



## CO<sub>2</sub> Extraction Systems

Centrifugal • Recirculating • Soxhlet



Centrifugal CO<sub>2</sub> Extraction System

- Extract polymers or assembled devices used in vacuum or clean room environments (ASTM E 595 TML CVCM)
- Decontaminate gauges, piping, panels, and pumps used in pressurized or liquefied oxygen systems (MSFC-SPEC-164D)
- Precision clean complex machined or 3D printed metal parts containing microscopic porosity or deep internal cavities
- Extract silicone biomedical components such as cables, encapsulated devices, tubing, septa, valves, and pump seals

### Engineered-to-Order CO<sub>2</sub> Extraction Systems

KinetX™ is a fully customizable precision cleaning platform employing field-proven centrifugal, recirculating, and flowthrough liquid CO<sub>2</sub> extraction designs and processes. KinetX™ can remove a multitude of surface (and subsurface) contaminations including machining oils, polishing waxes, particles, bioburden, extractable residues, and much more. Example applications include outgas cleaning, scouring, precision degreasing, bioburden reduction, and oxygen service cleaning.

KinetX™ combines an optional ultrasonic high boiling solvent (HBS) prewash or co-solvent infused liquid carbon dioxide wash-rinse cycles with energy-efficient CO<sub>2</sub> recycling and reuse in a single system. CO<sub>2</sub> recycling systems include distillation and clean fluid storage. KinetX™ systems use only environmentally safe, recyclable, and non-toxic prewash and wash-rinse co-solvents, and feature a top-loading extraction chamber with a manual or automatic closure. Automated systems utilize a Siemens PLC with a graphical user interface. Custom cleaning baskets or fixtures can be designed and manufactured to securely hold parts for maximum protection and cleaning (extraction) efficiency. An optional built-in CO<sub>2</sub> Composite Spray™ applicator is useful for precision thin film and microscopic particle removal.

**Example CO<sub>2</sub> Extraction Process:** Surface contamination is rapidly solubilized or mechanically

removed using a prewash agent with ultrasonics. A quick precision wash and rinse cycle with clean liquid CO<sub>2</sub> removes prewash agent to produce precision clean and dry parts. A built-in distillation system recycles 90%+ of the CO<sub>2</sub> while separating full-concentration prewash agent for recycle and reuse.

KinetX™ systems utilize state-of-the-art and production-proven standard CO<sub>2</sub> cleaning processes and plumbing and instrumentation designs fabricated with the finest commercial components available. We engineer and integrate our proprietary PID/process technology into cost- and performance-effective ASME-certified CO<sub>2</sub> cleaning systems specifically designed to meet your product cleanliness, production line, product flow, and cleaning capacity requirements.

## Customizable Features

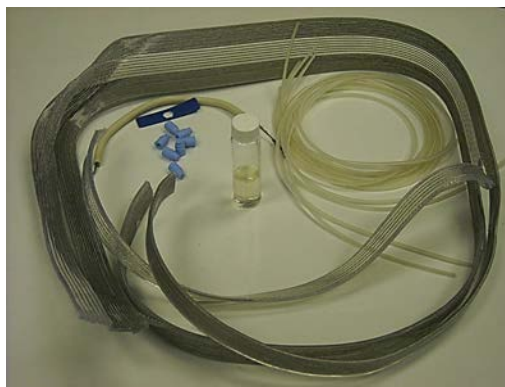
- **Proven Processes and Designs** – KinetX™ systems employ proprietary and production-proven **centrifugal, recirculating, and flowthrough** (shown right) CO<sub>2</sub> extraction system designs to meet your cleaning requirements.
- **Example Extraction Recipes** – Prewash-CO<sub>2</sub> Wash-Rinse, CO<sub>2</sub> Extraction, or CO<sub>2</sub> Extraction-CO<sub>2</sub> Composite Spray.
- **System Control** – Siemens industrial PLC and touch screen graphical user interface.
- **Top-Loading** – Provides efficient and ergonomic use, maximum capacity utilization, and simple load-unload automation adaptation.
- **Standard Extraction Chambers** – KX 1000 (10"×10" (0.5ft<sup>3</sup>)), KX 1200 (12"×12" (1 ft<sup>3</sup>)), KX 1800 (18"×18" (3 ft<sup>3</sup>)), KX 2400 (24"×24" (6 ft<sup>3</sup>)), and KX 3600 (36"×24" (14 ft<sup>3</sup>)).  
Custom sizes and capacities available.
- **Centrifugal System Option** – Bi-directional, variable-speed centrifugal cleaning action provides fast penetration, scouring action, and rapid cleaning for small complex parts.
- **Materials of Construction** – Carbon Steel (Coated) or Stainless-Steel wetted fluids processing chamber, drum, and delivery and storage system.
- **CO<sub>2</sub> Recycling Module** – Built-in CO<sub>2</sub> recycling system provides a continuous supply of clean liquid carbon dioxide wash-rinse fluid under constant pressure and temperature.
- **CO<sub>2</sub> Composite Spray Option** – Built-in CO<sub>2</sub> Composite Spray™ cleaning system provides selective 2D spray cleaning for fine particle and thin film residue removal.
- **Parts Handling Automation** – Manual load/unload to fully-robotic load/unload operation.



**Soxhlet  
Extraction System**

## System Options

- LightSPEC™ CO<sub>2</sub> Fluids Quality Monitor (CO<sub>2</sub> Recycling Module)
- Custom Cleaning Fixtures
- Transporters and Robots



**Contaminants (Center Vial) Extracted from Silicone Devices**



**Fully Customizable Soxhlet Extraction Cleaning Systems  
Oxygen Gauges, Valves, Piping, Panels, and Pumps**



Clean Manufacturing, *Reimagined.*

clean  
imagineering™

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Release Date: April 20, 2026

Tech Spec KinetX.PDF