PYREOS

Rev. 1.11

ezPyro™ Evaluation Tool

Software User Manual

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Please note: *the information contained in this document is subject to change without further notification.*

1 Introduction

This document covers the operation of the ezPyro™ Evaluation Tool software and should be used in conjunction with the **ezPyro™ Sensor Reference Manual**.

The software can be used to test up to four single-pixel sensors or one 2x2 array sensor. It enables you to optimise the sensor for a specific environment, observe signals in real time, and to experiment with register settings, optimising:

- Gain
- Filtering (HPF, LPF, Transconductance)
- Sample rate
- clk/sync for device synchronisation
- Interrupt enable / disable
- Wake Up (WUP)

Register settings can be saved to, and loaded from, a text file. Please refer to page 21 for details.

Please note: *this software is generic and can be used with any of the digital evaluation kits and development boards in this range. However, the evaluation kits also have type specific software which allows for a more in-depth analysis of the element that each kit has been developed for.*

2 Getting Started

2.1 Installing ezPyro™ Evaluation Tool

To install the ezPyro™ Evaluation Tool from the ezPyro™ Software folder on the supplied USB stick, open the ezPyro™ Evaluation Tool folder and run the setup application. The software is compatible with Windows 7, 8, & 10.

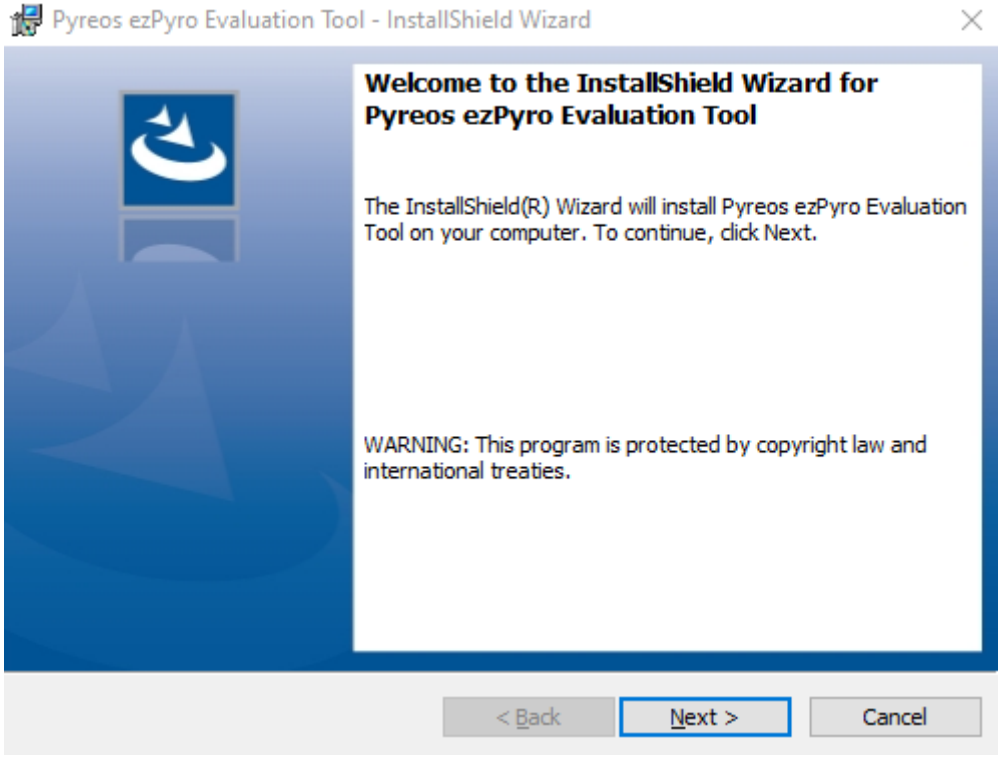

Figure 1: Evaluation Tool Install Shield Wizard

2.2 Launching the Software

1. Open the ezPyro™ Evaluation Tool from the **Start** menu of the connected computer. By default, the software launches in the 4-sensor single-pixel view. If a device has been connected before launching the software, go to step 4.

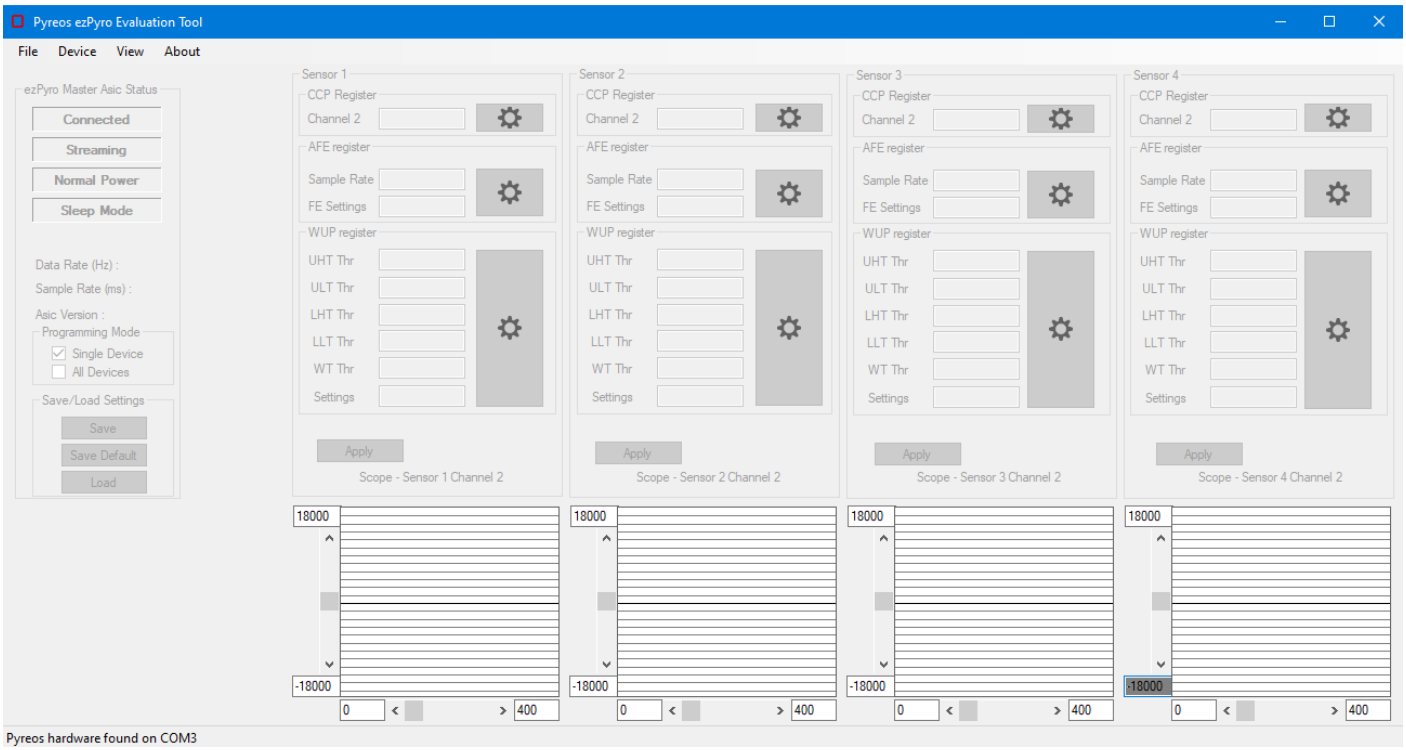

Figure 2: Multiple Single-Pixel Sensor View (Default) without a connected device

2. Connect the device to the PC.
3. The name of the device appears in the *Device* menu. Click on the device to complete the connection.

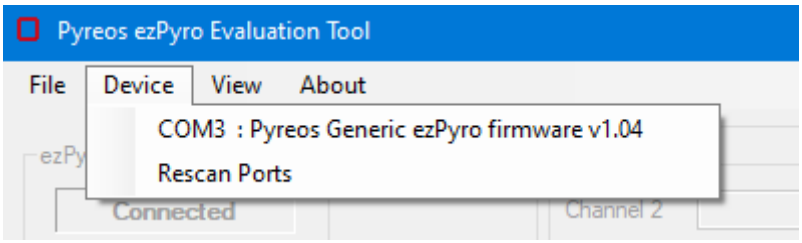

Figure 3: Connect to device

4. If no device appears in the list, or the device is plugged in after the software is opened, select **Rescan Ports** from the *Device* menu.

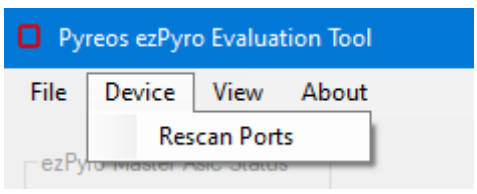

Figure 4: Connected to device

5. A warning message "*Master device has no channels enabled*" is displayed. This implies no data will be streaming as the **clk** and **sync** outputs of the master will be inactive when no data is being recorded. No data will be streamed until the channels have been enabled on the master (by default, Sensor 1 is the master, but this can be changed in the AFE register settings).

Note: *This message is not displayed if the sensors have been used previously or if a default configuration file exists.*

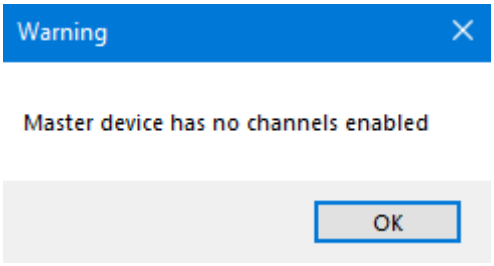

Figure 5: Device Connected - no channels active

6. Click on the **OK** button.

Note: *There can only be one master device for surface mounted devices. If there is more than one master, then the slaves receive multiple clock and sync signals, and this causes interference in the slave output resulting in a noisy signal.*

3 4-Sensor Single-Pixel View

With four sensors connected to the backplane board the following window is displayed.

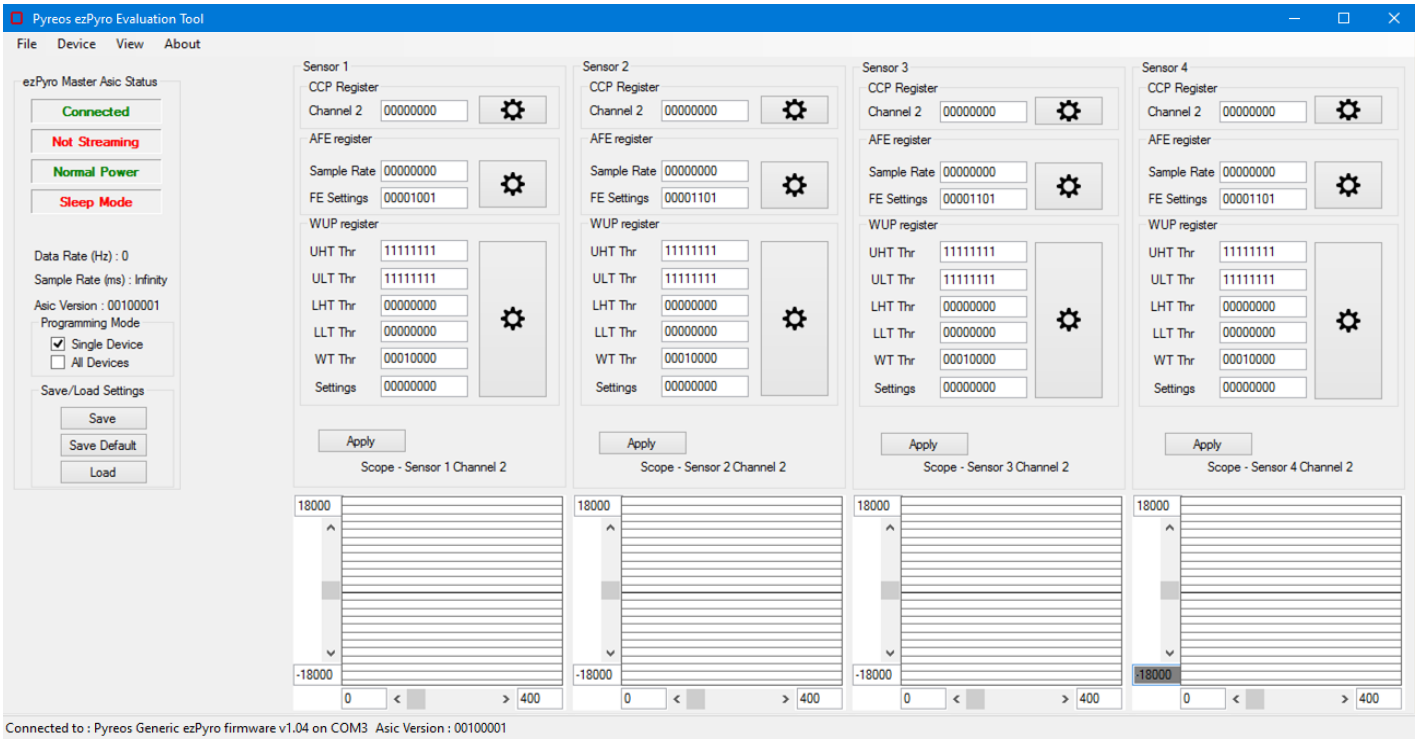

Figure 6: ezPyro™ Evaluation Tool window before sensors have been enabled

1. Input values as required into the CCP register(s) for the sensor.

Note: *These textboxes represent the bits of the registers. The input must be zeroes and ones (binary characters) and will be interpreted as a byte regardless of how many characters have been input. For example, 111 is interpreted as 00000111. Entries are treated as the least significant bits of the whole byte.*

When changing registers directly please refer to the sensor reference manual; this explains the meaning of each bit in the registers.

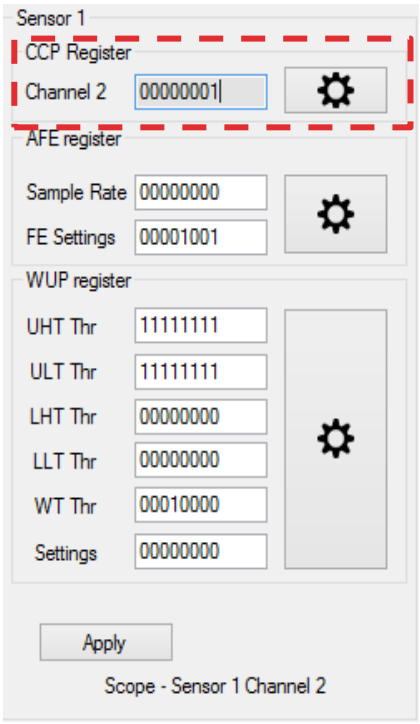

Figure 7: Changing CCP Register settings directly

Note: *Any change to a register setting is not implemented until the Apply button has been clicked. If a new setting has not been applied it is shaded grey, as shown in* Figure 7.

2. Click on the **Apply** button for the sensor. Check that a signal is displayed.

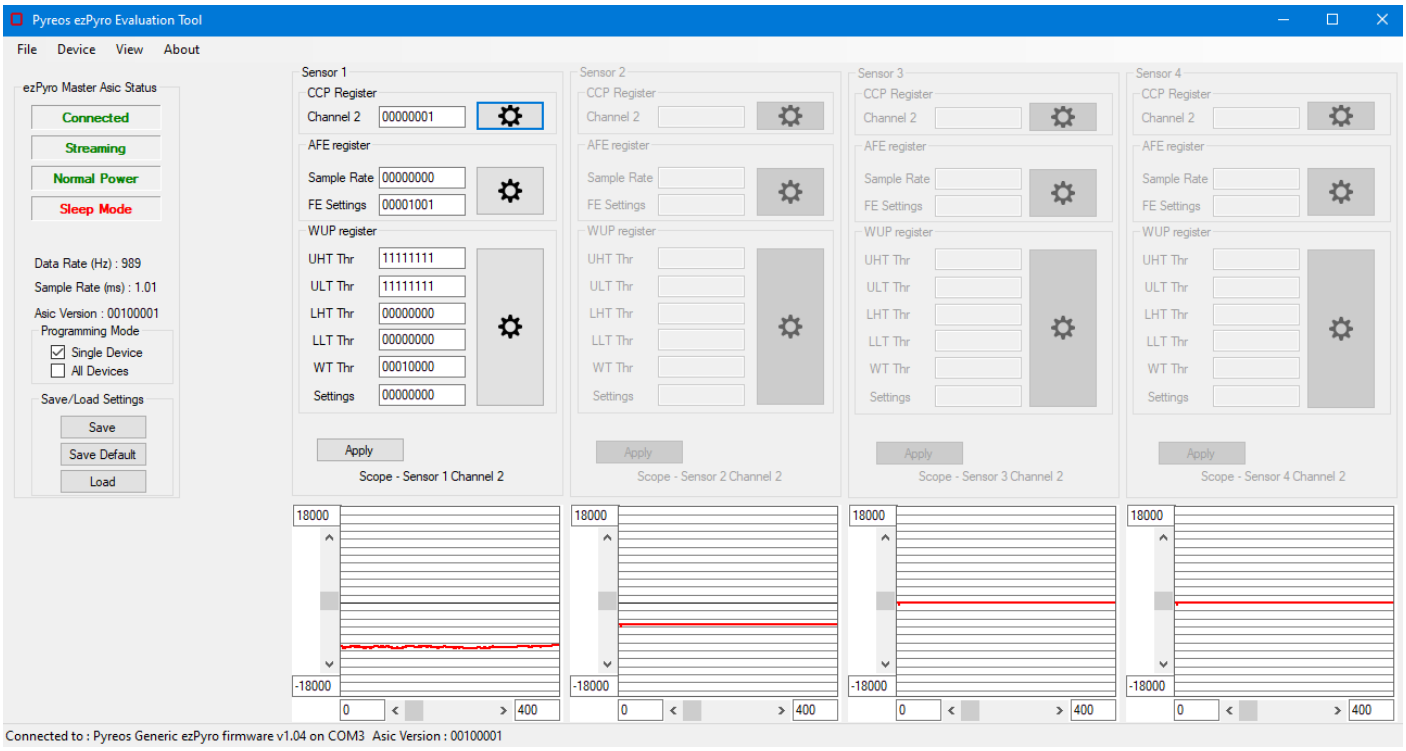

Figure 8: Changing CCP Register settings directly - No Saturation

3.1 Sensor Configuration Settings

For more detailed information about the CCP, AFE or WUP settings, click on the cogs adjacent to the register settings. Changes are not implemented until the **Apply** button has been clicked. If a modified text field has not been applied, the box is shaded grey.

Note: *Please refer to the ezPyro™ Sensor Reference Manual for information about these registers and their settings.*

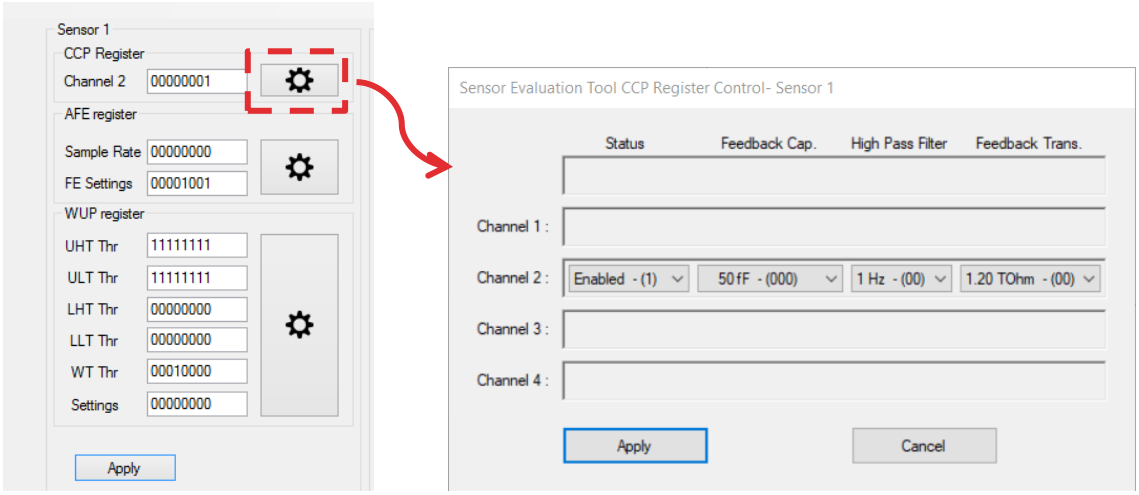

Figure 9: CCP Cog Single-Pixel Sensor view Sensor 1

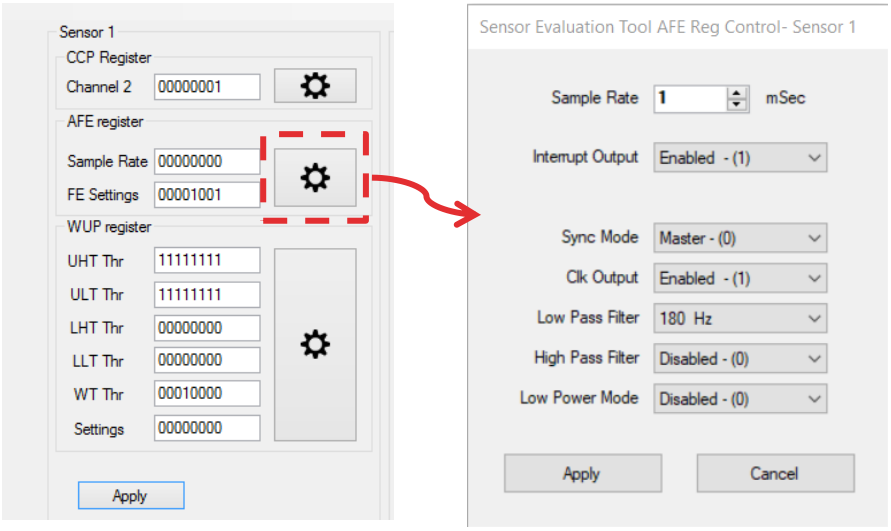

Figure 10: AFE Cog Single-Pixel Sensor view Sensor 1

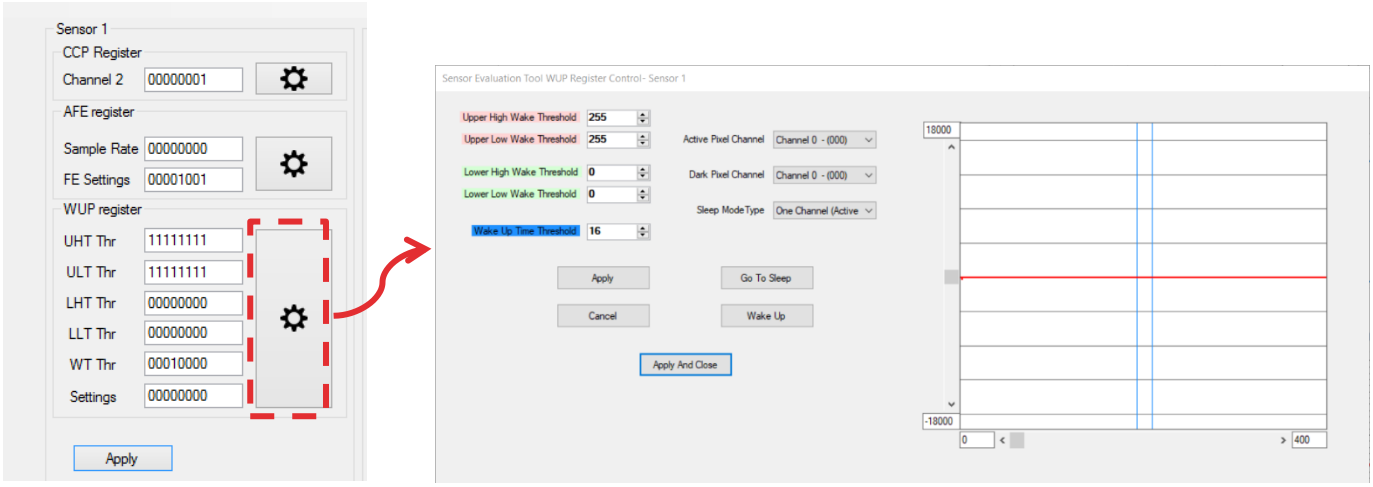

Figure 11: WUP Cog Single-Pixel Sensor view Sensor 1

3.2 Saturation

Sometimes when the device is first started it will saturate for a time before it settles. This can take up to 10 seconds to stop. Typical saturation events are shown in Figure 12. If the sensors are uncovered, and the gain and transconductance setting are set to maximum, signal saturation due to air flow is likely.

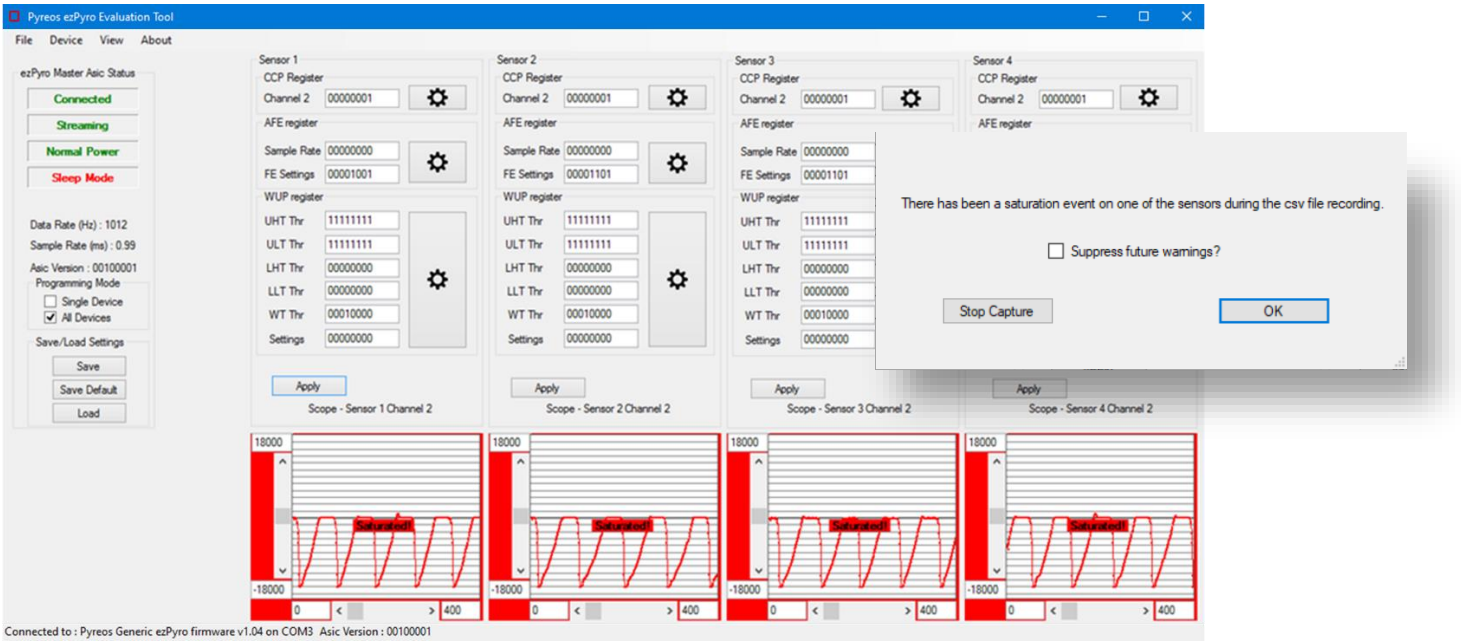

Figure 12: Changing CCP Registers directly – Saturation and Warning message for CSV capture

If saturation occurs during a csv file writing operation (see insert above), a warning dialog is displayed. Click on the **Stop Capture** button to cancel the recording of data. The dialog also offers the option to suppress the saturation warning message in future.

When a saturation event occurs 'Saturation Occurred ', is added to the file name and the saturated values are changed to 65535 in the appropriate data column. This ensures that the event is easy to identify when viewing files. It also allows any analysis to be easily accomplished without having to do any pre-processing of the data.

3.3 Multiple Sensor Single-Pixel Views

The ezPyro™ Evaluation Tool detects sensors when the device is connected to the PC and adjusts the display accordingly.

Note: *Sensors must be connected in numerical order. For example, if you want to use two sensors ensure they are placed in positions 1 and 2.*

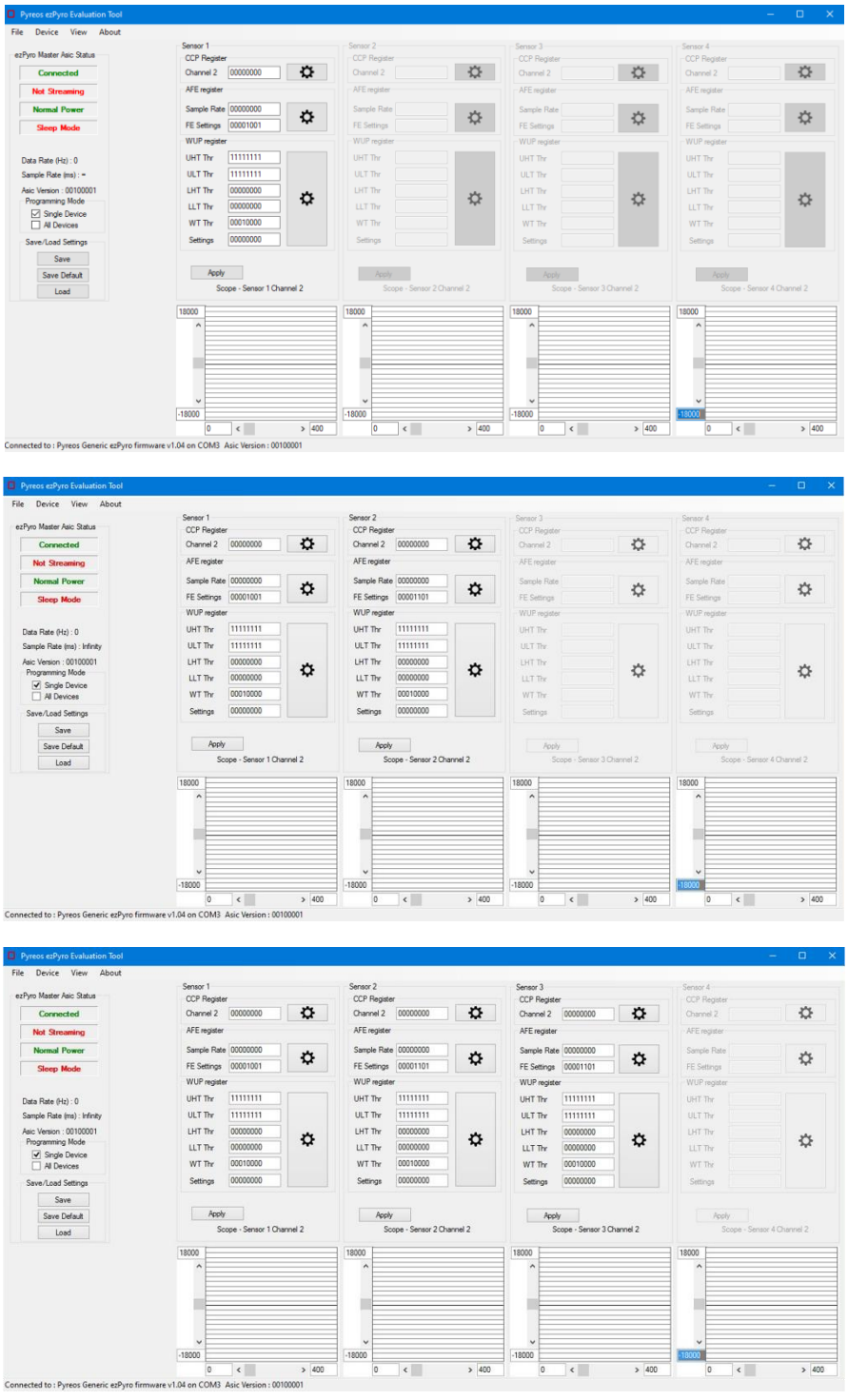

Figure 13: 1 (top), 2 (middle) and 3 (bottom) sensor single-pixel views

3.4 Programming Modes

By default, **Single Device** programming mode is selected. In this mode the settings for all sensors can be set independently. To apply the same register settings on all the devices, select the **All Devices** check box. In this mode, if the settings for any of the sensors are changed then the setting for all other sensors are also changed.

For example, clicking **Apply** for sensor 2, after making changes to sensor 2, will apply the changes to all the sensors. Clicking **Apply** for any of the other sensors will update all the sensors to the settings of that sensor, not the changed settings of sensor 2.

This does not apply to the master/slave bit, as only one sensor can be the master. Single device mode must be used to change the master to a different device.

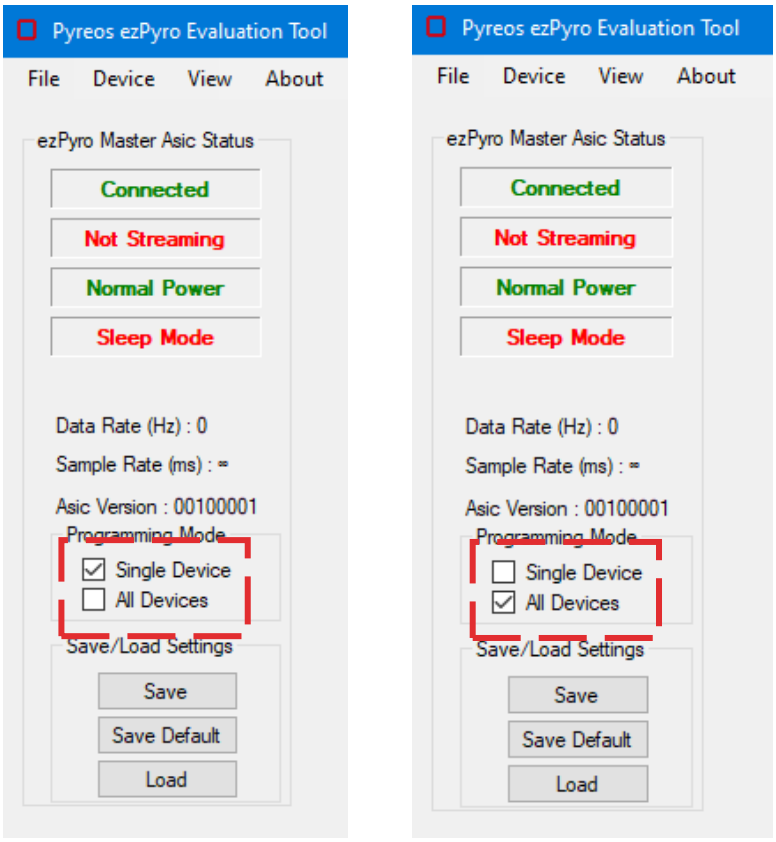

Figure 14: Single Devices and All Devices programming modes

If one of the configuration cogs is clicked while **All Devices** mode is active, **Single Device** programming mode is set automatically. Apply changes to the configuration form (see page 8) as required. To apply these changes to all sensors, select **All Devices** and then click the **Apply** button for the sensor.

3.5 Saving and Loading Settings

Click on the **Save** button to save the current settings for all sensors. To restore settings saved previously, click on the **Load** button, and then browse to the required file.

4 Single 2x2 pixel view

When the software starts, it displays a set of registers for each connected device (up to four). With a 2x2 array sensor (a single device incorporating 4 pixels) connected, the Sensor Evaluation Tool initially displays only one set of registers, the same as when one single pixel device is connected.

To display registers for each channel in the array, select **Single 2x2 Array Sensor View** from the *View* menu.

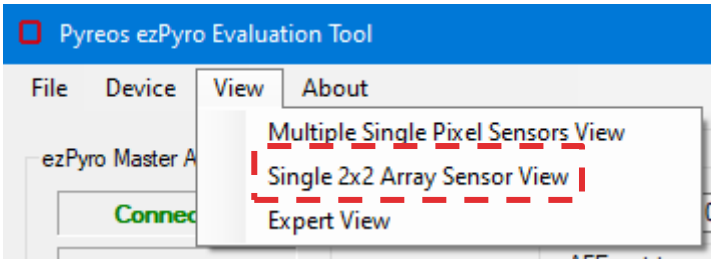

Figure 15: Single 2x2 Array Sensor View

In *Multiple Single-Pixel Sensors View*, the pixel is always attached to channel 2. In *Single 2x2 Array Sensor View, however*, the text above each scope states which channel is being displayed.

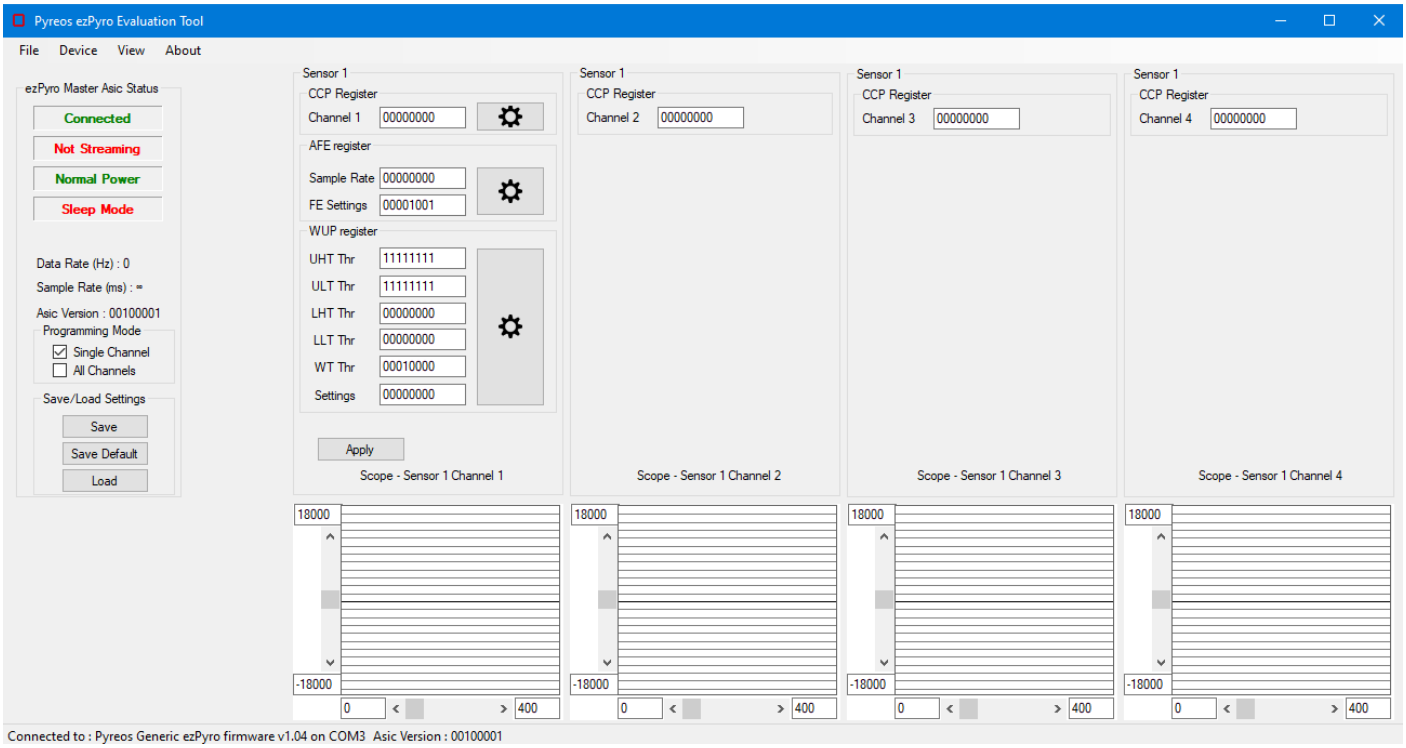

Figure 16: Single 2x2 Array Sensor View in Single Channel programming mode

In this view, the available programming modes are **Single Channel** or **All Channels**. With **Single Channel** selected, the register boxes for channels 2, 3 and 4 are active allowing each channel's settings to be changed independently of the others.

With **All Channels** selected, the register boxes for channels 2, 3 and 4 are greyed and disabled with the settings from Channel 1 applying to all channels. Click on the **Apply** button to confirm any changes to the register settings.

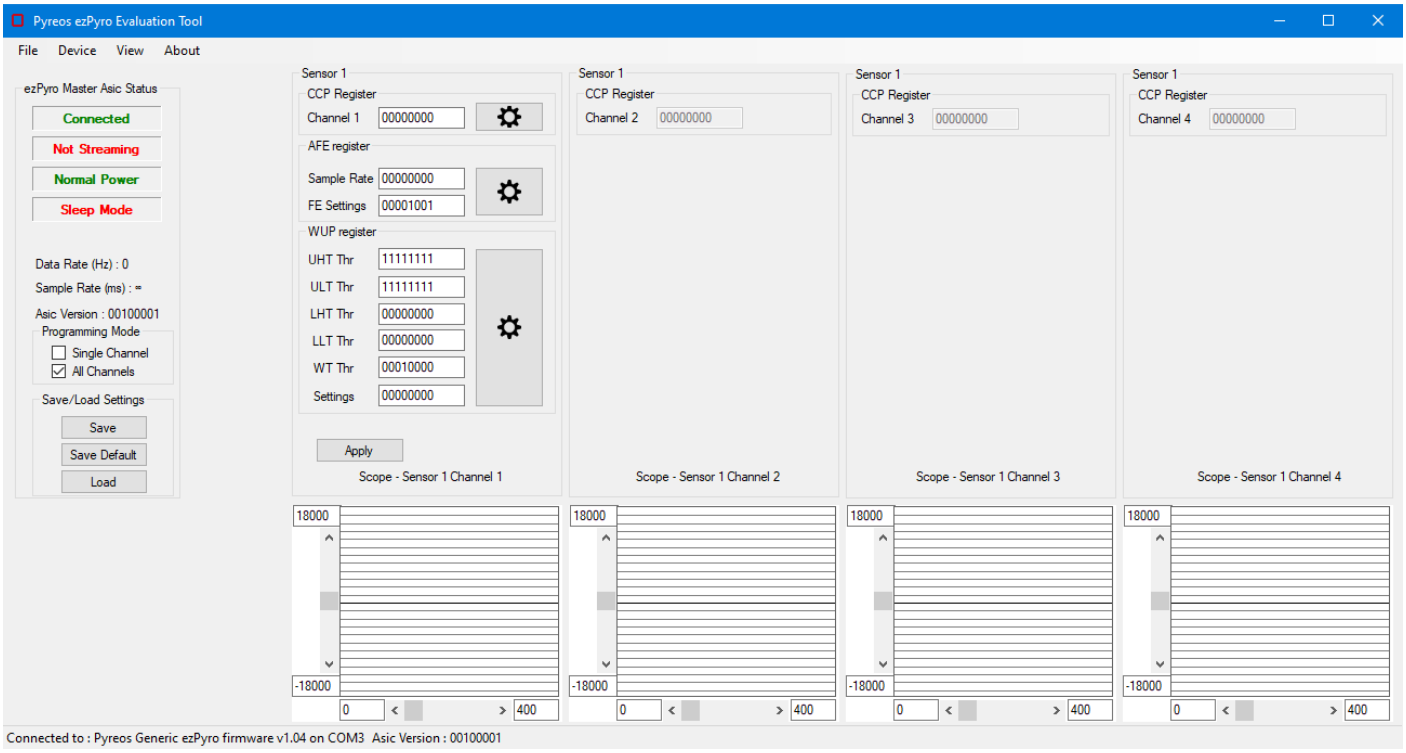

Figure 17: Single 2x2 Sensor View - All Channels programming mode

4.1 Register Control Settings

Click on the 'cog' adjacent to the CCP Register settings to display the Register Control dialog box. If **All Channels** mode was enabled, **Single Channel** programming mode is disabled, and the registers can now be programmed independently. In Single Channel programming mode, only Channel 2 settings are displayed, and these apply to all four sensors.

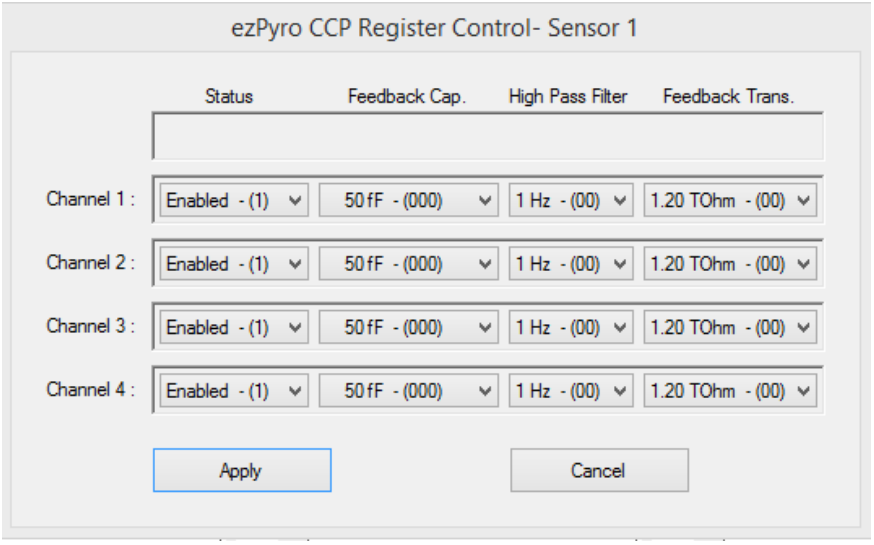

Figure 18: Single 2x2 Sensor View - CCP Register Control dialog box

5 Expert View

For a more detailed view of the sensor and additional options select **Expert View** from the *View* menu.

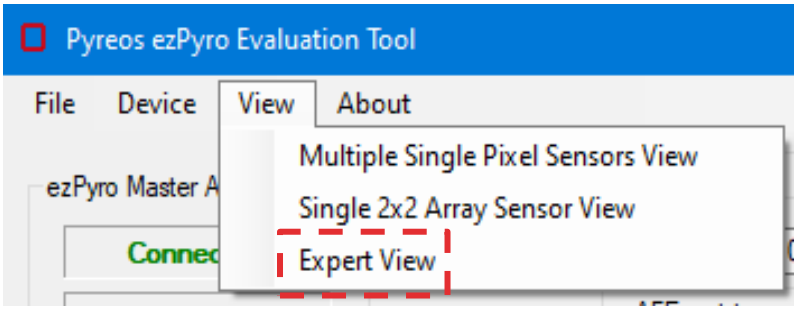

Figure 19: Opening Expert View

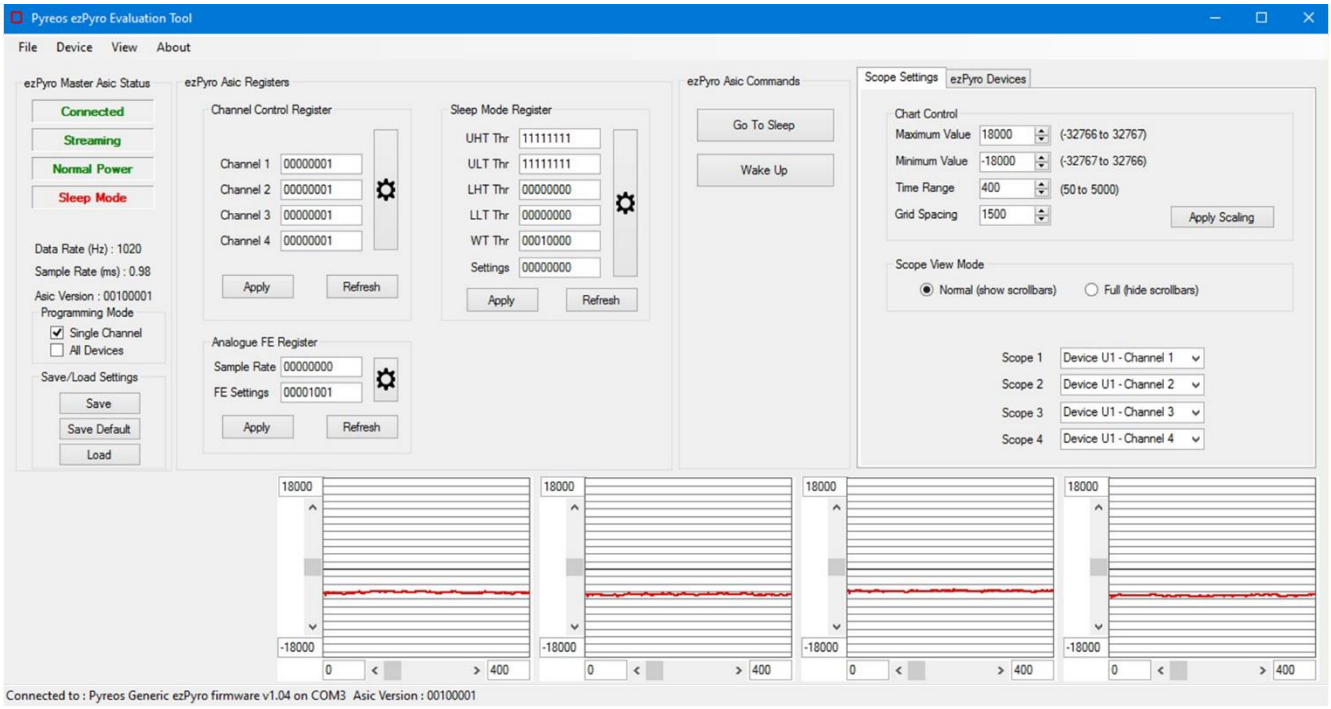

Figure 20: Expert View

Use **Expert View** to put the device into Sleep Mode, edit the scopes and assign device channels to them, and to control an emitter, if one is connected. The emitter controls are always displayed even if no emitter board is connected (there is no feedback from the board for the software to ascertain if a connection is present).

There are two tabs: *Scope Settings* and *ezPyro™ Devices.*

5.1 Sleep Mode

Use the ezPyro™ Evaluation Tool to put a device into Sleep Mode. However, the software does not allow the device to subsequently be forced to wake up. It is therefore important that the Sleep Mode WUP registers are manually set to values that allow a wake-up condition to be met before the device is put into Sleep Mode. Please refer to the sensor reference manual for details.

To put a device into Sleep Mode, click on the **Go To Sleep** button.

5.2 Wake Up Settings

For valid wake up settings, the UHT and ULT cannot be set to the same value, the LHT and LLT cannot be set to the same value, and the thresholds cannot be set to the maximum and minimum values. The WUT threshold must be set to at least the minimum number of samples.

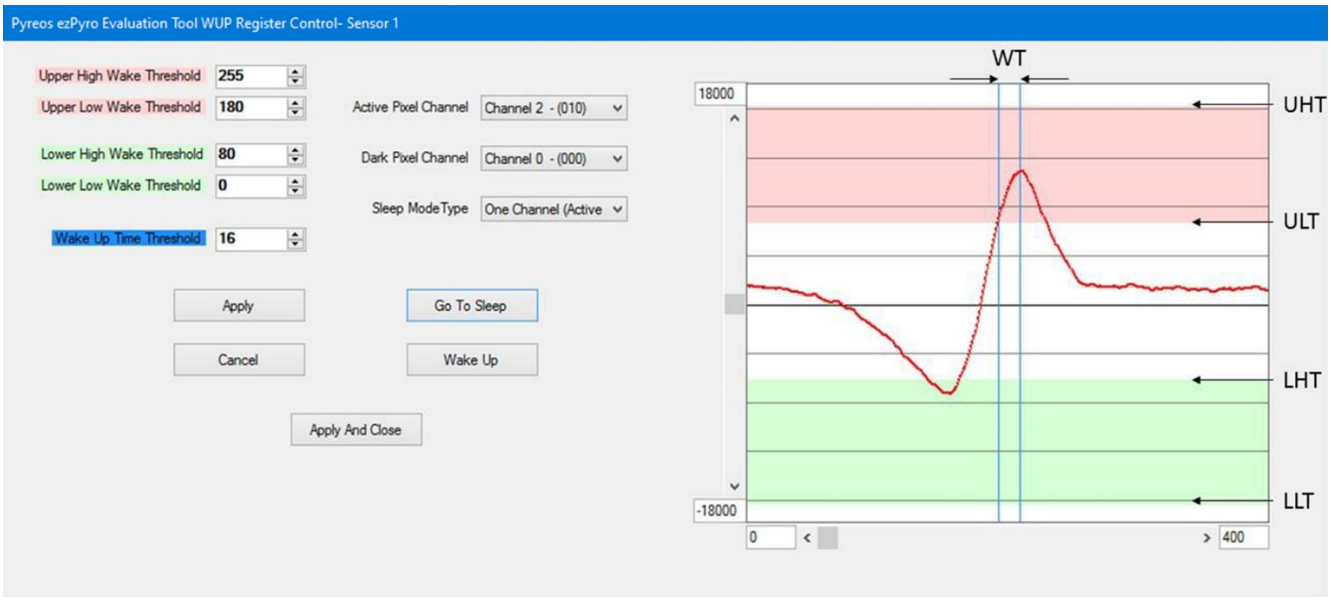

Figure 21: Valid LHT, LLT, UHT and ULT settings

If these conditions are not met, the following warning message is displayed.

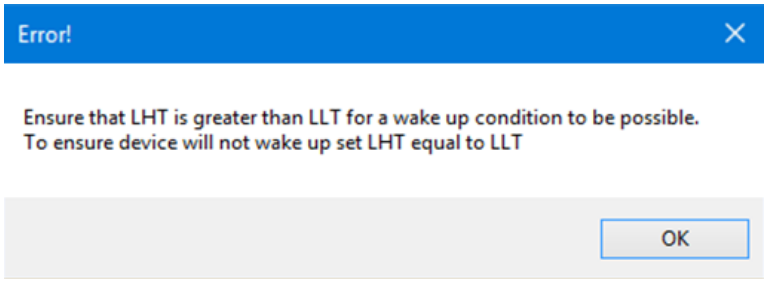

Figure 22: Wake up settings warning message

5.3 Scope Settings

Use the *Chart Control* settings to configure the X and Y scales and grid spacing on the four scopes. Select the channels to be displayed by the four scopes using the *Scope 1, Scope 2, Scope 3,* and *Scope 4* dropdown boxes.

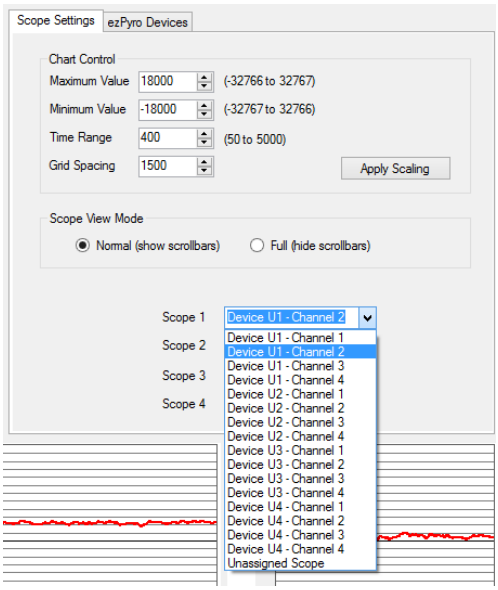

Figure 23: Scope Settings showing the dropdown device list for Scope 1

5.4 Sensor Devices

This tab shows the Emitter Control settings. The graphic on the right-hand side shows which of the devices is currently active and editable on the tab. The active registers are shown in green. Click on another device (for example, U4) to update the tab with that device's register settings.

Figure 24: ezPyro™ Devices tab in Single Device programming mode with U1 (left) and U4 (right) settings selected

By selecting the **All Devices** programming mode, all the sensor graphics are coloured green and the text boxes display the last individually selected device.

Figure 25: ezPyro™ Devices tab – All Devices programming mode

5.5 Register Control in Expert View

Figure 26: CCP Register- Detailed View

In Expert View, the Register Control dialog boxes (displayed by clicking on the 'cog' buttons) display descriptions of the registers in the same way, except for the CCP Register. This is because the single-pixel sensor view is designed for sensors with a single-pixel. Therefore, most of the CCP registers are not required. However, in Expert View no assumption is made about pixel numbers and the additional registers are displayed.

6 Saving Data to CSV file

To save data, select **Save to CSV** from the *File* menu.

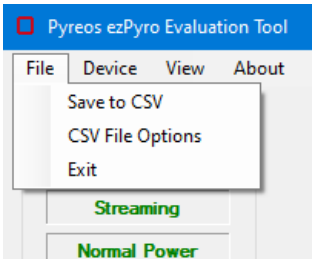

Figure 27: Save to CSV

The *Capture Data to CSV File* dialog box is displayed.

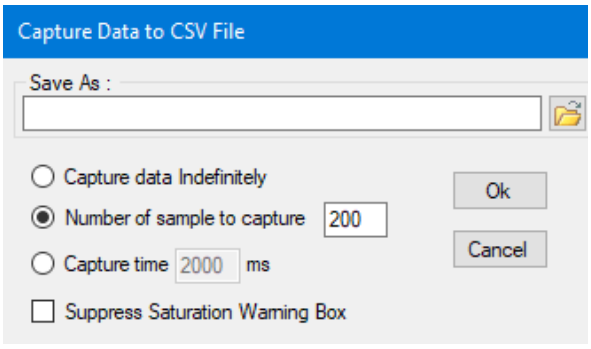

Figure 28: Save to CSV clicked

Enter the full address path to which the file should be written or browse to the required folder. By default, files are saved to the *Pyreos* folder if it exists or *Documents* if it does not. The *Pyreos* folder is created automatically in the Documents folder the first time the user saves a configuration file.

Choose options for the way data is to be captured. The options are to:

- **Capture data indefinitely**: save data until **Stop CSV Capture** is selected from the *File* menu.
- **Number of Samples to capture**: save a specific number of samples according to the sampling rate set in CSV File Options.
- **Capture time xxxx ms**: record data for a set time interval (in milliseconds).

6.1 Data Sampling Rates

1. Choose **CSV File Options** from the *File* menu to set the timing interval for data sampling.

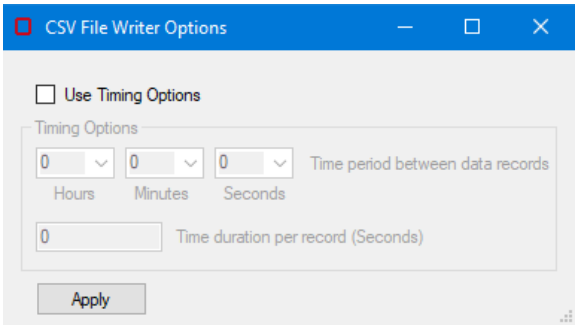

Figure 29: CSV Options Clicked

2. Select the **Use Timing Options** checkbox.

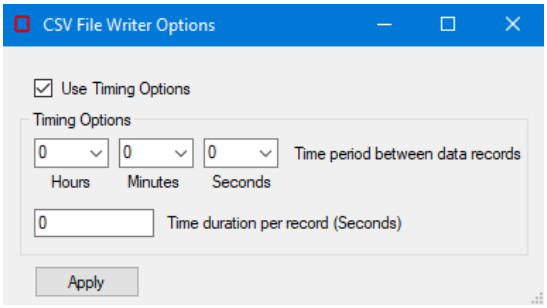

Figure 30: Enabling CSV Options

3. Input values for:

- **Time period between data records**: the delay between consecutive data samples
- **Time duration per record (Seconds)**: the time of each record.

WARNING: *The duration of each record cannot be greater than or equal to the delay between consecutive records.*

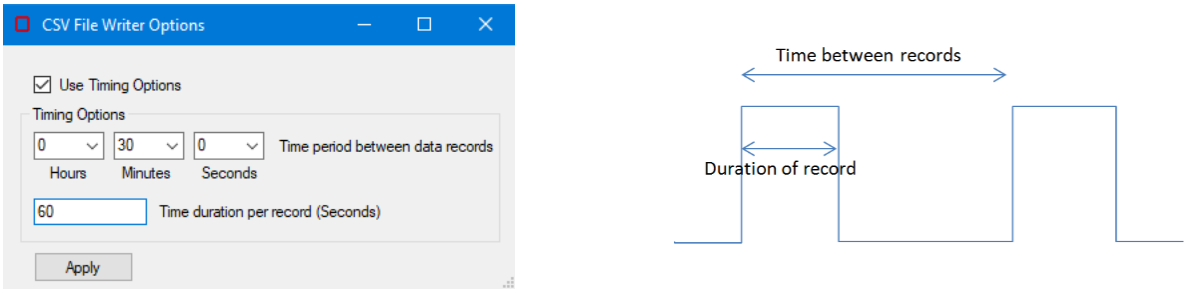

Figure 31: Applying data sampling times

4. Click on the **Apply** button.

Invalid timing options result in a warning message being displayed. If this occurs, correct the settings, and reapply.

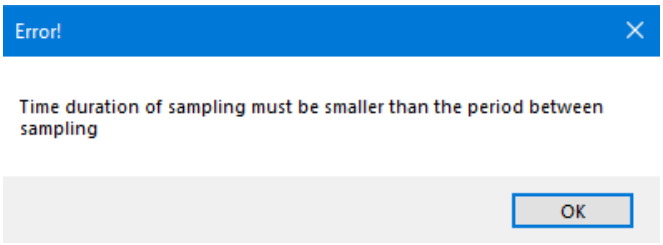

Figure 32: CSV Options error message

7 Saving and Loading Configuration Files

There are two options for saving the current settings in configuration files:

- **Save**: create and save the configuration in a text file in any location (*Documents\Pyreos* if unspecified).
- **Save Default**: as above, but also create or overwrite the default configuration file applied whenever the software initially connects to a device. This file has the name "default.txt' and is located in the *Documents\Pyreos\ezPyro Evaluation Tool* folder.

7.1 Saving Settings

To save the current set of register settings for future use:

1. Click on the **Save** button.

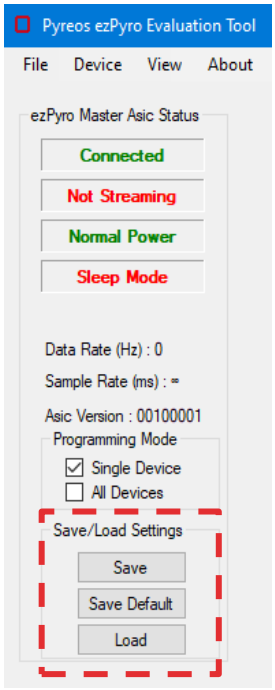

Figure 33: Save and Load buttons

2. A *Save As* dialog box is displayed. By default, files are saved in a folder called *Pyreos* in the *Documents* folder.

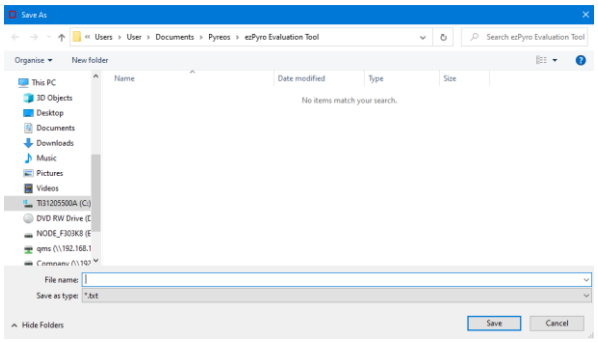

Figure 34: Saving Settings

3. Enter a suitable file name for the settings. The settings file is saved as a text file (TXT extension).
4. Click on the **Save** button.

7.2 Saving the Default Configuration

Click on the **Save Default** button to update the default configuration used by the software. You are given the option to save the configuration under another filename as described in the previous section. When confirmed, a second version of the configuration is saved as "default.txt' in the *Documents\Pyreos\ezPyro Evaluation Tool* folder. If the file already exists, it is overwritten. The default configuration file is applied to a device whenever the software first connects to it.

7.3 Loading Settings

To apply a previously saved set of registry settings:

1. Click on the **Load** button
2. An *Open* dialog box is displayed.

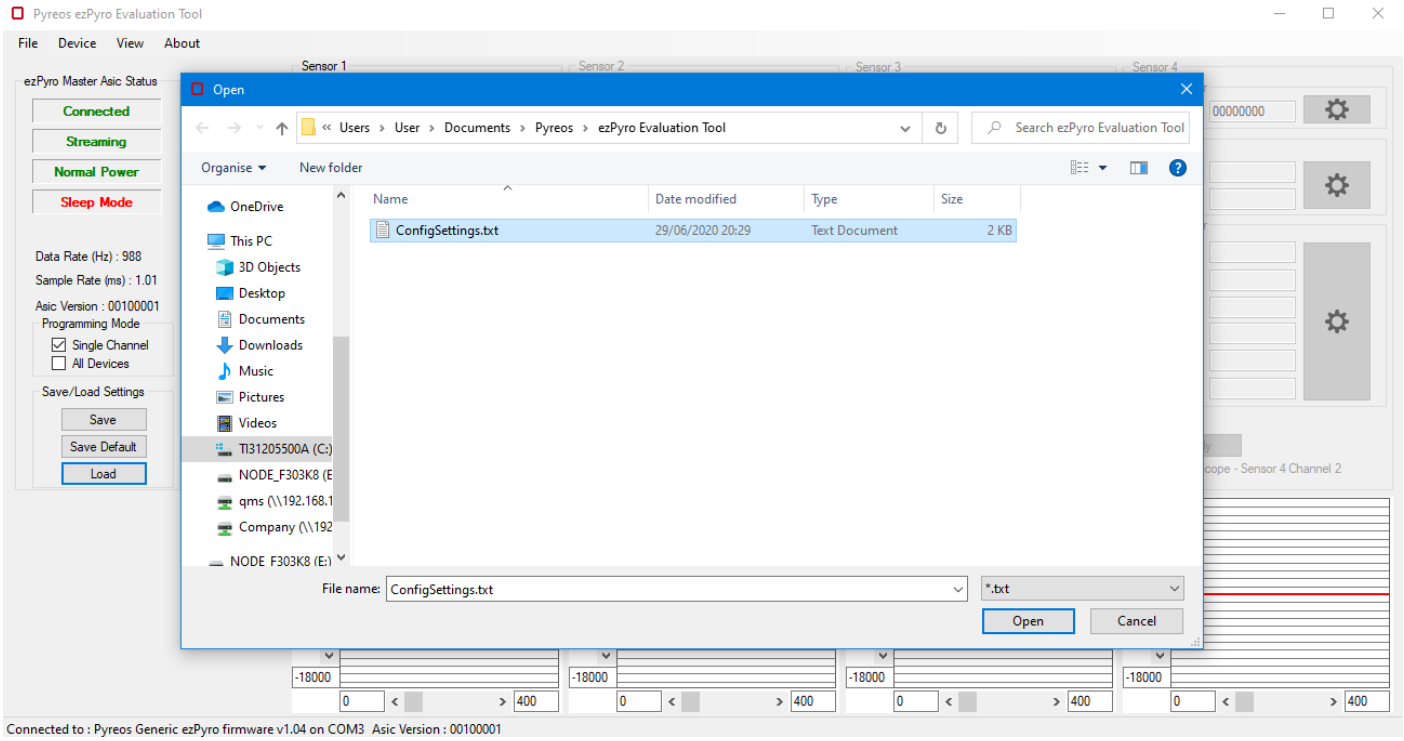

Figure 35: Load Settings - Select File

3. Select the required settings file.
4. Click on the **Open** button. The register settings are applied to the currently active device(s).

***Note:** Configuration files are specific for the number of devices used: for example, a configuration file for 2 sensors will not work for 1, 3 or 4 sensors.*

8 About

Click on **About** in the menu bar to display file and version information about the ezPyro Evaluation Tool software.

Figure 36: About Dialogue Box

9 Troubleshooting

9.1 No Kit Detected on the COM Ports

If no kit is detected on the COM port –

- Try rescanning the ports using the Rescan Ports options in the Devices dropdown menu.
- Try disconnecting the USB cable from the device and the PC and then reconnecting everything.
- Try disconnecting the USB cable from the device and the PC, close the Pyreos software. Reconnect the USB cable to the device and the PC and reopen the Pyreos software.

9.2 Signal Saturation

9.2.1 Continuous Saturation

If the signal remains saturated use the CCP and AFE register cogs to alter the gain, high pass filter, low pass filter, sample rate, and feedback trans. to the required levels so that the system gives clear, stable readings

9.2.2 Sporadic Saturation

If the readings are stable but suddenly saturate and then stabilise again, ensure that the environment around the kit is stable. Limit changes in temperature caused by air flow; drafts, air conditioning, etc. and sunlight.

9.3 I/O Exception

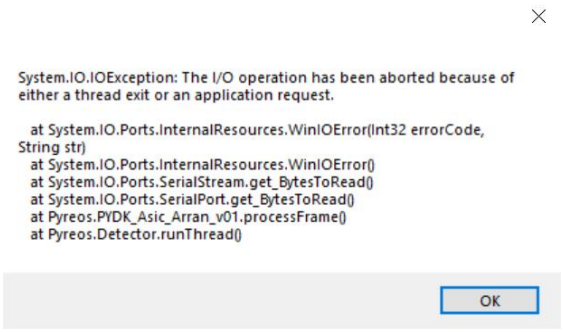

Figure 37: I/O Exception

If this warning appears check that the USB cable is undamaged and that it is connected properly.

A timeout warning also appears and the kit needs to be reconnected in the usual manner.

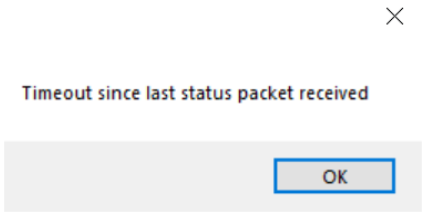

Figure 38: Timeout warning

If the problem persists replace the USB cable, ensuring that it can handle the transfer of both power and data.

9.4 Known 'Save To CSV' Bug

There is known bug when saving data from the ezPyro Evaluation Tool software.

The browse function allows the user to create a file in a specified folder.

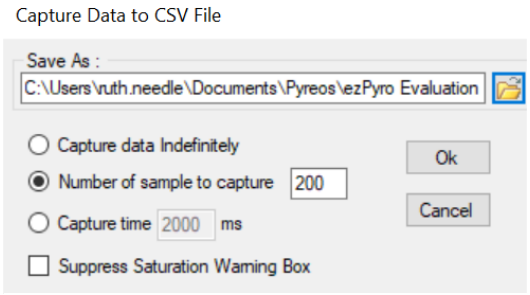

Figure 39: Browsed path to save csv file

However when ok is clicked the following exception appears.

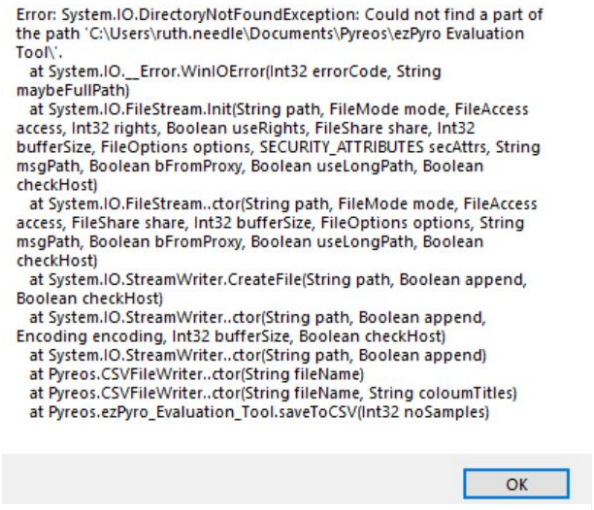

Figure 40: Directory Not Found Exception

At present the work around is to enter the file name directly in to the dialogue box. To save as a CSV file add .csv at the end of the file name, if this is omitted then the file is saved as a FILE and has to be converted to .csv later.

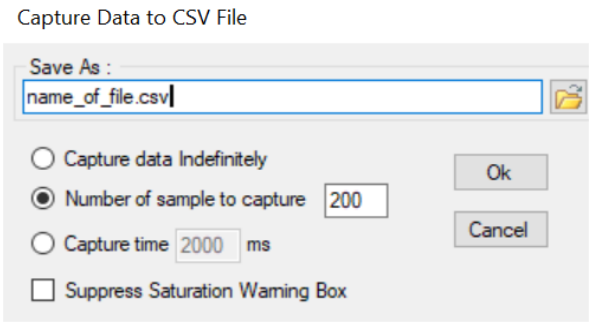

Figure 41: Direct save to csv file naming

This saves the file to the Pyreos\ezPyro Evaluation Tool folder that is automatically created in the Documents folder of the connected PC as part of the 'Save to CSV' process.

10 Further Information and Support

The Pyreos website has a list resources available to help our customers

https://pyreos.com/resource-centre

If you encounter any difficulties with the kit, please contact Pyreos Support

E-mail: support@pyreos.com

11 List of Abbreviations

AFE	Analog Front End
CCP	Channel Control Packet
CSV	Comma Separated Values
HPF	High Pass Filter
LHT	Lower High Threshold
LLT	Lower Low Threshold
LPF	Low Pass Filter
WT	Wake-up Time Threshold
WUP	Wake-Up Packet
UHT	Upper High Threshold
ULT	Upper Low Threshold