TO YOUR NEEDS



MC 16, the basic model

- Up to 2,000° C
- Program-controlled process flow
- LCD-display with all program data (20 programs)
- For graphite and for ceramic crucibles, temperature up to 2000° C
- Very easy to use, short training period
- Perfectly suited for small castings and small series
- 3.5 KW induction generator for fast heating
- Even for the casting of steel and platinum

MC 20 V with vibration technology

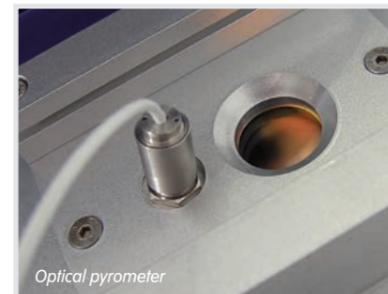
- Up to 2,000° C
- Systematically designed for intricate casting projects and for continuous operation
- Equipped with our vibration system – for better form filling, creating casts with greater, more consistent densities, higher elasticity and greatly reduced porosity
- Overpressure of up to 3 bars (casting under vacuum is also possible)
- Optical pyrometer for temperature measurement up to 2000° C

MC 60 V for aluminium, copper, gold...

- Up to 1,300° C
- Basing on the same technology as the MC 16, but larger melting/casting unit with much higher capacity
- Hence reduced maximum temperature (1300° C), perfect for gold and silver casting
- LCDdisplay with all program data
- Vibration technology
- Excellent ratio machine size to capacity: molds up to Ø 100 mm x 120 mm h

MC 100 V – high temperature plus capacity

- 8 kW (3x400 V) power generator for maximum temperature up to 2000° C
- High capacity: crucibles with casting volume of up to 450 g Au 18ct or 500g Pt, for use with molds up to Ø 100 mm x 120 mm h
- Vibration system
- Overpressure of up to 3 bars (casting under vacuum also possible)
- Optical pyrometer for temperature measurement up to 2000° C



Main benefits of all MC machines

- Very simple and safe to operate, short training periods
- All process parameters can be set individually and saved for repeated castings
- Excellent mold filling thanks to high overpressure and vibration system

A complete casting system covering just a few square feet

- 1 INDU MIX vacuum investment machine for bubble-free mixing of the investment compound and filling of the mold. The integrated vibrator eliminates any air bubbles.

Indumix 2+ for 1 mold 100 x 120mm (Ø x h)
 Indumix 3+ for up to 3 molds 100 x 120mm (Ø x h)
 Indumix 4+ for 1 mold 130 x 250 mm (Ø x h)

- 2 1,000°C furnace AK 20 for melting out the wax and burning out the form. Temperature pre-selection, high-quality insulation.

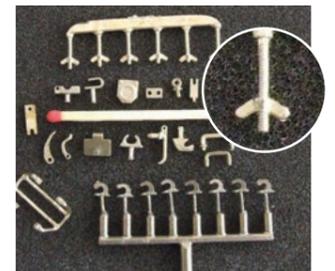
AK 20 interior size: ~ 300 x 300 x 200 (h) mm
 Also available AK 50: ~ 300 x 450 x 315 (h) mm
 Also available AK 135: ~ 410 x 620 x 575 (h) mm

- 3 MC Series casting machine

- 4 Sandblasting cabinet for easy removal of plaster: air pressure requirement: 270 l/min at 10 bar, 150 l/min at 5 bar, connection for suction system, foot switch for adjusting pressure.



A significant cost factor is the small amount of metal that must be calculated for the sprue.



Perfect for casting of micro parts



When precision counts ...



Perfectly suited for a fast workflow from 3D design > 3D print > casting

MC SERIES SMALL HIGH TEMPERATURE CASTING MACHINES

MC FOR GOLD AND SILVER

MC SERIES LARGE HIGH TEMPERATURE CASTING MACHINE



MC 16

MC 20 V

MC 60 V

MC 100 V

Performance

Power max. / electrical connection
Temperature max.

3.5 kW 230 V single phase
2000° C

3.5 kW 230 V single phase
2000° C

3.5 kW 230 V single phase
1300° C

8 kW 3x400 V
2000° C

Capacity

Casting volume
For use of molds

100 g Au 18 ct / 60 g Cu
110 g steel / 200 g Pt
up to ø 30/50/65/80 mm x 80 mm h

100 g Au 18 ct / 60 g Cu
110 g steel / 200 g Pt
up to ø 30/50/65/80 mm x 80 mm h

450 g Au 18 ct / 250 g Cu
300 g Ag 935
up to ø 80/100 mm x 120 mm h

450 g Au 18 ct / 250 g Cu
250 g steel / 500 g Pt
up to ø 80/100 mm x 120 mm h

Handling & control

Control panel
Automatic vacuum function
Automatic overpressure function
Casting also under vacuum only
Vacuum or overpressure after casting
Function washing by inert gas
Vibration system
Connections: cooling water, inert gas argon or nitrogen
Temperature measurement/control
equipped with an optical pyrometer/dual wave pyrometer

by LCD-Display, full text readout
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■
■
■ -1 up to +2 bar
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-
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■ up to 1,300°C ● up to 1,600°C
-

by LCD-Display, full text readout
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■ -1 up to +3 bar
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■ up to 2,000°C
■ / ●

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by LCD-Display, full text readout
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■ up to 2,000°C
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Quality management

RS 232, Ethernet, USB interface, diagnostic system
GSM-modem for remote service
DMS / InduthermCloud / iThermControl

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Accessories/peripheral equipment

Vacuum investment mixer Indumix 2+/Indumix 3+
Furnace AK 20/AK 50
Sandblasting cabinet
Vacuum pump, up to 8 m³/h / up to 21 m³/h
Floor unit
Water chiller

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■ = Standard equipment ○ = optional



The MC 100 V as a stand-alone version: The floor stand provides enough space for accessories such as the vacuum pump.

THE NEW MTC 100 V HIGH TEMPERATURE CASTING MACHINE



Your new
Indutherm
MTC 100 V
Platinum Casting
Machine

MTC 100 V – a highly versatile casting system

The MTC 100 V is a completely new, highly professional casting system for casting platinum or other high-temperature metal to be molten in ceramic crucibles. Instead of the error-prone centrifugal casting principle, INDUTHERM relies on a specially developed, automatic pressure and tilting system.

The combination of the tilt casting principle and sophisticated, automatic vacuum/overpressure control enables excellent mold filling for both delicate and solid castings, which is additionally supported by the proven INDUTHERM vibration system. Another advantage is the very compact design of the MTC 100 V compared to centrifugal casting machines.

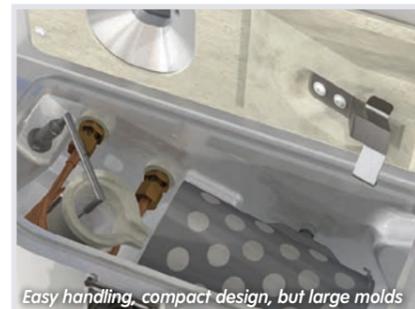
The most important technical data is the crucible capacity of 250 g steel or 600 g Pt, mold sizes up to $\varnothing 100 \times 150$ mm and a maximum temperature of 2,100° C. A single or optional multi-wavelength infrared pyrometer, automatic tilting with adjustable speed and variable pressure build-up ensure optimal process control and consistently high casting quality.

The new machine is extremely versatile as it can also work with a graphite crucible to cast alloys for example based on Au, Ag, Cu and others. There is no need to change any hardware components of the induction system.

In addition, the machine can handle investment molds (flasks), shell molds, ingot systems and any other molding system that fits into the chamber.

Excellent form filling thanks to novel high-speed pressure and tilting system

- Maximum casting quality due to
 - perfect form filling
 - less porosity
 - the finest surface quality
- Up to 600 gr Pt, 250 g steel or 450 g Au 18 ct
- For molds up to $\varnothing 100 \times 150$ mm
- It can also be used to cast gold and silver alloys
- Also for casting ingots
- High-quality multi-wavelength infrared pyrometer (option)
- 8 kW induction power, up to 2100° C
- Automatic tilting with adjustable speed
- Adjustable pressure build-up
- **It has a compact design and is much safer than a centrifugal caster!**



MTC 100 V

Performance

Power max. /electrical connection
Temperature max.

8 kW 3x400 V
2100° C

Capacity

Casting volume
450 g Au 18 ct / 250 g Cu
250 g steel / 600 g Pt

For use of molds
up to $\varnothing 100$ mm x 150 mm h

Induction mode
indirect and direct induction
(usage of graphite and ceramic crucible)

Handling & control

Program control/number of programs
by LCD-Display, full text readout/20

Automatic vacuum and overpressure function
■

Adjustable pressure mode, turbo pressure system, gas tank
■

Casting also under vacuum only
■

Vacuum or overpressure after casting
■ -1 up to +3 bar

Automatic filling with adjustable speed
■

Inert gas flushing
■

Vibration system
■

Thermocouple measurement/control
■ up to 1,300°C ○ up to 1,600°C

single-wavelength infrared pyrometer
■ up to 2,000°C

multi-wavelength infrared pyrometer
○ up to 2,100°C

Quality management

RS 232, Ethernet, USB interface, diagnostic system
■

GSM-modem for remote service
○

DMS / InduthermCloud / iThermControl
■ / ○ / ○

Accessories/peripheral equipment

Vacuum investment mixer Indumix 2+/Indumix 3+
○

Furnace AK 20/AK 50
○

Sandblasting cabinet
○

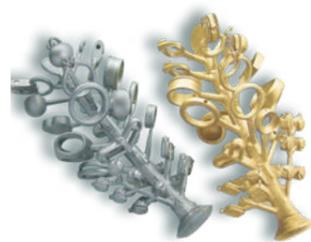
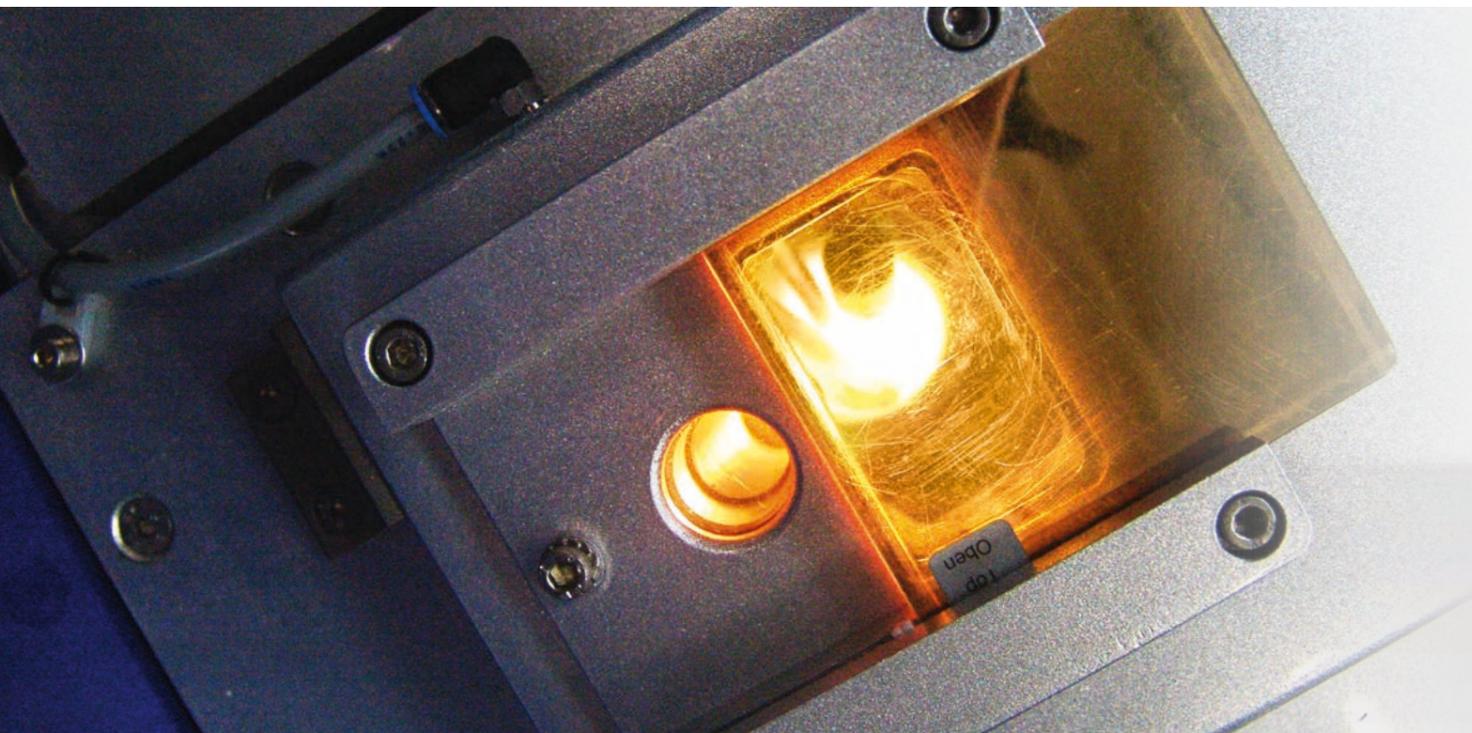
Vacuum pump, up to 8 m³/h / up to 21 m³/h
○ / -

Floor unit
■

Water chiller
○

■ = Standard equipment ○ = optional

THE VTC SERIES: FOR EVERY METAL OR ALLOY YOU WANT TO CAST



Casting trees in steel and in gold

VTC Series vacuum/pressure casting machines

The VTC 100 V – VTC 800 V are extremely versatile casting machines suitable for a wide range of applications. While the VTC Series was originally designed as a high-temperature casting machine for casting steel, palladium, platinum, etc. (max. 2,100 °C), it is also suitable for the economical production of castings in gold, silver, and other materials using large molds. In addition to mold casting, ingot casting is also possible.

The machine combines a dual-chamber differential pressure system with a tilting mechanism. The casting process is accomplished by rotating the entire melting-casting unit 90°.

One advantage of the tilting system is the use of inexpensive graphite or ceramic crucibles instead of drilled and plugged crucibles, which tend to last longer. For some alloys, such as copper beryllium, crucibles with holes and sealing bars quickly become leaky and unusable, which is why many users have processed these alloys only in open systems – meaning they can't choose to optimize the process with overpressure or vacuum. With the VTC Series, these handicaps don't apply.

A vacuum can be created in the melting and casting chambers to prevent oxidation during melting and air pockets in the mold.

The mold is automatically pressed against the melting chamber during casting, allowing

overpressure to be switched on during casting for better mold filling, and vibration technology further optimizes the process.



Sweep Mode Vibration System for perfect results even in Pt and Pd

Due to the vibration technology (see page 24) and the sophisticated vacuum/pressure system, this machine is perfectly suited for casting platinum and palladium without the need for an elaborate and sensitive centrifugal mechanism. The VTC machines are equipped with the advanced **Sweep Mode Vibration System**. It considers that each casting tree and even each item of a tree has a different resonance frequency, depending on its shape and size. Sweep mode vibration ensures that the optimum frequency is covered by generating variable frequencies.

Handling and control

Operation is simple and safe thanks to a clear and easy-to-use LCD display. All parameters, down to the variable tilting speed, can be individually set and saved to ensure that recurring castings produce consistent results.

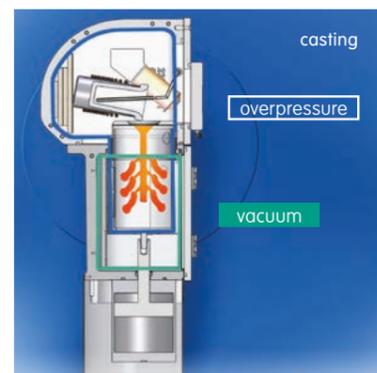
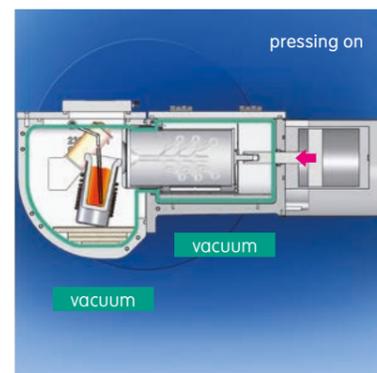
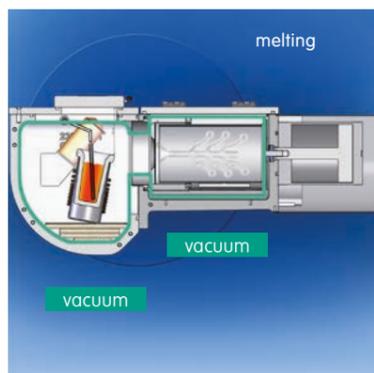
The high vacuum casting systems VTC 100 V Ti - VTC 800 V Ti

The VTC Ti Series is a cost-effective solution for casting highly reactive metals such as titanium, copper beryllium, amorphous steel, etc.

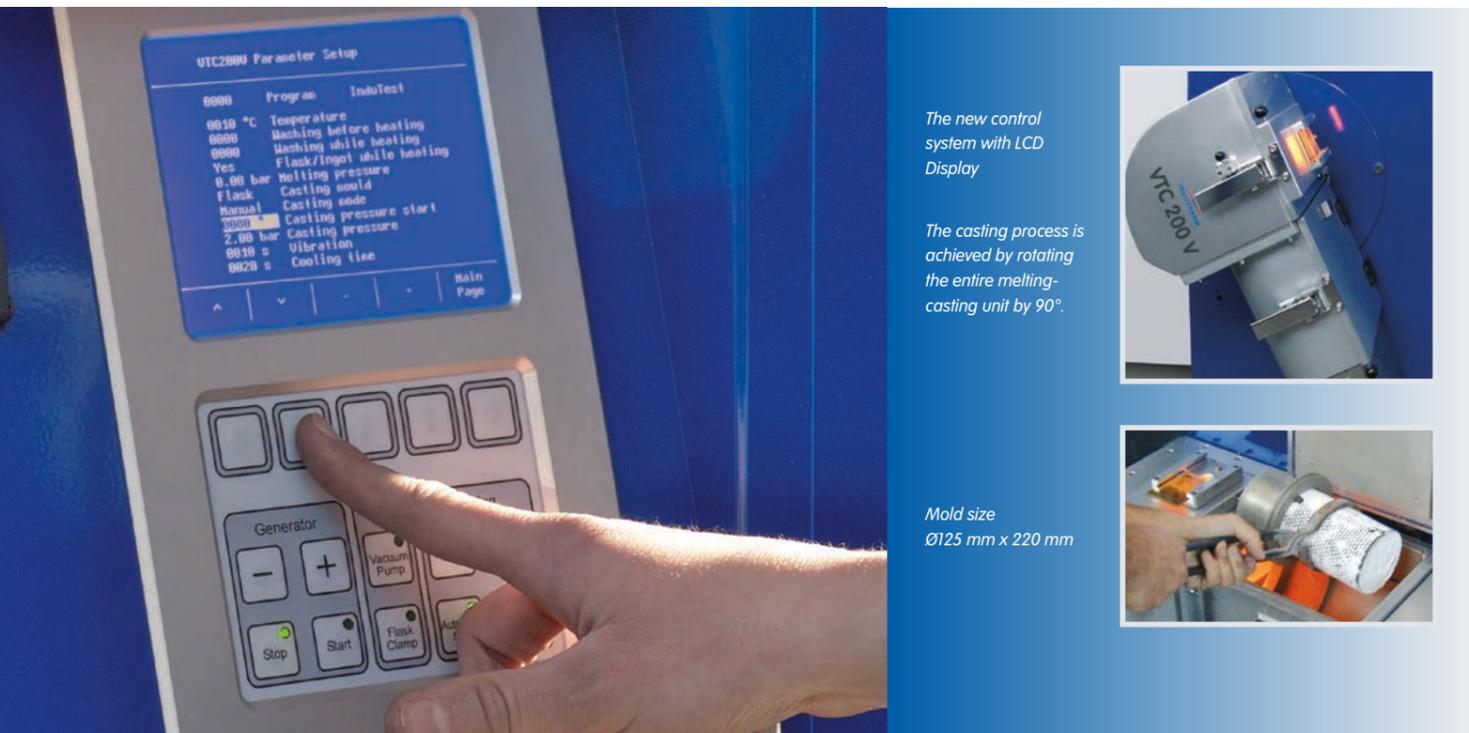
After numerous modifications, such as completely redesigned valves and hose connections, special seals, and an evacuation and inert gas purging process tailored to the machine, the required vacuum of 10⁻³ mbar was achieved. In addition, special crucibles and inductors were developed because the ceramic crucibles normally used also react with titanium. They also reduce melting times – and the shorter the melting time, the less time there is for any reaction.



A graphite crucible and a ceramic crucible



THE VTC SERIES VACUUM PRESSURE CASTING MACHINES



The new control system with LCD Display

The casting process is achieved by rotating the entire melting-casting unit by 90°.

Mold size
Ø125 mm x 220 mm



VTC 100 V / Ti

VTC 200 V / Ti

VTC 400 V / Ti

VTC 800 V / Ti

Performance

Power max. / electrical connection
Temperature max.

12 kW 3x400 V
2100° C

15 kW 3x400 V
2100° C

Performance

Power max. / electrical connection
Temperature max.

20 kW 3x400 V
2100° C

20 kW 3x400 V
2100° C

Capacity

Graphite crucible volume
Ceramic crucible volume
For use of molds up to

25 ccm = 450 g Au 18 ct / 250g Cu
30 ccm = 600 g Pt / 250 g steel
■ 125 mm / 220 mm h
○ 125 mm / 350 mm h

145 ccm = 2.0 kg Au 18 ct / 1.2 kg Cu
180 ccm = 2.5 kg Pt / 1 kg steel
■ 125 mm / 220 mm h
○ 125 mm / 350 mm h

Capacity

Graphite crucible volume
Ceramic crucible volume
For use of molds up to

300 ccm = 2.5 kg Cu
300 ccm = 2.0 kg steel
■ 125 mm / 220 mm h
○ 125 mm / 350 mm h

600 ccm = 4.0 kg Cu
600 ccm = 4.0 kg steel
■ 125 mm / 220 mm h
○ 125 mm / 350 mm h

Handling & control

Vibration technology
Automatic tilting with motor drive
Automatic mold fixing
Casting programs
Temperature measurement

■ sweep mode
■
■
100
thermocouple up to 1,300°C
optical pyrometer up to 2,000°C

■ sweep mode
■
■
100
thermocouple up to 1,300°C
optical pyrometer up to 2,000°C

Handling & control

Vibration technology
Automatic tilting with motor drive
Automatic mold fixing
Casting programs
Temperature measurement

■ sweep mode
■
■
100
thermocouple up to 1,300°C
optical pyrometer up to 2,000°C

■ sweep mode
■
■
100
thermocouple up to 1,300°C
optical pyrometer up to 2,000°C

Quality management

RS 232, Ethernet, USB interface, diagnostic system
Data printer
GSM-modem for remote service
DMS / InduthermCloud / iThermControl

■
■
■
■ / ○ / ○

■
■
■
■ / ○ / ○

Quality management

RS 232, Ethernet, USB interface, diagnostic system
Data printer
GSM-modem for remote service
DMS / InduthermCloud / iThermControl

■
■
■
■ / ○ / ○

■
■
■
■ / ○ / ○

Accessories/peripheral equipment

Pyrometer with video output
Vacuum investment mixer Indumix 4+
Furnace AK 135
Water chiller, vacuum pump ...

○
○
○
○

○
○
○
○

Accessories/peripheral equipment

Pyrometer with video output
Vacuum investment mixer Indumix 4+
Furnace AK 135
Water chiller, vacuum pump ...

○
○
○
○

○
○
○
○

■ = Standard equipment ○ = optional

THE VC SERIES VACUUM PRESSURE CASTING MACHINES



Find the perfect casting solution for your needs

Our VC Series machines range from small to very large capacities, from semi-automatic systems to fully automated casting production solutions. Many special features allow you to optimize each casting according to its individual characteristics.

Efficient process handling

Separate lock systems for overlapping casting

All Indutherm VC machines have separate locking systems for the melt and mold chambers. This allows you to save time by "overlapping" casting: while the mold remains in the vacuum chamber for a few minutes after casting, you can fill and heat the next charge.

Pneumatic bell lock and closing system

The melting chambers of all VC machines are locked by a pneumatic system. VC 460 V, VC 650 V and VC 680 V are additionally equipped with an automatic closing system.

Automatic mold and chamber lift

The mold lift facilitates mold handling. When the vacuum chamber is swiveled in, the inserted mold is lowered, and the chamber is automatically docked. When the chamber is opened, the mold is lifted for easy removal. This allows you to use economical, flangeless molds.

Program control system for fast and certified casting

Thanks to the control panel with full-text LCD display, all programs and parameters are easily and conveniently set.

The semi-automatic machines offer temperature programs. The fully automatic machines have a program control system involving all parameters. Up to 100 casting programs ensure fast operation and consistent casting results. Parameters are pre-programmed for all major alloys, including AGS, Alpha Plus, Heraeus, Legor, and Pandora. In practice, this means you can expect good casting results from the first mold without expensive pre-tests.

The program control and integrated data printer ensure a high level of safety and the possibility of precise process documentation (important for certified casting processes).

Industry 4.0 ready

Like all of our systems, the VC Series has software and interface management that allows remote service and support and provides the basis for future networking with other systems.

Pressure conditions and control – essential for your perfect casting results

Automatic vacuum and overpressure in the melting and mold chambers

A vacuum in the melting chamber allows degassing of the alloy and prevents unwanted

oxidation during melting (a low oxygen content is especially important when casting silver or red gold). Vacuum in the mold chamber during casting improves mold filling when casting filigree parts and prevents air inclusions. In addition, the system switches to overpressure in the melting chamber and increases the pressure differential.

ORC – Oxidation-reduced Casting

This special feature eliminates the danger of oxidation while the mold is cooling down.

TRS – Turbulence Reduction Software

TRS ensures a faster and more laminar metal flow. It improves mold filling and prevents investment particles from breaking off in critical areas of the form.

Turbo Pressure / Turbo Pressure PLUS

It optimizes the casting of very small and filigree objects and guarantees perfect results when casting with stones. Turbo Pressure allows you to reach a precisely defined pressure quickly. On all program-controlled VC models, Turbo Pressure is automatically activated at the desired time according to the selected program.

The **Turbo Pressure PLUS system** allows even higher and faster pressurization.

HSC – High Speed Casting

HSC further improves the filling and surface quality of filigree designs or those with large and flat surfaces. With HSC it's possible to cast treated colored stones at low mold temperatures.



Precise temperature control

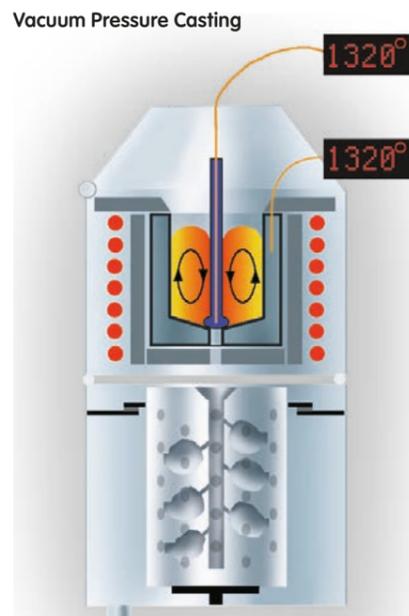
Dual temperature control

Temperature measurements in both the crucible wall and the crucible center (integrated into the sealing rod) ensure that temperature limits are strictly adhered to.

Mold temperature measurement

Until recently, molds with incorrect or different temperatures were a safety risk. When casting very small or delicate parts, the temperature of the mold is of utmost importance. Mold temperature measurement (standard on VC 650V and VC 680V) is an important safety feature. The mold temperature can be monitored to within one degree.

Melting by induction technology: The crucible containing the material is placed in the core of the induction coil. A strong alternating magnetic field generates a strong alternating current in the graphite crucible and the metal. This results in rapid heating and thorough mixing of the material.



THE INDUTHERM VIBRATION TECHNOLOGY

THE SEMI-AUTOMATIC VC VERSIONS



Vibration technology for enhanced casting results



The INDUTHERM Vibration System

- Vibration during casting generally improves material flow and mold filling
- Castings exhibit a higher and more consistent density
- Porosity is substantially reduced
- 50% smaller grain size
- Risk of hot cracks is reduced.
- Castings have greater stress and elasticity properties, making them easier to process further.

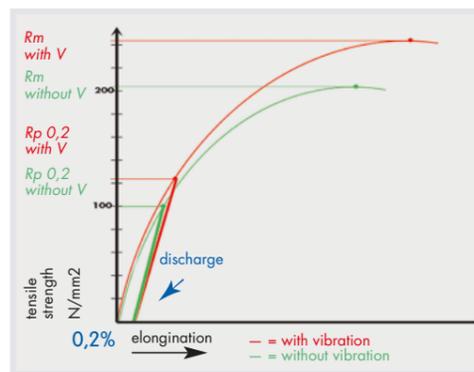
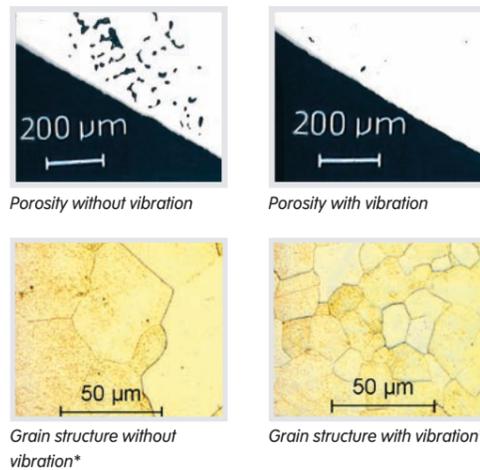
In practice this means: higher and more consistent quality, less waste, less post-processing, and better deformability.

A customer in USA has discovered that by using INDUTHERM vibration technology the total production time including post-processing was reduced by 25% (compared to a machine without vibration).



The INDUTHERM Sweep Mode Vibration System

The sweep mode vibration system can do even more: it considers that each casting tree and even each item of a tree has a different resonance frequency, depending on its shape and size. Sweep mode vibration, which generates variable frequencies, covers all natural resonances.



Elongation limit ~12% better with vibration
Tensile strength ~25% better with vibration

*Au 18 ct: 750 Au, 128 Ag, 122 Cu

VC 400

The ideal machine for smaller companies producing moderate quantities but needing significantly more capacity than the MC machines offer. Often, experienced casters are not particularly interested in automated functions or program control, and they can achieve the same quality with the VC 400 machine as with more advanced machines. ensures rapid heating and thorough mixing of the molten metal through inductive bath movement. In addition to the Turbo Pressure function, the VC 400 and VC 500 automatically switch to positive pressure after casting.

VC 500

For higher production rates with continuous casting operation, higher performance (shorter casting times) with even larger crucibles and mold capacities (molds up to 160 mm ø/400 mm H) is important. The high maximum temperature of 1,600°C extends the range of alloys that can be cast. Temperature measurements in both the crucible and the mold provide the best possible repeatability in the process. If alloys are frequently changed, 20 different temperature programs simplify the process.

* Liquid metal up to the top of the crucible
■ = Standard equipment ○ = optional

	VC 400	VC 500
Performance		
Power max. / electrical connection	3.5 kW 230 V or 4.5 kW 3x400 V	10 kW 3x400 V / 3x208 V
Temperature max.	1400° C	1600° C
Capacity		
Crucible volume	■ 170 ccm = 2.5 kg Au 18 ct / 1.5 kg Cu*	■ 245 ccm = 3.6 kg Au 18 ct / 2 kg Cu* ○ 386 ccm = 5.8 kg Au 18 ct / 3.3 kg Cu*
For use of molds up to	ø 130 mm / 240 mm h	■ ø 130 mm / 240 mm h ○ ø 160 mm / 400 mm h
Handling & control		
Maximum pressure	■ 1.5 bar/○ 3.0 bar	■ 1.5 bar/○ 3.0 bar
Automatic bell lock	■	■
Program control/programs	■ by LCD-display, full text readout/20	■
Dual temperature control	○	○
Mold and chamber lift	■	■
Variable vacuum in mold chamber	■	■
Turbo pressure system	■	■
Turbulence reduction software	■	■
Quality management		
RS 232, Ethernet, USB interface,	■	■
Diagnostic system	■	■
Data printer	-	-
GSM-modem for remote service	○	○
DMS / InduthermCloud / iThermControl	■ / ○ / ○	■ / ○ / ○
Accessories/peripheral equipment		
Sintering kit (for diffusion bonding)	○	○
Granulation tank/flake option	○ / ○	○ / ○
Water chiller, vacuum pump ...	○	○
Other versions		
Also available as a granulating unit	-	GU 500

THE FULLY AUTOMATIC VC MACHINES

VC 450 - VC 480 V



VC 450

The VC 450 has a program control system with a full-text LCD display. Twenty different casting cycles can be stored for reproducible and consistent casting results. Optionally, this machine is also available with the INDUTHERM vibration system (VC 450 V).



VC 460 V featuring a new highly comfortable automatic lid lock system

VC 460 V

We have developed our new program-controlled, fully automatic vacuum pressure casting machine VC 460 V, especially for casting jewelry with embedded stones and filigree shapes. On the one hand, we have further developed the proven INDUTHERM vibration system, especially for casting very delicate parts. On the other hand, the VC 460 V has an innovative high-speed overpressure system with up to 3 bar overpressure. The melting chamber's new automatic closing and locking system closes and locks the lid reliably, quickly, and gently at the touch of a button. This is an enormous increase in convenience and allows even higher production speeds.

Not to be forgotten: The design has been optically and ergonomically optimized, making the system even easier to use.

VC 480 V

We recommend the VC 480 V for productions that require more power and capacity to increase process speed and throughput. The VC 480 V is equipped with an 8 kW generator, advanced program control with 100 casting programs, automatic mold and chamber lift, variable vacuum in the mold chamber, and the INDUTHERM vibration system.

* Liquid metal up to the top of the crucible
 ** Injection of the metal into the mold, also known as "double chamber system"
 ■ = Standard equipment ○ = optional

	VC 450 / VC 450 V	VC 460 V	VC 480 V
Performance			
Power max. / electrical connection	4.5 kW 3x400 V	4.5 kW 3x400 V	8 kW 3x400 V
Temperature max. indirect inductive heating	1400° C	1400° C	1600° C
Capacity			
Crucible volume	■ 170 ccm = 2.5 kg Au 18 ct / 1,5 kg Cu*	■ 170 ccm = 2.5 kg Au 18 ct / 1,5 kg Cu*	■ 170 ccm = 2.5 kg Au 18 ct / 1,5 kg Cu* ○ 245 ccm = 3.6 kg Au 18 ct / 2 kg Cu*
For use of molds up to	ø 130 mm / 240 mm h	■ ø 130 mm / 240 mm h	■ ø 130 mm / 240 mm h ○ ø 160 mm / 400 mm h
Handling & control			
Vibration technology	- / ■ VC 450 V	■ optimized vibration system	■
Automatic lid lock system	-	■	-
Maximum pressure	■ 1.5 bar / ○ 3.0 bar	■ 3.0 bar (novel high speed system)	■ 1.5 bar / ○ 3.0 bar
Program control/number of programs	■ full-text LCD display / 20	■ full-text LCD display / 20	■ full-text LCD display / 100
Dual temperature control	○	○	○
Automatic mold and chamber lift	■	■	■
Variable vacuum in mold chamber	-	■	■
Turbo Pressure/Turbo Pressure PLUS system	■/-	■/■ with additional gas tank	■/○
Novel high speed overpressure system	-	■	-
Turbulence reduction software	■	■	■
HSC (High Speed Casting)**	○	○	○
Quality management			
RS 232, Ethernet, USB interface, diagnostic system	■	■	■
Data printer	○	○	○
GSM-modem for remote service	○	○	○
DMS / InduthermCloud / iThermControl	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○
Accessories/peripheral equipment			
Sintering kit / granulation tank / flake option	○ / ○ / ○	○ / ○ / ○	○ / ○ / ○
Water chiller, vacuum pump ...	○	○	○

OUR PREMIUM VC MACHINES

VC 650 V AND VC 680 V



VC 650 V

The fully equipped INDUTHERM VC 650 V offers very high speed and casting quality. The program control with 100 casting programs, the crucible capacity of up to 700 ccm, the sweep-mode vibration system, and the overpressure of up to 3 bar are the main advantages that make this machine ideal for large production runs.

VC 680 V

The VC 680 V is based on the VC 650 V. However, the standard filling device of this machine eliminates the need to open the melting chamber for refilling. This keeps the melting chamber temperature high and prevents unnecessary energy loss. Most importantly, no oxygen enters the melting chamber, so evacuating and refilling with inert gas is unnecessary.

This results in faster casting cycles; the crucible and sealing rod benefit from the largely constant atmosphere and temperature and have significantly longer service life.

The advantages:

- lower personnel costs
- more consistent casting quality
- better process stability, less waste
- optimised overlapping casting
- up to 20 casting cycles per hour
- high energy efficiency
- longer service lives for consumables
- minimised metal loss
- replenishment without loss of pressure

For indirect and direct induction heating, also as HTC versions

VC 650 V and VC 680 V are both suited for indirect or direct induction heating (see page 6). They are also available as high-temperature versions offering a maximum temperature of up to 2,000° C (HTC).



Automatic sealing rod, dual temperature measurement



An additional pressure tank integrated into the plant provides for even faster pressure build-up for activation of the Turbo Pressure PLUS function.

* Liquid metal up to top level of the crucible

** Injection of the metal into the mold, also known as "double chamber system"

■ = Standard equipment ○ = optional

	VC 650 V (HTC)	VC 680 V (HTC)
Performance		
Power max. / electrical connection	12 kW 3x400 V	12 kW 3x400 V
Temperature max. indirect inductive heating	1700° C	1700° C
direct inductive heating/HTC	1850° C / 2000° C	1850° C / 2000° C
Capacity		
Crucible volume	<ul style="list-style-type: none"> ■ 245 ccm = 3.6 kg Au 18 ct / 2 kg Cu* ○ 386 ccm = 5.8 kg Au 18 ct / 3.3 kg Cu / 8 kg Pt / 2 kg steel* ○ 700 ccm = 10.5 kg Au 18 ct / 6 kg Cu* 	<ul style="list-style-type: none"> ■ 245 ccm = 3.6 kg Au 18 ct / 2 kg Cu* ○ 386 ccm = 5.8 kg Au 18 ct / 3.3 kg Cu / 8 kg Pt / 2 kg steel* ○ 700 ccm = 10.5 kg Au 18 ct / 6 kg Cu*
For use of molds up to	<ul style="list-style-type: none"> ■ ø 130 mm / 240 mm h ○ ø 160 mm / 400 mm h 	<ul style="list-style-type: none"> ■ ø 130 mm / 240 mm h ○ ø 160 mm / 400 mm h
Handling & control		
Vibration technology	■ in sweep mode	■ in sweep mode
Automatic bell lock/automatic closing system	■/■	■/■
Maximum pressure	3 bar	3 bar
Program control/number of programs	■ by LCD-display, full text readout / 100	■ by LCD-display, full text readout / 100
Dual temperature control	○	○
Mold temperature measurement	■	■
Automatic feeding system w/ autom. sealing rod	-	■
Automatic mold and chamber lift	■	■
Variable vacuum in mold chamber	■	■
Turbo Pressure/Turbo Pressure PLUS system	■/■	■/■ with additional gas tank
turbulence reduction software	■	■
HSC (High Speed Casting)**	○	○
Quality management		
RS 232, Ethernet, USB interface, diagnostic system	■	■
Data printer	■	■
GSM-modem for remote service	■	■
DMS / InduthermCloud / iThermControl	■ / ○ / ○	■ / ■ / ■
Accessories/peripheral equipment		
Sintering kit / granulation tank / flake option	○ / ○ / ○	○ / ○ / ○
Water chiller, vacuum pump ...	○	○

THE VACUUM PRESSURE CASTING MACHINES FOR LARGE CASTING PARTS



picture: VC 1000 V with feeding system and window door

VC 3000 V with large mold chamber

VC 12000 V

Capacity and power for large-scale projects

Our large vacuum pressure casting machines are most often used for precise castings in aluminum alloys or arts and crafts items in brass or bronze. They are always the first choice for parts with complicated geometry or when the number of pieces is not large enough for die-casting.

Perfect conditions for high-quality aluminum castings

The hydrogen content of aluminum alloys can be adjusted by regulating the vacuum during melting. This eliminates foaming of the melt without the need for melt additives. Overpressure in the melt chamber during and after casting, and

a simultaneous vacuum in the mold chamber optimize mold filling, especially in filigree or thin-walled areas.

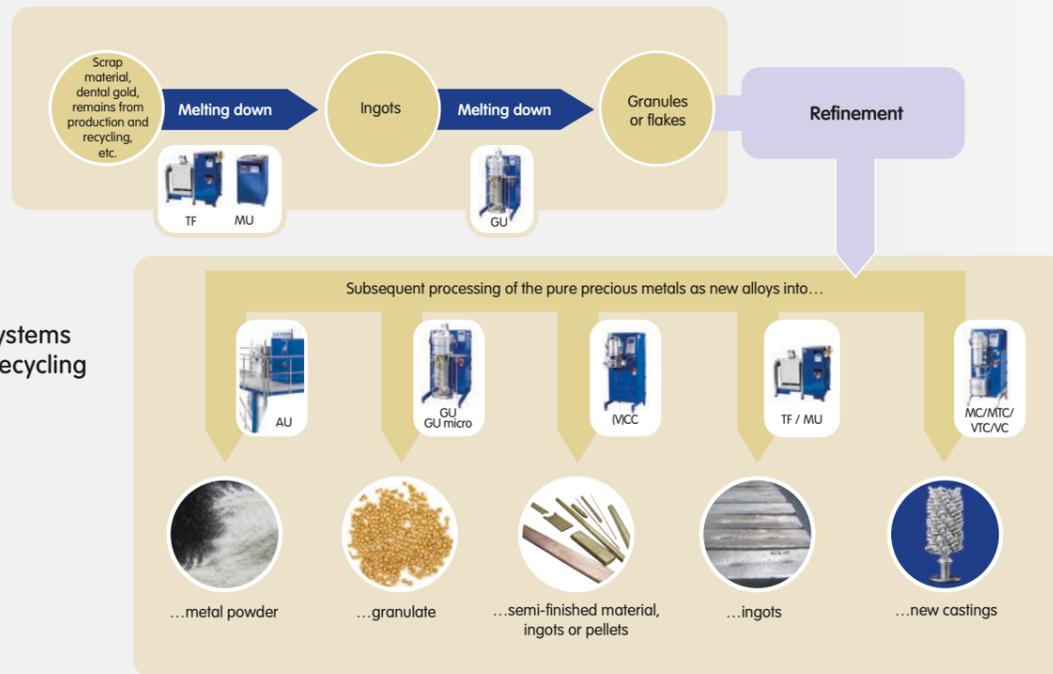
All our large VC machines are equipped with a program control system with 100 programs. The control panel with full text LCD display allows the user to set all programs and parameters very easily and conveniently. VC 1000 V – VC 12000 V use vibration technology for improved casting results, especially concerning mold filling and further processing properties. These versions offer the option of indirect inductive heating in graphite crucibles or direct inductive heating in ceramic crucibles. As HTC versions they reach maximum temperatures of 2,000° C (VC 12000 V up to 1,850° C).



	VC 1000 V (HTC)	VC 3000 V (HTC)	VC 12000 V (HTC)	VC 25000
Performance				
Power max. / electrical connection	20 kW 3x400 V	30 kW 3x400 V	40-60 kW 3x400 V	60 kW 3x400 V
Temperature max. indirect inductive heating	1500° C	1500° C	1300° C	1600° C
direct inductive heating/HTC	1850° C / 2000° C	1850° C / 2000° C	1850° C	
Capacity				
Crucible volume in liters* (HTC)	1.5 l (1.7) = 4 kg Al / 12 kg Cu / 12 kg steel*	3.4 l (3.9) = 8.5 kg Al / 25 kg Cu / 25 kg steel*	12 l (14) = 30 kg Al / 90 kg Cu / 90 kg steel*	25 l = 65 kg Al / 200 kg Cu*
For use of molds up to	ø 250 mm / 500 mm h	ø 450 mm / 600 mm h	ø 600 mm / 800 mm h	ø 600 mm / 800 mm h
Handling & control				
Vibration technology	■	■	■	-
Automatic bell lock	■	■	■	■
Maximum pressure	0.5 bar	0.3 bar	0.3 bar	0.3 bar
Program control (100 programs)	■ full-text LCD display	■ full-text LCD display	■ full-text LCD display	■ full-text LCD display
Dual temperature control	■	■	■	■
Automatic mold and chamber lift	■	■	-	-
Variable vacuum in mold chamber	■	■	■	■
Turbulence reduction software	■	■	■	■
HSC (High Speed Casting)**	○	○	○	○
quality management				
RS 232, Ethernet, USB interface, diagnostic system	■	■	■	■
Data printer	■	■	■	■
GSM-modem for remote service	■	■	■	■
DMS / IndutermCloud / iThermControl	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○
Accessories/peripheral equipment				
Granulation tank/flake option	○ / ○	○ / ○	○ / ○	○ / ○
Water chiller, vacuum pump ...	○	○	○	○

* Liquid metal up to the top of the crucible – other volumes on request. ■ = Standard equipment ○ = optional

MELTING UNITS FOR HANDPOURING AND RECYCLING

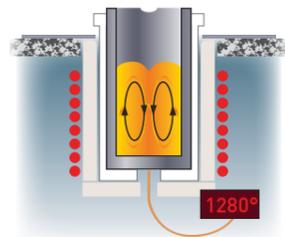


Indutherm systems used in the recycling process



MU / MUV / MUVV Series

MU / MUV / MUVV 200 C
high temperature melting machine for steel, platinum, palladium, chrome-cobalt...



With the MU and MUV series we offer melting machines for a wide range of needs, with crucible capacities from 155 ccm up to 1,200 ccm. The material is melted in open crucibles and poured into the casting or ingot mold by hand.

Melting Units MU Series

These furnaces are designed for melting gold and silver alloys and aluminum, bronze, and brass. Due to the powerful induction generator (15 kW) and the low induction frequency, the stirring effect of the metal is excellent.

The MU as vacuum casting machine: MUV/MUVV Series

The V versions include one or two additional high-capacity vacuum chambers. Evacuating the mold immediately after pouring improves mold filling, reduces porosity, and prevents oxidation of the hot metal.



Melting by induction technology: The crucible containing the material is placed in the core of the induction coil. A strong alternating magnetic field generates a strong alternating current in the graphite crucible and in the metal. This results in rapid heating and thorough mixing of the material.

The melting machine MU 200 C

The MU 200 C is designed for melting high-melting-point metals such as steel, palladium, platinum, chromium-cobalt, etc., by direct induction heating.

	MU 200 MUV/MUVV 200	MU 400-1200 MUV/MUVV 400-1200	MU 200 C MUV/MUVV 200 C
Performance			
Power max. / electrical connection	3.5 kW 230 V or 6 kW 3x400 V	10-15 kW 3x400 V	12 kW 3x400 V
Temperature max.	1300° C / or 1500° C	1500° C 1800° C **	2000° C
		MU/MUV/MUVV 400: 10 kW MU/MUV/MUVV 700: 12 kW MU/MUV/MUVV 900: 15 kW MU/MUV/MUVV 1200: 15 kW	
Capacity			
Crucible volume	155 ccm = 2.0 kg Au 18ct / 1.2 kg Cu *	MU/MUV/MUVV 400: 400 ccm** = 5.0 kg Au 18ct/3.2 kg Cu* MU/MUV/MUVV 700: 700 ccm** = 8.5 kg Au 18ct/5.5 kg Cu* MU/MUV/MUVV 900: 900 ccm** = 11 kg Au 18ct/7.2 kg Cu* MU/MUV/MUVV 1200: 1200 ccm** = 14.5 kg Au 18ct/10kg Cu*	155 ccm = 2.5 kg Pt / 1 kg steel *
(Non-)perforated molds with/without flange	■ up to ø160 mm/400 mm h (MUV/MUVV)		■ ø 160 mm / 400 mm h (MUV/MUVV 200 C)
Handling & control			
Temp. Measurement by thermocouple	■		-
Temp. Measurement by optical pyrometer	○		○
Temperature control	■		■
Temperature programs	20		-
DMS / InduthermCloud / iThermControl	■ / ○ / ○		■ / ○ / ○
Quality management			
RS 232, Ethernet, USB interface, diagnostic system	■		■
GSM-modem for remote service	○		○
Accessories/peripheral equipment			
Water chiller, vacuum pump ...	○		○

* Real capacity for casting / useful volume ** High temperature versions with reduced crucible volume ■ = Standard equipment ○ = optional

TF SERIES TILTING FURNACES FOR MELTING AND POURING LARGE QUANTITIES



Some metals produce a lot of smoke and oxides when melted. It is better to melt them in open systems using an air absorber.



There is no limitation in the material size.

Ideal for melting large parts: no sealing rod construction reduces the available space.

Power, efficiency, and safety

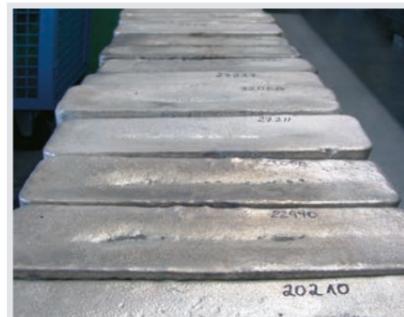
The TF Series tilting furnaces are equipped with 32-bit induction generators providing 25-60 kW output power (depending on the model). The low-frequency tuning ensures excellent mixing of the molten material. All versions are controlled from a console with a full-text LCD display. Efficient thermal insulation and electromagnetic shielding ensure high efficiency. Comparative tests conducted by a customer have shown that the TF 12000 is more productive than a competing model with twice the power and twice the energy costs.

TF 2000 and TF 4000 – the cost-effective tilting furnaces

The "small" TF machines have been designed with a focus on low energy consumption and safe, ergonomic handling. The melting unit and crucible can be tilted and locked in position at various angles by the user for gentle pouring. This "soft pouring" also prevents damage to the crucible. Pouring is continuous and gradual using a pivot lever. The operator is forced to stand to the side of the machine – away from the hazards of the pouring area. In the rare event of a crucible breakage, the machine will not be damaged – all assemblies are covered by a separate protective housing, and each model has a large collecting tray under the melting unit to prevent potential metal loss.

TF 6000, TF 12000 and TF 28000 – the giants among our tilting furnaces

The large crucible volumes of 6,000, 12,000 or 28,000 ccm give these machines enormous capacity. Due to the potentially large weight, the inductor/crucible unit is not tilted manually – it is driven by a high-torque motor drive. Using a joystick allows easy and sensitive control of the tilting process.



	TF 2000 / 4000 (HTC)	TF 6000 / 12000 (HTC)	TF 28000
Performance			
Power max. / electrical connection	20-30 kW 3x400 V	40-60 kW 3x400 V	60 kW 3x400 V
Temperature max.	1500° C	1500° C	1500° C
Temperature max. HTC version	1800° C	1800° C	
	TF 2000: 25 kW TF 4000: 30 kW	TF 6000: 40 kW TF 12000: 40 kW / 60 kW	
Temperature measurement by thermocouple	■	■	■
Capacity			
Crucible volume	2 l = 30 kg Au 18 ct / 16 kg Cu / 15 kg steel* 4 l = 60 kg Au 18 ct / 32 kg Cu / 30 kg steel*	6 l = 90 kg Au 18 ct / 50 kg Cu / 50 kg steel* 12 l = 180 kg Au 18 ct / 100 kg Cu / 100 kg steel*	28 l = 70 kg Al / 200 kg Cu*
Handling & control			
Tilting by lever	■	-	-
Tilting with motor drive (remote control)	-	■	■
Temperature control		■ full-text LCD display	
Temperature programs	20	100	100
Temp. Measurement by optical pyrometer	○	○	○
Quality management			
RS 232, Ethernet, USB interface, diagnostic system	■	■	■
GSM-modem for remote service	○	■	■
DMS / InduthermCloud / iThermControl	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○
Accessories/peripheral equipment			
Protective gas flush to avoid oxidation	○	○	○
Hood for smoke vent	○	○	○
Moveable table (with customized molds)	○	○	○
Water chiller	○	○	○

* Real capacity for casting / useful volume ■ = Standard equipment ○ = optional

CC/VCC SERIES CONTINUOUS CASTING MACHINES – OUR 5-IN-1 MULTITOOLS

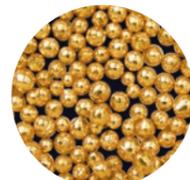
5in1

**CHANGE FUNCTIONS
WITHIN 5 MINUTES!**



● (VACUUM) CONTINUOUS CASTING OF WIRES, SHEET AND TUBES

with numerous options for cutting or sawing into sections during casting, bending, and coiling. VCC series with inert gas/vacuum melting chamber system



● PRODUCTION OF GRANULES

with the easy-to-install granulation tank



● PRODUCTION OF FLAKES

for sintering/diffusion bonding or refining applications



● PRODUCTION OF MULTI-LAYER RINGS AND BRACELETS

with the optional sintering/diffusion bonding kit



● CASTING INTO INGOT MOLDS

or any other molds

More flexibility, lower costs

With an INDUTHERM continuous casting machine, you can produce your own alloys or semi-finished products in different shapes and sizes in a very short time:

- Wire up to \varnothing 120 mm
- Tubes up to \varnothing 180 mm
- Bars, sheet and strips for a wide range of applications, and as basic material for further-processing, for stamping and pressing etc.
- Granules and flakes

Using a continuous casting machine can significantly reduce your investment in stock material. Your processes become faster, more flexible, and more efficient.

Our continuous casting machines are equipped with a number of unique details that significantly improve the quality of the semi-finished product, such as the unique vacuum system or the QUATTRO DRIVE drawing system. See details on the next page.

With a wide range of optionally available equipment, the versatility of these machines may be enhanced even more.

Maximum versatility

Granulation tank and flake kit

The easy-to-install granulation tank and the flake kit make any CC machine even more versatile. See page 42/43 for granulation/flake production details and available tank sizes.

Sintering kit

Sintering/diffusion bonding is optimal for producing multi-colored rings, most commonly sold as wedding rings or bracelets. Metals are processed under pressure and at temperatures below the solidification point. The pressure is generated pneumatically, not mechanically, via a threaded spindle. This means there is no risk of the graphite parts breaking due to heat expansion. The fusion between the layers has the same durability as the metal itself.

The sintering kit is ideal for occasional diffusion bonding jobs and small production runs.

Bar casting kit

The bar casting kit is designed to cast defined quantities of your alloy into ingot molds or other molds. The program control detects the equipment used and displays the appropriate parameter settings.

VCC VACUUM CONTINUOUS CASTING MACHINES – THE ONLY ONES WITH VACUUM AND QUATTRO DRIVE



- Feeding system for re-charging with constant vacuum in the melting chamber
- Vacuum melting chamber
- Flexible inert gas outlet
- Flexible LED spotlight
- Quattro drive system
- Flying saw



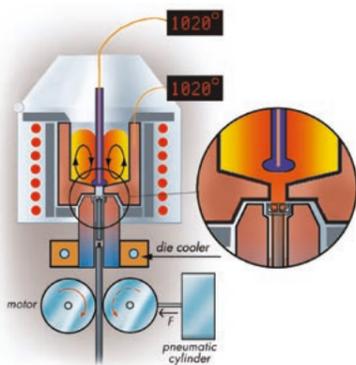
Unique vacuum system

For highest quality of semi-finished material:

To reduce the risk of oxidation during melting and drawing, we focus on avoiding contact with oxygen and rapidly reducing the temperature of the drawn material.

Features for fast temperature reduction:

- Cooling water temperature measurement and automatic flow control
- Optical temperature measurement in the center of the die
- Die cooler
- Additional secondary cooling system at the outlet



Features to avoid oxygen contact:

- Vacuum system for the melting chamber – unique to INDUTHERM continuous casting machines (VCC versions)
- Feeding system for recharging without oxygen contact and with constant vacuum in the melting chamber
- Inert gas system for the melting chamber
- Inert gas flushing at the die
- Optical die temperature measurement

These measures are ideal for copper-containing alloys like red gold or silver, as these materials tend to oxidize easily.



Quattro Drive System

Motorized and pneumatically operated feed rolls draw off the material on each of our continuous casting machines.

A bar end control sensor automatically stops when the molten material is exhausted.

The optional **Quattro Drive** drawing unit with four instead of two motorized feed rolls produces smoother tubes and sheets with reduced transport marks.

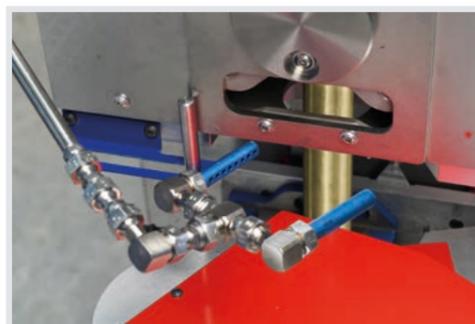
Numerous options for targeted production of semi-finished parts

Bending unit

The bending unit mounted on the bottom drawer allows the material to be bent without mechanical force on the die.

Hydraulic cutter

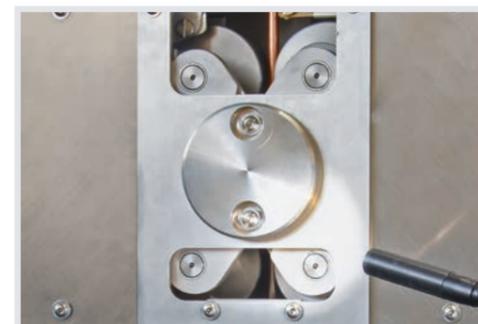
The hydraulic cutter is suited for cutting wire into pre-defined sections.



Secondary cooler at the outlet



Feeding system for recharging with constant vacuum in the melting chamber

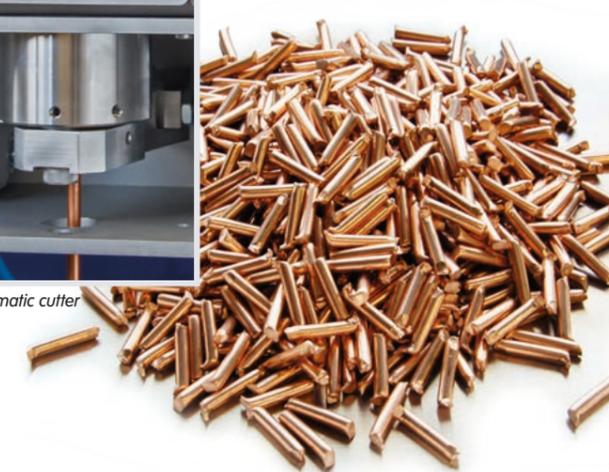


The Quattro Drive System has four feeding rolls.

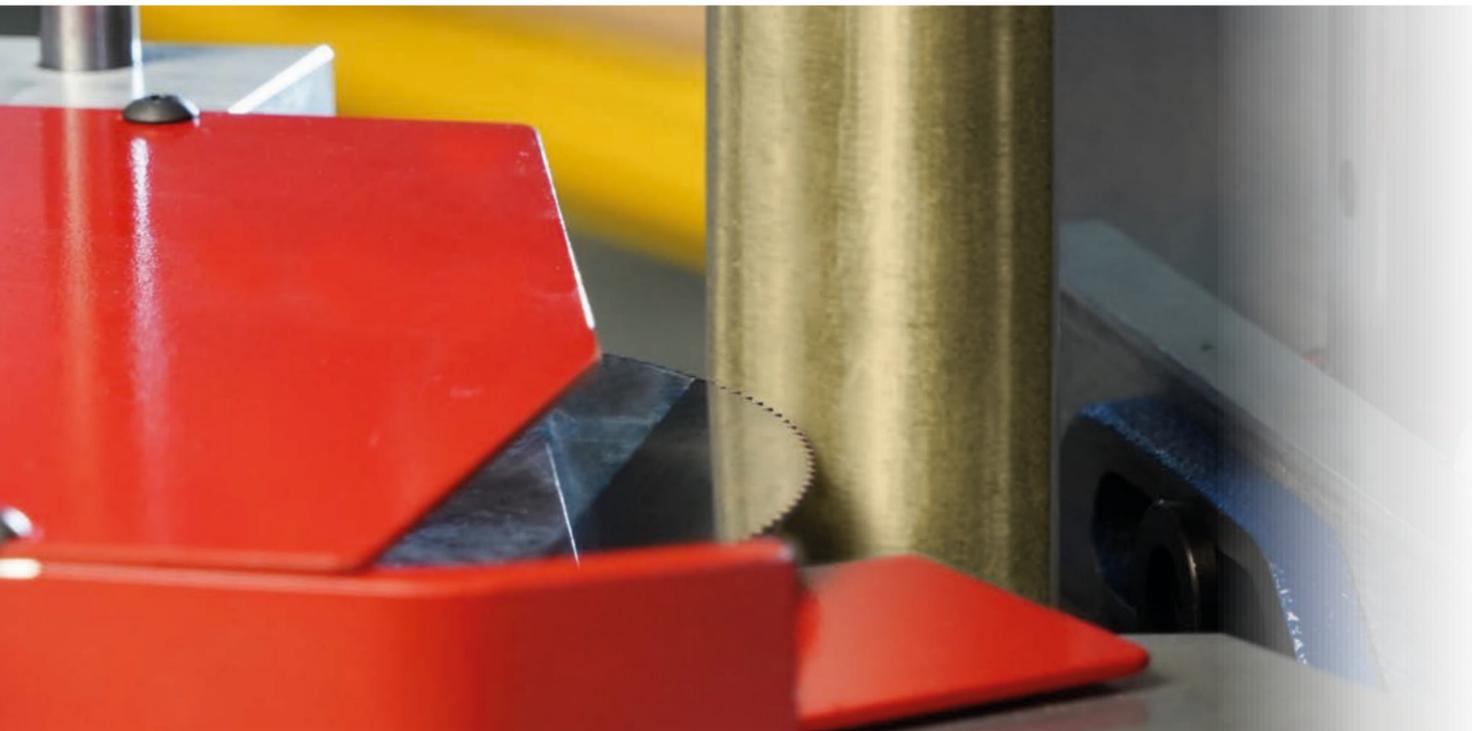


Bending unit

Pneumatic cutter



THE CC/VCC SERIES CONTINUOUS CASTING MACHINES



picture: VCC 400 with optional Quattro Drive



picture: VCC 1000 with Dual Drive

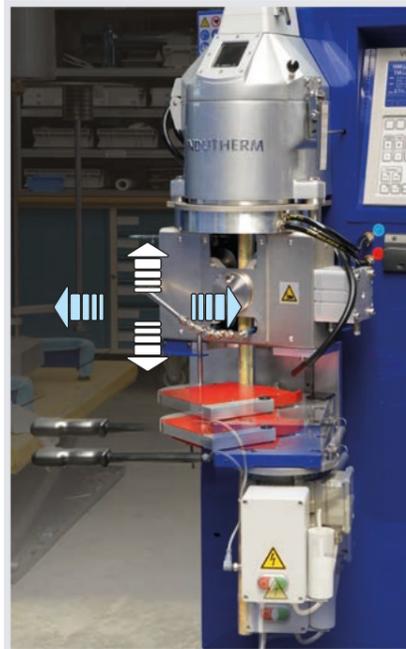


picture: CC 3000 with feeding device, Quattro Drive and flying saw

Continuous casting and cutting to size in one operation!

Flying saw for wire cutting during drawing

The swiveling electric saw moves in sync with the drawn bar or tube. This allows you to cut your material into defined sections during the drawing process. There's no need to stop the continuous casting process when the maximum length is reached.



	CC / VCC 400	CC / VCC 1000	CC / VCC 3000	CC / VCC 12000	CC / VCC 25000
Performance					
Power max. / electrical connection	15 kW 3x400 V / 3x208 V	20 kW 3x400 V	30 kW 3x400 V	40-60 kW 3x400 V	60 kW 3x400 V
Temperature max.	1500° C	1500° C	1500° C	1500° C	1500° C
Capacity					
Crucible volume	■ 245 ccm = 3.6 kg Au 18ct / 2 kg Cu* ○ 386 ccm = 5.8 kg Au 18ct / 3.3 kg Cu* ○ 700 ccm = 10.5 kg Au 18ct / 6 kg Cu*	■ 1.5 l = 4 kg Al / 12 kg Cu *	■ 3.4 l = 8.5 kg Al / 25 kg Cu *	■ 12 l = 30 kg Al / 90 kg Cu *	■ 25 l = 65 kg Al / 200 kg Cu *
Wire / tube production up to	■ ø 20 mm** / ■ ø 45 mm**	■ ø 40 mm** / ■ ø 65 mm**	■ ø 70 mm** / ■ ø 90 mm**	■ ø 120 mm** / ■ ø 180 mm**	■ ø 120 mm** / ■ ø 180 mm**
Sheet production	■ 50 x 8 mm / ○ 60 x 8 mm	■ 100 x 10 mm	■ 130 x 40 mm	■ 200 x 55 mm	■ 200 x 55 mm
Handling & control					
100 programs	by LCD-display, full text readout	by LCD-display, full text readout	by LCD-display, full text readout	by LCD-display, full text readout	by LCD-display, full text readout
Vacuum/inert gas overpressure	- CC 400 / ■ VCC 400	- CC 1000 / ■ VCC 1000	- CC 3000 / ■ VCC 3000	- CC 12000 / ■ VCC 12000	- CC 25000 / ■ VCC 25000
Neutral inert gas atmosphere	■	■	■	■	■
Optical die temperature measurement	■	■	■	■	■
Die cooler with protective gas flushing	■	■	■	■	■
Secondary cooler / water collection system	■ / ○	■ / ○	■ / ○	■ / ○	■ / ○
End bar sensor	■	■	■	■	■
Quality management					
RS 232, Ethernet, USB interface, diagnostic system	■	■	■	■	■
Data printer	■	■	■	■	■
GSM-modem for remote service	■	■	■	■	■
DMS / InduthermCloud / iThermControl	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○	■ / ○ / ○
Accessories/peripheral equipment					
Quattro drive drawing unit	○	○	○	○	○
Sintering / diffusion bonding kit	○	-	-	-	-
Granulation tank / flake option	○ / ○	○ / ○	○ / ○	○ / ○	○ / ○
Bending-unit / coiling equipment	○ / -	○ / ○	○ / ○	○ / ○	○ / ○
Simultaneous casting of several wires	-	○ 3 wires***	○ 5 wires***	○ 5 wires***	○ 5 wires***
Flying saw / pneumatic cutter	○ / ○	○ / ○	○ / ○	○ / ○	○ / ○
Water chiller, vacuum pump ...	○	○	○	○	○

■ = Standard equipment ○ = optional

* Liquid metal up to the top of the crucible – other volumes on request.

** Special dimensions or profiles on demand

*** not in combination with Quattro Drive

GRANULATING SOLUTIONS



We can offer you three different systems for the production of granules.

- If you only want to produce granules occasionally, adding a granulating tank to an existing vacuum pressure or continuous casting machine is a good alternative.
- For the production of micro granules, we recommend our GU 500 micro.
- Our GU Series granulating units are the machine of choice for frequent or permanent granule production.

The Granulation Tank for VC series and CC series casting machines

Granulation tanks are available for all machines in the VC series from VC 400 up to the VC 25000 and for all (V)CC continuous casting machines.

The main advantages:

- Easy installation of the granulation tank
- Fast switching between casting and granulating
- Ergonomically and perfectly balanced design for safe and easy handling
- Optimized streaming behavior of the cooling water
- Reliable separation of water and granules

The Micro Shot Systems
GU 500 micro - GU 3000 micro

The GU Micro series was designed to produce micro granules between 0.1 and 1 mm grain size. The systems are based on the INDUTHERM granulation units shown on the right, but all key components, particularly the jet system, have been specially developed. The main applications for micro granules are in metal laser-sintering processes, jewelry surface design, and soldering technology.

The Granulating Units
GU 500 - GU 25000

These shotmakers are developed especially for granulating bullions, sheet metal or casting residues into proper grains. The granulating tanks are very easy to remove for emptying. The GU machines are available with crucible sizes from 245 ccm up to 25,000 ccm.

The major applications are

- Preparation of alloys or alloy components
- Preparation of alloys from their components
- Cleaning material that has already been cast
- All under inert gas atmosphere or vacuum.



Optionally you can also produce thin flakes instead of granules.



Simple handling of the granulation tanks



Granulation tanks in different sizes:
left: GU 500, option for VC 400 - VC 680 V and (M)CC 400
middle: GU 1000, option for VC 1000 V and (M)CC 1000
right: GU 3000, option for VC 3000 V and (M)CC 3000



Micro granules in different alloys with a grain size of between 0.1 and 1 mm.

	GU 500 (HTC)	GU 1000 (HTC)	GU 3000 (HTC)	GU 12000 (HTC)	GU 25000
Temperature max.	1,600° C	1,600° C	1,600° C	1,600° C	1,600° C
Crucible volume in l*	0.245-0.386	1.5	3.4	12.0	25.0
Temperature max. HTC	2,000° C	2,000° C	2,000° C	1,850° C	-
Crucible volume in l* HTC	0.4	1.7	3.9	14.0	-
Volume in kg Au 18ct	3.6-5.7	22.0	51.0	180.0	-
Volume in kg Ag	2.4-3.8	14.0	34.0	120.0	250.0
Volume in kg Cu	2.1-3.3	12.0	30.0	105.0	215.0
Volume in kg Pt	6.5	25.0	65.0	-	-
Volume in kg steel	2.5	10.0	25.0	90.0	-
Generator kW (400 V)	10	20	30	40-60	60

* Liquid metal up to the top of the crucible - other volumes on request.



SU 450, OUR EFFICIENT SOLUTION FOR RING AND BANGLE PRODUCTION



Sintering/diffusion bonding is optimal for producing multi-colored rings, most commonly sold as wedding rings or bracelets. Metals are processed under pressure and at temperatures below the solidification point. The pressure is applied pneumatically, not mechanically, through a threaded spindle. This means there is no risk of the graphite parts breaking due to heat expansion. The fusion between the layers has the same durability as the metal itself. Prefabricated rings can be easily resized (7 sizes and more).

Benefits of the INDUTHERM sintering process:

- The sintering unit allows processes to be performed under a vacuum, which is important for alloys with a manganese content.
- Processes can be performed under inert gas
- Straightforward installation/removal of the rings
- Approximate duration of process: 5 min.
- Depending on the thickness of the rings, up to 6 rings or bangles can be processed simultaneously

Two different methods of sintering

Special **sintering machines SU 450/SU 450 XL** or the **sintering kit** for installation into existing casting or continuous casting machines.

Sintering Machines SU 450/SU 450 XL

The SU 450 machines are equipped with a highly sensitive sensor system that constantly monitors the reduction of the rings and provides real-time information on the reduction values on the display. The temperature can be controlled precisely, close to the solidus temperature until the reduction starts. As soon as the pre-set reduction value is reached, the process stops automatically to prevent excessive deformation (depending on the composition and alloy, the pre-set reduction value varies between 0.1 mm and 0.3 mm). The "Sensor Control System" significantly reduces the time and material required for production for two main reasons: firstly, because the process parameters can be defined quickly and without

having to make a lot of test rings, and secondly, because the quality of the sintering process is consistently very high. This reduces the amount of finishing required and the amount of material lost in subsequent diamond dressing or turning.

The Sintering Kit

The sintering kit can be installed in existing VC 400 to VC 680 V and continuous casting machines. The kit is ideal for the occasional diffusion bonding job and small batch production. It only takes a few minutes to install/remove the sintering kit. For larger production quantities, we recommend our SU 450 sintering machine.

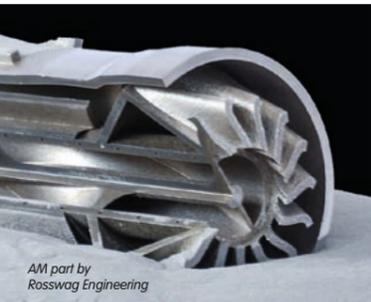


For sintering, the individual layers are centered on a spindle. For the simultaneous processing of multiple rings, the rings are separated by graphite shims.

	SU 450	SU 450 XL
Performance		
Power max. / electrical connection	4.5 kW 3x400 V	4.5 kW 3x400 V
Temperature max.	1300° C	1300° C
Capacity		
Sintering processes per hour	≈ 10	≈ 10
Diffusion bonding up to ø mm	35	70
Handling & control		
Reduction control	■	■
Electronic fix stop	■	■
Automatic process stop	■	■
Program control	■ LCD display, full text readout	■ LCD display, full text readout
Programs	100	100
Data printer	■	■
Quality management		
RS 232, Ethernet, USB interface, diagnostic system	■	■
Data printer	■	■
GSM-modem for remote service	○	○
DMS, induthermcloud, ithermcontrol	○	○
Peripheral equipment		
Water chiller, vacuum pump...	○	○

■ = Standard equipment ○ = optional

MACHINE SOLUTIONS FOR METAL POWDER PRODUCTION AND PROCESSING



Our vision is to make metal powder production and processing technology accessible to everyone.

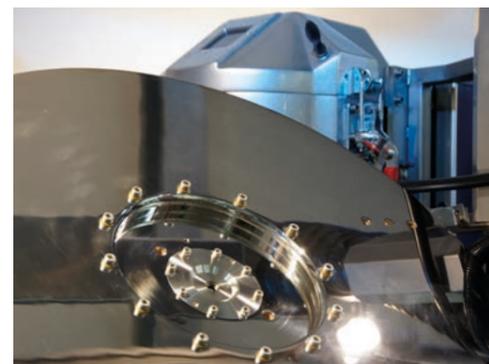
That is why we have developed different machine solutions that can be customized to meet each customer's unique needs.

The current product portfolio includes

- **Gas Atomizers** for the production of spherical metal powder in small to medium-sized batches (1,5l - 28l crucible volume)
- **Water Atomizers** for the production of more irregular metal powders as they are ideal for the recycling/refining, pressing & sintering processes, among others
- **Ultrasonic Atomizers** for the production of highly spherical metal powder in small or very small batches
- **Air Classifiers** for the precise separation of metal powders.

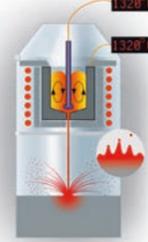
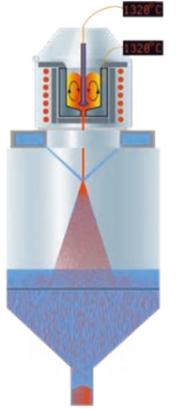
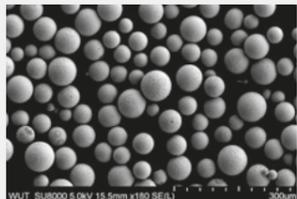
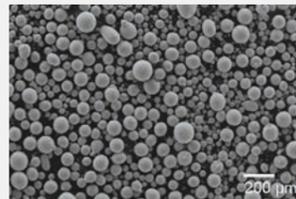
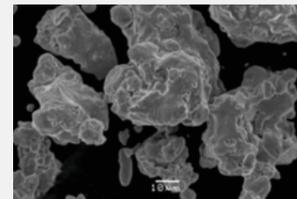
Advantages of all our systems for powder production and processing:

- **Oxidation-free processing**
The possibility of oxidation-free processing by means of de-gassing, vacuum and protective gas features.
- **Easy handling and cleaning**
The user-oriented and modular design of the systems ensures optimum accessibility for all operations, as well as for inspection and maintenance. Short installation and training times.
- **Quick alloy change with minimal cross contamination**
Polished stainless steel surfaces prevent powder adhesions – all parts are easy to clean without any residues. The risk of metal loss and cross-contamination is minimized.



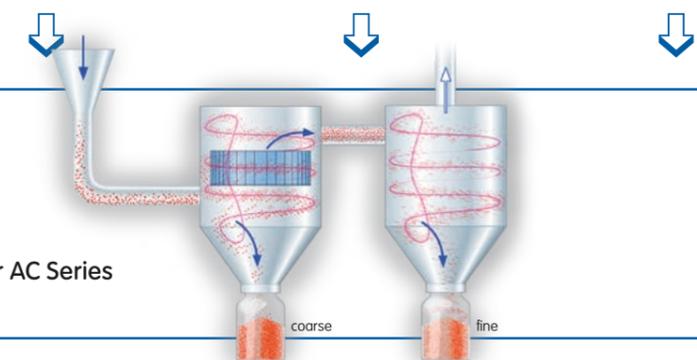
For detailed information about our solutions for the production and processing of metal powders, please request our special brochure!

Specific advantages of our different systems

	Ultrasonic Atomization AUS 500	Gas Atomization AUG 1000-25000	Water Atomization AUW 500-1000
Solutions for metal powder production (VIM systems)			
Shape of the powder	 Maximum spherical Ideal for SLM, MIM, and other Additive Manufacturing processes	 Highly spherical Ideal for SLM, MIM, and other Additive Manufacturing processes	 More irregular Ideal for recycling/refining processes, press & sinter processes, and others
Purity	Very high purity (oxidation-free processing in the closed-chamber machine by means of degassing, vacuum and protective gas features)	Very high purity (oxidation-free processing in the closed-chamber machine by means of degassing, vacuum and protective gas features)	High purity (oxidation-free melting by means of degassing, vacuum and protective gas features)
Batch size	Very small batch sizes Down to ~ 100 g bronze or steel technically and financially viable	Small to medium amounts Up to 180 kg bronze or steel per cycle (depending on version)	Small to medium amounts Up to 9 kg bronze or steel per cycle (depending on version). Larger versions are in development.
Other characteristics	From alloy creation to powder within 1 hour	Numerous variations of process parameters allow a very wide range of particle size distribution within one machine	Production of almost spherical powder is also possible

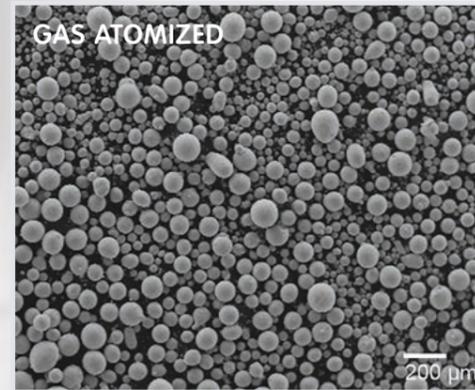
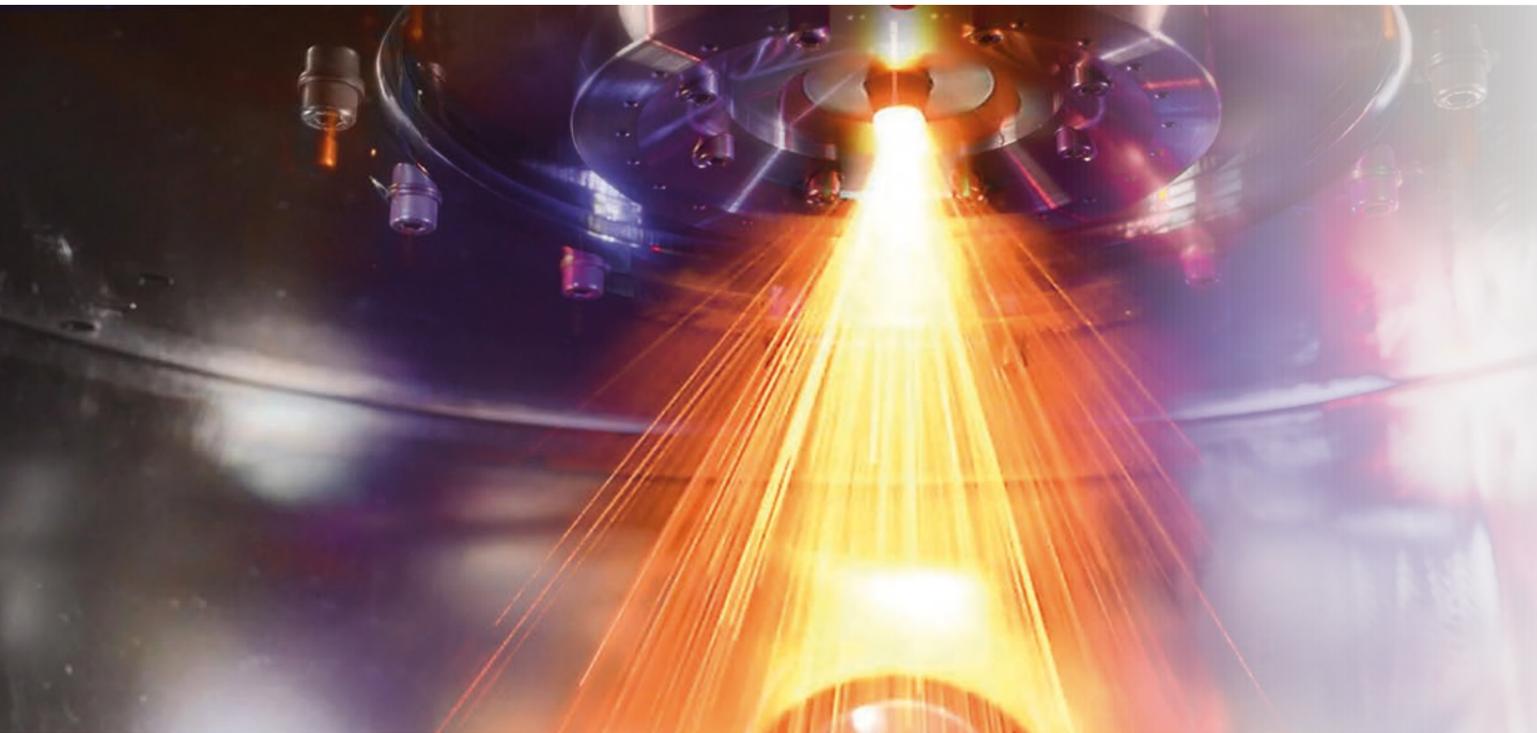
Solutions for metal powder separation

Air Classifier AC Series

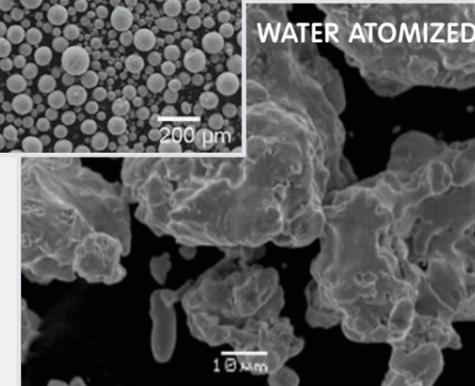


AUG SERIES – GAS ATOMIZERS

AUW SERIES – WATER ATOMIZERS



Ag-based solder alloy powder with an average particle size of ~60 μm

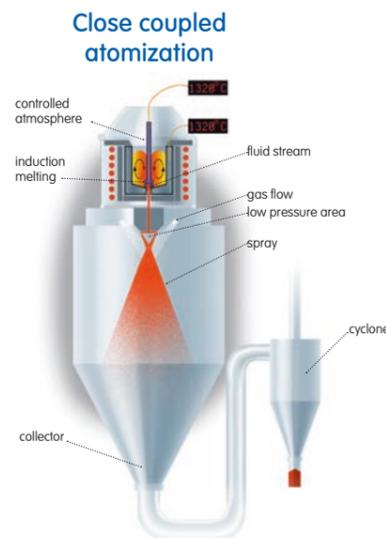


Ag-based solder alloy powder with an average particle size of ~50 μm



AUG Gas Atomizers: for numerous applications and a wide range of alloys

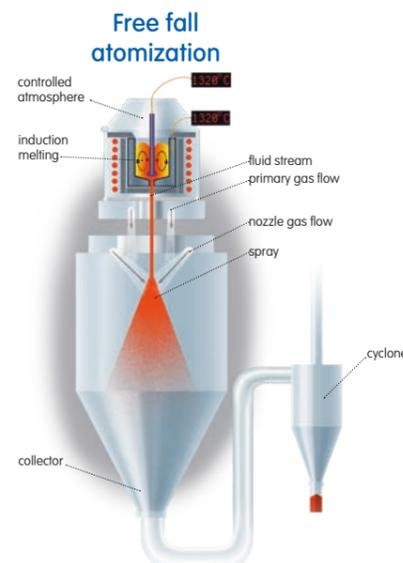
The INDUTHERM AUG machines are designed for a wide variety of applications thanks to a narrow size distribution with high yield and the possibility of flexible use with different nozzle systems. They are generally suitable for gas atomization of a wide range of alloys, such as those based on Cu, Au, Ag, Sn, or Zn (standard versions), as well as Fe, Co, Ni, Pd, or Pt (high-temperature versions HT, HTC and HTC+). Inductive heating takes place in graphite crucibles (up to 1600 °C) or ceramic crucibles: HT up to 1750 °C, HTC up to 1850 °C, HTC+ up to 2100 °C. Crucible volumes range from ~0.25 l to ~25 l. Please get in touch with us for our solutions to produce reactive materials such as Al or Mg.



Powder characteristics and particle sizes for every request

The AUG machines operate with different, easily interchangeable nozzle systems: free-fall and close-coupled atomizing nozzles to achieve specific metal powder properties and particle sizes. An optional anti-satellite system is available for maximum sphericity.

Our gas atomizers produce spherical, flowable metal powders with average particle sizes between ~1 and 200 μm for applications such as additive manufacturing, soldering or foam sintering, MIM, and other powder metallurgy processes.



Oxidation-free processing for maximum cleanliness

The AUG and AUW machines offer the possibility of oxidation-free processing in a closed chamber utilizing degassing, vacuum, and inert gas functions to achieve the highest degree of cleanliness. Oxygen sensor values below 0.5 ppm can be reproducibly achieved

The Gas Atomizer – at a glance:

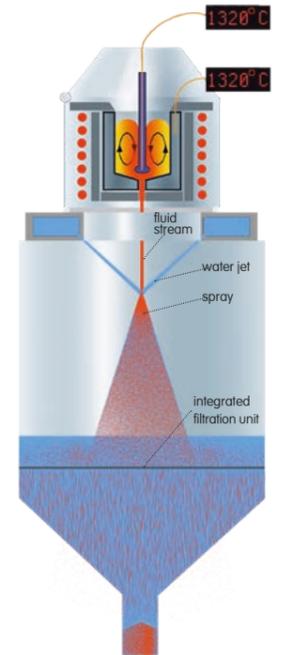
- Very simple handling via LCD-Display and neatly arranged control panel
- Flexible and economical production of small to medium metal powder batches
- Easy-to-clean concept: minimum metal loss and cross-contamination
- High powder yield over a particularly wide particle size range
- Particularly high process stability due to optimized nozzle systems
- Anti-oxidation features

AUW Water Atomizers

While both gas and ultrasonic atomization solutions are designed to produce spherical powders by avoiding any contact with fast quenching media during particle formation, water atomized powders typically have a more irregular shape, which is advantageous for some applications such as recycling/refining processes, press & sinter processes, and others.

However, producing nearly spherical fine powders by water atomization with appropriate process parameters is also possible, making the powder potentially suitable for AM applications.

Compared to gas atomization, operating costs are significantly lower.



	AUG/AUW 500	AUG/AUW 1000	AUG/AUW 3000	AUG/AUW 12000	AUG/AUW 25000
Temperature max.	2,100° C	2,100° C	2,100° C	1,850° C	1,500° C
Crucible volume in l*	0.25 - 0.7	1.5 - 1.7	3.4 - 3.9	12.0 - 14.0	25.0
Volume in kg bronze**	1 (optional 1.5 or 4)	9	22	80	180
Volume in kg steel** (HTC)	2.5	8	22	90	on request
Single cycle time	1-1.5 h	1.5-2 h	3-4 h	4-5 h	5-6 h
Generator kw	12	20	30	40-60	60+

* Liquid metal up to the top of the crucible – other volumes on request.

** Average capacities. Quantity may be increased by optimizing metal load using feeding systems.

AUS SERIES – ULTRASONIC ATOMIZERS



AUS 500, the compact Atomizer solution – from alloy creation to powder within 1 hour

The INDUTHERM Ultrasonic Atomizer Unit enables almost anybody to produce small batches of high-quality, spherical powder for the same target application as a gas atomized powder at an affordable price and without having a complex infrastructure.

The AUS 500 is available in different batch sizes from 0.25-0.7 l. The melting and alloying of the material in the crucible takes place with an indirect induction system (e.g. graphite crucible) or a direct induction system for high temperatures (ceramic crucible).

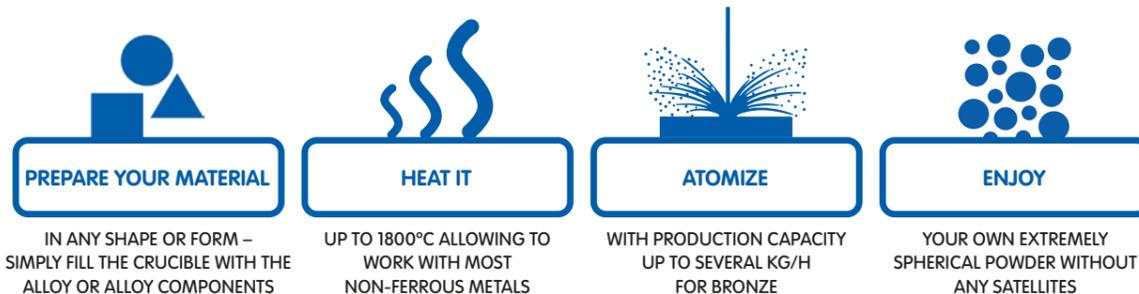


Compact AUS 500:
A footprint of just a few square meters including infrastructure

AUS 500	
Temperature max.	1,700° C
Crucible volume*	0,245 - 0,7 l
Volume in kg gold (up to)	10 kg Au 18 ct*
Volume in kg bronze**	5.6 kg
Single cycle time	1 h
Generator kw	10

*Liquid metal up to the top of the crucible

PERFECT POWDER IN 4 EASY STEPS



For detailed information about our solutions for producing and processing metal powders, please request our special brochure!

THE AIR CLASSIFIERS



AC series Air Classifiers

1- or 2-stage air classifier systems for the precise separation of metal powders

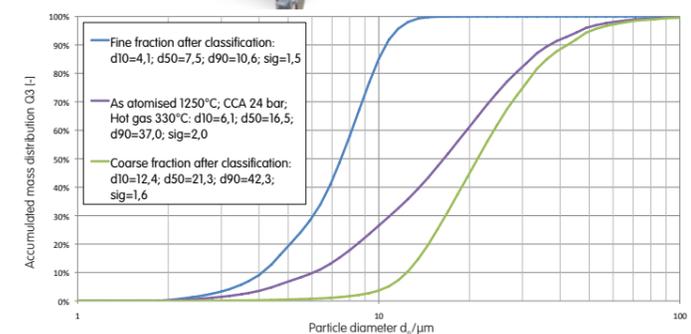
The AC Series air classifiers are designed to precisely separate metal powders into fine and coarse powder fractions, especially in the range < 25 µm, where conventional screening technologies fail.

For the processing of small to medium-sized powder batches

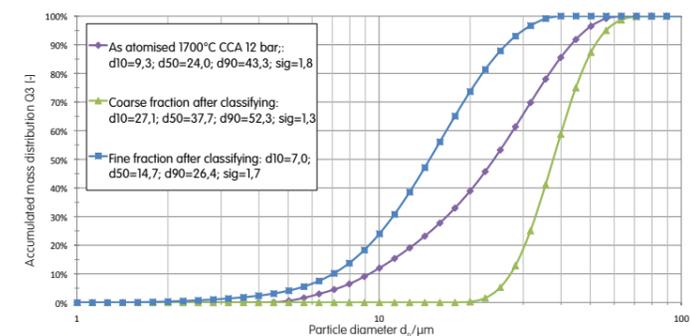
The easy-to-clean design of our air classifiers makes them ideal for any production that requires frequent changes in alloy or desired particle size, especially for precious and other specialty metals. These features qualify the AC Series machines for research and development applications and large plants with throughputs up to 200 kg/h (bronze or steel) and two-stage classification.

Classification under protective gas atmosphere: the G versions AC 1000 G / 3000 G

The AC G-Series is especially recommended for the separation of metals or alloys where the absorption of oxygen, moisture, or contamination from the ambient air must be avoided. An oxygen measurement system controls the process according to the set values. For example, a fixed oxygen setpoint can be defined before the process is started. Please get in touch with us for more information on the classification of reactive metals.

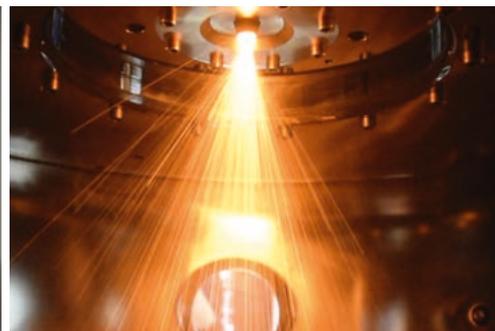


Particle size distribution of gas-atomized 18ct gold powder separated into coarse and fine powder fractions with the AC1000 Air Classifier. Cut point in this example ~10 µm.



Particle size distribution of gas-atomized steel powder separated into coarse and fine powder fractions with the AC 1000 Air Classifier. Cut point in this example ~25 µm.

	AC 1000	AC 1000 G	AC 3000 G
Throughput (steel)	75 kg / h	75 kg / h	200 kg / h
Classifier range (steel)	4 - 120 µm	4 - 120 µm	4 - 120 µm
Number of cut points	Single stage	Single stage	Single/double stage
Process atmosphere	Air	Inert gas	Inert gas



INDUTHERM
 CASTING AND POWDER
 PRODUCTION SYSTEMS

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