

Plasma Ignition System

Reliable direct ignition of gaseous, liquid and solid fuels



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Functional description

The plasma is created purely electrical without fuel by the high frequency excitation of a carrier medium (typically air).

The plasma is created at the tip of the plasma lance. In principle the plasma is an extended electric arc. The operational principle of the plasma ignition system is the microwave technology. The system mainly based on the high frequency generator (magnetron) which is built into the lance head, an attached plasma lance including initial ignition spark generator, and a supply unit with connection line. With an optimum plasma a power of 3 kW with a plasma temperature of app. 3500 °C is reached.

Plasma Ignition System components



Plasma lance	Technical data
Microwave power	3 kW
Plasma Jet length (typical)	150 mm
Plasma temperature	approx. 3500 °C
Lance diameter	35 mm
Protection class	IP65
Ambient temperature lance head	0 °C ... 60 °C
Operational temperature plasma lance (continuously)	180 °C
Operational temperature tip of lance (max. 2 min. without additional air or water cooling)	max. 1100 °C
Material	Stainless steel (1.4571)
Length of lance	max. 5 m
Power supply	400 V AC, 5 kW (others possible)
Carrier medium	e. g. Compressed air

Facts and Specifications

Characteristics

- ▶ Safe ignition of different gaseous, liquid and solid fuels
- ▶ Familiar high reliability
- ▶ High ignition potential: high temperature with high energy density in the ignition volume
- ▶ No fuel and no combustion air required
- ▶ Creation of plasma with variable carrier media possible (e. g. air)
- ▶ Easy and simple integration in superordinate control systems
- ▶ Low requirement for maintenance
- ▶ Few connections and interfaces required

Plasma Ignition System compared to a Conventional Ignition System

Plasma Ignition System	Conventional Ignition System
No fuel – electrical energy only	Fuel: gas or oil
No fuel supply – only cooling water	Fuel supply: storage, transport, and safety systems
Plasma Ignition System: plasma lance, supply unit, cooling and purging media	Ignition burner, fuel valves, flame control, burner control, combustion air supply
–	Fuel conditioning (pre-warming, pressure control, pumping)
–	Occupational safety (oil or gas discharge)
–	Periodic safety audits required (e. g. TÜV)



Features & Benefits

Advantages of a Plasma Ignition System

- ▶ **Fast return on investment**
Complete elimination of ignition fuel and the required infrastructure
- ▶ **Increased safety**
Complete elimination of the ignition burner's safety chain as no fuel is used
- ▶ **Compact design and low maintenance**
Fuel conditioning and frequent safety audits not required
- ▶ **Flexibility**
Fast available ignition system supporting the flexible operation of fossil fuel fired power plants
- ▶ **Flexible use**
Direct ignition of different solid fuels like pre-dried lignite (PDL), high volatile hard coal, coal dust or biomass
- ▶ **Wide range of applications**
Can be used for additional applications in the chemical industry and thermal processes (e. g. oxy-fuel systems (carrier medium CO₂) or oxygen-free thermal reactions)

Applications

The plasma ignition system is usable for ignition of difficult to be ignited fuels like pulverized solid fuels (pre-dried lignite (PDL), hard coal and biomass) as well as gases, oils and special fuels. Additionally the ignition in low-oxygen or oxygen-free atmospheres is possible.

These firing systems can be found in the following areas:

- ▶ Fossil-fired power plants (lignite, hard coal, biomass, oil and gas)
- ▶ Thermal process utilities (industrial ovens)
- ▶ Chemical plants
- ▶ Timber industry
- ▶ Waste incinerators
- ▶ Petrochemical industry
- ▶ Iron and steel industry



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