

# Quick-User Manual

## Jetfirst 200



### Restrictions and Precautions

- The following materials are forbidden in the RTP chamber:
  - Organic materials (Photoresists, PDMS, Kapton, ...)
  - Metallic contaminants
- Gold and Copper are accepted under extensive training with CMi staff
- This tool is not MICRO-ELECTRONIC compatible
- The wafers and/or dies can be silicon, sapphire and glasses. For glasses, the temperature will be limited to the thermal strain point minus 50°C.
- At temperatures higher than 800°C under vacuum and higher than 1000°C at atmospheric pressure, the TC will be destroyed if in contact with the sample (expensive!)
- When possible, RCA cleaning is highly recommended.

Plastic tweezers are not recommended as they might melt if in contact with the hot plate. Recommended to use metallic tweezers.

A test run with a dummy sample is recommended to make sure the tool is correctly set before running with your sample.

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## 1. Must-know

### 1.1. Temperature control

The tool is equipped with 2 complementary systems to set, control and monitor the temperature: 3 thermocouples (one for the regulation TC1 and two for the monitoring TC2 and TC3) and one pyrometer (see figure I).

#### **Thermocouple regulation:**

The regulation by thermocouple is done by direct contact measurement of the temperature on the wafer. The TC regulation is effective from the room temperature **up to 1000°C in atmosphere** and **up to 800°C under vacuum**. **Outside of these ranges of temperature or pressure, a regulation with pyrometer must be used and the thermocouple must be withdrawn from the process chamber!!**

The TC regulation is valuable for all types of substrates (Si, glass, quartz, susceptor, sapphire ...). The TC is in contact with the back side of silicon substrate or the susceptor. A clean back side is mandatory to ensure a good contact between the TC and the wafer and consequently a good reading of the temperature.

#### **Pyrometer regulation:**

The regulation by pyrometer is done by the conversion of the emitted radiation by the substrate in infrared into temperature. This conversion implies the creation of a conversion table (calibration table) which was done during the installation of the tool. The emissivity is dependent on the wafer itself and the layers that you have on it. A dedicated table could be necessary; in this case a test wafer with the same characteristics of the product wafer is needed.

The regulation with pyrometer is effective **from 500°C up to 1200°C in atmosphere** and **up to 1100°C under vacuum**. **Below 500°C, the thermocouple regulation must be used!**

The pyrometer regulation is not valuable for transparent substrates like glass, quartz, sapphire,... **All the transparent samples must be placed in a graphite/SiC susceptor.**

## 1.2. Software map

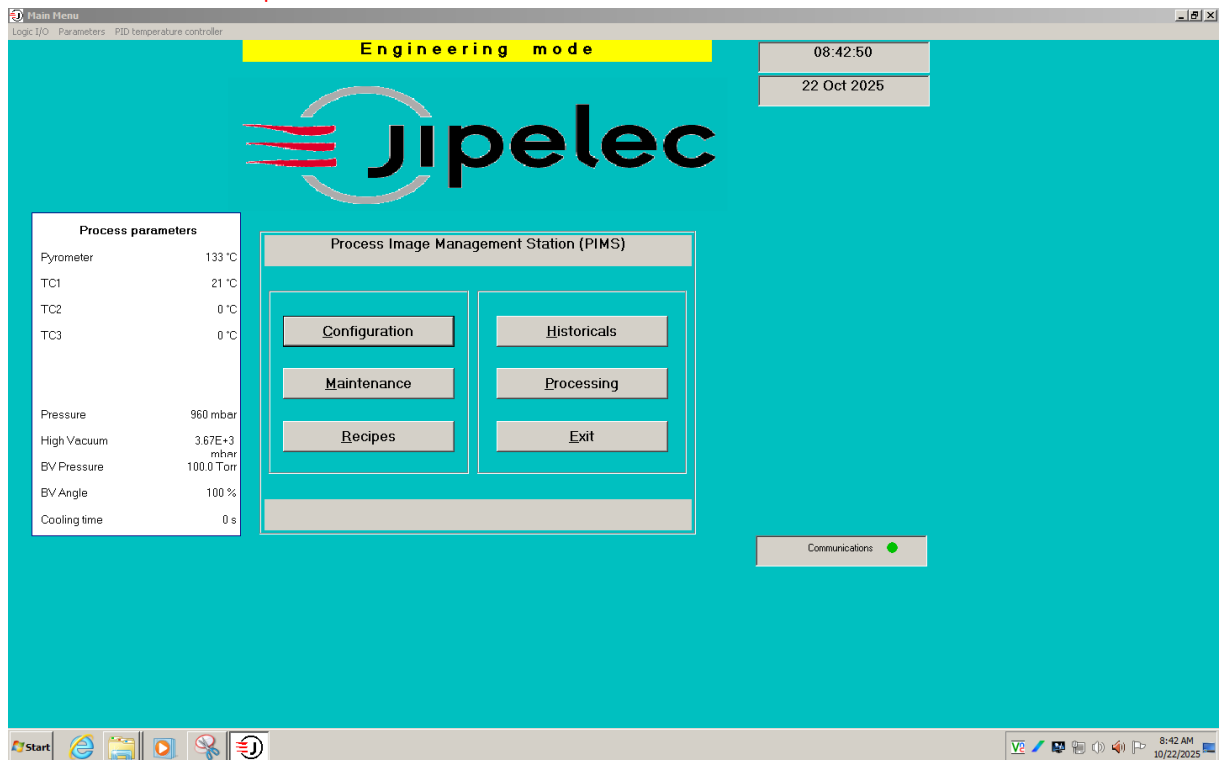


Figure 3. Software view

The different buttons/menus of the PIMS:

- *Logic I/O*: shows the white box with the real time read-out of the sensors
- *Parameters*: **FORBIDDEN**
- *PID Temperature controller*: where you can create/tune and apply the PID for your recipe
- *Configuration*: **FORBIDDEN**
- *Historicals*: where you can check previous logs and run of the tool
- *Maintenance*: **FORBIDDEN**
- *Processing*: where you can select a recipe and start a run
- *Recipes*: where you can create/tune your own recipe
- *Exit*: to exit the software

## 2. Using the tool

### 2.1. Substrates and picots

The system is compatible with wafers from 2" up to 8" as well as pieces of wafer or dies.

**Whatever the sample you process, it should never be placed directly on the metallic floor of the RTP chamber!**

Set carefully the picots according to your sample size, in their dedicated holes.

Transparent samples compatible with high temperature treatments (quartz or sapphire) must be placed in the 6" SiC susceptor (only 4" or smaller sample).

### 2.2. Thermocouple positioning/removal

To set the TC:

1. Unscrew nut (See Fig.9)
2. Move carefully up the connector until the TC touches the back of the substrate
3. The TC must touch (**no gap!**) but must not push up the substrate (**all picot should be in contact !**)
4. Screw back the nut whilst maintaining the TC in position.

As mentioned previously:

- **TC cannot support temperature above 1000°C at atmospheric pressure**
- **TC cannot support temperature above 800°C under vacuum**

If the TC must be, you must unscrew the nut (see Figures 9 & 10) to move down the connector (between 5 to 9 mm) and hide it in the metallic floor of the chamber. The TC should not anymore be visible (see Figure 7).

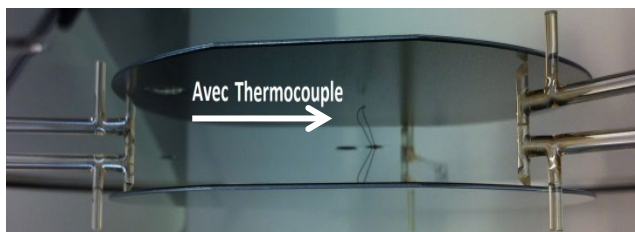


Figure 7

View of the TC in contact with the wafer placed on its 3 picots in quartz. TC should be touching its reflection

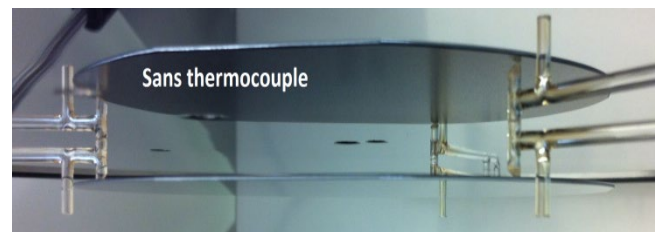


Figure 8

TC removed from chamber



Figure 9  
 Bottom part of the TC with the connector



Figure 10  
 Bottom part of the TC once the connector is  
 moved down of few mm.  
 (NB: the nut must be screwed back in upper  
 position before processing)

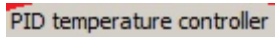
2.3. Start a run

1. Login on the PC zone 3
2. Turn On the tool (green button)
3. Open the chamber with the handle, load the wafer on the quartz picots:
  - a- If the temperature control is done by the thermocouple, check that the TC is in contact with the wafer and close the chamber
  - b- If the temperature control is done by the pyrometer, remove the TC from the chamber and close the chamber (see section 3.2)

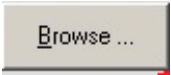
After closing the lid, lower the handle to lock the chamber.

**NB: A temperature higher than 800°C under vacuum and higher than 1000°C at atmospheric pressure destroy the TC if the TC is in contact with the sample!!!!**

4. Click on “PID temperature controller” in menu bar (top left) to have access to PID interface.



5. To transfer the PID parameters from the RTP PC to the RTP automate, select with the “browse” function, your PID table in your library under the path “QualiflowTherm/users\_lab/Your\_lab/...” and press “open”. The left column is filled with PID parameters on a yellow background.



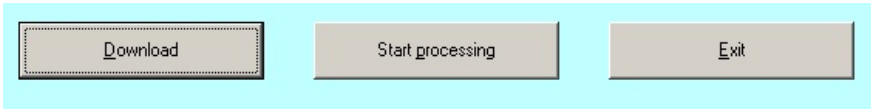
3. Press “Apply all “yellow” setpoints” to transfer these numbers in the right column (tool memory) with black background.



4. Check that the 2 columns have the same values for each Temperature zone, if it’s not the case, select the number in the left column and press “return”.

5. Close the window with “Exit”

6. Press on “Processing” and go to your directory from the menu “Recipe” to download and press “yes”. Once the recipe is selected, press on “Download”. Wait for the message “Download was successful” and then press “Ok”.



7. To start the recipe, press a first time “start processing”
8. Press a second time “start processing”
9. The process window opens to monitor the run. You can manually abort the run by pressing “STOP”
9. Once the run is done, save the process data in your directory and wait for the cooling down procedure (around 6 min).

**NB: the chamber is locked until the cooling finishes**

10. Once the cooling down procedure is done, the chamber is unlocked and you can open the chamber with the handle, take your sample and load a new one/ or close the chamber and logout.