
V2i

FROM VIBRATIONS
TO IDENTIFICATION

Acquisitor v4.0.1

Quick start guide

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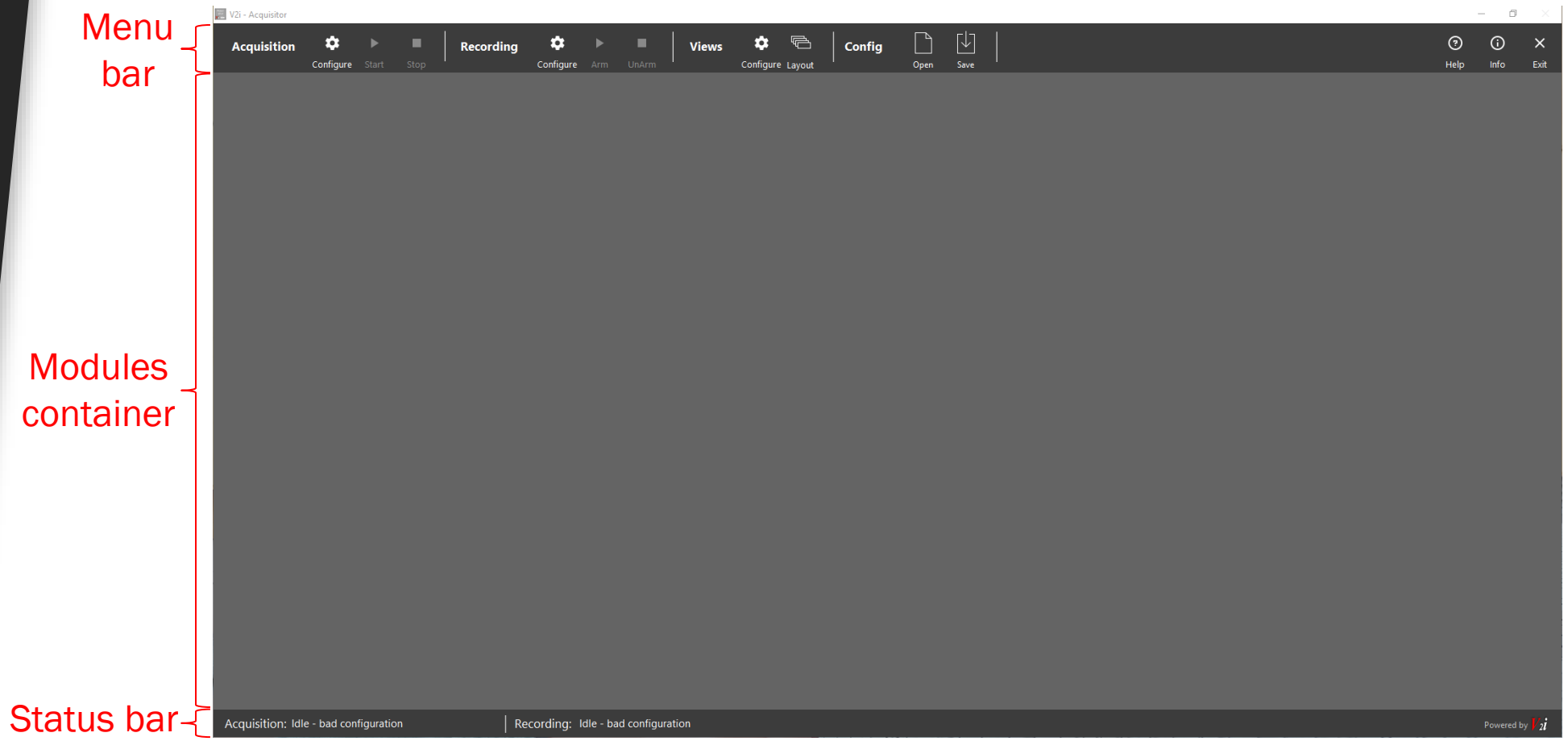
October 19, 2021

Introduction

- The Acquisitor, developed by V2i, is an integrated software capable of acquiring different hardware (mainly from National Instruments), recording the data, showing the data and posttreating them
- This Quick Start Guide provides the basic information for all the functionalities
- Click on the table of contents to go the desired section
- For more information and for pricing, please send an email to acquisitor@v2i.be

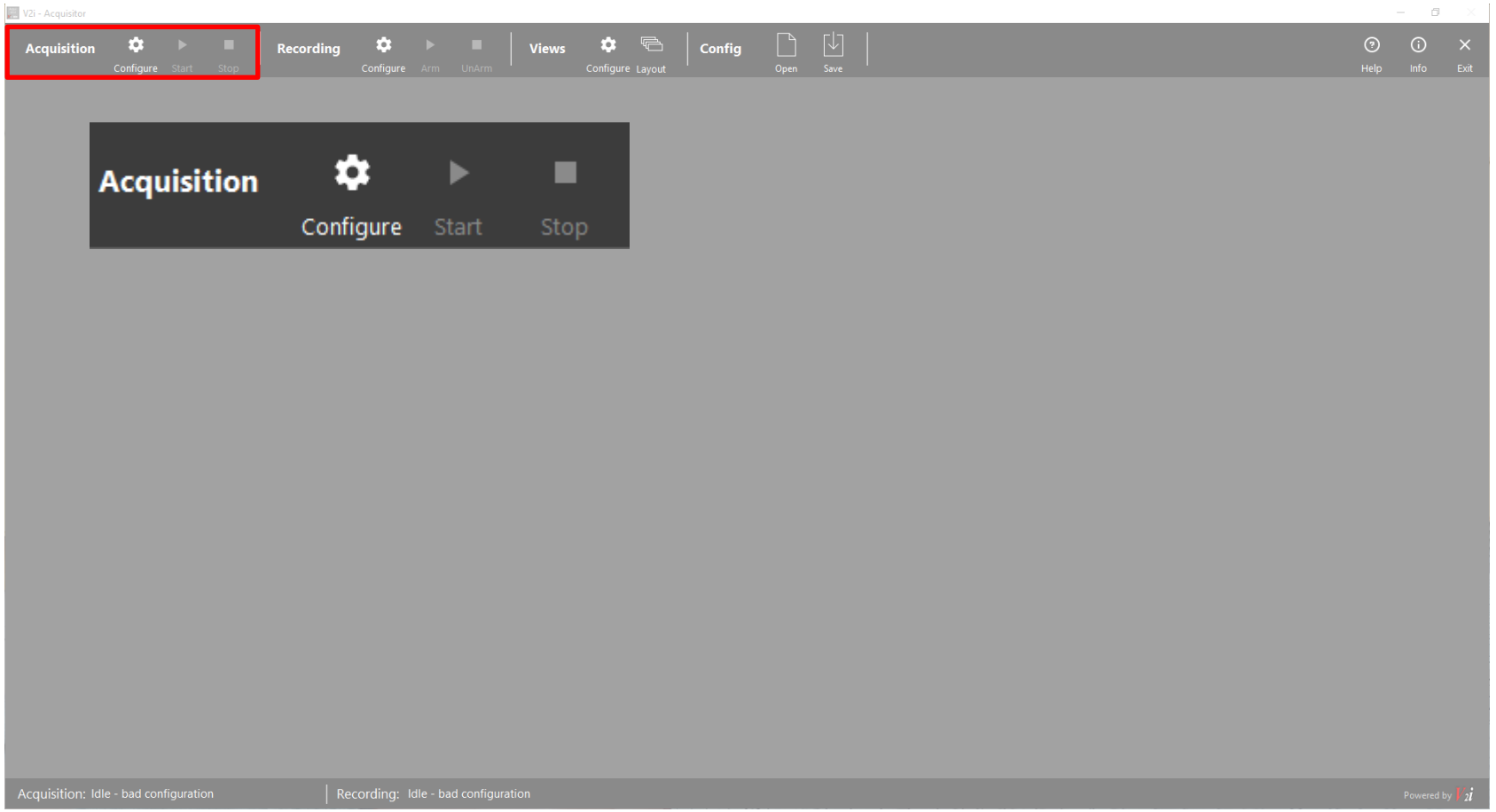
Main UI

- The main UI is split into three horizontal zones
  - **Menu bar:** includes the controls of the acquisition, the recording and the views
  - **Modules container:** container where the modules windows are located
  - **Status bar:** includes the status of the acquisition and the recording



Acquisition – Controls

- The acquisition menu bar includes three controls
  - **Configure:** launches the acquisition configuration editor
  - **Start:** starts the acquisition; only if the acquisition configuration is valid
  - **Stop:** stops the acquisition; only if the acquisition is running

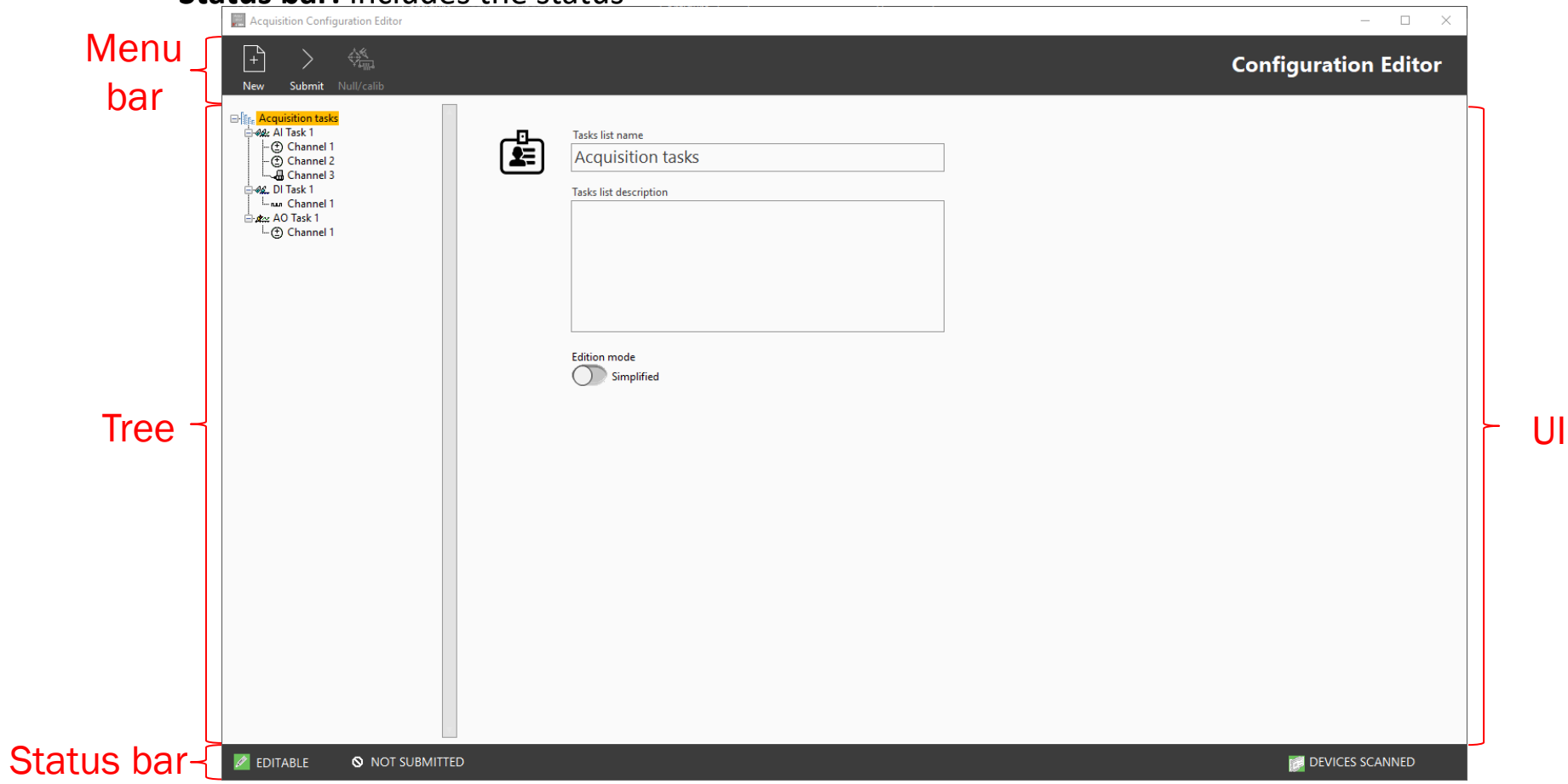


Acquisition – Status

- The acquisition status bar contains the status of the acquisition
  - **Idle – bad configuration:** configuration not valid; check the configuration editor
  - **Idle – ready to start:** configuration valid; press start to launch the acquisition
  - **Creating task:** task is being created
  - **Starting task:** task is being started
  - **Acquisition in progress...:** the acquisition is running correctly
  - **Stopping task:** task is being stopped
  - **Clearing task:** task is being cleared

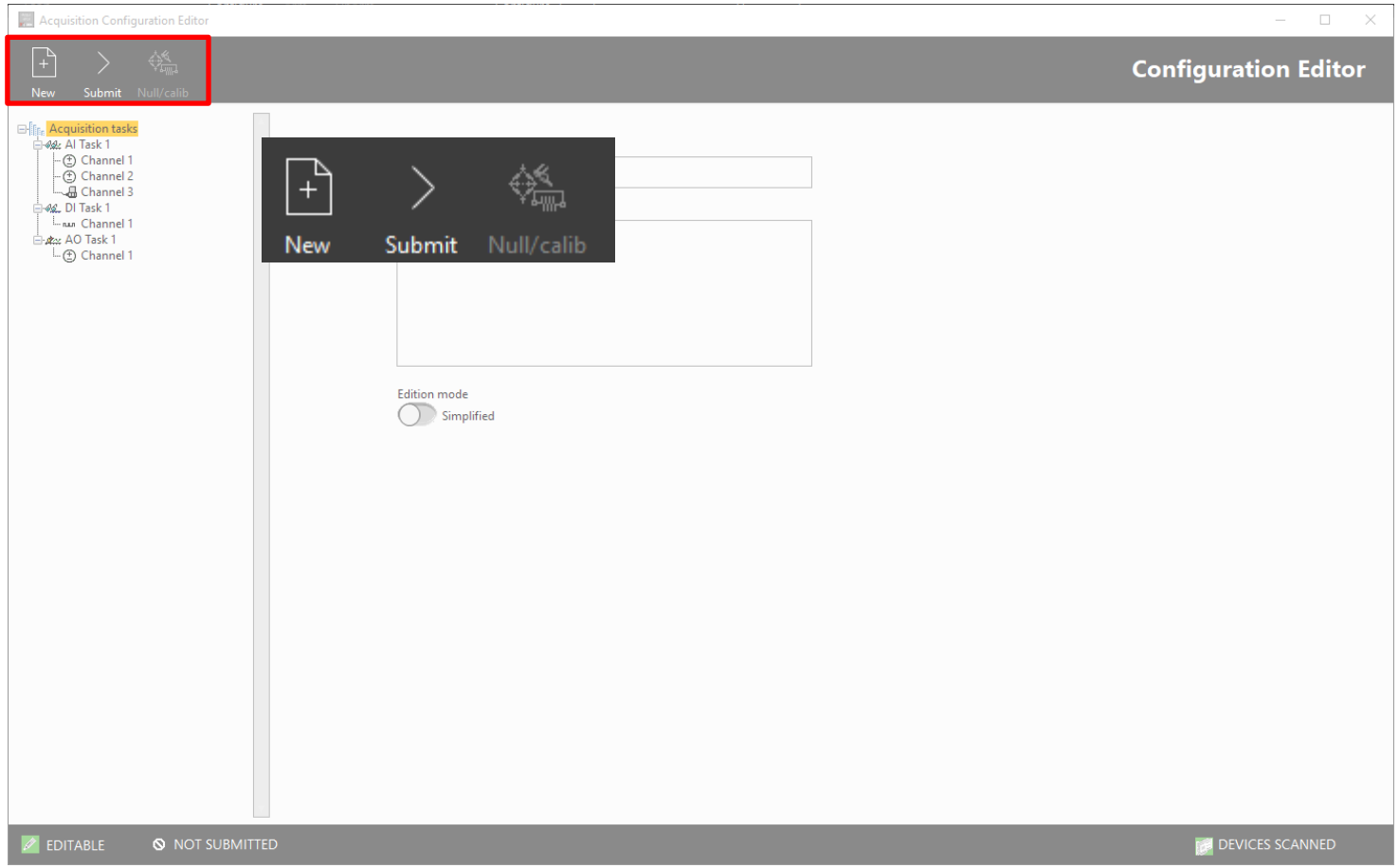
Acquisition – Configuration editor

- The acquisition configuration editor is split into four zones
  - **Menu bar:** includes the controls
  - **Tree:** visualizes the acquisition structure, consisting of tasks and channels
  - **UI:** user interface of the selected task/channel
  - **Status bar:** includes the status



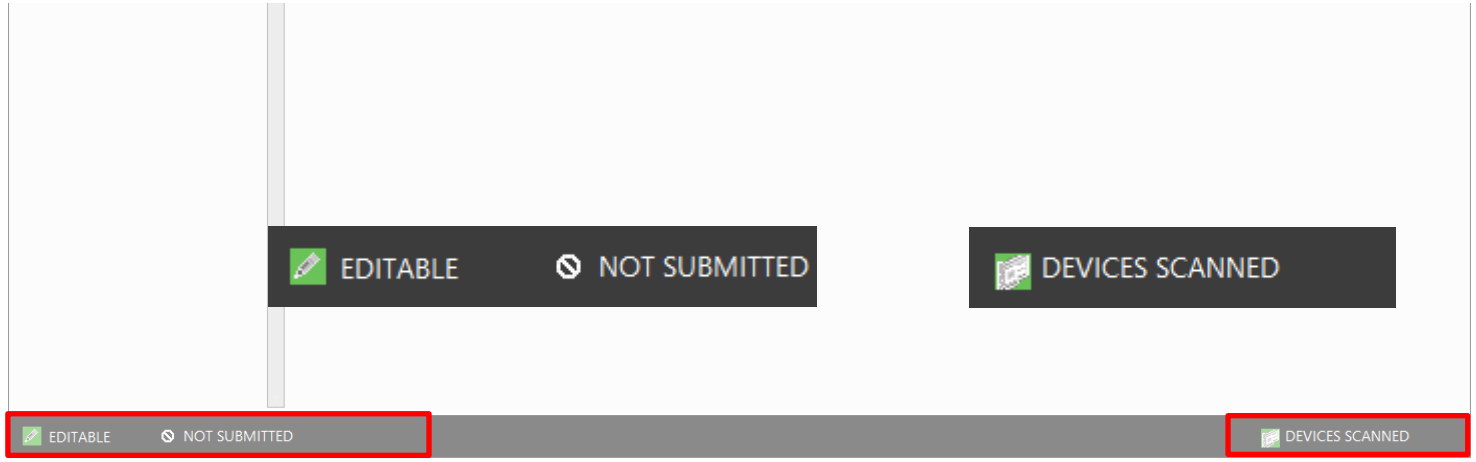
Acquisition – Configuration editor

- Menu bar
  - **New:** resets the configuration
  - **Submit:** creates and verifies the tasks
  - **Null/calib:** opens the null/calib UI



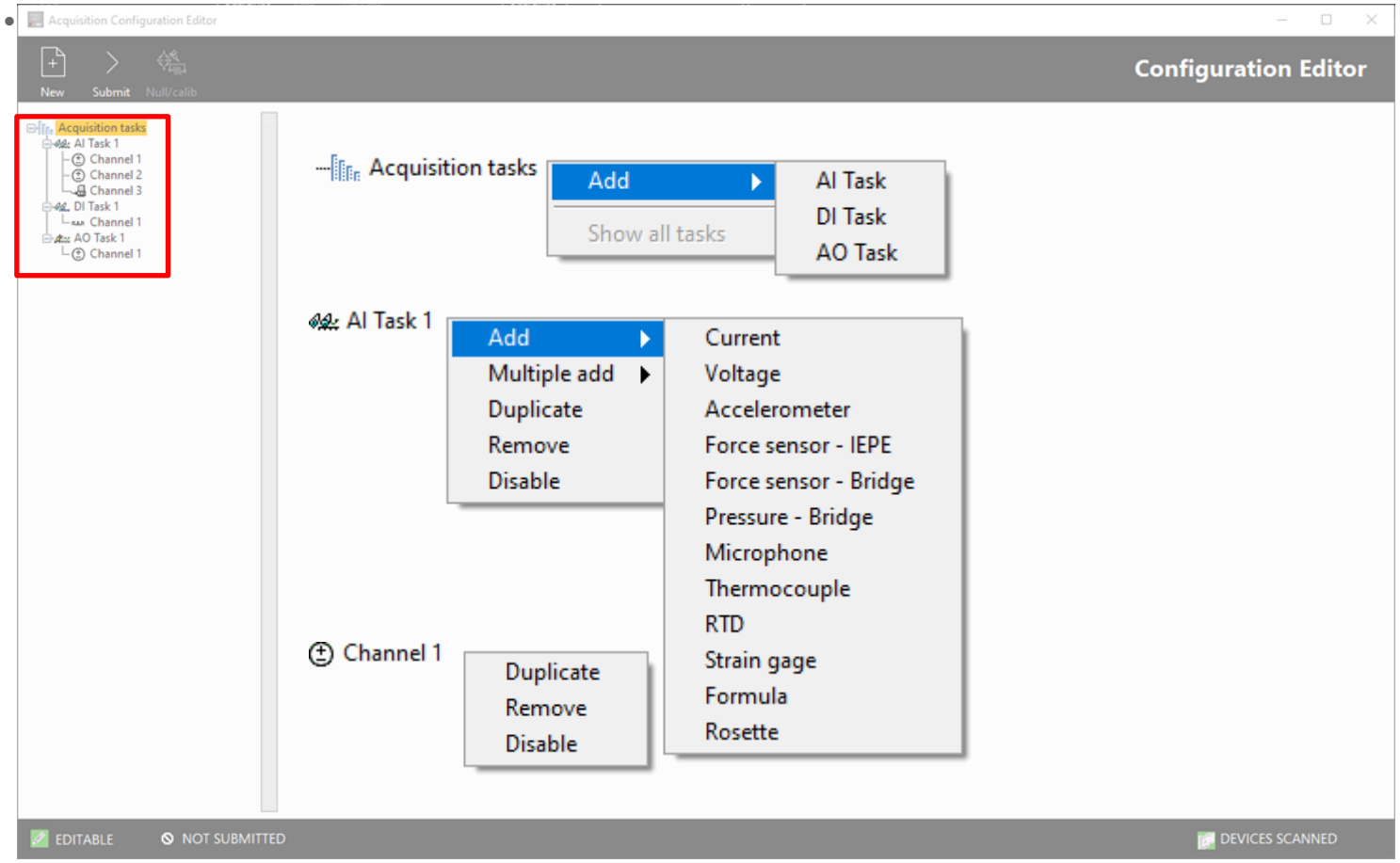
Acquisition – Configuration editor

- Status bar
  - **Editable status:**
    - NOT EDITABLE
    - EDITABLE
  - **Submit status:**
    - NOT SUBMITTED
    - SUBMITTING
    - ERROR : an error has occured during submission; check tasks/channels
    - WARNINGS : some warnings have occurred during submission; check tasks/channels
    - VALID CONFIG
  - **Scanning status:**
    - SCANNING DEVICES
    - ERROR WHILE SCANNING: an error has occurred during devices scanning; hover your mouse on status for more information
    - DEVICES SCANNED
    - Click on the scanning status to scan the devices



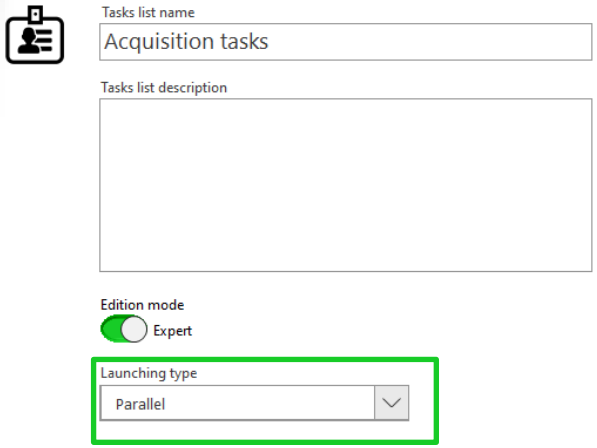
Acquisition – Configuration editor

- Tree
  - Right click on tasks list to add a task
  - Right click on a task to add one or multiple channels, to duplicate the task, remove it or disable it
  - Right click a channel to duplicate it, remove it or disable it



Acquisition – Configuration editor – Tasks list

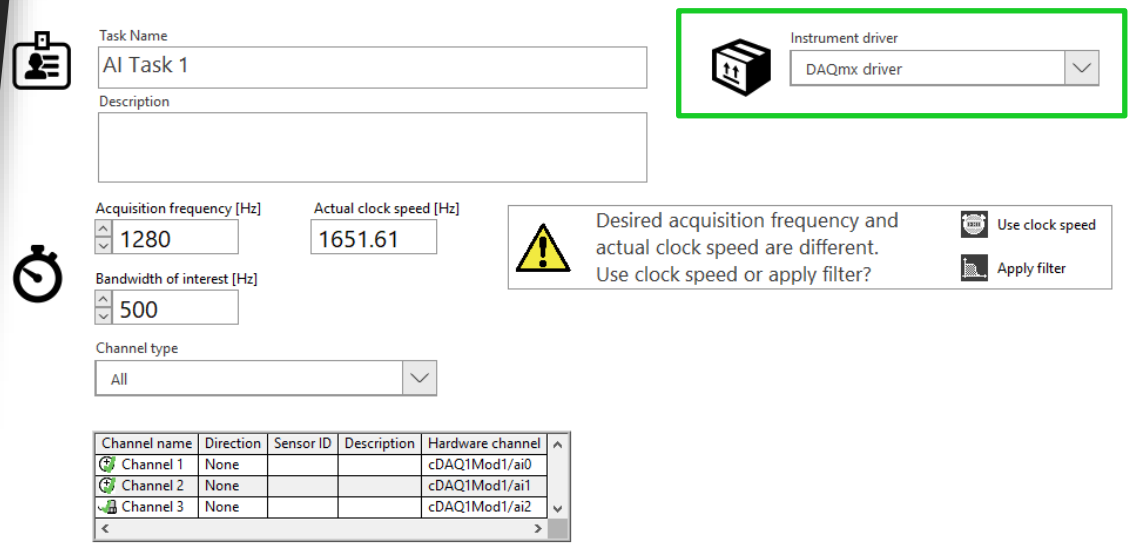
- Tasks list
  - **Tasks list name**
  - **Tasks list description**



- **Edition mode:** choose whether to display all the parameters in the tasks/channels UI (expert mode) or only the essential ones (simplified mode). In the following pages, the parameters not shown in simplified mode are framed in green
- **Launching type:** choose whether to launch the tasks in a sequential or parallel mode

Acquisition – Configuration editor – AI Task

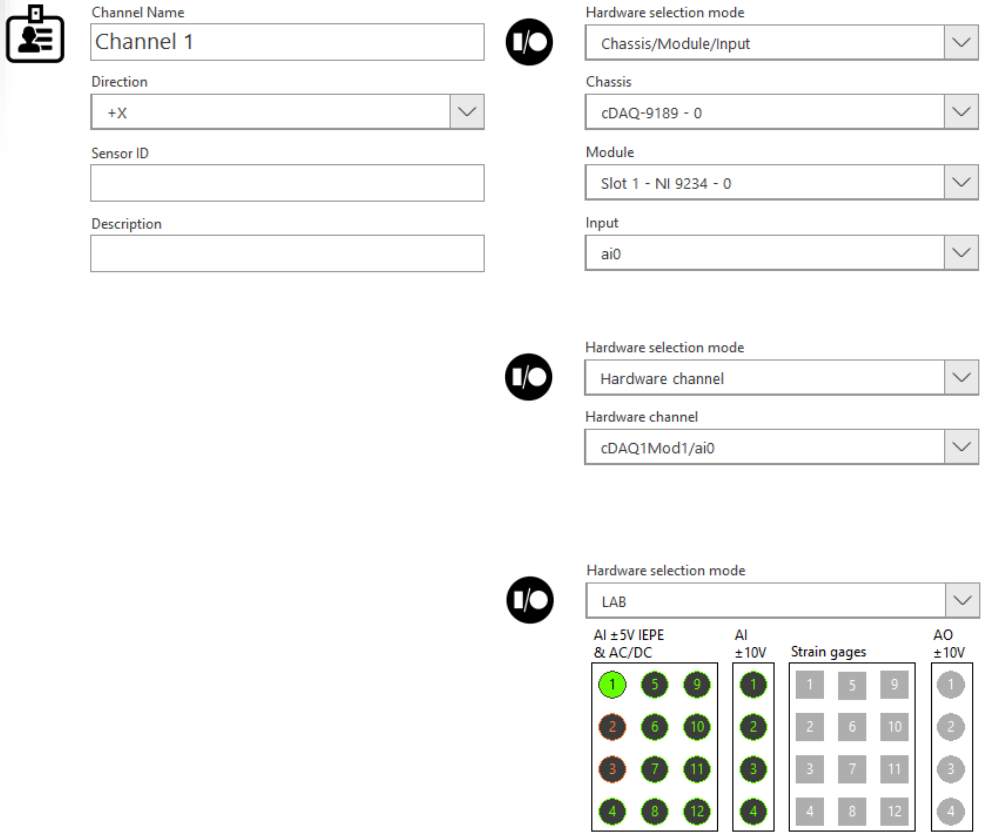
- AI Task: analog in task
  - **Task name**
  - **Description**
  - **Instrument driver:** choose which driver to use; DAQmx by default



- **Acquisition frequency [Hz]:** desired acquisition frequency
- **Actual clock speed [Hz]:** after submission, shows the actual clock speed used by the hardware
- **Warning:** in case the desired acquisition frequency and the actual clock speed are different, you can choose to use the clock speed (the acquisition frequency will change to match the clock speed) or to apply a filter to keep the desired acquisition frequency
- **Bandwidth of interest [Hz]:** equals to the acquisition frequency divided by 2.56, maximum frequency shown in spectral and waterfall modules
- **Channels listbox:** displays all the channels of the task. Choose the channel type to show all the parameters of this type. You can directly modify the parameters in this listbox

Acquisition – Configuration editor – AI Task

- Channel – common parameters
  - **Channel Name**
  - **Direction:** None, +X, -X, +Y, -Y, +Z, -Z
  - **Sensor ID**
  - **Description**

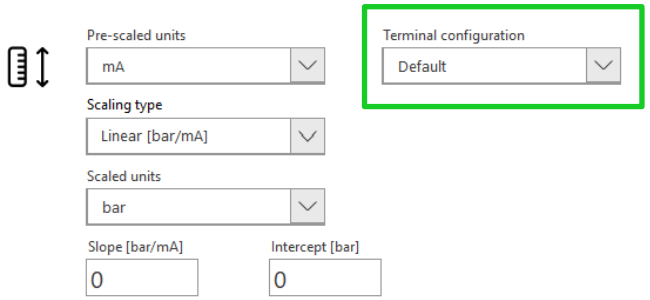


- **Hardware selection mode:** there are three different mode to select the hardware channel:
  - **Chassis/Module/Input:** you can choose separately the chassis, the module and the input
  - **Hardware channel:** you can choose the hardware channel by its LabVIEW channel name
  - **LAB:** if you use the V2i Laboratory Acquisition Box (LAB), you can choose the hardware channel by its position in the LAB front panel.

Selected hardware channel
Hardware channel already used
Selectable hardware channel
Incompatible hardware channel

Acquisition – Configuration editor – AI Task

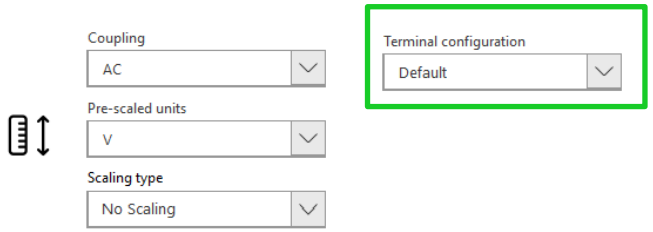
- Current channel
  - **Terminal configuration**
    - **RSE:** Referenced Single-Ended mode
    - **NRSE:** Non-Referenced Single-Ended mode
    - **Differential**
    - **Pseudodifferential**
    - Unavailable modes are surrounded by < >
  - **Pre-scaled units:** choose between mA and A. This unit is used if you choose not to scale and in the scaling data



  - **Scaled units:** you can enter whatever you want
  - **Scaling type**
    - In the following, 'unsc.' corresponds to the pre-scaled unit and 'EU' to the scaled unit
    - **No scaling**
    - **Linear [EU/unsc.]:** enter the slope in [EU/unsc.] and the intercept in [EU]
    - **Linear [unsc./EU] :** enter the slope in [unsc./EU] and the intercept in [unsc.]
    - **Map ranges:** enter the minimum and maximum value in [EU] and the minimum and maximum value in [unsc.]
    - **Polynomial:** enter in an array the terms $a_0, a_1, a_2, \ldots$ of the polynomial equation $y = a_0 + a_1 x + a_2 x^2 + \cdots$ where x is in [unsc.] and y in [EU]
    - **Table:** enter in two arrays the pre-scaled values and the corresponding scaled values. A linear interpolation is applied to the values inbetween

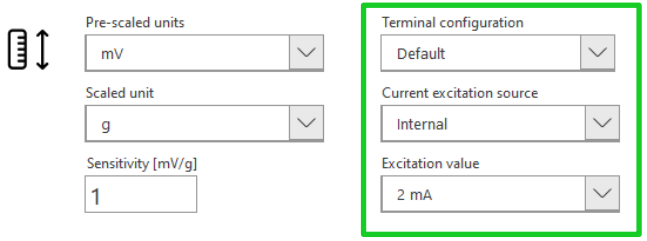
Acquisition – Configuration editor – AI Task

- ⊕ Voltage channel
  - **Terminal configuration, scaled units and scaling type:** see description of current channel
  - **Pre-scaled units:** choose between ‘mV’ and ‘V’
  - **Coupling**
    - **AC:** removes the DC offset from the signal
    - **DC:** measures all of the signal
    - **GND:** removes the signal from the measurement and measures only ground
    - Unavailable couplings are surrounded by < >

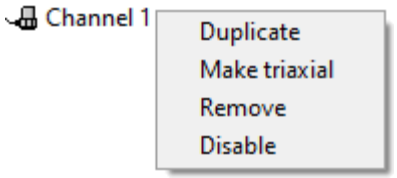


Acquisition – Configuration editor – AI Task

- Accelerometer channel
  - **Pre-scaled units:** choose between ‘mV’ and ‘V’
  - **Scaled units:** choose between ‘g’, ‘m/s²’ and ‘in/s²’
  - **Sensitivity:** enter the sensitivity in the selected units

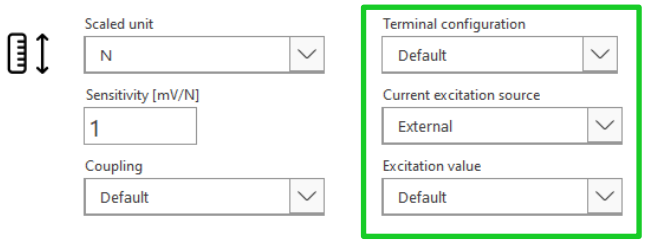


  - **Terminal configuration:** see current channel
  - **Current excitation source:**
    - **External:** use an excitation source other than the built-in excitation source of the device
    - **Internal:** use the built-in excitation source of the device
    - **None:** supply no excitation to the channel
  - **Excitation value:**
    - If ‘External’ is chosen, enter the value of the excitation
    - If ‘Internal’ is chosen, choose between the supplied values or ‘Default’ which will select the maximum value
  - **Make triaxial:** right click on the channel in the tree and click and ‘Make triaxial’. The channel will be twice duplicated and the three channels will have ‘+X’, ‘+Y’ and ‘+Z’ direction respectively



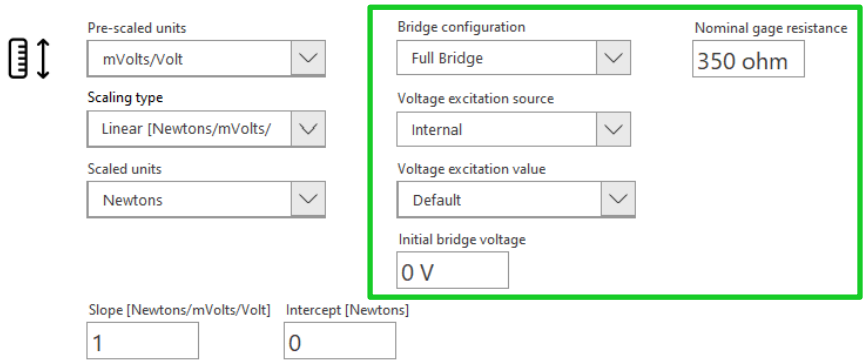
Acquisition – Configuration editor – AI Task

- Force sensor – IEPE
  - **Scaled units:** choose between ‘N’ and ‘lb’
  - **Sensitivity:** enter the sensitivity in the selected units
  - **Coupling:** see voltage channel
  - **Terminal configuration:** see current channel
  - **Current excitation source, excitation value:** see accelerometer channel



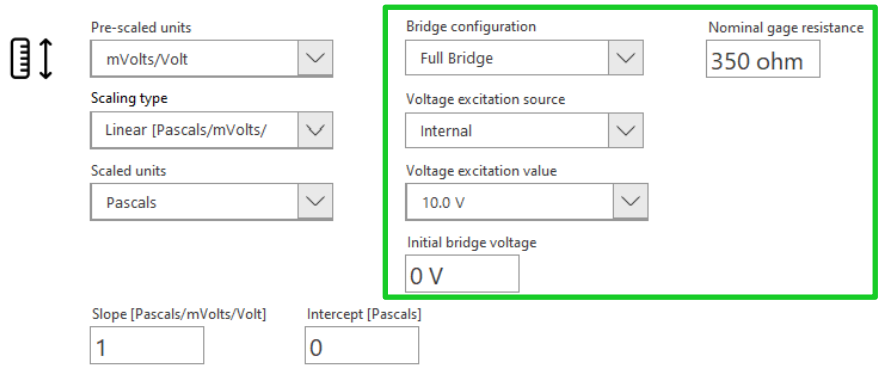
Acquisition – Configuration editor – AI Task

- Force sensor – Bridge channel
  - **Scaling type:** see current channel
  - **Voltage excitation source, voltage excitation value:** see accelerometer channel
  - **Pre-scaled units:** choose between ‘mVolts/Volt’ and ‘Volts/Volt’
  - **Scaled units:** choose between ‘Newton’, ‘Pounds’ and ‘kgf’
  - **Bridge configuration:** choose between ‘full bridge’, ‘half bridge’ and ‘quarter bridge’
  - **Nominal gage resistance:** enter the bridge resistance
  - **Initial bridge voltage:** offset of the bridge voltage to null the bridge. It will be overridden by the null/calib UI



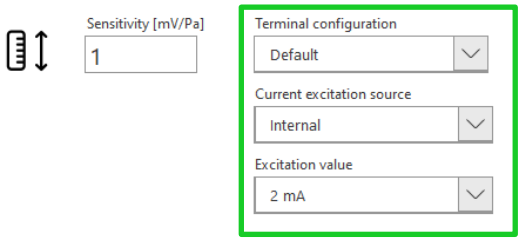
Acquisition – Configuration editor – AI Task

- Pressure – Bridge channel
  - **Scaling type:** see current channel
  - **Voltage excitation source, voltage excitation value:** see accelerometer channel
  - **Pre-scaled units, bridge configuration, initial bridge voltage, nominal gage resistance:** see force sensor – bridge channel
  - **Scaled units:** choose between ‘Pascals’, ‘psi’ and ‘bar’



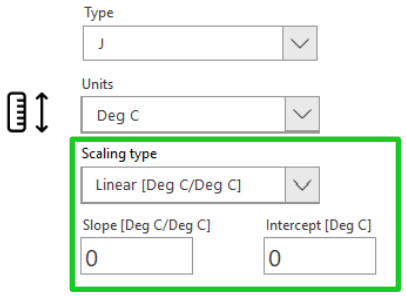
Acquisition – Configuration editor – AI Task

- Microphone channel
  - **Terminal configuration:** see current channel
  - **Voltage excitation source, voltage excitation value:** see accelerometer channel
  - **Sensitivity:** enter sensitivity in [mV/Pa]



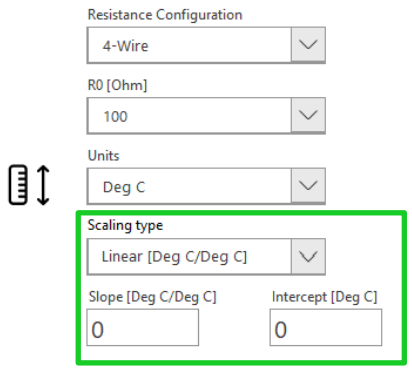
Acquisition – Configuration editor – AI Task

- Thermocouple channel
  - **Scaling type:** see current channel
  - **Type:** choose between ‘J’, ‘K’, ‘N’, ‘R’, ‘S’, ‘T’, ‘B’ and ‘E’
  - **Units:** choose between ‘Deg C’, ‘Deg F’, ‘K’



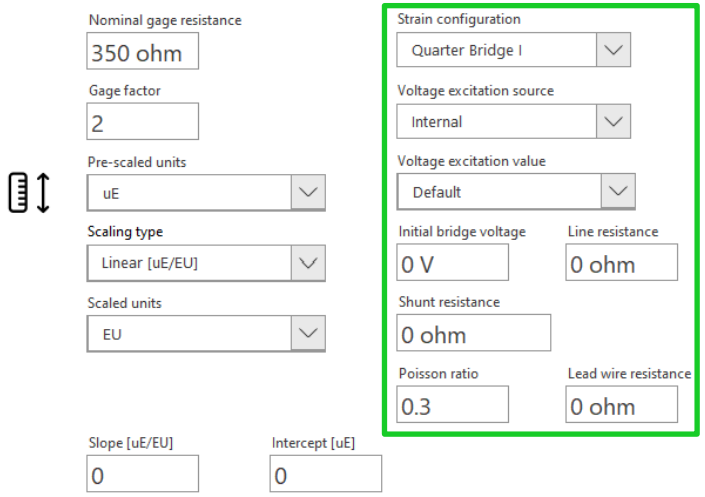
Acquisition – Configuration editor – AI Task

- RTD channel
  - **Scaling type:** see current channel
  - **Resistance configuration:** choose between '2-Wire', '3-Wire' and '4-Wire'
  - **R0 [Ohm]:** choose between '100' and '1000'
  - **Units:** choose between 'Deg C', 'Deg F', 'K'

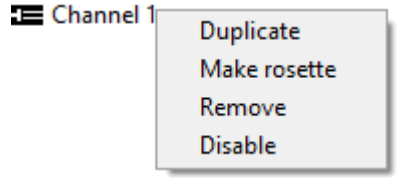


Acquisition – Configuration editor – AI Task

- Strain gage channel
  - **Nominal gage resistance**
  - **Gage factor**
  - **Pre-scaled units:** choose between ‘uE’ and ‘E’
  - **Scaling type, scaled units:** see current channel
  - **Voltage excitation source, voltage excitation value:** see accelerometer channel

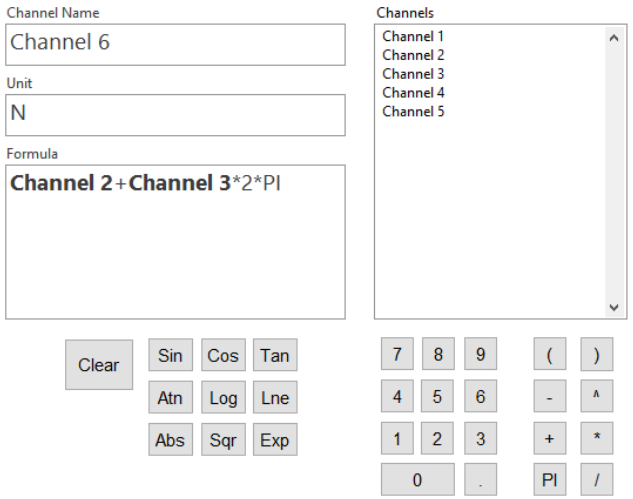


- **Strain configuration:** choose between ‘Full bridge I’, ‘Full bridge II’, ‘Full bridge III’, ‘Half bridge I’, ‘Half bridge II’, ‘Quarter bridge I’ and ‘Quarter bridge II’
- **Initial bridge voltage:** offset of the bridge voltage to null the bridge. It will be overridden by the null/calib UI
- **Line resistance:** line resistance of the bridge to calibrate it. It will be overridden by the null/calib UI
- **Shunt resistance:** depending of the device used
- **Poisson ratio**
- **Lead wire resistance**
- **Make rosette:** right click on the channel in the tree and click and ‘Make rosette’. The channel will be twice duplicated and a rosette channel will be created



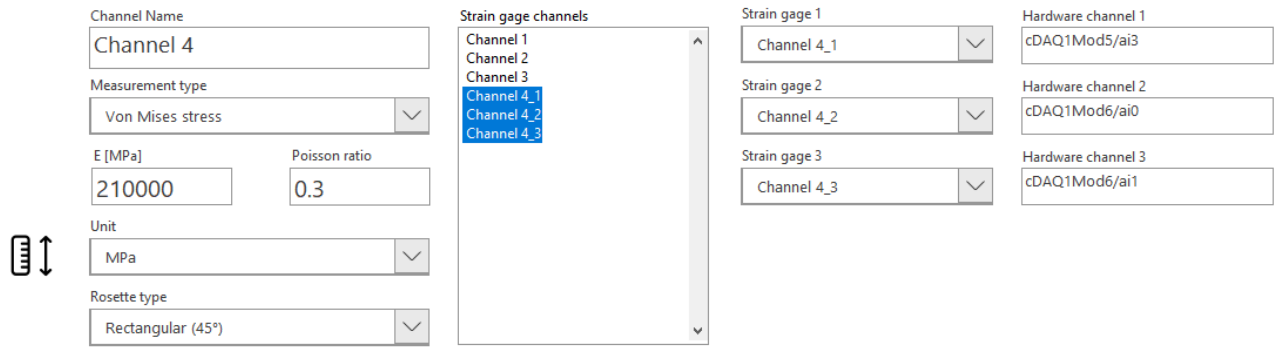
Acquisition – Configuration editor – AI Task

- Formula channel
  - This channel is a virtual channel computed from other channels. It is not bound to a hardware channel
  - **Channel name**
  - **Unit**
  - **Channels:** list of channels of the current task. Click on one channel to put it in the formula. Only the channels on top of the formula channel can be selected
  - **Formula:** the names of available channels are in bold. You can write the formula or use the buttons hereunder
  - **Clear:** clear the formula

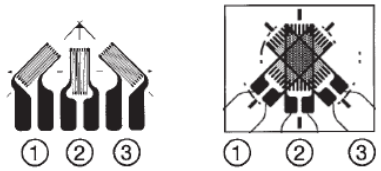


Acquisition – Configuration editor – AI Task

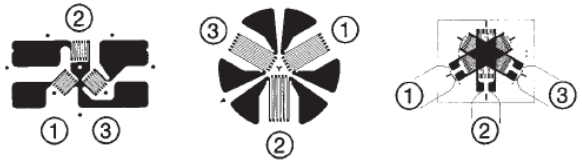
- Rosette channel
  - This channel is a virtual channel computed from other channels. It is not bound to a hardware channel
  - **E [MPa]:** Young modulus
  - **nu:** Poisson ratio
  - **Unit:**
    - ‘uE’ or ‘E’ if strain
    - ‘deg’ or ‘rad’ if angle
    - ‘MPa’ or ‘Pa’ if stress



  - **Rosette type:**
    - **rectangular (45°)**



    - **delta (120°)**



  - **Strain gage channels:** select using the listbox (multiple select using CTRL + click or SHIFT + click) or using the comboboxes ‘Strain gage 1’, ‘Strain gage 2’ and ‘Strain gage 3’. Respect the numbering of the schemas hereabove

Acquisition – Configuration editor – AI Task

- Rosette channel
  - **Measurement type:** for rectangular (45°) rosette
    - **Principal strain 1 ε_P and Principal strain 2 ε_Q**

$$\varepsilon_{P,Q} = \frac{\varepsilon_1 + \varepsilon_3}{2} \pm \frac{1}{\sqrt{2}}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + (\varepsilon_2 - \varepsilon_3)^2}$$

    - **Principal stress 1 σ_P and Principal stress 2 σ_Q**

$$\sigma_{P,Q} = \frac{E}{2}\left[\frac{\varepsilon_1 + \varepsilon_3}{1-\nu} \pm \frac{\sqrt{2}}{1+\nu}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + (\varepsilon_2 - \varepsilon_3)^2}\right]$$

- **Von Mises strain**

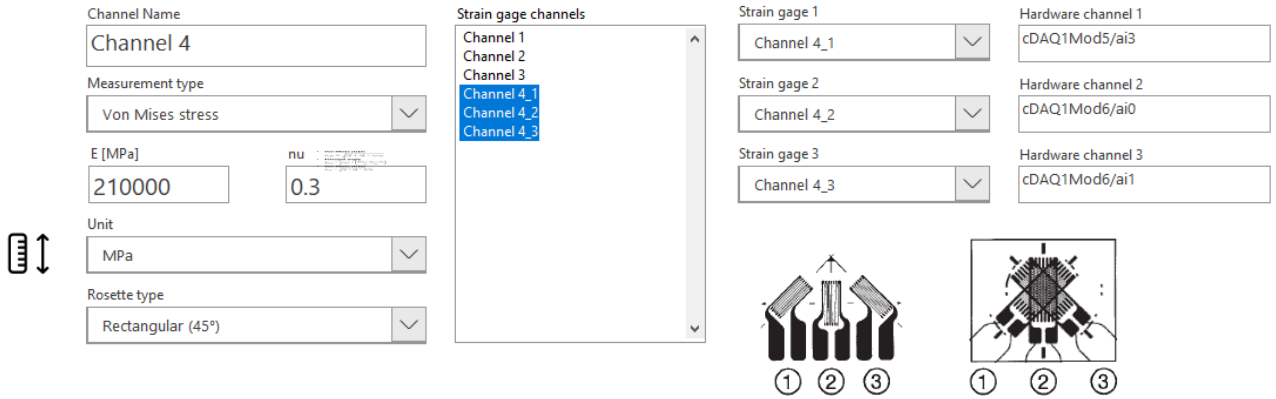
$$\varepsilon_{VM} = \sqrt{\varepsilon_P^2 + \varepsilon_Q^2 - \varepsilon_P \varepsilon_Q}$$

- **Principal angle**

$$\phi_{P,Q} = \frac{1}{2}\tan^{-1}\left(\frac{2\varepsilon_2 - \varepsilon_1 - \varepsilon_3}{\varepsilon_1 - \varepsilon_3}\right)$$

- **Von Mises stress**

$$\sigma_{VM} = \sqrt{\sigma_P^2 + \sigma_Q^2 - \sigma_P \sigma_Q}$$



Acquisition – Configuration editor – AI Task

- Rosette channel
  - **Measurement type:** for delta (120°) rosette
    - **Principal strain 1 ε_P and Principal strain 2 ε_Q**

$$\varepsilon_{P,Q} = \frac{\varepsilon_1 + \varepsilon_2 + \varepsilon_3}{3} \pm \frac{\sqrt{2}}{3}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + (\varepsilon_2 - \varepsilon_3)^2 + (\varepsilon_3 - \varepsilon_1)^2}$$

    - **Principal stress 1 $\sigma_P$and Principal stress 2 σ_Q**

$$\sigma_{P,Q} = \frac{E}{3}\left[\frac{\varepsilon_1 + \varepsilon_2 + \varepsilon_3}{1 - \nu} \pm \frac{\sqrt{2}}{1 + \nu}\sqrt{(\varepsilon_1 - \varepsilon_2)^2 + (\varepsilon_2 - \varepsilon_3)^2 + (\varepsilon_3 - \varepsilon_1)^2}\right]$$

- **Von Mises strain**

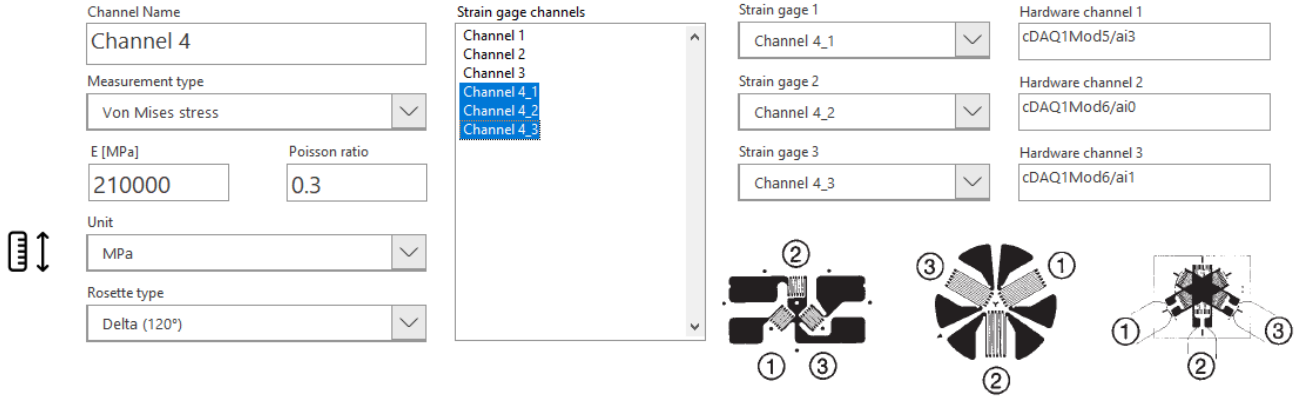
$$\varepsilon_{VM} = \sqrt{\varepsilon_P^2 + \varepsilon_Q^2 - \varepsilon_P \varepsilon_Q}$$

- **Principal angle**

$$\phi_{P,Q} = \frac{1}{2}\tan^{-1}\left(\frac{\sqrt{3}(\varepsilon_2 - \varepsilon_3)}{2\varepsilon_1 - \varepsilon_2 - \varepsilon_3}\right)$$

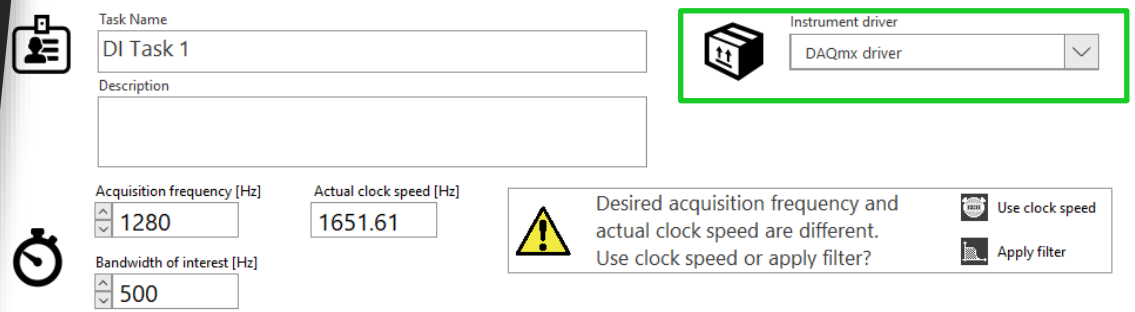
- **Von Mises stress**

$$\sigma_{VM} = \sqrt{\sigma_P^2 + \sigma_Q^2 - \sigma_P \sigma_Q}$$



Acquisition – Configuration editor – DI Task

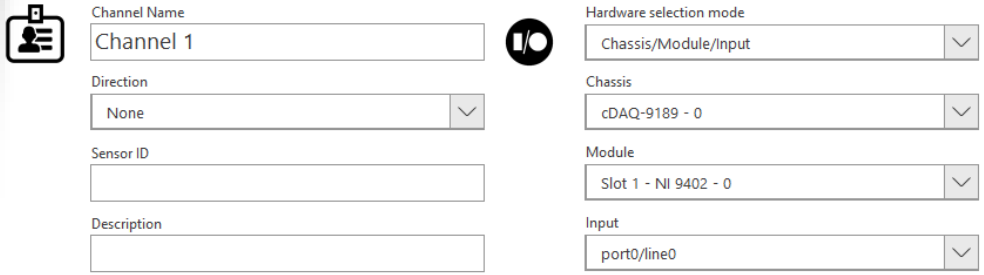
- DI Task: digital in task
  - **Task name**
  - **Description**
  - **Instrument driver:** choose which driver to use; DAQmx by default



- **Acquisition frequency [Hz]:** desired acquisition frequency
- **Actual clock speed [Hz]:** after submission, shows the actual clock speed used by the hardware
- **Warning:** in case the desired acquisition frequency and the actual clock speed are different, you can choose to use the clock speed (the acquisition frequency will change to match the clock speed) or to apply a filter to keep the desired acquisition frequency
- **Bandwidth of interest [Hz]:** equals to the acquisition frequency divided by 2.56, maximum frequency shown in spectral and waterfall modules

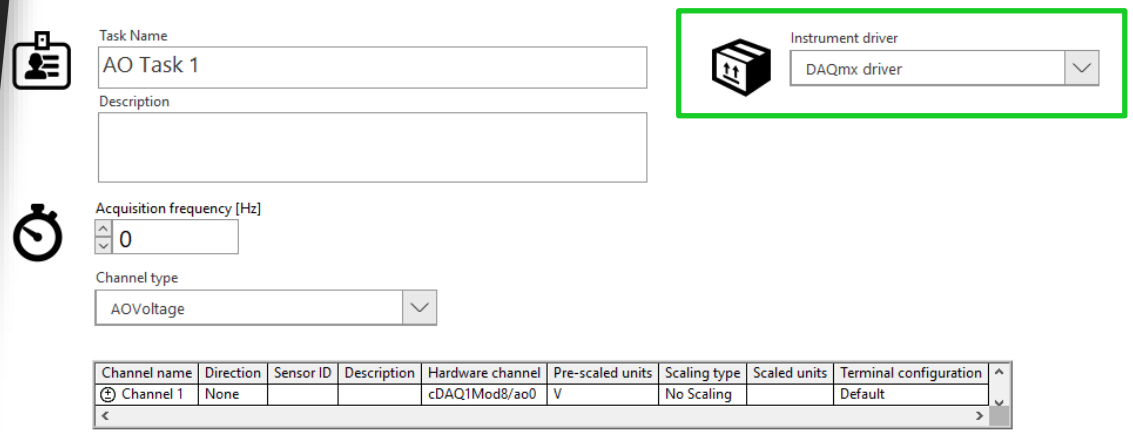
Acquisition – Configuration editor – DI Task

- Line Channel
  - See common parameters



Acquisition – Configuration editor – AO Task

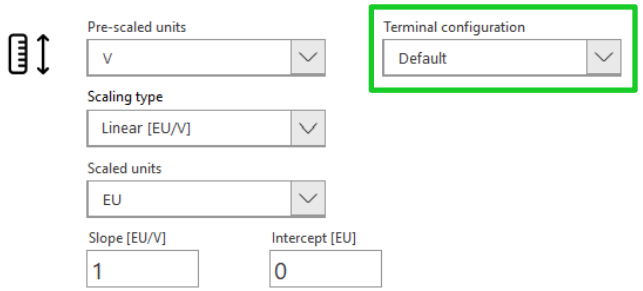
- AO Task: analog out task
  - **Task name**
  - **Description**
  - **Instrument driver:** choose which driver to use; DAQmx by default



  - **Acquisition frequency [Hz]:** desired acquisition frequency. You can set it to zero if you want to set the voltage asynchronously
  - **Channels listbox:** displays all the channels of the task. Choose the channel type to show all the parameters of this type. You can directly modify the parameters in this listbox

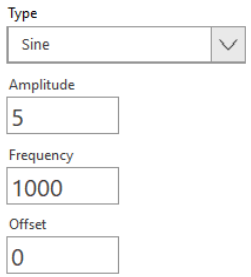
Acquisition – Configuration editor – AO Task

- AO Voltage channel
  - **Pre-scaled units:** Choose between ‘mV’ and ‘V’. This unit is used if you choose not to scale and in the scaling data
  - **Scaling type, scaled units:** see current channel
  - **Terminal configuration**
    - **RSE:** Referenced Single-Ended mode
    - **Differential**
    - **Pseudodifferential**
    - Unavailable modes are surrounded by < >



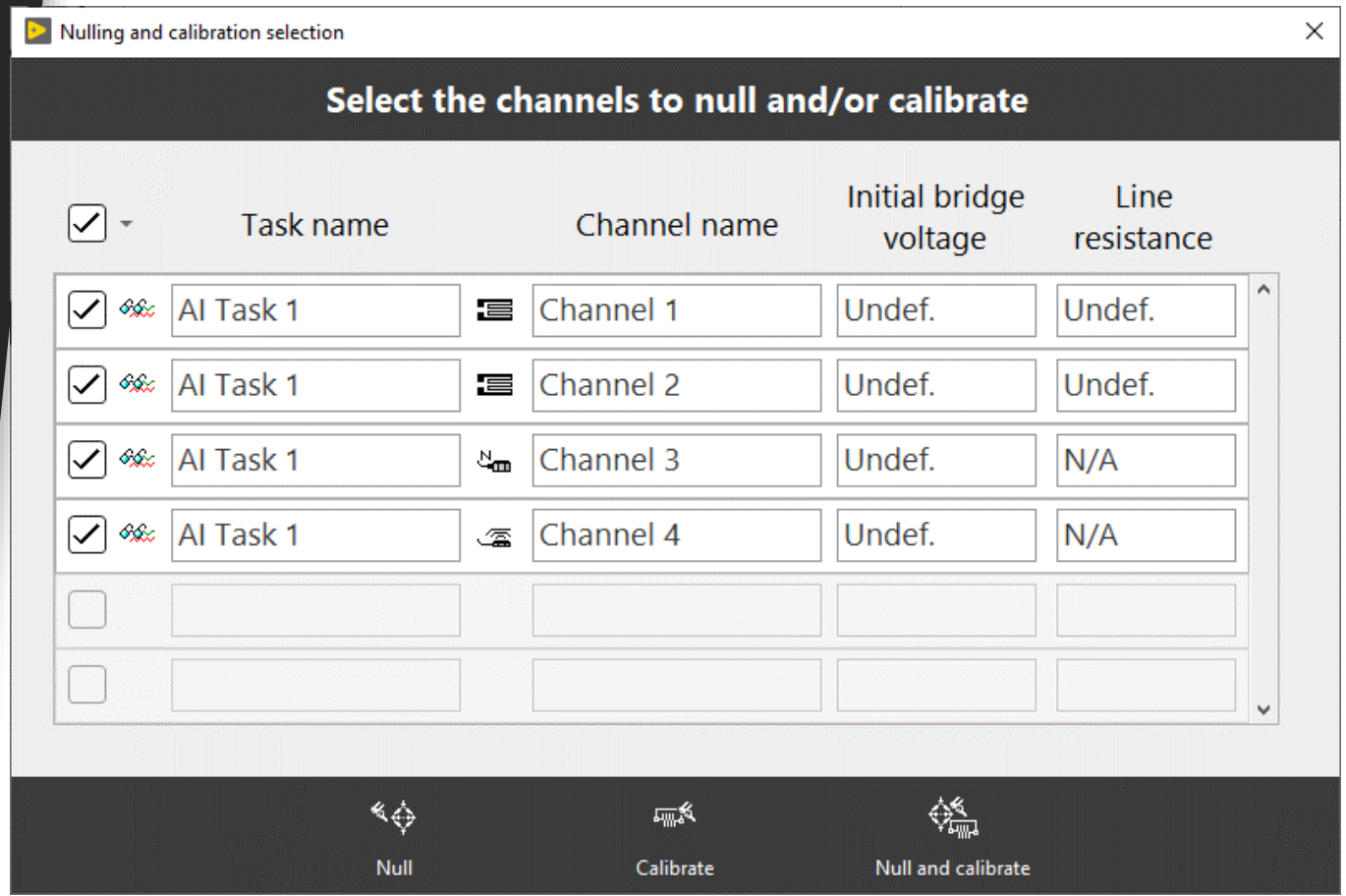
Acquisition – Configuration editor – AO Task

- AO Function generation channel
  - **Type:** choose between ‘Sine’, ‘Triangle’, ‘Square’ and ‘Sawtooth’
  - **Amplitude [V]**
  - **Frequency [Hz]**
  - **Offset[V]**



Acquisition – Configuration editor

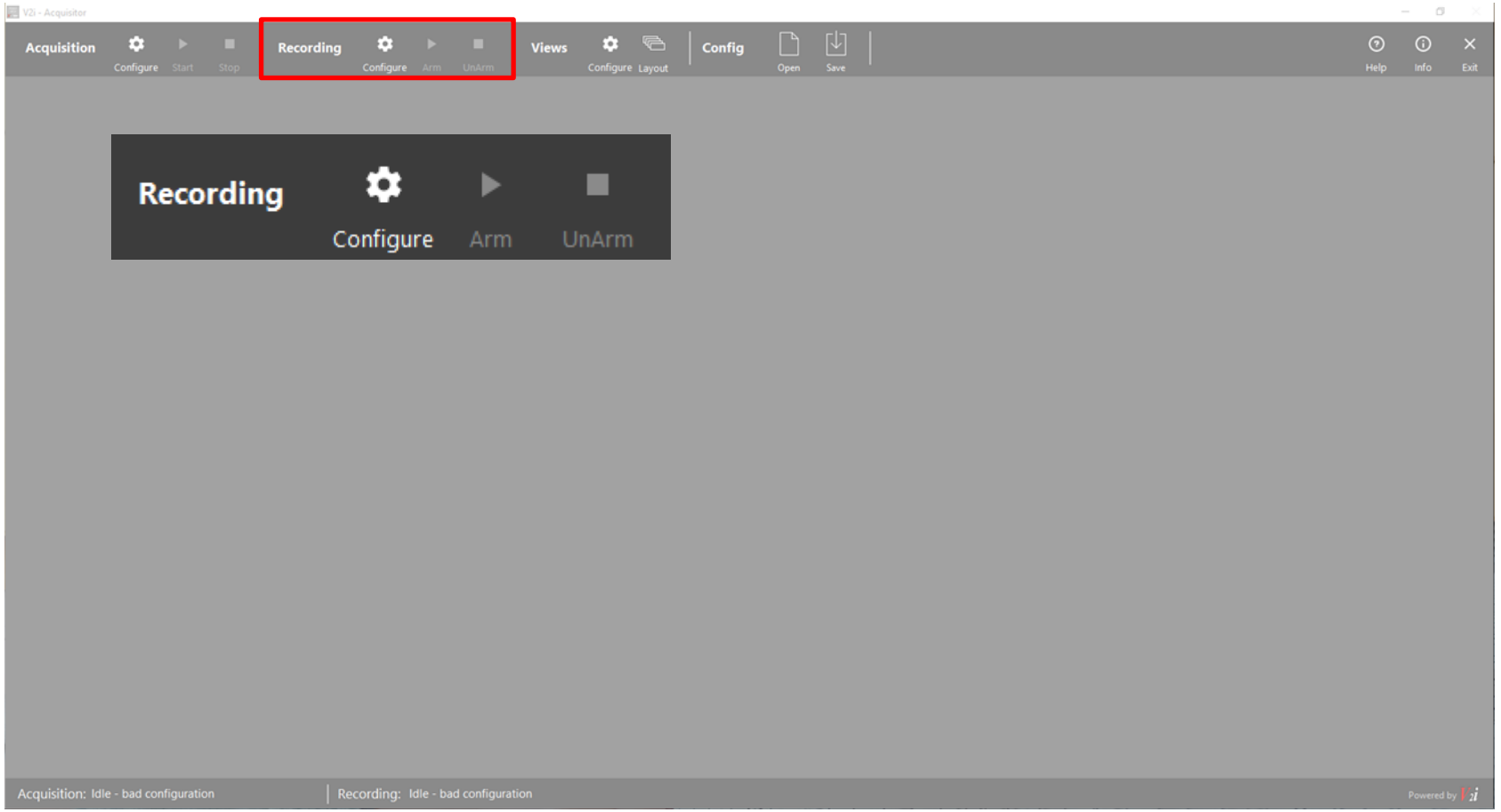
- Null/calib UI
  - After submission of a configuration containing ‘Strain gage’, ‘Force sensor – Bridge’ or ‘Pressure – Bridge’, you can open the Null/calib UI



  - You can select the channels to null or calibrate either by clicking on the checkboxes on the left or by clicking the arrow on the top left and choosing between ‘None’, ‘All’ or all the channels for a given task
  - Click then on ‘Null’, ‘Calibrate’ or ‘Null and calibrate’
  - After nulling, the column ‘Initial bridge voltage’ will be filled
    - Undef.: nulling not already done
    - Error: error during nulling
  - After calibrating, the column ‘Line resistance’ will be filled
    - Undef.: calibration not already done
    - Error: error during calibration
    - N/A: not applicable, when the channel is a ‘Force sensor – Bridge’ or a ‘Pressure – Bridge’

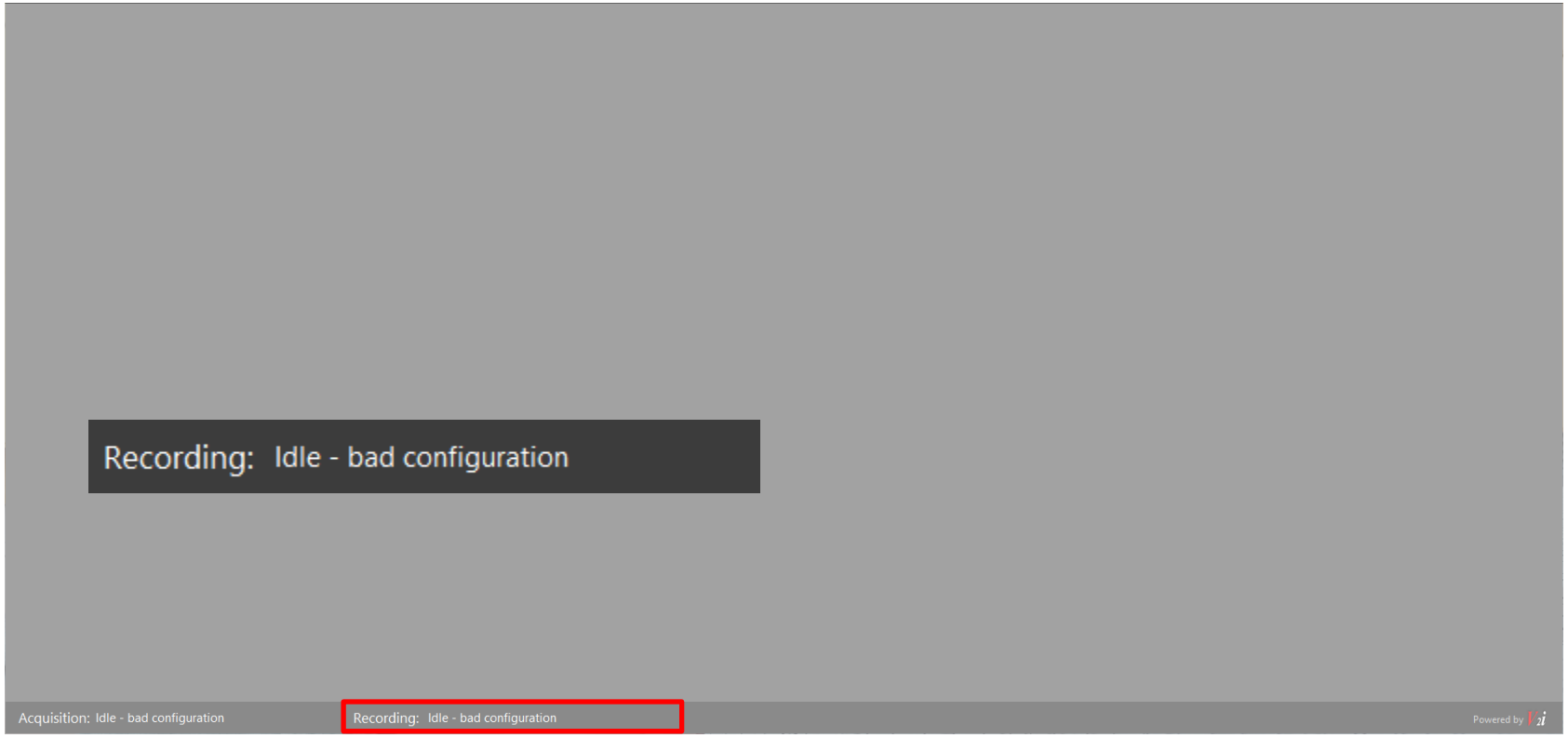
Recording – Controls

- The acquisition menu bar includes three controls
  - **Configure:** launches the recording configuration editor
  - **Arm:** starts waiting for a trigger. The data is recorded as soon as the trigger condition is met
  - **UnArm:** stops waiting for a trigger (no recording in progress) or stops the current recording



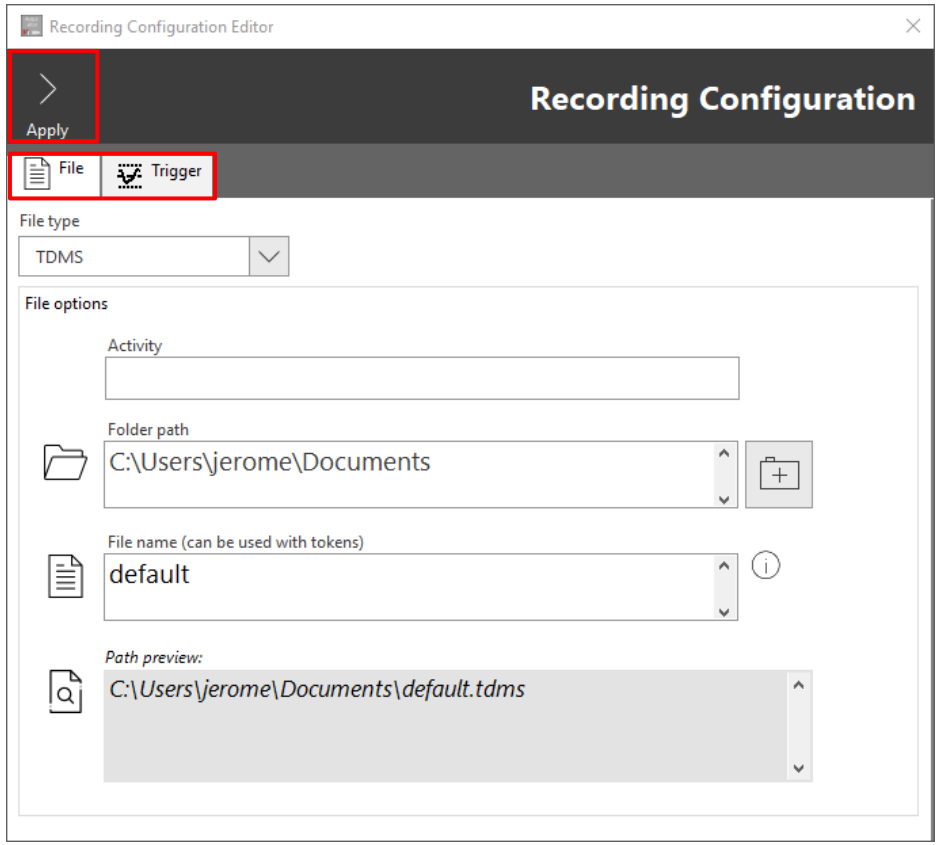
Recording – Status

- The recording status bar contains the status of the recorder
  - **Idle – bad configuration:** configuration not valid; check the configuration editor
  - **Idle:** configuration valid; press arm to start waiting for a trigger
  - **Armed waiting for trigger:** the recorder waits for the configured trigger start condition
  - **Recording:** the acquired data is being recorded



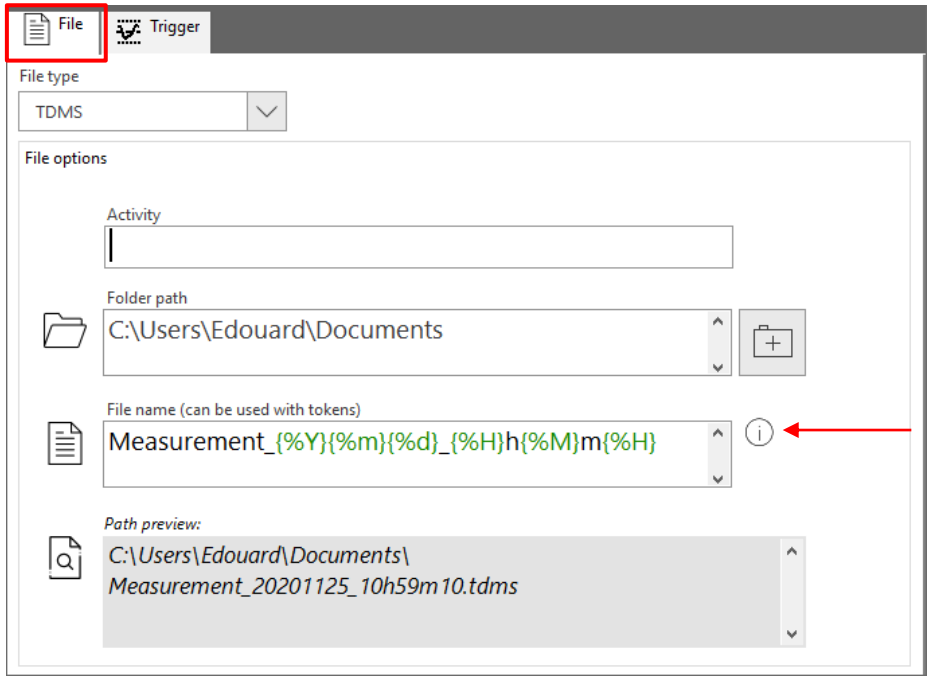
Recording – Configuration editor

- The recording configurator is made of a menu bar and two tabs
  - **Apply:** submits the recording configuration
  - **File:** opens the file configuration tab, which configures **where** the data is saved
  - **Trigger:** opens the trigger configuration, which configures **when** the data is saved



Recording – Configuration editor – File Configuration

- The **file** tab is used to define **where** the data is saved. The following options are available:
  - **File type:** the output data format. Only TDMS is available so far
  - **Activity:** a general metadata that is written in the TDMS file
  - **Folder path:** the folder where the TDMS file is saved
  - **File name:** the name of the TDMS file. Tokens are available to use dynamic names which are automatically generated. In this example, the year, month, day, and time of the day at which each recording is started is automatically generated. A token helper is available (see next page)
  - **Path preview:** a preview of the complete save path, including the tokens.

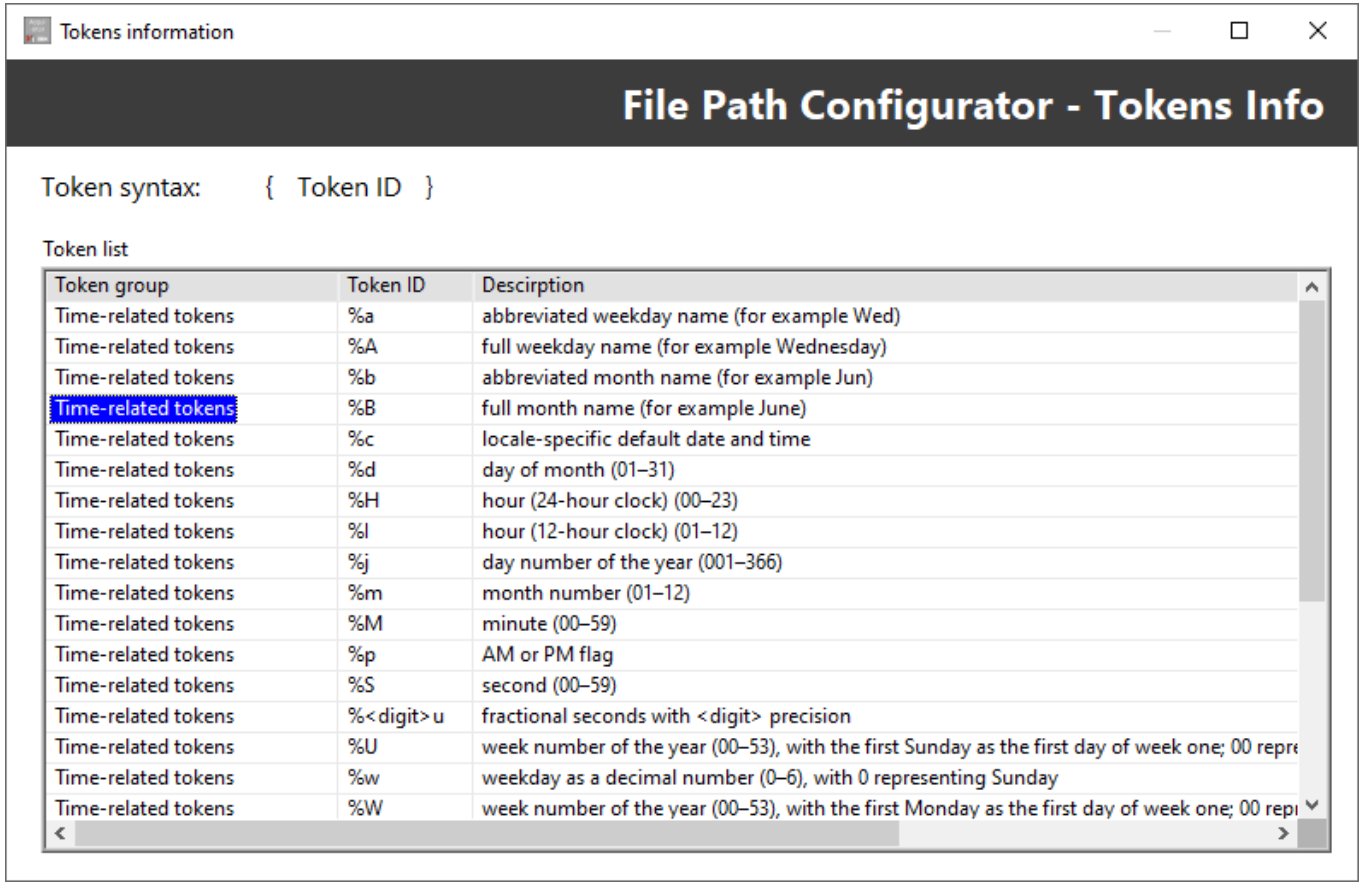


token helper

Recording – Configuration editor – Token helper

The token helper displays all the available tokens.

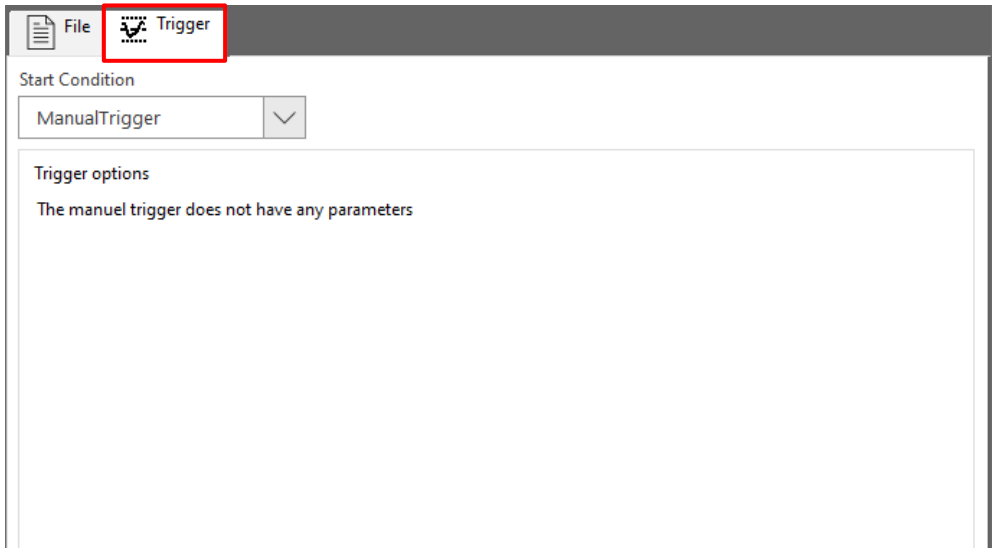
Double clicking on a token automatically inserts the token in the **File name** field of the file configuration editor, at the location where the cursor was before selecting the token helper.



Token group	Token ID	Descirption
Time-related tokens	%a	abbreviated weekday name (for example Wed)
Time-related tokens	%A	full weekday name (for example Wednesday)
Time-related tokens	%b	abbreviated month name (for example Jun)
Time-related tokens	%B	full month name (for example June)
Time-related tokens	%c	locale-specific default date and time
Time-related tokens	%d	day of month (01–31)
Time-related tokens	%H	hour (24-hour clock) (00–23)
Time-related tokens	%I	hour (12-hour clock) (01–12)
Time-related tokens	%j	day number of the year (001–366)
Time-related tokens	%m	month number (01–12)
Time-related tokens	%M	minute (00–59)
Time-related tokens	%p	AM or PM flag
Time-related tokens	%S	second (00–59)
Time-related tokens	%<digit>u	fractional seconds with <digit> precision
Time-related tokens	%U	week number of the year (00–53), with the first Sunday as the first day of week one; 00 repre
Time-related tokens	%w	weekday as a decimal number (0–6), with 0 representing Sunday
Time-related tokens	%W	week number of the year (00–53), with the first Monday as the first day of week one; 00 repr

Recording – Configuration editor – Trigger Configuration

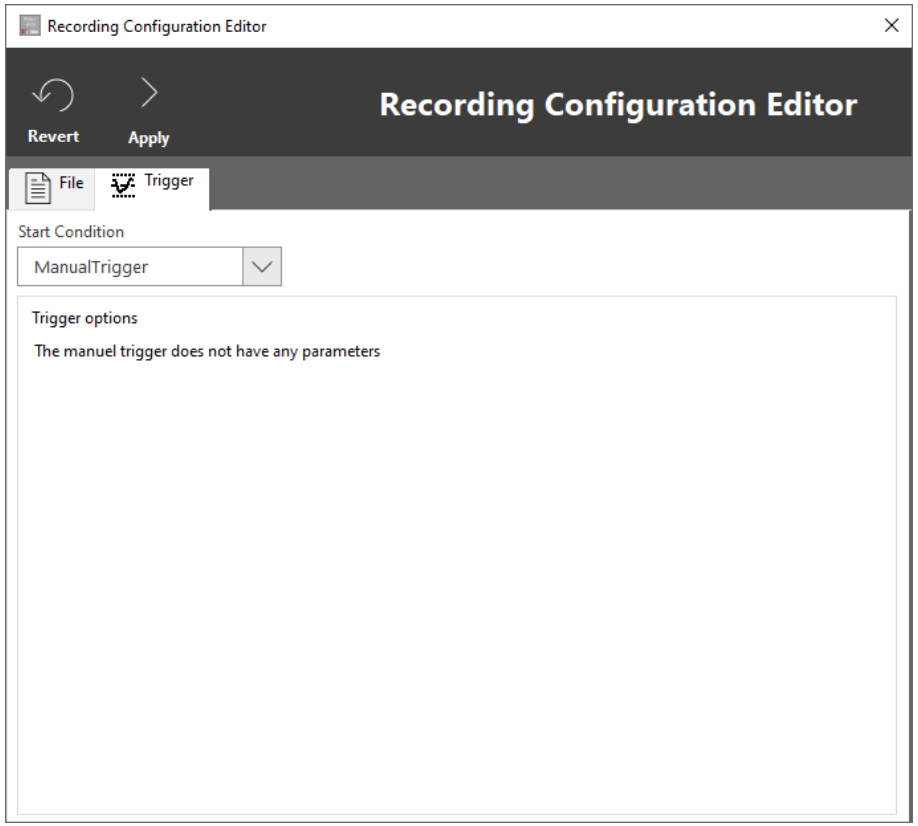
- The **trigger** configuration tab is used to define **when** the data is saved. The trigger type is selected via the **Start Condition** tab. Specific trigger conditions can be configured when applicable via the UI.
  - **Manual trigger** (manual start & stop)
  - **Time trigger** (manual start, stop after a selected duration)
  - **Periodic time trigger** (measures XX seconds each YY seconds)
  - **Gate trigger** (measures while the amplitude is above/below a given level)
  - **Gate and time trigger** (measures for XX seconds once the amplitude reaches a given level)



Selected trigger configuration

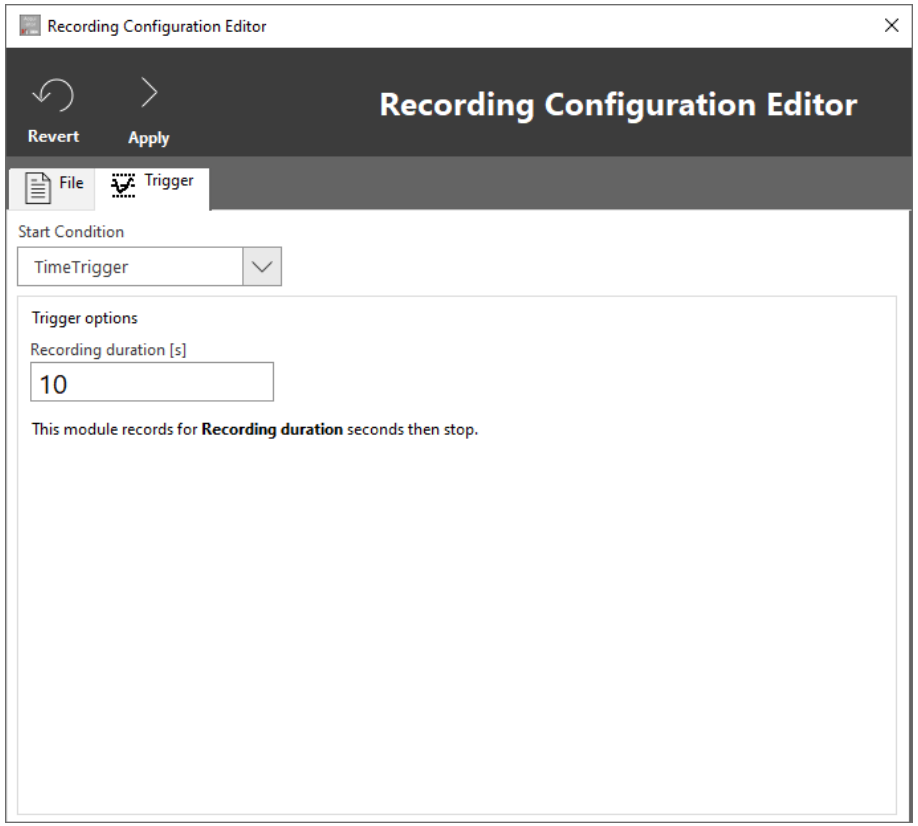
Recording – Configuration editor – Trigger Configuration

- Manual trigger: the recording is started and stopped via the **Arm** and **UnArm** buttons.



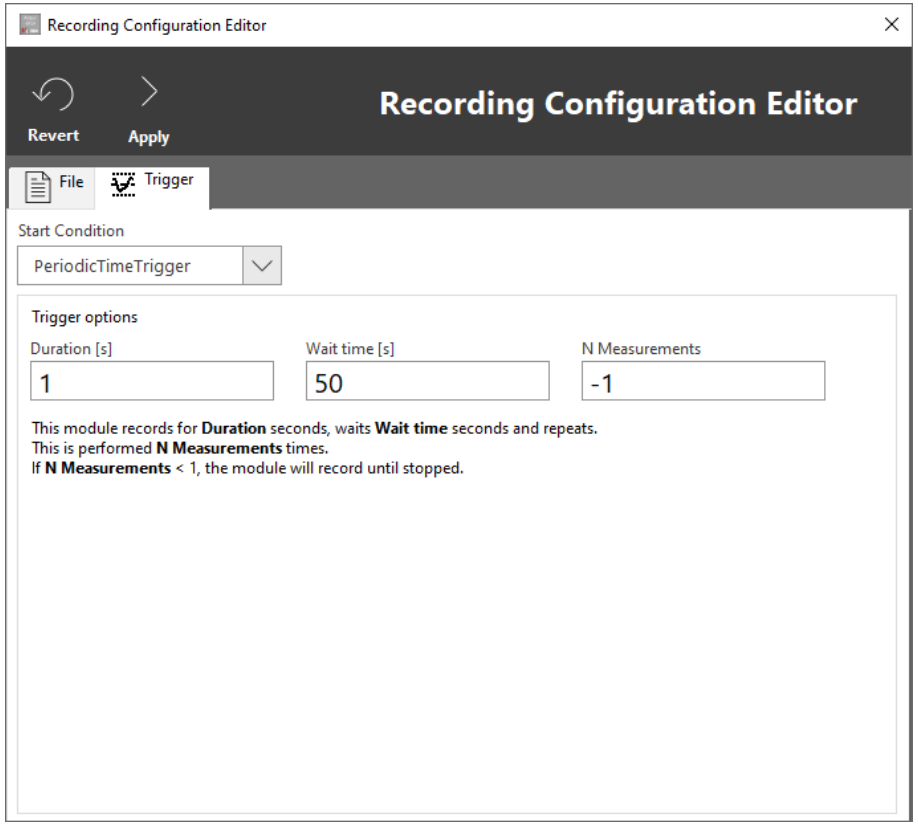
Recording – Configuration editor – Trigger Configuration

- Time trigger: the recording is stated via the **Arm** button and stops after the user defined duration or via the **UnArm** button.



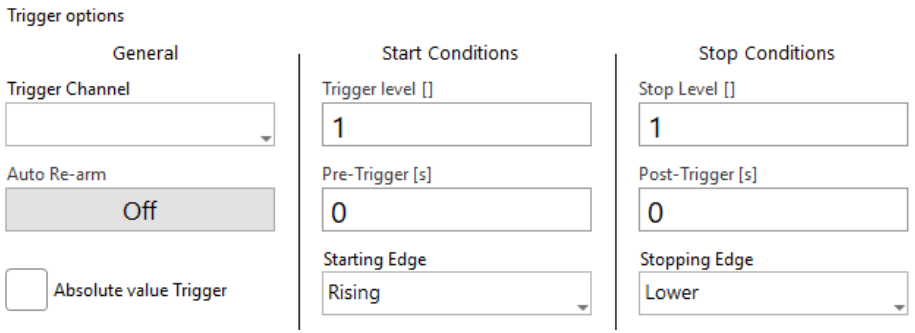
Recording – Configuration editor – Trigger Configuration

- Periodic Time trigger: measurements are performed periodically. The following options are available:
  - **Duration**: specifies the duration of each recording, in seconds
  - **Wait time**: specifies the amount of time to wait between two successive recordings, in seconds
  - **N Measurements**: specifies the amount of recordings to perform. If a negative value is used, the system won't stop until it is manually unarmed.



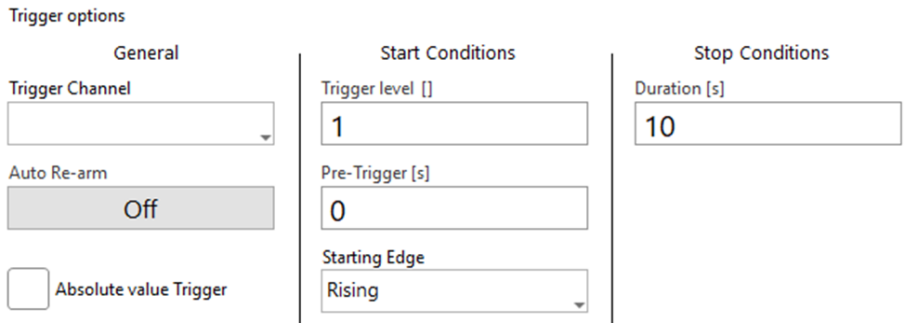
Recording – Configuration editor – Trigger Configuration

- Gate trigger: the system starts recording once the trigger condition is met and records as long as the amplitude is above or below a threshold. The following options are available:
  - **Trigger channel**: the acquisition channel user to start/stop recording
  - **Auto Re-arm**: the recorder starts looking for a new trigger once a stop trigger has been found
  - **Absolute value Trigger**: the absolute value of the channel is compared with the trigger level
  - **Trigger level**: the level which the trigger channel must reach to start recording
  - **Pre-Trigger**: the duration of the pre-trigger (measurements occurring before the trigger occurs)
  - **Starting Edge**: specifies if the system looks for a value above or below the trigger level
  - **Stop level**: the level which the trigger channel must reach to stop recording
  - **Post-Trigger**: the duration during which the trigger channel must remain below/above the stop level to stop the recording
  - **Stopping Edge**: specifies if the system looks for a value above or below the stop trigger level



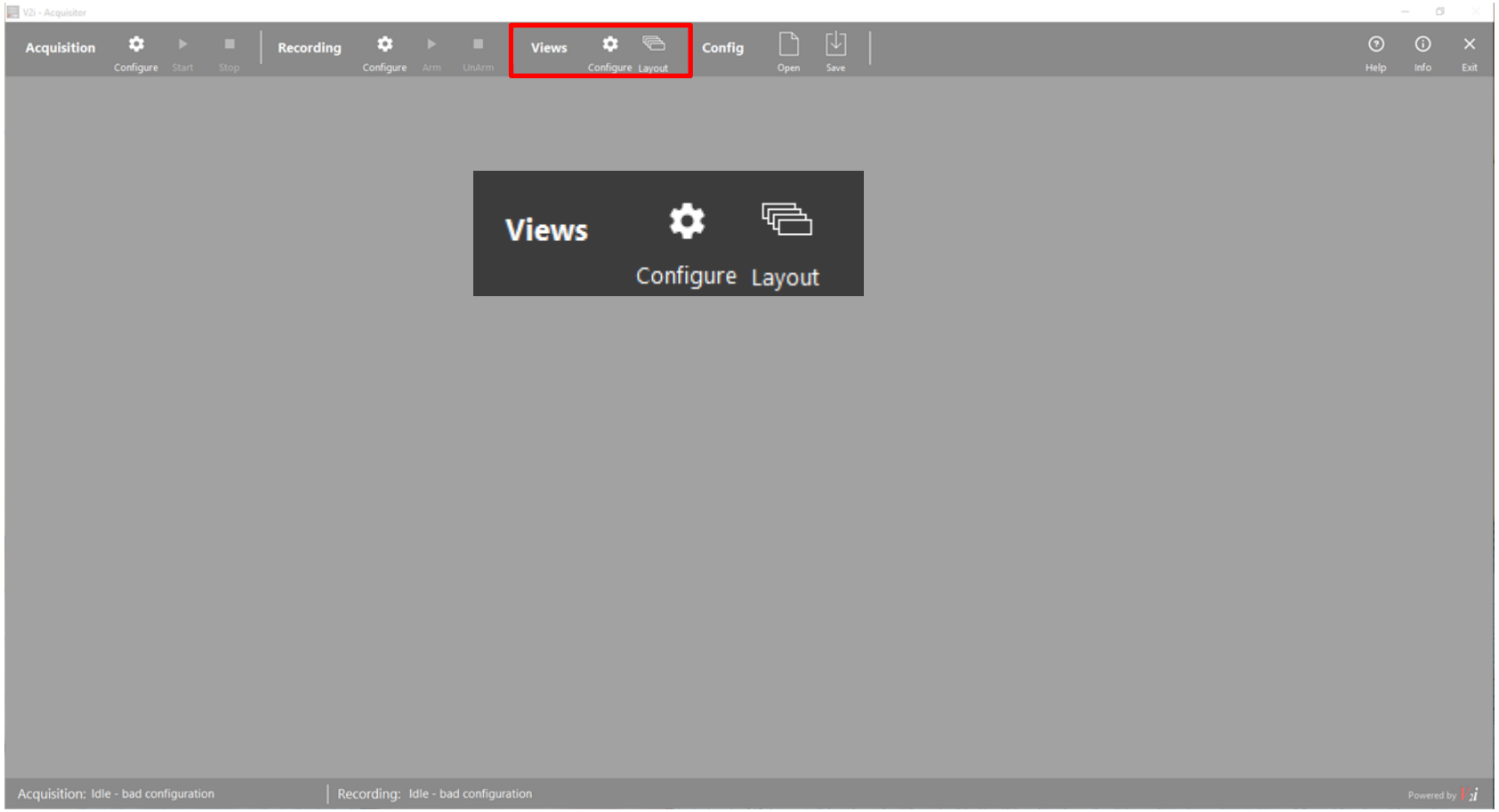
Recording – Configuration editor – Trigger Configuration

- Gate and time trigger: the system starts recording for a given duration once the amplitude reaches a treshold
  - **Trigger channel**: the acquisition channel user to start recording
  - **Auto Re-arm**: the recorder starts looking for a new trigger once a measurement is finished
  - **Absolute value Trigger**: the absolute value of the channel is compared with the trigger level
  - **Trigger level**: the level which the trigger channel must reach to start recording
  - **Pre-Trigger**: the duration of the pre-trigger (measurements occurring before the trigger occurs)
  - **Starting Edge**: specifies if the system looks for a value above or below the trigger level
  - **Duration**: the duration of each measurement, including the pre-trigger.



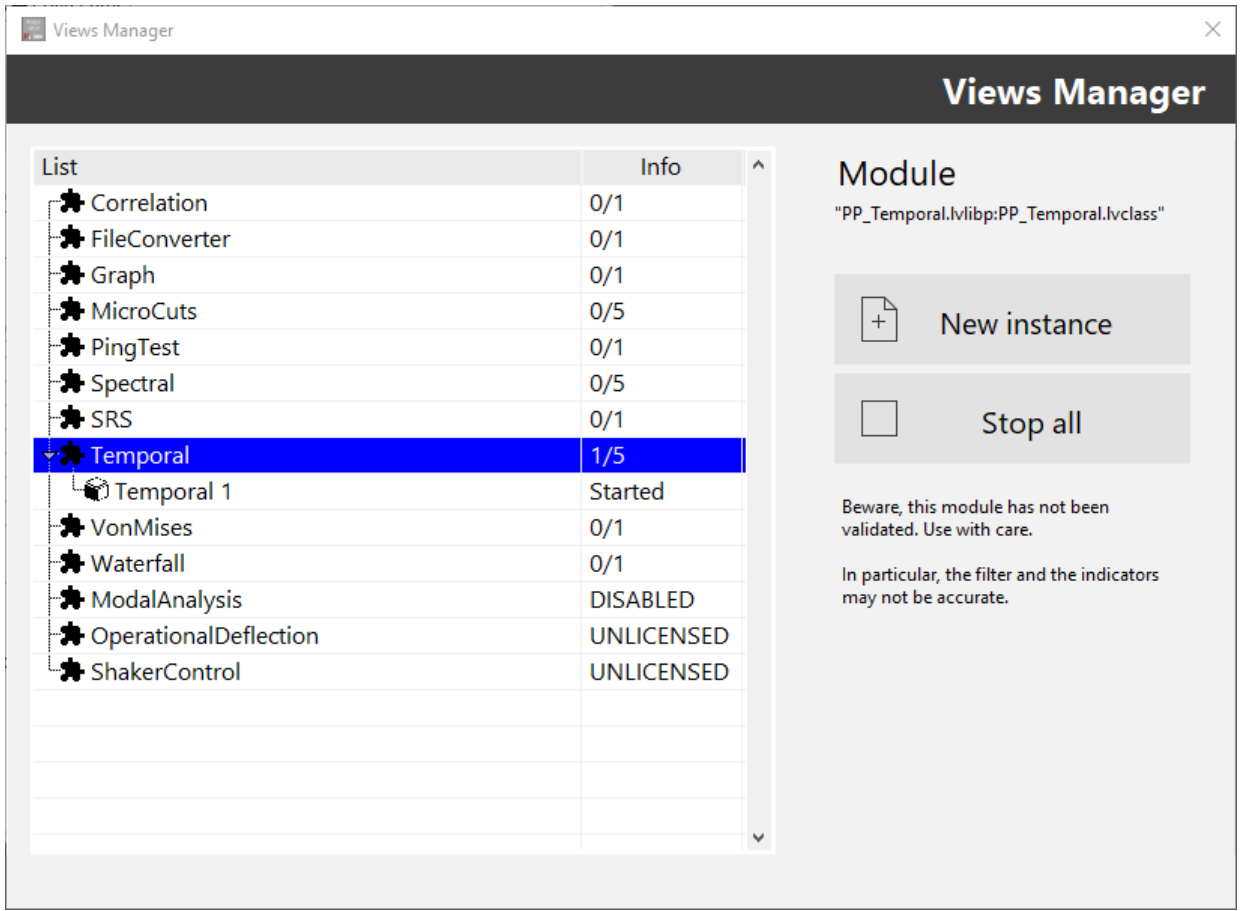
Views – Controls

- The views menu bar includes two controls
  - **Configure:** launches the views manager
  - **Layout:** changes the layout of the windows



Views – Views manager

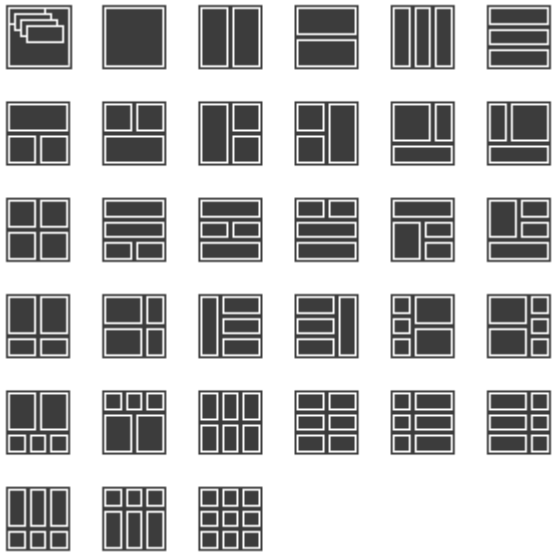
- The Views manager allows to start and stop instances of modules
  - The list on the left indicates the available modules and the number of instances started



  - Click on a module and 'New instance' to start an instance of the module
  - Click on an instance and 'Stop' or on a module and 'Stop all' to stop the instances of the module
  - If the module is disabled, make sure that the corresponding library is in the '%localappdata%\V2iAcquisitor\PPL\Plugin' folder
  - If the module is unlicensed and you want to activate it, send an email to acquisitor@v2i.be and specify your license parameters and the modules you want to activate

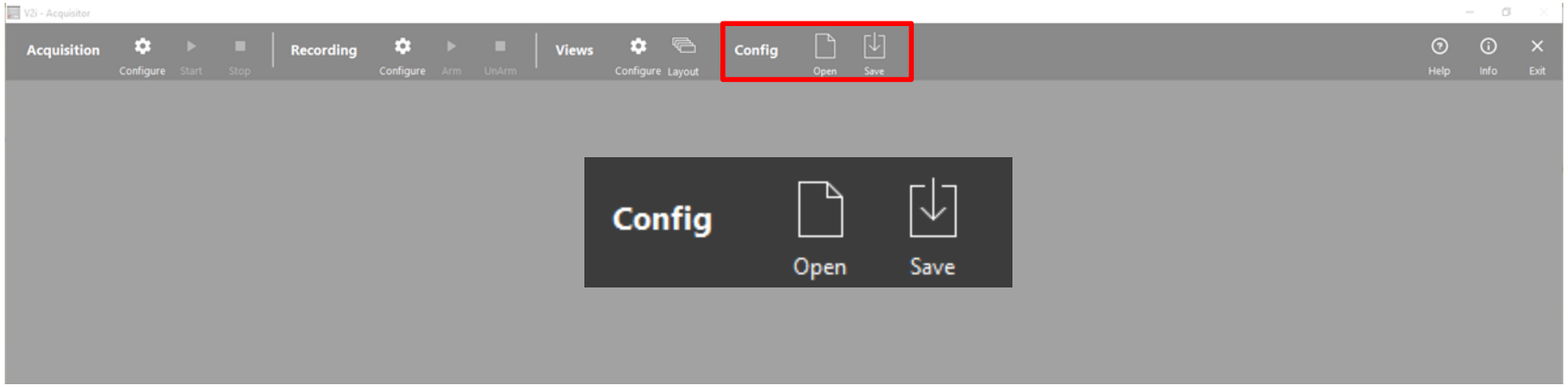
Views – Layout

- The Layout button allows you to change the windows layout
  - You can choose between 33 different layout
  - If there are more windows than on the layout, the remaining windows will be put in cascade mode

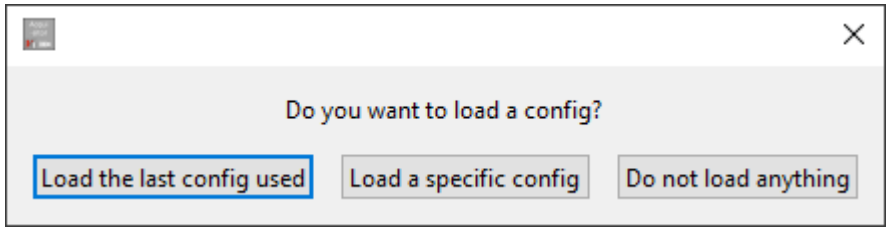


Config

- The config menu bar includes two controls
  - **Open:** opens a file dialog to select a xml file containing the configuration to load. The acquisition and recording configurations are then loaded in the software, the corresponding editors are opened and the configurations submitted.
  - **Save:** opens a file dialog to select a xml file in which to save the configuration

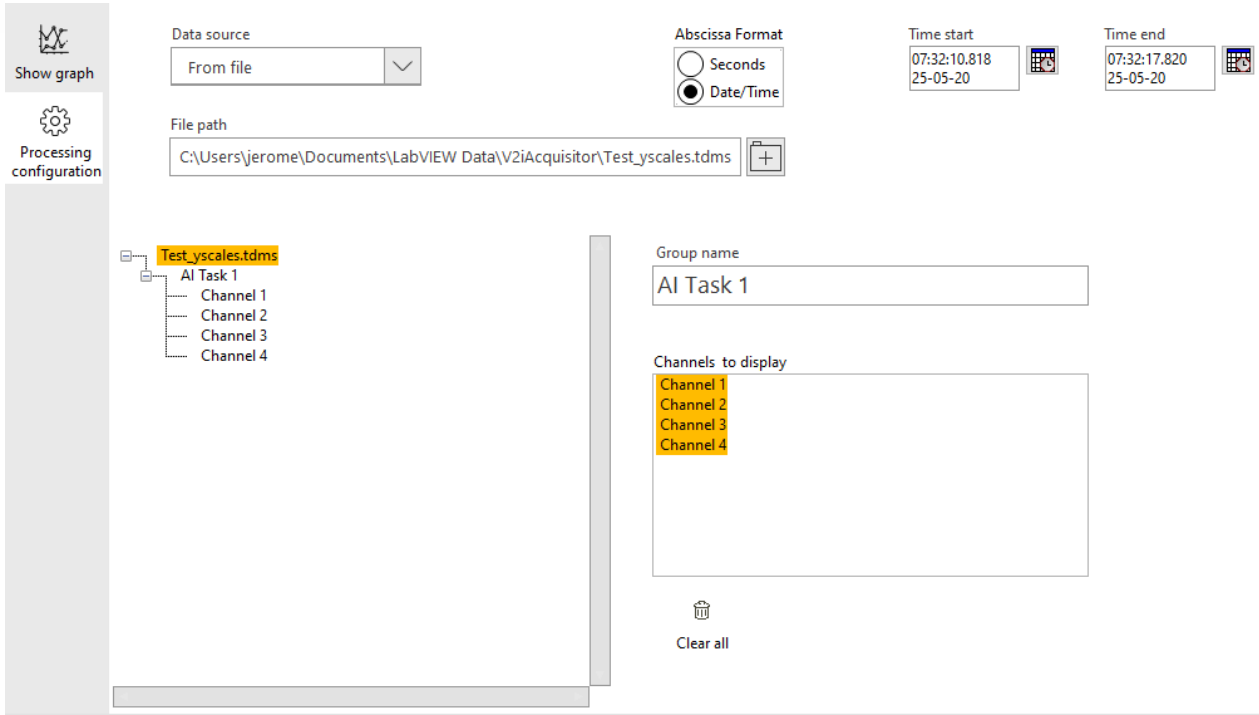


- Each time the acquisition or recording configuration is submitted, a temporary file is created in the folder %temp%\acquisitor
- When the software is launched, you can click on “Load the last config used” to load the last temporary config file saved



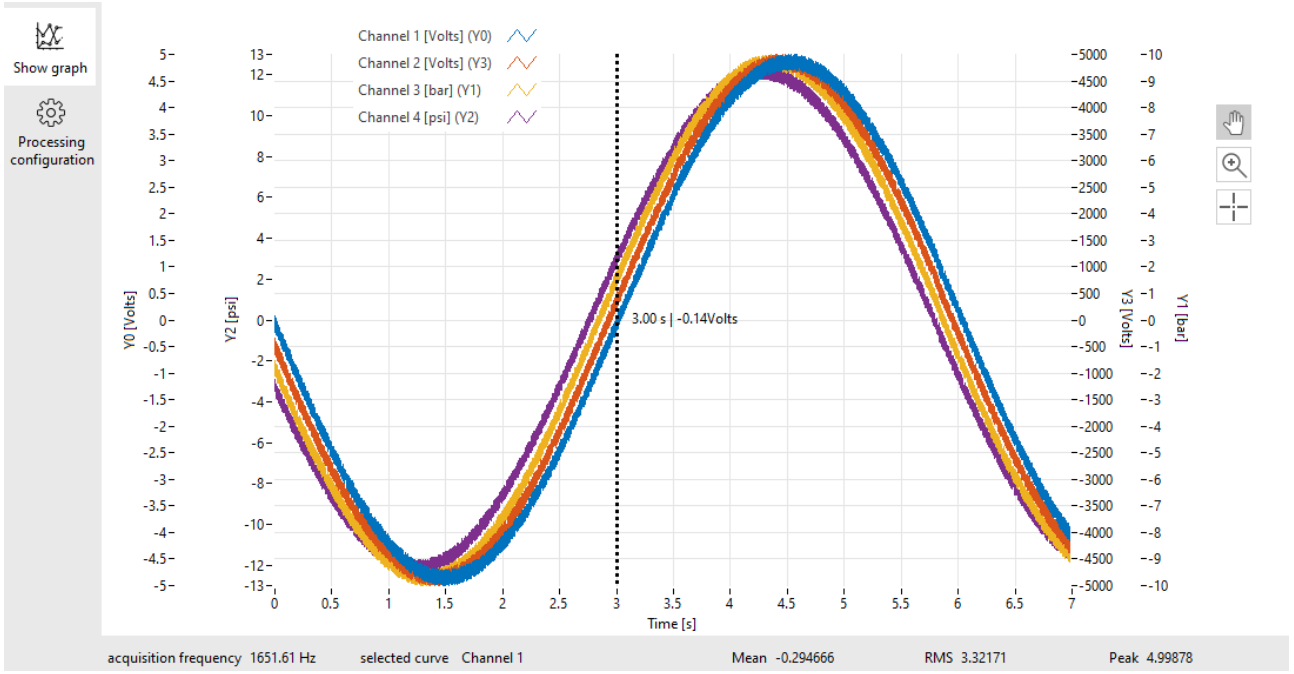
Temporal – Processing configuration

- Configure the acquired channels (‘From acquisition’) or recorded channels (‘From file’)
  - To choose the channels to display, select their names (or the task name) on the tree and drag and drop it in the ‘Channels to display’ list
  - To delete channels, select them on the ‘Channels to display’ list, right click and select ‘Delete’
  - You can also delete all channels by clicking on ‘Clear all’
  - The maximum number of channels is eight
  - You can change the period between the data updating by choosing the ‘refresh period’
  - Two abscissa format options are available
    - Seconds : relative time, with 0 corresponding to when you selected the channels or when the acquisition was started, whichever is the more recent
    - Date/Time : absolute time
  - In ‘From file’ mode, you can also select the file path and the time start and time end



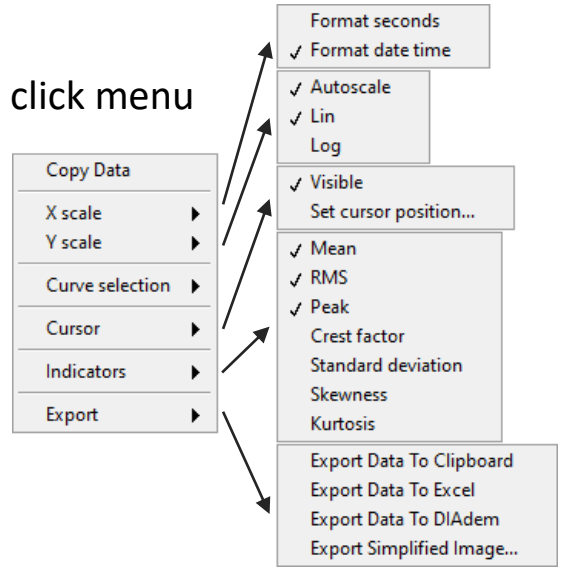
Temporal – Show graph

- Displays the data
  - There are four Y scales available. If there are multiple units, the software will choose automatically the Y scales. If you want to change, click on the legend curve and select the Y scale
  - In 'From acquisition' mode, you can click on ⏸ to pause the data refreshing
  - The abscissa format defined in the processing configuration tab can be changed ('X scale')



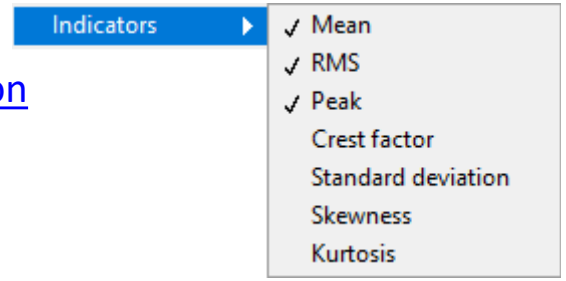
  - You can select to 'Autoscale' and change the mapping from linear ('Lin') or logarithmic ('Log') independently for all the axes
  - You can display a cursor ('Cursor') and attach it to a curve ('Curve selection')
  - You can export data in multiple formats

Right click menu



Temporal – Indicators computation

- The indicators are computed in ‘From file’ mode when the data are displayed and in ‘From acquisition’ mode when in pause. To select the indicators,



  - The indicators are computed in one-pass parallel computation
  - For each x in the data,

$$\delta = x - M_1$$

$$M_1 = M_1 + \frac{\delta}{n}$$

$$M_4 = M_4 + \delta^4 \frac{(n-1)(n^2-3n+3)}{n^3} + 6\frac{\delta^2}{n^2}M_2 - 4\frac{\delta}{n}M_3$$

$$M_3 = M_3 + \delta^3 \frac{(n-1)(n-2)}{n^2} - \frac{3\delta M_2}{n}$$

$$M_2 = M_2 + \delta^2 \frac{n-1}{n}$$

  - And

$$Mean = M_1$$

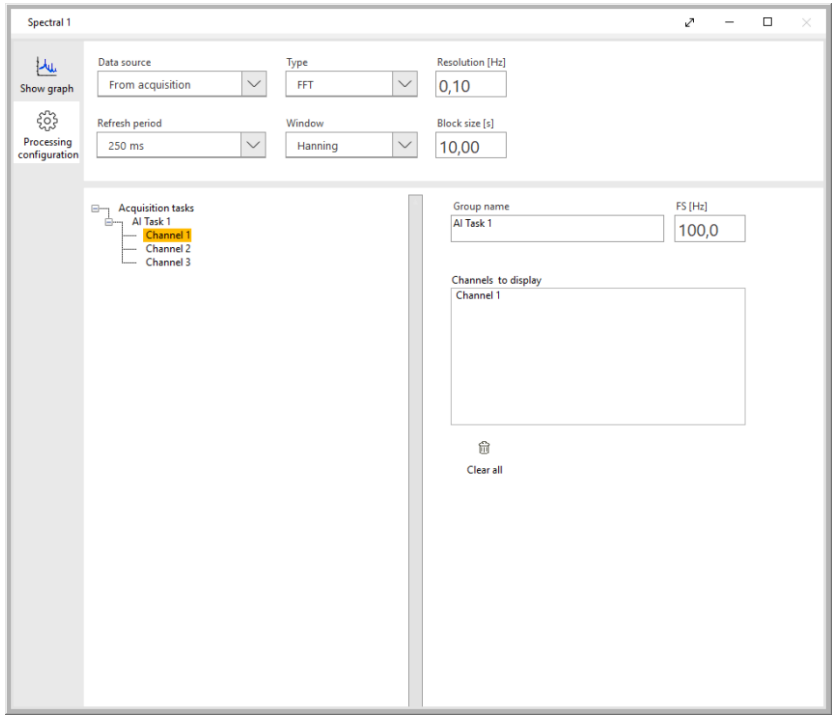
$$Standard\ deviation = \sqrt{\frac{M_2}{n-1}}$$

$$Skewness = \sqrt{n}\frac{M_3}{M_2^{1.5}}$$

$$Kurtosis = n\frac{M_4}{M_2^2}$$

Spectral – Channel Configuration

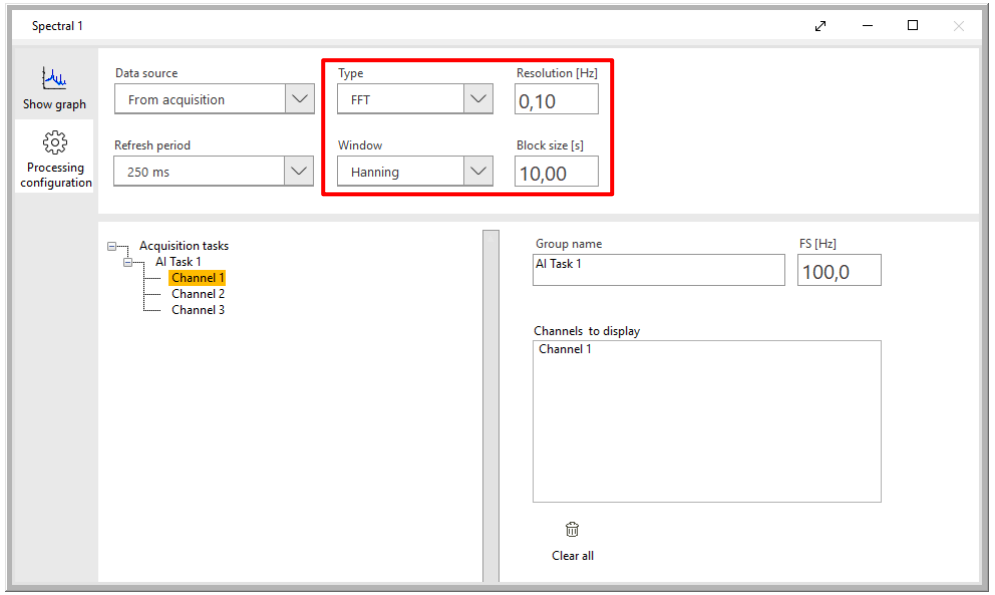
- Configure the acquired channels (‘From acquisition’) or recorded channels (‘From file’)
  - To choose the channels to display, select their names (or the task name) on the tree and drag and drop it in the ‘Channels to display’ list
  - To delete channels, select them on the ‘Channels to display’ list, right click and select ‘Delete’
  - You can also delete all channels by clicking on ‘Clear all’
  - The maximum number of channels is eight
  - You can change the period between the data updating by choosing the ‘refresh period’
  - In ‘From file’ mode, you can also select the file path and the time start and time end



Spectral – From Acquisition

- The following parameters are available in 'From Acquisition' mode:
  - **Type**: Selects the spectral analysis to perform (**FFT** (Fourier Transform), **PSD** (Power Spectral Density))
  - **Window**: Selects the window to apply to each block
  - **Resolution**: The frequency resolution of the spectrum
  - **Block size**: The buffer size used to compute the FFT
- The Graph window displays:
  - The signal currently in the buffer (top)
  - The spectrum of the signal (bottom)

  The graphs options are mostly identical to those of the temporal module



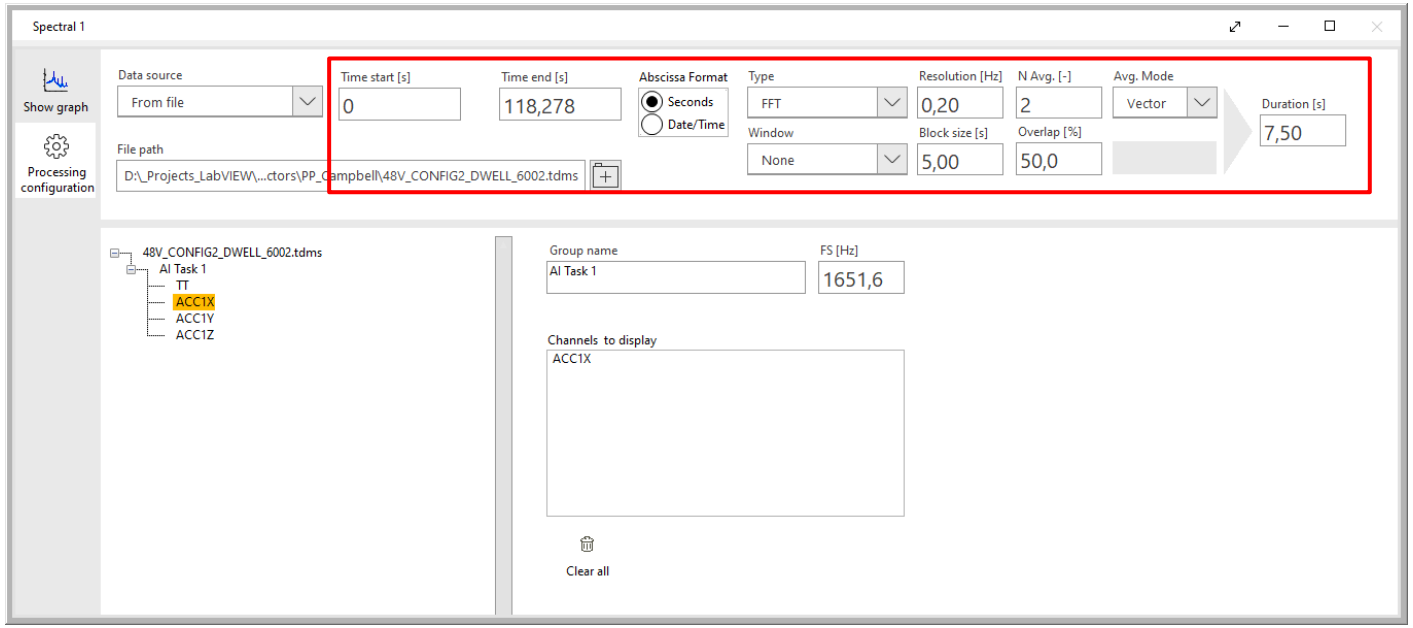
Move slider to resize the graphs

Spectral – From File

- The following parameters are available in 'From File' mode:
  - The **Time start/end** and **abscissa format** are identical to those of the temporal module
  - **Type**: Selects the type of spectral analysis to perform (FFT or PSD)
  - **Window**: Selects the window to apply to each block

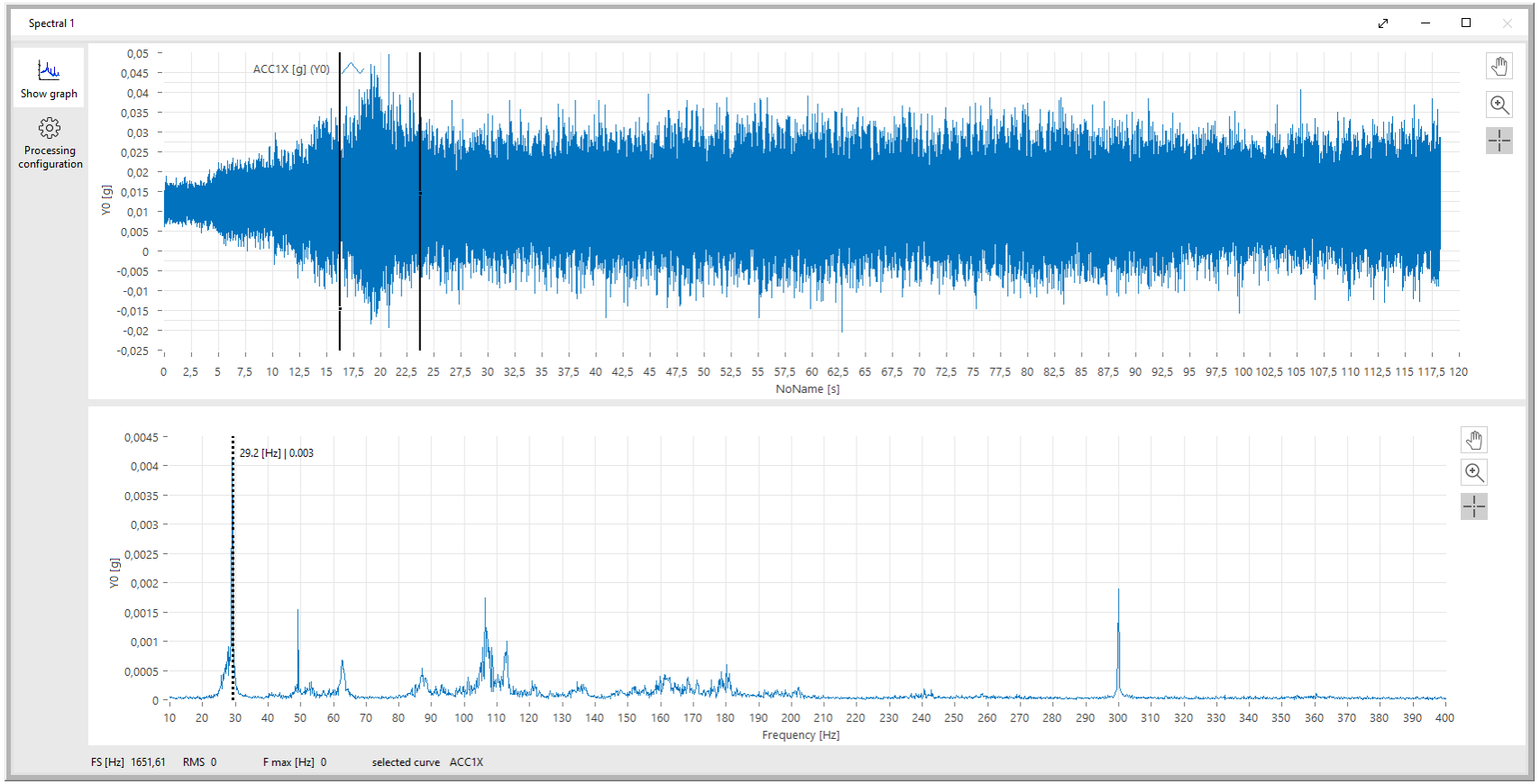
The spectrum is computed as follows:

N Avg spectra are computed from blocks of duration **Block Size**, which can be **overlapping** or not. The spectra are averaged using the **Avg. Mode** method. The total duration of the signal used to compute the spectra is given in **Duration**. The frequency resolution of the resulting spectrum is given by **Resolution**.



Spectral – From File

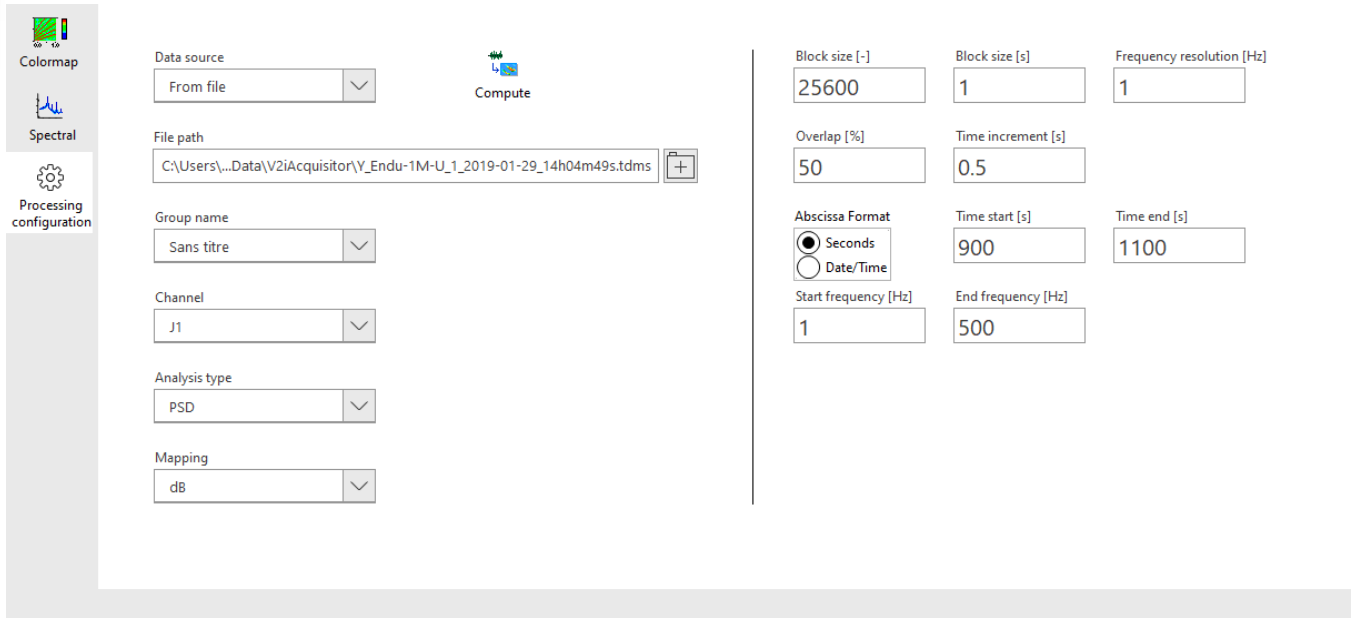
- The graph window of the “From file” mode is similar to that of the “From acquisition” mode
  - In this case, the whole imported signal is displayed in the top figure
  - The spectrum is computed on the signal between the cursors, which can be moved
  - Most of the plot options are identical to those of the Temporal Post-Processing



Waterfall – Processing configuration

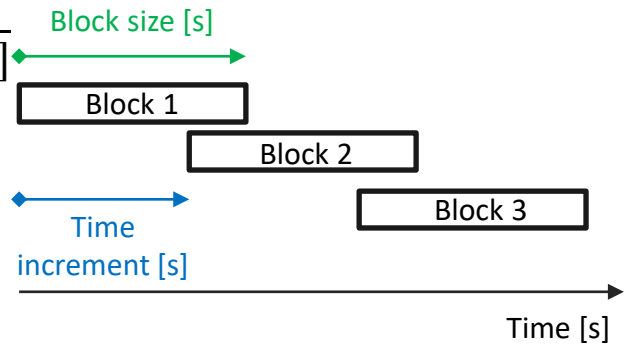
- Configure the acquired channels ('From acquisition') or recorded channels ('From file')
  - Analysis type: 'PSD' (*Power Spectral Density*), 'Power Spectrum' or 'FFT' (*Fast Fourier Transform*)
  - Mapping: 'Linear', 'Logarithmic' or 'dB' – decides which mapping to use for the Z-scale (the color)
  - 'Block size [-]' (number of points), 'Block size [s]' and 'Frequency resolution [Hz]' are correlated; they represent the size of the temporal block used for the computation

$$Frequency\ resolution\ [Hz] = \frac{1}{Block\ size\ [s]}$$



  - 'Overlap [%]' and 'Time increment [s]' are correlated; they represent the duration between each block start time

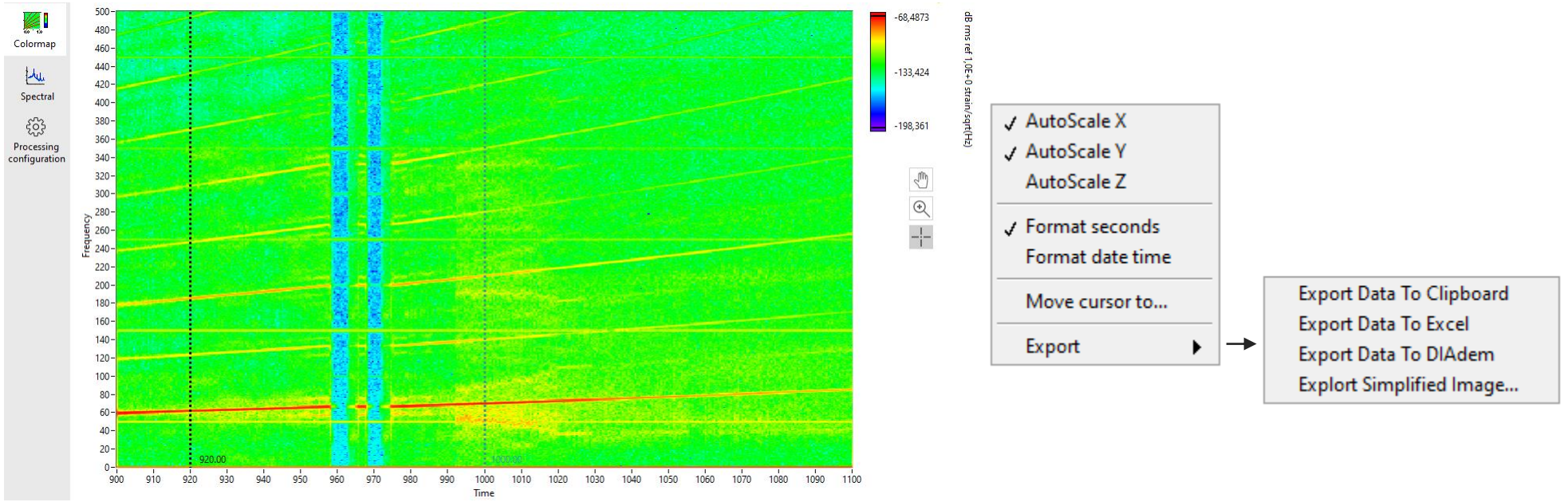
$$overlap\ [\%] = 100\left(1 - \frac{Time\ increment}{Block\ size}\right)$$



  - You can select the start and end frequency of the spectra to be computed
  - In 'From file' mode, you can choose the time history portion to analyze by selecting the time start and the time end

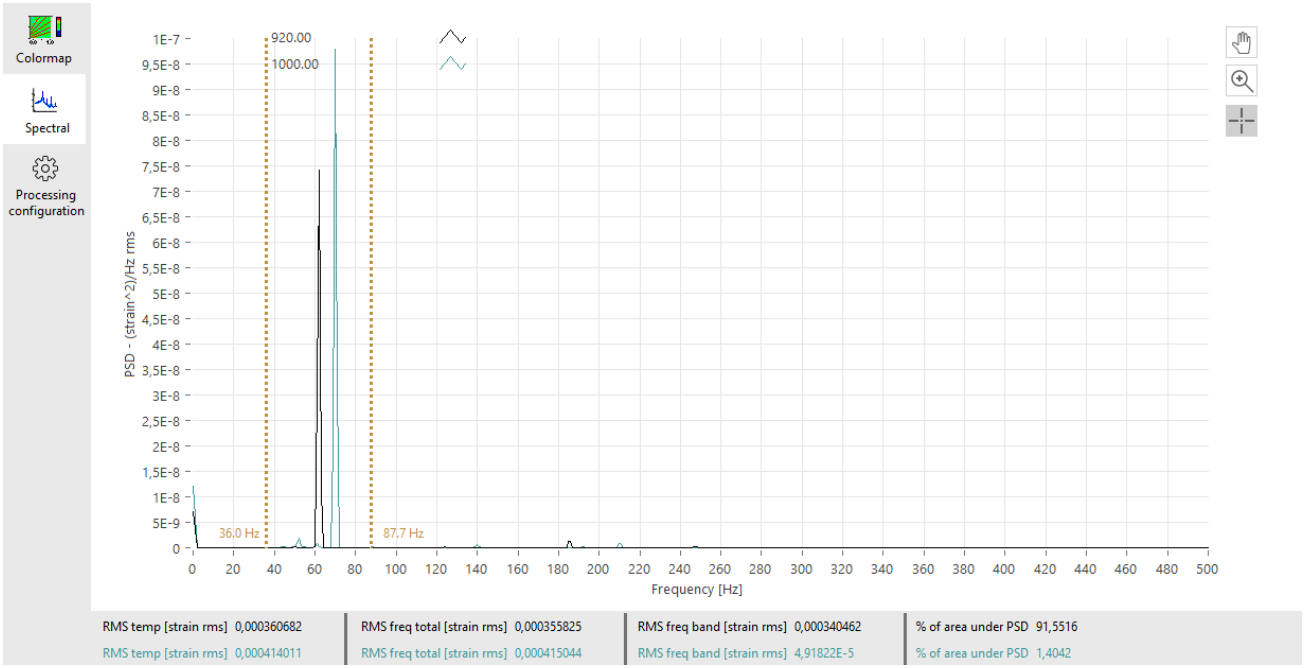
Waterfall – Colormap

- Displays the colormap
  - You can move the cursor either by drag&drop or by right-click -> 'Move cursor to…"; this cursor marks the start position of the block used to compute the spectrum visible in the 'Spectral' tab
  - As in the Temporal module, you can choose to autoscale, you can select 'seconds' or 'date time' as abscissa format and you can export the data
  - If you double-click on the top (or bottom) tick of the color scale, you can customize the maximum (or minimum) value of the scale; all the values over the maximum will be red and all the values under the minimum will be purple



Waterfall – Spectral

- Displays the selected spectrum
  - The two spectra are computed from the temporal block starting at the positions marked by the cursors in the colormap tab and indicated on the legend
  - You can select to autoscale and the mapping (‘Lin’ or ‘Log’) in the right-click menu



  - The ‘RMS temp’ is the Root Mean Square computed on the temporal block
  - The ‘RMS freq total’, only available on a PSD, is the square root of the area under the PSD and should be equivalent to ‘RMS temp’
  - The ‘RMS freq band’, only available on a PSD, is the square root of the area under the PSD delimited by the two cursors
  - The ‘% of area under PSD’, only available on a PSD, is the ratio, in %, of the area delimited by the two cursors and the total area

Thank you!

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