

User manual

Static electricity neutralizer

(power unit TZWN-05 + electrodes JO96/x/L)

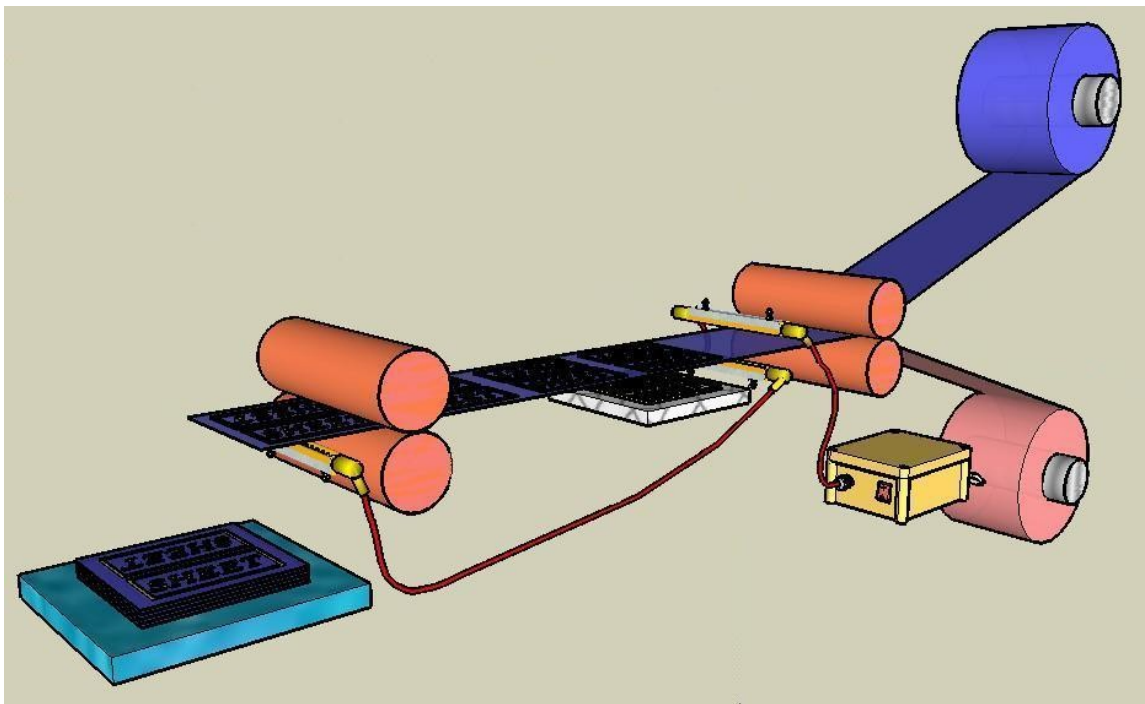


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Introduction

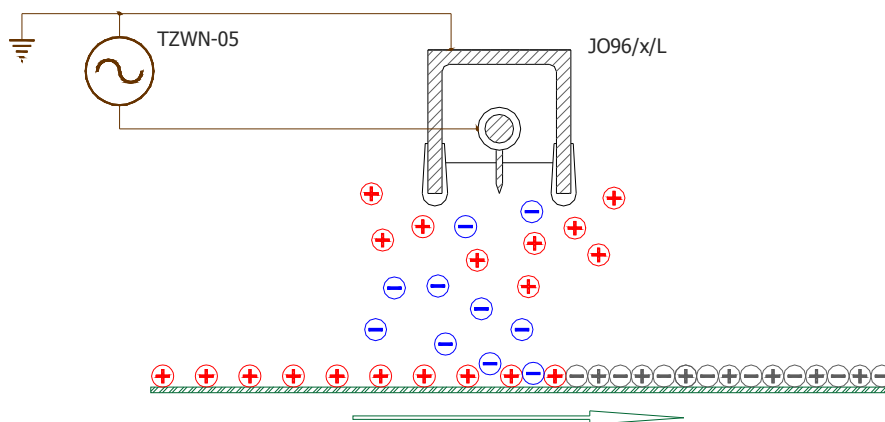
Static electricity is a phenomenon by which excessive electric charges are created on objects. That charges appear most frequently on materials of low electrical conductivity (insulators, dielectrics). In some special cases they can accumulate on conductive objects insulated from the ground (including human body).

Influence of electrostatic charges can result in numerous difficulties in technological processes, create hazards for safety of workers, danger of fire or explosions, and disturb the operation of electronic devices.

Complete deionizer consists of high voltage power supply (TZWN-05) and one or more pointed electrodes JO96/x/L connected to power supply with special cable. It is an active pointed neutralizer of increased hv frequency.

Principles of operation

Electrode(s) are placed near material that is to be neutralized. Power unit function is to provide high voltage needed to create ions around the pins of electrodes. After turning power supply on, near the points of electrode a powerful electric field is created. The result of this is partial (corona) discharge. It causes intensive ionization of air molecules (disintegration to positive and negative ions). Under electrostatic forces the electrified material attracts appropriate (of opposite polarity) ions that neutralize its charge.



Description of power unit TZWN-05

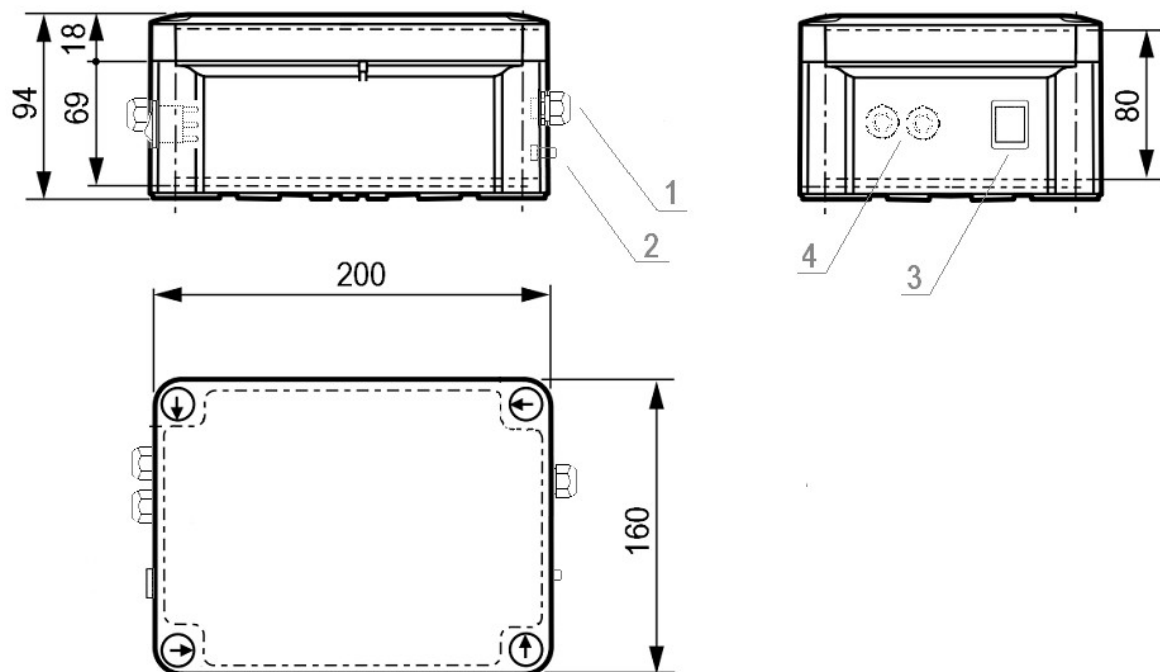
The power supply is designed to operate under a voltage of 230Vac and frequency of 50Hz from mains supply. Constructed as a single-step transistorized inverter with separate circuits controlling high-voltage windings. The power supply provides voltage of about 7kV. In order to improve the efficiency of the neutralization of the charges, the output voltage of increased frequency (about 1,2 kHz) and specially modified waveform has been used.



To ensure safety of use, output current is limited to 1mA. Overload of the power supply (eg. due to contamination on the electrodes, damage to the insulation ..) blocks the inverter of power unit and stops neutralization of the material.

Limited current capacity of high voltage source limits the length of usable electrode. Electrode JO96/x/L of a usable length of not more than 2600mm can be connected to one TZWN-05 power unit. If more than one electrode is in use, the total usable length of all the electrodes should also not exceed 2600mm. It is assumed here that the high-voltage connection cable is not longer than 1,5m. The longer the cable, the shorter the maxim total possible length of electrodes.

Power supply is equipped with rocker switch signaling the presence of voltage. Inside the case there is a fuse $J_n=160\text{mA}$. Device is designed for continuous operation.



- 1 - power cable gland
- 2 - ground connector
- 3 - power switch
- 4 - hv cables glands



Rated data of power unit TZWN-05

Type	TZWN-05
Compatible item	electrodes JO96/x/L
Supply voltage	230V, 50Hz
Input power	12 VA
Output voltage (with electrode JO-96/1800 with cable length 1500mm applied)	7 kV
Output short-circuit current	< 1 mA
Output voltage frequency	1,2 kHz
Waveform	appropriately modified
Maximum combined usable length of electrodes	2600 mm
Recommended combined usable length of electrodes	< 2000 mm
Number of high voltage connections	2
(cascading of electrodes is recommended, number of electrodes is not limited)	
Power switch	yes
Signaling presence of voltage	yes
Built-in fuse	160mA (Φ5x20mm)
Operation mode	continuous
Ambient temperature	273-323 K
Air humidity	<80 %, non-condensing
Operating position	any
Dimensions: length (with glands) x width x height	200(230)x160x94 mm
Enclosure class	IP55 - IK07
Weight	1,4 kg

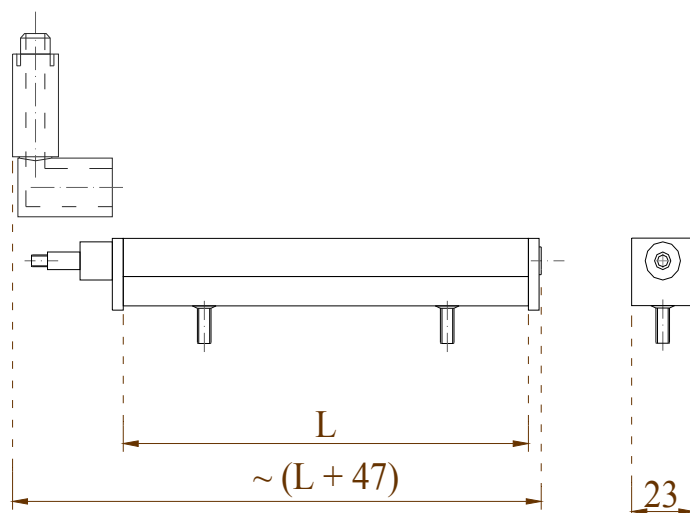


Description of electrode JO96/x/L

Electrode JO96 / x / L is designed for supply voltage 7kV 1,2kHz. It is built as monoblock, nondemountable element. Duralumin 20x20x2mm C-bar constitutes the structure. Inside it there is a conductive core with embedded pins. Ends are terminated with proper plastic insulators. Interiors of electrodes are filled with insulation resin. At the bottom there are M5 threaded rods attached, which serve for mounting on the machine. Electrode is combined to power supply output by high-voltage cable. Body of electrode should be fastened to frame of machine. Device is designed for continuous operation.

Electrodes are manufactured on an individual order. Available usable length range of electrodes is 100mm – 1900mm.

Electrode with single hv terminal



Manner of marking:

pinned electrode **JO96/1/L**

JO96 - model

/1 - one connection terminal

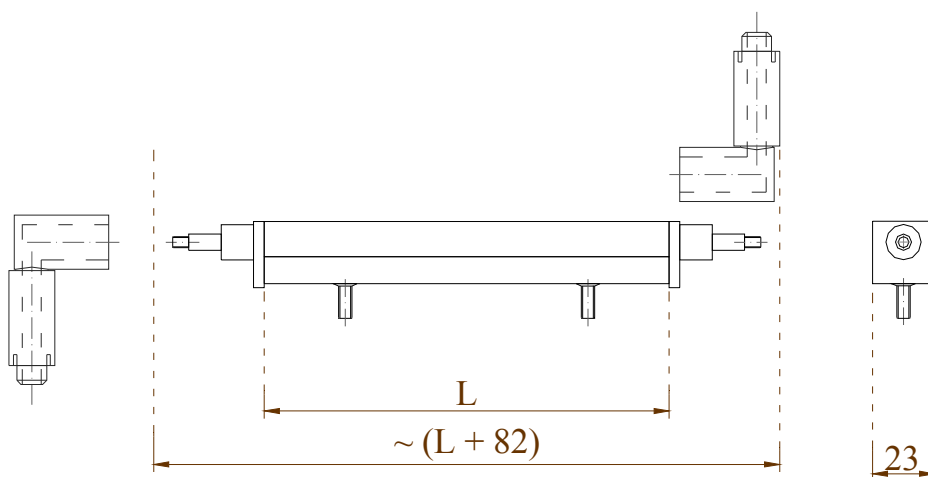
/L - electrode's usable length [mm]

Note:

The electrode's length together with the connection is about 50 mm longer than the usable length of electrode!



Electrode with double hv terminal



Manner of marking:

pinned electrode **JO96/2/L**

JO96 - model

/2 - two connection terminal

/L - electrode's usable length [mm]

Note:

The electrode's length together with the connection is about 85 mm longer than the usable length of electrode!

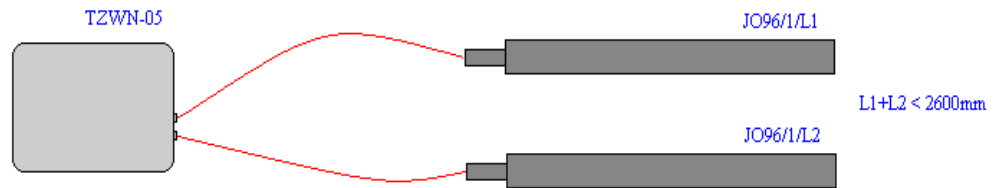
Rated data of electrode JO96/x/L

Type	JO96/1/L	JO96/2/L
Compatible item	power unit TZWN-05	
Supply voltage	7kVac, 1,2kHz	
Length of a single electrode	100 - 1900mm	
Maximum total usable length of electrodes	2600 mm	
Recommended total usable length of electrodes	< 2000 mm	
Installation distance	3 – 20 mm	
Max. number of electrodes for one power supply	2	~unlimited
Operation mode	continuous	
Ambient temperature	273-333 K	
Air humidity	<80 %, non-condensing	
Operating position	any	
Montage	M5 threaded rods	
Dimensions: width x height x length	23 x 23 x (L+50) mm	23 x 23 x (L+85) mm
Weight	0,65 kg/m	

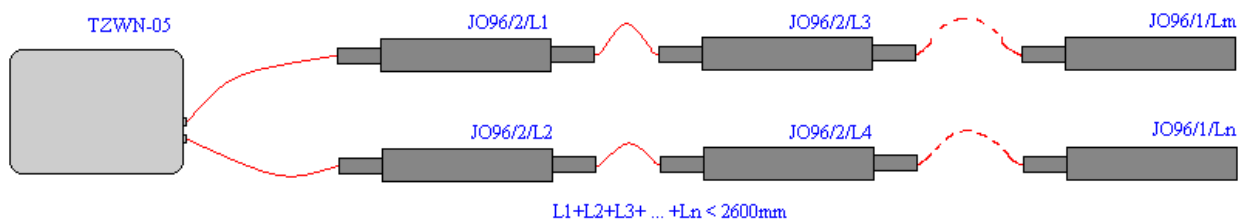


Arrangements of electrodes

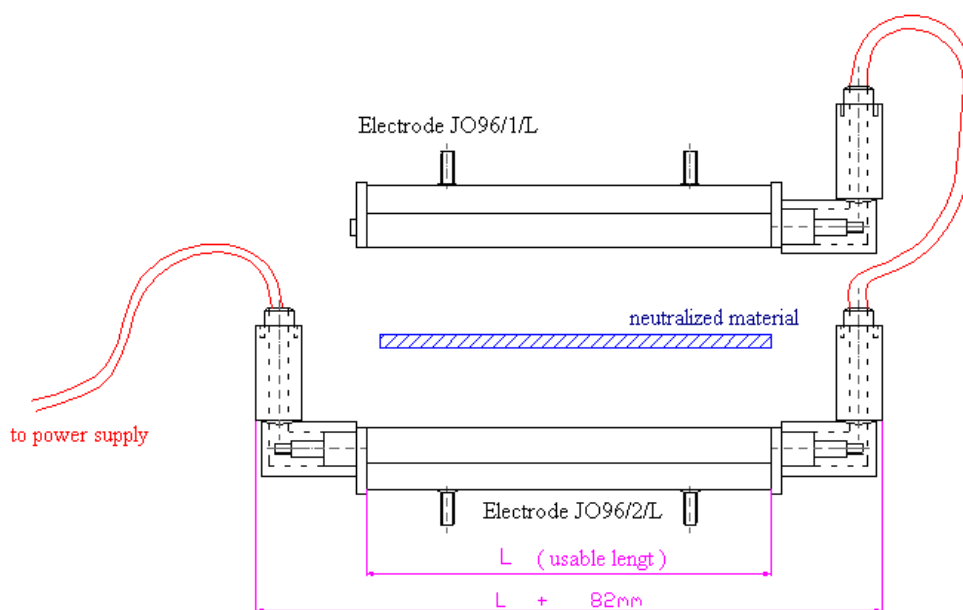
Electrode JO96/1/L is equipped with single high voltage connection terminal. That allows not more than two electrodes JO96/1/L being directly connected to the TZWN-05 power supply.



If more electrodes are necessary, transitional electrodes JO96/2/L should be applied. Electrodes JO96/2/L are equipped with high voltage connection terminals on both ends and enable cascading of the electrodes, "one after the other". That means that two sequences of JO96/2/L electrodes can be directly connected to the TZWN-05 power supply, with electrodes JO96/1/L at the end of chains. Electrodes with one terminal are then applied in the final place in a sequence. The electrode's connection terminals are protected with a special covering insulators, mounted after joining the high-voltage cables.



In those cases, where two or more electrodes are required, cascading connections are recommended. High-voltage cables are shorter, which favorably affects capacitive loss of connection.

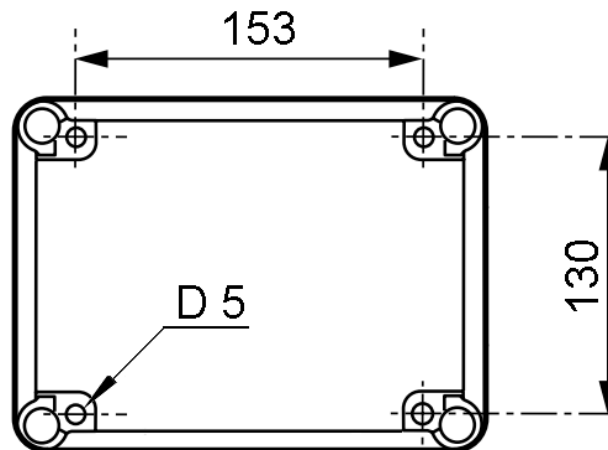


Installation

Note:

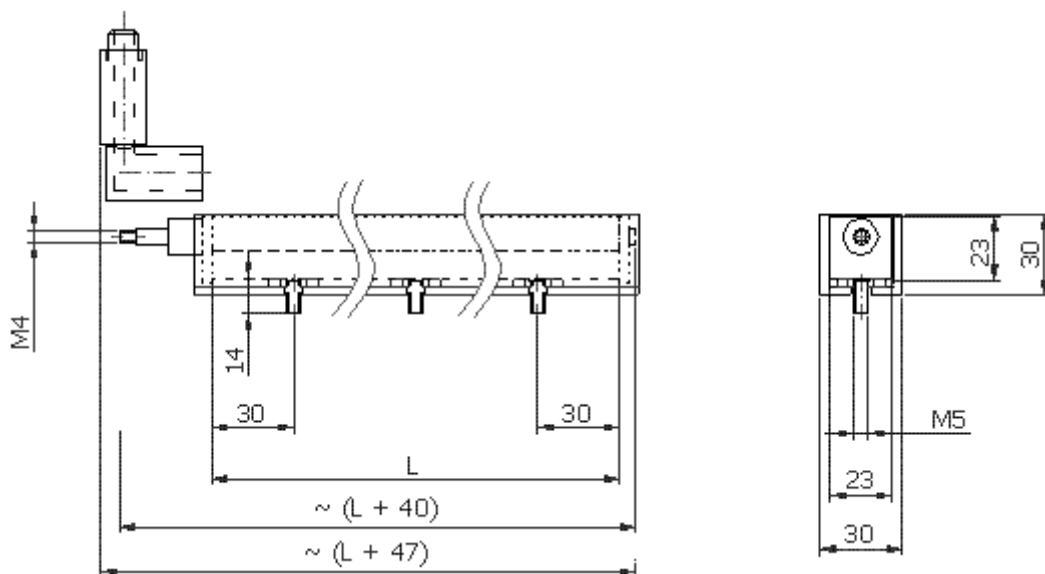
Device may not be installed in explosion hazard areas or environments with flammable substances!
Disconnect the power supply before carrying out work on the unit!
Electrical installation of the device should be done by a skilled electrician with proper qualifications!

Attach the power supply TZWN-05 to frame of machine using M4 screws kit. The housing has four mounting holes $\Phi 5$ factory-made in the bottom (with a spacing of 153 x 130). The power unit should be located as close as possible to the electrodes and positioned in such a way that its switch is easily accessible to operator.

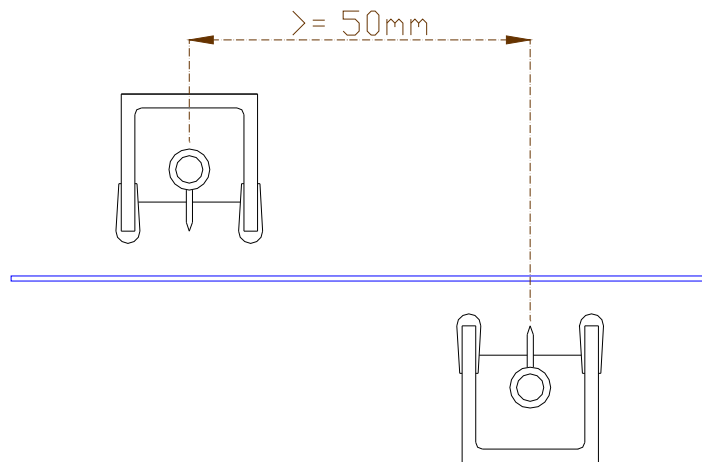


Fix electrode(s) firmly on machine, pointing its pins toward neutralized material. Electrode should be installed at a distance of 3-20mm from the moving material (usually around 5mm). Do not allow material to rub against electrode. At the bottom of electrodes there are factory-installed M5 threaded rods. Spacing between rods is $r = (L - 60)$ mm. Use brackets and screws from the assembly kit.

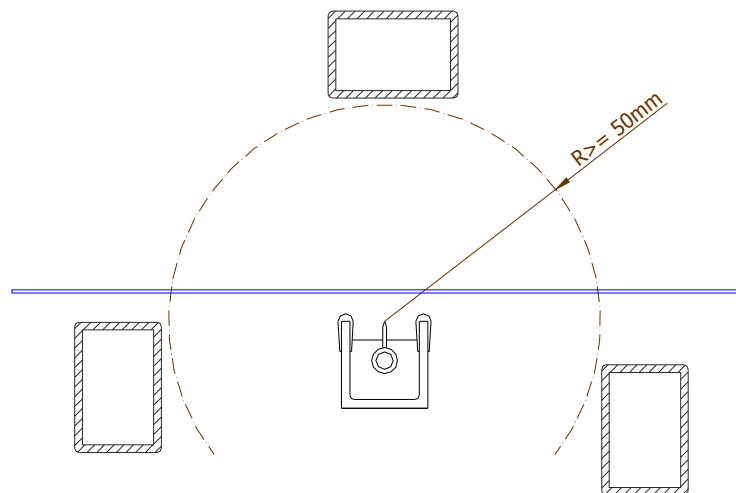
We recommend electrodes longer than 1500mm to be stiffened by embedding into alu U-profile 30x30x3 mm (as shown below). Long electrodes have a third fastening rod placed in the middle of the active length L.




In neutralization of discontinuous materials (fabric, yarn, fibre...) one electrode can be used. For continuous (foil, coated paper) the use of two electrodes, one on each side of the film (sheet) is recommended. In this case planes of symmetry of electrodes should be displaced for at least 50 mm.



To ensure maximum efficiency of operation, there should not be any metal elements at a distance of 50mm from the electrode.



Electrode of the neutralizer should be placed directly in front of the place, where the electrostatic charge is to be removed. The necessary amount of electrodes and their location must be determined experimentally.

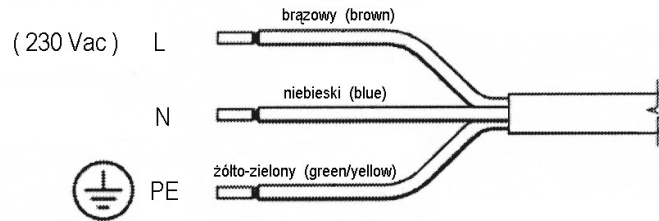
Earthing connector  of TZWN-05 power supply and aluminium body of JO96/x/L electrode should be connected to the earthed machine frame, using delivered cables. Resistance of power supply-electrode's body connection should not exceed the 0,5Ω.

High voltage cable connecting the power supply with the electrode should be relatively short. It should not touch the machine body (we recommend placing in insulating tubes). It should be fixed to machine frame.


Do not lay the hv cable near sharp metal parts. Do not bend beyond the natural bending radius. It is recommended to keep spacing and crossing with other cables at right angles.

Connect hv cable to the electrode's terminal and mount insulating sheath. Plug hv cable into power supply through gland and connect to male terminal. Then tightly close the cover of power unit. Unused output gland should remain blinded.

Connect the power cable to the mains power point or fit a plug (check earth connections, via the power cable).



Note:

Earthing must be done via the power cable and via the external earth wire to the earthing point  on the TZWN-05. Connect the external earth wire to an earthed machine part. Earthing is needed to ensure safe and proper operation and to prevent electrical shocks upon contact!

Neutralizer is designed to be built into another machine. Therefore it should be powered from the internal circuits of that machine so that the voltage is supplied only when the machine runs and to keep safety functions!

Usage

Assembled unit is switched on with rocker button, located on the front panel, by putting it in position I. Presence of voltage 230V is indicated with the control lamps (built-in in the switch). By normal operation of TZWN-05 converter, a quiet buzz is audible, coming from the inside of housing. In a dark area blue fireflies of corona discharges should be visible on the tips of the needles. Correctness of the electrode's operation can be checked by bringing a neon lamp placed on a insulating bar near to the electrode's points. The electric field around the needles should make the lamp glow.

Note:

Many factors (friction, pressure, temperature...) can cause electrostatic charge to be generated once again and accumulate on the material!

Note:

Do not tamper with the electrodes during operation!

Maintenance and repair of equipment should be performed by qualified personnel with the appropriate qualifications!

Neutraliser modules do not have elements that require special regular operational service.

Keep the device clean: dry, free from dust, dirt and chemicals.

Hoover regularly whenever it is necessary (especially electrodes). Periodic inspections should be done paying attention to the mounting, condition of cables, isolation of the electrodes and needles wear. Once a year verify effectiveness of anti-shock protection.

Troubleshooting

Symptoms	Possible reasons	Proceeding
Lamp of switch does not light	No power supply	Switch on the power
	Switched off rocker button	Switch on
	Burned fuse of power unit	Replace the fuse
	Corrupted light	Replace the lamp
Inverter does not buzz, no neutralization (neon lamp placed near to hv cable or electrode's pins do not glow)	Contaminated electrode – power supply overload	Clean up
	Damaged insulation of electrode - power supply overload	Replace electrode
	Corrupted hv cable insulation	Replace hv cable
	Damaged inverter	Send power supply to the service
No neutralization, power pack works correctly	Broken hv cable	Check the cable, replace damaged section
	Defective grounding connection of electrodes or power supply	Check wires and contacts
	Unfavorable electrode arrangement	Verify according to instruction

Damage of insulation of cables and electrodes is often visible in dark environment. If the power supply itself is working properly, and the whole set causes choking of the inverter, then following sections of electrodes should be joined, until detecting the item that caused the overload.