

**Appendix: Preventative Maintenance Schedule**

This section highlights some preventative maintenance items that have presented themselves on systems in the past. In many cases by following the guidelines provided system downtime can be reduced. Operators are encouraged to contact Customer Service at Angstrom Engineering with any concerns or suggestions on additions they may have.

<b>Interval</b>	<b>Maintenance</b>	<b>Spare Part Required</b>	<b>Vendor/Solution</b>
<b>Weekly</b>	Degas Ion Gauge (Granville-Phillips only)		Consult Angstrom if fails continuously
<b>Monthly</b>	Back up Inficon .mdb database and .ini settings files		Use CD burner or memory stick
	Sweep computer with antivirus software	Antivirus software	Customer preference
	Check for PC updates	Internet connection	Microsoft website
	Inspect/wipe door o-rings	O-ring – Spare parts list	Angstrom Engineering/Replace if damaged
	Check rough pump oil levels	Rough pump oil	Local supplier or Angstrom Engineering
	Check cryo pump helium pressure	Charging equipment	Austin Scientific
	Clean debris shields/replace foil	Solvents or blast cabinet/foil	Allfoil.com
	Check house pneumatic pressure		May not apply to in-house supply
	Check water flow/level		Requires a flow meter in return line/water level for closed system
	Check purge/vent gas flow	Inspect regulator/purchase or exchange bottle	May not apply to in-house supply
	Check process gas flow	Inspect regulator/purchase or exchange bottle	Local gas supplier
<b>6 Months</b>	Pump down and rate of rise test		Use Data logging feature in control software
	Check for water leaks		Open cabinet/visual inspect fittings

Interval	Maintenance	Spare Part Required	Vendor/Solution
Annually	Inspect rough lines/water lines		Replace if worn or frayed
	Inspect power cables/cords		Replace if worn or frayed
	Ensure all resistive transformer secondary cable connections are tight		Check for discoloration due to heat/tighten connection or replace cable. Consult Angstrom Engineering.
	Regenerate cryo pump	Purge gas must be on! Perform overnight	Interval From last time regenerated or pump was at room temperature.
	Change rough pump oil	Rough pump oil	Once a year is better than never. For all rotary vane pumps.
	Replace Cryo pump Adsorber	Cryo Adsorber - Spare parts list	CTI/Austin Scientific
	Clean Chamber rough valve	Isopropyl alcohol/swabs	Vent chamber/Remove valve/unplug rough pump/turn on pump and open the valve/clean valve seat and area around it with swabs and alcohol
	Clean Cryo foreline valve	Isopropyl alcohol/swabs	Vent cryo/Remove valve/unplug rough pump/turn on pump and open the valve/clean valve seat and area around it with swabs and alcohol
	Clean Cryo pump purge/overpressure valve	Isopropyl alcohol/swabs	To be done during a regeneration when the pump is warm and at room temperature. Poppet valve simply unscrews from the pump. Carefully wipe clean with swabs/wipes and alcohol the o-rings and the seal faces. Valve/poppet may be contained in a fitting to allow gas to be plumbed to exhaust.
	Back flush water through system	Rags to catch spills/bucket	For house water simply remove supply line and connect to return side of system. Collect water and debris in a vessel and dump in drain. Do not reverse flush back into house system. If closed loop is used same applies. Add more water to closed loop afterwards or drain and start with fresh water.
Add anti-fungal/algae solution to cooling water	Anti-fungal/algae solution or bleach	Prohibits growth of algae or fungus in water lines for closed loop systems.	
Replace water supply filter	Filter element	Open and closed loop water supplies should have a filter in a cartridge that can be replaced at regular intervals. Recirculating chillers usually have filters or screens as well that need to be cleaned out. If filters are badly clogged decrease	

Interval	Maintenance	Spare Part Required	Vendor/Solution
	Computer maintenance		interval to 6 months.
	Clean chamber viewports	Solution of acid	Perform a clean and defragmentation on the drive. Clean the air inlet filter on the front of the computer. Wipe away any deposited materials from interior of Pyrex viewports.
<b>Every 2 years</b>	Replace glove box HEPA filters	HEPA filters	Glove box supplier
	Inspect all glove box gloves for holes	Glove box gloves	Glove box supplier
	Calibrate Capacitance manometers and flow meters/controllers		Typically a local MKS distributor or consult Angstrom Engineering
	Calibrate Glove Box Sensors Clean flow switches	Wipes/flow switch face o-ring seal	Consult glove box manufacturer Drain/blow out water from system. Open face of flow switch carefully by turning counter clockwise. Remove paddle and wipe housing and cover clean.
	Replace door o-rings	Door o-ring - Spare parts list	Angstrom Engineering. Extreme care must be taken to not scratch seal face under o-ring. Use plastic tools to remove.
<b>Every 3 years</b>	Overhaul rough pumps	Overhaul kit	Use local supplier or PTB Sales. Applies to glove box pumps as well.
<b>Every 5 years</b>	Replace cryo pump array	Cryo pump array	CTI or PTB Sales. Consider having pump overhauled or exchanged depending on how the pump is running at the time.
	Clean cryo gate valve/transfer gate valve(s)	Hand tools/alcohol/wipes	Remove bonnet and slide gate from valve. Depending on system configuration this may be very easy, or require removal of cryo pump and gate valve to perform.