

# DENTON VACUUM DESK V OPERATING MANUAL

## DESK V - SPUTTER/ETCH UNIT AND ACCESSORIES



**Desk V**



**Desk V TSC**

DENTON VACUUM, LLC  
1259 N. CHURCH STREET  
MOORESTOWN, NJ 08057  
PHONE: 856-439-9100  
FAX: 856-439-9111  
[WWW.DENTONVACUUM.COM](http://WWW.DENTONVACUUM.COM)

Revised 12/2013 RDM

# Table of Contents

<b>INTRODUCTION</b>	<b>4</b>
GENERAL DESCRIPTION	4
SYSTEM VIEWS	6
FRONT VIEW OF UNIT	6
REAR VIEW OF UNIT	7
ELECTRICAL REQUIREMENTS	8
DESK V & DESK V TSC	8
CARBON ROD ACCESSORY AND CARBON YARN ACCESSORY	9
ENVIRONMENTAL CONDITIONS	9
OPTIONS	10
ROTATION	10
THICKNESS MONITOR	10
CARBON ROD EVAPORATION	10
CARBON YARN EVAPORATION	10
<b>SAFETY WARNINGS</b>	<b>11</b>
SAFETY SYMBOLS	12
<b>UNPACKING &amp; SETUP</b>	<b>12</b>
SYSTEM	12
<b>INSTALLATION</b>	<b>14</b>
BACKPANEL LAYOUT	14
CHAMBER PREPARATIONS	17
MECHANICAL PUMP INSTALLATION	18
TARGET INSTALLATION & REPLACEMENT	20
<b>INITIAL START-UP</b>	<b>21</b>
INSPECTION	21
START-UP PROCEDURE	22
OPENING THE CHAMBER	23
<b>DESCRIPTION OF CONTROLS</b>	<b>24</b>
SYSTEM START SCREEN	24
SCREENS	25
TIMED SPUTTER	29
<b>DESK V TIMED RECIPE PROGRAMMING</b>	<b>32</b>
<b>HOW TO CREATE AND STORE A PROGRAMMED RECIPE</b>	<b>33</b>
How to Use Timed Recipe Programming	33
TIMED SPUTTER RECIPE PROGRAMMING VALUE SELECTIONS	34
TIMED ETCH RECIPE PROGRAMMING VALUE SELECTIONS	34
MANUAL ETCH	35
TIMED ETCH	37
OVERVIEW	39
<b>OPERATION</b>	<b>41</b>
ETCH	42
SPUTTER	41
TIMED ETCH OPERATION	43

TIMED SPUTTER OPERATION.....	44
SHUT-DOWN PROCEDURE .....	46
OPTIONS .....	46
<i>QUARTZ CRYSTAL MONITOR</i> .....	46
<i>DESK V TSC</i> .....	47
<i>CARBON ROD ACCESSORY</i> .....	48
<i>CARBON YARN ACCESSORY</i> .....	51
<b>MAINTENANCE .....</b>	<b>53</b>
GENERAL MAINTENANCE.....	53
MECHANICAL PUMP.....	53
<i>MECHANICAL PUMP – OIL CHANGE</i> .....	54
<i>TOOLS REQUIRED</i> .....	54
SPUTTER TARGET .....	54
<i>TOOLS REQUIRED</i> .....	54
<i>INSTRUCTIONS</i> .....	54
PLASMA PROBLEMS.....	55
<b>TROUBLESHOOTING .....</b>	<b>56</b>
<b>VACUUM PERFORMANCE DATA SHEET .....</b>	<b>58</b>
<b>USED TARGET .....</b>	<b>59</b>
<b>TYPICAL PERFORMANCE DATA .....</b>	<b>60</b>
PUMPDOWN .....	60
DEPOSITION RATE .....	63
<b>PACKING DESK V FOR RETURN .....</b>	<b>66</b>
PACKING PHOTOS.....	67
FUSES.....	69
CONSUMABLES FOR CARBON ROD ACCESSORY .....	70
CONSUMABLES FOR CARBON YARN ACCESSORY .....	71
TARGETS FOR DESK V AND TSC.....	72
ADJUSTING THE VACUUM SAFETY BELLOWS SWITCH .....	73
<i>Emergency Stop Button</i> .....	74
<i>Battery Advisory</i> .....	74

---

# INTRODUCTION

## GENERAL DESCRIPTION

The Denton Vacuum DESK V Cold Sputter/Etch Unit is designed to deposit a conductive coating on an SEM sample and to provide some limited surface cleaning in some models.

A standard 6" diameter **Pyrex Cylinder** with top and bottom seals sits on an aluminum **Baseplate**. Metal chamber is optional with Turbo Pump option (TSC).

A two-stage, direct-drive Mechanical Pump mounted in the cabinet evacuates the cylinder. Turbo molecular pump is optional (TSC).

An automatic **Vent Valve** is slaved to the mechanical pump. It will automatically open when the Mechanical Pump is turned OFF to vent the chamber to atmosphere. It will automatically close when the Mechanical pump is turned on.

An insulated **Specimen Table** with provisions for height adjustment is mounted within the Pyrex cylinder. **Rotation** is optional.

The **Sputter Cathode** is clamped to an insulated aluminum plate in the chamber cover.

A manual **Shutter** is provided to shield the Sputter Cathode from contamination during the Etch cleaning cycle. The shutter control knob is left of the chamber. Clockwise rotation of the knob will open the shutter and counterclockwise rotation will close it.

A manual **Gas Control** is provided to control pressure in the cylinder. The Gas Control knob is to the left of the chamber.

For servicing and inspection convenience, all **Fuses** are mounted externally on the rear panel and the rear panel is hinged to provide access to internal components.

There are six main operations for the system: Vacuum, Etch Enable (if equipped), Rotation (if equipped), Sputter Enable, Timed Etch (if equipped) and Timed Sputter.

A Programmable Logic Controller (PLC) controls the system. A Touch Screen is used to interface with the PLC. Operator interface is through a graphics program that is running on the Touch Screen. This control system will be described in detail in the Operation section of this manual.



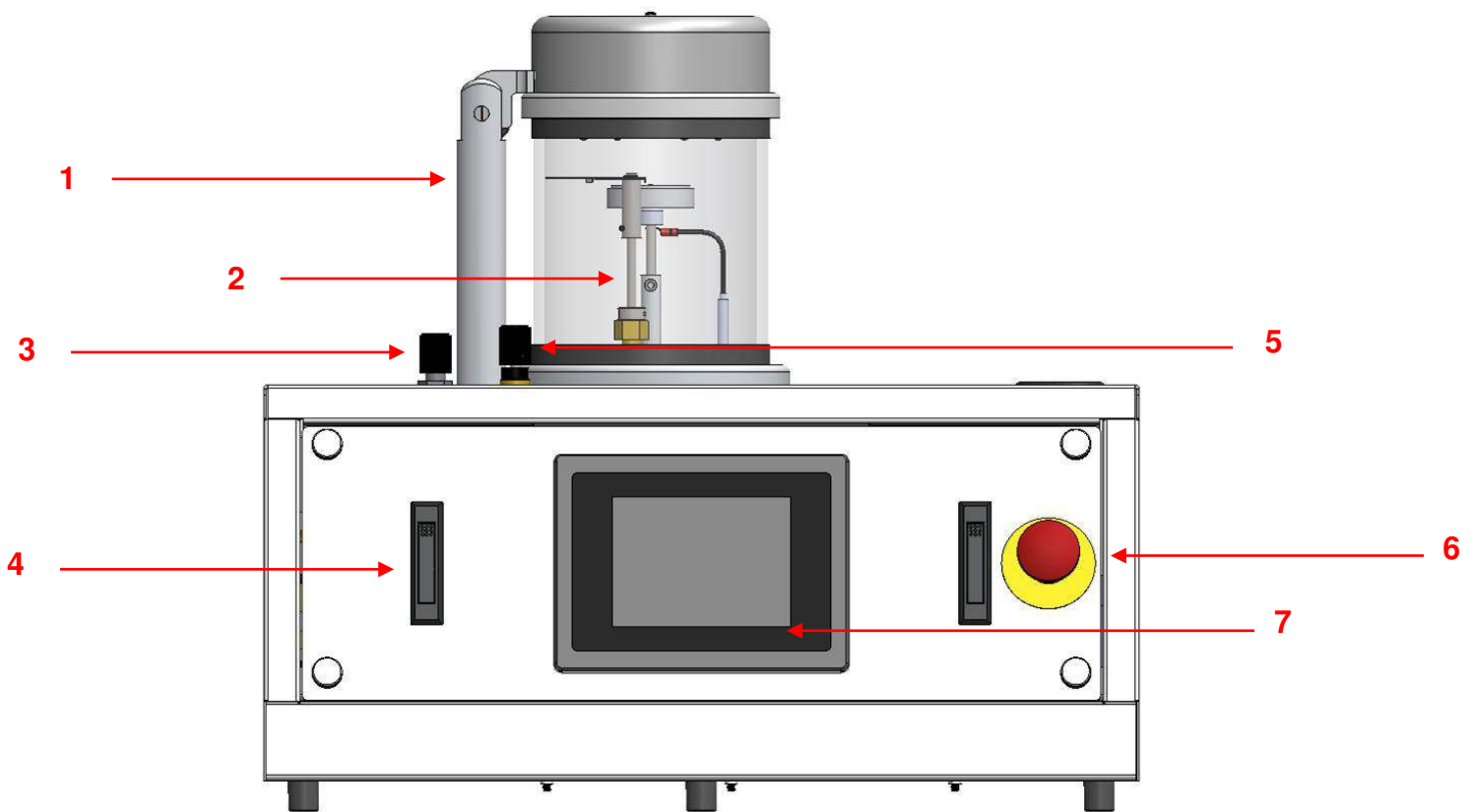
**NOTE:** *The system offers you a range of thin film process options. However, it is important to note that with all of this system's potential, there exist safety considerations. Individuals who are to operate, service, or maintain this system should familiarize themselves with this manual.*

*If this equipment is used in a manner not specified by Denton Vacuum, the protection provided by the equipment may be impaired.*

*A complete understanding of this control system is recommended before operating the vacuum system.*

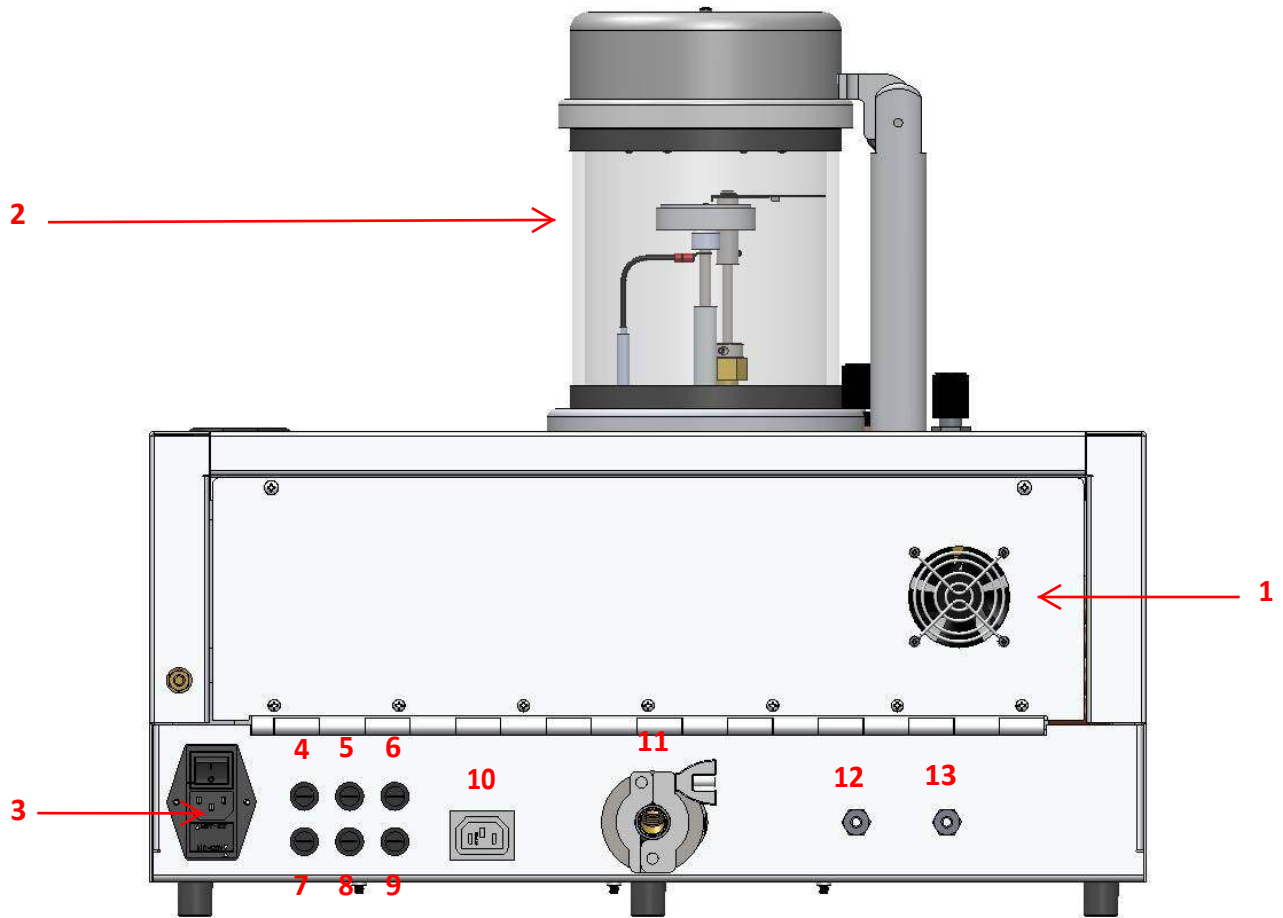
## SYSTEM VIEWS

### FRONT VIEW OF UNIT



<b>1</b>	Head Support	<b>4</b>	Front Panel Removal; Latch
<b>2</b>	Vacuum Chamber	<b>5</b>	Shutter Control
<b>3</b>	Gas Flow Valve	<b>6</b>	Emergency Shut-off
<b>7</b>	Color Touch Screen		

## REAR VIEW OF UNIT



<b>1</b>	Fan	<b>8</b>	<b>Fuse 5:</b> Rotation Motor (Option) 1 Amp
<b>2</b>	Vacuum Chamber	<b>9</b>	<b>Fuse 6:</b> Turbo Pump (Option) 2 Amps
<b>3</b>	120 VAC/220 VAC Input Power Connection	<b>10</b>	Mechanical Pump 120 VAC Power Connection
<b>4</b>	<b>Fuse 1:</b> Mechanical Pump 8 Amps	<b>11</b>	Mechanical Pump Piping Connection
<b>5</b>	<b>Fuse 2:</b> 24 VDC Power Supply 1 Amp	<b>12</b>	Vent Connection
<b>6</b>	<b>Fuse 3:</b> AC HVB Board 2 Amps	<b>13</b>	Gas Connection
<b>7</b>	<b>Fuse 4:</b> PLC Touch Screen 1 Amp		



Picture depicts the tilting, rotating omni found in the Desk V. The rubber belt controls the rotation of the specimen stage, while the chain turns the tilting mechanism at a different speed. As the white plastic insert moves around the angled cylinder, it causes the specimen table to tilt. Because the stage rotates at a different speed than does the tilting mechanism, the table's degree of tilt varies as it passes the same point in multiple rotations. All systems equipped with the tilting, rotating omni come with a screw that can be adjusted to allow for a fixed degree of tilt (or rotation without tilt).

## ELECTRICAL REQUIREMENTS

### DESK V & DESK V TSC

- Dual power input provided at rear of cabinet. Systems shipped set for 120 VAC. Customer must change the incoming voltage selection at the main power connection at the rear of the cabinet.



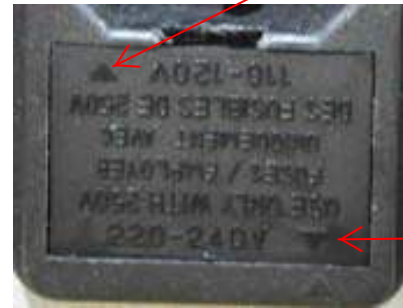
slot



Open drawer by placing screwdriver in slot.



Open the drawer and flip it to the desired voltage so that the arrow on the drawer aligns with the arrow on the frame.



*Verify that the incoming power connection is set for the proper voltage!*

- 120VAC; 10 Amps (standard); or
- 220 VAC; 8 Amps (non-US)
- Power cord provided with unit.

### **CARBON ROD ACCESSORY AND CARBON YARN ACCESSORY**

- 120 VAC; 10 Amps (standard); or
- 220 VAC; 5 Amps (non-US or special order).
- Power Cord provided with unit.

### **ENVIRONMENTAL CONDITIONS**

The system is designed and intended for use in the following environmental conditions. If all specifications are not met, system components may malfunction and can possibly cause injuries.

- Altitude up to 2000 m.
- Temperature range from 5 to 40°C.
- Maximum relative humidity 80% for temperature up to 31°C decreasing linearity to 50% relative humidity at 40°C.
- Mains supply voltage fluctuations not to exceed +/-10% of the nominal voltage.
- Other supply voltage fluctuations as stated by the manufacturer.
- Pollution degree 2 in accordance with IEC 664.

---

---

## OPTIONS

### ROTATION

- Tilting and rotating 2.0", 3.0", or 4.0" diameter plate.
- Controlled through touch screen.

*NOTE: Etch mode disabled with rotation.*

*Thickness monitor **cannot** be used with 4.0" diameter plate.*

### THICKNESS MONITOR

- Stand-alone Film Thickness Monitor
- Crystal Sensor head mounted through the Baseplate.

*NOTE: Thickness monitor **cannot** be used with 4.0" diameter plate.*

### CARBON ROD EVAPORATION

- Replaces sputter head with low voltage carbon rod evaporation.
- Replaces the 6" x 6" Pyrex cylinder with a 6" x 9" Pyrex cylinder.
- Stand-alone power supply.

### CARBON YARN EVAPORATION

- Replaces sputter head with low voltage carbon yarn evaporation.
- Replaces the 6" x 6" Pyrex cylinder with a 6" x 9" Pyrex cylinder.
- Stand-alone power supply.

---

---

## SAFETY WARNINGS

*This vacuum deposition system is comprised of a number of complex subsystems.*



*Lethal voltages, high temperatures, high pressures and powerful mechanical drive mechanisms are present throughout the system.*



*Every attempt has been made to safeguard operating and maintenance personnel. Interlocking of subsystems provides a high degree of operator safety.*

*System/software interlocks should never be defeated unless servicing of the system requires temporary interlock overrides. Hardwired safety interlocks must never be defeated.*



*All safety/software interlocks should be returned to operational status when problems have been corrected.*



*Operating and maintenance manuals have been provided and should be thoroughly understood before any operations are contemplated.*



*Only personnel with proper training and process experience should operate the system.*



*Check oil level in mechanical pump before starting machine!*

---

---

## SAFETY SYMBOLS



CAUTION: Risk of Electrical Shock



CAUTION: This symbol is intended to alert the user to the presence of important operation & maintenance instructions in this manual.



Protective Conductor Terminal: this symbol indicates where the protective earth ground is connected.

## UNPACKING & SETUP

### SYSTEM



*Caution! Two people are required to lift the unit from the shipping carton.*

The Denton Desk V system is shipped in a heavy-duty cardboard carton. The unit is shipped with oil in the mechanical pump. To unpack the unit, use the following procedure:

1. Open top of carton.
2. Remove packing material.
3. Remove manuals (CD) and glass cylinder. Glass cylinder will be wrapped in packing material.
4. Remove target and power cord. These will be in a plastic bag.
5. Lift machine out of box using the built-in handles on each side panel.



*Caution! Two people are required to lift the unit from the shipping carton.*

6. Remove the foam pieces from each side of the machine.
7. Place the unit in the desired location.

- 
- 
8. Cut the plastic band and remove cardboard piece.
  9. Replace the cardboard piece with the glass cylinder.



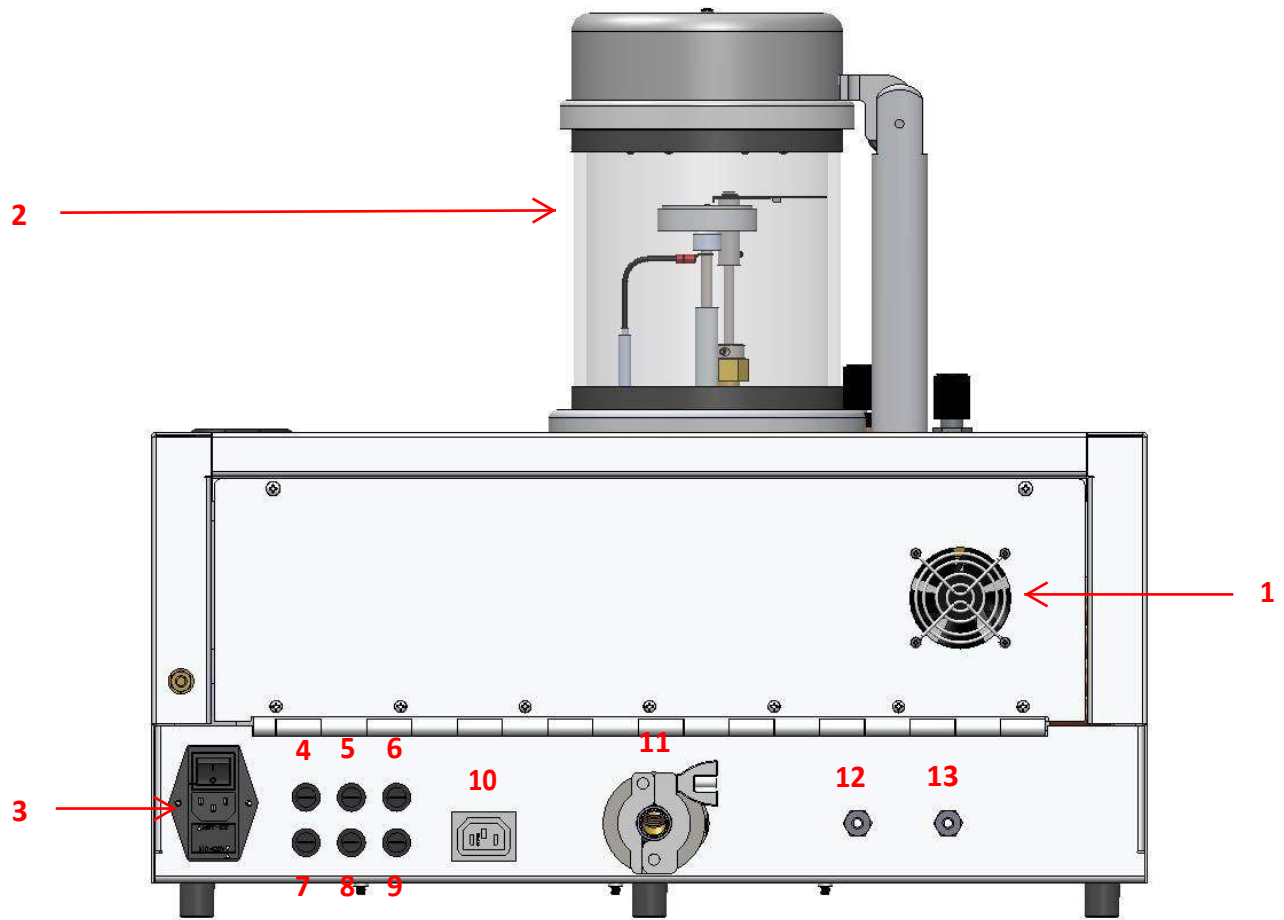
*Caution! Handle glass cylinder with care. Wipe all sealing surfaces with a clean lint-free rag before installing the glass cylinder.*

10. The Baseplate and Gaskets are cleaned using isopropyl alcohol and a lint-free cloth. The Gaskets are lubricated very lightly with vacuum grease. Sufficient grease has been applied when a finger is barely able to slide around the gasket.
11. The Chamber is placed on the baseplate; and the Sputter Head is positioned on the Chamber.
12. Lift the metal lid from the cylinder and install the target as described in the following manual section.

*NOTICE: You MUST save all packing material, box, and skid in the event the unit has to be returned for repair. If the unit is returned without the standard packaging materials, Denton Vacuum cannot be responsible for shipping damages.*

# INSTALLATION

## BACK PANEL LAYOUT



<b>1</b>	Fan	<b>8</b>	<b>Fuse 5:</b> Rotation Motor (Option) 1 Amp
<b>2</b>	Vacuum Chamber	<b>9</b>	<b>Fuse 6:</b> Turbo Pump (Option) 2 Amps
<b>3</b>	120 VAC/220 VAC Input Power Connection	<b>10</b>	Mechanical Pump 120 VAC Power Connection
<b>4</b>	<b>Fuse 1:</b> Mechanical Pump 8 Amps	<b>11</b>	Mechanical Pump Piping Connection
<b>5</b>	<b>Fuse 2:</b> 24 VDC Power Supply 1 Amp	<b>12</b>	Vent Connection
<b>6</b>	<b>Fuse 3:</b> AC HVB Board 2 Amps	<b>13</b>	Gas Connection
<b>7</b>	<b>Fuse 4:</b> PLC Touch Screen 1 Amp		

---

---

## INSTRUCTIONS

### VOLTAGE SELECTION



*Verify that the incoming power connection is set for the proper voltage!*

- Place the Desk V in the desired location.



*All systems are shipped with the fuse block installed for low voltage (100 – 120 VAC) operation. The following instructions are necessary only if the system will be connected to high voltage (200 -240 VAC) supply.*

- Voltage selection is required only between low (nominal 100 – 120 VAC) and high (nominal 200 – 240 VAC) ranges. There is no distinction between 50 and 60 Hz supplies. Refer to the Electrical Requirements section of this manual for specific power requirements.



*Verify that the proper fuse is in place visually inspecting the fuse for the proper rating. Use of an improper fuse may create a safety hazard.*

*For 100 – 120 VAC operation use a 10 Amp fuse.*

*For 200 – 240 VAC operation use an 8 Amp fuse*



*This system has line voltage present on the primary circuits whenever it is plugged into a main power source. Potentially lethal voltages are present when the line cord is connected.*

*This system must be disconnected from the main power source before inspecting the fuse.*

- To change the fuse block to high voltage (200 – 240 VAC) input, proceed as follows.
  - Pry open the entry module cover. A small flat bladed screwdriver can be used.
  - Inspect the external face plate of the fuse block. Arrows and text are molded into the faceplate to indicate the proper orientation for low voltage (100 -120 VAC) and high voltage (200 – 240 VAC) input supply.

- 
- 
- Re-install the fuse block in the proper orientation for high voltage (200 – 240 VAC) supply.
  - Connect the power cord to a 120VAC, 60Hz, 10 Amp outlet (systems shipped with default setting of 120 VAC).
  - OR
  - Connect the power cord to a 220VAC, 50Hz, 8 Amp outlet (change voltage selection at main power inlet connection).
  - The main electrical switch in the rear panel is the main circuit breaker. It should be switched to the ON position when you are ready to power up the system.

## **GAS CONNECTIONS**

- Connect Argon to the Gas inlet
  - Recommended for clean, inert atmosphere for sputtering.
  - Some users of the Desk V will be satisfied with system operation using room air as the sputtering gas. If room air is to be used, no connection is required.
  - Gas inlet fitting is 1/8" FNPT. Swagelok fittings not included. Denton recommends ¼ inch Swagelok fitting. Be certain to use ferrules that match your tubing type (plastic, metal, etc...).

*NOTE: For the Desk V TSC, however, argon is required. The argon cylinder should have a pressure-reducing regulator to provide 2- to 10-psig to the unit. Tygon tubing is acceptable.*

- Connect Nitrogen or other inert gas to the Vent inlet.
  - Recommended for clean inert atmosphere for venting the chamber.
  - Some users of the Desk V will be satisfied with system operation using room air for venting the chamber. If room air is to be used, no connection is required.
  - Gas inlet fitting is 1/8" FNPT.

*NOTE: Nitrogen from a dry source is recommended. The nitrogen cylinder should have a pressure-reducing regulator to provide 2- to 10-psig to the unit. Tygon tubing is acceptable.*

---

---

## CHAMBER PREPARATIONS

- The Baseplate and Gaskets are cleaned using isopropyl alcohol and a lint-free cloth. The Gaskets are lubricated very lightly with vacuum grease. Sufficient grease has been applied when a finger is barely able to slide around the gasket.
- The Chamber is placed on the baseplate; and the Sputter Head is positioned on the Chamber.
- Check manual shutter movement (if provided). The two segments should overlap when positioned at back of chamber. This is the open position for sputtering. Rotate knob clockwise to spread the segments, and then move the spread shutter back over specimen pedestal. This is the position for etching.

---

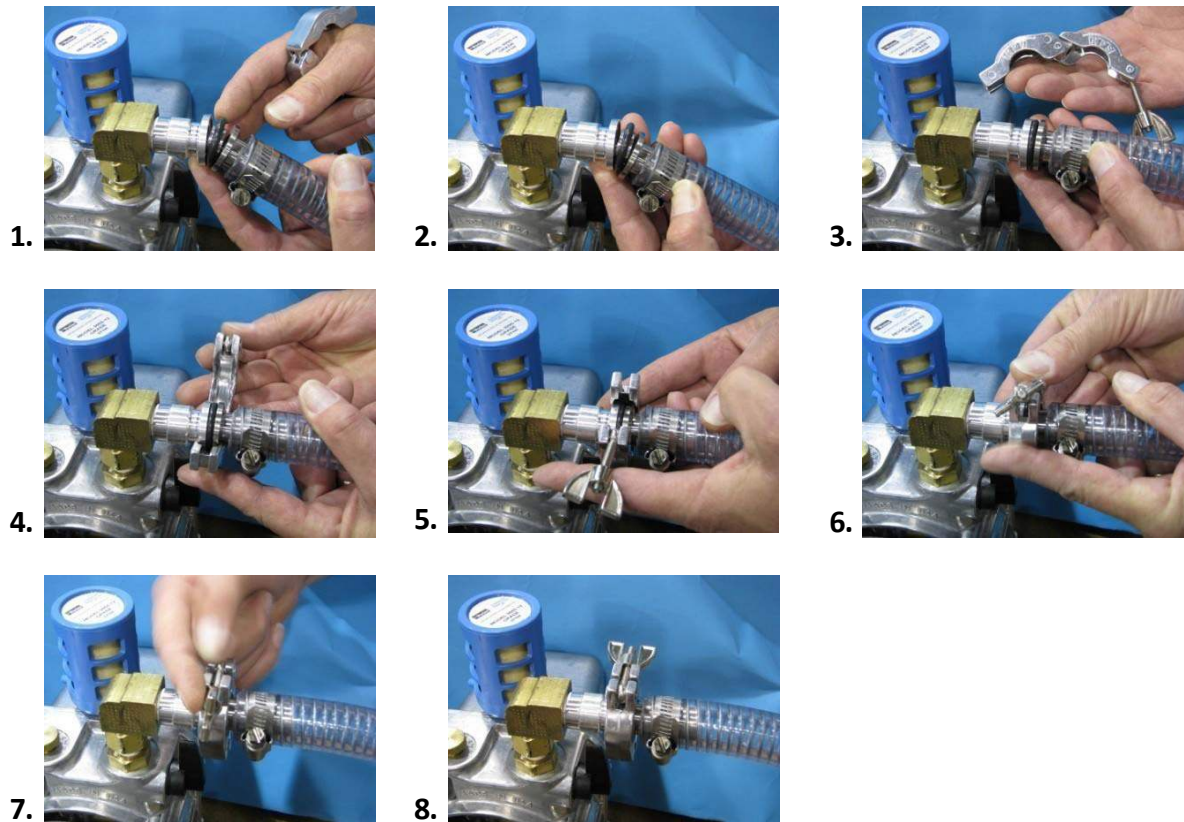
---

## MECHANICAL PUMP INSTALLATION

### Mechanical Pump Installed



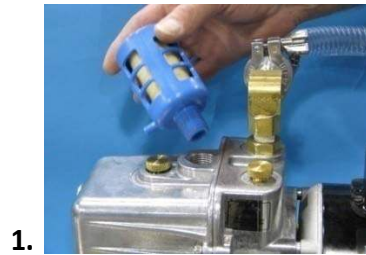
#### Step #1 - Installation of vacuum hose to the pump



## Step #2 - Installation of vacuum hose to the rear of the DESK V



## Step #3 - Mist Filter Installation

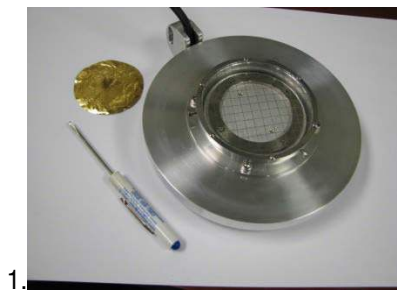


- **Check oil level in the mechanical pump.** If the oil level is  $\frac{1}{2}$  full in the sight glass, the pump is ready. For detailed instructions, refer to the Maintenance section of this manual.

# TARGET INSTALLATION & REPLACEMENT

## Tools Required

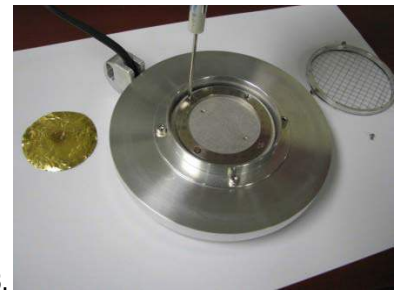
Small Phillips screwdriver & target



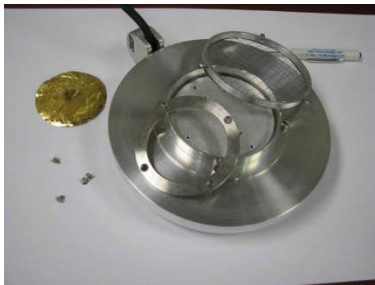
1.



2.



3.



3a.



4.



5.



6.

1. Open sputter head
2. Remove grid screen
3. Remove retaining ring
4. Center target on plate
5. Replace retaining ring
6. Replace grid screen and close sputter head

The Desk V is ready for operation.

## INITIAL START-UP

### INSPECTION

Before starting up the unit, make sure the following are provided:



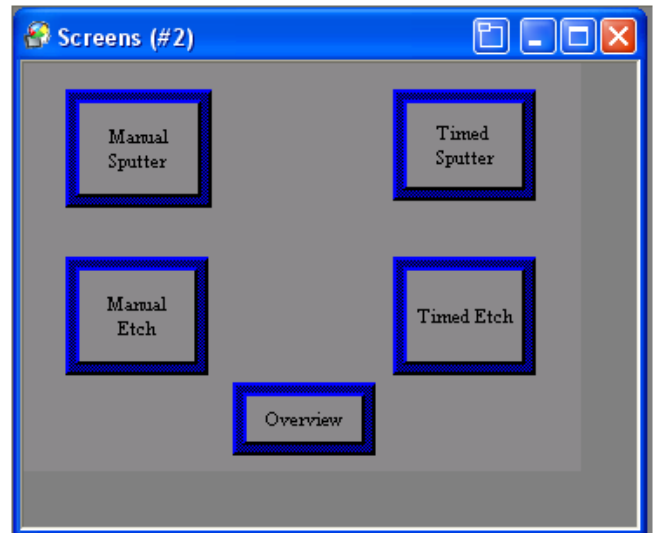
*Verify that the incoming power connection is set for the proper voltage!*

1. 120VAC, 60Hz, 10-amp service **or** 220VAC, 50Hz, 8 Amps. Verify that the incoming voltage connection is set for the proper voltage setting.
2. 5-psig-argon gas (or room air, if deemed adequate).
3. All lines are properly connected and there are no loose wires, hoses, or hardware.
4. Check rotary motion: (optional)
  - Make sure the small sprocket is spaced from feedthrough nut by at least 1/16".
  - Make sure that the chain is not tight. It should be slightly limp.



*Check the mechanical pump oil level only after it has been running for a few minutes. This will give the oil a chance to be distributed throughout the pump and will give a more accurate level reading.*

## START-UP PROCEDURE



To start-up the system, use the following procedure:

1. Turn ON Main Power.
2. Press the START button on the touch screen.
3. Select the desired operating screen from the on-screen menu.
  - Manual or Timed Sputter
  - Manual or Timed Etch
  - Overview
4. Operation of the system is described in detail in the Operation section of this manual.

---

---

## OPENING THE CHAMBER

- Be sure that chamber is vented (mechanical pump is off).
- Grasp the underside of the metal top plate. Lift vertically and tilt the plate back towards the support post. The top plate is hinged to the post.
- To replace the sputter head on the cylinder reverse the procedure.



*NOTE: The sputter head WILL only rotate 180 degrees so the target is facing up.*

Grasp under side of top plate and lift.



Tilt it back so that the target faces up.



---

# DESCRIPTION OF CONTROLS

## SYSTEM START SCREEN



The Desk V<sup>1</sup> system is semi-automatic and is controlled by a PLC. The operator interface is a touch panel with graphical interface to the PLC. Graphical interface is supported with software. Manual operation of valves, pump, power supply, and fixture rotation subsystems is through this graphical interface. Timed processes are also operated through this interface.

This software links the operator to the PLC. It allows for control input and data display. This software is active when power is applied to the system.

The Start Screen is visible only when the control system is first started. Pressing the START button will provide access to the control system.

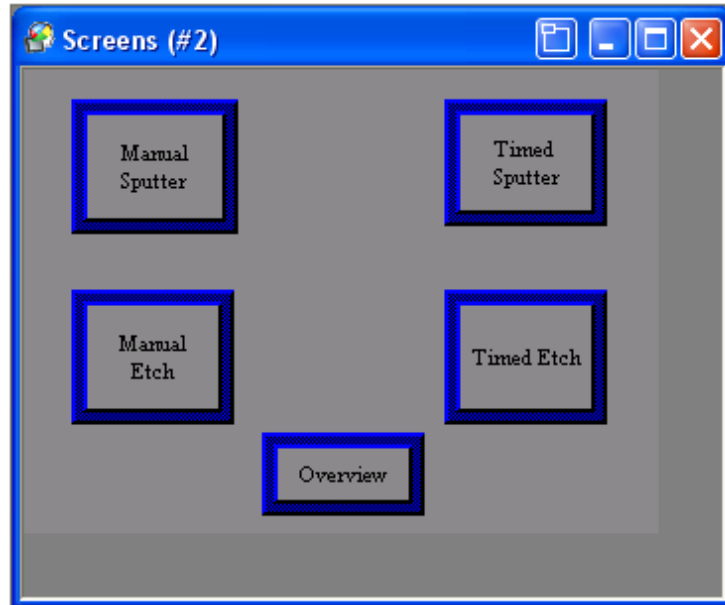


**NOTE:** This section of the operating manual describes controls for the Standard Desk V as well as the Desk TSC. There are differences between the two.

---

---

## SCREENS



### Standard Desk V & Desk V TSC

Access to all control screens is available on this screen. Each system function is described in detail later in this section of the Operating Manual

- **Manual Sputter** – Provides access to the manual operation of the sputter controls. Pump(s), Sputter Power, Sputter Setpoint (mAmps), Auto Vent Enabled (available *only* with TSC option), Substrate Rotation (option) and Gas Valve controls are available from this screen. System parameters are displayed on this screen: Chamber Pressure (Torr), DC Current, Turbo @ Speed Indicator (available *only* with TSC option), Vent Time Remaining (available *only* with TSC option), and Sputter Setpoint (mAmps).
- **Timed Sputter** – Provides access to the timed operation of the sputter controls. Process Setpoint (Torr), Sputter Setpoint (mAmps), Process Time (seconds), and Vent After Sputter Enabled are programmed from this screen. System parameters are displayed on this screen: Vent After Sputter Enabled Indicator and Timed Sputter Enabled Indicator.
- **Manual Etch** – Provides access to the manual operation of the etch controls. Pump(s), Etch Power, Etch Setpoint (mAmps), Auto Vent Enabled (available *only* with TSC option), Substrate Rotation (option) and Gas Valve controls are available from this screen. System parameters are displayed on this screen: Chamber Pressure (Torr), DC Current, Turbo @ Speed Indicator (available *only* with TSC option), Vent Time Remaining (available *only* with TSC option), and Etch Setpoint (mAmps).
- **Timed Etch** – Provides access to the timed operation of the etch controls. Process Setpoint (Torr), Etch Setpoint (mAmps), Process Time (seconds), and Vent After Etch Enabled are programmed from this screen. System parameters are displayed on this screen: Vent After Etch Enabled Indicator and Timed Etch Enabled Indicator.

- **Overview** - This screen is used to display current system status and the state of vacuum chamber and pumping system. Chamber Pressure (Torr), Process Setpoint (Torr), DC Current, and Process Time Remaining (Seconds) are displayed.

All system controls are implemented by using the touch screen. All subsystem controls are available on individual control screens

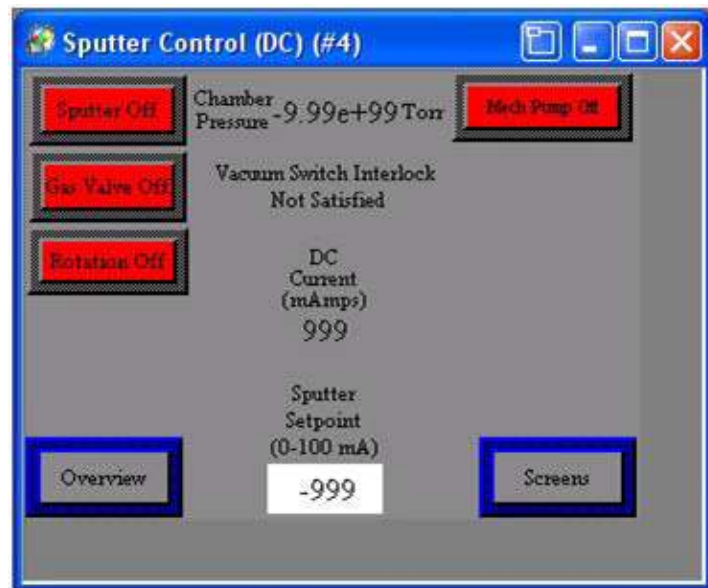
Subsystem controls are available on the following control screens:

- Manual Sputter – manual operation of the Sputter process.
- Timed Sputter – Timed operation of the Sputter process.
- Manual Etch – manual operation of the Etch process.
- Timed Etch – Timed operation of the Etch process.

Process parameters (setpoint and real) and system controls are displayed on the appropriate screens.

## MANUAL SPUTTER

### Standard Desk V



Manual Sputter operations are available on this screen.

- Select Manual Sputter from the Screens menu.
- ON/OFF operation of the Mechanical Pump, Gas Valve, Rotation (if equipped), and Sputter Power Supply is available on this screen.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.
- Safety interlocks are in place to prevent unsafe operation of the sputter power supply. The power supply will not turn ON unless all safety interlocks are satisfied.

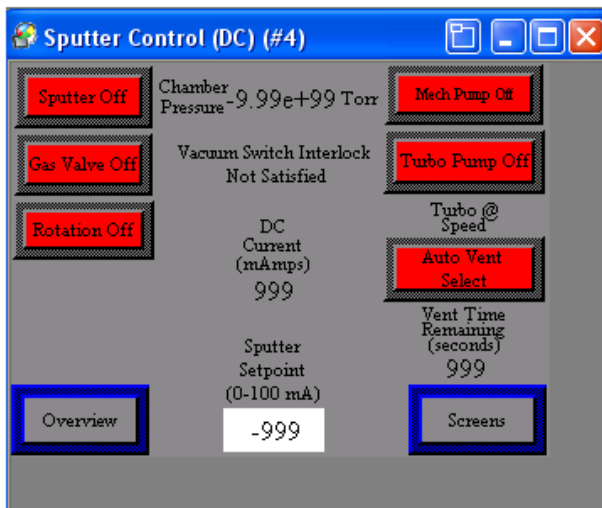
**NOTE:** Sputter Setpoint must be set before power supply is turned ON.

**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0 \times 10^{-1}$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Sputter Setpoint allows for adjustment of the power setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Sputter Setpoint is displayed.

**NOTE:** Sputter Setpoint range is 0 – 100 milliamps.

- Electrical Current output of the Power Supply is displayed in milliamps.
- Current Chamber Pressure is displayed in Torr.
- The Overview button will return to the Overview screen.
- The Screens button will return to the Screens menu.



Desk TSC

Manual Sputter operations are available on this screen.

- Select Manual Sputter from the Screens menu.
- ON/OFF operation of the Pumps(s), Gas Valve, Rotation (if equipped), and Sputter Power Supply is available on this screen.
- The Auto Vent Enabled function is available on this screen.
- This feature will shut down the pumps and safely vent the chamber to atmosphere. The Vent Time Remaining will count down the delay required before venting the chamber to atmosphere.



**WARNING!** Ten (10) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.

- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.
- Safety interlocks are in place to prevent unsafe operation of the sputter power supply. The power supply will not turn ON unless all safety interlocks are satisfied.

**NOTE:** Sputter Setpoint must be set before power supply is turned ON.

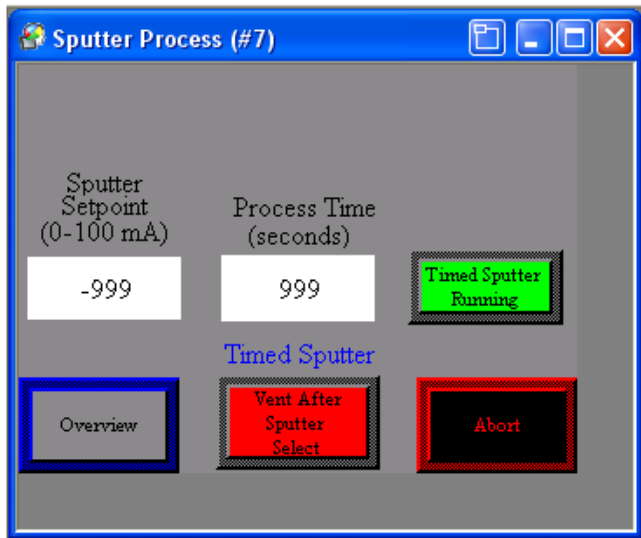
**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Sputter Setpoint allows for adjustment of the power setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Sputter Setpoint is displayed.

**NOTE:** Sputter Setpoint range is 0 - 100 milliamps.

- Electrical Current output of the Power Supply is displayed in milliamps.
- Current Chamber Pressure is displayed in Torr.
- Vent Time Remaining is displayed in seconds.
- Turbo @ Speed indicator will display when turbo pump is at full operating speed (if equipped).
- The Overview button will return to the Overview screen.
- The Screens button will return to the Screens menu.

## TIMED SPUTTER



### Standard Desk V

Timed Sputter operations are available on the Timed Sputter screen.

- Select Timed Sputter from the Screens menu.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.

**NOTE:** Sputter Setpoint must be set before power supply is turned ON.

**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

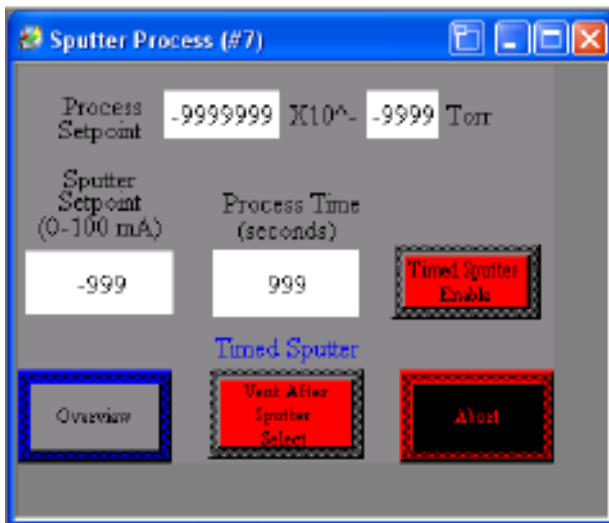
- The system will automatically pump down to  $4.0e-2$  Torr *before* activating the Timed Sputter process.
  - Timed Sputter processes can be started with the chamber at atmospheric pressure or from any pressure, but the sputtering process will not begin above  $4.0e-2$  Torr.
- Sputter Setpoint allows for adjustment of the power setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Sputter Setpoint is displayed.

*Note: Sputter Setpoint range is 0 - 100 milliamps.*

- Process Time allows for adjustment of the Process Timer setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Process Time data box. The current Sputter Timer setpoint is displayed.

*Note: Process Time setpoint range is 0 – 600 seconds.*

- Process Time Remaining is displayed in seconds.
- Vent After Sputter Enabled button will enable an automatic vent of the system to atmosphere after the timed sputter is complete.
- The Timed Sputter Running button will start the Sputter power Supply and the Process Timer.
- The Abort button will end a Timed Sputter process immediately.
- The Overview button will return to the Overview screen.



Desk TSC

Timed Sputter operations are available on the Timed Sputter screen.

- Select Timed Sputter from the Screens menu.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.

**NOTE:** Sputter Setpoint must be set before power supply is turned ON.

**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Process Setpoint allows for adjustment of the process pressure start setpoint. A pop-up data entry screen is available by pressing the setpoint data boxes. The current Process Setpoint is displayed.

- The system will automatically pump down to the Process Setpoint before activating the Timed Sputter process.
- Timed Sputter processes can be started with the chamber at atmospheric pressure or from any pressure, but the sputtering process will not begin above the Process Setpoint.
- Sputter Setpoint allows for adjustment of the power setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Sputter Setpoint is displayed.
- Note: Sputter setpoint range is 0 – 100 mAmps standard.
- Process Time allows for adjustment of the Process Timer setpoint of the Sputter Power supply. A pop-up data entry screen is available by pressing the Process Time data box. The current Sputter Timer setpoint is displayed.

**Note: Process Time setpoint range is 0 – 600 seconds.**

- Process Time Remaining is displayed in seconds.
- Vent After Sputter Enabled button will enable an automatic vent of the system after the timed sputter is complete.
- The Timed Sputter Running button will start the Sputter power Supply and the Process Timer.
- The Abort button will end a Timed Sputter process immediately.
- The Overview button will return to the Overview screen.

## Desk V Timed Recipe Programming

Timed Recipe Programming provides access to the creation and storage of up to 10 separate recipes. Parameters include Recipe Name, Process Setpoints (Torr and milliamps), Process Time (seconds), Vent After Sputter Select and Timed Sputter Enable.

**Timed Sputter Recipe Parameters Screen**

**Timed Etch Recipe Parameters Screen**

YOUR RECIPE NAME			
Recipe No.	Recipe Name	Process Setpoint1	Process
0		0	0
1		0	0
2		0	0
3		0	0

YOUR RECIPE NAME			
Recipe No.	Recipe Name	Etch Setpoint	Process Time
0		0	0
1		0	0
2		0	0
3		0	0

Below are the Timed Recipe Parameter screens for both sputter and etch functions.

**Sputter With Turbo**

With Turbo Sputter Recipe Parameters						
Recipe No.	Recipe Name	Process Setpoints	Process Setpoints	Sputter Setpoint	Process Time	Vent After Sputter Select
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						

**Etch With Turbo**

With Turbo Etch Recipe Parameters						
Recipe No.	Recipe Name	Process Setpoints	Process Setpoints	Etch Setpoint	Process Time	Vent After Etch Select
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						

**Without Turbo**

Without Turbo Sputter Recipe Parameters				
Recipe No.	Recipe Name	Sputter Setpoint	Process Time	Vent After Sputter Select
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				

**Without Turbo**

Without Turbo Etch Recipe Parameters					
Recipe No.	Recipe Name	Etch Setpoint	Process Time	Vent After Etch Select	Timed Etch Enable
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					

With Turbo Sputter Recipe Parameters							
Recipe No.	Recipe Name	Process Setpoint1	Process Setpoint2	Sputter Setpoint	Process Time	Vent After Sputter Select	Timed Sputter Enable
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							

To input data, touch cell.

**NOTE:** The difference between “with turbo” and “without turbo” in recipe programming is that when using a turbo molecular pump, one can select pressure settings (as found in setpoint1 and setpoint2).

### How to Use Timed Recipe Programming

To create a Timed Recipe from the Timed Sputter screen, select Recipe. This will bring you to the Recipe page. Touch the cell under the “Recipe Name” portion of the table to open the keyboard. From there, enter the name of the recipe you wish to create and save.

To input other values, simply touch the cell in which you wish to input a value. With recipes created and stored, your recipe name will now be displayed on the timed sputter page.

To engage a recipe, simply select the recipe name from the drop down menu and press the send recipe button. The program will automatically bring you to the timed sputter page.

If you selected enabled timed sputter for a recipe, your process will begin after the timed sputtering page appears.

**NOTE:** If you change the parameters at any time after the recipe has been sent, the recipe name will disappear from the timed sputter page. Changes made on the timed sputter page will not be saved on your recipe page. However, the system will still be functional with the new parameters.

A few notes regarding operation of the Timed Recipe Programming follow:

- The system will automatically pump down to the Process Setpoint before activating the Timed Sputter process.
- Timed Sputter processes can be started with the chamber at atmospheric pressure or from any pressure, but the sputtering process will not begin above the Process Setpoint.

The Timed Recipe Program provides the following data input fields:

#### **TIMED SPUTTER RECIPE PROGRAMMING VALUE SELECTIONS**

Recipe Number: can create and store up to 10 recipes.

Recipe Name: alphanumeric and up to 10 characters.

Process Setpoint1: base number (in Torrs)

Process setpoint2: exponent (in Torrs)

Example: setpoint1 (5) and setpoint2 (3) is equivalent to  $5^{-3}$  (five to the minus three) Torr

Sputter Setpoint: power setting in mAmps (0 to 100 range).

Process Time: up to 600 seconds.

Vent After Sputter Select: enables an automatic vent of the system after the timed sputter is complete.

Timed Sputter Enable: starts Sputter power Supply and the Process Timer (in seconds).

#### **TIMED ETCH RECIPE PROGRAMMING VALUE SELECTIONS**

Recipe Number: Can create and store up to 10 recipes.

Recipe Name: alphanumeric and up to 10 characters.

Process Setpoint1: base number (in Torrs)

Process setpoint2: exponent (in Torrs)

Example: setpoint1 (5) and setpoint2 (3) is  $5^{-3}$  (five to the minus three) Torr

Etch Setpoint: power setting in mAmps (0 to 10 range).

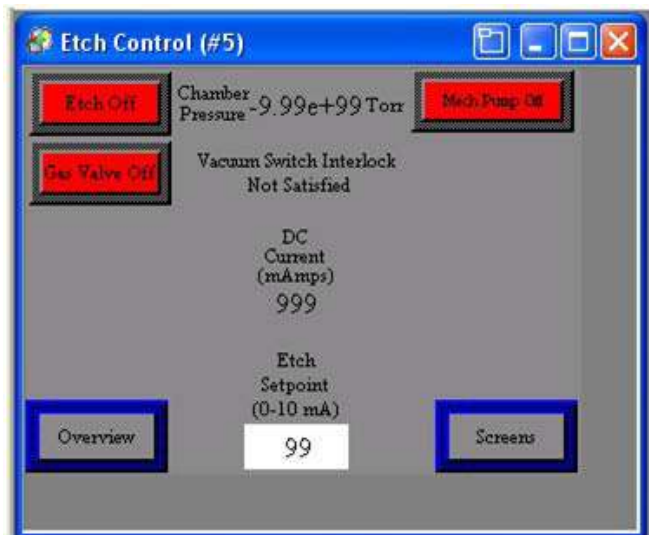
Process Time: up to 600 seconds.

Vent After Etch Select: enables an automatic vent of the system after the timed sputter is complete.

Timed Etch Enable: starts Sputter power Supply and the Process Timer (in seconds).

## MANUAL ETCH

NOT an option with Rotation.



Manual Etch operations are available on the Etch screen.

- Select Manual Etch screen from the Screen menu.

### Standard Desk V

- ON/OFF operation of the Mechanical Pump, Gas Valve, and Etch Power Supply is available on this screen.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.

**NOTE:** Etch Setpoint should be set before power supply is turned ON.

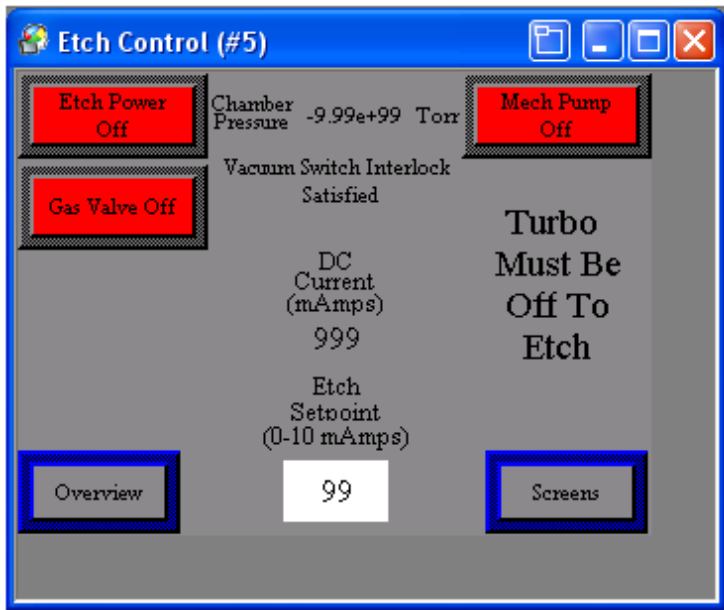
**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Etch Setpoint allows for adjustment of the power setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Etch Setpoint is displayed.

*Note: Etch Power setpoint range is 0 – 50 mAmps standard.*

- Current chamber pressure is displayed in Torr.
- The Overview button will return to the Overview screen.
- The Screens button will return to the Screens menu.

**Note:** Turbo Pump must be OFF to operate the Manual Etch function.



## Desk TSC

*NOT an option with Rotation.* Manual Etch operations are available on the Etch screen.

- Select Manual Etch screen from the Screen menu.
- ON/OFF operation of the Mechanical Pump, Gas Valve, and Etch Power Supply is available on this screen.

**NOTE:** Etch Setpoint should be set before power supply is turned ON.

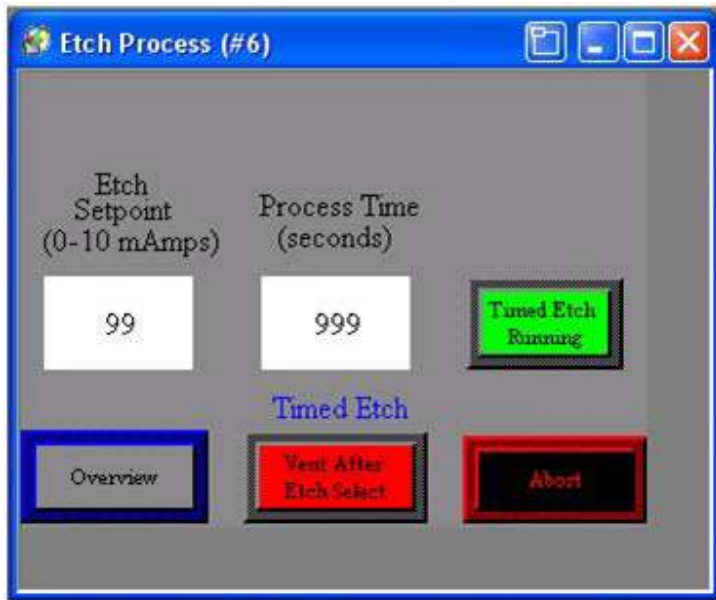
**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Etch Setpoint allows for adjustment of the power setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Etch Setpoint is displayed.

**Note:** Etch Power setpoint range is 0 – 10 mAmps.

- Current chamber pressure is displayed in Torr.
- The Overview button will return to the Overview screen.
- The Screens button will return to the Screens menu.

## TIMED ETCH



Standard Desk V

*NOT an option with Rotation.*

Timed Etch operations are available on the Timed Etch screen.

- Select Timed Etch from the Main screen.
- ON/OFF operation of the Etch Power Supply is a push button on this screen.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.

**NOTE:** Etch Setpoint should be set before power supply is turned ON.

**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

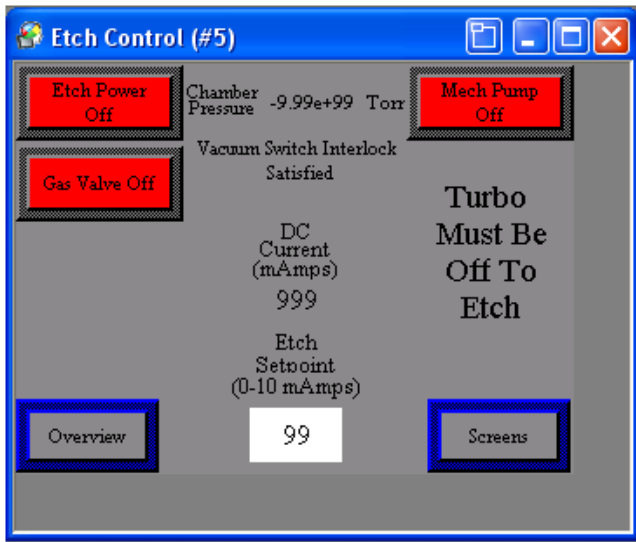
- Etch Setpoint allows for adjustment of the power setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Etch Setpoint is displayed.

**Note:** Etch Power setpoint range is 0 – 10 mAmps.

- Process Time allows for adjustment of the Process Timer setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Process Time data box. The current Sputter Timer setpoint is displayed.

**Note:** Setpoint range is 0 – 600 seconds.

- The Timed Etch Running button will start the Etch power supply and the Process Timer.
- Vent After Etch Enabled button will enable an automatic vent of the system after the timed etch is complete.
- The Abort button will end a Timed Etch process immediately.
- The Overview button will return to the Overview screen.



Desk TSC

Timed Etch operations are available on the Timed Etch screen.

**Note:** Turbo Pump must be OFF to operate the Manual Etch function.

- Select Timed Etch from the Main screen.
- ON/OFF operation of the Etch Power Supply is a push button on this screen.
- Inactive buttons are **RED**. Buttons will switch to **GREEN** when active.

**NOTE:** Etch Setpoint should be set before power supply is turned ON.

**NOTE:** Power Supply is interlocked to chamber pressure setpoint of  $5.0e-1$  Torr. The Power supply will NOT turn ON above this chamber pressure. The power supply will not turn on unless the Gas Valve is ON.

- Etch Setpoint allows for adjustment of the power setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Setpoint data box. The current Etch Setpoint is displayed.

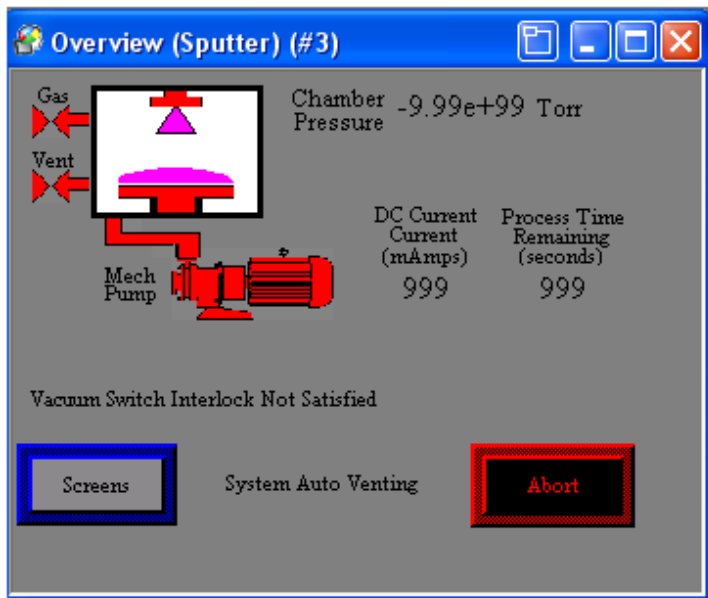
**Note:** Etch Power setpoint range is 0 – 10 mAmps.

- Process Time allows for adjustment of the Process Timer setpoint of the Etch Power supply. A pop-up data entry screen is available by pressing the Process Time data box. The current Sputter Timer setpoint is displayed.

**Note:** Setpoint range is 0 – 600 seconds.

- The Timed Etch Running button will start the Etch power supply and the Process Timer.
- Vent After Etch Enabled button will enable an automatic vent of the system after the timed etch is complete.
- The Abort button will end a Timed Etch process immediately.
- The Overview button will return to the Overview screen.

## OVERVIEW



### Standard Desk V

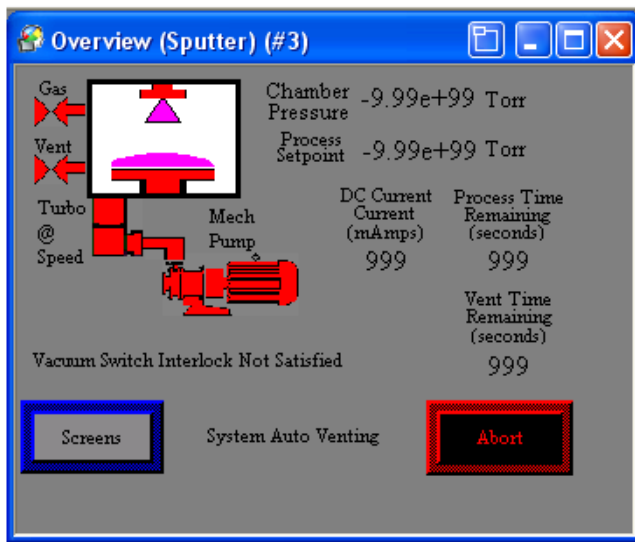
- Select Overview from any other screen.
- All active system parameters are graphically displayed on the Overview screen.
- Current chamber pressure is displayed in Torr. Inactive graphics are **RED**. Graphics will switch to **GREEN** when active. Note the **PINK** in the graphic above. This indicates that the sputter and etch are in operation.
- The DC Current is displayed in mAmps.

- ON/OFF operation of the subsystems (pumps, valves, rotation, sputter, and etch) is graphically displayed on this screen.
- Process Time Remaining is displayed in seconds.
- Text messages are displayed on this screen to indicate current active operation in the control system. These messages will describe the current active operation as follows:

<u>Message</u>	<u>Active Operation(s)</u>
Auto Sputter Without Vent	- Timed Sputter is enabled; Vent After Sputter is NOT enabled.
Auto Sputter With Vent	- Timed Sputter is enabled; Vent After Sputter is enabled.
Auto Etch Without Vent	- Timed Etch is enabled; Vent After Sputter is NOT enabled.
Auto Etch With Vent	- Timed Etch is enabled; Vent After Sputter is enabled.
System Auto Venting	- Ten minute delay timer is counting down. Desk V TSC <i>only</i> .

**NOTE:** The Abort button will stop a Timed Sputter or Etch process immediately.

- The Screens button will return to the Screens menu.



Desk TSC

All active system parameters are graphically displayed on the Overview screen.

- Select Overview from any other screen.
- Inactive graphics are white. Graphics will switch to black when active.

- Current chamber pressure is displayed in Torr.
- The Process Setpoint is displayed in Torr.
- The DC Current is displayed in mAmps.
- ON/OFF operation of the subsystems (pumps, valves, rotation, turbo @ speed, sputter, and etch) is graphically displayed on this screen.
- Process Time Remaining is displayed in seconds.
- The Vent Time Remaining is displayed in seconds.
- Text messages are displayed on this screen to indicate current active operation in the control system. These messages will describe the current active operation as follows:

<u>Message</u>	<u>Active Operation(s)</u>
Auto Sputter Without Vent	- Timed Sputter is enabled; Vent After Sputter is NOT enabled.
Auto Sputter With Vent	- Timed Sputter is enabled; Vent After Sputter is enabled.
Auto Etch Without Vent	- Timed Etch is enabled; Vent After Sputter is NOT enabled.
Auto Etch With Vent	- Timed Etch is enabled; Vent After Sputter is enabled.
System Auto Venting	- Ten minute delay timer is counting down. Desk V TSC <i>only</i> .

**NOTE:** *The Abort button will stop a Timed Sputter or Etch process immediately.*

- The Screens button will return to the Screens menu.

## OPERATION

This section of the manual will describe manual and timed operation of the system. A brief description is provided for a better understanding of the operation of the system.



*A complete understanding of the Control System is required before operating the system. Read the "Description of Controls" section of this manual before proceeding!*

---

---

The Denton Vacuum DESK V Cold Sputter/Etch Unit is designed to clean the surface of SEM specimens and to deposit a heavy metal conductive coating on the clean surface.

A standard 6" diameter by 6" high **Pyrex Cylinder** with top and bottom Seals sits on an aluminum **Baseplate**. (6" D. x 6" H. Metal Chamber on TSC)

The cylinder is evacuated by a two-stage, direct-drive, **Mechanical Pump** (externally mounted) and a turbo pump (Desk V TSC *only*), which is mounted to a flange in the side of the metal chamber. The mechanical pump provides rough vacuum and the turbo molecular pump (Desk V TSC *only*) provides pumping into the high vacuum range.

An automatic **Vent Valve** is slaved to the mechanical pump. It will automatically open when the Mechanical Pump is turned OFF to vent the chamber to atmosphere. It will automatically close when the Mechanical pump is turned on.

An insulated **Specimen Table** with provisions for height adjustment is mounted within the Pyrex cylinder. The **Sputter Cathode** is clamped to an insulated aluminum plate in the chamber cover.

The Desk V contains a single high voltage power supply. The output of the power supply is connected to the substrate fixture for Etch and to the Sputter Cathode for Sputter deposition. Power output varies: Etch = 0 - 10 milliamps; and Sputter = 0 - 100 milliamps.

A manual **Shutter** is provided as the etch electrode and to shield the Sputter Cathode from contamination during the Etch cleaning cycle. The shutter control knob is left of the chamber. Clockwise rotation of the knob will open the shutter and counterclockwise rotation will close it.

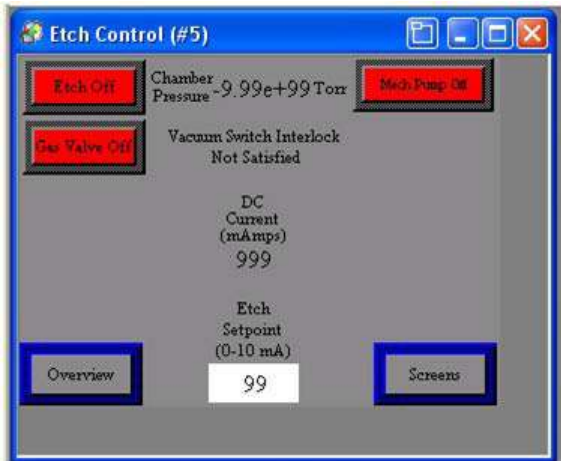
A manual **Gas Control** is provided to control pressure in the cylinder. The Gas Control knob is to the left of the chamber.

The standard Desk V is equipped with a vacuum gauge to provide vacuum pressure measurements in the vacuum chamber down to the limit of the mechanical pump. The Desk V TSC is equipped with a full range gauge to provide vacuum pressure measurements down to the limits of the turbo molecular pump.

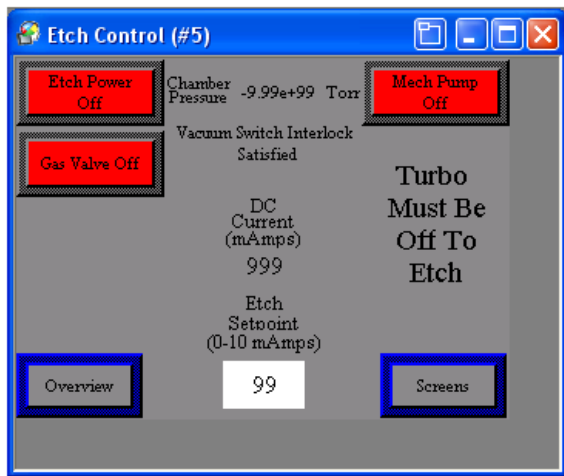
## ETCH

*NOT an option with Rotation. Remove rotation Fixturing and install non-rotating fixture plate before proceeding!*

**Note:** Turbo Pump must be OFF to operate the Manual Etch function.



**Standard Desk V**



**Desk TSC**



**NOTE:** Shutter must be in the closed position (knob fully clockwise)

- From the Manual Etch screen, turn the Mechanical Pump ON. Wait for the Vacuum pressure to drop below  $4.0 \times 10^{-2}$  Torr.
- With the mechanical pump running, turn the Gas Valve ON.
- Stabilize at between  $1.5 \times 10^{-1}$  and  $2.0 \times 10^{-1}$  Torr by adjusting the Gas flow control knob.
  - Gas Flow valve clockwise = decrease flow, reduce pressure.
  - Gas Flow valve counter-clockwise = increase flow, increase pressure.

**NOTE:** Additional gas flow may be required when using a new target.

- Close the Shutter.
- From the Manual Etch screen, turn Etch Power On with the Etch Setpoint at a non-zero value.
  - Increase the Etch Setpoint to desired level (0 - 10 mAmps).
  - Actual current will be displayed on the Manual Etch and the Overview screens.
- Turn the Etch Power On.
- Etch for the desired time.

- Turn OFF the Etch Power.
- Shut the Gas Valve OFF.



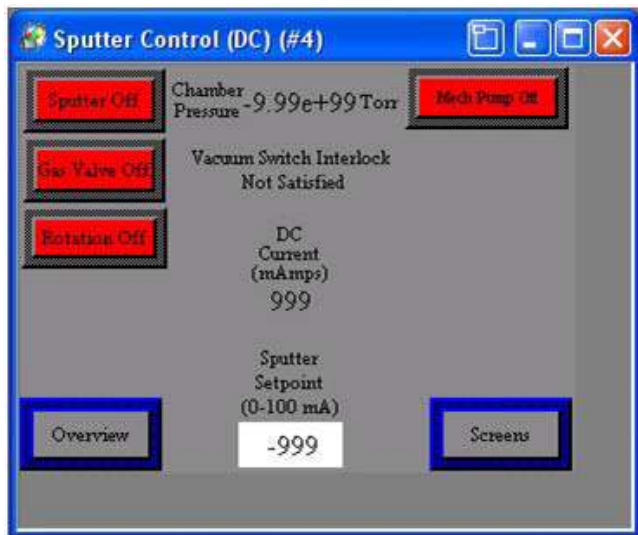
NOTE: Do not run the Etch supply for more than ten minutes.

**NOTE:** Do not close the manual Gas Flow valve. Leave this set to the desired gas flow required for the Timed Etch process.

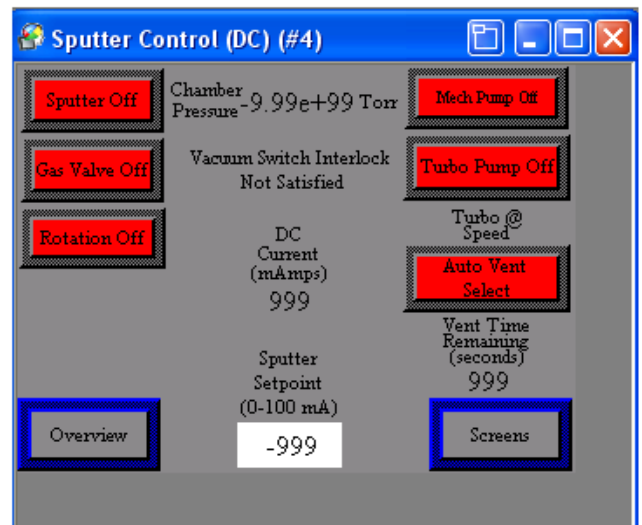
**NOTE:** Once the desired settings of time, etch level, and gas flow have been established and set, the Timed mode of operation can be used.

## SPUTTER

**NOTE:** Sputtering pressure can be reached with or without the use of the optional Turbo Molecular pump (Desk V TSC only). Experimentation is required to adjust the gas flow/pumping speed combination required for your individual process requirements.



**Standard Desk V**



**Desk TSC**

- From the Manual Sputter screen, turn the mechanical pump ON. Wait for the Vacuum pressure to drop below  $4.0e-2$  Torr.
- For DESK V TSC, turn ON the optional Turbo Molecular pump and wait for the pressure to drop to the desired starting vacuum level.
- Continue pumping and open the Gas Valve.
- Stabilize at between  $5.0e-2$  and  $7.5e-2$  Torr by adjusting the Gas flow control knob.

- 
- 
- Gas Flow valve clockwise = decrease flow, reduce pressure.
  - Gas Flow valve counter-clockwise = increase flow, increase pressure.

*NOTE: Additional gas flow may be required when using a new target.*

- Turn Rotation ON ( if equipped).
- Open Shutter
- From the Manual Sputter screen, turn Sputter Power On with the Sputter Setpoint at a non-zero value.
  - Increase the Sputter Setpoint to desired level (0 - 50 mAmps).
  - Actual current will be displayed on the Manual Sputter and the Overview screens.
- Sputter for the desired time.
- Turn OFF the Sputter Power and reduce the Sputter Setpoint to zero.
- Shut the Gas Valve OFF.



*NOTE: Do not close the manual Gas Flow valve. Leave this set to the desired gas flow required for the Timed Sputter process.*

- Turn OFF the optional Turbo pump (Desk V TSC) from the Vacuum screen.

*The system control will wait ten (10) minutes before turning off the Mechanical Pump (to protect the turbo pump).*

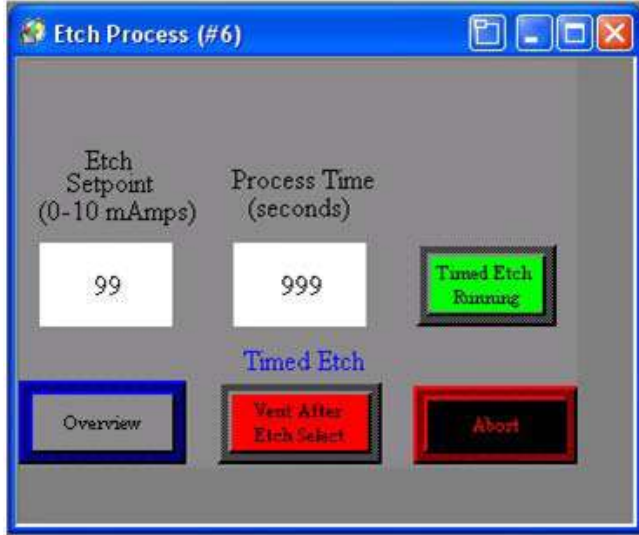
- After ten (10) minutes, turn OFF the Mechanical Pump. The automatic Vent Valve will open to vent the chamber to atmosphere.

**NOTE:** *Once the desired settings of time and power, and gas flow have been established and set, the Timed mode of operation can be used.*

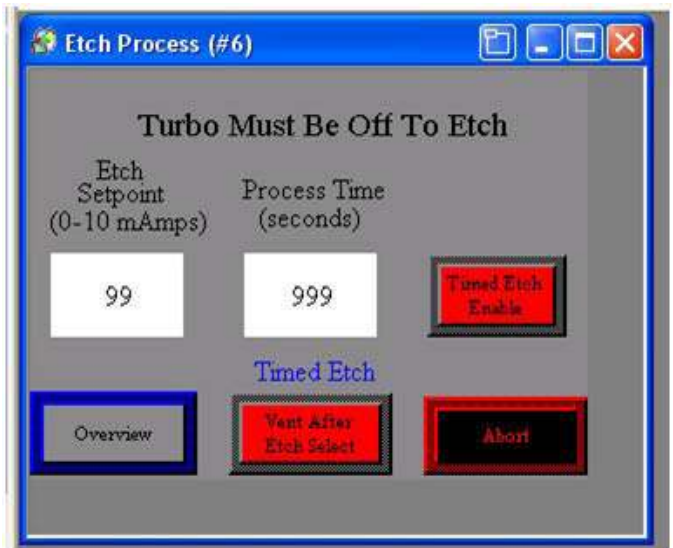


**WARNING!** *Ten (10) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.*

## TIMED ETCH OPERATION



Standard Desk V



Desk TSC



**NOTE:** Shutter must be in the closed position (knob fully clockwise)

- Set the desired Etch power setpoint.
- Set the desired Process Time setpoint.
- Select Vent After Etch Enables if desired.



**NOTE:** The manual Gas Flow valve should have been manually set to the desired gas flow required for the Timed process.

**Note:** Turbo Pump must be OFF to operate the Manual Etch function.

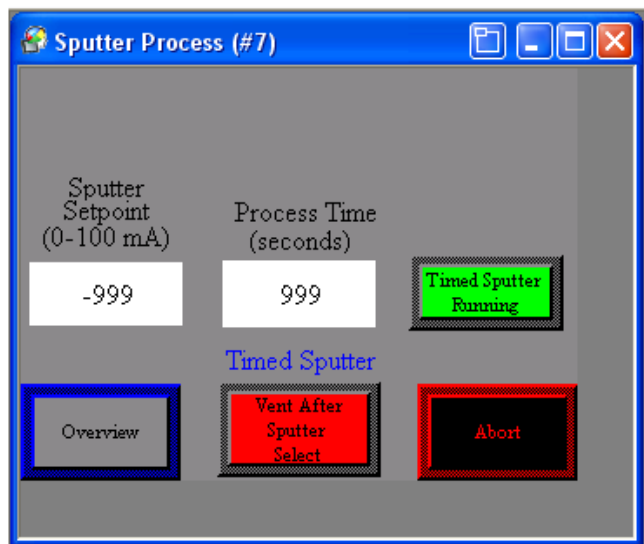
- Activate the Timed Etch Running button and the system will operate as follows:
  - Mechanical Pump will start and pump the chamber to the initial vacuum level:
    - 4.0e-2 Torr is the fixed setpoint for all models.
  - When the fixed setpoint is reached:
    - The Gas Valve will open (to the manually adjusted flow setpoint).
    - System will stabilize for 30 seconds.

- The Etch power supply will turn ON to the setpoint power level.
  - Power will continue until the Process Timer times out.
  - The power supply will shut OFF and the Gas Valve will close.
  - If the Vent After is enabled, the Mechanical Pump will shut off and the system will vent to atmosphere.
  - If Vent after is not enabled, the power supply will shut OFF and the pumps will remain on.
- Etch Power setpoints can be adjusted at any time during this timed operation.

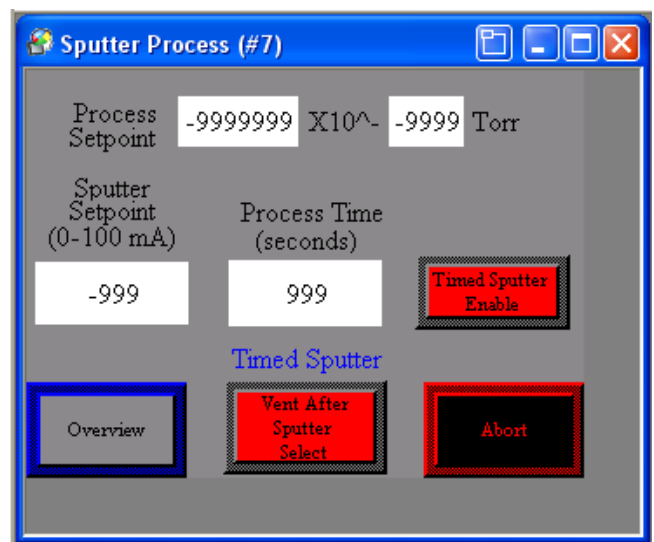


**WARNING!** Ten (10) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.

## TIMED SPUTTER OPERATION



**Standard Desk V**



**Desk TSC**

- Set the desired Sputter power Setpoint. 0 – 50 mAmps
- Set the desired Process Time setpoint. 0 – 600 seconds.
- Select Vent After Sputter Enabled if desired.
- Set the desired Process Setpoint (Desk TSC *only*).



**NOTE:** *The manual Gas Flow valve should have been manually set to the desired gas flow required for the Timed process.*

- Activate the Timed Sputter Running button and the system will operate as follows:
  - Pumps will start and pump the chamber to the initial vacuum level:
  - Below 4.0e-2 Torr is the fixed setpoint for the Standard Desk V.
    - The Process Setpoint is programmable for the Desk V TSC.

**NOTE:** *See the Description of Controls section of this manual for instruction on how to program the Process Setpoint.*

- Rotation is ON during this time (if equipped).
- When the fixed setpoint or the Process Setpoint is reached:
  - The Gas Valve will open (to the manually adjusted flow setpoint).
  - System will stabilize for 30 seconds.
  - The Sputter power supply will turn ON to the setpoint power level.
  - Power will continue until the Process Timer times out.
  - Power supply will shut OFF and Gas Valve will close.
  - If the Vent After is enabled, the pumps will shut off and the system will vent to atmosphere.
    - The ten minute Vent Delay Timer will activate to safely shut down the turbo pump (Desk TSC *only*).
  - If Vent after is not enabled, the power supply will shut OFF and the pumps will remain on.
- Sputter power setpoints can be adjusted at any time during this timed operation.



**WARNING!** *Ten (10) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.*

---

---

## SHUT-DOWN PROCEDURE

1. Turn off all sub-systems (sputter, etch, gas, rotation).
2. For DESK V TSC option, turn off turbo pump, and **wait five (5) minutes before turning off mechanical pump, or the turbo pump will be damaged.**
3. Turn off mechanical pump.



*WARNING! Five (5) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.*

## OPTIONS

### QUARTZ CRYSTAL MONITOR

*OPTIONAL*



*Note: Read the operating manual for the deposition controller before proceeding!*

Deposition Monitors require programming before depositions. The Operating Manual for the appropriate Deposition Monitor is provided with the Desk V system. Please read this manual before proceeding to operate the Desk V system with the Deposition Monitor.

The Deposition Monitor will require programming of the following material parameters:

- Material Density
- Tooling Factor
- Acoustic Impedance
- Thickness Endpoint

The Material Density and Acoustic Impedance are provided in a list in the Operating Manual for the Deposition Monitor. The Tooling Factor must be calculated relative to the material and the position of the crystal sensor.

A complete definition of these parameters and instructions for calculating each parameter are included in the Operating Manual of the Deposition Monitor.

---

---

Deposition with the Deposition Monitor should proceed as follows:

1. Complete the Etch process as described in the Etch section of this manual (if required).
2. Begin the Sputter process as described in the Sputter section of this manual.
3. When the Shutter is opened, start the Deposition Monitor.
4. When the Deposition Monitor reaches the programmed thickness, close the shutter.
5. Power down the Sputter source as described in the Sputter section of this manual.

## DESK V TSC

### OPTIONAL

Metal vacuum chamber with pump port for Turbo molecular pump on side flange and 2.0" viewport on front replaces the standard Pyrex cylinder.

Turbo Molecular pump is operated from the Manual Sputter screen.

For proper performance of the TSC system, the following needs to be accomplished:

1. Mechanical pump must be ON until the chamber pressure less than 1.0e0 Torr before turning Turbo Pump ON.
2. Turn on Turbo for 20 minutes. (Previous testing with a hot filament gauge produced 5 x 10E-6 Torr.)
3. Turn on the Gas Valve, adjust Gas Flow Valve to reach 5.0e-2 Torr and wait for the pressure to stabilize.
4. Set Sputter Setpoint to desired setpoint.
5. Turn Sputter Power ON. (Plasma will be visible).
6. Turn off Turbo Pump, **wait for ten (10) minutes**, and then vent system by turning off the mechanical pump.

Turbo pump is used to reach high vacuum in the metal Chamber. Gas Control can be used with Turbo Pump to reach process pressure control in the Chamber.



**WARNING!** Ten (10) minutes must elapse between turning off the turbo pump and turning off the mechanical pump, or the turbo pump will be damaged.



**WARNING!** Never turn system off when turbo pump is running. Turbo pump must be turned off before turning system off.

## CARBON ROD ACCESSORY

### OPTIONAL



**Caution!** The bright light from the carbon evaporation source can damage the optic nerve. NEVER look at a heated source without eye protection such as a welder's glasses or a coated piece of glass such as one might use to watch a solar eclipse.

### Requirements

- 120/220 VAC; 10/5 amp electrical outlet.
- Emery board or file - used to flatten sections of carbon rod.
- 1/16" diameter swizzle stick to push carbon rods through opening in sleeves.
- Welder's goggles (shade #5 or higher) to observe evaporation process.
- Carbon Rods, 0.125' x 2.0", sharpened (100 per pack) = DVI part number CAR001-0024



**WARNING!** Use dark glass to observe carbon evaporation. Intense brightness is harmful to eyes when viewed directly.

### Sample Prep

To check your carbon evaporation technique, before coating samples, do the following:

1. Coat a glass cover slip with gold.
2. When the cover slip is overcoated, the gold color will change:
  - To copper with 100 Å of carbon
  - To orange with 150 Å of carbon
  - To purple with 200 Å

## Operation

The Desk V sputter head must be flipped over. Replace the standard 6.0" diameter by 6.0" high Pyrex cylinder with the 6" D. x 9" H. Pyrex cylinder. Mount the Carbon Rod accessory plate to the top of the larger Pyrex cylinder.

The Desk V vacuum pumping system can be used to evacuate a Pyrex cylinder with a carbon evaporation source mounted in the metal cover. The source can be mounted so as to vary the source-to-specimen distance from 3-1/2" to 5".

Two carbon rods are positioned in the center of the "yoke" to do the coating. One rod will have a point or reduced section. The other will have a full diameter section that has been carefully flattened on the end touching the point (or reduced section) of the other rod.

Both carbon rods should be inserted, one after another, through the outside end of the fixed rod holder. First, the pointed rod should be inserted (point trailing) and pushed through with the flattened carbon rod to move into the moving rod holder. Continue pushing the rods until the spring is deflected about 1/8 inch. Tighten the thumbscrew holding the flattened carbon in the fixed holder. If using a reduced section carbon rod, the spring should be moved out a little more than the length of the reduced carbon.

With the carbon source loaded, place the Pyrex cylinder on the baseplate, seat the source head, and start pump down. Within two to three minutes, the chamber vacuum gauge should read about 5.0e-2 Torr.

Turn on FILAMENT POWER on the Carbon Evaporation Module. Rotate powerstat clockwise to obtain 15 amp reading on ammeter. Carbon point should be bright red and outgassing. Increase filament power to 28 to 32 amps until a light spark is seen. **DO NOT** exceed 50 amps on the meter.



**WARNING!** Use dark glass to observe carbon evaporation. Intense brightness is harmful to eyes when viewed directly.

At 4" source-to-specimen, about 1/8" length of .040 inches reduced section will deposit about 100 angstroms of carbon.

For evaporating at relatively high pressure, it is good practice to check carbon film thickness. Coat a glass cover slip with gold. The gold color will change to copper when the cover slip is over-coated with 100 angstroms of carbon; to orange with 150 angstroms of carbon; to purple with 200 angstroms of carbon.

At  $5.0 \times 10^{-2}$  Torr, the average gas molecule travels about .04" between collisions. With a source-to-specimen distance of 4", the carbon will make many collisions. It will arrive from all available directions. Above  $7.5 \times 10^{-2}$  Torr, the thickness of the carbon film will diminish rapidly, as compared to the expected thickness.

If the carbon chamber will not pump below  $1.0 \times 10^{-1}$  Torr, check by substituting the Desk V chamber. If that pumps down, then the trouble is probably with the "L" gaskets on the carbon chamber. Wipe them clean with a lint free cloth and acetone. Apply a thin coating of vacuum grease to the gasket on the glass side and on the baseplate side.

### **General Notes**

The chamber should first be pumped to  $5.0 \times 10^{-2}$  Torr or less.

Denton Vacuum supplies a carbon of excellent quality. It is suggested that a low power setting, to degas the carbon, be used; slowly raise to evaporate. Degas the carbon (bright red) for 5 to 10 seconds. (Watch the chamber pressure rise, and then start to fall back.)

Carbon may be evaporated slowly or rapidly. Normally, after degassing, the power is increased to where the carbon starts depositing. Length of evaporation time will depend on the desired thickness of carbon film. It should take from 30 seconds to totally evaporated the carbon. **DO NOT** take power too high for more than one minute. **NEVER EXCEED 50 AMPS.**

A rapid evaporation (flashing) may be utilized by presetting the control to 75 percent of dial rotation, and then turning on the power. The flash will last from 1 to 2 seconds and help reduce heat damage.

---

---

## CARBON YARN ACCESSORY

### OPTIONAL



*Caution! The bright light from the carbon evaporation source can damage the optic nerve. NEVER look at a heated source without eye protection such as a welder's glasses or a coated piece of glass such as one might use to watch a solar eclipse.*

### Requirements

- 120/220 VAC; 10/5 amp electrical outlet.
- Welder's goggles (shade #5 or higher) to observe evaporation process.
- Carbon Yarn (25 feet) = DVI part number YRN001-0001



*WARNING ! Use dark glass to observe carbon evaporation. Intense brightness is harmful to eyes when viewed directly.*

### Sample Prep

To check your carbon evaporation technique, before coating samples, do the following:

1. Coat a glass cover slip with gold.
2. When the cover slip is overcoated, the gold color will change:
  - To copper with 100Å of carbon
  - To orange with 150 Å of carbon
  - To purple with 200 Å

### Operation

The Desk V sputter head must be rotated to the side. Replace the standard 6.0" diameter by 6.0" high Pyrex cylinder with the 6" D. x 9" H. Pyrex cylinder. Mount the Carbon Yarn accessory plate to the top of the larger Pyrex cylinder.



**DO NOT** permit the mounting post to touch the pump-out cover, which is at baseplate ground. This would short the filament current directly to ground.

The Carbon Yarn Evaporation Source is adjustable and is designed to provide carbon films for support, replication or conduction. The mounting posts are drilled and tapped to screw onto the pair of low-voltage feedthroughs. The rectangular extension blocks connect to the upper posts. This arrangement gives flexibility to locate the source as desired. Each block contains a spring-loaded terminal to attach each end of the carbon yarn. By depressing the spring-loaded terminal, the carbon yarn may be clamped.

The carbon yarn evaporation unit is designed to use high-purity carbon yarn. The height is adjustable by loosening the screw holding the unit to the mounting post.

### **Loading the Carbon Yarn**

The carbon yarn is placed across two spring-loaded electrode posts. (Carbon sublimates – i.e., it goes from a solid to a gas with no liquid phase). When reloading, allow time for posts to cool as they get quite hot, especially when firing carbon for 30 seconds or longer.

### **General Notes**

The chamber should first be pumped to 50 m Torr or less.

Denton Vacuum supplies a carbon of excellent quality. It is suggested that a low power setting, to degas the carbon, be used; slowly raise to evaporate. Degas the carbon (bright red) for 5 to 10 seconds. (Watch the chamber pressure rise, and then start to fall back.)

Carbon may be evaporated slowly or rapidly. Normally, after degassing, the power is increased to where the carbon starts depositing. Length of evaporation time will depend on the desired thickness of carbon film. It should take from 30 seconds to totally evaporated the carbon. **DO NOT** take power too high for more than one minute. **NEVER EXCEED 50 AMPS.**

A rapid evaporation (flashing) may be utilized by presetting the control to 75 percent of dial rotation, and then turning on the power. The flash will last from 1 to 2 seconds and help reduce heat damage.

Carbon vaporizes due to localized heat caused by resistance to flow of electric current. Carbon resistance lowers as carbon heats up, but will stabilize.

---

---

# MAINTENANCE

## GENERAL MAINTENANCE

The Desk V will operate more efficiently if kept clean. Scale build-up on the baseplate should be cleaned off weekly and the surface cleaned with acetone or alcohol using a lint free cloth or paper and solvent. Be sure all debris is vacuumed away. Clean coating build-up from the cylinder with a metal polish. "Wenol" and "Pol" are recommended. These polishes clean off the coating deposit and polish the glass.

To ensure a proper vacuum seal, inspect the cylinder and gaskets for nicks, cracks, and other foreign material. Apply a thin coat of vacuum grease to the gaskets and immediately wipe off the grease to prevent excessive grease build-up. Inspect the sealing surface for nicks or scratches. These must be smoothed out with emery and polished with fine emery or Scotch Brite. Any deposit build-up must be similarly removed and the entire surface wiped clean with acetone or alcohol using a lint-free cloth. Vacuum the baseplate to remove all debris and powder deposits.

## MECHANICAL PUMP

Mechanical pump oil should be changed annually or whenever it becomes contaminated. Check oil level and condition. If the oil appears cloudy or brownish, it needs changing. The oil is changed by opening the drain outlet of the Mechanical Pump.



***CAUTION! DO NOT ATTEMPT TO RE-ALIGN, OR MOVE DRAIN VALVE IN EITHER DIRECTION. METAL CASTING WILL BE DAMAGED. USE PLASTIC TUBING IF NECESSARY TO FACILITATE DRAIN.***

Pour just under 1 liter of mechanical pump oil into the exhaust port to refill. Oil level is read accurately only when the pump is operating and pressure is lower than one Torr

---

---

## **MECHANICAL PUMP – OIL CHANGE**

*The pump contains oil. WARNING! Check the oil level before starting the machine. Mechanical pumps may vary. Typical pump shown below.*

Check oil level at sight port.

### **TOOLS REQUIRED**

- Drain pan.

Should the pump require additional oil, proceed as follows:

1. The drain valve is the brass screw mounted at the lower end of the pump body.
2. Place drain pan under drain hole, under the pump.
3. Turn the drain valve counterclockwise.
4. It is not necessary to remove the screw.
5. Tilt the pump forward and drain until flow stops.
6. Turn drain screw clockwise until closed.
7. Remove drain pan. Discard oil following EPA guidelines.
8. Refill with new oil by removing the brass fill plug at the top of the pump body.
9. Fill to the top of the OIL LEVEL line on the sight port.

## **SPUTTER TARGET**

### **TOOLS REQUIRED**

- Small Phillips screwdriver & target

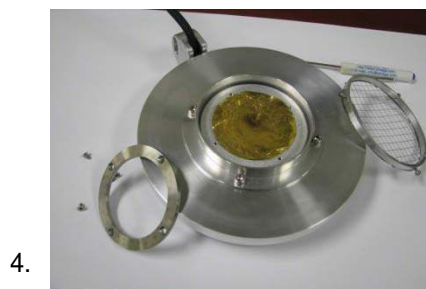
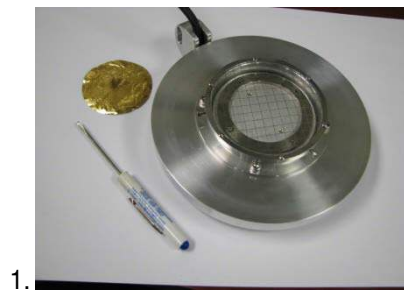
### **INSTRUCTIONS**

1. Open sputter head
2. Remove grid screen
3. Remove retaining ring
4. Center target on plate
5. Replace retaining ring

---

---

6. Replace grid screen and close sputter head



## PLASMA PROBLEMS

If the plasma is flickering during sputtering, the problem is a high voltage short or starvation of gas. Add more gas before checking other possibilities.

1. If during etching, take the pedestal apart and clean.
2. If during sputtering, take the sputter head apart and clean. Call the factory if guidance is needed in this area (856-439-9100).

## TROUBLESHOOTING

DESK V TROUBLESHOOTING GUIDE		
FAULT	PROBABLECAUSE	ACTION
1. No power	<ol style="list-style-type: none"> <li>a. 120/220 VAC not present at line cord</li> <li>b. System ON switch is defective or off.</li> <li>c. Blown fuse.</li> </ol>	<ol style="list-style-type: none"> <li>a. Check AC receptacle.</li> <li>b. Press switch to the ON position or replace.</li> <li>c. Replace fuse F1, 10 amps, located on rear panel.</li> </ol>
2. Mechanical pump will not start	<ol style="list-style-type: none"> <li>a. Blown fuse.</li> <li>b. Bad connection.</li> </ol>	<ol style="list-style-type: none"> <li>a. Replace 5-amp F2 fuse located on rear panel.</li> <li>b. Check all cables attached to mechanical pump.</li> </ol>
3. Chamber will not pull vacuum	<ol style="list-style-type: none"> <li>a. Check oil level in mechanical pump.</li> <li>b. Inspect bell jar gaskets for cracks on sealing surface.</li> <li>c. Inspect bell jar for chips across sealing surface.</li> <li>d. Vent valve open.</li> <li>e. Vacuum leak in system.</li> </ol>	<ol style="list-style-type: none"> <li>a. Fill oil level until it reaches center of sight glass.</li> <li>b. Replace old gaskets if bad.</li> <li>c. Replace bell jar if chips are across sealing surface.</li> <li>d. Missing 24 VDC at vent valve connector or defective valve.</li> <li>e. Locate and seal vacuum leak.</li> </ol>
4. Sputter head seals, but vacuum is poor.	<ol style="list-style-type: none"> <li>a. Cracked bell jar gaskets.</li> <li>b. Chip on bell jar.</li> <li>c. Low oil level in mechanical pump.</li> <li>d. Dirty oil in mechanical pump.</li> <li>e. Vacuum leak in system.</li> <li>f. Thermocouple gauge tube bad or dirty.</li> <li>g. Turbo pump off [turbo</li> </ol>	<ol style="list-style-type: none"> <li>a. Replace gaskets.</li> <li>b. Replace bell jar.</li> <li>c. Add oil to pump.</li> <li>d. Change oil in pump.</li> <li>e. Find and repair leak.</li> <li>f. Clean or replace DV-23 thermocouple tube.</li> <li>g. Check fuses and</li> </ol>

**DESK V  
TROUBLESHOOTING GUIDE**

<b>FAULT</b>	<b>PROBABLECAUSE</b>	<b>ACTION</b>
	option only].	connections.
5. Unstable vacuum pressure.	<ul style="list-style-type: none"> <li>a. Dirty pump oil.</li> <li>b. Sample outgassing.</li> <li>c. Defective mechanical pump.</li> <li>d. Dirty vacuum gauge tube.</li> </ul>	<ul style="list-style-type: none"> <li>a. Change pump oil.</li> <li>b. Sample may need long pumping time to outgas.</li> <li>c. Replace mechanical pump.</li> <li>d. Clean gauge tube.</li> </ul>
6. Sputter or Etch mode, no plasma.	<ul style="list-style-type: none"> <li>a. Electrical short in Sputter head.</li> <li>b. Chamber has excessive deposits of metal causing an electrical short.</li> <li>c. Defective high voltage transformer or PC board.</li> <li>d. Fuse blown.</li> </ul>	<ul style="list-style-type: none"> <li>a. Disassemble Sputter head, check for shorts.</li> <li>b. Clean chamber parts.</li> <li>c. Call factory for help.</li> <li>d. Replace fuse F3, 2 amps, located on rear panel</li> </ul>
7. Unit will only sputter at high pressures (150mT and up). Current fluctuates at suggested pressure (50-75mT).	<ul style="list-style-type: none"> <li>a. Thermocouple tube defective or dirty.</li> <li>b. Magnet in Sputter head is too weak.</li> </ul>	<ul style="list-style-type: none"> <li>a. Clean or replace DV-23 tube.</li> <li>b. Replace weak magnet.</li> </ul>
8. Poor quality coatings.	<ul style="list-style-type: none"> <li>a. Sputter pressure too high.</li> <li>b. Contaminates in plasma.</li> </ul>	<ul style="list-style-type: none"> <li>a. Keep pressure between 50-75mT.</li> <li>b. Use Argon in place of room air for sputtering.</li> </ul>
9. Target center falls out, about the size of a half dollar.	<ul style="list-style-type: none"> <li>a. Normal wear pattern, target depleted.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace target.</li> </ul>
10. Turbo pump will not operate. [Turbo units only]	<ul style="list-style-type: none"> <li>a. Blown fuse.</li> <li>b. Bad connection.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace fuse.</li> <li>b. Check cables.</li> </ul>

---

---

# VACUUM PERFORMANCE DATA SHEET

(For reference only)

## VACUUM PERFORMANCE: PUMPDOWN AND ULTIMATE VACUUM

### DESK V or Desk V TSC

DATE:  SERIAL #:  BY:

ULTIMATE PRESSURE

START VACUUM   
HI VAC

Notes	Minute	Vacuum (Torr)	Minute	Vacuum (Torr)	Minute	Vacuum (Torr)	Minute	Vacuum (Torr)
Mech pump only*	1		11		21		31	
	2		12		22		32	
Turbo**	3		13		23		33	
	4		14		24		34	
	5		15		25		35	
	6		16		26		36	
	7		17		27		37	
	8		18		28		38	
	9		19		29		39	
	10		20		30		40	

\* Standard Desk V with mechanical pump.

\*\* Desk V TSC with mechanical pump and turbo pump. Turn Turbo pump on at 1.0e-1 Torr.

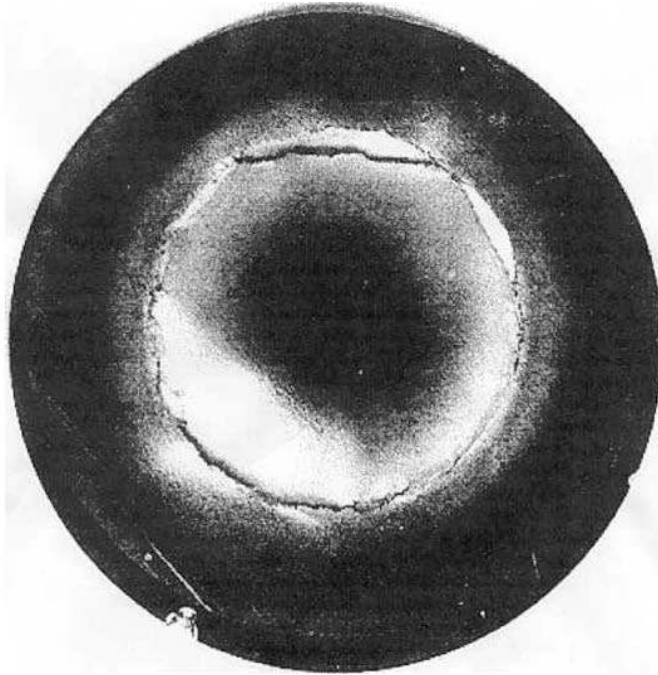
To evaluate the performance of the vacuum system, periodically record the vacuum pressure during the pump down of the chamber. This document can be used to collect the data.

---

## USED TARGET

### TYPICAL WEAR PATTERN ON USED TARGET

TARGET

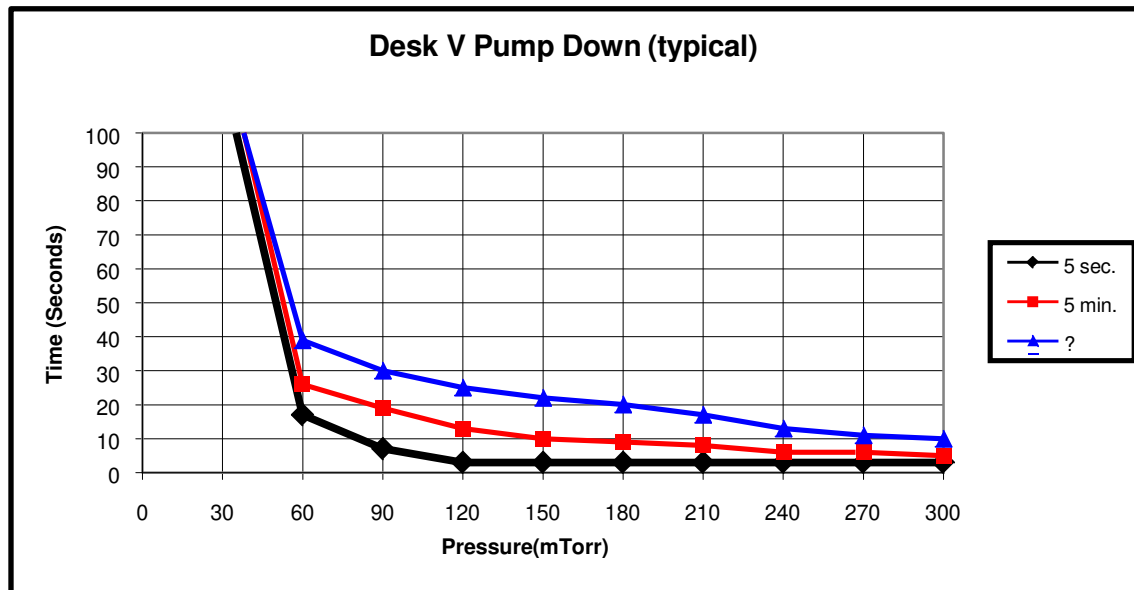


Typical wear pattern  
on used target.

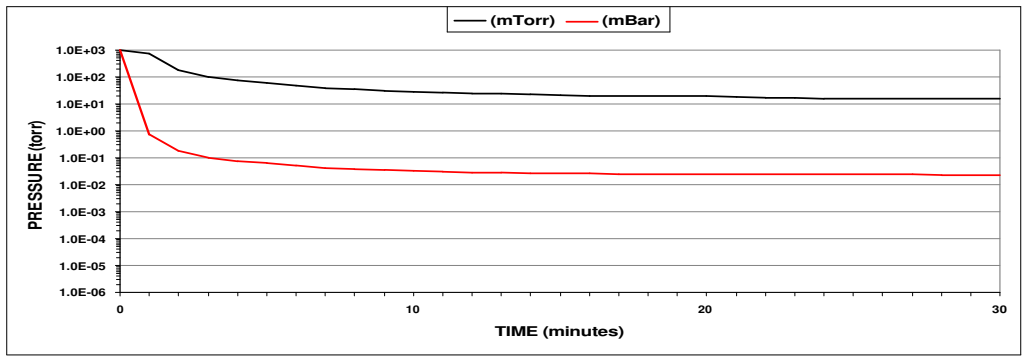
# TYPICAL PERFORMANCE DATA

## PUMP DOWN

Desk V: Pump Down (typical)			
Time (Seconds)	Chamber open before pump down		
	5 sec. mTorr	5 min. mTorr	? mTorr
0			
30			
60			
90			
120			
150			
180			
210			
240			
270			
300			



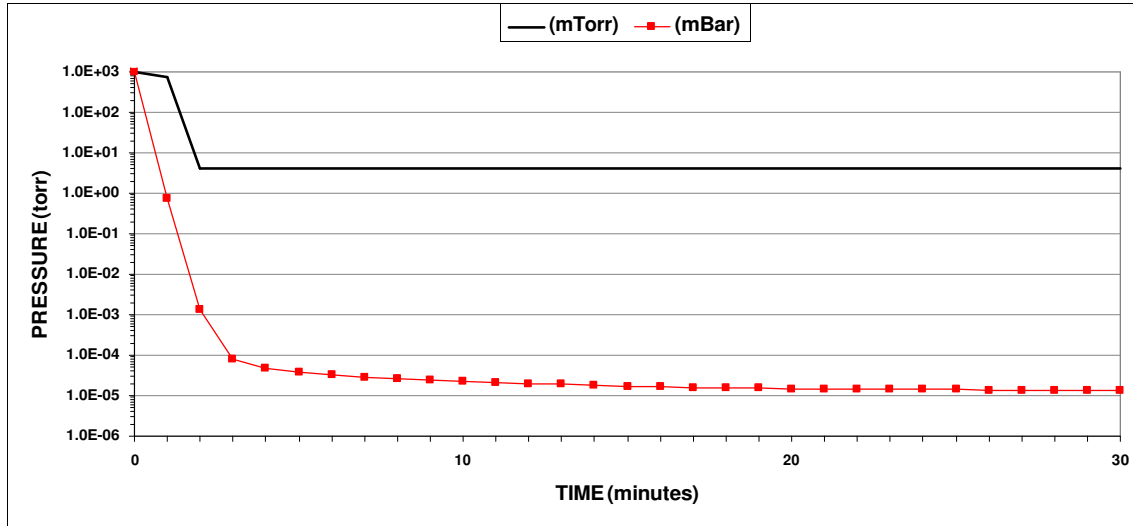
DESK V TSC: Pump Down (typical) Mechanical Pump ONLY		
Time	TC gauge Pressure	FR gauge Pressure
(Minutes)	(mTorr)	(mBar)
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		



DESK V TSC Pump Down (typical) Mechanical Pump & Turbo Pump ON		
Time	TC gauge Pressure	FR gauge Pressure
(Minutes)	(mTorr)	(mBar)
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

Turbo ON

***Turbo at Speed***



## DEPOSITION RATE

**Desk V: Gold Deposition Rate (typical)**

Initial pressure < 20 mTorr  
 Source to substrate distance = 2.375" (60 mm)  
 Timed Sputter = 10 minutes (600 seconds)

<b>Target Material:</b>	<b>Gold</b>
<b>Gas:</b>	<b>Air</b>
<b>Pressure :</b>	<b>50 mTorr</b>

Power	Current	Film Thickness	Deposition Rate
%	mAmps	Å	Å / sec.
38	10	260	0.43
58	20	650	1.08
78	30	1020	1.70
97	40	1750	2.92

<b>Target Material:</b>	<b>Gold / Palladium</b>
<b>Gas:</b>	<b>Air</b>
<b>Pressure :</b>	<b>50 mTorr</b>

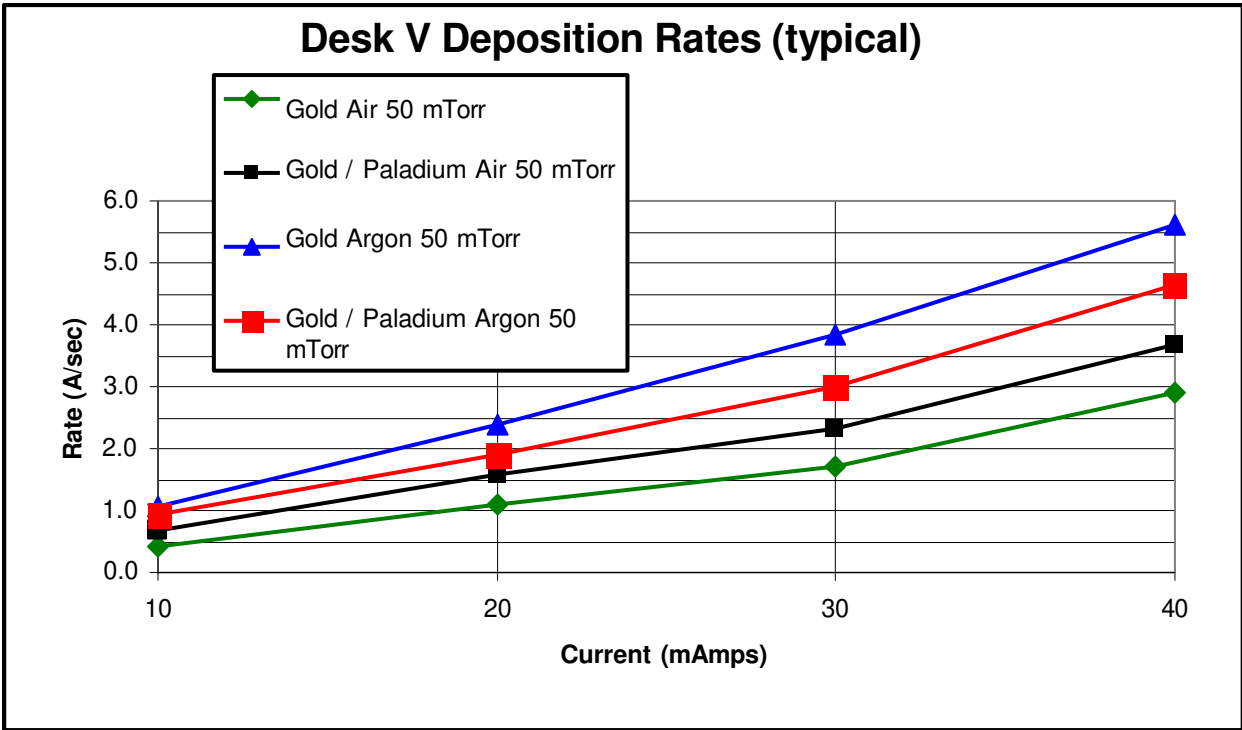
<b>Power</b>	<b>Current</b>	<b>Film Thickness</b>	<b>Deposition Rate</b>
<b>%</b>	<b>mAmps</b>	<b>Å</b>	<b>Å / sec.</b>
37	10	405	0.68
58	20	945	1.58
78	30	1390	2.32
97	40	2210	3.68

<b>Target Material:</b>	<b>Gold</b>
<b>Gas:</b>	<b>Argon</b>
<b>Pressure :</b>	<b>50 mTorr</b>

<b>Power</b>	<b>Current</b>	<b>Film Thickness</b>	<b>Deposition Rate</b>
<b>%</b>	<b>mAmps</b>	<b>Å</b>	<b>Å / sec.</b>
26	10	640	1.07
47	20	1440	2.40
68	30	2300	3.83
83	40	3360	5.60

<b>Target Material:</b>	<b>Gold / Palladium</b>
<b>Gas:</b>	<b>Argon</b>
<b>Pressure :</b>	<b>50 mTorr</b>

<b>Power</b>	<b>Current</b>	<b>Film Thickness</b>	<b>Deposition Rate</b>
<b>%</b>	<b>mAmps</b>	<b>Å</b>	<b>Å / sec.</b>
22	10	560	0.93
48	20	1140	1.90
68	30	1805	3.01
88	40	2795	4.66



---

---

## PACKING DESK V FOR RETURN

(See photos on the next page.)



**NOTE: The DESK V must be packed in a carton and banded to a skid when returning it to DVI for service!**



**NOTE: If the machine is not packed on a skid, the oil must be drained from the mechanical pump when returning the unit to DVI for service!**

It may be necessary to return the Desk V unit for repair. Follow these instructions for safe return of the unit.

If available, use original packing materials, box, and skid received with your system from Denton Vacuum. Pack as follows:

- a. **For the DESK V: remove the Pyrex cylinder and wrap it in bubble wrap packaging material. Band the hinged top plate down to prevent it from moving during shipment.**
- b. For the Desk V TSC: secure the sputter head to the chamber by taping and banding it to the chamber.
- c. Place insulation pieces on either side of the cabinet.
- d. Place the unit (with insulation on sides) into the cardboard carton.
- e. Add bubble wrap on top and sides of the machine to fill the gaps.
- f. Tape the carton closed.
- g. Repack the mechanical pump into the original shipping carton.
- h. Repack any other accessories (carbon rod or yarn accessories) into their original shipping carton(s).
- i. Band all of the cartons to the skid.
- j. **Ship the unit with a carrier that handles electronic equipment. Call Denton Vacuum for recommended freight handler (856-439-9100).**

*NOTE: Denton Vacuum WILL NOT be responsible for any damages sustained in shipment, including warranty work.*

In the event that the unit is returned to Denton Vacuum with inadequate packing materials, Denton Vacuum will provide the packing materials at a charge to the customer.

## PACKING PHOTOS



**Ship Via a carrier that handles electronic equipment. DO NOT ship via a common carrier, such as Yellow Freight or UPS.**

## SUGGESTED SPARES

### CONSUMABLES FOR DESK V AND TSC

CONSUMABLES FOR DESK V AND TSC			
PART NO.	DESCRIPTION	LOCATION	QTY.
DSK004-0016	6" D. X 6" H. PYREX CYLINDER	DESK V	1
DSK001-0045	6" CYLINDER GASKET	DESK V PYREX CYLINDER, DESK V TSC ST ST CHAMBER	2
VFT002-0061	SIGHT GLASS	VIEW PORT FOR TSC	1
GSK002-0015	COPPER GASKET SEAL	VIEW PORT FOR TSC	1
ORG004-0128	O-RING	TOP & BOTTOM OF TSC CHAMBER (OLD STYLE)	2
OIL001-0007	OIL	MECHANICAL PUMP	300 CC
PMP007-0049	MIST FILTER	MECHANICAL PUMP	1
PMP007-0050	FILTER ELEMENT REPLACEMENT - OIL MIST ELIMINATOR	MIST FILTER FOR MECHANICAL PUMP	1
MFG002-0001	POL POLISH (150 ML TUBE)	TO CLEAN METAL & GLASS	1
ORG001-0004	O-RING	SHUTTER & GAS INLET	2
ORG001-0045	O-RING	SHUTTER & GAS INLET HIGH VOLTAGE FEEDTHROUGH	2
DSK001-0076	ANODE GRID	SPUTTER HEAD ASSEMBLY	1
VAC002-0016	DV-23, THERMOCOUPLE GAUGE TUBE	BASEPLATE	1
DSK001-0125	10A, 250V, MAGNETIC CIRCUIT BREAKER	REAR PANEL (NEW STYLE)	1
HOS002-0003	½" DIAMETER VACUUM HOSE	PUMP TO CHAMBER	
DSK001-0165	MECHANICAL PUMP	CABINET	1
PRB001-0002	H.V.FEEDTHROUGH	BASEPLATE	1
DSK001-0065	CATHODE PLATE	TARGET SEAL	1
PMP005-0412	LUBRICANT RESERVOIR	TURBO PUMP FOR DESK V TSC	1

---

---

## FUSES

<b>FUSES FOR DESK V AND TSC</b>			
<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>QTY.</b>
FUS001-0047	10 AMP, 250V, TIME DELAY, CERAMIC BODY	MAIN FUSE (110V)	1
FUS001-0053	8 AMP, 250V, TIME DELAY, CERAMIC BODY	MAIN FUSE (230V)	1
FUS001-0067	5 AMP, 250V, TIME DELAY, CERAMIC BODY	MECHANICAL PUMP (110/230v)	1
FUS001-0051	4 AMP, 250V, TIME DELAY, CERAMIC BODY	HIGH VOLTAGE (110/230v)	1
FUS001-0049	2 AMP, 250V, TIME DELAY, CERAMIC BODY	CONTROL (110/230V)	1
<b>FUSES FOR CARBON ACCESSORIES</b>			
<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>QTY.</b>
FUS001-0047	10 AMP, 250V, TIME DELAY, CERAMIC BODY	CARBON ACCESSORY (110V)	1
FUS001-0067	5 AMP, 250V, TIME DELAY, CERAMIC BODY	CARBON ACCESSORY (230v)	1

## CONSUMABLES FOR CARBON ROD ACCESSORY

CONSUMABLES FOR CARBON ROD ACCESSORY			
PART NO.	DESCRIPTION	LOCATION	QTY.
CHB005-0057	6" D. X 9" H. PYREX CYLINDER	DESK V CARBON ACCSY.	1
DSK001-0047	6" D. X 3.5" H. PYREX CYLINDER	DESK V TSC CARBON ACCSY.	1
DSK001-0045	6" GASKET	6" PYREX CYLINDER	2
CAR001-0014	CERAMIC BUSHING	CARBON FIXTURE	2
SPR001-0024	SPRING	CARBON FIXTURE	1
CAR001-0012	1/8" STATIONARY CHUCK	CARBON FIXTURE	1
CAR001-0013	MOVABLE CHUCK	CARBON FIXTURE	1
CAR001-0024	CARBON RODS, 1/8" D. X 2" L.	CARBON FIXTURE	100
CAR001-0004	THUMB SCREW, KNURLED	CHUCKS	2
DWG001-0061	LEAD – 3 1/2" GROUND	CARBON FIXTURE	1
DWG001-0055	LEAD – 11" LONG, ELECTRICAL (TO FEED THROUGH)	CARBON FIXTURE	1
DSK003-0012	SUPPORT POST	CARBON FIXTURE	1
SRC002-0131	3/8" L.V. FEED THROUGH	BASEPLATE	2
CAR001-0017	CAP	HEAD	1
BUS002-0010	BUSHINGS	BASEPLATE	4
HDW005-0004	SCREW, NYLON	CAP	1
CON005-0034	STRAIN RELIEF	CAP	2
ORG004-0049	O-RING	BASEPLATE	2

## CONSUMABLES FOR CARBON YARN ACCESSORY

CONSUMABLES FOR CARBON YARN ACCSY.			
PART NO.	DESCRIPTION	LOCATION	QTY.
CHB005-0057	6" D. X 9" H. PYREX CYLINDER	DESK V CARBON ACCSY.	1
DSK001-0047	6" D. X 3.5" H. PYREX CYLINDER	DESK V TSC CARBON ACCSY.	1
DSK001-0045	6" GASKET	6" D. PYREX CYLINDER	2
YRN001-0001	CARBON YARN	CARBONFIXTURE	25 FT.
CAR001-0015	CHUCK	CARBONFIXTURE	2
HDR001-0029	CARBON YARN HOLDER	CARBONFIXTURE	2
DSK003-0012	POST	CARBONFIXTURE	2
SRC002-0131	3/8 L.V. FEEDTHROUGH	BASEPLATE	2
ORG004-0049	O-RING	BASEPLATE	2
BUS002-0010	BUSHING	BASEPLATE	4
CAR001-0017	CAP	HEAD	1
CON005-0034	STRAIN RELIEF	CAP	2
HDW005-0004	SCREW, NYLON, (8-32 x .38 L.)	CAP	1

# TARGETS FOR DESK V SERIES

## TARGETS FOR DESK V AND TSC

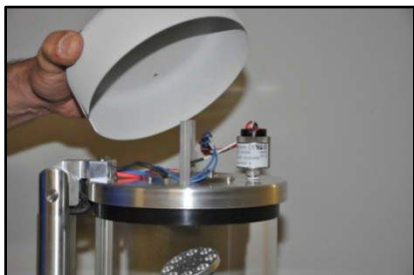
TARGETS FOR DESK V and TSC		
PART NO.	MATERIAL	THICKNESS
<b>2.375" DIAMETER TARGETS</b>		
TAR001-0158	(Au) Gold (99.99%)	0.002"
TAR001-0159	(Au/Pd) Gold/Palladium (60/40)	0.002"
TAR001-0091	(Au/Pd) Gold/Palladium (60/40)	0.010"
TAR001-0030	(Pt) Platinum (99.99%)	0.0025"
TAR001-0099	(Pt/Pd) Platinum/Palladium (60/40)	0.002"
TAR001-0253	(Pd) Palladium Target (99.99%)	0.1mm
TAR001-0223	(Au/Pd) Gold Palladium (60/40) – 60mm diameter	0.1mm
TAR001-0227	(Au/Pd) Gold Palladium (60/40) – 60mm diameter	0.2mm
<b>50MM X 50MM TARGETS</b>		
TAR001-0031	(Pd) PALLADIUM (99.9%)	0.1mm
TAR001-0033	(Ag) SILVER (99.9985%)	0.1mm
TAR001-0107	(Ag) SILVER (99.9985%)	2.0mm
TAR001-0102	(Ir) Iridium (99.8%)	.127mm
TAR001-0065	(Ti) Titanium (99.99%) (TSC only)	.127mm
TAR001-0179	(Cr) Chromium (99.95%) (TSC only)	.0625"
TAR001-0221	(C) Carbon (99.999%) (TSC only)	.0625"
TAR001-0032	(Cu) Copper (99.999%) (TSC only)	0.1mm
TAR001-0104	(Pt) PLATINUM (99.998%)	0.1mm
<b>RETAINERS FOR TARGETS</b>		
DSK004-0017	FOR 2" DIAMETER AND 50MM X 50MM TARGETS (Aluminum)	
DSK003-0036	FOR 2" DIAMETER AND 50MM X 50MM TARGETS FOR TSC (stainless steel)	

PRECIOUS METAL PRICES ARE SUBJECT TO CHANGE WITH MARKET VALUE.

PLEASE CALL DENTON VACUUM AT 856-439-9100 FOR A QUOTATION.

## Adjusting the Vacuum Safety Bellows Switch

- 1) Remove the top cover on the sputter head and locate the bellows safety switch.



- 2) The bellows safety switch is a round cylinder with 3 wires (red, white, and black) coming from the top (the name Whitman Controls can be found on the side).



- 3) Pump system down to a vacuum level between 10 torr and 100 torr (  $1.0E+01$  and  $1.0E+2$ ).
- 4) When the vacuum level is between 10 torr and 100 torr (  $1.0E+01$  and  $1.0E+2$ ), shut the manual valve on the Mechanical Pump. **(DO NOT TURN THE PUMP OFF ON THE TOUCH SCREEN AS THIS WILL VENT THE SYSTEM).**
- 5) On the vacuum bellows safety switch, locate the knurled locking ring on the top portion of the switch; loosen the ring while holding onto the section of the switch from which the wires come out from.



- 6) Upon loosening the locking ring, slowly rotate the section with the wires counter clockwise, while looking at the touch screen.
- 7) When the interlock message changes to “All Satisfied,” lock the knurled ring back down.
- 8) Re-open the manual valve on the Mechanical Pump and turn the pump off on the touch screen.
- 9) The bellows interlock message should re-appear.
- 10) Start the mechanical pump again and check to ensure that the bellows interlock goes to all satisfied. If it does not, repeat steps 2 thru 9.
- 11) If the bellows goes to all satisfied, re-install cover the sputter head.

## Emergency Stop Button



To ensure proper operation, make certain that the emergency button (shown here) is pulled-out completely. The Desk V cannot operate when the emergency button is pushed-in.

## Battery Advisory:

Note: The battery in your Desk V tool is not rechargeable and the life expectancy is 1 -1.5 Years. To avoid losing the program on your screen, keep the tool plugged in and the tool on. The screen must always be powered (24 VDC). Should you need to replace the battery, always replace it with the screen powered.