

4 OPERATING INSTRUCTIONS FOR OPERATORS

This chapter describes how to operate the Oxford Instruments Plasma Technology **PlasmaPro®100 Cobra** tool. All procedures described here must only be performed by operators with the appropriate skills and training.


The chapter comprises the following sections:

- Emergency shutdown
- Starting up the tool
- Performing basic operations
- System alerts
- Leak testing the process chamber

4.1 Emergency shutdown

In an emergency, press a red **Emergency Off** button on the tool (see [Figure 1-3](#)). Once operated, a button latches in the off position to ensure that electrical power is removed from the tool.

The emergency off buttons are intended for use when electrical power must be immediately removed from the tool in order to prevent personal injury or an immediate hazard. A button must also be operated if the building is being evacuated because of fire, earthquake, flood or other major event.

 Caution	EMERGENCY OFF
Only press an Emergency Off button if an immediate hazard is perceived. Repeated use of Emergency Off buttons can degrade the tool's hardware, resulting in premature failure.	

Note that pressing the emergency off button does not remove all potential hazards from the tool. Refer to [Section 1.7.1.1](#) for a list of hazards that may still be present after pressing the emergency off button.

When the emergency situation has been rectified and it is safe to operate the tool, perform the start-up sequence described in [Section 5.2](#) to recover from the shut-down.

4.2 Starting up the tool

This section only applies to users with *MANAGER*, *SUPERVISOR*, *MAINTENANCE* or *USER* privilege.

PlasmaPro®100 Cobra

4.2.1 Power-up sequence

Figure 4-1 shows the power-up sequence for the tool.

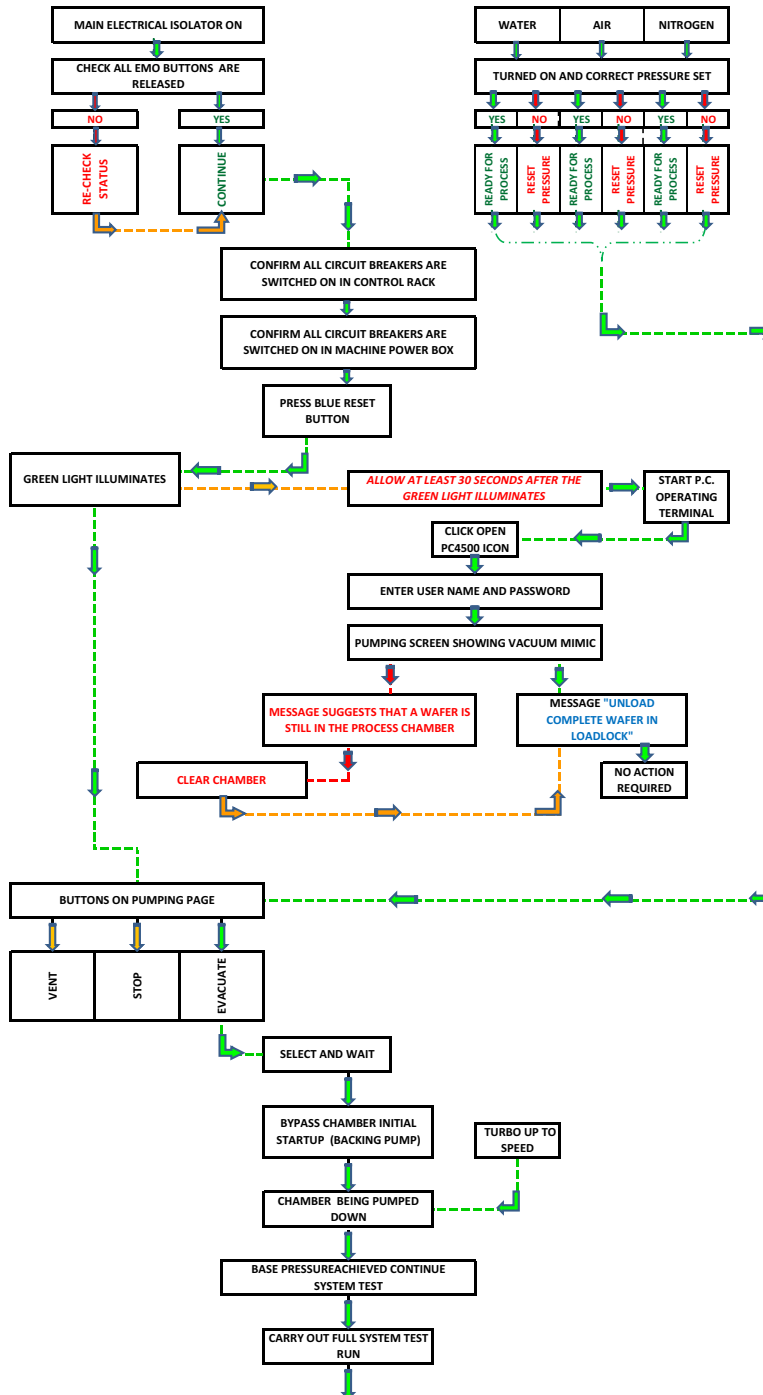


Figure 4-1 Tool power-up sequence

4.2.2 Tool power-up procedure

This section describes how to start up the tool when it is fully powered down. It is assumed that the tool is switched off at the facility electrical isolation box.

- 1 Check the maintenance log, to ensure that the tool is in a good state to be operated.
- 2 Check the history of the tool's gas bottles and gas lines. Particularly check if any gas lines have been recently opened or if any gas lines may contain air.
- 3 Check that all the tool's covers are correctly fitted and the doors are closed.
- 4 Check there is no visible damage to the tool.
- 5 Turn on the cooling water isolation valves.
- 6 Check that the cooling water pressures and flows are within specification.
- 7 Ensure that the tool's compressed air supply is turned on, and that the pressure is within specification.
- 8 If it can be confirmed that all gas lines do not contain air, turn on all manually operated gas isolation valves, including any cylinder valves. If one or more gas lines may contain air, leave the valves closed and display a clear note of why this has been done.
- 9 Apply electrical power to the tool by switching on the facility electrical isolation box.
- 10 Rotate all **emergency off** buttons to check that they are out (see [Figure 1-3](#)).
- 11 Switch on the isolator mounted on rack box 1.
- 12 Press the blue **System Reset** button on the tool control box.
- 13 Switch on the heater/chiller unit.
- 14 Switch on the remote PC controller.
- 15 Check that the controller boots up correctly and that the Access Control window opens.

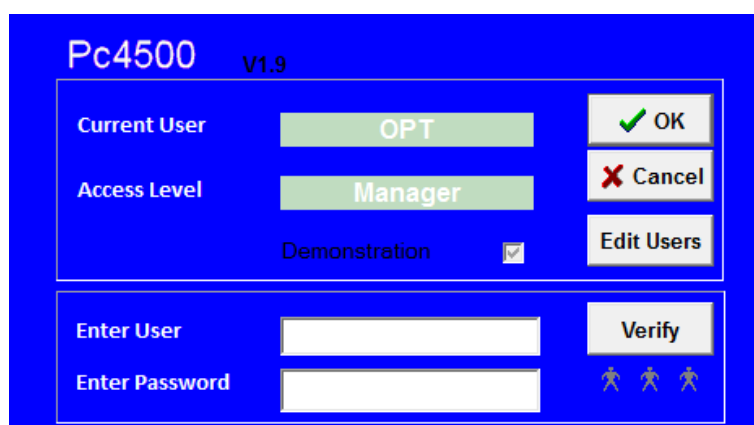


Figure 4-2 Access Control window

- 16 The tool is now powered up. If any gas lines are shut off because they may contain air, evacuate those gas lines before turning on the process gas supply (see [Section 5.9](#)).

PlasmaPro®100 Cobra

4.3 Performing basic operations

This section describes basic machine operations that apply to all users.

4.3.1 Logging on and off

The PC4500 application incorporates several different levels of login to match the job functions of different personnel who might use the tool. [Section 5.15.1](#) describes how a person with *MANAGER* privilege can create and manage new login accounts.

The login procedure is the same for all login levels.

When the PC4500 application is first started, the Access Control page is automatically displayed ([Figure 4-3](#)). You can also access this page at any time by selecting the **User Log In** item from the system menu (see [Figure 3-6](#)).

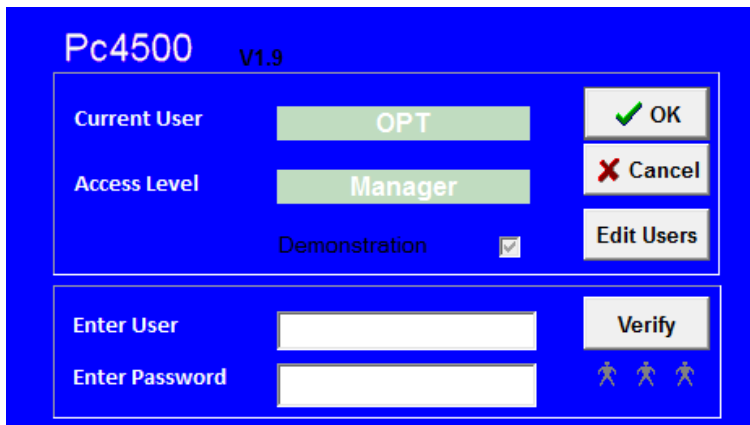



Figure 4-3 Access Control window

To log on to the controller:


- 1 Type your account user name in the **Enter Name** field.
- 2 Type your account password into the **Enter Password** field. The password is case-sensitive: for example, **Password** and **pAsswOrd** are different passwords.
- 3 Ensure that the **Demonstration** button is NOT selected.
- 4 Click **Verify**.
- 5 If the information entered is correct, the log-in status is displayed in the **Current User** and **Access Level** fields.
- 6 Click **OK**. The PC4500 application now loads and displays the Pump Control page or the Production page, depending on your access level.
- 7 If the login information is not verified correctly, re-enter your name and password and click **Verify**.

4.3.2 Opening and closing the loadlock

	TOXIC GASES
	<p>Exposure to toxic gases can cause death or serious injury. The loadlock vent sequence includes a purging step to remove any trace of toxic gas.</p> <p>Always follow the proper procedure when venting the loadlock. Do not change the purging time on the Tolerances page.</p>

4.3.2.1 Venting and opening the loadlock

To open the loadlock:

- 1 If the loadlock is not vented, click the **menu** icon .
- 2 Select the **Pumping** menu option. The Pumping page opens.
- 3 Click **stop** in the Loadlock panel.

Loadlock		
Vent Time Left	0	secs
Lid	CLOSED	
Pirani	7.69e-03	Torr
evacuate stop vent		

Figure 4-4 Loadlock panel on the pumping page

- 4 Click **vent**. The tool automatically operates the appropriate valves to vent the loadlock.
- 5 Wait until the **Vent Time Left** field in the Loadlock panel displays zero time, indicating that the vent sequence has completed.

4.3.2.2 Closing and evacuating the loadlock

To close the loadlock:

- 1 Grip the loadlock by the lip at the top of the lid.
- 2 Lower the lid until it rests on the top of the loadlock.

PlasmaPro®100 Cobra

- 3 Check that the graphical display on the Pumping page indicates that the lid is closed. If the graphical display does not indicate that the lid is closed, do not attempt to evacuate the loadlock.

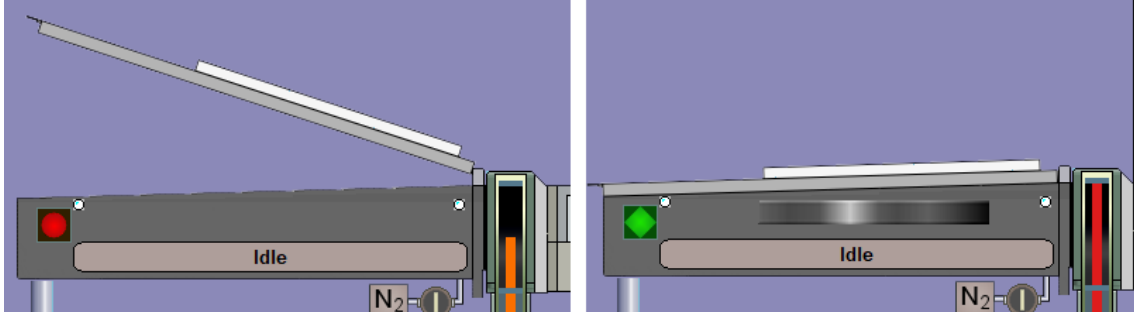


Figure 4-5 Pumping page showing the loadlock lid open and closed

- 4 Click **evacuate** in the Loadlock panel. A prompt opens asking for a wafer identity. If you have loaded a process wafer into the chamber, enter a wafer identity and click **OK**. If there are no wafers in the chamber, click **Cancel**.

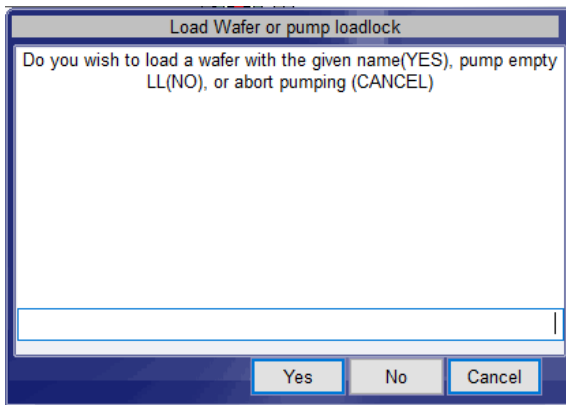


Figure 4-6 Load Wafer or Pump loadlock window

The tool now automatically actuates all the relevant valves to evacuate the loadlock.


- 5 When the base pressure has been reached, the Loadlock panel on the Pumping page displays the message *Ready*.

4.3.3 Automatic process run

This section describes an automatic process run, which allows a complete process to run automatically once the wafers have been loaded into the loadlock.

- 1 Check that the following conditions are true:
 - a) The tool is started up, with all vacuum pumps running.
 - b) The process chamber is evacuated (see [Section 5.7.1](#)).
 - c) The loadlock is vented (see [Section 4.3.2](#)).
- 2 Open the loadlock lid (see [Section 4.3.2](#)).
- 3 Place the wafer on the loadlock arm or carrier.

PlasmaPro®100 Cobra

- 4 Close the loadlock lid (see Section 4.3.2.2).
- 5 Evacuate the loadlock and enter the wafer identity (see Section 4.3.2).
- 6 Click .
- 7 Select the **Recipes** menu option. The Recipes page opens.

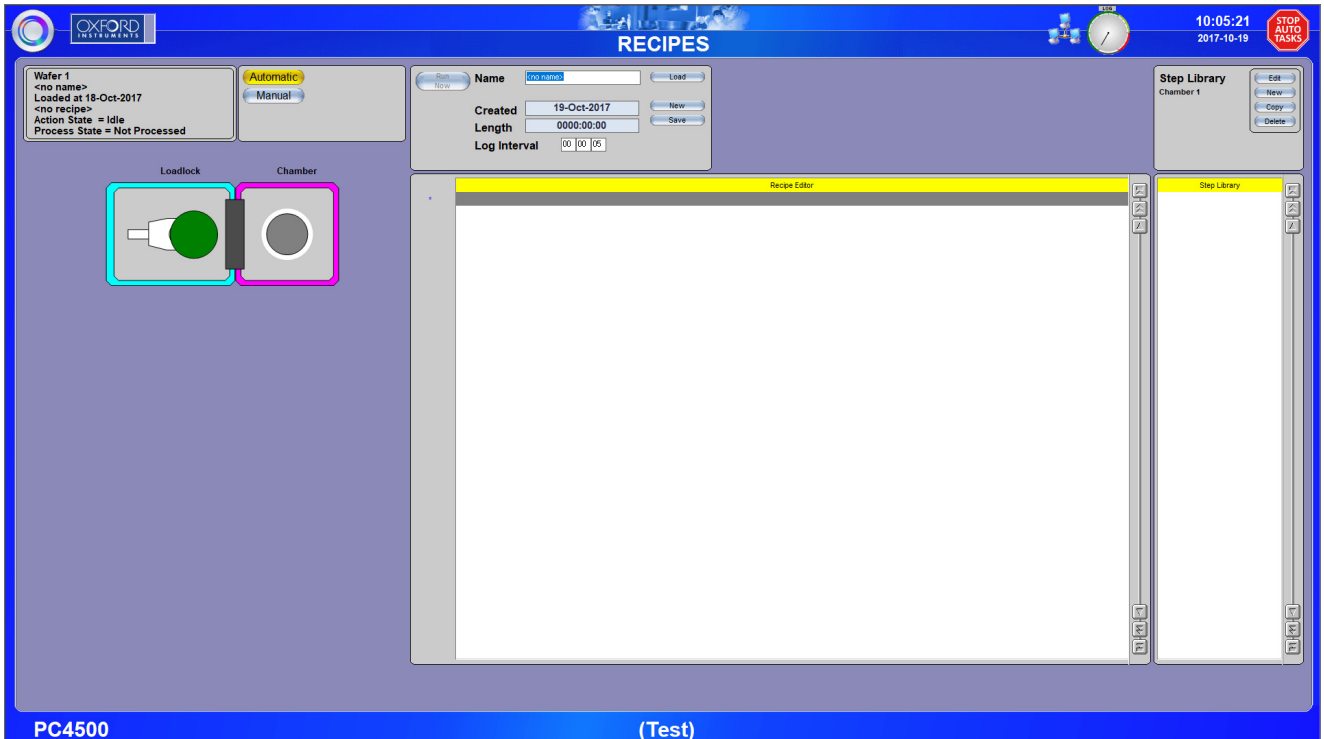


Figure 4-7 Recipes page



- 8 Click **Load** in the central panel. The **Load Recipe** window opens.
- 9 Select a recipe to load into the **Recipe Editor** panel.
- 10 Inspect the list of recipe steps in the **Recipe Editor** panel to confirm that the correct recipe has been loaded.
- 11 If you want to automatically load a wafer into the process chamber, click **Automatic**. The colour of the button changes to yellow to confirm that it has been selected.
- 12 If you want to run the recipe without loading a wafer into the process chamber, click **Manual**. The colour of the button changes to yellow to confirm that it has been selected. You would select **Manual** to run a cleaning recipe, or if a wafer is already present in the process chamber.
- 13 Click **Run Now** (Figure 4-8). This initiates the following automatic sequence:
 - a) The Process Control page is displayed to allow you to monitor the progress of the run.
 - b) The tool evacuates the loadlock (if **Automatic** is selected).
 - c) When the process chamber reaches its base pressure, the tool transfers the wafer into the process chamber (if **Automatic** is selected).

PlasmaPro®100 Cobra

- d) The process starts.
- 14 To pause the process at any stage, click **pause** on the Process Control page. This immediately switches off the plasma RF power and stops the step time at its present value.



Figure 4-8 Control buttons on the Process page

- 15 To re-start the process, click **pause** again (Figure 4-8). This switches on the plasma RF power and re-starts the step timer from its present value.
- 16 To stop the process, either:
 - a) click **stop** (Figure 4-8). This causes the process to abort and resets the step timer to zero. The tool displays the message **Process Complete**. You can then run the same process or a different process, if required.
 - b) or to stop an automatic process and return all wafers to the loadlock, click .
- 17 Wait until the process has completed. If you have selected **Automatic**, wait until the wafer has been transferred back into the loadlock.
- 18 Click .
- 19 Select the **Pumping** menu option. The Pumping page opens.
- 20 Vent the loadlock (see Section 4.3.2).
- 21 Open the loadlock lid and remove the wafer (see Section 4.3.2).
- 22 Repeat the steps in this section to process further wafers.
- 23 When you have processed all the wafers, evacuate the loadlock (see Section 4.3.2.2).

4.4 System alerts

This section applies to all users.

The tool displays a system alert when the PC4500 application detects an event that requires the attention of the user. The tool automatically categorizes each alert, depending on its severity and the level of response required by the user. Details of the three possible alert categories are shown in Table 4-1.

Table 4-1 System alert categories

Alert Category	Description	Example	Action
Blue	A warning. This indicates that a service parameter is out of tolerance but the process is continuing.	Low flow of cooling water.	Resolve the issue as soon as possible. If necessary pause the process after the current wafer has completed.