Evactron® Series
Decontaminators and Cleaning Systems

Evactron® CombiClean™ System
• Cleans SEM/TEM samples and SEM chambers from one desktop controller
• Stores samples and parts after cleaning
• Uses patented Safar TEM side loaders

De-Contaminator
Chambers with the Evactron
De-Contaminator
Plasmaashing and glow discharge cleaning of samples have long been cleaning methods available for sample preparation for SEMs and TEMs, but they require expensive auxiliary equipment. Argon and oxygen plasmas are normally used. Argon cleans via a sputter etching mechanism. However, sputter etch should be avoided because of possible damage to components within the chamber. The Evactron De-Contaminator, on the other hand, is a small device which is attached to any vacuum chamber allowing for direct in situ cleaning of the vacuum chamber. The Evactron Decontaminator has a valve manifold which introduces a small stream of gas such as room air, oxygen or hydrogen into the vacuum chamber. An attached pressure sensor is used to control the amount of gas flow. The gas flows past an electrode energized by a low power (5-20 W) radio frequency (RF) generator. This will create RF plasma localized in the region around the electrode. The Evactron RF plasma creates radicals that chemically etch and remove hydrocarbons, organics, and surface carbon from SEMs and other vacuum systems. Contaminants are ashed into volatile products which are removed through the roughing pump. As seen in the figure below left, the radicals are carried out of the plasma into the main chamber by convection. In the chamber they react with all exposed surfaces including the specimen if present. The plasma is confined to the Plasma Radical Source (PRS), which prevents ion bombardment damage to the instrument or specimen.

Evactron Plasma
Radical Source (PRS)
Evactron Electron Column EDX
Evactron Exhast
High Vacuum Pump
VentDect™ Technology

Evactron® CombiClean™ System is a unified system. The system features a microprocessor with embedded software to regulate a leak valve and control the chamber pressure by a MicroPuri purge. The microprocessor also regulates the RF power, has a clock to time the downstream plasma cleaning and nitrogen purging cycles, and records the operational and fault log.

Cleaning with the Evactron® CombiClean System may be setup from either the front panel or a remote computer.

Ordering Information
Cat. No. Description Qty.
91000-17 Evactron® CombiClean™ System each

Evactron® Series
Decontaminators and Cleaning Systems

reduce hydrocarbon contamination in vacuum chambers, improving electron microscope imaging and analytical performance.
Evactron® Model EP Plasma Decontaminators

The Evactron® E-Series™ of remote RF plasma cleaners reduces hydrocarbon contamination from high vacuum chambers by breaking down the carbon and turning it into gas phase that are then removed by the pumping system.

**Features**
- High cleaning efficiency
- Small footprint/compact plasma radical source (PRS)
- Operates at TMP and turbomolecular pressures
- “Pop” Ignition (patent pending)
- Windows and Android GUI software
- Desktop controller
- Fits chambers and load locks
- Vacuum safety interlock

**Evactron® Model EP**
The Evactron® EP Decontaminator is the latest model in the E-Series™ cleaning systems. It was designed for:
- Cleaning high vacuum chambers
- SEM/FIB
- Pre-cleaning of the samples

The Evactron® EP model with instant ignition from any vacuum level brings the user higher cleaning rates at low pressures. It uses flowing afterflow to remove surface hydrocarbons from vacuum chambers operating with turbo molecular pumps.

**Ordering Information**

**Attaching Flange required, sold separately. See below.**

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>91000-01</td>
<td>For Hitachi 820/4600 Series SEM</td>
<td>each</td>
</tr>
<tr>
<td>91000-10</td>
<td>For JEOL TMP Systems</td>
<td>each</td>
</tr>
<tr>
<td>91000-15</td>
<td>For Zeiss E-Model</td>
<td>each</td>
</tr>
</tbody>
</table>

**Technology**
- Energy efficient high power plasma
- Flow through gas supply
- Plasma Radical Source (PRS) design maximizes delivery of radicals to chamber
- “Pop” ignition of the plasma works at pressures below 100 Pa/750 mTorr
- Low pressure: 3-10 Pa/7-22.5 mTorr
- Starts and operates at turbo molecular pump compatible pressures
- Fixed match provides maximum plasma power transfer

**Other Features**
- High reliability at 20 Watts and 13.56 MHz output power
- No vacuum gauge needed
- NV 40 Flange standard, CF 2.75 optional
- Vacuum only operation interlock
- >10 Amin. cleaning rates
- Rack mount for system integration
- Elegant and compact design
- Windows GUI interface/Android tablet programming compatibility

---

**Evactron® Zephyr™ Plasma Decontaminators**

The Evactron® Zephyr Decontaminator line was created to accommodate SEMs, FIBs, and other vacuum chambers that use turbo molecular pumps. They are designed for SEM/FIB systems and offer fast and efficient hydrocarbon removal with no damage to samples or sensitive components. They offer users:
- Cleaning of SEM/FIB chambers at turbo pressure
- Shorter cleaning time (increased production, less downtime)
- One button operation

**Evactron® Zephyr Model 25 Zephyr Plasma Decontaminator**
- Desktop controller
- SEM/FIB chambers or load locks
- 2 operating regimes

**Features**
- Classic mode (roughing pressures)
- T-pump main (turbo molecular pressures)

This easy to use tabletop model easily removes atmospheric hydrocarbons and carbon contamination from SEMs, FIBs, and other vacuum chambers.

The Evactron® Zephyr Model 25 Decontaminator utilizes a remote RF plasma to produce gas-phase radicals that flow downstream through the chamber eliminating contamination.

This model was created for chambers that use turbo molecular pumps (TMPs). It is designed to clean/de-contaminate in the turbo pressure regime at 1-50 mTorr and has no adverse effects on the TMP temperatures.

**Benefits**
- No stress to the turbo molecular pump
- Safety de-contaminates the chamber without damage to sensitive components
- Shorter cleaning time, giving increased production with less system downtime
- Cleans chamber while in “pump down”
- Increased mean free path, yet ion damage free

---

**Evactron® SoftClean™ System**

The Evactron® SoftClean Chamber extends the ability to pre-clean specimen, specimen mounts, and holders with the proven downstream plasma ashing process before examination in the chamber, thus insuring high image quality. The Evactron® SoftClean Chamber can also be used as a specimen storage system, keeping samples in a clean environment.

The downstream plasma process used in the Evactron® SoftClean Chamber is gentle, yet very effective at removing HCl contamination. Sputter etching by other plasma cleaners can damage specimens through exposure to energetic ions and heat.

The Evactron® SoftClean Chamber uses reactive gas radicals to remove HCl from specimen surfaces by chemical etch, preserving critical sample fine structure. This downstream etching process breaks down problematic HCl residues into smaller molecules such as CO₂, NO and CO, which are easily pumped out of the chamber.

**Specifications**
- Cleans SEM/TMP systems
- Cleans TEM grids/sample rods
- Insert sample storage
- Just use air for oxygen radicals, or use other gases for alternative plasma processes
- Easy setup and operation. Pressurization power, pressure and time settings
- Can be operated from either front panel or computer interface
- Optional shroud can cover transducer and valve assembly on the Plasma Radical Source

**Evactron® SoftClean Chamber**
- Start cleaning by using chamber vent and evacuation controls
- Advanced plasma detection logic
- Cleaning and error log record history and aid troubleshooting
- Electronic Chassis: 3.5"H x 19"W x 7"D (8 x 23 x 46 cm)
- RP Power: 5-20 Watts at 13.56 MHz
- T-tube operating pressure
- Optional Safar side loaders
- Accommodates up to three TEM stage rods

---

**Evactron® Adapter Flanges – SEM Port to KF40**

All dimensions are in millimeters
OD = Outside Flange diameter
ID = Inside Diameter

I = number of mounting holes + symmetry
D-ring not included with Adapter Flange

The most common Adapter Flanges are shown

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>230001-01</td>
<td>FEI, 120 OD, 93 ORID, 109 BC, 6H, each</td>
<td></td>
</tr>
<tr>
<td>230002-01</td>
<td>FEI, 87 OD, 60 ORID, 74 BC, 3H, each</td>
<td></td>
</tr>
<tr>
<td>230003-01</td>
<td>FEI, 64 OD, 38 ORID, 57 BC, 4 H, each</td>
<td></td>
</tr>
<tr>
<td>230004-01</td>
<td>FEI, 90 OD, 60 ORID, 78 BC, 3 H, each</td>
<td></td>
</tr>
<tr>
<td>230005-01</td>
<td>FEI, 100 OD, 75 ORID, 6H, each</td>
<td></td>
</tr>
<tr>
<td>230006-01</td>
<td>FEI, 59 OD, 38 ORID, 52 BC, 4 H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230007-01</td>
<td>FEI, 70 OD, 45 ORID, 64 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230008-01</td>
<td>FEI, 70 OD, 50 ORID, 62 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230009-01</td>
<td>FEI, 70 OD, 38 ORID, 60 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230010-01</td>
<td>FEI, 70 OD, 30 ORID, 57 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230011-01</td>
<td>FEI, 70 OD, 23 ORID, 55 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230012-01</td>
<td>FEI, 70 OD, 15 ORID, 53 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230013-01</td>
<td>FEI, 70 OD, 10 ORID, 51 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230014-01</td>
<td>FEI, 50 OD, 38 ORID, 52 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230015-01</td>
<td>FEI, 40 OD, 30 ORID, 49 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230016-01</td>
<td>FEI, 30 OD, 30 ORID, 47 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230017-01</td>
<td>FEI, 25 OD, 25 ORID, 45 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230018-01</td>
<td>FEI, 20 OD, 20 ORID, 43 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230019-01</td>
<td>FEI, 15 OD, 15 ORID, 41 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230020-01</td>
<td>FEI, 10 OD, 10 ORID, 39 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230021-01</td>
<td>FEI, 5 OD, 5 ORID, 37 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230022-01</td>
<td>FEI, 3 OD, 3 ORID, 35 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230023-01</td>
<td>FEI, 2 OD, 2 ORID, 33 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230024-01</td>
<td>FEI, 1 OD, 1 ORID, 31 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
<tr>
<td>230025-01</td>
<td>FEI, 0.5 OD, 0.5 ORID, 29 BC, 4H, 1 PIECE each</td>
<td></td>
</tr>
</tbody>
</table>
Evactron® Series
Decontaminators and Cleaning Systems

Removing Hydrocarbons and Decontaminating Vacuum Chambers with the Evactron De-Contaminator

Plasma ashing and glow discharge cleaning of samples have long been cleaning methods available for sample preparation for SEMs and TEMs, but they require expensive auxiliary equipment. Argon and oxygen plasmas are normally used. Argon cleans via a sputter etching mechanism. However, sputter etch should be avoided because of possible damage to components within the chamber. The Evactron De-Contaminator, on the other hand, is a small device which is attached to any vacuum chamber allowing for direct in situ cleaning of the vacuum chamber. The Evactron Decontaminator has a valve manifold which introduces a small stream of gas such as room air, oxygen or hydrogen into the vacuum chamber. An attached pressure sensor is used to control the amount of gas flow. The gas flows past an electrode energized by a low power (5-20 W) radio frequency (RF) generator. This will create RF plasma localized in the region around the electrode. The Evactron RF plasma creates radicals that chemically etch and remove hydrocarbons, organics, and surface carbon from SEMs and other vacuum systems. Contaminants are ashed into volatile products which are removed through the roughing pump. As seen in the figure below, the radicals are carried out of the plasma into the main chamber by convection. In the chamber they react with all exposed surfaces including the specimen if present. The plasma itself is confined to the Plasma Radical Source (PRS), which prevents ion bombardment damage to the instrument or specimen.

Evactron® CombiClean™ System

• Cleans SEM/TEM samples and SEM chambers from one desktop controller
• Stores samples and parts after cleaning
• Uses patented Safar TEM side loaders

Decontaminate specimens and columns of SEMs and TEMs. The Evactron® CombiClean™ System combines onboard vacuum cleaning chamber and external PRS (Plasma Radical Source) control in one unified system.

• Cleans SEM/TEM samples and SEM chambers from one desktop controller
• Stores samples and parts after cleaning
• Uses patented Safar TEM side loaders

Innovative Design

Designed as a complete cleaning solution, the Evactron® CombiClean System features an integrated vacuum chamber for desktop cleaning samples and vacuum parts, as well as an external Plasma Radical Source (PRS) for Evactron® in-situ cleaning of F beam instruments such as SEMs, FIBs, and other analytic instruments, by removing carbon contamination. The system monitors operation of either PRS unit, has internal memory, and is designed for routine operation with minimal operator training. Onboard control allows for changing the cleaning modes between external and internal PRS with just the flip of a switch.

This system is compatible with rotary vane pumps without the worry of oil backstreaming.

Dry Nitrogen purge feature keeps specimens clean after plasma cleaning.

Storage mode allows continued dry nitrogen purging of samples while external PRS is in use.

System monitors operation of either PRS unit onboard control allows for changing modes between internal and external PRS with just the flip of a switch.

Wide Pressure Range

Ordering Information

<table>
<thead>
<tr>
<th>Cat. No.</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>91000-17</td>
<td>Evactron® CombiClean™ System</td>
<td>each</td>
</tr>
</tbody>
</table>

Evactron® CombiClean System

Cleans SEM/TEM samples and SEM chambers from one desktop controller
Stores samples and parts after cleaning
Uses patented Safar TEM side loaders

Evactron Plasma Radical Source (PRS) attached.
An adapter flange is used to mount the Evactron De-Contaminator in the SEM.

Evactron® Decontaminators and Cleaning Systems

Plasma ashing and glow discharge cleaning of samples have long been cleaning methods available for sample preparation for SEMs and TEMs, but they require expensive auxiliary equipment. Argon and oxygen plasmas are normally used. Argon cleans via a sputter etching mechanism. However, sputter etch should be avoided because of possible damage to components within the chamber. The Evactron De-Contaminator, on the other hand, is a small device which is attached to any vacuum chamber allowing for direct in situ cleaning of the vacuum chamber. The Evactron Decontaminator has a valve manifold which introduces a small stream of gas such as room air, oxygen or hydrogen into the vacuum chamber. An attached pressure sensor is used to control the amount of gas flow. The gas flows past an electrode energized by a low power (5-20 W) radio frequency (RF) generator. This will create RF plasma localized in the region around the electrode. The Evactron RF plasma creates radicals that chemically etch and remove hydrocarbons, organics, and surface carbon from SEMs and other vacuum systems. Contaminants are ashed into volatile products which are removed through the roughing pump. As seen in the figure below, the radicals are carried out of the plasma into the main chamber by convection. In the chamber they react with all exposed surfaces including the specimen if present. The plasma itself is confined to the Plasma Radical Source (PRS), which prevents ion bombardment damage to the instrument or specimen.