

**plasma**brush<sup>®</sup>

## Operating Instructions

### HV cable extension HVC



We are pleased that you decided on a brand device from **relyon plasma** GmbH and thank you for the trust you have placed in our company. In order to make the best possible use of the device, please read through these Operating Instructions carefully.

**i** **Important advice!**  
It is essential to read these Operating Instructions thoroughly prior to assembly, installation and commissioning.

**It is essential to observe the safety instructions!** Non observance of the safety instructions can result in accidents and cause serious injury and damage to property.

**Commissioning and operation of the cable extension HVC must only be carried out by qualified and instructed technicians!**

**Provide instruction for your personnel.** The operating company/user is responsible for ensuring that personnel fully comprehend how to operate the device and understand the safety regulations.

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Translation Operating Instructions

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# 1 Safety

The cable extension HVC has been built in accordance with the relevant international standards. As with every technical product, however, the system may be dangerous in the case of unauthorized or non-specified use.

In addition to the notes in these Operating Instructions, observe generally applicable safety instructions.

Work with the plasma generator can be dangerous and result in serious - in some cases even fatal - injuries. Therefore always protect yourself and others.



## Caution – Danger!

Please mind and follow the safety advices and demands of this operation instructions, otherwise serious – in some cases even fatal – injuries may result of the use of this device.

## 1.1 Residual dangers

This device has been produced with state-of-the-art technology. Nevertheless, residual risk can never be totally excluded.

It is essential to observe the following safety instructions:



## Caution – electrical voltage!

- Danger from high voltage
  - Never touch the cable extension HVC during operation.
- Danger from high voltage. If damages are detectable at the electrical connection, mains cable or at the device:
  - Do not put the device into operation.
  - Have the damaged parts repaired by a specialist or replace them.



## Caution – health hazard!

The device operates at a high frequency (~ 40 to 65 kHz at the plasma generator).

- Persons with a pacemaker or hearing aid should take the following precautionary measures:
  - Never hold the cable extension HVC near a pacemaker or hearing aid.
  - Consult a doctor prior to working near the cable extension HVC.
- In hospitals or similar buildings, it is possible that operation of the system may impair the operation of electromedical, information technology and other devices (ECG, PC, ...).
  - Prior to commissioning the device, ensure that the users of such devices or systems have been informed of this possibility.



## Risk of stumbling!

Install or place cable and gas line in suitable cable routes. Install the cable in a way that there is no risk of stumbling.

## 1.2 Information for the user / user obligations

- Emitted interference can always be expected at the cable extension HVC.
  - The system is tested in accordance with the EMC directive.
  - The user must check and ensure electromagnetic compatibility with other electric and electronic devices in the direct vicinity.
- The cable extension HVC must only be operated with the original plasma power supplies and the original plasma generator from **relyon plasma** GmbH.
- The plasma generators from **relyon plasma** GmbH must be operated only with one cable extension HVC.
- Ensure that:
  - The operating personnel have read and understood these Operating Instructions.
  - Persons near the plasma jet have also been informed of the hazards and have the necessary protective equipment.
  - Maintenance work is only carried out by qualified technicians.
- Provide instruction for operating personnel, in particular, on the safety instructions in these Operating Instructions.
- Always keep the cable in perfect working order.
- Modifications to the cable extension result in forfeiture of the operating license and invalidation of the guarantee. Exception: The modifications are explicitly permitted by the manufacturer.

## 1.3 Specified operation

The cable extension HVC and a suitable plasma generator is designed exclusively for plasma treatment of material surfaces (metals, textiles, glass, plastics) for activation, cleaning, coating or residue removal at atmospheric pressure.

Under no circumstances may the device be operated by untrained personnel.

## 1.4 Inadmissible operating conditions

Device operation is inadmissible under the following conditions:

- Use in potentially explosive areas (EX).
- strong dust deposition
- too high air humidity (see technical data, page 8)
- an installation location with an absolute altitude higher than 2.000 m
- strong vibrations

## 2 Device description

### 2.1 Function

The cable extension HVC is part of an atmospheric pressure plasma generator used for atmospheric plasma treatment or pretreatment of a very wide variety of material surfaces. It is designed for industrial applications where, for example, surfaces are activated with plasma and cleaned prior to printing, bonding or painting. The application of surface coatings is also possible.

The device is also suitable for laboratory operation by instructed personnel.

### 2.2 Device overview

#### 2.2.1 Device



No.	Component
1	cable extension HVC

#### 2.2.2 Connections



No.	Component
1	High-voltage plug
2	cable
3	High-voltage connection socket

## 2.3 Scope of delivery

The following components are included in the delivery:

- HVC High-voltage cable extension
- Operating Instructions

### 3 Technical data

#### 3.1 Technical data

Designation	Value
Permanent operating voltage:	maximum 6 kV peak
test voltage (inner conductor)	16 KV/DC 5 minutes
test voltage (inner conductor / 1. shielding)	16 KV/DC 5 minutes
test voltage (1. and 2. shielding)	2,5 KV/DC
capacitance	89,5 pF/m
Working voltage of plasma generator	<ul style="list-style-type: none"> <li>• up to 20 kV (max. voltage during ignition, short time)</li> <li>• up to 2 kV (average operating voltage)</li> </ul>
Mass	
• cable extension	1,2 kg; 2.65 lbs
Minimum bending radius of HV cable	120 mm; 4.72"
maximum torsion	±180°/2m
length	8000 mm; 315" or 9000mm; 354" depending on configuration Other lengths only after agreement with <b>relyon plasma</b> GmbH. → Other lengths may lead to an adaption of the power source
Limit temperature	
• cable extension	≤ 80 °C; 176 °F
Operating conditions	
• Air humidity	< 80% rel. (non-condensing)
• Temperature	10 – 40 °C; 50 – 104 °F
Storage conditions	
• Air humidity	< 80% rel. (non-condensing)
• Temperature	0 – 60 °C; 32 – 140 °F

The cable is optimized for use with robots.



#### **Caution – damage to device possible!**

The unit can be damaged if more than one attached cable extensions HVC is in use.  
- The plasma generator must be operated only with one cable extension HVC.



### 3.2 Admissible operating parameters

The cable extension HVC in combination with a appropriate plasmagenerator (e.g. plasmabrush® PB3) is designed for plasma treatment of material surfaces (metals, textiles, glass, plastics) for activation, cleaning, coating or residue removal at atmospheric pressure. This plasma treatment may lead to a significantly improved result for subsequent gluing, painting, printing, coating, wetting, lamination, metalizing or bonding process on the surface.

All system components in the working area of the plasma generator must be grounded. The specified limit values must always be observed during operation:

Designation	Value
Safety distance (persons to plasma generator outlet opening)	1000 mm; 39.37"
Minimum bending radius cable	120 mm; 4.72"
maximum torsion cable	±180°/2m
maximum working temperature	≤ 80 °C; 176 °F
On-load factor	100%



#### **Caution – damage to device possible!**

The unit can be damaged if more than one attached cable extensions HVC is in use.  
- The plasma generator must be operated only with one cable extension HVC.

## 4 Transport/storage

- Store the cable extension HVC in a dry location. This prevents the electrical contacts from corroding.
- Prevent the cable extension HVC from contamination.
- Prevent the cable extension HVC from mechanical deformations (crushing/ buckling/ stretching/.pressing)

## 5 Installation

### 5.1 Device



#### Caution – electrical voltage!

Danger from high voltage.

- The connection of the plasma generator or the media supply to the cable extension HVC must only be done by qualified electricians.

Before installing the device, the following conditions must be fulfilled:

- The device must be undamaged.
- In the permanent installation or in the electrical installation of the building has to be a suitable upstream all-pole switch or circuit breaker according to the requirements of national security (Germany: VDE 0100) to disconnect the device from the supply voltage. This separating device must be located close to the device and must be easily accessible for the user. In addition, this switch has to be designated as a breaker for the device.

To install the device, carry the following steps out in the specified sequence:

1. Before installing either the HVC or any other component of the plasma generator, make sure that all components are switched off and disconnected from the main power supply.
  2. Install the cable extension HVC in a suitable routings (e.g. cable routings)
  2. Make sure that there is no danger of stumbling.
  3. Connect a suitable plasma generator.
  4. Connect the cable extension HVC with plasma generator to a suitable current supply of **relyon plasma** GmbH.
- ✓ The cable extension HVC is installed.

## 5.2 EMERGENCY-STOP function

The device will be integrated on site in the EMERGENCY-STOP function of the higher-order main system.

- If the device voltage supply is cut off as a result of the EMERGENCY-STOP function of the higher-order main system, the power supply and compressed air supply of the device is disconnected.
- Prior to switching on again, a safe initial state must be established by the higher-order main system.



### Caution – electrical voltage!

Danger from high voltage

- It is important to ensure that both control voltage and the mains is disconnected for the device in emergency stop.

## 6 Operation



### Caution – electrical voltage!

Danger from high voltage

- It is important to ensure that both the plasma generator and the extension cable is correctly connected to a suitable power supply of **relyon plasma GmbH**.

## 7 De-commissioning



### **Caution – electrical voltage!**

Danger from high voltage.

- The disconnection of the current supply and the disconnection of the plasma generator from the media supply must only be carried out by qualified electricians.

For decommissioning the device, carry out the following steps in the specified sequence:

1. Switch off the media supply.
  2. Disconnect the power supply.
  3. Disassemble the plasma generator.
  4. Disassemble the cable extension HVC.
- ✓ The device is not in operation.

## 8 Maintenance



### **Caution – high voltage! Danger to life!**

High voltage is generated in the unit of the device. It is still present after the device has been switched off.

- Opening the device is prohibited.
- Always disconnect the power supply from the device prior to care, maintenance and repair work and before opening the plasma generator.



### **Caution – damage to device possible!**

Opening the device may result in it being damaged.

- Opening the device is prohibited.

### 8.1 Cleaning

Clean the cable extension HVC only externally.

- Only dry clean the cable extension HVC.
- The media supply must be switched off.
- The plasma generator must be cooled down.

## **9 Correction of faults**

### **9.1 No plasma formation**

If the device does not create plasma, check the following items first:

- Is the HV cable damaged?
- Is the HV cable kinked?

### **9.2 Operation malfunctions**

- Plasma ceases during operation.
- Parasitic discharges (discharges at undesired positions, e.g. at the plasma generator cable connection. It can be destroyed).
- Sparkovers

If such operation malfunctions occur, first carry out the following steps:

1. Switch off the device
2. Then check the device visually for external damage.
3. If no damage is visible, switch the device on again.

If the device still does not operate trouble-free, shut down the device and contact After Sales Service.

### **9.3 After Sales Service**

If the device does not work correctly, send it to **relyon plasma** GmbH for examination.

After Sales Service address:

- see rear side of Operating Instructions.

## 9.4 Overview of malfunctions / faults

Malfunction / fault	Cause	Remedy
plasma cannot be switched on or plasma ceases during operation	Energy transfer o the plasmagenerator intercepted	Check the proper connection of the HVC with the power source as well as with the plasma generator
	An internal fault has occurred	De-energize the device. Switch on again
	Mains fuse has tripped	Check mains fuse, provide more powerful fusing if necessary
	power cable interrupted	Check mains cable
	Wear of nozzle and electrode	Check nozzle and electrode for wear, replace if necessary
	Short-circuit, the plasma generator is defective	Contact After Sales Service
	Cable break	Check HV cable from media supply to the plasma generator for possible cable breakage
		Problem cannot be eliminated: Contact After Sales Service

## 10 Environment

### 10.1 Disposal



#### **Do not forget environmental protection.**

Used electrical and electronic devices must not be disposed of together with household waste.

- The device contains valuable raw materials that can be recycled. Always hand in the device therefore to an appropriate acceptance point.

## 11 Conformity / standards

### 11.1 CE



#### **Our EC Declaration of Conformity.**

The marking is on the type plate on the bottom side of the device housing.

### 11.2 Product standards

The device complies with the following provisions and standards:

2004/108/EC EC-EMC Directive

Guideline of the European Council for harmonization of the legal specifications of the member states with regard to electromagnetic compatibility.

2006/95/EC EC Low Voltage Directive

Directive 2006/95/EC of the European Parliament and Council dated December 12th, 2006 for harmonization of the legal requirements of the member states with regard to electric equipment for use within specific voltage limits.

EN 55011 (2007 + A2:2007) transient emissions, limit group 2, class A

EN 61000-6-2 (2005) Immunity from disturbance

Type of protection IP50

IEC 60529



## 12 Spare parts

Item-no	product description
78517400	HVC cable extension 8m
78879600	HVC cable extension 9m

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