


Induction heating  
by TRUMPF Hüttinger

Generators for  
reliable heating  
processes



**TRUMPF Hüttinger**  
generating confidence



## An induction solution for virtually every heating process.

Most materials that conduct electricity will heat up when exposed to a high-frequency magnetic field. By induction, energy can be rapidly and precisely transferred into the work piece without physical contact with the source. The result is a fast and efficient heating process that can be performed in a variety of environments, even vacuum. Our contribution: TRUMPF generators provide robust, reliable and stable performance even under the most demanding conditions.

## TRUMPF Hüttinger – process expertise

We have many years experience in induction processes at all levels of difficulty. As a result, the generators we have developed are distinguished by their wide range of outputs and frequencies, as well as their wide operating margins.

TRUMPF Hüttinger meets customer specific demands rapidly and precisely. Our application laboratory in Freiburg, Germany, supports you by finding the right heating solution for your process.

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### Industry solutions

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Automotive industry  
Packaging industry  
Medical technology  
Glass industry  
Aviation and aerospace  
Semiconductor industry  
Telecommunication  
Mechanical engineering  
Science and research

And other industries where heating processes are used in production

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### Classic applications

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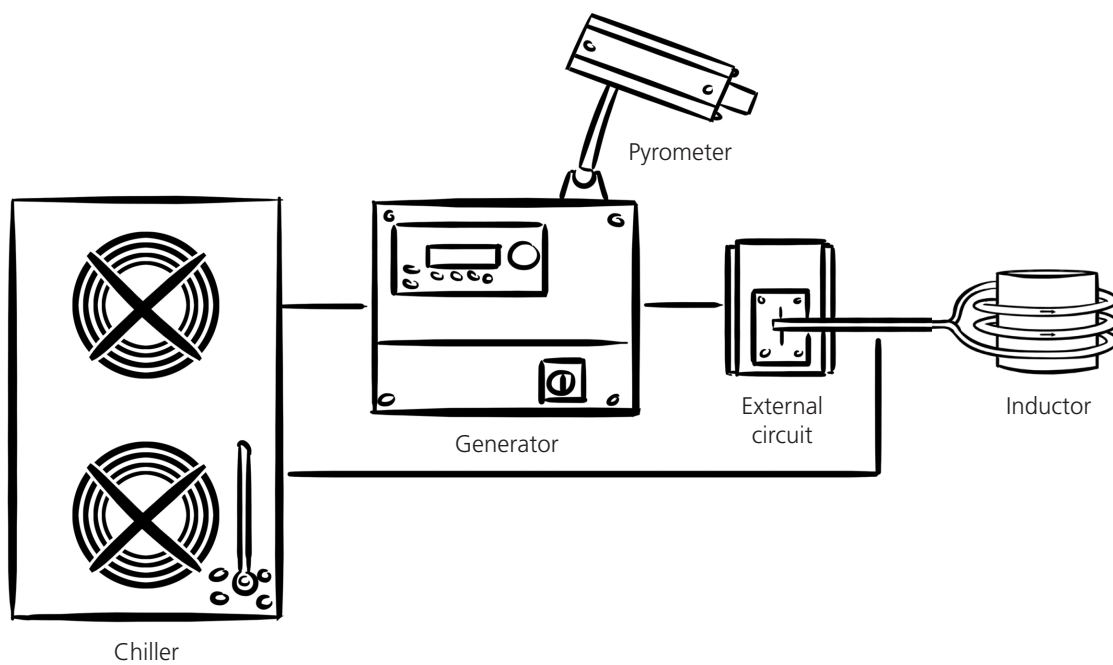
Annealing, tempering  
(Cable) heating  
Melting  
Shrinking  
Drying  
Gluing  
Tube welding  
Heat treatment  
Bonding  
Forging  
Softening

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### Special applications

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Crystal growing  
Epitaxy  
Zone floating  
Skull melting  
Inductive coupled plasma



TRUMPF Hüttinger Induction system

Powerful, wide matching ranges and superior process reliability:  
Generators from TRUMPF Hüttinger meet every challenge;  
both in middle and high frequencies.

## TruHeat MF

TRUMPF Hüttingers MF generators successfully combine the best product features known in the market – from a high efficiency factor in a small installation space over highly modern interfaces to an intelligent cooling concept. Designed in versatile parallel-resonant circuit technology and with their high process reliability they provide a powerful and dependable solutions for a high-tech world.

## TruHeat HF

TRUMPF Hüttingers HF generators are ideal for heating even the smallest of components. Featuring an extremely broad frequency range they are the perfect solution for sophisticated heating processes. Its impressive long-term stability makes the TruHeat HF Series a key asset in critical processes such as zone floating or complicated melting methods.



# TruHeat MF

TruHeat MF Series 3000 / 5000 / 7000 is a family of powerful and extremely versatile medium frequency generators for induction heating applications. Specifically designed for high performance processes, these generators are offered in a wide variety of configurations and parameters. Individual models are available with an output power of 10 Kilowatt (kW) to 250 kW over a frequency range of 3 kilohertz (kHz) to 200 kHz. They can be operated with mains voltages between 380 Volts (V)

and 480 V, for ease of use all over the world. The used parallel circuit technology enables a wide range of applications. The TruHeat MF Series handles a variety of applications. No matter if traditional or hightech. Such as epitaxy and crystal growing, hardening, melting, soldering or annealing processes. The different series enable easy integration into existing systems or facilities where space may be limited.

## Features

- Extremely compact design featuring a high power density
- Wide mains voltage range
- Parallel oscillating circuit ensures quick process adaptation
- Process power control from almost 0 percent to 100 percent
- Approved reliability
- Advanced user interface

## Benefits

- Easily integrates into new or existing systems
- Ready for worldwide use
- Eliminates setup-time for capacitor changeovers and improves productivity and process stability
- Ideal for temperature controlled processes
- High productivity and constant process results
- Easy to configure and to operate

Our generators cover all possible frequencies for your industrial heating processes



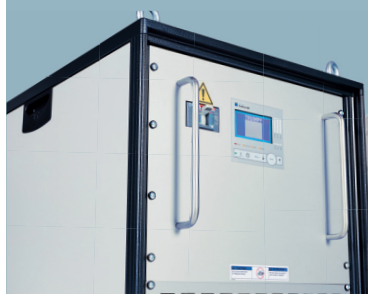
TruHeat MF Series 7000 G3

TruHeat MF Series 7000 G3

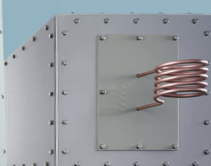


TruHeat MF Series 5000 G3

TruHeat MF Series 3000 G3



External tank circuit (exemplary)



## Technical data of TruHeat MF Series G3

Output parameters	TruHeat MF 3000 G3	TruHeat MF 7000 G3	TruHeat MF 7000 G3
Output power	10 kW <sup>1</sup> , 20 kW <sup>1</sup> , 30 kW <sup>1</sup> , 40 kW <sup>1</sup> , 50 kW	60 kW <sup>1</sup> , 80 kW <sup>1</sup> , 100 kW	300 kW
Output frequency	5 – 30 kHz 20 – 200 kHz <sup>2</sup>	5 – 30 kHz 20 – 200 kHz <sup>3</sup>	5 – 30 kHz
Output voltage	300, 600 V*		

\* Inductor voltages up to 1200 V

Mains connection data			
Mains power consumption	13 kVA, 25 kVA, 37 kVA, 49 kVA, 61 kVA	73 kVA, 97 kVA, 121 kVA	361 kVA
Mains voltage	380 – 480 V ± 10 %		
Mains frequency	50/60 Hz		
Power factor	< 0,95		
Efficiency	< 94,5 %		
Safety Category	1 or 3		

Cooling specifications			
Max. water pressure	6 bar		
Min. differential pressure	3 bar		
Min. water flow rate at 4 bar			
Power supply unit	~ 11 l/min	~ 13 l/min (5 – 30 kHz) ~ 26 l/min (20 – 200 kHz)	40 l/min
Max. cooling water temperature	≤ 35 °C		

Dimensions			
W x H x D (without connectors)	444 mm x 400 mm x 754 mm	600 mm x 1600 mm x 800 mm	1800 mm x 800 mm x 1600 mm
Weight	98 kg	349 kg	968 kg

Protection class			
	IP20	IP54	IP54

Interfaces	
AD user interface	37-pin Sub-D (optional)
RS-232 <sup>4</sup> / RS-485 <sup>4</sup>	9-pin Sub-D
PROFIBUS <sup>4</sup>	9-pin Sub-D
Profinet <sup>4</sup> or EtherCAT	RJ45 (optional)
Service interface	RJ45
OPC - UA <sup>4</sup>	Yes
Web GUI	Yes
External 24 V	Yes

Certification	
CE	Yes
Semi F47-0706 <sup>4</sup>	Yes
NRTL	Yes (optional)
FCC <sup>4</sup>	Yes

<sup>1</sup> Software downgrading

<sup>2</sup> Power derating: ~ 33 kW @ 200 kHz

<sup>3</sup> Power derating: ~ 66 kW @ 200 kHz

<sup>4</sup> Contact us. Gateway solutions available for RS-232/RS-485, PROFIBUS and Profinet.

## Technical data of TruHeat MF Series 7000 (G2)

Output parameters	
Output power	60 kW, 80 kW, 100 kW, 120 kW, 150 kW, 180 kW, 200 kW, 240 kW
Output frequency	3.5 – 17.5 kHz 12 – 60 kHz 40 – 100 kHz 40 – 200 kHz <sup>1</sup>
Output voltage	300, 600, 750, 900, 1200 V

Mains connection data	
Mains power consumption	75 kVA, 93 kVA, 116 kVA, 139 kVA, 174 kVA, 209 kVA, 232 kVA, 278 kVA
Mains supply	AC 380 – 480 V
Mains frequency	50 Hz / 60 Hz
Power factor	> 0.95
Efficiency	91 %

Cooling specifications	
Max water pressure	6 bar
Min. differential pressure	2.2 bar – 2.5 bar <sup>2</sup>
Water flow rate	28 l/min, 32 l/min, 42 l/min, 37 l/min, 50 l/min
Cooling water temperature	5 – 35 °C   ≤ 45 °C with power reduction

Dimensions	External circuit	
W x D x H	800 mm x 800 mm x 2000 mm	max. 400 mm x 710 mm x 400 mm
Weight	510 – 700 kg <sup>3</sup>	18 – 86 kg
Power cable length	5 – 25 m	

Protection class	External circuit	
	IP54	IP54 <sup>4</sup>

Interfaces	
AD user interface	37-pin sub-D female connector
RS-232 / RS-485	9-pin sub-D
PROFIBUS	9-pin sub-D female connector
Ethernet	RJ 45
EtherCAT	on demand
PROFINET <sup>5</sup>	RJ 45

Certificates	
CE	Yes
Semi F47	Yes

<sup>1</sup> With corresponding reduction in apparent power

<sup>2</sup> 2.2 bar at 200 – 240 kW output

<sup>3</sup> Depending on output power

<sup>4</sup> To be implemented by the user in the connection jaws' area

<sup>5</sup> Optional

## Technical data of TruHeat MF Series 3000 / 5000 / 7000

Output parameters	
Output power	10 kW, 20 kW, 30 kW, 40 kW
Output frequency	5 kHz – 20 kHz 20 kHz – 100 kHz 20 kHz – 200 kHz <sup>1</sup>
Output voltage	300, 600 V

Mains connection data	
Mains power consumption	13 kVA, 25 kVA, 37 kVA, 49 kVA
Mains voltage	3/PE AC 400 – 480 V +/- 10 %
Mains frequency	50 Hz / 60 Hz
Power factor	0.96
Efficiency	87 %

Cooling specifications	
Max. water pressure	6 bar
Min. differential pressure	3 bar
Min. water flow rate at 4 bar	
Power supply unit	16.5 l/min – 21.5 l/min (cabinet)
External circuit	7 l/min
Max. cooling water temperature	35 °C

Dimensions	TruHeat MF 3000	TruHeat MF 5000	TruHeat MF 7000	External circuit
W x H x D (without connectors)	444 mm x 400 mm x 754 mm	555 mm x 505 mm x 843 mm	600 mm x 1405 mm x 825 mm	max. 215 mm x 250 mm x 400 mm
Weight	87 kg	105 kg	220 kg	21 – 25 kg

Protection class	TruHeat MF 3000	TruHeat MF 5000	TruHeat MF 7000	External circuit
	IP 21	IP 21	IP 54	IP 54 <sup>2</sup>

Interfaces	
AD user interface	25-pin Sub-D / 37-pin Sub-D
RS-232 / RS-485	9-pin Sub-D
PROFIBUS	9-pin Sub-D

Certification	
CE	Yes

<sup>1</sup> At 200 kHz max. 35 kW output power

<sup>2</sup> To be implemented by the user in the connection jaws' area



# TruHeat HF

TruHeat HF Series 1000 / 3000 / 5000 is a family of HF generators for induction heating processes. Its compact size and high power density, combined with a broad frequency range, makes it unique in the industry. The field of application is as broad as the world of induction heating. Whether it's for thermal treatment of micro devices or for highly automated heating processes, TruHeat HF Series 1000 / 3000 / 5000 masters any challenge. With its high efficiency HF design it is a very cost effective heating solution. Short heating times and precise energy delivery are just two of the many benefits that allow this generator to become your partner in productivity. A variety of interfaces for easy system integration is available.

TruHeat HF Series 3000 / 5000 H for parallel oscillating circuits is a family of HF generators for traditional and modern induction heating processes. Compared to the TruHeat HF Series 1000 / 3000 / 5000, it features a flexible power cable between the power supply and the application area for distances up to 20 meters. This allows for the oscillating circuit to be moved wherever the heating process takes place.

TruHeat HF Series 7000 provides what it takes to meet heating requirements when running at frequencies higher than 500 kilohertz (kHz). The generator's external circuit – oscillating on resonant frequency – allows for optimum load adaptation to the specific heating solution. This technological approach excels especially in places where applications often change.

## Features

- Extremely compact design
- Robust and reliable design
- Wide load adaptation range
- Wide frequency range
- Very high reproducibility for processes
- Multiple communication interfaces

## Benefits

- Allows easy system integration
- Maximized uptime in industrial environments
- Maintains productivity for critical, long-term processes
- Enables optimal operating frequency for the respective process
- Consistent process results
- Remote control from higher-level management systems



Tube type generator  
TruHeat HF Series 7000



TruHeat HF Series 1000  
(power unit)



TruHeat HF Series 3000  
("19 rack)



TruHeat HF Series 5000  
(table top unit)



External circuit of  
TruHeat HF Series 1000 / 3000 / 5000

## Technical data of TruHeat HF Series 1000 / 3000 / 5000

Output parameters	
Output power	5 kW, 10 kW
Output frequency	50 kHz – 450 kHz at 35 A <sup>2</sup> 50 kHz – 800 kHz at 17,5 A
Winding ratio of the output transformer	6:1 – 16:1
Output voltage	250, 520 V
Output current	17.5 – 35 A

Mains connection data	
Mains power consumption	6.5 kVA – 12.5 kVA
Mains voltage	3/PE AC 200 / 208 V, ± 10 % 3/PE AC 400 V, ± 10 %
Mains frequency	50 Hz / 60 Hz
Power factor	0.95
Efficiency	90 %

Cooling specifications (water-cooled)	
Max. water pressure	6 bar
Min. differential pressure	3 bar
Water flow rate	
Power supply unit	4.2 l/min – 9.5 l/min
External circuit	3.6 l/min
Max. cooling water temperature	35 °C

Dimensions	HF Series 1000	HF Series 3000	HF Series 5000	External Circuit
W x H x D (without connectors)	211 mm x 122 mm x 500 mm	483 mm x 133 mm x 662 mm	555 mm x 195 mm x 700 mm	114 mm x 186 mm x 328 mm
Weight	16 kg	30 kg	41 kg	12 kg

Protection class	HF Series 1000	HF Series 3000	HF Series 5000	External Circuit
	IP 30	IP 54	IP 54	IP 54 <sup>1</sup>

Interfaces	
AD user interface	37-pin Sub-D
RS-232	9-pin Sub-D
CAN bus	5-pin mini-style connector
PROFIBUS	9-pin Sub-D

Certification	
CE	Yes

<sup>1</sup>To be implemented by the user in the connection jaws' area

<sup>2</sup>Only up to a power cable length of max. 2 m

## Technical data of TruHeat HF Series 3000 / 5000 for parallel oscillating circuits

Output parameters	
Output power	5 kW, 10 kW
Output frequency	60 kHz 100 kHz 200 kHz 300 kHz 400 kHz
Max. output voltage	100, 150, 200, 250, 300, 400, 500, 600 V
Frequency range	0.9. $f_n < f < 1.2 f_n$

Mains connection data	
Mains power consumption	6.2 kVA, 12.2 kVA
Mains voltage	3/PE AC 200 / 208 V, $\pm 10\%$ 3/PE AC 400 V, $\pm 10\%$
Power factor	0.95
Efficiency	90 %

Cooling specifications (water-cooled)	
Max. water pressure	6 bar
Min. differential pressure	3 bar
Min. water flow rate	
Power supply unit	3.5 l/min at 3 bar
External circuit	3.6 l/min at 2 bar
Max. cooling water temperature	35 °C

Dimensions	TruHeat HF Series 3000	TruHeat HF Series 5000	External Circuit
W x H x D (without connectors)	483 mm x 133 mm x 560 mm	554 mm x 194 mm x 730 mm	110 mm x 160 mm x 215 mm
Weight	28 kg	39 kg	6 kg
Power cable length	5 – 20 m		

Protection class	TruHeat HF Series 3000	TruHeat HF Series 5000	External Circuit
	IP 30	IP 30	IP 54 <sup>1</sup>

Interfaces	
AD user interface	37-pin sub-D
RS-232 / RS-485	9-pin sub-D
PROFIBUS	9-pin sub-D
DeviceNet	5-pin mini-style connector

Certification	
CE	Yes

<sup>1</sup> To be implemented by the user in the connection jaws' area

## Technical data of TruHeat HF Series 7000

Output parameters	
Output power <sup>1</sup>	10 kW, 30 kW, 60 kW, 100 kW, 120 kW
Output frequency	400 kHz – 800 kHz 1000 kHz – 3000 kHz
Output voltage <sup>2</sup>	5000 V, 6300 V, 6600 V, 7000 V

Mains connection data	
Mains power consumption <sup>2</sup>	21 kVA, 63 kVA, 126 kVA, 210 kVA, 252 kVA
Mains voltage	3/PE AC 200 / 208 V, ± 10 % <sup>3</sup> 3/PE AC 400 V, ± 10 % 3/PE AC 480 V, ± 10 %
Mains frequency	50 Hz / 60 Hz
Power factor	0.9
Efficiency	60 %

Cooling specifications	
Max. water pressure	6 bar
Min. differential pressure	3.5 bar
Water flow rate power supply unit <sup>2</sup>	10 l/min, 30 l/min, 60 l/min, 100 l/min, 120 l/min
Max. cooling water temperature	35 °C

Dimensions	TruHeat HF 7010	TruHeat HF 7030	TruHeat HF 7060 / 7100 / 7120
W x H x D (without connectors)	600 mm x 1700 mm x 600 mm	1600 mm x 2000 mm x 800 mm	2000 mm x 2000 mm x 800 mm
Weight	900 kg	1200 kg	1500 – 2400 kg

External circuit dimensions	TruHeat HF 7010 / 7030 / 7060	TruHeat HF 7100 / 7120
Without connectors	400 mm x 400 mm x 670 mm	400 mm x 400 mm x 800 mm

Protection class	
Power supply unit	IP 54
External circuit	IP 54 <sup>4</sup>

Interfaces	
AD user interface	40-pin, harting

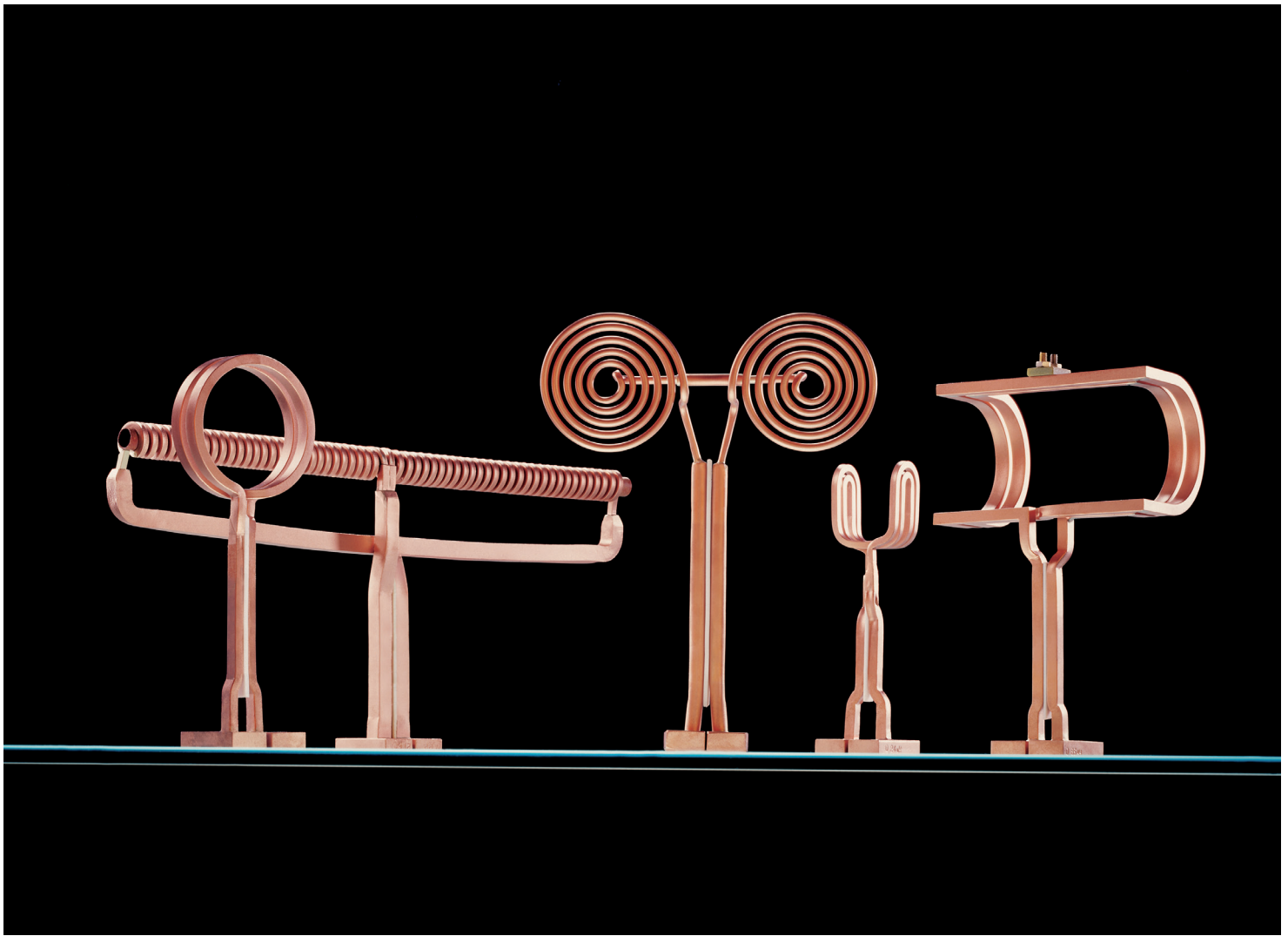
Certification	
CE	Yes

<sup>1</sup> Specified power values reflect only a selection of the most common versions. Other power values are available upon request

<sup>2</sup> Values correlate with the data rank in "Output Power"

<sup>3</sup> Upon request

<sup>4</sup> To be implemented by the user in the connection jaws' area



## Not just accessories but critical parts in the heating process.

TRUMPF generators with their external circuits are certainly the heart of an induction heating process. But a functional and comprehensive system requires more key components to ensure reliable and optimal performance. These are coaxial transformers, chillers and pyrometers which provide you a complete process solution. You can benefit from our integrated system design by specifying TRUMPF Hüttinger for these assets. Particularly important is the inductor, the element responsible for transferring the generator's energy into the work piece. TRUMPF Hüttinger's expertise in induction heating theory and practice, allows us to design the perfect inductor for your application.

- **Inductors**  
Custom-designed for your application; the name TRUMPF Hüttinger stands for manufacturing excellence.
- **Coaxial transformers**  
Optimized matching for low-impedance applications. Exploits the generator's power to the maximum.
- **Chillers**  
High temperatures need controlled cooling. Our chillers provide the necessary facilities for safe and reliable operation of the generator and coil.
- **Pyrometer and controllers**  
Reliable temperature detection and fast response to even small temperature changes result in more consistent process results and better yields.

# You have the idea. We develop the solution.

It typically starts with the question of whether and how induction technology can make a manufacturing step more productive. Here TRUMPF Hüttinger offers you an individual solution concept in several steps. This leads to maximum transparency and reliability from the outset and allows you to first verify feasibility without having to buy a system directly. Initially the requirements and process temperature are defined. Solutions are developed and tested on this basis with analytical methods.

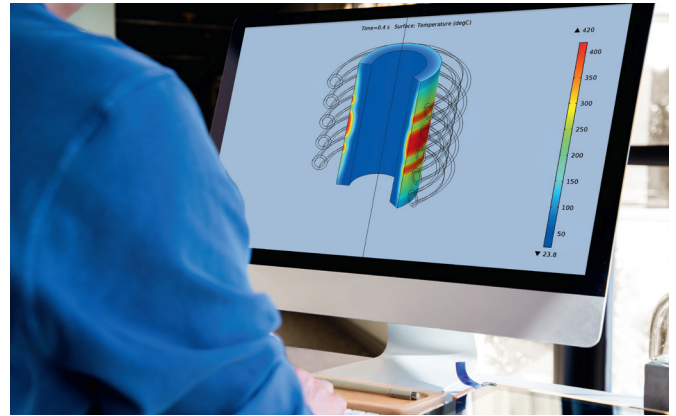
The approach is as individual as your process.

+49 761 8971-0  
Team.Induction@de.trumpf.com



## Step 1 Analysis

- Analysis of the material properties and process environment
- Analysis of the process parameters such as the start and end temperature, surface characteristics, geometry, heating and cycle time, thermal insulation etc.
- Analysis of other constraints for the overall system such as floor space, target unit cost, etc.



## Step 2 Preparing approaches

### Basic trials:

- Definition and inclusion of the constraints
- Preparation and setup of application tests
- Adaptation of the power supply
- Adjustment of temperature measurement and control systems
- Fabrication of a test inductor

### Numeric simulation:

- Creation of a 2D or 3D model under consideration of the component and surrounding geometry



## Our expertise is your advantage.

### Low investment cost

Feasibility study with minimal investment cost

### Cost-optimized production processes

Efficiency improvement and cost reduction through an optimized heating process

### Tailor-made solutions

Solutions tailored specifically for your production

### Decades of experience

You can rely on our experienced engineers



### Step 3

Test phase and optimization

#### Laboratory tests:

- Adaptation and optimization of the test inductor
- Determination of the electrical and thermal parameters
- Determination of the inductor geometry

#### Numeric simulation:

- Performing the calculations
- Adaptation and optimization of the model
- Preparation of field patterns (temperature, magnetic field, etc.)
- Determination of the electrical and thermal parameters
- Determination of the inductor geometry



### Step 4

Implementation

- Economic efficiency calculation
- Documentation of the results
- Implementation of the individually developed application in your production process
- On request: commissioning on site

