Monoblock X User Manual

1   Table of Contents

2 FIGURES

3 Overview

The MonoblockX GUI is distributed by using a setup installer program. It loads the GUI and all necessary components for its use on to the host computer.

4 Installation

To install the MonoblockX GUI please follow these directions:

1. If the installer was provided on a CD-ROM, please place the disc in your computer and navigate to its main folder. If you downloaded the installation package, please extract the archive file to a known location and navigate to the main folder.
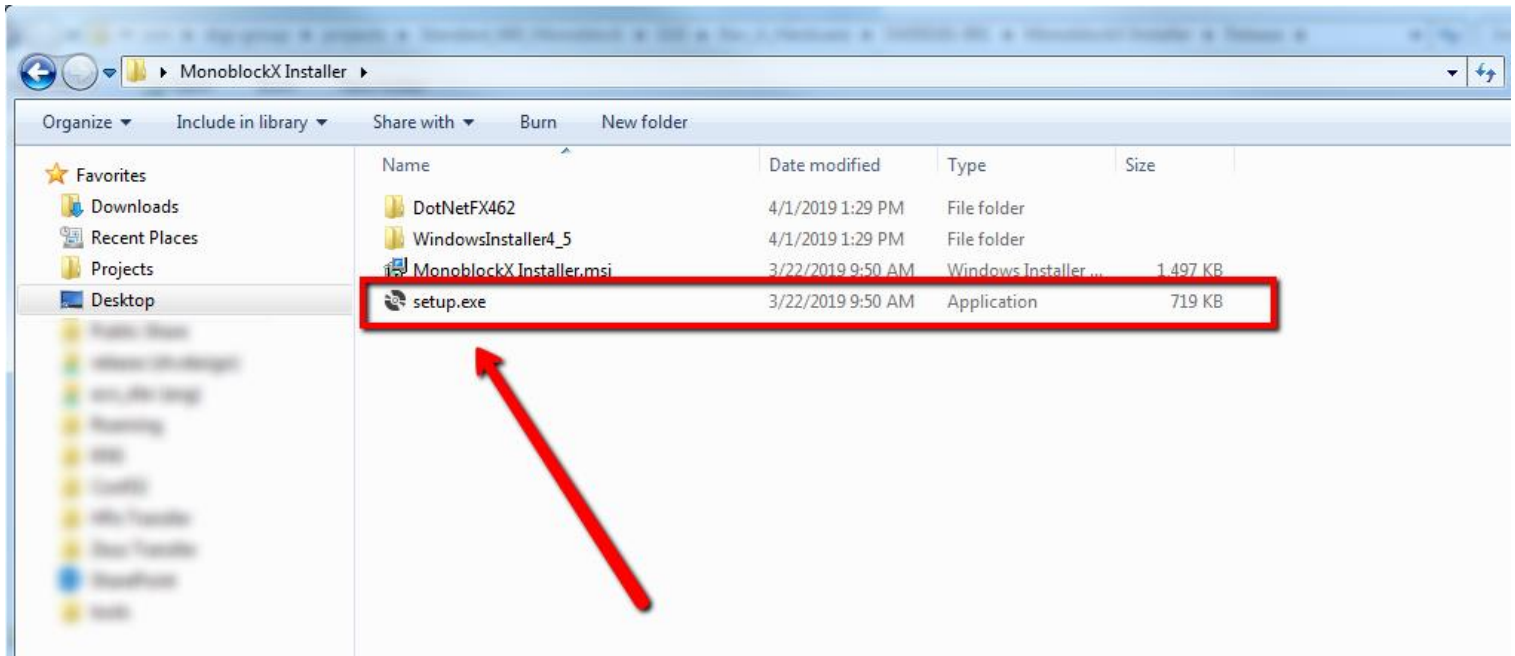
<p align="center">Figure 1: Unzipped directory showing installation utility</p>

2. Inside that folder will be a number of files, including a *setup.exe* file. Run the *setup.exe* file by double-clicking on it. This will start the utility, after it finishes loading, it will display the Welcome screen and indicate the version of the GUI it will install:

Rev B
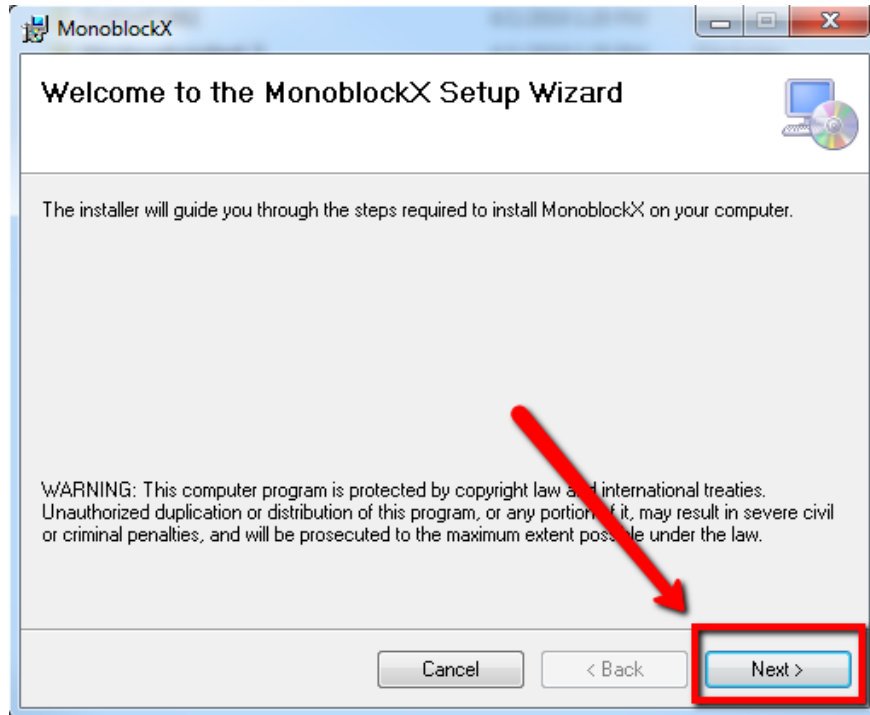
Figure 2: Welcome screen to Monoblock X Installer

3. Select *Next* and you will be prompted where to install the GUI, unless you need a special configuration, leave the default settings selected, if you do need a special configuration, please contact Spellman High Voltage. Select *Next* again and the installer will indicate it is ready to install with the following screen:
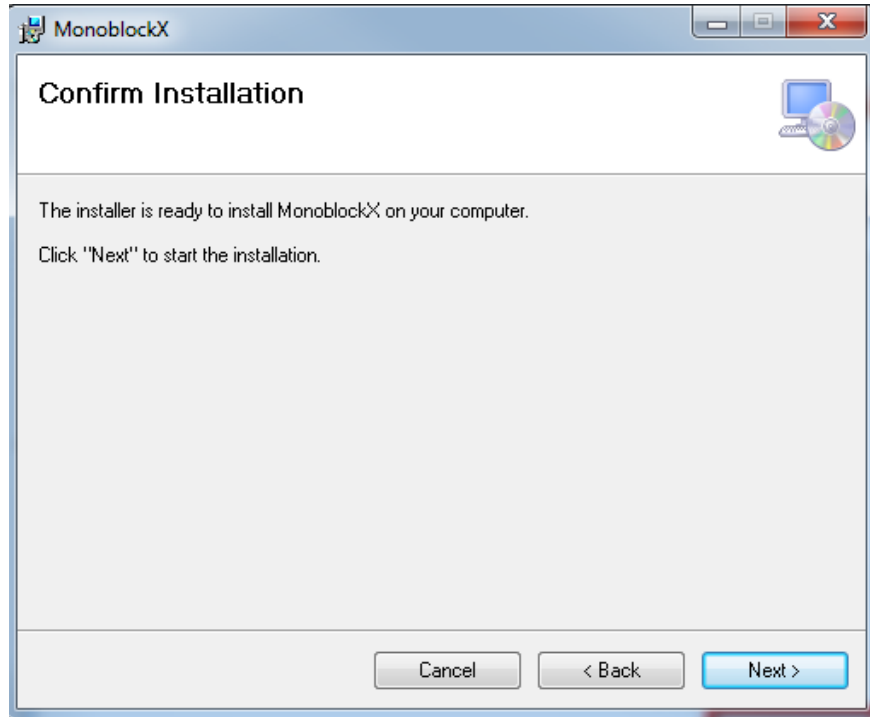
Figure 3: Monoblock X Installer is configured and ready to install

If you do not see this screen, please contact Spellman High Voltage for assistance.

4. Select *Next* and the installation will begin, this can take up to 2 minutes, when completed, a message will appear indicating such:
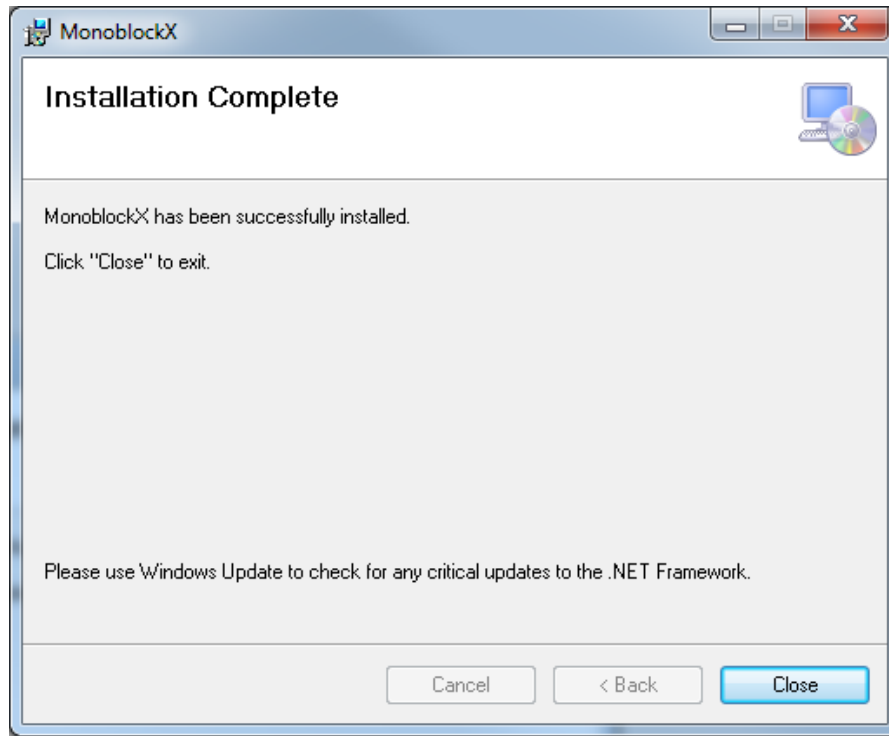
Figure 4: Monoblock X Installer has completed installation

5. Once installed, an item in your Start Menu will be created to start the GUI software:
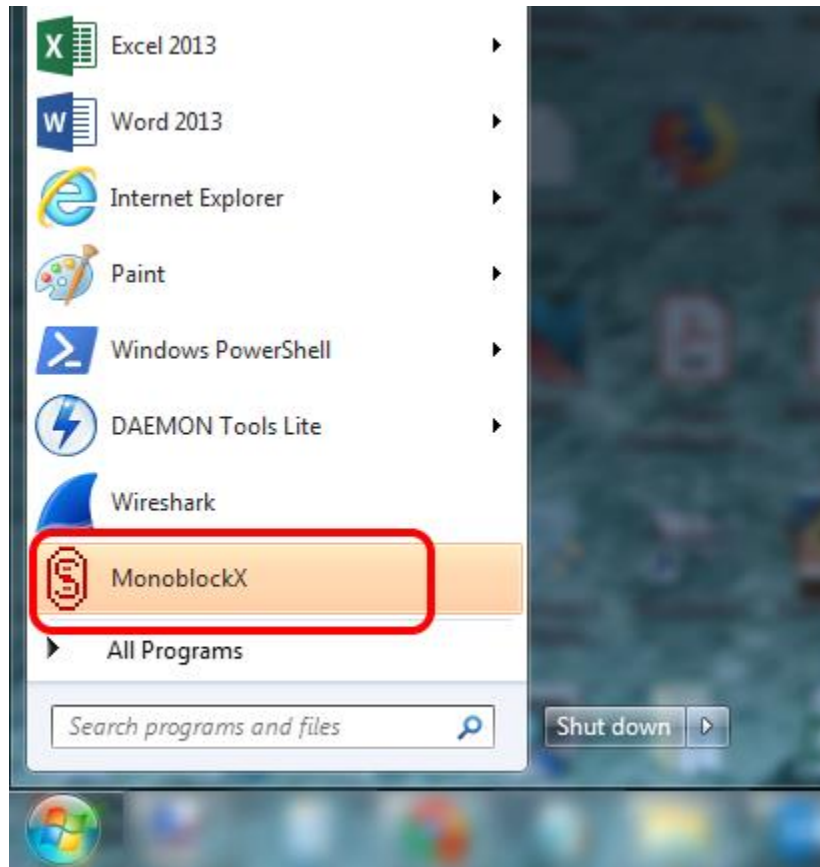
Figure 5: Monoblock X entry shown in Start Menu

5   Initial Configuration

Once the Monoblock X software has been installed on your computer, it must be configured to communicate with the power supply you are using.

1. Start the software for the power supply by selecting the corresponding entry in your Start Menu, under the Spellman High Voltage Electronics program group. You will be presented with a license agreement:
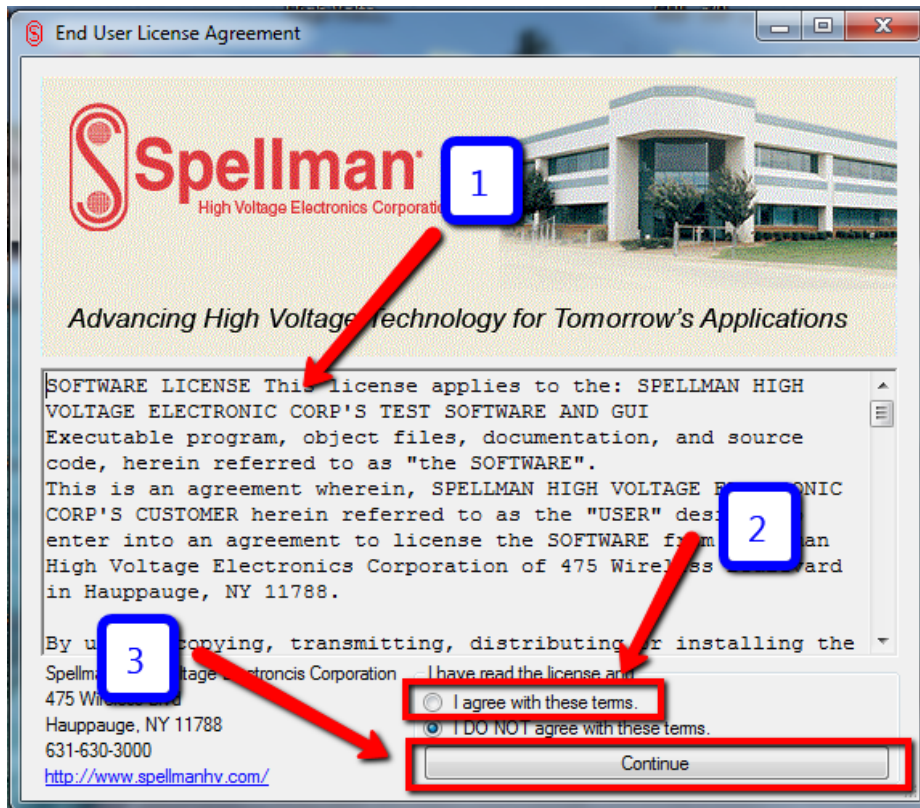
Figure 6: Monoblock X License Agreement

2. Please carefully read the license terms (1) and acknowledge your agreement by selecting "I agree with these terms." (2), then click *Continue* (3). On initial startup, you will be presented with the communications settings:

USA   CHINA   EUROPE   JAPAN   MEXICO

Figure 7: Monoblock X GUI waiting for communications configuration

3. Configure either the Serial or Ethernet settings according to the specifications of the power supply you are trying to control and then select *Connect*. The software will begin sending messages to the power supply to establish communication. Once connected, the Com Status indicators will become green and say "Connected".
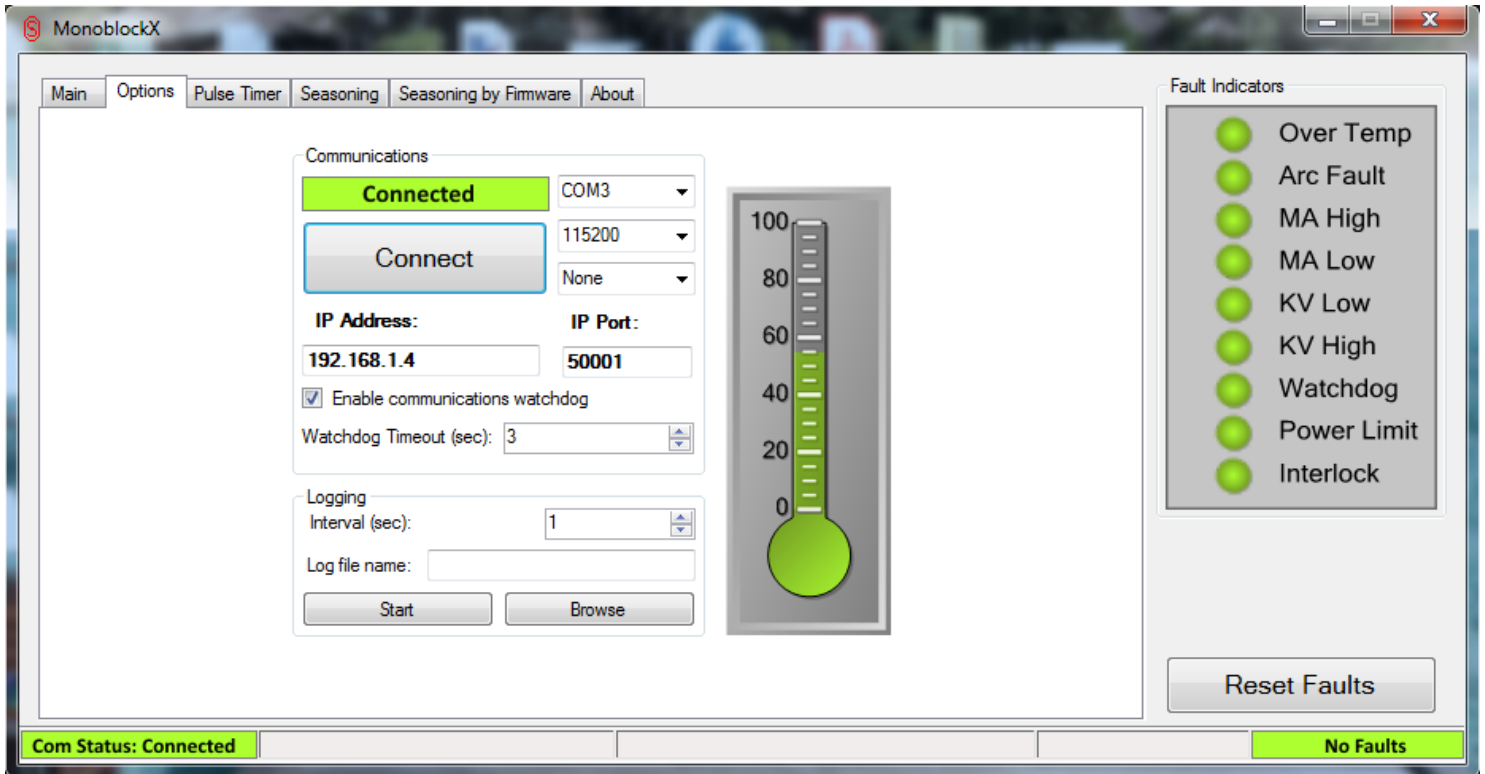
Figure 8: Monoblock X GUI successfully connected to power supply

4. At this point, the communication configuration is complete and the settings will automatically save for the next use. You will not need to configure the communication settings in the future, unless you need different settings.

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

6 Using the GUI

The GUI window is made up of three primary elements:

1. The fault indicators and fault reset button are always present on the right side of the window.
2. The status bar is along the bottom.
3. The tabbed control pages.

6.1 Fault Indicators

Along the right side of the GUI is the fault indicator panel, this panel contains a series of LED indicators showing all possible system faults. A green indicator means that fault is not present and red means it is an active fault. When all the indicators are green, the system is not in a fault condition and may operate normally. Correspondingly, when an indicator is red, it means the system has faulted with that type of error and may not continue until the fault is corrected. Once a present fault condition is corrected, the *Reset Faults* button may be used to clear out the latched condition and restore the system to operation.
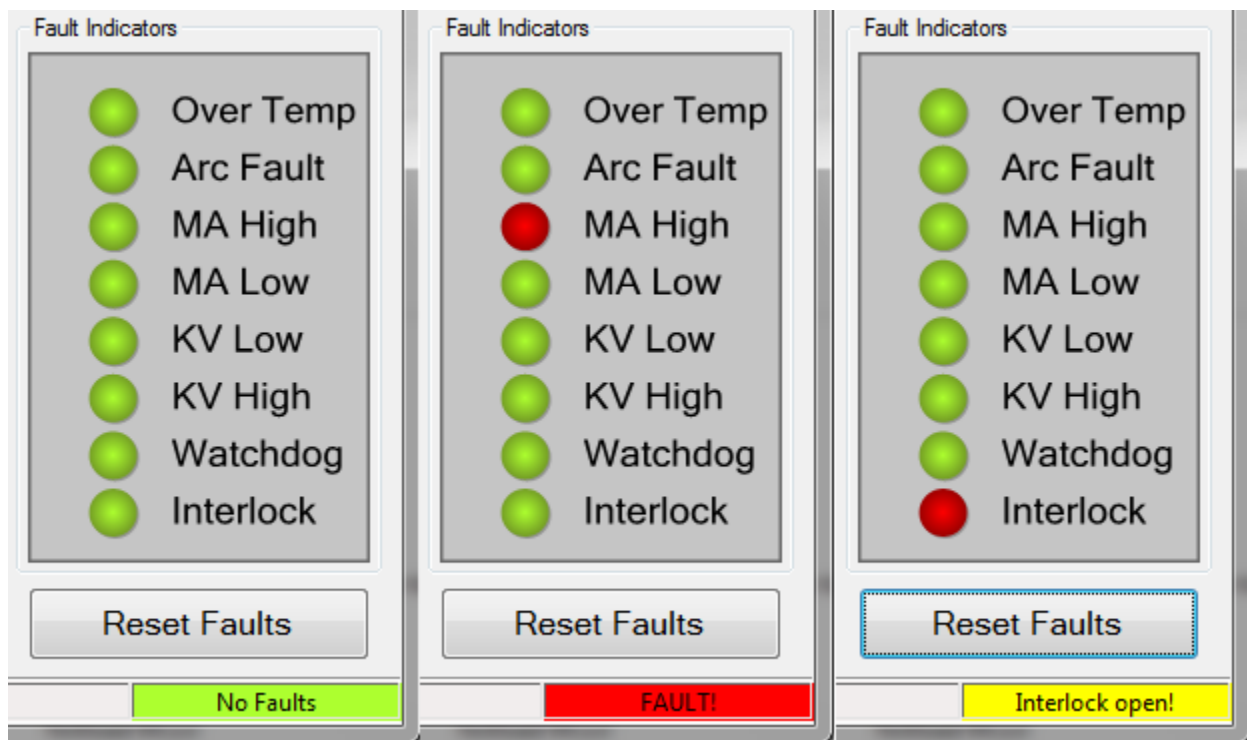
Figure 9: Fault indicators with no faults, high current fault and open interlock warning

In Figure 9 you can see the system with no faults on the left, with a latched high current fault in the middle and an open Interlock on the right. Note that an interlock open does not need to be reset and shows up yellow on the status bar.

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

6.2 Status Bar

6.2.1 Fault Status

The status bar indicates the status of the power supply, including communication status, seasoning status, fault status and cycle timer status. The fault status is shown above at the rightmost part of the status bar and is either:

- No Faults – the system has no faults or open interlocks.
- FAULT! – the system has a fault, shown on the above indicator panel, which must be resolved and reset before operation can commence.
- Interlock open! – the system has one or more open interlocks, this condition will automatically be cleared when the interlocks are closed, there is no need to click *Reset Faults*

6.2.2 Communication status

On the leftmost part of the status bar is the communication status:
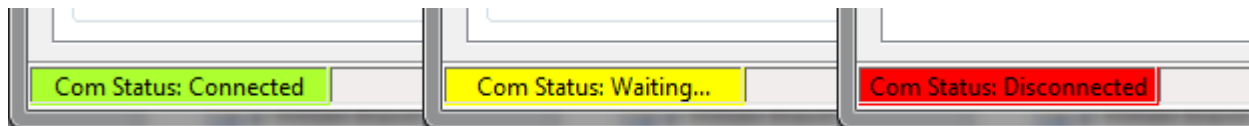
Figure 10: Communication status indicator on the status bar

This indicator can have three states:

- Connected – The software is actively sending data to the power supply and receiving *valid* data from the power supply, normal operations.
- Waiting… - The software is actively sending data to the power supply, but is receiving either no data, or invalid data, communications problem.
- Disconnected – The software is not attempting to communicate with the power supply.

6.2.3 Seasoning Status

When the power supply is running an automated seasoning profile, the progress and time remaining in that operation will be displayed to the immediate right of the communication status indicator with a progress bar and countdown clock.

| Com Status: Connected | Seasoning (3%, 05:49 remaining) | | No Faults |
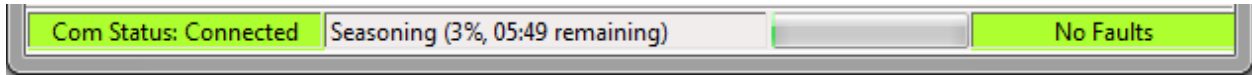
Figure 11: Status bar showing seasoning status and progress bar

The clock will countdown to the completion of the seasoning profile, while the percentage readout and progress bar will indicate progress through the entire seasoning profile.

6.3 Tabbed Control Pages

The majority of the GUI window will be taken up by the Tabbed Control Page interface. This interface contains five tabs providing controls for the power supply, as well as information about the supply's performance and the software itself.

6.3.1 Main page
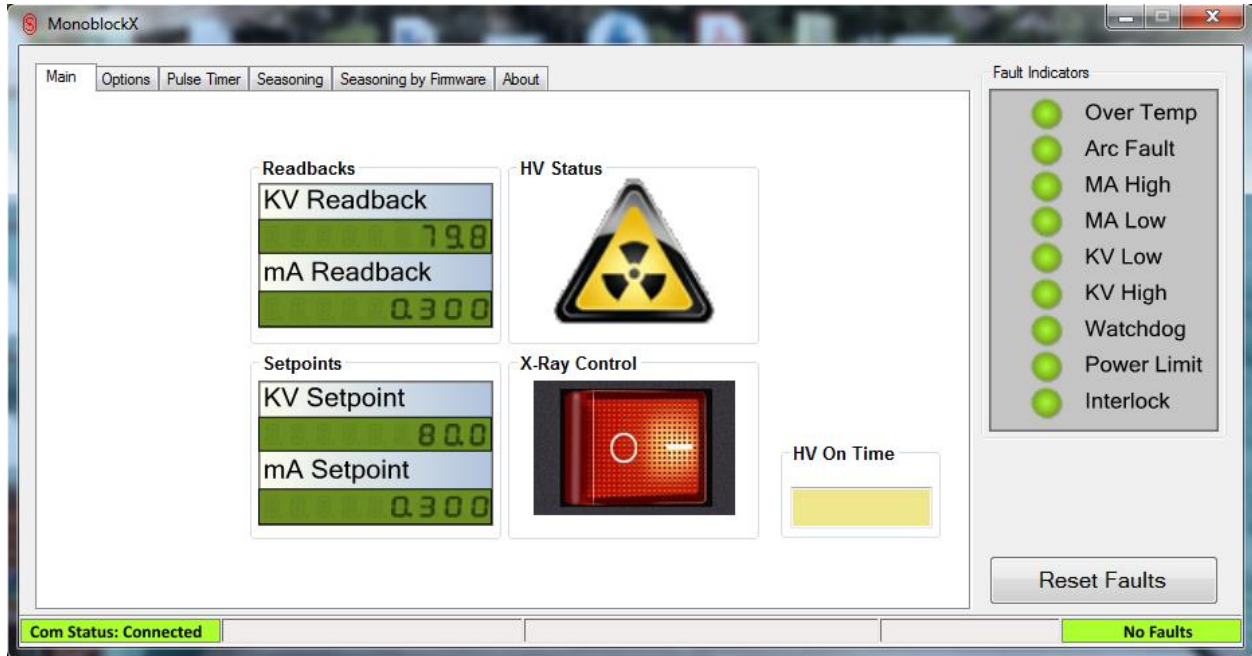
Figure 12: Main page showing active High Voltage output with readbacks and setpoints

The main control page provides access to the voltage and current setpoints, readbacks and the HV On/Off control and readbacks.

6.3.1.1 Operating the setpoints:

1. Select the setpoint you wish to alter, it will become highlighted in yellow:
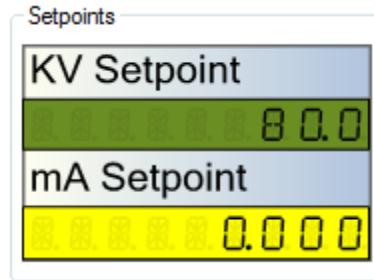
Figure 13: Current setpoint selected

2. Use the number and decimal keys to type in the new setpoint:
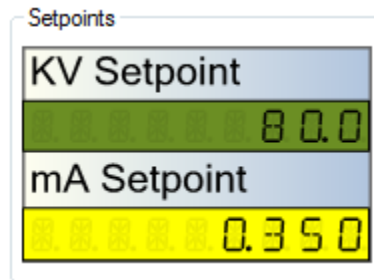
Figure 14: Current setpoint new value entered

3. Press Enter to lock the new setpoint in, or press Esc to cancel entry. If locked in, the new value will be validated and sent to power supply. The power supply will also validate the entry and then apply the new setpoint if valid.

These fields read back the setpoints stored by the unit continuously, so they will always represent what the power supply is using as the setpoints. For example, if a value is entered that the power supply fails to validate, the supply will automatically switch to the previously entered value and the corresponding field will change to reflect that.

To operate the HV on/off control, simply click the red rocker switch icon, assuming no faults are present the supply will switch on and the switch will reflect the new on state. The HV Status warning indicator will also change to show a radiation warning symbol.

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO
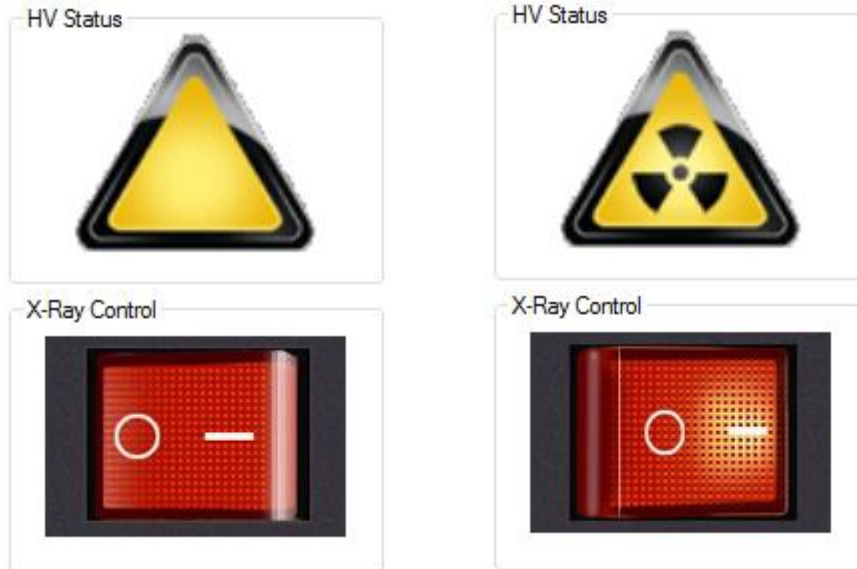
Figure 15: High Voltage On/Off control and indicator

This image shows the switch and warning indicator in the off (left) and on (right) configurations.

6.3.2 Options page

This page shows the communications settings and a temperature reading for units that support it.
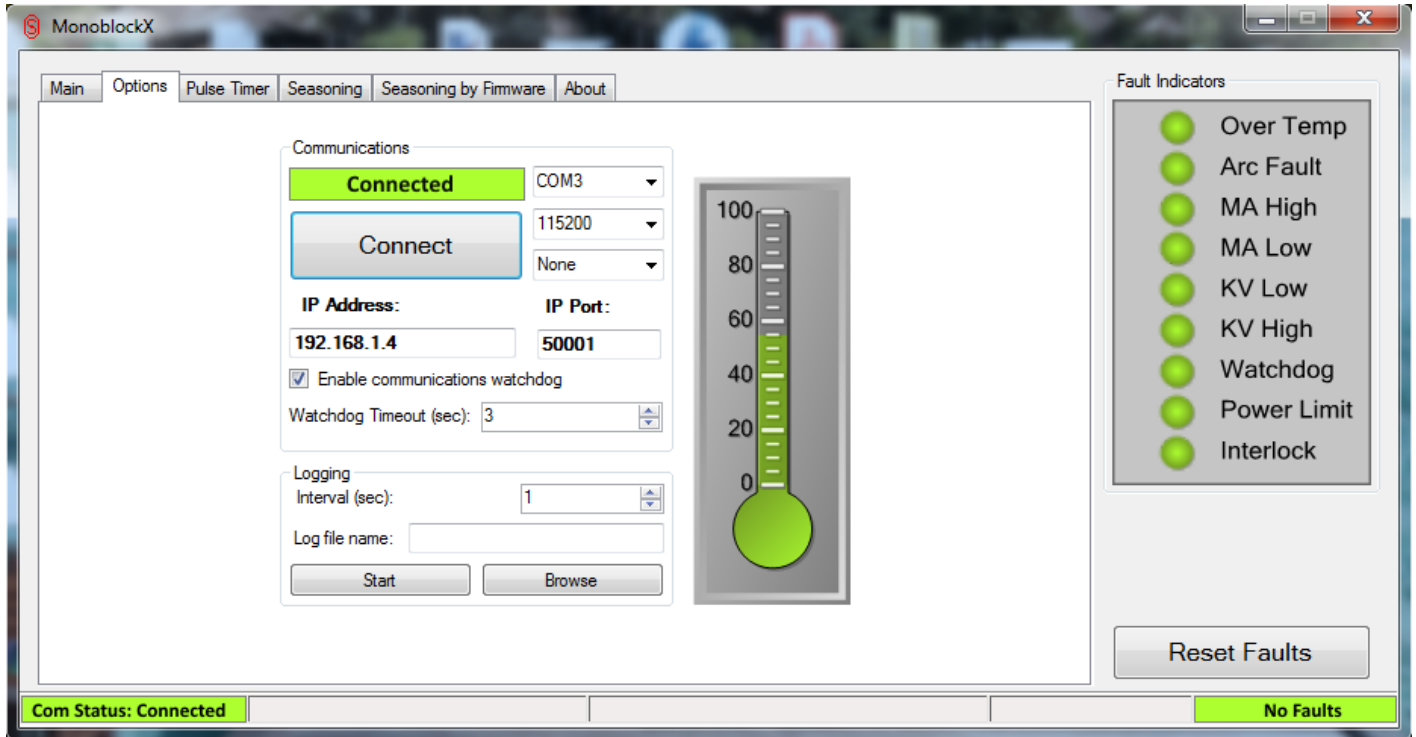
Figure 16: Options page showing communication settings and thermometer

6.3.2.1 Temperature indicator

If the selected power supply contains support for a temperature reading, the thermometer display will be visible. This gives a quick visual indicator of the temperature of the supply, with the specific temperature displayed if the mouse is hovered over the indicator. The color of the indicator changes according to the temperature as well:

- Green – this means the temperature is within the safe operating range for the power supply
- Yellow – this means the temperature is approaching the maximum safe operating temperature for the power supply
- Red – this means the temperature is at or above the maximum safe operating temperature for the power supply.

6.3.2.2 Communications watchdog

Also present in the communications settings is the checkbox to enable the communications watchdog. Once checked, the watchdog will be enabled and the GUI will maintain a heartbeat signal to the supply

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

automatically. If communications are interrupted, the power supply will automatically shut down after a brief timeout period with a Watchdog fault. If unchecked, the watchdog is automatically disabled on the supply and the heartbeat signal is terminated.

6.3.2.3 Logging Functionality

The options page also contains an option for logging telemetry from the Monoblock unit you're connected to. This allows monitoring of unit behavior over long term operations, and can log at a selectale interval (defaults to 1 second). The data is recorded in CSV format, with a header indicating the start time of the log and software/firmware versions involved. Each record includes the following fields:

- Timestamp of log entry
- HV Status
- Fault Status
- Filament status
- Temperature readback (if not available this reads "N/A")
- KV Readback
- KV Setpoint
- mA Readback
- mA Setpoint

6.3.3 Seasoning page

This page holds all the controls for loading and executing tube seasoning profiles. The command set provided for your power supply may contain default Monthly, Weekly, Daily or New Tube seasoning profiles.
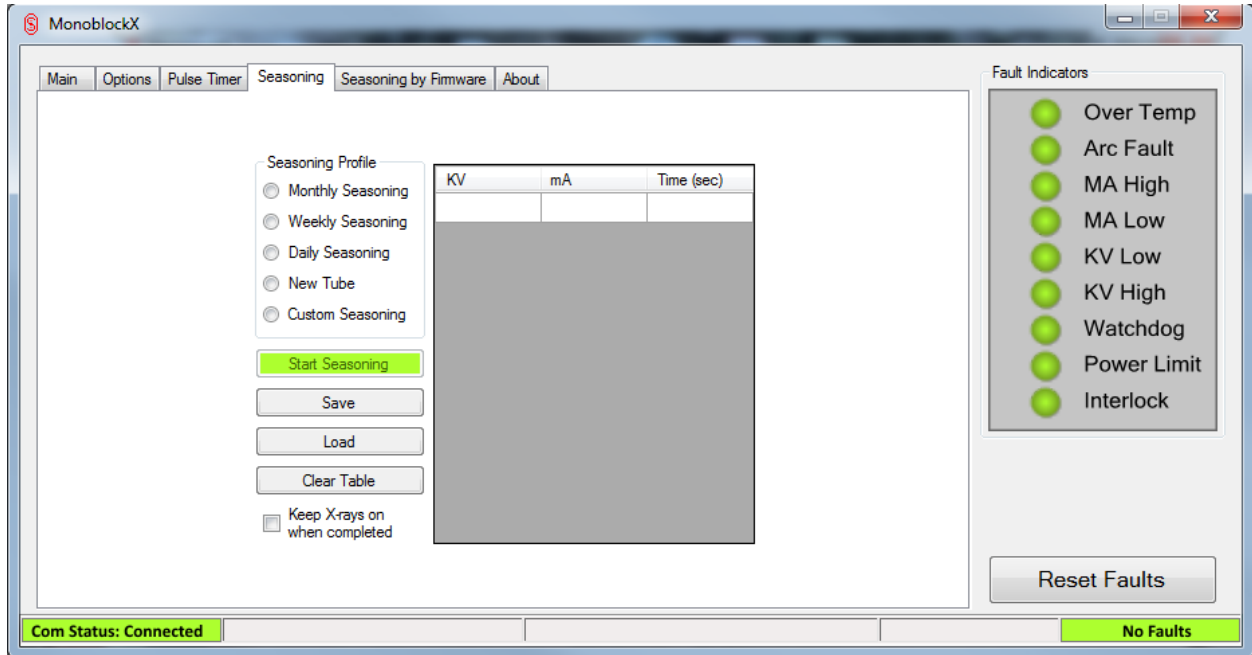
Figure 17: Seasoning pages showing profile selection and editing

If these profiles are included, the relevant option will be selectable in the Seasoning Profile box in the upper left. Selecting an included profile will automatically populate the table on the right of the page with that profile.

6.3.3.1 Loading and executing an included profile:

1. Select the desired profile from the Seasoning Profile window in the upper left, the table will populate with the setpoints and times for each step:
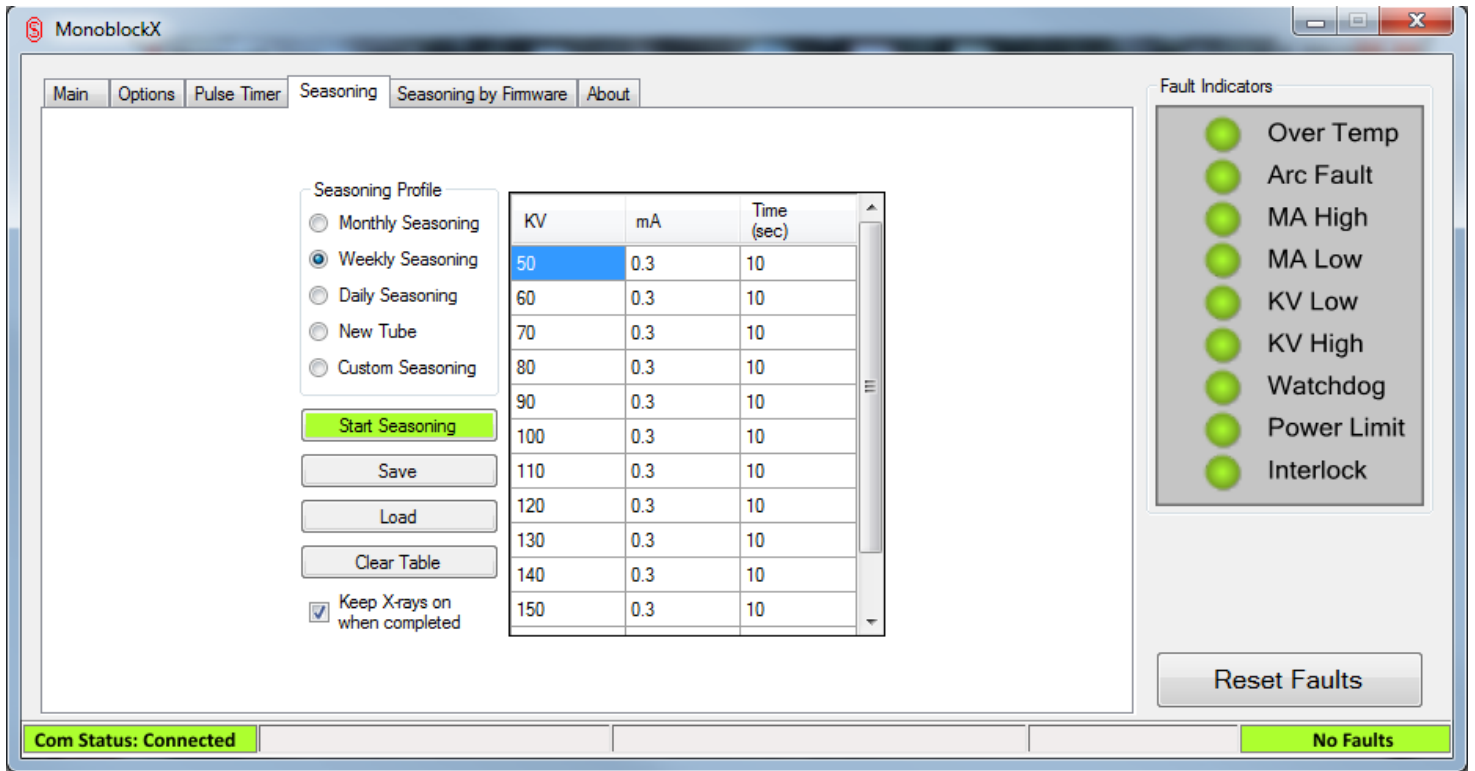
Figure 18: Included Weekly seasoning profile selected and displayed in table

2. If you do not need to make any changes, select *Start Seasoning* on the left and a warning will be displayed, indicating that proceeding will enable High Voltage output:
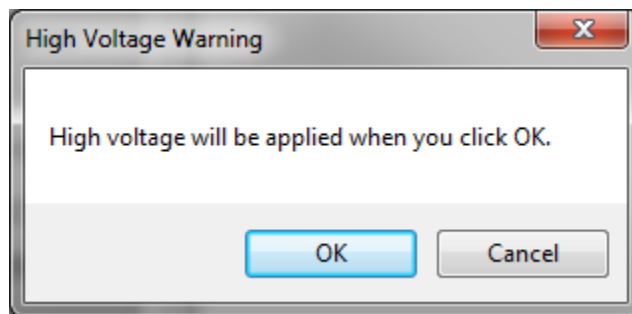
Figure 19: High Voltage warning

Rev B

3. Select OK to proceed, the HV output will be enabled and the first series of setpoints will be loaded. At this point the table will highlighted in red and yellow coloring, red for steps that have not yet executed, yellow for the step currently executing and green for steps that have been completed. The seasoning status indicators will also appear in the status bar as described in section 4.2.3 of this manual.

Figure 20: Seasoning in progress

6.3.3.2   Creating and executing a custom seasoning profile:

1. Select *Custom Seasoning* from the Seasoning Profile box, if there is already a profile constructed in the table, such as one of the included default profiles, it will remain populated so it is easy to customize an existing profile without needing to re-enter it by hand, otherwise there will be one blank row in the table for you to start entering data:

Figure 21: Custom profile selected, awaiting entries

2. To create a step, select the blank row near the bottom by clicking in one of the fields (KV, mA or Time) and begin entering values using the numeric keys on the keyboard. As soon as you start entering values, a new blank row will appear under that for further steps. Simply fill in the parameters you want for each step and move on to the next line. You can also edit steps this way, by modifying parameters on lines that are already populated. Each line must have a value for each of the three parameters to be considered valid.
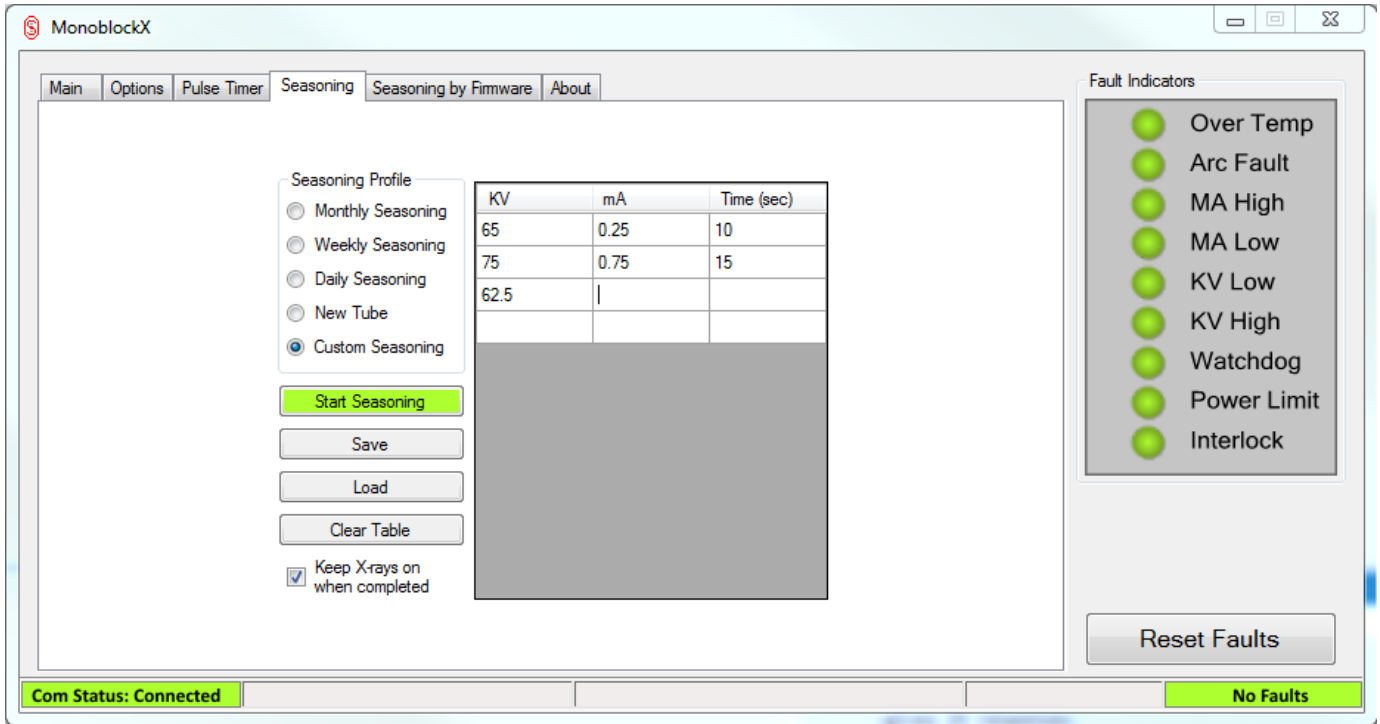
Figure 22: Custom table partially entered

3. Once the entire profile has been entered, you now have the option of saving the profile, starting the seasoning process, or abandoning the custom profile by selecting an included one, or loading a saved one.

   a. To start the seasoning profile, click on *Start Seasoning*, at this point the software will try to verify your table by ensuring each step has all needed parameters and they are all valid. If this succeeds, you will receive a High Voltage warning (see Figure 22), indicating that continuing will cause High Voltage output to be enabled. Select OK to proceed, the HV output will be enabled and the first series of setpoints will be loaded. At this point the table will highlighted in red and yellow coloring, red for steps that have not yet executed, yellow for the step currently executing and green for steps that have been completed. The seasoning status indicators will also appear in the status bar as described in section 4.2.3 of this manual. (see Figure 23)
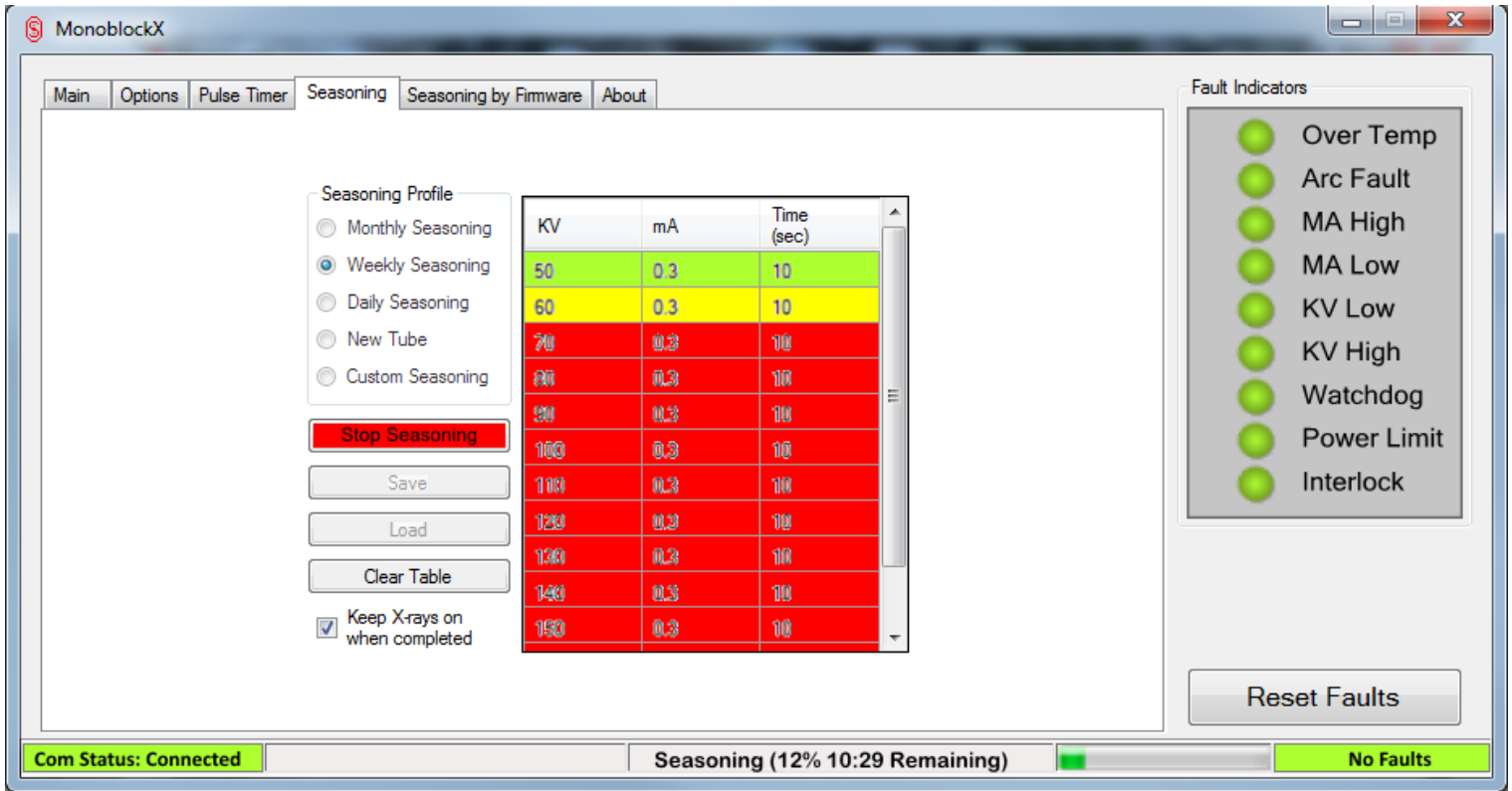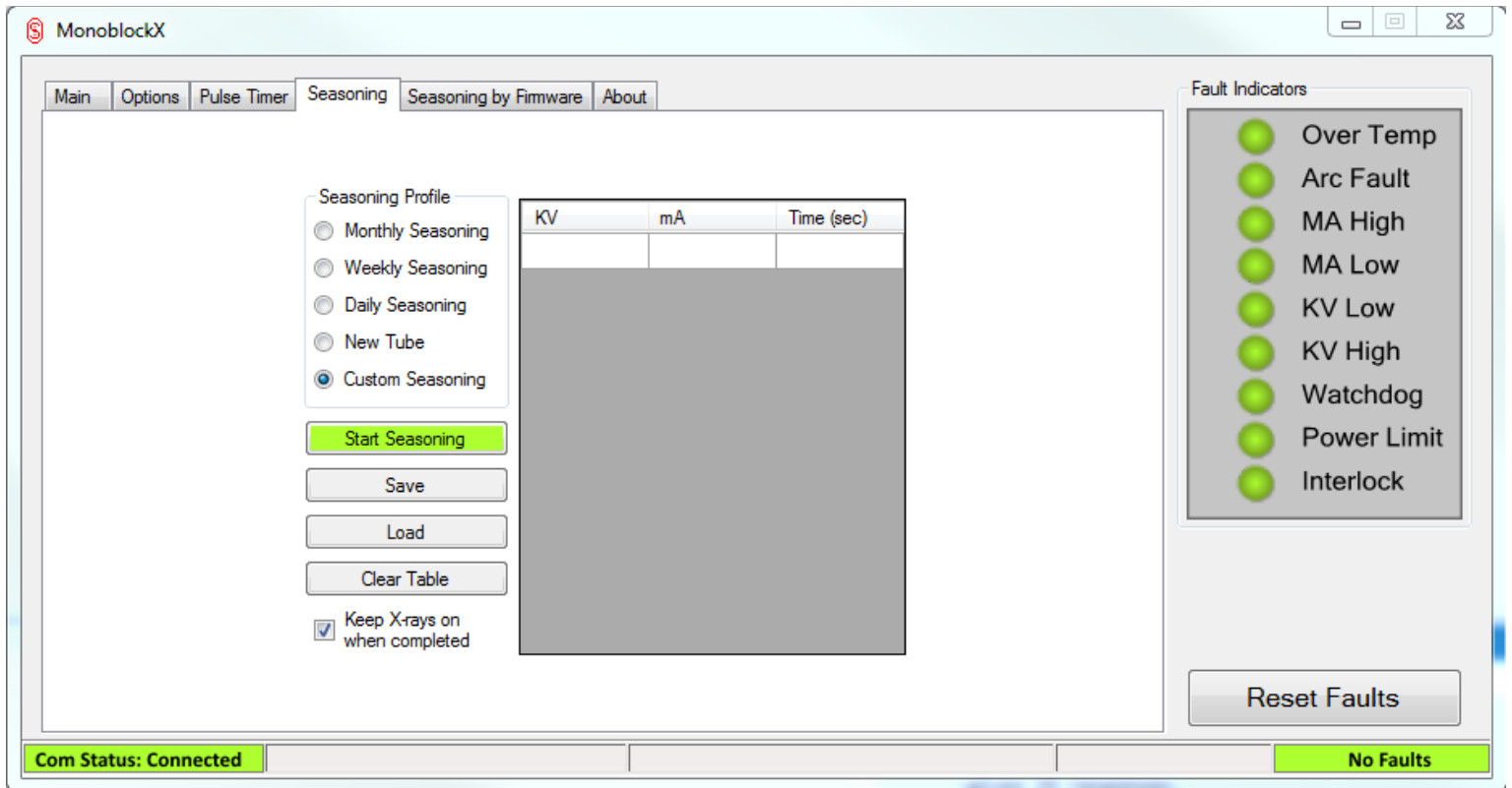
Rev B

b. To save the profile, select the save button, a Save File dialog will open, prompting for a location and name to save your profile to. Once the file has been named, select Save and the file will be written. This type of file can be reloaded later by any Monoblock X package for use, not only the one used to create it.
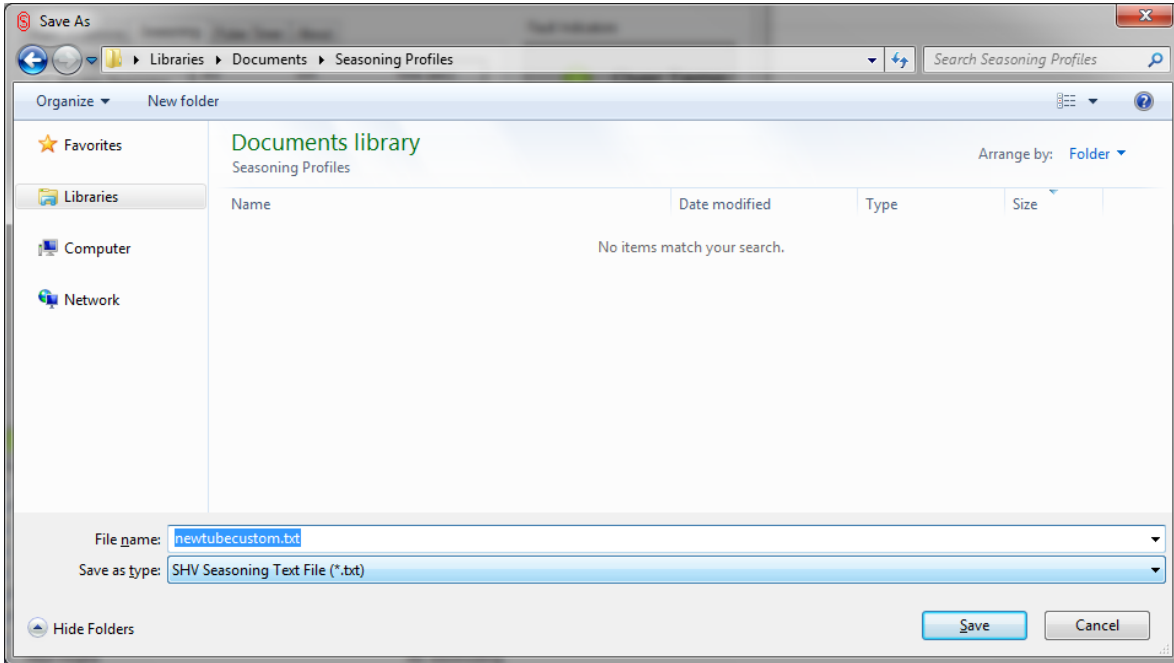
Figure 23: Save file dialog for saving a seasoning profile

c. To abandon the custom profile, you can either click *Clear Table* which will delete all entries, select one of the included tables which will overwrite the custom entries with the bundled ones, or load a previously saved profile which will also overwrite any values in the table. You may also simply ignore the values, as they have no bearing on the supply unless seasoning is started.

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

6.3.3.3 Loading and executing a previously saved profile:

1. Select *Load* and a file open dialog will appear. Use this dialog to navigate to and select the saved profile you wish to load. The software will attempt to read the file and if successful, the table will be populated with loaded values. Otherwise an error message will be displayed indicating the software could not read the file.

Figure 24: Load file dialog for loading a saved profile
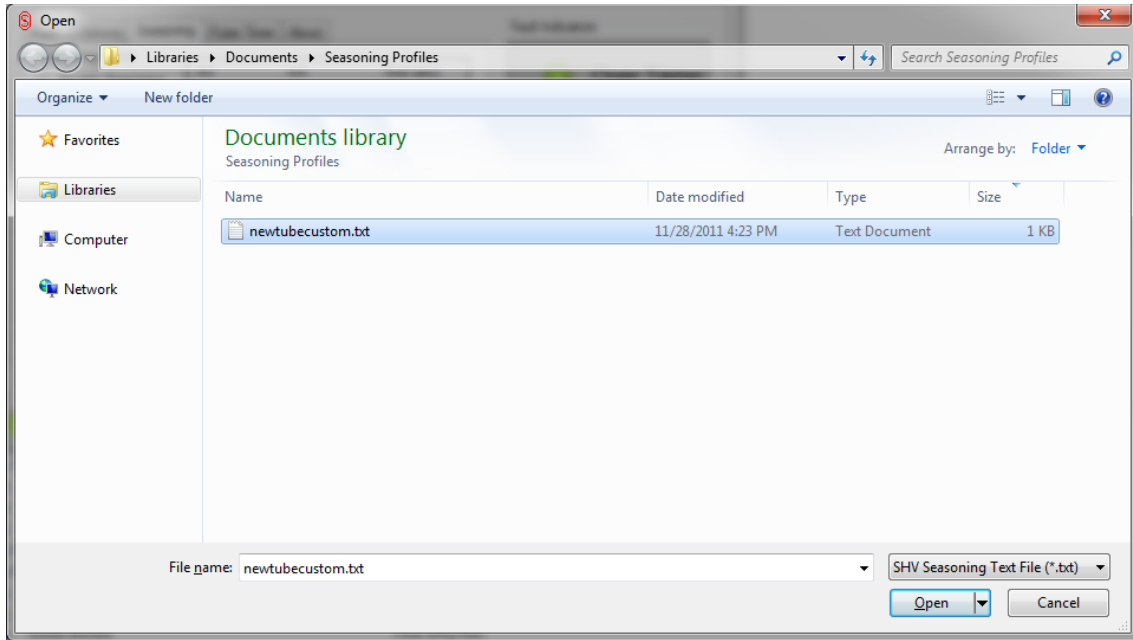
2. Once the table has been loaded, you can make changes to it as if it were any other custom profile, save them back to the same file or a new file if you like.

3. Once the profile is configured how you want it, click *Start Seasoning*, at this point the software will try to verify your table by ensuring each step has all needed parameters and they are all valid. If this succeeds, you will receive a High Voltage warning, (see Figure 22) indicating that continuing will cause High Voltage output to be enabled. Select OK to proceed, the HV output will be enabled and the first series of setpoints will be loaded. At this point the table will highlighted in red and yellow coloring, red for steps that have not yet executed, yellow for the step currently executing and green for steps that have been completed. The seasoning status indicators will also appear in the status bar as described in section 4.2.3 of this manual. (see Figure 23)

6.3.4 Seasoning by Firmware Page

This page works like the Seasoning page except that it uses seasoning profiles that are stored in the firmware of the system, not user defined at the time of seasoning.
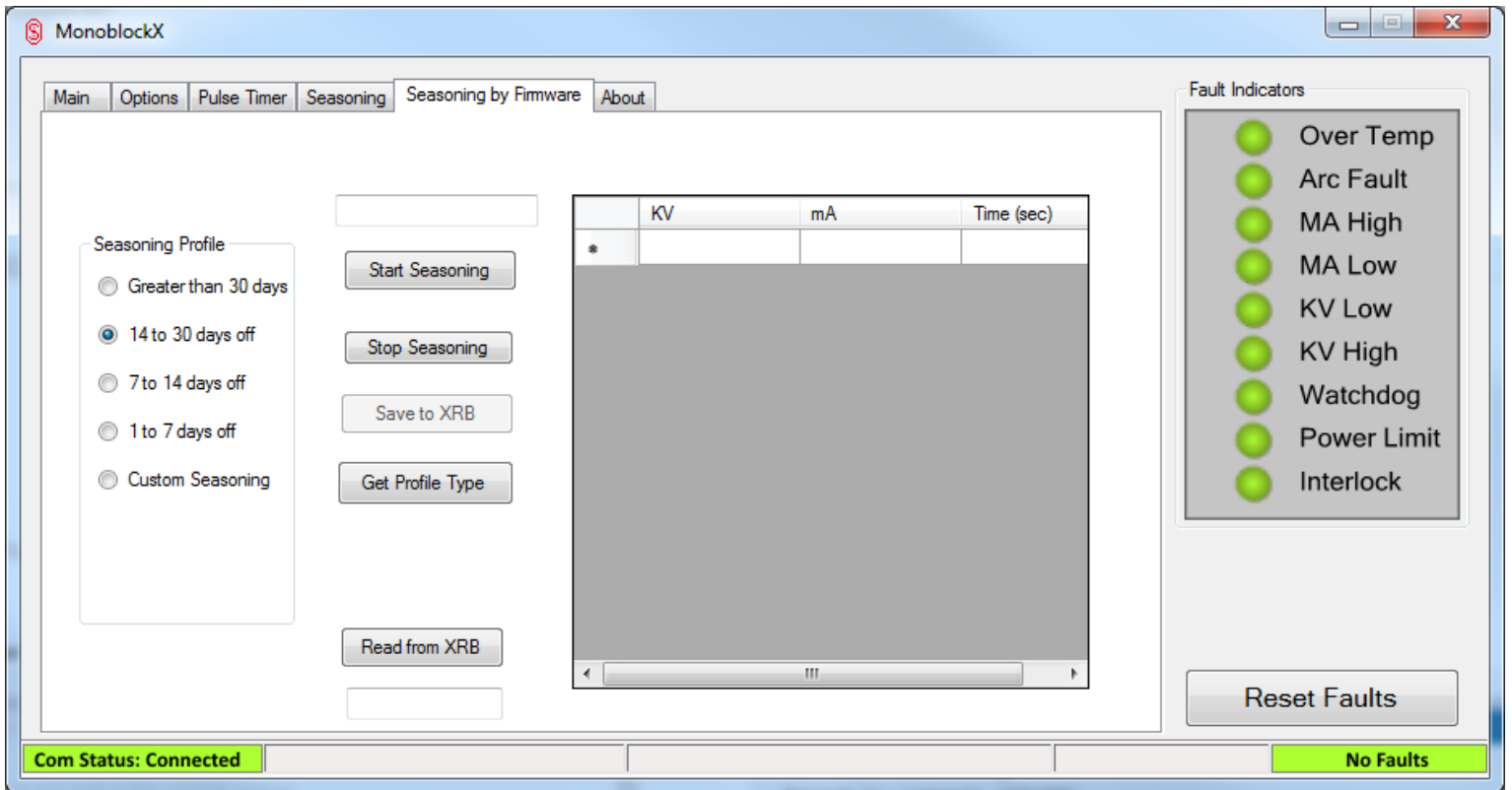
Figure 25: Seasoning By Firmware Page

6.3.4.1 Loading the current profile:

1. Click the "Get Profile Type" Button. This will query the firmware of the system to determine what current seasoning profile is loaded.
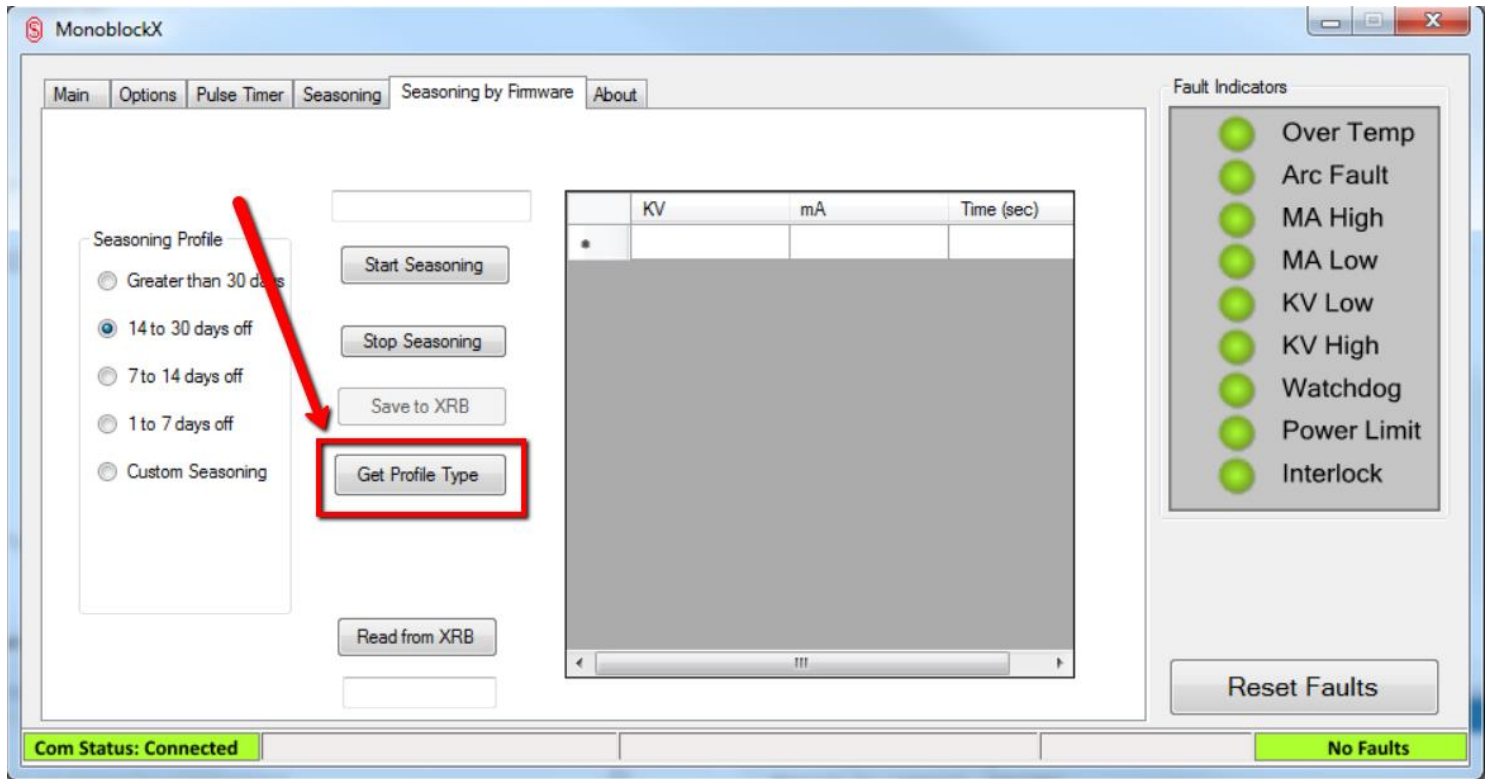

Figure 26: The Get Profile Button Reads the Firmware's Profile Setting

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

2. The Seasoning Profile that's currently selected in the firmware will be noted by the selected radio button on the left side of the screen.
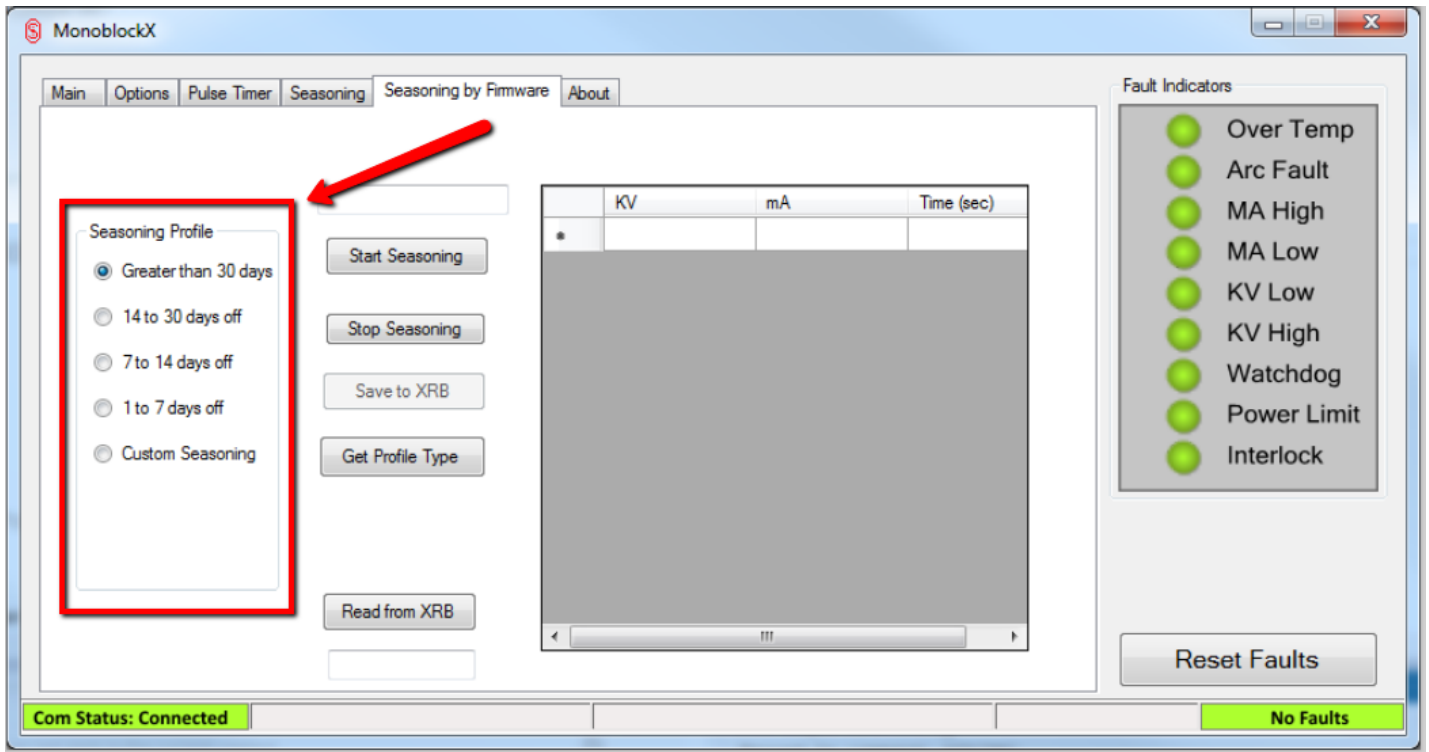
Figure 27: The Current Seasoning Profile Option Read from The Generator

3. To see the actual Seasoning Profile Values click the "Read from XRB" button. The GUI will query the firmware for all of the seasoning profile values and load them into the profile values section.
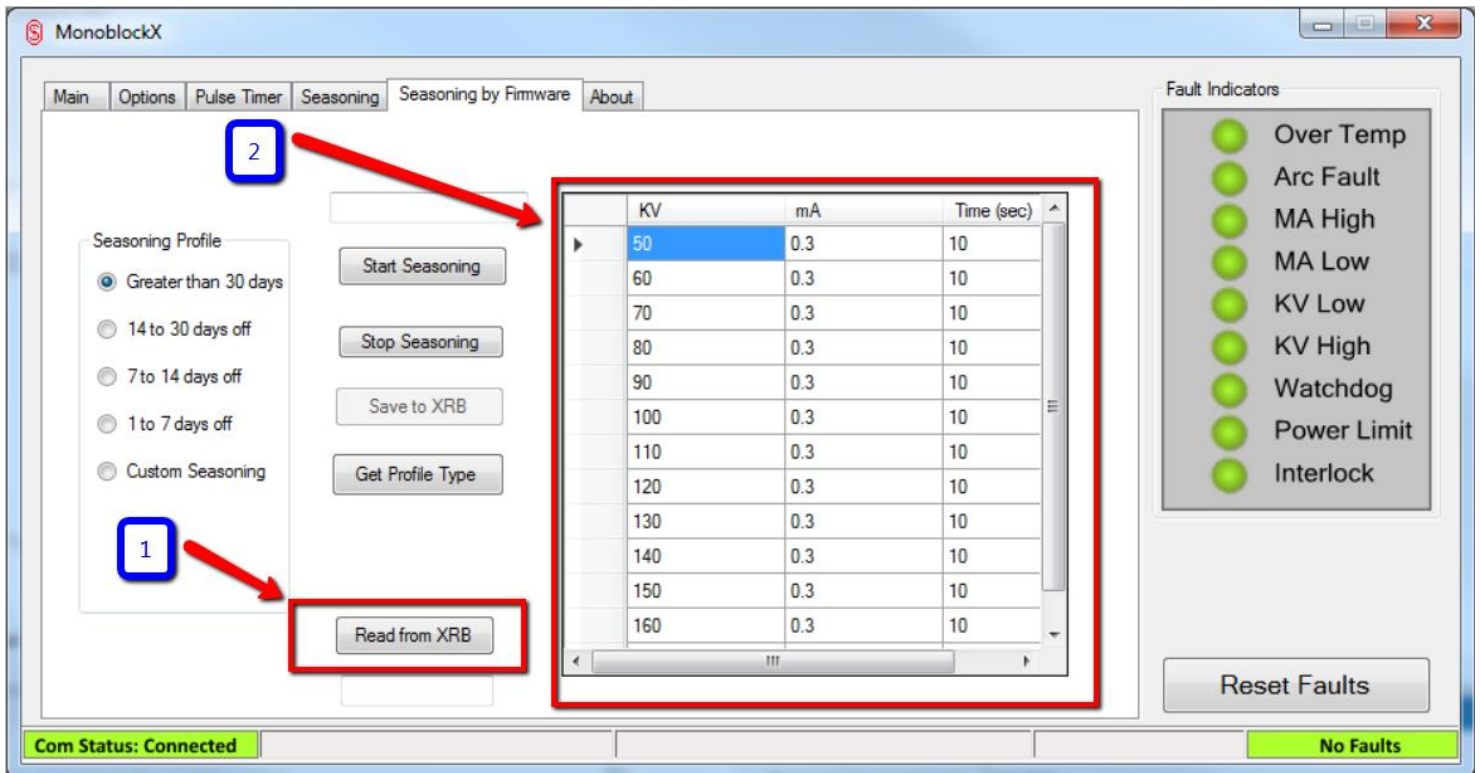
Figure 28: Current Seasoning Profile Read from Firmware

USA   CHINA   EUROPE   JAPAN   MEXICO

6.3.4.2 Using a Custom Seasoning Profile

1. You can also use and store a custom seasoning profile into the firmware. Click the "Custom Seasoning" Radio Button in the Seasoning Profile Options section.
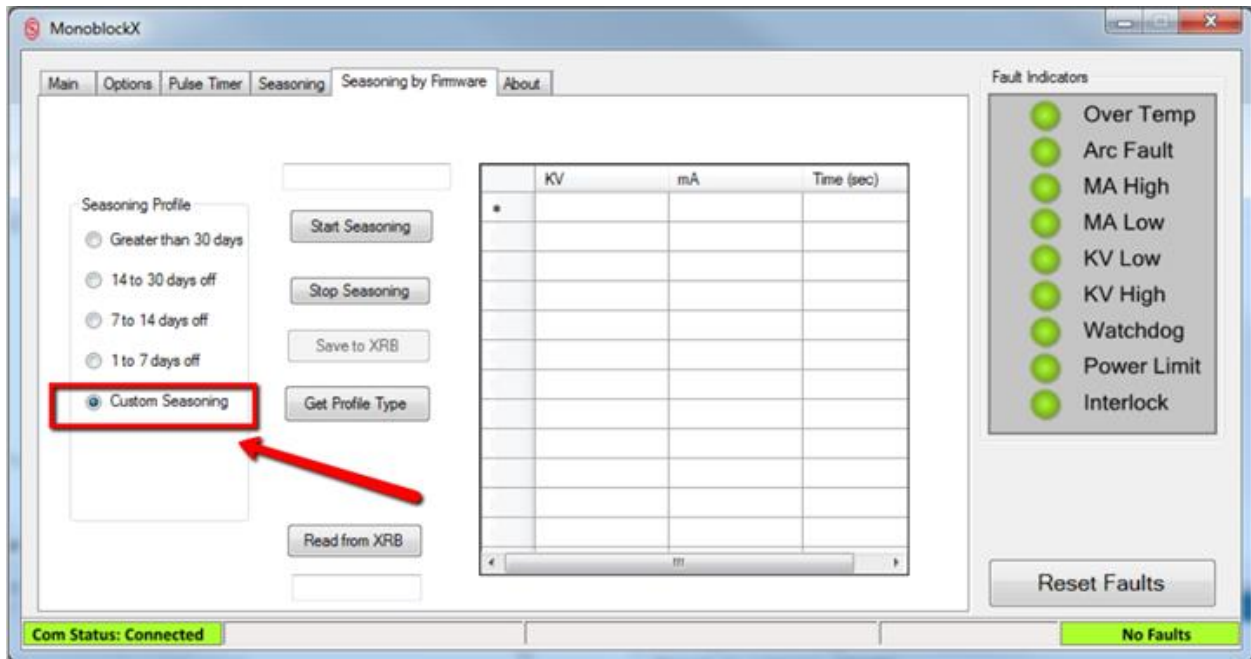
Figure 29: Custom Seasoning Profile Selected

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

2. Enter the values for your custom profile. Once all values are entered, click the "Save to XRB" Button. The GUI will proceed to send the custom values to the firmware.

Figure 30: Save to XRB Button

USA   CHINA   EUROPE   JAPAN   MEXICO

3. Once the GUI finishes saving the custom seasoning profile to the firmware you can continue to the seasoning step by pressing the "Start Seasoning" button.

Figure 31: Start Seasoning Button

6.3.5 Pulse Timer Page

This page has the controls for the Pulse Timer module; this timer allows the power supply to cycle between two configured states at specific time intervals for testing.
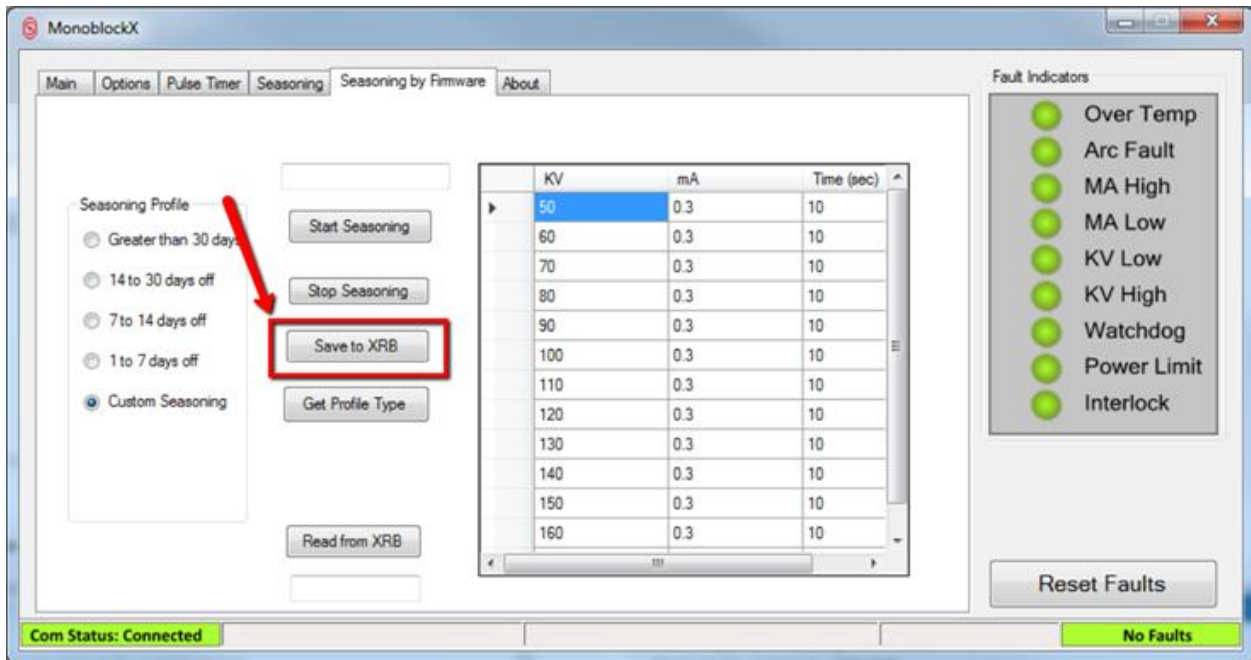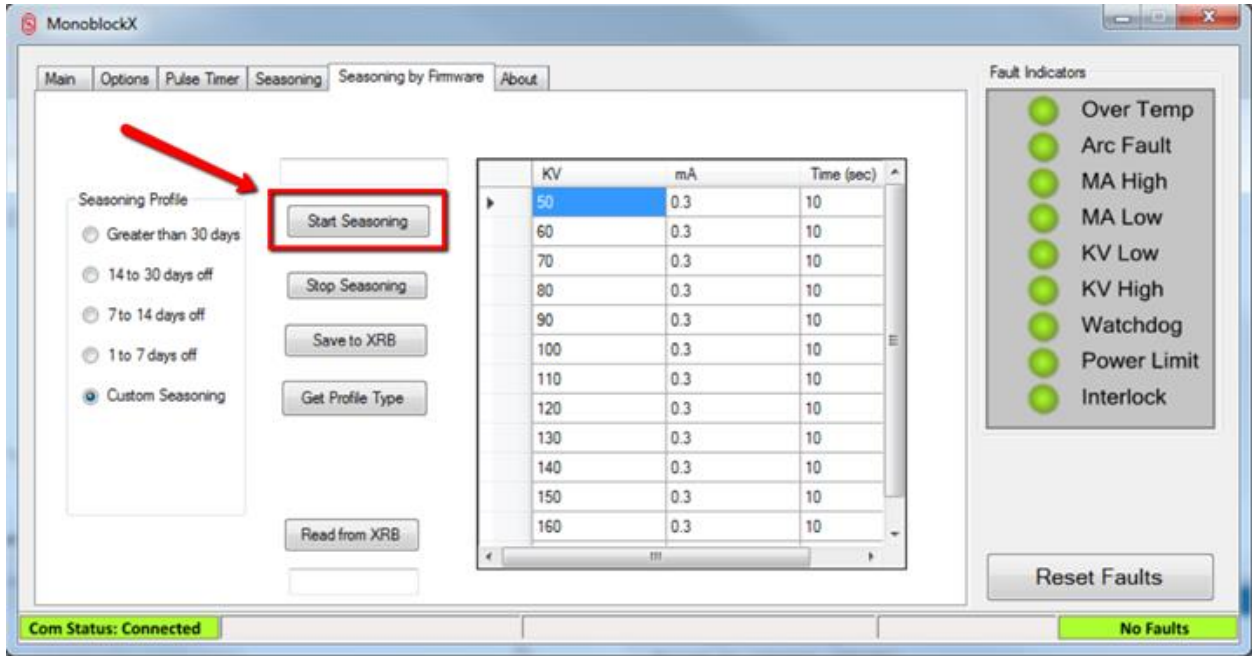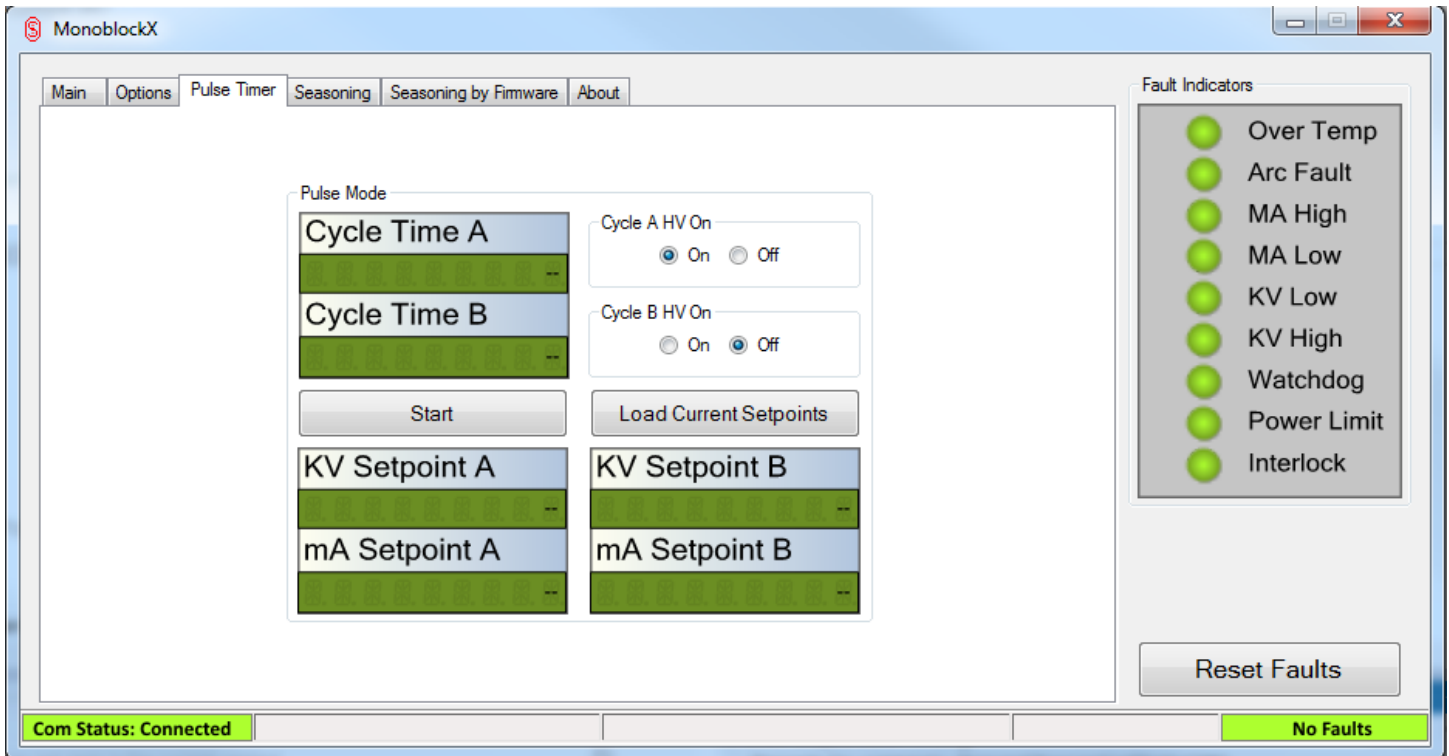

Figure 32: Pulse Timer page before configuration

Voltage, current and high voltage enabled settings are available for both cycles. The timer for each cycle has a 0.5 second resolution, with a minimum cycle time of 1 second for each. Initially the fields are unpopulated and must be configured for use. The *Load Current Setpoints* button will load the currently active voltage and current setpoints in to the A and B setpoint windows and set Cycle A to HV On and Cycle B to HV Off

6.3.5.1 *Example, use the pulse timer to turn the power supply on for 2 seconds and off for 3:*

1. Select the Cycle Time A field and type in 2.0 and press Enter, then select Cycle Time B field and type in 3.0 and press Enter.
2. Select *Load Current Setpoints* to load the current setpoints the power supply is using to the A and B setpoint fields. At this point, the timer should now be configured with the same voltage and current setpoints, but with opposite HV enable settings for each cycle, as shown is Figure 29.

Rev B
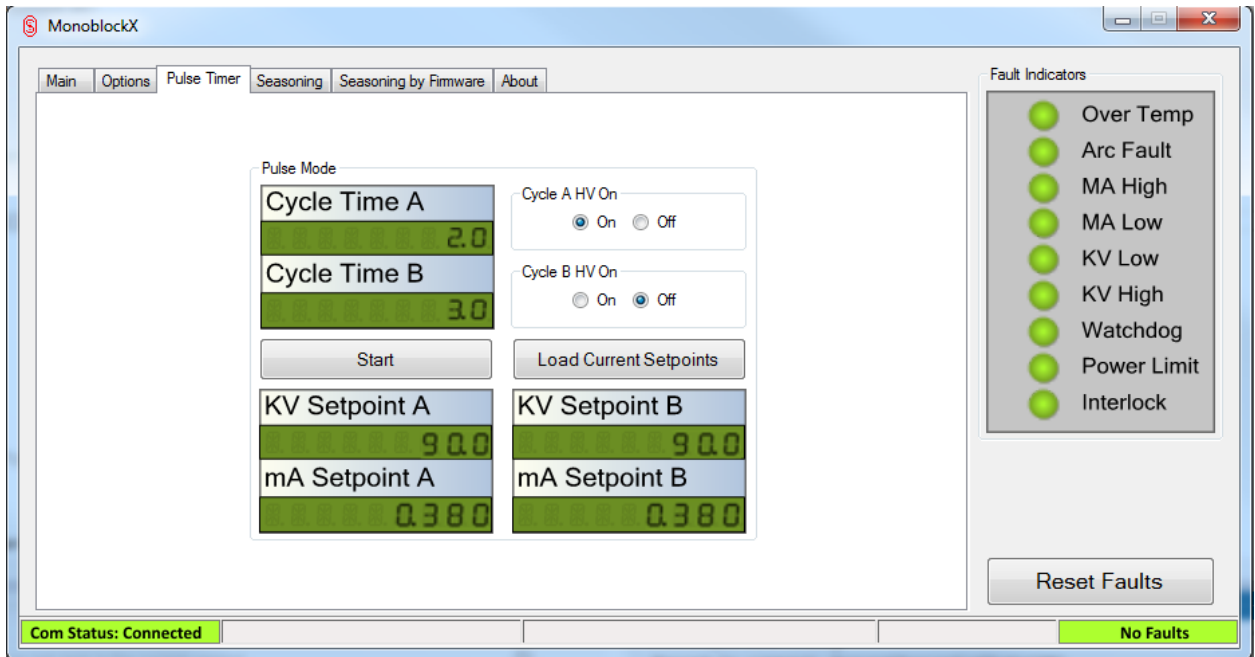
Figure 33: Pulse Timer configured for cycling supply on for 2 seconds and off for 3 seconds

3. Click *Start* the power supply will immediately be commanded to the Cycle A setpoints and HV state for 2 seconds, during which time the status bar will display "Cycle A", followed by "Cycle B" and the Cycle B setpoints and HV state for 3 seconds, then the sequence will repeat until *Stop* is clicked.

Figure 34: Status bar indicating cycle A and B during timer operation

Rev B

USA   CHINA   EUROPE   JAPAN   MEXICO

6.3.6 About page

Figure 35: About page showing all the system versions

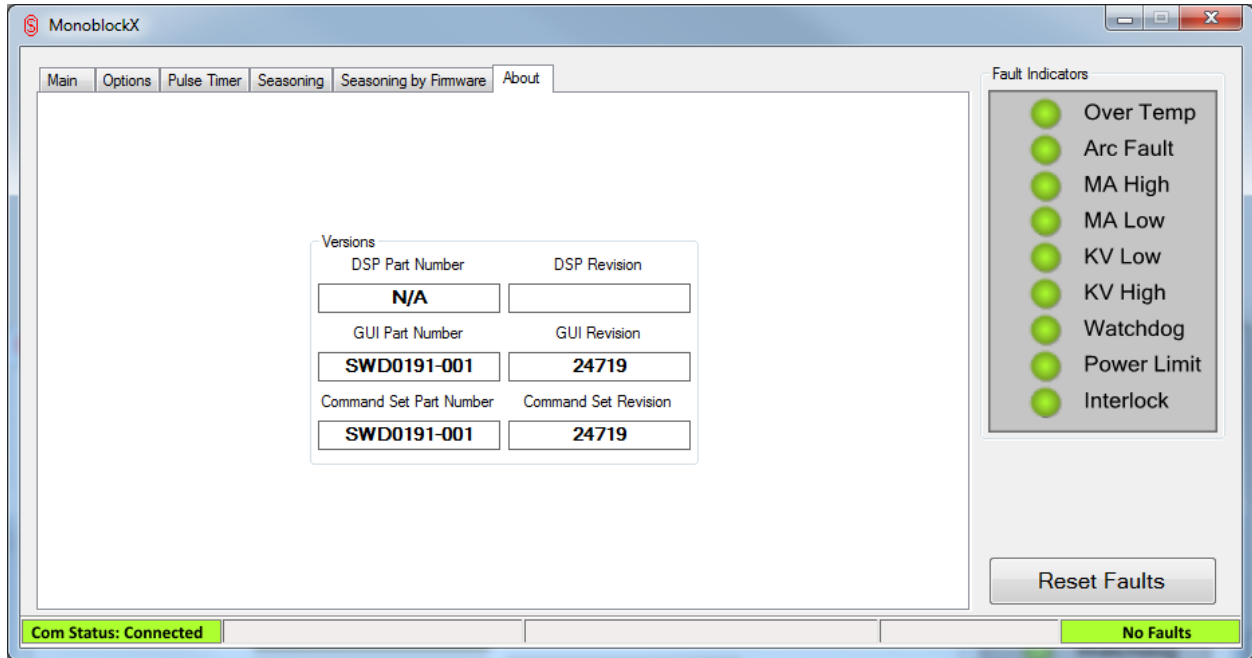This page displays all available version information about the software, the command set and the firmware on the power supply. The information available may vary between power supplies and command sets.

7 Troubleshooting

This section contains a list of common problems and possible solutions

7.1 Communications

- **Communication status says "Waiting…" and the power supply never connects:**
  - Check that the selected communication port, baud rate and parity match your power supply correctly. Settings for one supply may not automatically work for any other supply. If you are unsure of the correct settings for your power supply, contact Spellman High Voltage for assistance
  - Check that the serial cable connecting your device to the computer is in good working order and securely connected at both sides and that it is not a null-modem cable.
  - Note that some USB/Serial bridge adapters may not work well with the power supply, always use a native RS-232 serial port if available.
- **Power supply keeps shutting down with a Watchdog fault**
  - This means the communications watchdog is enabled on the power supply and must also be enabled on the GUI, this can happen if you are using different software to control the supply and switch to the Monoblock X software. If the watchdog is enabled and disabled on the Monoblock X software this will resynchronize the state to the software.
  - This can also indicate unreliable communications, make sure that the cable connecting the supply to the computer is in good condition and is firmly connected. This is indicative of an intermittent failure and communications may appear to work at a sluggish pace in this condition.

7.2 Seasoning

- **When trying to start seasoning or save a profile, the "Error verifying seasoning profile table. Please check your values!" message is displayed:**
  - This message indicates an invalid entry in the seasoning table, to resolve, check all entered values for blank spaces, or mistyped numbers.
- **During seasoning, seasoning stops abruptly with the message "HV turned off unexpectedly! Check system and click Start Seasoning to resume" and power output is disabled:**
  - This indicates that the power supply abruptly shut down without being commanded to. Check all interlocks and the fault indicators and correct any problems discovered. Once the system is cleared of problems and faults, click *Start Seasoning* to resume the profile.