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OZPEN™ CO_2 FIBER OPTICS CLEANING UNIT FOR HIGH POWER COMPONENTS

Features:

- Superior removal of any residue on fiber optics and other components especially for high power applications.
- Quick dry and solvent free cleaning process.
- Designed to clean small surface areas.
- Superior to solvent cleaning wiping techniques.
- More economical and versatile than snow guns with enclosures.
- Cleans a variety of substrates such as glass, metal, etc.
- Removes dust particles, polishing compounds, fingerprints, surface films, and other surface residues.
- CO_2 composite spray

Applications:

- Effective cleaning of various high power fiber optic connectors and other components
- Optical element cleaning, optical coating preparation/cleaning
- Electro-optic sensors and medical devices cleaning
- Semiconductor and biomedical components surface cleaning

Product Description:

The **OZPEN** is a versatile, precision, small surface area cleaning system for critical fiber optics and other manufacturing operations. The **OZPEN** generates and propels an adjustable spray of clean dry air or nitrogen containing small CO_2 particles to efficiently remove foreign matter from a surface.

The **OZPEN** replaces or augments conventional solvent-aided wiping cleaning techniques which can spread, smear or shed, or redeposit trace residues and particles over critical surfaces.

The composite spray cleaning technique is a patented process where one can deliver controlled shear stress on surface contaminants using chemically active, dry CO_2 spray for efficient and effective removal of inorganic and organic surface contamination from critical substrate surfaces.

The cleaning unit delivers a precisely controlled accelerated stream of solid carbon dioxide particles (i.e. snow) at high velocity. The snow is created from the conversion of liquid CO_2 to solid CO_2 particles and CO_2 gas at the spray nozzle. The nozzle, propellant pressure, and temperature are adjusted for optimal cleaning process.

The main method for removal of particulate and other loosely bound contaminants is momentum transfer. In this process, an incoming CO_2 particle strikes a particle on the surface. The resulting force overcomes the force holding the particle to the surface, and the CO_2 gas spray/propellant plume then carries the particle away. This unique dry process can remove very small particles (< 100 nm in size) without the need for using other wet cleaning techniques.

Note: Embedded debris must be cleaned or loosened by means of ultrasonic cleaning prior to cleaning with CO_2.

Thin film organic contamination may also be removed by CO_2 composite snow cleaning. To remove organic species they must be soluble in liquid CO_2. Typical light oils are good candidates for CO_2 cleaning.

Solid CO_2 spray within the spray plume exists at temperature of approx. -78 °C. The cooling properties of CO_2 can be used to remove contaminant with high water content, first by freezing then by fracturing it from the underlying substrate.

Each **OZPEN** is equipped with a flexible coaxial tube, spray pen applicator, and foot switch. The basic system provides precision cleaning capability right out of the box and includes all components for precision cleaning apart from the process gases.

OZPEN, Front Snow and Propellant Controls


CO_2 Cleaning of The Connector


Dirty Fiber Before Cleaning


Same Fiber After CO_2 Cleaning


AR Coated Air Gap High Power Connector, (Example How To Clean Hard To Reach Places)

Ordering Information For Standard Parts:

Bar Code	Part Number	Description
45702	OZ-PEN-110 V	Compact tabletop, composite CO_2 spray cleaning pen for precision cleaning. Equipped with power switch, propellant thrust controller (0-125 psi), nitrogen gas gauge, CO_2 flow controller and propellant temperature control, spray pen applicator with 1 m long hose, standard nozzle and pen holder. 110 V version.
45703	OZ-PEN-230 V	Compact tabletop, composite CO_2 spray cleaning pen for precision cleaning. Equipped with power switch, propellant thrust controller (0-125 psi), nitrogen gas gauge, CO_2 flow controller and propellant temperature control, spray pen applicator with 1 m long hose, standard nozzle and pen holder. 230 V version CE Certified.

Basic plug-n-spray cleaning system includes:

1. CO_2 Composite Spray Generator: a compact table top chassis equipped with power switch, clean dry air (CDA) or N_2 propellant thrust controller (0-125 psi) and gauge, propellant gas temperature controller and precision CO_2 injection flow controller. Spray applicator: Pencil style, 1 m long cabled to generator, and pen holder.
Internal: Particle capillary: Size 20 (fine, installed)

2. Connection Kit: Cylinder, adaptor, hose, for liquid CO_2 cylinder. Pressure regulator for N_2 supply and hose.

3. Operation manual.

Standard Product Specifications

Property	Value	Comment
Voltage requirements	110 V, 230 V	230 V CE Certified
Cleaning agent supply	Liquid CO_2, 650-950 psi, 50-75° F	Not Included
Propellant supply	N_2, CDA gas, 70-150 psi	Not Included
Spray Control	Foot switch	
Maximum Environmental operating temperature	80° F	
Workspace (spray generator)	12.5” W x 10” D x 5.5” H	
Fluid filtration	0.5 micron (standard)	
Particle capillary	Size 20 (fine) installed (0.02”)	

Gas connections:

CO_2 connection	Country	Connector type	Connector description	
	USA/Canada	CGA 320	0.825"-14 NGO	No pressure regulator used
	UK	BS341-No 8	W 0.860" x 14 TPI	
	Germany	DIN-477-No 6	W 21.8 X 1/14"	
	Italy	UNI 4406	W 21.7 X 1/14"	
	Netherlands	RU 1	W 21.8 X 1/14"	
Propellant gas/ nitrogen	USA/Canada	CGA 580	0.965"-14 NGO INT	Pressure regulator supplied
	UK	BS 341-No3	G 5/8" INT	
	Germany	DIN 477-No10	W 24.32 x 1/14" RH	
	Italy	UNI 4409	W 21.7 X 1/14"	
	Netherlands	RU 3	W 24.32 X 1/14"	

Typical gas cylinder specifications

	CO_2 cylinder (liquid/dip tube)	Nitrogen cylinder
Cylinder type	K	T
Gas purity	99.99%	99.99-99.999
Total weight	88 kg	75 kg
Liquid gas content	27.2 kg	8.4 m3
Pressure	830 psig/57.2 bar	2640 psig/183 bar
Dimensions approx. height, OD	150 cm x 23 cm	145 cm x 21 cm
Gas suppliers	Linde, Praxair, others	Linde, Praxair, others

Note: Gas connections:
1. For other countries please enquire
2. Gas Connection Source:
http://hiq.linde-gas.com/international/web/lg/spg/like35lgspg.nsf/docbyalias/tool_sg_cylinder_outlet#a5

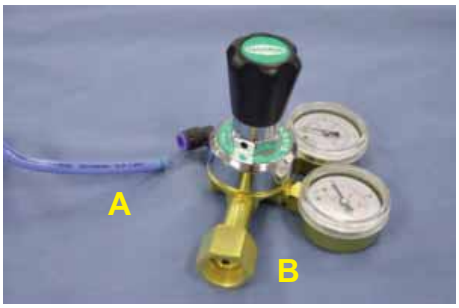
Gas consumption and cost of the cleaning

In the table below typical gas consumption is specified for the OZPEN. The cost of cleaning depends very much of the initial cleanliness of the component that needs to be cleaned.
You can use the CO_2 cleaning method only. It depends on the type of the part that you wish to clean.
For fiber optic components we typically use some other pre-cleaning method, either solvent wiping or ultrasonic cleaning, before we use the CO_2 method.
With a little experimenting you can determine which approach works best for a specific application.

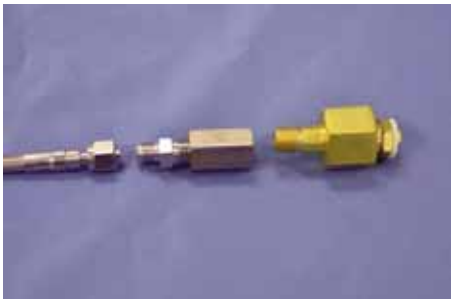
Property	Value	Comment
CO_2 (liquid) usage	2.5-3.5 kg/hour	
N_2 usage	10-15 SCFM	Typically 4 T size cylinders per one CO_2 cylinder

The cost of the cleaning depends mainly on gas cost and how long one cleans each part.
Typically CO_2 and N_2 cost approximately $100 and $50 per cylinder respectively. If a clean supply of compressed air is used as the propellant gas instead of nitrogen then the cost is substantially lower.
Cleaning per piece can typically cost approximately from $0.07 - $0.35 per piece. This is only a guideline, and the cost will vary based on parts being cleaned.

OZPEN connection and typical setup.

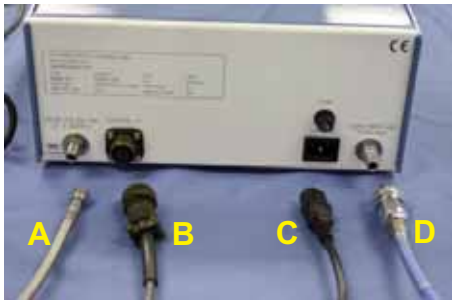


Propellant gas line connection.
A: Nitrogen supply
B: European DIN connection.

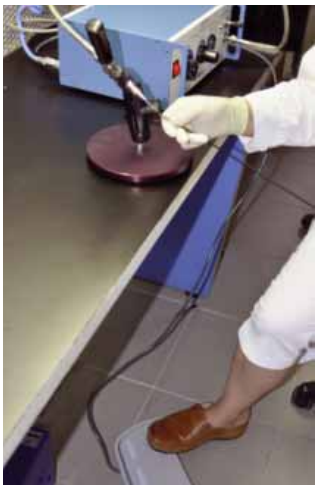


CO_2 Liquid connection to cylinder DIN 8 standard connection

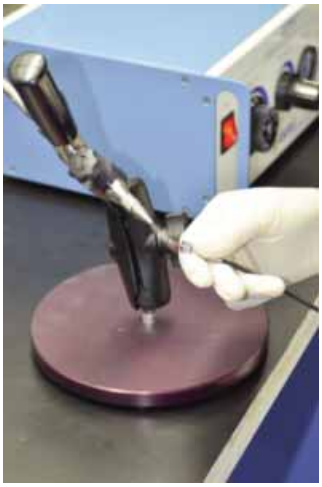
CO_2 & N_2 Cylinders, typical gas supply (USA) connection shown.



Back of the unit connections
A: CO_2 connection (use 9/16” wrench).
B: Foot pedal connection.
C: Power connection.
D: Propellant gas, Nitrogen.



OZPEN cleaning high power patchcord.



Fiber optic connector cleaning - close up.