Operating the Autosamdri – 931 Critical Point Dryer

General Process in Auto Mode:

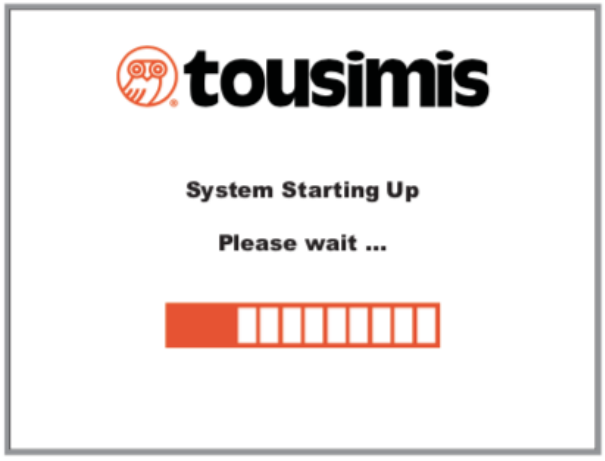
1. Open the CO_2 tank all the way.
2. Turn the red power witch in the front of the CPD on.
3. Press Enter User/Sample Information if you want to do that.
    a. Otherwise just press Main Menu.
4. Press NEXT to start Auto Mode.
5. Open the sample chamber and put in enough 100% Ethanol to completely cover your sample.
6. Quickly put your samples into the chamber and secure the lid.
7. Press COOL – wait a little bit.
8. Once the camber has cooled press SLOW FILL.
9. Press CONFIRM the chamber is secured.
    a. The machine will automatically proceed through the remainder of the steps.
10. When it is done the screen will say Process Complete.
11. Remove the lid by evenly loosening the Knurl Nuts.
12. Remove your samples and reseal the lid.
13. Once you are done with all your runs turn off the CPD and close the CO_2 tank.
14. Fill out the log sheet and make sure you record the weight of the CO_2 tank at the end of your session.

More Detailed Operation in Auto Mode:

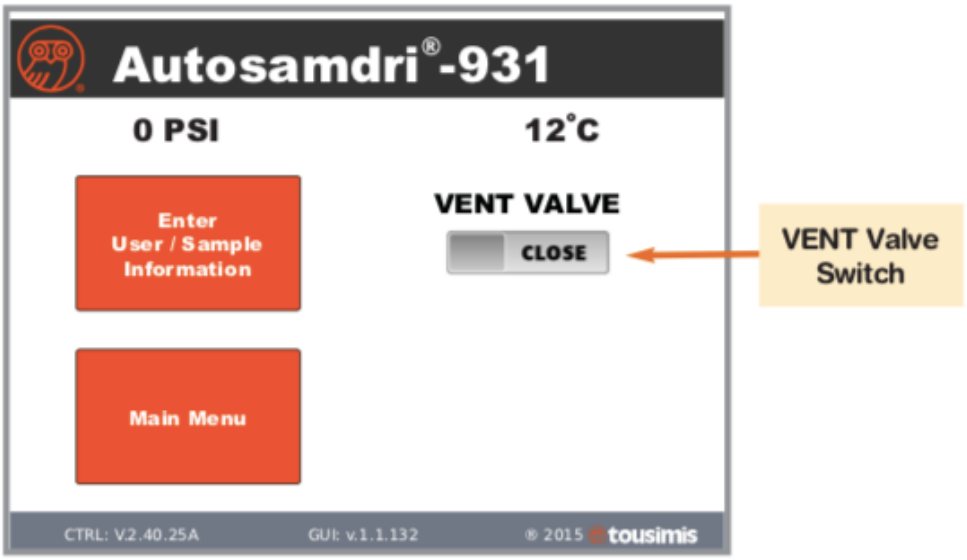
1. All 5 metering valves (COOL, SLOW FILL, FILL, BLEED, PURGE/VENT) have been factory preset. There is no need to adjust these Metering Valves.
   Open the main LCO2 Tank valve.

2. Turn power switch ON.

3. The 931 Touchscreen Control Panel will start up with the following screen display.



4. The 931 is ready to operate when the following screen is displayed.



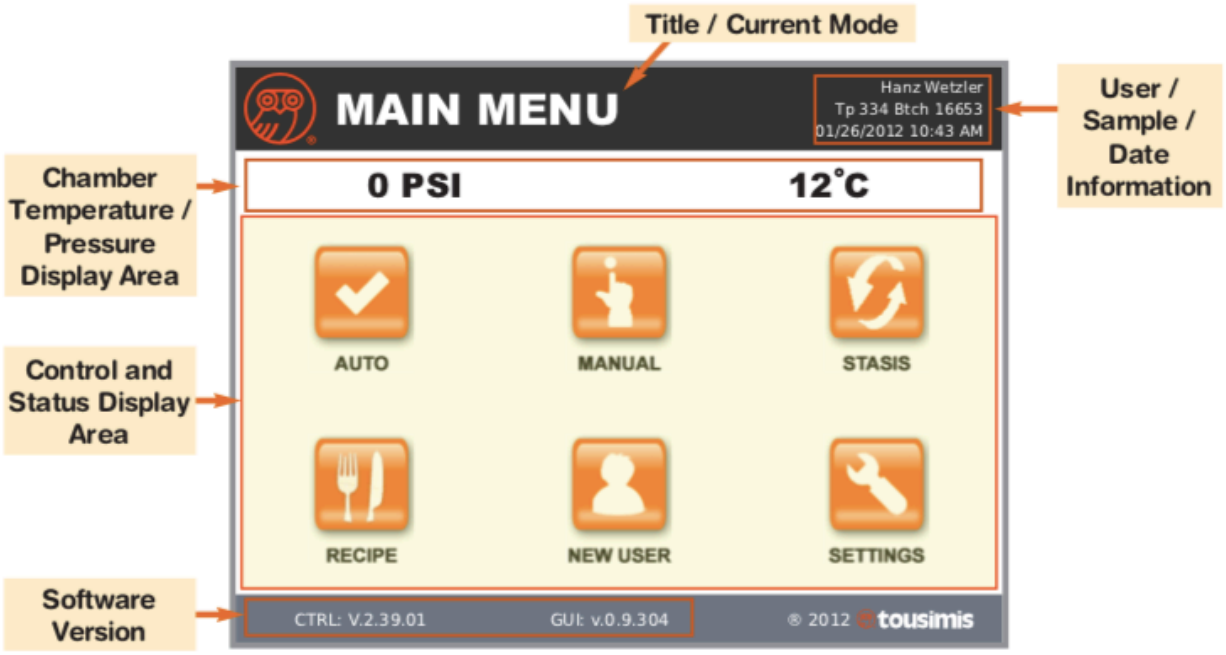
Press **Enter User / Sample Information** to enter User / Sample Information.
You may also press **Main Menu** to start operation without entering User / Sample Information.

If PROCESS CHAMBER is under pressure (above 50 psi), the 931 will display "CHAMBER UNDER PRESSURE."
Press VENT VALVE Switch to open VENT VALVE in order to start a new process run.

5. Enter User Name or ID (maximum 18 spaces long) and press Enter.

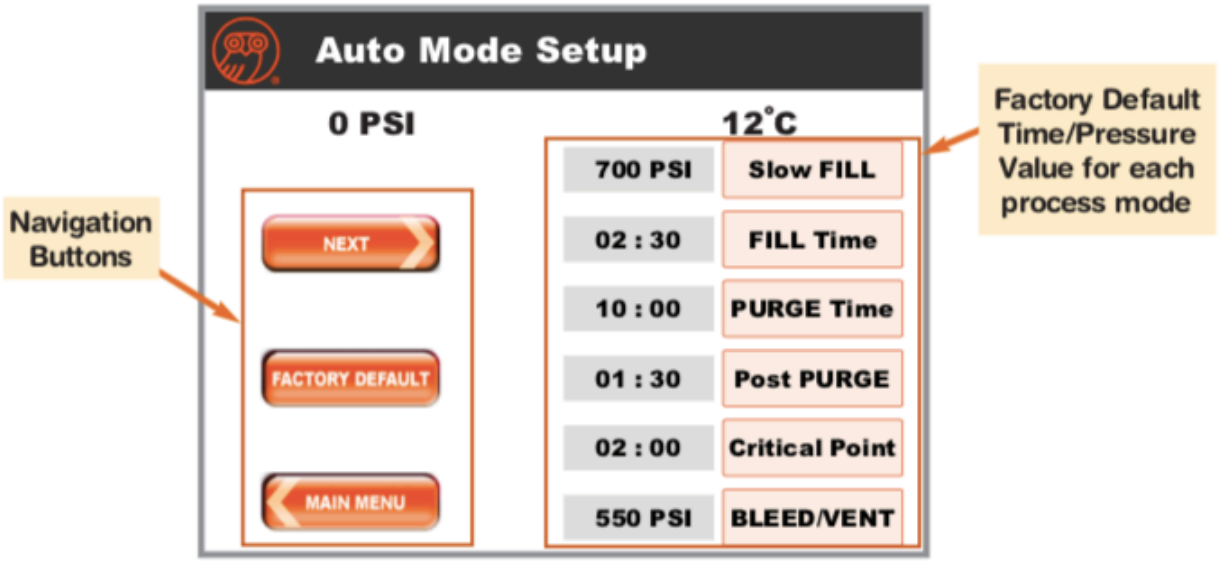
6. From the following screen, Enter Sample ID or Description (maximum 18 spaces long) and press Enter.

7. Main Menu will then be displayed. Press any button to initiate desired mode.



AUTO Mode:

1. Factory Default Time and Pressure Values may be used or updated from the Auto Mode Setup Screen.

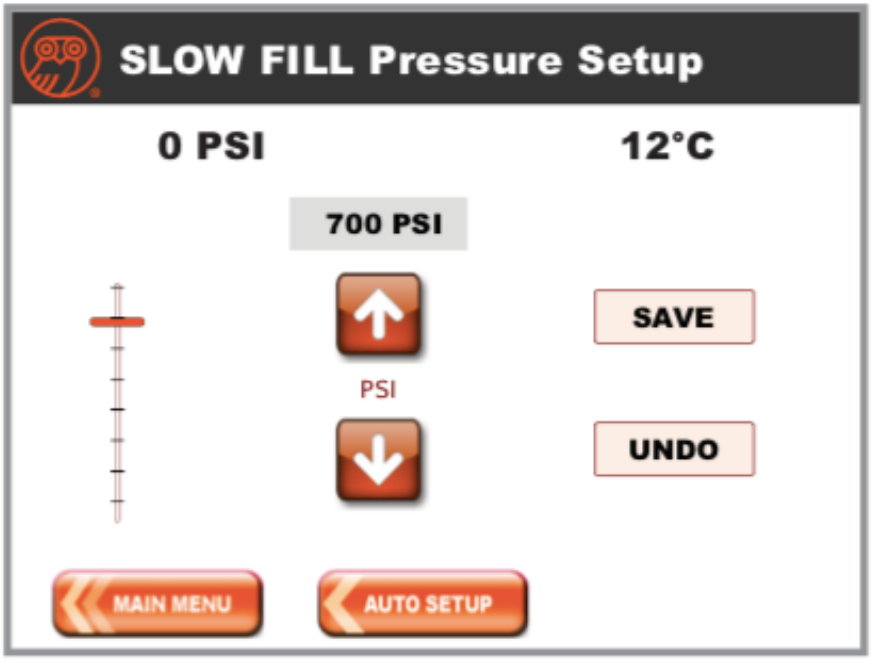


• Press NEXT to advance screen or to modify preset values press appropriate buttons. For example, to modify "Slow FILL" time, press Slow FILL button.
• Press NEXT button to start "Auto Mode."
• To restore tousimis® recommended preset values, press FACTORY DEFAULT button.
  • Exit the mode by pressing MAIN MENU button.

Update Time and Modes:

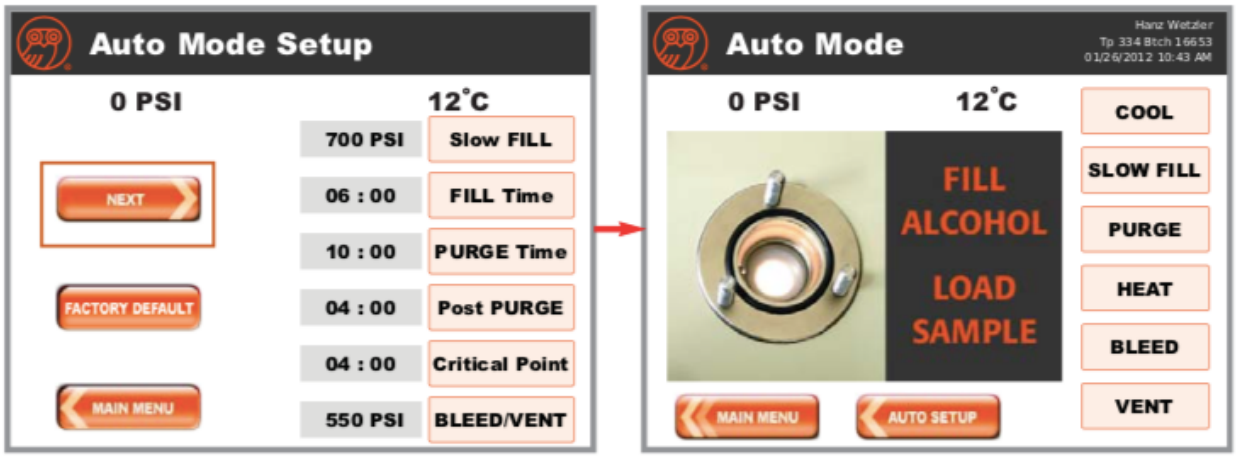
2. To update Time, use arrow buttons or slide bar to change value and press SAVE. UNDO button restores tousimis® recommended default values for typical process run. Press MAIN MENU or AUTO SETUP button to exit without saving.

3. To update SLOW FILL Pressure or BLEED/VENT Pressure, use arrow buttons or slide bar to change value and press SAVE. UNDO button restores tousimis® recommended value for typical process run. Press MAIN MENU or AUTO SETUP button to exit without saving.

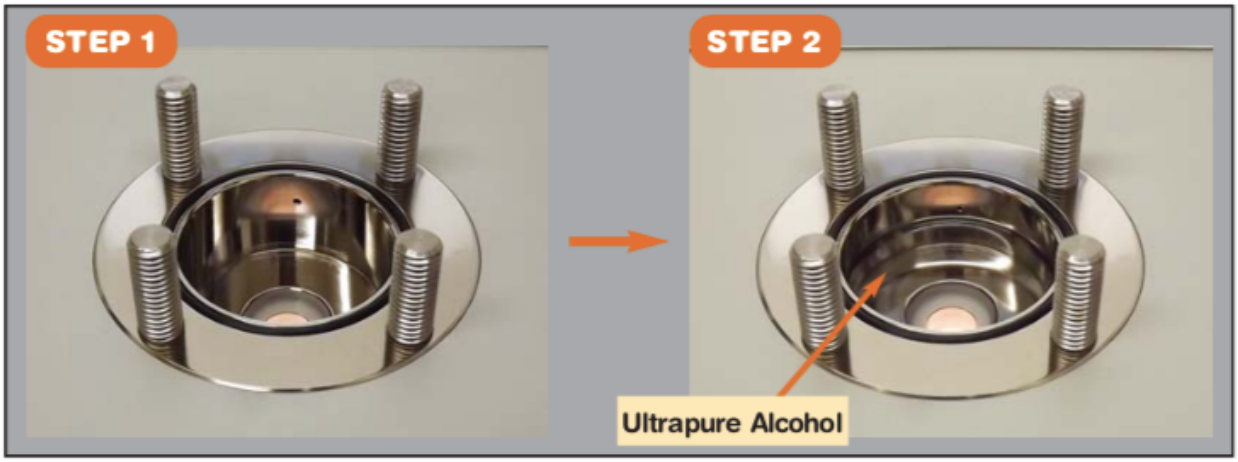


Continue once all settings established:

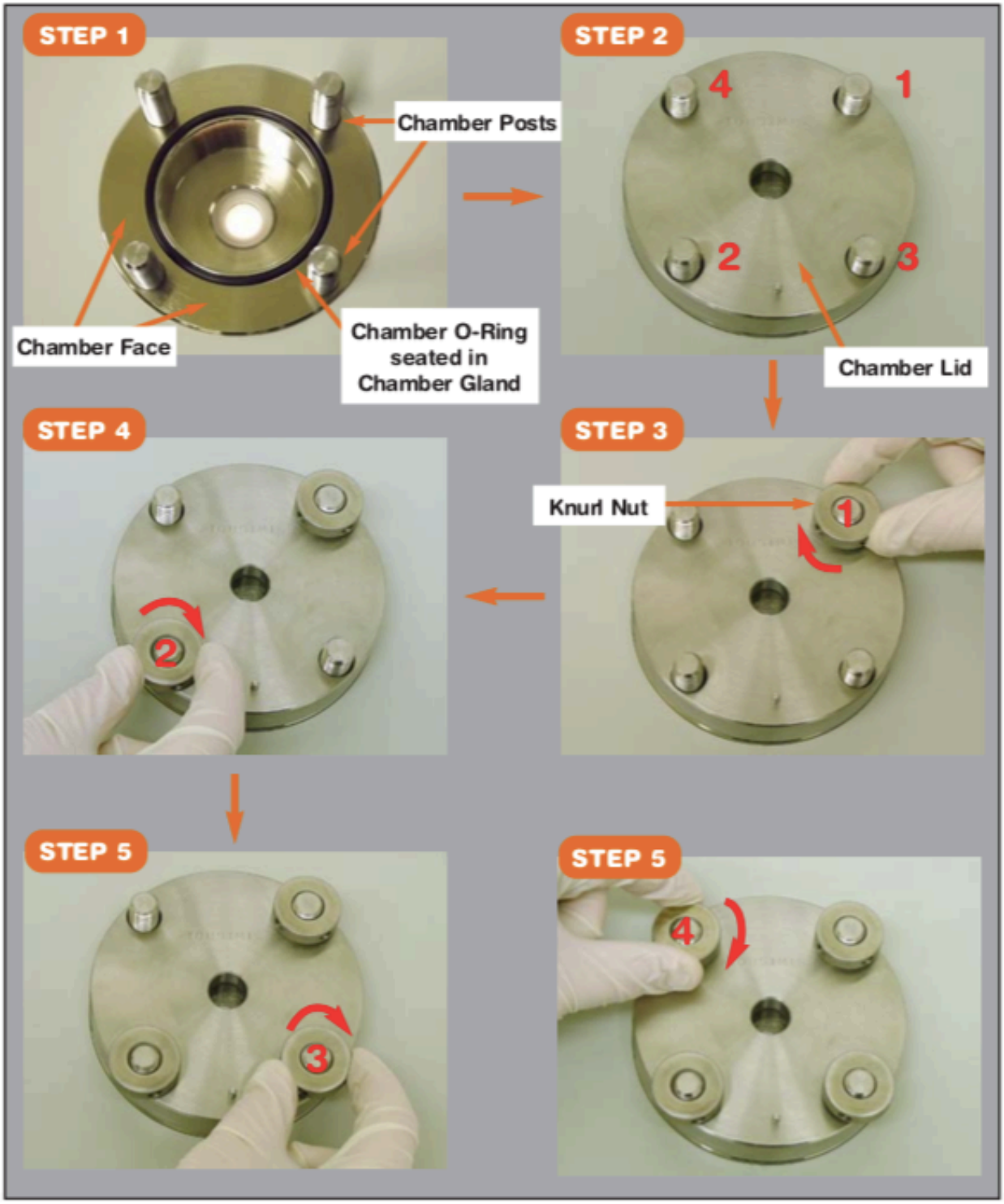
4. Press NEXT button from AUTO MODE SETUP page once Time/Pressure modifications are input to satisfaction.



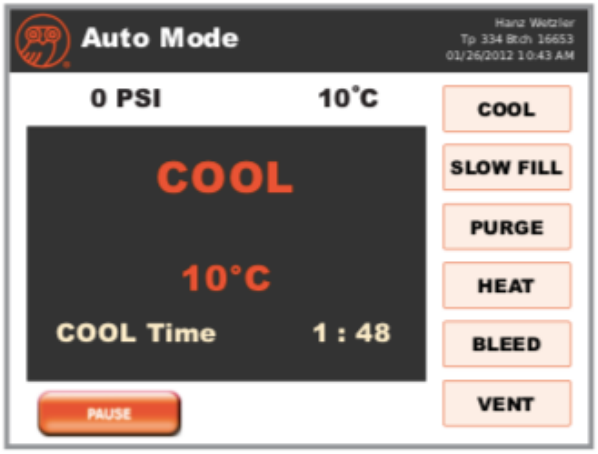
5. Pour sufficient alcohol into Process Chamber to cover your sample. Quickly transfer sample holder(s) into the Process Chamber. Secure chamber lid. <u>Once lid is secure press COOL button.</u>



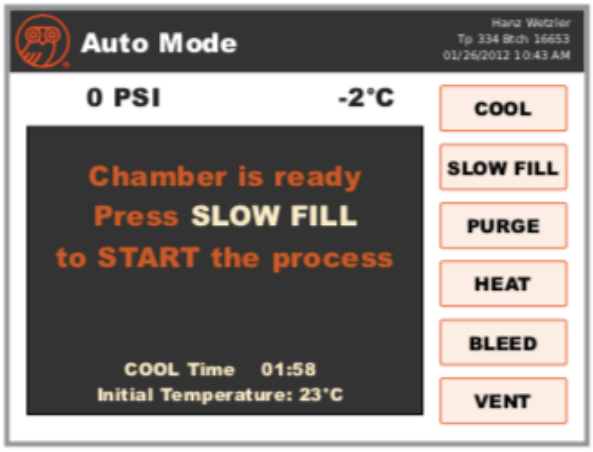
Secure the lid in a “Star Pattern”:



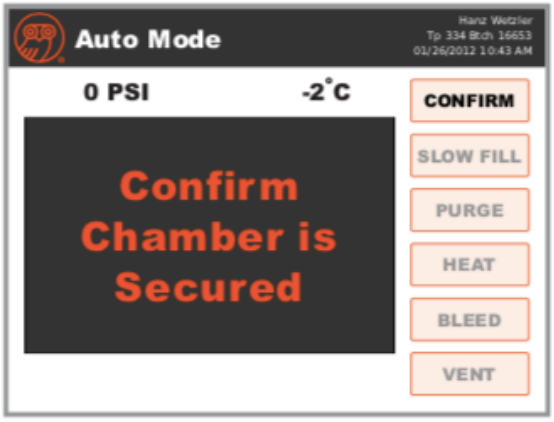
6. As the chamber temperature slowly begins to drop, you may hear the LCO2 circulating through the unit. The 931 will continue cooling by itself until the chamber temperature reaches 0°C (±5°C).



7. At this cut off point, the cooling will automatically stop and display the following message:

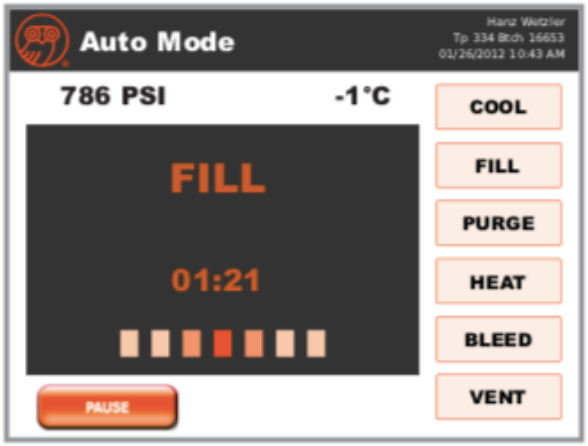


8. Press the SLOW FILL button to advance. The 931 requires confirmation of chamber security to further continue process. Double check chamber security and press CONFIRM.

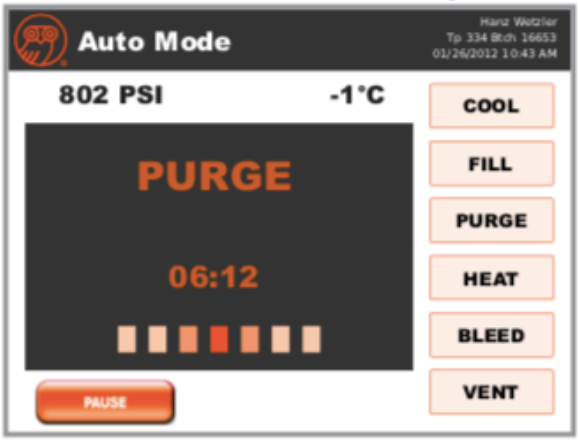


9. The 931 will begin to fill the chamber with LCO2. *From this point forward, the 931 will automatically advance through all process modes sequentially until completion.* During the SLOW FILL mode, the LCO2 will enter and fill the Process Chamber slowly.

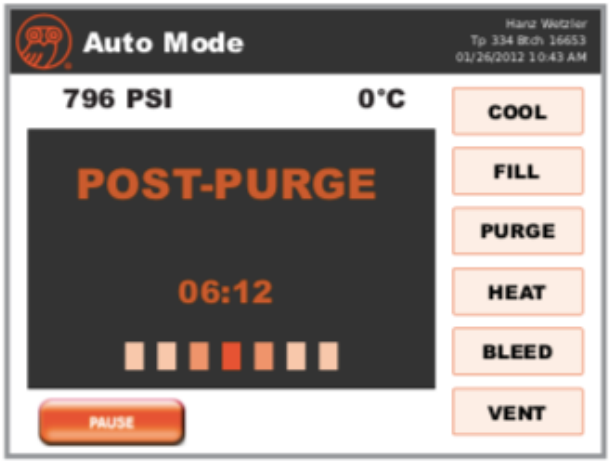
10. The 931 will advance to FILL Mode. The chamber temperature is automatically maintained below 10°C (±5°C). This is normal.



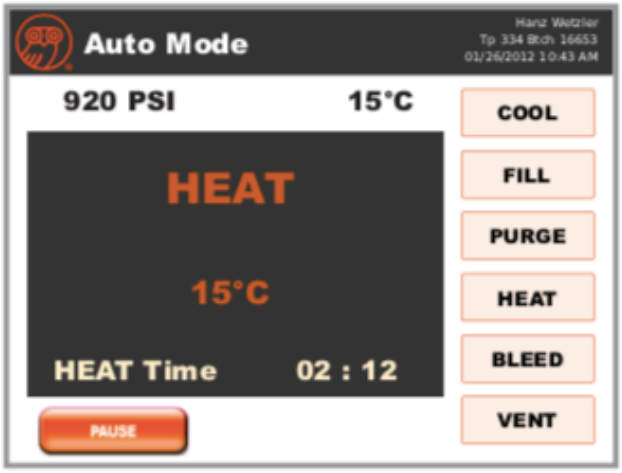
11. After the FILL mode expires, the 931 will automatically advance into the PURGE mode. The 931 will remain in the PURGE mode for the duration of process time.



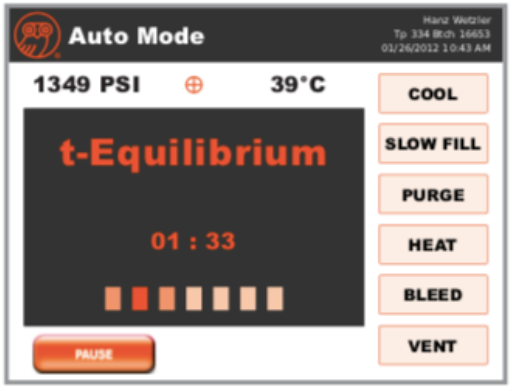
12. Upon Completion of the PURGE mode, the unit will automatically advance into a POST-PURGE FILL mode in which the chamber fills with LCO2.

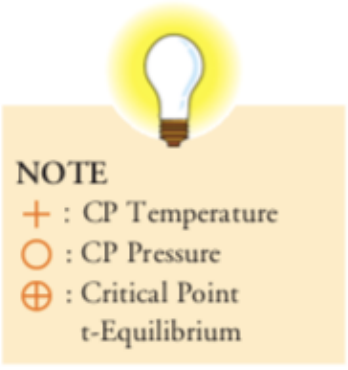


13. Upon completion of the POST-PURGE FILL mode, the HEAT mode will activate. The HEAT mode is when the samples are carried through the ***"Critical Point."***
Both the pressure and temperature will steadily increase.

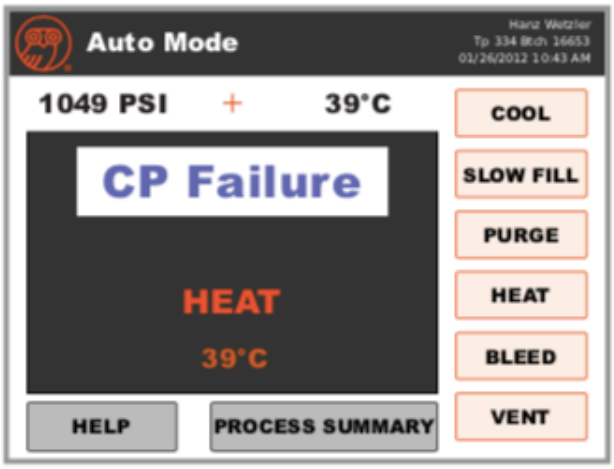


14. When the chamber pressure reaches and goes beyond 1072 PSI, it will stabilize in the range of 1350 PSI (±5% @ 20°C). As the temperature reaches 31°C, the unit has achieved the ***"Critical Point"*** and this is where the 'tousimis® equilibrium'cycle starts.



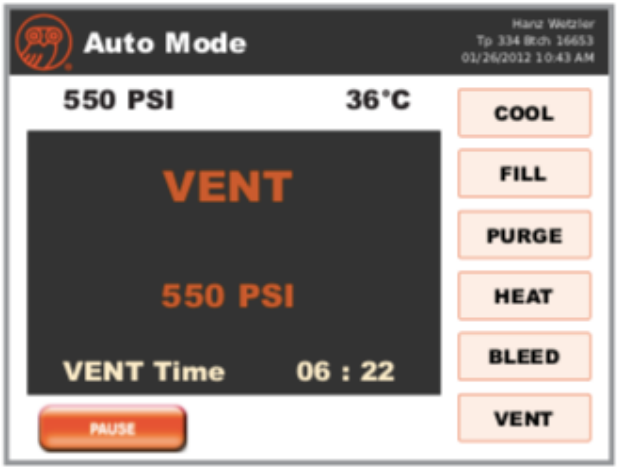


15. If chamber pressure has not reached critical pressure prior to critical temperature “CP Failure” will be displayed.



16. At the end of the ‘tousimis® equilibrium’ period, the 931 will automatically advance into the BLEED Mode.

17. At the preset pressure (factory default: 550 PSI), the 931 will automatically advance from the BLEED Mode into the VENT Mode.

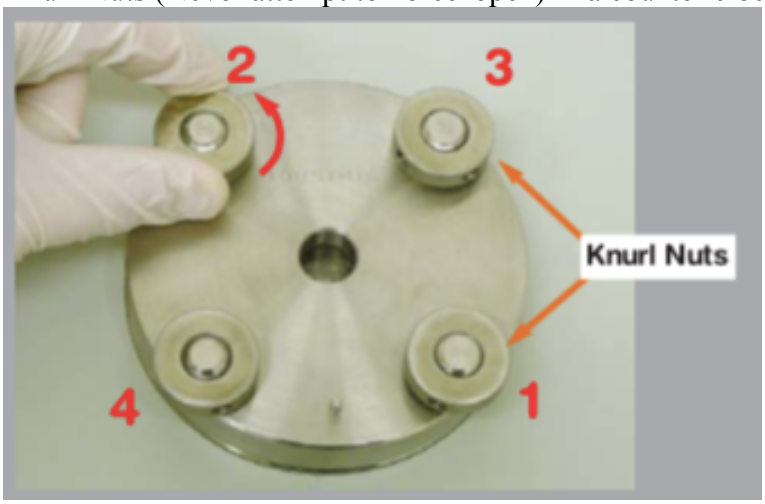


18. It is not necessary to re-adjust the PURGE-VENT metering valve flow rate as it is preset. The Process Chamber should then come to atmospheric pressure after VENT Mode.

19. When chamber pressure reaches less than 5 PSI, the 931 will display “Process Complete.”

20. To review the process summary, press the PROCESS SUMMARY button.

21. At this point, the chamber lid may be removed by alternatively and evenly loosening the Knurl Nuts (Never attempt to 'force' open) in a counter clockwise direction.



22. The sample(s) can then be removed from the Process Chamber. Reseal the Process Chamber with the chamber lid to help keep it clean and moisture free.

23. The next process run may be initiated provided there is sufficient LCO_2. Otherwise, the system power may be turned OFF.

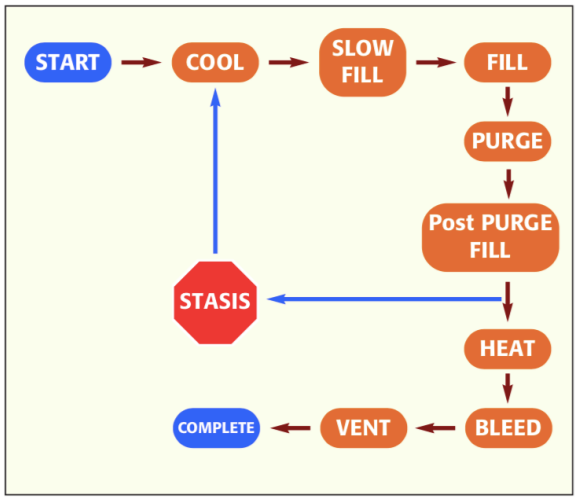
Manual Mode:

You can run the CPD in Manual Mode (pages 29-33 in the large manual), it is basically the same as auto mode you just have to click on the buttons for each mode rather than it advancing automatically.

Stasis Mode:

- For the STASIS Process, Autosamdri®-931 will use two different PURGE Times.
  - Normal PURGE Time will be used for the initial PURGE Process before the 931 advances into Stasis Cycle.
  - Stasis PURGE Time will be used during Stasis Cycle.
  - Most Alcohol will be exit from process chamber during Normal PURGE Time.
  - The Stasis Purge Time recommended is to set it to less than 30% of normal PURGE Time to help reduce LCO2 consumption.

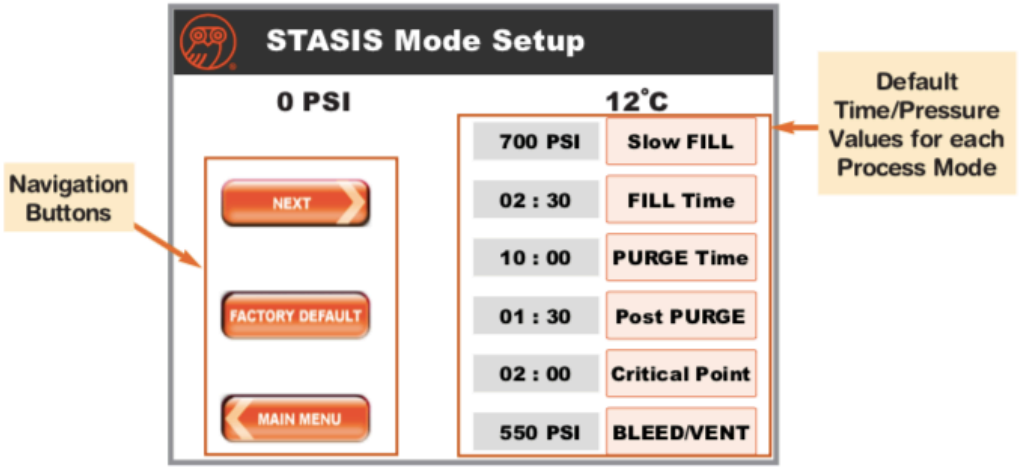
Example: STASIS Process Settings
Slow FILL: 3 Min
FILL: 6 Min
Normal PURGE Time: 10 Min
Post-PURGE FILL: 4 Min
Critical Point: 10 Min
Stasis Time: 2 Hours
Cycle: 3 Times
Stasis PURGE Time: 5 Min



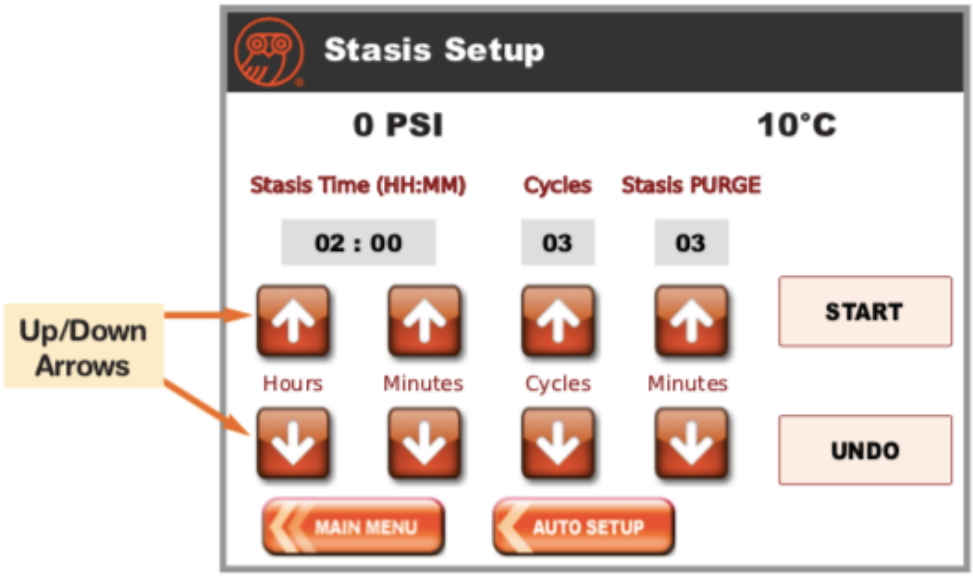
Process Sequence Example:
COOL → SLOW FILL (3 MINS) → FILL (6 MINS) → PURGE TIME (10 MINS) → POST-PURGE-FILL (4 MINS)
→ STASIS #1 (2 HOURS) → COOL → SLOW FILL (3 MINS)
→ STASIS PURGE TIME (3 MINS) → POST-PURGE FILL (4 MINS)
→ STASIS #2 (2 HOURS) → COOL → SLOW FILL (3 MINS)
→ STASIS PURGE TIME (3 MINS) → POST-PURGE FILL (4 MINS) → STASIS #3 (2 HOURS) → COOL → SLOW FILL (3 MINS)
→ STASIS PURGE TIME (3 MINS) → POST-PURGE FILL (4 MINS) → HEAT → CRITICAL POINT (tousimis®-EQUILIBRIUM 10 MINS) → BLEED → VENT

Setting Up Stasis Mode:

1. You may either use the Factory Default settings or Custom Setup the desired Time and Pressure Values for each Process Mode and press NEXT.



2. Using the Up/Down arrows, you may setup the desired "Stasis Times", "Stasis Cycles" and "Stasis PURGE Time". Press START to initiate the Stasis Mode.



Press RESET button to restore the factory default values.
Press either MAIN MENU or AUTO SETUP buttons to exit without saving values.

3. Once the START button is pressed, the 931 will operate as per Auto Mode from this point forward until POST-PURGE FILL Mode.

4. Upon completion of the POST-PURGE FILL Mode, the 931 will automatically advance into the first cycle of the STASIS Mode.
    a. The sample will now stay submerged in LCO2 allowing time for the intermediary fluid to dissipate from sample interior out into the surrounding LCO2.

5. After the initial STASIS Mode is completed, the 931 will advance into COOL Mode and resume the process.

6. The 931 will then automatically advance into the SLOW FILL Mode and then into the Stasis-PURGE Mode, followed by POST-PURGE FILL Mode.

7. Upon completion of the last preset STASIS Mode cycle, the 931 will then advance into the COOL Mode, SLOW FILL Mode, PURGE Mode and POST-PURGE FILL Modes sequentially just as if it were in an Auto Mode.

8. During STASIS Mode, if chamber pressure drops to 0 PSI, the 931 will pause and display a Chamber Security Check notice (Security Feature) stating "Confirm Chamber is Secured."

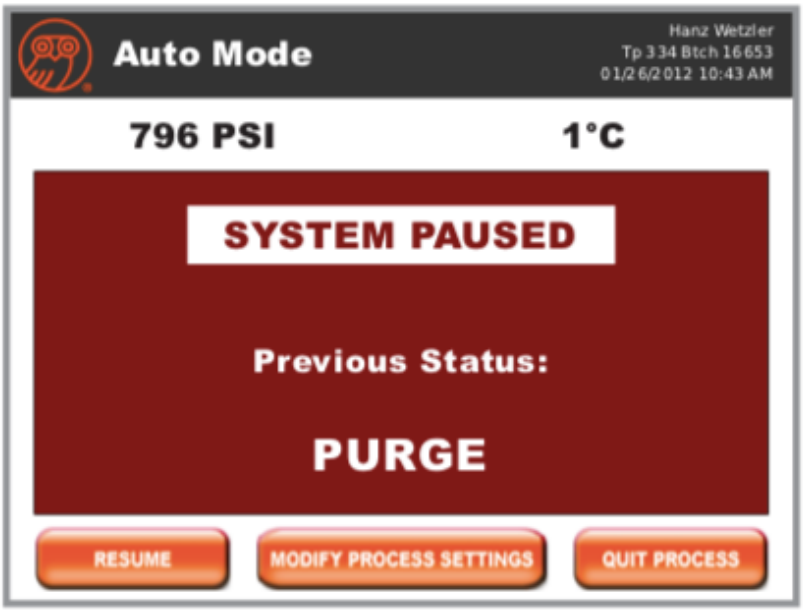
9. The remaining processes will run automatically.

10. When the CPD is finished remove your samples and reseal the chamber.

11. Close the CO_2 tank and turn off the machine.

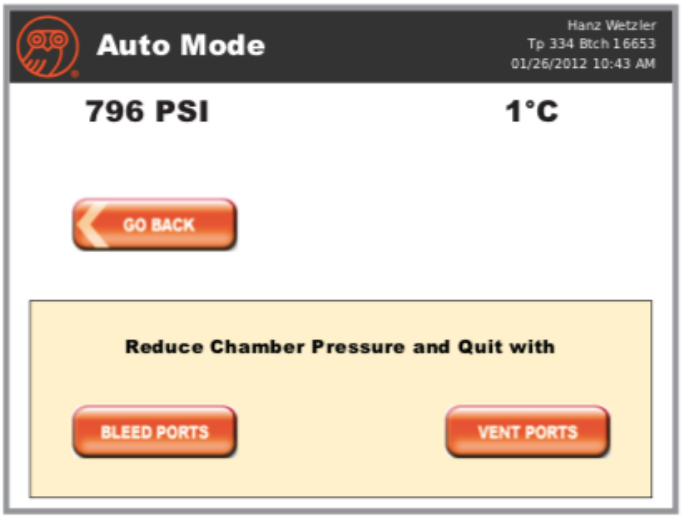
If you need to stop a process run:

1. At any point in the run hitting the PAUSE button will stop the process.



   - Hitting RESUME will start the process up again.
   - The MODIFY PROCESS SETTINGS button will redirect the display view to the "Modify Settings" Page where the 931 Auto Mode Settings may be modified.
   - During STASIS Mode, there will be an extra button for STASIS Setting Modification. Use "STASIS Mode" (Chapter 4.4) instructions to modify settings.

2. Press QUIT PROCESS button on the Pause Screen and Modify Settings Screen will display a BLEED PORTS and VENT PORTS option to reduce chamber pressure in order to terminate the current process run.



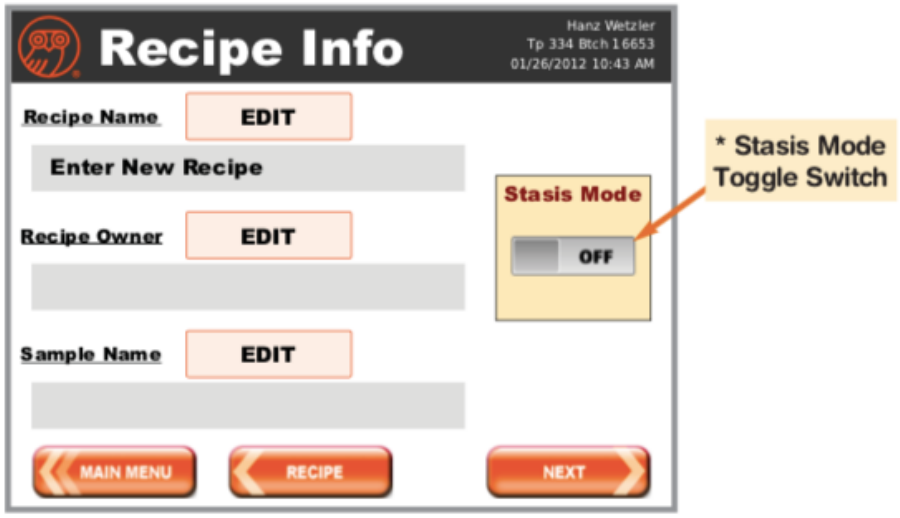
BLEED PORTS: This vents the chamber pressure back to 0 PSI while allowing intermediary fluid (Ultrapure Alcohol) to stay within the Process Chamber. Therefore, your sample will not be exposed to gas.

VENT PORTS: This vents the chamber pressure out and it is often set at a quicker flow. All intermediary fluid (Ultrapure Alcohol, if present) in the Process Chamber will be discharged through these ports.

Recipe Mode:

1. The "Recipe Mode" allows the input and storage of up to 10 custom process run protocols. Press RECIPE button from "Main Menu" page to enter "Recipe Mode". To create a new recipe, press ENTER NEW RECIPE button. To run or modify a previously saved recipe, press previously saved recipe name.

2. Press EDIT button next to either “Recipe Name”, “Recipe Owner” or “Sample Name” to update the appropriate information for the Recipe.



* Press Stasis Mode Toggle Switch to set “Stasis Mode” ON/OFF for the recipe.

3. Type “Recipe Name” and press Enter to update information.

4. Press NEXT when the complete information has been entered into screen. Press MAIN MENU or RECIPE button to exit without saving.

5. <u>If the Stasis Mode Switch is OFF:</u>
   You may modify the preset values. Pressing START will save recipe and start the “Auto Mode” immediately. SAVE RECIPE will Save the recipe only. Press RECIPE and MAIN MENU to exit without saving.

6. <u>If the Stasis Mode Switch is ON:</u>
   You may modify the preset values and press NEXT. Press RECIPE and MAIN MENU to exit without saving.

7. Set “Stasis Time” and “Stasis Cycle” and press START to save recipe and start “Stasis Mode” immediately. Press SAVE to save the recipe only. Press GO BACK and RECIPE to exit without saving.