DLyte eBlast

Electro Blasting Surface Finishing

Powered by DryLyte® TECHNOLOGY

GPAINNOVA

DLyte eBlast is a new equipment that provides a stream of solid-electrolyte particles propelled by a non-conductive liquid media to improve surface quality of metal parts using the patented electro blasting technology.

Electro Blasting is an electrochemical metal surface finishing process especially designed to to treat to a mirror finish metal parts with complex geometries. This system is also suitable for large or heavy parts which are difficult to polish by immersion or require a localized surface finishing, as for instance welded areas.

This new way to apply dry electropolishing allows a focused surfacing, as the media is projected towards a localized area of the piece.

DLyte eBlast overcomes part size and weight limitations which are present in abrasive and electropolishing systems by immersion, as the piece can be treated locally and without the need of motion.

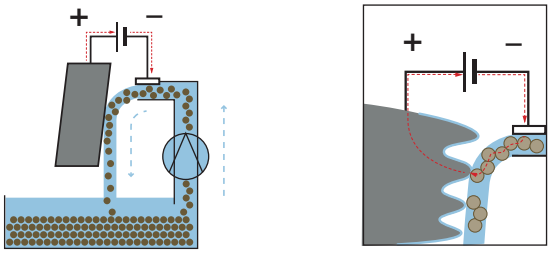
Main process benefits are:

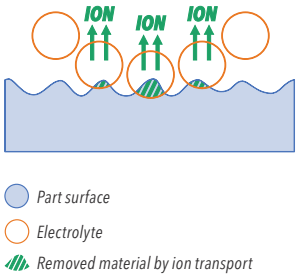
+ Geometry preservation
+ It does not round edges
+ Localized and selective surface finishing
+ Suitable to process large and heavy pieces
+ Designed for blind holes, slots, occluded areas and inner channels
+ Suitable to mirror-like finishing, as it avoids pitting on the surface
+ High current densities, fast processes

The Electro-Blasting Process

Electro-blasting is an electrochemical metal surface finishing process especially designed to surface finish parts with complex geometries and large or heavy parts.

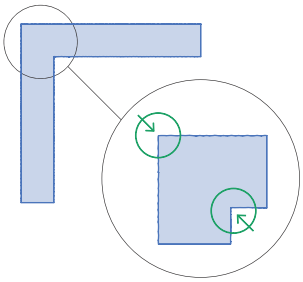
Electro-blasting uses a jet of a fluid composed by a non-conductive liquid and free solid polymer particles to remove roughness from the metal surfaces.





The process removes material only from the peaks of the roughness.

The particles conduct the current between the electrode and the surface, producing an electrochemical reaction where they contact the surface. As particles contact the surface selectively on roughness peaks, only those peaks get electrochemically eroded, producing an overall polishing effect. The metal is extracted as metal cations, which then get captured in the polymer matrix of the particles.



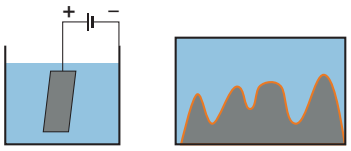
The process does not round edges and can penetrate the internal cavities of the piece.

The non-electrically conductive liquid is not directly involved in the electropolishing process. The main function of the liquid is to carry the particles, but its carefully studied composition contributes to **maintain the connectivity and conductivity between particles during the process.** Additionally, this liquid forms a protective layer over the metallic surface, accumulating especially in roughness valleys, thus protecting the surface from pitting.

Comparison vs. DryLyte Process

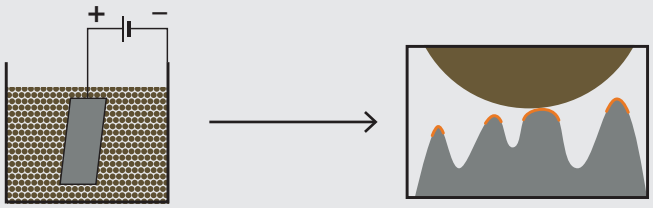
In this new process, the gas in the interstitial space (the space between particles) used in the DryLyte Technology has been replaced by a non-conductive liquid. This modifies the physical state of the media, that instead of a granular material, it becomes a proper fluid that can be pumped, projected, collected, etc. opening a wide range of new possibilities.

Conventional Electropolishing



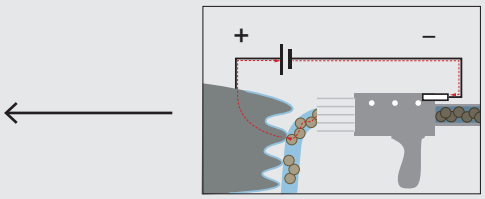
+ All surfaces contact liquid
+ General oxidation
+ Low discrimination

DryLyte Polishing



+ Spheres contact on roughness peaks
+ Localized oxidation
+ Selective removal of metal
+ Geometry preservation
+ Improved corrosion resistance

Electro Blasting



+ Spheres contact on roughness peaks
+ Localized oxidation
+ Selective removal of metal
+ Geometry preservation
+ Improved corrosion resistance
+ Localized surface finishing
+ Avoids pitting

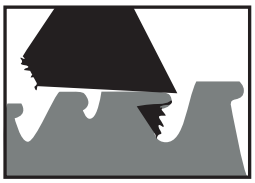
Comparison vs. Abrasive Blasting

Electro-blasting is not an abrasive process and do not use high pressures to remove roughness. It is an electrochemical process that can only be used to polish conductive surfaces. The conductive particles have an electrochemical effect, not an abrasive one.

This process is respectful with the material on the surface, by protecting it during the process, and if desired, generating a passive layer.

This method does not stress the surface, does not cause scratches over smooth surfaces, and it does not produce inclusions on the metal surface, as abrasive blasting does. Another advantage of this process versus abrasive blasting is that it does not create dust remnants, or noise. It does not create breathing difficulties, or risk of rebounded abrasive injuries.

Abrasive Blasting



+ Plastic deformation of roughness peaks
+ Inclusion of broken abrasive
+ No improved resistance to corrosion
+ Rounding of peaks and geometry harm

Electro-Blasting's Benefits

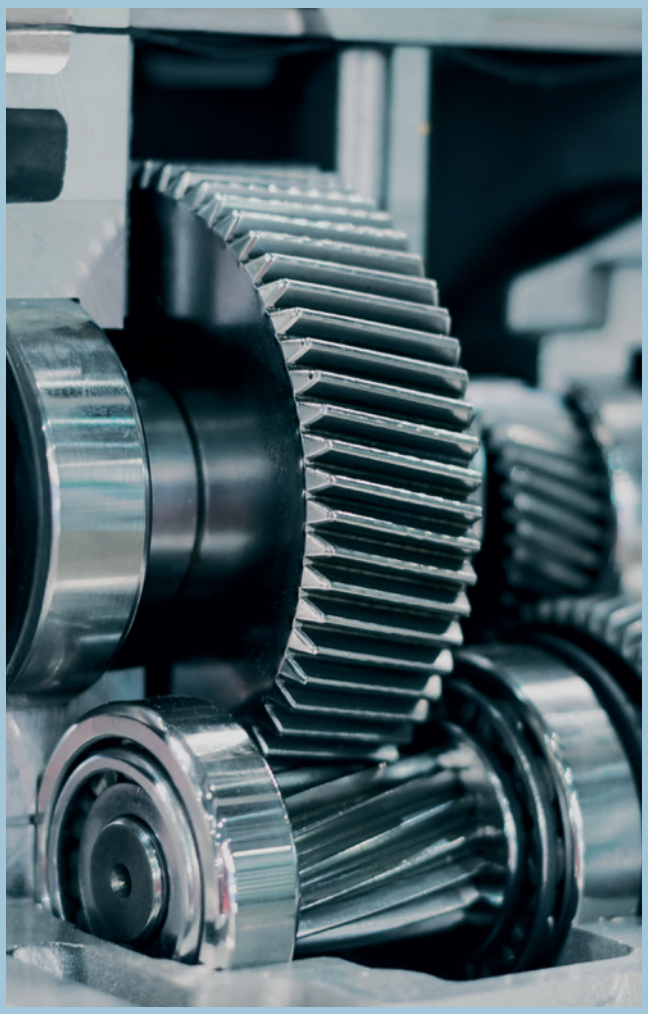
DryLyte® TECHNOLOGY

Most of the benefits of the DryLyte Technology are also present in electro-blasting.

General Benefits of DryLyte and Electro Blasting Technology

+ Homogeneous results
+ Geometry preservation
+ Repeatability and homogeneity
+ It increases the bearing ratio and reducing the friction
+ It improves wear, fracture, and fatigue resistance
+ It enhances the corrosion resistance

1 Due to its focused effect, it is specially well suited for parts that require a localized action or have areas that cannot be treated otherwise.



2 It overcomes part size and weight limitations which are present in abrasive and electropolishing systems by immersion, as the piece can be treated locally and without the need of motion.

3

It avoids any mark on the surface as the fluid is effectively removing the particles from the surface and acts as a lubricant during the process. In addition, this liquid forms a protective layer over the metallic surface, accumulating specially in roughness valleys, thus protecting the surface from pitting.

4

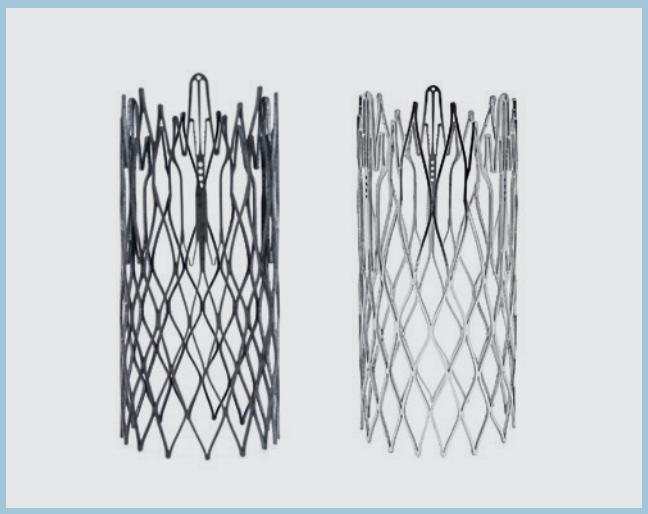
Parts with cavities and narrow spaces such as blind holes, slots, corners and occluded areas can be treated, as eBlast uses a fluid instead of a granular material, and is able to focus the media stream towards the target area from a very short distance.

5

The final roughness achieved with this process is very low –Ra (final) < 0.01 µm– in short cycles while avoiding undesired side effects on the surface.

6

It is very suitable to finish delicate and fragile pieces without harming them as the process does not use vibration nor strong mechanical forces.



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The process is clean, non-hazardous and with an easy waste management. It is silent and it does not produce dust. It generates solid-state particles and metal-free liquid as a residue which can be treated by standard waste management centers.

Applications

Molds

Mold polishing is one of the applications of eBlast. This technique has been primarily a manual process requiring a high level of skill and knowledge. eBlast is able to mirror finish molds with functional and cosmetic applications. It performs high standard for surface flatness, smoothness and geometric precision in molds. It is especially useful for molds with cavities, slots and occluded areas. Due to their focused effect, it is specially well suited for parts that require a localized action or have areas that cannot be treated otherwise.

eBlast overcomes part size and weight limitations which are present in abrasive and electropolishing systems by immersion as the piece can be treated locally and without the need of motion.

Cavities

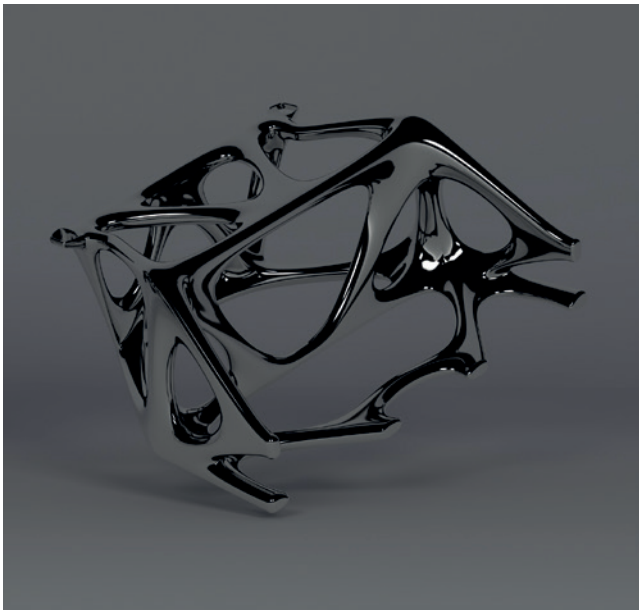
Parts with cavities and narrow spaces such as blind holes, slots, corners and occluded areas are specially difficult to be polished, as the abrasive or dry media behaves as a granular material with limited mobility. To overcome this limitation, eBlast uses fluid instead of a granular material, and is able to focus the media stream towards the targeted area from a very short distance. On the other hand, this liquid forms a protective layer over the metallic surface, accumulating specially in roughness valleys, thus protecting the surface from pitting.

Welded Parts

Welded parts require surface finishing to improve its corrosion, aesthetic and fatigue resistance. eBlast gives parts a chrome-like appearance and finish without the high costs and environmental disadvantages of chrome plating. As part of the eBlast process, pieces are naturally passivated, while the free iron, which promotes aggressive corrosion, is removed.

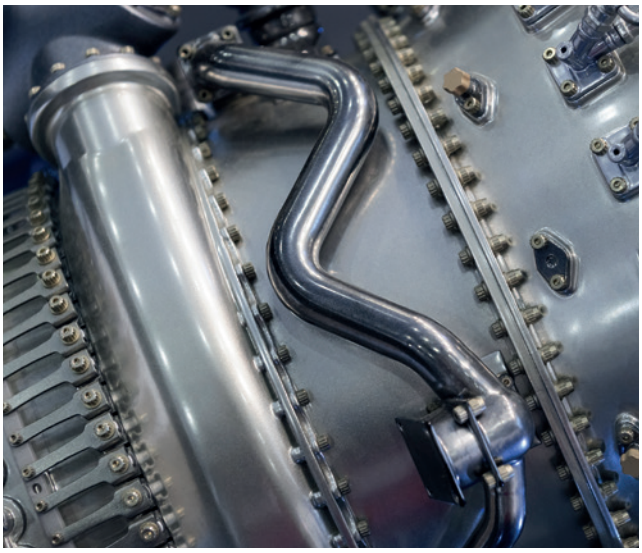
The process improves resistance to corrosion, removes stressed or disturbed layers of surface metal caused by welding, cutting, or mechanical finishing and provides the highest form of passivation.

One of the advantages of this process against liquid electropolishing and vibratory finishing is that it can applied locally overcoming the weight and size limitations. The technology is scalable and can be fully automated for mass finishing.



Complex Geometries and Additive Manufacturing

Internal surfaces of complex geometries can be easily treated with eBlast as the stream of electrolyte and current can be effectively directed to the target surface. This direct approach improves the results obtained with abrasive polishing and electropolishing, where the lack of proper movement of media and the faraday effect become unpolished surfaces.



Inner Channels

Straight inner channels and channels with open angles with a minimum diameter of 50 mm can be effectively polished with eBlast. With the use of its flexible nozzles and diffusers, inner surfaces can be treated, as the electrode is located at the tip of the nozzle. The high viscosity of the media flows through the cavities maintaining the particles' connectivity, protecting the surface during the process and cleaning the surface at the end of the process.

Delicate and Fragile Parts

As the eBlast process does not use vibration nor strong mechanical forces, it can be used to finish delicate and fragile pieces without harming them. As the media stream has low pressure, pieces can be electrically connected without a tight fixation.

How it Works

The eBlast equipment comprises two systems:

– **The recirculating system** pumps the electrolytic media (liquid plus particles) through the eBlast gun to the working cabin. The user controls this stream and can direct it to the relevant areas to polish. The eBlast gun hosts an electrode so that the particles coming out from the nozzle have electrical connectivity.

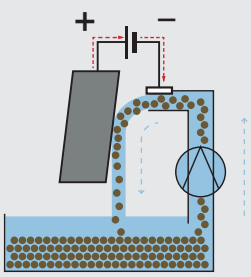
+ Media conditioning system

+ Adjustable pressure and flow rate

+ Cabinet and piece cleaning system

+ Compressed air gun for additional cleaning

– **The electrical system** comprises a power source that is connected to the piece to polish and to the electrode in the nozzle. The current that the power source provides, can be tuned by different parameters for each metal and alloy, which is a key parameter of a successful polishing result. The current flows in the close circuit are established between power source–electrode–particles–surface.

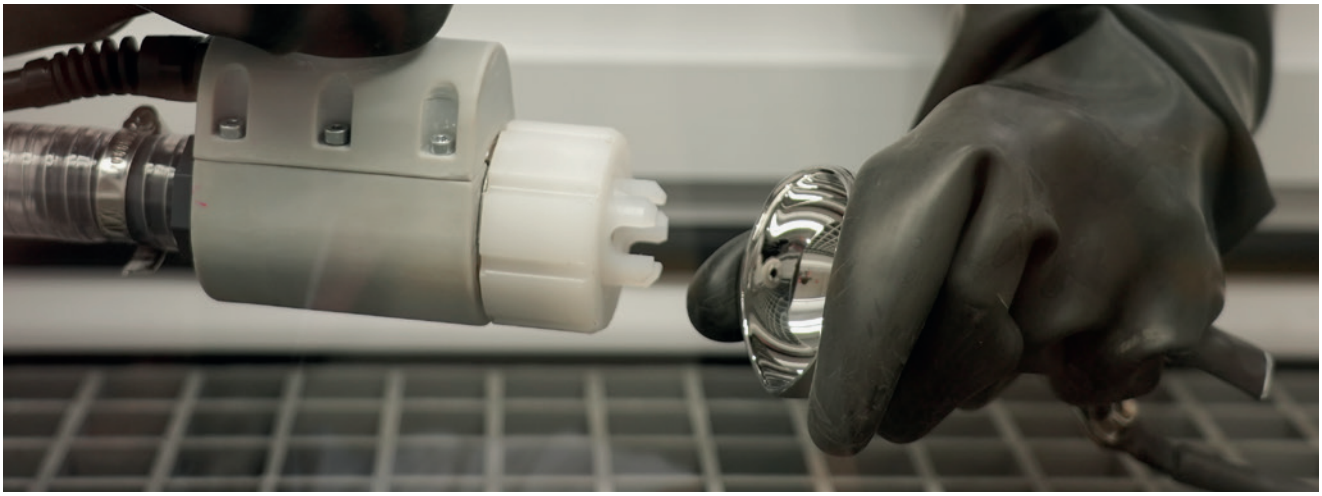


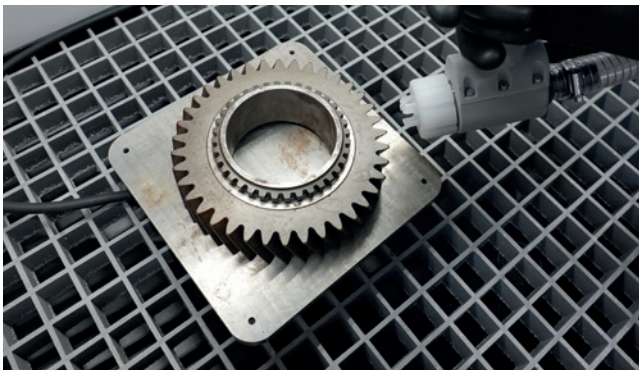
Recirculating System + Electrical System = ***eBlast***

DLyte eBlast

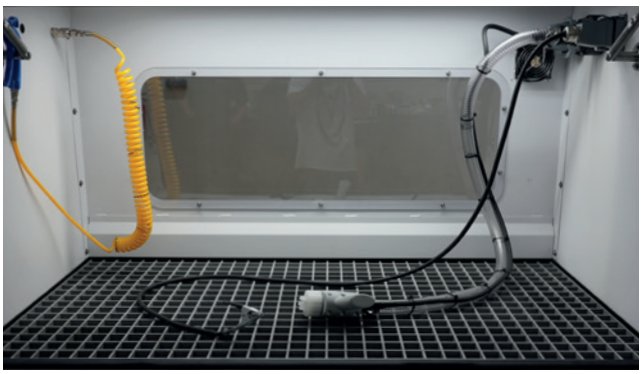
The equipment comprises different guns and nozzles to achieve targeted surface finishing depending on the geometry and application.

The distance of application of the jet differs between materials with a maximum distance of 100 mm for stainless steel and cobalt-chrome (CoCr) and 20 mm for titanium and carbon steel.





The turntable system increases comfort, and productivity while decreasing the overall operator's fatigue. By placing the part on the turntable, and manually spinning it while electro blasting it, saves time and effort from lifting and turning heavy parts.



The work area has been designed to hold 300 kg and a maximum piece volume of 1,000 x 500 x 500 mm. Heavy parts can be placed easily with a bridge crane as the cabinet includes front loading and top loading doors.

User-friendly interface with advanced HMI Panel with TFT color widescreen display with intuitive operation, ready for 4.0 Industry and high performance, functionality and numerous integrated interfaces, to offer the greatest convenience in the DLyte application.

Range of Materials

All kinds of metal surfaces can be treated with electro blasting technology. The current formulations are best suited to polish **stainless steel, cobalt-chrome, nickel and its alloys, titanium and its alloys, and tool steels.**

Electrolyte Media

The electrolyte media is a fluid composed by a non-conductive liquid and free solid polymer particles.

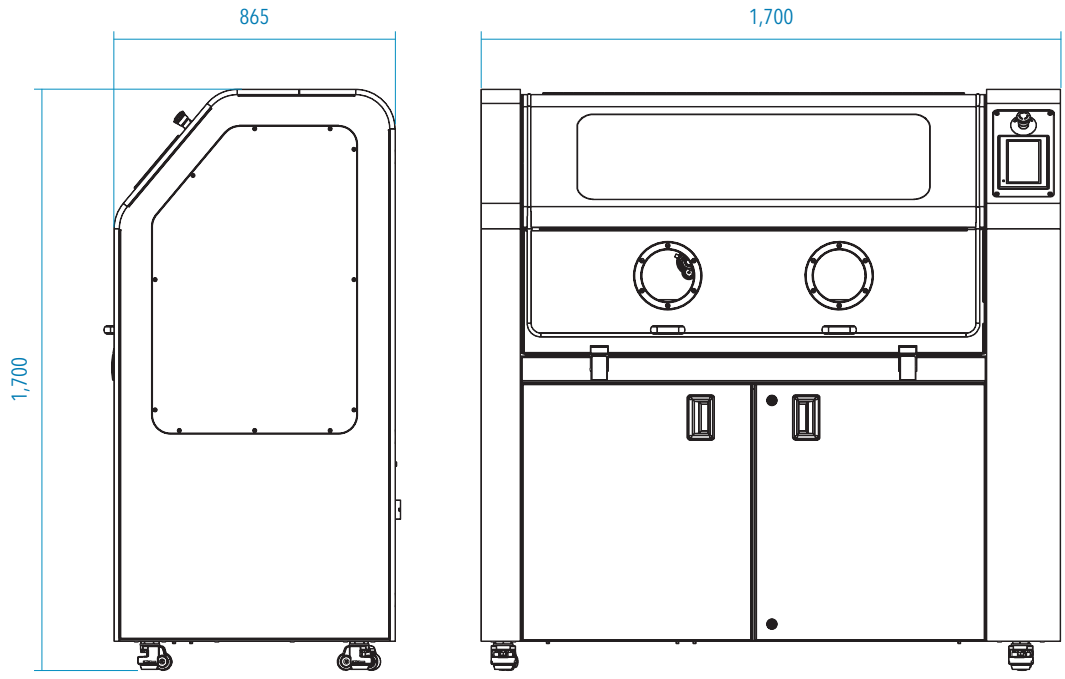
The main function of the liquid is to carry the particles, as well as additional technical effects such as:

+ Maintaining particles' connectivity
+ Protecting the layer over the surface treated
+ Efficient temperature dissipation
+ Cleaning the surface when the process is finished

Particles function comprises:

+ Conducting the electricity from the electrode to the surface to polish
+ Producing located electrochemical effects on roughness peaks
+ Cleaning the surface and removing oxides
+ Capturing metal ions generated during the process

Technical Drawing



Technical Data

MACHINE	**Machine dimension**	1,700 x 865 x 1,700 mm
	Window dimension	1,030 x 325 mm
	Machine weight	505 kg
ELECTROLYTE	**Electrolyte capacity**	30 l
	Electrolyte weight	35 kg
PIECE CAPACITY	**Piece volume**	1,000 x 500 x 500 mm
	Piece weight	300 kg
ELECTRIC	**Rated power (P)**	8.14 KW
	Rated voltage	230 ± 10% Vac (P+N+GND)
	Frequency	50-60Hz
	Power consumption (full-load current) (I)	20.5 A
	Power cord plug	CETAC 32A
ELECTROLYSIS GUN	**Electrolysis power**	0-120 Vdc
	Electrolysis consumption	0-60 A
	Electrolyte pressure	1 bar
	Electrolyte flow	20-30 l/min
AIR CONSUMPTION	**Max air pressure**	5 bar
	Max air consumption	500 l/min
	Air connection	Ø 8 mm
TEMPERATURE HUMIDITY	**Operating**	5 °C to 35 °C
	Machine storage	-10 °C to +70 °C
	Electrolyte storage	5 °C to 40 °C (max. 24 months)
	Operation and storage	30-70%

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