

# Changing X-Box Settings

This presentation is designed to provide a step-by-step followthrough. If you have any questions, do not hesitate to contact us.

Make sure you do not overwrite existing energy and preset options associated with calibrations. Only edit settings you are comfortably having changed. Calibrations will not function if you are collecting data with different energy and current than your reference standards.

# Changing X-Box Settings

The Tracer series employs a 2 watt bulb. Your energy multiplied by your current will equal the wattage you are using.

NEVER GO ABOVE 2 WATTS - THIS WILL DESTROY YOUR TUBE.

It is strongly recommended that you keep settings below 1.5 watts, this will lengthen the life of your tube.

# Changing X-Box Settings

To calculate your wattage, multiply energy by current.

For example,  $40 \text{ keV} \times 30 \text{ } \mu\text{A} = 1200 = 1.2 \text{ watts}$

$15 \text{ keV} \times 25 \text{ } \mu\text{A} = 375 = 0.375 \text{ watts}$

# Changing X-Box Settings

Finally, before beginning any changes to your X-box settings, record all existing settings - at minimum take a screenshot of the computer screen when you first load your Tracer's settings so that if a mistake is made, you can re-input all of the original factory presets.

# Changing X-Box Settings

When you first open up X-Ray Ops, the screen will be blank

Windows 8.1 Pro  
Build 9600  
10:38 PM  
6/10/2014

# Changing X-Box Settings

First, enter in the com port number the Tracer is plugged into

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6/10/2014

# Changing X-Box Settings

The screenshot shows a Windows 8.1 Pro desktop with a yellow-green background. A window titled 'Bruker AXS Handheld Inc. Tube Settings / Monitor' is open at the top, displaying 'Version: 1.2.21' and various settings. Below it, the 'Devices and Printers' control panel window is open, showing a list of devices. A callout box with a black border and white background contains the text: 'You can find this information in 'Devices and Printers' in the Start Menu or Control Panel'. A black arrow points from the callout box to the 'Prolific USB-to-Serial Comm Port (COM9)' device, which is highlighted with a blue selection box. Other devices listed include 'DUCK', 'Fax', 'Microsoft XPS Document Writer', 'Send To OneNote 2010', and 'Serial Adaptor'. The system tray at the bottom right shows the date and time as 10:38 PM on 6/10/2014.

Version: 1.2.21

Control Panel > All Control Panel Items > Devices and Printers

Add a device Add a printer Remove device

VITO-TOSHIBA2

Printers (4)

DUCK Fax Microsoft XPS Document Writer Send To OneNote 2010

Unspecified (2)

Prolific USB-to-Serial Comm Port (COM9) Serial Adaptor

Prolific USB-to-Serial Comm Port (COM3) Model: USB-Serial Controller Category: Unknown

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# Changing X-Box Settings

Next, select High Speed Communications if you have a Tracer IIIV+ or newer

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals  HandShake

Open XRay Comm Port

High Voltage Settings	Filament Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222						
198	222						
223	228						
103	222						
167	206						
167	206						

Pulse Length 200  Auto Mo  
Pulse Period 254  Tube En

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_

Firmware to Upload: \_\_\_\_\_

ADC/DAC Version: \_\_\_\_\_

Start Script Upload Firmware

Flux 0  
IR LED 4095  
Vacuum 723

Finally, click 'Open Xray Comm Port'

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Light Pipe	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	167
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	0
Filter #3	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	0.00
Filter #4	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	206
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	4095

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled

Log Data to File:

Script File:

Firmware to Upload:

ADC/DAC Version:

Re-Read Settings Update Settings Start Update Actuals Monitor Actuals Start Logging Start Script Upload Firmware

Actual HV (kV) 0.05  
Actual HVG DAC 167  
HVG Current (mA) 0  
Anode Current ( $\mu$ A) 0.00  
Actual FG DAC 206  
FG Current (mA) 8  
Anode diode 4095  
Cathode diode 137  
Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 723

**You will see your Tracer's X-box settings**

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Light Pipe	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	167
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	0
Filter #3	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	0.00
Filter #4	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	206
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	4095

Pulse Length 200  Auto Mode  
Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start Update Actuals Monitor Actuals Start Logging Start Script Upload Firmware

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_  
Firmware to Upload: \_\_\_\_\_  
ADC/DAC Version: \_\_\_\_\_

Actual HV (kV) 0.05  
Actual HVG DAC 167  
HVG Current (mA) 0  
Anode Current ( $\mu$ A) 0.00  
Actual FG DAC 206  
FG Current (mA) 8  
Anode diode 4095  
Cathode diode 137  
Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 723

Take a screen shot or record these settings  
- if anything goes wrong, you can re-input  
these factory defaults by hand.

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Filter #1	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	167
Filter #3	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	0
Filter #4	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	0.00
Filter #5	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	206
Filter #6	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8
Filter #7	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	4095

Actual HV (kV) 0.05  
Actual HVG DAC 167  
HVG Current (mA) 0  
Anode Current ( $\mu$ A) 0.00  
Actual FG DAC 206  
FG Current (mA) 8  
Anode diode 4095  
Cathode diode 137  
Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 723

These are the data stored in your Tracer - editing here will change the internal settings of your Tracer unit

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Light Pipe	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 167
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 0
Filter #3	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
Filter #4	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 8
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 4095

Pulse Length 200  Auto Mode  Skip reread  
Pulse Period 254  Tube Enabled

Re-Read Settings Update Settings Start Update Actuals Monitor Actuals Start Logging Start Script

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_

Firmware to Upload: \_\_\_\_\_  
ADC/DAC Version: \_\_\_\_\_

Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0

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Clicking 'ReRead Settings' will re-import these X-box settings if you have problems

# Changing X-Box Settings

The first column to the far left includes your input voltage settings

The screenshot displays the Bruker AXS software interface for configuring an X-ray setup. The window title is "Read and Set filter layers" and "Bruker AXS Handheld In". The interface is divided into several sections:

- High Voltage Settings:** A table with columns for High Voltage, Filament Current, and High Voltage. The first column (High Voltage) is highlighted by a callout box. Values include 107, 198, 198, 223, 103, 167, and 167.
- Control Parameters:** Includes "Pulse Length" (200), "Pulse Period" (254), "Auto Mode" (checked), "Tube Enabled" (unchecked), and "Skip reread" (checked).
- Actuals/Status:** A list of current values: Actual FG DAC (206), FG Current (mA) (8), Anode diode (4095), Cathode diode (137), Input Voltage (14.4), Input Current (21), Pulse Length (200), Temp. (26.1), Filter (0), Flux (0), IR LED (4095), and Vacuum (723).
- Buttons:** "Re-Read Settings", "Update Settings", "Start", "Update Actuals", "Monitor Actuals", "Start Logging", "Start Script", and "Upload Firmware".

The desktop background features a green fern leaf. The taskbar at the bottom shows the Windows 8.1 Pro logo, the time 10:40 PM, and the date 6/10/2014.

# Changing X-Box Settings

The second column to the right includes the filament current settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage Settings	High Voltage Settings	High Voltage Settings	High Voltage Settings
Filter #1	107	224	15	29	15	29
Filter #2	198	222	40	30	40	30
Filter #3	198	222	40	30	40	30
Filter #4	223	228	40	43	40	43
Filter #5	103	222	15	25	15	25
	167	206	40	11	40	11
	167	206	40	11	40	11

Pulse Length: 200, Pulse Period: 254, Auto Mode:  Tube Enabled:

Log Data to File: \_\_\_\_\_ Start Logging

Script File: \_\_\_\_\_ Start Script

Firmware to Upload: \_\_\_\_\_ Upload Firmware

ADC/DAC Version: \_\_\_\_\_

Actual FG DAC: 206, FG Current (mA): 8, Anode diode: 4095, Cathode diode: 137, Input Voltage: 14.4, Input Current: 21, Pulse Length: 200, Temp.: 26.1, Filter: 0, Flux: 0, IR LED: 4095, Vacuum: 723

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# Changing X-Box Settings

The third column to the left includes the voltage preset - this is your target energy

The screenshot displays the Bruker AXS Handheld Inc. Tube Settings / Monitor software interface. The interface is divided into several sections:

- High Voltage Settings:** Includes fields for High Voltage (kV) and Filament Current (µA).
- Filament Current Settings:** Includes fields for Filament Current (µA) and Filament Current (mA).
- High Voltage ADC Presets:** A table with columns for High Voltage (kV), Filament Current (µA), and Filament Current (mA). A callout box points to this column, stating: "The third column to the left includes the voltage preset - this is your target energy".
- Actuals:** A table showing actual values for various parameters.

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Filament Current (µA)	Filament Current (mA)
107	224	15 kV	29 µA	200
198	222	40 kV	30 µA	200
198	222	40 kV	30 µA	200
223	228	40 kV	43 µA	200
103	222	15 kV	25 µA	200
167	206	40 kV	11 µA	200
167	206	40 kV	11 µA	200

Actuals	
Actual FG DAC	206
FG Current (mA)	8
Anode diode	4095
Cathode diode	137
Input Voltage	14.4
Input Current	21
Pulse Length	200
Temp.	26.1
Filter	0
Flux	0
IR LED	4095
Vacuum	723

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals  Vers

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current	Actual HVG	HVG Current	Anode Current (µA)	Actual FG DAC	FG Current (mA)	Anode diode	Cathode diode	Input Voltage	Input Current	Pulse Length	Temp.	Filter	Flux	IR LED	Vacuum	
Filter #1	107	224	15 kV	29 µA	200	2		200	206	8	4095	137	14.4	21	200	26.1	0	0	4095	723	
Filter #2	198	222	40 kV	30 µA	200	1		200													
Filter #3	198	222	40 kV	30 µA	200	3		200													
Filter #4	223	228	40 kV	43 µA	200	4		200													
Filter #5	103	222	15 kV	25 µA	200	2		200													
Filter #6	167	206	40 kV	11 µA	200	1		200													
Filter #7	167	206	40 kV	11 µA	200	1		200													

Pulse Length 200  Auto Mode  Skip reread PC Trigger

Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start Update Actuals Monitor Actuals

Log Data to File: Start Logging

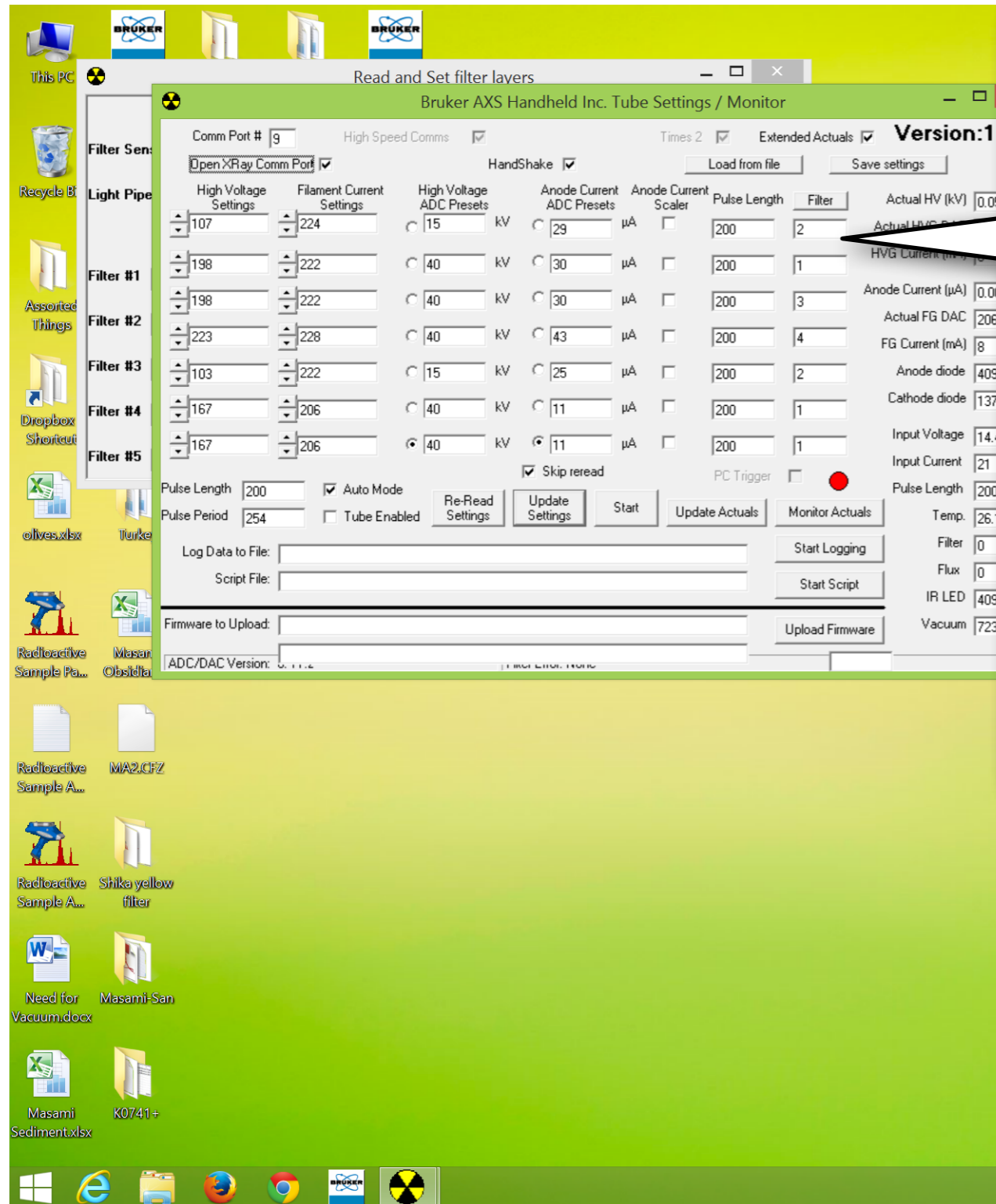
Script File: Start Script

Firmware to Upload: Upload Firmware

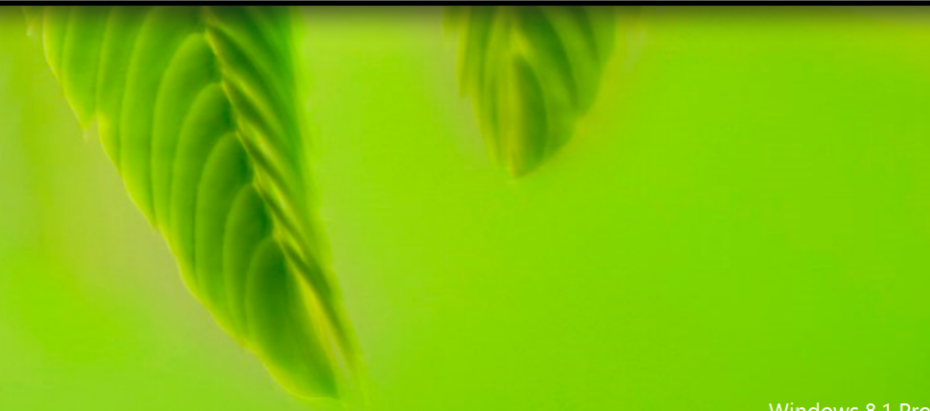
ADC/DAC Version: 0.1.1.2

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# Changing X-Box Settings



The final column includes your filters. If you manually use filters, you may not want to change these. If, however, you have a Tracer IV or a model which has a filter wheel, these will be important to specify



# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.2

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals  HandShake

Open XRay Comm Port  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	0.05
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	0
Filter #3	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	0.00
Filter #4	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	206
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled

Re-Read Settings Update Settings Start Update Actuals Monitor Actuals

Log Data to File: Start Logging

Script File: Start Script

Firmware to Upload: Upload Firmware

ADC/DAC Version: 0.1.1.2

Actual HV (kV) 0.05  
Actual HV (kV) 0  
HVG Current (mA) 0  
Anode Current ( $\mu$ A) 0.00  
Actual FG DAC 206  
FG Current (mA) 8  
Anode diode 4095  
Cathode diode 137  
Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 723

1: 1 mil Ti/12 mil Al (Yellow)  
2: No Filter  
3: 1 mil Cu/1 mil Ti/12 mil Al (Red)  
4: 6 mil Cu/1 mil Ti/12 mil Al (Green)  
5: 1 mil Ti (Blue)

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Filter #1	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	167
Filter #3	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	0
Filter #4	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	0.00
Filter #5	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	206
Filter #6	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8
Filter #7	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	4095

Actual HV (kV) 0.05  
Actual HVG DAC 167  
HVG Current (mA) 0  
Anode Current ( $\mu$ A) 0.00  
Actual FG DAC 206  
FG Current (mA) 8  
Anode diode 4095  
Cathode diode 137  
Input Voltage 14.4  
Input Current 21  
Pulse Length 200  
Temp. 26.1  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 723

The last column features the actual settings when you test your parameters

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# Changing X-Box Settings

The screenshot shows the 'Bruker AXS Handheld Inc. Tube Settings' window. The interface includes a sidebar with filter settings (Filter #1 to #5) and a main panel with various parameters. A callout box points to the 'High Voltage Settings' and 'Filament Current Settings' sections.

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>
Filter #3	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>
Filter #4	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>

Other settings visible include: Comm Port # 9, High Speed Comms checked, HandShake checked, Pulse Length 200, Pulse Period 254, Auto Mode checked, Tube Enabled unchecked, and buttons for Re-Read Settings, Update Settings, Start, and Upload.

**These settings are important for your calibrations, they will not function if you change the energy and current they are based on.**

Windows 8.1 Pro, Build 9600, 10:40 PM, 6/10/2014

# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals  Version: 1.2.21

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 167
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 0
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
167	206	40 kV					FG Current (mA) 8
167	206	40 kV					Anode diode 4095

Pulse Length 200  Auto Mode Re-Read Settings

Pulse Period 254  Tube Enabled

Log Data to File: Script File:

Firmware to Upload:

ADC/DAC Version:

Here, I am selecting parameters not used in any calibration, check with Bruker Elemental to find out what parameters your calibrations are based on

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 167
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 0
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
167	206	40 kV					FG Current (mA) 8
167	206	40 kV					Anode diode 4095

Pulse Length 200  Auto Mode  
Pulse Period 254  Tube Enabled Re-Read Settings

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_

Firmware to Upload: \_\_\_\_\_ Upload Firmware

ADC/DAC Version: \_\_\_\_\_

Right now, this calibration is using 40 keV as a target energy

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 167
198	222	45 kV	30 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 0
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
167	206	40 kV					FG Current (mA) 8
167	206	40 kV					Anode diode 4095

Pulse Length 200  Auto Mode Re-Read Settings  
Pulse Period 254  Tube Enabled

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_

Firmware to Upload: \_\_\_\_\_

ADC/DAC Version: \_\_\_\_\_

If I want to change the target energy to 45, I replace 40 with 45.

Windows 8.1 Pro  
Build 9600  
10:41 PM  
6/10/2014



# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 167
198	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 0
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
103	222	15 kV	25	<input type="checkbox"/>	200	2	Actual FG DAC 206
167	206	40 kV	11	<input type="checkbox"/>			FG Current (mA) 8
167	206	40 kV	11	<input type="checkbox"/>			Anode diode 4095

Pulse Length 200  Auto Mode  Skip reread

Pulse Period 254  Tube Enabled Re-Read Settings Update Settings

Log Data to File: Script File: Firmware to Upload: ADC/DAC Version: 0.1.1.2

I can do the same to the target current, I change 30  $\mu$ A to 31  $\mu$ A

Windows 8.1 Pro Build 9600 10:42 PM 6/10/2014

# Changing X-Box Settings

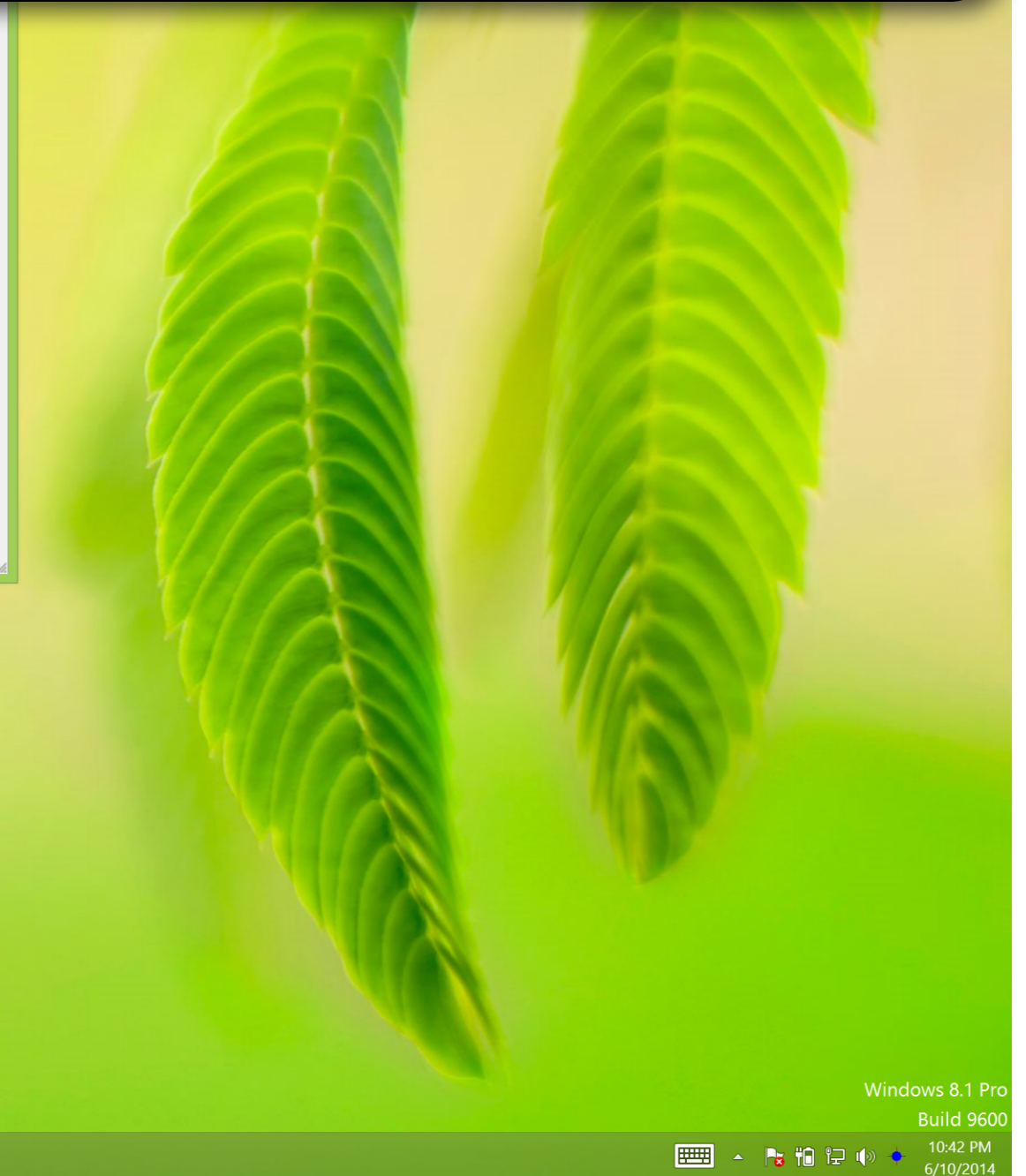
Here, we have the input voltage and current. These must be changed as well

The screenshot shows the Bruker software interface with various settings for an X-ray experiment. The 'High Voltage Settings' section includes:

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	0.05
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	167
198	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	0
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	0.00
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	206
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	8
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	4095

Other visible settings include:

- Input Voltage: 14.4
- Input Current: 21
- Pulse Length: 200
- Temp: 26.1
- Filter: 0
- Flux: 0
- IR LED: 4095
- Vacuum: 723



The desktop environment shows a Windows 8.1 Pro interface with a taskbar at the bottom. The taskbar includes icons for Internet Explorer, File Explorer, and several application windows. The system tray in the bottom right corner displays the time as 10:42 PM and the date as 6/10/2014. The desktop background is a light green color.

# Changing X-Box Settings

The current high voltage setting for 40 keV is 198 - it will likely have to be higher to maintain 45 keV

The screenshot shows the Bruker software interface with the following settings:

Filter	High Voltage (kV)	Filament Current (µA)
Filter #1	198	222
Filter #2	223	228
Filter #3	103	222
Filter #4	167	206
Filter #5	167	206

Other settings visible in the software window include:

- Comm Port #: 9
- High Voltage Settings: 107
- Filament Current Settings: 224
- Pulse Length: 200
- Pulse Period: 254
- Auto Mode:
- Tube Enabled:
- Re-Read Settings:
- Update Settings:
- Start:
- Update Actuals:
- Monitor Actuals:
- Log Data to File:
- Script File:
- Start Logging:
- Start Script:
- Firmware to Upload:
- Upload Firmware:

Readings on the right side of the software window:

HVG Current (mA)	0
Anode Current (µA)	0.00
Actual FG DAC	206
FG Current (mA)	8
Anode diode	4095
Cathode diode	137
Input Voltage	14.4
Input Current	21
Pulse Length	200
Temp.	26.1
Filter	0
Flux	0
IR LED	4095
Vacuum	723

Windows 8.1 Pro, Build 9600, 10:42 PM, 6/10/2014

# Changing X-Box Settings

Here, a slightly higher voltage setting of 201 will be tested.

The screenshot displays the Bruker software interface for X-ray settings. A callout box highlights the 'Filter #1' voltage setting, which is set to 201. The interface includes various control panels for High Voltage and Filament Current settings, buttons for 'Start', 'Update Settings', and 'Monitor Actuals', and a status panel on the right showing real-time data like Input Voltage (14.4) and Input Current (21). The desktop background is a green leaf image.

Filter	High Voltage (kV)	Filament Current (µA)
Filter #1	201	222
Filter #2	223	228
Filter #3	103	222
Filter #4	167	206
Filter #5	167	206

Parameter	Value
Input Voltage	14.4
Input Current	21
Pulse Length	200
Temp.	26.1
Filter	0
Flux	0
IR LED	4095
Vacuum	723

# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Light Pipe	107	224	<input type="radio"/> 15 kV	<input type="radio"/> 29 $\mu$ A	<input type="checkbox"/>	200	2	2.10
Filter #1	198	222	<input type="radio"/> 40 kV	<input type="radio"/> 30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 169
Filter #2	201	222	<input checked="" type="radio"/> 45 kV	<input checked="" type="radio"/> 31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 2
Filter #3	223	228	<input type="radio"/> 40 kV	<input type="radio"/> 43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
Filter #4	103	222	<input type="radio"/> 15 kV	<input type="radio"/> 25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
Filter #5	167	206	<input type="radio"/> 40 kV	<input type="radio"/> 11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 9
	167	206	<input type="radio"/> 40 kV	<input type="radio"/> 11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 4095
								Cathode diode 138
								Input Voltage 14.4

Pulse Length 200  Auto Mode  
Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start

Log Data to File: \_\_\_\_\_  
Script File: \_\_\_\_\_

Firmware to Upload: \_\_\_\_\_  
ADC/DAC Version: \_\_\_\_\_

Click the radio buttons next to the target energy and current

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actuals
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	Actual HV (kV) 2.10
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 169
201	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 2
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 0.00
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 206
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 9
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 4095

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled

Log Data to File:  Start Logging

Script File:  Start Script

Firmware to Upload:  Upload Firmware

ADC/DAC Version: 0.1.1.4

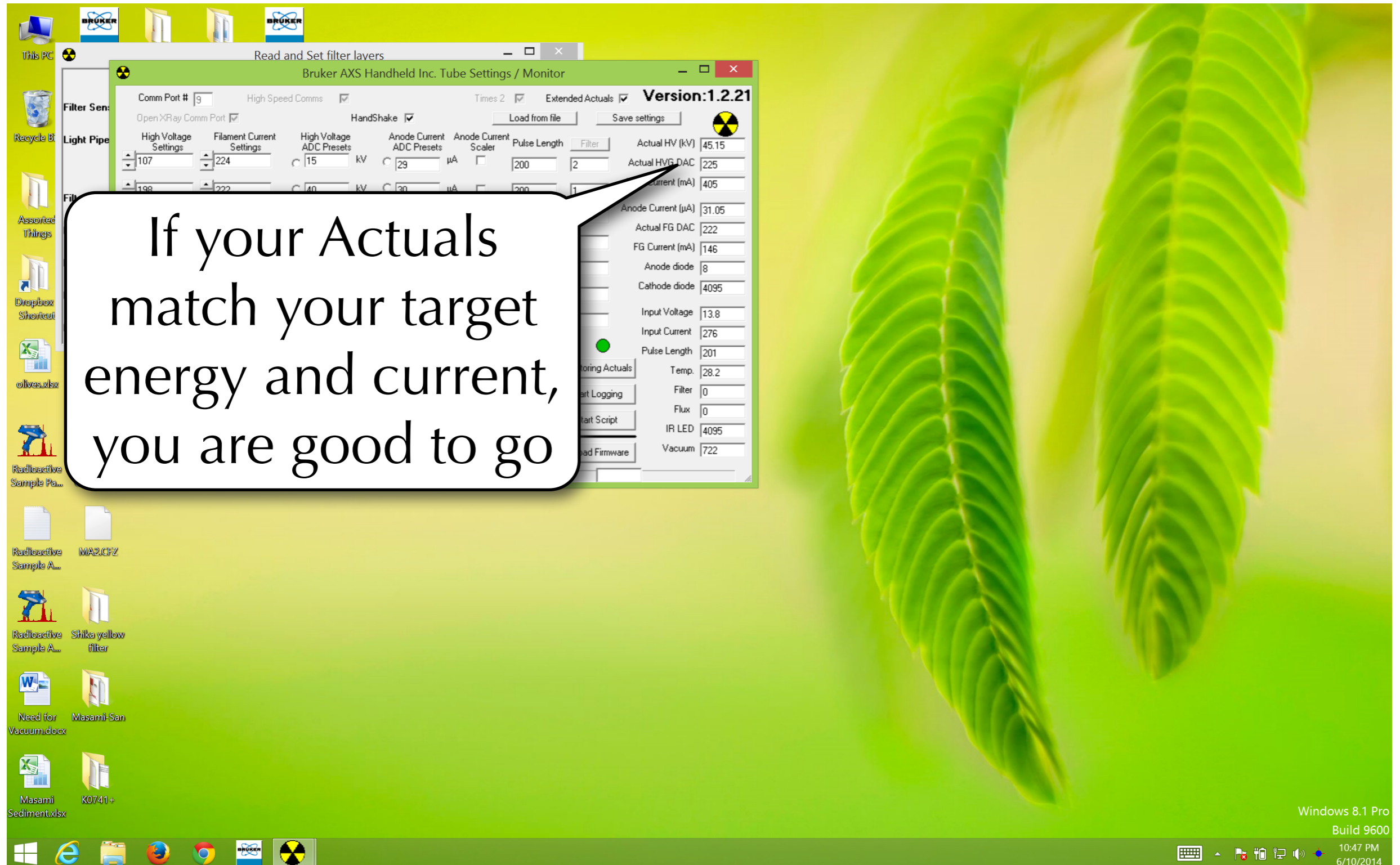
Actuals:

Input Voltage	14.4
Input Current	23
Pulse Length	201
Temp.	27.0
Filter	0
Flux	0
IR LED	4095
Vacuum	723

Then click 'Monitor Actuals'

Windows 8.1 Pro  
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# Changing X-Box Settings



The image shows a Windows 8.1 desktop with a green background of two large green leaves. A software window titled "Bruker AXS Handheld Inc. Tube Settings / Monitor" is open, displaying various parameters for an X-ray tube. A callout box with a black border and white background contains the text: "If your Actuals match your target energy and current, you are good to go". The software interface includes sections for "Filter Settings", "Light Pipe", and "High Voltage Settings". The "Actuals" section on the right lists various measured values.

**Actuals Data:**

Parameter	Value
Actual HV (kV)	45.15
Actual HVG DAC	225
Actual Current (mA)	405
Anode Current (μA)	31.05
Actual FG DAC	222
FG Current (mA)	146
Anode diode	8
Cathode diode	4095
Input Voltage	13.8
Input Current	276
Pulse Length	201
Temp.	28.2
Filter	0
Flux	0
IR LED	4095
Vacuum	722

Windows 8.1 Pro  
Build 9600  
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6/10/2014

# Changing X-Box Settings

If not, you can unselect 'PC Trigger' then turn off 'Monitor Actuals'

The screenshot displays the Bruker AXS handheld software interface. The main window is titled 'Bruker AXS Handheld Inc. Tube Settings / Monitor' and shows various parameters for the device. A 'PC Trigger' checkbox is visible, which is currently checked. Below it, there is a 'Monitor Actuals' checkbox, which is currently unchecked. The interface also includes buttons for 'Load from file', 'Save settings', 'Start Logging', 'Start Script', and 'Upload Firmware'. The background of the software window is a green image of two leaves.

Parameter	Value
Actual HV (kV)	2.95
Actual HVG DAC	225
HVG Current (mA)	3
Anode Current (µA)	0.00
Actual FG DAC	222
FG Current (mA)	9
Anode diode	4095
Cathode diode	139
Input Voltage	14.3
Input Current	23
Pulse Length	200
Temp.	28.2
Filter	0
Flux	0
IR LED	4095
Vacuum	723

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Comm Port # 9 High Speed Comms  Times 2

Open XRay Comm Port  HandShake  Load from

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length
Filter #1	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200
Filter #3	230	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200
Filter #4	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200
Filter #5	103	222	15 kV	11 $\mu$ A	<input type="checkbox"/>	200

Pulse Length 200  Auto Mode  Skip reread

Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start Update Actuals

Log Data to File: Script File: Start Script

Firmware to Upload: Upload Firmware

ADC/DAC Version: Flux 0 IR LED 4095 Vacuum 723

I can then select a new high voltage setting, in this case 230

Windows 8.1 Pro Build 9600 10:46 PM 6/10/2014

# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Filter #1	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	45.15
Filter #2	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 225
Filter #3	230	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 405
Filter #4	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 31.05
Filter #5	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 222
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 146
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 8

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled

Re-Read Settings Update Settings Start Update Actuals Monitoring Actuals

Log Data to File: Script File: Start Logging Start Script

Firmware to Upload: Load Firmware

ADC/DAC Version: 0.1.1.2

Actual HV (kV) 45.15  
Actual HVG DAC 225  
HVG Current (mA) 405  
Anode Current ( $\mu$ A) 31.05  
Actual FG DAC 222  
FG Current (mA) 146  
Anode diode 8  
Cathode diode 4095  
Input Voltage 13.8  
Input Current 276  
Pulse Length 201  
Temp. 28.2  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 722

To test this, I can click 'Monitor Actuals' then 'PC Trigger'

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

Filter	High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
Light Pipe	107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	45.15
Filter #1	198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 225
Filter #2	230	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 405
Filter #3	223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 31.05
Filter #4	103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 222
Filter #5	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 146
	167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 8

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start Update Actuals Monitoring Actuals

Log Data to File: Start Logging

Script File: Start Script

Firmware to Upload: Upload Firmware

ADC/DAC Version: 0.1.1.4

Actual HV (kV) 45.15  
Actual HVG DAC 225  
HVG Current (mA) 405  
Anode Current ( $\mu$ A) 31.05  
Actual FG DAC 222  
FG Current (mA) 146  
Anode diode 8  
Cathode diode 4095  
Input Voltage 13.8  
Input Current 276  
Pulse Length 201  
Temp. 28.2  
Filter 0  
Flux 0  
IR LED 4  
Vacuum 7

Make sure the Pulse Length does not exceed 199-201

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# Changing X-Box Settings

Read and Set filter layers

Bruker AXS Handheld Inc. Tube Settings / Monitor

Version: 1.2.21

Comm Port # 9 High Speed Comms  Times 2  Extended Actuals

Open XRay Comm Port  HandShake  Load from file Save settings

High Voltage Settings	Filament Current Settings	High Voltage ADC Presets	Anode Current ADC Presets	Anode Current Scaler	Pulse Length	Filter	Actual HV (kV)
107	224	15 kV	29 $\mu$ A	<input type="checkbox"/>	200	2	45.15
198	222	40 kV	30 $\mu$ A	<input type="checkbox"/>	200	1	Actual HVG DAC 225
230	222	45 kV	31 $\mu$ A	<input type="checkbox"/>	200	3	HVG Current (mA) 405
223	228	40 kV	43 $\mu$ A	<input type="checkbox"/>	200	4	Anode Current ( $\mu$ A) 31.05
103	222	15 kV	25 $\mu$ A	<input type="checkbox"/>	200	2	Actual FG DAC 222
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	FG Current (mA) 146
167	206	40 kV	11 $\mu$ A	<input type="checkbox"/>	200	1	Anode diode 8

Pulse Length 200  Auto Mode  Skip reread  PC Trigger

Pulse Period 254  Tube Enabled Re-Read Settings Update Settings Start Update Actuals Monitoring Actuals

Log Data to File: Start Logging

Script File: Start Script

Firmware to Upload: Upload Firmware

ADC/DAC Version: 0.1.1.2

Input Voltage 13.8  
Input Current 276  
Pulse Length 201  
Temp. 28.2  
Filter 0  
Flux 0  
IR LED 4095  
Vacuum 722

Windows 8.1 Pro  
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When the Actual energy and current match my target energy and current presents, then you have successfully reprogrammed the X-box