IG2 Quick Start Guide

Unpacking the IG2

1. Inspect the boxes for any visible damage. If there is any damage, please report it to the shipping company immediately.
2. Remove all components and inspect them for damage. If there is any damage, please report it to the shipping company immediately.
3. Verify that you have the following items. If any are missing, please contact RBD Instruments at 541-330-0723 or e-mail us at tech@rbdinstruments.com.
   - 04-165 Ion Source
   - 32-175 Control
   - IG2-CA1 Cable
   - AC Power Cord
   - IG2 USB flash drive (includes IG2 Manual)

Setting up the IG2

1. Install the 04-165 Ion Source in the vacuum system.
2. Bake the system at 150° C to 200° C for 4 to 8 hours. You may use heat tape to bake only the 04-165.
3. Install the 32-175 Control in a 19" electronics rack or use on a desktop.
4. Verify that the 32-175 Control front panel power switch is in the OFF position.
5. Connect the 04-165 Ion Source to the 32-175 Control using the IG2-CA1 cable.
6. Connect the AC power cord (120 VAC OR 230 VAC) to the 32-175 and then plug the AC power cord into the power outlet. **DO NOT TURN ON THE POWER to the 32-175 at this time**.
7. Set the following switches and controls on the 32-175 Control front panel:
    a. Set the Beam Control switch to Off.
    b. Set the Beam Voltage Select dial to 500, which is its lowest setting.
    c. Turn the Focus Adjust dial arrow to center (straight up).
    d. Turn the Filament Adjust dial fully counterclockwise (set to 0).
8. On the 32-175 Control back panel, set the Filament Select Switch (labeled F1 and F2) to the F1 position.
9. Follow the instructions for operating the 32-175, which appear on the next page.

The IG2 is now ready for use.

Operating the IG2 With the 32-175 Controller

32-175 Front Panel Controls and Meter

- **Main power ON / OFF**: Turns the 32-175 ON and OFF
- **Beam voltage ON / OFF / Remote Switch**: Turns the beam voltage ON, OFF and on and off remotely. *In the remote mode TTL low (or shorted relay contacts) = Beam ON*
- **Beam Voltage Knob**: Sets the Beam Voltage to 500, 1000, 1500, or 2000 volts DC. The Beam voltage accelerates the ions to the target.
- **Focus**: Adjusts the size of the ion beam.
- **Emission Potentiometer**: Sets the filament current, resulting emission current is displayed on the emission meter.
- **Emission Meter:** Displays the emission current, 25mA nominal.

Initial Out-gassing of the 04-165 Ion Source

NOTE: Before outgassing the 04-165 ion source the vacuum chamber needs to be baked out to remove water vapor from the ion source.

1. With the 32-175 main power switch OFF, make sure that the Emission Potentiometer is fully CCW. The Emission Potentiometer controls the filament current. 0 to 10 turns corresponds to 0 to 2.0 amps of filament current.
2. Set the Beam Voltage Knob to 500 V and the Beam Voltage Switch to OFF.
3. Turn the 32-175 main power switch ON.
4. Slowly turn the Emission Potentiometer CW 6 to 7 turns until you have 1 to 2 mA of emission current.
5. Wait for 10 to 20 minutes then turn the Emission Potentiometer CW until you have 5 mA of emission current.
6. Wait 10 to 20 minutes and then increase the Emission Potentiometer until you have 10 mA of emission current.
7. Repeat this process in increments of 5 mA until you have 25 mA of emission current.
8. With the emission current still at 25 mA and the Beam voltage set to 500 V, turn the beam voltage ON.
9. Wait 5 minutes and then turn the beam voltage to 1000V.
10. Wait 5 minutes and turn the beam voltage to 1500V.
11. Wait 5 minutes and turn the beam voltage to 2000V.

12. Turn the beam voltage OFF.
13. Turn the emission current knob fully CCW.
14. Repeat steps 2-13 for filament F2.
15. Turn off the 32-175 main power.

The 32-175 and 04-165 ion source are now ready to operate using filament F1 or F2.

Operation of the 32-175 Control and 04-165 Ion Source

1. Make sure that the emission current knob is fully CCW.
2. Set the beam voltage to OFF.
3. Turn the emission current knob CW 6 to 7 turns until there is 1 to 2 mA of emission current.
4. Let the emission current stabilize for a minute then slowly increase the emission current knob until there is 25 mA of emission current.
5. Back-fill the chamber with Argon to 5 to 6 X 10^{-5} Torr.
6. Set the beam voltage knob to the desired acceleration voltage (typically 2000V).
7. When you turn the beam voltage to ON the 04-165 source will be sputtering the sample.

Optimizing the Ion Beam Diameter (Focus)

Method 1 - Measure the Target Current:

Using a picoammeter with a +90 V bias to measure the target current. Adjust the Focus knob on the 32-175 to maximize the target current (typically 5 µA). The maximum current corresponds to the highest current density (smallest beam diameter).

Method 2 – Focus on a Phosphor Sample:

Insert a phosphor sample with a fine mesh over the surface to prevent charging on the phosphor sample. When the beam voltage is turned on the phosphor will illuminate. Adjust the 32-175 Focus knob for the smallest beam looking at the ion induced illumination. You can also use this method to de-focus the ion beam to sputter over a larger area. The current density will drop when the ion beam is defocuses.

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