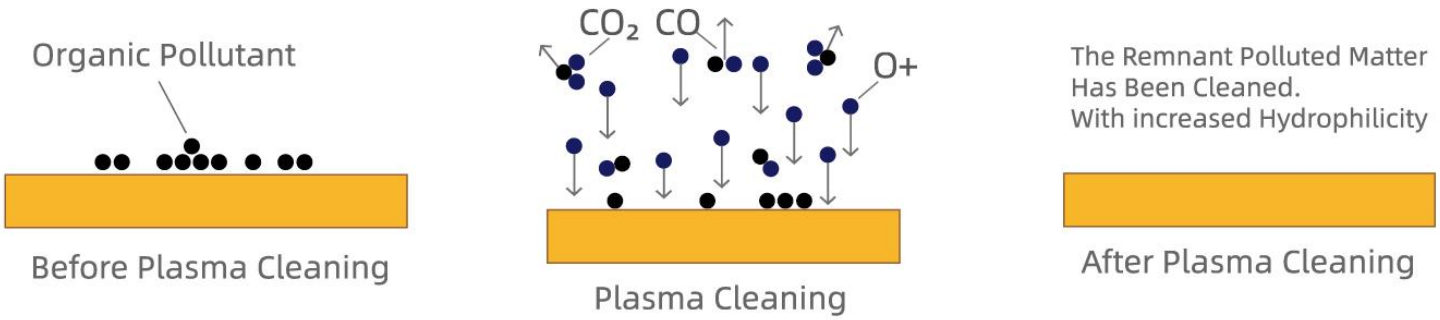
Low-temperature plasma surface treatment system

1.Principle of plasma surface treatment technology

The energy of particles in low temperature plasma is generally about a few to ten electron volts, which is greater than the bonding energy of polymer materials (several to ten electron volts), and it can completely break the chemical bonds of organic macromolecules and form new bonds. However, it is much lower than the high-energy radioactive rays, which only involve the surface of the material and do not affect the properties of the matrix. In low-temperature plasma in non-thermodynamic equilibrium state, electrons have high energy, which can break the chemical bonds of molecules on the surface of materials, improve the chemical reactivity of particles (greater than that of hot plasma), and the temperature of neutral particles is close to room temperature. These advantages provide suitable conditions for surface modification of heat-sensitive polymers. Through low temperature plasma surface treatment, a variety of physical and chemical changes occur on the surface of the material, or it produces etching and roughness, or forms a dense cross-linked layer, or introduces oxygen polar groups, so that the hydrophilicity, cohesiveness, dyeability, biocompatibility and electrical properties are improved respectively. When the surface of the material is treated under appropriate process conditions, the surface morphology of the material changes significantly, and a variety of oxygen-containing groups are introduced to make the surface change from non-polar and difficult to stick to a certain polarity, easy to stick and hydrophilic, which is conducive to bonding, coating and printing. Low temperature plasma flow

treatment is the best method to modify the surface of three-dimensional objects. Its principle is shown in the figure. A plasma region is formed by applying AC high frequency and high voltage at both ends of the electrode to generate gas arc discharge in the air between the two electrodes. The plasma reaches the surface of the treated object under the blowing of the air flow to achieve the purpose of modifying the 3D surface.



2.Advantages of plasma treatment technology

Compared with traditional processes, plasma surface treatment technology has the following advantages:

(1) Strong function, the modification effect only occurs on the surface of the material (about a few to dozens of nanometers), does not affect the inherent properties of the matrix, and the treatment uniformity is good;

② Wide applicability, regardless of the type of substrate of the treatment object, such as polymer materials, glass, metal, plastic,

etc., can be processed;

③ Easy to operate, simple process, convenient operation, strong production control and stable performance;

④ High efficiency, with production lines, sustainable operation;

⑤ Energy saving and environmental protection, the whole dry treatment mode only consumes air and electricity, and does not produce pollution.

3. Application scope

▷Composite materials, glass, ITO and other industries and FPC&PCB surface treatment;

▷Cleaning and activation of electronic circuit board before sealing, recycled compound, semiconductor IC products before sealing, PCB surface residue and other materials;

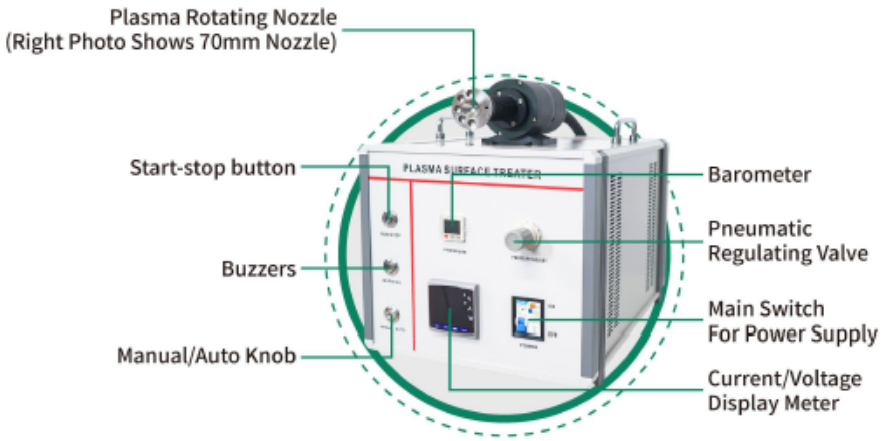
▷New energy vehicle lithium battery electrode welding, coating, surface activation cleaning before coating;

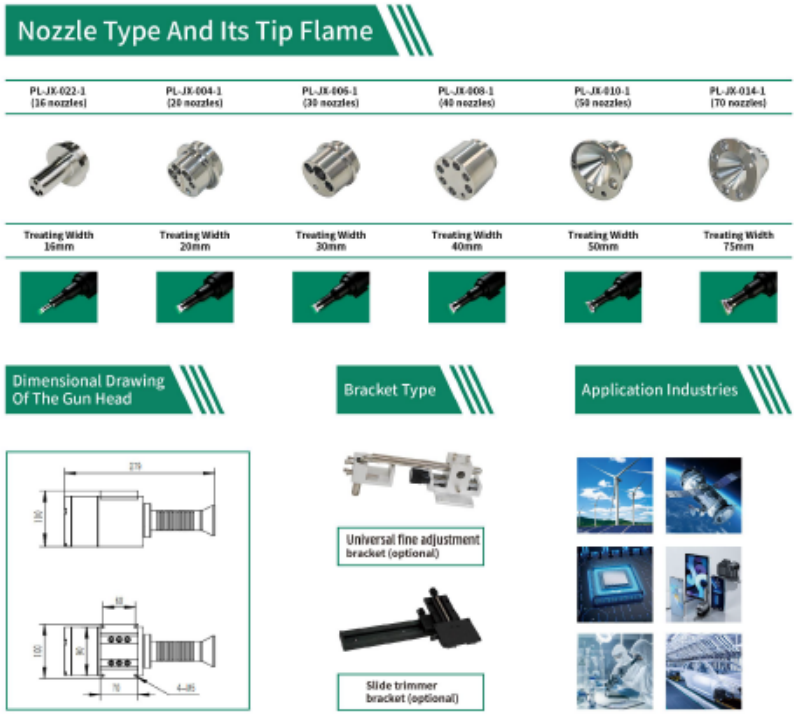
▷Plastic, silicone, glass and metal surface screen printing, pad printing, activation cleaning, etc.;

▷Surface treatment of PP, PE, PVC, PC, ABS and other composite materials before bonding, printing and spraying;

▷Electronic accessories such as mobile phone screen surface treatment, mobile phone shell printing, dispensing and other pre-treatment, all kinds of connector surface cleaning, screen printing in various industries, transfer printing pre-treatment.

4. Plasma machine details





Technical Parameters

Input Voltage	AC220V(±10%)
Plasma Output Power	1000VA
Input Current	4.0A—6.0A
Power Frequency	20kHz
Air Requirements	Dry, oil-free compressed air (60L/min) is required.
Air Input Pressure	0.1-0.25Mpa
Synchronization	Switching signal synchronization, encoder synchronization
Relative Humidity	<93% (no condensation)
Storage Ambient Temperature	-25℃—+55℃
Cleaning Height	5-15mm
Treating Width	⩽75mm
Brackets	Universal micro-adjustment bracket, slide micro-adjustment bracket (optional)
Host Volume	580 (L) *350 (W) *320 (H) mm
Net Weight	22kg
Outer Box Size	640 (L) *395 (W) *475 (H) mm
Gross Weight	30kg

Technical Parameters

Detection Function	Air pressure detection, transformer primary current detection, grid current detection, IGBT temperature detection, abnormal alarm output signal detection
Failure Alarms	Plasma power supply failure alarm, use of air pressure instability alarm (high and low pressure alarm), Rotary motor failure alarm, real-time power detection alarm

List Of Main Configurations	Flat	Quantities
Plasma Surface Treatment Machine Mainframe	Tower	1
Plasma Rotary Spray Gun	Interleave	1
Instruction Manual, Warranty Card, Certificate Of Conformity, Etc.	Interleave	1

List Of Wearing Parts	Flat	Quantities	Duration Of Use
Extrusion Nozzle	Size	1	8000 hours
Electrode	Size	1	8000 hours
External Barrel Of A Gun	Size	1	8000 hours

Note: The life of consumable parts is very much related to power and air pressure, and different cleanliness requirements will also affect the value, the above is for reference only. If the machine works continuously for 24 hours, the wear and tear of consumables will be faster.