

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 NF_3 chemistry straight to where process deposits build up, such that they are immediately removed and do not accumulate.

US Patents: 10535506 and 10337105

For additional patents visit www.mksinst.com/patents

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.

Product Features

- Reactivates atomic fluorine concentration in foreline to remove powder byproduct
- Cleanline performance ~ 1 μm of 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



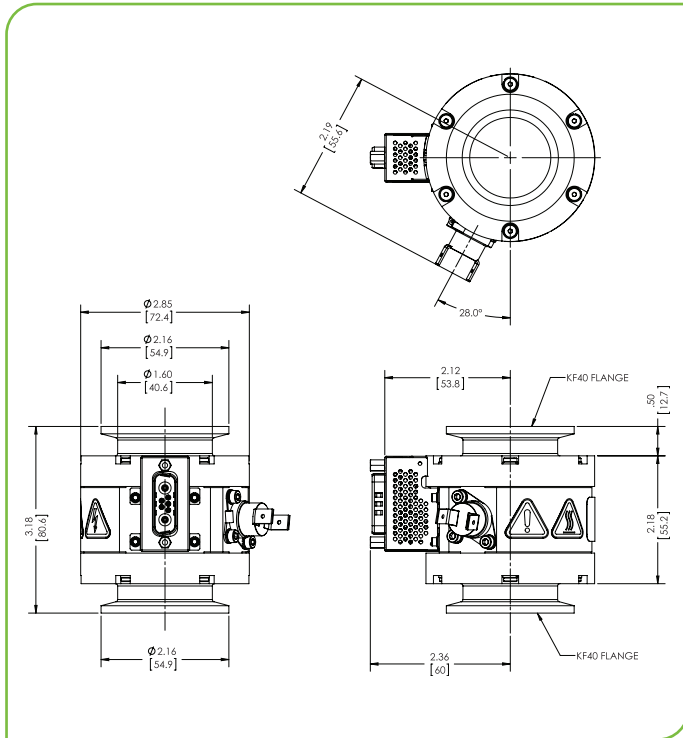
Key Benefits

- 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 NF_3 consumption

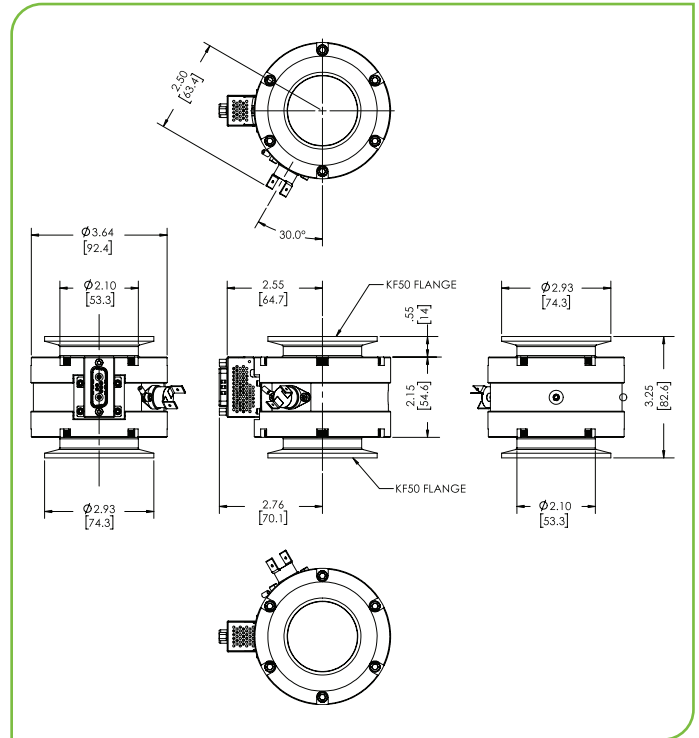
Specifications

	KF40	KF50	ISO 80 mm
Wetted Materials	<ul style="list-style-type: none"> • 316L Stainless • Aluminum Nitride • Kalrez® 9500 	<ul style="list-style-type: none"> • 316L Stainless • Aluminum Nitride • Kalrez® 9500 	<ul style="list-style-type: none"> • 6061-T6 Aluminum • Aluminum Nitride • Kalrez® 9500
Flanges	KF40	KF 50	ISO80
Length	3.175" [80.6 mm]	3.25" [82.5 mm]	7.15" [181.6 mm]
Inner Diameter	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)
Max Mechanical Axial Force	200 lbf Tensile or Compressive		
Weight	2 lbf	3.6 lbf	9.5 lbf
Max Mechanical Moment	100 ft*lbf	100 ft*lbf	200 ft*lbf
Max Operating Temperature	< 150°C		
Gas Input: NF₃ or F₂ (with matching Argon flow)	< 3 slm	< 5 slm	< 6 slm
Operating Pressure Range	0.15 - 3 Torr	0.15 – 3 Torr	0.25 – 5 Torr
Plasma Power (fixed)	50 W	50 W	200 W
Plasma Ignition	Any condition within Operating Flow and Pressure window; Optionally 100% Argon (0.25 – 5 Torr, < 6 slm)		
Typical Pipe Clean Rate	<ul style="list-style-type: none"> • Up to 20 mg/min SiO₂ powder • ~60 sec/meter of 40mm pipe/μm of SiO₂ powder 	<ul style="list-style-type: none"> • Up to 20 mg/min SiO₂ powder • ~ 60 sec / meter of 50mm pipe / μm of SiO₂ powder 	<ul style="list-style-type: none"> • Up to 100 mg/min SiO₂ powder • ~60 sec/meter of 80mm pipe/μm of SiO₂ powder
Typical Electrode Lifetime	2000 RF Hours		
Helium Leak Rate	1 e-9 atm*cc/sec		
Compliance	<ul style="list-style-type: none"> • CE • RoHS 2021 • SEMI S2 		

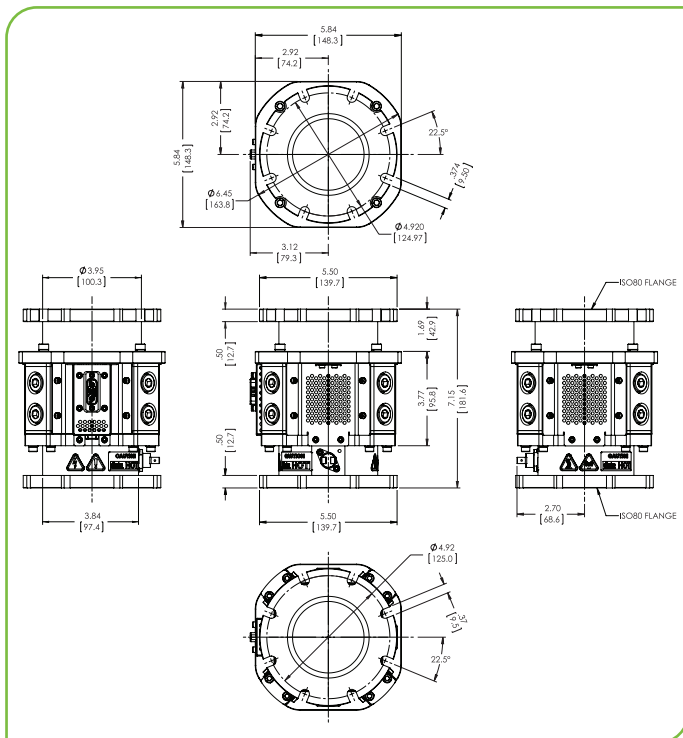
Dimensional Drawings: 40 mm, 50 mm and 80 mm



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).

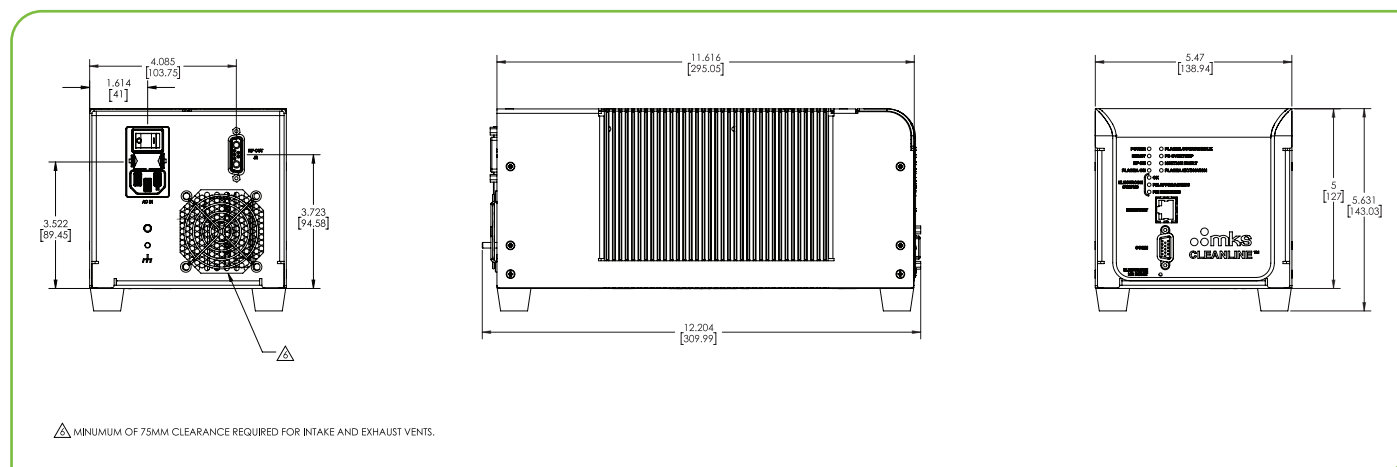


80 mm Plasma Source Dimensional Drawing. Shown with ISO80 flanges.
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

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"> • 100 – 132 VAC 50/60 Hz 6A Service (400W typical) • 200 – 264 VAC 50/60 Hz, 6A Service (switch selectable)
Ambient Temperature	10° – 40°C Non-condensing
Weight	10 lbf
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"> • Input: Plasma On Command • Output: Ready, RF On, Plasma On, Plasma Fault
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).