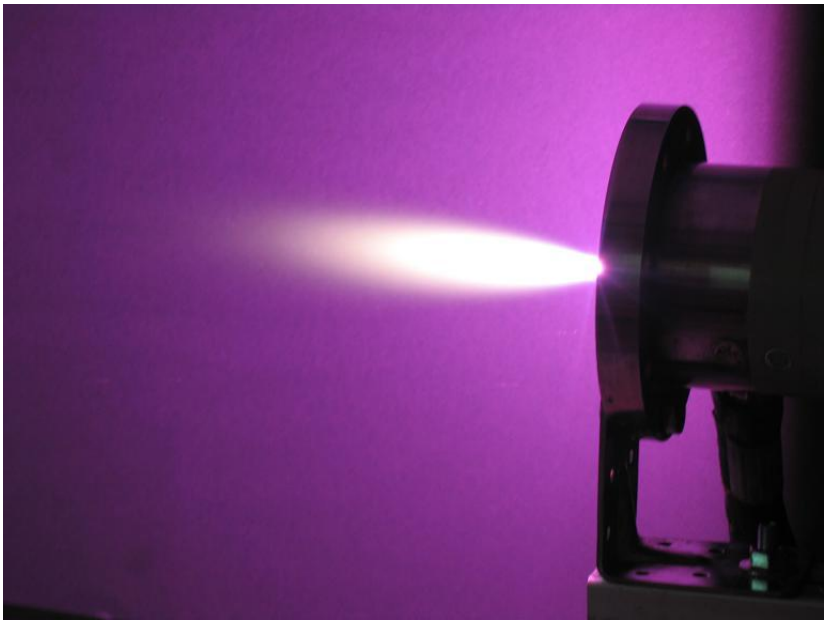
PlasmaAir AG

ABLUFTREINIGUNG

5 - 100 kW
Plasma sources
and its applications



PlasmaAir AG
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Germany

Plasma sources and its applications

What sets us apart

The PlasmaAir AG has been producing arc-heated plasma torch systems for some of the most demanding applications in the world for almost 20 years. CFC cracking in the chemical industry, POU exhaust air purification in the semiconductor industry, thermal treatment of waste materials, pilot burners for coal power plants and metal powder production are just some of the many applications of plasma sources.

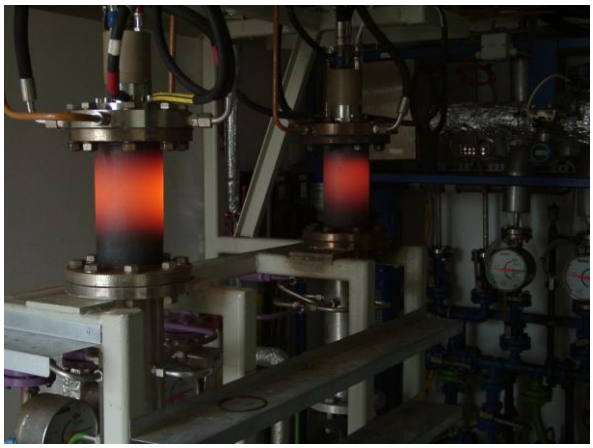

Fig. 1: Cracking plant for CFCs (2 reactors)

Advantages

PlasmaAir delivers more than just the plasma sources. Our customers receive turnkey systems that provide all the elements needed for safe and reliable operation and handling of the plasma system.

User friendliness, versatility in use with plasma gases, as well as high safety, reliability and lifetime of wear components characterise the PlasmaAir sources. Customer satisfaction is important to us, therefore we offer solutions specific to the particular application.

We provide

- Turnkey solutions adapted to customer needs and requirements
- Automated systems, with easy handling
- Commissioning and maintenance service from a single source
- Complete integration with process control software according to customer specifications
- Intrinsically safe construction
- After Sales Service available, including remote monitoring
- 1 year warranty on all delivered components, with the exception of wearing parts

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Water vapour as plasma gas

Water vapour is a very cost-effective working gas compared to other typical plasma gases. In addition, the chemical properties of water plasma can be used for different processes.

Steam plasma burners are used mainly in CFC disposal and plasma pyrolysis.

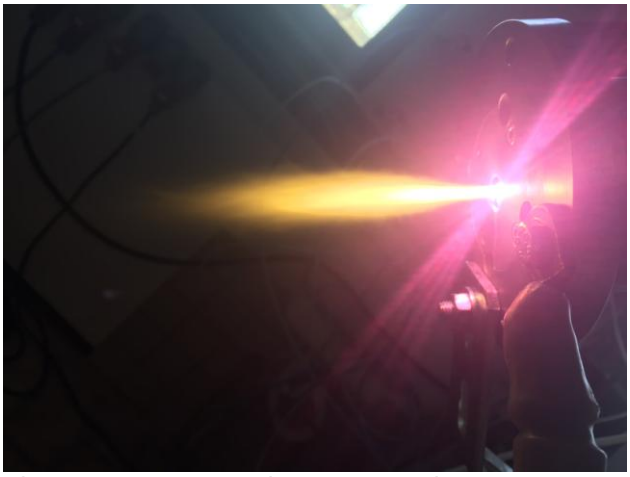

Fig. 2: Water vapour plasma source in use

Advantages of water vapour plasma

- Enthalpy density
  With steam plasma, a very high enthalpy density can be achieved.
- Chemical composition
  Water vapor plasma is chemically very reactive. It consists of the radicals O, H, OH, O_2, H_2 and H_2O at an average temperature in the range of 4.000°C and peak values in the core of about 12.000°C
- cost advantage
  Water is anywhere available at very low costs.
- Thermal efficiency
  The thermal efficiency of steam plasma sources is about 80 - 95%.
- Versatility
  This thermal arc burner, which works with water vapour, can be operated without major modifications with the most diverse reducing and oxidizing gases; for example with air, pure oxygen or carbon dioxide.
- Flammability
  Water is not combustible as a starting product.

Technical data

El. power	5 - 20 kW 20 - 50 kW
Water vapour flow-rate	0.5 - 2.5 kg/h
Average temperature	approx. 3,500 - 4,000°C
Core temperature	approx. 9,000°C
Lifetime of electrodes	several hundred hours depending on the operating point

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Nitrogen as plasma gas

The nitrogen plasma burner was developed as a decentralized air purification system especially for the semiconductor industry. Each system consists of a high-temperature plasma stage and a downstream wet scrubber. The core of the plant is a plasma torch powered by nitrogen as a plasma gas.

Fig. 3: Nitrogen plasma torch

Technical data

El. power	5 - 10 kW 10 - 25 kW
Nitrogen flow-rate	10 - 40 slm
Average temperature	3,000 - 6,000°C
Core temperature	up to 14,000°C
Lifetime of electrodes	several 100 h

Point of use (POU) abatement systems in semiconductor industries

- disposal of SF_6, NF_3, CF_4, silanes
- greenhouse gas in nitrogen with up to 600 slm
- high degradation rate > 95%
- no flammable gases
- small and compact systems

Exhaust gases with the following ingredients can be treated:

	Concentration [PPMv]		degree of purification
	raw gas	clean gas	
SiH_4	766	ND	> 99%
C_3F_8	820	0,9	99,88%
CF_4	824	1,5	99,89%
NH_3		ND	> 99%
HF		ND	> 99%
COF_2	1548	1,86	99%

Fig. 4: decentralised exhaust air purification system

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Air as plasma gas

Using air as a plasma gas is cheap and available anywhere. The contained oxygen is actively used to support chemical processes (plasma cutting, combustion). The PlasmaAir AG has developed an air plasma source, that can be used for example as a pilot burner for coal power plants.

Two different burners were developed, covering different power ranges. In addition to use in coal-fired power plants, the air-driven plasma torches are also used in pyrolysis, plasma coating and surface treatments.

Technical data

PB01-L

El. power	3 - 7 kW
Air flow-rate	10 - 25 slm
Average temperature	3,000 - 6,000°C
Core temperature	up to 12,000°C
Lifetime of electrodes	several 100 h

PB13-L

El. power	8 - 25 kW
Air flow-rate	15 - 40 slm
Average temperature	3,000 - 6,000°C
Core temperature	up to 12,000°C
Lifetime of electrodes	several 100 h

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Argon as plasma gas

Plasma atomization is a relatively new process suitable for the production of high purity powder. This makes it possible to produce powders of reactive metals and high melting point alloys such as titanium, zirconium, tantalum, etc. The plasma gas used in this application is argon. PlasmaAir AG has developed a 50 - 100 kW argon plasma source for this application in particular.

Technical data
PB100-A

El. Power	10 - 30 kW 50 - 100 kW
Argon flow rate	100 - 300 slm
Average temperature	4,000°C
Core temperature	12,000°C
Lifetime of electrodes	several 100 h


Fig. 6: 70 kW Argon source

Power supplies for arc plasma torches

Our DC power supplies, which were specially developed for the operation of the plasma burners, are characterised by extreme electrical stability and robust performance. The power supplies are adapted to the respective application and the corresponding power range. Power supplies in the range from a few kW up to 3 x 100 kW are available.


Fig. 7: 100 kW system with 1200 A, 100 V

Further equipment

Upon customer request, the following additional equipment is designed:

- gas supplies
- cooling units
- user interfaces

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