

Process power from
TRUMPF Hüttinger

Generators for
plasma excitation.



TRUMPF Hüttinger
generating confidence



TRUMPF Hüttinger - who we are

TRUMPF Hüttinger is a high-tech company and a leading global manufacturer of DC, medium-frequency, high-frequency and semiconductor-based solid-state microwave generators. We generate electricity at the required frequency and power. Our business divisions include plasma technology, industrial heating, battery inverter systems and microwave generators and amplifiers. Our process power supplies are being used in many key processes in research, development and production.

Behind all these technologies is a TRUMPF Group company with its own development, production, sales and service with subsidiaries in Europe, America and Asia. Development and production are located in Germany and Poland. TRUMPF Hüttinger employs around 2000 people worldwide, 600 of them at its headquarters in Freiburg, Germany.

Finding the best solution is what drives us. Or as we say at TRUMPF Hüttinger: generating confidence!



Seven locations around the globe

Your contact at TRUMPF Hüttinger:





TRUMPF Hüttinger harnesses one of nature's most awesome powers.

We can see it in lightning, the northern lights and the sun's corona – fascinating examples of naturally occurring plasma phenomena. Also called the Fourth State of Matter, plasma is created when gas is heated to an extremely high temperature, causing the kinetic energy of the gas particles to rise so much that electrons are released from the atoms and molecules. In nature, plasmas are self-igniting and highly unstable. Fortunately, scientists and engineers have figured out how to create sustained and precisely controlled plasmas for use in the world of industrial technology.



Generators from TRUMPF Hüttinger help to achieve the mastery of plasma creation, making it possible to perform a wide range of intriguing applications. Our generators, developed and refined over many years, deliver the stable and accurate energy needed for these various plasma applications, as e.g. large area coating respectively etching semiconductors, solar cells and flat panel displays; surface treatment of metals and plastics among others. As a result, DC, middle, radio and microwave frequency generators from TRUMPF Hüttinger are the acknowledged leaders in many high technology markets.

Performance in the harshest industrial environments.



Providing customer solutions. Every day!

DC generators from TRUMPF Hüttinger are built to perform in the harshest of industrial environments. Across the range, our generators do not compromise when it comes to accuracy, repeatability or arc suppression. Continually, they deliver the energy needed to run your processes efficiently and effectively. But even better, DC power supplies from TRUMPF Hüttinger are modular and scalable. Individual blocks can be easily combined to provide an extended power range. You get flexibility and redundancy with unparalleled performance.

Direct current (DC)

TruPlasma DC Series 3000 (G2) / 4000 (G2) – the strong ones

Versatile DC generators with high power density. Ideal for sophisticated DC plasma processes such as solar cell manufacturing. Can be combined to create high power stacks and are equipped with TRUMPF Hüttinger's advanced arc management system. Available in pulse mode, too.

TruPlasma Arc Series 3000 – the arc cathode specialists

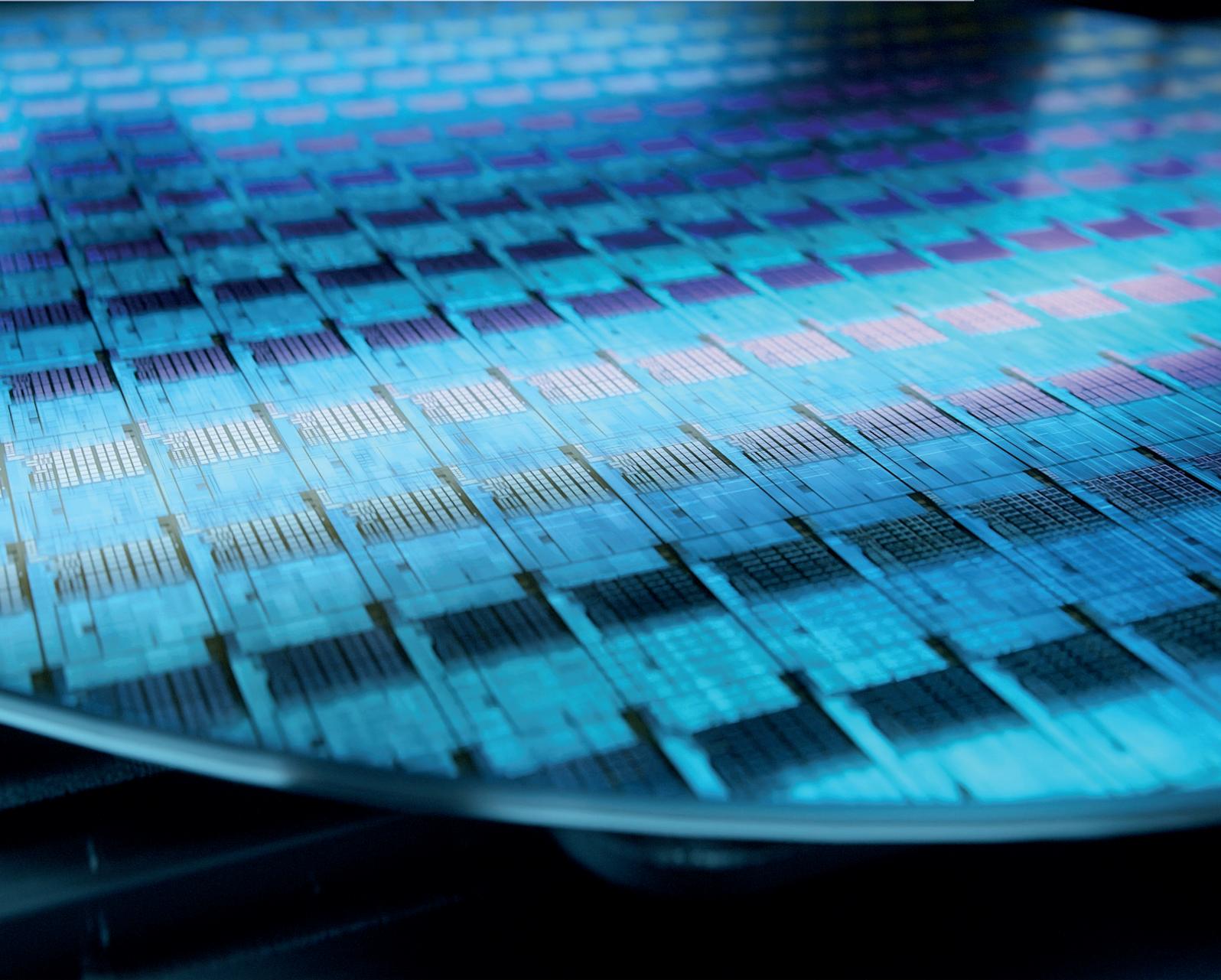
Built for harsh industrial environments and optimized for use in cathodic arc melting hard coating processes.

TruPlasma Highpulse Series 4000 (G2) – the peak performers

High impulse DC generators for creating superior film characteristics. Designed especially for High Power Impulse Magnetron Sputtering (HIPIMS). It's the key enabler for this innovative PVD pulse sputtering technology. Capable of peak power of up to 8 megawatts.

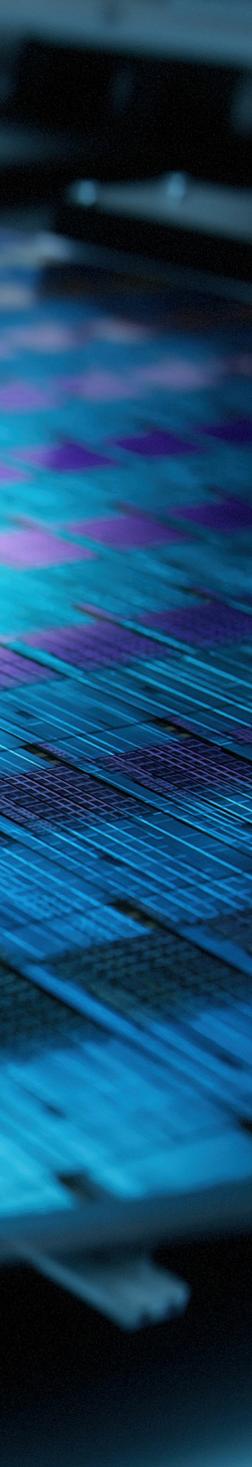


Using our knowledge for your benefits.



Generators from TRUMPF Hüttinger – the power to meet your needs.

TRUMPF Hüttinger offers a proven range of generators for plasma excitation in industry, science, research, and development. Our MF, RF and MW generators are perfectly matched to all processes and can be seamlessly integrated into any system design concept. Their high up-time and progressive arc management enhances their already superior process stability. We offer leading technology solutions for sputtering with either single or dual magnetrons, reactive or metallic processes, with isolating or conductive targets.



Middle Frequency (MF)

TruPlasma Bipolar Series 4000 (G2) – the bi-polar choice

Bi-polar pulsed DC power supplies with a broad output range and adjustability. Ideal for reactive sputtering with dual magnetrons.

TruPlasma MF Series 7000 (G2) – the superior ones

The first choice for large area deposition processes using double magnetron sputtering. Our latest MF family attains a formerly unachievable coating quality – even with the most difficult reactive processes, and with simultaneous high output sputtering rate.

Radio Frequency (RF)

TruPlasma RF Series 1000 (G2/13) – the robust ones

Energy-efficient RF generator for coating and etching processes in semiconductor manufacturing applications. Accurate output power regulation and extreme robust operation ensure maximum productivity.

TruPlasma RF Series 3000 / RF 3006 (G2/13) – the efficient ones

With previously unheard-of energy efficiency and robustness, the TruPlasma RF Series 3000 revolutionizes the production of semiconductor elements, microchips, solar cells and flat screens in addition to assuring outstanding process stability.

TruPlasma VHF Series 3000 – the innovative

The TruPlasma VHF Series 3000 generators offer all of the conditions for a power supply that is stable and optimally adjusted to the respective process ensuring that you archive excellent, reproducible results.

TruPlasma RF Air Series 1000 – the compact

Optimized RF generators that are perfectly suited to plasma-processes such as RIE, ALD and PECVD. The flexible, robust design of the RF generators allows the throughput to be increased and the operating costs to be reduced.

TruPlasma Match Series 1000 (G2/13) – the supplementary

Their intelligent matching algorithm and digital control platform for process monitoring provide a comprehensive solution in which all of the components work together optimally: the TRUMPF RF system.

Microwave Frequency (MW)

TruPlasma MW Series 1000 – the flexibel

The versatile solution when it comes to the retrofitting of existing plants and the operation in multi-generator configuration. Thanks to the high efficiency as well as the long lifetime, very low operating costs are guaranteed. Best suited for demanding plasma coating and growth processes.

TruPlasma MW Series 3000 – the modular

The ideal field of application: demanding MW-CVD processes. It comes standard in two compact 2 kW and 6 kW variants and can be combined in 6 kW steps up to a maximum of 48 kW.



It's not just accessories.

You certainly need more than just a power source.

The conditions and constraints present in many plasma environments require special devices to ensure that your equipment functions as desired. Matching networks, master oscillators, RF switches and coaxial cables: these are all critical elements in a well designed RF power delivery system. We, TRUMPF Hüttinger, are chosen by experts because of our extensive high frequency expertise and decades of process experience.



CombineLine - innovative Combiner technology

Unique high-frequency combiner technology with true 50-Ohm output impedance. Ensures stable processes for best productivity.

Components

Matchboxes

Impedance matching networks for the complex loads typical in plasma excitation.

Master oscillators

Precise frequency synchronization for applications with multiple RF sources.

RF switches

Provide power to several process chambers from a single generator

Coaxial cables

Perfect for low-loss connections between the generator and matchbox.

TruPlasma RF System

Plasma processes behave like a complex, variable load, to which the power supply from the generator needs to be continually adjusted. Active matchboxes handle this task, ensuring precise adjustment to the optimal impedance of 50 ohms at all times. The result is a perfectly matched system solution, the TRUMPF RF System.



Features

Arc Management

Targeted arc detection guarantees the highest productivity possible, while protecting the product and your system at the same time.

Auto Frequency Tuning

The patented auto frequency tuning solution enables simultaneous and fast frequency tuning between the generator and matchbox.

Multi-Level pulsing

Any type of pulse shape can be achieved with the multi-level, freely-selectable pulsing mode.

Meeting your changing needs: TRUMPF Hüttinger DC solutions.



TRUMPF Hüttinger DC solutions: Our portfolio

Plasma processes are complex and ever changing, especially from application to application. If only your power supply adapted as fast as your requirements changed. In fact, by choosing modular DC generators from TRUMPF Hüttinger, you can make sure they do! Easy to scale and with numerous control options, we offer the flexibility you need to stay competitive.

Direct current

TruPlasma DC Series 3000 (G2)



Compact DC generators, ideally suited for metallic sputtering applications. These generators have a high power density and provide full rated power over a broad range of load impedances. The arc management CompensateLine ensures superior film qualities at high deposition rates. With a new generation of very compact, water-cooled units, TRUMPF Hüttinger now offers continuous DC power supplies that can replace pulsed generators in many sputtering applications.

Output 2 – 300 kW

Cooling Air/Water

Interfaces Analog/Digital
RS 232
RS 485
PROFIBUS (optional)
DeviceNet (optional)
EtherCAT (optional)

TruPlasma Arc Series 3000



Featuring dynamic current regulation, the power supplies are ideally suited for cathodic arc sputtering processes. Designed for use in harsh industrial environments. They can be used for any application with similar current and voltage requirements. Typical applications include hard and decorative coatings or those requiring high e.g. ion implantation.

Output Current 150, 200 A

Cooling Air

Interfaces Analog/Digital
RS 232
RS 485
PROFIBUS (optional)

Direct current pulsed

TruPlasma Highpulse Series 4000 (G2)



High impulse power DC generators for depositing extremely precise thin film layers. Peak powers of up to 8 megawatts. Designed especially for High Power Impulse Magnetron Sputtering (HIPIMS), they create high plasma densities. Ideal for functional and decorative applications, metal ion etching and semiconductor applications.

Output 1 – 8 MW

Frequency 1 – 10 000 Hz

Cooling Air/Water

Interfaces Analog/Digital
RS 232
RS 485
PROFIBUS
EtherCAT (optional)
DeviceNet (optional)

TruPlasma DC Series 4000 (G2)



Compact DC generators with pulse mode for demanding sputtering applications. The flexible pulse parameters with maximum pulse frequency reduce the arcs also in critical processes. The arc management circuitry allows you to achieve high yields in critical deposition processes.

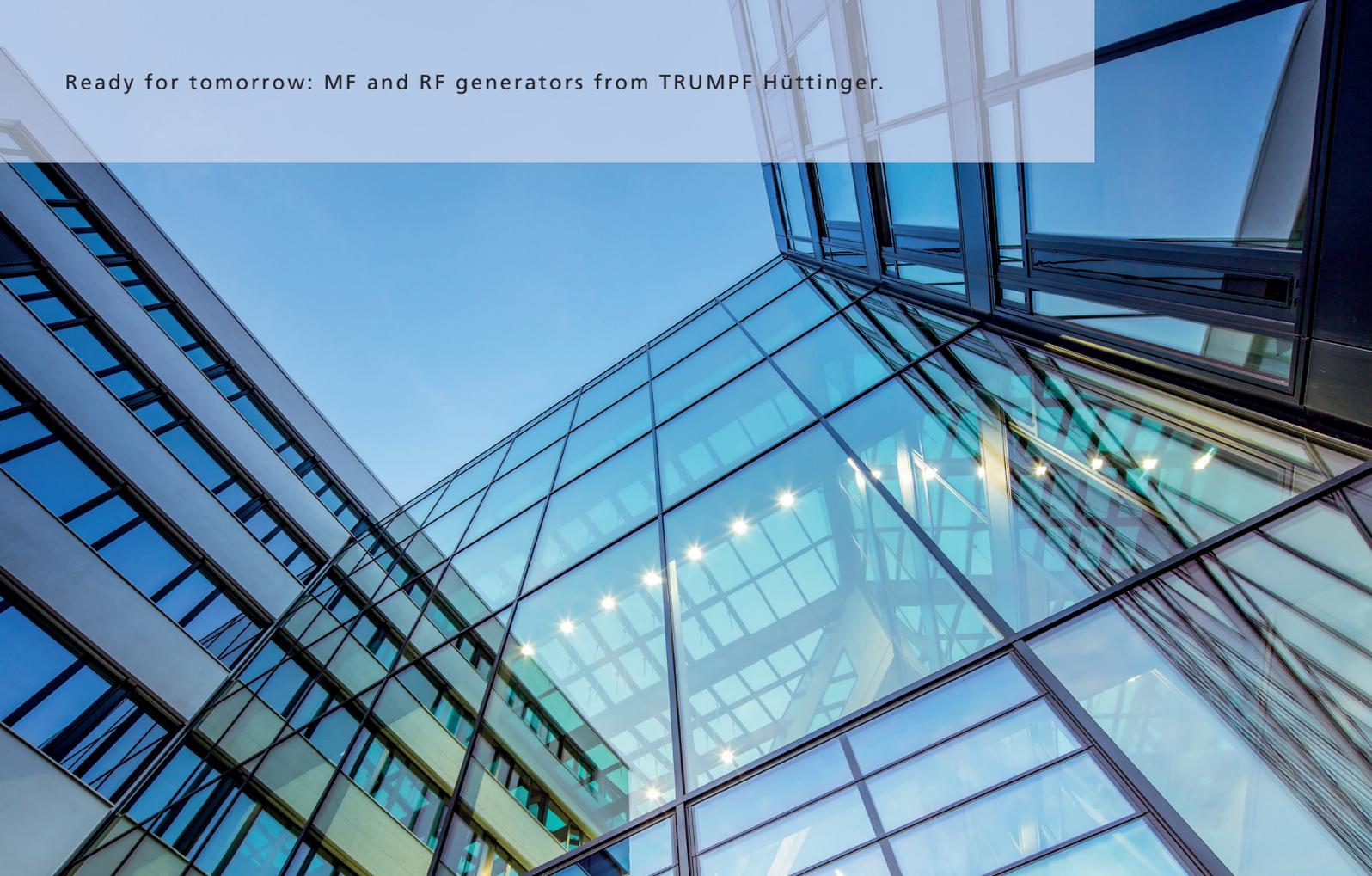
Output 5 – 40 kW

Frequency 0 – 100 kHz

Cooling Air/Water

Interfaces Analog/Digital
RS 232
RS 485
PROFIBUS (optional)
DeviceNet (optional)
EtherCAT (optional)

Ready for tomorrow: MF and RF generators from TRUMPF Hüttinger.



TRUMPF Hüttinger MF and RF solutions: Our portfolio

RF generators

TruPlasma RF Series 1000 (G2/13)



Extremely robust RF generator for PECVD and etching applications in semiconductor manufacturing. Accurate output power regulation and CombineLine allow for stable processes and best productivity. Cost-efficient system integration due to compact half 19" design.

Output	1 – 3000 W
Frequency	13 560 kHz
Cooling	Water
Interfaces	Analog RS 232 RS 485 DeviceNet PROFIBUS EtherCAT

TruPlasma RF 3006 (G2/13)



The extremely robust generator design enables longer operating times. This series is the first choice for demanding applications such as the manufacture of semiconductor elements or solar cells.

Output	6 kW
Frequency	13 560 kHz
Cooling	Water
Interfaces	Analog RS 232 RS 485 DeviceNet PROFIBUS EtherCAT

TruPlasma RF Series 3000



Thanks to special converter technology, the TruPlasma RF Series 3000 achieves up to 80 % efficiency – which means energy losses are halved compared to the market standard. The patented CombineLine coupler ensures a particularly steady process.

Output	12 – 24 kW
Frequency	13 560 kHz
Cooling	Water/Air
Interfaces	RS 232 RS 485 EtherNet PROFIBUS DP EtherCAT (optional) PROFINET (optional)

MF generators

TruPlasma Bipolar Series 4000 / 4000 (G2)



Ideally suited for PECVD and dual cathode sputtering processes, where reliability and performance are critical. The highly sophisticated fully digital arc management ensures optimum results for film quality and deposition rate.

Output	10 – 180 kW
Frequency	20 – 80 kHz
Cooling	Water
Interfaces	Analog/Digital RS 232 RS 485 PROFIBUS EtherCAT (optional)

TruPlasma MF Series 7000 (G2)



With their superior arc management and ignition behavior, the output voltage and frequency (adjustable over a wide range) and their high current reserve, our new MF generators are the number one choice for large area coating and demanding processes. As a result of peak efficiencies of more than 90 percent and particularly efficient water management, unique in MF technology, they are also extremely economical to operate.

Output	50 – 150 kW
Frequency	20 – 50 kHz*
Cooling	Water
Interfaces	RS 232 RS 485 EtherNet PROFIBUS A/D (optional) PROFINET (optional)

* 20 – 70 kHz until 100 kW optionally available.

TruPlasma RF Air Series 1000



The air-cooled TruPlasma RF 1001 Air delivers up to 1000 watts of high-precision, reproducible RF energy with an extremely fine resolution and is thus suitable for diverse plasma applications. Whether manufacturing semiconductors, solar cells, or displays – the patented TRUMPF Hüttinger technology guarantees top reliability.

Output	3 – 1000 W
Frequency	13 560 kHz
Cooling	Air
Interfaces	Analog/Digital RS 232 RS 485 PROFIBUS EtherCAT

TruPlasma VHF Series 3000



Based on an innovative platform concept that enables the highest level of power density and meets the most demanding process requirements. These compact VHF generators are also very cost-effective and have a robust design.

Output	5 – 10 kW
Frequency	40 680 kHz
Cooling	Water
Interfaces	RS 232 RS 485 DeviceNet EtherCAT ETG

TruPlasma Match Series 1000 (G2/13)



Our matchboxes are the ideal complement to RF generators from TRUMPF Hüttinger. Their intelligent matching algorithm and digital control platform for process monitoring provide a comprehensive solution in which all of the components work together optimally – the TRUMPF RF System.

Output	1 – 24 kW
Frequency	13 560 kHz
Cooling	Water/Air
Interfaces	Analog SystemPort RS 232 RS 485 PROFIBUS EtherCAT

New ideas don't just come from laboratories.

TRUMPF Hüttinger MW solutions: Our portfolio

MF generators

TruPlasma MW Series 1000



Their ability to synchronize phase and frequency makes them ideal for operating small plasma torches and plasma systems with multiple distributed generators. They are equipped with a number of unique features as standard, such as nano-pulsing, dual-level pulsing, auto frequency control and power stabilization.

Output	300 W and 1000 W
Frequency	2400 – 2500 MHz
Cooling	Water (300 W also as air cooled available)
Interfaces	EtherNet EtherCAT

TruPlasma MW Series 3000



Optimized for the operation of larger microwave plasma systems. Depending on the required power level, several 6 kW generators can be modularly interconnected up to 48 kW.

Output	2 kW – 48 kW
Frequency	2400 – 2500 MHz
Cooling	Water
Interfaces	EtherNet EtherCAT

The power to meet your needs. TRUMPF Hüttinger:

Process experts with experience.

Process expertise and experience are key to developing optimum plasma energy sources. Over the past few decades, TRUMPF Hüttinger has enjoyed the unwavering loyalty of its customers. Their continued support attests to our ability to provide products that are reliable, robust and that deliver exceptional process stability.

Applications:

- Plasma-enhanced chemical vapour deposition (PECVD)
- Plasma etching (dry etching)
- Plasma diffusion
- Plasma polymerization
- Plasma cleaning
- Unipolar magnetron sputtering
- Dual magnetron sputtering (DMS)
- Hard coating

The perfect development partner for plasma.

Despite its many uses, plasma technology is still in its infancy. New applications are continuously being developed. TRUMPF Hüttinger is ready to work with you to find the optimal energy source you need for new or existing uses. TRUMPF Hüttinger's DC, middle, radio and microwave frequency units already cover a wide range of applications. With our cost-effective, field-proven devices, customer-specific requirements can be accommodated with custom solutions that are based on our standard products.

Sectors:

- Glass industry
- Photovoltaic industry
- Automotive industry
- Flat panel display industry
- Semiconductor industry
- Chemical industry
- Science and research
- Manufacturing industry



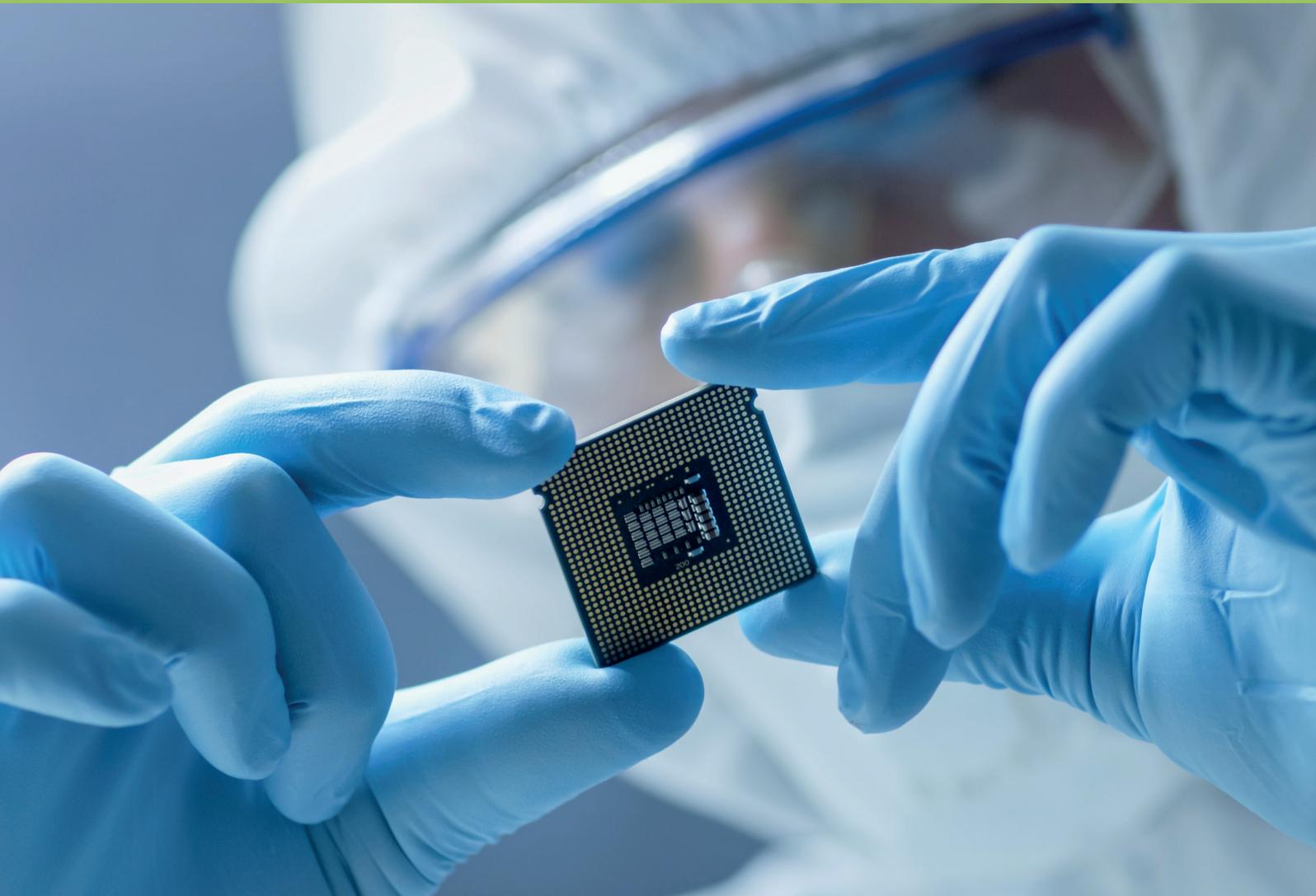


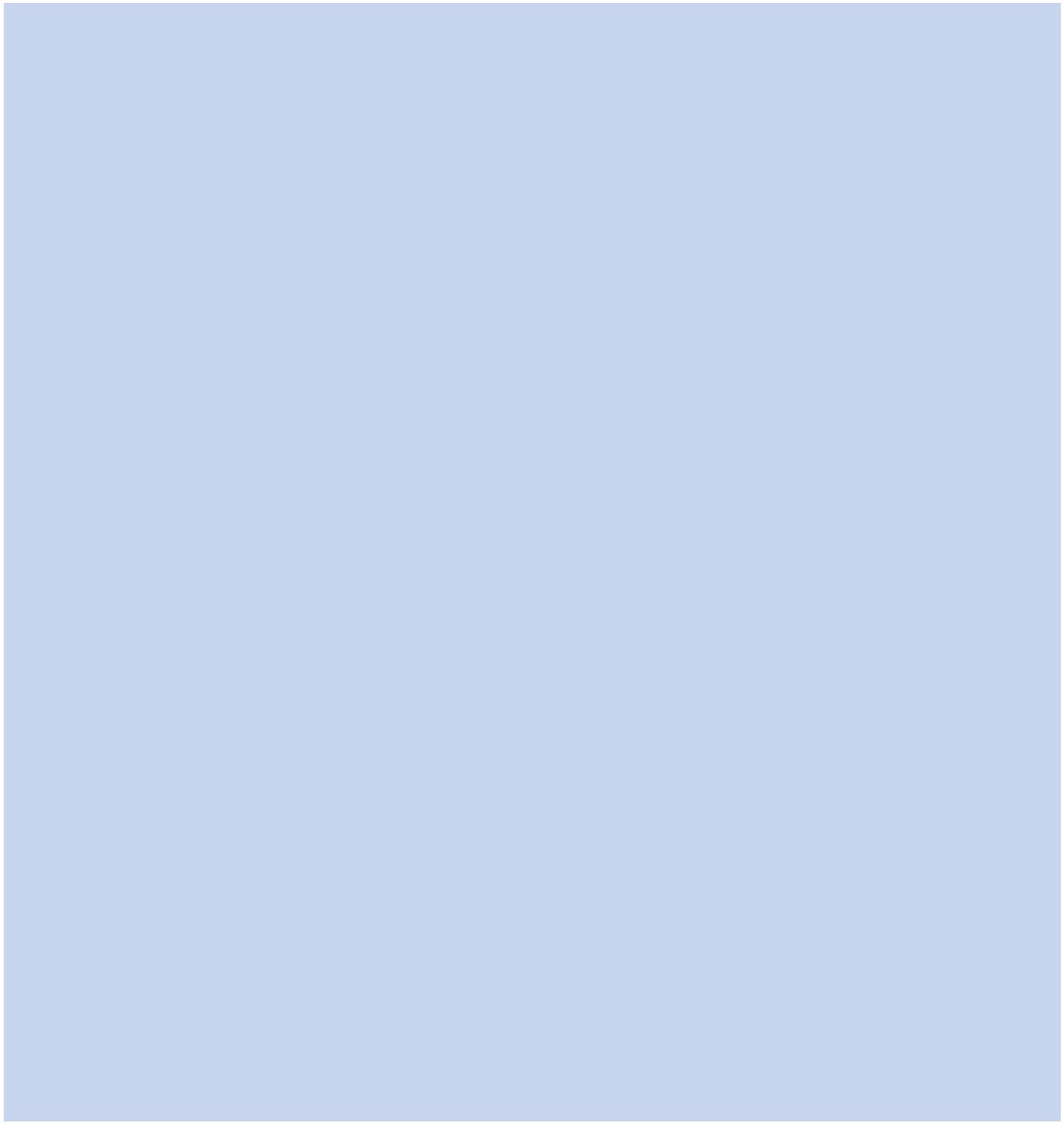
Pioneer in power conversion.

Together, we can take plasma excitation into the future.

TRUMPF Hüttinger is a pioneer in power conversion. Our expertise has enabled customers around the world to perfect existing processes and create exciting new ones. Yet, we know that our future inventions and developments will be a result of our close collaboration with scientists and engineers seeking solutions to real-world problems. Their applications, new production techniques and innovative developments require the resources of a company committed to rapidly and efficiently bringing new technology to the market.

To our Website:





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