

TruPlasma MF series 7000 (G2)

Optimized  
for perfection.



Outstanding layer quality, even with  
challenging and reactive DMS processes.

## Best in class.

Trust is good, control is better – having both is best of all. With the TruPlasma MF 7000 (G2) series generators from TRUMPF Hüttinger, you can trust in outstanding layer quality and the highest productivity while simultaneously maintaining full control of your processes.

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.

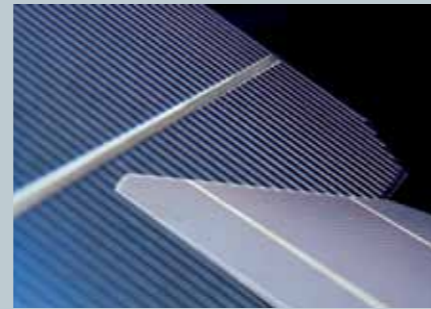
Choose the best in class – the TruPlasma series MF 7000 (G2) deserves your trust!



Market leader for large area coating.



Outstanding results with coating processes in the display / touch panel industry.



Full control in the production of thin film solar cells.

### Highest reliability even with critical processes.

With a TruPlasma series MF 7000 (G2) generator, you have full control over even the most critical processes – for example, applying challenging materials such as  $\text{SiO}_x$  to architectural glass,  $\text{Al}_x\text{O}_x$  coating flat screens or the TCO coating of solar glass. TRUMPF Hüttinger's highly developed MF technology makes it possible to apply extremely thin (in the nm range), high-strength and absolutely homogenous layers.

In the fields of architectural glass, displays / touch panels or solar – put your trust in the know-how of the technology leader TRUMPF Hüttinger!



### TruPlasma MF series 7000 (G2): highlights at a glance

- 1 Outstanding layer quality and productivity
- 2 Maximum cost effectiveness over the entire lifespan
- 3 Stable process power supply, even under difficult ambient conditions
- 4 Well suited for application worldwide without technical adaptations

# Maximum efficiency.

unique

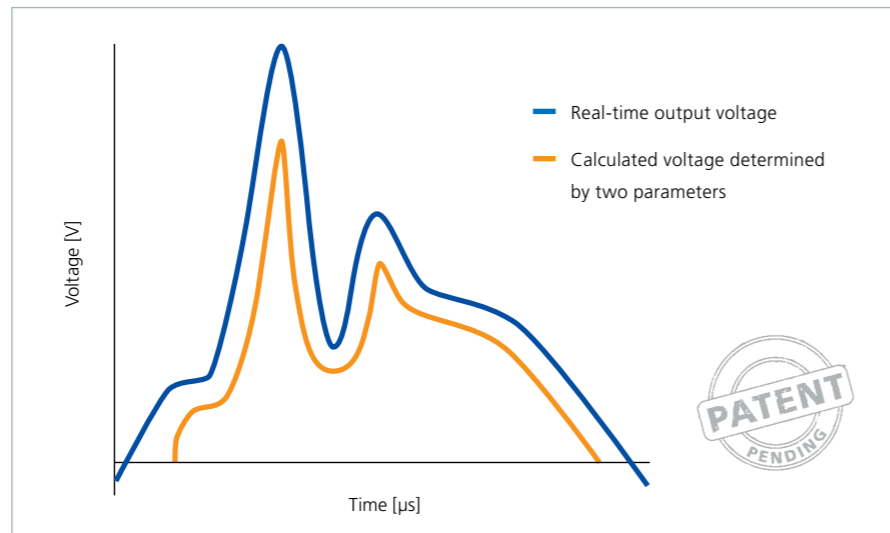
## 1 Superior arc management.

The key to outstanding layer quality and productivity lies in the superior arc management of the TruPlasma MF series 7000 (G2). High reaction speeds and corresponding reduced residual energies ensure stable processes and maximum sputtering rates. This results in absolutely homogenous layers across the entire substrate surface.

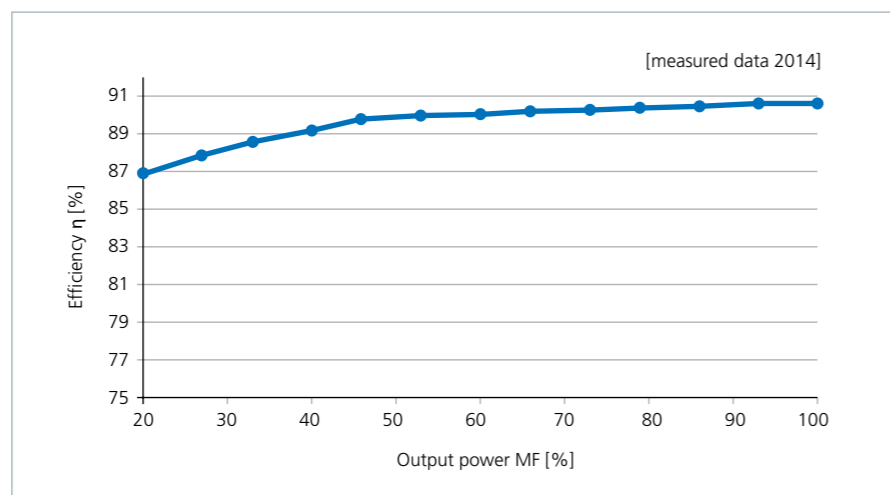
Straightforward adjustment with few parameters supports the flexible adaptation to a wide variety of processes. This makes it easy for you to find the optimum balance between the sensitivity of arc treatment and the desired throughput.

## 2 High operating efficiency.

The TruPlasma series MF 7000 (G2) guarantees maximum cost effectiveness over the entire lifespan. With its sophisticated energy concept, the generators feature outstanding operating efficiency with simultaneous minimal energy consumption. Their exemplary reliability and long lifespan also ensure very high system availability and therefore the lowest operating and maintenance costs.



The fastest arc recognition is realized on the basis of just two parameters: The voltage value of each half-wave is compared to the corresponding value of the previous half-wave with the same polarity. This makes real-time arc recognition possible even before the output current rises.



With a peak efficiency of 91 %, an operating efficiency of more than 80 % is realized even during partial load operation of just 10 %.

## 3 Flexible cooling concept.

The production conditions in different parts of the world differ widely in some cases which makes the robust technical layout of the generators all the more important in order to guarantee a stable process power supply even under challenging ambient conditions. As a result, the TruPlasma series MF 7000 (G2) generators handle high coolant water temperatures of up to 45 °C and low differential pressures of 2.5 bar without difficulty. The consumption of coolant water can also be adapted to the supply temperatures – a TRUMPF Hüttinger innovation.

High relative humidity in tropical countries does not affect our generators. The thoroughly sealed (IP 54) control cabinet supports operation with dry air purging, preventing the formation of condensate in the unit. Furthermore, the TruPlasma series MF 7000 (G2) can be equipped with active control cabinet dehumidification.



One hundred percent water cooling is not only highly effective but a very clean cooling method as well. The risks of air cooling (for example contamination or corrosion due to salty air) are avoided.

## 4 Broad operating voltage range.

The TruPlasma series MF 7000 (G2) generators are also very flexible in regards to their electrical layout. With a broad connected voltage range of 380 to 480 V  $\pm$  10 %, they can be used worldwide without technical adaptations. As a result, costly conversions of the existing installations on site are not required. This makes an additional contribution to highly economical operation.

### Overview of your benefits:

1 Superior arc management	▶ outstanding layer quality and productivity
2 High operating efficiency	▶ maximum cost effectiveness over the entire lifespan
3 Flexible cooling concept	▶ stable process power supply, even under difficult ambient conditions
4 Broad operating voltage range	▶ suitable for application worldwide without technical adaptations

# Innovations with added value.

## 1 Effective ignition aid.

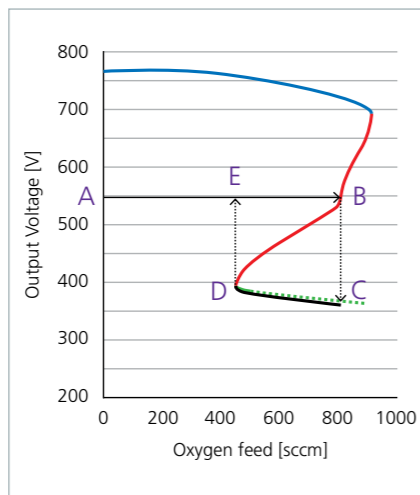
As a rule, the ignition of plasma requires a much higher voltage than maintaining the running process. The ignition aid developed by TRUMPF Hüttinger works with a low energy input, so that arc formation and thermal stress are avoided. Individual control of the ignition process is given by the ignition voltage and ramp time parameters.



Version	Ignition voltage
1100 V standard version	≤ 3100 V (adjustable)
540 V high current version	≤ 1500 V (adjustable)

## 2 Voltage-controlled transition mode.

The ideal process state for the sputtering process is the so-called transition mode – posing especially high requirements for process control. With corresponding pre-adjustment, the MF output, current and voltage of the generators are determined by the target impedance alone – upward or downward fluctuations during the transition are excluded. The controller also reacts very quickly to changes in the target and process states.



Operating points in voltage-controlled operation.

## 3 Broad frequency range.

With its broad frequency range from 20 to 70 kHz (optional), which can be adjusted independently of the MF output, current and voltage, the TruPlasma series MF 7000 (G2) generators are particularly flexible in coordinating the process parameters. This means you can easily find the optimum balance between the desired productivity and layer quality for any process.

## 4 Convenient operation.



The convenient TruControl Power operating software features comprehensive configuration and diagnosis functions.

Our easy to use, multilingual TruControl Power software has numerous features for operation, configuration and diagnosis. TruControl as a graphical PC user interface displays all relevant actual values; the nominal values can be specified by you. Intelligent warnings and alarm messages support rapid troubleshooting.

By recording and visualizing important operating parameters with high temporal resolution (oscilloscope function) and summarizing measurements over a long period of time (trend function), you are provided with important information to ensure process quality. Operation and fault analysis are supported without additional hardware.

### Additional benefits for your application:

- |   |                                    |   |  |
|---|------------------------------------|---|--|
| 1 | Effective ignition aid             | ▶ | prevents arc formation and thermal stress at the targets |
| 2 | Voltage-controlled transition mode | ▶ | trouble-free operation in transition mode                |
| 3 | Broad frequency range              | ▶ | precise control of layer quality and productivity        |
| 4 | Convenient operation               | ▶ | effective configuration and diagnosis                    |



## Product versions.



Technical data TruPlasma MF	7050	7075	7100	7120	7150
<b>Output parameters</b>					
Output power	50 kW	75 kW	100 kW	120 kW	150 kW
Output voltage Standard version High current version <sup>2</sup>	1100 V 540 V		1100 V /		
Output current Standard version High current version <sup>2</sup>	110 A  220 A (300 A <sup>1</sup> )	200 A  400 A	225 A  400 A	300 A  /	320 A (350 A <sup>1</sup> )  /
Output frequency Standard range Extended range <sup>2</sup>	20 – 50 kHz 20 – 70 kHz		20 – 50 kHz /		
<b>Mains input parameters</b>					
Mains voltage	380 – 480 V ±10 %				
Mains frequency	50/60 Hz ±5 %				
Power factor	0,95				
Efficiency	> 90 %				
<b>Cooling specifications</b>					
Cooling water temperature	+ 5 to 35 °C				
Cooling water Δp	2,5 bar ≤ 6,0 bar				
Cooling water flow	≈30 l/min <sup>3</sup> @23°C inlet cooling water			67 l/min	
<b>Arc handling</b>					
Arc energy	FastTreatment: ≈ 10 mJ/kW   UltraFastTreatment <sup>2</sup> : ≈ 1 mJ/kW				
Interfaces	RS232/485, Ethernet, Profibus, A/D <sup>2</sup> , EtherCAT <sup>4</sup> , PROFINET <sup>2</sup>				
Dimensions (w x h x d)	800 x 2000 x 800 mm				
Weight	560 kg	610 kg	660 kg		
Protection class	IP 54				
Certificate	CE				

<sup>1</sup> max. output current below nominal power

<sup>2</sup> optional

<sup>3</sup> under final qualification

<sup>4</sup> on request



- MF arc switch:  
DE102010031568, US20130134890A1, CN103026452A, EP2596517  
- MF arc recognition



- MF ignition switch:  
DE102010038605, US20130187545A1, CN103038994A, EP2599209

# Expertise builds trust.

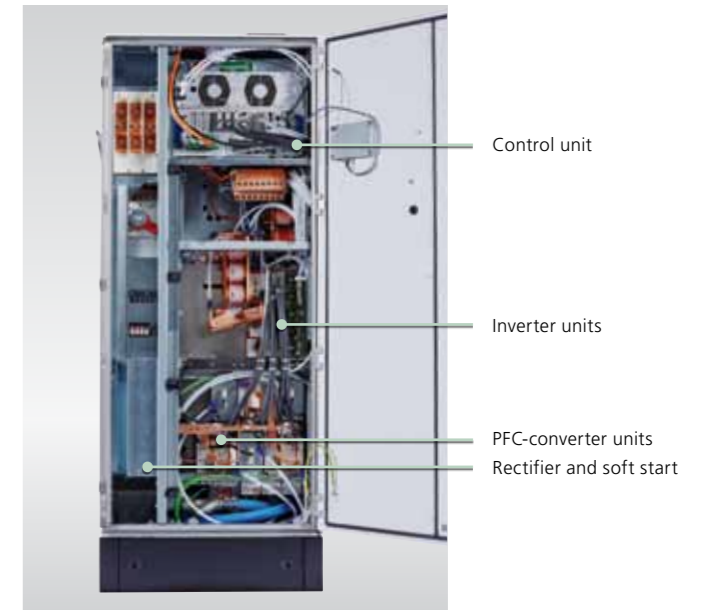


## Individual service.

Our work is not done with the sale of a generator. We are always available to answer any questions you may have. Quick support in case of disruptions keeps downtime to a minimum. Our tailor-made TruServices service agreements and maintenance contracts along with our flexible training program offer you comprehensive options to optimize the availability and productivity of your generator. We are happy to assist you.

## Low space requirements, maintenance-friendly concept.

All components of a TruPlasma series MF 7000 (G2) generator are housed in a compact control cabinet with a very small footprint (800 x 800 mm). This low space requirement is particularly useful in the field of glass coating, since several generators have to be installed side by side as a rule. All generator modules in the control cabinet are easily accessible from the outset and can be replaced quickly and easily by qualified personnel. Calibrating the replacement modules is not required. The mains connection, power cables and control lines can be connected on site, from above or below as an option. The water connection is accessible without having to open the door at the front.



## MF history highlights (plasma).

Based on 70 years of experience in electronics, TRUMPF Hüttinger enters into a cooperation agreement with the Fraunhofer Institute for Electron Beam and Plasma Technology (FEP). The goal is the joint development and optimization of applications for large area coating (LAC).



The first coating system for architectural glass is successfully equipped with process power supplies from TRUMPF Hüttinger.



**TruPlasma MF series 7000 (BIG)**  
Faster arc management for use in challenging LAC processes.

TRUMPF Hüttinger becomes the market leader for large area coating.



**TruPlasma MF series 7000 (Scasar)**  
Presentation of what is then the world's best arc management for critical FPD and touch panel processes.

TRUMPF Hüttinger becomes the market leader for critical DMS processes in the FPD market.



**TruPlasma MF series 7000 (G2)**  
Further improvements in arc management for optimum productivity, even in critical, reactive processes. TRUMPF Hüttinger therefore sustains its position as the technology and market leader in the field of large area coating.



1992

1993

1994

1997

1999

2005

2008

2014

**TruPlasma MF series 3000 (TIG)**  
Presentation of the world's first arc treatment for MF process power supplies.

