

TruPlasma Bipolar
Series 4000 (G2)

Generating
waveforms.



Spotless images, bright perspectives:
TRUMPF Hüttinger for impressive quality and performance.



Flexible solutions. Extreme precision. High performance for reactive sputtering, sputtering of difficult materials and PECVD processes.

The TruPlasma Bipolar Series 4000 (G2) power supplies are ideally suited for plasma-assisted film deposition PECVD and dual cathode sputtering processes, where reliability and performance are critical. Typical application areas are semiconductor manufacturing, architectural glass coating and solar cell production, high-quality hard and decorative coatings as well as optical films.

The second generation of highly sophisticated fully digital arc management ensures optimum results for film quality and deposition rate. Its compact size and comprehensive set of communication interfaces makes the TruPlasma Bipolar Series 4000 (G2) the best choice for easy tool integration in limited space conditions.

The TruPlasma Bipolar Series 4000 (G2) is available with output powers ranging from 10 kilowatts to 60 kilowatts. They consist of a DC power section and switching section which is responsible for pulsing the output power. This topology allows a wide range of output pulse configurations. The duty cycle for each half-wave can be independently adjusted to maximize process results and target utilization. TRUMPF Hüttinger's unique, pro-active arc management minimizes arc energy and process interruptions which results in maximum yield and productivity.

Features

- Extremely low arc energy
- Ultrafast digital control platform
- Software adjustable waveforms
- Innovative design of power electronics
- DC, DC-pulsed and Bipolar in one unit
- Full water cooling

Benefits

- High film quality and production yield
- Stable plasma even in reactive processes
- Simple adoption to different process requirements
- High Mean Time Between Failures (MTBF)
- Flexibility and low cost of ownership
- Compact housing, protected from environmental hazards

TruPlasma Bipolar Series 4000 (G2)



Output Parameters

Output Power		10 kW, 20 kW, 30 kW, 40 kW, 60 kW
Output Voltage		1000 V (rms)
Output Current (rms)		25 A, 50 A, 75 A, 100 A, 150 A
Regulation Modes		Power, Voltage, Current
Regulation Line $\pm 10\%$ Load 10 % – 100 %	Accuracy	$\pm 0.5\%$
	Repeatability	$\pm 0.2\%$
Output Polarity		Floating
Stacking units for higher power		Yes, up to 180 kW ¹

1) Available upon request.

Pulsed Operation Parameters

Pulsing Frequency	40 kHz fixed 20 kHz, 40 kHz, 60 kHz, 80 kHz adjustable Up to 100 kHz ²
Operation Modes	Bipolar pulsing, Bipolar with adjustable (asymmetric) duty cycle, Bipolar trapeze, Unipolar pulsing ² , DC ²

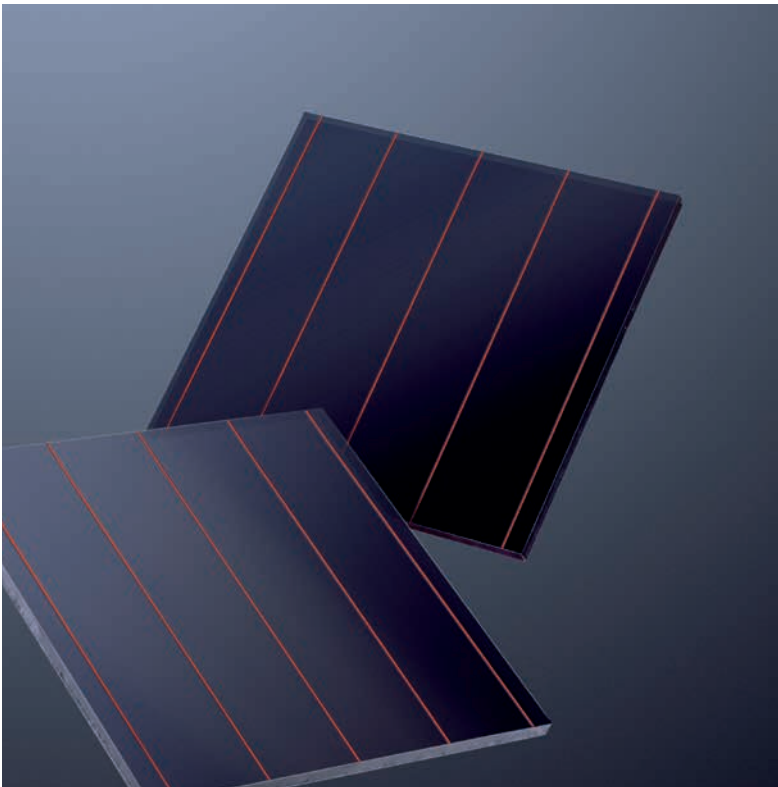
2) Available upon request.

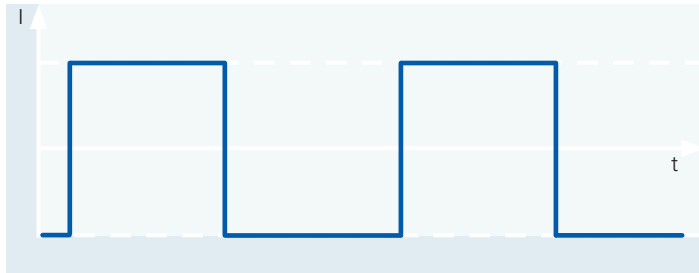
Arc Detection Criteria

Arc Detection Time	< 100 ns
I _{max} Detection	Adjustable current threshold [%] Automatic mode or [A] Manual mode
Dynamic Voltage Change	Adjustable voltage threshold [%] Dedicated to voltage drops > 100 V
U _{sag} Detection	Adjustable voltage threshold [%] Dedicated to voltage drops < 100 V
Dynamic Cross Detection: Automatic	Adjustable voltage [V] and current [A] threshold Monitors output voltage and current

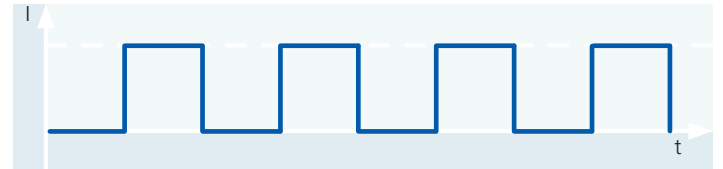
Input Parameters

Line Voltage	3 x 400 V – 480 V $\pm 10\%$
Line Frequency	50 Hz / 60 Hz $\pm 5\%$
Efficiency	> 90 %

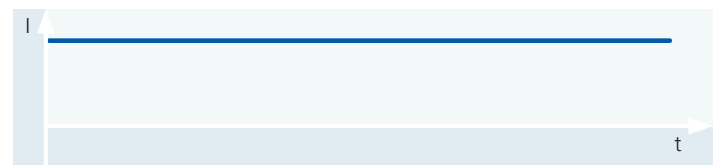




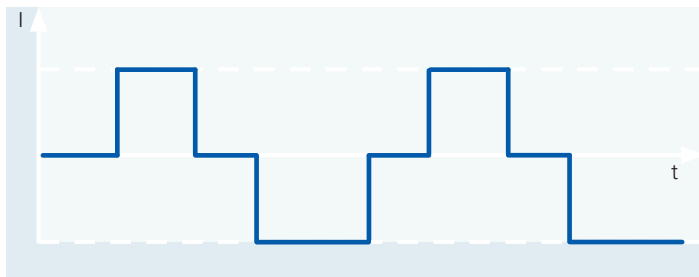
Bipolar mode with symmetrical outputs



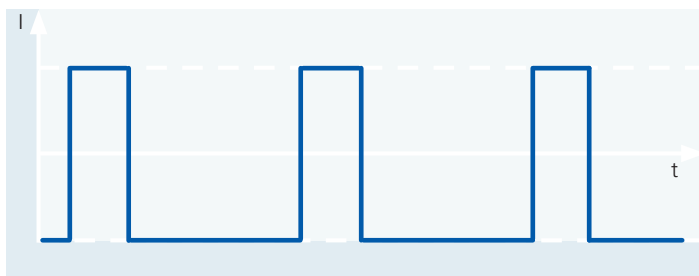
MonoPulse mode – negative or positive



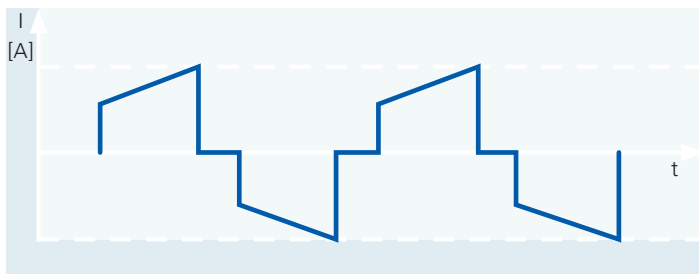
DC mode – negative or positive



Bipolar output with asymmetrical outputs and off time



Bipolar output with asymmetrical outputs



Bipolar trapeze mode



Cooling Specifications

Max. Water Pressure	Up to 7 bar
Min. Differential Pressure	2 bar
Water Flow	4 l/min – 12 l/min
Max. Cooling Water Temp.	Up to +35 °C

Environmental Specifications

Ambient Temperature	+5 °C to +45 °C operating -25 °C to +55 °C storage
Relative Humidity	5 % – 85 % non condensing
Air Pressure³	860 hPa – 1 060 hPa

3) Max. 2 000 m above sea level.

Interfaces

Analog / Digital	25-pin Sub-D
RS 232 / RS 485	9-pin Sub-D
PROFIBUS	9-pin Sub-D
EtherCAT⁴	RJ45
DeviceNet⁴	5-pin DeviceNet Connector

4) Available upon request.

Dimensions (W x H x D, mm)

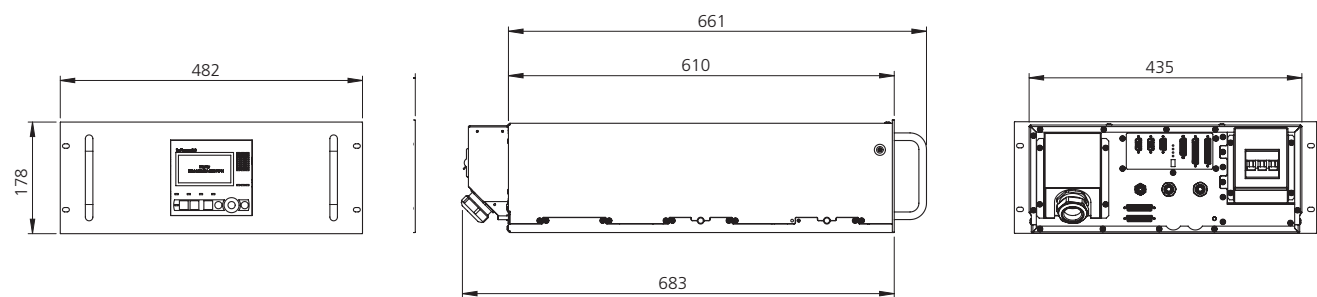
TruPlasma Bipolar 4010 (G2)	482 (19") x 178 (6HU) x 683
TruPlasma Bipolar 4020 (G2)	482 (19") x 266 (6HU) x 683
TruPlasma Bipolar 4030 (G2)	482 (19") x 355 (8HU) x 683
TruPlasma Bipolar 4040 (G2)	482 (19") x 355 (8HU) x 683
TruPlasma Bipolar 4060 (G2)	482 (19") x 622 (14 HU) x 683

Weight

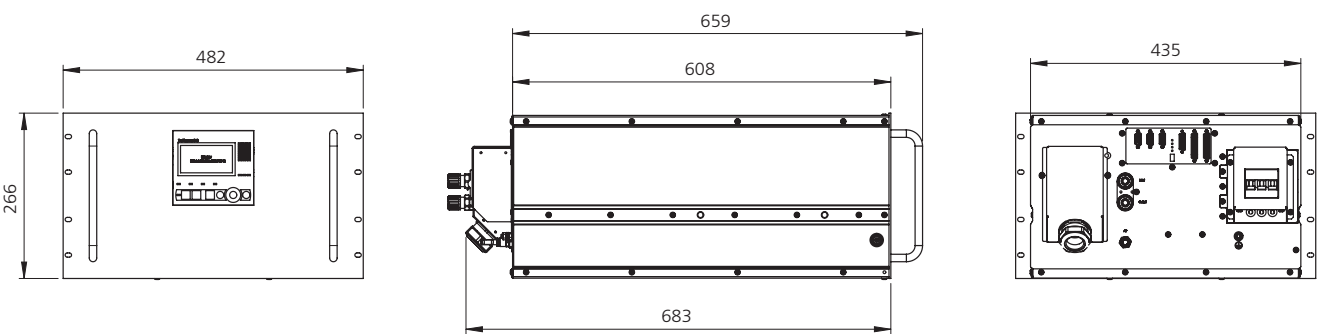
TruPlasma Bipolar Series 4000 (G2)	50 kg – 160 kg
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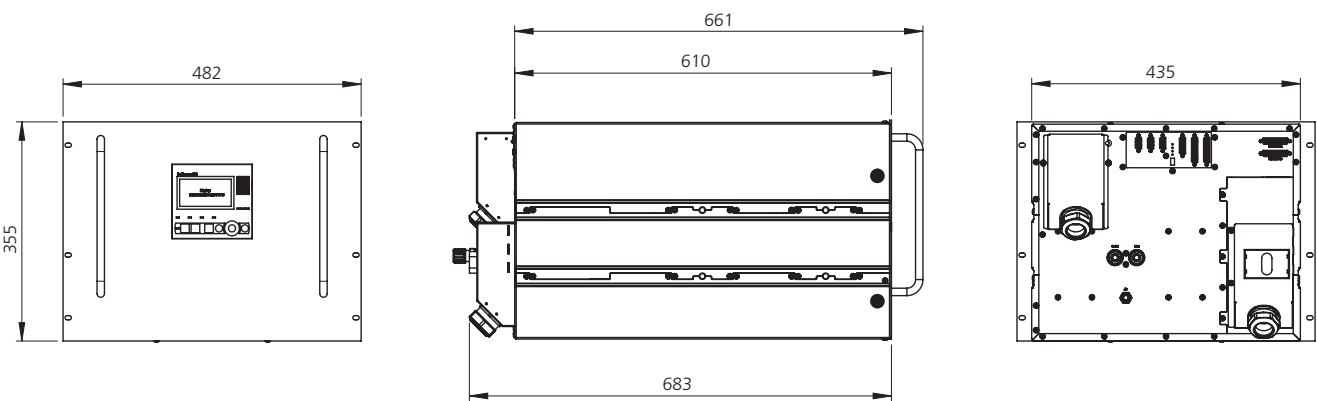
TruPlasma Bipolar 4010 (G2)



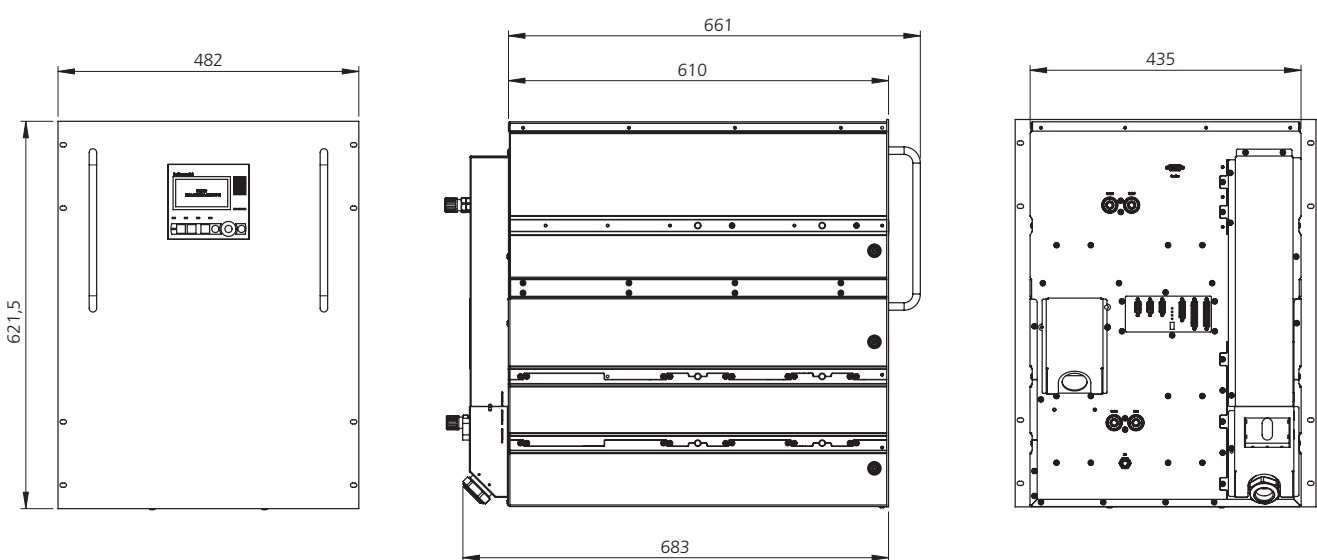
TruPlasma Bipolar 4020 (G2)



TruPlasma Bipolar 4040 (G2)



TruPlasma Bipolar 4060 (G2)





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