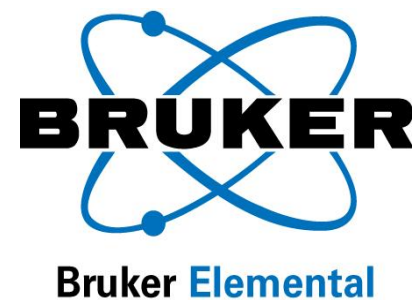


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# X-Ray Ops

## User Guide

For use with Tracer III-V<sup>+</sup>, Tracer III-SD and Tracer IV-SD

Release Date: May 12, 2010

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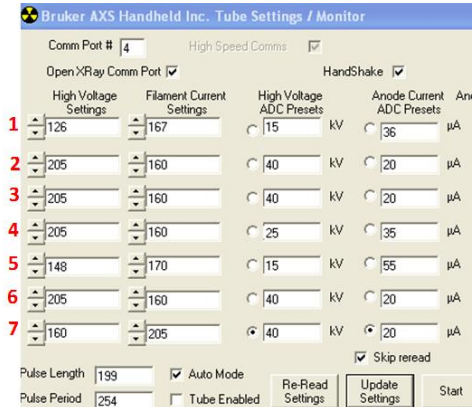
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## Introduction

The Tracer analysis programs on the PC require preset voltage and current settings (six are stored in the instrument memory). The program *X-Ray Ops* is used to set and optimize these settings. In addition to selecting voltage and current settings, X-Ray Ops also provides pulse length and beam filter preset options for each of the voltage and current settings. Once the preset is completed, each new voltage/current and filter setting should be checked using the procedure defined on page 6, *Checking X-Ray Tube Setup and Count Rates with PXRF Program*.

Use X-Ray Ops to set the values for voltage, current, filter and pulse length for a particular application. It is recommended that you use line 2 for your custom configuration.

Line 7 is the active tube settings ONLY. When the Tracer is used with the PDA, starting a measurement will change the settings stored in Line 7. The tube settings must be stored in Lines 1 to 6 (as viewed from X-Ray Ops) to be used in PXRF. **Line 7 will not be saved and can be overwritten.**



Line	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets
1	126	167	15	36
2	205	160	40	20
3	205	160	40	20
4	205	160	25	35
5	148	170	15	55
6	205	160	40	20
7	160	205	40	20

Figure 1. Tube Settings, Lines 1-7

## Using X-Ray Ops

### Opening Communications

To open communications between the Tracer and the X-Ray Ops software stored on your computer, follow these steps:

1. **PLACE** the unit in a bench-top stand.
2. **REMOVE** the battery (if installed).
3. **PLUG** the AC Power supply into Power Connector located in the handle.
4. **PLACE** the opposite end of the Power supply into a power outlet that fits the range of the AC adapter.
5. **ENSURE** the unit's trigger is not activated.
6. **TURN** power on.
7. **ALLOW** the instrument to warm up for at least 60 seconds.
  - a) If using the Tracer IV, **LISTEN** and **WAIT** for filter wheel to spin and initialize.
  - b) If using the Tracer III, **ENSURE** that the correct filter is in place.
8. **CONNECT** the multi-pin (7-pin LEMO) connector from the download cable into the connector located on the instrument face below the PDA cradle.
  - a) To connect, **ALIGN** red dot on the LEMO connector with the red dot on the instrument.

9. **CONNECT** the serial connector of the download cable into the serial port of the PC or into the serial-to-USB Adapter. Ensure that the USB end of the serial-to-USB Adapter is inserted into a USB port of the PC.
10. **START** X-ray Ops.
11. **ENTER** the appropriate Comm Port number (Figure 2 **A**).
12. **SELECT** *Hi Speed Comm* **B**.
13. **CLICK** *Open X-Ray Comm Port* **C**. The program will read the present settings from the instrument.
  - a) If communication fails, **VERIFY** the com port number.

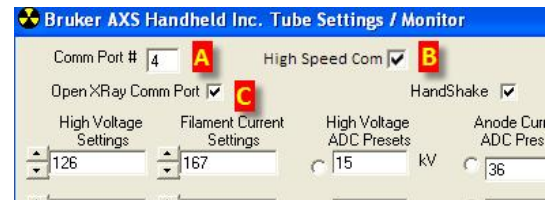


Figure 2

### Altering the Voltage, Current, and Pulse Settings

To create a custom setting, **ENTER** the High Voltage Setting, Filament Current Setting, High Voltage ADC Preset, Anode Current ADC Preset, Pulse Length, and Filter number on Line 2. The Pulse Length target will be  $200 \pm 2$ . The High Voltage and Filament Current settings will be approximations based on other known settings. These settings will be adjusted (see Optimizing Settings, page 5).

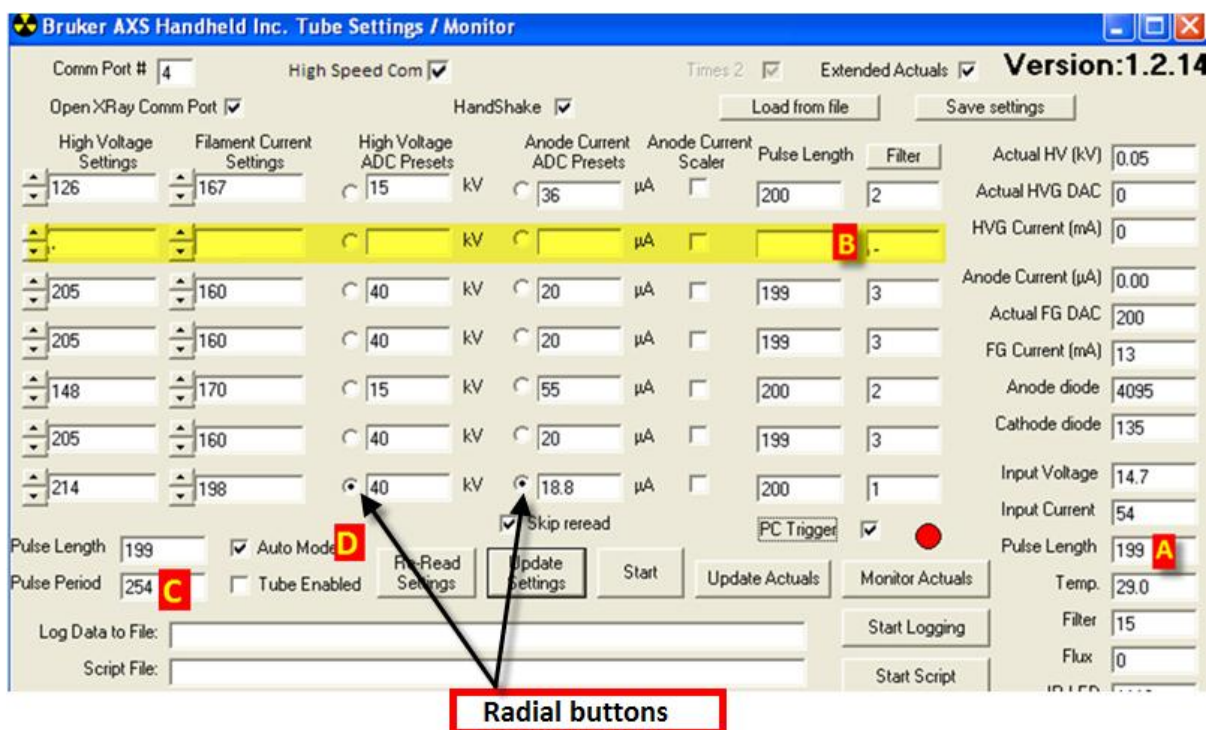


Figure 3

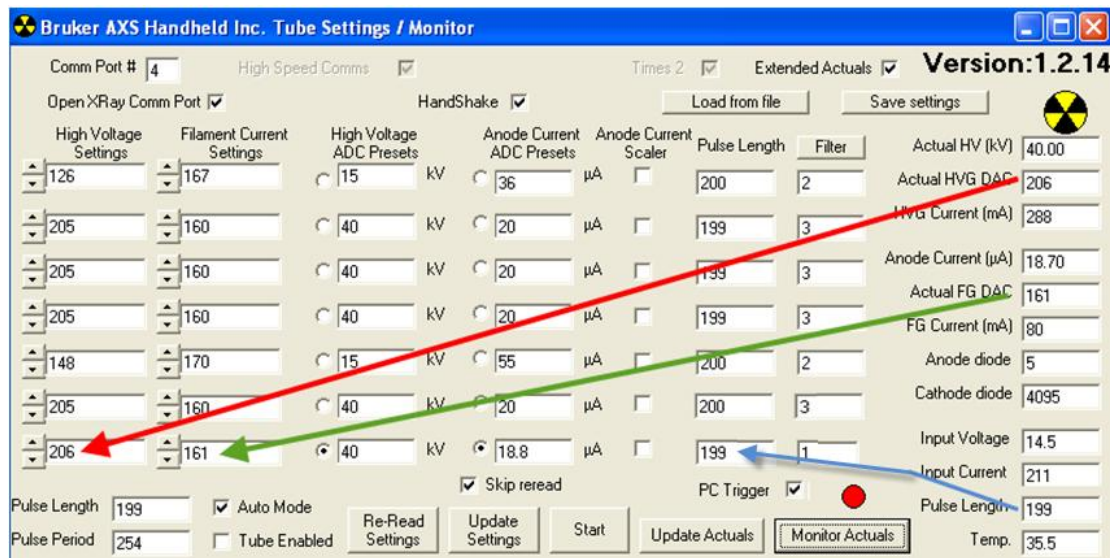
## Optimizing Settings

After the initial customized setting has been established, the setting will need to be optimized.

### CAUTION

- The Filament Current must not exceed 250.
- Modify the Pulse Length (Figure 3 **B**) to match the actual Pulse Length **A**.
- DO NOT LEAVE Pulse length **B** at 200 unless it is the actual pulse length **A** from the right hand column.
- DO not change the Pulse Period **C**. It should remain set at 254.
- Auto Mode **D** should always be checked.

1. **CHECK** the *High Voltage* and *Anode Current* radial buttons (see Figure 3) for the row you wish to update (generally, this will be Line 2).
2. **ACTIVATE PC Trigger TO START X-rays.**
3. **CLICK Monitor Actuals.**
4. **MONITOR** the actual readings (see far right column of figure below). Optimal High Voltage, Filament Current, and Pulse Length are achieved when, within 1-2 seconds of trigger pull, the ACTUAL voltage and current are obtained and remain stable to within  $\pm 0.5$  kV and  $\pm 1.0$   $\mu$ A for 2 minutes.



5. **REPLACE** preliminary numbers with actual numbers in each of the three fields.
6. **UNCHECK** PC Trigger.
7. **CLICK Monitor Actuals** to stop monitoring process.
8. **CLICK Update Settings.**
9. **CLICK Re-Read Settings TO ENSURE** that the settings have been updated.

10. **REPEAT** steps 3 through 9 for each row you wish to optimize.
  - a) **TO ADJUST** pulse length up or down, **VARY** the filament current down or up until a value of  $200 \pm 2$  is reached.
  - b) **CONTINUE TO MODIFY** the above settings UNTIL the voltage and current are stable at the desired flux AND the settings match the actual values.

### Checking X-Ray Tube Setup and Count Rates with PXRf Program

1. **EXIT** X-Ray Ops.
2. **START** the PXRf Program.
3. **SELECT** Setup/Instrument Setup.
4. **REFER** to the PXRf User Guide (Bruker Document 030.0006) **TO CHECK** the following setup parameters:
  - a) 1024 Channels for Tracer III-V, and 2048 for Tracer III-SD and Tracer IV-SD
  - b) 2 Bytes per channel
  - c) Advanced Header (under Setup menu/DPP Board)
  - d) Accumulation Mode
  - e) Ensure "S1 TURBOSD LE Mode" is NOT selected
  - f) PC Trigger (this allows the Start/Stop to activate the X-ray tube)
  - g) The PC Port number (under Download)
  - h) A Baud Rate of 57,600 for Tracer III-V (under Download); for Tracer III-SD and Tracer IV-SD, Baud Rate is 115,200
5. **ENSURE** the trigger is not activated/squeezed.
6. **PLACE** your desired sample on the aperture of the instrument.
  - a) **ENSURE** the sample is centered over the aperture.
  - b) **ENSURE** the sample covers the entire opening located in the center of the instrument's nosepiece.
7. **PLACE** the Sample Radiation Shield Cover on the nose of the instrument.
8. On the PXRf menu, **CHECK** the color of the radial dial indicator under the File Menu.



- a) If radial dial is green, then communication with the unit is open.

- b) If radial dial is red, then communication with the unit is not taking place. **CLICK** the radial dial. If it does NOT turn green, **CHECK** setup and download settings.
9. From the PXRF menu, **SELECT** Tube, then **SELECT** Read.
10. **SELECT** your custom setting (generally Line 2)
11. **CLICK** Start button in PXRF. (The button should change from Start to St<sup>o</sup>p).
12. **Press and hold** the trigger.
13. **OBSERVE** the spectrum of the Setup Standard in the PXRF Program.
  - a) If a spectrum does not appear, **ENSURE** the radial dial is green.
14. **RELEASE** the trigger and check the Raw and Valid count rates.
15. **EXIT** PXRF and **RE-OPEN** X-ray Ops, and then **ADJUST** current to achieve desired count rate.
  - a) **OPTIMIZE** tube settings.
  - b) **REPEAT** as necessary.
16. **CLICK** Save Settings.
17. **SAVE** file.