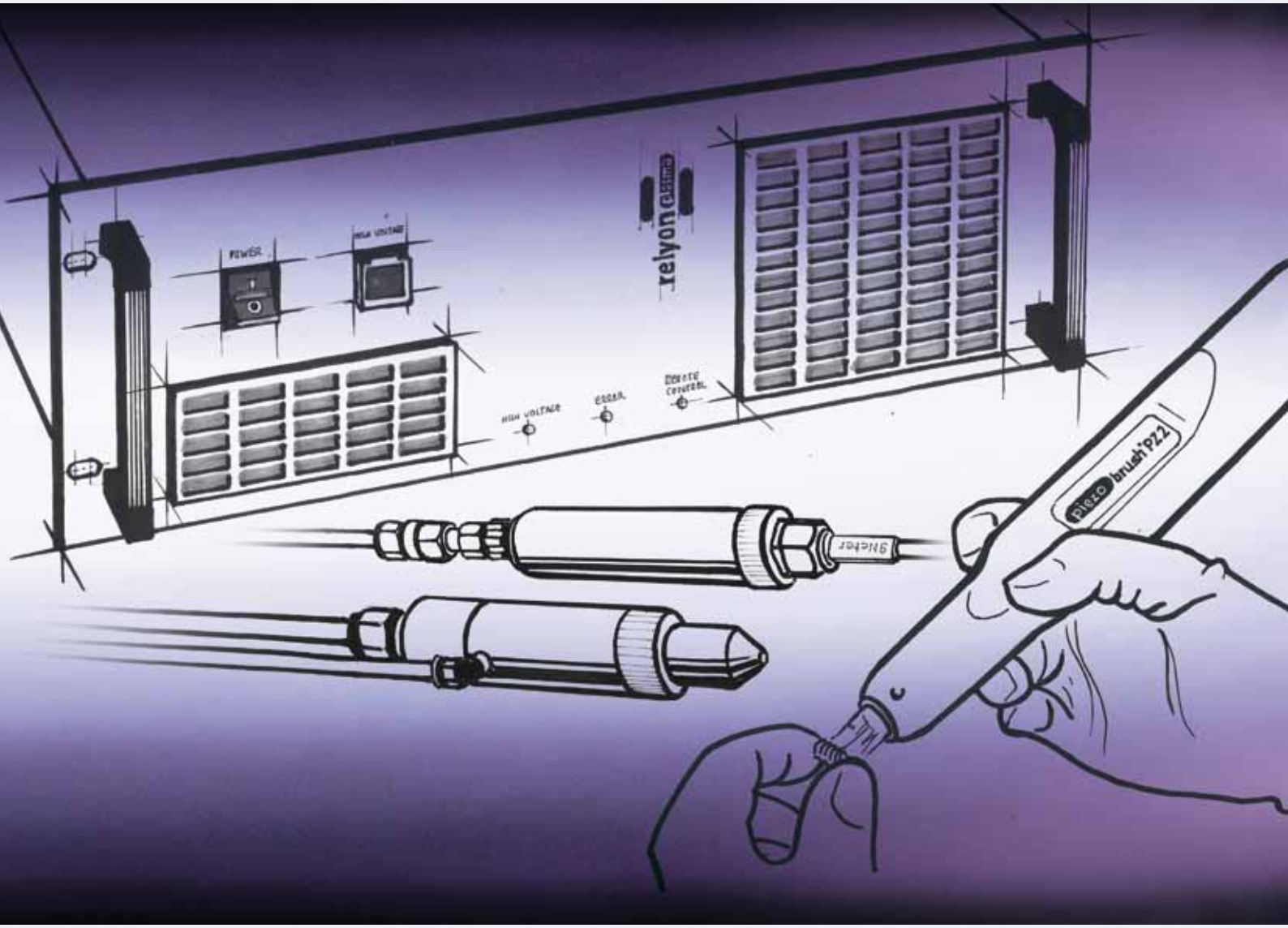
relyon plasma®

rely on plasma technology



Innovative plasma products

Efficient and reliable

Our principle – advancing technology through safer processes

As a modern, technology-oriented company with a lean corporate structure, we deliver reliable plasma solutions which are "Made in Germany".

Our products have been tested both in practical applications and in our test laboratory in terms of their process capability and service life.

Every process stage is supported by consistent quality management in accordance with DIN EN 9001, which ensures maximum product functionality and safety.

– You can rely on plasma –

The relyon plasma management:
Dr. Stefan Nettesheim, Managing Director. Cynthia Kunu, Sales Assistant. Dipl.-Ing. Dominik Burger, Project Engineer. Dr. Dariusz Korzec, Process Technology. Jürgen Seissler, Sales Director. Birgit Zimmermann, Public Relations. Dipl.-Ing. Klaus Forster, Managing Director.

We focus on your plasma applications

With our professional sector expertise we are able to supply a broad spectrum of elegant series solutions, for instance, for atmospheric plasma surface treatment. We are experts in the activation and fine cleaning of a wide variety of technical materials, as well as sterilisation and tissue stimulation in laboratories and the medical sector.

On the following pages you can find the perfectly tailored plasma system for each of these applications.

Don't hesitate to contact us if you have any special technical requirements – our experts will be delighted to advise you.

Our plasma technologies

In accordance to a variety of different requirements, we have implemented 2 different technologies in our product portfolio.

Pulsed Atmospheric Arc Technology (PAA® Technology) for applications that require high performance and rapid processes.

Piezoelectric Direct Discharge Technology (PDD® Technology) for sensitive processes that require cold active plasma.

Our plasma products

Our technical platforms can provide you with a comprehensive modular system to suit your requirements.

Here, we are able to meet all your configuration needs - from an individual manual work station right through to a fully automated high speed system.

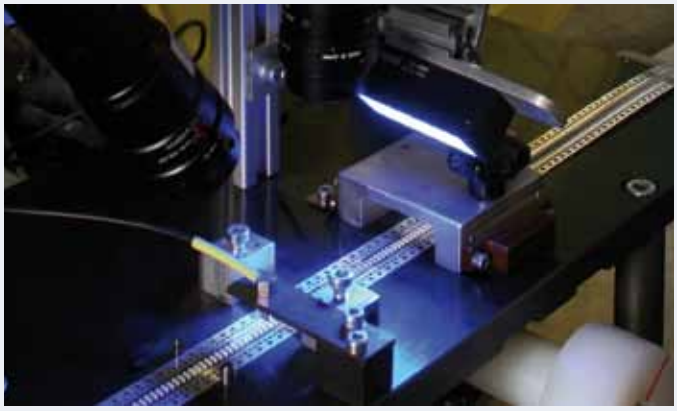
piezobrush® Cold active processes

Surface activation

Laboratory technology, dental technology
Model construction, precision engineering
Micromechanics, optics
Assembly technology, electronics

Germ reduction

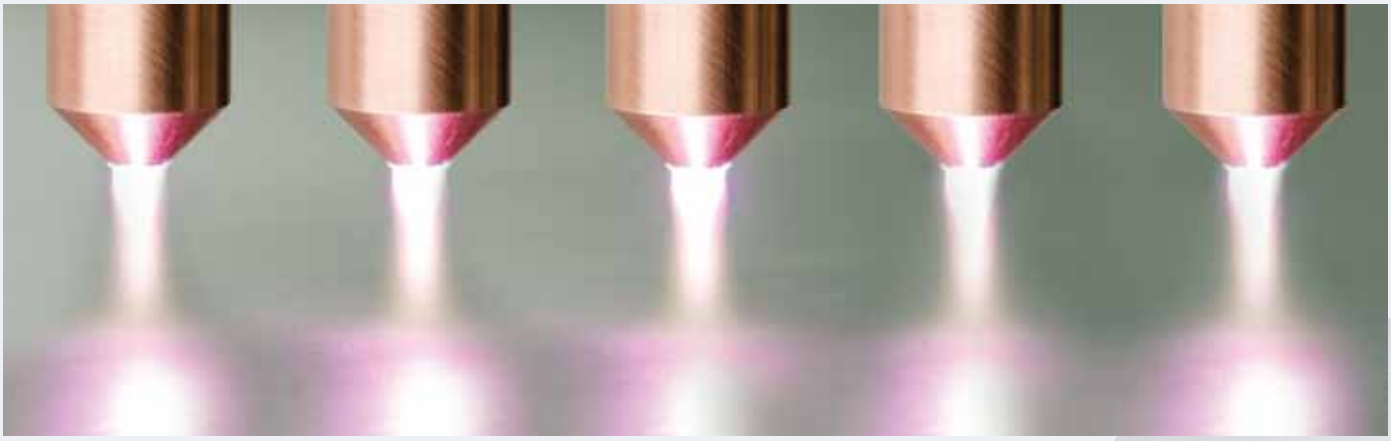
Microbiology
Food technology
Medical technology
Microfluid technology

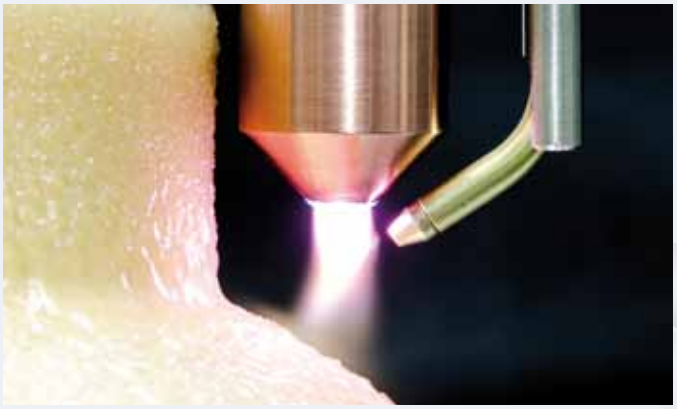


Automated processes, printing and labelling

Inkjet, pad printing
Coding, microfilling
Wetting behaviour of automated processes

plasmabrush® High performance processes

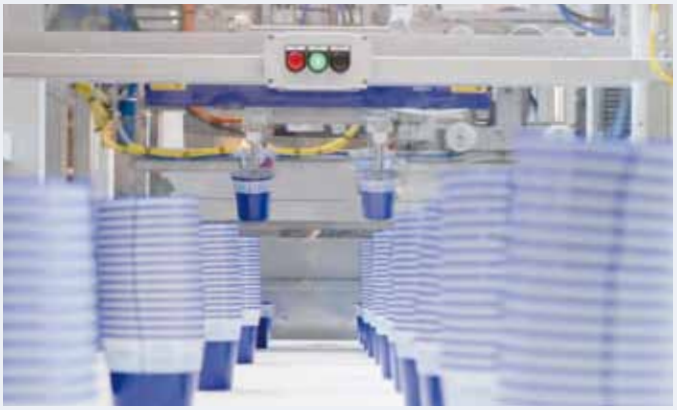




Coating processes

Hot melt coating as a highly active compound layer.

Cleaning electrical assemblies and application of fluxing agents before the soldering process.



Activation processes

In the packaging industry at maximum processing speeds.

Sealing technology, coating, laminating, printing.

Cleaning processes

Removal of soldering residue, fluxing agents or release agents.

Removal of oxide layers.

piezobrush® Hand-held device for universal applicati

Technology

relyon plasma has developed PDD® Technology specially for plasma generation which is particularly compact. PDD® (Piezoelectric Direct Discharge) is based on direct electrical discharge via an openly operated piezo-electric transformer(PT).

With maximum efficiency, a low input voltage is transformed in such a way that very high electrical field strengths are created and the ambient process gas, typically air, is dissociated and ionised. In the case of PDD, the gas temperature of the plasma volume is inessential higher than ambient temperature.

Electron densities of approx. 10^{14} and 10^{16} per m^{-3} are achieved. In this way, PDD produces a typical "cold" non-equilibrium plasma.

The properties of PDD® therefore open up a multitude of application possibilities. PDD devices are used in medical research for germ reduction, odour reduction and in microbiology.

Typical industrial applications include surface activation for the optimisation of wetting and bonding properties in the case of plastics, e.g. in printing, coating and bonding processes.

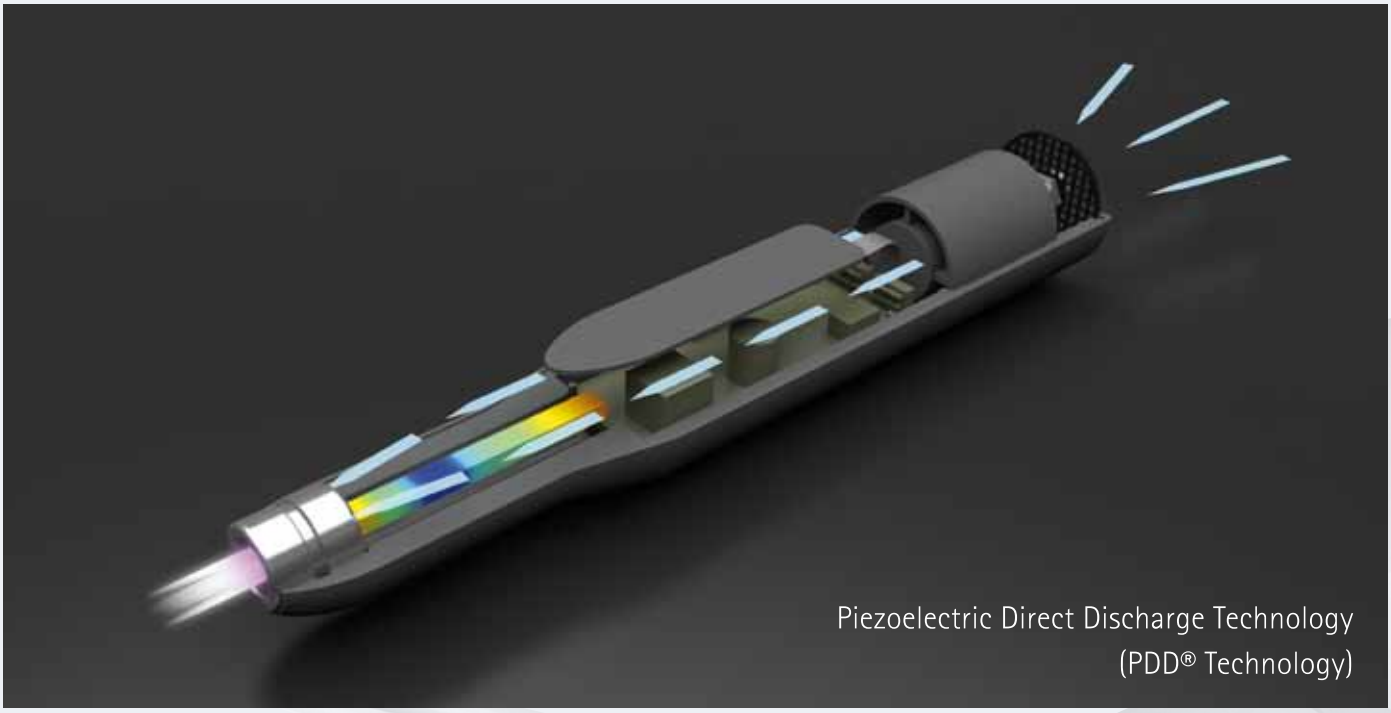
Features

- Simple to use
- No external gas supply required
- Cold active plasma
- Maximum operational reliability
- Optimum efficiency
- Variable nozzles

Applications

- Medical research
- Microbiological processes, germ reduction, odour reduction
- The pharmaceutical industry
- Life science
- Food processing
- Surface activation for the optimisation of wetting and bonding properties in the case of plastics, e.g. in printing, coating and bonding processes.

on - it couldn't be any simpler ...



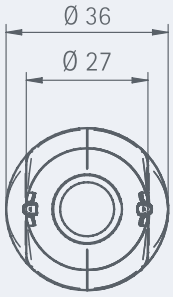
Piezoelectric Direct Discharge Technology
(PDD® Technology)

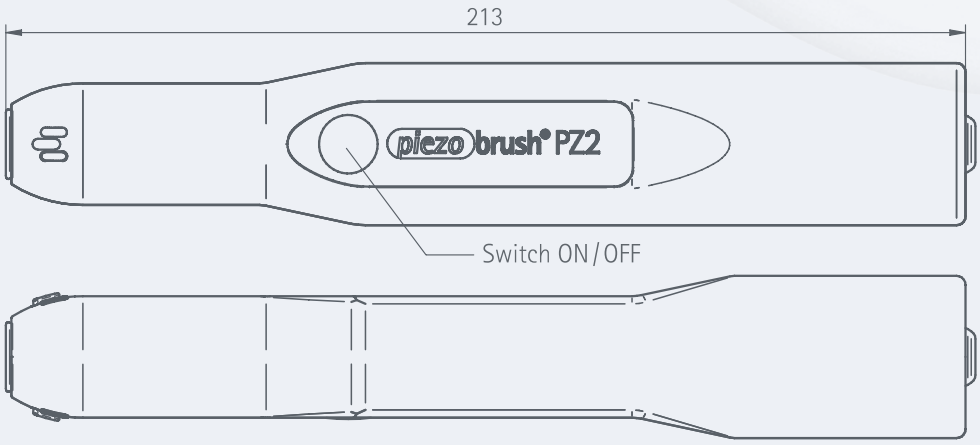
Technical Information

Electrical connection	110 - 240 V / 50 - 60 Hz 15 V DC
Power requirement	max. 30 W
Specification	Hand-held device with power supply unit, Integrated ventilator
Weight	170 g
Plasma temperature	< 50 °C
Typical treatment distance	5 – 10 mm
Typical treatment width	5 – 20 mm

Set contains:

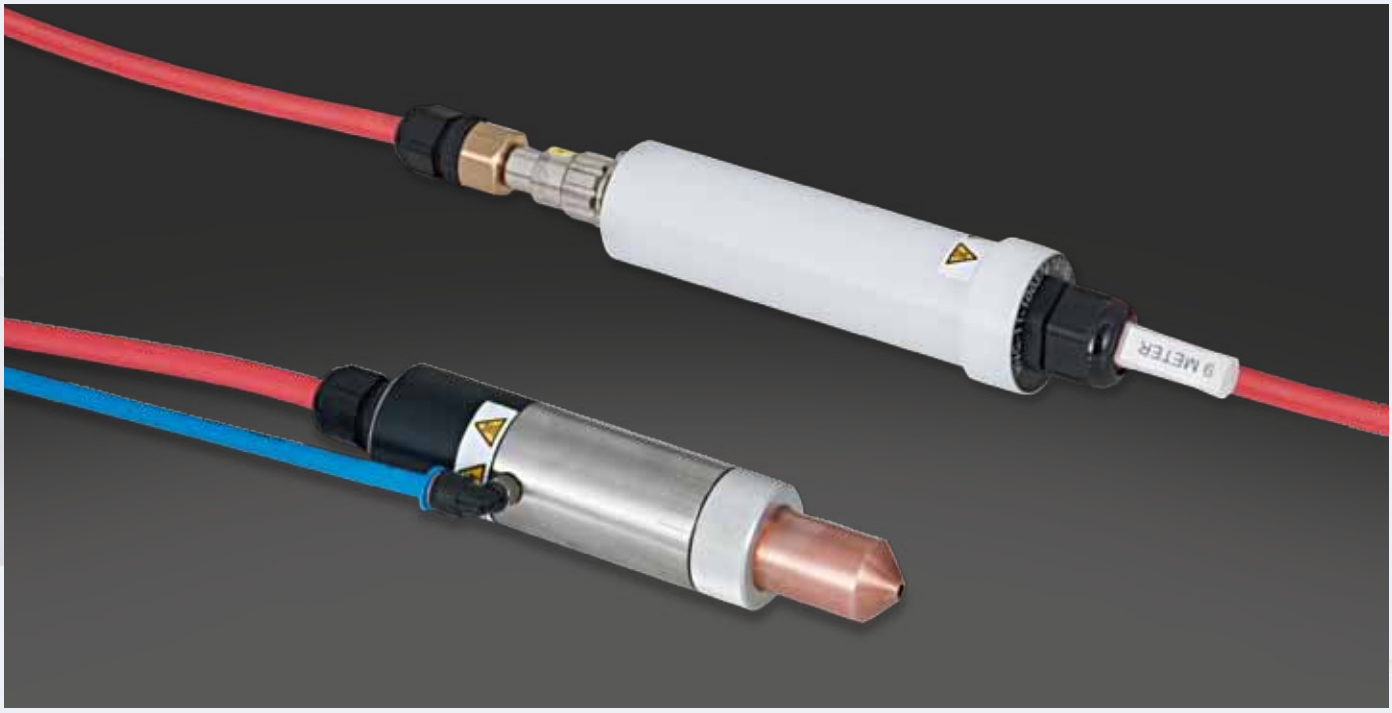
- Multirange power supply unit
- Replacement nozzles
- Transport case





... plug in, switch on and it's ready to use

plasmabrush® High power Plasma generator for indus



Technology

The nozzle-type plasma generators are particularly compact and have long-term stability due to the combination of a unipolar pulsed high voltage source and a vortex flow in the nozzle (PAA® Pulsed Atmospheric Arc Technology). In this dynamically controlled operating mode the arc is prevented from stabilising at a "hot spot" and nozzle erosion is minimised.

The arc rotates at a high frequency in the combustion chamber. Despite the high power density, there is only minimal warming of the nozzle and hardly any erosion of the electrodes.

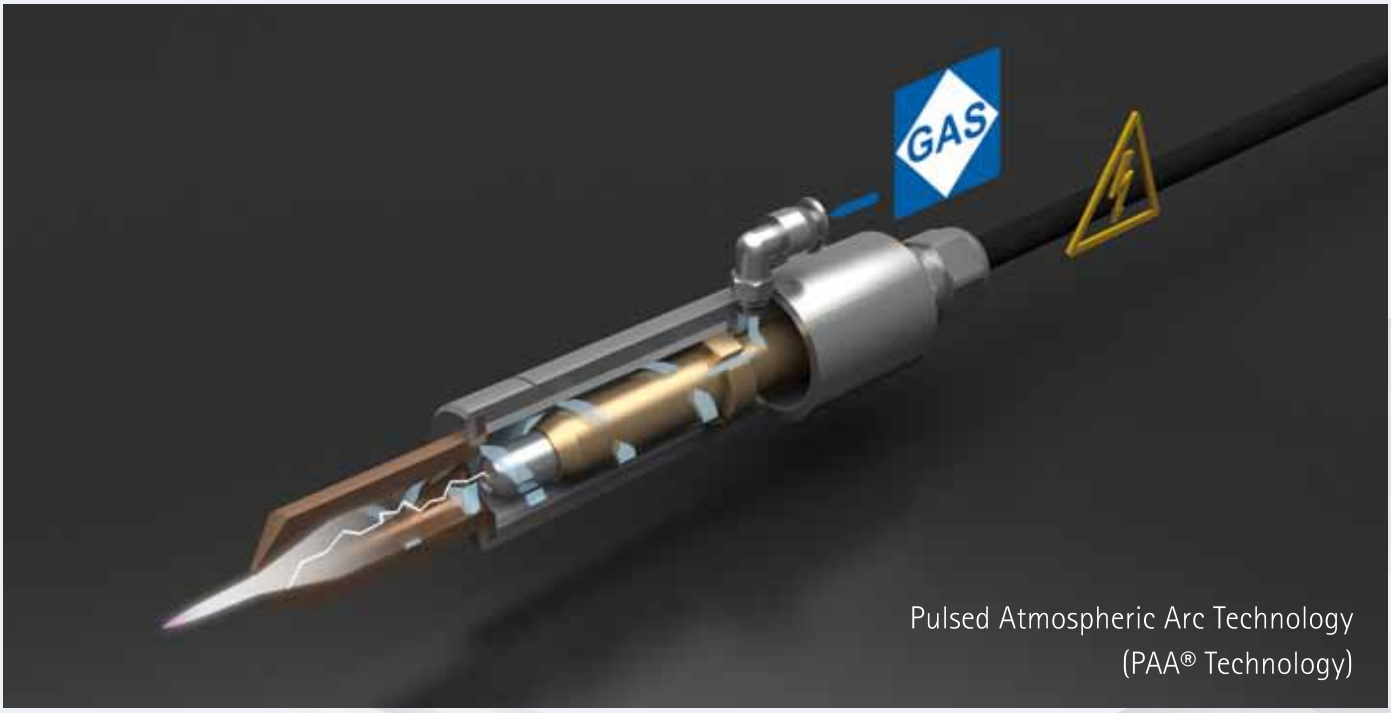
A special advantage of the unipolar nozzle control is the asymmetrical thermal loading of the nozzle components. The interior anode is subject to a lower thermal load and also less oxidation. The exterior cathode has a larger surface area and this ensures good dissipation of heat. Therefore, no water cooling is required. In addition, the high frequency pulse excitation of the arc minimises the dielectric polarity reversal losses in the high voltage cables.

The plasma temperature can be freely adjusted in a wide range via variable nozzles, the gas flow and the pulsed energy. This increases the spectrum of process gases and process gas mixtures that can be used. Nitrogen, forming gas (N_2/H_2), argon/oxygen or argon/hydrogen can be used, even though most industrial applications are operated using compressed air.

Features

- Compact and robust
- Lengthy service life
- For compressed air, nitrogen and special gases
- Suitable for use with robots
- Wide operating range in terms of gas flow and temperature
- Minimal heating of the housing
- Variable nozzles

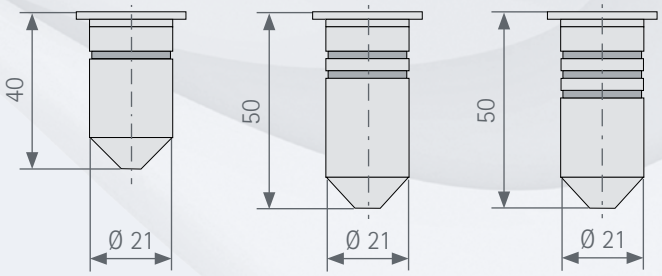
trial production processes ...

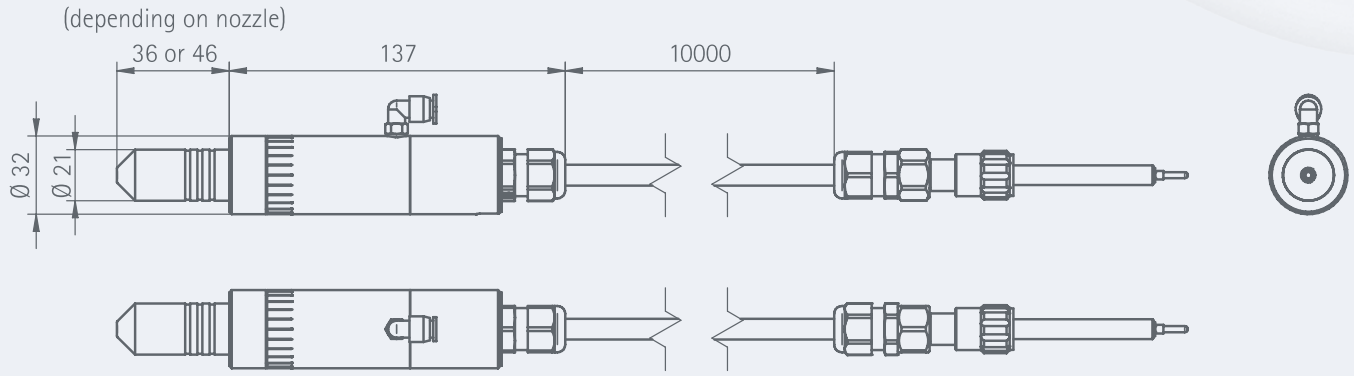


Pulsed Atmospheric Arc Technology
(PAA® Technology)

Technical Information

Flow range	30 to 70 L/min
Cable length	10 m
Weight	680 g
Diameter Ø	32 mm
Gas connector	6 mm
Typical treatment distance	10 – 25 mm
Typical treatment width	15 – 25 mm
to be operated with PS2000 and HV cable extension	





... and high speed applications

PS2000 – the high voltage, high performance package ...

Controlled high voltage source
for industrial use and rack mounting.

Technology

High voltage source optimised for Pulsed Atmospheric Arc Technology (PAA® Technology). Due to the use of a unipolar pulsed high voltage, the arc is prevented from stabilising at "hot spots" in the nozzle. The latest IGBT switching technology and the use of high quality, high voltage components ensure that the source is extremely reliable and efficient. Overloading is also not possible in continuous 24/7 operation. In the event of cable damage or short circuiting during critical operations the control unit intercepts all power fluctuations safely.

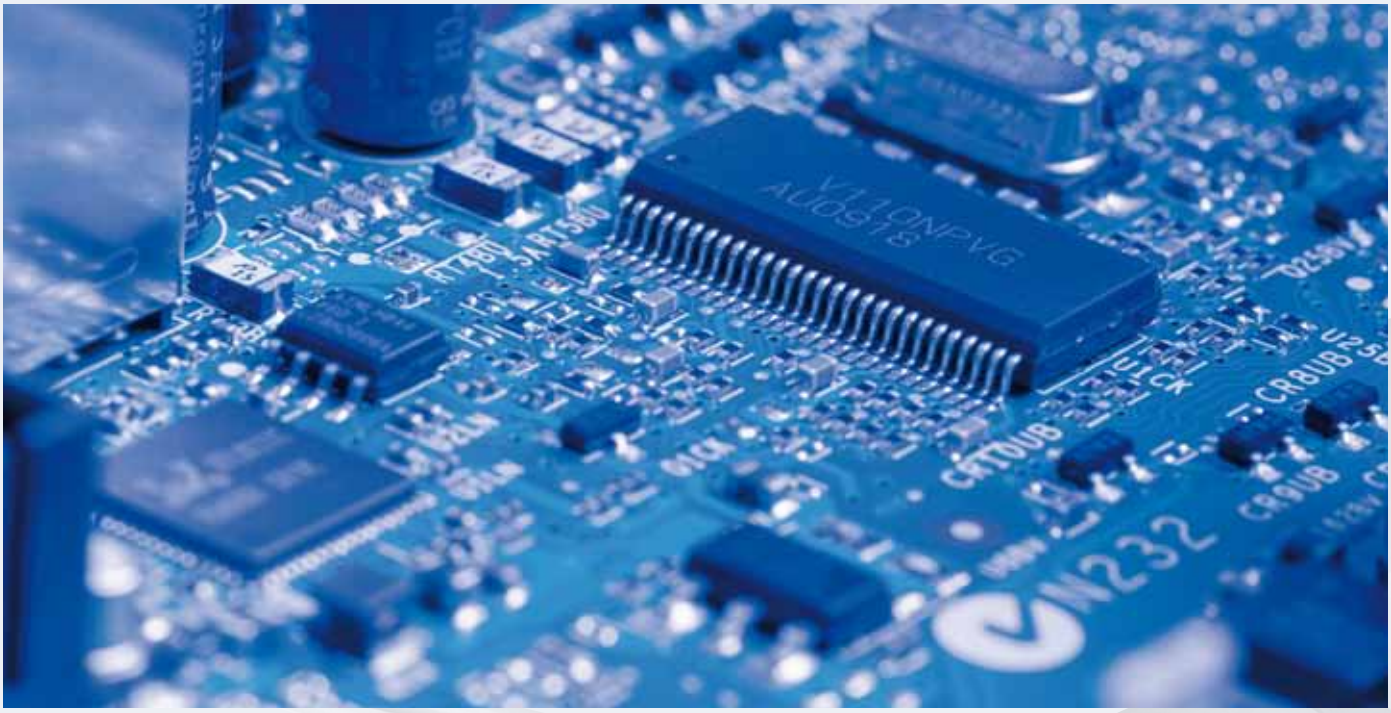
The capability of the PS2000 is particularly reflected in the fact that it can operate with variable loads and can effectively pump loads within a large potential range of up to > 12kV. This special feature ensures continuous ignition performance across a wide power range and for different process gases.

The high voltage source is switchable in a range of milliseconds at full load and therefore optimised for timed processes where highly precise timing is beneficial.

All communication is based on the reliable and fast CAN bus. Even in the event of a fault, the communication remains active. Integration into each automated production plant is simple and standardised, even in the case of several high voltage sources.

Features

- 19 inch industry standard
- Short circuit proof
- CANopen interface
- Controllable
- Variable working point



Technical Information

Input voltage	220V – 240V AC, 50 – 60 Hz
Max. input current	6 A
Fuses	6.3 A /500V AC time-lag
High voltage	Pulsed direct current (DC)
Power	0 - 1000 watt variable
Open circuit voltage	Up to 20 kV
Bus communication	CANopen format (CIA301)

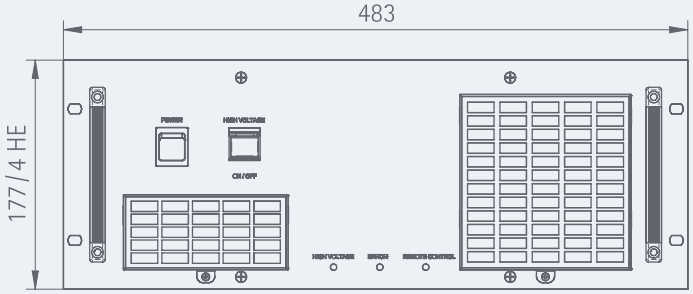
Ambient conditions

Protection class DIN EN 60529 DIN EN 61440	 IP20 Class I
Temperature	10°C - 40°C; 50°F – 104°F
Air humidity	< 80 % (non condensing)

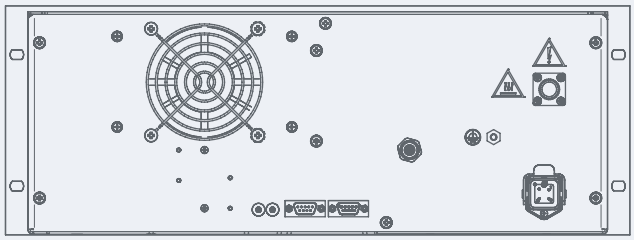
Dimensions

Weight	18 kg
Dimensions	W=483 mm; H=177 mm; D= 430 mm (W=19"; H= 6.96"; D=16.93")

Front View



Rear View



... for 19" rack integration

plasmabrush® High performance system – simply con

That's all you need to construct a high performance plasma system and integrate it into your process

Atmospheric plasma system PB3 and PS2000

Perfectly tailored components in a robust industrial design: PS2000 19 inch high voltage unit and PB3 plasma generator connected with flexible 10 m cable for simple integration into a wide range of systems.

Thanks to our many years of experience in arc dynamics, fluid mechanics and power electronics, we have developed an atmospheric plasma system which is unique in terms of power density and function. In the development of this plasma unit which can be used for many different applications, ,we have placed the focus on easy integration into industrial processes with very effective user friendly communication abilty.

Whatever your requirements - from ultrafine cleaning, surface activation, coating, right through to germ reduction processes, our systems will fit into every processing environment: safely and reliably.

nect ...

Features

- Compact design
- Simple integration
- Suitable for compressed air, nitrogen and other gases
- Variable output
- High start/stop dynamics
- Maximum operational reliability

Applications

- Fine cleaning
- Removal of oxide layers
- Surface functionalisation
- Activation prior to bonding, sealing, casting or printing
- Coating, laminating and sealing
- Germ reduction

Materials

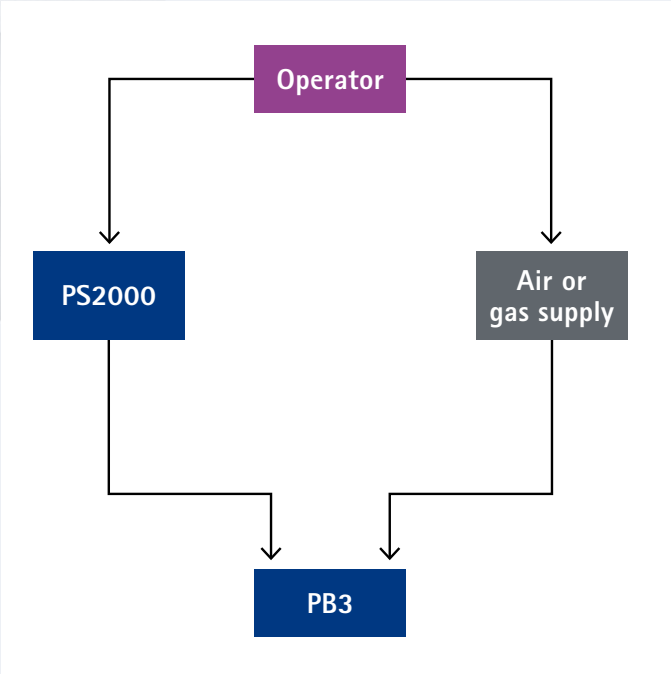
- Thermoplastics PP, ABS, PE, PET, POM
- Elastomers
- Epoxide, polyester, CFK, GFK
- Fabrics
- Paper
- Metal
- Glass and ceramics
- Natural materials

... and it's ready to use

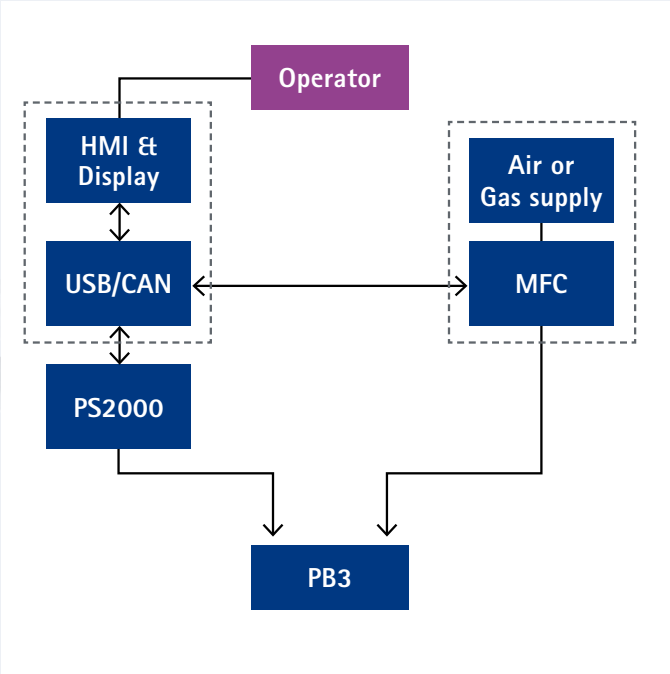
plasmabrush® High performance system – simply con

All you need: compressed air and an electrical socket. You can construct a complete plasma system in just a few steps. All parameters are controlled and visualised by our user-friendly software.

You always remain in control: from the simple laboratory solution with visualisation on the laptop right through to complete process control in multi-channel applications. Optional accessories



Example A: **Basic system:**
Start/stop with fixed parameter setting



Example B: **Computer-controlled system** with variable performance and variable gas flow as well as process data visualisation

The modular plasmabrush system is optimised at minimal expense for each application. At the same time, the typical requirements and industry standards are fulfilled completely. With reference to this, three typical system examples are described as follows:

In the simplest case (Example A), the user operates the basic system directly via an on/off switch, either on the front side of the high voltage power supply or via an externally connected switch. The gas or compressed air supply is set at a fixed value.

In the simplest case, with a constant system pressure, a 2/1-way valve and a fixed throttle are sufficient for the gas supply.

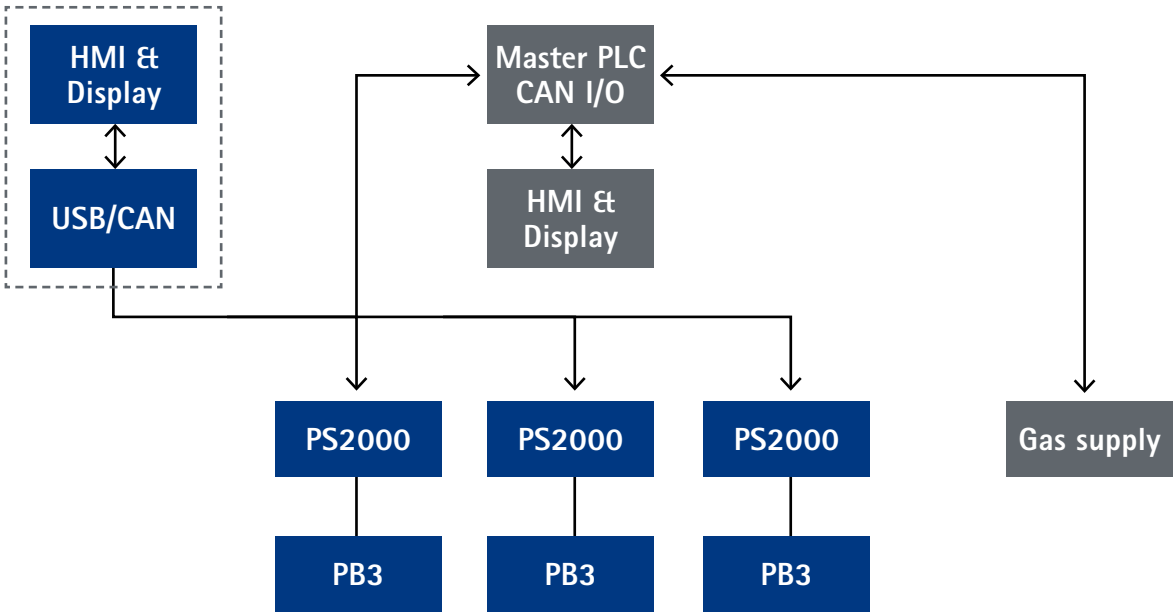
The system independently detects any misfiring caused by the gas flow having been set incorrectly or the high voltage cable having been disconnected. The electrical performance parameters of the high voltage source are in a typical basic setting (default setting). A new set of parameters can be configured offline or online via the CAN bus (see accessories).

A variable system with full flexibility is outlined in Example 2. Here the user controls all process parameters and operation via a graphic interface. For the real-time display of the operating status, the bidirectional functionality of the CAN bus is used, this is compatible with (CANOpen CiA301 Industrial Standard) all common industrial sensors and control components such as mass flow controllers (MFC).

nect ...

With a simple CAN to USB interface (see accessories), all standard laptops or PC´s can be connected via USB 2.0. In this way, there are no restrictions with regard to ease of operation, graphical real-time display or process data storage. relyon plasma GmbH offers a standard software package for this (see accessories).

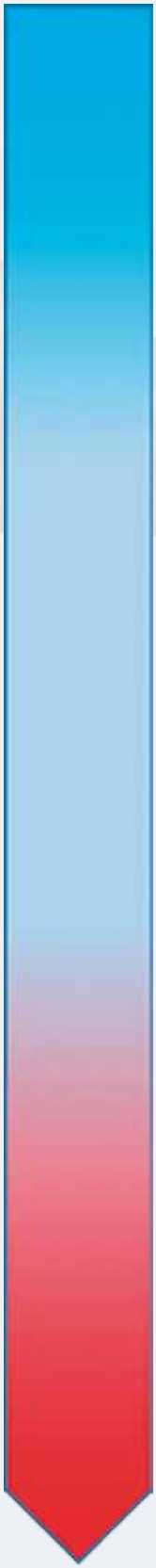
For the integration of the plasma system into an industrial production plant, the CANOpen standard offers a distinct advantage with regards to communication capability and robustness. A plasma multichannel system (Example C) can be constructed with minimum wiring. The system is independent of the selected control system and, regardless of whether SPC or an industrial PC is used, a fast and reliable communication system can be simply constructed to all system components. Mass flow controllers, pressure sensors, temperature sensors, etc. can also be simply integrated and linked via the bus. All variants of process monitoring, remote diagnosis and reliable reporting of process parameters can therefore be simply implemented. The service technicians can simply connect to the CAN bus and, depending on the set access rights, can view all historical and current data.

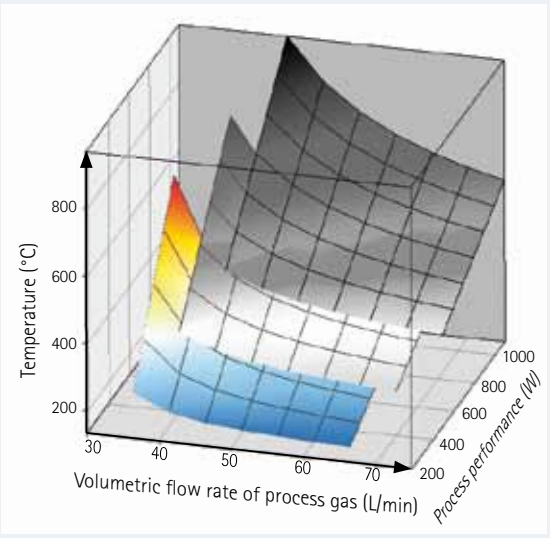


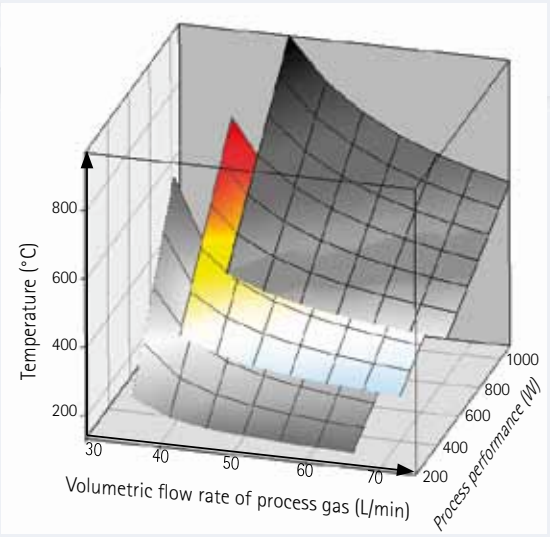
Example C: **Multichannel system** with full processing control, data visualisation and service interface with remote maintenance option

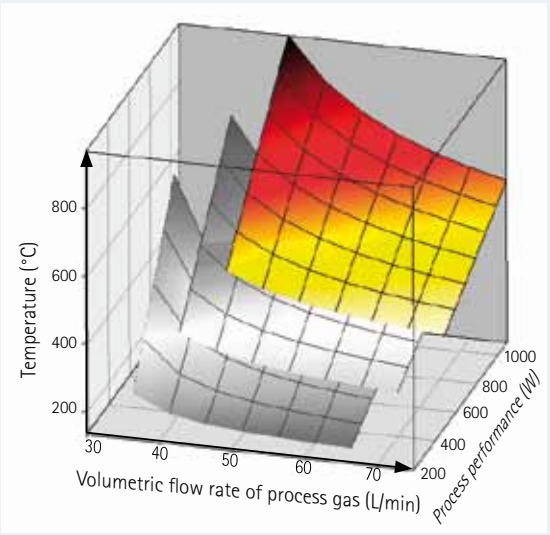
... and it's ready to use

plasmabrush® Plasma generator with interchangeabl









A suitable nozzle for every process. The fine adjustment is derived from the characteristic diagrams which here depict the relationship between gas flow and input power.

e nozzles – tailored to your process ...

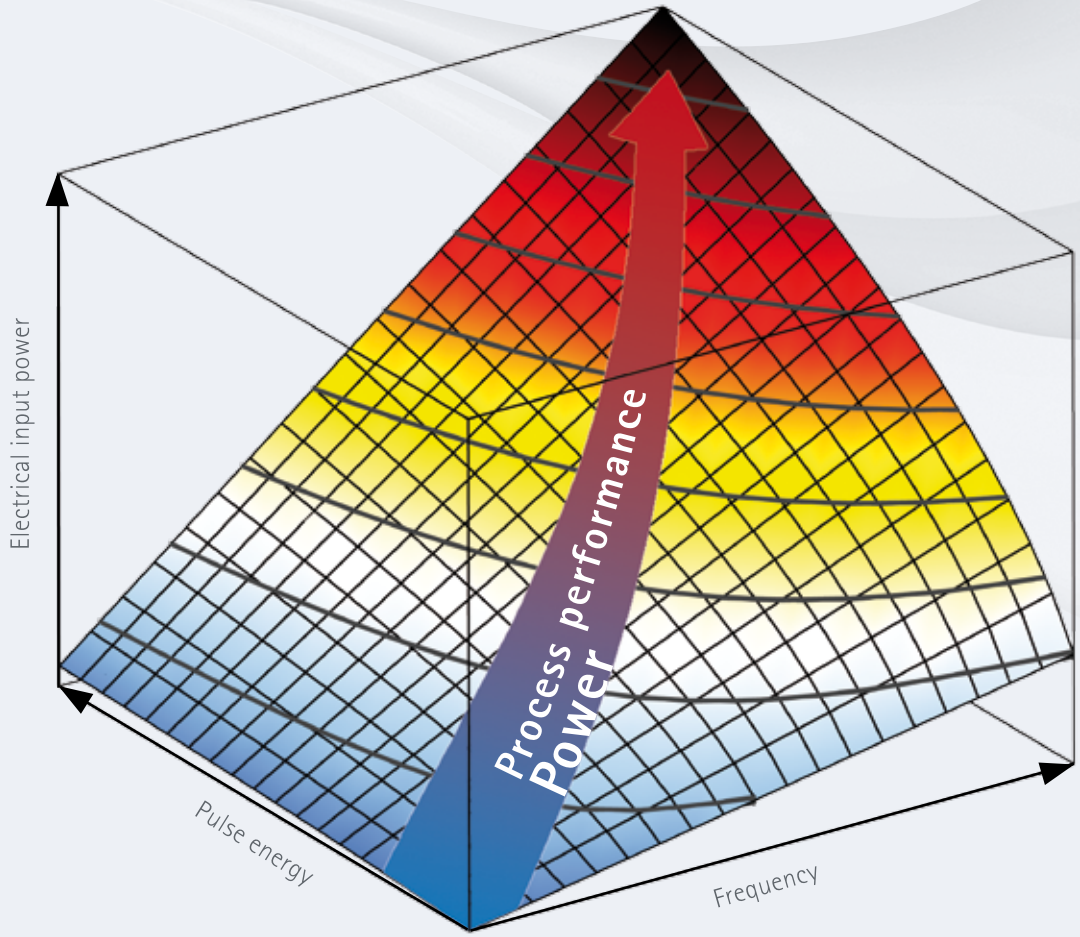
Process variability is the keyword leading to the success of surface treatment using the relyon plasma system. The processing of metals, glass, organic materials, textiles or polymers requires process control that is adapted to the specific application. An equally important feature is the range of possible applications, e.g. cleaning, activation, coating, bleaching or heating. Further parameters include the cycle time required by the application, process speed, product geometry and working distance.

For different applications, a variety of nozzle attachments can be selected, which enable the geometry and temperature range of the plasma flame to be preselected on an approximate basis.

All nozzles can be quickly and easily changed. In addition, each nozzle enables optimum adaptation to the process by the choice of the process gas, in the simple case "air", and mass flow setting.

A fine tuning of the process takes place via the pulsed energy and frequency, which can be set within a broad range at the high voltage source.

Extensive practical experience exists for most applications, or alternatively relyon plasma can provide a recommendation in advance using numerical process simulation with regard to the selection of suitable components and the optimum process control.



The characteristic diagram of power which is fed into the arc in relationship to pulse energy and frequency.

... optimised for maximum service life

plasmabrush® System technology

Optional accessories and expert advice for your perfect plasma system

Electrical integration package

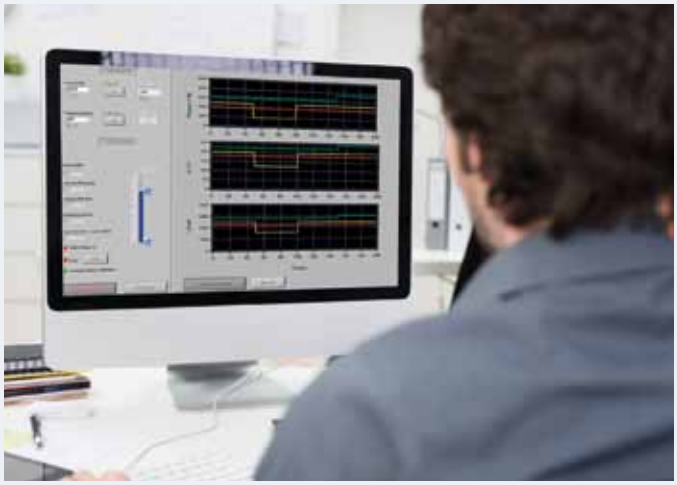
Optional kit consisting of:

- USB/CANopen interface
- Cable set/plug
- Windows® compatible software for system control, data visualisation, process control and data export function
- User manual

Gas supply package

Optional kit consisting of:

- Mass flow controller (MFC)
- Universal maintenance unit for compressed gas
- Communication cable



Software

- All system functions at a glance
- Suitable for servicing and remote maintenance
- Robust CANopen communication
- USB compatible

CANopen

Expert advice for your individual requirements ...

... in application technology

We will determine the optimum process parameters to meet your requirements.

... in system technology

We will advise you on the configuration of the components required for implementation of the optimum process.

Our philosophy: "KISS - Keep it simple and smart"

If you have already defined specific requirements in your system environment or in your equipment, we will be delighted to advise you on which solution will be the best and most cost-effective for you.

Your relyon plasma Management

relyon plasma®

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