

# Cleanline®

## Foreline Plasma Clean System



The MKS Cleanline® Foreline Plasma Clean System increases tool uptime and productivity by continuously removing process byproducts and deposits from CVD and Etch system pumping lines. This novel approach to foreline cleaning delivers atomic fluorine radicals from  $\text{NF}_3$  or  $\text{O}_2$  chemistry straight to where process deposits build up, such that they are immediately removed and do not accumulate.

US Patents: 10535506, 11367598, 11745229  
For additional patents visit [www.mks.com/patents](http://www.mks.com/patents)

### Product Features

- Reactivates atomic fluorine concentration in foreline to remove powder byproduct
- Cleaning performance ~ 1  $\mu\text{m}$  of  $\text{SiO}_2$  powder removed, over 1 meter of pipe, in 1 minute
- Conductance is equivalent to an open section of pipe for full process transparency
- Plasma source can be heated to 150°C
- Reliable ignition in process gas

The Cleanline system can be installed anywhere in the vacuum line, including at the chamber outlet, where it can improve particle performance. The internal geometry matches the conductance of standard piping and the plasma source can operate at typical foreline temperatures. This system is designed to be completely passive when not powered.



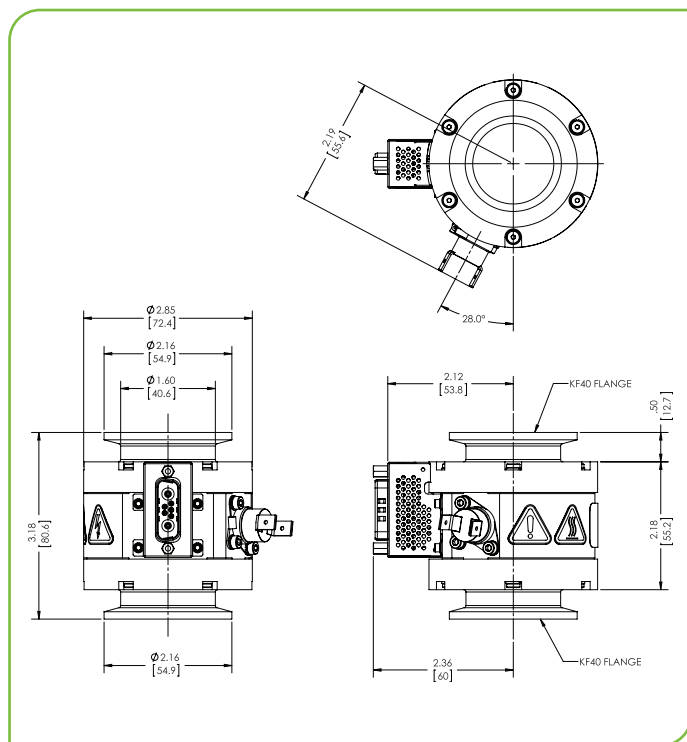
### Key Benefits

- Increase tool uptime and productivity by avoiding foreline preventative maintenance
- Improve particle performance by continuously cleaning the foreline that is closest to the chamber
- Improve chamber matching and wafer-to-wafer matching with a consistently clean foreline
- Reduce EH&S hazards associated with manual foreline cleaning and maintenance
- Operates simultaneously with chamber clean to enable foreline cleaning with no additional  $\text{NF}_3$  consumption

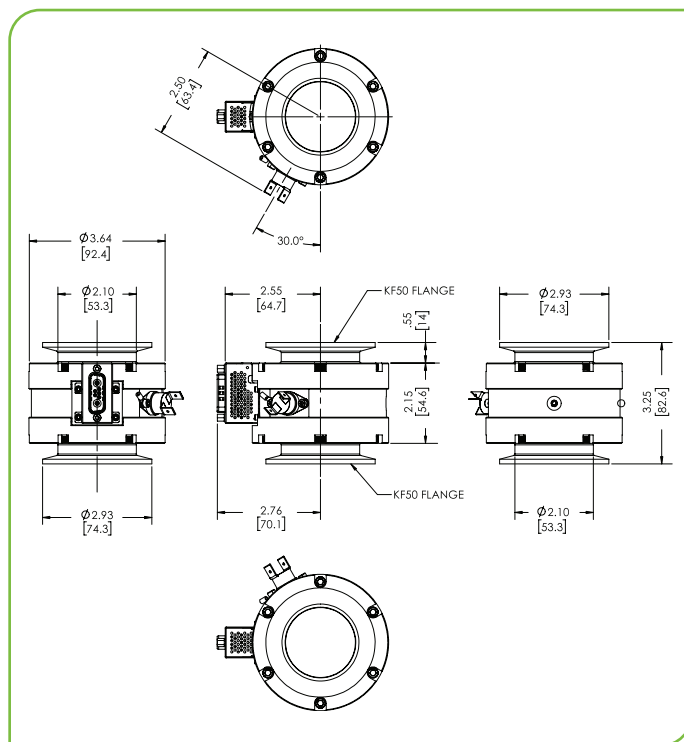
## Specifications

	KF40	KF50	ISO 80 mm
<b>Wetted Materials</b>	<ul style="list-style-type: none"> <li>• 316L Stainless</li> <li>• Aluminum Nitride</li> <li>• Kalrez® 9500</li> </ul>	<ul style="list-style-type: none"> <li>• 316L Stainless</li> <li>• Aluminum Nitride</li> <li>• Kalrez® 9500</li> </ul>	<ul style="list-style-type: none"> <li>• 6061-T6 Aluminum</li> <li>• Aluminum Nitride</li> <li>• Kalrez® 9500</li> </ul>
<b>Flanges</b>	KF40	KF 50	ISO80
<b>Length</b>	3.175" [80.6 mm]	3.25" [82.5 mm]	7.15" [181.6 mm]
<b>Inner Diameter</b>	1.41" [35.8 mm] (same as KF40 pipe)	2.10" [35.8mm] (Same as KF50 pipe)	2.86" [72.64 mm] (same as ISO 80mm pipe)
<b>Max Mechanical Axial Force</b>	200 lbf Tensile or Compressive		
<b>Weight</b>	2 lbs	3.6 lbs	9.5 lbs
<b>Max Mechanical Moment</b>	100 ft*lb	100 ft*lb	200 ft*lb
<b>Max Operating Temperature</b>	< 150°C		
<b>Gas Input: NF<sub>3</sub> or F<sub>2</sub> (with matching Argon flow)</b>	< 3 slm	< 5 slm	< 6 slm
<b>Operating Pressure Range</b>	0.15 - 3 Torr	0.15 – 3 Torr	0.25 – 5 Torr
<b>Plasma Power (fixed)</b>	50 W	50 W	200 W
<b>Plasma Ignition</b>	Any condition within Operating Flow and Pressure window; Optionally 100% Argon ( 0.25 – 5 Torr, < 6 slm)		
<b>Typical Pipe Clean Rate</b>	<ul style="list-style-type: none"> <li>• Up to 20 mg/min SiO<sub>2</sub> powder</li> <li>• ~60 sec/meter of 40mm pipe/μm of SiO<sub>2</sub> powder</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 20 mg/min SiO<sub>2</sub> powder</li> <li>• ~ 60 sec / meter of 50mm pipe / μm of SiO<sub>2</sub> powder</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 100 mg/min SiO<sub>2</sub> powder</li> <li>• ~60 sec/meter of 80mm pipe/μm of SiO<sub>2</sub> powder</li> </ul>
<b>Typical Electrode Lifetime</b>	2000 RF Hours		
<b>Helium Leak Rate</b>	1 e <sup>-9</sup> atm*cc/sec		
<b>Compliance</b>	<ul style="list-style-type: none"> <li>• CE</li> <li>• RoHS 2021</li> <li>• SEMI S2</li> </ul>		

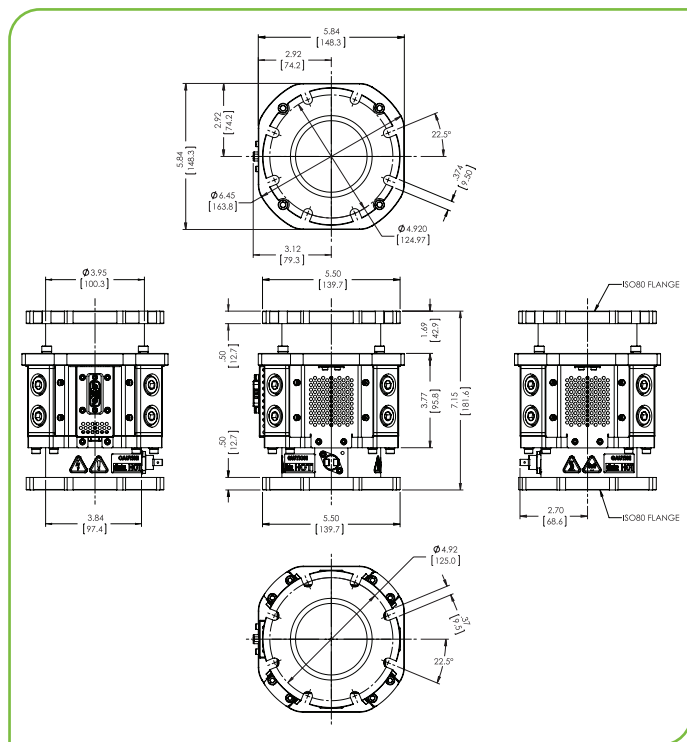
## Dimensional Drawings: 40 mm, 50 mm and 80 mm



40 mm Plasma Source Dimensional Drawing. Shown with KF40 flanges.  
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).



50 mm Plasma Source Dimensional Drawing. Shown with KF50 flanges.  
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

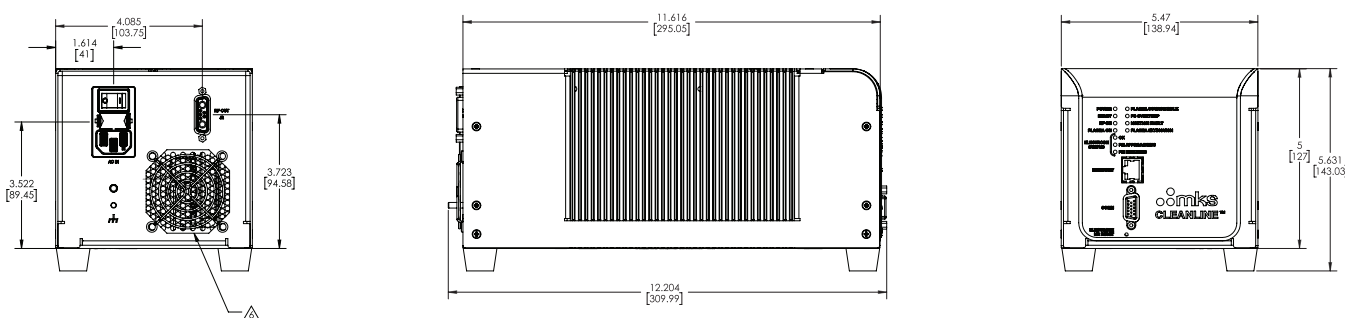


80 mm Plasma Source Dimensional Drawing. Shown with ISO80 flanges.  
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

## Specifications: Power Supply/Controller

	Power Supply Controller
Dimensions	5.5" W x 5" H x 12" D [139.7 mm W x 127 mm H x 304.8 mm D]
Input Power	<ul style="list-style-type: none"> <li>• 100 – 132 VAC 50/60 Hz 6A Service (400W typical)</li> <li>• 200 – 264 VAC 50/60 Hz, 6A Service (switch selectable)</li> </ul>
Ambient Temperature	10° – 40°C Non-condensing
Weight	10 lbs
Cooling	Air Cooled, Rear Panel Fan (requires 2" of clearance)
RF Output	1 Mhz
Interface	24 VDC Discrete Logic <ul style="list-style-type: none"> <li>• Input: Plasma On Command</li> <li>• Output: Ready, RF On, Plasma On, Plasma Fault</li> </ul>
Diagnostics	Ethernet Web Page Diagnostics via Front Panel RJ45

## Dimensional Drawing: Power Supply/Controller



Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).