MediPlas

Reactor

Series/Type:	**V 1.0**
Ordering code:	**Prototype**
Date:	2025-02-19
Version:	1

Preliminary data

Intended use

Electroceramic plasma reactor with dielectric barrier discharge (DBD) and integrated active cooling for the controlled generation of reactive oxygen and nitrogen species.

Features

- Compact and highly efficient
- Active temperature control (cooling and heating)
- Easy to integrate.
- Continuous operation
- Medical grade materials[1]

Specification

Max. continuous input power	40 W
Input voltage fan	3 … 12 V (max. 127 mA)
Input voltage temperature control	±12 V (max. 3 A)
HV input (RMS)	1.2 … 3.0 kV AC (< 30 kHz) (max. 30 mA peak)
Typ. ignition voltage[2]	1.2 kV (RMS) 20 kHz
Gas flow	0 … 10 slm
Max. relative pressure[3]	200 hPa
Max. absolute pressure[4]	1200 hPa
Input Gas type	Air, CDA; humid air (non condensing)
Input Gas humidity[5]	0… 90% rh
Output Gases[6] see *Cautions and warnings*	Air with an increased concentration of ozon (O_3); nitrogen oxide (NO_x) and hydrogen peroxide (H_2O_2)

[1] All materials used that come into direct or indirect contact with the inner tube system are biocompatible according to USP Class VI or ISO 10993-1. The biocompatibility of the component must be demonstrated in the final operation of the system.
[2] condensed dry air (rH 6%), flow 0.5 slm, 20 °C environmental temperature, ambient pressure.
[3] The max. relative pressure refers only to the tightness of the system.
[4] The max. absolute pressure refers to the ignition voltage.
[5] Condense build-up in the reactor is prohibited.
[6] The Output varies with operating conditions (see Chapter: *Ozone production (from air)* and *Nitrogen oxides production (from air)*)

Preliminary data

Dimensions	56 x 54 x 76 (w x h x d) mm
Weight	205+/–5g
Operating temperature:	5 °C … 50 °C
Agency approvals	RoHS
Cooling	Active with fan

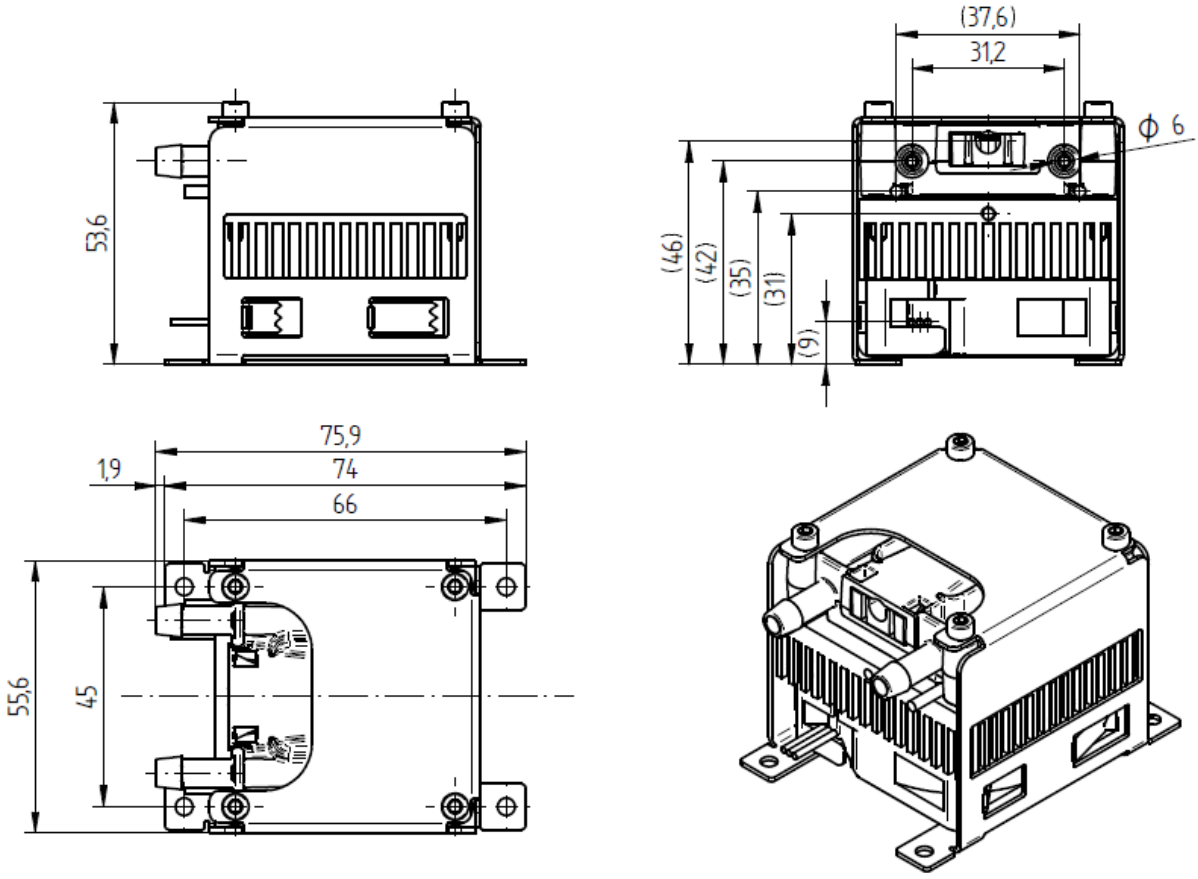
- Safety specification(s)

Standard	Designed to meet IEC 61010-1

- Other specification(s)

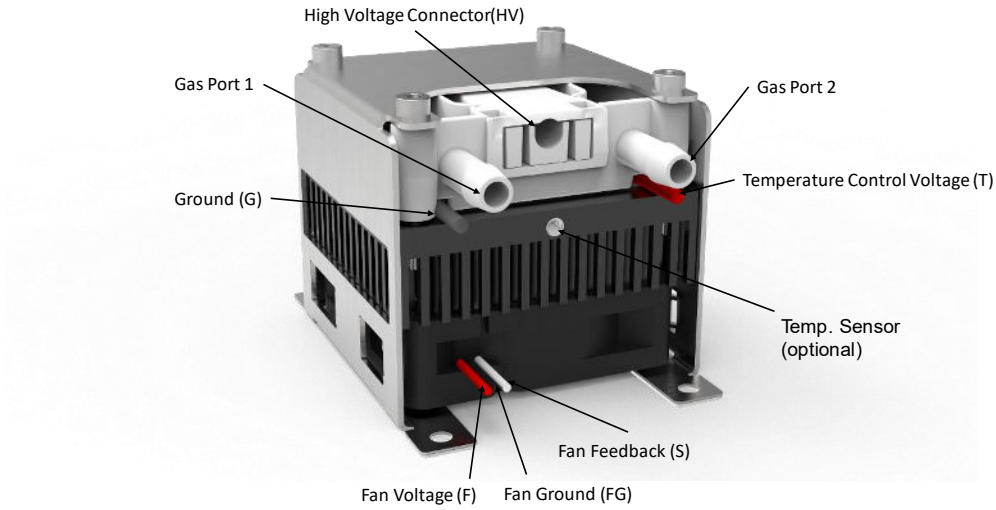
Standard	Mechanical shock: Meets IEC 60601-1-11 Chapter 10.1.2 a)

Dimensional drawings



Preliminary data

Interfaces: cables and ports



Interfaces

Interfaces	Type	Size 1	Size 2
Gas port 1	Hose connector	$Ø_{inner}$ 4 mm	-
Gas port 2	Hose connector	$Ø_{inner}$ 4 mm	-
High voltage [6]	Connector for HV cable	$Ø_{max}$ 5 mm	
Temperature control (T)	Wire red	AWG 20	L = 200 ±20 mm
Ground (G)	Wire black	AWG 20	L = 200 ±20 mm
Fan Voltage (F) [7]	Molex 22013037 Pin 2	Wire red	L = 290 ±10 mm
Fan GND (FG) [7]	Molex 22013037 Pin 1	Wire black	L = 290 ±10 mm
Fan Feedback (S) [7]	Molex 22013037 Pin 3	Wire white	L = 290 ±10 mm
Temp. Sensor (optional)	Thread	M3	8 mm

[7] Installation description read *HV Connection*.
[8] Connect to molex 22232031 or similar.

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Work range

Value	Min.	Typ.	Max.
Gas flow [slm]	0	1	10
Temperature Control [A]	- 3	2	3
Fan [V]	3	12	12
High voltage power [W]	5	10	20
O3 concentration[9] [ppm]	0	2500	4000

[9] condensed dry air (rH 6%), flow 0.5 slm, 20 °C environmental temperature.

Environmental

Range of enviroment:		indoor
Pollution degree		2
Operating temperature	°C	5 … 50
Operating humidity	% RH	up to 85
Cooling	W	~ 40, depending on working point
Altitude (max)	m ASL	3000

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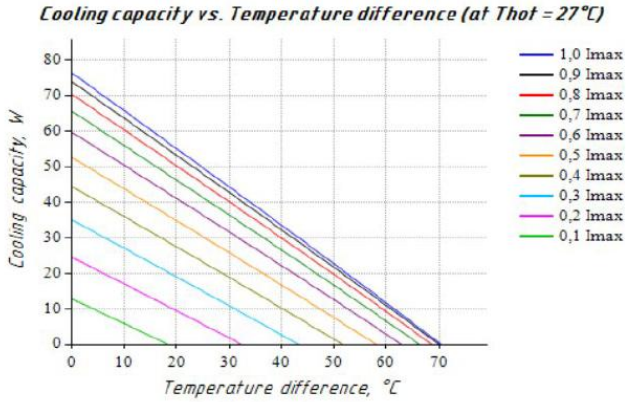
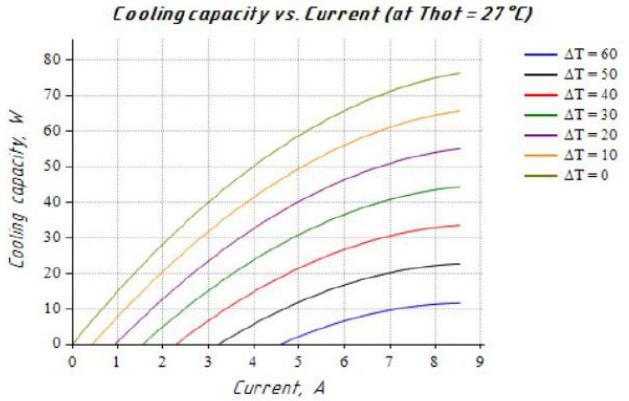
Temperature control

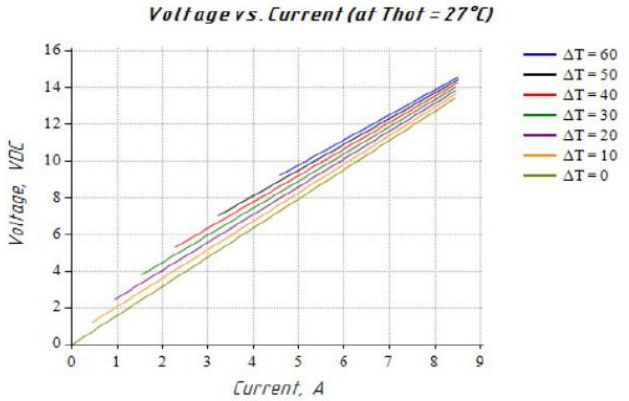
To influence the chemistry inside of the reactor, the temperature can be controlled by a thermoelectric cooler module. The ‘hot side’ is coupled to the air-cooler system.

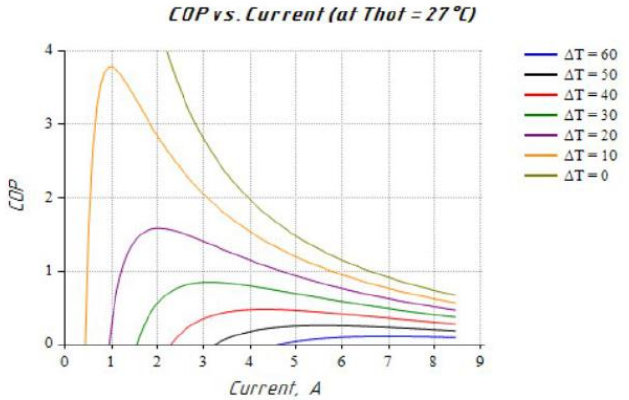
The “reactor temperature” can be calculated by measuring the plasma power (“heat removed”) and the temperature difference of the module according to the specification of the cooler module:

Data sheet – at hot side temperature 27 °C









To cool the inside of the reactor, a positive voltage must be applied to the red cable opposite the black earth cable. To heat the inside, a negative voltage can also be applied.

Preliminary data

Pressure drop

The MediPlas Reactor is designed for a wide range of applications and operating conditions at atmospheric pressure. The gas flow f can be up to 10 slm.

The pressure drop dp across he reactor per flow f is almost linear over the entire application range and can be calculated according to:

$$\boldsymbol{dp\ [hPa] = \ 9,5\ \left[\frac{hPa}{slm}\right] x\ f\ [slm] \pm 20\%}$$

Ozone production (from air)

The ozone production rate strongly depends on the electrical parameters and the composition of the feed gas.

The drier the feed gas and the higher the oxygen content of the feed gas, the higher the expected ozone output of the reactor.

Depending on the set electrical parameters, the quantity and the type of feed gas used, ozone generation rates of up to 1 g/h with dry air, or up to 30 g/h with pure oxygen can be achieved on a stationary basis.

Nitrogen oxides production (from air)

The nitrogen oxides production rate also strongly depends on the electrical parameters and the composition of the feed gas.

The more DBD power and the higher the internal temperature of the reactor, the higher the expected nitrogen oxides output of the reactor.

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Installation instructions

The MediPlas reactor is intended for installation in a device or machine. To prevent personal injury, it must be installed in such a way that the end user cannot come into direct contact with the reactor. The precautionary measures and warnings for dangers for the installer are described in the chapter Cautions and warnings.

Note: The safety of a system into which the MediPlas reactor is integrated is the responsibility of the installer of the system.

Machine, device and housing integration

The reactor has only a basic insulation, the device, machine or enclosure in which the reactor is to be integrated needs secondary measures against dangerously active voltages fulfill the typical insulation requirements.

In a device, machine or enclosure in which the reactor is to be integrated and the objective is to comply with IEC 61010-1, the mechanical, fire protection and requirements to the circuit breaker of IEC 61010-1 must be met.

The required additional circuit breaker for integration must meet the following requirements in accordance with IEC 61010-1.

a) A switch or circuit breaker must be present in the system.

b) The switch or circuit breaker shall be suitably located and easily accessible.

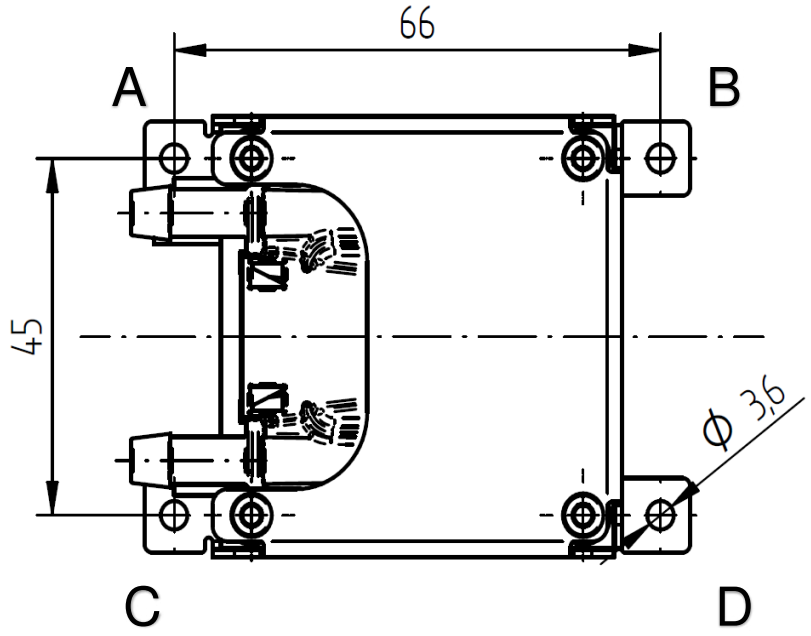
c) The switch or circuit breaker must be labeled as a disconnecting device for the appliance.

or

End product must meet the requirements for the disconnecting device of EN 61010-1.

Mounting Method

All four mounting holes should be utilized for best mechanical performance. The recommended screw size is M3. The recommended torque for the screws is 1.5 Nm.



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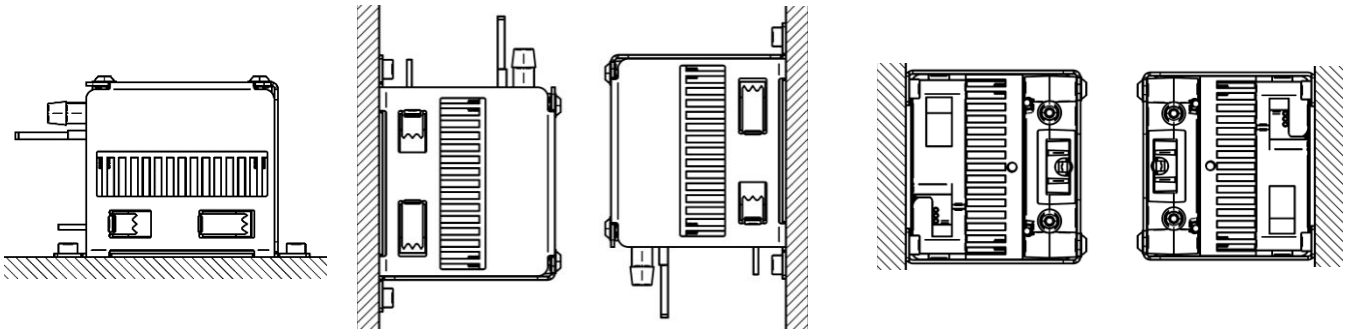
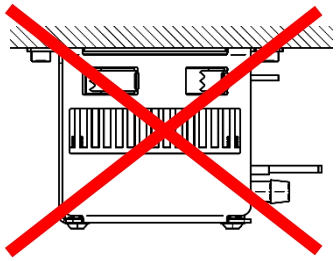
Mounting directions

Recommended standard mounting direction is (A). Mounting direction (B)-(E) are also possible.

(A) Standard mounting (B) (C) (D) (E)

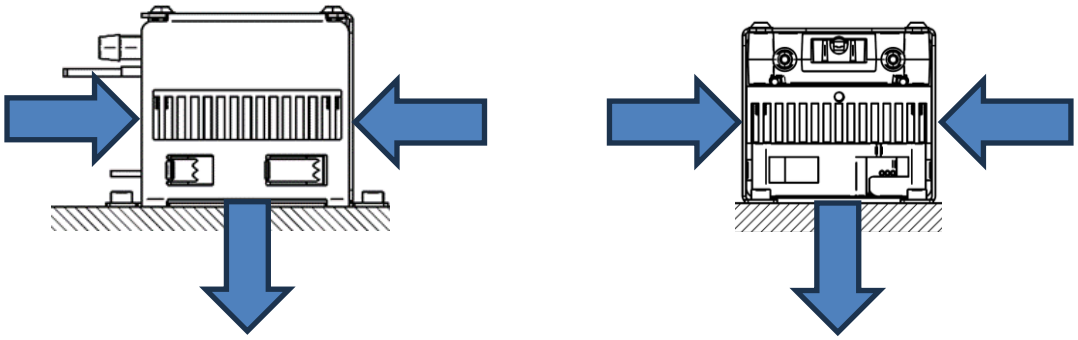


Installation top side down is prohibited and may cause damages to the device.



Ventilation

The device pushes with the fan air through the cooler. Make sure the air inlets and the air outlet are not blocked. **The installation with blocked in- or outlets may cause the device to overheat and damages the device.**



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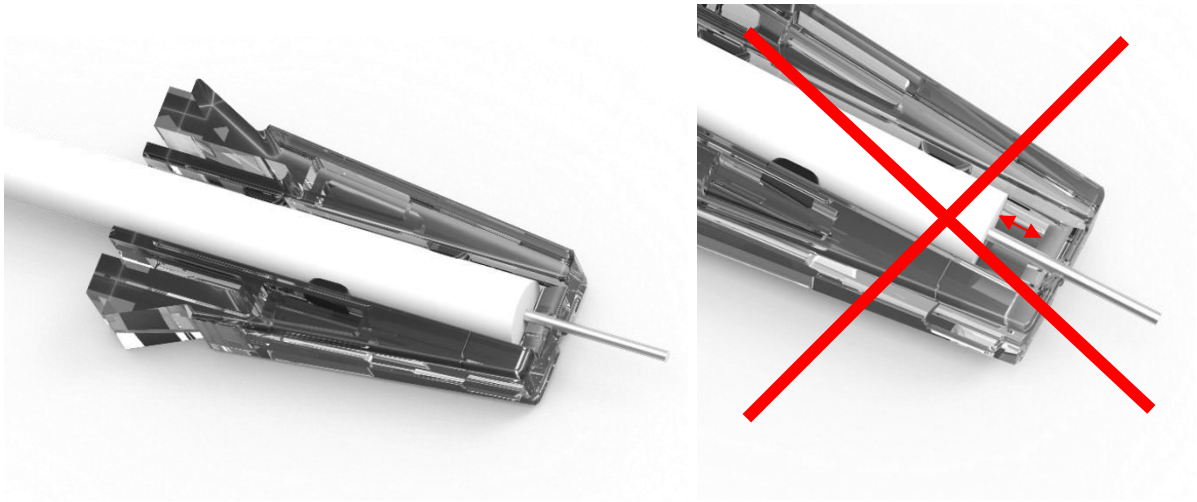
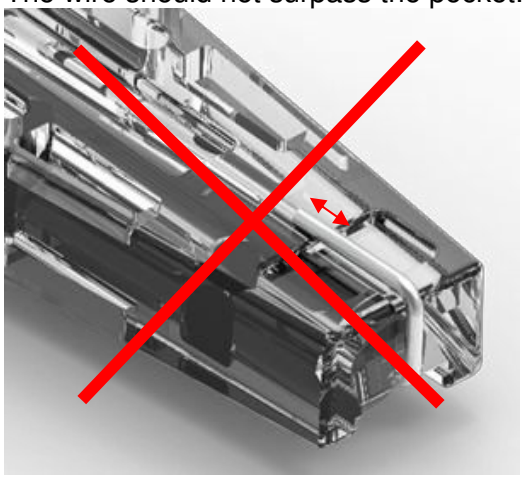
HV Connection

Remove 10 ±1 mm from isolation of the HV-cable. Press the cable in the HV-Connector, make sure that there is no gap between isolation and the lip of the HV-Connector.

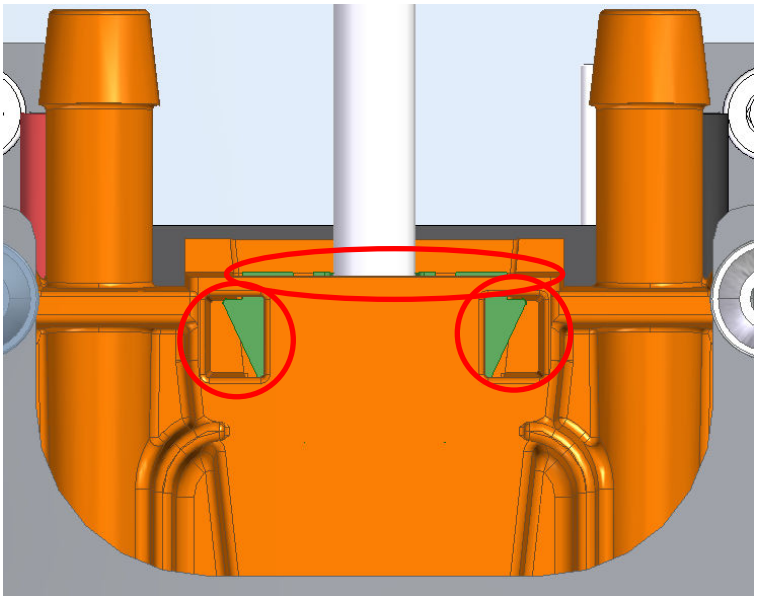


Fold the stranded wire around the HV-Connector.

The wire should not surpass the pocket.



Insert the HV-Connector with the HV-Cable in the MediPlas Reactor. Make sure the Connector is plugged in completely and the engagement hooks are locking the connector in the housing.



Danger due to high voltage! Always ensure that the high voltage parts are connected correctly!

Cleaning and maintenance

No cleaning is necessary when used as intended and under the conditions described under chapter *Specification.*
There are no Maintenance intervals during the lifetime of the appliance.

Impermissible operating conditions

Operation of the unit is not permitted under the following conditions:

- Use in potentially explosive atmospheres (EX)
- In case of insufficient ventilation/insufficient heat exchange
- In case of condensing intake air
- In case of heavy dust deposits
- At altitudes above 3000 m above sea level
- Without active cooling via integrated fan.
- Without secondary casing.

The protective effect of the device may be impaired, if it is used in a manner not intended by the manufacturer.

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Cautions and warnings

	The safety of a system into which the device is integrated is the responsibility of the installer of the system.
	This symbol indicates a hazard which, if ignored, could result in serious injury or death and/or damage to property. Observe the safety instructions in this manual! Failure to do so can have serious consequences for the health of persons as well as damage to property and the environment. This manual is an integral part of the appliance and must be accessible each time it is used. Read the instructions completely before using the appliance. Only use the appliance in accordance with the instructions contained herein!
	Warning symbol of electrical voltage
	Warning symbol of hot surfaces
	Only TECHNICALLY QUALIFIED SERVICE PERSONNEL familiar with the principles of electrical safety should operate this supply. The power supply SHOULD NOT BE EXPOSED TO WATER) OR MOISTURE OR DUSTY ENVIRONMENTS (Pollution degree 2). Electrical safety must be always maintained.
	Danger from high voltage! Always proof proper connection of the high voltage parts. Don't open the device. If the device is damaged disconnect the voltage supply and contact the manufacturer.
	Danger due to high voltage! Always ensure that the high voltage parts are connected correctly. Do not open the device. If the device is damaged, disconnect the voltage supply and contact the manufacturer.
	Danger due to hot surface! The cooler surface can be hot. Do not touch during or immediately after operation.
	The device is designed for indoor use only. Splashing water, excessive humidity may cause the device to destruction or fail.
	Never attempt to operate the device in any manner not described in this manual. Never remove DANGER and WARNING labels from the device. Replace lost or damaged labels immediately.

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	Caution – nitrogen oxides and ozone (O_3)! The machine produces nitrogen oxides, ozone, and other hazardous substances, depending on feed gas supply and power settings. – Make sure the working area is well ventilated. – Install a sufficient gas extraction – Proof tightness of the gas system. – Note that national health and safety measures must be observed when operating the device. – Only use the device in well vented areas or in conjunction with a suitable extraction device. – Do not leave the device running unattended.
	Caution: – Only connect high-voltage cables with a suitable diameter to ensure a safe connection to the reactor. – Pay attention to the prescribed length of the insulation stripping of the high-voltage cable – Use appropriate fastening to prevent loosening of the device in your system. – After installation, check the tight fit of the HV connector and the HV stranded wire used to avoid an electrical hazard due to a loosening high-voltage cable.
	Caution: This product is not serviceable outside of relyon plasma GmbH. When manipulating the device, the protection provided by the product safety may be impaired.
	Before adjusting or changing the device, ensure that the device is in a safe state by associated high-voltage generator is switched off or disconnected from the it's all dedicated power supplies or supply voltage lines.
	If the product is used in a manner not specified in this data sheet the protection provided by the product safety may be impaired.

Preliminary data

Manufacturer Info

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Important notes

8. The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, FilterCap, FormFit, InsuGate, LeaXield, MediPlas, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PiezoBrush, PlasmaBrush, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SurfIND, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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