



FROM VIBRATIONS TO IDENTIFICATION

V2i S.A.

Avenue du Pré-Aily, 25 Liège Science Park 4031 LIEGE - BELGIUM

T. +32 4 287 10 70 F. +32 4 287 10 71 info@v2i.be www.v2i.be

Acquisitor v4.0.1

Quick start guide

October 19, 2021



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- 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 <u>acquisitor@v2i.be</u>



- 5. <u>Views</u>
- 6. <u>Config</u>

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 _

Menu bar	ding 🌣 🕨 🛛 Views 🏟 🕾 Config 🗋 💟 Configure Arm UnArm Configure Layout Open Save	– 5 × O O X Help Info Exit
Modules container		
Status bar – Acquisition: Idle - bad configuration	Recording: Idle - bad configuration	Powered by V_2



2. <u>Main UI</u>

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Acquisition – Controls

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





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Acquisition – Status

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- 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: Idle - bad configuration



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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

	tion Configuration Editor	- D X
Menu _ + bar	Submit Null/calib	Configuration Editor
	Task 1 Tasks list name Channel 1 Acquisition tasks Channel 3 Tasks list description Channel 1 Tasks list description	
Tree -	Simplified	
Itus bar-{ 🗷 EDITA	ABLE O NOT SUBMITTED	DEVICES SCANNED



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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		- 🗆 X
+ > ♦% New Submit Null/calib		Configuration Editor
Image: All Task 1 Image: Channel 1 Image: Channel 2 Image: Channel 3 Image: Channel 1 Image: Channel 1	Submit Submit Null/calib Edition mode Simplified	
🖉 EDITABLE 🛛 NOT SUBMITTED		DEVICES SCANNED



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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

		EDITAB	ile (NOT SUBMITT	ED	DEVICES SCAN	NED
BLE	🔕 not submit	TED					DEVICES SCANNED



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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		– 🗆 X
Image: heat state Image: heat state New Submit Null/calib		Configuration Editor
	Al Task Add Al Task DI Task AO Task	
	Al Task 1 Add Current Multiple add Voltage Duplicate Remove Force sensor - IEPE Disable Force sensor - Bridge	
	 Pressure - Bridge Microphone Thermocouple RTD Strain gage Formula Disable 	



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Acquisition – Configuration editor – Tasks list

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• 🌆 Tasks list

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- Tasks list name
- Tasks list description

Acquisition tasks		
asks list description		
dition mode		
Expert		

- 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



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Acquisition – Configuration editor – Al Task

• Al Task: analog in task

Task name

Channel name Direction Sensor ID Description Hardware channel

cDAQ1Mod1/ai0

cDAQ1Mod1/ai1

cDAQ1Mod1/ai2

ΔII

Channel 1 None

Channel 2 None

A Channel 3 None

- Description
- Instrument driver: choose which driver to use; DAQmx by default

₽ ₽ ≡)	Task Name AI Task 1				Instrument driver DAQmx driver	
	Description			V		
	Acquisition frequency [Hz]	Actual clock speed [Hz]			frequency and	Use clock speed
Ś	Bandwidth of interest [Hz]		<u> </u>		are different. apply filter?	Apply filter
	Channel type					

- 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



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Acquisition – Configuration editor – Al Task

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

~~~~	Channel Name		Hardware selection mode	
₽ ₽	Channel 1	$\mathbf{D}$	Chassis/Module/Input	$\sim$
_	Direction	•	Chassis	
	+X 🗸		cDAQ-9189 - 0	$\sim$
	Sensor ID		Module	
			Slot 1 - NI 9234 - 0	$\sim$
	Description		Input	
			ai0	$\sim$

	Hardware selection mode
D	Hardware channel
	Hardware channel
	cDAQ1Mod1/ai0

_	Hardware selection m	ode		
D	LAB			$\sim$
	AI ±5V IEPE & AC/DC	AI ±10V	Strain gages	AO ±10V
	1 6 9	0	1 5 9	0
	260	0	2 6 10	2
	900	3	3 7 11	3
	<b>4 8 B</b>	4	4 8 12	4

- 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



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### Acquisition – Configuration editor – Al Task

- ① 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

Pre-scaled units		Terminal configuratio
mA	$\sim$	Default
Scaling type		
Linear [bar/mA]	$\sim$	
Scaled units		
bar	$\sim$	
Slope [bar/mA]	Intercept [bar]	
0	0	
	mA Scaling type Linear [bar/mA] Scaled units bar	mA Scaling type Linear [bar/mA] Scaled units bar Slope [bar/mA] Intercept [bar]

- 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  $a_0, a_1, a_2, ...$  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



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### Acquisition – Configuration editor – Al Task

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• 
 Voltage channel

 $\sim$ 

 $\sim$ 

 $\sim$ 

Coupling

AC

V

Scaling type

No Scaling

01

Pre-scaled units

Terminal configuration, scaled units and scaling type: see description of <u>current</u> <u>channel</u>

Terminal configuration

Default

Pre-scaled units: choose between 'mV' and 'V'

 $\sim$ 

- 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 < >



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#### 

- 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

units	Terminal configuration
$\sim$	Default 🗸
it	Current excitation source
$\sim$	Internal 🗸
/ [mV/g]	Excitation value
	2 mA 🗸

Pre-scale

mV

Scaled un

g

Sensitivity
1

**1** 

- Terminal configuration: see <u>current channel</u>
- 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

Duplicate Make triaxial Remove Disable



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### Acquisition – Configuration editor – Al Task

• 🗠 Force sensor – IEPE

Scaled unit

Sensitivity [mV/N]

Default

Ν

1 Coupling

- Scaled units: choose between 'N' and 'lb'

 $\sim$ 

 $\sim$ 

 $\sim$ 

- Sensitivity: enter the sensitivity in the selected units
- Coupling: see voltage channel

Terminal configuration

Current excitation source

Default

Excitation value

Default

 $\sim$ 

 $\sim$ 

Terminal configuration: see <u>current channel</u>

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 Current excitation source, excitation value: see <u>accelerometer channel</u>



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### Acquisition – Configuration editor – Al Task

- 🗠 Force sensor Bridge channel
  - Scaling type: see current channel
  - Voltage excitation source, voltage excitation value: see <u>accelerometer channel</u>
  - 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

	Pre-scaled units		Bridge configuration		Nominal gage resistance
[][	mVolts/Volt	$\sim$	Full Bridge	$\sim$	350 ohm
	Scaling type		Voltage excitation source		
	Linear [Newtons/mVolts/	$\sim$	Internal	$\sim$	
	Scaled units		Voltage excitation value		
	Newtons	$\sim$	Default	$\sim$	
			Initial bridge voltage		
			0 V		
	Slope [Newtons/mVolts/Volt]	Intercept [Newto	ns]		
	1	0			



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### Acquisition – Configuration editor – Al Task

- 🛥 Pressure Bridge channel
  - Scaling type: see <u>current channel</u>
  - Voltage excitation source, voltage excitation
     value: see <u>accelerometer channel</u>
  - Pre-scaled units, bridge configuration, initial bridge voltage, nominal gage resistance: see force sensor – bridge channel
  - Scaled units: choose between 'Pascals', 'psi' and 'bar'

ſ∎↑	Pre-scaled units mVolts/Volt	$\sim$	Bridge configuration Full Bridge	$\sim$	Nominal gage resistance
G 🕈	Scaling type Linear [Pascals/mVolts/	$\mathbf{\vee}$	Voltage excitation source	$\sim$	
	Scaled units Pascals	$\sim$	Voltage excitation value		
			Initial bridge voltage		
	Slope [Pascals/mVolts/Volt]	Intercept [Pa	iscals]		



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### Acquisition – Configuration editor – Al Task

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

<b>-</b>	Sensitivity [mV/Pa]	Terminal configuration	
JI	1	Default 🗸 🗸	
		Current excitation source	
		Internal 🗸	
		Excitation value	
		2 mA 🗸	



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### Acquisition – Configuration editor – Al Task

- **I** Thermocouple channel
  - Scaling type: see <u>current channel</u>
  - Type: choose between 'J', 'K', 'N', 'R', 'S', 'T',
     'B' and 'E'
  - Units: choose between 'Deg C', 'Deg F', 'K'

[]



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### Acquisition – Configuration editor – Al Task

- I RTD channel
  - Scaling type: see <u>current channel</u>
  - 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'

	Resistance Configuratio	n
	4-Wire	$\sim$
	R0 [Ohm]	
	100	$\sim$
	Units	
UI.	Deg C	$\sim$
	Scaling type	
	Linear [Deg C/Deg	c] 🗸
	Slope [Deg C/Deg C]	Intercept [Deg C]
	0	0



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### Acquisition – Configuration editor – Al Task

#### • Strain gage channel

- Nominal gage resistance
- Gage factor
- Pre-scaled units: choose between 'uE' and 'E'
- Scaling type, scaled units: see <u>current</u>
   <u>channel</u>
- Voltage excitation source, voltage excitation value: see <u>accelerometer channel</u>

	Nominal gage resistance		Strain configuration	
	350 ohm		Quarter Bridge I	$\sim$
	Gage factor		Voltage excitation source	2
	2		Internal	$\sim$
- •	Pre-scaled units		Voltage excitation value	
][	uE	$\sim$	Default	$\sim$
	Scaling type		Initial bridge voltage	Line resistance
	Linear [uE/EU]	$\sim$	0 V	0 ohm
	Scaled units		Shunt resistance	
	EU	$\sim$	0 ohm	
			Poisson ratio	Lead wire resistance
			0.3	0 ohm
	Slope [uE/EU]	Intercept [uE]		
	0	0		

- <u>Strain configuration</u>: 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 Channel 1 duplicated and a rosette channel will be created

Duplicate Make rosette Remove Disable



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### Acquisition – Configuration editor – Al Task

• Rormula 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

Channel Name	Channels	
Channel 6	Channel 1 Channel 2	^
Unit	Channel 3 Channel 4	
N	Channel 5	
Formula		
Channel 2+Channel 3*2*PI		
		~
Clear Sin Cos Tan	7 8 9	( )
Atn Log Lne	4 5 6	-
Abs Sqr Exp	1 2 3	+ *
	0.	PI /

- Formula: the names of available channels are in bold. You can write the formula or use the buttons hereunder
- Clear: clear the formula



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### Acquisition – Configuration editor – Al 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°)



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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

	Channel Name		Strain gage channels		Strain gage 1		Hardware channel 1	
	Channel 4		Channel 1 Channel 2	^	Channel 4_1	$\sim$	cDAQ1Mod5/ai3	
	Measurement type		Channel 3 Channel 4 1		Strain gage 2		Hardware channel 2	_
	Von Mises stress	$\sim$	Channel 4_2 Channel 4_3		Channel 4_2	$\sim$	cDAQ1Mod6/ai0	
	E [MPa]	Poisson ratio			Strain gage 3		Hardware channel 3	
	210000	0.3			Channel 4_3	$\sim$	cDAQ1Mod6/ai1	
- •	Unit							
][	МРа	$\sim$						
	Rosette type							
	Rectangular (45°)	$\sim$		~				



2. <u>Main UI</u>

- Controls

6. <u>Config</u>

- 9. Waterfall

### Acquisition – Configuration editor – Al Task

### • Rosette channel

- **Measurement type:** for rectangular (45°) rosette —
  - Principal strain 1  $\varepsilon_P$  and Principal strain 2  $\varepsilon_0$

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

• Principal stress 1  $\sigma_P$  and Principal stress 2  $\sigma_Q$ 

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

**Von Mises strain** ٠

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

- Principal angle ٠  $\phi_{P,Q} = \frac{1}{2} \tan^{-1} \left( \frac{2\varepsilon_2 - \varepsilon_1 - \varepsilon_3}{\varepsilon_1 - \varepsilon_2} \right)$
- Von Mises stress ٠

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

	Channel Name	Strain gage channels	Strain gage 1	Hardware channel 1
	Channel 4	Channel 1 A	Channel 4_1	cDAQ1Mod5/ai3
	Measurement type	Channel 3 Channel 4 1	Strain gage 2	Hardware channel 2
	Von Mises stress	Channel 4_2 Channel 4_3	Channel 4_2	cDAQ1Mod6/ai0
	E [MPa] nu : margine and second secon		Strain gage 3	Hardware channel 3
	210000 0.3		Channel 4_3	cDAQ1Mod6/ai1
	Unit			
]]	MPa 🗸		. 本	
	Rosette type			
	Rectangular (45°)	~		
			(1) (2) (3) (1)	23



2. <u>Main UI</u>

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]1

- 8. <u>Spectral</u>
- 9. <u>Waterfall</u>

### Acquisition – Configuration editor – Al Task

#### • Rosette channel

- Measurement type: for delta (120°) rosette
  - Principal strain 1  $\varepsilon_P$  and Principal strain 2  $\varepsilon_Q$

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

• Principal stress 1  $\sigma_P$  and Principal stress 2  $\sigma_Q$ 

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

• 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

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

Channel Name		Strain gage channels		Strain gage 1		Hardware channel 1	
Channel 4		Channel 1 Channel 2	^	Channel 4_1	$\sim$	cDAQ1Mod5/ai3	
Measurement type		Channel 3 Channel 4_1		Strain gage 2		Hardware channel 2	
Von Mises stress	$\sim$	Channel 4_2 Channel 4_3		Channel 4_2	$\sim$	cDAQ1Mod6/ai0	
E [MPa]	Poisson ratio			Strain gage 3		Hardware channel 3	
210000	0.3			Channel 4_3	$\sim$	cDAQ1Mod6/ai1	
Unit							
MPa	$\sim$	·		. 2 .	3		Jun
Rosette type		_					
Delta (120°)	$\sim$	·	~				3
				1 3	2		2



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### Acquisition – Configuration editor – DI Task

## • Contraction of the second se

- Task name
- Description
- Instrument driver: choose which driver to use; DAQmx by default

Task Name DI Task 1				Instrument driver	
				DAQmx driver	$\sim$
Description					
Acquisition frequency [Hz]	Actual clock speed [Hz]		Desired acquisitio	on frequency and	Use clock spe
<del>(</del> 1280	1651.61		actual clock spee		Use clock spe
Bandwidth of interest [Hz]		<b>/</b> •	Use clock speed		Apply filter

- 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



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### Acquisition – Configuration editor – DI Task

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• 🚥 Line Channel

– See <u>common parameters</u>

Channel Name	-	Hardware selection mode			
Channel 1		Chassis/Module/Input	$\sim$		
Direction		Chassis			
None	$\sim$	cDAQ-9189 - 0	$\sim$		
Sensor ID		Module			
		Slot 1 - NI 9402 - 0	$\sim$		
Description		Input			
		port0/line0	$\sim$		



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### Acquisition – Configuration editor – AO Task

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• AO Task: analog out task

- Task name
- Description
- Instrument driver: choose which driver to use; DAQmx by default

Task Name							Instrur	nent driver		
AO Task 1							DAC	Qmx driver		`
Description										
Acquisition frequ	uency [Hz]									
÷ 0										
Channel type										
AOVoltage			\ \	/						
Channel name	Direction	Sensor ID	Description	Hardware channel	Pre-scaled units	Scaling type	Scaled units	Terminal configuration	^	
(1) Channel 1	None			cDAQ1Mod8/ao0	V	No Scaling		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



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### 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

Default

 $\sim$ 

 $\sim$ 

 $\sim$ 

Intercept [EU]

Pre-scaled units

V

Scaling type

EU Slope [EU/V]

Linear [EU/V] Scaled units

]

- Terminal configuration
  - RSE: Referenced Single-Ended mode
  - Differential
  - Pseudodifferential
  - Unavailable modes are surrounded by < >



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### Acquisition – Configuration editor – AO Task

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





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### 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

Þ	Nulling and	calibration selection					×	
Select the channels to null and/or calibrate								
	<ul> <li>*</li> </ul>	Task name		Channel name	Initial bridge voltage	Line resistance		
	<ul> <li>***</li> </ul>	AI Task 1	3	Channel 1	Undef.	Undef.	^	
		AI Task 1	3	Channel 2	Undef.	Undef.		
		AI Task 1	۲	Channel 3	Undef.	N/A	]	
		AI Task 1		Channel 4	Undef.	N/A	]	
		*\$		ant the second				
		Null		Calibrate	Null and calibrate			

- 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'



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### **Recording – Controls**

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- The acquisition menu bar includes three controls
  - **Configure:** launches the <u>recording configuration editor</u>
  - 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

V2i - Acquisitor				- 0
Acquisition 🌣 🕨 🗏		Views 🌣 🕾 Config	I ☐ ↓   Open Save	• • • •
Configure Start Stop	O Configure Arm UnArm	Configure Layout	Open Save '	Help Info E
	ing 🌣 🕨			
Record	ing 🌣 🕨			
	Configure Arr	n UnArm		



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### **Recording – Status**

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- 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: Idle - bad configuration



•

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### **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

📃 Record	ling Configuration Editor X	
Apply	Recording Configuration	
File	Trigger	
File type TDMS		
File option	15	
	Activity	
	Folder path	
	C:\Users\jerome\Documents	Selected tab
	File name (can be used with tokens)	
	default	
	Path preview:	
۵	C:\Users\jerome\Documents\default.tdms	


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	<u>Co</u>	nfig	<mark>ur</mark> a	<u>atic</u>	<u>nc</u>
<u>edi</u>	<u>tor</u>				

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#### **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.

File Trigger	
File type	
TDMS	
File options	
Activity	
Folder path	
C:\Users\Edouard\Documents	+
File name (can be used with tokens)	
Measurement_{%Y}{%m}{%d}_{%H}h{%M}m{%H}	token helper
Path preview:	
C:\Users\Edouard\Documents\ Measurement_20201125_10h59m10.tdms	



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#### **Recording – Configuration editor – Token helper**

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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.

		File Path Configurator - Tokens Info
oken syntax: {	Token ID }	
oken list		
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	%с	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	%ј	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</digit>	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
	%W	week number of the year (00–53), with the first Monday as the first day of week one; 00 rep



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## **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)

File     Trigger       Start Condition     ManualTrigger	
Trigger options The manuel trigger does not have any parameters	- Selected trigger configuration



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## **Recording – Configuration editor – Trigger Configuration**

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





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## **Recording – Configuration editor – Trigger Configuration**

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

$\langle \rangle$		<b>Recording Configuration Editor</b>	
Revert App			
tart Condition			
TimeTrigger	$\sim$		
Trigger options			
ingger options			
Recording duratio	n [s]		
	n [s]		
Recording duratio		t <b>ion</b> seconds then stop.	
Recording duratio		<b>tion</b> seconds then stop.	
Recording duratio		<b>tion</b> seconds then stop.	
Recording duratio		tion seconds then stop.	
Recording duratio		tion seconds then stop.	
Recording duratio		tion seconds then stop.	
Recording duratio		tion seconds then stop.	
Recording duratio		tion seconds then stop.	



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#### **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.

✓) /	Recordi	ng Configuration Edit	0
Revert Apply			
File Trigger			
Start Condition			
PeriodicTimeTrigger	$\checkmark$		
Trigger options			
Duration [s]	Wait time [s]	N Measurements	
1	50	-1	
This is performed N Measureme		ds and repeats.	
	ents times.	ds and repeats.	
This is performed N Measureme	ents times.	ds and repeats.	
This is performed N Measureme	ents times.	ds and repeats.	
This is performed N Measureme	ents times.	ds and repeats.	
This is performed N Measureme	ents times.	ds and repeats.	



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## **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

General	Start Conditions	Stop Conditions
Trigger Channel	Trigger level []	Stop Level []
	1	1
Auto Re-arm	Pre-Trigger [s]	Post-Trigger [s]
Off	0	0
	Starting Edge	Stopping Edge
Absolute value Trigger	Rising	Lower



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## **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.

General	Start Conditions	Stop Conditions
Trigger Channel	Trigger level []	Duration [s]
*	1	10
Auto Re-arm	Pre-Trigger [s]	_
Off	0	
	Starting Edge	
Absolute value Trigger	Rising	



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# Views – Controls

- The views menu bar includes two controls
  - Configure: launches the views manager
  - Layout: changes the <u>layout</u> of the windows

V2i - Acquisitor											-	- 0	$\times$
Acquisition	Configure Start	Recording	<b>\$</b>		Views	۵ پ	Config	Open Save			0		×
	Configure Start		Configure A	rm UnArm	c	onfigure Layout		Open Save			Help	Info	Exit
							_						
					Views		<b>\$</b>	þ					
							figure	Layout					
				_	_	CON	inguie	Layout					
Acquisition: Id	le - bad configuratio	Re	cording: Idle	- bad configura									



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#### 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

Views Manager			
		Views Manag	e
ist	Info	^ Module	
	0/1	"PP_Temporal.lvlibp:PP_Temporal.lvclass"	
- 🗯 FileConverter	0/1		
🕈 Graph	0/1		
A MicroCuts	0/5	+ New instance	
🗯 PingTest	0/1	- New Instance	
🗯 Spectral	0/5		
SRS SRS	0/1	Stop all	
📮 Temporal	1/5		
L 🍘 Temporal 1	Started	Beware, this module has not been	
🖈 VonMises	0/1	validated. Use with care.	
🗯 Waterfall	0/1	In particular, the filter and the indicators	
🕈 ModalAnalysis	DISABLED	may not be accurate.	
OperationalDeflection	UNLICENSED		
- 🖈 ShakerControl	UNLICENSED		

- 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



2. <u>Main UI</u>

3. Acquisition

4. <u>Recording</u>

5. <u>Views</u>

- <u>Controls</u>
- Views manager
- Layout

6. <u>Config</u>

7. <u>Temporal</u>

8. <u>Spectral</u>

9. <u>Waterfall</u>

# Views – Layout

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- 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





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#### 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

Acquisition	¢ Configure	► Start	Stop	Recording	Configure	▶ ∎ Arm Un/	Arm Views	s 🔅 🕞 Configure Layout	Config	Open					<b>⊘</b> Help	(i) Info	×
								Config		Open	↓ Save						

- 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

		×
Do y	ou want to load a config?	
Load the last config used	Load a specific config	Do not load anything



Show

Proc

config

1. Introduction

2. Main UI

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#### 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'

graph	Data source From file	Abscissa Format Seconds Date/Time	Time start 07:32:10.818 25-05-20	Time end 07:32:17.820 25-05-20
essing guration	File path C:\Users\jerome\Documents\LabVIEW Data\\			
	Test_yscales.tdms Al Task 1 Channel 1 Channel 2 Channel 3 Channel 4	Group name AI Task 1 Channels to display Channel 1 Channel 2 Channel 3 Channel 4		
		급 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



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## Temporal – Show graph

Displays the data

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X

Show graph

£63

Processing

configuration

- 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 II to pause the data refreshing
- The abscissa format defined in the processing configuration tab can be changed ('X scale')

Channel 1 [Volts] (Y0) 5-13-Channel 2 [Volts] (Y3) 12-4.5-4500 Channel 3 [bar] (Y1) 4-4000 10-Channel 4 [psi] (Y2) 3.5--3500 € 3-8-3000 _¦-2.5--2500 6-2--2000 1.5-4--1500 -3 1-1000 -2 2--0.5 Coltr -0 Coltr -500 **≾** -1 V2 [psi] 3.00 s | -0.14Volts Б -0 -0 ₽ -0.5---500 -2 -1---1000 --2 -1.5--1500 ---3 -4--2--2000 --4 -6--2.5---2500 --5 -3---3000 -8---6 -3.5--3500 --7 -10--4---8 4000 -4.5-4500 --9 -12--5--13-, -- 5000 --10 0.9 3.5 Time [s] acquisition frequency 1651.61 Hz Mean -0.294666 selected curve Channel RMS 3.32171 Peak 4,9987

- 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





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Indicators
 computation

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#### Temporal – Indicators computation

V2i – October 19, 2021 – #51

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, Indicators ✓ Mean ✓ RMS The indicators are computed in one-pass parallel computation _ ✓ Peak Crest factor For each x in the data, — Standard deviation  $\delta = x - M_1$ Skewness  $M_1 = M_1 + \frac{\delta}{n}$ Kurtosis  $M_{4} = M_{4} + \delta^{4} \frac{(n-1)(n^{2}-3n+3)}{n^{3}} + 6 \frac{\delta^{2}}{n^{2}} M_{2} - 4 \frac{\delta}{n} M_{3}$  $M_{3} = M_{3} + \delta^{3} \frac{(n-1)(n-2)}{n^{2}} - \frac{3\delta M_{2}}{n}$  $M_{2} = M_{2} + \delta^{2} \frac{n-1}{n}$ And _  $Mean = M_1$ Standard deviation =  $\sqrt{\frac{M_2}{n-1}}$  $Skewness = \sqrt{n} \frac{M_3}{M_2^{1.5}}$  $Kurtosis = n \frac{M_4}{M_2^2}$ 



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## **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'

Spectral 1						2	-	×
Show graph	Data source From acquisition	$\sim$	Type FFT	/	Resolution [Hz]			
දිටුදු Processing configuration	Refresh period 250 ms	$\sim$	Window Hanning	/	Block size [s]			
	Acquisition tasks Al Task 1 Channel 2 Channel 3				Group name Al Task 1 Channels to display Channel 1	FS [Hz] 100,0	)	
					ዤ 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



- 2. Main UI
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- <u>Channel</u> <u>Configuration</u>
- From Acquisition
- From File
- 9. <u>Waterfall</u>

## **Spectral – From Acquisition**

V2i – October 19, 2021 – #53

- 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

Spectral 1	2	-   X Spectral 1	₽ - □ ×
Data source     Type       Show graph     From acquisition     FFT       \$000 Processing configuration     250 ms     Window	Resolution [Hz] 0,10 Block size [s] 10,00	لللل 5 - Show graph کورک 2 0 - ورک 2 Processing configuration -5 -	
Acquisition tasks Al Task 1 Channel 1 Channel 2 Channel 3	Group name FS [Hz] Al Task 1 Channels to display Channel 1	3,5 - 3 - 2,5 - 2 2 2 2 2 2 2 2 2 5 1,5 -	Mayo alidar ta ragiza tha graph
	fi	≤ 1,5 - 1 - 0,5 - 0 -, 0 -,	0         0,5         1         1,5         2         2,5         3         3,5         4         4,5         5         5,5         6         6,5         7         7,5         8         8,5         9         9,5         10         1           Frequency (Hz)         Frequency         Frequency (Hz)         Fr



2. Main UI

3. Acquisition

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7. Temporal

8. Spectral

- <u>Channel</u> <u>Configuration</u>

- From Acquisition

- From File

9. <u>Waterfall</u>

## **Spectral – From File**

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- 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 1										2	-		×
Show graph ξζζζ Processing configuration	Data source From file File path D:_Projects_LabVIEW\ctors\PP_C	Time start [s]	Time end [s] 118,278 ELL_6002.tdms +	Abscissa Format	Type FFT Window None	× ×	Resolution [Hz] 0,20 Block size [s] 5,00	N Avg. [-] 2 Overlap [%] 50,0	Avg. Mode		Duration [ 7,50	s]	
	48V_CONFIG2_DWELL_6002.tdms     AI Task 1     TT     ACC1X     ACC1Y     ACC1Z		Group name Al Task 1 Channels to d ACC1X	splay		FS [Hz]							



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- 8. <u>Spectral</u>
- <u>Channel</u> <u>Configuration</u>
- From Acquisition
- From File
- 9. <u>Waterfall</u>

# **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 <u>Temporal Post-Processing</u>





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- 5. <u>Views</u>
- 6. <u>Config</u>
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- 8. <u>Spectra</u>
- 9. <u>Waterfall</u>
- Processing configuration
- <u>Colormap</u>
- <u>Spectral</u>

Mapping

dB

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#### Waterfall – Processing configuration

- Configure the acquired channels ('From acquisition') or recorded channels ('From file') Analysis type: 'PSD' (*Power Spectral Density*), 'Power - 'Overlap [%]' and 'Time increment Spectrum' or 'FFT' (*Fast Fourier Transform*) [s]' are correlated; they represent the duration between each block Mapping: 'Linear', 'Logarithmic' or 'dB' – decides which start time mapping to use for the Z-scale (the color) overlap [%] 'Block size [-]' (number of points), 'Block size [s]' and Time increment 'Frequency resolution [Hz]' are correlated; they represent the size of the temporal block used for the computation Frequency resolution [Hz] =Block size [s] Block size [s]• Block 1 Block 2 Block size [-] Block size [s] Data source Frequency resolution [Hz Colorma  $\sim$ From file 25600 Block 3 Compute -he Time Spectral Overlap [%] File path Time increment [s] increment [s] C:\Users\...Data\V2iAcquisitor\Y_Endu-1M-U_1_2019-01-29_14h04m49s.tdms 50 0.5 303 Time [s] Processing Abscissa Format Time start [s] Time end [s] Group name configuration  $\sim$ Seconds Sans titre 900 1100 Date/Time You can select the start and end Start frequency [Hz] End frequency [Hz] Channel  $\sim$ J1 500 frequency of the spectra to be Analysis type computed  $\sim$ PSD
  - In 'From file' mode, you can choose the time history portion to analyze by selecting the time start and the time end



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- 8. Spectral

#### 9. <u>Waterfall</u>

- <u>Processing</u> configuration

- <u>Colormap</u>
- <u>Spectral</u>

# 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 <u>Temporal</u> 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





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- 8. Spectral

#### 9. <u>Waterfall</u>

- <u>Processing</u> configuration

- <u>Colormap</u>
- <u>Spectral</u>

# 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 <u>colormap</u> 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!

Jérôme Ligot, Edouard Verstraelen Engineers

Tel: +32 4 287 10 70

Website: www.v2i.be