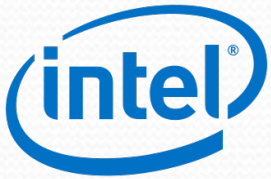
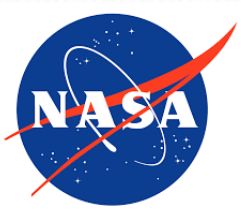
Tergeo plasma cleaners

Versatile tabletop plasma cleaner for R&D and low volume production

Typical customers

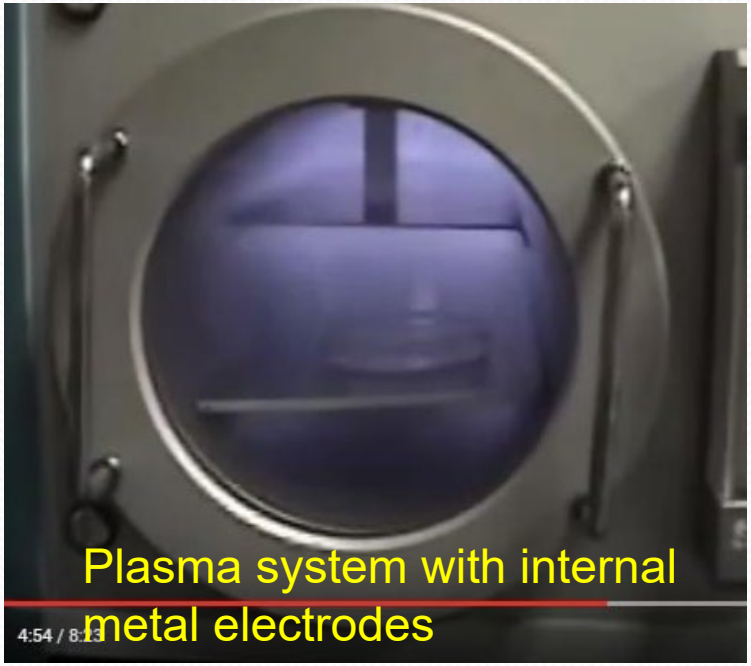


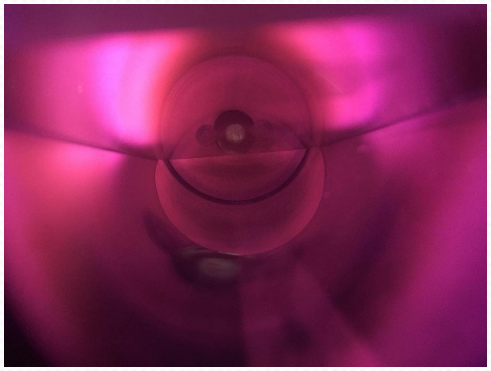


Spec

Items	Feature and Spec
RF power supply	75 watt or 150 watt, 13.56MHz high frequency RF power supply, automatic impedance matching
Sample chamber	Cylindrical quartz chamber (ID:110mm, OD:120mm, Depth 280mm for basic Tergeo; ID160mm, OD170mm, Depth 280mm for Tergeo plus). One rectangular quartz shelf included.
Plasma discharge mode	Capacitive coupled discharge for the direct plasma source. Inductively coupled plasma source as the remote plasma source.
Electrode placement	External rf electrode design to reduce ion sputtering on the metal electrodes.
Source design	Dual plasma sources in one system. Both the traditional direct mode plasma processing and the gentle downstream mode plasma processing in one system
Plasma diagnostics	Realtime plasma intensity sensor for quantitative plasma status monitoring
Gas delivery	One solenoid valve controlled gas input port for chamber venting/purging purpose; two or three additional MFC regulated gas input ports for process gas delivery. All the gas input ports use the standard 1/4" Swagelok tube compression fitting.
Pressure sensor	Premium full range (1e-4 to atm) micropirani pressure sensor from MKS Instruments
Pump	Basic oxygen service oil pump (ultimate pressure <10mTorr) or oill free dry pump. Pump is controlled by the plasma cleaner.
System control	7 inch LCD touchscreen. 20-recipe library. Fully automatic operation. 3-recipe job sequence mode.
Enclosure dimension	W450mm X H250mm X D430mm for basic Tergeo, W500mm X H300mm X D430mm for Tergeo-plus
AC input	Universal 110V~230V AC input 50/60Hz

Better uniformity and lower contamination





Inductive coil antenna design in some low cost plasma cleaner results in bad uniformity

Better uniformity. Plasma discharge technology in Tergeo plasma cleaner originates from the research carried out in the Plasma & Ion Source Technology at the Lawrence Berkeley National Laboratory. The difference in plasma color is because of the different process gas. Tergeo plasma cleaner clearly has much better uniformity. Bad uniformity means bad process control.

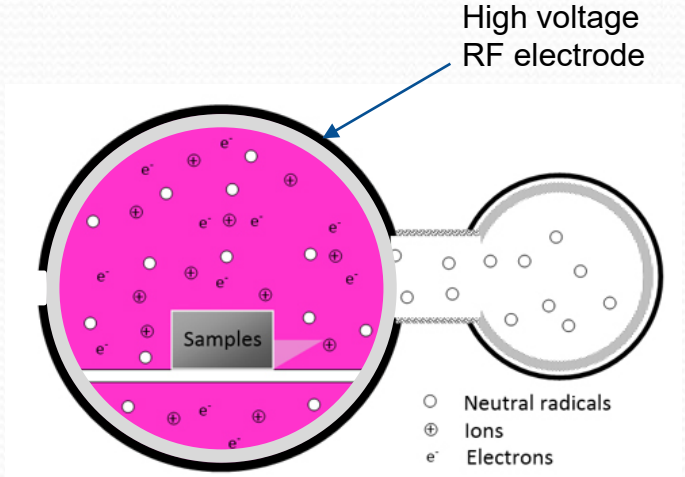
Lower contamination: Electrodes are placed outside of the quartz tube in Tergeo plasma cleaner. Ions can't reach the metal electrodes. If high voltage metal electrode is placed inside the plasma chamber, ions will be accelerated to high energy and sputter metal out of the electrodes. Metal will then deposit onto the samples and cause metal contamination issue. Metal sputtering contamination issue is especially severe if KHz rf power supply is used to generate the plasma.

Tergeo vs other plasma cleaners

High voltage rf electrode is placed outside the plasma chamber in Tergeo system. It results in better plasma uniformity and less contamination.

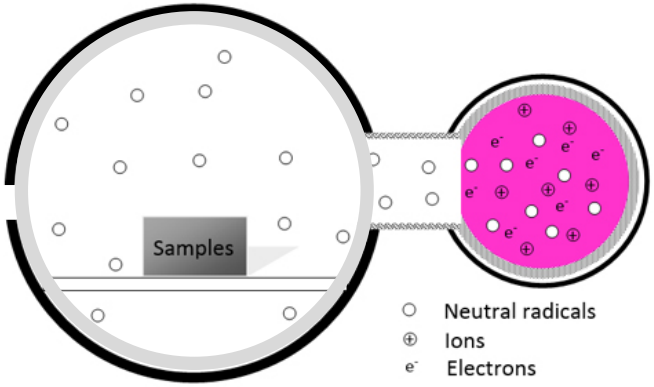
Tergeo

Direct mode



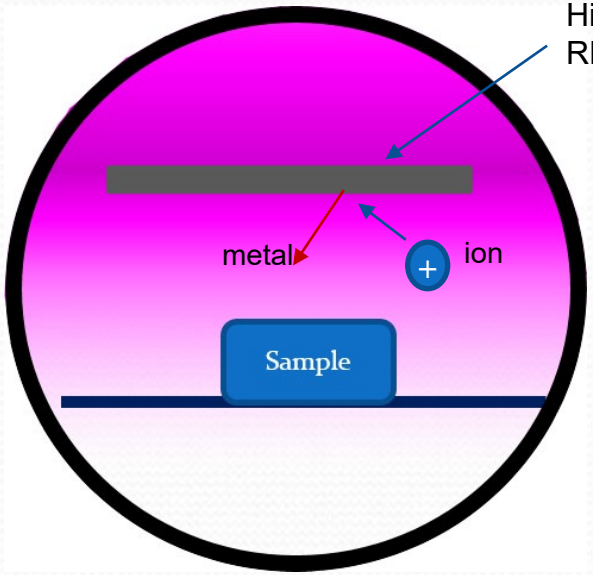
Better uniformity, no metal contamination

Downstream mode



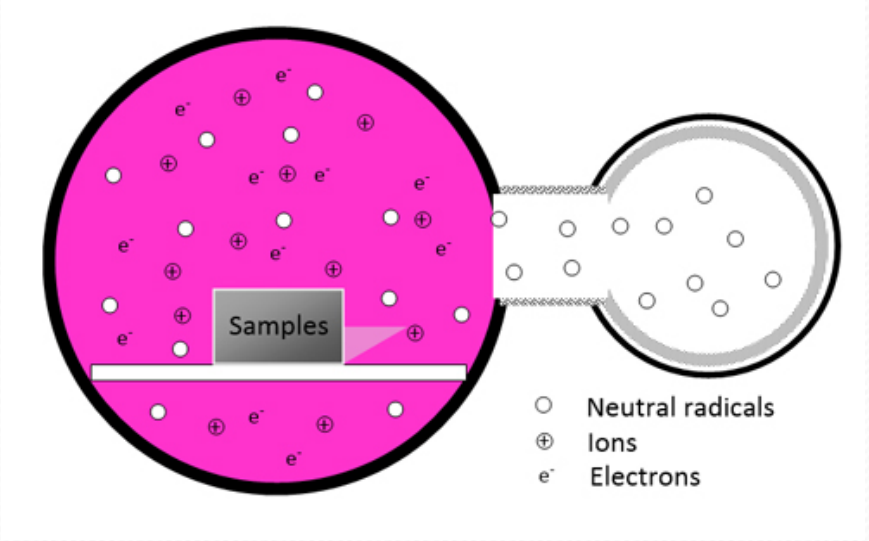
Gentle ion-free chemical reaction

Competitors

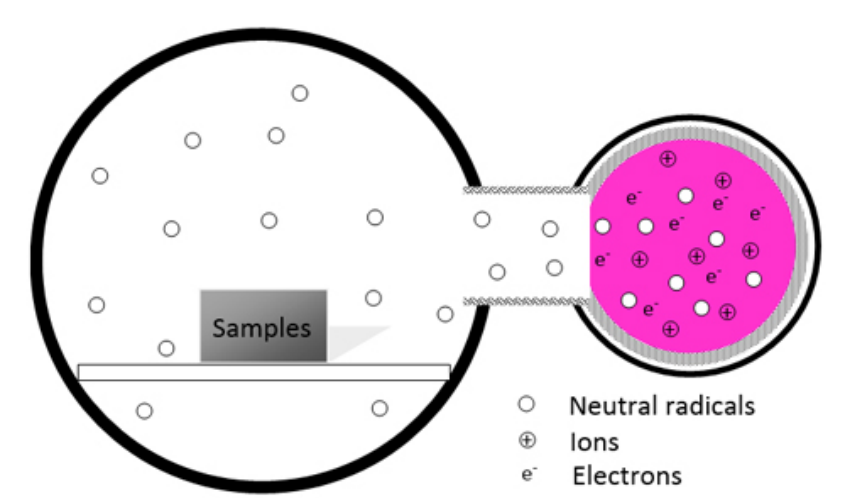


High voltage rf electrode in the plasma attracts high energy ions and cause metal sputtering contamination on the samples

Direct vs downstream cleaning modes

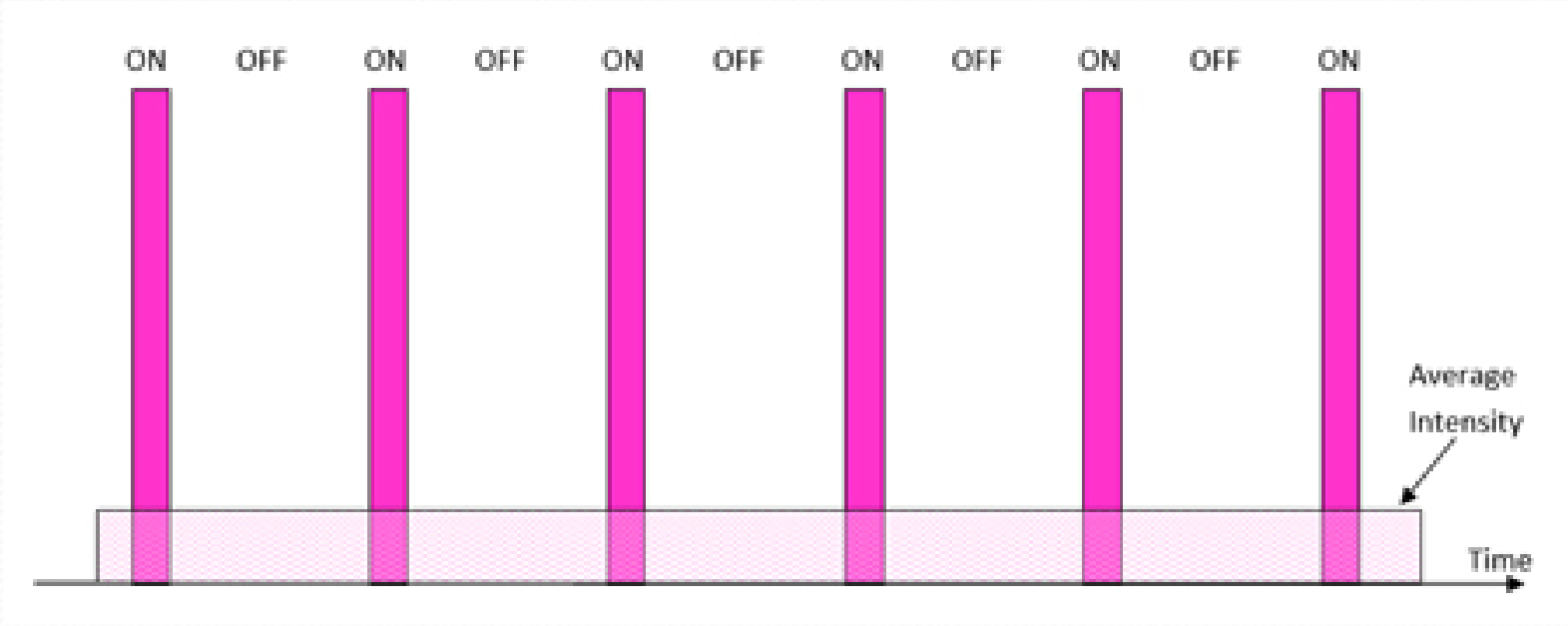


Direct/immersion mode plasma cleaning
Plasma is generated in sample chamber
Samples are immersed in plasma
Samples are subject to chemical reaction with radicals and energetic ion sputtering



Remote/downstream mode plasma cleaning
Plasma is generated outside sample chamber.
Samples are not immersed in energetic plasma
Only gentle chemical reaction takes place on sample surface.
No energetic ion sputtering. No sample damage due to excessive heating, charging and ion bombardment.

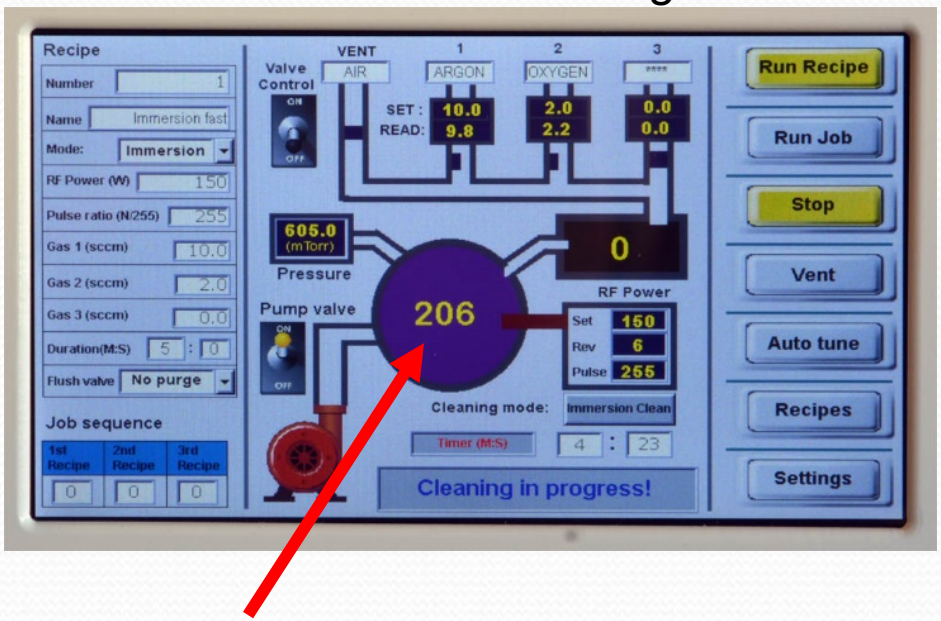
Pulsed mode operation



Low duty cycle pulsed mode operation can significantly reduce average plasma intensity for delicate samples.

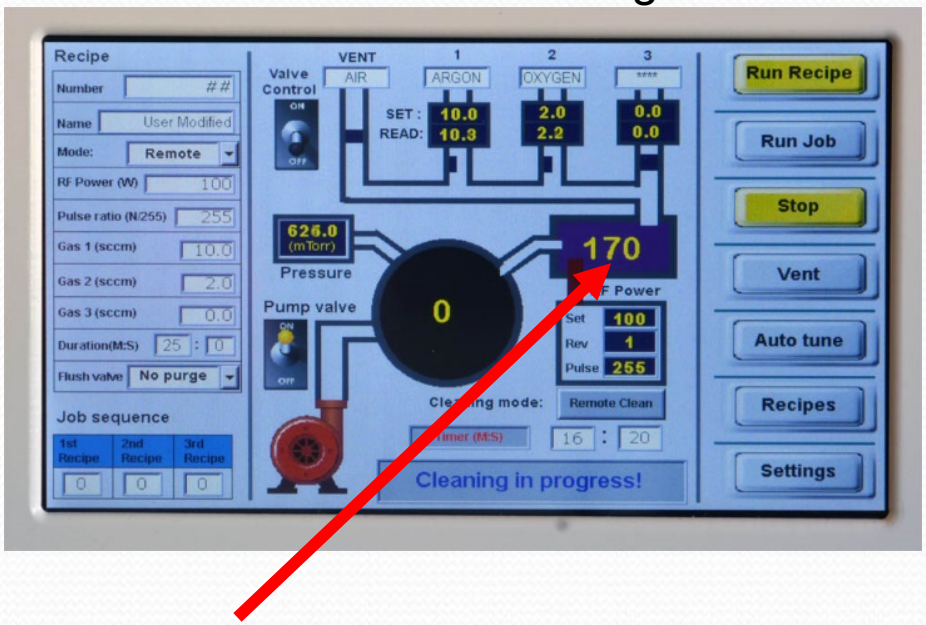
Dual plasma source and dual sensor

Direct/immersion cleaning mode



Plasma generated in the sample chamber. Plasma strength reading is 206

Remote/downstream cleaning mode



Plasma generated in the remote plasma source. Plasma strength reading is 170

Take the guesswork out of plasma cleaning. Plasma sensor tells the user exactly how strong the plasma is. User can use the quantitative plasma strength measurement as feedback to adjust gas flow rate and rf power for desired cleaning speed. User doesn't need to be plasma expert to set up right cleaning recipe for different samples.

Intuitive design and easy to use

- Two different user interface: LCD touchscreen user interface and PC remote control user interface.
- Intuitive user interface. Easy to use. No extensive training required.
- Fully automatic operation. Supports 60 recipes. One button to start. Repeatable and reliable results.
- Recipe lock/unlock function to prevent unintended modification of the optimized recipes. Essential features for production runs and for shared facility.
- Smart system self-diagnostic. Notify user the operation tips, system status and problems on the LCD screen or PC user interface.

Supports total 20 recipes

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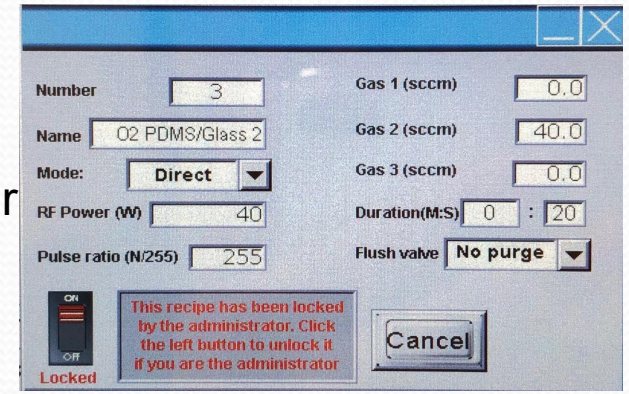
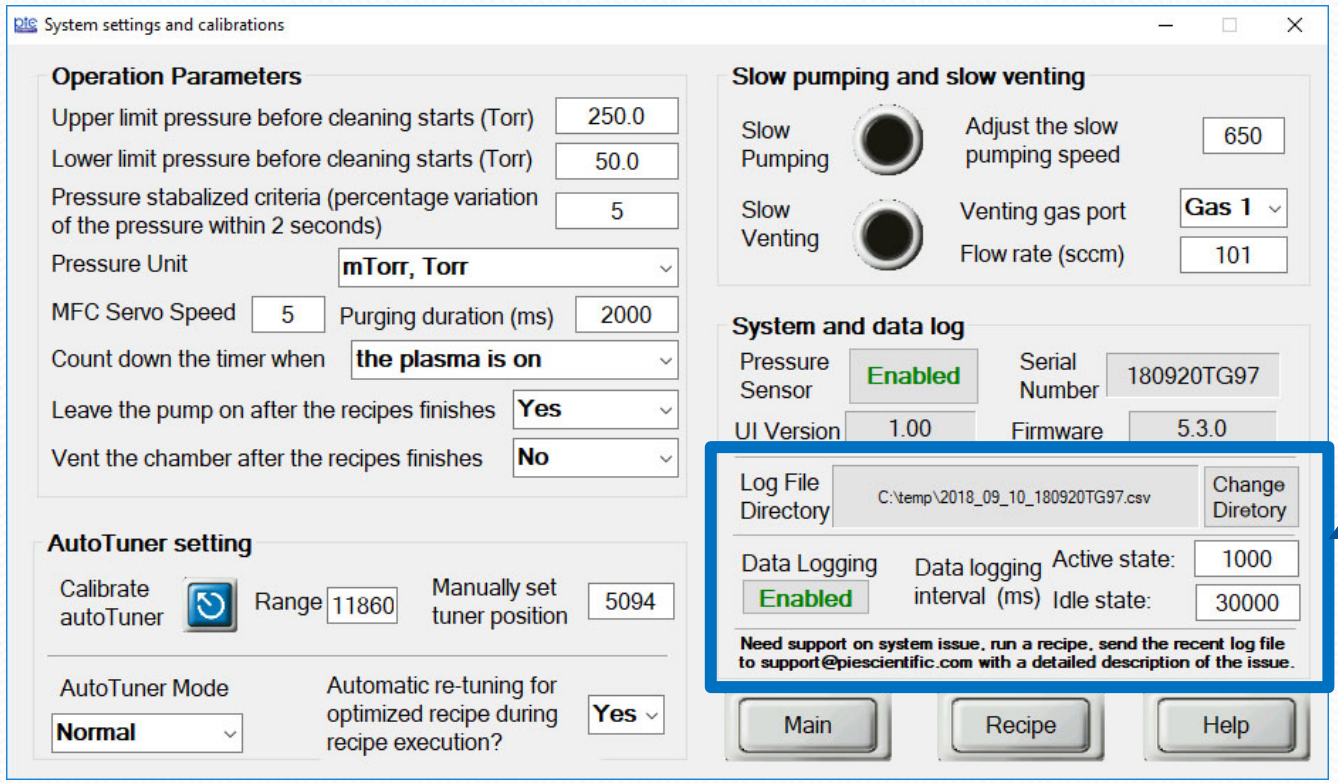
#	Recipe Name	Mode Selection	Power (Watt)	Duty Ratio	Gas 1 (sccm)	Gas 2 (sccm)	Gas 3 (sccm)	Duration (M:S)	Purging Gas	Tuned? (Y/N)
1	Pure Argon	Immersion	150	255	3.0	0.0	0.0	2 : 0	No	Yes
2	Pure Oxygen	Immersion	150	255	0.0	2.0	0.0	2 : 0	No	Yes
3	Low power mix	Immersion	25	255	5.0	2.0	0.0	2 : 0	No	Yes
4	Medium pow. mix	Immersion	75	255	5.0	2.0	0.0	2 : 0	No	Yes
5	High pow. mix	Immersion	150	255	2.0	2.0	0.0	2 : 0	No	Yes
6	Remote mix MP	Remote	75	255	5.0	2.0	0.0	2 : 0	No	No
7	Remote MIX HP	Remote	150	255	20.0	3.0	0.0	2 : 0	No	No
8	Remote O2 HP	Remote	150	255	0.0	2.0	0.0	2 : 0	No	No
9	Remote Ar LP	Remote	25	255	10.0	0.0	0.0	2 : 0	No	No
10	Low power O2	Immersion	25	255	0.0	1.0	0.0	2 : 0	No	Yes

Recipe can be locked for production



System log and run record

1. The capability to keep a run log is essential for some bio-medical, pharmaceutical and defense industries.
2. The PC control software provided by PIE Scientific LLC can save the system parameters and run logs in to a CSV file. The CSV file can easily be processed in excel.
3. PC communicates with Tergeo through an RS232 serial port. An regular USB port on PC can be easily converted to an RS232 port using an USB-RS232 converter. Then the user can simply connect the PC and Tergeo with a D-sub 9 cable and an USB-RS232 converter.



How do we support customers all over the world?

More than 70% of our sales are international export. Our customers cover North America (U.S.A and Canada), U.K., E.U (such as Germany, France, Sweden, Netherlands, etc.), Asia (Japan, S. Korea, China, Hong Kong, Taiwan, Singapore, Malaysia, Thailand, and India), Australia, New Zealand, and Israel. Reliability is the No.1 priority in our system design. Additionally, our system is designed to be easy to support globally. Here are several advanced features designed for easy to support and service.

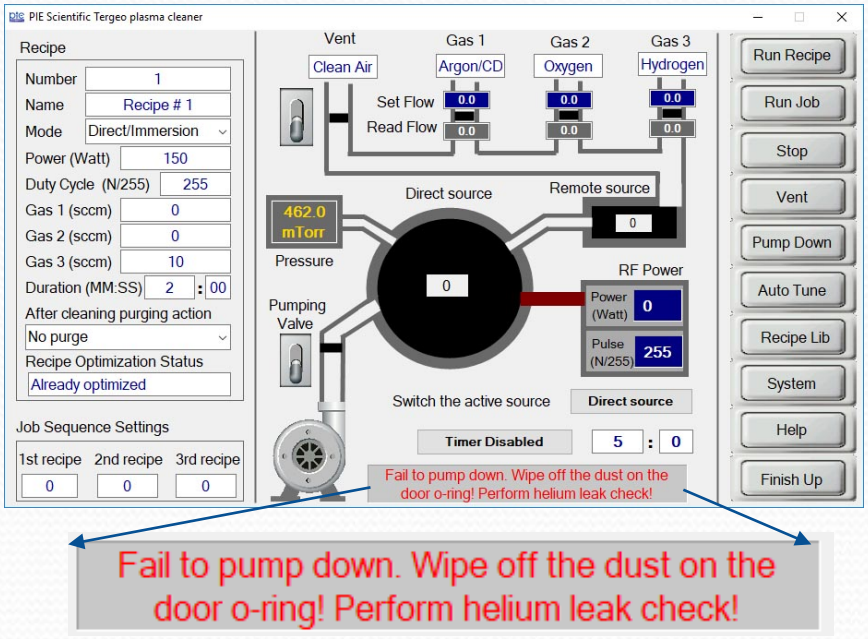
1) Smart system self-diagnostics capability. The system constantly monitors the status of each sub-components. If it detects an issue, it will display a message on the LCD touchscreen display and prompt user what to do.

2) Remote control of the Tergeo plasma system from our U.S. headquarter. Tergeo system can be operated from an external computer. We can log onto the computer at the customer site from the United States to operate the machine and figure out any issues. Skype is one of the remote access platforms.

3) PC control software for Tergeo keeps a system status log. The customer can just send us the log file for us to figure out any system issue.

4) Remote video support through Skype or Facetime. We can view the LCD touchscreen of the Tergeo system and figure out any issue. We can also guide the user to service and repair the system through remote video support.

Smart system self-diagnostics

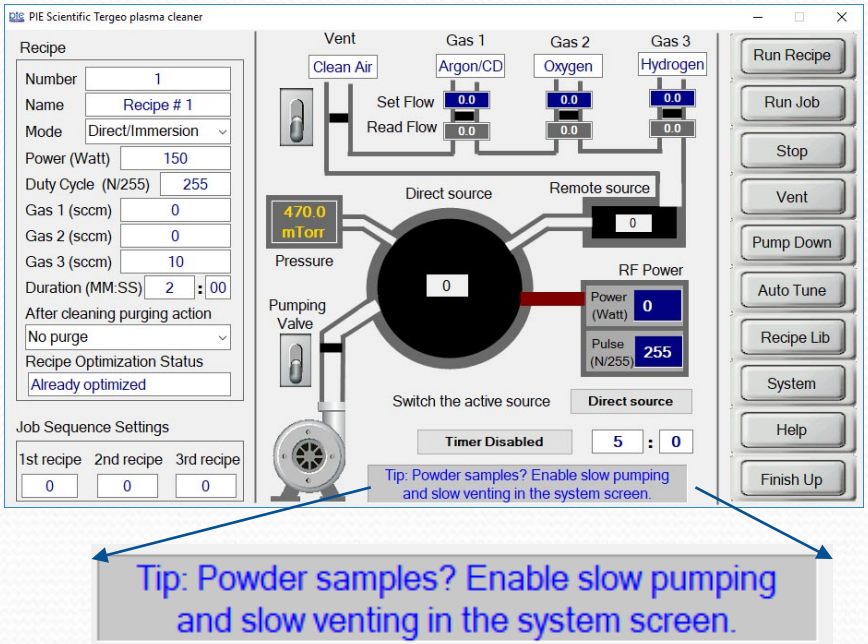


Fail to pump down. Wipe off the dust on the door o-ring! Perform helium leak check!

System self-diagnostics:

The system constantly monitors the status of each sub-components. Once it detects an issue, it will display a message on the LCD touchscreen display and prompt user what to do.

For example: one of the previously most reported issue from our customer is the dust particles on the door o-ring that cause vacuum leak. It can be easily resolved by wiping off the dust with a lint free wipe. The MKS pressure sensor used in Tergeo is sensitive to helium gas. Spraying helium gas around the vacuum joint can detect the leak point.



Tip: Powder samples? Enable slow pumping and slow venting in the system screen.

System operation guide:

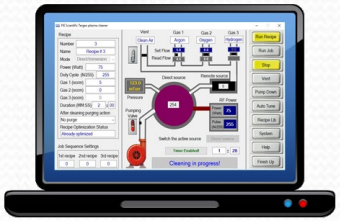
When the system is in the idle state, the status display window will cycle through pre-stored tip messages and help the user to get familiar with the system faster.

System can also detect how the system is being operated (such as manual mode or recipe mode). It will provide suggestion on how to operate the system in the optimal method based on how the system is being used by the operator.

Remote support methods

Method 1: remotely access the machine from the U.S. headquarter in the Silicon Valley

Customer site: Control the Tergeo with a PC



U.S. headquarter: remotely control the Tergeo through skype or Teamviewer remote screen sharing.

Method 2: remote video support through Skype or Facetime

View the machine in real-time to guide the user to troubleshoot the issue.

Method 3: Upload the data log file to the U.S. headquarter for analysis