Synertronic Designs

Glaz GUI

Graphical User Interface 12.7

- Supports LineScan and PD devices
- Device and script testing
- Application-specific UIs

Overview

Glaz UI is a stand-alone user interface to configure and take measurements with *Glaz LineScan* cameras. It is also a useful tool to test camera performance and script files.

Installing Glaz UI

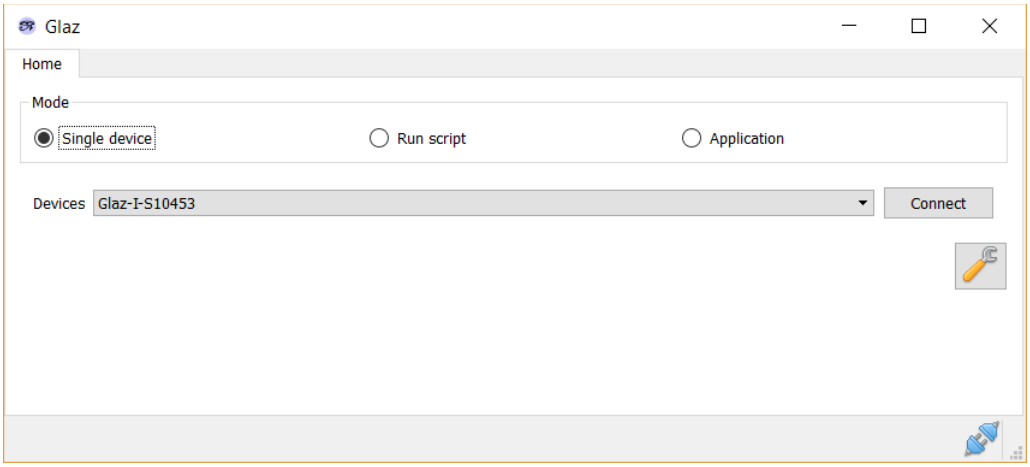
The installer for *Glaz UI* can be downloaded from the Synertronic Designs web page. Download and run the installer.

If the target PC is not connected to the internet, it is advisable to pre-install the USB device driver. The USB device driver can be downloaded from the Synertronic Designs web page.

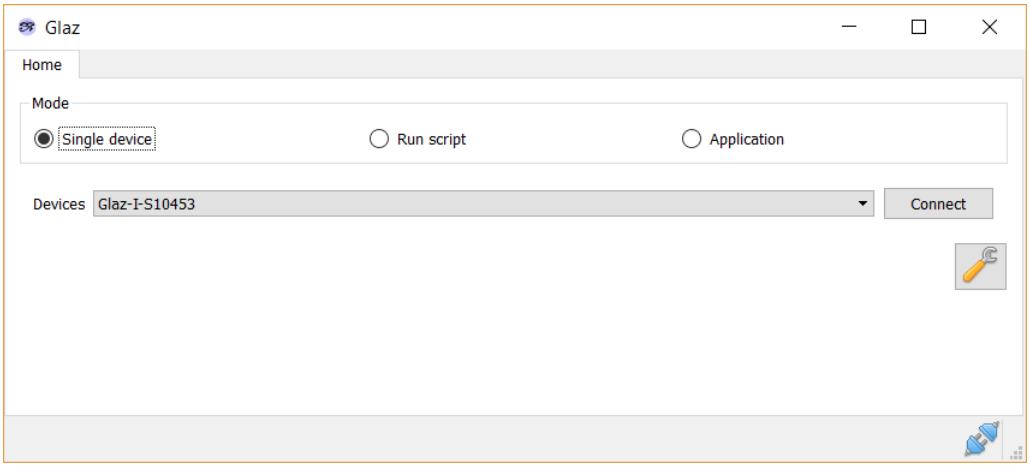
Home page

When starting the application, the **Home** page is displayed. The application can be used in several modes:

- **Single device**
  Use this mode to connect with a single device. This is a quick way to do basic measurements, test device functions and perform calibrations.
- **Run script**
  This mode requires a script file and can be used to test scripts and perform more complex multi-camera measurements.
- **Application**
  This mode offers several application-specific extensions. See the application-specific documentation on the Synertronic Designs web page.



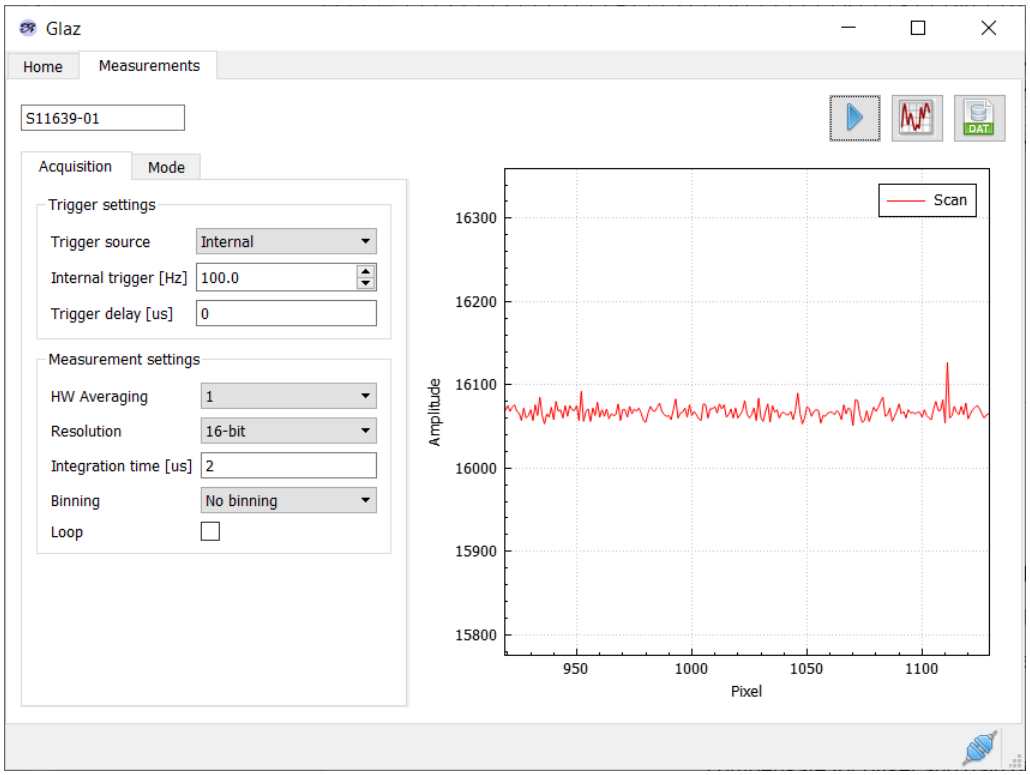
Single device mode



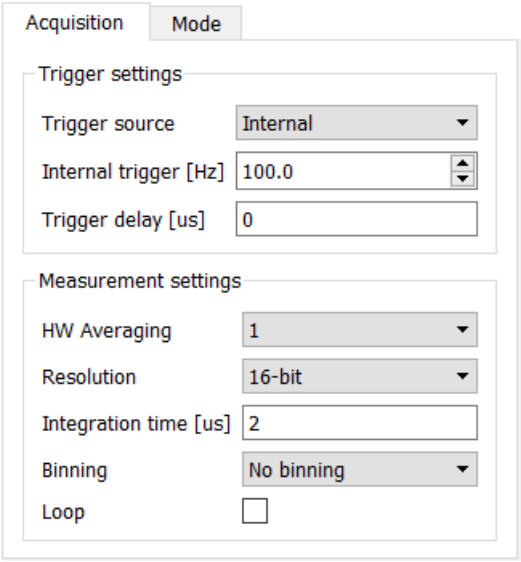
1. Select the **Home** page.
2. Select **Single device** mode.
3. Select the *Glaz* device in the **Devices** drop-down.
4. Click **Connect**.

After successfully connecting to a device, a **Measurements** tab is added. Click on the **Measurements** tab to switch to the measurement page.

Measurements page



Acquisition tab



The **Acquisition** parameters are grouped into **Trigger settings** and **Measurement settings**.

The following **Trigger settings** are provided:

- **Trigger source**
  Set the trigger source. The following options are provided:
  - **Internal** – The camera generates its own trigger at the specified internal trigger frequency.
  - **External** – The camera is triggered by an external signal on the TRIG port.
  - **External burst** – The camera waits for an external trigger on the TRIG port and then generates its own trigger at the specified internal trigger frequency.
- **Internal trigger [Hz]**
  Set the internal trigger frequency in Hz.
- **Trigger delay [us]**
  Set the trigger delay in µs.

Supported trigger settings for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Trigger source	Internal External External burst	Internal External External burst	Internal External	Internal External burst
Internal trigger [Hz]	Yes	Yes	Yes	Yes
Trigger delay [µs]	Yes	Yes	Yes	Not available

The following **Measurement settings** are provided:

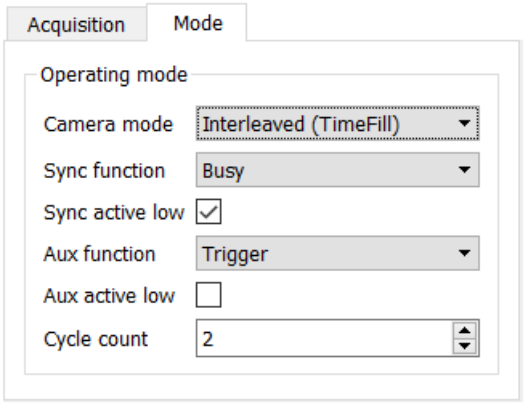
- **Hardware averaging**
  Set the number of scans for hardware averaging.
- **Resolution**
  Set the resolution in number of bits.
- **Integration time [us]**
  Set the integration time of the camera in µs.
- **Binning**
  Sets the level of pixel binning.

- **Loop**
  When unchecked, the application will only take one measurement when clicking the button. When checked, the application will keep taking measurements, until the button is clicked.

Supported measurement settings for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Hardware averaging	1 to 256	1 to 256	1	1
Resolution	10, 12, 14, 16	10, 12, 14, 16	12 (fixed)	16 (fixed)
Integration time [us]	Yes	Yes	Yes	Not available
Binning	Yes	Yes	Yes	Yes

Mode tab



The **Mode** parameters are grouped into **Operating mode**.

The following **Operating mode** options are provided:

- **Camera mode**
  Set the camera mode. The following options are provided:
  - **TimeFill** – Sensor integration and readout are interleaved. Use this option to maximise the temporal fill factor.
  - **PulseSync** – Sensor integration and readout are performed sequentially. Use this option when multi-camera synchronisation is critical or when combining measurements with the Glaz-PD.
- **Sync function**
  Set the *Sync* port function. The following options are provided:
  - **Busy** – Active while the camera is running a measurement.
  - **Integration window** – Active while the camera is integrating.
  - **Trigger** – Equal to the delayed trigger signal.
  - **Trigger cycle start** – Pulse at the start of a cycle. See the device manual for more information about cycle counting.
  - **Trigger cycle running** – Active after a cycle started. See the device manual for more information about cycle counting.
- **Sync active low**
  Set the *Sync* port polarity. When checked, the *Sync* port is active low.
- **Aux function**
  Set the *Aux* port function. The following options are provided:

- **Input** – The port is used as a high-impedance digital input.
- **Busy** – Active while the camera is running a measurement.
- **Integration window** – Active while the camera is integrating.
- **Trigger** – Equal to the delayed trigger signal.
- **Trigger cycle start** – Pulse at the start of a cycle. See the device manual for more information about cycle counting.
- **Trigger cycle running** – Active after a cycle started. See the device manual for more information about cycle counting.

- **Aux active low**
  Set the *Aux* port polarity. When checked, the *Aux* port is active low.
- **Cycle count**
  Set the number of triggers in one cycle. See the device manual for more information about cycle counting.

Supported operating mode options for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Camera mode	TimeFill PulseSync	TimeFill PulseSync	TimeFill (fixed)	TimeFill (fixed)
Sync function	Busy Integration window Trigger Trigger cycle start Trigger cycle run	Busy Integration window Trigger Trigger cycle start Trigger cycle run	Busy Integration window	Busy Integration window
Sync active low	Configurable	Configurable	Active low (fixed)	Active low (fixed)
Aux function	Input Busy Integration window Trigger Trigger cycle start Trigger cycle run	Input Busy Integration window Trigger Trigger cycle start Trigger cycle run	Not available	Not available
Aux active low	Configurable	Configurable	Not available	Not available
Cycle count	Yes	Yes	Not available	Not available

Buttons

The functions of the buttons:


Starts a measurement. When a measurement starts, the button changes to the stop button  .


Stops the measurement.

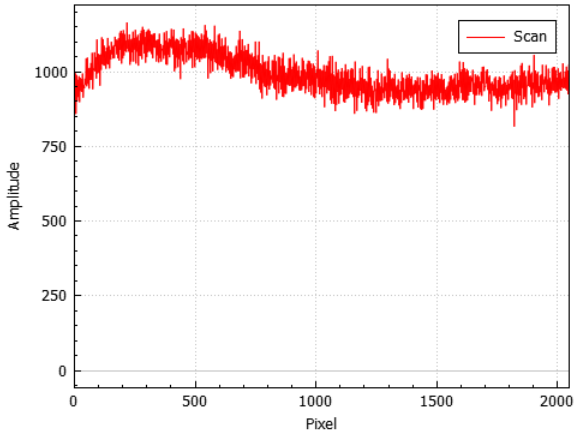

Performs a noise analysis with the current camera settings. See “Noise analysis” for more information.


Export the plotted data to a CSV (comma separated values) file.

Perform a measurement

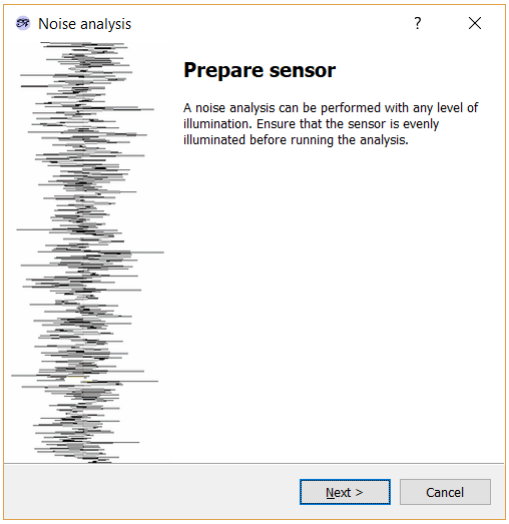
1. Set the relevant **Trigger settings** and **Measurement settings**.
2. Click  to start the measurement.
3. The start button  changes to a stop button  .

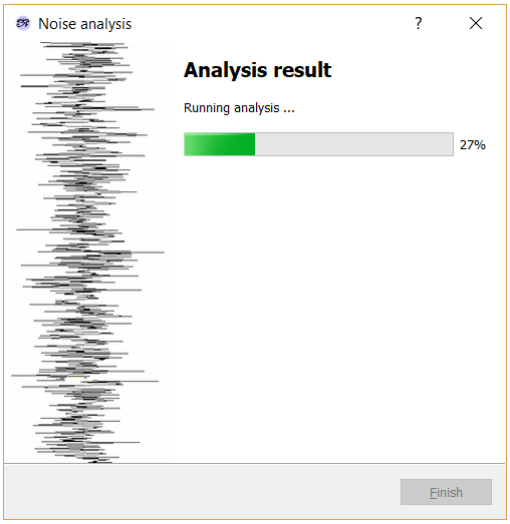
4. Wait until the measurement is finished or click to abort the measurement.
5. When the measurement is completed or was aborted, the stop button changes back to the start button .
6. The result is displayed in the 2D graph.



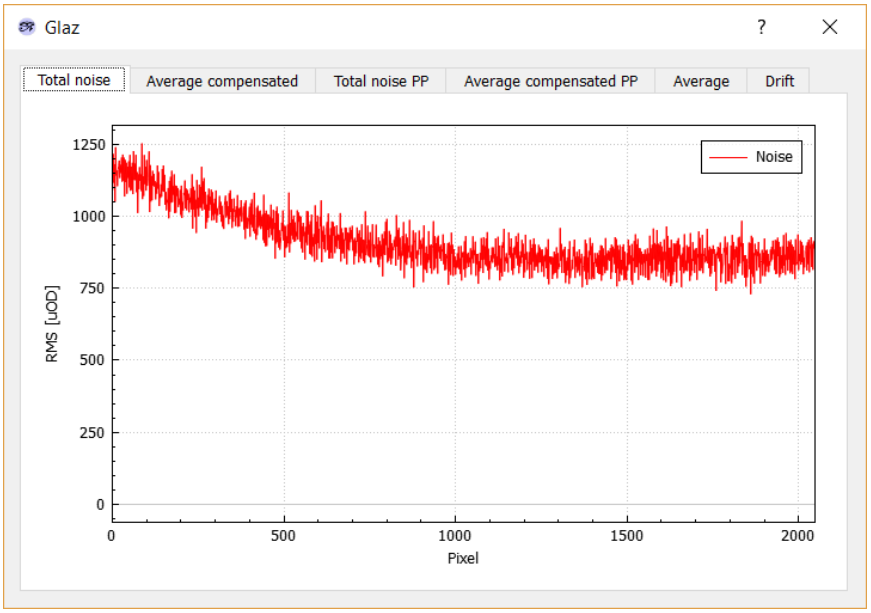
Noise analysis

1. Set the relevant **Trigger settings** and **Measurement settings**.
2. Click to open the **Noise analysis** dialog.
3. You are instructed to prepare the sensor illumination, before starting the noise analysis.
4. Click **Next** to start the noise analysis or **Cancel** to abort the analysis.
5. After clicking **Next**, the camera starts taking measurements. A progress dialog is displayed. Wait until the measurement is completed.





6. After completing the measurements, the result dialog is displayed:

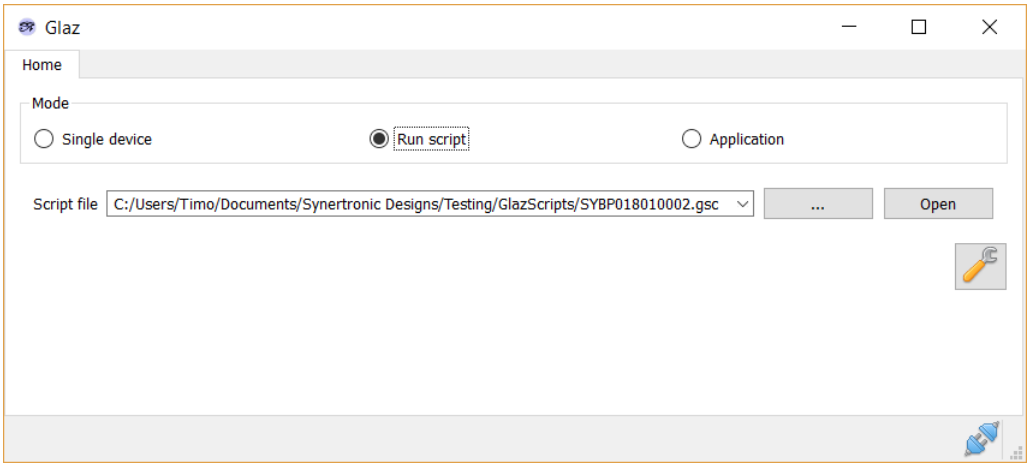


7. Click × in the top right corner of the dialog to close the dialog.
8. Click **Finish** on the **Noise Analysis** dialog.

The noise analysis is performed on 100 scans using the current measurement settings. The following results are shown:

- Total noise: A graph of the RMS noise level for each pixel. This RMS noise graph includes the effect of drift.
- Average compensated: A graph of the average compensated RMS noise level for each pixel. To compensate for drift, the average of each scan is subtracted from each pixel reading.
- Total noise PP: A graph of the total peak-peak noise level for each pixel. The noise levels include the effect of drift.
- Average compensated PP: A graph of the average compensated peak-peak noise level for each pixel. To compensate for drift, the average of each scan is subtracted from each pixel reading.
- Average: A graph of the average sensor reading for each of the 100 scans.
- Drift: A graph of the difference of the average of each of the 100 scans relative to the average of the first scan.

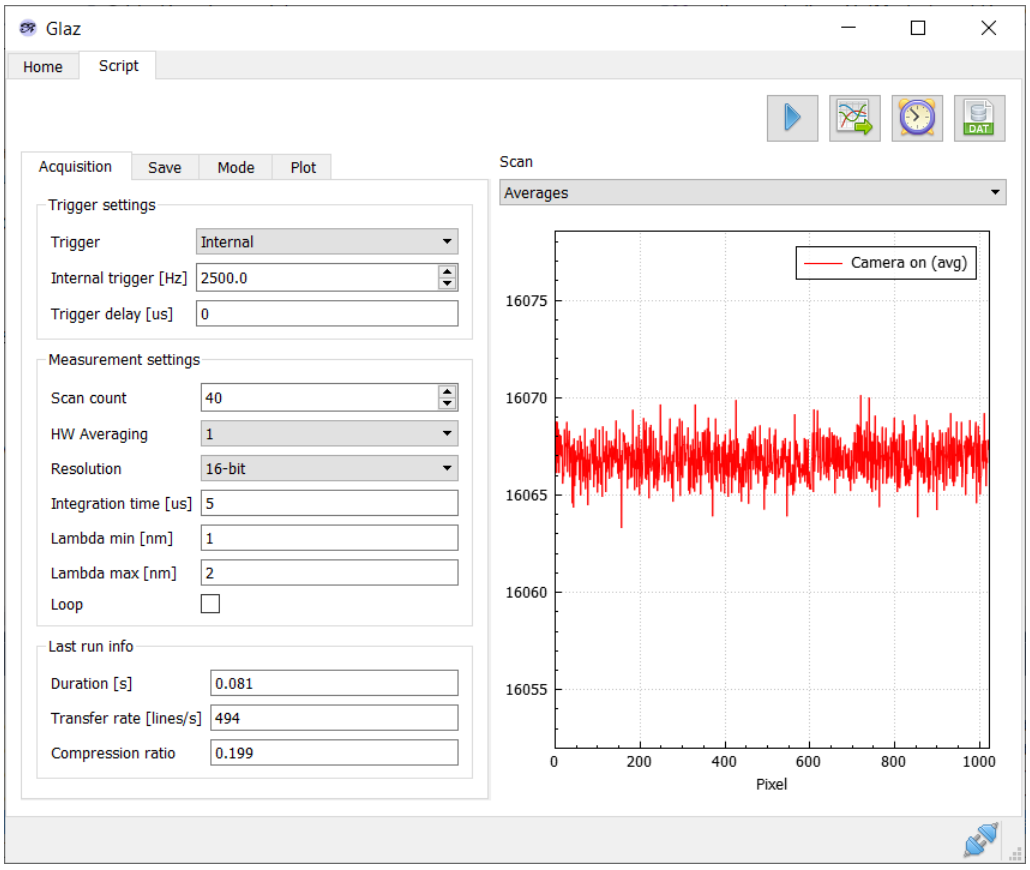
Script mode



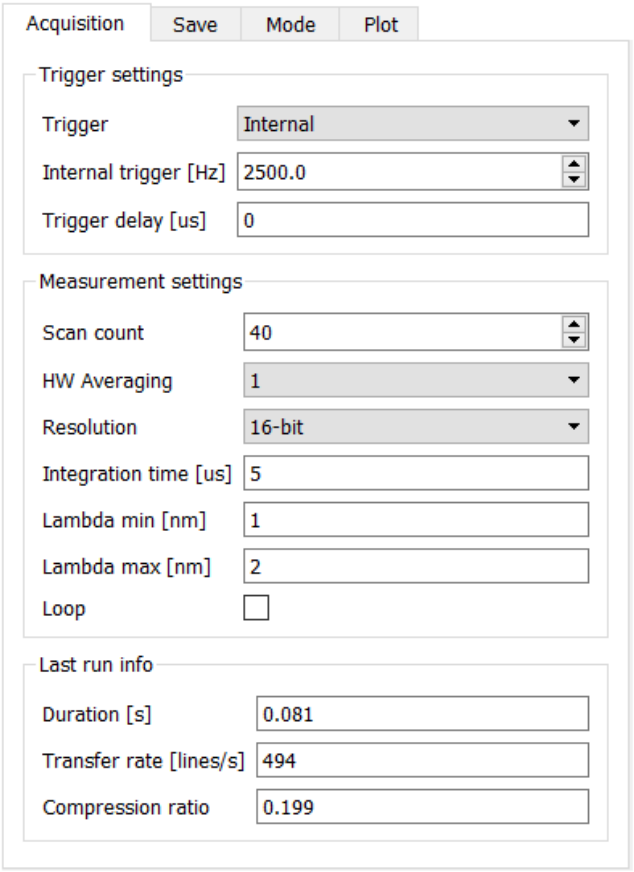
1. Select the **Home** page.
2. Select **Run script** mode.
3. Select a script file by using one of the following methods:
    - Click ... to open a file dialog to select a script file.
    - Type the script file name into the **Script file** line edit.
    - Use the **Script file** drop-down to select a previously entered script file.
4. Click **Open** to load the script file.

After successfully loading the selected script, a **Script** tab is added. Click on the **Script** tab to switch to the script page.

Script page



Acquisition tab



The **Acquisition** parameters are grouped into **Trigger settings**, **Measurement settings** and **Last run info**.

The following **Trigger settings** are provided:

- **Trigger source**
  Set the trigger source. The following options are provided:
  - **Internal** – The camera generates its own trigger at the specified internal trigger frequency.
  - **External** – The camera is triggered by an external signal on the TRIG port.
  - **External burst** – The camera waits for an external trigger on the TRIG port and then generates its own trigger at the specified internal trigger frequency.
- **Internal trigger [Hz]**
  Set the internal trigger frequency in Hz.
- **Trigger delay [us]**
  Set the trigger delay in µs.

Supported trigger settings for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Trigger source	Internal External External burst	Internal External External burst	Internal External	Internal External burst
Internal trigger [Hz]	Yes	Yes	Yes	Yes
Trigger delay [µs]	Yes	Yes	Yes	Not available

The following **Measurement settings** are provided:

- **Scan count**
  Set the number of scans (lines) per measurement run.

- **Hardware averaging**
  Set the number of scans for hardware averaging.
- **Resolution**
  Set the resolution in number of bits.
- **Integration time [us]**
  Set the integration time of the camera in µs.
- **Binning**
  Sets the level of pixel binning.
- **Lambda min [nm]**
  The minimum wavelength. This must be set when using IFFT pre-processors.
- **Lambda max [nm]**
  The maximum wavelength. This must be set when using IFFT pre-processors.
- **Loop**
  When unchecked, the application will only take one measurement when clicking the button. When checked, the application will keep taking measurements, until the button is clicked.

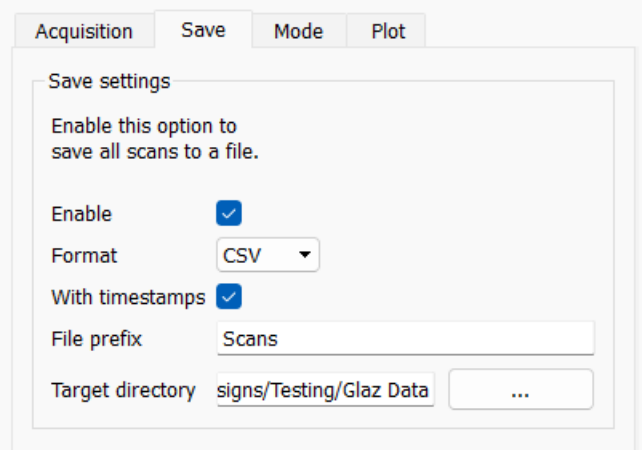
Supported measurement settings for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Hardware averaging	1 to 256	1 to 256	1	1
Resolution	10, 12, 14, 16	10, 12, 14, 16	12 (fixed)	16 (fixed)
Integration time [us]	Yes	Yes	Yes	Not available
Binning	Yes	Yes	Yes	Yes

The following **Last run info** is provided:

- **Duration [s]**
  The duration of the last measurement run.
- **Transfer rate [lines/s]**
  The average line transfer rate from the camera to the PC.
- **Compression ratio**
  The compression ratio of data sent from the camera to the PC. Only the LineScan-I-Gen2 and LineScan-II support data compression.

Save tab



The **Save** parameters are grouped into **Save settings**.

The following **Save settings** are provided:

- **Enable**
  When checked all scans are saved to a binary file.
- **Format**
  Select the file format. The following formats are supported:
  - **Binary:** Proprietary binary file format. See format description below.
  - **CSV:** Text file with comma-separated values.
- **With timestamps**
  When checked timestamps for each line are also saved to the binary file.
- **File prefix**
  The binary filename will start with this prefix. The date and time are appended to the prefix to generate the full filename.
- **Target directory**
  The target directory where the binary files will be saved. Click ... to open a file dialog to select a target directory.

The binary file uses Big-Endian encoding.

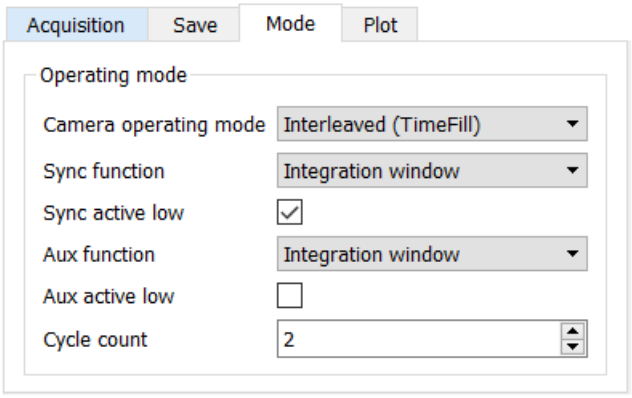
The binary file format without timestamps:

```
uint16              number of scans, Ns
uint16              number of pixels, Np
Np x uint16         1. scan
Np x uint16         2. scan
...
Np x uint16         Ns. scan
```

The binary file format with timestamps:

```
4 x uint8           preamble consisting of 4 bytes: 0x00, 0x00, 0xA5, 0xC3
uint8               version: 0x01
uint16              number of scans, Ns
uint16              number of pixels, Np
uint32              timestamp for 1. scan
Np x uint16         1. scan
uint32              timestamp for 2. scan
Np x uint16         2. scan
...
uint32              timestamp for Ns. scan
Np x uint16         Ns. scan
```

Mode tab



The **Mode** parameters are grouped into **Operating mode**.

The following **Operating mode** options are provided:

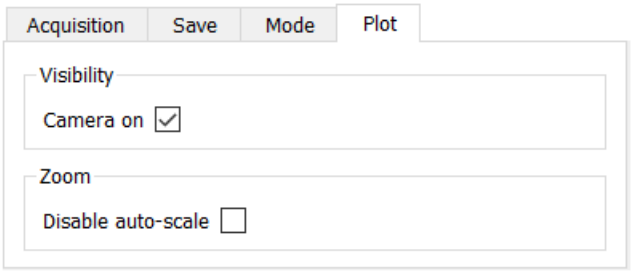
- **Camera mode**
  Set the camera mode. The following options are provided:
  - **TimeFill** – Sensor integration and readout are interleaved. Use this option to maximise the temporal fill factor.
  - **PulseSync** – Sensor integration and readout are performed sequentially. Use this option when multi-camera synchronisation is critical or when combining measurements with the Glaz-PD.
- **Sync function**
  Set the *Sync* port function. The following options are provided:
  - **Busy** – Active while the camera is running a measurement.
  - **Integration window** – Active while the camera is integrating.
  - **Trigger** – Equal to the delayed trigger signal.
  - **Trigger cycle start** – Pulse at the start of a cycle. See the device manual for more information about cycle counting.
  - **Trigger cycle running** – Active after a cycle started. See the device manual for more information about cycle counting.
- **Sync active low**
  Set the *Sync* port polarity. When checked, the *Sync* port is active low.
- **Aux function**
  Set the *Aux* port function. The following options are provided:
  - **Input** – The port is used as a high-impedance digital input.
  - **Busy** – Active while the camera is running a measurement.
  - **Integration window** – Active while the camera is integrating.
  - **Trigger** – Equal to the delayed trigger signal.
  - **Trigger cycle start** – Pulse at the start of a cycle. See the device manual for more information about cycle counting.
  - **Trigger cycle running** – Active after a cycle started. See the device manual for more information about cycle counting.

- **Aux active low**
  Set the *Aux* port polarity. When checked, the *Aux* port is active low.
- **Cycle count**
  Set the number of triggers in one cycle. See the device manual for more information about cycle counting.

Supported operating mode options for different LineScan models:

	LineScan-I-Gen2	LineScan-II	LineScan-LS	LineScan-NMOS
Camera mode	TimeFill PulseSync	TimeFill PulseSync	TimeFill (fixed)	TimeFill (fixed)
Sync function	Busy Integration window Trigger Trigger cycle start Trigger cycle run	Busy Integration window Trigger Trigger cycle start Trigger cycle run	Busy Integration window	Busy Integration window
Sync active low	Configurable	Configurable	Active low (fixed)	Active low (fixed)
Aux function	Input Busy Integration window Trigger Trigger cycle start Trigger cycle run	Input Busy Integration window Trigger Trigger cycle start Trigger cycle run	Not available	Not available
Aux active low	Configurable	Configurable	Not available	Not available
Cycle count	Yes	Yes	Not available	Not available

Plot tab



The **Plot** settings are grouped into **Visibility** and **Zoom**.

The **Visibility** group lists all plotted traces. Check or uncheck the associated check box to turn traces on or off.

The following **Zoom** options are provided:

- **Disable auto-scale**
  When checked, the plot will not auto-scale when plotted traces are updated.

Buttons

The functions of the buttons:


Starts a measurement. When a measurement starts, the button changes to the stop button  .


Stops the measurement.

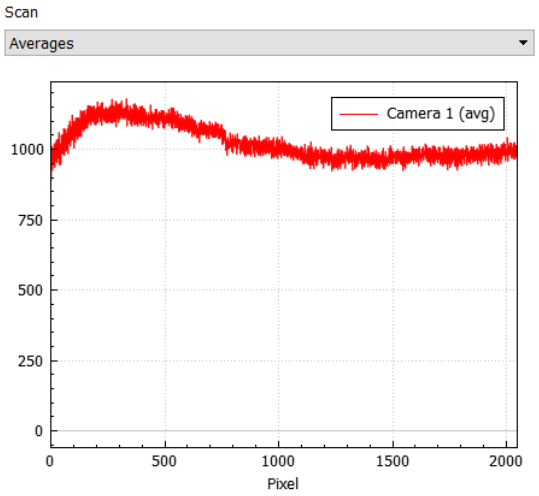

Captures the background of each camera.

Displays the timestamps for each averaged scan. This is useful to check that cameras are running synchronously.

Export the plotted data to a CSV (comma separated values) file.

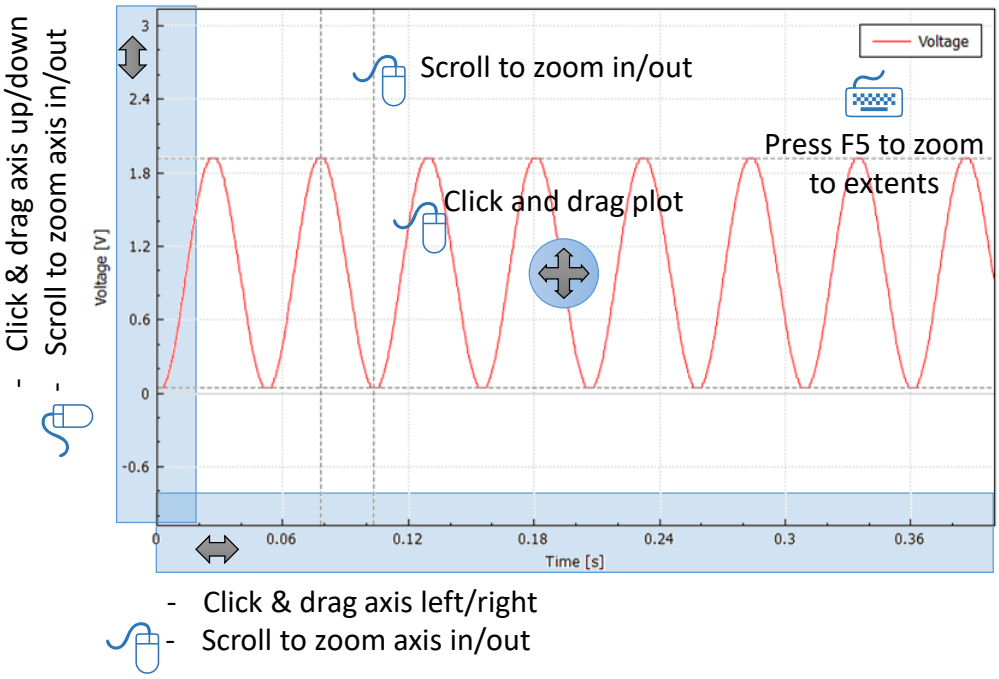
Perform a measurement

1. Set the relevant **Trigger settings** and **Measurement settings**.
2. Click to start the measurement.
3. The start button changes to a stop button .
4. Wait until the measurement is finished or click to abort the measurement.
5. When the measurement is completed or was aborted, the stop button changes back to the start button .
6. The results are displayed in the 2D graph. There will be a trace for each camera.
7. Use the **Scans** drop-down to select the overall averaged result or individual scan results. Individual scan results are only available if `keepscans` was enabled in the script.
8. Use the **Scans** drop-down to select the *Glaz-PD* results. This will only be available, if *Glaz-PD* devices were used in the script.



Interacting with plots

The diagram below summarises the different keyboard (⌨) and mouse (🖱) plot interactions.



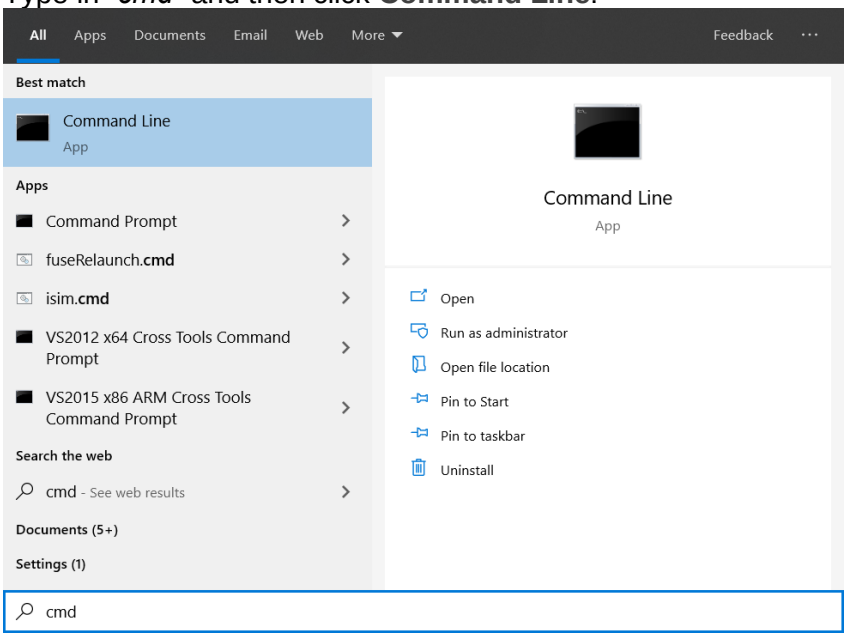
Zoom per axis	Place the mouse cursor over one of the axes and scroll up/down to zoom in/out on that axis.
Zoom graph	Place the mouse cursor over one of the plots and scroll up/down to zoom the whole plot in/out.
Zoom to extents	Press the F5 key.
Change y-axis range	Click on the y-axis and drag it up/down.
Change x-axis range	Click on the x-axis and drag it left/right.
Change plot ranges	Click on a trace and drag it left/right/up/down.

Launch the Glaz UI in developer mode

1. Open a cmd window:

   a. On the keyboard click the **Windows** button or click on the **Windows start** icon to open the Windows start menu.

   b. Type in *"cmd"* and then click **Command Line**:

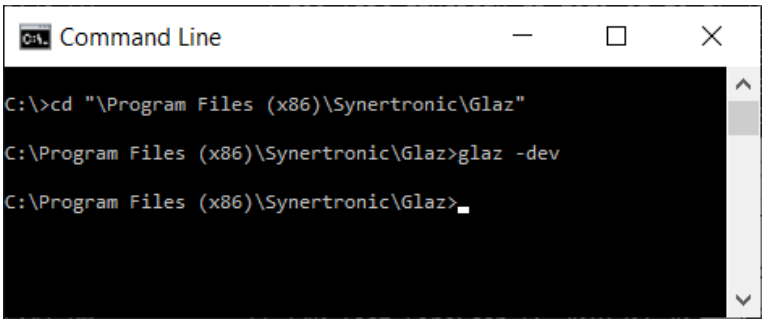


   c. In the cmd window navigate to the *Glaz UI* program directory by typing in one if the following commands:

```
cd "\Program Files (x86)\Synertronic\Glaz"   (on 64-bit operating systems)
cd "\Program Files\Synertronic\Glaz"         (on 32-bit operating systems)
```

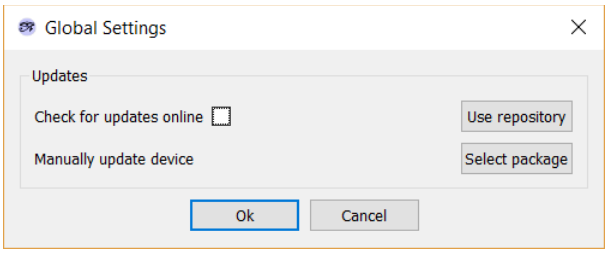
   d. Run the *Glaz UI* in developer mode by typing in:

```
Glaz -dev
```

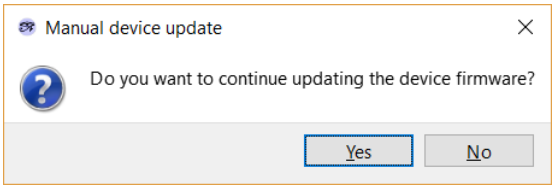


Firmware updates

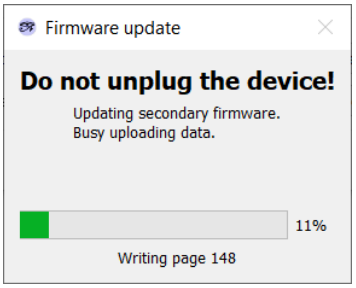
1. Launch the **Glaz UI** in developer mode.
2. Select **Single device** on the **Home** page.
3. Connect to the target device.
4. Click  to open the **Global Settings** dialog.



5. In the **Updates** group, click **Select package**.
6. Use the file dialog to navigate to and select the firmware package (*pkg* file) provided by Synertronic Designs.
7. You are queried if you want to continue with the update. Click **Yes** to continue or **No** to abort.



8. If **Yes** was selected the firmware update process is started.

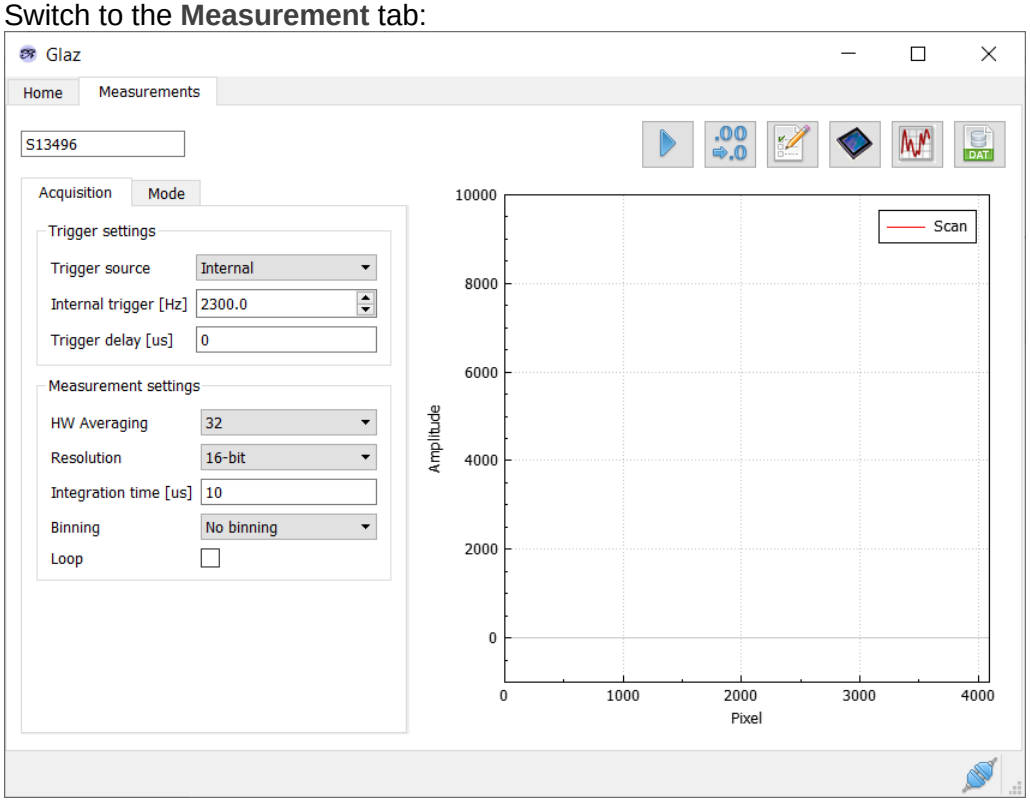


9. Wait for the update process to complete. Do not unplug the device!

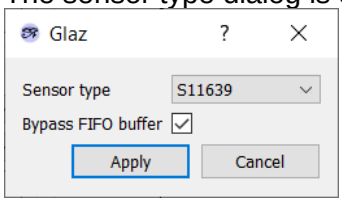
Under no circumstances, disconnect the device during a firmware update. If a firmware update fails due to a power or connection failure, the device must be returned to Synertronic Designs for reprogramming.

Setting the sensor type

1. Launch the **Glaz UI** in developer mode.
2. Select **Single device** on the **Home** page.
3. Connect to the target device.
4. Switch to the **Measurement** tab:



5. Click the **Configure sensor type**  icon.
6. The sensor type dialog is opened:

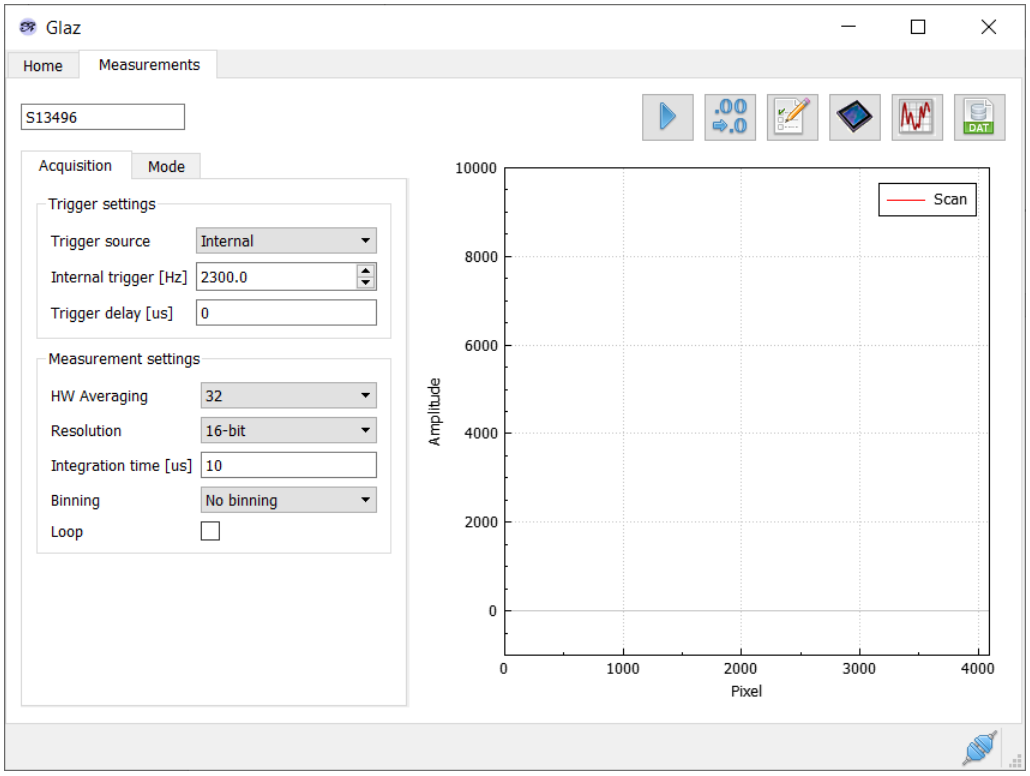


7. From the **Sensor type** drop-down select the relevant sensor.
8. For LineScan-II devices with firmware version 9.0 or above, the option for bypassing the FIFO buffer is available. Follow the instructions provided by Synertronic Designs regarding this setting.
9. Click **Apply**
10. Switch back to the **Home** tab and disconnect from the device.

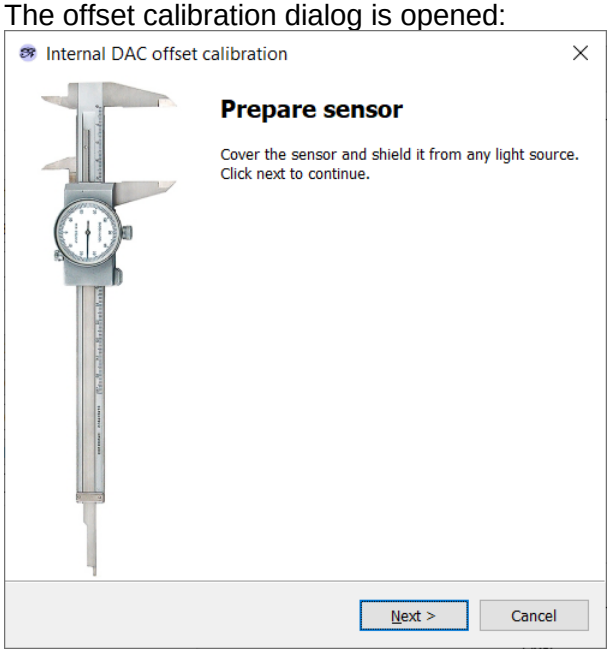
> ⚠ First disconnect and connect to the device again before taking measurements after the sensor type was changed.

Perform sensor offset calibration

1. Launch the Glaz UI in developer mode.
2. Select **Single device** on the **Home** page.
3. Connect to the target device.
4. Switch to the **Measurement** tab:

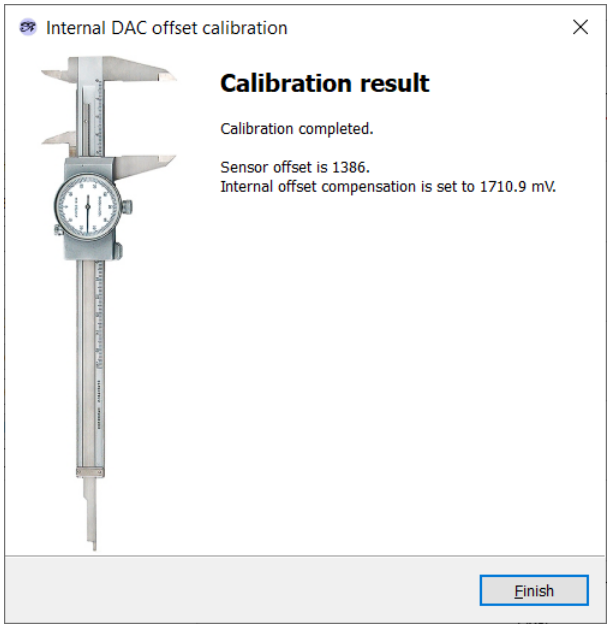


5. Click the **Calibrate internal DAC offset**  icon.
6. The offset calibration dialog is opened:



7. Shield the camera sensor from any incident light and click **Next**.

8. Wait for the calibration to finish:



9. Click **Finish**.

The dark measurement will now be calibrated to be between 1350 and 1450 counts.

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