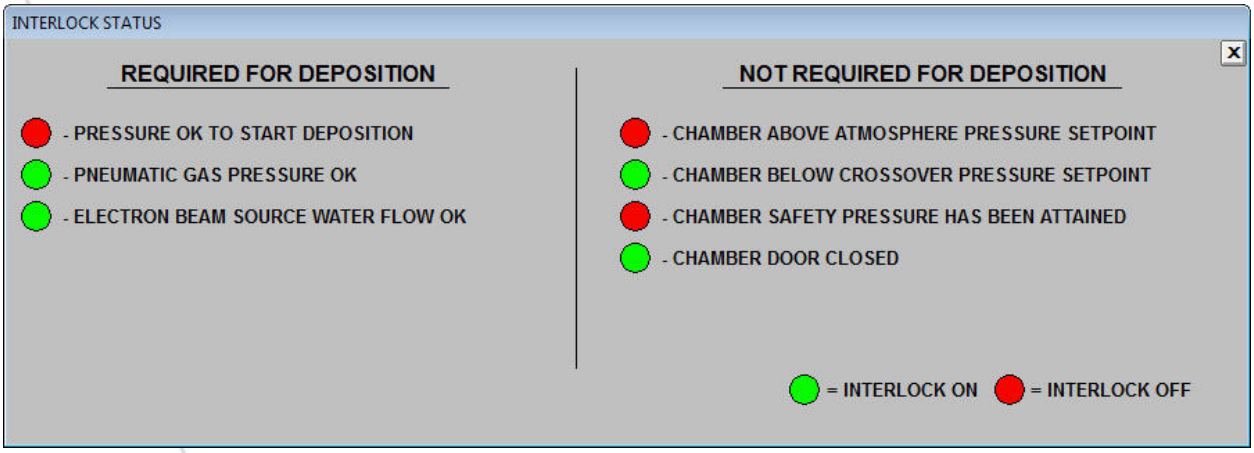
Chapter 9 – Interlocks and Setpoints

Note that all interlocks on the left hand side of the system interlocks window are required for deposition to start. If the operator is attempting to run a deposition and it aborts shortly after starting, a quick look at this interlock window may show why. Almost all of the interlocks are setpoints relating to pressures. All of these setpoints are explained in the following section pertaining to the pressure setpoint values. Interlocks that are not pressure setpoints are explained next.



Pressure OK to Start Deposition

The pressure OK to Start Deposition indicator indicates when the chamber pressure has been low enough to achieve both the chamber base pressure and chamber deposition base pressure setpoints. These pressure setpoints are described in further detail in the following section. The chamber base pressure setpoint must be achieved during the chamber pump down sequence or regeneration sequence with chamber pump down. This setpoint is typically lower that the deposition pressure setpoint. The pressure in the chamber must be lower than the chamber deposition pressure setpoint before an Inficon deposition is allowed to start. Once the deposition software is running a process the pressure in the chamber is allowed to rise as high as the chamber safety pressure setpoint before the process will be aborted. This allows for higher chamber pressures during sputtering and for out gassing materials during normal evaporation depositions.

Pneumatic Gas Pressure OK

This interlock is a pneumatic pressure switch mounted just inside the bulkhead feed through marked, “PNEUMATIC GAS” on the system utility panel. This normally open pressure switch has been set to close at approximately 60 PSI. The purpose of this interlock is to ensure that there is enough pneumatic gas pressure to operate valves, especially gate valves and foreline valves on turbo pumps, at all times. If the system loses pneumatic pressure and the switch opens, a low pneumatic pressure alarm is shown. There is a 5 second timer to account for short term pressure variations below

the switch setpoint. The indicator shows green when the actual pressure is higher than the setpoint.

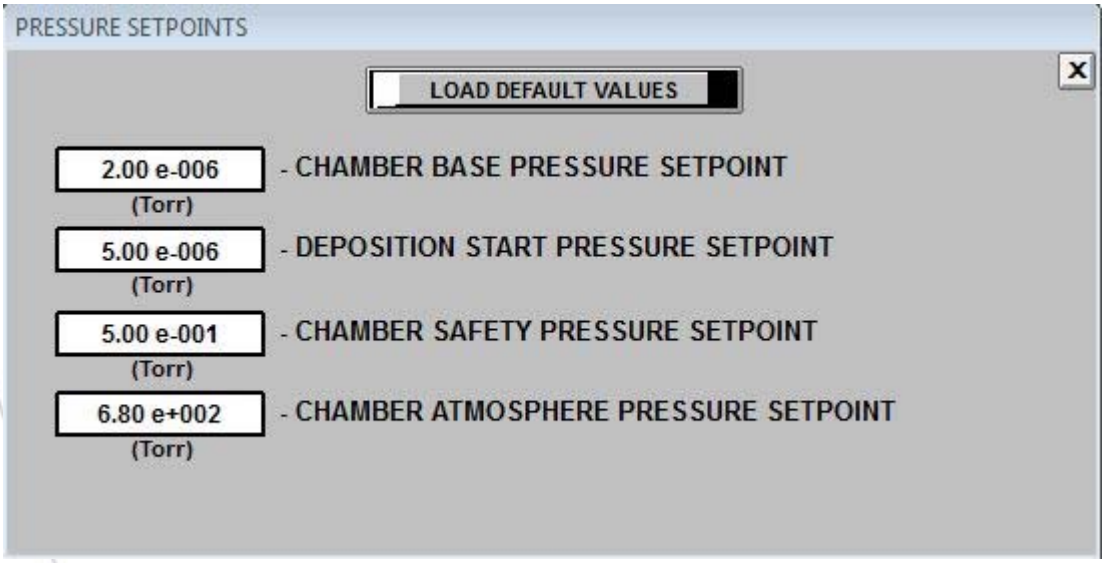
Electron Beam Source Water Flow OK

The electron beam source requires water cooling during operation. A flow switch is connected to the water return line from the e-beam to the water return manifold. The switch has a settable normally open contact for water flow. When there is sufficient water flow the contact in the flow switch closes, and the interlock is made. The red and green LEDs on the front of the flow switch inside the cabinet illuminate when sufficient flow is achieved and the switch is closed. These LEDs can be observed if the rear panel on the cabinet is removed. The source must have flow to operate.

Chamber Door Closed

A safety rated switch is mounted next to each chamber door and is activated by the door opening and closing. The switch is magnetic and contacts close inside the switch when the door closes, and open when the door is opened. The primary function of the switch is to ensure the door is closed when the operator wishes to pump down the chamber. The front door must be closed to seal the chamber, or the roughing pump could pump on the glove box environment (where applicable). An alarm is produced when the door is open, however the alarm 'automatically acknowledges' and resolves itself once the door is closed again. The deposition sources are electro-mechanically disabled by the door switch(s) and as such cannot operate in any way with a chamber door open for safety. The indicator shows green when the door is physically closed.

Pressure Setpoints



User settable pressure setpoints are found on the pressure setpoints page. Others are found on the vent options page. Note that users logged in at the Supervisor level only are allowed to make changes to the values. They may also load default values at any time by clicking on the load default values button.

Chamber Base Pressure Setpoint

The chamber base pressure is a user settable setpoint triggered from the Granville-Phillips chamber gauge module. This pressure setpoint must be achieved during the initial pump down along with the Deposition Start Pressure Setpoint before deposition can take place. Note that after the Chamber Base Pressure setpoint has been achieved the Deposition Start Pressure Setpoint is used for subsequent deposition starts. When pumping down using the chamber pump down sequence, the time it takes from the moment the turbo is started until the pressure is less than the chamber base pressure must be less that the base pressure time delay setpoint. If the time exceeds the timer setpoint a fault is issued, the rough and turbo pumps are stopped and the foreline valve is closed. The indicator shows green when the base pressure has been achieved (low enough) at least once and the system has not been vented.

Deposition Start Pressure Setpoint

The deposition start pressure set point is a user settable setpoint triggered from the Granville-Phillips chamber gauge module. This pressure setpoint must be achieved before a deposition can start. Unlike the chamber base pressure set point this pressure must be achieved before each deposition process is started where as the chamber base pressure set point is only reached once during the initial pump down. Note that after the set point has been achieved it is ignored during deposition, allowing for pressure

fluctuations from out gassing materials, and partial pressures during a sputter operation (if applicable).

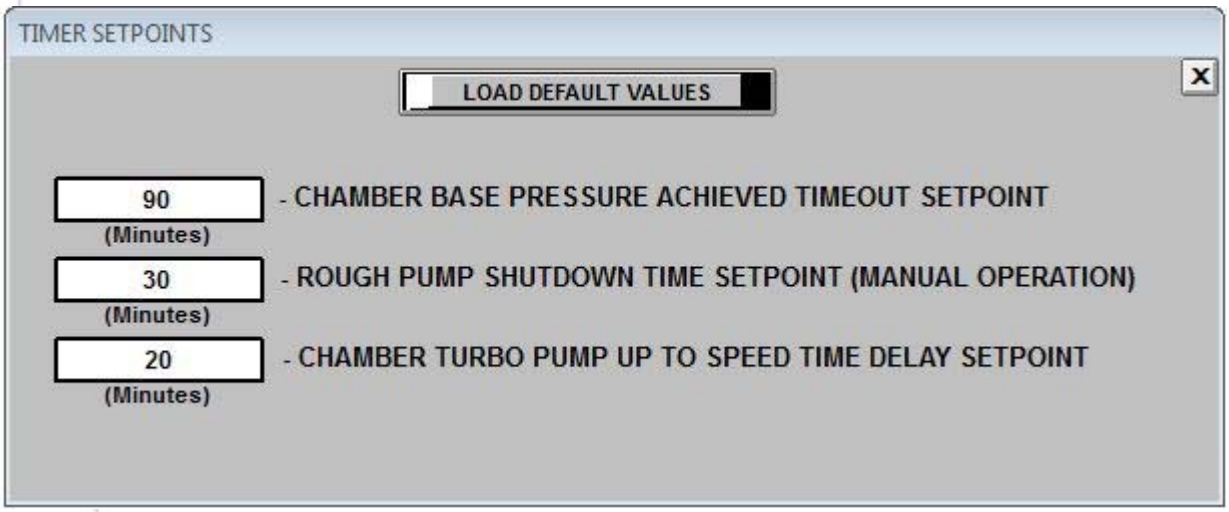
Chamber Safety Pressure Setpoint

The chamber safety pressure is also a user settable pressure setpoint, and it is triggered from the chamber gauge. This setpoint is not considered until the chamber achieves the base pressure setpoint. Then, if the pressure in the chamber ever rises to this pressure setpoint, the turbo and rough pumps are stopped, the foreline valve is closed and a fault is shown. This setpoint must be higher in pressure than the chamber crossover pressure setpoint. The indicator is green when the actual pressure in the chamber is lower than the safety pressure setpoint.

Chamber Atmosphere Pressure Setpoint

The chamber atmosphere pressure setpoint is a user settable setpoint triggered from the chamber gauge. This is the pressure that the chamber must achieve in manual operation, or during a chamber vent sequence before the gate valve to load lock can be opened. The indicator is green when the actual pressure in the chamber is higher than the atmosphere setpoint.

Timer Setpoints



User settable timers for the chamber are found on the timer setpoints page. Note that users logged in at the Supervisor level only are allowed to make changes to the values in this window. They may also load the default values at any time by clicking on the load default values button.

Chamber Base Pressure Achieved Timeout Setpoint

This timer represents the maximum time it can take for the chamber to reach the chamber base pressure setpoint from the time the turbo pump starts during an automatic sequence.

Rough Pump Shutdown Time Setpoint (Manual Operation)

This timer represents the maximum allowable time the rough pump can be left on while in manual mode without the foreline valve open. Designed primarily for rotary vane applications, it simply doesn't allow the rough pump to be left on for an extended period of time without the foreline valve open.

Chamber Turbo Pump Up to Speed Time Delay Setpoint

This timer represents the maximum allowable time the turbo pump can take to achieve the up to speed setpoint during a full pump down or when the turbo is turned on manually.