OROS 3-Series/NVGate®

Reference Manual

Contents:

Chapter 1: Analyzer Settings 1-1 to 1-163
Chapter 2: Display 2-1 to 2-89
Chapter 3: Hardware Management 3-1 to 3-20
Chapter 4: Project Manager 4-1 to 4-37
Chapter 5: Tools 5-1 to 5-67
Chapter 6: Menu, Views, Toolbars 6-1 to 6-70
Chapter 7: User Preferences 7-1 to 7-58
Chapter 8: Operation with Multiple Hardware 8-1 to 8-12
Chapter 9: Remote controller 9-1 to 9-5

Chapter 1: Analyzer settings

Table of contents:

1.1 ASB (Analyzer Setting Browser) 1-6
1.1.1 Analyzer architecture 1-7
1.1.1.1 On-Line acquisition synopsis 1-7
1.1.1.2 Post analysis synopsis 1-8
1.1.1.3 Specialized mode 1-11
1.2 Controls 1-11
1.2.1 Access modes 1-11
1.2.1.1 From the module 1-12
1.2.1.2 From the collection 1-12
1.2.1.3 From the sub-module 1-13
1.2.1.4 From the setting 1-13
1.2.2 Contextual menu 1-14
1.2.2.1 On an item 1-14
1.2.2.2 On ASB background 1-14
1.2.3 Plug-in analyzer status 1-15
1.2.4 Copy/Paste 1-15
1.3 Sources 1-16
1.3.1 Front-end 1-16
1.3.1.1 Input settings 1-16
1.3.1.2 Auto-ranging 1-17
1.3.1.3 Inputs 1-21
1.3.1.4 DC input 1-23
1.3.1.5 Aux. DC inputs 1-23
1.3.1.6 External Syncs 1-24
1.3.1.7 Aux. External Syncs 1-30
1.3.1.8 Output settings 1-30
1.3.1.9 Outputs 1-30
1.3.1.10 Aux. Output 1-31
1.3.2 Recorder 1-31
1.3.2.1 Arming 1-32
1.3.2.2 Recover 1-32
1.3.2.3 Track 1-33
1.3.2.4 Mode 1-33
1.3.2.5 Trigger 1-35
1.3.2.6 Bandwidths 1-35
1.3.2.7 Progress Bar 1-36
1.3.3 Player 1-36
1.3.3.1 Selected record 1-39
1.3.3.2 Tracks 1-41
1.3.4 Connection wizards 1-42
1.3.4.1 Inputs 1-42
1.3.4.2 Outputs 1-45
1.3.4.3 Tachometer 1-46
1.3.4.4 Event connection 1-46
1.3.4.5 Tracks 1-46
1.4 Resources 1-47
1.4.1 Output signals 1-47
1.4.1.1 Sine 1-47
1.4.1.2 Multi-sine 1-48
1.4.1.3 Random noise 1-50

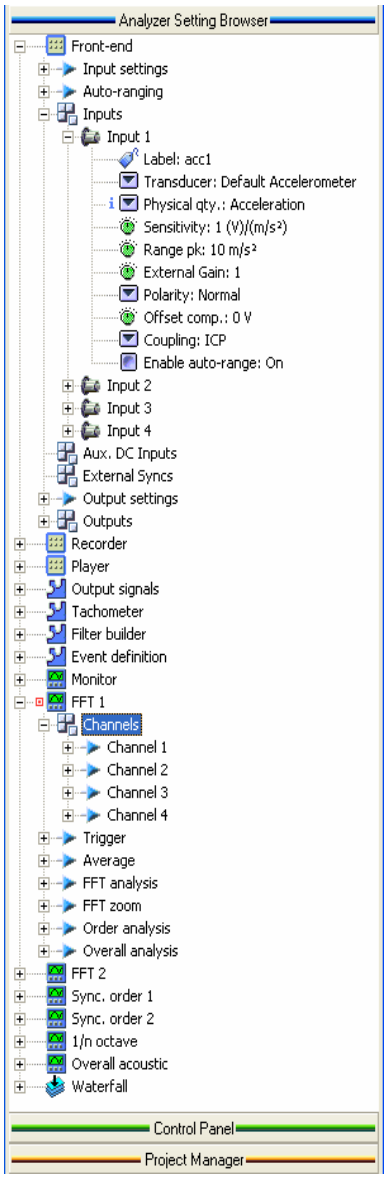
1.4.1.4 Chirp 1-51
1.4.1.5 Advanced sine 1-52
1.4.1.6 Advanced sine settings 1-53
1.4.1.7 Synchro 1-58
1.4.2 Tachometer 1-61
1.4.2.1 Tachs 1-61
1.4.2.2 Ext. Tach 1-66
1.4.2.3 DC Tachs 1-69
1.4.2.4 Fractional Tachs 1-71
1.4.2.5 RPM Profiles 1-72
1.4.3 Filter builder 1-72
1.4.3.1 High-Low pass 1-72
1.4.3.2 Pass-Stop band 1-73
1.4.3.3 Integrator 1-74
1.4.4 Time windows 1-76
1.4.4.1 Force 1-76
1.4.4.2 Response 1-77
1.4.5 Event definition 1-79
1.4.5.1 Edge detection 1-79
1.4.5.2 RPM 1-81
1.4.5.3 Delta RPM 1-82
1.4.5.4 Level 1-84
1.4.5.5 Delta level 1-85
1.4.5.6 Periodic 1-86
1.4.5.7 Combined events 1-87
1.4.5.8 User events 1-87
1.5 Analysis plug-ins 1-88
1.5.1 FFT 1-88
1.5.1.1 Channel 1-92
1.5.1.2 Trigger 1-94
1.5.1.3 Average 1-96
1.5.1.4 FFT analysis 1-98
1.5.1.5 FFT zoom 1-99
1.5.1.6 Order analysis 1-102
1.5.1.7 Correlation 1-104
1.5.1.8 Overall analysis 1-105
1.5.1.9 FFT status 1-106
FFT x 1-106
FFTx cur. Blk 1-107
Count 1-108
Real-time 1-109
Block overload 1-109
Analysis overload 1-109
1.5.2 Synch order 1-110
1.5.2.1 Channel 1-112
1.5.2.2 Tach 1-114
1.5.2.3 Trigger 1-114
1.5.2.4 Average 1-117
1.5.2.5 Order FFT 1-118
1.5.2.6 Overall analysis 1-120
1.5.2.7 SOA Status 1-121
Sync. Order x 1-121

SOAx cur.blk 1-122
Trigger State....1-123
Count....1-123
Real-time....1-123
Block overload....1-124
Analysis overload....1-124
1.5.3 1/n Octave 1-125
1.5.3.1 Channel 1-126
1.5.3.2 Trigger....1-126
1.5.3.3 Average 1-128
1.5.3.4 CPB filters....1-132
1.5.3.5 1/n Octave status 1-133
1/N oct....1-133
Count....1-134
Analysis overload....1-135
Time to stabilization 1-135
1.5.4 Overall acoustic....1-136
1.5.4.1 Overview....1-136
1.5.4.2 Channels....1-137
1.5.4.3 Trigger....1-137
1.5.4.4 Average 1-139
1.5.4.5 Peak detector....1-140
1.5.4.6 RMS detectors....1-141
1.5.4.7 OVA status....1-142
OVA....1-142
Trigger state 1-143
Count....1-143
Analysis overload....1-143
Time to stabilization 1-143
1.6 Monitor and Waterfall....1-144
1.6.1 Monitor 1-144
1.6.1.1 Channel 1-144
1.6.1.2 FFT analysis....1-145
1.6.1.3 Overall analysis....1-145
1.6.2 Waterfall 1-146
1.6.2.1 Glossary 1-148
1.6.2.2 Channel 1-148
1.6.2.3 Trigger....1-149
1.6.2.4 Mode 1-150
1.6.2.5 Windows (2D view, 3D view, color spectrum) 1-152
1.6.2.6 Waterfall status 1-158
Waterfall 1-158
Trigger State....1-159
Count....1-159
Real-time....1-159
% Block lost....1-160
% Block transferred 1-160
1.7 Control Panel 1-161
1.7.1 Overview 1-161
1.7.1.1 Areas 1-161
1.7.1.2 Control buttons....1-161
1.7.2 Tabs 1-161

1.7.2.1 Setting 1-162
1.7.2.2 Status.....1-162
1.7.2.3 Macro 1-162

1.1 ASB (Analyzer Setting Browser)

The analyzer is controlled through a tree of settings called the Analyzer Setting Browser (ASB). This tree consists of a set of modules corresponding to the main functions:

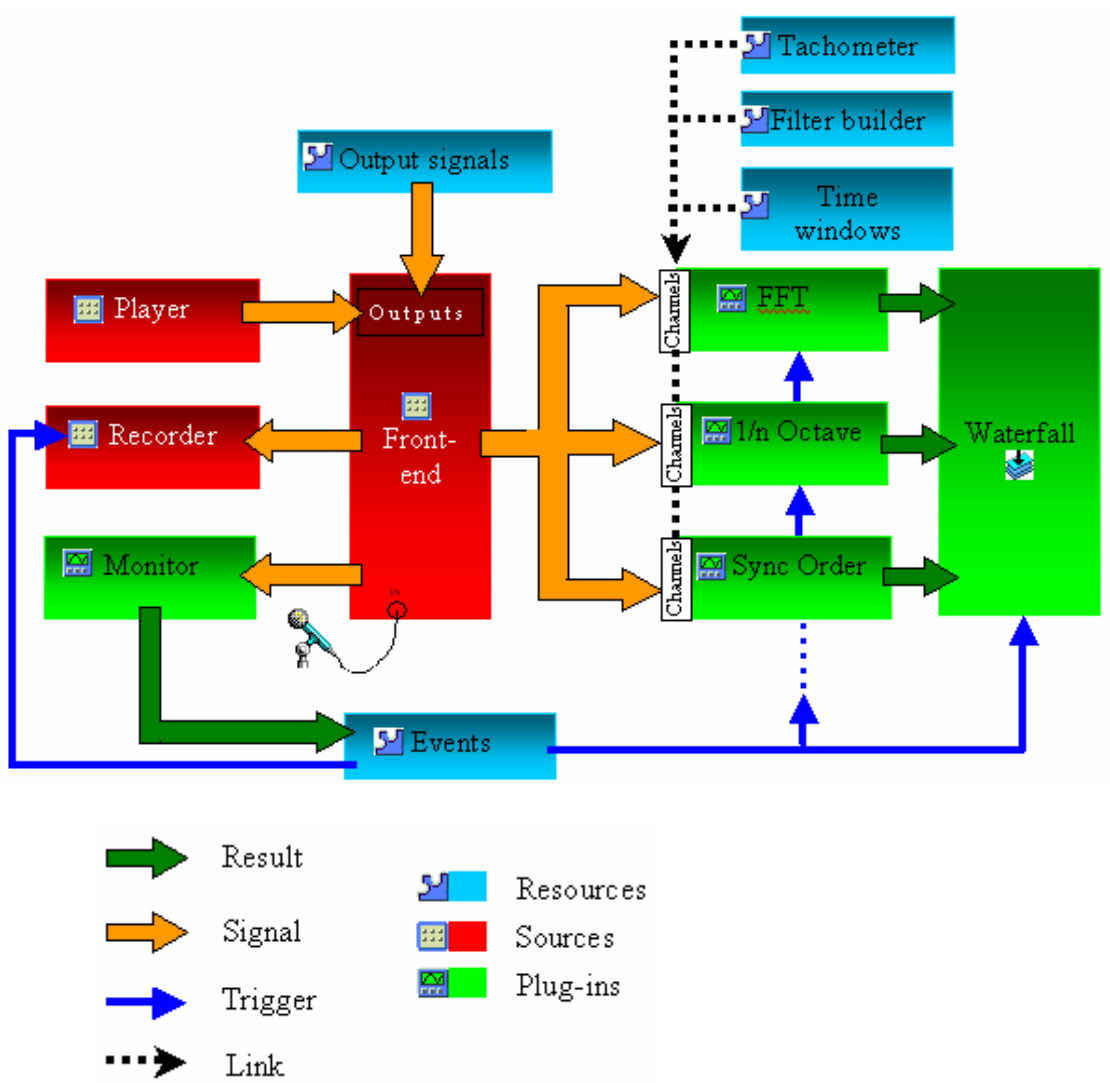


- The **sources** that acquire, store and play back signals
- The **resources** that provide events, filters, weighting windows, and tachometers to the plug-in analyzers
- The **plug-in** analyzers that process independent analysis modes
- The **Waterfall** that synchronizes the results computed by the plug-ins
- The modules contain different functions located on sub-modules. The settings are inside the sub-modules. The ASB has a maximum depth of 3 levels: module, sub-module, and settings. In the case of multiple similar sub-modules (inputs for example), the sub-modules are arranged in collections.
- For each module, this document provides an array that summarizes the available results with detailed information.

1.1.1 Analyzer architecture

1.1.1.1 On-Line acquisition synopsis

The following synopsis presents the basic structure of the NVGate® multi analyzer architecture for real-time acquisition and analysis. In this mode, OR3X processes parallel analysis with all plug-in analyzers running at the same time (FFT, 1/n Octave, SOA, Recorder…).
The Front-end inputs may be connected to any plug-in analyzer through the channels. There are up to 32 (8 for OR34/OR35 analyzer) channels on each plug-in analyzer. Any input plug-in analyzer channel combination is allowed.



The plug-in analyzers share general resources such as Filters, Events, Time windows, and Tachometers. These resources can be associated with any channel or plug-in analyzer with a centralized set of parameters: for example, by applying filter 1 to channel 1 to 8 of each plug-in analyzer and filter 2 to channels 9 to 16 you can modify filtering characteristics directly from the resource settings.

The Filter builder provides general purpose filters for low pass, high pass, pass band, stop band and integration functions that apply to the time domain signals. For example: distributing Input I to channel 1 to 3, will provide simultaneous analysis of

acceleration, velocity and displacement of an accelerometer by applying Integrator filter to channel 2 and double Integrator filter to channel 3.
The Time windows resources allow the modification of force and response weighting windows. For example: associating the force window with channel 1 and the Response window to the rest of channels allows the modification of response characteristics from a single set of parameters in the resource.

The Event Definition resource is used to create an event that can start, stop and trigger plug-in analyzers acquisition. These events can be based on different criteria (DC level, RPM, time…) as well as on results computed by the Monitor (Kurtosis, RMS, DC…). For example: an event based on an input RMS level can be used to start and/or stop the FFT averaging and the Recorder simultaneously by connecting the event to the plug-in analyzer trigger sub-module.

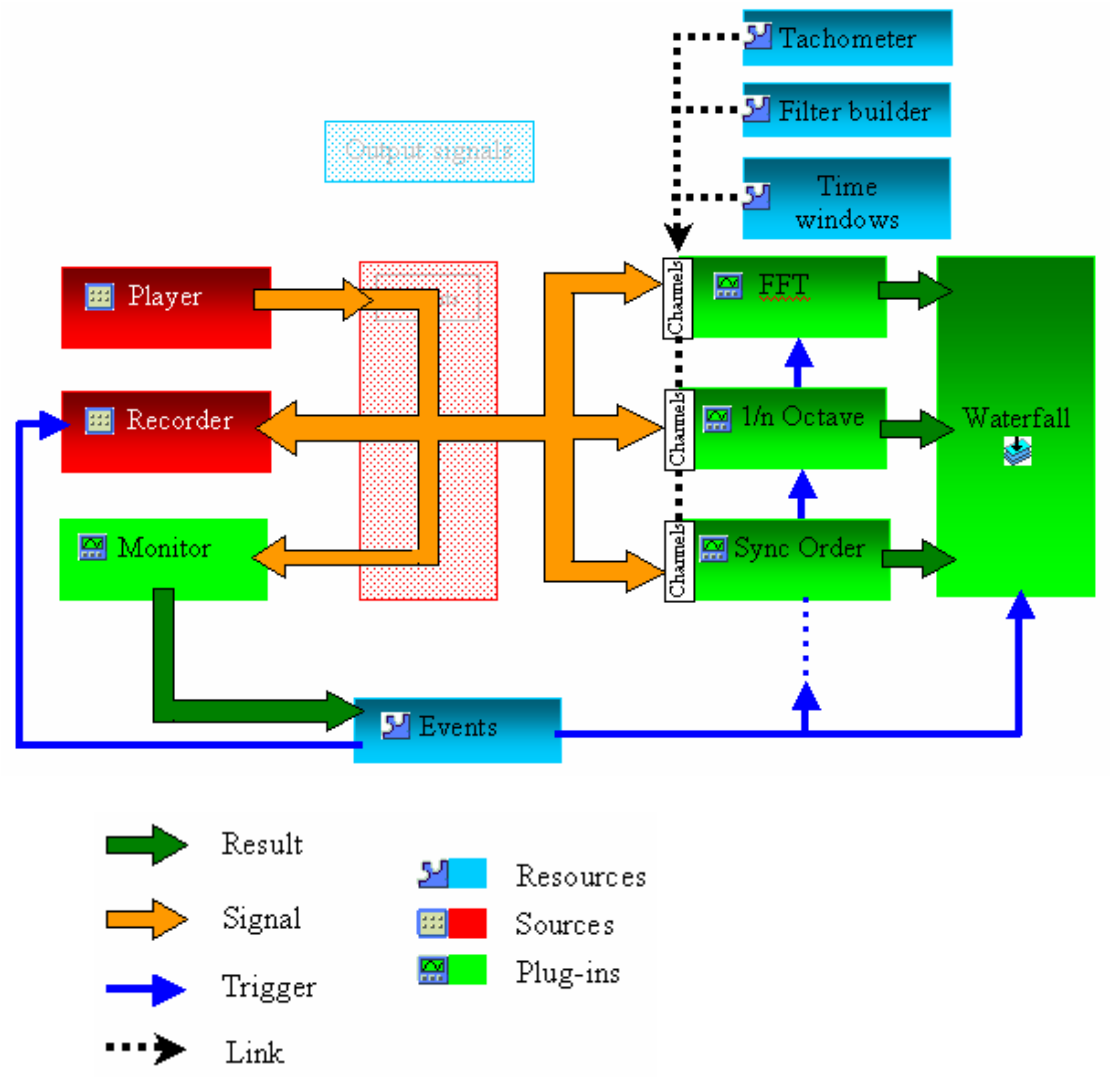
The Waterfall module collects and synchronizes the results computed and provided by the different plug-in analyzers. These results are displayed in segments and can be sorted in relation to selectable references (Time, RPM, DC…). For example: while computing orders, it is possible to track these values by adding them and the Tachometer (the reference) to the Waterfall. You will then be able to display order profiles and switch the reference between time and RPM. It is then possible to add any new result (value or spectrum) or any reference (DC input, 2nd tach) to the Waterfall.

Using the ‘Setup’ menu (see also Chapter 6 “Menu, Views, Toolbars”) it is possible to guide you through connections of inputs, player tracks, output signals, event, filters or waterfall and display properties related.

1.1.1.2 Post analysis synopsis

In the Post analysis mode, the Front-end and Output signals are no longer available. The only source able to provide recorded time signals is the player.
Post analysis features exactly the same functions as the On-Line mode replacing the inputs by the Player tracks. The Player tracks are then connectable to the plug-in analyzer channels and can be used by the resources.
Post analysis processing can be performed on the DSP (Connected mode, only for OR36/OR38) as well as on the PC CPU (Office mode).

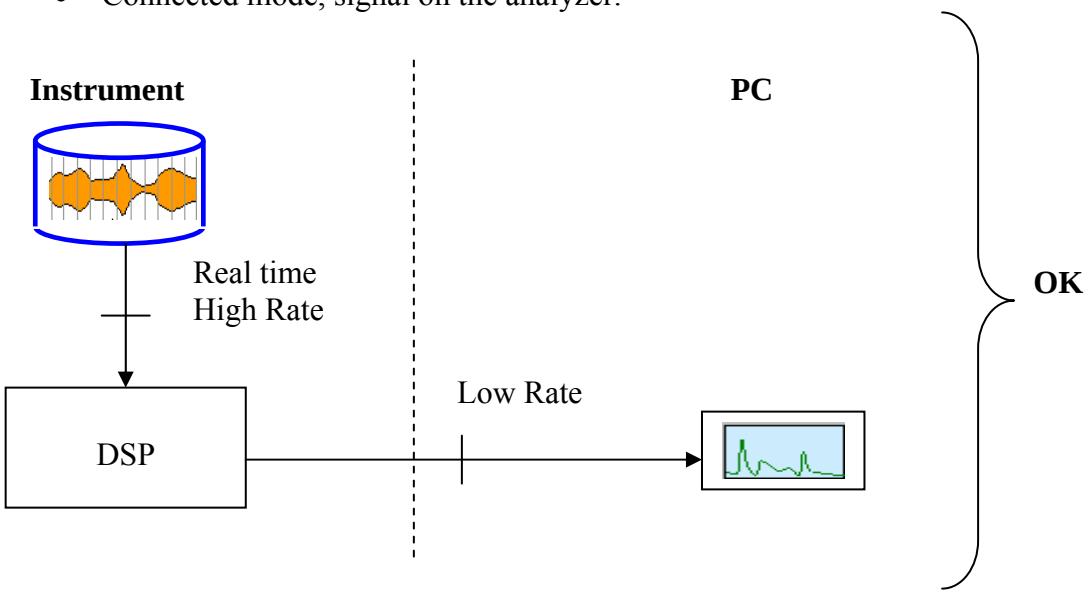
In addition to the Post analysis, it is possible to split the recorded signal files (channels and duration) by re-recording selected channels and time segments in a new signal file.
Post analysis processing time depends directly on the computation load. It may be faster or slower than the real-time analysis.
Using the Post analysis accommodates larger requests in terms of computation power. This cannot be achieved in real-time analysis.



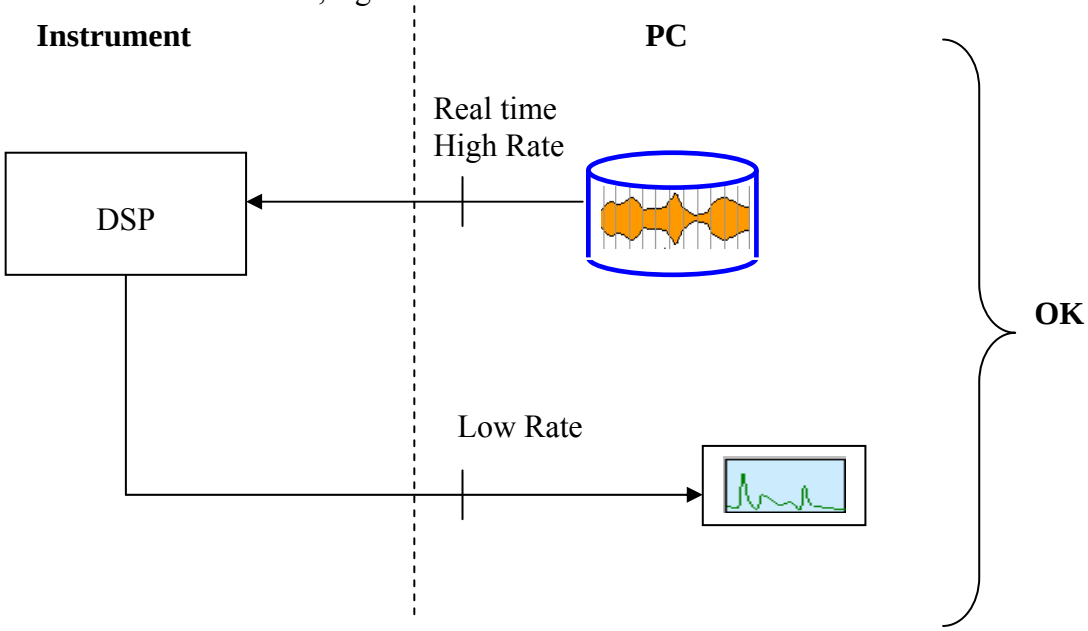
: If the time signal is recorded on the PC or on the Mobi-disc™, it is highly recommended to be in office mode (hardware not connected) in order to avoid low performances and malfunctions.

Example:

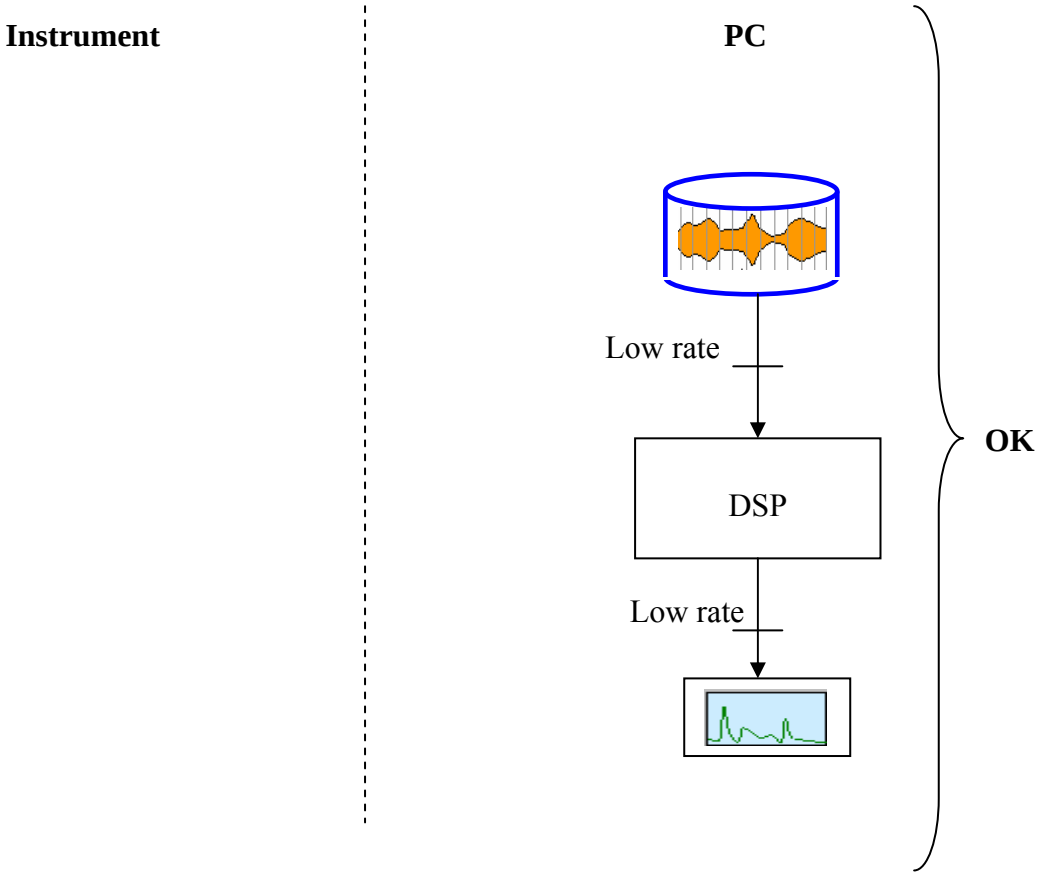
- Connected mode, signal on the analyzer.



- Connected mode, signal file on the PC.



- Office mode, signal file on the PC



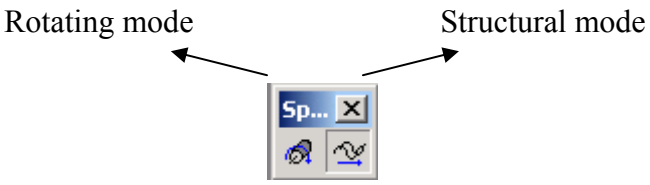
1.1.1.3 Specialized mode

NVGate Provides specialized modes that enable dedicated functionalities related to the application. By selecting specialized mode functionalities such as;

- Availability of results
- Settings
- Tool-bars

will be enabled. Unselecting specialized mode will mask these functionalities.

There are 2 specialized modes:



- **Structural mode**: this mode is dedicated to the acquisition of modal data through hammer acquisition or signals provided by up to 6 shakers. The following topics are available when structural mode is active:

  - Visibility of FRF (H1, H2) and Coherence results in FFT plug-ins.
  - Visibility of time windows (force and response) in the ASB, and control panel.
  - Availability of the inputs node settings in ASB and Control Panel.
  - Availability of accept/reject toolbar

- **Rotating mode**: this mode is dedicated to rotating and reciprocating machines. The following topics are available when rotating mode is active:
  - FFT order extraction, constant band tracking or synchronous order.
  - 'Tachometer' setting.
  - Plug-in analysis 'Sync Order' will be unlocked.

Note: these specialized modes can be selected (by default) in the user's preferences.

1.2 Controls

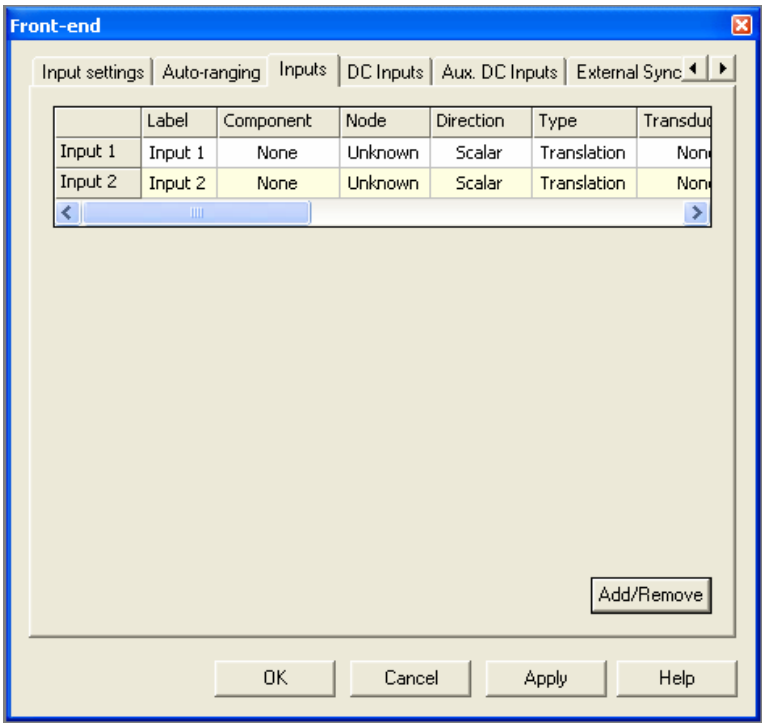
This section explains how to access the different controls contained in the ASB (settings, custom display...) and what they mean.

1.2.1 Access modes

There are four access modes to adjust a setting:

1.2.1.1 From the module

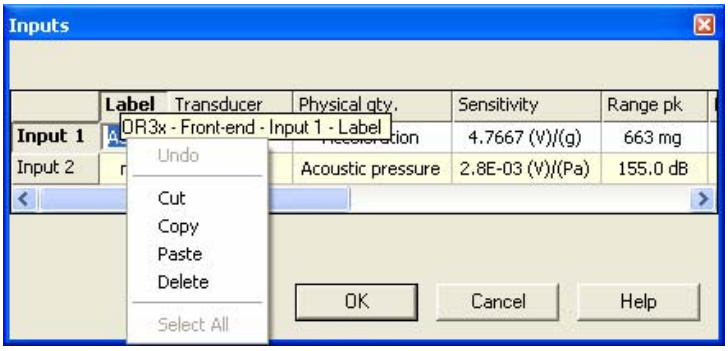
The first access level is available by right clicking on a module (Front-end, Recorder, Tachometer, FFT...) and **Properties** where all the settings contained in this module can be adjusted.



It is also possible to copy and paste some items from a cell to another if they have compatible titles (Label, Transducer, Sensitivity…).

1.2.1.2 From the collection

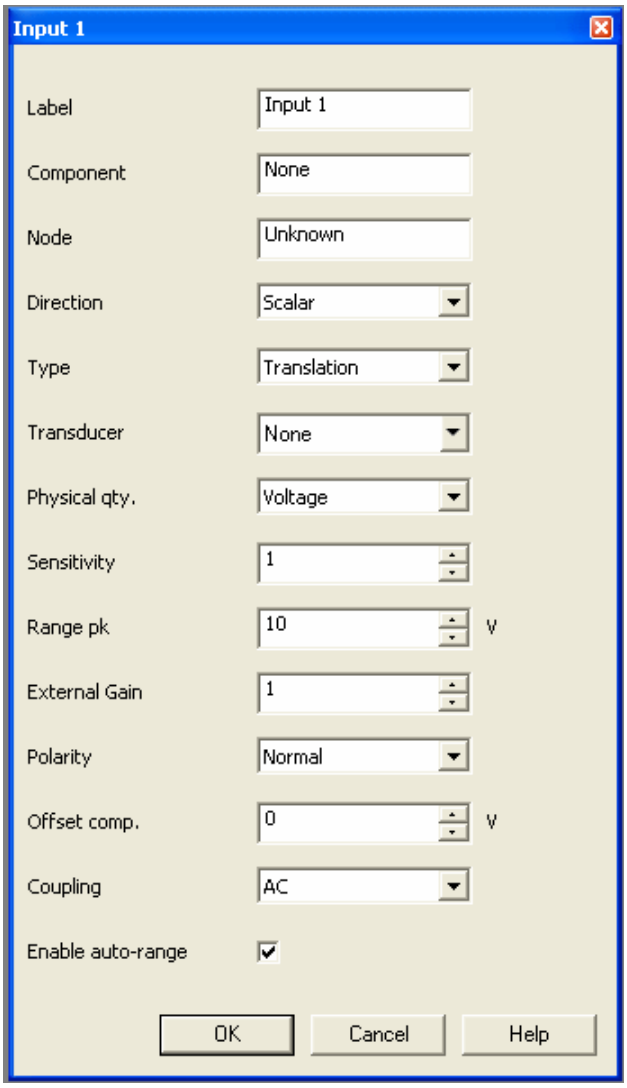
The second access level is available by right clicking on a collection (Inputs, Outputs, Channels, Tracks...) and **Properties** where all the settings contained in this collection can be adjusted.



It is also possible to copy and paste some items from a cell to another if they have compatible titles (Label, Transducer, Sensitivity…).

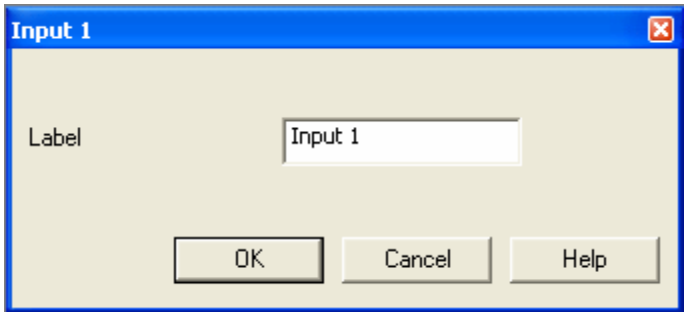
1.2.1.3 From the sub-module

The third access level is available by right clicking on a sub-module (Input x, Output x, Track x, Channel x...) and **Properties,** where all the settings contained in this sub-module can be adjusted.



1.2.1.4 From the setting

The fourth access level is available by right clicking on the setting itself (Label, Duration, Transducer, Coupling...) and **Properties,** where the new value for this setting can be entered.



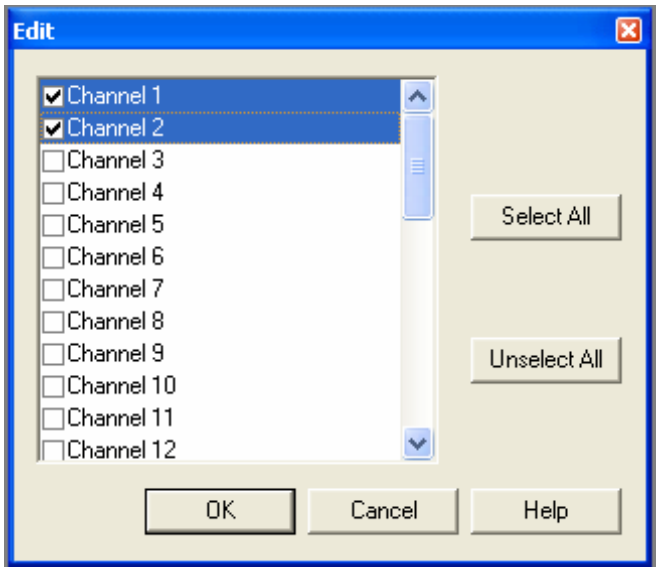
1.2.2 Contextual menu

Contextual menus appear when right clicking on an area or an item.

1.2.2.1 On an item

Different controls are available according to the item you right click on.

- **Properties:** displays the properties of the item.
- **Add/Remove:** Available for collections (Channels, Event...), it enables or disables some items of the collection



- **Set to default**: Reset a setting, a sub-module or a module to the default values. All connections are removed
- **Copy (Ctrl+C)**: Copy a setting, a sub-module, or a module. This copy is internal and does not use the Clipboard
- **Paste (Ctrl+V)**: Available when a copy action has been previously performed. Only the settings common to both the copy and the paste item are affected
- **IDN info:** Available only when the Shift key is pressed. It displays an identification number used by NVDrive®
- **View state**: Available only on plug-ins, it hides or shows the status of this plug-in in the Status window
- **Add to control panel**: Enable the corresponding setting to be modified from the Control Panel.
- **dB**: Enable the corresponding setting to be displayed in dB. Only available for some scalar settings.

1.2.2.2 On ASB background

- **Auto width**: this function adjusts the width of the ASB.

1.2.3 Plug-in analyzer status

An icon is displayed in the ASB when a plug-in is connected. For each plug-in the icon displays the analysis status (running, stopped, recording...).

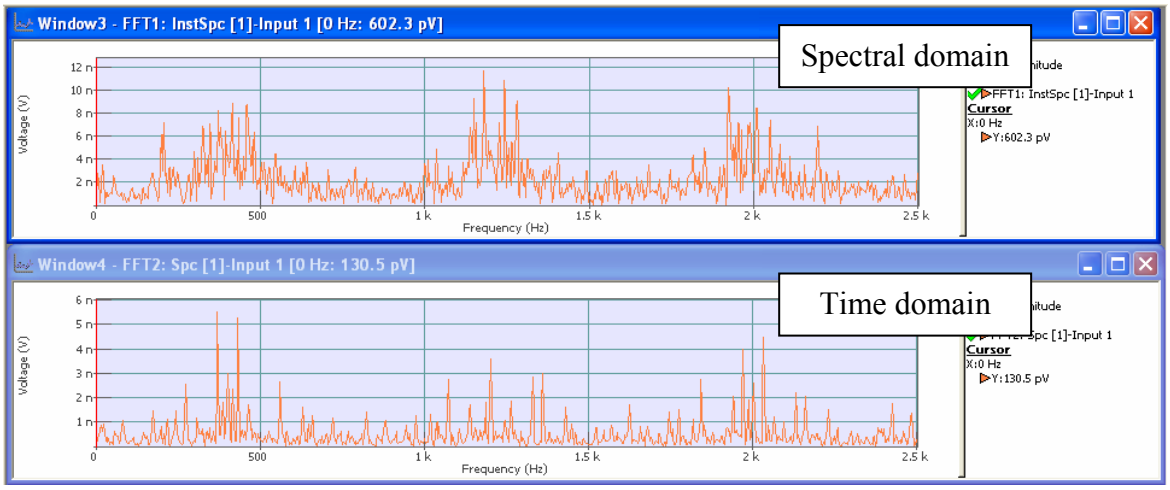
- **Running** : the plug-in analyzer is processing the data acquisition.
- **Paused** : the plug-in analyzer is paused. The plug-in analyzer is not processing any data. The user must click on the "continue" button to continue the analysis. For the recorder plug-in the “Continue" action starts a new record because in the paused state no data is recorded.
- **Stopped** : the plug-in analyzer is stopped.
- **Recording** : the plug-in recorder is processing the data acquisition.
- **Block Triggering** : the plug-in analyzer is waiting for the Trigger event to occur in order to process the data.
- **Waiting** : in the manual rejection mode, the plug-in analyzer is waiting for the user to accept or to reject the current analyzed signal block.
- **Failure** : the plug-in analyzer has failed (the analyzer is no longer able to compute the data acquisition; a warning message will appear)

1.2.4 Copy/Paste

By right clicking on any settings of the ASB you can Copy values of settings, and then Paste it anywhere else. There is an automatic type matching, which allows pasting only value of the same settings (using the IDN number).

This Copy/Paste is available at each level of the ASB. This let you the opportunity of the multi-analysis in the same condition.

For example you can see the same signal in the time domain and in the spectral domain, with exactly the same settings (for instance resolution). In the following example, the FFT1 have been set in the ‘Spectral domain’, with a specific range and a resolution. For the FFT2, right click on FFT2 and paste the setting from FFT1, then you have just to change the domain from spectral to time in that case.
You can compare the signal in, exactly, the same conditions.



1.3 Sources

The sources are represented by 3 modules: Front-end, Recorder, and Player. These modules control the Input/Output parameters.

1.3.1 Front-end

The Front-end module contains the settings that control the analyzer inputs, outputs, Ext Sync, and auxiliaries
Available results:

Type	Size	Dimension	Domain	Save
Signal	256 pt	2D	time	Display only
DC	1 pt	1D	time	Display only
DC profile	2048 pt max	2D	time	Display only
RMS	1 pt	1D		Display only

- **Signal:** The input time signal after sampling at the *Input settings/ Input sampling* rate
- **DC:** The DC input signal after sampling at the *Input settings/ DC input sampling* rate
- **DC profile:** Changes in the DC input signal during the *Input settings/DC profile duration* time
- **Output Signal:** The output signal
- **Aux Output Signal:** The auxiliary output signal

1.3.1.1 Input settings

The Input settings sub-module controls the Front-end general parameters that apply to all channels.

- **Input sampling**: the dynamic input and output sampling frequency (in Samples/second). Changing this will set the maximum bandwidth for all plug-in analyzers and recorders to the following value: Sf / 2.56.

Sampling frequency	Frequency range
102.4 kS/s	40 kHz bandwidth
65.536 kS/s	25.6 kHz bandwidth
51.2 kS/s	20 kHz bandwidth
32.768 kS/s	12.8 kHz bandwidth
25.6 kS/s	10 kHz bandwidth
16.384 kS/s	6.4 kHz bandwidth
12.8 kS/s	5 kHz bandwidth
8.192 kS/s	3.2 kHz bandwidth
6.4 kS/s	2.5 kHz bandwidth
5.12 kS/s	2 kHz bandwidth
4.096 kS/s	1.6 kHz bandwidth
3.2768 kS/s	1.28 kHz bandwidth
3.2 kS/s	1.25 kHz bandwidth
2.048 kS/s	800 Hz bandwidth

- **DC input sampling***: the sampling frequency (in Samples/second) = SF_Slow of optional DC Inputs (parametric).

DC input sampling	Description
15 S/s (60 Hz rejection)	The sampling frequency applied to the DC inputs is 15 samples/second, and the 60 Hz component of the signal is rejected at x dB
12.5 S/s (50 Hz rejection)	The sampling frequency applied to the DC inputs is 12.5 samples/second, and the 50 Hz component of the signal is rejected at x dB

- **DC profile duration***: the duration of the DC profile must be a multiple of 1/SF_Slow, with SF_Slow is the DC input sampling. Its minimum value is 10 / SF_Slow, and its maximum value is 2048 / SF_Slow.
- **Inputs x-y 200V***: enables the 200V power supply on the corresponding block of 8 inputs LEMO connectors. There are up to 4 blocks of 8 inputs LEMO depending of the hardware configuration (input 1-8, input 9-16, input 17-24 and input 25-32)
- **Check ICP**: run an ICP check. The analyzer checks if an ICP transducer is correctly connected to each input for which the coupling is ICP. The analyzer checks the ICP connection by measuring DC polarization voltage through time averaging and opens a window with the results:
  - short circuit: DC voltage < 4V (the sensor may be faulty)
  - ICP detected: DC voltage between 4V and 20V (an ICP sensor is detected)
  - no connection: DC voltage > 20V (no ICP sensor is detected), open circuit
  - unstabilized input: DC voltage was not stabilized after 40 s.
- **Detect TEDS:** Run a TEDS detection. The analyzer detects if a TEDS transducer is connected to an input with the ICP TEDS coupling. All the characteristics of the transducer are detected and it automatically appears in the transducer database.

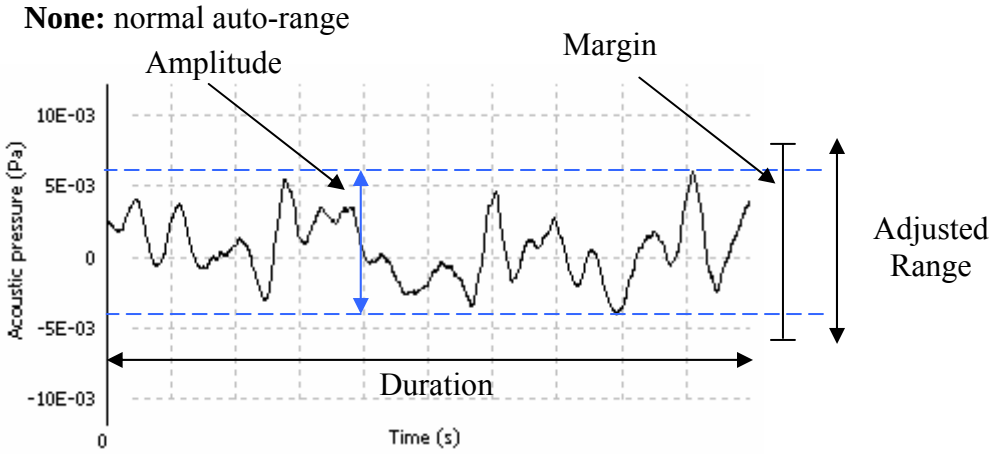
1.3.1.2 Auto-ranging

Auto-ranging consists of making an automatic adjustment of the Input ranges to the levels of the signals present on input. It concerns only inputs for which the Enable auto-range is set to On. It can be done in two ways: Normal auto-range or Peak detection auto-range.
The normal auto-range must be used when the input signal level (Peak to peak) is stationary.
The peak detection auto-range must be used if there are spikes or large variations in the selected input. The computation takes into account (for all channels) data read during each spike of the selected input. This mode is useful if there are spikes in the selected input as in modal analysis, for example.

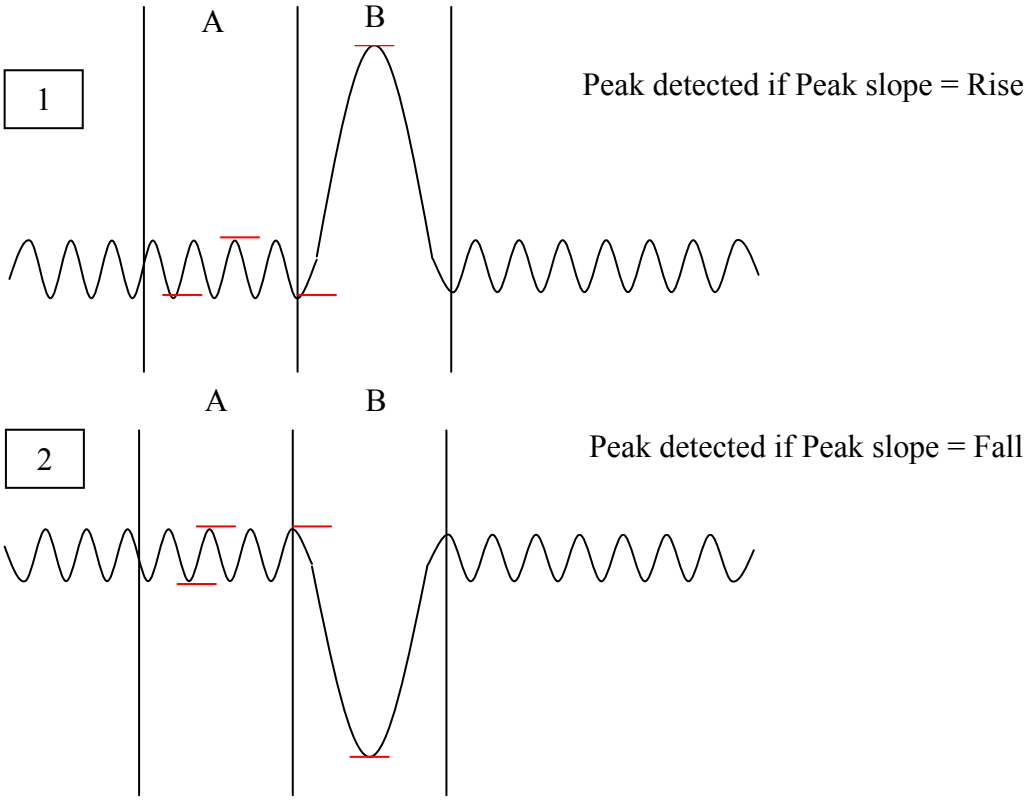
* Optional, depends on hardware options

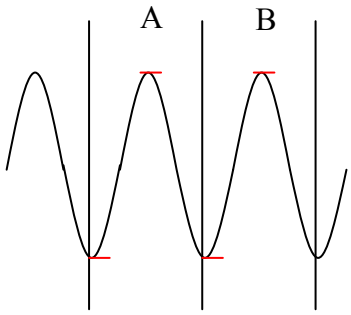
- **Auto-range**: button used to run the auto-range. If a Peak detection auto-range is running, the user can press this button to cancel the auto-range.
- **Peak detection on**: the input selected for peak detection (in a peak detection auto-range). If this value is “none”, it is a normal auto-range. The list contains all the inputs for which the enable auto-range is set to On.

None: normal auto-range

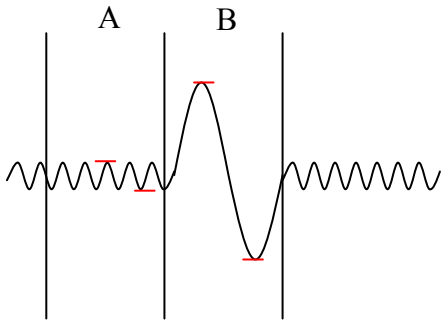


Input x: auto-range on peak.
Auto-range starts when Input x amplitude value changes dramatically according to a defined factor (Edge detection).





No peak detected



No peak detected

Margin: the margin in dB added to the max detected to determine the new range.

Margin	Description
no	the max detected becomes the new range
3 dB	add 3 dB to the max detected to compute the new range
20 dB	add 20 dB to the max detected to compute the new range

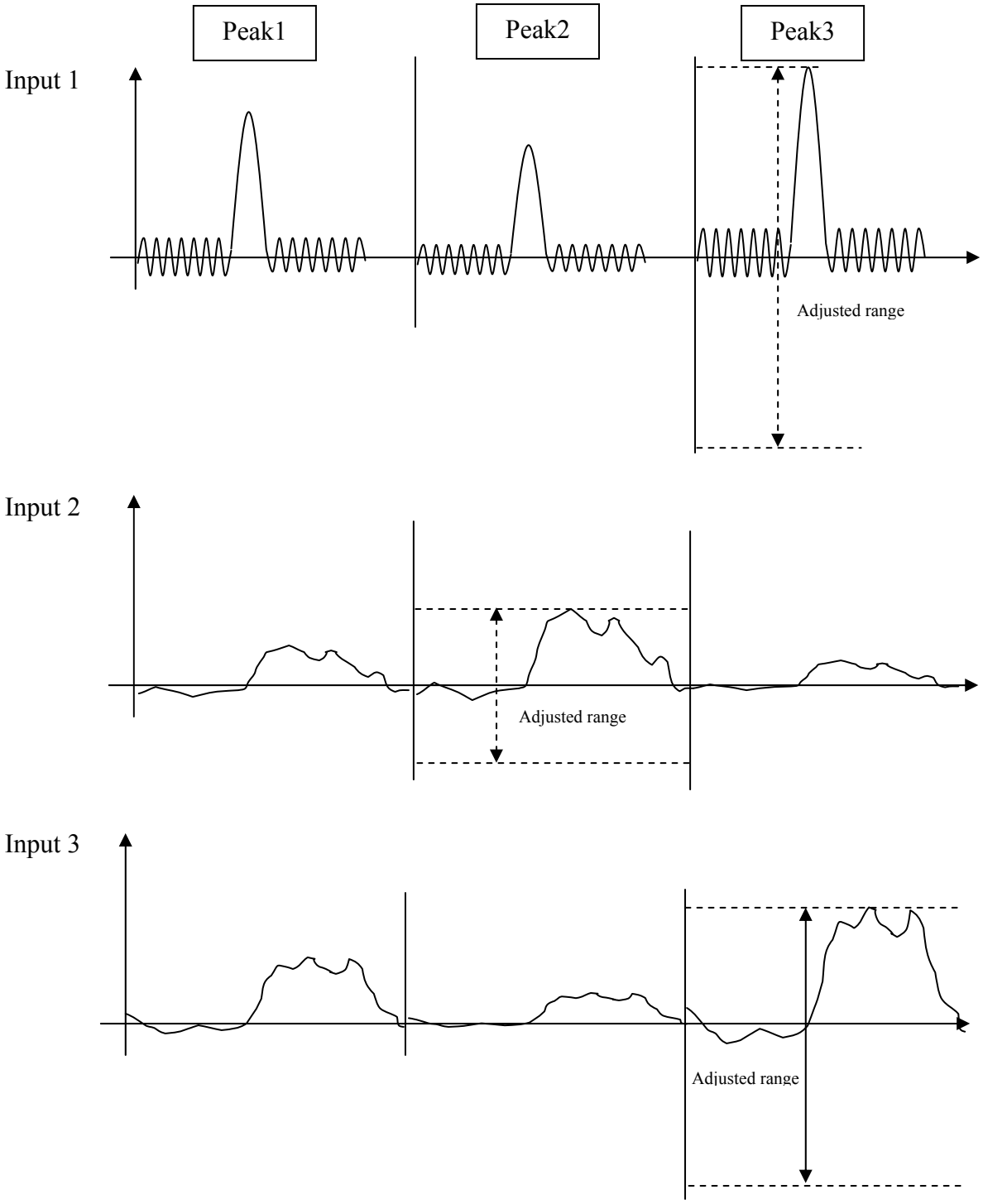
- **Duration**: duration of the normal auto-range.
  Hidden/fixed: hidden in Peak detection auto-range mode.
- **Peak slope**: the peaks are detected only with this slope.
  Hidden/fixed: hidden in Normal auto-range mode.

Peak slope	Description
Rise	Auto-range on a rising edge (1)
Fall	Auto-range on a falling edge (2)
Any	Auto-range on any edge (1 or 2)

- **Number of peaks**: the number of peaks to detect in order to achieve the Peak detection auto range. It can vary from 1 to 10.
  Hidden/fixed: hidden in Normal auto-range mode.

  For example: Peak number = 3, Peak detection = input 1 and inputs 2 and 3 are connected to the analyzer and available for auto-ranging. The inputs 2 and 3 will be auto-ranged during the 3 peak detections and the maximum detected range will be kept for each input.

  Peak detection with a hammer works well with a low sampling frequency (less than 13.8 kS/s). With higher sampling rate it may be difficult to detect the peaks.



- **Edge detection**: corresponds to the factor value that is used to detect the input x amplitude variations.

Edge detection	**Description**
Low sensitivity	Factor = 100
Normal	Factor = 20
High sensitivity	Factor = 3

Hidden/fixed: hidden in Normal auto-range mode.

1.3.1.3 Inputs

Contains all the settings related to the input x such as transducer type, sensitivity, coupling

- **Label**: the name of this input (by default Input n, with 1 <= n <= 32). The label of each input is used in the result name and in all connection tools.
- **Component**: the name of the structure to which the sensor is attached.
  Hidden/fixed: only visible in the structural mode
- **Node**: the name (usually a number) of the point of measurement.
  Hidden/fixed: only visible in the structural mode
- **Direction**: identify the axis and the direction of the measurement defined by the position of the sensor
  Hidden/fixed: only visible in the structural mode

Direction	Description
Scalar	Sensor measuring in the scalar direction
-X	Sensor measuring in the negative X direction
+X	Sensor measuring in the positive X direction
-Y	Sensor measuring in the negative Y direction
+Y	Sensor measuring in the positive Y direction
-Z	Sensor measuring in the negative Z direction
+Z	Sensor measuring in the positive Z direction

- **Type**: the kind of measurement (if direction is different from scalar).
  Hidden/fixed: only visible in the structural mode.

Type	Description
Translation	Sensor measuring translation in the selected direction
Rotation	Sensor measuring rotation along the selected axis in the selected direction

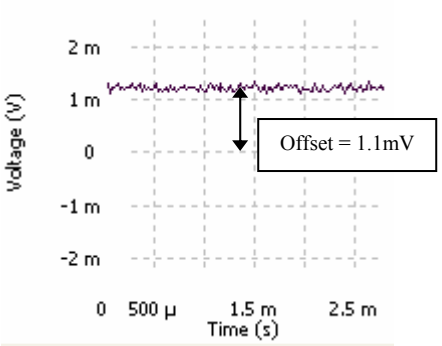
- **Transducer**: the transducer connected to this input. Selecting a transducer will automatically modify the sensitivity.
- **Physical qty**.: the physical quantity applied to this input. It modifies the sensitivity and range peak units if necessary.
  Hidden/fixed: fixed if a transducer is selected for this input.
- **Sensitivity**: transducer sensitivity. Changing it updates the range peak.
- **Range pk**.: the maximum input level for this channel, from 17.5mV up to 40V for a sensibility of 1 V/V. For a sensibility of 2 V/m/s^2 those values will be divided by 2 (0.0087 m/s^2 and 20 m/s^2) and for an external gain of 0.1 those values will be multiplied by 10 (0.175V and 400V). This setting can be displayed in dB.
- **External gain**: This enables the analyzer to take into account an external attenuation or amplification: for example if there is an external gain of 3dB, you can set the value of this setting to 3dB to retrieve the genuine amplitude of the signal. This setting can be displayed in dB.

- **Polarity**: The polarity applied to the signal. If the value is "inverted", positive and negative values are inverted. For example, if the signal value is 4 Volts with "Normal" polarity, it will be -4 Volts with "Inverted" polarity.

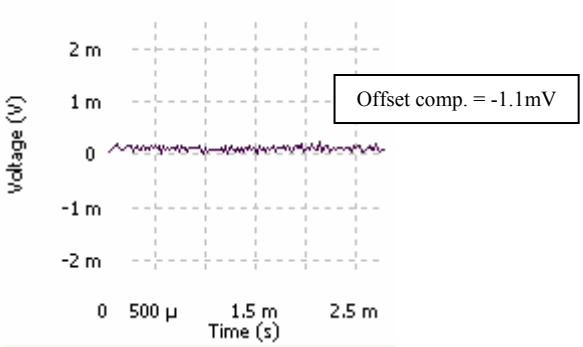
Polarity	Description
Normal	Normal polarity
Inverted	Positive and negative values are inverted

- **Offset comp**: the offset compensation in Volts for DC coupling.

Real



Compensated



- **Coupling**: the input coupling.

Coupling	Description
AC	AC coupling with signal ground connected to the analyzer hardware ground and a 0.35 Hz first order high pass filter.
DC	DC coupling with signal ground connected to the analyzer hardware ground. It is advisable to use the DC coupling when analyzing very low frequencies (< 10 Hz frequency range).
ICP	AC coupling with ICP current source (nominal 4 mA). Signal ground is connected to the analyzer hardware ground.
AC floating ± 40V	AC coupling with signal ground floating. This position is used to avoid ground loop problems (absolute input voltage values are ± 40V).
DC floating ± 40V	DC coupling with signal ground floating. This position is used to avoid ground loop problems.
ICP TEDS	AC coupling with ICP current source (nominal 4 mA). Signal ground is connected to the analyzer hardware ground. This coupling allows inverted current for TEDS detection.

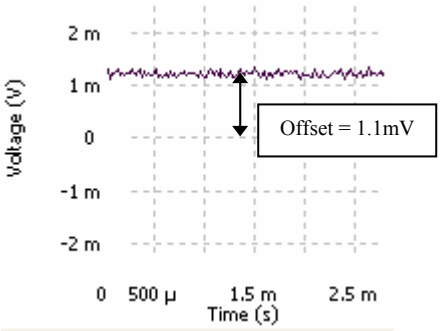
- **Enable auto-range**: On / Off. “On” allows the auto-range to change the range peak of this input. “Off” will set the input range unchanged.

1.3.1.4 DC input

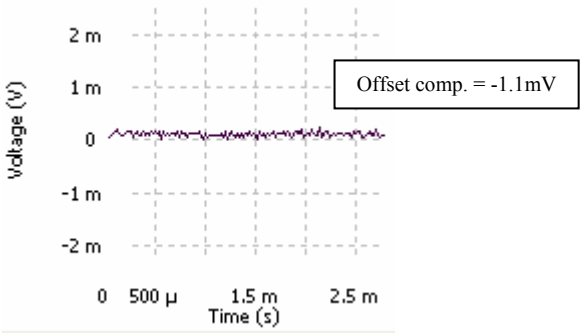
Contains all the settings related to the DC input x (optional) such as transducer type, sensitivity. Parametric inputs sampled at Low freq (16 bits) that provide accurate and stable DC measurement.

- **Label**: the name of this DC input (by default DC input n, with 1 <= n <= 8). The label of each DC input is used in the result name and in all connection tools.
- **Transducer**: the transducer connected to this DC input. Selecting a transducer will automatically modify the sensitivity.
- **Physical qty**.: the physical quantity applied to this DC input. It modifies the sensitivity and range peak units if necessary.
  Hidden/fixed: fixed if a transducer is selected for this DC input.
- **Sensitivity**: transducer sensitivity. Changing it updates the range peak.
- **Range pk**.: the maximum input level for this channel, from 156mV up to 10V. For a sensibility of 2 V/m/s^2 those values will be divided by 2 (0.078 m/s^2 and 5 m/s^2). This setting can be displayed in dB.
- **Offset comp**.: the offset compensation in Volts.

Real



Compensated



- **Enable auto-range**: On / Off. It allows the auto-range to change the range pk of this DC input.

1.3.1.5 Aux. DC inputs*

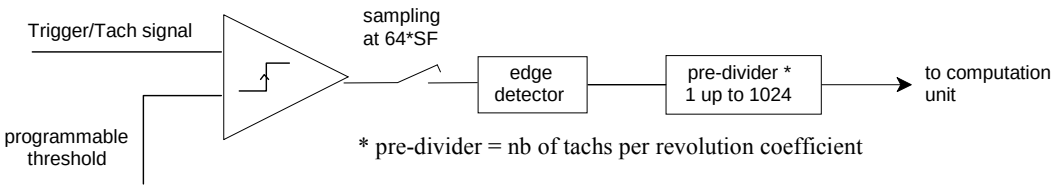
Parametric inputs sampled at Low freq (16 bits) that provide accurate and stable DC measurement.
Contains all the settings related to the DC located on the “aux” part input x such as transducer type, sensitivity...
See

* Optional, depends on hardware options.

DC input p 1-23 for Aux. DC inputs setting details.

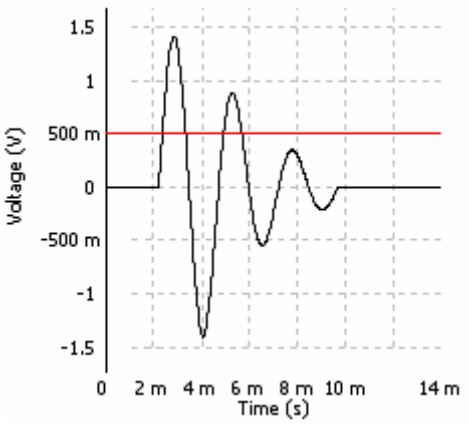
1.3.1.6 External Syncs

High speed levels comparator that provides accurate events for the tach trigger. External sync is sampled at 64* the Front-end sampling frequency in order to achieve higher precision in delay or phase measurements.
For external sync or tach signals whose frequency is too high, an internal hardware divider is available in order to lower signal frequency.
The upper frequency of the external sync must be lower than 64 times the Front-end frequency range. At input frequencies greater than 300 kHz, sensitivity can be decreased due to the electronic circuit.
In any case max frequency of a signal on an Ext Sync (before any pre-divider has been applied) is 375 kHz.



- **Label**: the name of this External Sync. (by default Ext. sync. n, with 1 <= n <= 2). The label of each External Sync is used in the result name and in all connection tools.

- **Threshold**: the detection level.



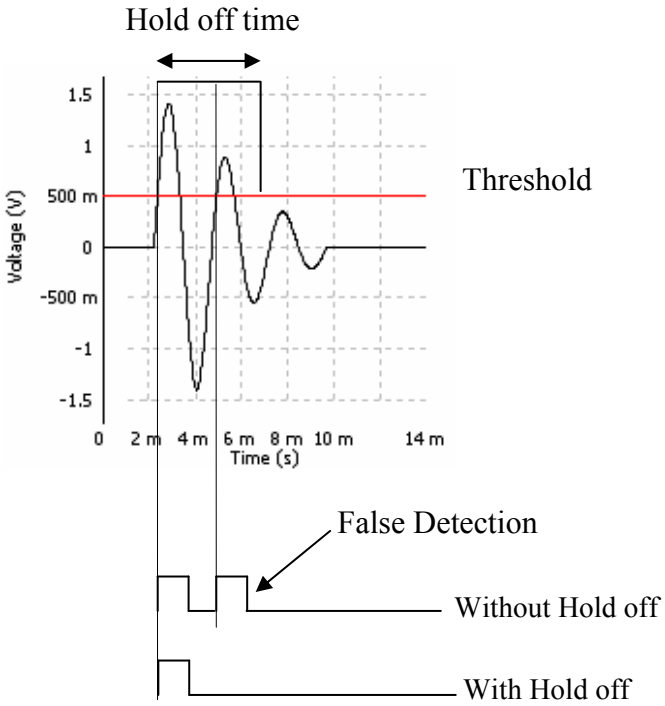
Threshold

- **Slope**: the slope associated with the threshold that defines the trigger detection.

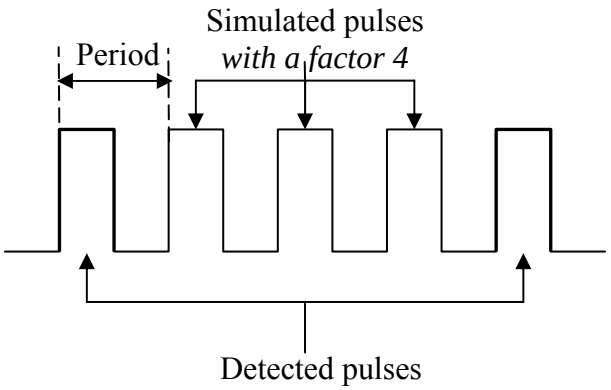
Slope	Description

Rise	The threshold is reached on rising edge of the External sync. signal
Fall	The threshold is reached on falling edge of the External sync. signal

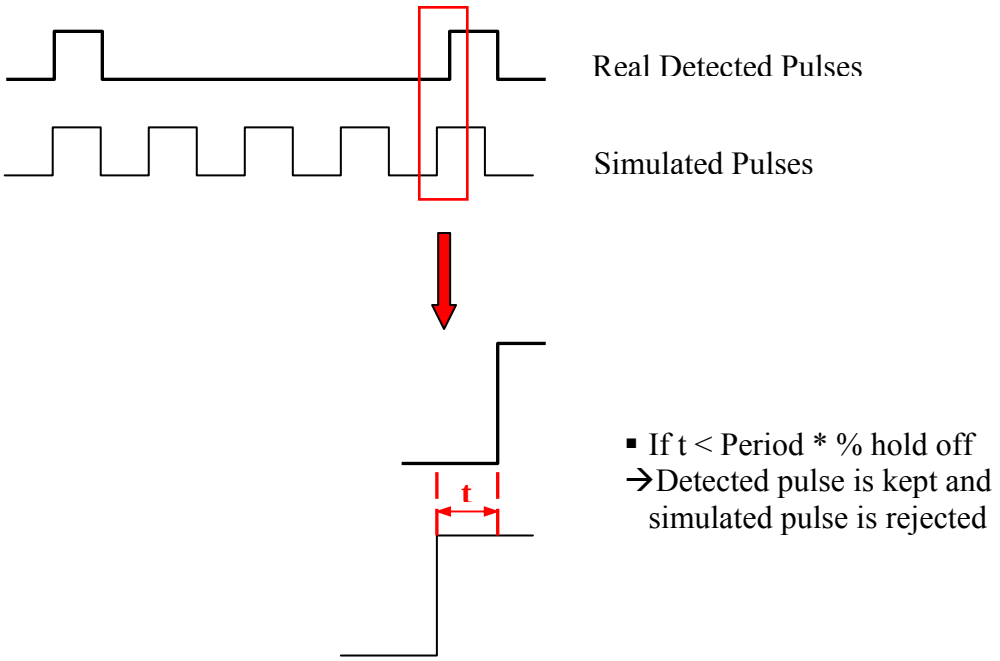
- **Hold off**: defines the minimum time (expressed in seconds) between two pulses. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. The user can enter any value between 0 and 36000s.



- **Hystersis**: defines the hystersis around the threshold. The value can be adjusted between 0 and the full scale of the input signal (depending on the input range). If Slope is set to RISE, the input signal must go below Threshold - Hystersis before a new pulse can be detected. If Slope is set to FALL, the input signal must go above Threshold + Hystersis before a new pulse can be detected. This setting is used to reject false pulse detection following, for example, a transition of the input signal. This setting can be displayed in dB.
- **Pre-divider**: Hardware pre-divider is available after the edge detector and is used to reduce the frequency of the signal to be measured. When the tach is enabled, the measured speed take into account the pre-divider setting when displaying the true RPM value. The user can enter any integer value between 1 and 255. If tach is 'On' this setting is linked to the 'pulse/rev' setting.
- **Post-mutiplier:** selection of the multiplier factor. It allows to generate an 'ExtSync' signal which the pulse frequency is multiplied by the selected factor. The user can enter any integer value between 1 and 50. This is particularly used with slow time base as GPS or standard clock.



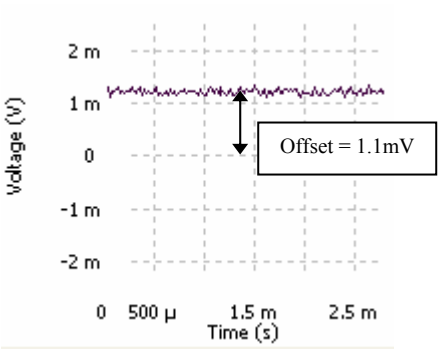
- **Multiplier Hold off:** defines the maximum time (expressed in percentage of the last period measured after multiplication) between a detected pulse and a simulated pulse. If a simulated pulse is detected before this time has expired since the detected pulse then this pulse is not added. By this way, the simulated signal is synchronize with the input signal. The user can enter any value between 1% and 99%.



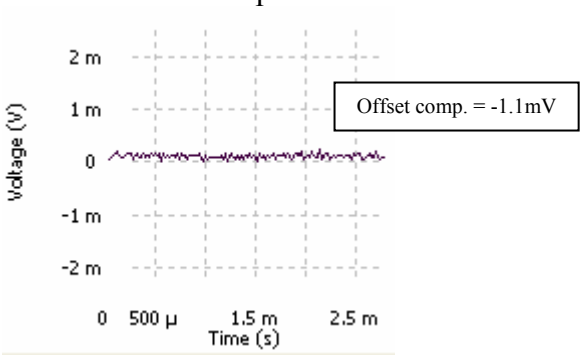
- **Physical qty**.: the physical quantity applied to this External sync. It modifies the sensitivity and range peak units if necessary.
- **Sensitivity**: the sensitivity of the transducer. Changing it updates the range peak.
- **Range pk**.: the maximum input level for this channel, from 300mV up to 40V. For a sensibility of 2 V/m/s^2 those values will be divided by 2 (0.015 m/s^2 and 20 m/s^2) and for a gain of 0.1 those values will be multiplied by 10 (3 V and 400V) This setting can be displayed in dB.
- **External gain**: this setting can be displayed in dB. This allows the analyzer to offset an external gain: for example if there is an external gain of 3dB, the value may be set to 3dB to retrieve the genuine amplitude of the signal.

- **Offset comp**.: the offset compensation in Volts.

Real



Compensated

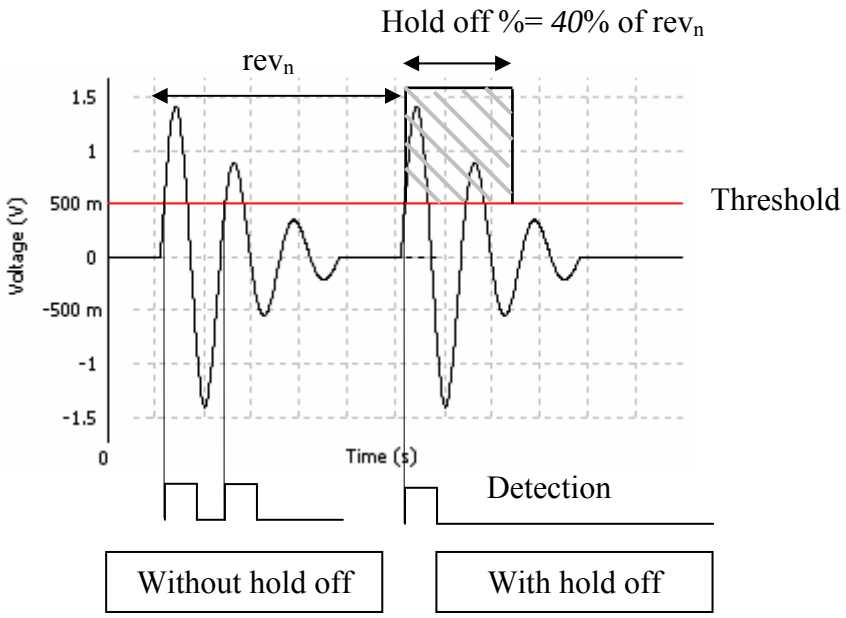


- **Coupling**: the coupling of this external sync.

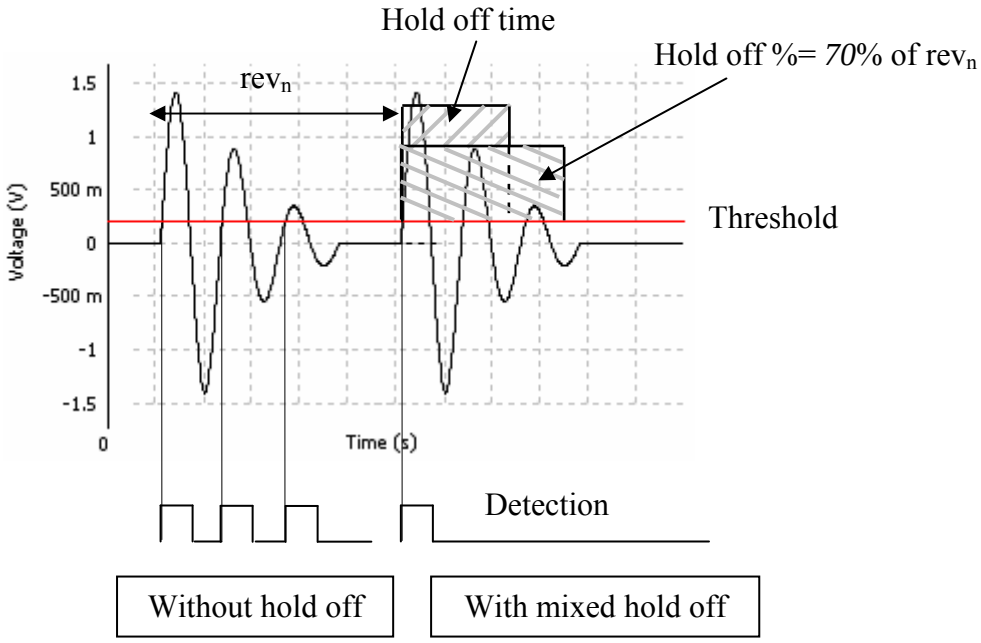
Coupling	Description
AC	AC coupling with signal ground connected to the analyzer hardware ground and a 0.35 Hz high pass filter.
DC	DC coupling with signal ground connected to the analyzer hardware ground. It is advisable to use the DC coupling when analyzing very low frequency (< 10 Hz frequency range).

- **Tach**: On / Off. Used to activate a digital tach whose source is this external sync.
- **Hold off (% period):** defines the minimum time (expressed in % of the last valid tach period) between two tach pulses used to measure angular speed. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. This is used to reject angular speed variations that are too large. This minimum time is in fact the maximum between the Hold off setting value and the value computed using the last tach period length and the Hold off (% period) setting value.
  Hidden/fixed: Hidden if Tach is Off.

Example of the Hold Off % setting at 40%:



Mixed Hold off: in this case, the hold off to be applied is the highest value between hold off time and hold off %.



- **Pulse / rev**: the number of pulses per revolution. The user can enter an integer value between 1 and 1024. For a non-integer number of pulses per revolution the user must use a virtual tach.
  Hidden/fixed: Hidden if Tach is Off.
- **Average size**: defines the average number used to compute the average speed. Revolution number n average speed is: avrg_speed[n-1] + (inst_speed[n-1] - avrg_speed[n-1]) / avrg_size.
  Hidden/fixed: Hidden if Tach is Off.
- **Max speed**: defines the highest measured angular speed. All revolutions with a speed higher than Max speed are rejected. By default Max speed is expressed in RPM. The limit of Max speed depends on the sampling frequency of the input, on the pulse/rev and on the hold off. If the Max speed value is modified, the Min speed is automatically adjusted according to a speed ratio (*MinSpeed = MaxSpeed / SpeedRatio*). The Speed Ratio value is not able to be modified.
  The Max speed setting is also used:
  - to specify the limit of Y axis of the RPM profile result
  - to compute the limit of the maximum order of the SOA plug-in analyzer.

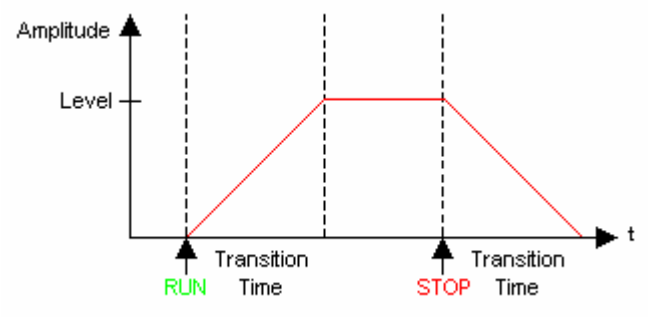
  Hidden/fixed: Hidden if Tach is Off.
- **Min speed**: defines the lowest measured angular speed. All revolutions with a speed lower than Min speed are forced to 0 RPM. By default Min speed is expressed in RPM. The user can enter any value between Max speed / 1000 and Max speed. The max Min speed and min Min speed are defined according to the Max speed and Speed ratio.
  Hidden/fixed: Hidden if Tach is Off.

1.3.1.7 Aux. External Syncs

Contains all the settings related to the auxiliary External sync. x such as threshold, slope, tach.
See External Syncs p 1-24 for Aux. Aux. External Syncs setting details.

1.3.1.8 Output settings

Used to control general output behavior.



- **Transition time**: The value of this setting is the time it takes for the output to go from 0 to activated level and the time it takes for the output to go from the activated level to 0 when deactivated. This transition time is applied only if the *Output x/transition control* value is "On"
- **Mute all**: On / Off: When "On", all the outputs are set to zero. The value of this setting is automatically set is "On" when the *Emergency Stop* setting from the same sub-module is pushed.
- **Emergency Stop**: Automatically mutes all the outputs when pushed. Use the *Mute all* setting from the same sub-module to make the outputs work again.

1.3.1.9 Outputs

Contains all the settings related to the output x.

- **Label**: the name of this Output (by default Output n, with 1 <= n <= 2). The label of each output is used in the result name and in all connection tools.
- **Source**: the input signal of the output (NONE by default). The input signal can be any dynamic input of the Front-end (in the On-line mode) or any signal generated by the output signals resource (in the On-line mode) or any track of the Player (recorded from inputs).
- **Applied filter**: the filter applied to this output. The list of filters applicable to the outputs is defined in the Filter module, by choosing Apply to= All.
- **Clipping**: the amplitude limitation of the output signal (from 1 mV to 10 V).
- **Gain**: This setting can be displayed in dB. It is the gain applied to the output signal.

- **Impedance**:

Impedance	Description
GND	The output is connected to the ground.
50 Ohms	The output impedance is equal to 50 Ohms.
600 Ohms[1]	The output impedance is equal to 600 Ohms.

- **Synchronization**:

Synchronization	Description
Free run	The output delivers a signal as soon as there is a source connected.
Linked to run	The output is activated only after the first run action.

- **Transition control**: On / Off. If the value of this setting is "On" the *Output settings/transition time* is applied when this output is activated or disabled.

1.3.1.10 Aux. Output

Contains all the settings related to the auxiliary output.
See Outputs p 1-30 for Aux. Output setting details.

1.3.2 Recorder

The Recorder module is used to configure the time signal recording sessions (Bandwidth, Trigger).
This plug-in is used to record signals from the different types of Front-end (inputs, DC inputs or external synch inputs) or Player inputs (in Post-Analysis mode). The data can be recorded on the PC hard disk in office mode or on the OR3x hard disk in connected mode. Each recorded signal is called a track in the recorder. A recorded signal file can contain up to 4 different sampling frequencies:

- One for parametric inputs
- One for external synch inputs
- Up to 2 for other inputs

The user can select a trigger event to start the acquisition of a record and another one to stop the record.
Available results:

Type	Size	Dimension	Domain	Save
RMS	1 pt	1D		Display only
Monitoring Signal	2048 pt max	2D	Compressed time	Saved on PC hard disk
Time	20, 40 or 60 GBytes[2]	2D	Time	Saved on PC or on Analyzer hard disk.

[1] Only available for OR38 & OR36. For phone lines connections use.
[2] Depending on the analyzer type

RMS: RMS level measured on a recorded input signal computed on the selected bandwidth.

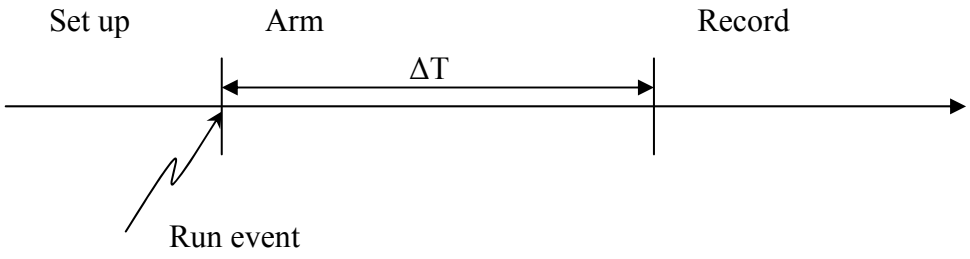
Monitoring signal: this result displays the compressed input signal after frequency decimation. The result is only updated during recording.

Time: time domain signal sampled at Sampled Frequency 1 or Sampled Frequency 2 automatically saved on hard disk during acquisition.

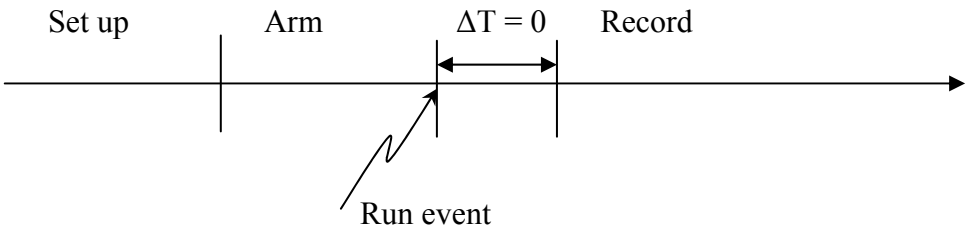
1.3.2.1 Arming

Arming of the recorder is a backup of your record settings allowing an interesting gain of time:

- Unarmed record: the recorder is armed automatically by the start event. Then between the beginning of the start event and recording, there is a time ΔT corresponding to the arming (i.e. the backup of the record settings).



- Armed record: after the setup the recorder is armed (i.e. backup of the record settings allowing more security for you record). Then at any moment, when the recorder is armed, a 'Run event' starts the record instantaneously (ΔT = 0).



1.3.2.2 Recover

Used to recover a project or a measurement.

There are two kinds of recovery:

- Manual recovery: in the case of the initial project have been cancelled from your PC, or have been recorded with another PC, or if the project has been renamed. The user can recover the project (in the 'Hard drive' then 'Manage…') from the Hardware disc.

- Automatic recover: in the case of an unexpected stop of the analyzer (during record, at the end of the record (in Stand Alone for example) or before saving). During the following launch of NVGate, the Disc will be automatically scanned, and then all files unsaved will be recovered if the initial project is

found in the local tree diagram. The recovered measurement will be renamed with the date of record.
This recovery type can handle multi records; the recover will be based on the shorter record.
If an unexpected stop occurred (alimentation lost…), signals will be recovered and only few seconds will be lost, depending on the configuration of your record (sampling frequency, slow inputs). For example at 51.2 kS/s a maximum of 2.5 s could be lost.

If the mode 'Time to stop' in the recorder is selected, files unsaved will not be recovered.

1.3.2.3 Track

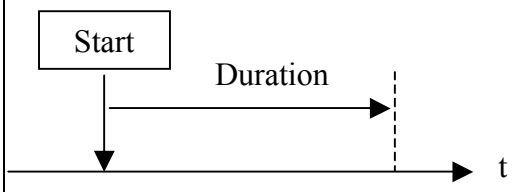
Used to configure the track x to be recorded.

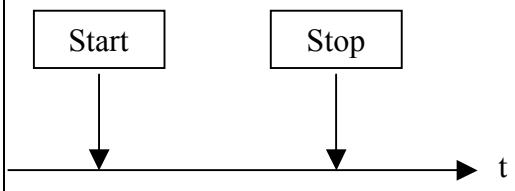
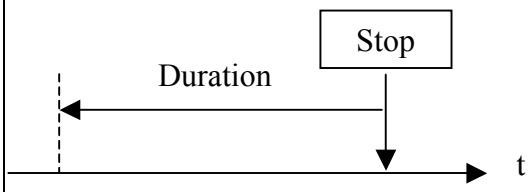
- **Source**: signal to be recorded. It may come from the input Front-end or from the Player in post analysis mode (see "Post analysis" topic chapter 6).
- **Signal bandwidth**: frequency bandwidth of the recorded track. This value is equal to the sampling frequency of the recorded signal divided by 2.56 (this factor was chosen in order to avoid any aliasing problem during frequency analysis). For the DC input this setting is forced to the input setting DC input sampling value. For the External Synchro input this setting is forced to the input setting input sampling value. For the input, the user can choose between the two frequency bandwidths defined in the next settings.

1.3.2.4 Mode

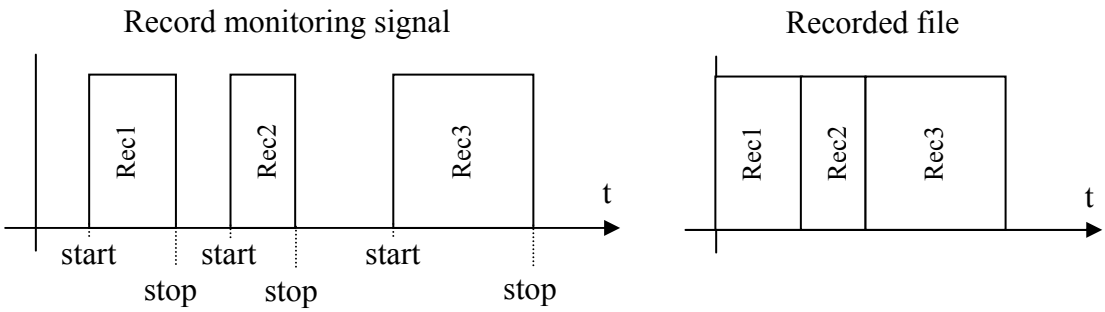
This sub-module is used to define the recording set-up (record on PC hard disk or on the analyzer hard disk, the number of records...).

- **Record**: enables the Record plug-in. The user can choose between Off (the recorder is disabled) and On PC (in the Office mode) or On analyzer (in the Connected mode).
- **Mode**: defines the ways the signal is recorded.

Recorder mode	Description
Start to time 	Acquisition begins on the start event and stops when the specified duration has been recorded. The user with the Stop command can stop the acquisition at any moment. If the Number of records is greater than 1, a new record is started with a new start event. When all the specified records have been recorded the plug-in goes in the Stopped state (the Stop command also forces the plug-in the Stopped state).

Start to stop 	Acquisition begins on the start event and stops when the user sends a stop command or when a stop event occurs (depending on the selected stop event). If the Number of records is greater than 1, a new record is started with a new start event. When all the specified records have been recorded the plug-in goes in the Stopped state (the Stop command also forces the plug-in the Stopped state).
Time to stop 	Acquisition begins on the Run command. The record stops when a stop event has been detected or when the user sends a Stop command. The duration of the recorded signal is equal to the minimum between the time elapsed since the Run command and the value specified in the Duration setting (i.e. only the last Duration seconds of the recorded inputs are saved in the signal file).

- **Duration:** defines the duration of a record.
- **Max duration**: displays the largest value for the Duration setting corresponding to the space available on the selected hard disk (PC hard disk in Office mode or the OR3x hardware HD in Connected mode). The max duration is computed from the free space of the selected hard disk, the number of tracks (and their corresponding sampling frequency) and the number of records. In the Time to stop recorder mode the maximum duration is mainly limited by the size of memory available on the hardware. The limitation is 262144 blocks of 2048 samples, for example: 1 record of 32 channels at 51.2kHz, the largest duration is 262144 * 2048 / (32 * 51200) = 327.6 s.
  Hidden/fixed: Fixed
- **Number of records**: defines the number of records (1 to 1000). The recorded signal file can contain several records except in the Time to stop recorder mode (in this case only one record is available).



- **Format**: defines the format of the recorded samples.

Format	Description
Normal	Samples are saved in 32 bit floating point format in SI unit
Compacted	Samples are saved in 16 bit signed integer format in logical unit (-32767<= sample value <= 32768). This format reduces the amount of hard disk space and throughput required by a factor of 2.

1.3.2.5 Trigger

This sub-module is used to you define the start and stop conditions of the signal to be recorded.

- **Recorder:** defines the status of the recorder ("armed" or "unarmed"). The user can choose to arm the record in order to be ready for recording. When a "Run" is made with a recorder in the status "unarmed", before running the record will be set to "armed". In the status "armed", any modifications of Front End or Recorder settings put automatically the recorder in the status "unarmed". The action of "armed" corresponds to the creation of a .lxf file (which corresponds to save the record set up).
- **Start**: defines an event to start the recorder. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Start" condition.
  Hidden/fixed: Hidden if the recorder mode is "Time To Stop"
- **Stop**: defines an event to stop the recorder. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Stop" condition.
  Hidden/fixed: Hidden if the recorder mode is "Start To Time".
  Note: If a trigger is used to stop the recorder, it doesn't stop exactly at the event, one more block is recorded. It is useful in connected mode to stop the record on all the DSPs at the same time.
- **Start delay**: defines the delay between the start event date and the real beginning of the record. The user can enter a value between -131072/Fe_{Max} s and 360000 s (where Fe_{Max} is the largest sampling frequency of the recorded signals). The pre-trigger capability (Start Delay < 0) is very useful when the user wants to record the signal just before the start event.
  Hidden/fixed: Hidden if the recorder mode is "Time To Stop".
- **Stop delay**: defines the delay between the stop event date and the real stop date. The user can enter a value between 0 s and 360000 s.
  Hidden/fixed: Hidden if the recorder mode is "Start To Time".

1.3.2.6 Bandwidths

Used to set the bandwidth and sampling frequency of the signal to be recorded.

- **Sampling**: sampling frequency. The user can define up to 2 sampling frequencies among the available decimated values of the input setting sampling frequency.

- **Bandwidth**: this is the signal frequency bandwidth in the frequency domain. The frequency bandwidth is equal to the sampling frequency divided by 2.56.

Note: once running the recorder, the other plug-in analyzer settings cannot be modified without restarting the record.

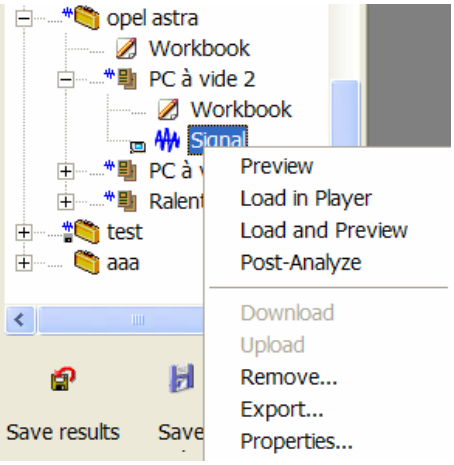
1.3.2.7 Progress Bar

Depending on the recorder mode the progress bar can be a normal, backward or 'snake' type, with text indicating the state of the recording and the time of recorded data.

1.3.3 Player

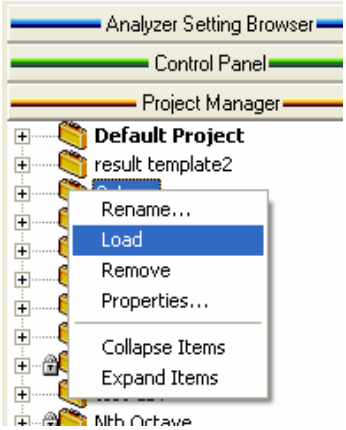
The Player module is used to playback recorded signals that can be computed in post analysis mode. In this way you can re-inject the recorded signals into any plug-in analyzer (Monitor, FFT, 1/n Octave...). It is also possible to play back a recorded signal through the Output during On-line analysis. There's several way to load the recorded signal for post-analysis:

- By right clicking on the signal you want to analyze, then you can **preview**, **load, load & preview** or **Post-Analyze** it.



- **Preview** let you visualize the recorded signal envelope. Contents of signal files can be visualized in a high-speed preview even if you are manipulating huge file. This new technology allows multiple files preview at the same time. Very large domain record (several Gigabytes) can be previewed in a click, even if the hardware is not connected. Means that the files can be located on the hardware OR3x disk and visualized (not post-analyzed) on the PC without request of downloading, or Hardware connection.
- **Load in player** makes your signal available for post-analysis without viewing it.
- **Load & Preview** is a combination that let you see the envelope of the recorded signal you are post-analyzing.
- **Post analyze** is a combination that let you see the envelope of the recorded signal you are post-analyzed, switch to post-analysis and start the setup menu for post-analysis.

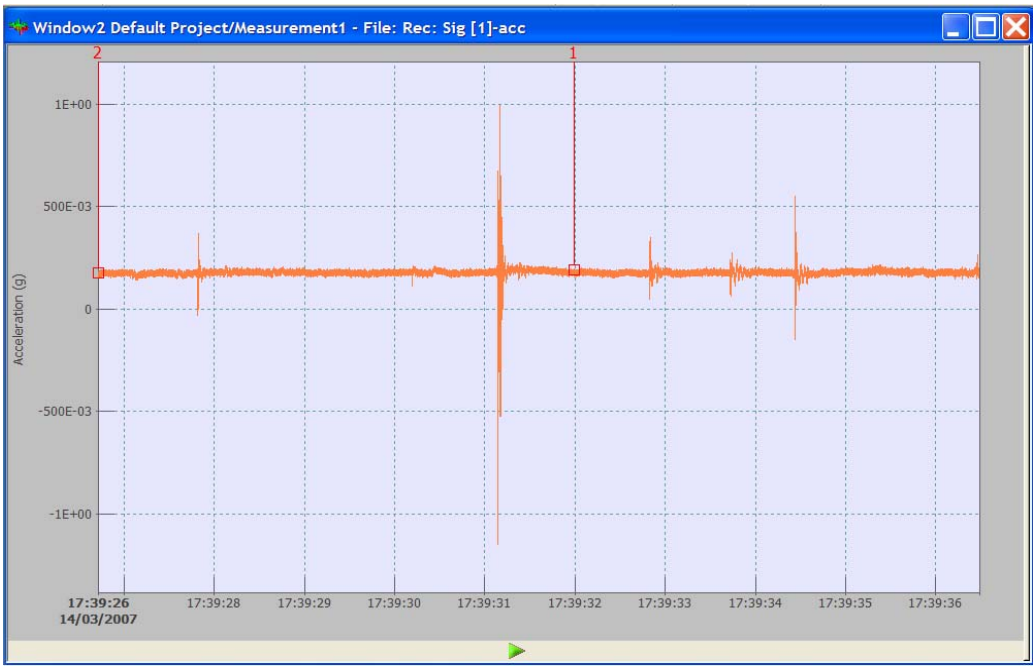
Note: By right clicking on your project, you can load the settings of this project as well as the recorded signal and results windows. - KO



Play-Back

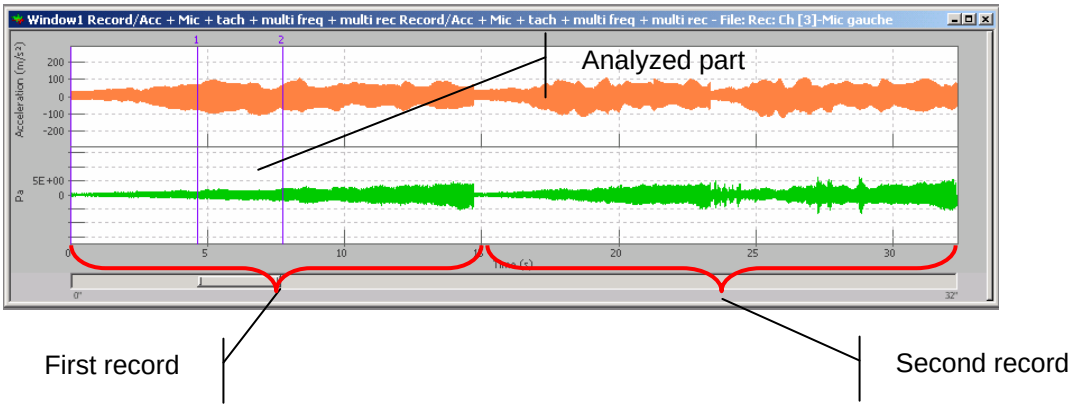
In all last configurations, the recorded signal could be listened simply.
by clicking on in the active window. The button stops the play back at any time.

The cursor follows the played back signal.

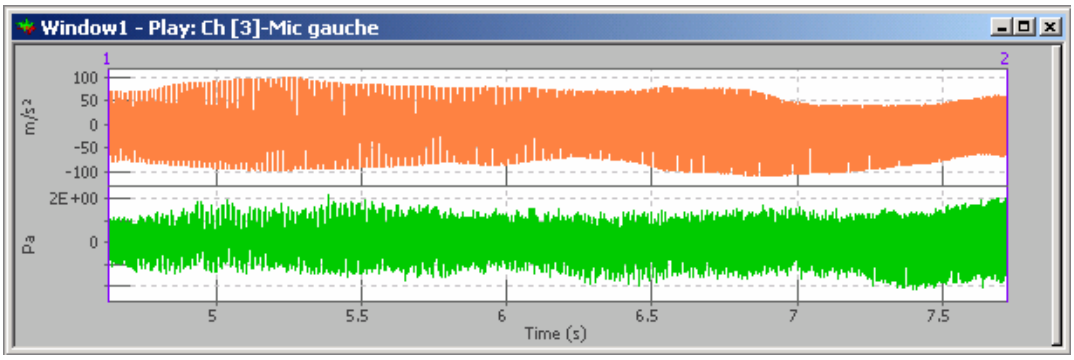


NVGate® proposes 2 different types of windows for post-analysis operation that let you analyze more precisely a part of the signal:

- One for the file overview providing a compressed view of each record.



- The second type is the zoom on the analyzed part (between the start and stop offset cursors).



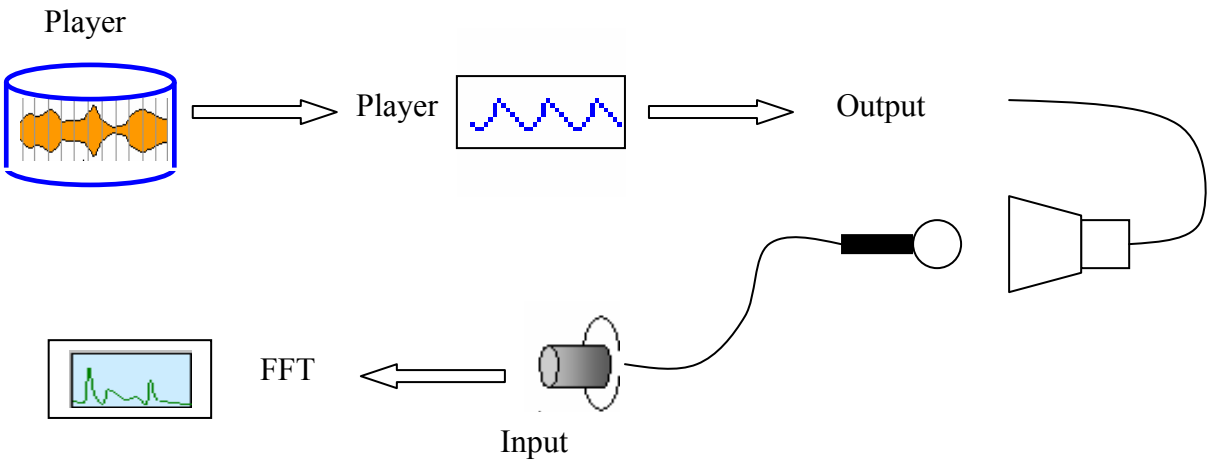
This operating mode allows an easier navigation inside the recorded domain file to locate the part of interest, and then post-analyze only this selected part.

Available results

Type	Size	Dimension	Domain	Save
Signal File	2048 compressed pt max	2D	Compressed time	Display only

There are 2 modes for the player:

- **Post-analysis**, the player takes place of the front end; the signal can be analyzed by any plug-ins.
- **Play-back** In connected mode on-line, signals are played on the output (load files in the player and connect tracks to outputs). Note that the Input sampling must be the same as player max bandwidthx2.56.

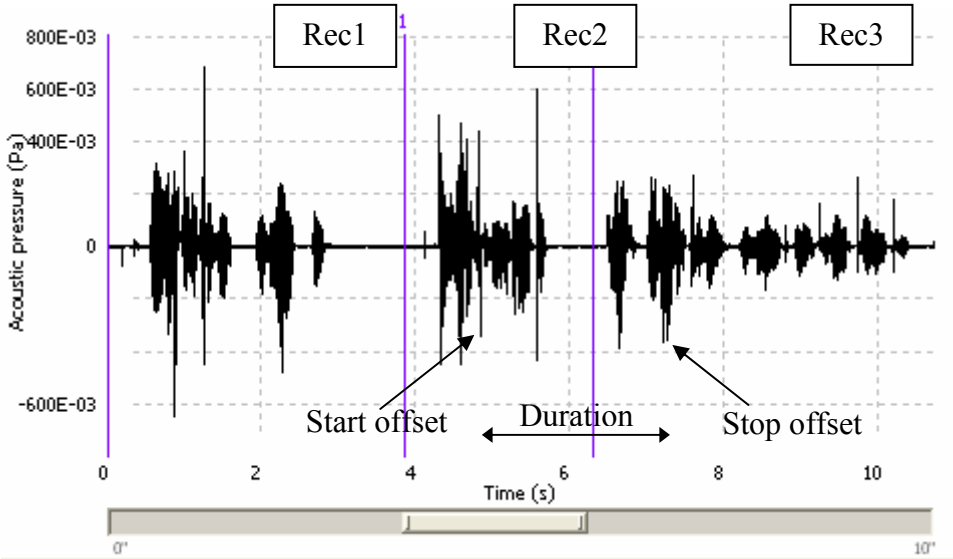


This plug-in is used to select a signal file, which can be analyzed in the Post-analysis mode or played on the output in connected mode on line.

1.3.3.1 Selected record

This sub-module contains the signal file settings loaded in the Player module.

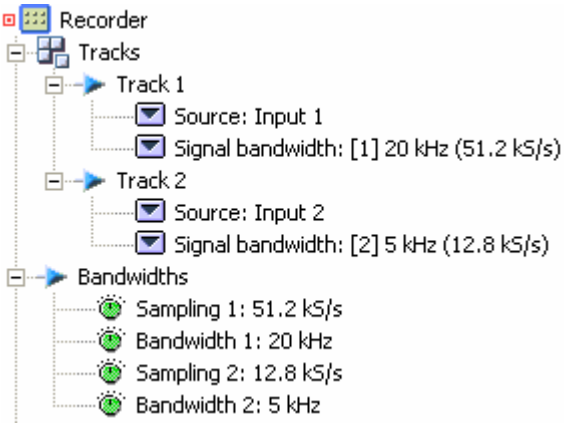
- **Signal file**: the name of the measure containing the signal file.



- **Record number**: defines the selected record (if the signal file contains more than 1 record).
- **Start offset**: the beginning position of the part of signal to analyze or play (0 <= Start Offset < Stop Offset).
- **Stop offset**: the end position of the part of signal to analyze or play (Start Offset < Stop Offset <= selected record duration).
- **Duration**: the duration of the selected part of signal between the Start offset and the Stop offset.
  Hidden/fixed: Fixed

- **Repeat mode**: On/Off: used to repeat playback of the selected part of the signal indefinitely. The repeat mode is not enabled in post-analysis mode.
  Hidden/fixed: Hidden in post analysis mode
- **Max bandwidth**: contains the list of available frequency bandwidths in the selected signal file. This setting defines the largest frequency bandwidth for all the plug-in analyzers in the post-analysis mode.

  For example:
  Input 1 and Input 2 are the inputs to be recorded. Input 1 will be recorded with signal bandwidth = 20 kHz and Input 2 with signal bandwidth = 5 kHz.



In post analysis mode, the Player max bandwidth can be selected between 5 kHz and 20 kHz. Then, each Signal bandwidth group can be used in different plug-ins.

ON-LINE		**POST ANALYSIS**				
Recorded file		**Player**	**Plug-in analyzer**			
Signal Bandwidth 1	Signal Bandwidth 2	Selected Max Bandwidth	Plug-in analyzer x		Plug-in analyzer y	
			Selected Bandwidth	Available Input	Selected Bandwidth	Available Input
20 kHz	5 kHz	5 kHz	≤ 5 kHz	#1 & #2	≤ 5 kHz	#1 & #2
20 kHz	5 kHz	20 kHz	≤ 5 kHz	#1& #2	20 kHz	Only #1

The maximum available bandwidth for a plug-in analyzer depends on the Player max bandwidth selected. Then the inputs available in a plug-in are linked to the plug-in analyzer selected bandwidth. In the example above, the plug-in analyzer y selected bandwidth is 20 kHz. As the Player selected max bandwidth is 20 kHz, the Input 2 (signal bandwidth 2 = 5 kHz) cannot be analyzed at the frequency of 20 kHz.

- **Analysis mode**: defines how the selected part of signal is analyzed in the post-analysis mode. *Hidden/fixed:* Visible in post analysis mode

Analysis mode	Description
Continuous	The selected part of the signal is played continuously.
Time step	The player switches to pause every "Time step" second.

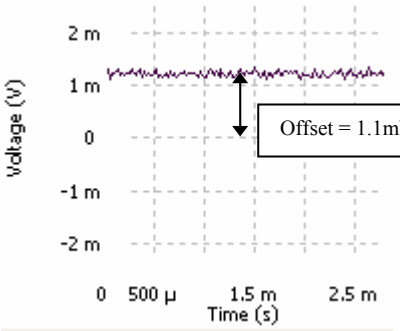
- **Time step**: defines the time step in seconds in the "Time step" analysis mode. The player switches to "pause" every "time step" second. The user must then click on the "Player Continue" button to analyze the next "time step" signal duration.
  Hidden/fixed: Visible in the post analysis mode

1.3.3.2 Tracks

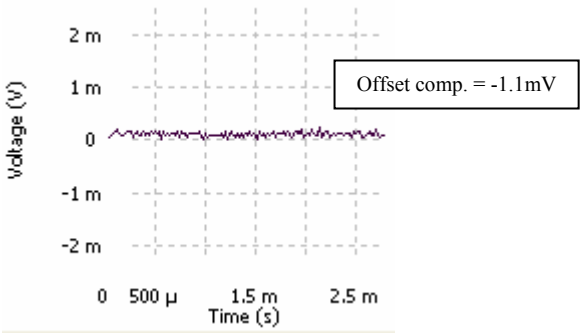
Displays the list of the tracks contained in the selected signal file. The following settings are automatically adjusted at each signal file new selection.

- **Label**: the name of the input signal recorded. *Fixed*
- **Transducer:** the name of the transducer used during recording.
- **Physical qty.**: the unit of the input signal selected during recording.
- **Sensitivity:** the sensitivity of the transducer.
- **Range peak:** the input range peak in the transducer SI unit. *Fixed*
- **Offset comp.**: the input offset compensation in Volts.

Real



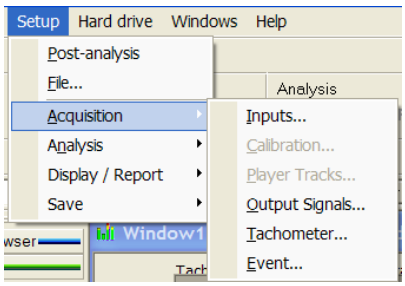
Compensated



- **Coupling:** the input coupling. *Fixed*
- **Signal bandwidth:** the equivalent signal frequency bandwidth and the corresponding sampling frequency (for example: 20 kHz (51.2 kS/s).
  The player tracks can be connected to a plug-in analyzer in the Post-analysis mode or to the Front-end output in Connected mode on line. *Fixed*

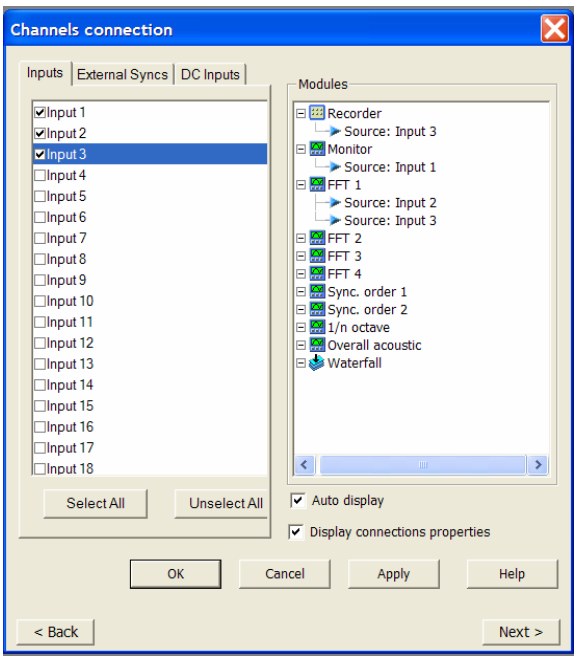
1.3.4 Connection wizards

Connection wizards are available in the setup toolbar and in the setup menu.



1.3.4.1 Inputs

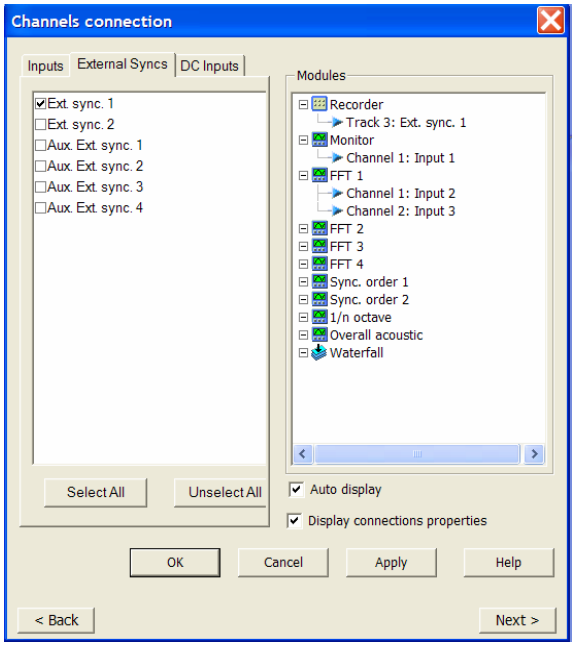
- **Inputs**



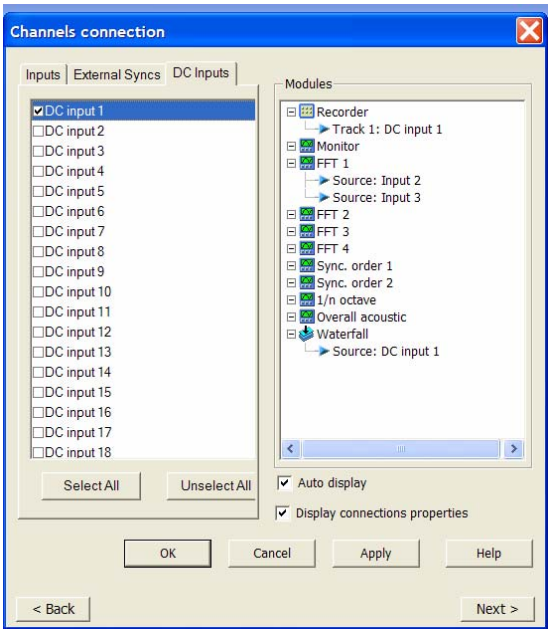
To select inputs, simply drag & drop the selected inputs to the requested analysis mode (plug-in analyzer), you will immediately see the inputs sharing out.

- **External Syncs**

In the same way, the selected External Syncs could be connected to the recorder.

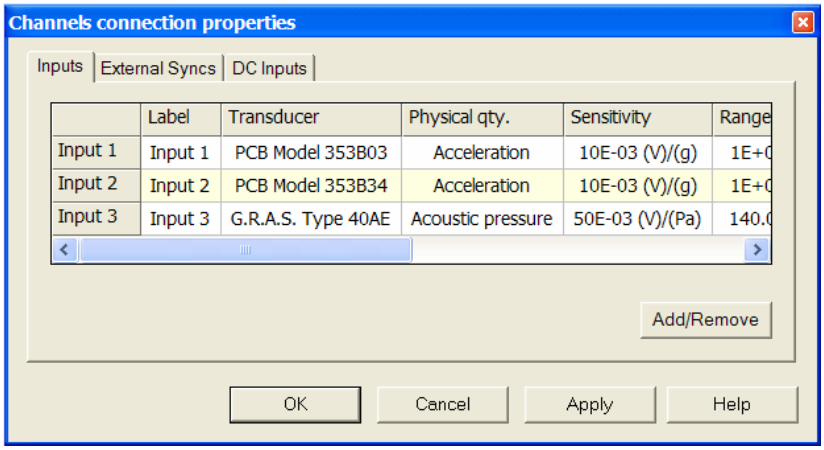


- **DC Inputs**

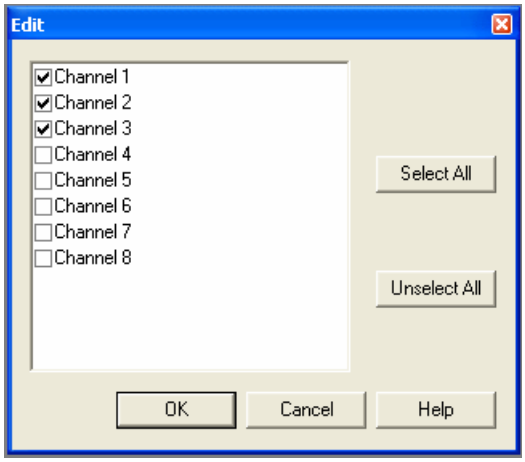


Using drag & drop, connect the selected Inputs to the Recorder and/or to the waterfall.

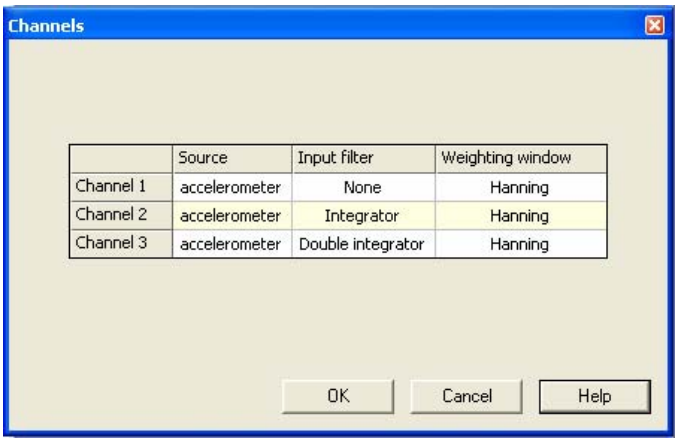
At any time you can add or remove the channel you selected in a plug-in analyzer by right clicking on it and by selecting remove. You have also the opportunity to **select** or **unselect all** channels.
The **auto display** box displays automatically the window with graph corresponding to your selection. To know more about auto display, see also chapter 7 'User Preferences' p 7-14.
By selecting 'Display connections properties', the window with Channels connections properties is displayed.



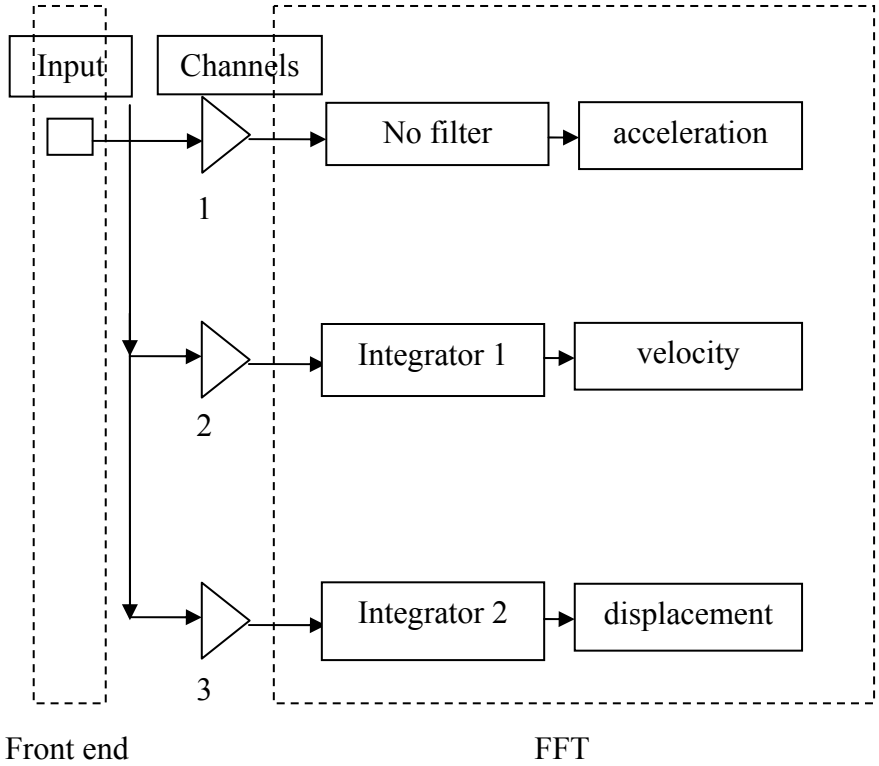
For each plug-in, up to 8 or 32 channels (depending on purchased configuration) are available for input connection. This allows multiple preprocessing of each input.



For example:
Distributing Input 1 (accelerometer) to channel 1 to 3 will provide simultaneous analysis of the 3 different physical quantities available from acceleration (velocity and displacement).
This can be achieved by applying Integrator filter (Integrator1) to channel 2 and double Integrator (Integrator2) to channel 3, then you have simultaneously the analysis of acceleration, velocity and displacement of the accelerometer.



	Source	Input filter	Weighting window
Channel 1	accelerometer	None	Hanning
Channel 2	accelerometer	Integrator	Hanning
Channel 3	accelerometer	Double integrator	Hanning

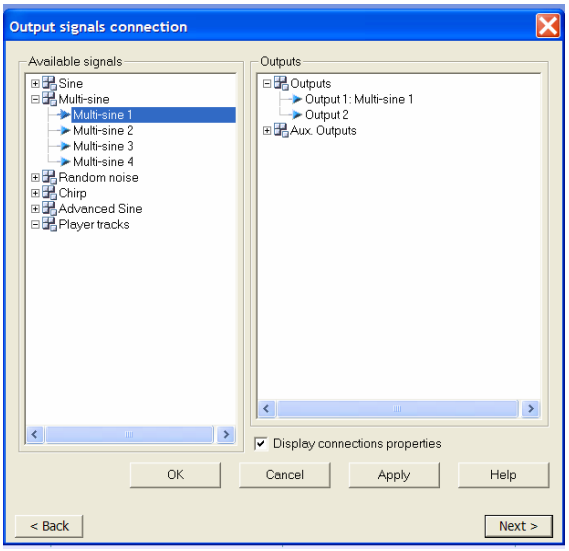


During Order Analysis, you can track up to 8 orders by channel, but you can put up to 8 channels by input. That means for 2 inputs you can track 16 orders and so on.

Using Order spectra, you can have a complete signal on Channel 1 and an A-weighted signal on Channel 2.

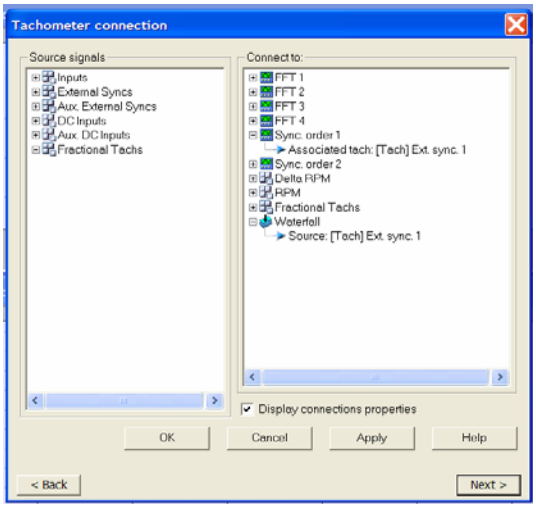
1.3.4.2 Outputs

To connect output signals on outputs or Aux.Outputs simply drag and drop available signals on outputs.

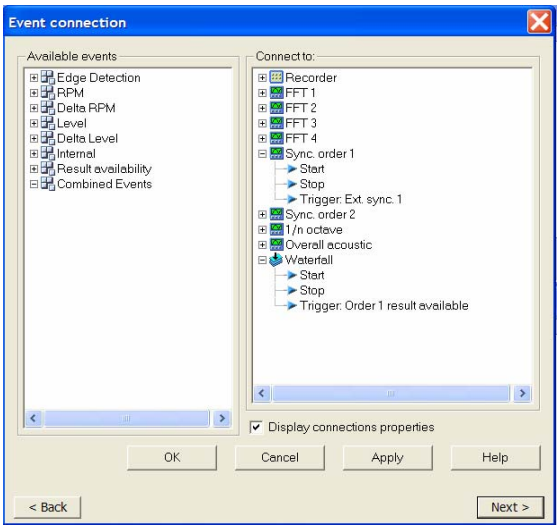


1.3.4.3 Tachometer

Connect a source corresponding to a tachometer signal to a plug-in FFT or SOA or to an event.



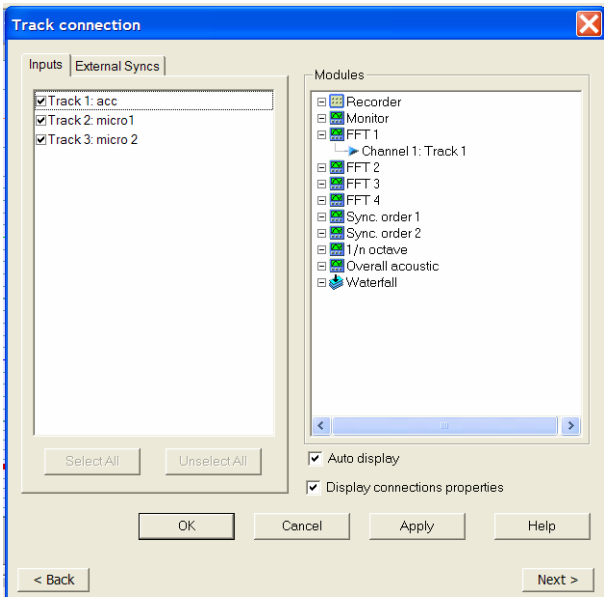
1.3.4.4 Event connection



Connect available events to plug-ins to use them as triggers.

1.3.4.5 Tracks

For the post-analysis, the same settings are available, the difference is that the inputs are no longer available, now you have track to connect to the different plug-in analyzer. Channels are available for each track like for input that means that the multi-analysis works in the same way with the post-analysis, all the examples are available replacing inputs by tracks.



1.4 Resources

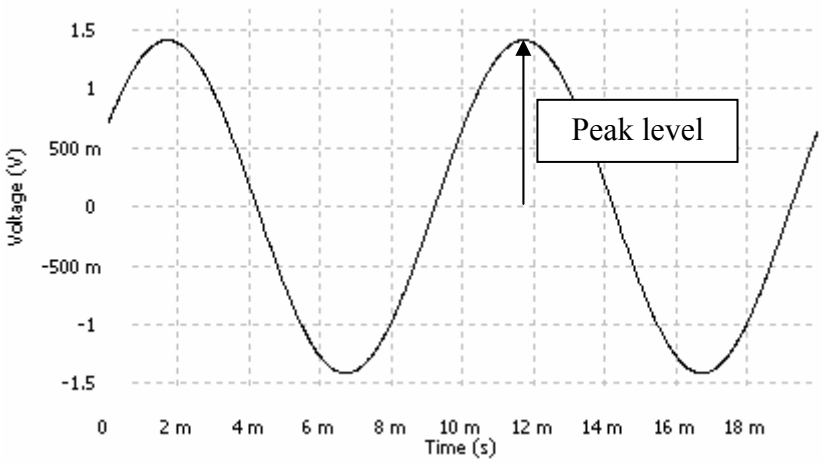
The resources provide a wide range of tools shared by the Plug-in analyzers such as:

1.4.1 Output signals

This module generates multiple signals such as fixed sinus, random noises, and swept sinus.

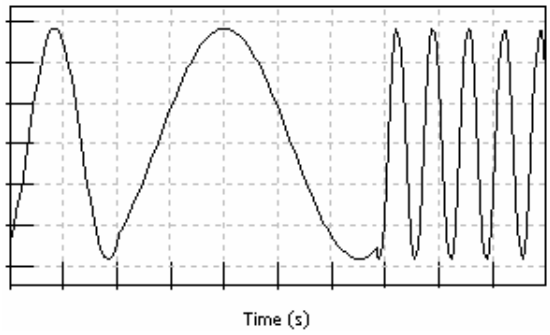
1.4.1.1 Sine

Used to generate and configure up to 6 fixed sinus. A sinusoidal signal is generated with the frequency specified in the sine **Frequency** field. The frequency corresponds to one of the analysis bands. This type of signal is used for measuring the amount of distortion in a system, for example. The amplitude of the signal can be changed using the **Level** settings.



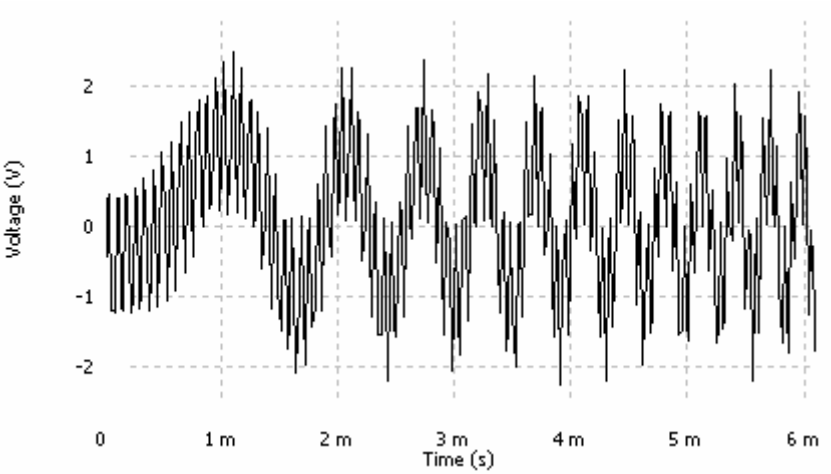
- **Frequency**: sine frequency can be 0 for DC generation.
- **Peak level**: the peak level
- **RMS level**: sine RMS level. This setting can be displayed in dB.

Note: Amplitude and frequency modifications are applied immediately without any transition.



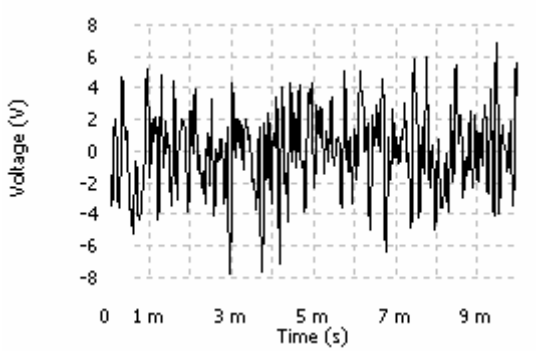
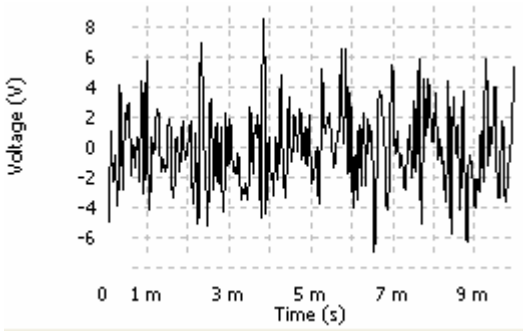
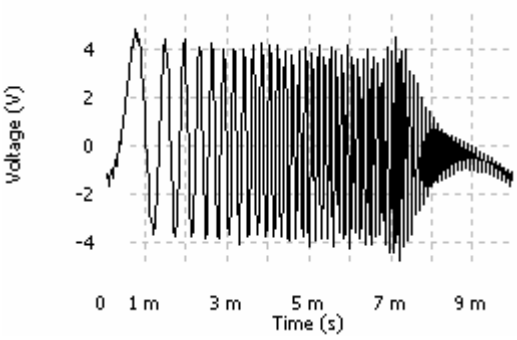
1.4.1.2 Multi-sine

Used to generate and configure up to 2 multi-sines. The multi-sine is computed by adding sine signals whose frequencies are power of two sub-modules of sampling frequency. So with the FFT analyzer, each sine signal can be exactly at an analysis frequency line and there is no leakage due to analysis window.
Due to its specific structure, using a rectangular analysis window for FFT analysis on a multi-sine excitation is recommended.
The phase between sine signals can be controlled in order to get a low crest factor or randomized, but with a higher crest factor.
Multi-sine is periodic with a period equal to the opposite of its frequency resolution.



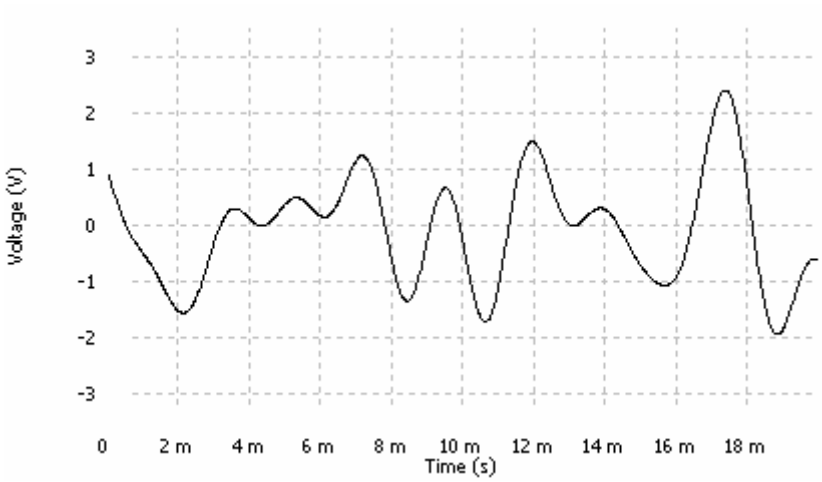
- **Lower frequency**: the lower frequency of the multi-sine frequency range. Its minimum value is the resolution.
- **Upper frequency**: the upper frequency of the multi-sine frequency range. Its maximum value is SF / 2.56, where SF is the sampling frequency.
- **RMS level**: multi-sine RMS level. This setting can be displayed in dB.
- **Resolution**: the resolution of the multi-sine. Its minimum value is SF / 16384, where SF is the sampling frequency. Its maximum value is SF / 256.

- **Phase**: Computational mode of the original sinusoid phases.

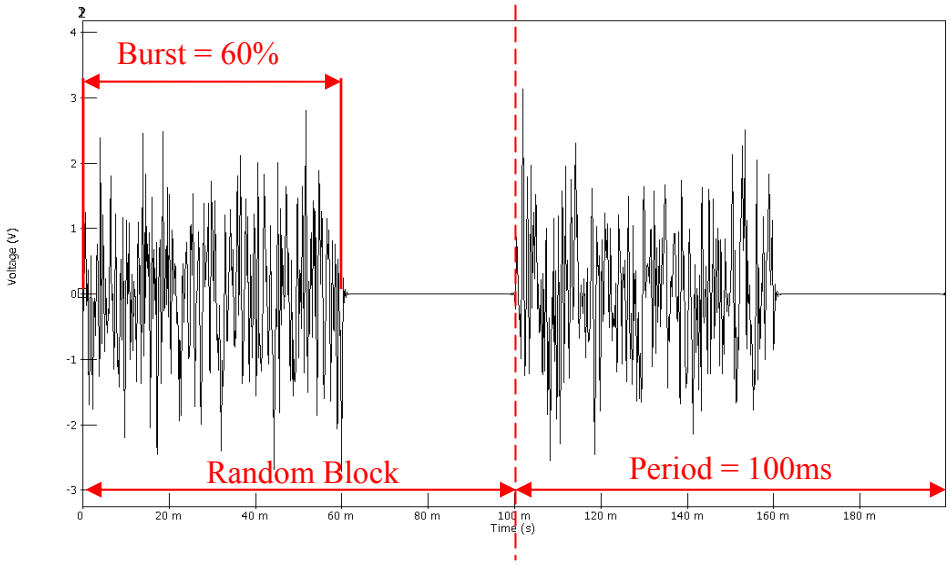
Phase	**Description**
Random	The original phase of each sinusoid is selected randomly after each multi sine deactivation/activation. First activation:  After reactivation: 
Fixed	Each sinusoid has the same original phase even after multi sine deactivation/activation. 

1.4.1.3 Random noise

Used to generate and configure up to 2 white or pink random noise types.
Random noise is generated using algorithms that guarantee no short or long-term periodicity.



- **Lower frequency**: the lower frequency of the Random noise frequency range. Its minimum value is equal to SF / (2.56 * 6400), where SF is the sampling frequency and 6400 + 1 is the resolution.
- **Upper frequency**: the upper frequency of the Random noise frequency range. Its maximum value is SF / 2.56, where SF is the sampling frequency.
- **RMS level**: the Random noise RMS level. This setting can be displayed in dB.
- **Period**: The period selected for the Random noise. It used to define a Random Block. Its maximum value is 100ms.
- **Burst**: This setting lets the user specify the percentage of non-null signal in a random block.

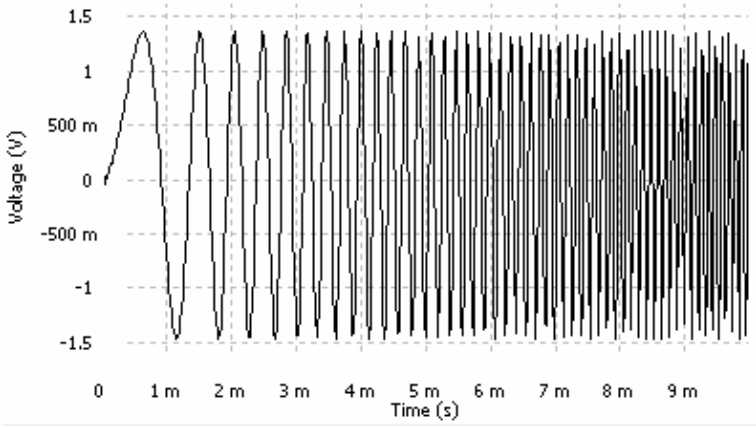


- **Type**:

Type	Description
White	White noise has the same distribution of power for all frequencies, so there is the same amount of power between 0 and 500 Hz, 500 and 1,000 Hz or 20,000 and 20,500 Hz.
Pink	Pink noise has the same distribution of power for each octave, so the power between 0.5 Hz and 1 Hz is the same as between 5,000 Hz and 10,000 Hz. Since power is proportional to amplitude squared, the energy per Hz will decline at higher frequencies at the rate of -10dB/decade.

1.4.1.4 Chirp

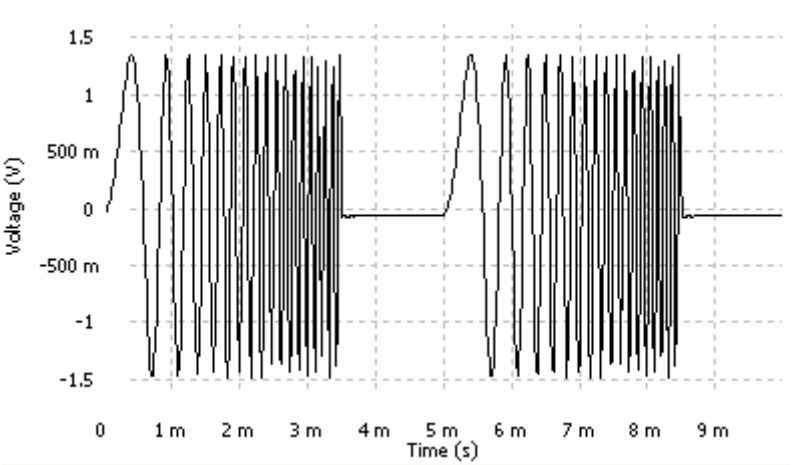
Used to generate and configure up to 6 chirps. A sine signal, of which the frequency varies from **Lower Frequency** to **Upper Frequency**, is generated in the delay corresponding to the size of a generator block. The **Burst** setting lets the user specify the percentage of non-null signal (corresponding to a swept sine) over the size of a generator Block. For instance, for a burst value of 25% and a generator block size of 1024 samples, the analyzer hardware delivers blocks of 256 samples of swept sine separated by blocks of 768 null samples.



- **Lower frequency**: the lower frequency of the Random noise frequency range. Its minimum value is equal to SF / (2.56 * 6400), where SF is the sampling frequency and 6400 + 1 is the resolution.
- **Upper frequency**: the upper frequency of the chirp frequency range. Its maximum value is SF / 2.56, where SF is the sampling frequency.
- **RMS level**: the chirp RMS level. This setting can be displayed in dB.
- **Size**: This setting specifies the number of samples required for the generator to go from the lower frequency to the upper one.

Size
256
512
1024
2048
4096
8192
16384

- **Burst**: This setting lets the user specify the percentage of non-null signal greater than the size of a generator block. For instance, for a burst value of 25% and a block size of 1024, the generator delivers blocks of 256 samples of chirp separated by blocks of 768 null samples.

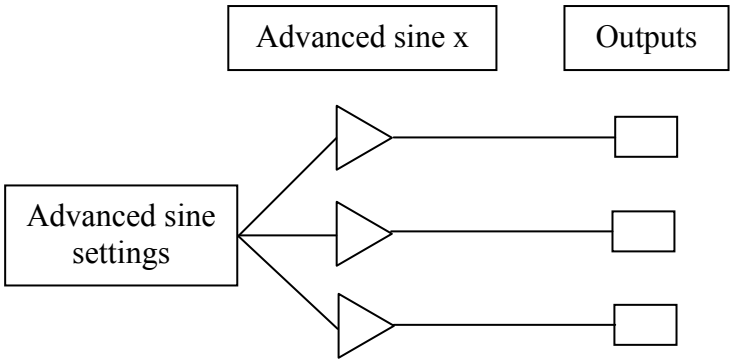


Size = 256
Burst = 70

1.4.1.5 Advanced sine

Used to generate and configure up to 6 advanced sines, allowing the user to generate a swept sine, a pure tone, or to sweep step-by-step.

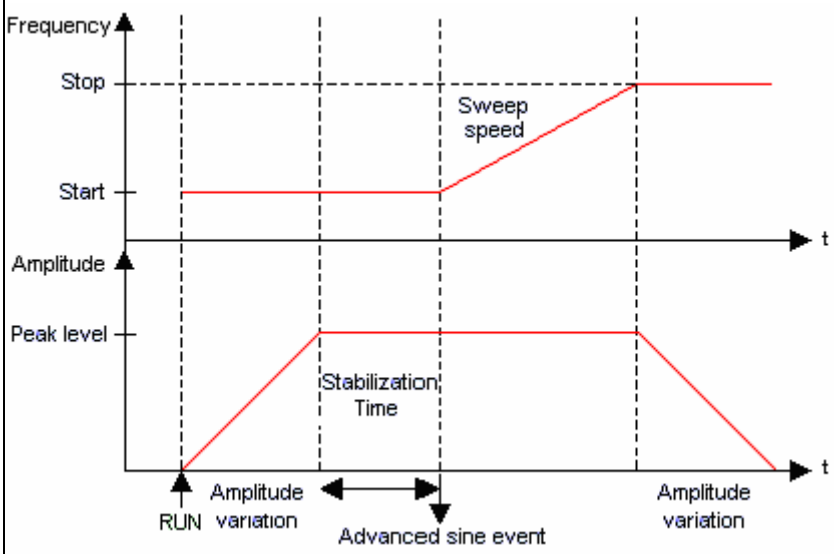
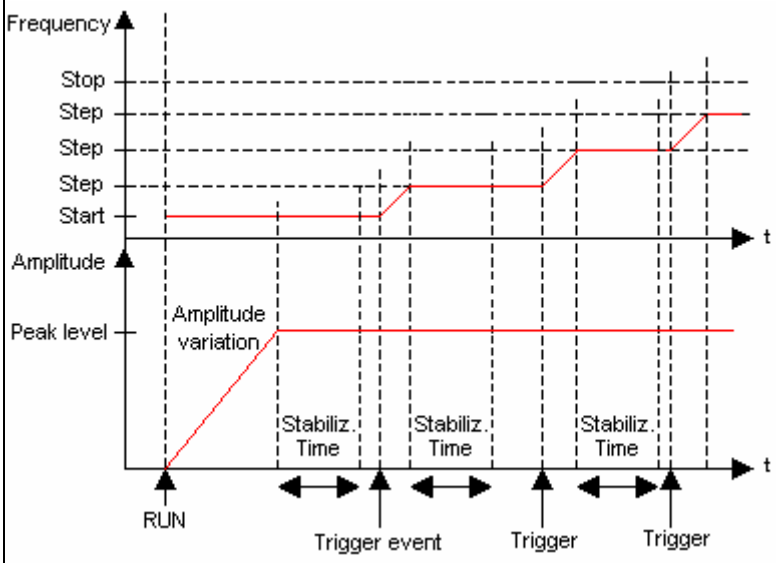
- **Gain**: Each advanced sine has a gain setting with a 0dB reference that is the value of the *Advanced sine settings/ Peak level setting*
- **Phase offset**: All the advanced sine have the same phase reference. This setting is used to set a phase offset between them.

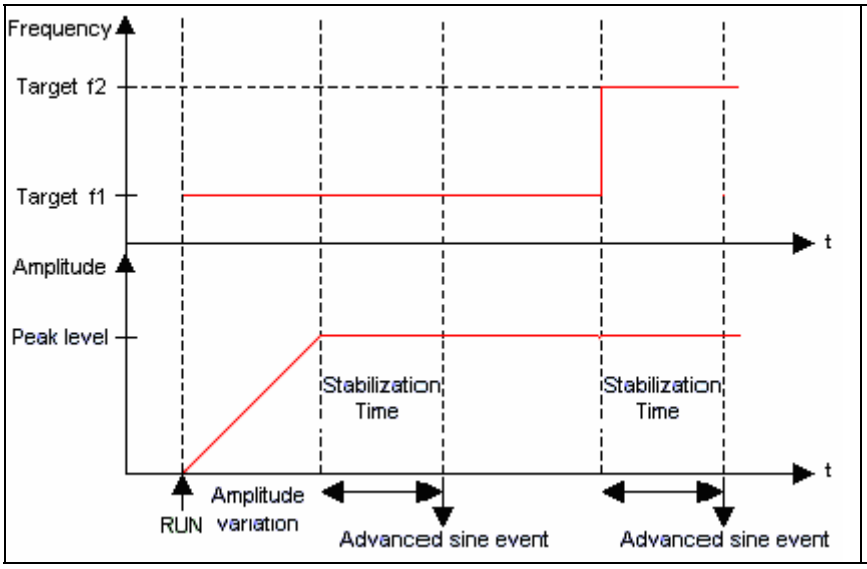


1.4.1.6 Advanced sine settings

This sub-module contains the settings related to the main advanced sine generator, including the advanced sine mode setting, stabilization time, amplitude variation...

- **Mode**:

Mode	**Description**
Sweep: 	The advanced sine performs a continuous sweep of the frequencies between Start Frequency and Stop Frequency
Step: 	The advanced sine performs a sweep of the frequencies between Start Frequency and Stop Frequency, it stops at each step, waits during stabilization time, and waits for the new step event before going on.
Pure tone:	The advanced sine generates a pure sine with the frequency of the *Advanced sine settings/ Target Frequency* value

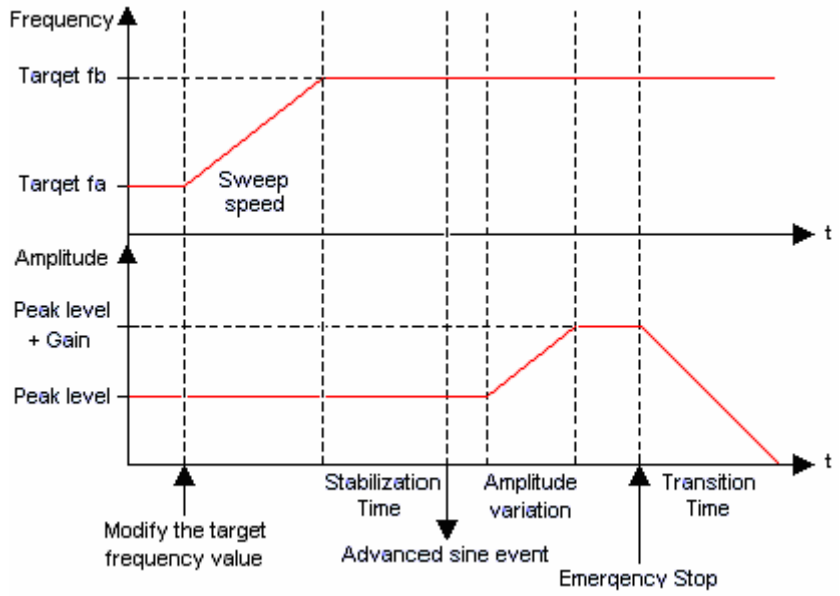


- **Synchronization**: “linked to run” or “Free run”. The Advanced sine generator will not be stopped by a stop event, if the setting is on ‘Free run’. The default value is ‘Linked to run’.
  If you change the amplitude or the frequency of the generated signal, there will be a stabilization time, and you will have to generate an event when the signal is stabilized.
  In those 3 modes, each time the generator stops on a frequency; at the beginning (amplitude increase until the first frequency), at a new step (at the end of stabilization time), or in ‘pure tone’ or ‘swept sine’ pause mode when it reaches the frequency target; the generator send a stabilized event, after being stabilized (amplitude and frequency). In ‘Free run’, if the generator is already stabilized at the run event, then a stabilized event is generated at this moment.
  If the output is on ‘Advanced sine’ source, the setting of ‘Synchronization’ of the advanced sine will recopied to the ‘synchronization’ of the output (which one become fixed).

  Hidden/fixed:

Mode	**Sweep**	**Step**	**Pure tone**
Synchronization	Fixed to ‘Linked to run’	Visible	Visible

- **Pause**: On / Off. When Pause is active, the frequency sweeping is halted then there is only one frequency generated. This frequency is now called "Target frequency". You can modify this frequency value to another target to be reached so the frequency will sweep to this new target.



Hidden/fixed:

Mode	Sweep	Step	Pure tone
Pause	visible	hidden	hidden

- **Peak level**: the advanced sine peak level (between 0 and 10 V).

- **Start frequency**: The start frequency of the sweep.
  Hidden/fixed:

Mode	Sweep	Step	Pure tone
Start frequency	visible	visible	hidden

- **Stop frequency**: The stop frequency of the sweep.
  Hidden/fixed:

Mode	Sweep	Step	Pure tone
Stop frequency	visible	visible	hidden

- **Target frequency**: The value of this setting is the frequency currently generated when the value of the *Pause* setting is "On" or if the *Mode* is set to "Pure Tone"
  Hidden/fixed:

Mode	Sweep	Step	Pure tone
Target frequency	visible if Pause = On	visible if Pause = On	visible

- **Sweep variation**: Two different types of sweep are available: a linear sweeping or a logarithmic sweep:

Sweep variation	Description
Lin	The Sweep speed is constant
Log	The Sweep speed increases exponentially when the frequency increase is linear

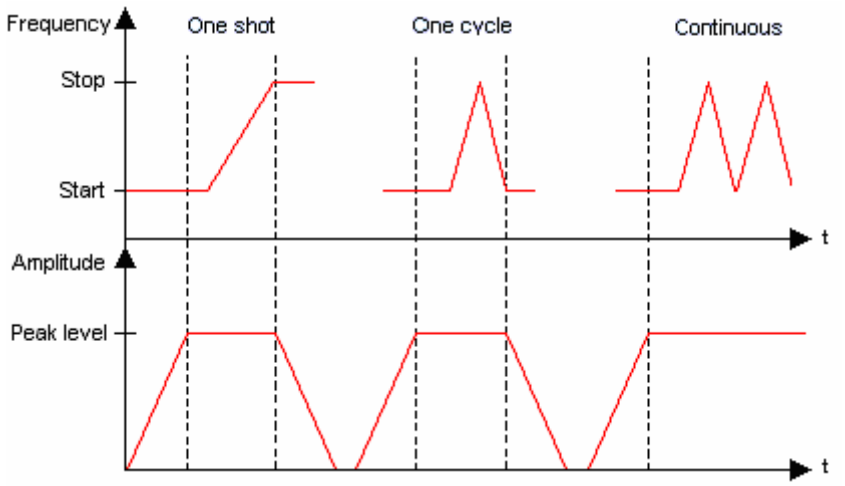
Hidden/fixed:

Mode	Sweep	Step	Pure tone
Sweep variation	visible	fixed to Lin	hidden

- **Sweep speed**: It is expressed in Hz/s in a linear sweep variation, and in dec/s in a logarithmic sweep variation.
Hidden/fixed:

Mode	Sweep	Step	Pure tone
Sweep speed	visible	hidden	hidden

- **Sweep type**:



Sweep type	Description
One shot	The advanced sine sweeps the frequencies from Start Frequency to Stop Frequency and stops.
One cycle	The advanced sine sweeps the frequencies from Start Frequency to Stop Frequency, then back to Start Frequency and stops.
Continuous	The advanced sine sweeps the frequencies between Start Frequency to Stop Frequency without stopping.

Hidden/fixed:

Mode	Sweep	Step	Pure tone
Sweep type	visible	visible	hidden

- **Stabilization time**: Sweep mode: Selects wait time for the advanced sine at the start frequency and at the right level before starting the sweep. Step mode: Selects wait time for the advanced sine at each step before waiting for the new step event.
- **Amplitude variation**: Maximum length of time for the advanced sine to reach a new level.
- **Phase speed**: Speed of phase variation when setting a new value for *Advanced sine x/ Phase offset setting*
- **Step**: Frequency gap between two steps
  Hidden/fixed:

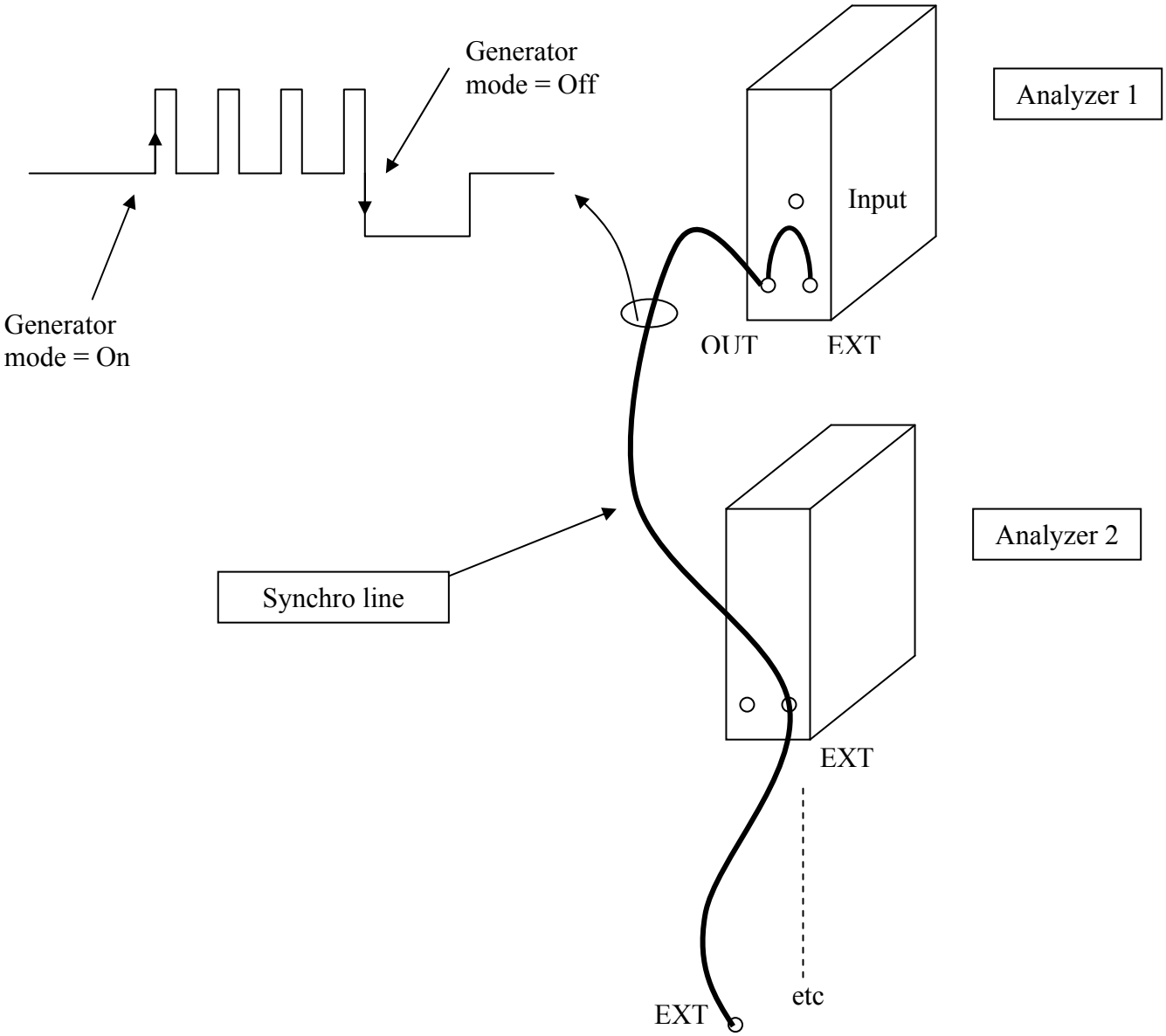
Mode	**Sweep**	**Step**	**Pure tone**
Sweep type	visible	visible	hidden

- **New step**: The event that triggers the sweep of the advanced sine to the next step
  Hidden/fixed:

Mode	**Sweep**	**Step**	**Pure tone**
Sweep type	hidden	visible	hidden

1.4.1.7 Synchro

This special output signal is used to synchronize raw data recorded on multiple OR3X units (even OR2X). This synch signal must be connected on ext. synch trigger input of each recording unit (see below)

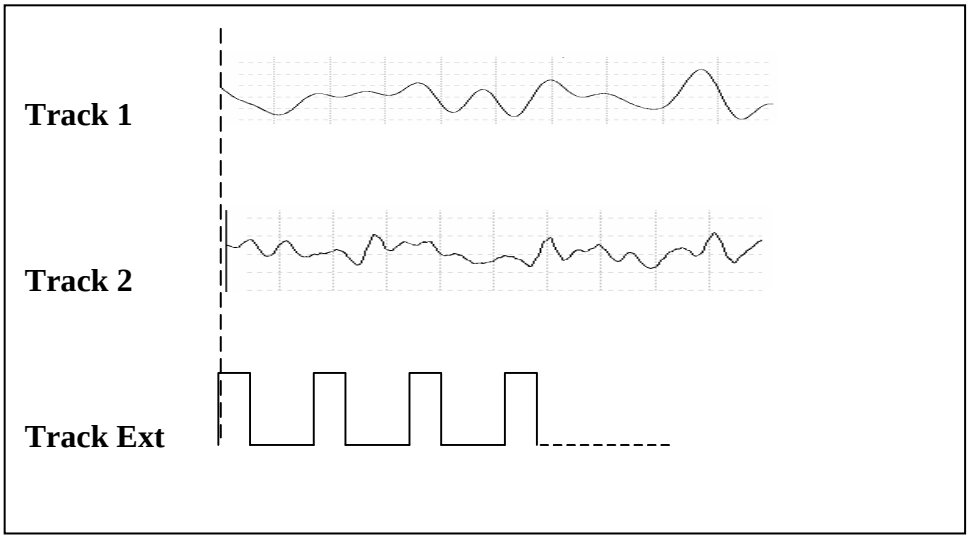


- **Active**: On/Off Set the synch signal available in sources list, no signal is generated on outputs at this stage
- **Generator Mode**: Controls synch signal behavior.
  - **On**: start the synch clock generation (0 / +5 V square @ 50 Hz)
  - **Off**: stop the synch clock generation followed by a -2V step during x sec.

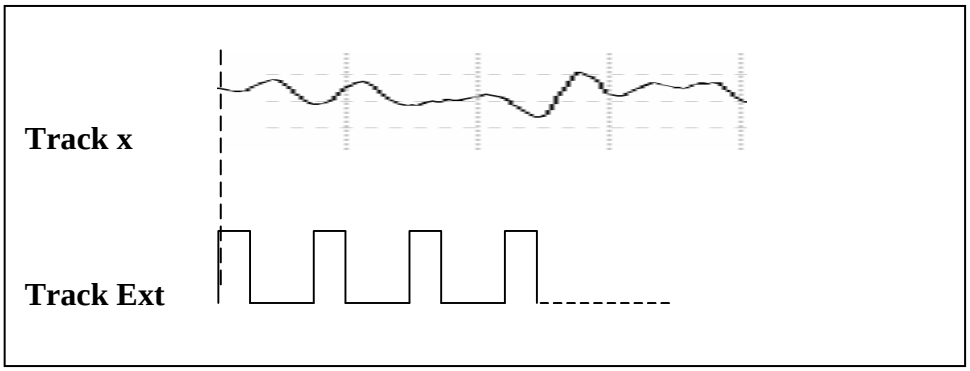
Basic procedure.

1. Activate the synch signal
2. Select *Front-end / Output 1 / source = Synchro*
3. Set *Front-end / ext synch / coupling = DC* on each recording unit
4. Set *Front-end / ext synch / threshold = 2 V* on each recording unit
5. Set *Recorder/trigger/start = ext synch* on each recording unit
6. Add ext. sync track to the recorder on each unit
7. Set same recording duration on each unit
8. Run each unit
9. Set *generator mode = on* to start record

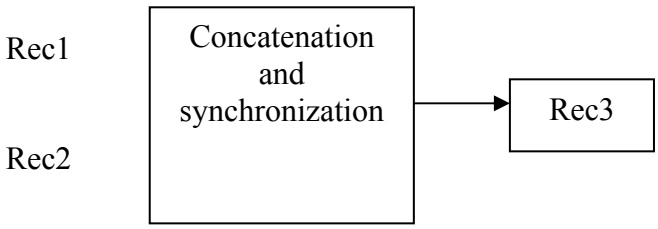
Record on Analyzer 1



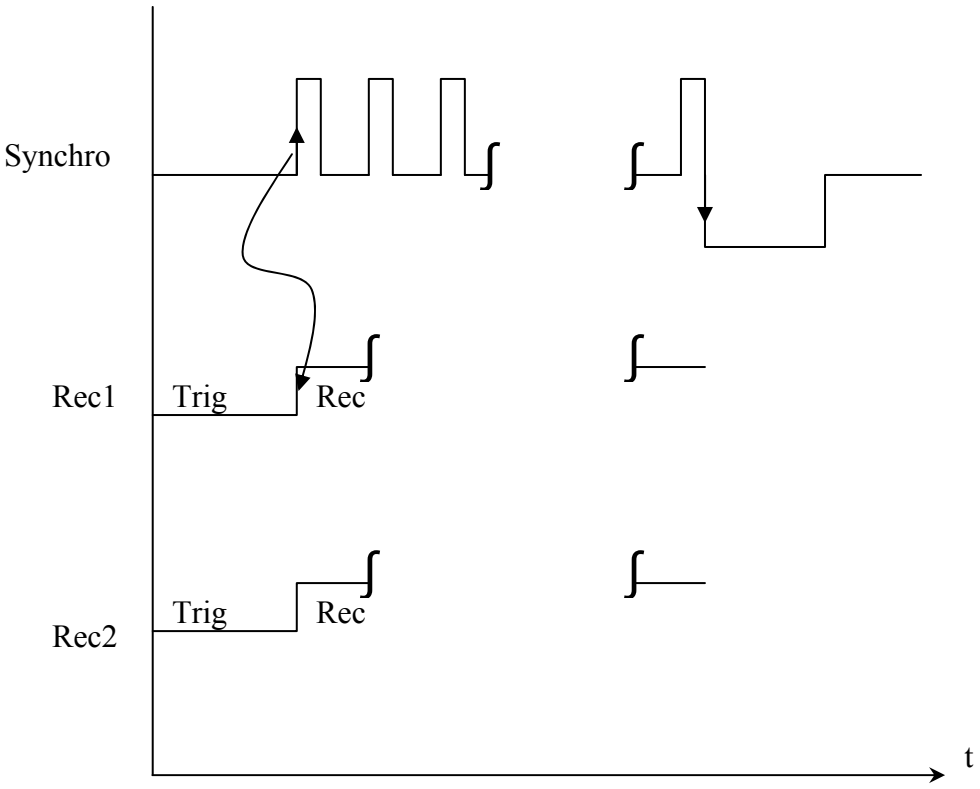
Record on Analyzer 2



10. Download all recorded files on one PC
11. Launch 'Track Assembler'



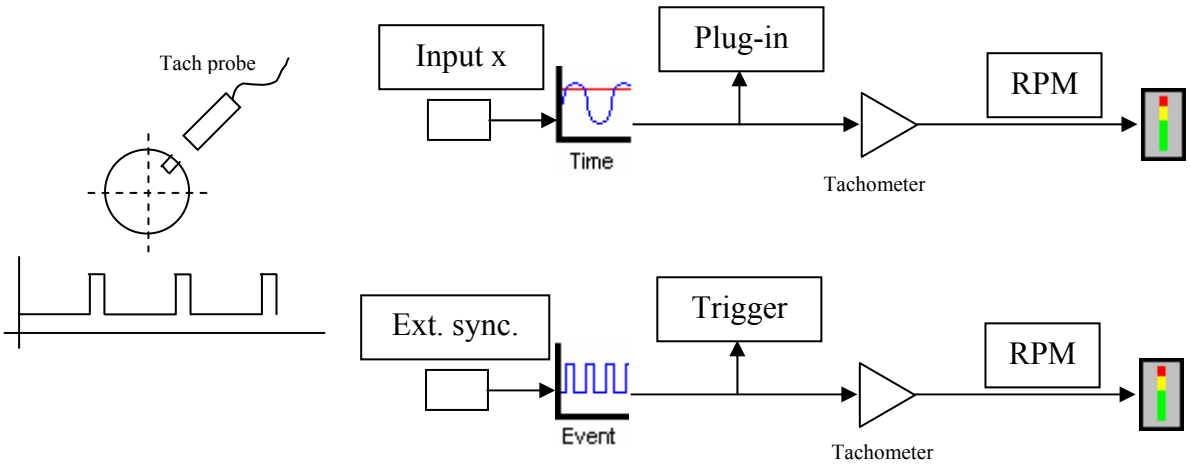
The concatenation synopsis is shown on the following scheme:



More information on the Track Assembler in Chapter 8 ‘Operation on multiples Hardwares’

1.4.2 Tachometer

This module is used to set up several tachometer sources, including virtual tachometers in the case of multiple shafts. Tachometers are based on signals that provide pulses/revolution.



The tach probe that provides the pulse signal can be connected either on an input or on an External sync. The External sync is sampled at 64* the Front-end sampling frequency in order to achieve higher precision in delay or phase measurements.

Available results

Type	Size	Dimension	Domain	Save
Filtered signal	256 pt	2D	time	Display only
Angular speed	1 pt	1D	Angular speed	Display only
Ext Tach Angular speed	1 pt	1D	Angular speed	Display only
Virtual Angular speed	1 pt	1D	Angular speed	Display only
RPM Profile	2048 pt max	2D	time	Display only
Ext Tach Profile	2048 pt max	2D	time	Display only
Virtual Tach Profile	2048 pt max	2D	time	Display only

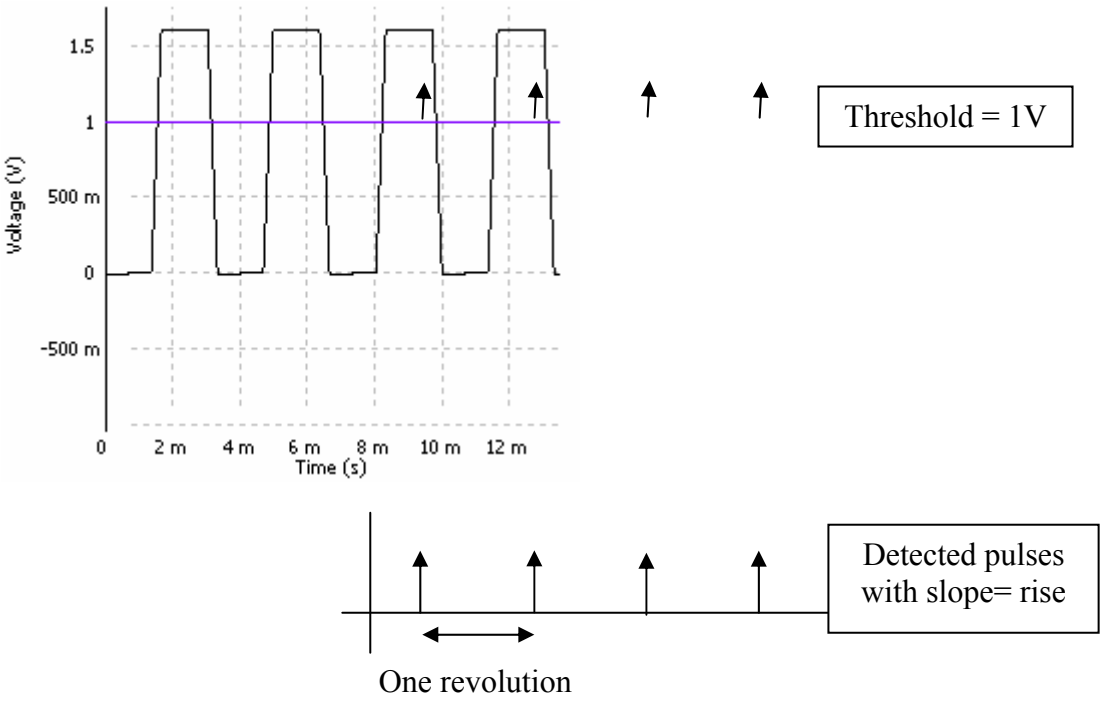
All tachs can be used as source for the RPM and Delta RPM event type and/or for order analysis (Constant band tracking of the FFT plug-in and Synchronous Order Analysis plug-in analyzers).

1.4.2.1 Tachs

Used to define up to 4 tachometers using signal from fast analog input (from the Front-end or from the Player)

- **Label**: the name of the tach.

- **Source***: the tach input signal (NONE by default). The input signal can be any Front-end input in Connected mode on line or any Player track in Post-analysis mode (except for the DC input and the Ext. Sync. inputs or tracks).
- **Input filter**: adds a digital filter before the tach process. The user can choose any filter from the list of the defined filters.
- **Threshold**: sets the signal threshold for tach pulse detection. The threshold is expressed in the same unit as for the input signal. The value can be adjusted between +/- the full scale of the input signal (depending of the input range).

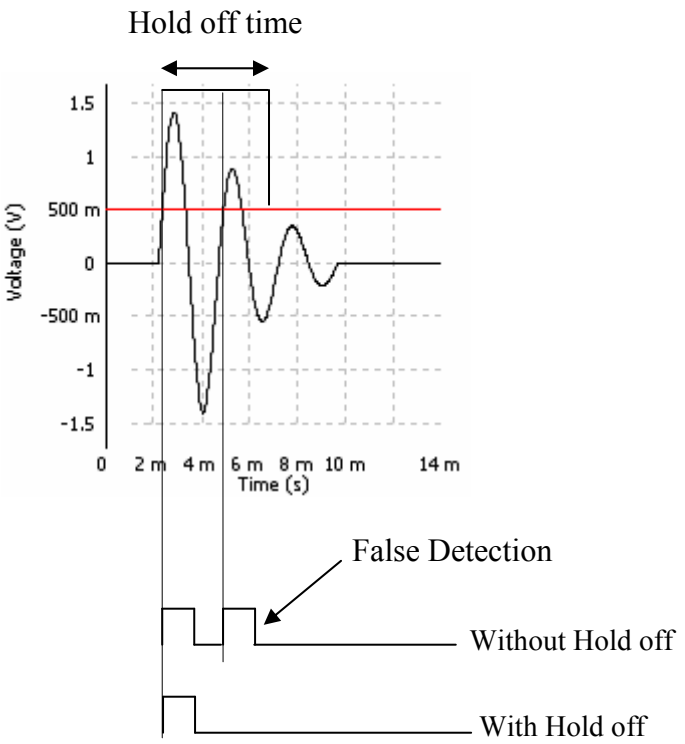


- **Slope**: selects the input signal slope on which a tach pulse is detected.

Slope	Description
Rise	Tach pulses are detected on rising edge of the input signal
Fall	Tach pulses are detected on falling edge of the input signal

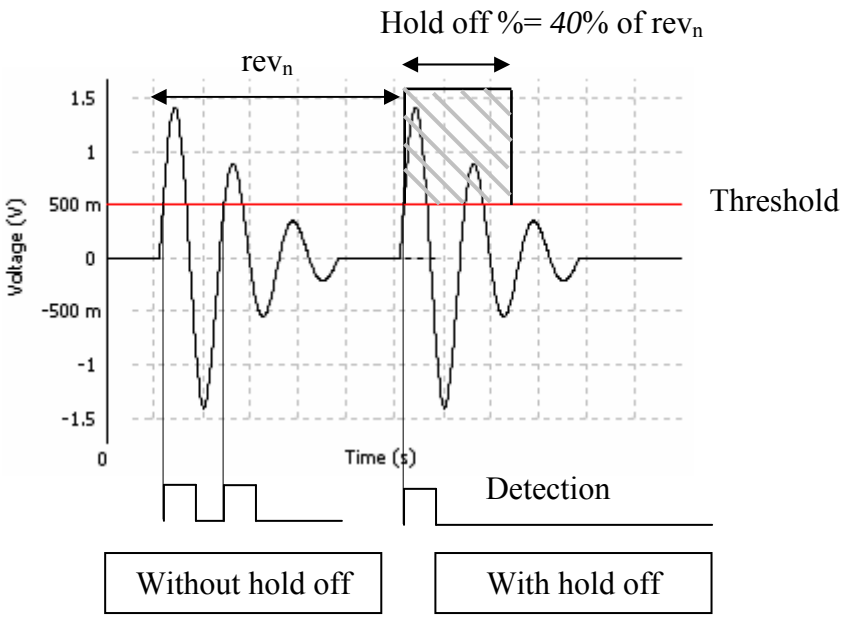
- **Hold off**: defines the minimum time (expressed in seconds) between two tach pulses used to measure angular speed. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. This minimum time is in fact the maximum between the Hold off setting value and the value computed using the last tach period length and the Hold off(% period) setting value. The user can enter any value between 0 and 36000s.

* Input 5 to input 8 are not able to be set as source using an OR35 analyzer.

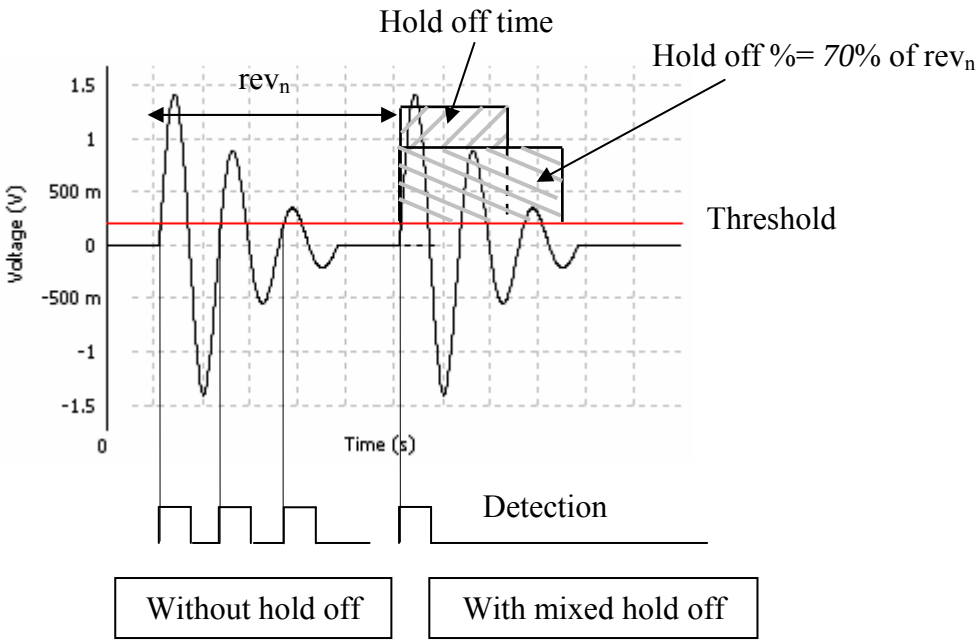


- **Hold off (% period):** defines the minimum time (expressed in % of the last valid tach period) between two tach pulses used to measure angular speed. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. This is used to reject angular speed variations that are too large. This minimum time is in fact the maximum between the Hold off setting value and the value computed using the last tach period length and the Hold off(% period) setting value.
  Example of the Hold Off setting at 40%:

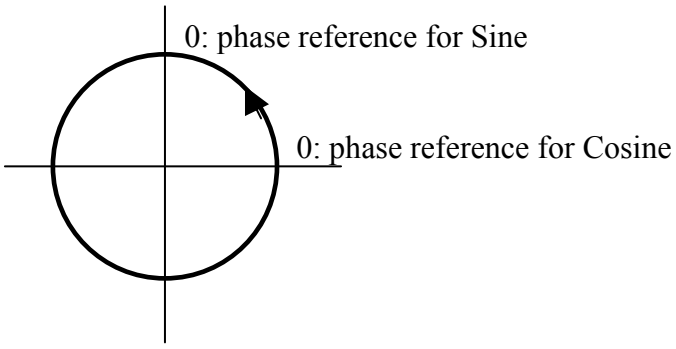
Example of the Hold Off % setting at 40%:



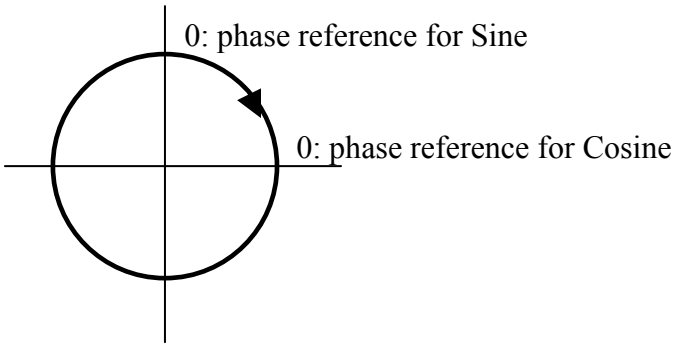
Mixed Hold off: in this case, the hold off to be applied is the highest value between hold off time and hold off %.



- **Hystersis**: defines the hystersis around the threshold. The value can be adjusted between 0 and the full scale of the input signal (depending on the input range). If Slope is set to RISE, the input signal must go below Threshold; Hystersis before a new pulse can be detected. If Slope is set to FALL, the input signal must go above Threshold + Hystersis before a new pulse can be detected. This setting is used to reject false pulse detection following, for example, an input signal transition.
- **Pulse / rev**: the number of pulses per revolution. The user can enter an integer value between 1 and 1024. For a non-integer number of pulses per revolution the user must use a virtual tach.
- **Rotation**: defines the direction of rotation of the tachometer. That means the tachometer rotates in 'counter clockwise' or in 'clockwise' direction. By default the direction of rotation is set to 'Counter clockwise'. The phase reference for Constant Band Tracking in SOA, or in FFT, a setting phase reference is available:
  - Phase reference on Cosine or Sine in Counter clockwise:



- Phase reference on Cosine or Sine in Clockwise:



For the FFT the direction of rotation is available only if:

- The average is set to 'Time'
- An associated tachometer is defined
- A trigger event is selected in the FFT
- The trigger event and the tachometer must be coherent:
  - If event = edge detection, the input specified for this event must be the tachometer source as well.
  - If event = Delta RPM, the tachometer defined for this event must the same tachometer associated to the FFT.
  - If event = Ext Sync, the Ext sync selected for this event must be the source of the tachometer associated to the FFT.

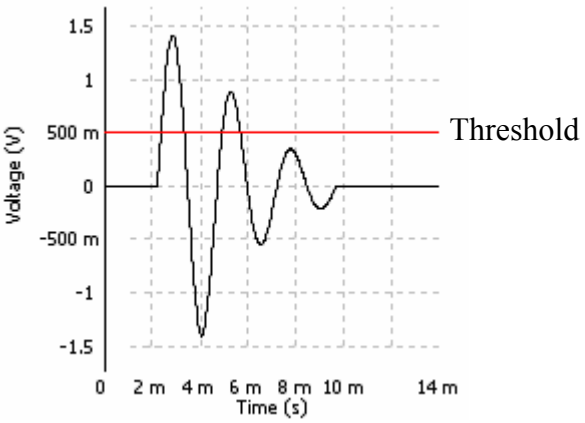
- **Average size**: defines the average number used to compute the average speed. Revolution number n average speed is: avrg_speed[n-1] + (inst_speed[n-1] - avrg_speed[n-1]) / avrg_size.
- **Max speed**: defines the highest measured angular speed. All revolutions with a speed higher than Max speed are rejected. By default Max speed is expressed in RPM. The limit of Max speed depends on the sampling frequency of the input signal and is equal to: 60 * Fe / (2 * 2.56) for the maximum and Max speed / 1000 for the minimum. The Max speed setting is also used:
  - to specify the limit of Y axis of the RPM profile result
  - to compute the limit of the maximum order of the SOA plug-in analyzer.
- **Min speed**: defines the lowest measured angular speed. All revolutions with a speed lower than Min speed are forced to 0 RPM. By default Min speed is expressed in RPM. The user can enter any value between Max speed / 1000 and Max speed.

1.4.2.2 Ext. Tach*

Used to define up to 6 Ext Tachs, using signal from the Ext. Sync. input from the Player). This replaces the Ext Sync (with tach 'On') from the front-end, in Post-analysis. Then Ext tach is visible, on Track x connect the Ext Sync and then in the Ext tach set the source to Ext Sync.

- **Label**: the name of the tach.
- **Source**: the input signal of the tach (NONE by default). The input signal can be any Front end Ext. Sync. input (in Connected mode on line) or player track (in Post-analysis mode).
- **Pulse / rev**: the number of pulses per revolution. The user can enter an integer value between 1 and 1024. For a non-integer number of pulses per revolution the user must use a virtual tach.

  Note: In Post-analysis, the number of pulses per revolution is added to the number entered for the acquisition.
- **Average size**: defines the average number used to compute the average speed. Revolution number n average speed is: avrg_speed[n-1] + (inst_speed[n-1] - avrg_speed[n-1]) / avrg_size.
- **Threshold**: sets the signal threshold for tach pulse detection. The threshold is expressed in the same unit as for the input signal. The value can be adjusted between +/- the full scale of the input signal (depending of the input range).



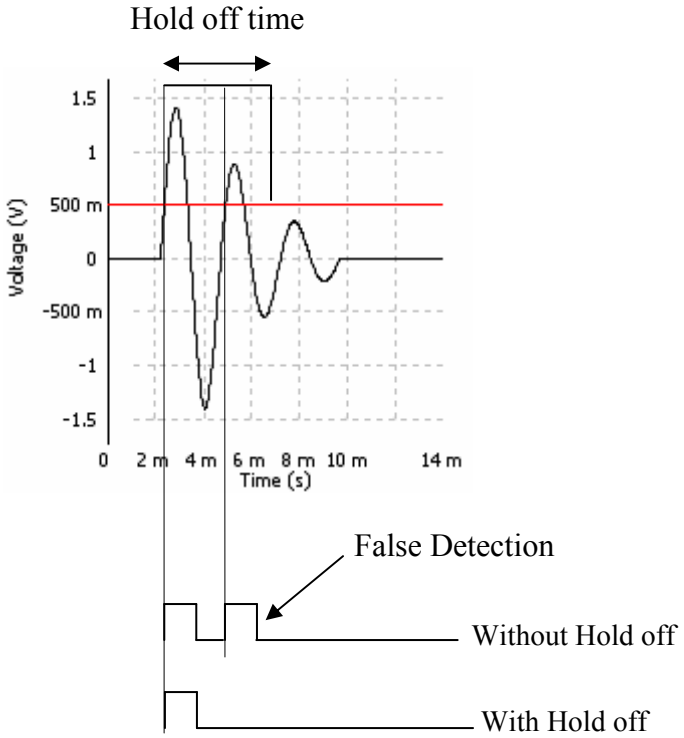
- **Slope**: selects the slope of the input signal on which a tach pulse is detected.

Slope	Description
Rise	The tach pulses are detected on rising edge of the input signal
Fall	The tach pulses are detected on falling edge of the input signal

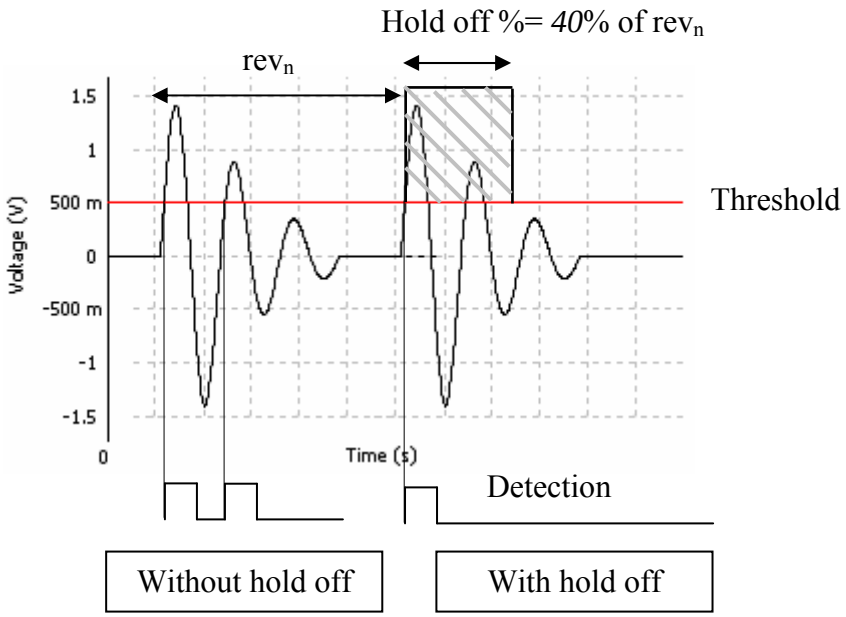
- **Hold off**: defines the minimum time (expressed in seconds) between two tach pulses used to measure angular speed. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. This minimum time is in fact the maximum between the Hold off setting value and

* Only available in Post analysis mode

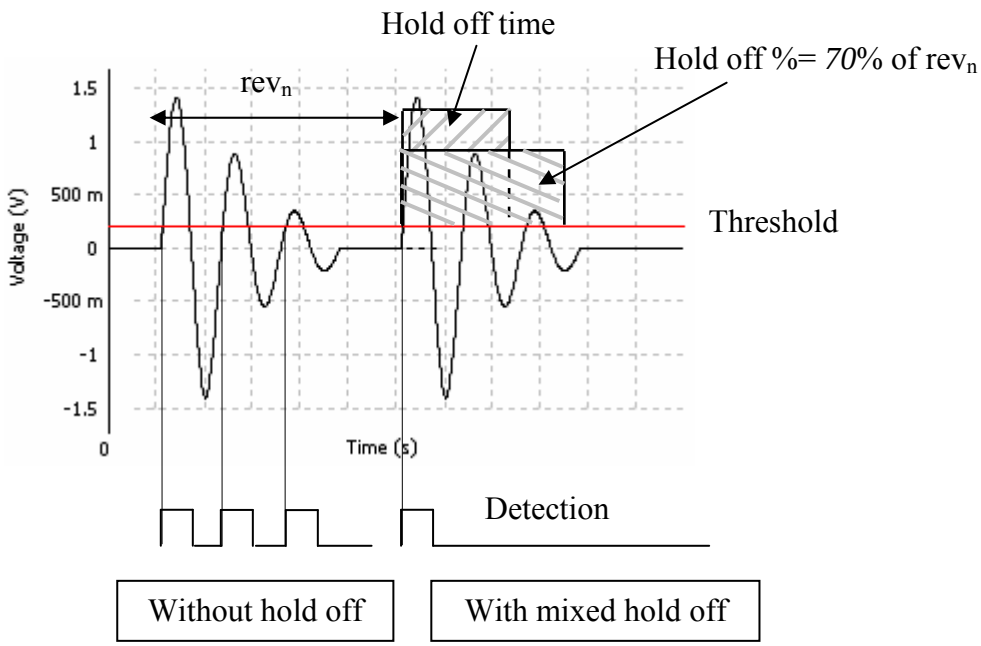
the value computed using the last tach period length and the Hold off(% period) setting value. The user can enter any value between 0 and 36000s.



- **Hold off (% period):** defines the minimum time (expressed in % of the last valid tach period) between two tach pulses used to measure angular speed. If a pulse is detected before this time has expired since the last valid pulse then the new pulse is rejected. This is used to reject angular speed variations that are too large. This minimum time is in fact the maximum between the Hold off setting value and the value computed using the last tach period length and the Hold off (% period) setting value.
  Example of the Hold Off setting at 40%:



Mixed Hold off: in this case, the hold off to be applied is the highest value between hold off time and hold off %.



Note: the hold off value in Post-Analysis is added to the time or the percentage already put for the acquisition.

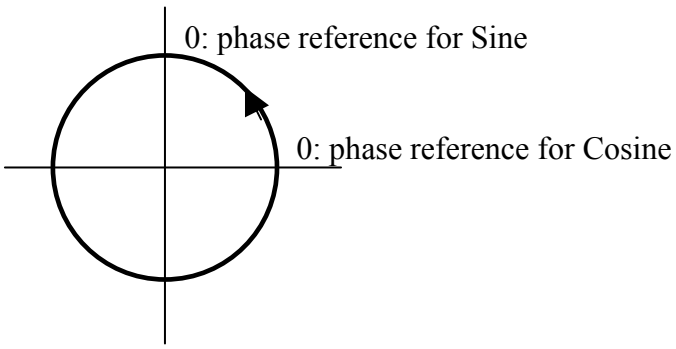
- **Hystersis**: defines the hystersis around the threshold. The value can be adjusted between 0 and the full input signal scale (depending on the input range). If Slope is set to RISE, the input signal must go below Threshold; Hystersis before a new pulse can be detected. If Slope is set to FALL, the input signal must go above Threshold + Hystersis before a new pulse can be detected. This setting is used to reject false pulse detection following, for example, an input signal transition.
- **Max speed**: defines the highest measured angular speed. All revolutions with a speed higher than Max speed are rejected. By default Max speed is expressed in RPM. The Max speed limit depends on the input signal sampling frequency and is equal to: 60 * Fe / (2 * 2.56) for the maximum and Max speed / 1000 for the minimum. The Max speed setting is also used:
  - to specify the limit of Y axis of the RPM profile result
  - compute the limit of the maximum order of the SOA plug-in analyzer.
- **Min speed**: defines the lowest measured angular speed. All the revolutions with a speed lower than Min speed are forced to 0 RPM. By default Min speed is expressed in RPM. The user can enter any value between Max speed / 1000 and Max speed.

1.4.2.3 DC Tachs

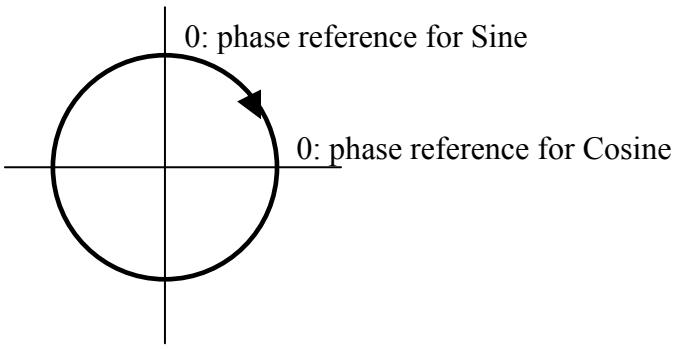
Used to define up to 4 tachometers using signal from DC inputs. It's particularly interesting if a tachometric transducer which delivers voltage proportional to rotational speed is used for the measure (the sensitivity is in Volt/RPM). It's means that the rotational speed is always known during the rotation.

When 'tach' in DC input properties is activated several set-up become available:

- **Max speed:** defines the highest measured angular speed. All revolutions with a speed higher than Max speed are rejected. By default Max speed is expressed in RPM. The Max speed limit depends on the input signal sampling frequency and is equal to: 60 * Fe / (2 * 2.56) for the maximum and Max speed / 1000 for the minimum.
- **Min speed:** defines the lowest measured angular speed. All the revolutions with a speed lower than Min speed are forced to 0 RPM. By default Min speed is expressed in RPM. The user can enter any value between Max speed / 1000 and Max speed.
- **Rotation:** defines the direction of rotation of the tachometer. That means the tachometer rotates in 'counter clockwise' or in 'clockwise' direction. By default the direction of rotation is set to 'Counter clockwise'. The phase reference for Constant Band Tracking in SOA, or in FFT, a setting phase reference is available:
  - Phase reference on Cosine or Sine in Counter clockwise:



  - Phase reference on Cosine or Sine in Clockwise:



For the FFT the direction of rotation is available only if:

- The average is set to ‘Time’
- An associated tachometer is defined
- A trigger event is selected in the FFT
- The trigger event and the tachometer must be coherent:
  - If event = edge detection, the input specified for this event must be the tachometer source as well.
  - If event = Delta RPM, the tachometer defined for this event must the same tachometer associated to the FFT.
  - If event = Ext Sync, the Ext sync selected for this event must be the source of the tachometer associated to the FFT.

- **Average size:** defines the average number used to compute the average speed.

Notes:

- The DC Input **physical quantity** must be angular velocity.

The connection of a DC Input is possible using the wizard toolbar and especially the tachometer connection window. If a DC Input is defined as a tach by this way, the set up ‘tach’ is automatically activated and the physical quantity is forced to angular velocity.

- The **sensitivity** and the **offset** can be automatically updated by calibrating the DC Input.

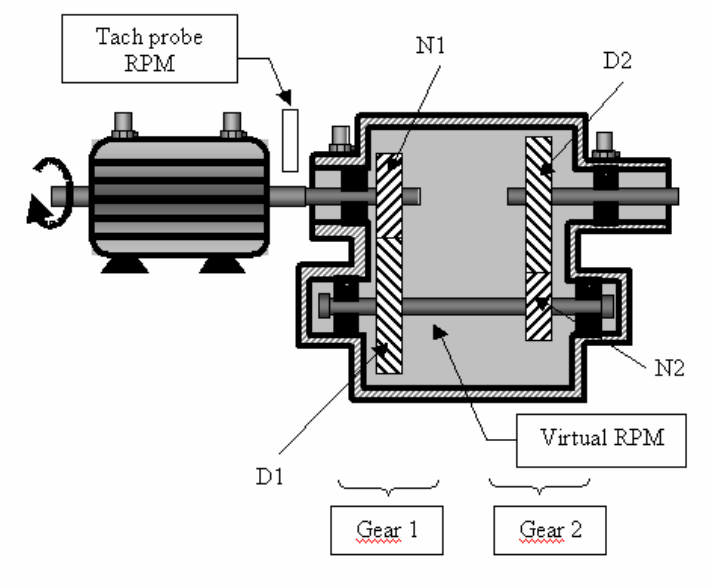
Tachs DC in Post-Analyze.

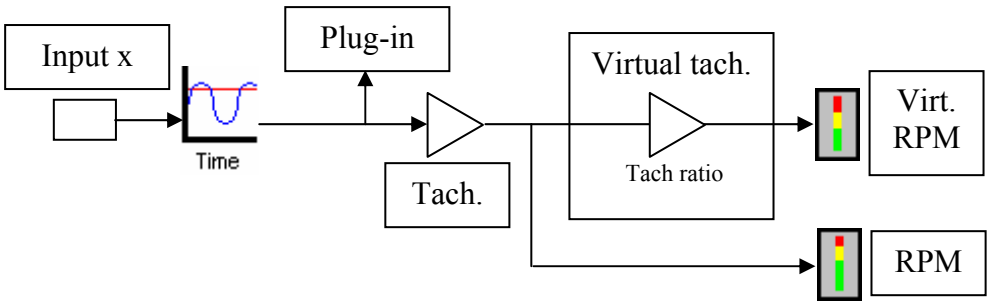
In Post-Analyze, the DC tachs are available.

They can be activated and connected to a DC Input available in the signal loaded in the player. The set up magnitude, sensitivity and offset allow to calibrate the DC Input in post analyze to obtain the correct values of the angular velocity.

1.4.2.4 Fractional Tachs

Used to define up to 4 fractional Tachs, using data from the Tachs or the Ext Tachs. Virtual tach computes RPM speed for a not accessible shaft by using gear ratio setting.





- **Label**: the name of the virtual tach.
- **Source**: the source of a virtual tach can be any tach or Ext. tach.
- **Tach ratio**: this is the ratio between the output angular speed and the input angular speed. This setting is defined by the product of 2 fractions: N1/D1 * N2/D2 where N1, D1, N2 and D2 are integer values. Tach.1 / Tach.2 ratio maximum value cannot be higher than 2.
- **Average size**: defines the average number used to compute the average speed. Revolution number n average speed is: avrg_speed[n-1] + (inst_speed[n-1] - avrg_speed[n-1]) / avrg_size.
- **Max speed**: defines the highest measured angular speed. All revolutions with a speed higher than Max speed are rejected. By default Max speed is expressed in RPM. The limit of Max speed depends on input signal sampling frequency

and is equal to: 60 * Fe / (2 * 2.56) for the maximum and Max speed / 1000 for the minimum. The Max speed setting is also used:

- to specify the limit of Y axis of the RPM profile result
- to compute the limit of the maximum order of the SOA plug-in analyzer.

- **Min speed**: defines the lowest measured angular speed. All the revolutions with a speed lower than Min speed are forced to 0 RPM. By default Min speed is expressed in RPM. The user can enter any value between Max speed / 1000 and Max speed.

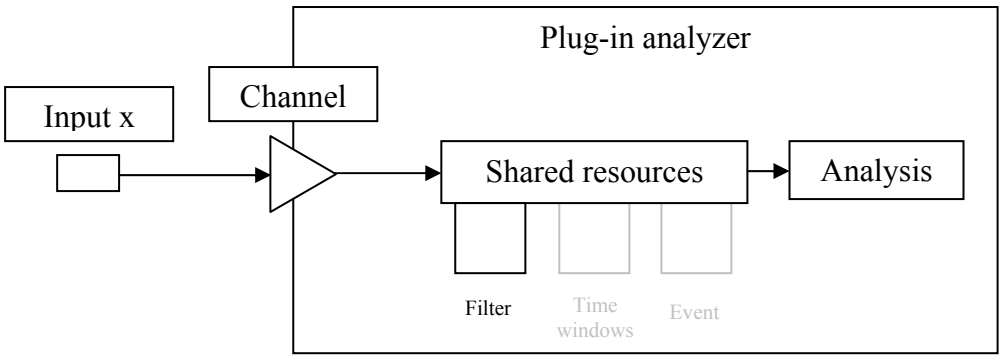
1.4.2.5 RPM Profiles

Defines the RPM profile window display.

- **Duration profile**: defines the maximum profile duration (from 10s to 1200s).
- **Min resolution**: defines the shortest time between 2 angular speed values saved in the profile.
  Hidden/fixed: fixed to a value equal to Duration profile / 2048.

1.4.3 Filter builder

Used to define several filters that can be applied to FFT or Sync. order plug-in input filters.



1.4.3.1 High-Low pass

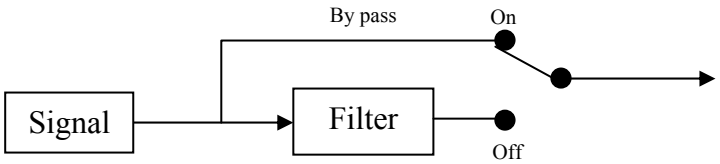
Used to design a high-pass filter or a low-pass filter (Butterworth, elliptic…).

- **Label**: the name of the filter (by default High-Low pass n, with 1 <= n <= 4).
- **Type**: the type (Low pass or High pass) of the filter.
- **Filter order**: filter order from 1 to 6. The higher is the order, the steepest is the cut-off.

- **Apply to**: this filter can be applied to the corresponding FFT plug-in only.. The other modules have the frequency range that corresponds to the input sampling (in connected mode on-line) or to the max player bandwidth (in post analysis mode).

Apply to	Description
All (40 kHz)	The frequency (for example 40 kHz) applied to all plug-in analyzers except FFT.
FFT x (20 kHz)	The frequency (for example 20 kHz) applied to the FFT x analyzer.

- **Cut-off frequency**: the filter cut-off frequency. Its maximum value is the input frequency range. Its minimum value is: FR / 40 (for a Low pass filter) and FR / 400 (for a High pass filter), where FR is the input frequency range.
- **By-pass**: On / Off. The filter is not applied if By-pass is On.



By passing a filter does not request stabilization time.

1.4.3.2 Pass-Stop band

Used to design a band-pass filter or a band-stop filter.

- **Label**: the name of the filter (by default Pass-Stop band n, with 1 <= n <= 4).
- **Type**: the type (Band pass or Band stop) of filter.
- **Filter order**: 2, 4, 6, 8 or 10. The higher is the order, the steepest is the cut-off.
- **Apply to**: this filter can be applied to any module whose frequency is lower than or equal to the selected frequency range. The FFT plug-in analyzers have their own frequency range. The other modules have the frequency range that corresponds to the input sampling (in connected mode on-line) or to the max player bandwidth (in post analysis mode).

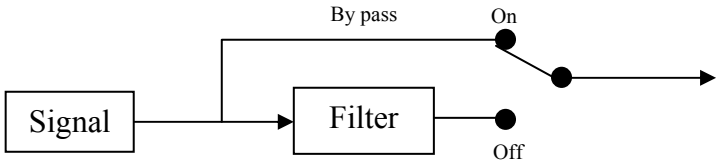
Apply to	Description
All (40 kHz)	The frequency (for example 40 kHz) applied to all plug-in analyzers except FFT.
FFT x (20 kHz)	The frequency (for example 20 kHz) applied to the FFT x analyzer.

- **Low cut-off frequency**: the low filter cut-off frequency. Its minimum value is 0.055 * FR, where FR is the input frequency range. However, the following conditions must also be fulfilled:

  0.0075 * FR <= B <= 0.5 FR

  where B is the bandwidth between Low and high cut-off frequency and FR is the input frequency range.

- **High cut-off frequency**: the filter high cut-off frequency. Its maximum value is the input frequency range. However, the following conditions must also be fulfilled: see Low cut-off frequency.
- **By-pass**: On / Off. The filter is not applied if By-pass is On.



By passing a filter does not request stabilization time.

1.4.3.3 Integrator

Used to design a time integrator filter associated with a high pass filter (to limit gain near DC components).

- **Label**: the name of the filter (by default Integrator n, with 1 <= n <= 4).
- **Type**: the type (High Pass + single integ. / High Pass + double integ.) of the filter.
- **Apply to**: this filter can be applied to any module whose frequency is lower than or equal to the selected frequency range. The FFT plug-in analyzers have their own frequency range. The other modules have the frequency range that corresponds to the input sampling (in the on-line mode) or to the max player bandwidth (in post analysis mode).

Apply to	Description
All (40 kHz)	The frequency (for example 40 kHz) applied to all plug-in analyzers except FFT.
FFT x (20 kHz)	The frequency (for example 20 kHz) applied to the FFT x analyzer.

- **HP cut-off frequency**: the cut-off frequency of the High pass filter contained in this integrator filter. Its maximum value is FR / 2000, and its minimum value is FR / 10000, where FR is the input frequency range.
- **Integration time**: Filter integration time. By default, the time constant of integrator filter is equal to 1s. This value can be modified by the user. This setting is used to specify the integration time of the integrator filter. The frequency response of a first order integrator filter is equal to:

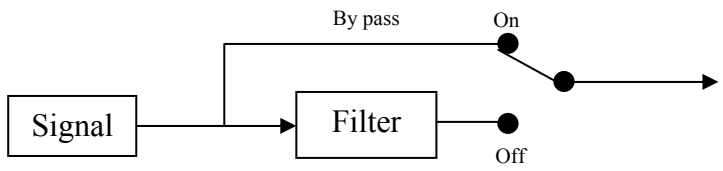
$$S(f) = \frac{1}{j\frac{w}{w0}}$$

where: $\omega 0 = \frac{2\Pi}{T}$ T is the integration time. By default T = 1s.

The attenuation of a sine signal with a frequency of f Hz is equal to:

$$20\log(\frac{1}{Tf})$$

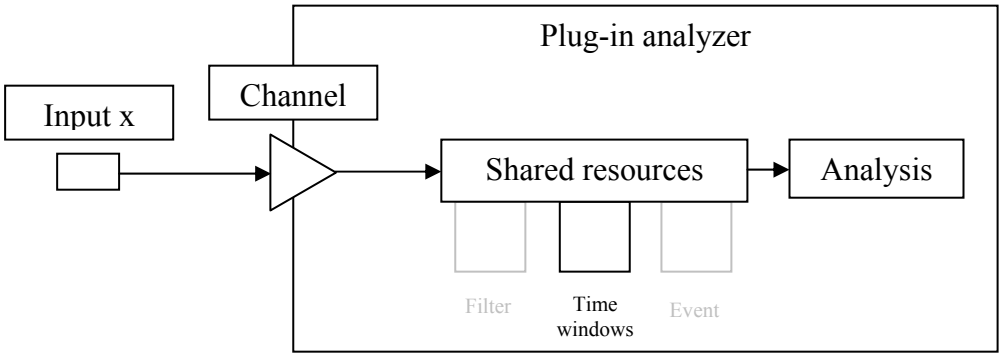
- **By-pass**: On / Off. The filter is not applied if By-pass is On.



By passing a filter does not request stabilization time.

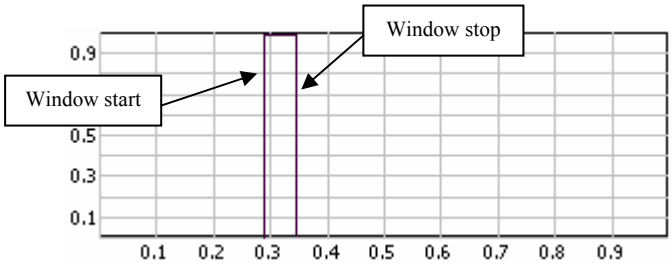
1.4.4 Time windows

Used to define time weighting windows that can be applied to FFT blocks.

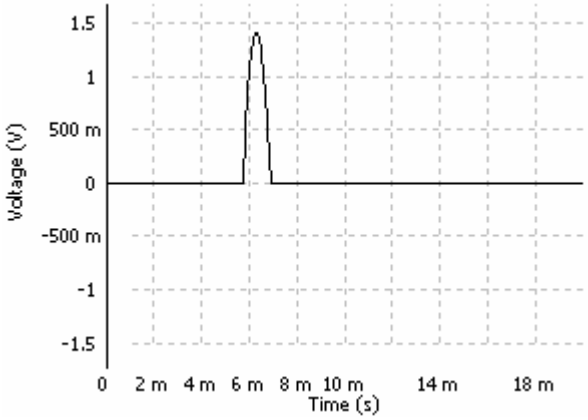


1.4.4.1 Force

This setting is generally used to set up a uniform time window around the interesting part of the signal such as hammer impact, for example.



Note: it is possible to adjust the start and stop values graphically by using drag and drop on the graph.

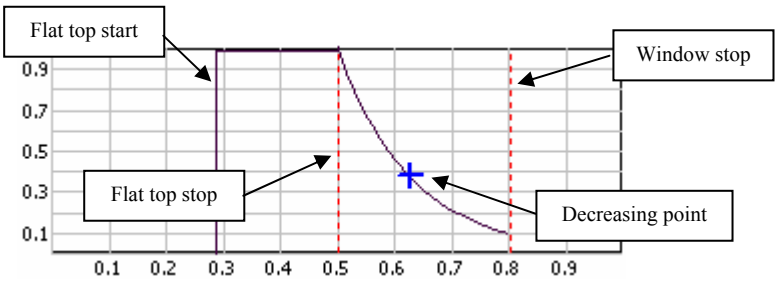


- **Window Start**: Starting point of the window as a percentage of the triggered block size of the plug-in using the window. The block size is the plug-in resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.
- **Window Stop**: Stopping point of the window in percentage of the triggered block size of the plug-in using the window. The block size is the plug-in

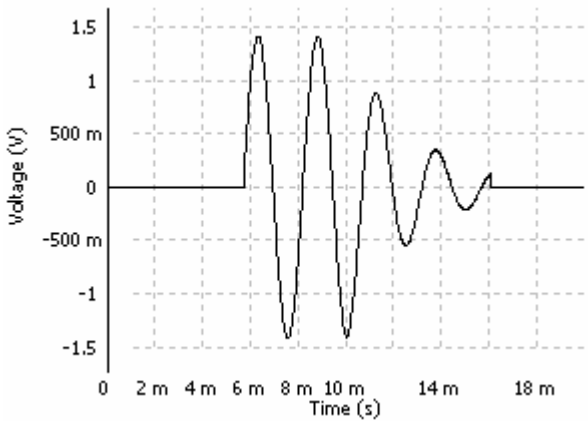
resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.

1.4.4.2 Response

This setting is generally used to set up a uniform time window around the interesting part of the signal such as the response of an accelerometer after a hammer impact, for example.



Note: it is possible to adjust the values graphically by using drag and drop on the graph.

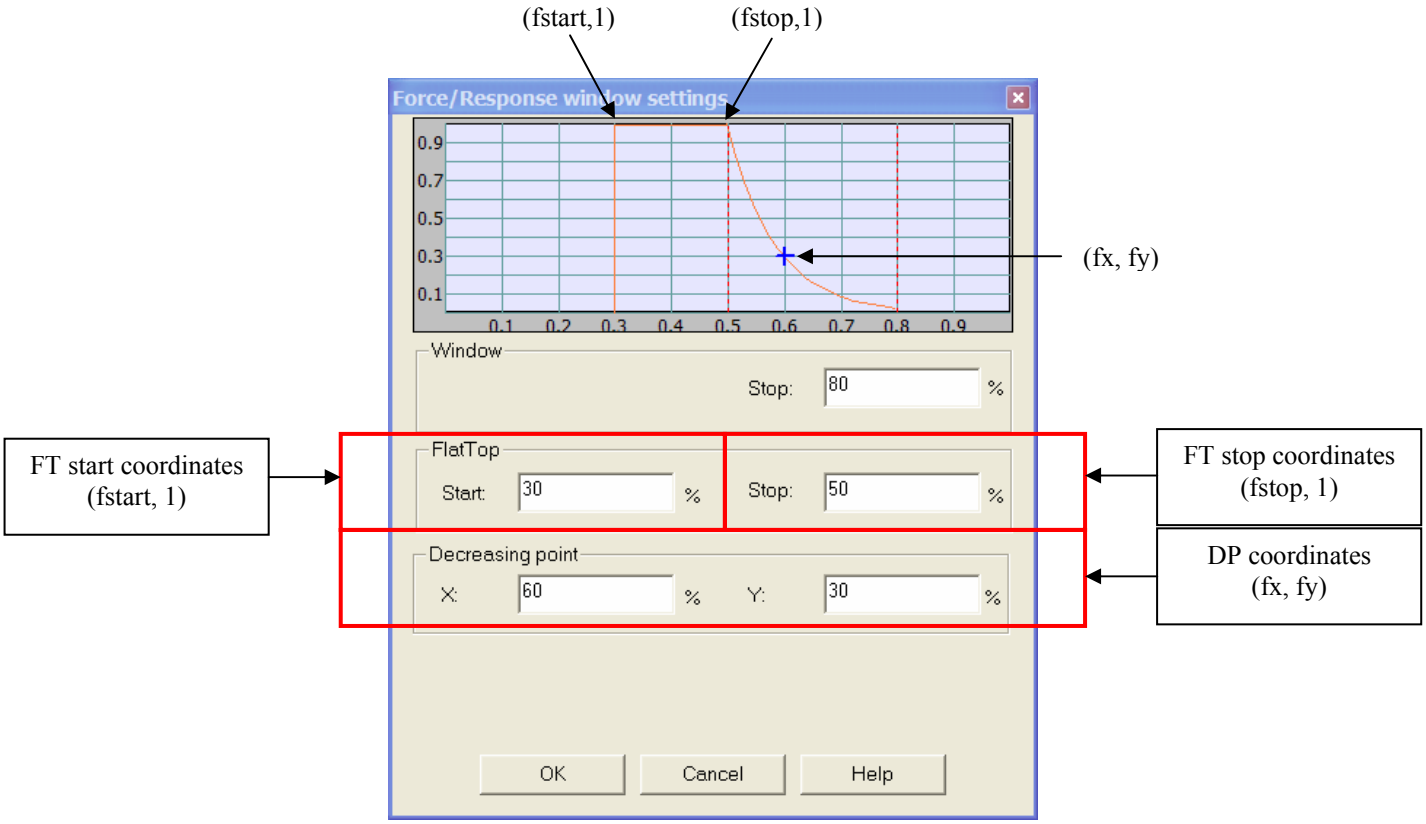


- **Window Stop**: Stopping point of the window as a percentage of the triggered block size of the plug-in using the window. The block size is the plug-in resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.
- **Flat top Start**: Starting point of the window flat top as percentage of the triggered block size of the plug-in using the window. The block size is the plug-in resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.
- **Flat top Stop**: Stopping point of the window flat top as a percentage of the triggered block size of the plug-in using the window. The block size is the plug-in resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.
- **Decreasing point X**: Abscissa of the intermediate point that determines the decreasing coefficient of the exponential function as a percentage of the triggered block size of the plug-in using the window. The block size is the plug-in resolution setting value multiplied by 2.56. ex: for 401 lines resolution the triggered block size is 401*2.56 = 1024 samples.

- **Decreasing point Y**: Ordinate of the intermediate point that determines the decreasing coefficient of the exponential function as a percentage of the value of the signal.
- **Exponential coefficient**: this coefficient is calculated with the coordinates of Decreasing point Y and Decreasing point X.

the formula used to compute this coefficient: Exp coeff $= \dfrac{\ln(fy)}{(fx - fstop)}$

Fy, fx and fstop are described below

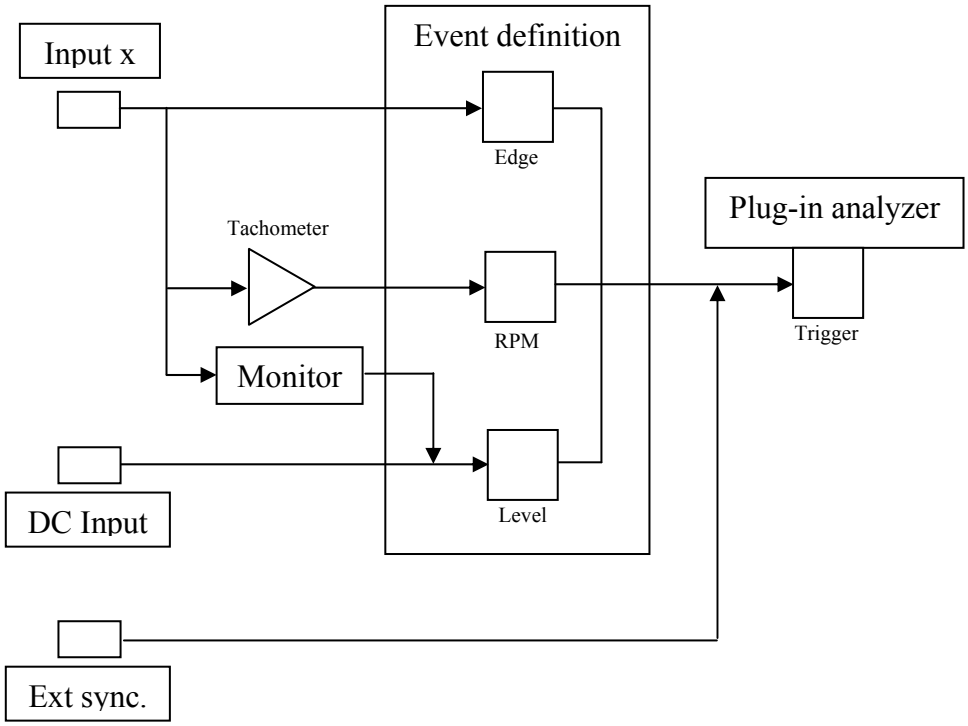


In this example, it then gives Exp coeff $= \dfrac{\ln(0{,}3)}{(0{,}6 - 0{,}5)} = -12{,}04$

Note: a time window can be applied to several plug-in analyzer channels. The modification of the time window values will be applied to all the channels the time window is active.

1.4.5 Event definition

This module is used to define multiple events that can start, stop, and trigger the plug-ins or the source modules such as Recorder and Player.

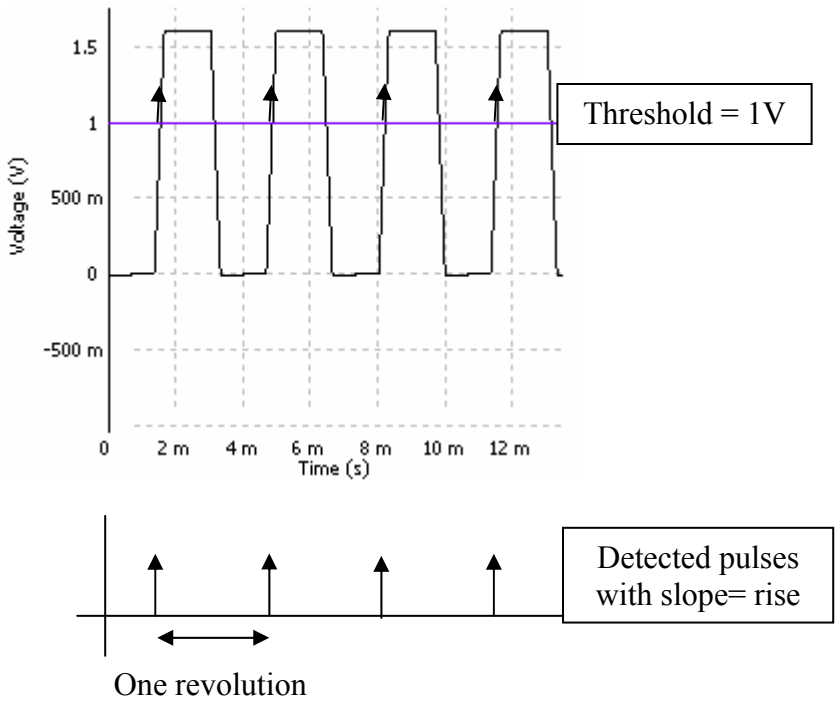


1.4.5.1 Edge detection

This module is used with the analog inputs (tach pulse or hammer impact). This trigger can be applied to any plug-in analyzer including Waterfall and Recorder.

- **Label**: the name of the event (by default Edge n, with 1 <= n <= 2).
- **Source***: selects the signal input source. The user can choose any Front-end fast analog input (in connected mode on-line) or from the Player (in post-analysis mode).
- **Input filter**: adds a digital filter before the edge detection process. The user can choose any filter from the list of the defined filters.
- **Threshold**: sets the signal threshold for edge detection. The threshold is expressed in the same unit as for the input signal. The value can be adjusted between +/- the full input signal scale (depending on the input range).

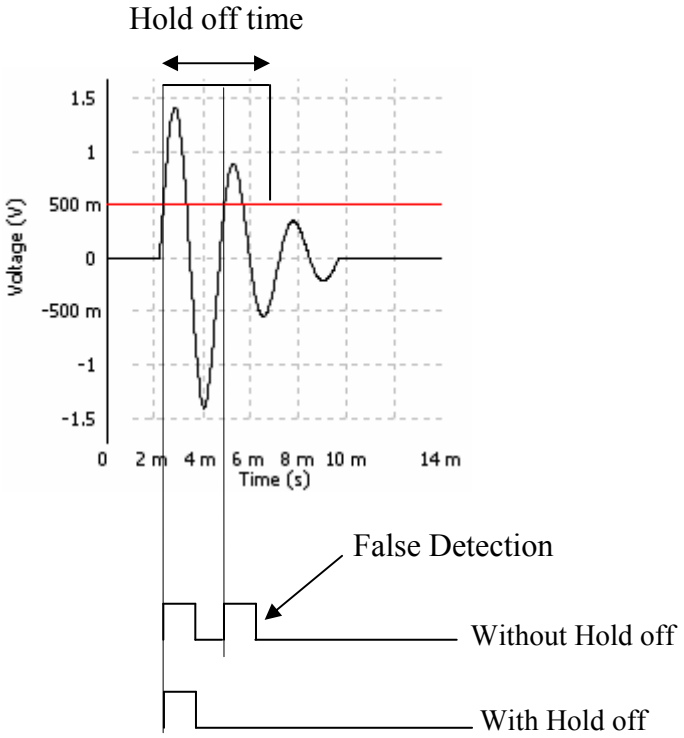
* Input 5 to input 8 are not able to be set as source using an OR35 analyzer.



- **Slope**: selects the slope of the input signal on which a transition is detected.

Slope	Description
Rise	The events are detected on rising edge of the input signal
Fall	The events are detected on falling edge of the input signal

- **Hold off**: defines the minimum time (expressed in seconds) between the detection of two edges. If a transition is detected before this time has expired since the last valid event then the new edge is rejected. The user can enter any value between 0 and 36000s.

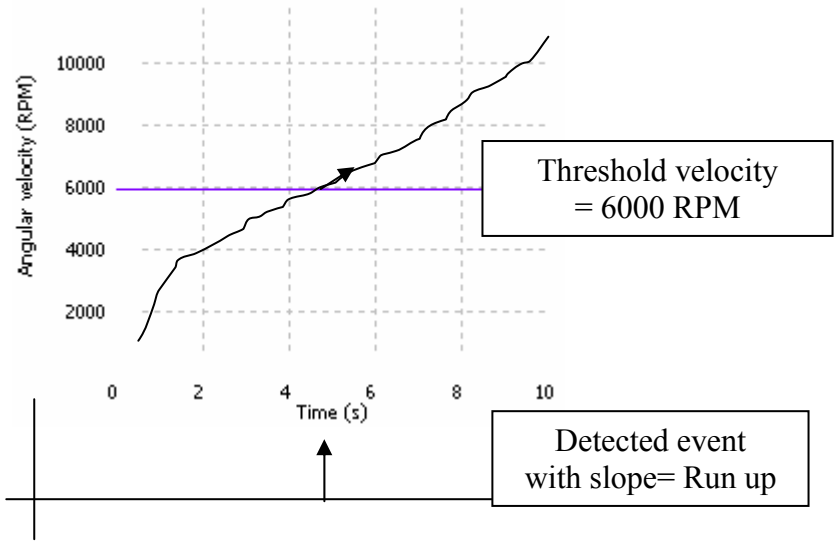


- **Hystersis**: defines the hystersis around the threshold. The value can be adjusted between 0 and the full scale of the input signal (depending on the input range). If Slope is set to RISE, the input signal must go below Threshold - Hystersis before a new event can be detected. If Slope is set to FALL, the input signal must go above Threshold + Hystersis before a new event can be detected. This setting is used to reject false edge detection following, for example, an input signal transition.

1.4.5.2 RPM

This module is associated with the Tachometer module. This trigger can be applied to any plug-in analyzer including Waterfall and Recorder.

- **Label**: the name of the event (by default RPM n, with 1 <= n <= 2).
- **Source**: selects the tach source. The user can choose any active tach as the source of the RPM event.
- **Threshold velocity**: defines the threshold velocity for detecting an event. The user can enter any value between the Min Speed and the Max Speed setting values defined in the tach source.

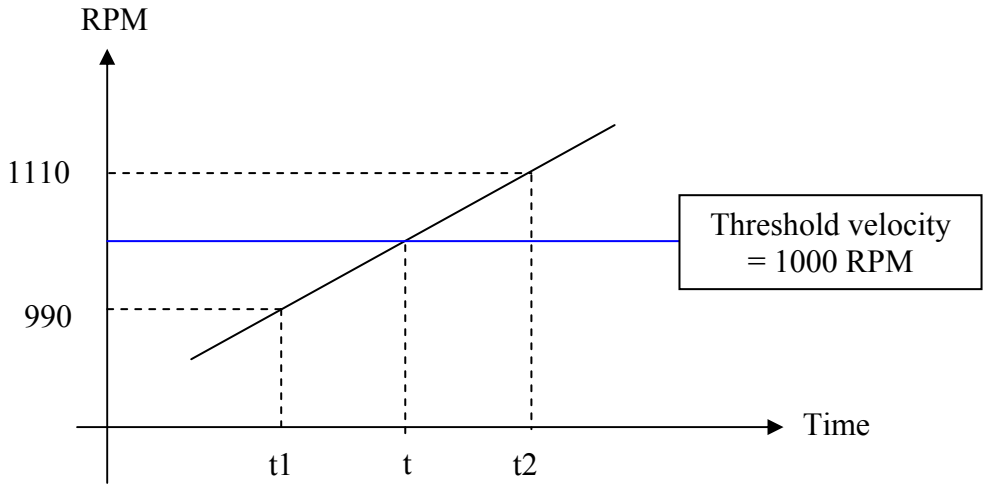


- **Slope**: selects the slope of the tach velocity evolution on which a transition is detected.

Slope	Description
Run up	Events are detected on speed acceleration
Run down	Events are detected on speed deceleration

- **Hystersis**: defines the hystersis around the threshold. The value can be adjusted between 0 and the Max Speed setting of the tach source. If Slope is set to RISE, the velocity must go below Threshold - Hystersis before a new event can be detected. If Slope is set to FALL, the velocity must go above Threshold + Hystersis before a new event can be detected. This setting is used to reject false edges detection following, for example, tach velocity transition.

- **Interpolation**: used for the interpolation of the event date. For example, if Threshold velocity is 1000 RPM and if the tach delivers a revolution at 990 RPM beginning on date t1 and a revolution at 1010 RPM beginning on date t2:
  - if the Interpolation is disabled, the event is detected on date t2
  - if the Interpolation is enabled, the event is detected on date t1 + (t2 - t1) * (1000 - 990) / (1010 - 990)



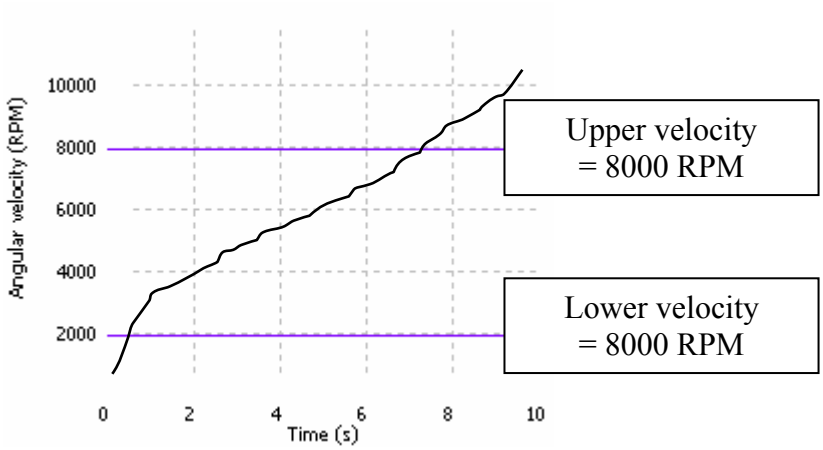
$$\frac{1010-990}{1000-990}=\frac{t2-t1}{t-t1}$$

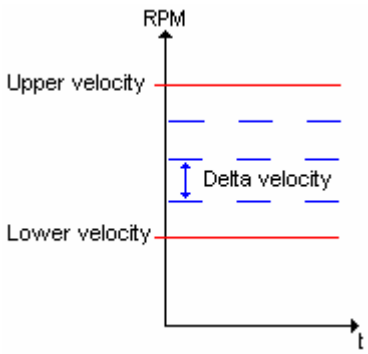
$$t=t1+(t2-t1)\frac{(1000-990)}{(1010-990)}$$

1.4.5.3 Delta RPM

This module is associated with the Tachometer module. It is used to trigger a plug-in by step. This trigger can be applied to any plug-in analyzer including Waterfall and Recorder.

- **Label**: the name of the event (by default Delta RPM n, with 1 <= n <= 2).
- **Source**: selects the tach source. The user can choose any active tach as source of the Delta RPM event.
- **Lower velocity**: the level above which the velocity variation condition is tested for launching the delta RPM event.
- **Upper velocity**: the level below which the velocity variation condition is tested for launching the delta RPM event.
- **Delta velocity**: the variation in velocity that launches the event.





- **Number of events**: the number of events between Upper velocity and Lower velocity (considering Delta velocity).

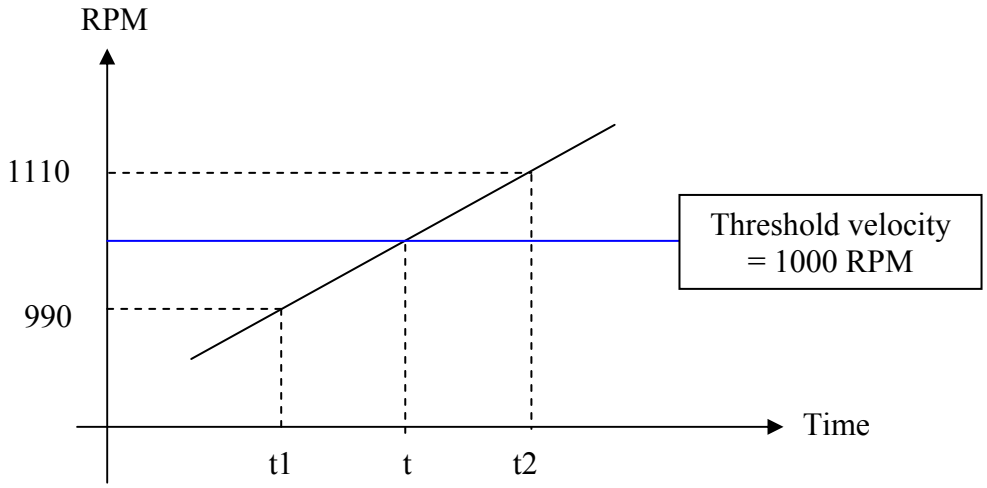
$$Number\ of\ events = \frac{Uppervelocity - Lowervelocity}{Deltavelocity} + 1$$

- **Slope**: selects the slope of the tach velocity evolution on which a transition is detected.

Slope	Description
Run up	Events are detected on speed acceleration
Run down	Events are detected on speed deceleration
First	The first event detected (during rise or fall) determines the slope of this event.
Any	Events are detected on speed acceleration and deceleration.

- **Interpolation**: Used for the interpolation of the event date. For example, if Threshold velocity is 1000 RPM and if the tach delivers a revolution at 990 RPM beginning at the date t1 and a revolution at 1010 RPM beginning on date t2:
  - If the Interpolation is disabled, the event is detected on date t2

- If the interpolation is enabled, the event is detected on date t1 + (t2 - t1) * (1000 - 990) / (1010 - 990)



$$\frac{1010-990}{1000-990}=\frac{t2-t1}{t-t1}$$

$$t=t1+(t2-t1)\frac{(1000-990)}{(1010-990)}$$

1.4.5.4 Level

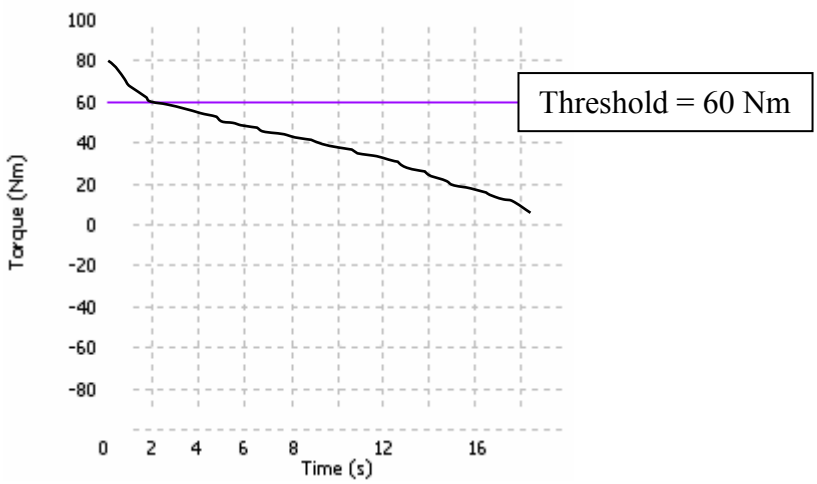
This module is used with DC inputs (optional) and/or associated with the Monitor module. This event can be applied to any plug-in analyzer including Waterfall and Recorder.

- **Label**: the name of the event (by default Level n, with 1 <= n <= 4).
- **Source**: selects a DC input or a Monitor channel as source of the level event.
- **Type**: the type of measurement for level detection.

Type	Description
DC	measurement of the input DC level
Min	measurement of the minimum signed input level
Max	measurement of the maximum signed input level
RMS	measurement of the input RMS level
Skew	measurement of the input skew level
Kurtosis	measurement of the input kurtosis level

Hidden/fixed: The type is fixed to DC if the source is a DC input.

- **Threshold**: The threshold of the level event. The limitation is +/- Range peak of the source for DC, Min and Max types. The limitation is +/- 20 for skew. The value goes from 1 to 250 for kurtosis and from 0 to Range peak of the source for RMS. This setting can be displayed in dB if the measurement type chosen is RMS.



- **Status**:

Status	Description
Above	The event is detected if the measured value is above the threshold.
Under	The event is detected if the measured value is below the threshold.

1.4.5.5 Delta level

This module is used with DC inputs (optional) and/or associated with the Monitor module. It is used to trigger a plug-in by step. This trigger can be applied to any plug-in analyzer including Waterfall and Recorder.

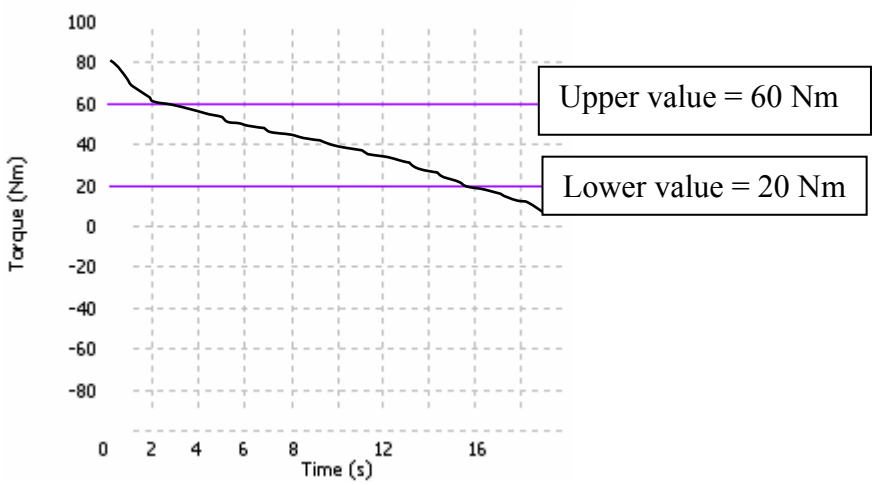
- **Label**: the name of the event (by default Delta n, with 1 <= n <= 4).
- **Source**: selects a DC input or a Monitor channel as source of the level event.
- **Type**: the type of measurement for delta level detection.

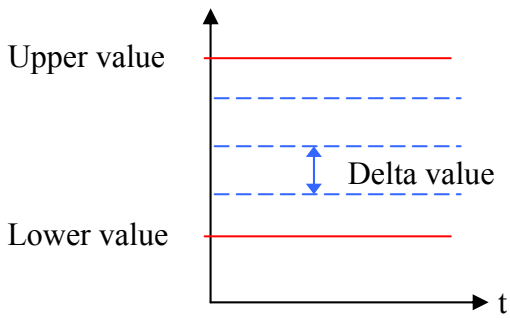
Type	Description
DC	measurement of the input DC level
Min	measurement of the minimum signed input level
Max	measurement of the maximum signed input level
RMS	measurement of the input RMS level
Skew	measurement of the input skew level
Kurtosis	measurement of the input kurtosis level

Hidden/fixed: The type is fixed to DC if the source is a DC input.

- **Lower value**: the lower level of the delta level event. Its minimum value is - Range peak of the source for DC, Min and Max types. It is 0 for RMS, - 20 for skew and 1 for kurtosis. This setting can be displayed in if the measurement type chosen is RMS.

- **Upper value**: the upper level of the delta level event. Its maximum value is Range Peak of the source for DC, Min, Max and RMS types. It is 20 for skew, and 250 for kurtosis. This setting can be displayed in dB if the measurement type chosen is RMS.





- **Delta value**: This setting can be displayed in dB if the measurement type chosen is RMS.
- **Slope**: selects the slope of the level evolution on which a transition is detected.

Slope	Description
Rise	The events are detected on an increasing level
Fall	The events are detected on a decreasing level
First	The first event detected (during rise or fall) determines the slope of this event.
Any	The events are detected on a increasing or decreasing level

1.4.5.6 Periodic

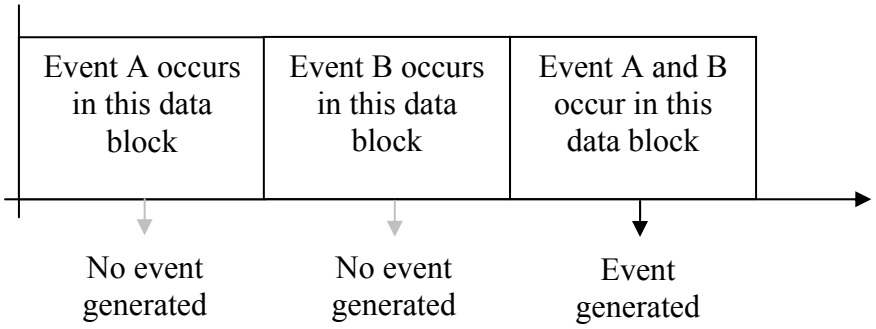
Used to trigger a plug-in by periodic step. This event can be applied to any plug-in analyzer including Waterfall and Recorder.

- **Label**: the name of the event (by default Periodic n, with 1 <= n <= 2).
- **Period**: defines the event generation period. An event is generated every Period second (the first one is generated 1 period after the run). The user can enter a value between 2 ms and 1000000 s.

1.4.5.7 Combined events

Used to combine several trigger events.

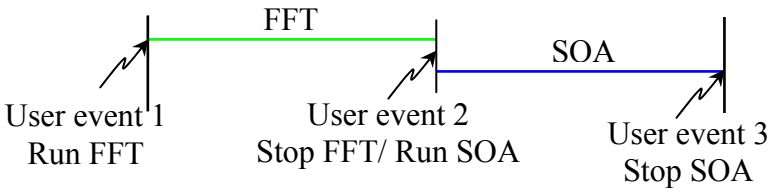
- **Label**: the name of the event (by default Combination n, with 1 <= n <= 2).
- **Event A**: defines the first operand of the combined event. The user can choose any defined event as operand except for a combined event.
- **User**: defines the user used to detect a new event from the two operands, Event A and Event B.

User	Description
A or B	An event is generated when event A or B occurs
A and B	An event is generated when both event A and B occur at the same time (in the same data block) Example: 
A after B	An event is generated when event A occurs after event B.

- **Event B**: defines the second operand of the combined event. The user can choose any defined event as operand except for a combined event.

1.4.5.8 User events

Four user events are available. These events are compatible with the macros. They are particularly useful to run several plug-ins at different time in the same analysis.



- **Label**: allows to rename the event.
- **Trigger**: The user event's triggering.

1.5 Analysis plug-ins

The analysis plug-ins are used to compute the Front-end input signals or the signal provided by the Player.

1.5.1 FFT

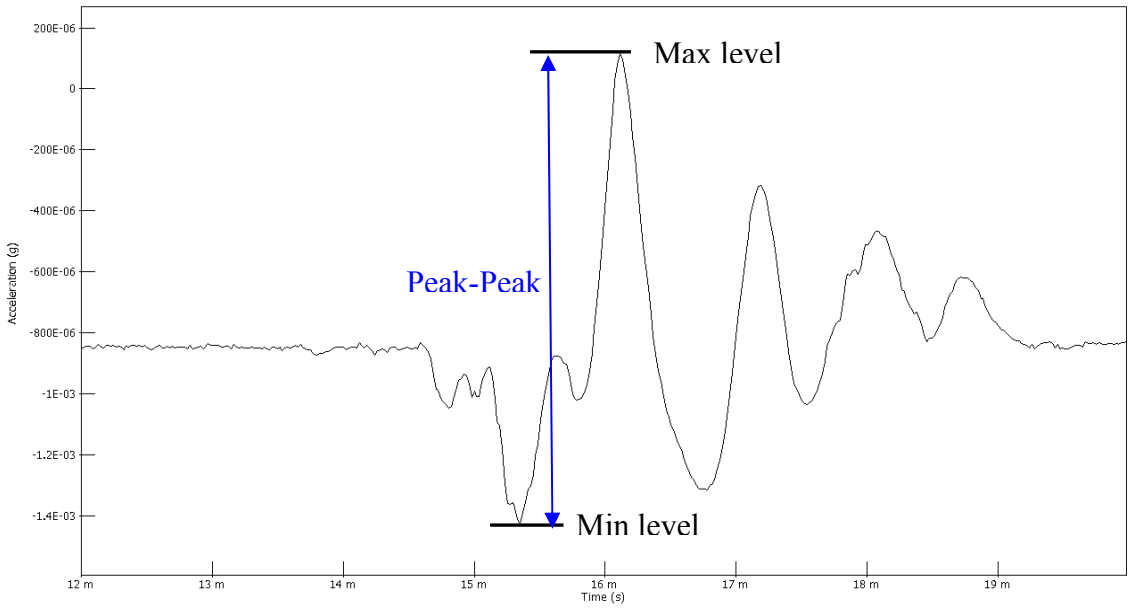
This plug-in is used to compute the input signal FFT (you can also compute time signals in post analysis mode with the Player module).

Available results:
With Resolution being the value of the *FFT x/FFT analysis/Resolution* setting

Type	Size	Dimension	Domain	Save
Filtered signal	256 pt	2D	time	Display only
Triggered block	(Resolution-1)*2,56	2D	time	Yes
Min level	1pt	2D		Yes
Max level	1pt	2D		Yes
Peak	1pt	2D		Yes
Peak-Peak	1pt	2D		Yes
Crest Factor	1pt	2D		Yes
Avg. block	(Resolution-1)*2,56	2D	time	Yes
Weighted block	(Resolution-1)*2,56	2D	time	Yes
Spectrum	Resolution	2D	spectral	Yes
Inst. spectrum	Resolution	2D	spectral	Yes
Avg. spectrum	Resolution	2D	spectral	Yes
Order & Overall	1 pt	1D		Yes
Inst. cross-spectrum	Resolution	2D	spectral	Yes
Avg. cross-spectrum	Resolution	2D	spectral	Yes
FRF H1	Resolution	2D	spectral	Yes
FRF H2	Resolution	2D	spectral	Yes
Coherence	Resolution	2D	spectral	Yes
Order profile	2048 pt max	2D	time	Display only
Zoomed spectrum	Resolution	2D	spectral	Yes
Zoomed avg. spectrum	Resolution	2D	spectral	Yes
Lissajoux	(Resolution-1)*2,56	2D		Yes
Cepstrum	1/((Resolution-1)*2,56)	2D		Yes
Zoomed cross spectrum	Resolution	2D	spectral	Yes
Zoomed avg. cross spectrum	Resolution	2D	spectral	Yes
Zoomed FRF H1	Resolution	2D	spectral	Yes
Zoomed FRF H2	Resolution	2D	spectral	Yes
Zoomed Coherence	Resolution	2D	spectral	Yes
Zoomed Cepstrum		2D		Yes
AutoCorrelation	(Resolution-1)*2,56	2D	time	Yes
CrossCorrelation	(Resolution-1)*2,56	2D	time	Yes
Inst.AutoCorr	(Resolution-1)*2,56	2D	time	Yes
Avg.AutoCorr	(Resolution-1)*2,56	2D	time	Yes
Inst.CrossCorr	(Resolution-1)*2,56	2D	time	Yes
Avg.CrossCorr	(Resolution-1)*2,56	2D	time	Yes

Cepstrum*				
InstCepstrum*				
AvgCepstrum*				
ZommedCepstrum*				
Correlation*				
instCorrelation*				
AvgCorrelation*				
CrossCorrelaion*				
InstCrossCorrelaion*				
AvgCrossCorrelaion*				

- Filtered signal: This result is available if a filter is selected in the FFT x/Channel x/Input filter setting. It displays the input time signal after filtering.
- Triggered block: This displays the signal after being triggered by the event selected with the *FFT x/Trigger/Trigger* setting.



* Results below are calculated from the triggered block results. The refresh & computation rate depend on the PC to analyzer connection availability (non real-time results)

- Min level: displays the maximal value of the signal.
- Max level: displays the minimal value of the signal.
- Peak: displays the absolute value of Min level and Max level.
- Peak-Peak: displays the difference between Min level and max level. Peak-Peak level ≥ 0.

- Crest factor: displays the ratio Peak level/RMS level. Characteristics of the Crest Factor:
  - Crest Factor ≥ 1
  - DC level = 1
  - Crest Factor of sinus = $\sqrt{2}$

- Max level = $\sqrt{N}$

N = number of samples in the triggered block = 2.56*lines number-1

- Avg. block: This result is available if the *FFT x/Average/Domain* setting value is Time. It the time signal block average.
- Weighted block: This result displays the signal after being weighted by the weighting window selected using the *FFT x/Channel x/Weighting window* setting.
- Spectrum: This result is available if the *FFT x/Average/Domain* setting value is Time. It displays the result of the FFT processing after time averaging.
- Inst. spectrum: This result is available if the *FFT x/Average/Domain* setting value is Spectral. It displays the FFT processing results.
- Avg. spectrum: This result is available if the *FFT x/Average/Domain* setting value is Spectral. It displays the instant spectrum average result.
- Order & Overall: It displays the result of the computation of the orders chosen with the *FFT x/Channel x/Tracked order* setting and the Overall level if the *FFT x/Overall Analysis/Band power tracking* is set to On.
- Inst. cross-spectrum: This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the cross spectrum between the 2 channels selected.
- Avg. cross-spectrum: This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the instant cross spectrum average results.
- FRF H1: This result is not available if there is no cell checked in the matrix of the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the Frequency Response Function H1, see Appendix for details.
- FRF H2: This result is not available if there is no cell checked in *FFT x/FFT analysis/Cross spectrum* setting. It displays the Frequency Response Function H2, see Appendix for details.
- Coherence: This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the H1/H2 ratio.
- Order profile: It displays changes in the Order & Overall result.
- AutoCorrelation: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Time.
- CrossCorrelation: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Time. This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix
- Inst. AutoCorr: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Spectral or Frequency synchronous.
- Avg. AutoCorr: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Spectral or Frequency synchronous.

- Inst. CrossCorr: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Spectral or Frequency synchronous. This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix
- Avg. CrossCorr: This result is available if correlation is selected in *the FFT x/Correlation* and *FFT x/Average/Domain* setting value is Spectral or Frequency synchronous. This result is not available if there is no cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix
- Zoomed spectrum: This result is available when the value of the *FFT x/FFT zoom/Factor* setting is different from None. It displays the FFT zoomed signal processing result. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* settings respectively.
- Zoomed avg. spectrum: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None. It displays the zoom spectrum average result. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting respectively.
- Lissajous: This result simultaneously displays the value of the channel chosen on the Y axis and the value of the reference channel on the X axis at the same time.
- Cepstrum: This result is always available. X scale is in quefrency (time equivalent) and Y scale is always in dB.
  Cepstrum analysis can be used as a tool for the detection of periodicity in a spectrum, for examples families of harmonics with uniform spacing.
  A high quefrency represents rapid fluctuations in the spectrum (small frequency spacings) and a low quefrency represents slow changes with quefrency (large frequency spacings). Note that the quefrency does not give information regarding absolute frequency, only about frequency spacings.
- Zoomed cross-spectrum: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None and if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the zoomed cross spectrum between the two channels selected. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting, respectively.
- Zoomed avg. cross-spectrum: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None and if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the zoomed cross spectrum average result. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting, respectively.
- Zoomed FRF H1: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None and if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the zoomed Frequency Response Function H1, see Appendix for details. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting, respectively.

- Zoomed FRF H2: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None and if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the zoomed Frequency Response Function H2, see Appendix for details. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting, respectively.
- Zoomed Coherence: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None and if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. It displays the zoomed H1/H2 ratio results. The minimum and maximum of the X axis are the values of the *FFT x/FFT zoom/Min freq* setting and *FFT x/FFT zoom/Max freq* setting, respectively.
- Zoomed Cepstrum: This result is available when the *FFT x/FFT zoom/Factor value* setting is different from None. It displays the zoomed cepstrum.

Computation SPUs:

Bandwidth	Fdec	Resolution	Envelope	Zoom	SPU/Channel for Real-time	SPU/Channel for non Real-time
20k	1	401	No	No	1	0,5
10k	1	401	No	No	0,5	0,25
Nk	1	401	No	No	=N/20	=N/40
10k	2	401	No	No	1	1
5k	4	401	No	No	0,8	0,6
2k	10	401	No	No	0,6	0,6
1k	20	401	No	No	0,5	0,6
Lower than 1k	Higher than 20	401	No	No	0,5	0,5
20k	1	401 and below	No	No	1	0,5
20k	1	801	No	No	1,25	0,5
20k	1	1601	No	No	1,5	0,5
20k	1	3201	No	No	2	0,5
20k	1	6401	No	No	3	0,5
20k	1	401	No	No	1	0,5
20k	1	401	No	Yes	2	1,5
20k	1	401	No	No	1	0,5
20k	1	401	Yes	Yes	3	3

Where

$$Fdec = \frac{SamplingFrequency/2.56}{FFTBandwidth}$$

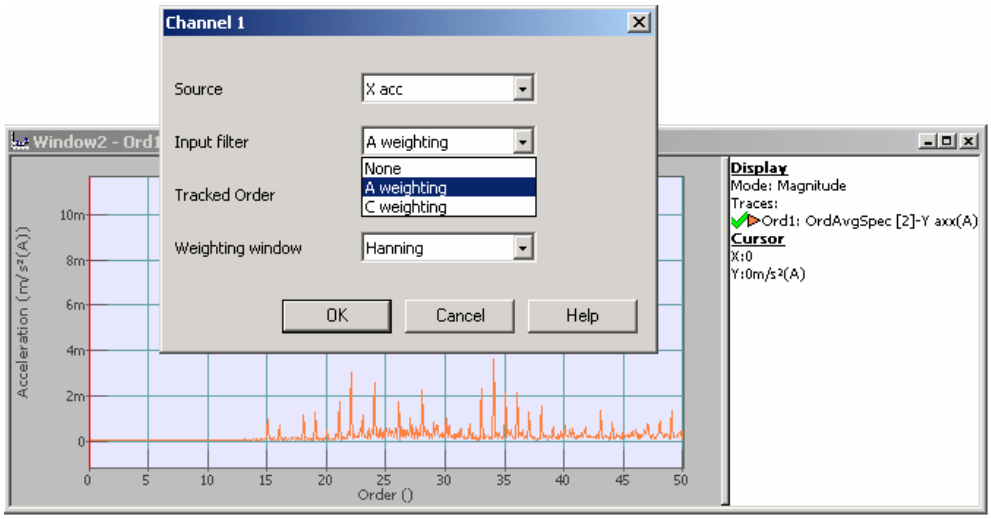
Sampling Frequency: set in *Front-End/Inputs settings/Input sampling*

FFT Bandwidth: set in *FFTx/FFT analysis/range*

1.5.1.1 Channel

Contains the settings related to the source input.

- **Source**: input source to be analyzed. It may come from the input Front-end or from the Player in the post analysis mode (see the post analysis chapter). In the post analysis mode, the tracks with a signal bandwidth lower than the range of the FFT cannot be plugged.
- **Input filter**: filter to be used for filtering the source before analysis. The Filters that are not compatible with the FFT range cannot be selected (see the Filter builder chapter). The A and C weighting on time domain are available in the NVGate® filter list.

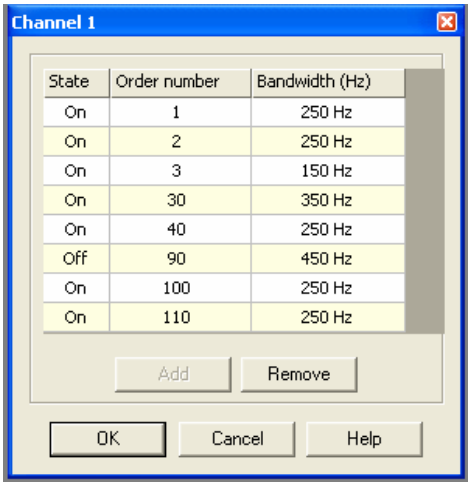


These acoustics filters can be applied as all other NVGate® filters pass/stop band, high/low pass, and integrators.

Note: These weighting on time domain are no longer available for pass band higher than 25.6kHz and lower than 10kHz.

For filter characteristics, see the Appendix.

- **Tracked order**: orders to be tracked with the FFT Constant Band Tracking mode. Up to 8 different orders may be selected for each channel, and there are three settings for each order:
- **State**: ON if you want the order to be computed
- **Order number**: Select the number of the order you want to track, from 0.001 up to 800.
- **Bandwidth**: Select the bandwidth used to compute the energy of the order from *3*FrequencyRange/(NumberOfLine-1)* up to *FrequencyRange* with *FrequencyRange* being the value of the setting Range from the FFT analysis sub-module, and *NumberOfLines* being the value of the Resolution setting from the FFT analysis sub-module.
- **Weighting window**: window used to



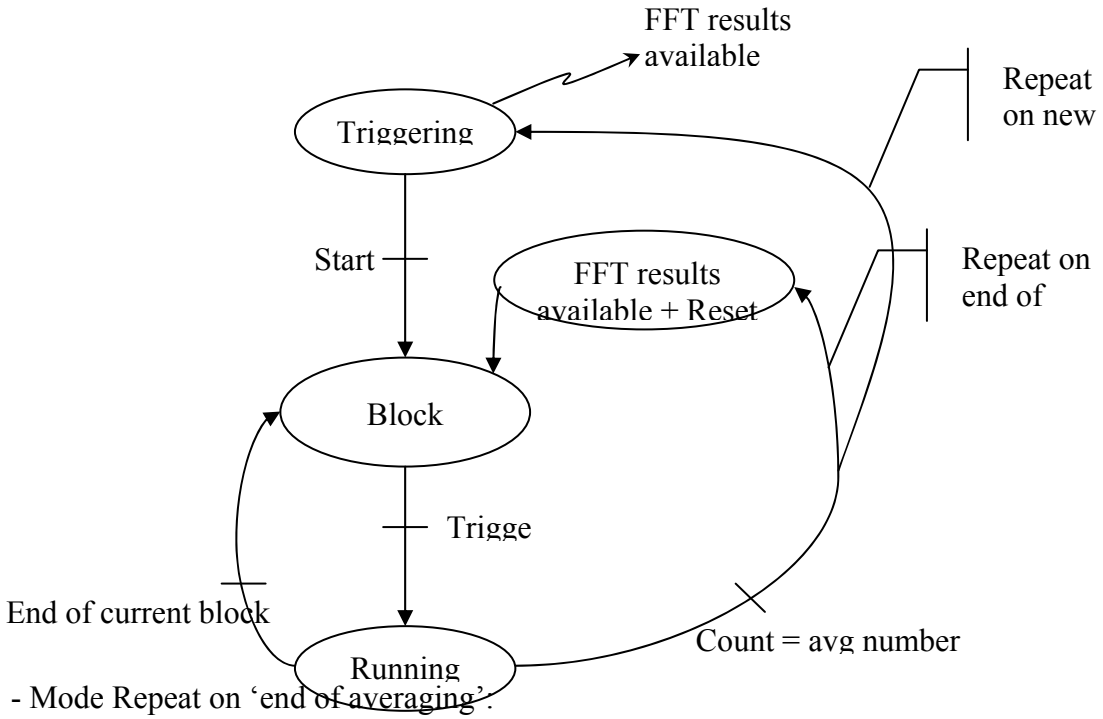
weighting the signal before the processing. There are six set windows: Uniform, Hanning, Hamming, Kaiser Bessel, Flat top, and three customized windows: Force, Response and Dual exp (see the Time Windows chapter). For the window characteristics, see the Appendix.

1.5.1.2 Trigger

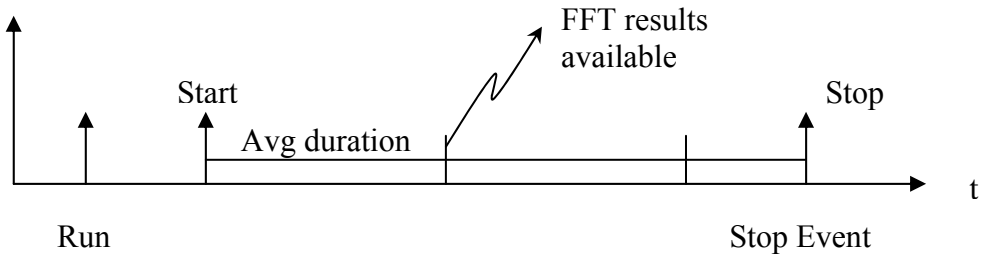
Contains the settings related to trigger events and how to start, and stop signal computation.

- **Start**: defines the event to start the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Start" condition.
- **Stop**: defines the event to stop the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Stop" condition.
- **Trigger**: defines an event to compute the FFT on one block of time signal. After the computation, the plug-in waits for a new event to compute another block.
- **Repeat**: this setting is used to select a condition for the plug-in to be restarted. If an event is selected as a Start event, the option “New start” is available, and when this mode is selected each Start event restarts the plug-in. The “End of averaging” mode is available when the value of the *FFT x/Average/Type* setting is different than “Exponential” mode. This restarts the plug-in when the averaging is finished. For linear average when it is set to "End of averaging", the "Avg duration" gives the periodicity of the average restart. By default the Repeat mode is set to “Off”.

  The following scheme describes the repeat mode for the FFT analysis:

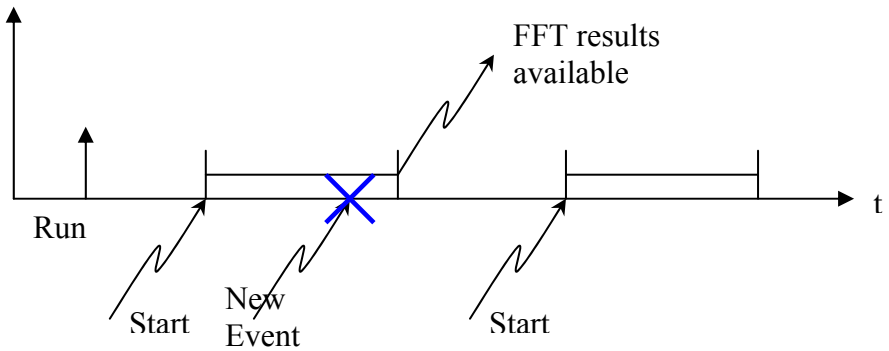


- Mode Repeat on ‘end of averaging’.



The 'Run' corresponds to the start of the analyzer. The start is the beginning of average duration. At the end of the first average, the second average will start and so on till the end of the integration time (even if the last short time integration duration is not over). Each averaging has the same size, except the last that can be smaller.

- Mode Repeat on 'New start':



The 'Run' trigger the analyzer, but the average begins at the start event (set in the event definition). This averaging stops at the end of average duration or at the stop event. Then the next averaging is waiting for the new start event to occur.

In case a new event occurs during a previous averaging, this start event won't be effective because the previous average duration is not over, you can only set other event after the end of the previous one.

- **Start delay**: time delay applied to the time the start event occurs, or block percentage delay.
  The delay in percentage is calculated as:
  Start delay in % = [(Start delay in s) / (Block duration)] * 100
  This value of start delay can be negative and also greater than 100 %.

  Note: some settings (bandwidth, number of lines) are directly linked with the start delay, then by modifying any of these settings the last Start delay modified (time or %) would be fixed, and the other one will be automatically sets regarding modified settings.

- **Accept mode**: used to select the method for rejecting signal blocks.

Mode	**Description**
Normal	All the blocks are accepted
Manual	After the computation of each block, the plug-in is in the Waiting mode and waits for the user to push the accept

	or reject button
Overload rejection	Blocks with an overload are automatically rejected

- **Trigger Frequency:** Adjust the synchronous frequency (for Frequency Domain Synchronous Analysis).
  Hidden/fixed: The Trigger frequency is enabled when FFTx/Average/Domain is set to Frequency Synchronous.

1.5.1.3 Average

Contains the settings related to the type of averaging of the signals to be computed.

- **Domain**: You can choose between Spectral, Time or Frequency Synchronous.

Domain	Description
Spectral	Calculates the average after FFT processing,
Time	Calculates the average before FFT processing.
Frequency Synchronous	Frequency domain Synchronous averaging (FDSA) uses one frequency band as the phase reference, and each FFT block is recomputed so that the phase of the frequency chosen with the *FFT x/FFT analysis/Trigger Frequency* setting is 0. Enables the Trigger frequency setting to be adjusted from *FFTx/Trigger/Trigger frequency*.

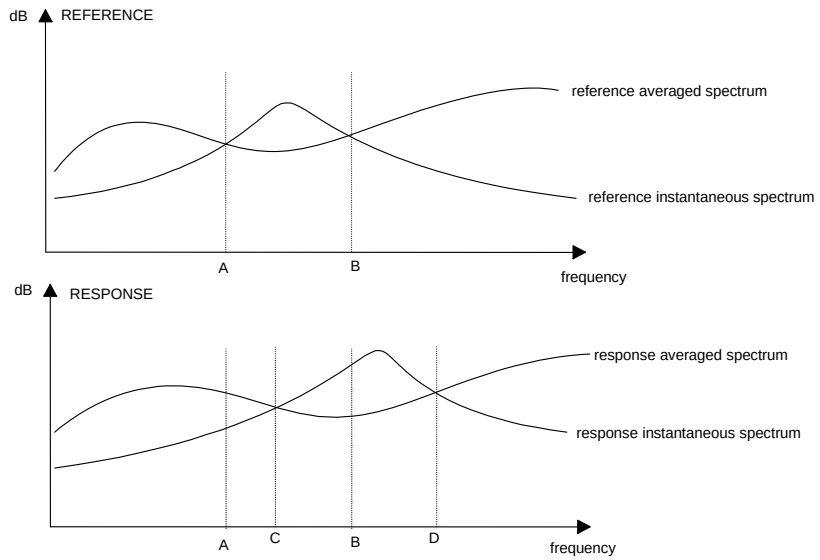
- **Size**: The number of signal blocks used to compute the average, from 1 up to 1000000000.
- **Duration**: The duration of the signal used to compute the average. This depends on four other settings: Size from the same sub-module, and Range Overlap and Resolution from the FFT Analysis sub-module. BlockDuration = (NumberOfLines-1)/FrequencyRange

  Duration = BlockDuration * (Size - (Size-1)*Overlap)

  With BlockDuration being the duration of one block of signal, NumberOfLines being the value of the setting Resolution from the FFT analysis sub-module, FrequencyRange being the value of the setting Range from the FFT analysis sub-module, Size being the value of the setting Size from the same sub-module and Overlap being the value of the setting Overlap from the FFT analysis sub-module.
  The average duration disappears when the trigger of the FFT is changed from “Free Run” to a different trigger (Manual, Ext.Sync., Delta RPM,…) as the elapsed time between two triggering is not predictable anymore.”

- **Type**: The method of averaging the signal. There are four different averaging modes: Linear, Exponential, Peak hold, and Referenced Peak hold.

Type	Description
Linear	Linear averaging of results is carried out on the value of the Size setting from the same sub-module. The FFT plug-in automatically stops when the

	given number of averages is reached.
Exponential	In this mode of computation, each new average is obtained by adding its previous value and the new FFT result divided by the value of the Size setting, and then subtracting its previous value divided by the value of the Size setting.
Peak hold	This method processes the peaks found in their spectrum power density for each channel, and for a number of FFT analysis given by the value of the Size setting. The FFT plug-in automatically stops when a given number of averages is reached. For each frequency line, each time the value of the instantaneous spectrum is greater than the value of the averaged spectrum, the averaged spectrum value becomes equal to the instantaneous spectrum value. Otherwise, the average spectrum value is not modified. Note: in this case averaged spectrum doesn't mean average value but hold value.
Referenced Peak hold	 This method processes the peaks found in their spectrum power density for each channel, and for a number of FFT analyses determined by the size setting. The FFT plug-in automatically stops when a given number of averages is reached. When this mode is selected, a new setting called Reference channel appears in the same sub-module; if None is selected, the average processing is the same as the Peak hold mode. If a channel is selected, then there are two different behaviors depending on the channel: For the reference channel: For each frequency line, each time the value of the instantaneous spectrum is greater than the value of the average spectrum, the average spectrum value is equal to the instantaneous spectrum value. Otherwise, the average reference spectrum value is not modified. For the other channels: For each frequency line, for each modification of the average reference spectrum, the average channel spectrum is equal to the instantaneous channel spectrum values, even if it is less than the average spectrum value. The modification of the reference and the other channels is synchronized. In this example, the modified spectrum lines are between **A** and **B** for both

	reference channel and response channel. The spectrum lines between **B** and **D** in the response channel are not updated. The modification of the reference and response channels is synchronized Each time the peak value of the reference channel has been modified, the **averaged cross spectrum** is equal to the instantaneous reference spectrum by the response spectrum product. In this example, the modified spectrum lines are between **A** and **B**. The functions as transfer function (where the reference channel is taken into account) will be modified between **A** and **B**.

Hidden/fixed: Peak hold and Referenced Peak hold are only available if the Domain setting from the same sub-module is set to Spectral.

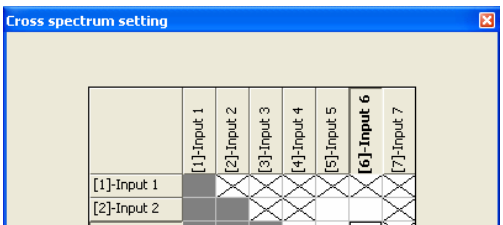
- **Reference channel**: channel to be used as a reference in the Referenced Peak hold averaging mode. This setting is only available when this averaging mode is selected. You can choose between the channels that are plugged into the FFT plug-in, if 'None' is selected the average processing is the same as the Peak hold mode.

1.5.1.4 FFT analysis

Contains the settings related to the type of analysis of the signals to be computed.

- **Range**: the FFT plug-in frequency range. The analyzer sampling frequency divided by 2.56 limits this range, and the minimum is obtained by dividing this limit by 50000. For example, if the analyzer sampling frequency is 51,2kS/s, then the max range is 20 kHz and the min is 400mHz. In post analysis mode, the Max Bandwidth setting from the Player plug-in provides the analyzer sampling frequency by multiplying the value by 2.56 (ex: if max bandwidth = 20 kHz then the analyzer sampling frequency is 51.2kS/s), otherwise, the analyzer sampling frequency is provided by the input sampling setting from the Front end plug-in input setting sub-module.
- **Frequency Span:** This is a fixed setting, for information only. It displays the frequency span between two points of a spectral result. The FFT frequency span is obtained by dividing the FFT frequency range by the resolution minus 1. For example if the FFT Range is 20kHz and the resolution is 401 lines, then the frequency span is: 20000 / (401 - 1) = 20000 / 400 = 50Hz.
- **Overlap**: Defines the amount of overlap of input signals between two successive FFT computations, from 0% to 99.99%.
- **Resolution**: The FFT resolution. There are seven possible resolutions: 101, 201, 401, 801, 1601, 3201 or 6401 lines. The FFT frequency span is obtained by dividing the FFT frequency range by the resolution minus 1. For example if the FFT Range is 20kHz and the resolution is 401 lines, then the frequency span is: 20000 / (401 - 1) = 20000 / 400 = 50Hz.
- **Trigger Frequency:** This setting is only available when the *FFT x/Average/Domain* setting is "Synchronous". The value can be chosen from the FFT Frequency range; this frequency is the phase reference: each FFT block is recomputed so that the phase of the frequency chosen is 0.

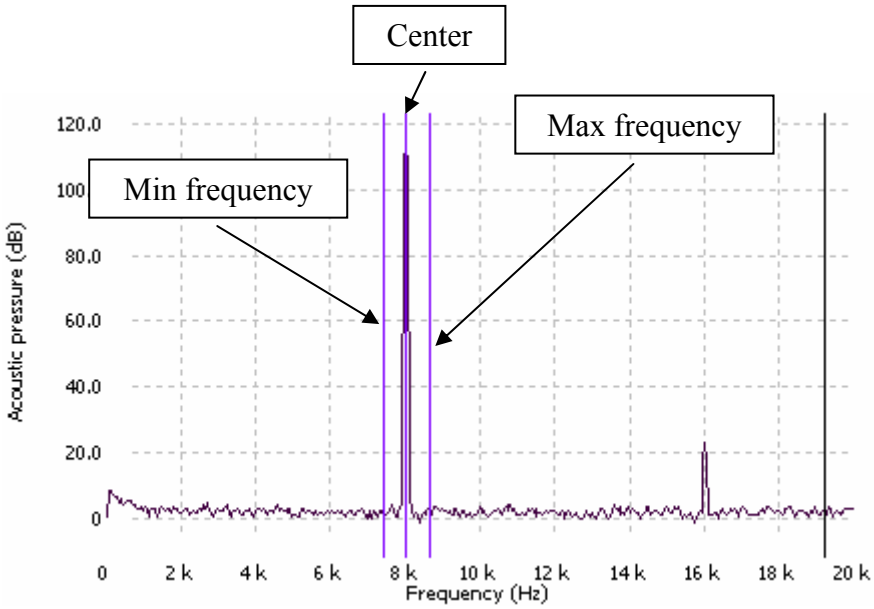
- **Cross spectrum**: Matrix used for the selection of the computed cross spectra,



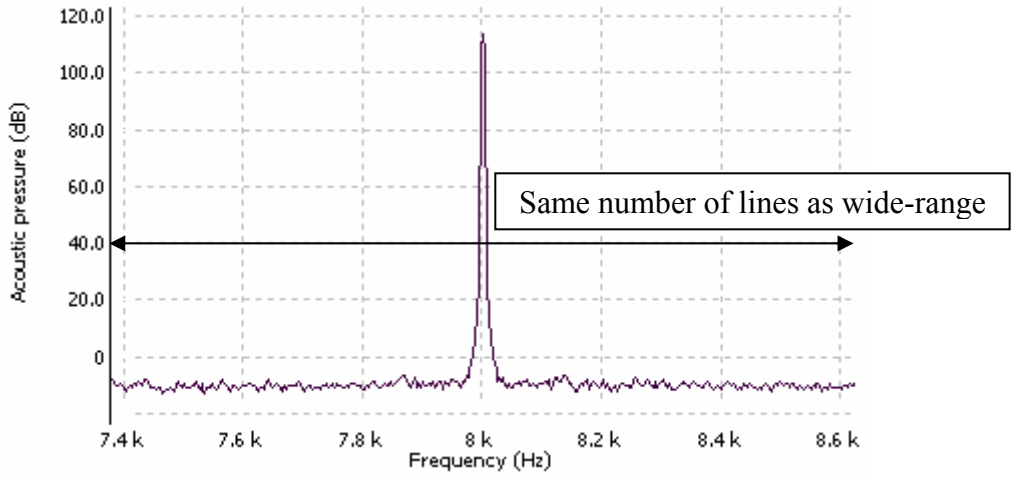
Only the upper half of the matrix can be used, because when a box is checked, two cross spectra are computed with each of both channels being the reference. Selecting the cross spectra is necessary to have access to some results: instant cross spectrum, average cross spectrum, FRF H1, FRF H2 and coherence.

1.5.1.5 FFT zoom

Unlike the display zoom function; the analysis zoom function allows you to zoom into a selected bandwidth increasing the analysis resolution.
Wide-range average spectrum:



Zoomed average spectrum:



- **Factor**: Switch the FFT zoom on or off depending on its value. If the value is "None" there is no zoom result available. There are seven possible factors: x2, x4, x8, x16, x32, x64, x128. The value stands for the dividing factor to be used to obtain the frequency span of the zoom results. For example, if the FFT

resolution is 401 lines and the Frequency range is 20kHz then the frequency span is 50Hz. If the zoom is activated with a x4 factor, the frequency span of the zoom results is 50 / 4 = 12,5Hz. The zoom results are Zoomed Spectrum, Zoomed Average Spectrum, and Zoomed cross spectrum, Zoomed Avrg cross spectrum, Zoomed FRF H1, Zoomed FRF H2, Zoomed Triggered Block and Zoomed Coherence if there is at least one cell checked in the *FFT x/FFT analysis/Cross spectrum* matrix. These results are available when the Factor is different from the None value.

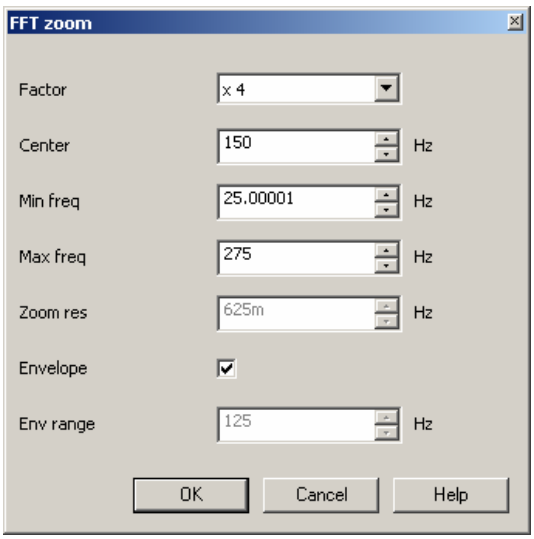
- **Center**: The center frequency of the zoom. The value can be set directly, or automatically by changing the Min Frequency or the Max frequency settings.
- **Min freq**: The minimum frequency of the zoom. The value can be set directly, or automatically by changing the Center or Factor settings to match them.
- **Max freq**: The maximum frequency of the zoom. The value can be set directly, or automatically by changing the Center or the Factor settings to match them.

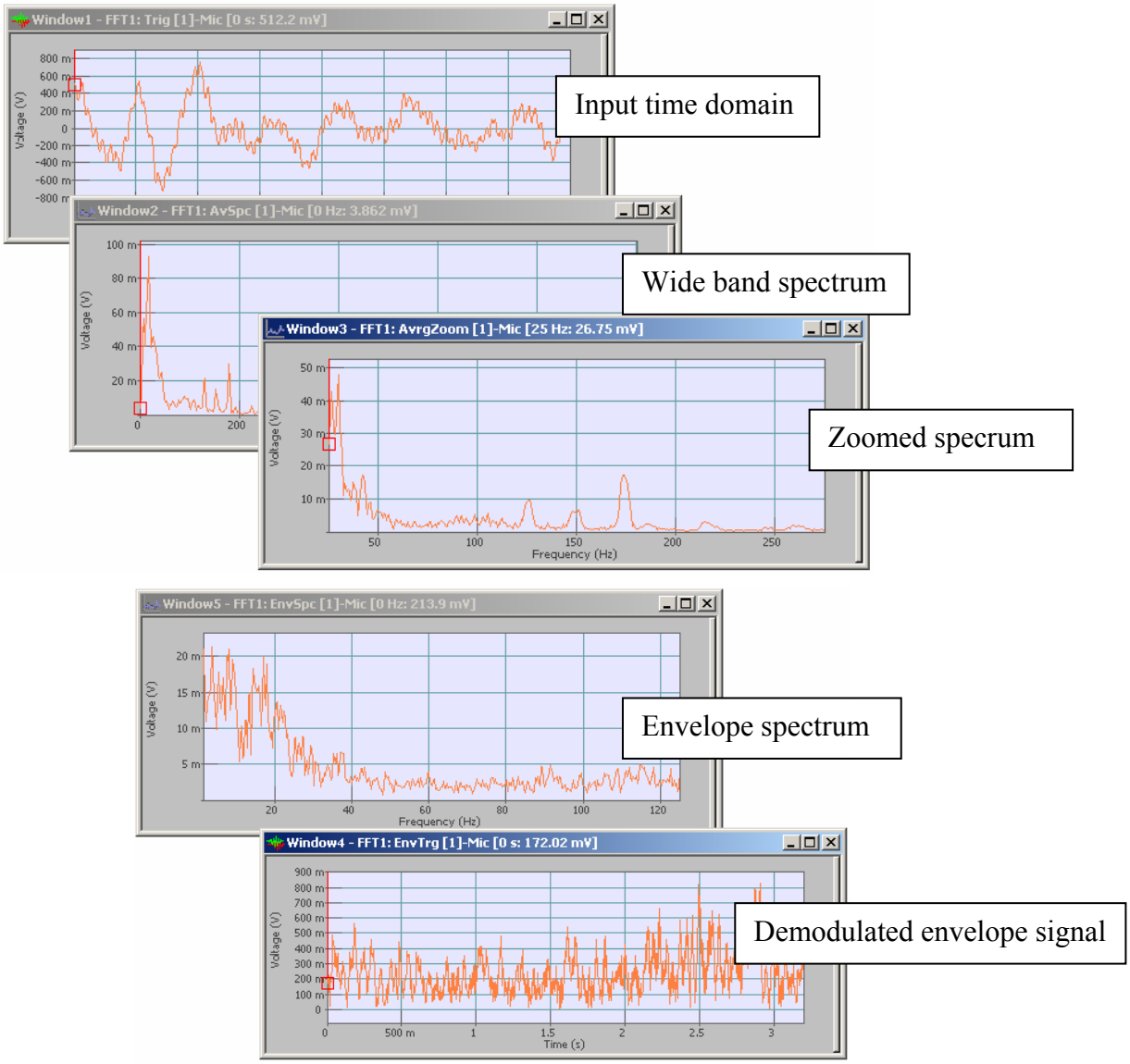
Note: These zoom settings are working as following:

- Set **Factor** and **Center** (min and max values are update automatically with the center frequency) if the zoom would be done around a central frequency well defined. By modifying Factor, max and min frequencies will be automatically set to define zoom limits.
- Set **max** and **min** frequencies (center and factor are update automatically) if the limits in frequency would be fixed on specific values.

- **Envelope**: FFT plug-in integrates as a standard an amplitude demodulation analysis that provides envelope results. Even demodulated time domain signal and envelope spectra can be handled for real time display, result saving and report generation.

Envelope demodulation is linked to the FFT zoom activation. When FFT zoom is different from none, the envelope demodulation can be activated through a simple click.
Then the envelope limits (range, modulating, frequency) are set by the zoom settings. It is then possible to get simultaneously the entire spectral and time information with the following displays:

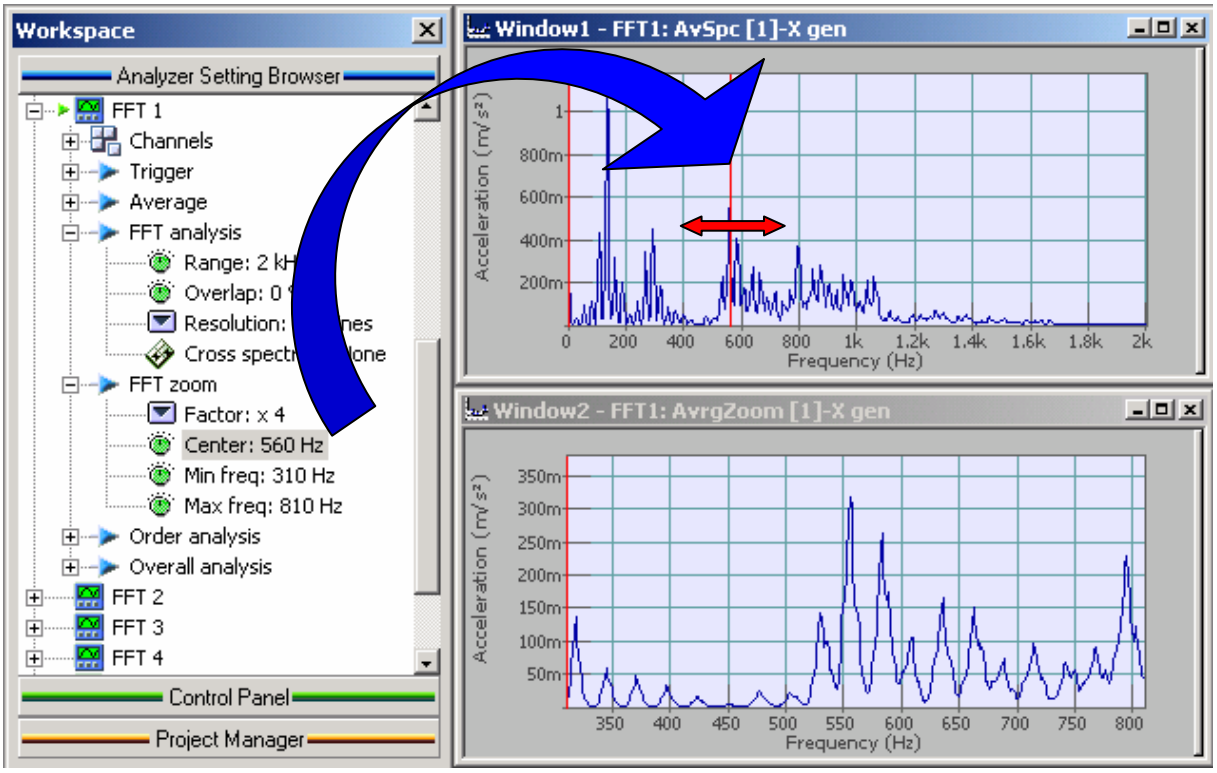




Hidden/fixed: The envelope is available only if the zoom is active.

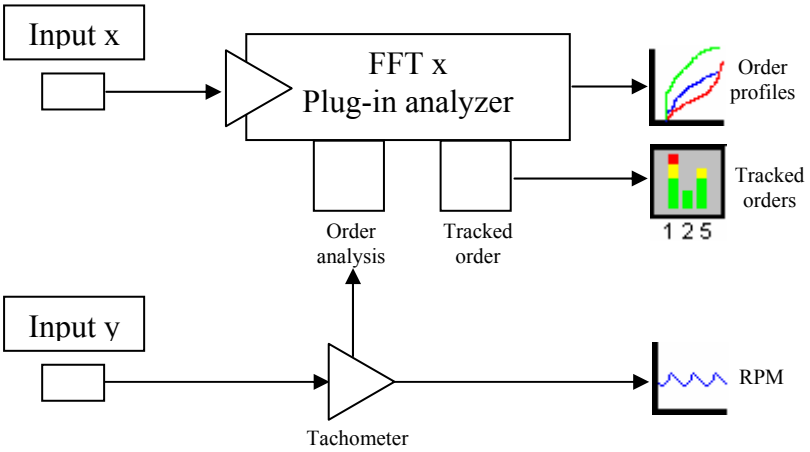
Note: All frequency setting, such as FFT zoom boundaries, start and stop sweep sine, filter limits, etc… can be directly controlled from a display. This is easily achieved by drag and drops the corresponding setting inside a compatible (with X-axis as frequency) graph.

As an example (see fig below) you can easily focus on spectra area using the zoom center setting as a cursor in the wideband FFT spectra. Then it is efficient to move the center of the FFT zoom from one peak to the order as a cursor. In cab also be useful to control pass-band filter limits, directly from the corresponding spectra. Try it when you use the monitor filter scalar values.



1.5.1.6 Order analysis

Contains the settings related to constant band tracking operations.



- **Associated tach**: The selected Tach enables the FFT plug-in to perform Constant Band Tracking.

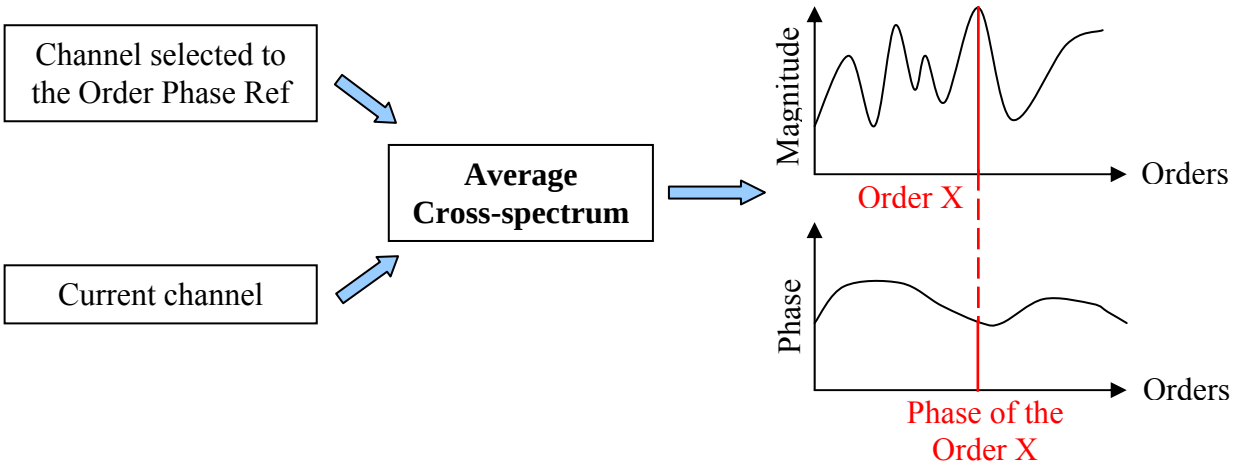
  Warning: Do not select an associated tach if you do not use one, the FFT will not start.

- **Center on peak**: This setting is used to center the spectral lines used to compute the total power around a peak (if it exists) close to the order frequency.

- **Refresh mode**: When displaying some order profile results, this setting is used to choose between two methods of adding a new measurement point to the curve.

Mode	Description
Delta time	A new point is added periodically. The Time Resolution settings set the refreshing period.
Delta RPM	A new point is added each time the Tach speed has increased the Speed Resolution setting value.

- **Duration profile**: The size of the profile window time axis.
- **Time resolution**: used to set the refreshing period for the order profile results. This setting is visible if the Refresh Mode setting value is Delta time.
- **Max speed**: The Max speed that the Tach selected with the Associated Tach setting can handle. This value is for information only; it cannot be set directly. This setting is visible if the Refresh Mode setting value is Delta RPM.
- **Min speed**: The Min speed that the Tach selected with the Associated Tach setting can handle. This value is for information only; it cannot be set directly. This setting is visible if the Refresh Mode setting value is Delta RPM.
- **Speed resolution**: used to set the refreshing conditions for the order profile results. A new point is added each time the Tach speed has increased of the setting value. This setting is visible if the Refresh Mode setting value is Delta RPM.
- **Orders Phase ref**: This function allows to use the cross-spectrum phase value for the phase of the order (relative phase). The cross-spectrum phase is the relative phase between the input signal of the current channel and the reference input signal associated to this channel. Whatever the average mode, the average cross-spectrum is always used to calculate the orders phase.



- No activated: The phase of the order is the spectrum phase of the frequency corresponding to the order value (absolute phase). If the average mode is spectral, the inst-spectrum is used and if the average mode is time, the average spectrum is used.

- Activated: choose the channel used to calculate the orders phase.
If a channel is selected, the cross-spectrum matrix is not available anymore.

Note: This set up don't change the spectrum phases and consequently don't change the orders phases extracted from a waterfall of spectra.

1.5.1.7 Correlation

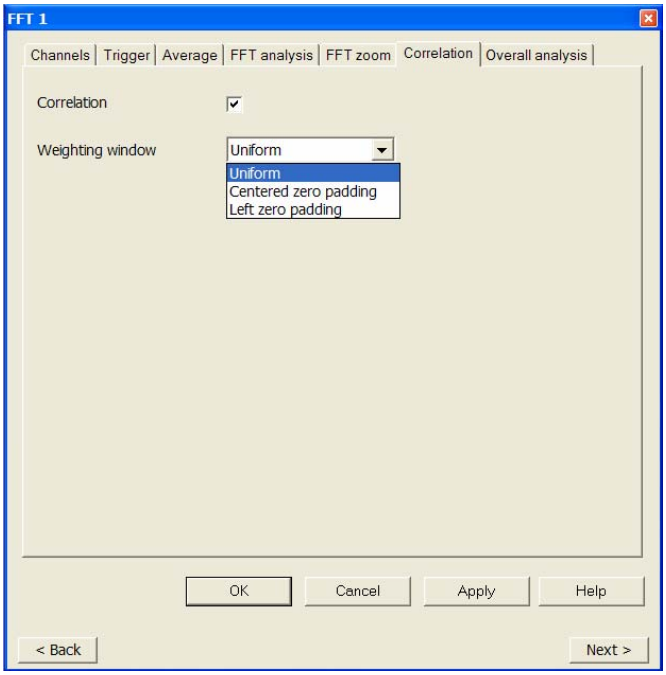
Calculation of the Auto Correlation and the Cross Correlation.

The cross-correlation function $\Re xy(\tau)$ gives a measure of the extent to which two signals correlate with each other as a function of the time displacement τ between them.

$$\Re xy(\tau) = y(\tau) \otimes x(-\tau)$$

Where: τ is the time displacement
$\otimes$ is the convolution symbol

The auto-correlation is a special case where $x(\tau) = y(\tau)$.



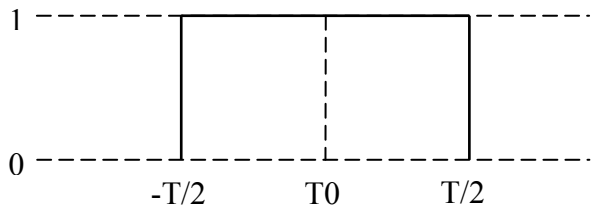
- **Correlation:** Allows to activate or not the calculation of the correlation.

All results of the correlation are in the time domain with –T/2 et T/2 where T equal to the duration of the block trigger of the FFT.

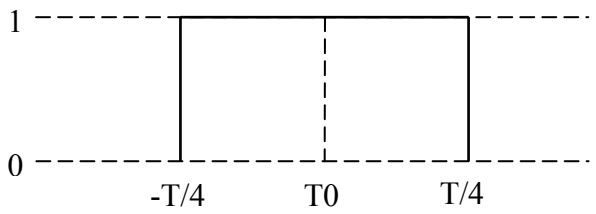
- **Weighting window:** Choose between following values of this setting:

Three types of correlation window are available:

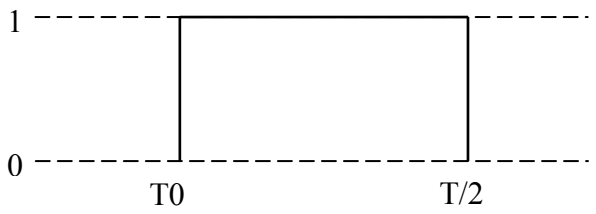
Uniform [-T/2, T/2] (where T is the trigger block length): All the window coefficients are equal to 1. For best results with the Uniform weight window, you should use signal sources that are self-windowing, such as transients, burst, and periodic waveforms (signal period must be a multiple of the weight window length). In order to have the trigger point (T0) at the center of the time trigger block, the trigger Delay must be set to –T/2**.**



Centered Zero Padding [-T/4, T/4] (where T is the trigger block length): Only the central part of the window (representing the half-length) is not null. This weight window must be used with random noise. In order to have the trigger point (T0) at the center of the time trigger block, **the trigger Delay must be set to –T/4** (where T is the trigger block length)



Left Zero Padding [0, T/2] (where T is the trigger block length): Only the first half of the window is not null. This weight window must be used with random noise. In order to have the trigger point (T0) at the beginning of the time trigger block, **the trigger Delay must be set to 0.**



If the correlation is activated then all results of the FFT will be affected by the weighting windows of the correlation. When the setting Correlation is deactivated the weighting windows by default (Hanning) is applied on all inputs of the FFT plug-in.

Notes: Results from the correlation are normalized.

Considerations to obtain good results when making correlation measurement.

- Use input **AC** coupling. Both auto correlation and cross correlation are disturbed by DC offset in the input signal.
- Use appropriate trigger mode and trigger delay. The trigger mode should be different from free run. The trigger Delay must be set to –T/2 (where T is the time signal block length) with the Uniform and Centered Zero Padding correlation weighted window (and 0 for the Left Zero Padding window). But in some cases, especially with the Centered Zero Padding and Left Zero Padding window (as these function types attenuate parts of the trigger signal block), the trigger Delay must be adjusted to position the input signal with respect to time.

1.5.1.8 Overall analysis

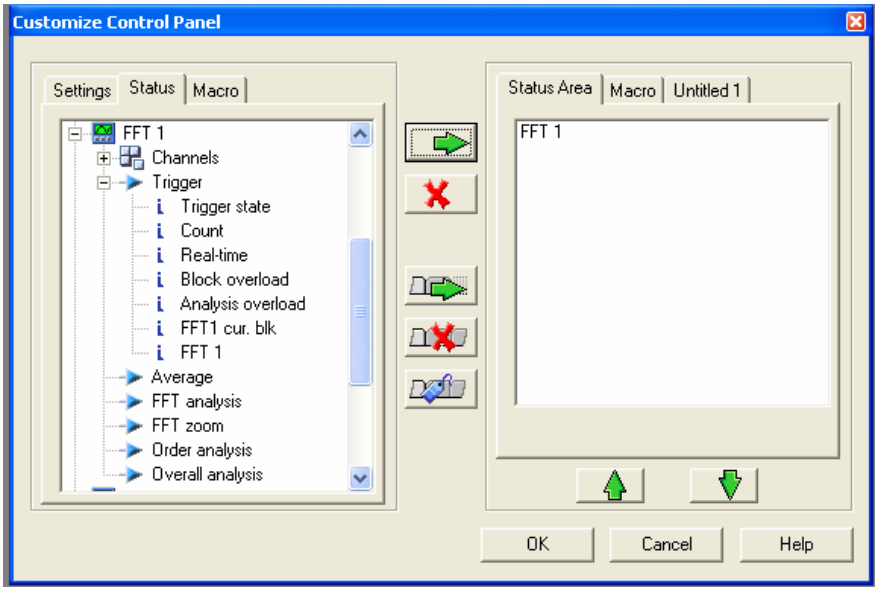
Calculation of the FFT bands sum.

- **Band power tracking**: Switches computation of the overall level result on or off.

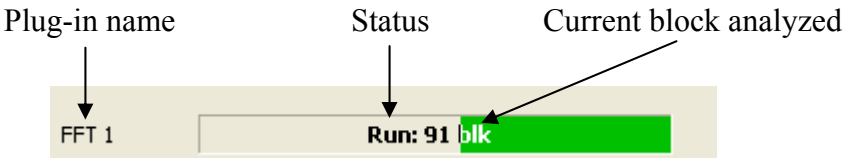
- **Lower frequency**: Specifies the lower frequency of the overall computation frequency range.
- **Upper frequency**: Specifies the upper frequency of the overall computation frequency range.

1.5.1.9 FFT status

All statuses are available for the control panel. Statuses are refreshed all the time at roughly 10 Hz.



FFT x



The current plug-in status is synthesized in a special progress-bar. This progress bar is automatically displayed in the 'control panel' when the plug-in is active (i.e. as soon as at least 1 input is connected to the FFT plug-in). This status is called 'FFTx' (x from 1 to 4) and it is available in the status ASB tree (see customize control panel).
This status displays the averaging count (i.e. current analyzed block number), the plug-in state and the real-time status.

- **State**: block number analyzed
- **Run:** The FFT plug-in is computing spectra and averaging it.
- **Stop:** The FFT plug-in is stopped.
- **Trig:** The FFT plug-in is waiting for next block; i.e. next trigger event (block triggering) or first start event (triggering)
- **Pause:** The FFT plug-in averaging is paused
- **Waiting:** The FFT plug-in averaging is waiting for the acquisition to be accepted or rejected (in structural mode).

Notes: in exponential averaging mode the average counts stops increasing as soon as the set value is reached.

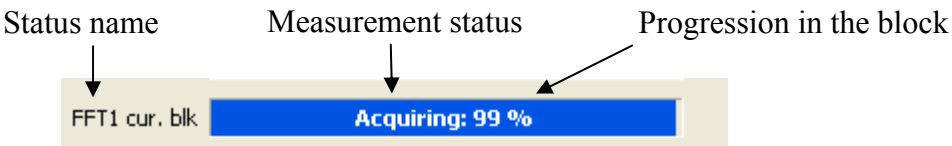
The way the status bar is displayed, depends on the type of averaging selected:

- **'Linear'**, **'Peak hold'** or **'Ref peak hold':** the progress bar is filled from left to right.
- **'Exponential'**: the progress bar is filled from right to left with a flashing until the end of the acquisition.

The color of the background bar and of the text depends on real-time status:

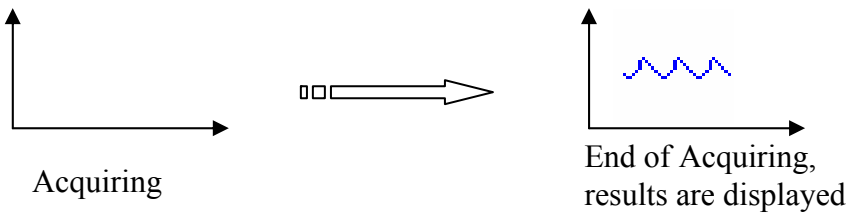
- *Green background and white or black text*: acquisition in real-time.
- *Red background and white or black text*: the current acquisition is not real-time (current block is not analyzed).
- *Green background and red text*: the current acquisition is real-time, but since start not all the blocks were analyzed.

FFTx cur. Blk



This status displays if the measurement has been triggered (for long time acquisition) and the progression in the block.

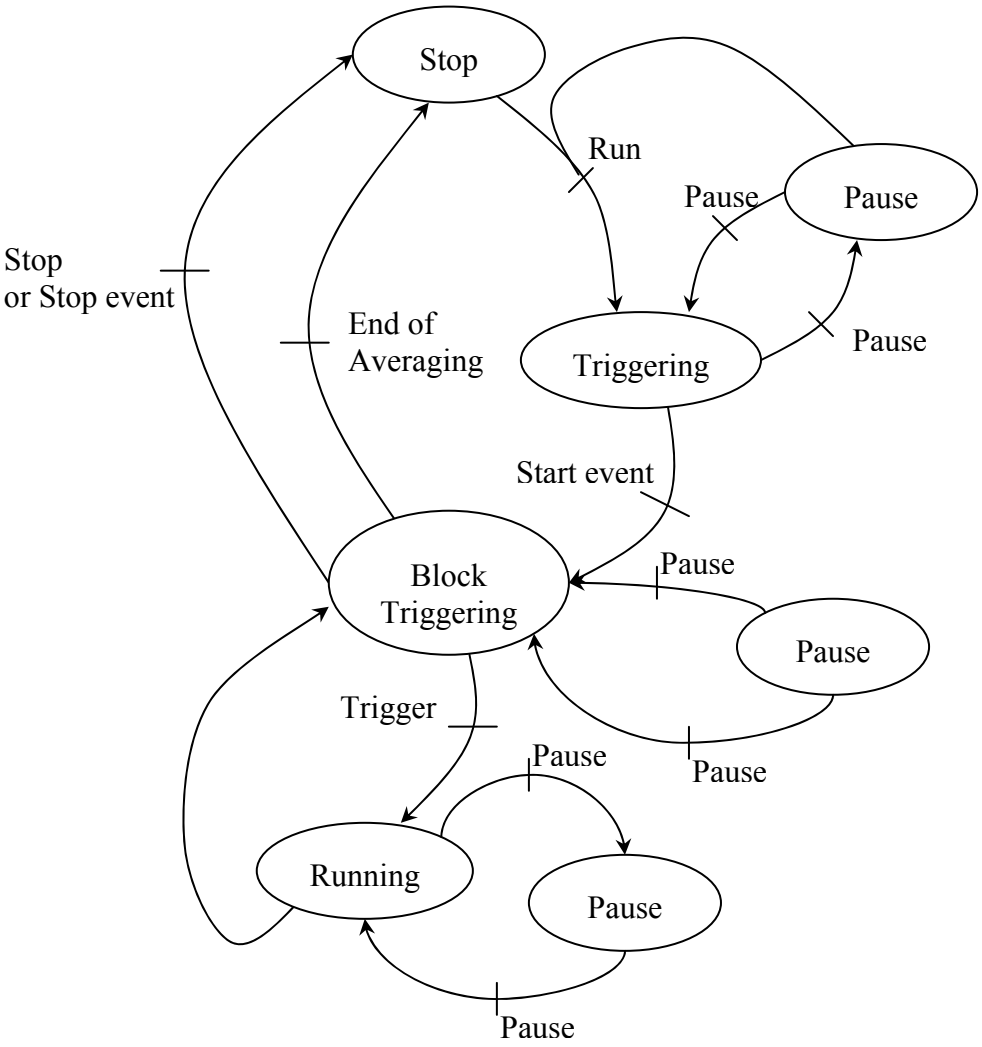
- Triggering: displays the state of the triggering in percentage before acquiring.
- Acquiring: displays the progression of the time block acquisition in percentage. Until the acquiring period is not finished, the corresponding results are not available; they will be displayed at the end of the acquisition.



- Paused: the acquisition is paused
- Stop: the acquisition is stopped

Trigger State

The following scheme describes the basic statuses evolution of the FFT measurement:



By default the trigger state is on ‘Stop’ and waiting for a ‘Run’ (start or trigger). Then the state become ‘Triggering’ and is waiting for a start event, the states become ‘Block Triggering’ and is now waiting for a trigger event for being in the ‘Running state. If there is less than one second elapsed since the end of current block analysis, FFT status stay at “running” state.
The status is ‘Stop’ after a stop event or at the end of averaging.
In structural mode, a state ‘Waiting’ is available and is waiting for the ‘Accept/Reject’ event to continue.

Count

This status displays the averaging count processed. This status is expressed in analyzed block.

Real-time

This status displays if the averaging is in real-time or not (i.e. the current block is analyzed or not). If the corresponding signal were not available at this time, the acquisition is not real-time. That means that the treatment is longer than the acquisition. There are three values for this state:

- **'OK'**: The acquisition is real-time (all block have been processed and averaged)
- **'No'**: Acquisition was not real-time (some previous blocks are missing in the average).
- **'-'**: The acquisition is currently not real-time (current block is not analyzed an averaged).

Block overload

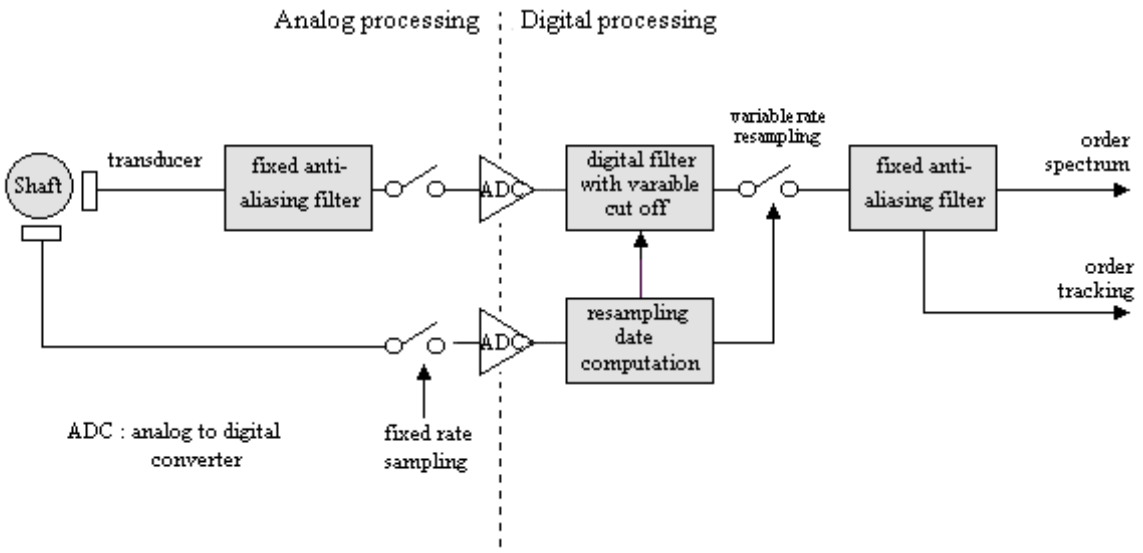
This status corresponds to the instantaneous overload indication within 1 FFT trigger block, for instance amplitude overload occurred in the current analyzed block. It is useful in structural mode if for one hammer impact one channel is overloaded. Note that overloaded block may be automatically rejected (see accept mode).

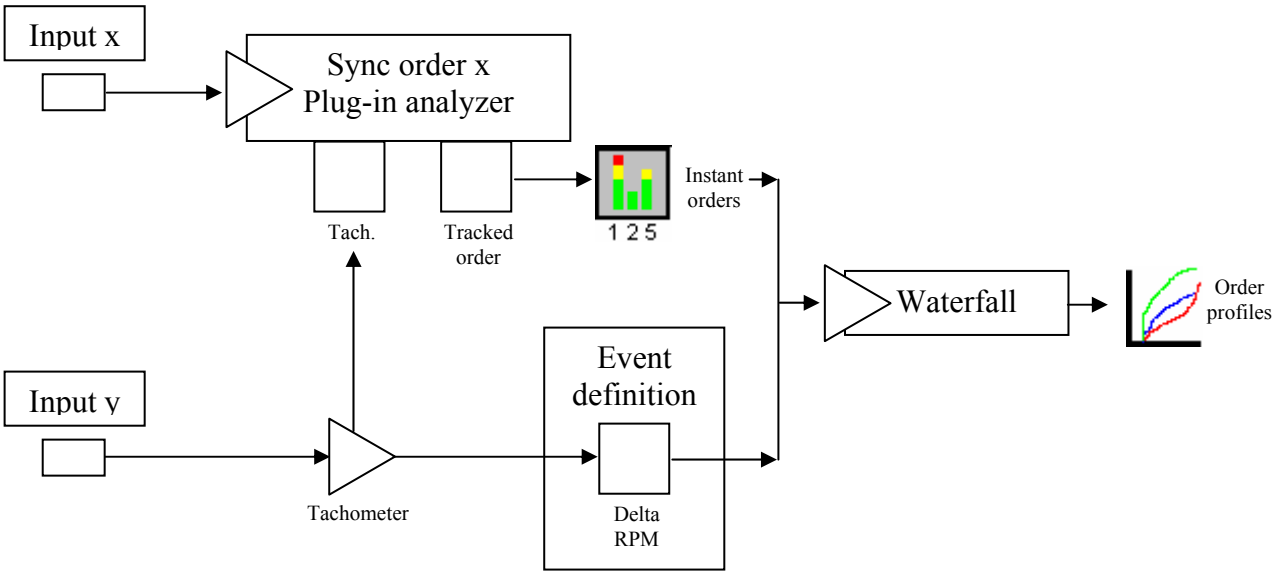
Analysis overload

This status corresponds to overload indication over the measurement period. It means that during the whole measurement period there was (or not) an overload. It memorizes block overloaded.

1.5.2 Synch order

This plug-in is used to perform synchronous order tracking (it is also used to compute time signals in post analysis mode with the Player module).





Available results:
With Resolution being the value of the *Synch. order x/Order FFT /Resolution* setting

Type	**Size**	**Dimension**	**Domain**	**Save**
Filtered signal	256 pt	2D	time	Yes
Triggered block	(Resolution-1)*2.56	2D	sampling angle(rev)	Yes
Avg. block	(Resolution-1)*2.56	2D	sampling angle(rev)	Yes
Weighted block	(Resolution-1)*2.56	2D	sampling angle(rev)	Yes
Order spectrum	Resolution	2D	order	Yes
Order inst. spectrum	Resolution	2D	order	Yes
Order avg. spectrum	Resolution	2D	order	Yes
Order & Overall	1 pt	1D		Yes

- Filtered signal: This result is available if a filter is selected in the *Synch. order x/Channel x/Input filter* setting. It displays the input time signal after filtering it.
- Triggered block: This displays the signal after being triggered by the event selected with the *Synch. order x/Trigger/Trigger* setting .
- Avg. block: This result is available if the value of the *Synch. order x/Average/Domain* setting is Time. It displays the time signal block average.
- Weighted block: This result displays the signal after being weighted by the weighting window selected with the *Synch. order x/Channel x/Weighting window* setting.
- Ord spectrum: This result is available if the value of the *Synch. order x/Average/Domain* setting is Time. It displays the result of the Synchronous order processing results after time averaging.
- Ord inst. spectrum: This result is available if the value of the *Synch. order x/Average/Domain* setting is Spectral. It displays the Synchronous order processing results.
- Ord avg. spectrum: This result is available if the value of the *Synch. order x/Average/Domain* setting is Spectral. It displays the average order instant spectrum results.
- Order & Overall: It displays computation of the orders chosen with the *Synch. order x/Channel x/Tracked order* setting and the Overall level if the *Synch. order x/Overall Analysis/Band power tracking* is set to On.

Computation SPUs:

Bandwidth	Fdec	Reso	SPU/Channel for Real-time
20k	1	401	3
10k	1	401	1,5
Nk	1	401	=(N*3)/20
10k	2	401	2
5k	4	401	1,3
2,5k	8	401	1,1
1,25k	16	401	0,9
625	32	401	0,8
313	64	401	0,7
156	128	401	0,6
78	256	401	0,6
20k	1	401 and below	3
20k	1	801	3,25

Where

$$Fdec = \frac{SampleFrequencyBandwidth/2.56}{SOAFreqBandwidth}$$

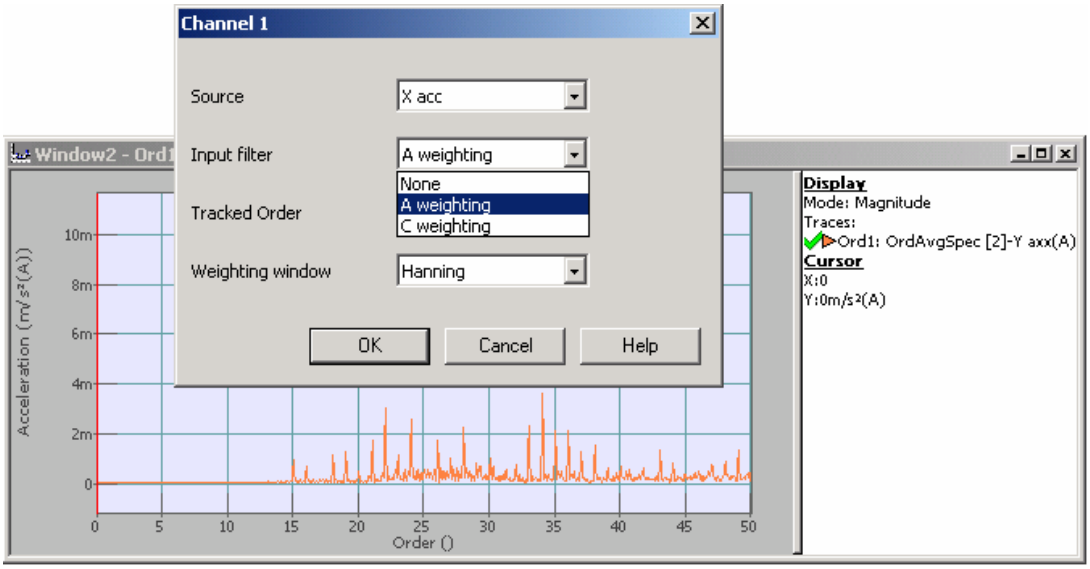
Sampling Frequency: set in *Front-End/Inputs settings/Input sampling*

FFT Bandwidth: set in *FFTx/FFT analysis/range*

1.5.2.1 Channel

Contains the settings related to the source input.

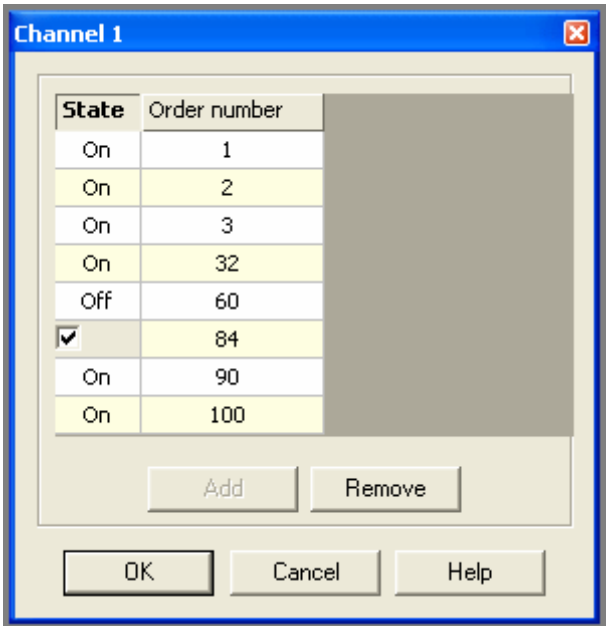
- **Source**: Input source to be analyzed. It may come from the Front-end input or from the Player in post analysis mode (see the post analysis chapter). In post analysis mode, only the tracks with the same signal bandwidth can be plugged.
- **Input filter**: filter to be used for filtering the source before the analysis. The Filters that are not compatible with the upper frequency of the plug-in cannot be selected (see the Filter builder chapter). The A and C weighting on time domain are available in the NVGate® filter list.



These acoustics filters can be applied as all other NVGate® filters pass/stop band, high/low pass, and integrators.

Note: These weighting on time domain are no longer available for pass band higher than 25.6kHz and lower than 10kHz.

- **Tracked order**: Orders to be tracked by the Synchronous Order Tracking. You can select up to eight different orders per channel, and there are 2 settings for each order:



- **State**: ON if you want the order to be computed
- **Order number**: Select the number of the order you want to track, from 0.001 up to 800

- **Weighting window**: window used to weight the signal before processing. There are 6 fixed windows: Uniform, Hanning, Hamming, Kaiser Bessel, and Flat top; 3 customized windows: Force, Response (see the Time Windows chapter) For the window characteristics, see the Appendix.

1.5.2.2 Tach

Contains the Synchronous order analysis tachometer settings.

- **Associated tach**: The selected Tach enables the plug-in to perform Synchronous Order Tracking.
- **Phase reference**: selects the original phase when computing the absolute spectrum phase.

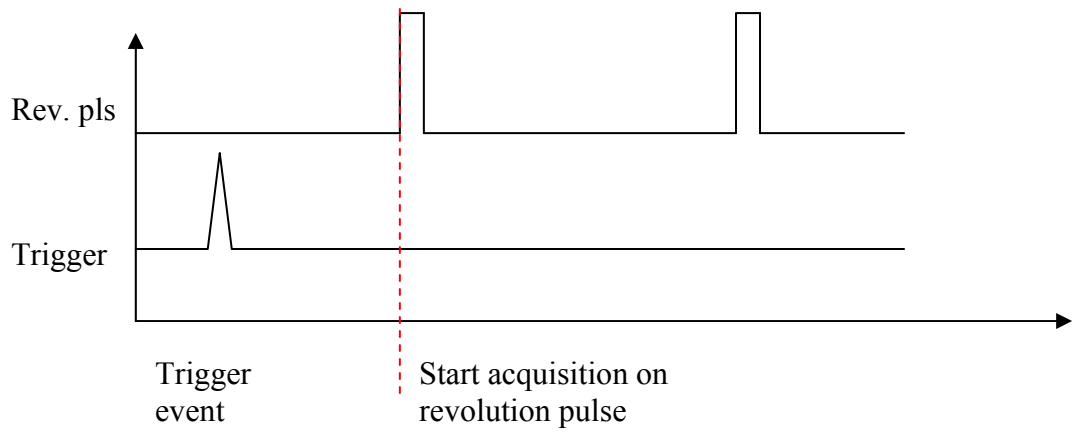
Phase reference	Description
Pulse Edge	the original phase is referenced from the tach edge detection, i.e. the position of the unbalance. It gives the absolute phase.
Pulse Center	the spectrum phase is corrected with the phase of the first order of the tach signal (the correction is applied to all the spectrum lines proportionally to the number of lines). This corresponds to the center of the tach pulse. This setting can be used only if the tach signal is analyzed (the source of the tach must be a source of the analyzer). It gives a relative phase.

For example if the analyzed signal is a pure sine and if this signal is also applied to the tach input (with a threshold of 0 Volt and a positive slope), the measured spectrum phase at the sine frequency is:
Pulse Edge: -90 °
Pulse Center: 0 ° (whatever the threshold level of the tach is)

- **Accepted speed variation**: Percentage of variation of the tach speed accepted during one revolution. The default value is 100%. It means that this parameter is not taken account.

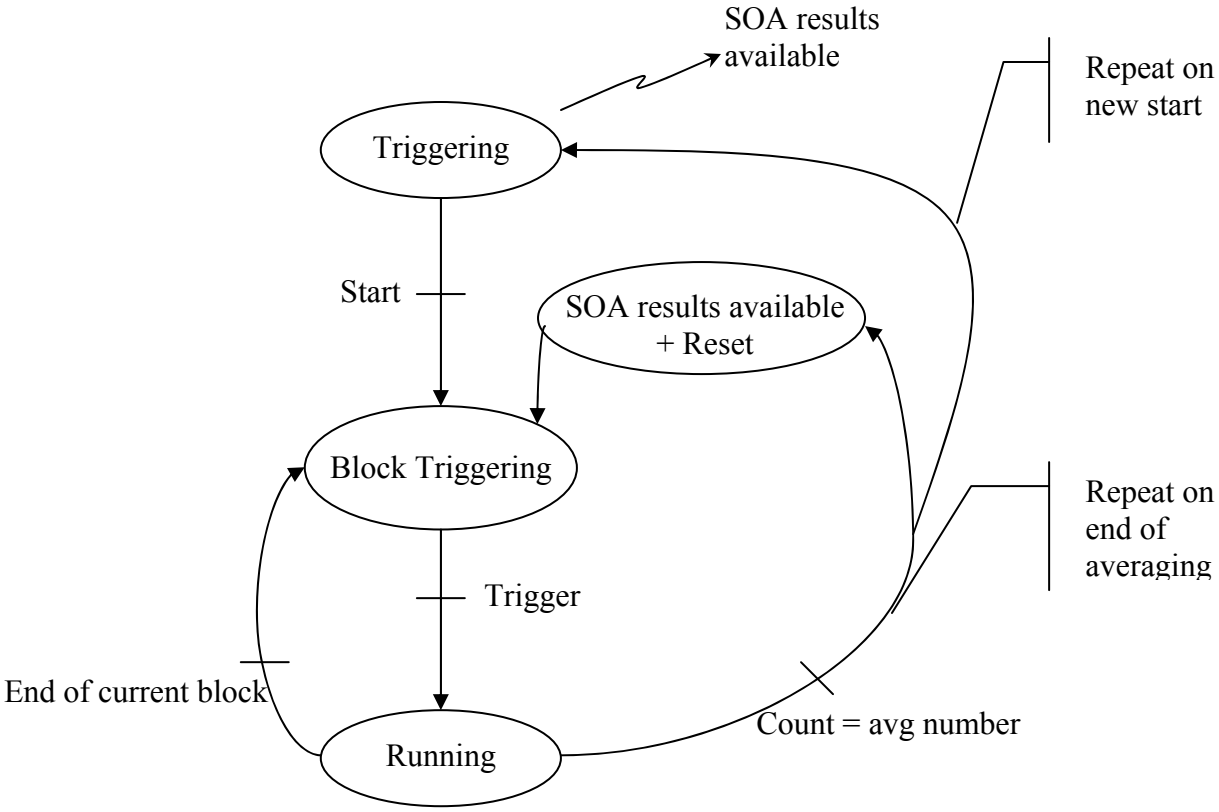
1.5.2.3 Trigger

Contains the settings related to triggering events and how to start, and stop signal computation. Note that the trigger is always done on the next available revolution pulse:

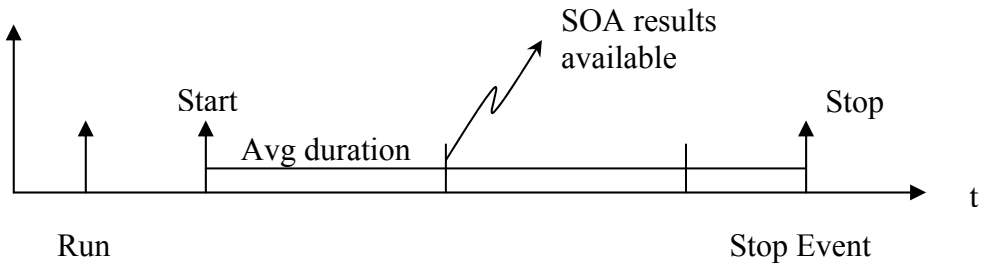


- **Start**: defines the event to start the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Start" condition.
- **Stop**: defines the event to stop the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Stop" condition.
- **Trigger**: defines an event to compute the Order Spectrum on one block of time signal. After the computation, the plug-in waits for a new event to compute another block.

  Warning: SOA will not start without any tachometer, the SOA will stay in the status ‘triggering’.
- **Repeat**: This setting allows selecting a condition for the plug-in to be restarted. If an event is selected as a Start event, the option New start is available, and when this mode is selected each Start event restarts the plug-in. The mode End of averaging is available when the value of the *Sync Order x/Average/Type* setting is different from the Exponential mode, it restarts the plug-in when the averaging is finished. It is set to "Off" except for linear average when it is set to "End of averaging". In this case, the "Avg duration" gives the periodicity of the average restart.

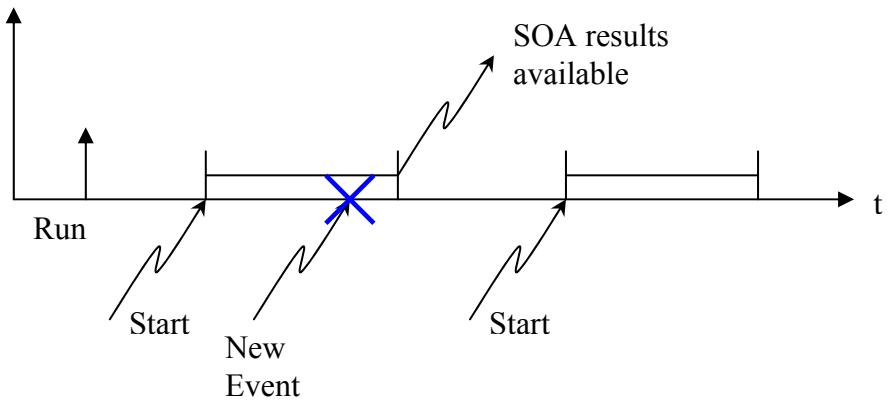


- Mode Repeat on ‘end of averaging’:



The ‘Run’ corresponds to the start of the analyzer. The start is the beginning of average duration. At the end of the first average, the second average will start and so on till the end of the integration time (even if the last short time integration duration is not over). Each averaging has the same size, except the last that can be smaller.

- Mode Repeat on ‘New start’:



The ‘Run’ trigger the analyzer, but the average begins at the start event (set in the event definition). This averaging stops at the end of average duration or at the stop event. Then the next averaging is waiting for the new start event to occur.

In case a new event occurs during a previous averaging, this start event won’t be effective because the previous average duration is not over, you can only set other event after the end of the previous one.

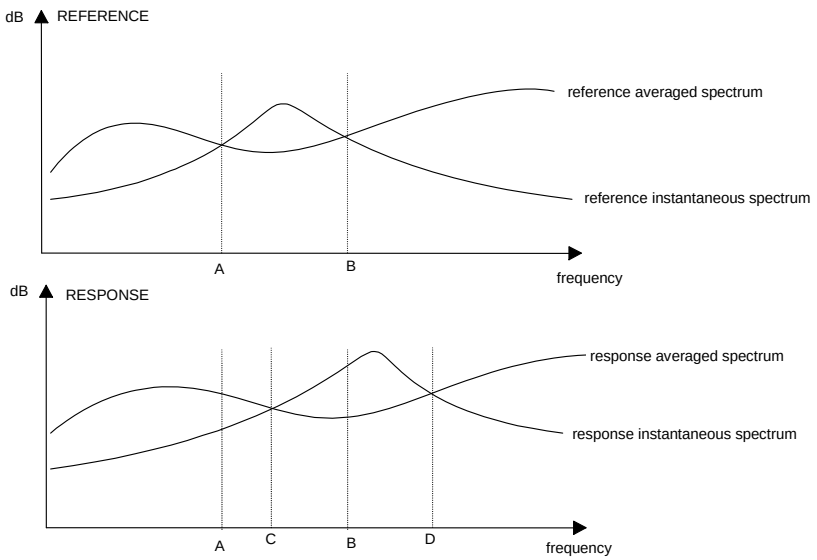
- **Accept mode**: selects the method of rejecting signal blocks.

Mode	**Description**
Normal	All blocks are accepted
Overload rejection	Blocks with an overload are automatically rejected

1.5.2.4 Average

Contains the settings related to the type of averaging of the signals to be computed.

- **Domain**: You can chose between Spectral and Time: the spectral domain averaging computes the average after Order spectrum processing, while time domain averaging the average before Order spectrum processing.
- **Size**: The number of signal blocks used to compute the average, from 1 up to 1000000000.
- **Type**: The method of averaging the signal. There are four different averaging modes: Linear, Exponential, Peak hold, and Referenced Peak hold.

Type	Description
Linear	Linear averaging of results is carried out on the value of the Size setting from the same sub-module. The plug-in automatically stops when the given number of averages is reached.
Exponential	In this mode of computation, each new average is obtained by adding its previous value the new Order spectrum result divided by the value of the Size setting, and subtracting its previous value divided by the value of the Size setting too.
Peak hold	This method processes the peaks found in their spectrum power density for each channel, and for a number of Order spectrum analysis determined by the size setting. The plug-in automatically stops when a given number of averages is reached. For each order line, each time the value of the instantaneous spectrum is greater than the value of the average order spectrum, the average order spectrum value is equal to the instantaneous order spectrum value. Otherwise, the average order spectrum value is not modified.
Ref Peak hold	 This method processes the peaks found in their spectrum power density for each channel, and for a number of FFT analyses determined by the size setting. The FFT plug-in automatically stops when a given number of averages is reached. When this mode is selected, a new setting called Reference channel appears in the same sub-module; if None is selected, the average processing is the same as the Peak hold mode. If a channel is selected, then there are two different behaviors depending on the channel:

	For the reference channel: For each frequency line, each time the value of the instantaneous spectrum is greater than the value of the average spectrum, the average spectrum value is equal to the instantaneous spectrum value. Otherwise, the average reference spectrum value is not modified. For the other channels: For each frequency line, for each modification of the average reference spectrum, the average channel spectrum is equal to the instantaneous channel spectrum values, even if it is less than the average spectrum value. The modification of the reference and the other channels is synchronized. In this example, the modified spectrum lines are between **A** and **B** for both reference channel and response channel. The spectrum lines between **B** and **D** in the response channel are not updated. The modification of the reference and response channels is synchronized Each time the peak value of the reference channel has been modified, the **averaged cross spectrum** is equal to the instantaneous reference spectrum by the response spectrum product. In this example, the modified spectrum lines are between **A** and **B**. The functions as transfer function (where the reference channel is taken into account) will be modified between **A** and **B**.

Hidden/fixed: Peak hold and Referenced Peak hold are only available if the Domain setting from the same sub-module is set to Spectral.

- **Reference channel**: channel to be used as a reference in Referenced Peak hold averaging mode. You can choose between the channels that are plugged into the plug-in. If None is selected, the average processing is the same as the Peak hold mode.
  Hidden/fixed: This setting is only available when the Referenced Peak hold averaging mode is selected.

1.5.2.5 Order FFT

Transforms the order blocks into order spectra.

- **Max speed**: defines the highest angular speed accepted. All revolutions with a speed higher than Max speed are rejected by the analysis.

  The Max speed value is given by:

  Max speed (RPM) = Frequency Range (Hz) / Max Order * 60

  If a tach is connected to this plug-in, the max speed value is forced to the value defined in tachometer properties.
  To know more, see § 1.4.2.1 tachometer /tachs.

- **Min speed**: defines the lowest measured angular speed accepted. All revolutions with a speed lower than Min speed are rejected by the analysis.

  The RPM velocity dynamic is defined by:

  Max Speed / Min Speed = 64

- **Max order**: defines the highest order that can be computed.

Max order
6.25
12.5
25
50
100
200
400

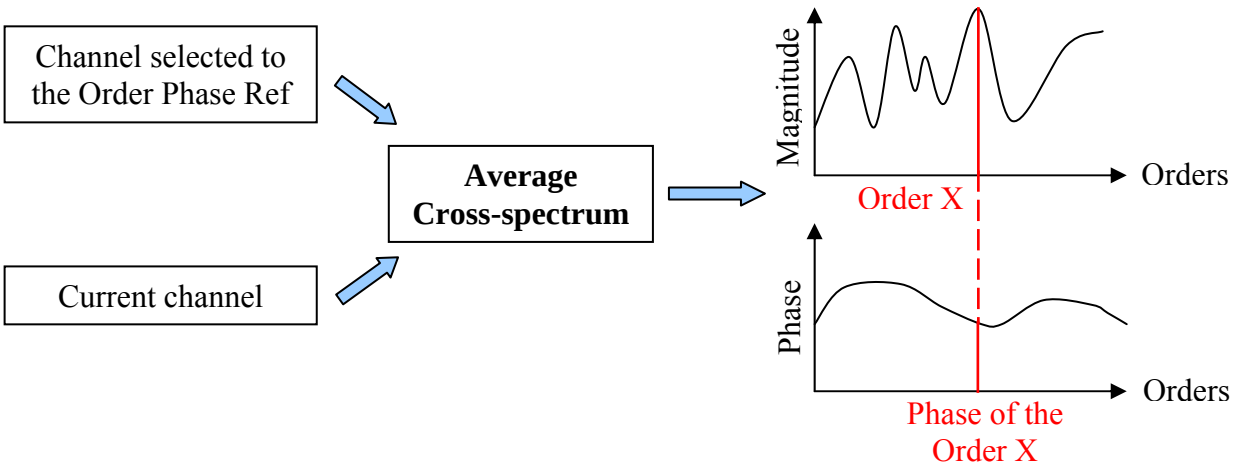
- **Order resolution**:

Order resolution
1
1/2
1/4
1/8
1/16
1/32

- **Overlap**: defines the amount of overlap of blocks of signal between 2 successive Order FFT computations expressed in revolutions, from 0 to 1/Order resolution.-1. For example: if *Order resolution* setting is 1/8, then Overlap range is from 0 to 7
- **Upper frequency**: The Upper frequency that can be processed by the plug-in. It depends on two settings: *Max speed* setting and *Max order* setting. If Max speed is in RPM you have the formula: Upper Frequency = MaxOrder * (MaxSpeed/60). For example Max speed = 770 RPM, Max Order = 100 then Upper Frequency = 100* (770/60) = 1283.333 Hz
  Hidden/fixed: fixed
- **Resolution**: The number of lines computed by the Order FFT: this depends on two settings: *Max order* setting and *Order resolution* setting. Resolution = (MaxOrder / OrderResolution) + 1. For example: if Max order = 50 and Order resolution = 1/8, then Resolution = 50 * 8 + 1= 401 lines.
  Hidden/fixed: fixed
- **Phase Ref**: The phase reference for the computation of the Order FFT

Phase reference	
Cosine	Default value
Sine	Leads to a +90° phase Offset

- **Orders Phase ref**: This function allows to use the cross-spectrum phase value for the phase of the order (relative phase). The cross-spectrum phase is the relative phase between the input signal of the current channel and the reference input signal associated to this channel. Whatever the average mode, the average cross-spectrum is always used to calculate the orders phase.



- No activated: The phase of the order is the spectrum phase of the frequency corresponding to the order value (absolute phase).
To know more, see *§1.5.2.2 Ext Syncs/Tach/Phase Ref p1-115.*

- Activated: choose the channel used to calculate the orders phase.
If a channel is selected, 'Phase Ref' in *SOA/Tach* is not activated.

Note: This set up don't change the spectrum phases and consequently don't change the orders phases extracted from a waterfall of spectra.

- **Range**: Frequency range of the plug-in, set automatically in order to process the *Sync Order x/Order FFT/Upper frequency* value. For optimum performance, the *Front End/Input sampling* setting value should be close to the value of the Range setting multiplied by 2.56. For example: for a Range value of 20kHz, the input sampling should be 20000*2.56 = 51.2kS/s.
Hidden/fixed: fixed

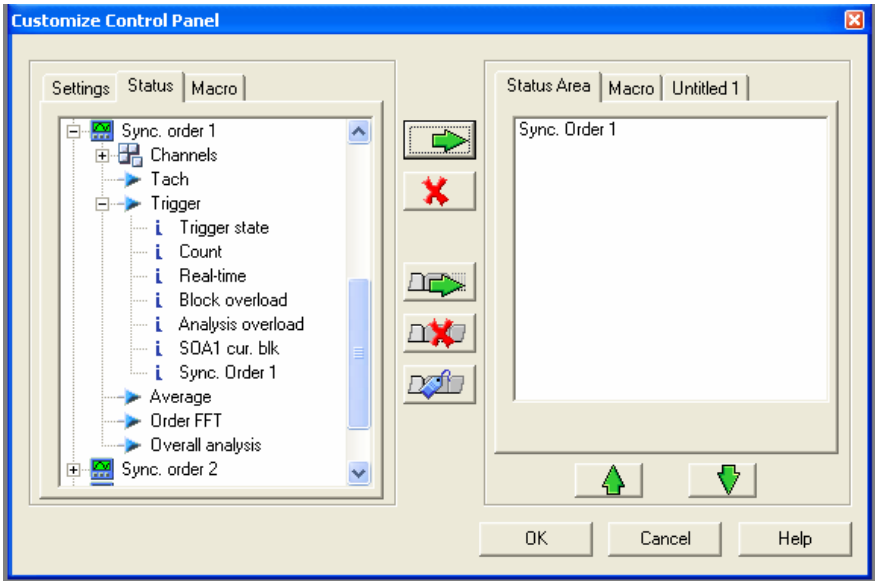
1.5.2.6 Overall analysis

Calculation of the order bands sum.

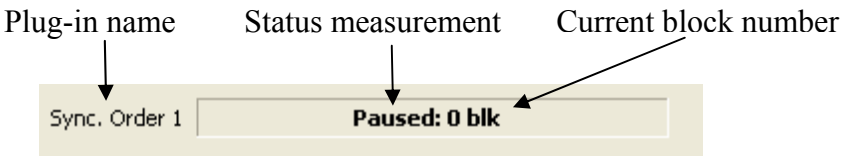
- **Band power tracking**: Switches computation of the overall level result "on or off".
- **Lower Order**: Specifies the lower order of the overall computation order range
- **Upper Order**: Specifies the upper order of the overall computation order range

1.5.2.7 SOA Status

All statuses are available to add to the control panel



Sync. Order x



The current plug-in status is synthesized in a special progress-bar. This progress bar is automatically displayed in the 'control panel' when the plug-in is active (i.e. as soon as at least 1 input is connected to the Sync Order plug-in). This status is called 'Sync. Order x' (x is 1 or 2) and it is available in the status ASB tree (see customize control panel).
This setting displays the averaging count (i.e. a current analyzed block number), the plug-in state and the real-time status.

- **State**: block number analyzed
- **Run:** The SOA plug-in is computing order spectra and averaging it.
- **Stop:** The SOA plug-in is stopped.
- **Trig:** The SOA plug-in is waiting for next block; i.e. next trigger event (block triggering) or first start event (triggering)
- **Pause:** The SOA plug-in averaging is paused
- **Waiting:** The SOA plug-in averaging is waiting for the acquisition to be accepted or rejected (in structural mode).

Notes: in exponential averaging mode the average count stops increasing as soon as the set value is reached.

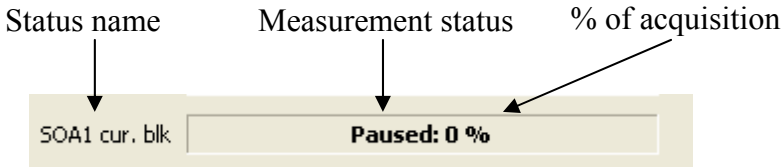
The way the status bar is displayed, depends on the type of averaging selected:

- **'Linear'**, **'Peak hold'** or **'Ref peak hold':** the progress bar is filled from left to right.
- **'Exponential'**: the progress bar is filled from right to left with a flashing until the end of the acquisition.

The color of the background bar and of the text depends on real-time status:

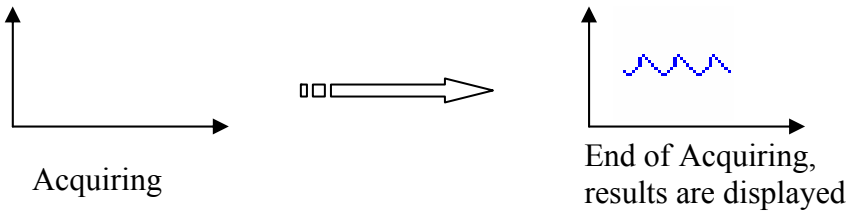
- *Green background and white or black text*: acquisition in real-time.
- *Red background and white or black text*: the current acquisition is not real-time (current block is not analyzed).
- *Green background and red text*: the current acquisition is real-time, but since start not all the blocks were analyzed.

SOAx cur.blk



SOA cur. blk is a status that shows if the measurement has been triggered (for long time acquisition) and the progression in the block.

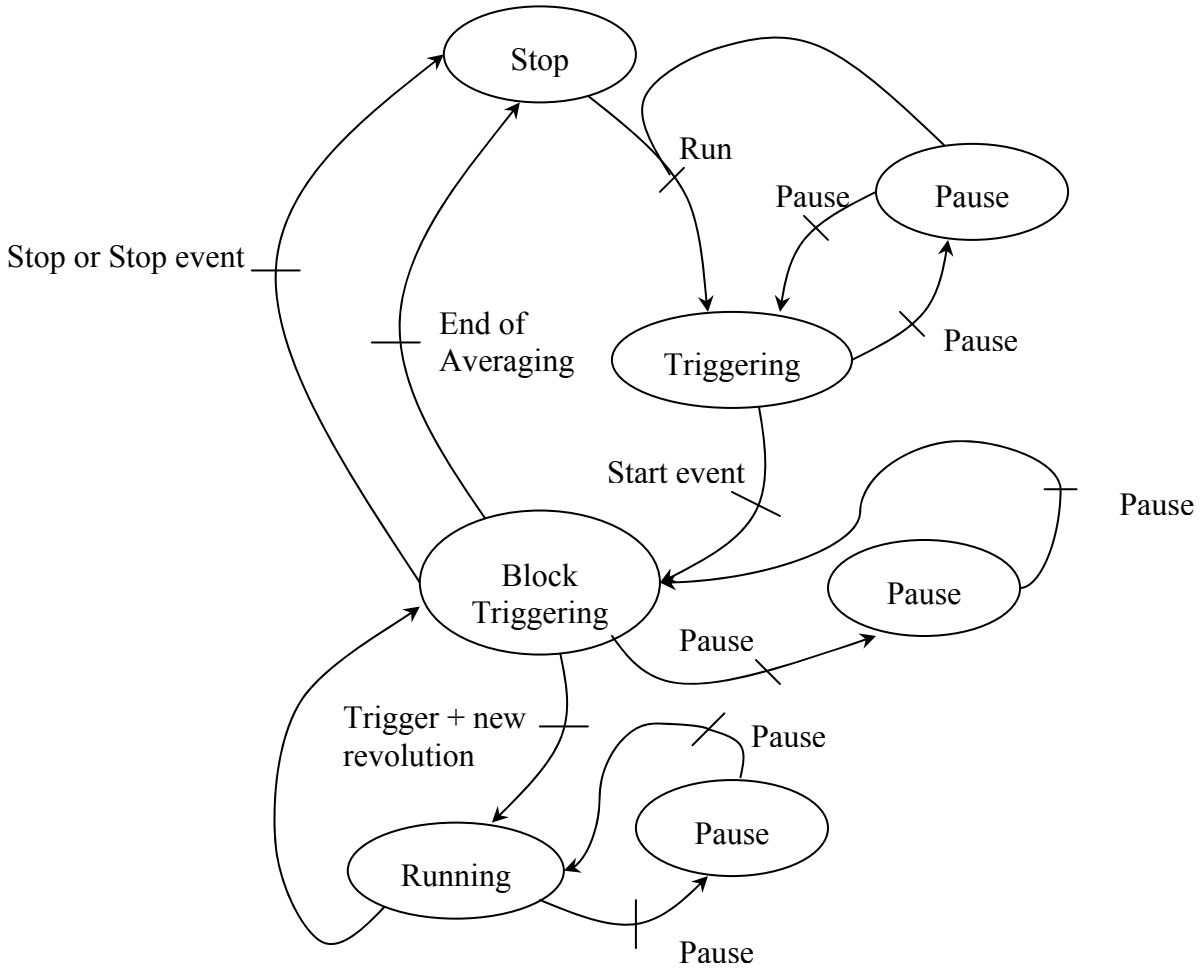
- Triggering:
- Acquiring: displays the evolution of the acquisition in percentage. During the acquiring period, no result is displayed; the result will be display at the end of the acquisition.



- Paused: the acquisition is paused
- Stop: the acquisition is stopped

Trigger State

The following scheme describes the different states of the measurement:



By default the trigger state is on ‘Stop’ and waiting for a ‘Run’ (start or trigger). Then the state become ‘Triggering’ and is waiting for a start event, the states become ‘Block Triggering’ and is now waiting for a trigger event for being in the ‘Running state. If after one second there is no trigger event, the state comes back to ’Block Triggering’.
The state is ‘Stop’ after a stop event or at the end of averaging.

Note: all start event, trigger, new revolution or run are ignored in ‘free run’ mode

Count

This status displays the averaging count processed. This status is expressed in analyzed block.

Real-time

This status displays if the averaging is in real-time or not (i.e. the current block is analyzed or not). If the corresponding signal were not available at this time, the

acquisition is not real-time. That means that the treatment is longer than the acquisition. There are three values for this state:

- ‘**OK**’: The acquisition is real-time (all block have been processed and averaged)
- ‘**No**’: Acquisition was not real-time (some previous blocks are missing in the average).
- ‘**-**‘: The acquisition is currently not real-time (current block is not analyzed an averaged).

Block overload

This status corresponds to the instantaneous overload indication within 1 SOA trigger block, for instance amplitude overload occurred in the current analyzed block. Note that overloaded block may be automatically rejected (see accept mode).

Analysis overload

This status corresponds to overload indication over the measurement period. It means that during the whole measurement period there was (or not) an overload. It memorizes block overloaded.

1.5.3 1/n Octave

This plug-in computes 1/1, 1/3, 1/12 and 1/24 octave analysis based on order 3 digital filters and RMS detectors.
The filter bank complies with:

IEC 1260:1995 class 1 and
ANSI S1.11-1986

Mid band frequencies are based on powers of ten.

Available results:

FilterNumber = ((1/Mode) * (ln (High/Low) / ln 2)) + 1

Where:
"Mode" is the value of the *1/n octave/CPB filters/Mode* setting: 1 for octave, 1/3 for 1/3 octave…
"High" and "Low" are respectively the values of the *1/n octave/CPB filters/Upper central freq* and *1/n octave/CPB filters/Lower central freq* settings

For example if mode = 1/3 octave, High =7.94 kHz and Low = 7.94 Hz then *FilterNumber = 3 * (ln 1000 / ln 2) +1 = 30.897* => 31 filters

Type	Size	Dimension	Domain	Save
1/n octave	FilterNumber	2D	spectral	Yes
Avg. 1/n octave	FilterNumber	2D	spectral	Yes
Min Avg. octave	FilterNumber	2D	spectral	Yes
Max Avg. octave	FilterNumber	2D	spectral	Yes
Overall level	1 pt	1D	level	Yes
Overall Weighted	1 pt	1D	level	Yes

- 1/n octave: This result is always available. It displays the output of the RMS detectors that analyzes the output of each filter from the filter bank.
- Avg. 1/n octave: This result is available when the 1/n Octave plug-in is in "Running" state. It displays the result of the averaging of the 1/n octave result.
- Min Avg. octave: This result is available when the 1/n Octave plug-in is in "Running" state. It displays the minimum value of each band of the Avg 1/n octave result. Restarting the plug-in will reset this result.
- Max Avg. octave: This result is available when the 1/n Octave plug-in is in "Running" state. It displays the maximum value of each band of the Avg 1/n octave result. Restarting the plug-in will reset this result.
- Overall level: This result is available when the 1/n Octave plug-in is in "Running" state. It displays the overall level of the signal between the lower and upper frequency. It is computed before the filter bank, thus it is not the addition of the values of the 1/n octave result.

- Overall Weighted: This result is available when the 1/n Octave plug-in is in “Running” state. It displays the overall level of the weighted signal between the lower and upper frequency. The weighted filter is chosen by the *1/n octave/CPB filters/Global Level Weighting* setting. It is computed before the filter bank, thus it is not the addition of the values of the 1/n octave result.

Computation SPUs:

Bandwidth	Fdec	Reso	SPU/Channel for Real-time
25.6k	1	1/3rd	4
20k	1	1/3rd	3
12.8k	1	1/3rd	2
10k	1	1/3rd	1,5
20k	1	1/3rd	3,0
10k	2	1/3rd	2,0
5k	4	1/3rd	1,25
20k	1	1/1	1,5
20k	1	1/3rd	3
20k	1	1/12th	6
20k	1	1/24th	12

Where

$$Fdec = \frac{SampleFrequencyBandwidth/2.56}{OCTFreqBandwidth}$$

Sampling Frequency: set in *Front-End/Inputs settings/Input sampling*

1/N Oct Bandwidth: set in *OCT/FFT analysis/range*

1.5.3.1 Channel

Contains the settings related to the source input.

- **Source**: input source to be analyzed. It may come from the Front-end input or from the Player in post analysis mode (see the post analysis chapter). In post analysis mode, tracks with a signal bandwidth lower than the Upper central frequency cannot be plugged.

1.5.3.2 Trigger

Contains the settings related to triggering events and how to start and stop signal computation.

- **Start**: defines the event to start the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Start" condition.

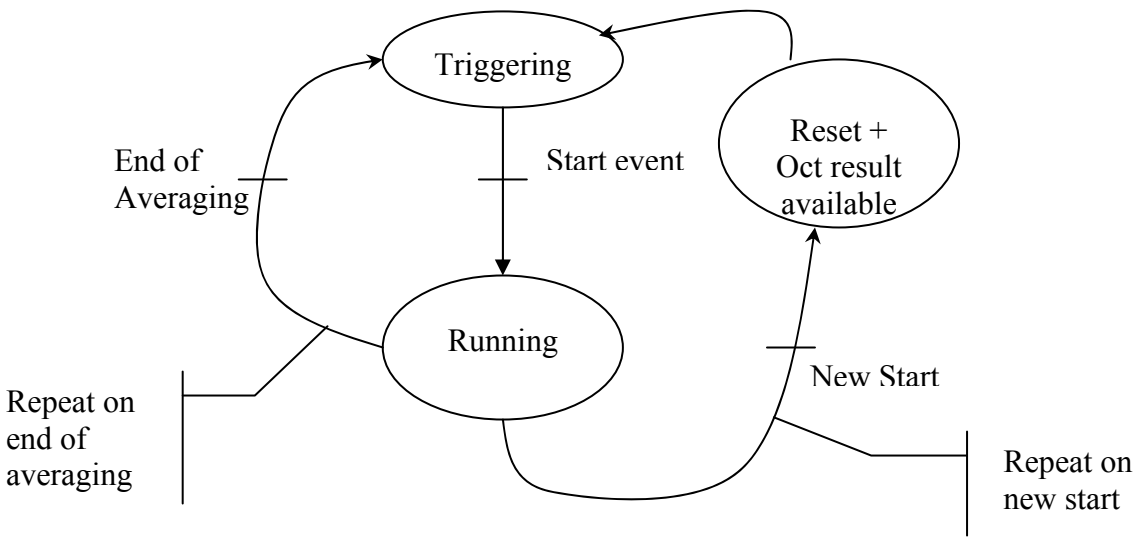
- **Stop**: defines the event to stop the analysis. The user can choose any event among the list of defined events. By default only the Free run and Manual events are available. The user can define another event in the "Event Definition" shared resources and then use this event for the "Stop" condition.
- **Repeat**: This setting allows selecting a condition for the plug-in to be restarted. If an event is selected as a Start event, the option New start is available, and when this mode is selected each Start event restarts the plug-in. The mode End of averaging is available when the value of the *1/n Octave x/Average/Type* setting is different from the Exponential mode, it restarts the plug-in when the averaging is finished. It is set to "Off" except for linear average when it is set to "End of averaging". In this case, the "Avg duration" gives the periodicity of the average restart.

Repeat	**Description**
Off	no repeat. The measurement is stopped at the end of averaging.
New start	The measurement restarts when the start event occurs. It is enabled if Start is different from Free run.
End of averaging	The measurement restarts at the end of averaging.

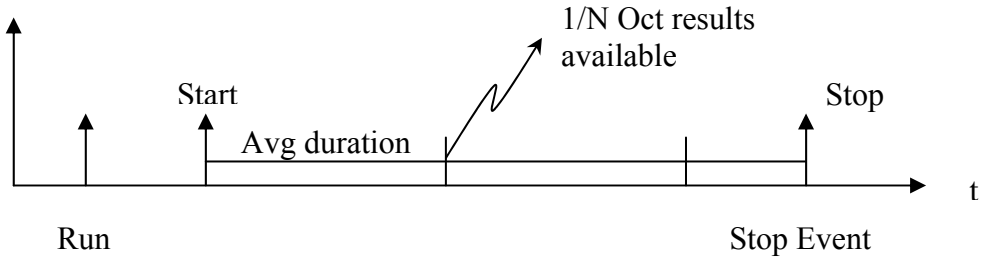
Hidden/fixed: the average type sets the authorized repeat modes.

Type	**Repeat mode**
Linear	Off / New start / End of Averaging
Repeat	Set to End of averaging
Short LEQ (1/8s or 1s)	Set to End of averaging
Other types	Set to Off

The following scheme is a description of the two different repeat modes:

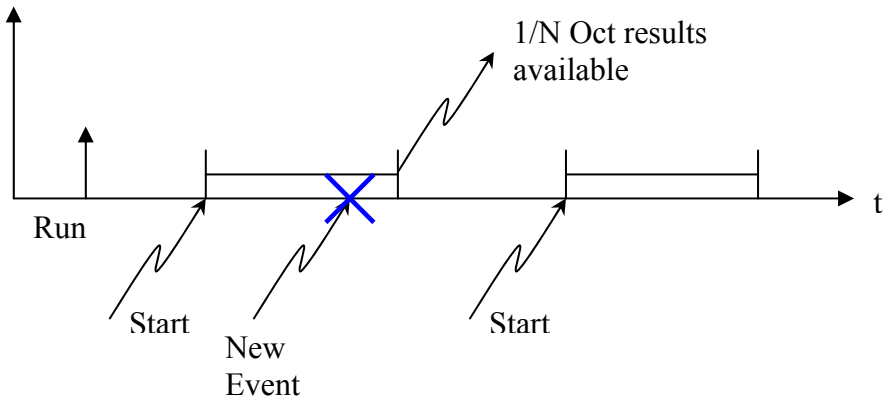


- Mode Repeat on ‘end of averaging’:



The ‘Run’ corresponds to the start of the analyzer. The start is the beginning of average duration. At the end of the first average, the second average will start and so on till the end of the integration time (even if the last short time integration duration is not over). Each averaging has the same size, except the last that can be smaller.

- Mode Repeat on ‘New start’:



The ‘Run’ trigger the analyzer, but the average begins at the start event (set in the event definition). This averaging stops at the end of average duration or at the stop event. Then the next averaging is waiting for the new start event to occur.

In case a new event occurs during a previous averaging, this start event won’t be effective because the previous average duration is not over, you can only set other event after the end of the previous one.

1.5.3.3 Average

Contains the settings related to the type of averaging of the signals to be computed.

- **Type**: the average type.

Type	Description
Linear	Arithmetic average of the instantaneous 1/n octave during the "Avg duration"
Repeat	Performs linear averaging over "Short duration" time and finally computes a linear average of all "Short duration" results over "Avg. duration" time *Refresh* is performed every "Short duration" with the display if the corresponding linearly averaged spectrum over "Short duration" time. The final averaged spectrum corresponds to the linear averaged

	spectrum over "Avg. duration" (equivalent to the linear average of each "Short duration" result). The *event "Oct result available"* (to be used for instance as a trigger in the waterfall) corresponds to the Avg. 1/n oct spectrum after each "Short duration" calculation.
Exponential	Works with the same time constant on every detector. It is equivalent to a RC filter following the squaring module. Performs continuous exponential averaging of instantaneous 1/n octave spectrum over "Exponential time constant" value. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event "Oct result available"* corresponds to the periodicity (1/(fs* 2,56))*256 with fs the input sampling frequency).
Constant BT 0.2 dB	Performs exponential averaging with averaging time in each 1/n octave band inversely proportional to the frequency so that the product B*T is constant. For "Constant BT 0.2 dB": B*T = 500 with B the center frequency of 1/n octave band and T the corresponding integration time. This averaging setting gives a standard error ε<0.2dB *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Constant BT 0.5 dB	Performs exponential averaging with averaging time in each 1/n octave band inversely proportional to the frequency so that the product B*T is constant. For "Constant BT 0.5 dB": B*T = 100 with B the center frequency of 1/n octave band and T the corresponding integration time. This averaging setting gives a standard error ε<0.5dB *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Constant BT 1 dB	Performs exponential averaging with averaging time in each 1/n octave band inversely proportional to the frequency so that the product B*T is constant. For "Constant BT 1 dB": B*T = 25 with B the center frequency of 1/n octave band and T the corresponding integration time.

	This averaging setting gives a standard error ε<1dB *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Constant BT 2 dB	Performs exponential averaging with averaging time in each 1/n octave band inversely proportional to the frequency so that the product B*T is constant. For "Constant BT 2 dB": B*T = 5 With B the center frequency of 1/n octave band and T the corresponding integration time. This averaging setting gives a standard error ε<2dB *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Short LEQ 1/8s	Corresponds to a linear averaging with a fixed "Short duration" of 1/8s (equivalent to Repeat averaging mode with non selectable "Short duration" parameter). *New result* available every 125 ms for display and for the Waterfall. The *event "Oct result available"* corresponds to the Avg. 1/n oct spectrum after each "Short duration" calculation (every 125ms). This average mode is not available for frequency ranges below 5kHz.
Short LEQ 1s	Corresponds to a linear averaging with a fixed "Short duration" of 1s (equivalent to Repeat averaging mode with non selectable "Short duration" parameter). *New result* available every second for display and for the Waterfall. Note: The tenth second measure corresponds to the average of the entire measurement (not the average for the tenth second). Moreover if you stop the measurement before the end, the last measurement would not be displayed. The *event "Oct result available"* corresponds to the Avg. 1/n oct spectrum after each "Short duration" calculation (every 1s). This average mode is not available for frequency ranges below 5kHz.
Fast	Corresponds to an exponential averaging with a fixed "Exponential time constant" of 0.125s. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input

	sampling frequency) The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency). This average mode is not available for frequency ranges below 5kHz.
Slow	Corresponds to an exponential averaging with a fixed "Exponential time constant" of 1s. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency). The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency). This average mode is not available for frequency ranges below 5kHz.
Impulse	Corresponds to an exponential integration with a raise Exponential time constant of 35 ms and a fall Exponential time constant of 1500ms. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency). The *event "Oct result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency). This average mode is not available for frequency ranges below 5kHz.

Hidden/fixed: the last five types are enabled only if the Upper central frequency is upper than 6.3 kHz.

- **Avg**. **duration**: defines the long term average duration time in second. See the table below for more information. If you change the short duration, the average duration will be automatically adjust to the closest value multiple of short duration.
- **Short duration**: defines the short term average duration time in second. See the table below for more information.
- **Exponential time constant**: defines the average duration time in second for the exponential averaging mode. See the table below for more information.

Hidden/fixed:

Type	**Avg. duration**	**Short duration**	**Exponential time constant**
Linear	Visible	not used	not used
Repeat	visible	visible	not used
Exponential	not used	not used	visible
Cst BT	not used	not used	not used
Short LEQ1/8s	visible	set (1/8s)	not used

Short LEQ 1s	visible	set (1s)	not used
Fast	not used	not used	set (1/8s)
Slow	not used	not used	set (1s)
Impulse	not used	not used	set (0.035s)

1.5.3.4 CPB filters

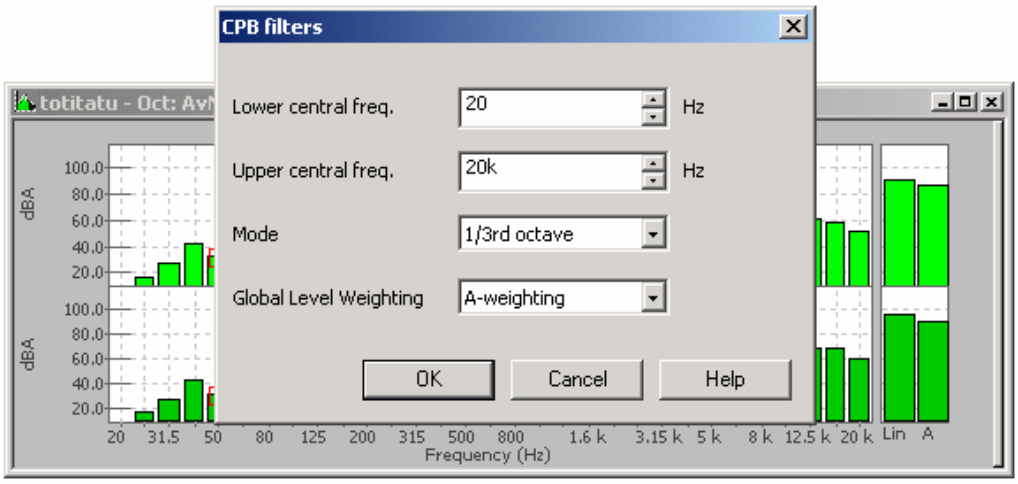
Defines the frequency range and the resolution.

- **Lower central freq**: the central frequency of the lower band of the frequency range. The bands considered are octave bands (for the octave mode) and 1/3 octave bands (for the other modes).
  The user enters a value, which is adjusted to the closest central frequency. The bandwidth between the Lower and Upper central frequencies must be lower than or equal to eleven filters (considering octave bands) and 31 filters (considering 1/3 octave bands). So, if this bandwidth increases, then the Upper central frequency is automatically reduced.
- **Upper central freq**: the central frequency of the upper band of the frequency range. The bands considered are octave bands (for the octave mode) and 1/3 octave bands (for the other modes).
  The user enters a value, which is adjusted to the closest central frequency. The bandwidth between Lower and Upper central frequency must be lower than or equal to eleven filters (considering octave bands) and 31 filters (considering 1/3 octave bands). So, if this bandwidth increases, then the Lower central frequency is automatically increased.
- **Mode :**

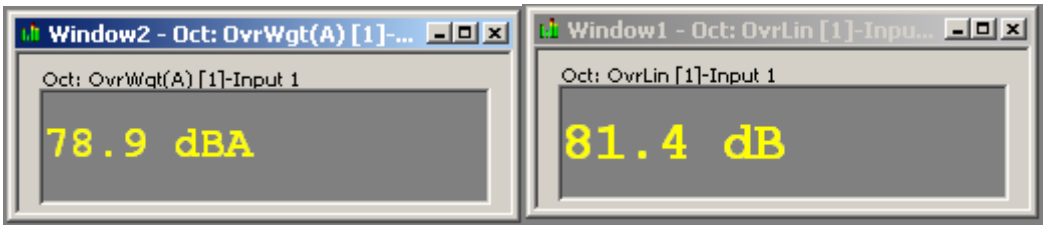
Mode	Description
Octave	Octave digital filter
1/3 octave	1/3 octave digital filter
1/12 octave	1/12 octave digital filter
1/24 octave	1/24 octave digital filter

- **Global Level weighting:**

Weighted overall levels of the1/n Octave Plug-in are now computed on the time domain (weighting filter and detector). Processing weighting in the time domain provides accurate measurement for non-stationary signals (impulsive).

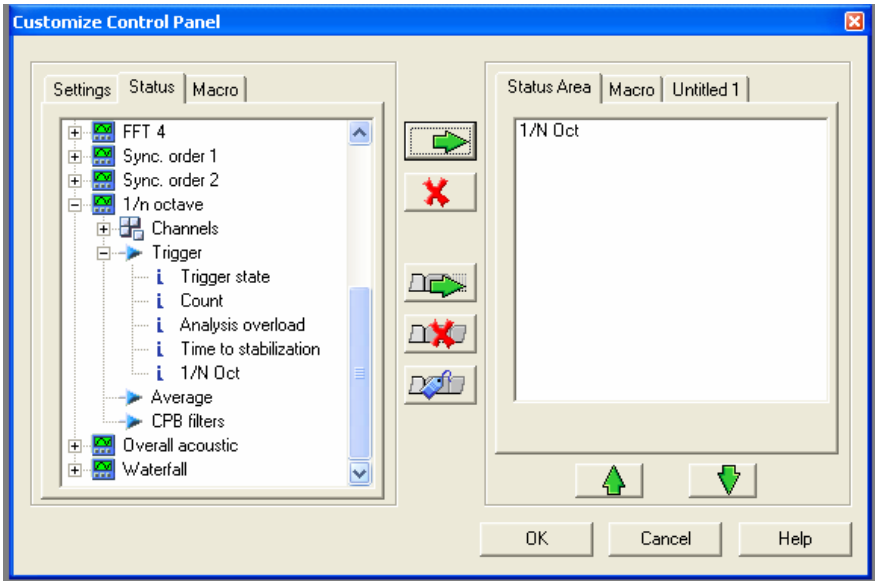


The type of time domain weighting (A or C) is selected in the ASB setting *1/n Oct / CPB filters / Global level weighting.*
These overall values can be displayed in view meter.

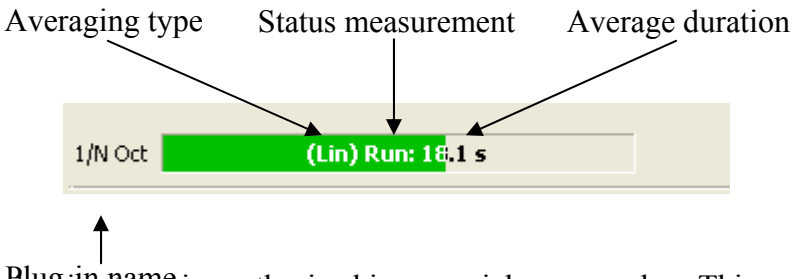


1.5.3.5 1/n Octave status

All statuses are available to add to the control panel



1/N oct



The current plug-in status is synthesized in a special progress-bar. This progress bar is automatically displayed in the 'control panel' when the plug-in is active (i.e. as soon as at least 1 input is connected to the Sync Order plug-in). This status is called '1/N Oct' and it is available in the status ASB tree (see customize control panel).
This status displays the type of averaging between brackets (i.e. Lin, Rep, Leq, CBT, Fast, Slow, Ipls or Exp), the plug-in state (Run, Paused, Stop) and the real-time status.

The way the status bar is displayed depend on the mode selected:

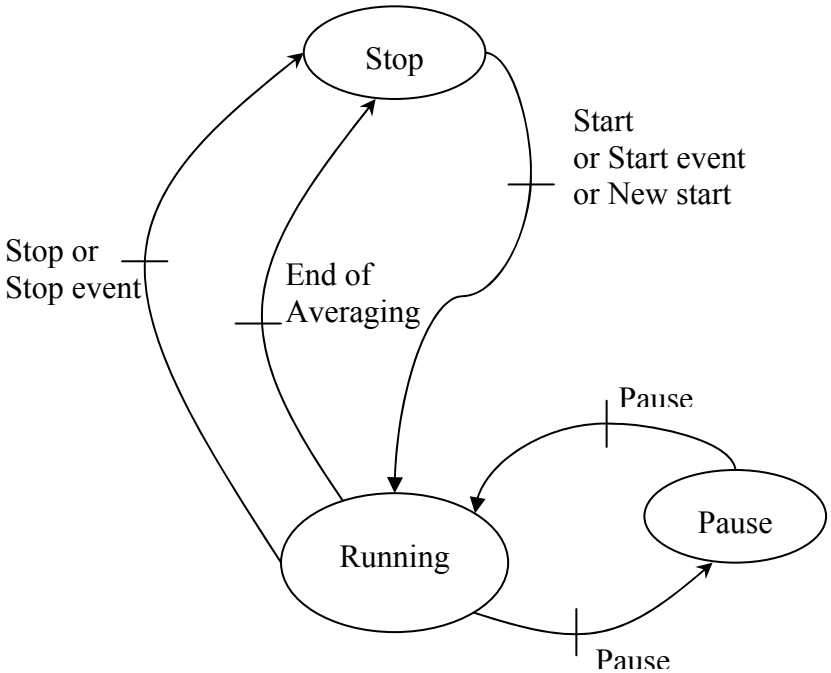
- **Linear, Repeat, Short Leq:** display the Average Duration. The status bar is displayed from left to right. The text displayed indicates the state of the acquisition (Run, Paused or Stop) with the time.
- **Cst BT, Fast, Slow, Impulse:** the status bar is a 'snake' type; the text displayed indicates the state of the acquisition (Run, Paused or Stop).
- **Exponential:** the status bar is displayed from right to left with flashing until the end of the acquisition. The text displayed indicates the exponential averaging time.

The color of the background bar and of the text depends on real-time status:

- *Green background and white or black text*: acquisition in real-time.
- *Red background and white or black text*: the current acquisition is not real-time (current block is not analyzed).
- *Green background and red text*: the current acquisition is real-time, but since start not all the blocks were analyzed.

Trigger state

The following scheme describes the different states of the measurement:



Count

This status displays:

- The average time in linear, short Leq and repeat modes.
- The exponential time constant in exponential, Fast, Slow, Impulse modes.
- The integration time T in constant band tracking modes.

Note that in linear mode, if repeat were on end of averaging, the count would restart at the end of averaging until stop event. If repeat were on new start, the count is set to zero at the end of averaging waiting for a new trigger.
In Short Leq mode, the count is stopped at the end of time duration (the repeat mode is made on short duration).

Analysis overload

This status displays if during the acquisition, there were an amplitude overload (or not) of the analyzed inputs.

Time to stabilization

Until this time to stabilization is over, results are not available. All filters have a stabilization time and at any change of settings, filters need this time before the results are available. The lower the frequency is the longer this stabilization is.
The filters stabilization time is given by:
Time (s) = x * 5 / lower central frequency
Where x depends on the mode :

Mode	**x**
Octave	1
1/3 octave	1
1/12 octave	4
1/24 octave	8

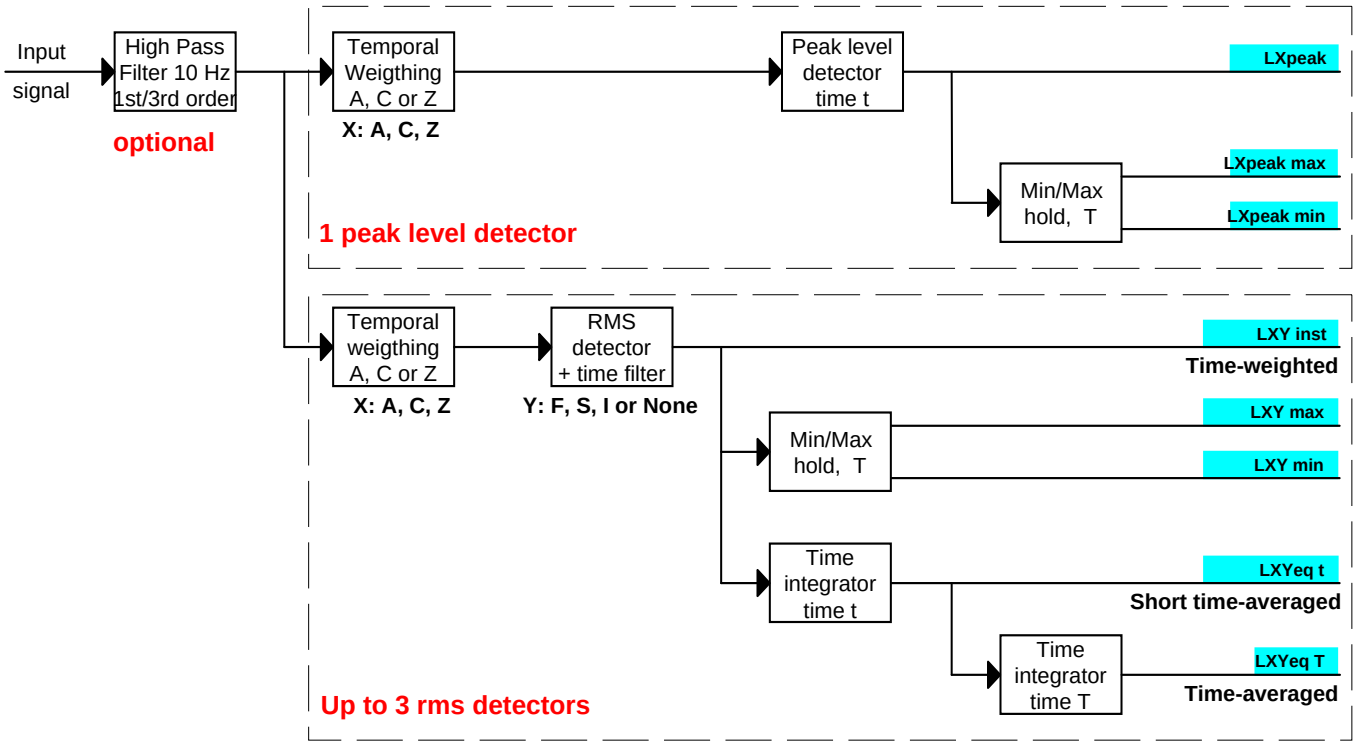
If there were no change between two run, no stabilization would be necessary. But if a new plug-in is connected, the system is reinitialized and then there is a time to stabilization.

1.5.4 Overall acoustic

1.5.4.1 Overview

ORNV-OVA operates as the other plugs-in.
Frequency response is conformant with IEC 60 651 and IEC 60 804 standards for class 0 and with IEC 61 672-1 standard for class 1. The real frequency range is low bounded by the high pass filter (see below).
The high frequency is limited by 1.2 times the input frequency range. For example with input frequency range equal to 20 kHz a signal at 24 kHz can be detected.

The following scheme describes the way signals are processed in the instrument.



Note: Available results are labeled in blue.

Available results:

Type	Size	Dimension	Domain	Save
L*X*peak	1 pt	Scalar	Level	Yes
L*X*peak max	1 pt	Scalar	Level	Yes
L*X*peak min	1 pt	Scalar	Level	Yes
L*XY* inst	1 pt	Scalar	Level	Yes
L*XY* max	1 pt	Scalar	Level	Yes
L*XY* min	1 pt	Scalar	Level	Yes
L*XY* eq *t*	1 pt	Scalar	Level	Yes
L*XY* eq *T*	1 pt	Scalar	Level	Yes

X = Applied weighting (A or C), in case of Z selection (no weighting) X is not displayed.
Y = Applied time filter (None, Fast, Slow or Impulse), If none is selected (no time filtering) Y is not displayed
t = Short time integration duration. This duration is repeated until T.
T = Integration duration. T = ∑ t

Response of A and C filters are fully conformant with above mentioned standards for all available frequency ranges, but in order to be have a sound level meter fully conformant with these standards a frequency range of 20 kHz or greater must be used.

Computation SPUs:

Bandwidth	SPU/Channel for Real-time
25,6k	1,25
20k	1
12,8k	0,75
10k	0,5

The overall acoustic levels analysis requires 1 SPU per channel at 20 kHz bandwidth. The number of required SPUs is directly proportional to the analysis bandwidth (i.e. the sampling frequency divided by 2.56).

1.5.4.2 Channels

- **Source**: input source to be analyzed. It may come from the Front-end input or from the Player in post-analysis mode (see the post-analysis chapter). In post-analysis mode, tracks with different signal bandwidth cannot be plugged simultaneously.

- **10Hz high pass filter**: High pass filtered activation. When this setting is “on” a 10 Hz 3rd order high pass filter is applied on the current input in order to remove very low frequency components from input signals. Attenuation, is conformant with IEC 61 672-1standard: 3 dB at 10 Hz, 60 dB at 1 Hz and lower than 0.5 dB at 20 Hz. When this setting is “off” inputs are filtered by default with a first order 5 Hz filter that rejects residual DC component. The attenuation is 3 dB at 5 Hz and 14 dB at 1 Hz. The 10 Hz high pass filtering can be set independently on each channel.

1.5.4.3 Trigger

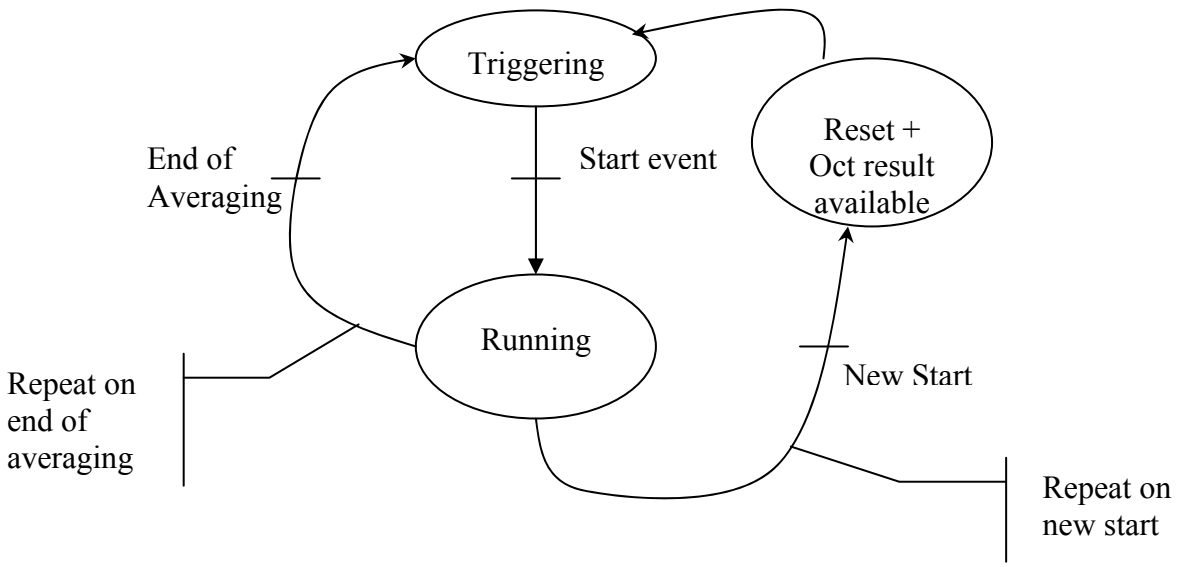
Contains the settings related to plug-in start and stop signal computation.

- **Start**: selects the event to start the averaging or short averaging. Any event can be chosen among the list of defined events. By default only the Free run and Manual events are available. Additional events can be defined in the "Event Definition" shared resource.

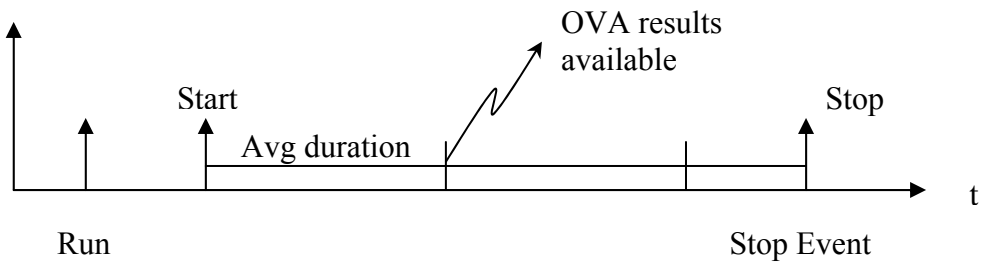
- **Stop**: selects the event to stop the averaging. Any event can be chosen among the list of defined events. By default only the Free run and Manual events are available. Additional events can be defined in the "Event Definition" shared resource.

When repeat mode is active (short Leq n averaging, or linear + repeat) averaging are repeated between start and end of averaging. New short averaging occurs at end of averaging or new event on start.

The following scheme is a description of the two different repeat modes:

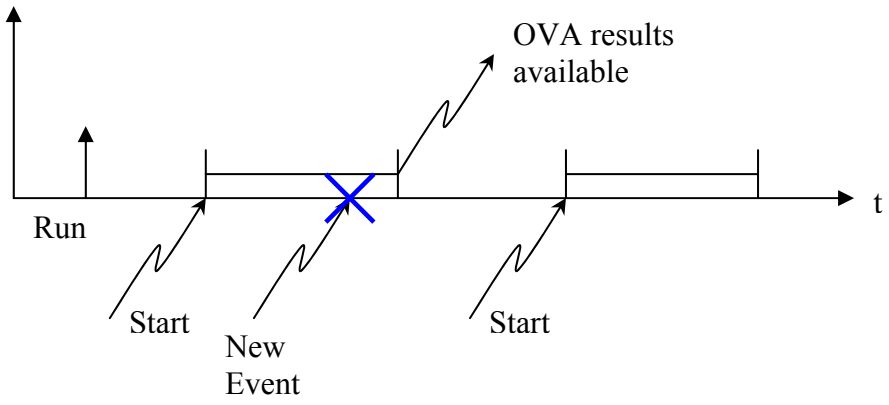


- Mode Repeat on ‘end of averaging’:



The ‘Run’ corresponds to the start of the analyzer. The start is the beginning of average duration. At the end of the first average, the second average will start and so on till the end of the integration time (even if the last short time integration duration is not over). Each averaging has the same size, except the last that can be smaller.

- Mode Repeat on ‘New start’:



The ‘Run’ trigger the analyzer, but the average begins at the start event (set in the event definition). This averaging stops at the end of average duration or at the stop event. Then the next averaging is waiting for the new start event to occur.

In case a new event occurs during a previous averaging, this start event won’t be effective because the previous average duration is not over, you can only set other event after the end of the previous one.

1.5.4.4 Average

- **Type:** Lets you choose the averaging mode within the following list:

Type	Description
Linear	Arithmetic average of the instantaneous detector outputs during the "Avg duration"
Short Leq 1/8s	Corresponds to a repeated linear averaging with a fixed "Short duration" of 1/8s. Long duration averaging is simultaneously computed. All computations end after Avrg. duration elapsed. *New result* available every 1/8s for display and for the Waterfall. The *event "OVA Leq result available"* (to be used for instance as a trigger in the waterfall) corresponds to detector outputs availability each 1/8s.
Short Leq 1s	Corresponds to a repeated linear averaging with a fixed "Short duration" of 1s. Long duration averaging is simultaneously computed. All computations end after Avrg. duration elapsed. *New result* available every second for display and for the Waterfall. The *event "OVA Leq result available"* (to be used for instance as a trigger in the waterfall) corresponds to detector outputs availability every second.
Short Leq (t)	Corresponds to a repeated linear averaging with a user selectable "Short duration". Long duration averaging is simultaneously computed. All computations end after Avrg. duration elapsed.

	New result available every short duration (t) for display and for the Waterfall. The *event "OVA Leq result available"* (to be used for instance as a trigger in the waterfall) corresponds to detector outputs availability every short duration.

All these modes features long duration set up.

- **Repeat**: Performs linear averaging over "Short duration" time and finally computes a linear average of all "Short duration" results over "Avg. duration" time
  Refresh is performed every "Short duration".

  The *event "OVA Leq result available"* (to be used for instance as a trigger in the waterfall) corresponds to detector outputs availability after each "Short duration" calculation.

  This setting is available for modification only when linear averaging is active, on all over cases it feature only information.

- **Average duration:** sets the integration duration. T = ∑ t, this settings is available for every type. If you change the short duration, the average duration will be automatically adjust to the closest value multiple of the short duration.

- **Short duration**: sets short time integration duration. This duration is repeated until the average duration. This setting is not available for linear type, and only modifiable in Short Leq (t) (automatically set in other types).

The table below shows the state of these settings function of the average type:

Type	**Repeat**	**Avg. duration**	**Short duration**
Linear	Visible	Visible	Not used
Short Leq (t)	Fixed (end of averaging)	Visible	Visible
Short Leq1/8s	Fixed (end of averaging)	Visible	Fixed (1/8s)
Short Leq 1s	Fixed (end of averaging)	Visible	Fixed (1s)

1.5.4.5 Peak detector

Activated or not with A, C or Z (flat) time weighting.

A	Selects the 'A' weighting on the time signal. This weighting type is not available for frequency ranges below 10 kHz and above 25.6 kHz.
C	Selects the 'C' weighting on the time signal. This weighting type is not available for frequency ranges below 10kHz and above 25.6 kHz.
Z	No weighting applied. This is the default setting for frequency range lower than 10kHz and above 25.6 kHz.

1.5.4.6 RMS detectors

For each channel 1 to 3 RMS detectors can be activated

	Weighting	Time filter
RMS detector 1	A-weighting	Fast
RMS detector 2	C-weighting	Slow
RMS detector 3	Z-weighting	Impulse

These detectors are fully conformant and validated as defined in IEC 61 672-1 and IEC 61 672-2 standards.

For each detector a min/max hold function is provided.
For each detector the following setting can be set:

- Weighting

A	Selects the 'A' weighting on the time signal. This average mode is not available for frequency ranges below 10kHz
C	Selects the 'C' weighting on the time signal. This average mode is not available for frequency ranges below 10kHz.
Z	No weighting applied. This is the default setting for frequency range lower than 10kHz

- Time filter

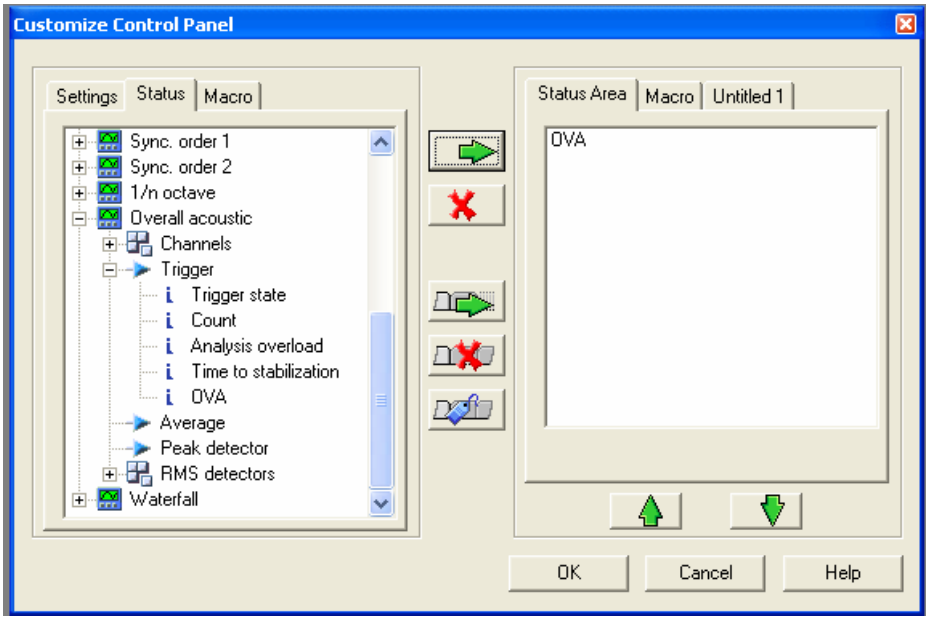
Fast	Corresponds to an exponential averaging with a fixed "Exponential time constant" of 0.125s. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency) The *event " OVA Leq result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Slow	Corresponds to an exponential averaging with a fixed "Exponential time constant" of 1s. *Refresh* is performed when new instantaneous spectrum is available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency). The *event " OVA Leq result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
Impulse	Corresponds to an exponential integration with a raise Exponential time constant of 35 ms and a fall Exponential time constant of 1500ms. *Refresh* is performed when new instantaneous spectrum is

	available (periodicity: (1/(fs*2,56))*256 with fs the input sampling frequency). The *event " OVA Leq result available"* corresponds to the periodicity ((1/(fs*2,56))*256 with fs the input sampling frequency).
None	No time filter applied

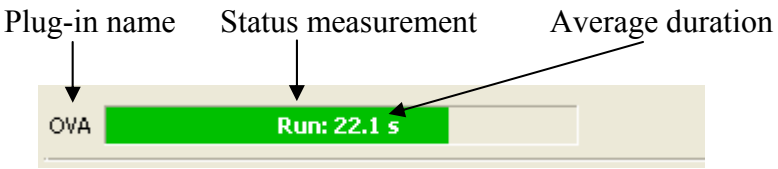
Note: Time filter are available for all frequency ranges

1.5.4.7 OVA status

All statuses are available to add to the control panel



OVA



The current plug-in status is synthesized in a special progress-bar. This progress bar is automatically displayed in the 'control panel' when the plug-in is active (i.e. as soon as at least 1 input is connected to the Overall Acoustic plug-in). This status is called 'OVA' and it is available in the status ASB tree (see customize control panel).
This status displays the type of averaging between brackets (i.e. Lin, Rep, Leq, CBT, Fast, Slow, Ipls or Exp), the plug-in state (Run, Paused, Stop) and the real-time status.

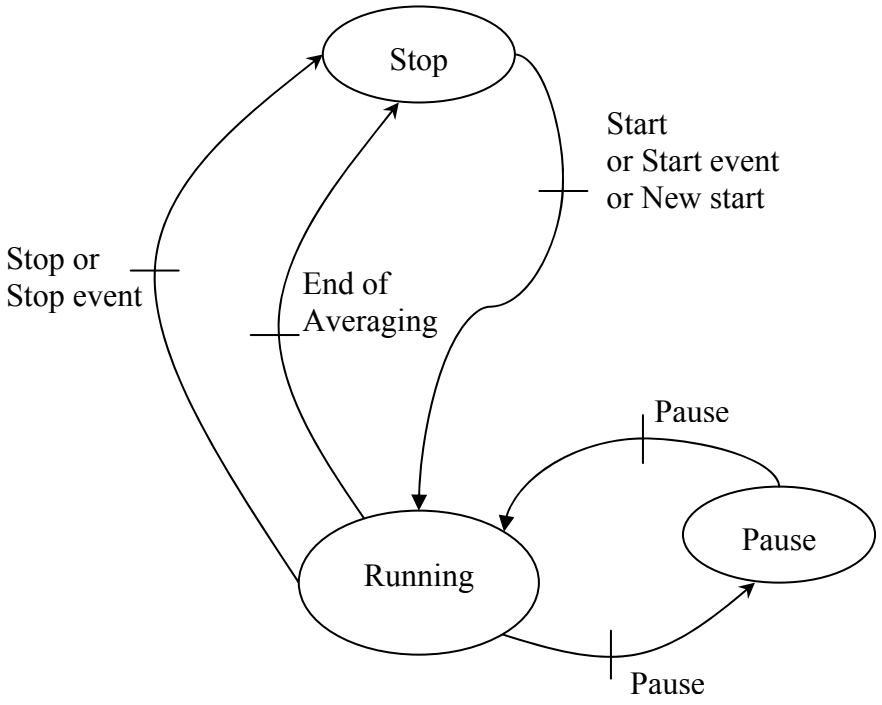
The status bar is displayed from left to right (whatever the type average is: Short Leq 1s, Short Leq 1/8s, Short Leq (t) or Linear), and the text displays the average duration with the measurement state (Run, Paused, Stop).

The color of the background bar and of the text depends on real-time status:

- *Green background and white or black text*: acquisition in real-time.
- *Red background and white or black text*: the current acquisition is not real-time (current block is not analyzed).
- *Green background and red text*: the current acquisition is real-time, but since start not all the blocks were analyzed.

Trigger state

The following scheme describes the different states of the measurement:



Count

This status displays time till the end of averaging time in any type of mode (in mode repeat for linear, the count restart et the end of averaging, in others modes the count is stopped at the end of averaging).
Note that in linear mode, if repeat were on end of averaging, the count would restart at the end of averaging until stop event. If repeat were on new start, the count is set to zero at the end of averaging waiting for a new trigger.
In Short Leq mode, the count is stopped at the end of time duration (the repeat mode is made on short duration).

Analysis overload

This status displays if during the acquisition, there were an overloaded period (or not).

Time to stabilization

Until this time to stabilization is over, results are not available. All filters have a stabilization time and at any change of settings, filters need this time before the results are available. The lower the frequency is the longer this stabilization is.

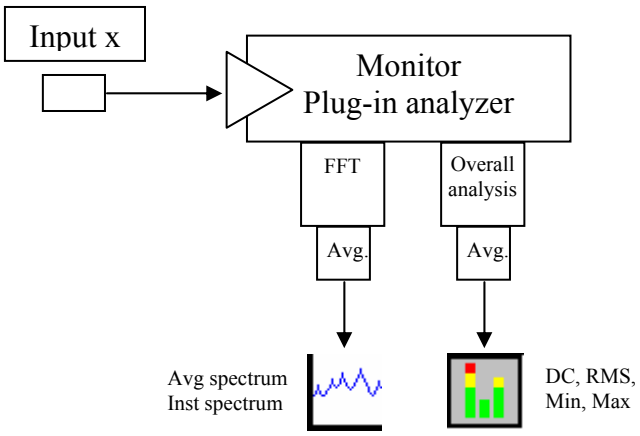
If there were no change between two run, no stabilization would be necessary. But if a new plug-in is connected, the system is reinitialized and then there is a time to stabilization.

1.6 Monitor and Waterfall

There are 2 additional plug-ins that are used to monitor signals and to synchronizes computed results in the Waterfall.

1.6.1 Monitor

The Monitor input can be connected and hot swapped independently of any plug-in analysis. It is used to monitor one or several signals.



Available results:

- **Triggered block**: This displays the time domain signal.
- **Inst. spectrum**: It displays the FFT processing results.
- **Avg. spectrum**: It displays the average spectrum.
- **DC, Max, Min, RMS, Kurtosis** on a specified band

1.6.1.1 Channel

Contains the source of the signal to be monitored.

- **Source***: input source to be analyzed. It may come from the Front-end input or from the Player in post analysis mode (see the post analysis chapter). In post analysis mode, tracks with a signal bandwidth lower than the range of the Monitor cannot be plugged.

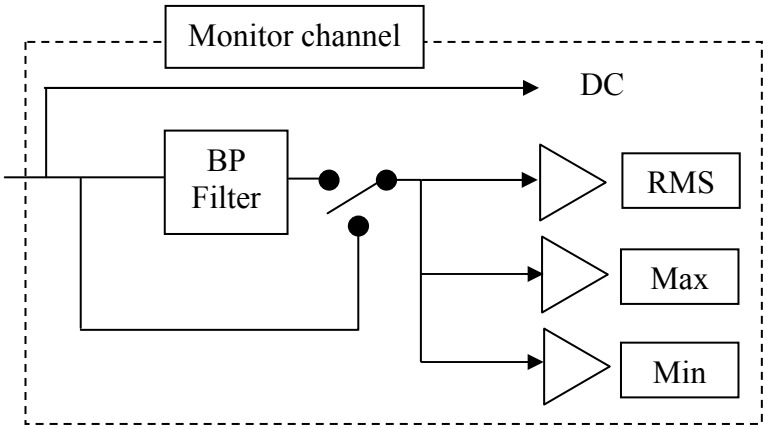
* Using input 5 to input 8 as source with an OR35 analyzer will cause Non-real-time analysis. This way may lose some trigger event samples.

1.6.1.2 FFT analysis

Contains the settings related to the FFT analysis of the signals to be monitored.

- **Range**: the frequency range of the Monitor plug in.
  Hidden/fixed: The monitor range is fixed by the input frequency range (in connected mode on-line) and by the max bandwidth of the player (in post analysis mode).
- **Frequency Span:** This is a fixed setting, for information only. It displays the frequency span between two points of a spectral result. The FFT frequency span is obtained by dividing the frequency range of the FFT by the resolution minus 1. For example if the FFT Range is 20kHz and the resolution is 401 lines, then the frequency span is: 20000 / (401 - 1) = 20000 / 400 = 50Hz.
- **Resolution**: the resolution of the FFT. The FFT frequency span is obtained by dividing the FFT frequency range by the resolution minus 1. For example, if the FFT Range is 20kHz and the resolution is 401 lines, then the frequency span is: 20000 / (401 - 1) = 20000 / 400 = 50Hz.
  Hidden/fixed: fixed to 401 lines
- **Domain**: The averaging domain: spectral domain averaging computes the average after FFT processing.
  Hidden/fixed: fixed to spectral
- **Avg duration**: Exponential coefficient for averaging.

1.6.1.3 Overall analysis



- **Avg duration**: Each scalar is computed for each block of signal (length of the block is 256/ (*Front-end / Input Sampling*), and then average during the value of the setting.
- **Filter order**: the order of the filter: 2, 4, 6, 8 or 10.
- **Low cut-off frequency**: the low cut-off frequency of the filter. Its minimum value is 0.055 * FR, where FR is the input frequency range. However, the following conditions must also be fulfilled:

  0.0075 * FR <= B <= 0.5 FR,

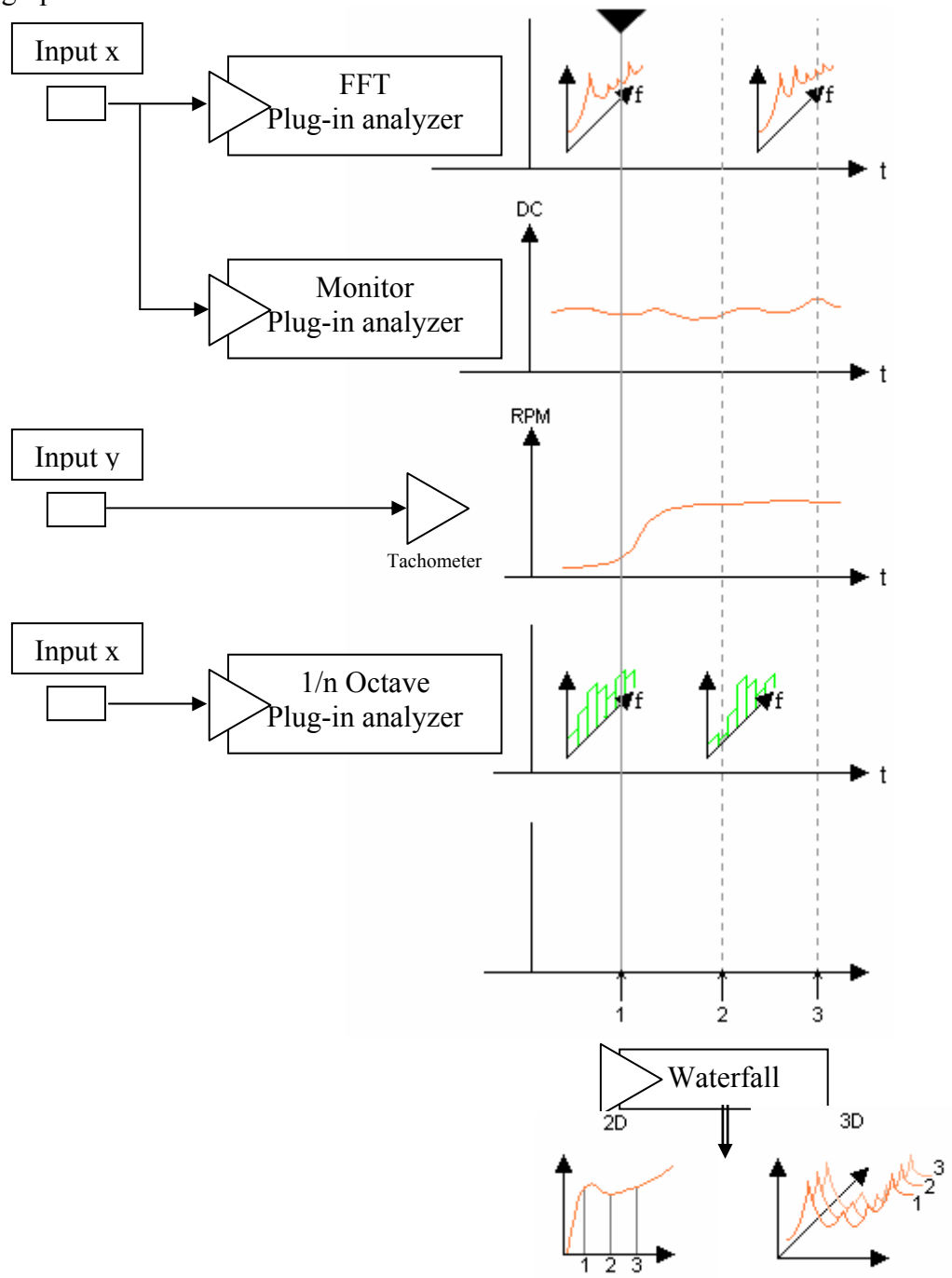
  Where B is the bandwidth between Low and high cut-off frequency and FR is the input frequency range.

- **High cut-off frequency**: the high cut-off frequency of the filter. Its maximum value is the input frequency range. However, the following conditions must also be fulfilled: see Low cut-off frequency.
- **Filter**: On / Off. The filter is not applied if **Filter** is Off

1.6.2 Waterfall

The Waterfall module is used to stack data such as Spectra, 1/n Octave, RPM or DC values picked up from available Plug-ins into slices. Data into slices are synchronized and can be sorted by references (time, RPMs or DC levels).

The following scheme describes the waterfall slices collection behavior. When selected event (trigger) occurs, the latest computed data from each associated plug-in are collected into the current slice. Then data can be displayed into 2D (for scalar) and 3D graph in function of each reference.



Results available:

	3D	2D (profiles)
FFT	▪ Triggered block ▪ Weighted block ▪ Inst. Spectrum ▪ Average Spectrum ▪ Inst. Cross Spectrum ▪ Average Cross Spectrum ▪ FRF ▪ Coherence ▪ Inst. Zoom Spectrum ▪ Average Zoom Spectrum ▪ Zoom Cross Spectrum ▪ Zoom Average Cross ▪ Zoom FRF ▪ Zoom Coherence	▪ Overall Power ▪ Order x
Sync. Order	▪ Triggered block ▪ Weighted block ▪ Order Inst. Spectrum ▪ Order Average Spectrum	▪ Order x ▪ Overall Power
1/n Octave	▪ 1/n Octave ▪ Average results: - AvNoct - MinOct - MaxOct	▪ Overall level: OvrLin ▪ Overall Weighted level: OvrWgt
Overall acoustic		- Lxypeak - Lxy inst - Lxy eq 1/8s - Lxy eq 1s - Lxy eq t *X* = Applied weighting (A or C), in case of Z selection (no weighting) X is not displayed. *Y* = Applied time filter (None, Fast, Slow or Impulse), If none is selected (no time filtering) Y is not displayed. t = Short time integration duration. T
Tachometer		▪ Tach Angular Speed (ref) ▪ Virtual Angular Speed (ref) ▪ Ext Tach Angular speed (ref) ▪ DC Tach speed (ref)
Front end		▪ DC (ref)
Monitor		▪ Monitor DC ▪ Monitor RMS ▪ Monitor Skew ▪ Monitor Ktsis ▪ Monitor Max ▪ Monitor Min
		▪ Time (ref) always selected ▪ Slice (available as ref if selected)

All these results are also available in post-analysis mode.

Computation SPUs

Unlike other plug-in, the memory of the waterfall depend on the capacity of the PC and others applications running on it. The depth of the waterfall is function of the free memory of your PC, and is limited to around 3 millions samples per DSP.

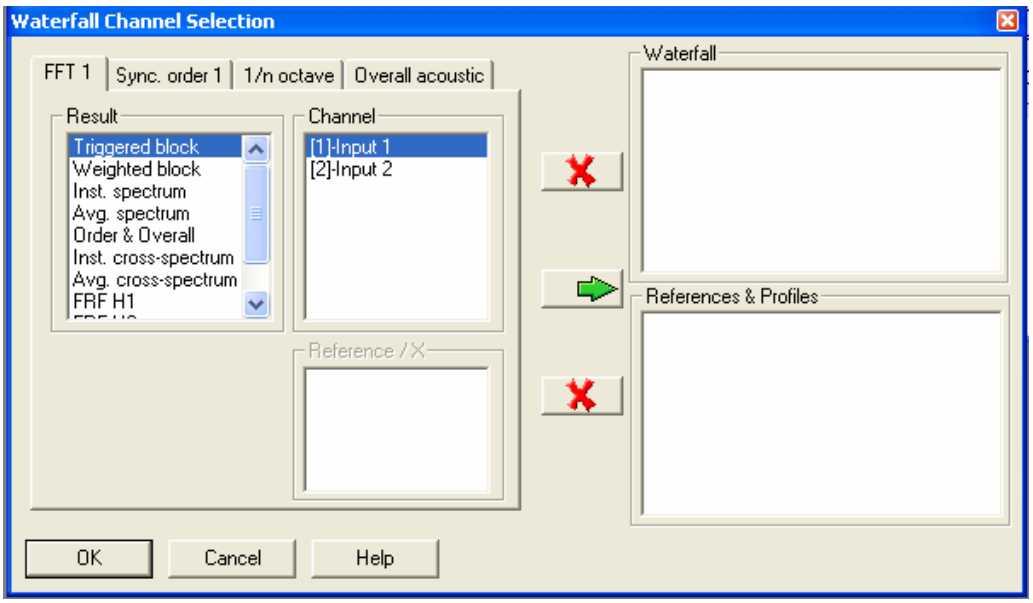
1.6.2.1 Glossary

This section will explain specific vocabulary of the Waterfall.

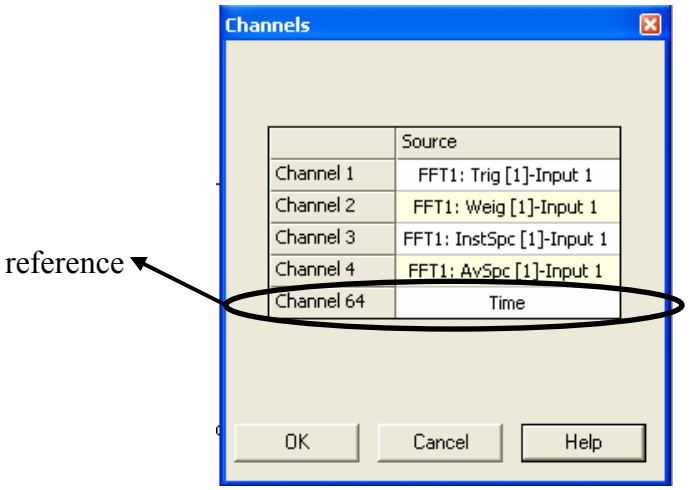
- **Slice**: this represents one acquisition of the Waterfall. A slice is a set of scalar and spectrum data acquired at the same time. The Waterfall is a stack slices.
- **Depth**: this is the maximum number of slices you can acquire on the Waterfall.
- **Section**: section at the current position of the cursor. The extraction section is created only if a tach has been selected in the Waterfall (see chapter 2 Display, Waterfall window menu).
- **Reference**: A scalar collected by the waterfall acquisition that can put in order the slices. The reference corresponds to the X-axis of the profiles and the Z-axis of the 3D graphs.
- **Profiles or 2D Results**: profiles of a scalar evolution in function of time or any reference associated with the waterfall
- **Results 3D**: spectra collected by the waterfall acquisition putted in order by a reference. These types of results are displayed in 3D graphs (3D, isometric or color-spectrogram).

1.6.2.2 Channel

The different channels are available by putting selected inputs in the plug-in.
It contains the results to be picked up by the Waterfall.
The following window let you select for each analysis plug-in, the channel related to the result.



- **Source**: In the ASB the channels are different from other ASB channels, the source of channel 1 and following are the results. The source of channel 64 and previous ones are the references. By default the time reference is always associated with a result source.



1.6.2.3 Trigger

Contains the settings related to triggering events and how to start and stop signal computation.

- **Start**: selects the event to start the waterfall acquisitions. This setting selects the event, which enable acquisition that is to say data collection does not operate while start event is no occurred. Any event can be chosen among the list of defined events. By default only the Free run and Manual events are available. Additional events can be defined in the "Event Definition" shared resource. The start time corresponds to the zero of the waterfall time scale. By default start is set to “free run” this allows waterfall acquisition to start immediately after run.
- **Stop**: selects the event to stop the waterfall acquisitions. This setting selects the event, which ends acquisition that is to say data collection, does not operate after stop event occurred. Any event can be chosen among the list of defined events. By default only the Free run and Manual events are available. Additional events can be defined in the "Event Definition" shared resource.
- **Trigger**: selects the event that trigs waterfall acquisitions. This setting selects the event which trig acquisitions that is to say a new data collection occur each time trigger event occurred. If trigger is set to periodic (period 20ms) the Waterfall acquisition will operate as fast as possible, this can hang user interface during acquisitions. The first time a source is selected for the Waterfall, if trigger = Periodic, then the event corresponding to the availability of the source results is assigned to the trigger. Ex: Setting FFT1 spectra into the waterfall plug-in will set Trigger to ‘FFT1 result available’. By default the trigger is set to ‘Periodic’ with a period of 20.

List of events	Description
Manual	This event occurs when the user requests a manual trigger.
Events from Event module	see Event module
FFTx result available	This event is in the list if a signal is connected to an FFTx channel source. This event occurs when an FFT measurement starts. This event is generated at each calculation of a new spectrum in exponential averaging and at the end of averaging in linear.
Oct result available	This event is in the list if a signal is connected to an Octave channel source. This event occurs when an Octave measurement starts. This event is generated at each new spectrum calculated (every 256 samplings) for CBT, Fast, Slow, Impulse and exponential averaging. For the others averaging this event is generated at the end of averaging on t.
Order x result available	This event is in the list if a signal is connected to an Order x channel source. This event occurs when an Order x measurement starts. This event is generated at each calculation of a new spectrum in exponential averaging and at the end of averaging in linear.
Overall acoustic result available	This event is in the list if a signal is connected to an Overall acoustic channel source. This event occurs when an Overall acoustic measurement starts. This event is generated at each new spectrum calculated (every 256 samplings) for CBT, Fast, Slow, Impulse and exponential averaging. For the others averaging this event is generated at the end of averaging on t.
Periodic	This event simplifies the instrument setup by shortcutting periodic event activation. Selecting periodic for the trigger will make appears the period setting.

There is two ways to trigger the waterfall:

- The analyzer is running, it keeps in memory last measurements. Then with the waterfall you can select some specific results (for example for Δrpm or Δtime).
- The plug-in triggering, at the end of each average the plug-in send an event. The plug-in put the rhythm into the waterfall. This mode is the default mode.

1.6.2.4 Mode

Contains the settings related to the Waterfall display mode.

- **Mode**:

  Off: the Waterfall is inactive. This mode is useful to check your signal and your settings before the analysis.

  One shot: the Waterfall is active between ‘start’ and ‘stop’, there’s only one acquisition (for example: coast downs or run ups). The Waterfall ends on stop or when the number of slices is full.

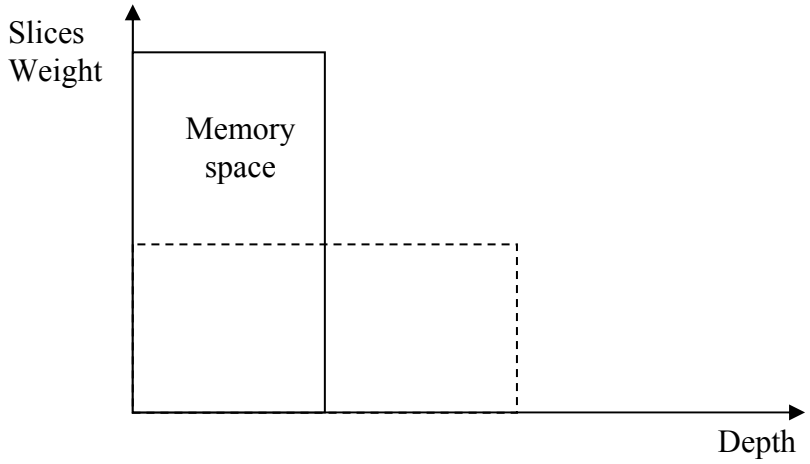
Continuous: this mode memorizes the n last slices (selected number of slices) before the stop event. This mode is similar to the 'time to stop' mode of the recorder. This mode is different from the monitoring; the continuous mode is storage of measurement (for example: detection of ultimate strain).

- **Number**: the number of Waterfall slices (from 2 to 100 000). If the Waterfall trigger is a Delta RPM event, the "Event number" of this Delta RPM event is assigned to the number of Waterfall slices. The waterfall depth is managed automatically, allowing the user to get the greatest slices/point number depending on the current available physical memory on the PC running NVGate. This functionality protects waterfall or profiles acquisition from memory overloads. That means the depth of the Waterfall is a function of slices weight (which depend on the type of analysis).

  For example with 512 Mb of RAM under windows XP™ it is possible to handle:

  - Up to 9800 spectra in the waterfall i.e. 1 channel * 9 800 slices or 4 channels * 2 400 slices.

  - In the same way with the Overall acoustic plug-in you can track up to 64 000 acquisitions on 16 channels.



The area is fixed. If the slices weight were important, then the depth would be small. In the 'stand alone' mode, the depth is limited (around 3 millions sampling per DSP) because of the memory size of the OR3x.
The area is function of the free memory space available when you select to use the Waterfall. The memory space has to be exactly the same during all the measurement that means the measurement could hang if you start another application on your computer during the measure.

Notes:

- **OVA**: if the waterfall trigger selected were « OvA Leq result available », the slices number would depend on durations (average duration « T » and short duration « t ») from the sub module Average in Overall acoustic.

Average type	Slices number
short Leq (t)	T/t
short Leq 1/8s	T/t
short Leq 1s	T/t
Linear, with repeat = End Of Averaging	T
Linear, with repeat != End Of Averaging	Independent

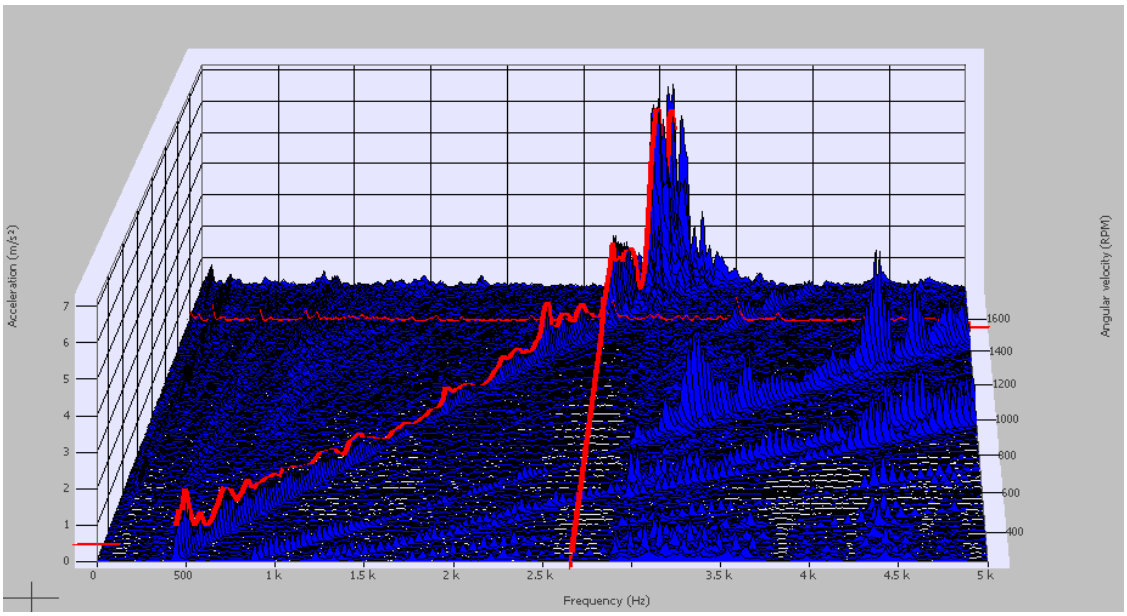
- **1/N Octave**: if the waterfall trigger selected were « Oct result available », the slices number would depend on durations (average duration « T » and short duration « t ») from the sub module Average in 1/N Octave.

Average type	Slices number
Linear, with repeat = End Of Averaging	T
Linear, with repeat != End Of Averaging	Independent
Repeat	T/t
Exponential	Indepedent
Constant BT	Independent
short Leq 1/8s	T/t
short Leq 1s	T/t
Fast	Independent
Slow	Independent
Impulse	Independent

The on line display uses more power and could slow displays; acquisitions stay real-time.

1.6.2.5 Windows (2D view, 3D view, color spectrum)

Waterfall display features different type of view of the stacked results. All views are related to the same 3D space:



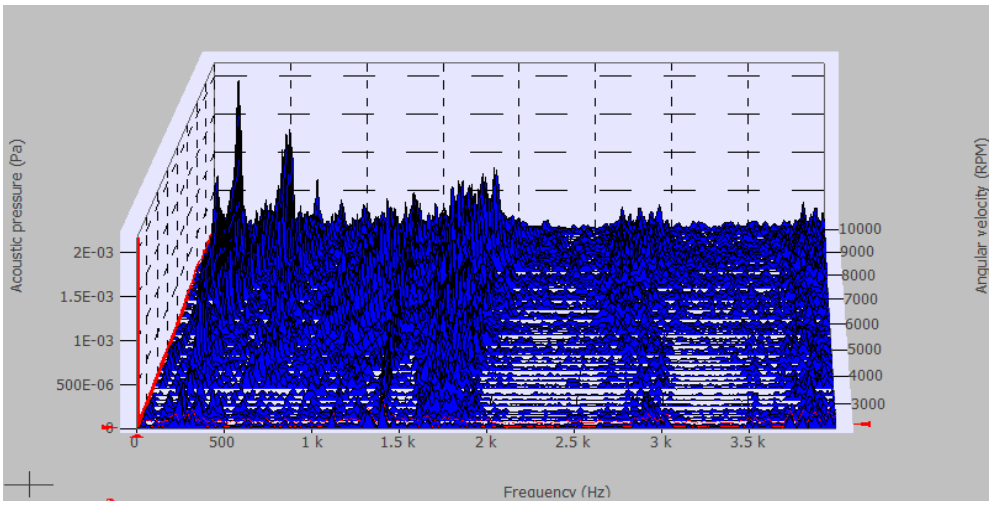
The Z-axis is the selected reference (RPM, time or number of slices in order of the acquisition) its range is the waterfall depth. You can change the reference for z-axis at any time. This is available for 2D and 3D view.

The Y-axis is the selected magnitude; this can be changed at any time

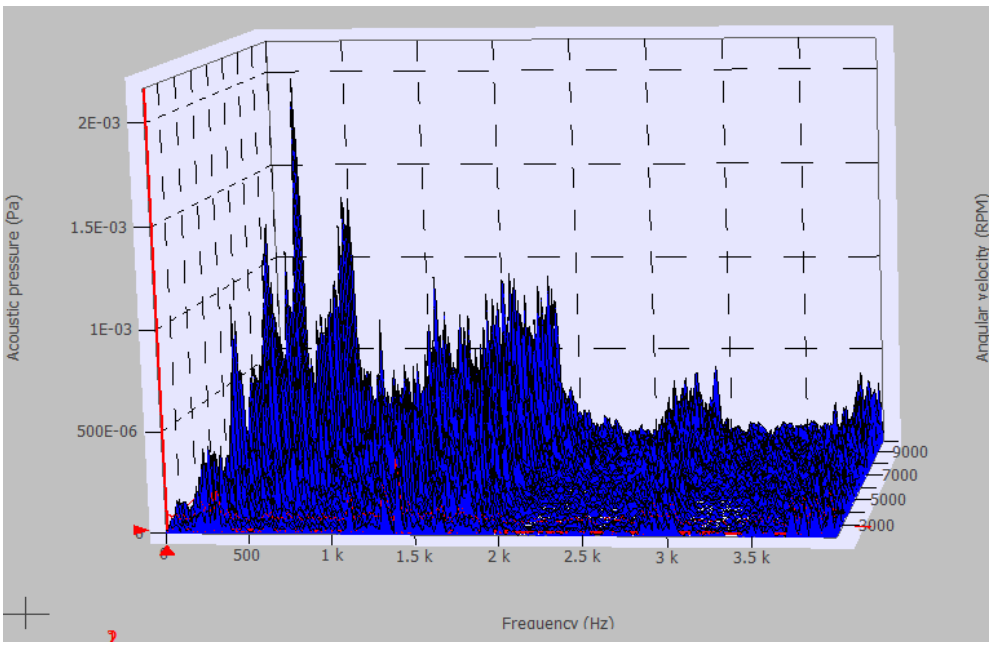
The X-axis is the frequency.

The 3D space can be displayed as:

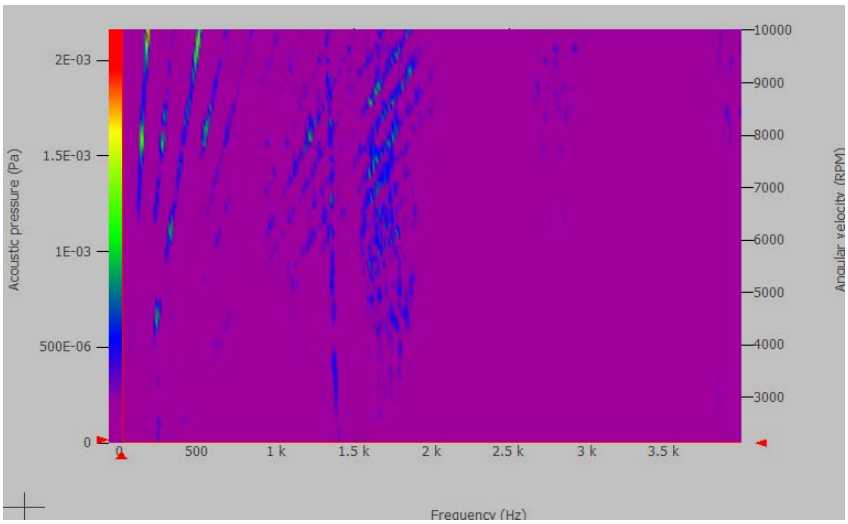
- 3D isometric



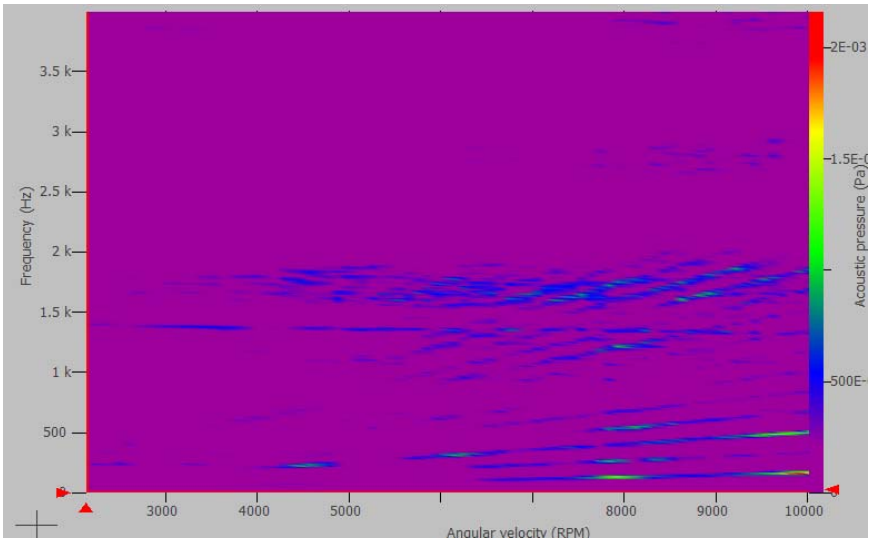
- 3D perspective:



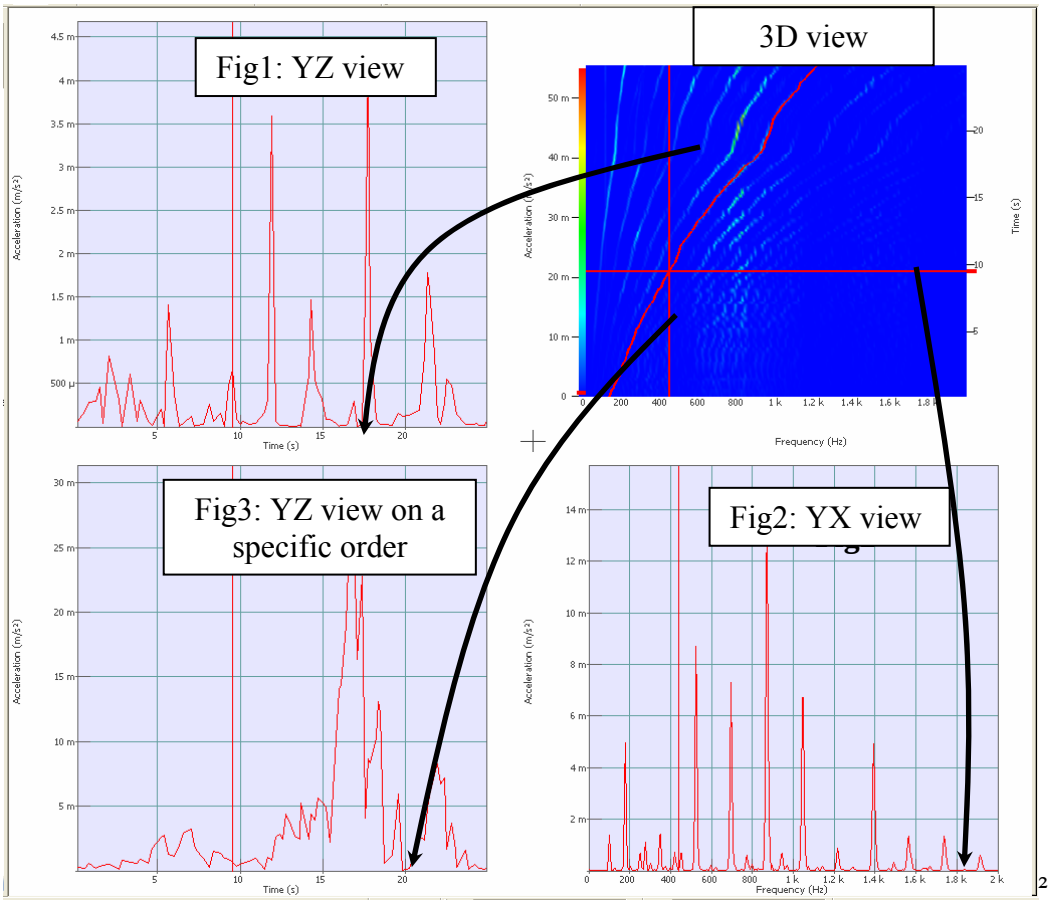
- Freq/Time Colormap:



- Time/Freq Colormap:



Waterfall display provides extraction of section from the 3D space

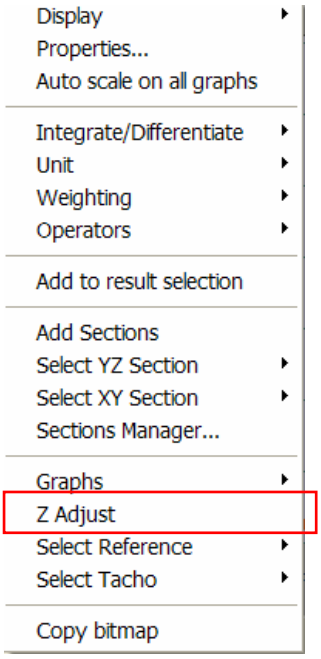


These sections are linked with cursors of the of the 3D view:

- **Fig1**: for a fixed value of the X-axis of the 3D view,
- **Fig2**: For a fixed value of the reference
- **Fig3**: for a fixed value of the order (follow the evolution of an order) or frequency for order spectra waterfall.

During the acquisition an autoscale is available on the z-axis (reference) if 'z Adjust' is active.

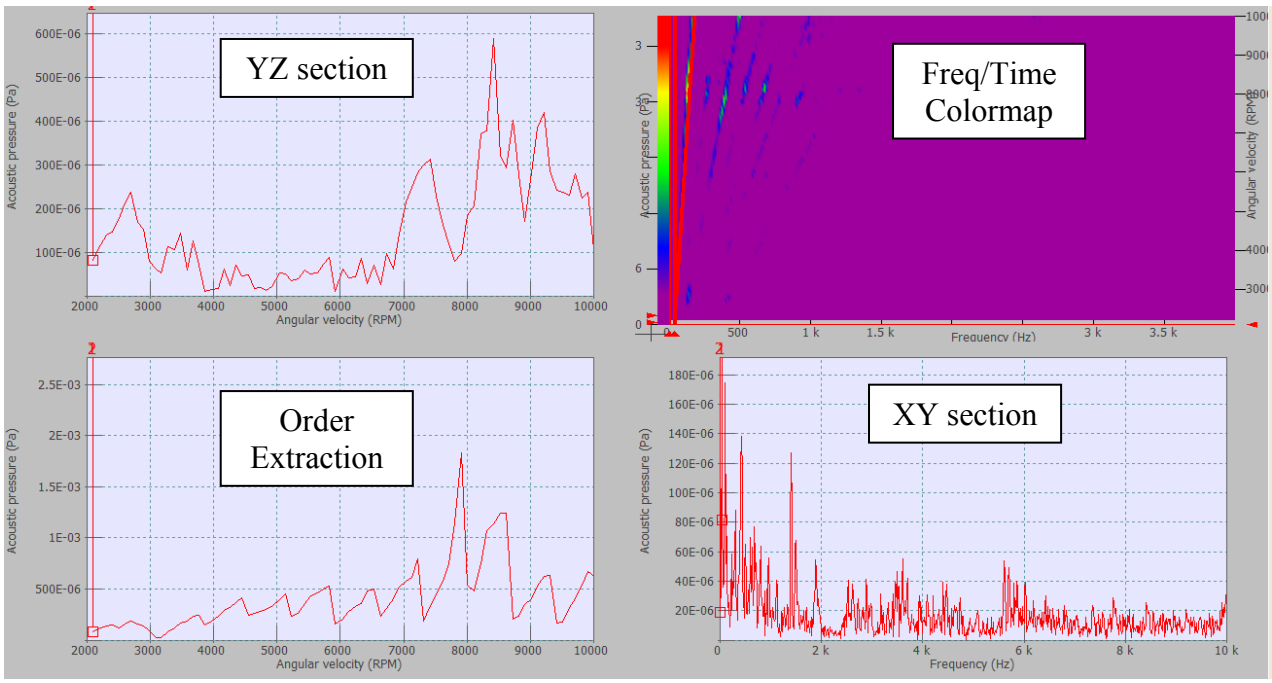
The 'Select Tacho' mode allows tracking an order in function of the selected tachometer. The extraction order could be done in function of the selected tacho.



4 Graphs are available for the windows allowing tracking different results:

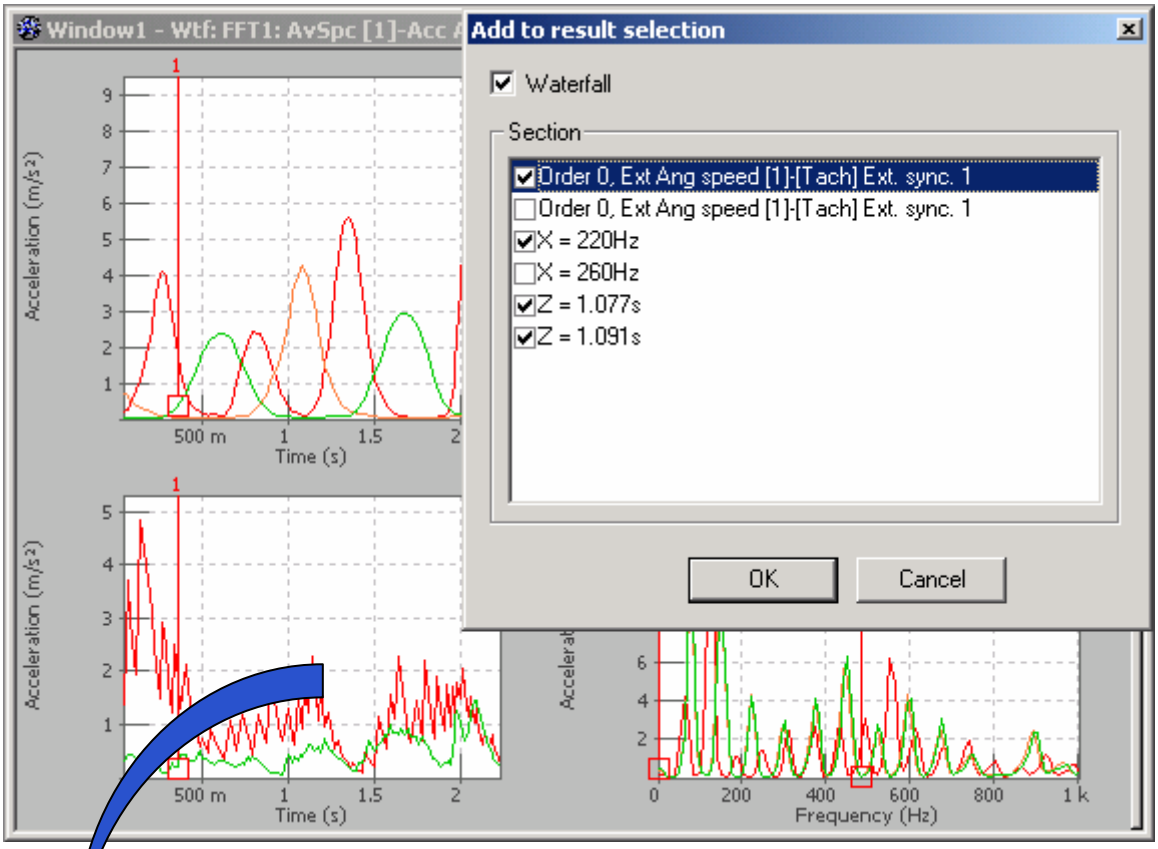
- 3D view: you can select by right-clicking on it an isometric view, a perspective view, a freq/time colormap or a time/freq colormap (useful to track orders). The 3D view is the default view.

- 2D views: - XY section,
  - YZ section,
  - Order extraction (only available if a tachometer is active).

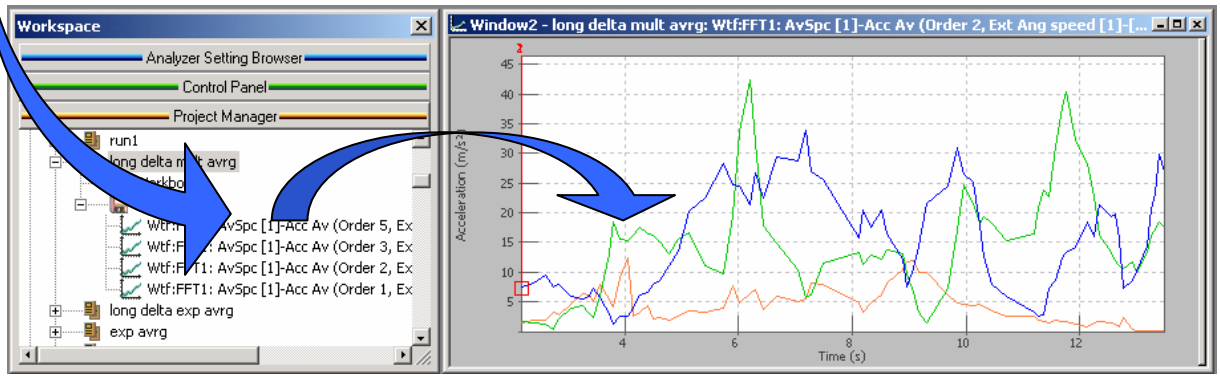


The sections are displayed in these 2D views. The sections can be managed in the section manager window (see waterfall window in chapter2 'Display').

In the section manager, add section made a copy of each cursor (Frequency, Reference, Order) in all displayed windows. These memorized traces could be added to result by the 'add to result selection.
The waterfall sections can be saved as independent results (spectra, reference profiles, extracted profiles).
The selection is achieved using the "Add to result selection" entry from the waterfall window contextual menu.



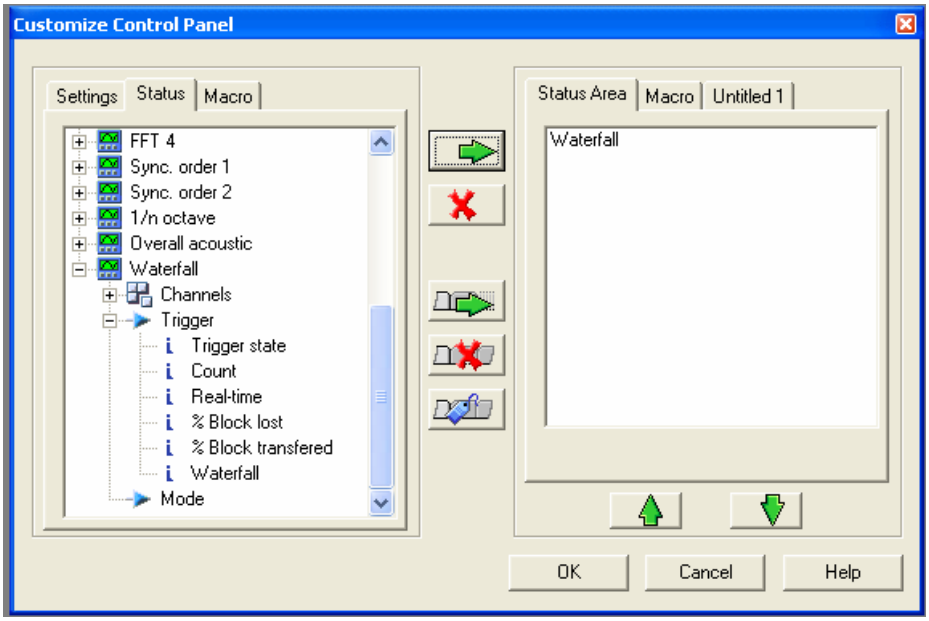
At this step, you can select the result to be saved from the list of available waterfall results.



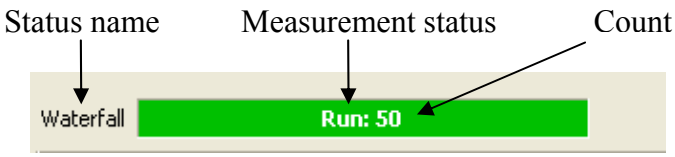
After being saved, the sections became independent results, reducing the amount of saved data when you are focusing only on extracted data.

1.6.2.6 Waterfall status

All statuses are available to add to the control panel



Waterfall



The current plug-in status is synthesized in a special progress-bar. This status bar is automatically displayed in the 'control panel' when the plug-in is active (i.e. as soon as at least 1 input is connected to the Waterfall plug-in). This status is called 'Waterfall' and it is available in the status ASB tree (see customize control panel).
This status displays the slice number acquired in the waterfall, the plug-in state (Run, Paused or Stop) and the real-time status.

The way the status bar is displayed, depends on the mode selected:

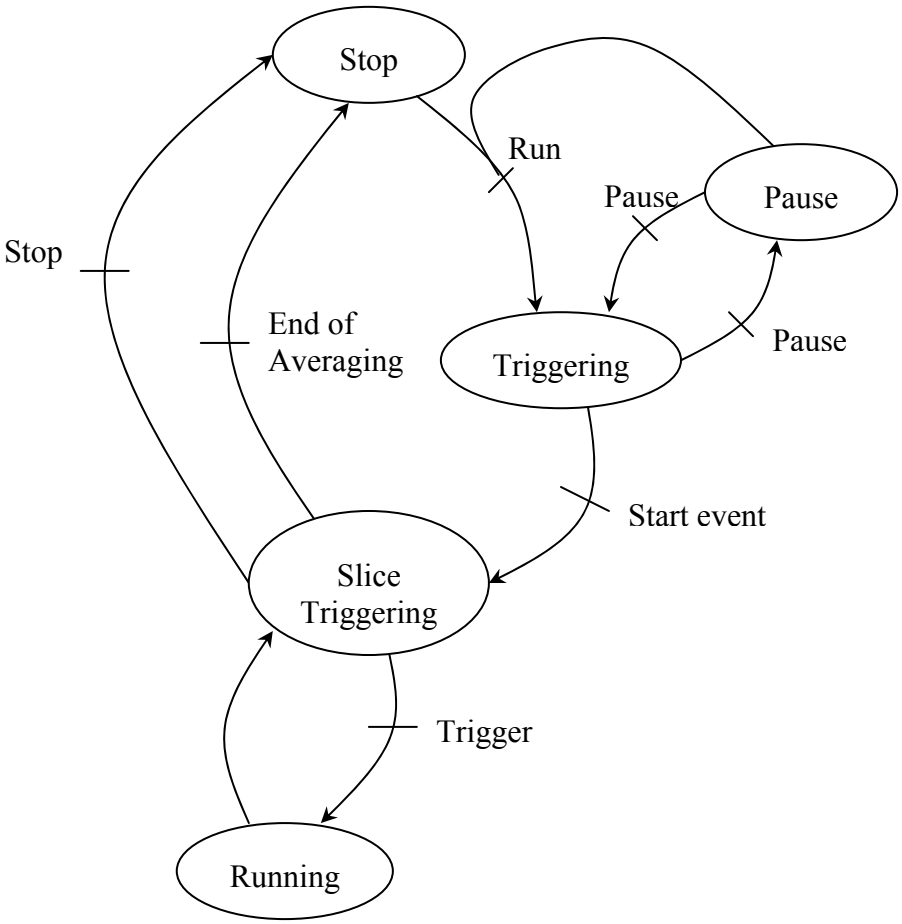
- 'One shot' mode: the progress bar is filled from left to right.
- 'Continuous' mode: the progress bar is filled from right to left with flashing until the end of the acquisition.
- 'Off' mode: the progress bar is empty with the text 'Off' inside.

The color of the bar and of the writing let you know what happens during the acquisition:

- *Green background and white or black text*: acquisition in real time.
- *Red background and white or black text*: the current acquisition is not real time.
- *Green background and red text*: the current acquisition is real time, but a previous acquisition was not real time.

Trigger State

The following scheme describes the different states of the measurement:



By default the trigger state is on ‘Stop’ and waiting for a ‘Run’ (start or trigger). Then the state become ‘Triggering’ and is waiting for a start event, the states become ‘Block Triggering’ and is now waiting for a trigger event for being in the ‘Running state.
The state is ‘Stop’ after a stop event or at the end of averaging.

Count

This status displays the averaging count, that total number of slices already acquired.

Real-time

This status displays if the averaging is in real-time or not (i.e. the current block is analyzed or not). If the corresponding signal were not available at this time, the acquisition is not real-time. That means that the treatment is longer than the acquisition. There are three values for this state:

- **‘OK’**: The acquisition is real-time.
- **‘No’**: One previous acquisition was not real-time.
- **‘-‘**: The acquisition is currently not real-time.

% Block lost

During an acquisition, results are stocked on the analyzer DSP in a buffer storage (limited to 4 MSample per DSP). If the depth of the waterfall is larger than this, then the PC must empty this buffer storage during acquisition (then the PC can store more results). The DSP to PC transfer takes place as soon as the waterfall acquisition starts depending on connection status (stand alone, poor quality). This process continuously empties the DSP memory. A block is lost if the DSP to PC transfer is not able to get it before the DSP memory is full.

In ‘one shot’ mode and for depth smaller than X the acquisition is preferred to the displaying, i.e. the display takes place at the end of acquisition

In ‘continuous’ mode or for depth larger than X, the displaying is preferred to the acquisition, in order to see quickly any change during the measurement, some block may be lost.

% Block transferred

This status displays the percentage of block that the PC could have recovered from the DSP buffer storage.
Note that: %Block lost + %Block transferred = 100%.

1.7 Control Panel

The configurable Workspace area provides quick access to settings and/or ASB status. It looks similar to the “Favorites” in Internet Explorer. The settings can be classified into customizable tabs. The Control Panel also contains general analyzer command buttons.

1.7.1 Overview

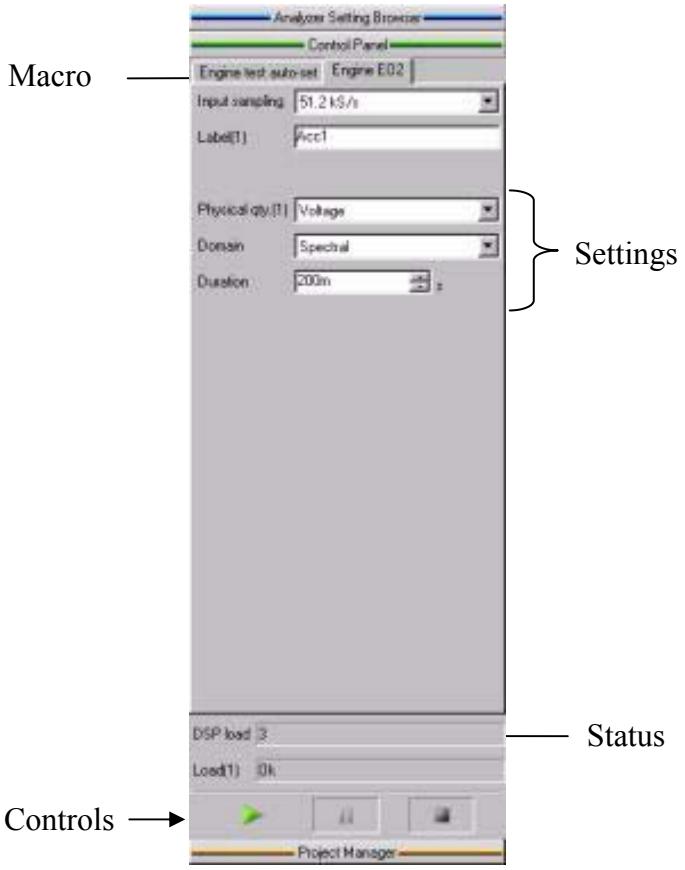
1.7.1.1 Areas

To configure the control panel, right click on the control panel and select Customize Control Panel or use the menu Tools \ Customize Control Panel (see chapter 6 “User interface, “Tools” topic).
By connecting any inputs to any plug-ins on the ASB, the corresponding progress bar will be displayed in the Control Panel.

1.7.1.2 Control buttons

The commands Run, Pause, and Stop are available at the bottom of the control panel.

1.7.2 Tabs



1.7.2.1 Setting

It is possible to create as many setting tabs as wanted. These tabs can contain settings or statuses (max 20).

1.7.2.2 Status

The status area is just above the buttons and is visible whatever a setting tab is selected. It can contain only statuses. Each time a plug-in is connected, the corresponding status bar is automatically added to the control panel.

1.7.2.3 Macro

This tab is dedicated to the “Macro” button.
See also the "Macro" topic from the Chapter 5: Tools

Chapter 2: Display

Table of contents:

2.1 Introduction 2-7
2.1.1 Add/remove 2-7
2.2 Display Window 2-8
2.2.1 Areas (infotrace, graph, scale) 2-8
2.2.1.1 Infotrace 2-8
2.2.1.2 Graph 2-9
2.2.1.3 Scale 2-9
2.2.2 Pointer type 2-9
2.2.2.1 Hand 2-9
2.2.2.2 Magnifying glass 2-9
2.2.2.3 Cursor 2-9
2.2.2.4 Scale scrolling 2-10
2.2.2.5 Rotation 2-10
2.2.2.6 Thumbtack 2-10
2.3 Contextual menu 2-11
2.3.1 Infotrace menu 2-12
2.3.1.1 Customize 2-12
2.3.1.2 Auto width 2-12
2.3.1.3 Copy marker table 2-12
2.3.1.4 Close 2-12
2.3.2 Graph menu 2-13
2.3.2.1 X zoom 2-13
2.3.2.2 Y zoom 2-13
2.3.2.3 Z zoom 2-13
2.3.2.4 X scale 2-14
2.3.2.5 Y scale 2-14
2.3.2.6 Z scale 2-14
2.3.2.7 3D view 2-15
2.3.2.8 Marker manager 2-17
2.3.2.9 User marker manager 2-18
2.3.2.10 Reset Min & Max 2-18
2.3.3 Window menu 2-19
2.3.3.1 Display 2-19
2.3.3.2 Properties 2-23
2.3.3.3 Select trace 2-23
2.3.3.4 Remove trace 2-23
2.3.3.5 Memorize trace 2-23
2.3.3.6 Clear memory 2-24
2.3.3.7 AutoMemorize 2-24
2.3.3.8 Auto scale Y on all 2-24
2.3.3.9 Cascade view 2-24
2.3.3.10 Integrate/Differentiate 2-25
2.3.3.11 Unit 2-26
2.3.3.12 Weighting 2-26
2.3.3.13 Operators 2-28
2.3.3.14 Add to Result selection 2-33
2.3.3.15 Copy graph(s) 2-33
2.3.3.16 Copy bitmap 2-33

2.3.3.17 Copy data 2-33
2.3.3.18 Copy to Result template 2-34
2.3.3.19 Add Alarm 2-34
2.3.3.20 Waterfall window menu 2-36
2.4 Graph type 2-41
2.4.1 Time 2-41
2.4.1.1 Source signals (plug-in/process) 2-41
2.4.1.2 Properties 2-42
2.4.2 Spectral 2-44
2.4.2.1 Source Signals 2-44
2.4.2.2 Properties 2-45
2.4.3 Lissajous 2-48
2.4.3.1 Source Signals 2-48
2.4.3.2 Properties 2-49
2.4.4 Nth octave 2-50
2.4.4.1 Source Signals 2-50
2.4.4.2 Properties 2-50
2.4.5 Viewmeter 2-52
2.4.5.1 Source Signals 2-52
2.4.5.2 Properties 2-53
2.4.6 Monitoring 2-55
2.4.6.1 Source Signals 2-55
2.4.6.2 Properties 2-55
2.4.7 Compressed signal 2-56
2.4.7.1 Source Signals 2-56
2.4.7.2 Properties 2-57
2.4.8 Profile 2-58
2.4.8.1 Source Signals 2-58
2.4.8.2 Properties 2-59
2.4.9 Complex profile 2-60
2.4.9.1 Source Signals 2-60
2.4.9.2 Properties 2-61
2.4.10 Coherence 2-64
2.4.10.1 Source Signals 2-64
2.4.10.2 Properties 2-64
2.5 Scale 2-66
2.5.1 Scale mode 2-66
2.5.1.1 Toolbar button 2-66
2.5.1.2 Axis operation 2-66
2.5.2 Axis properties 2-66
2.5.2.1 Min 2-66
2.5.2.2 Max 2-67
2.5.2.3 Type 2-67
2.5.2.4 Scale type 2-67
2.5.2.5 Enable/disable zoom 2-67
2.6 Cursors 2-68
2.6.1 Style 2-68
2.6.1.1 Vertical line 2-68
2.6.1.2 Vertical dashed line 2-68
2.6.1.3 Vertical with rectangle 2-69

2.6.1.4 Cross hair 2-69
2.6.1.5 Vertical + horizontal 2-69
2.6.2 Dual 2-70
2.6.3 Link 2-71
2.6.4 Waterfall link 2-72
2.6.4.1 Link 2-72
2.6.4.2 Link by reference 2-72
2.6.5 Free 2-72
2.7 Markers 2-73
2.7.1 Free 2-74
2.7.1.1 Free marker properties 2-74
2.7.2 Harmonic 2-76
2.7.2.1 Harmonic marker properties 2-76
2.7.3 Peak 2-78
2.7.3.1 Peak marker properties 2-78
2.7.4 Max 2-81
2.7.4.1 Max marker properties 2-81
2.7.5 Side band 2-84
2.7.5.1 Side band marker properties 2-84
2.7.6 Power band 2-86
2.7.6.1 Power band marker properties 2-86
2.7.7 Octave 2-87
2.7.7.1 Octave marker properties 2-87
2.7.8 Copy marker 2-88

2.1 Introduction

This section explains all the functions and information you can find in the graphs, windows, infotrace. The Display chapter also contains the information relative to the scales, graphic modes, display modes and the contextual menus.

2.1.1 Add/remove

Allows to display the measurement results of the active plug-in analyzers.
There are 2 ways to display the Add/Remove window:

- From the **Window** menu.
- From the **Window** toolbar.

The maximum number of traces, windows and layout available are:

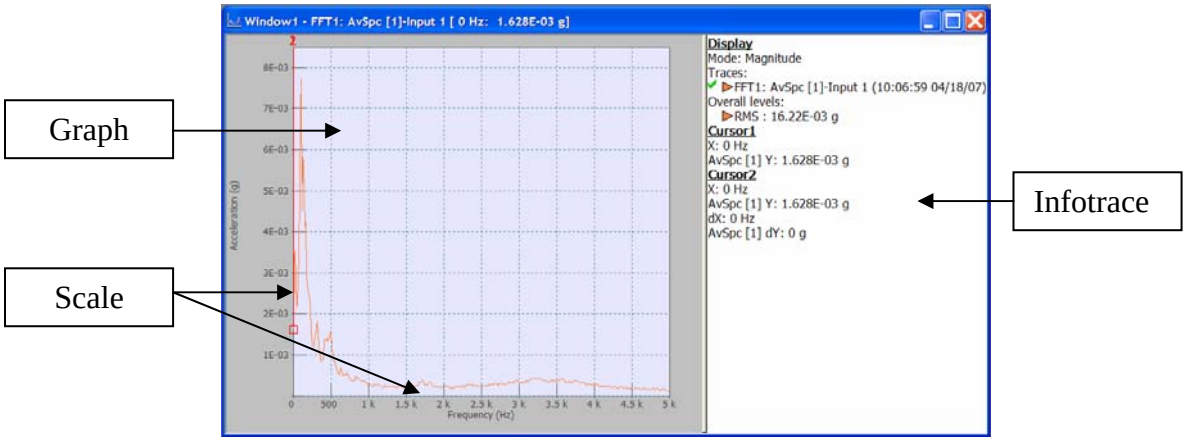
- 32 Traces per Window
- 32 Windows per Layout
- 16 Layouts per project.

2.2 Display Window

The windows allow to display signal traces. They can contain several traces in the same graph (multi-trace display) or several graphs (multi-graph display). The windows can display 1D graphs (viewmeter, RPM monitoring), 2D graphs (profiles, signal recording) or 3D graphs such as Waterfall display.

2.2.1 Areas (infotrace, graph, scale)

All the window areas described below are right clickable so the user can choose the active trace, apply an operator or change the scales.

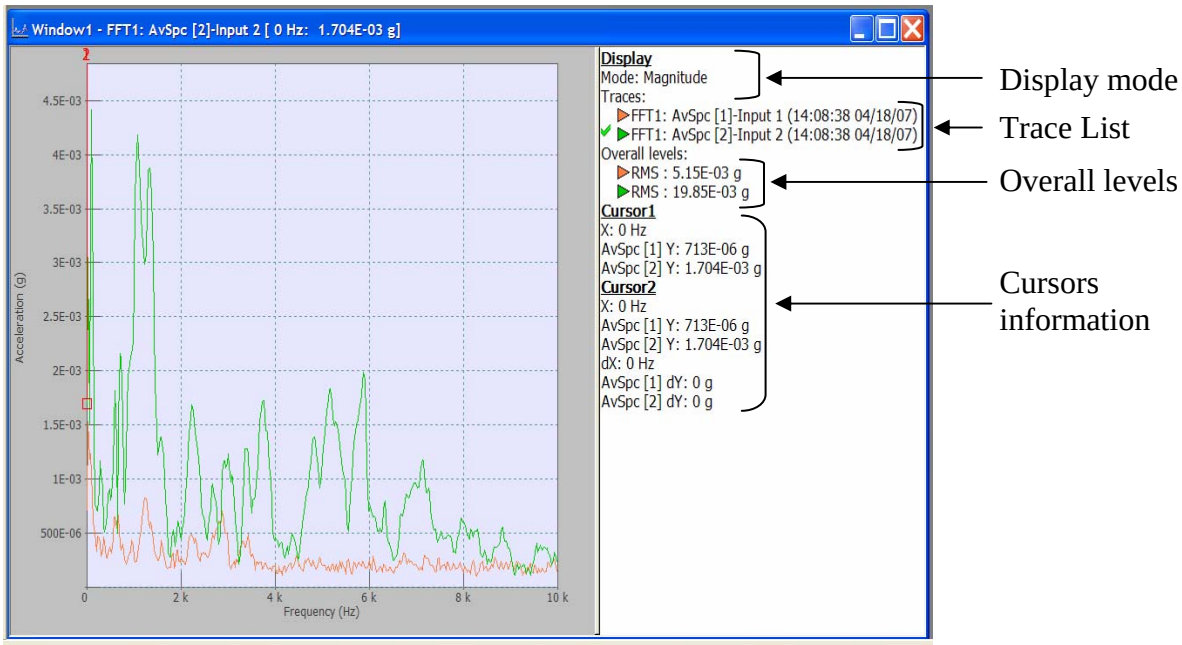


2.2.1.1 Infotrace

Displays information about the graph:

- **Graph mode:** magnitude, real...
- **List of traces with their states:** available or not / displayed in all areas or not / not displayed. You can move into the infotrace to select a specified trace and to follow cursor's value of this trace. Memorized traces are also displayed in the list (Memx)
- **Overall levels:** Displays the RMS level in 2D windows containing spectra or time signals.
- **Cursor information:** x, y, order, dx, dy if available
- **Marker arrays**

Using arrays of you keyboard you can select the active trace in the infotrace.



2.2.1.2 Graph

Displays computed traces. It can be multi-trace or multi-graph.

2.2.1.3 Scale

Displays the magnitude and the grid of the graph

2.2.2 Pointer type

2.2.2.1 Hand

Displayed when ‘move mode’ is selected. Used to change x and y scale boundaries by left clicking and dragging.

2.2.2.2 Magnifying glass

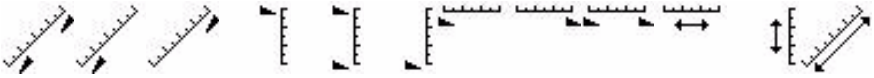
Displayed when the magnifying tool is selected: Used to select a rectangle in a graphic area, or to zoom in with a by left clicking and dragging.

2.2.2.3 Cursor

Displayed when cursor mode is selected: Used to move the cursor by left clicking and dragging.

2.2.2.4 Scale scrolling

Displayed when scale mode is selected and when the cursor is on a scale area. See cursor toolbar for details.



2.2.2.5 Rotation

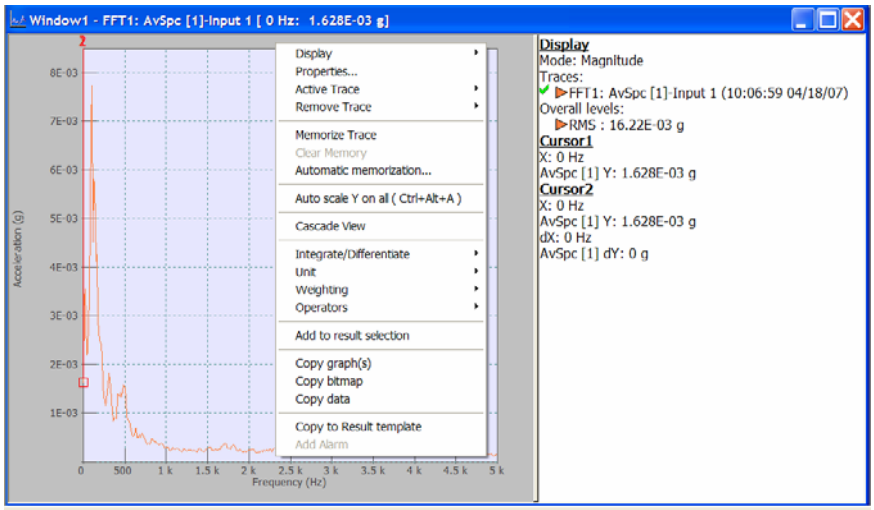
Displayed when the rotation tool is selected: Used to rotate a 3D graph.

2.2.2.6 Thumbtack

Displayed on the Outlook bar control, used to select a pane by left-clicking.

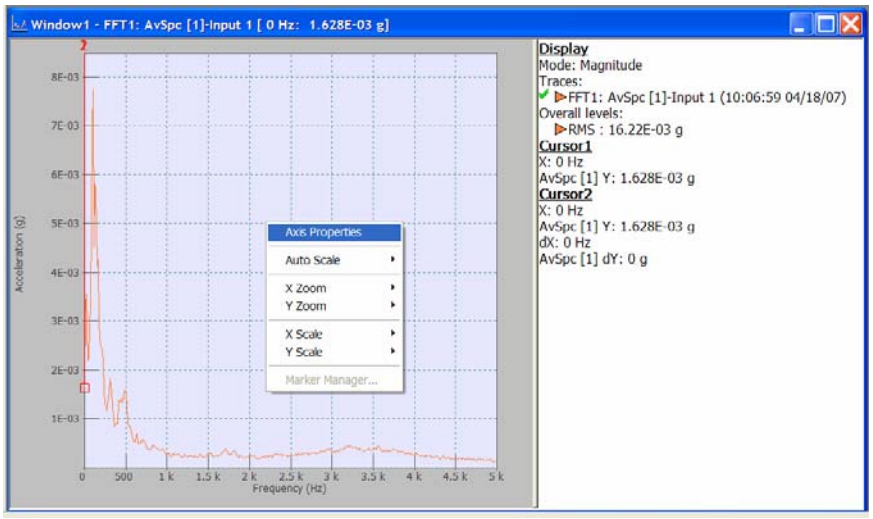
2.3 Contextual menu

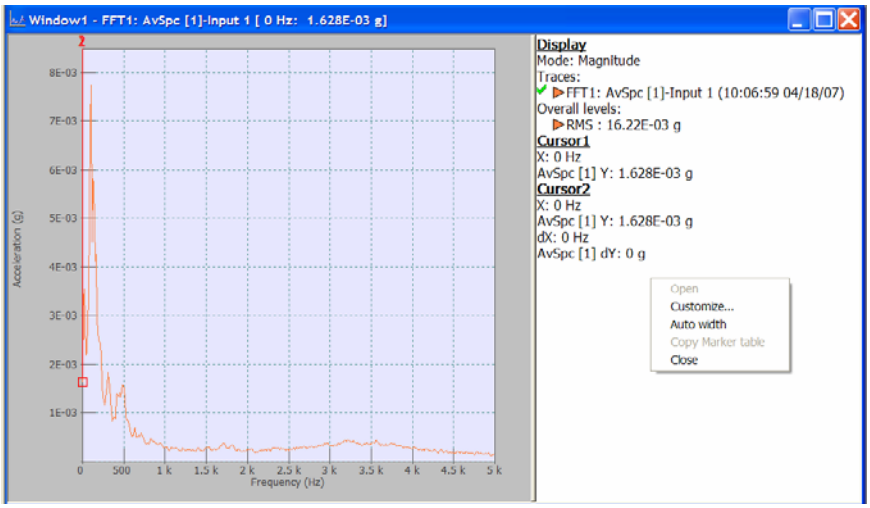
Apply any action to the displayed traces and/or graphs by using the contextual menus on the selected area.



Right Click on the window

Right Click on the graph





Right Click on the infotrace

2.3.1 Infotrace menu

2.3.1.1 Customize

From the Infotrace, right click and select Customize.

This dialog box is used to select the information to be displayed in the infotrace (cursor coordinates, marker values…).
All checked items are displayed, unchecked items are not displayed.

- **Select All:** Selects all items
- **Unselect All:** Unselects all items
- **Ok:** Applies the changes and closes the dialog box.
- **Cancel:** ignores the changes and closes the dialog box.

2.3.1.2 Auto width

Sets the Infotrace area width to the width of the largest element currently displayed.

2.3.1.3 Copy marker table

Copies the marker table content to the clipboard in Excel format, in order to paste it in Excel. Each column/line of the table becomes a column/line in the Excel sheet.
See the “Copy marker” topic p 2-88 for more details about the marker table copy.

2.3.1.4 Close

Hides the Infotrace area.

2.3.2 Graph menu

2.3.2.1 X zoom

All of these functions are available if there is no active X automatic autoscale.

- **Zoom in:** Zoom in on the horizontal scale by placing the cursor position in the center.
  If the center is at the minimum value, you may not zoom. You may zoom if the X scale width is greater than the active signal precision in X.
- **Zoom out:** Zoom out from the horizontal scale by placing the cursor position in the center.
  If the center is at the minimum value, you may not zoom. You may zoom if Z min and max values are included in the min and max value gap defined by the active signal of the window. Full width.
  Restores the X min and max values defined by the active signal of the window.
- **Auto-scale:** Set min and max values of the X scale to the X min and max values of the active signal for the “On active” item and to the X min and max values of all signals of the window for “On all” item. A margin is added to these values to facilitate visibility. The X width is always more than X active signal precision.

2.3.2.2 Y zoom

- **Zoom in:** Used to zoom in on the vertical scale. You may zoom in if the scale width is greater than the active signal precision in Y.
- **Zoom out:** Used to zoom out from the vertical scale. You may zoom in if min and max values are included in Y min and max value gap defined by the active signal of the window. Full width:
  Restores the Y min and max values defined by the active signal of the window.
- **Auto-scale:** Sets min and max values of the Y scale to the Y min and max values of the active signal for the “On active” item and to the min and max values of all signals of the window for “On all” item. A margin is added to these values to facilitate visibility. The Y width is always more than Y active signal precision.

2.3.2.3 Z zoom

All of these functions are available if there is no active X automatic autoscale.

- **Zoom in:** Used to zoom in on the Z scale. You may zoom if the scale width is greater than the active signal precision in Z.
- **Zoom out:** Used to zoom out from the Z scale. You may zoom if min and max values are included in Z min and max value gap defined by the active signal of the window.

- **Full width:** Restores the Z min and max values defined by the active signal of the window.
- **Auto-scale**: Sets min and max values of the Z scale to the Z min and max values of the active signal. A margin is added to these values to facilitate visibility. The Y width is always greater than Y active signal precision.

2.3.2.4 X scale

Changes X scale type of the area to the selected type. Available types (according to the kind of the area) are:

- Linear
- Logarithmic

2.3.2.5 Y scale

Changes Y scale type of the area to the selected type. Available types (according to the kinds of the area and the window) are:

- Linear
- Logarithmic
- DB

2.3.2.6 Z scale

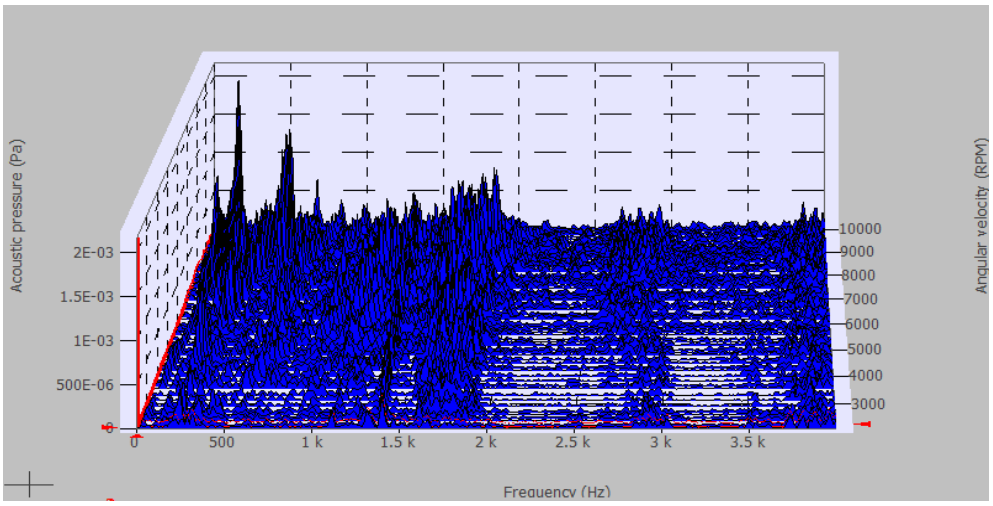
Changes Z scale type of the area to the selected type. Available types (according to the kinds of the area and the window) are:

- Linear
- Logarithmic
- DB

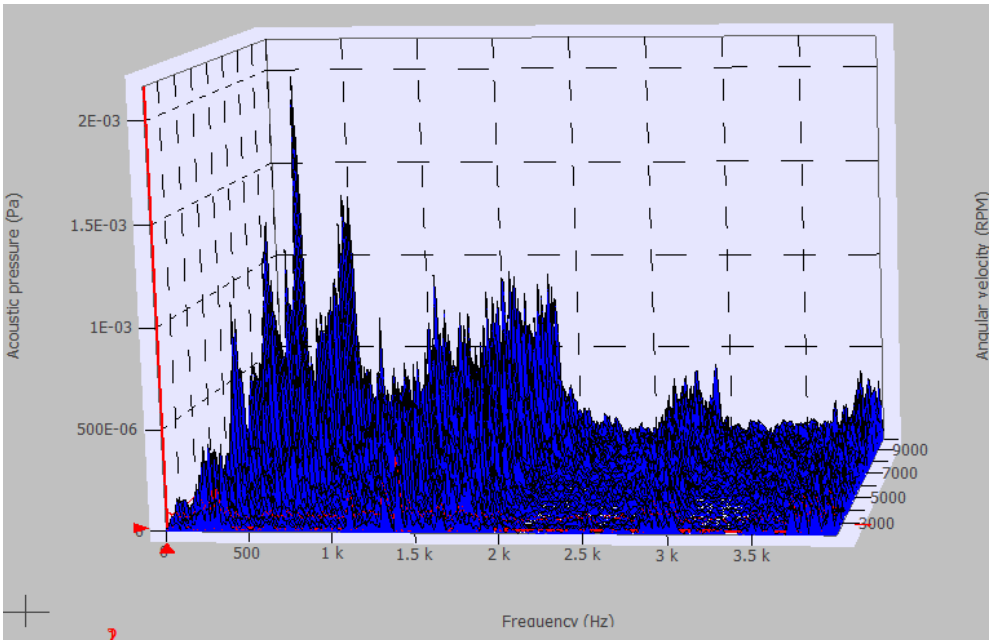
2.3.2.7 3D view

There are 4 different views only available in 3D Waterfall areas.

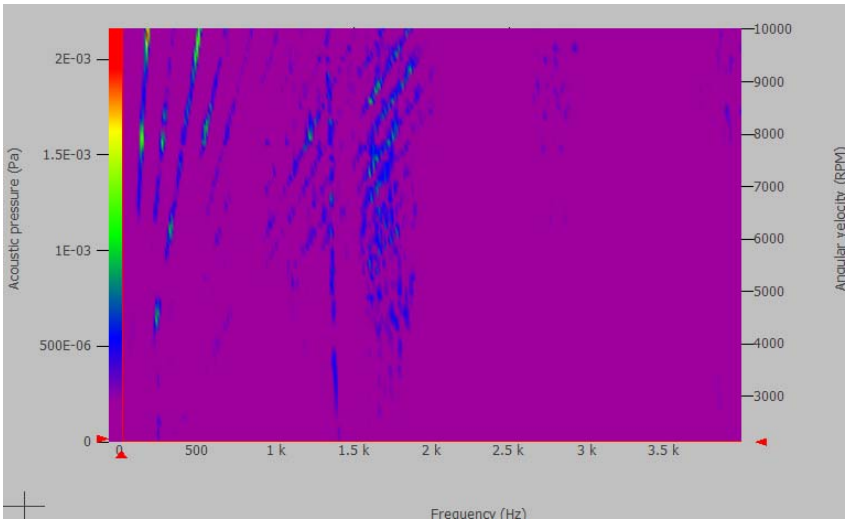
- 3D isometric



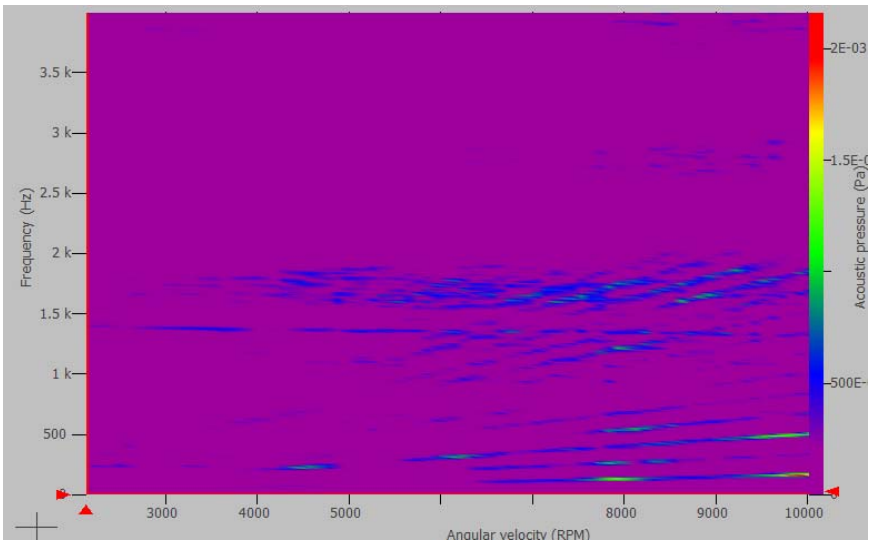
- 3D perspective:



- Freq/Time Colormap:

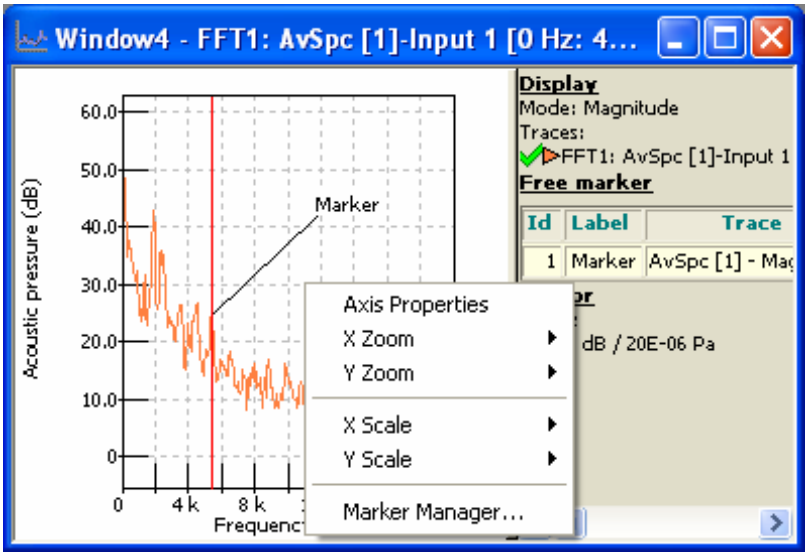


- Time/Freq Colormap:



2.3.2.8 Marker manager

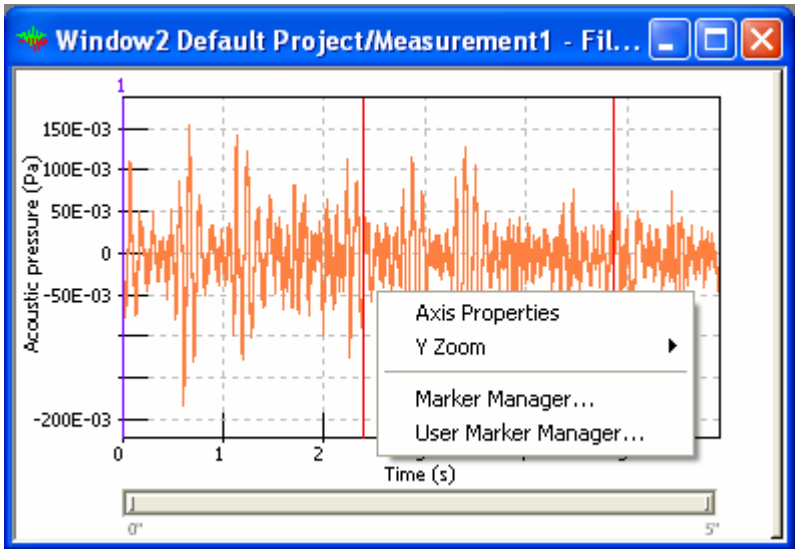
Gives the list of all the markers in the window, except record markers. In this dialog box, any window marker can be removed or modified.

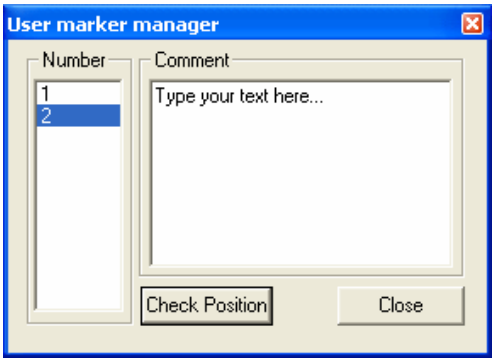


- **Select All:** Checks all the items of the list
- **Unselect All:** Uncheck all the items of the list.
- **Remove:** Removes all checked markers from the window
- **Properties:** Displays the properties dialog of the active marker of the list.

2.3.2.9 User marker manager

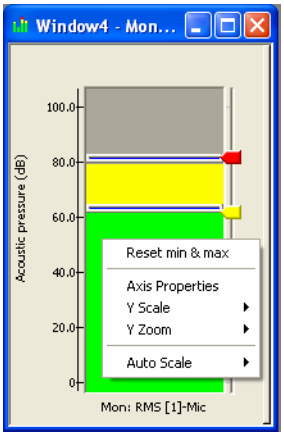
This dialog is only available for the Monitoring and Compressed windows. It contains the list of all record markers of the record signal opened. In the monitoring window, each record marker comment can be modified. In the compressed window, comments cannot be modified.





2.3.2.10 Reset Min & Max

Restores min and max values for the selected scale



2.3.3 Window menu

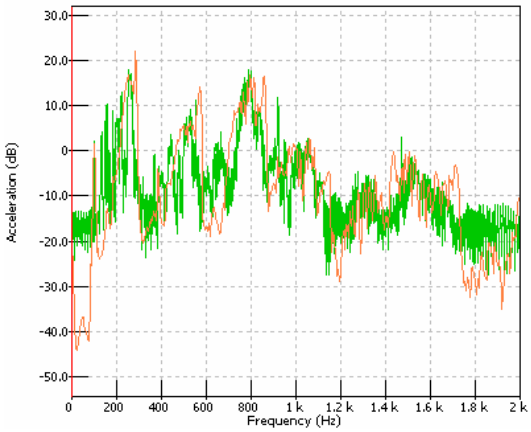
2.3.3.1 Display

In each window, several display modes are available, depending on the graph type.

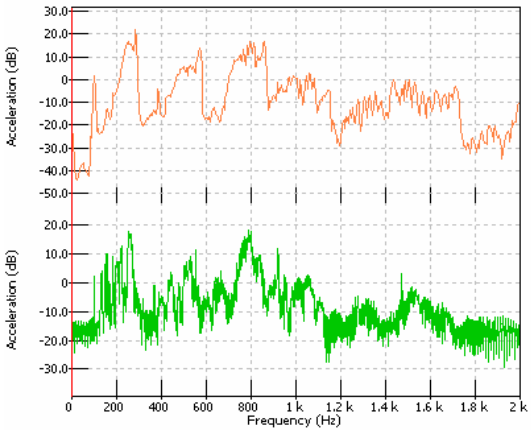
Graph type	Display mode
Time signal	Multi-trace Multi-graph Time multi-trace 3D
Spectral	Magnitude Phase Real part Imaginary part Magnitude/Phase Real/Imaginary Polar Real part 3D Imaginary part 3D Magnitude 3D Phase 3D Real part multi-graph Imaginary part multi-graph Magnitude multi-graph Phase multi-graph Merged magnitude/phase
Nth Octave	Multi-trace Multi-graph
Viewmeter/Monitoring	Continuous Viewmeter Brick Digital Digital magnitude & phase
Waterfall	Magnitude Phase Real part Imaginary part
Monitoring/Compressed signal	Multi-graph (Only one mode available)
Profile	Multi-trace Multi-graph
Complex profile	Magnitude Phase Real part Imaginary part Magnitude/Phase Real/Imaginary Real part multi-graph Imaginary part multi-graph Magnitude multi-graph Phase multi-graph Merged magnitude/phase

Lissajoux	Multi-trace (Only one mode available)
Constant Band Tracking	Magnitude Phase Real part Imaginary part Magnitude/Phase Real/Imaginary Real part multi-graph Imaginary part multi-graph Magnitude multi-graph Phase multi-graph Merged magnitude/phase

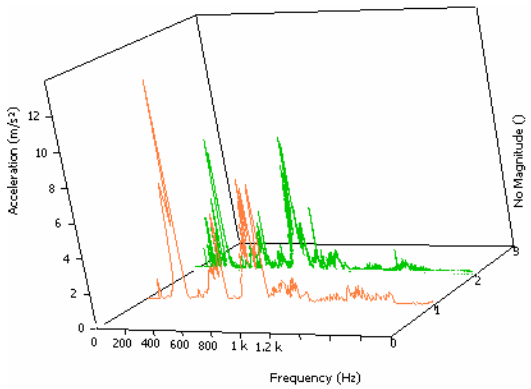
- **Multi-trace:** This mode displays all window traces of the same type in one graph. In several window types, two multi-trace graphs are displayed in the same window: for example, one for the Real part and one for the imaginary part. In this mode, a **magnitude gathering mode** can be activated in the set preferences window: this mode displays signals by creating one area for each Y magnitude included in the window. If two or more signals have the same Y magnitude, they will be displayed in the same area.



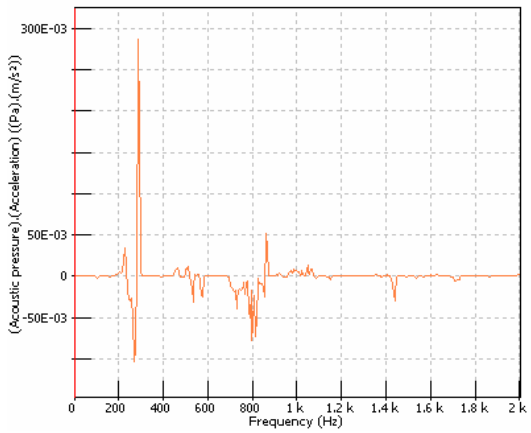
- **Multi-graph:** This mode displays one graph per trace in the window.



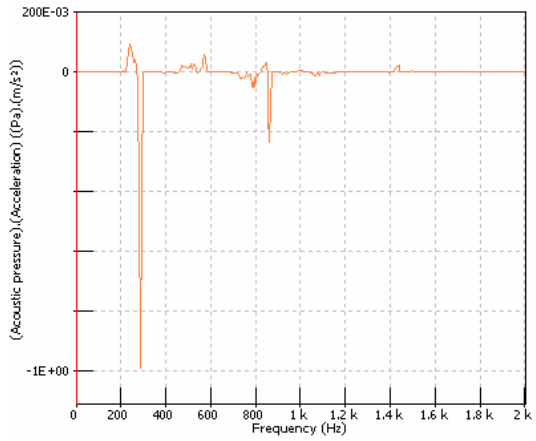
- **Multi-trace 3D:** This mode displays all traces in the same 3D graph.



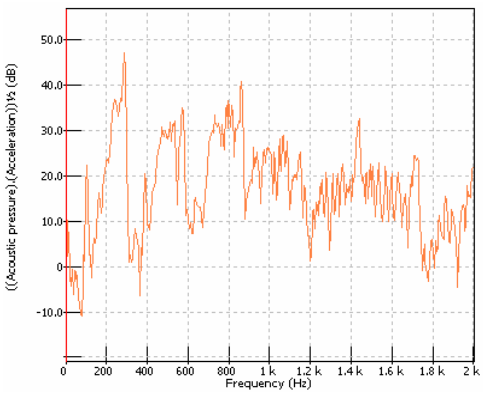
- **Real part:** This mode displays the real part of the signal. It can be displayed in multi-trace, multi graph, or multi-trace 3D, depending on the graph type.



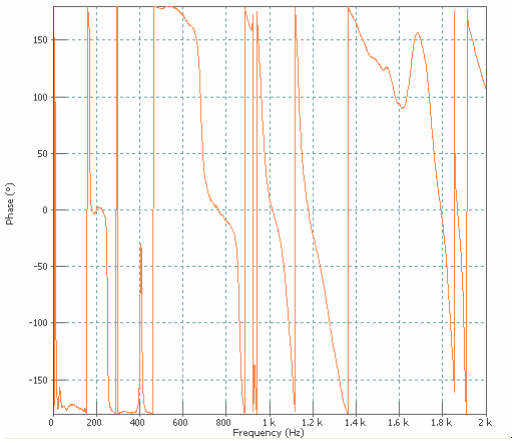
- **Imaginary part:** This mode displays the imaginary part of the signal. It can be displayed in multi-trace, multi graph, or multi-trace 3D, depending on the graph type.



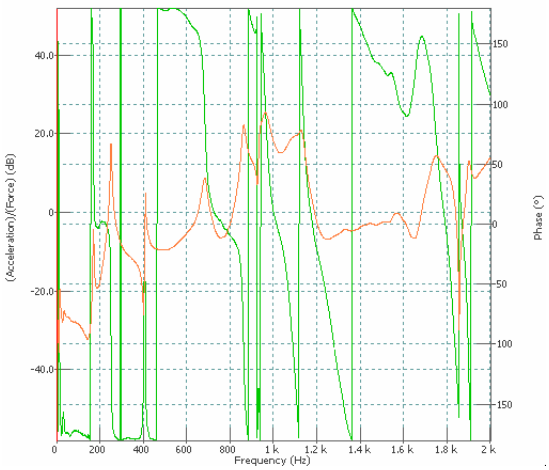
- **Magnitude:** This mode displays the magnitude of the signal. It can be displayed in multi-trace, multi graph, or multi-trace 3D, depending on the graph type.



- **Phase:** This mode displays the phase of the signal. It can be displayed in multi-trace, multi graph, or multi-trace 3D, depending on the graph type.



- **Merged magnitude/phase:** This mode displays the magnitude and the phase of the signal in the same area. This is a multi-trace mode. The module scale is on the left of the graph and the phase scale is on the right.



2.3.3.2 Properties

See “Graph type” topic p 2-41.

2.3.3.3 Select trace

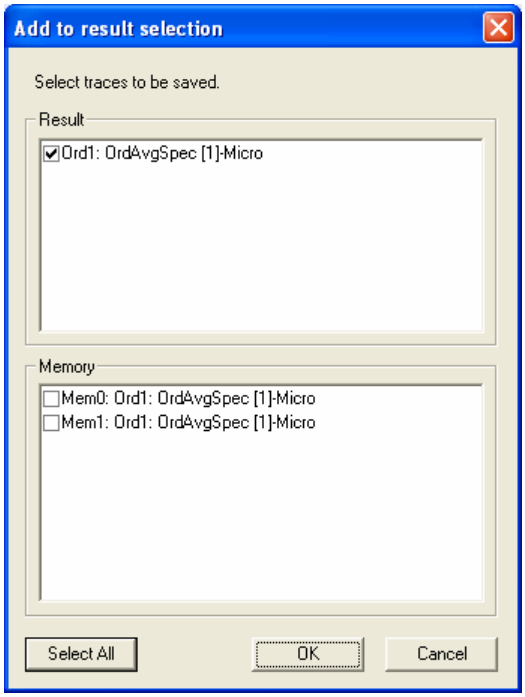
Select the active trace of the window. When the signal changes, the Y scale is updated to the Y magnitude of the signal. Only signals with the same Y magnitude as the active signal are displayed. The others are displayed as unavailable in the info-trace.
The color of the cursor corresponds with the trace’s color; you can select in the infotrace the active trace and its linked cursor using arrays of the keyboard.

2.3.3.4 Remove trace

Removes selected trace from the window. If this trace is the active one, the active signal is changed. A trace can be removed using ‘Ctrl suppr’.

2.3.3.5 Memorize trace

Memorizes the active trace of the active window at any time (independently from Run and Stop event).
The memorized trace is named *Memx: active trace name.* There’s an incrementation of the memorized traces id (x). You can save the memorized traces by adding it to the result selection.

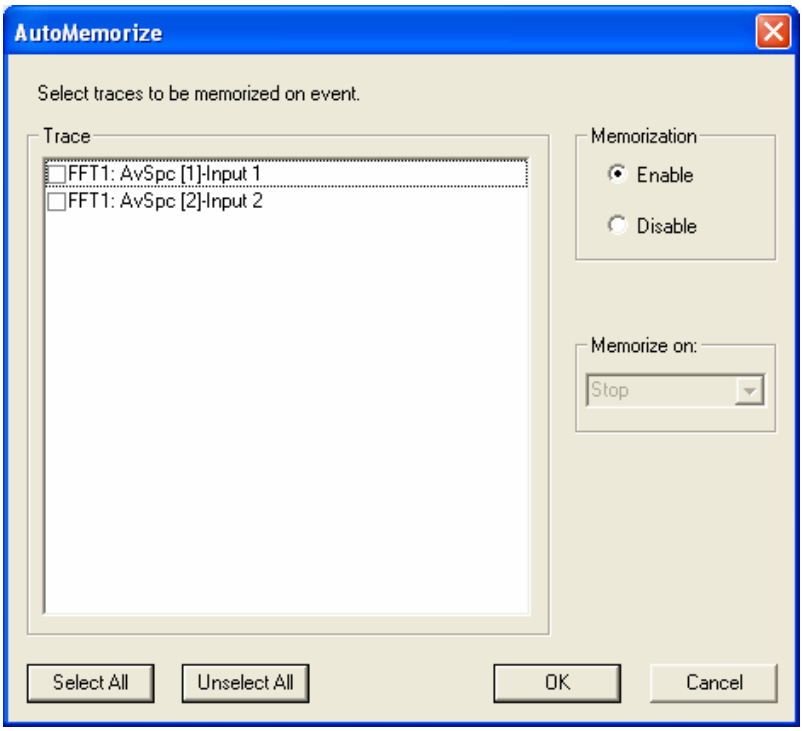


Note: you can memorize an active trace by using the insert button of the keyboard.

2.3.3.6 Clear memory

Clear all memorized traces. You can remove specific memorized traces with the ‘Remove trace’ command.

2.3.3.7 AutoMemorize



‘AutoMemorize’ traces consists in memorizing traces on the stop event (Start event, Stop event…). Select the graph to be memorized.

By using an operator on an active trace and his associated memorized traces is available by right-clicking on the graphs and selecting ‘operators’. This operator will be automatically updated if a memorized trace is added or deleted (see also operators).

During a multi-run, the average on automatic memorized trace is done automatically for each run, and the average trace is automatically updated.

2.3.3.8 Auto scale Y on all

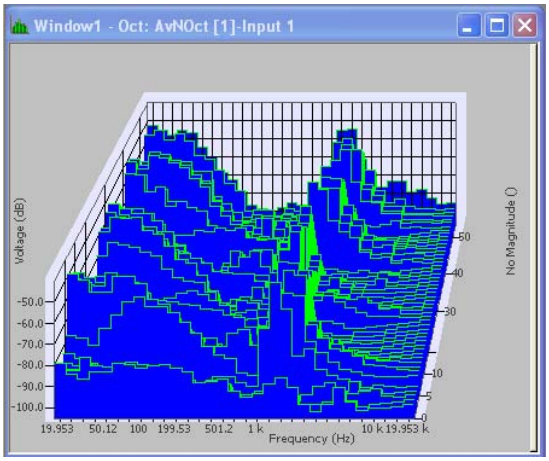
Sets min and max values of the Y scale to the Y min and max values of all signals displayed in the graph. A margin is added to these values to facilitate visibility. The Y width is always more than Y active signal precision.

2.3.3.9 Cascade view

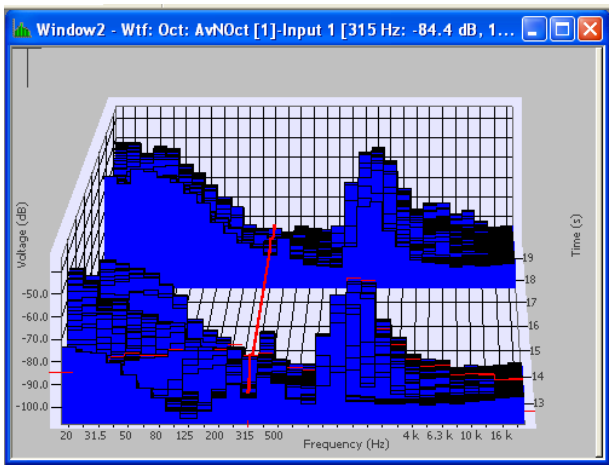
Present the current active trace in a cascade view of the last 50 (default value) recovered results.
This is dedicated for monitoring used, this is not a waterfall (acquisition mode in real-time). The Z-axis represents the number of slices independently from any reference such as time or RPM evolution.

This function is available only for 2D spectra and trigger blocks.

Warning: if you are in manual trigger, or if there is an absence in the time, you won't be able to notice it with the cascade view. In the following example, a pause has been made during the measurement; on the waterfall 3Dview (with time for reference) it is possible to see this pause. In the cascade view the pause won't be noticed (number of block for reference).



Cascade View



Waterfall 3D view

2.3.3.10 Integrate/Differentiate

These commands are available only for results with an X-Axis that represents frequency lines. The operations are performed in the spectral domain.

- **Normal:** No operation is performed on the data
- **dt:** The result is integrated, so that acceleration becomes velocity. The formula used is:

$$\text{val_dt} = \frac{val}{j\omega}$$

- **dt²:** The result is integrated twice, so that acceleration becomes displacement. The formula used is:

$$\text{val_dt2} = \frac{val}{(j\omega)^2}$$

- **dx/dt:** The result is derived, so that velocity becomes acceleration. The formula used is:

$$\text{val_dx/dt} = \text{val} \times (j\omega)$$

- **dx/dt²:** The result is derived twice, so that displacement becomes acceleration. The formula used is:

$$\text{val_dx/dt2} = \text{val} \times (j\omega)^2$$

2.3.3.11 Unit

These commands are available only for results with an X-Axis that represents frequencies. The operations are performed in the spectral domain

- **RMS:** Provides the RMS (EU) value. This is the default unit.
- **Peak:** It is based on a sine signal, and therefore equal to 1.414 times the RMS value.
- **Peak-Peak:** It is based on a sine signal, and therefore equal to 2.828 times RMS value.
- **EU²:** Means Square value.
- **PSD (EU²/Hz):** Calculates the Power Spectral Density of the result. The formula used is:

$$\text{val_PSD} = \frac{val^2}{ENBW \times Frequency_resolution}$$

  Where ENBW is the Equivalent Noise Band Width that takes into account the weighting windows (1 for Rectangular, 1.5 for Hanning, 1.36 for Hamming, 3.77 for Flat top) and *val* the RMS value.

- **ESD (EU²/Hz²):** Calculates the Energy Spectral Density of the result. The formula used is:

$$\text{val_ESD} = \frac{val^2}{ENBW \times Frequency_resolution^2}$$

  Where ENBW is the Equivalent Noise Band Width that takes into account the weighting windows (1 for Rectangular, 1.5 for Hanning, 1.36 for Hamming, 3.77 for Flat top) and *val* the RMS value.

- **RMS PSD (EU/Hz$^{1/2}$):** Calculates the RMS Power Spectral Density of the result. The formula used is:

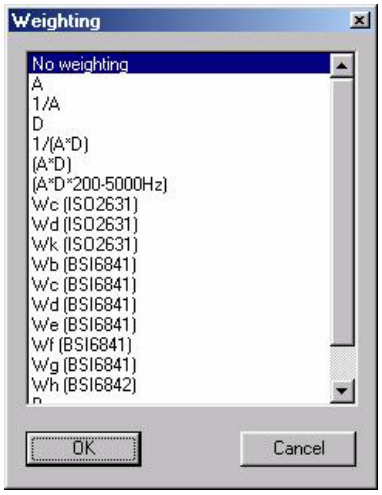
$$\text{val_RMSPSD} = \frac{val}{(ENBW \times Frequency_resolution)^{1/2}}$$

  Where ENBW is the Equivalent Noise Band Width that takes into account the weighting windows (1 for Rectangular, 1.5 for Hanning, 1.36 for Hamming, 3.77 for Flat top) and *val* the RMS value.

2.3.3.12 Weighting

These commands are available only for results with an X-Axis that represents frequencies. The operations are performed in the spectral domain

- **None:** No weighting is applied.
- **A Weighting:** Selects the “A” weighting
- **More:** Used to select specialized weighting



See more details about Weightings in chapter “Appendix 2, Weighting Windows and Filters”.

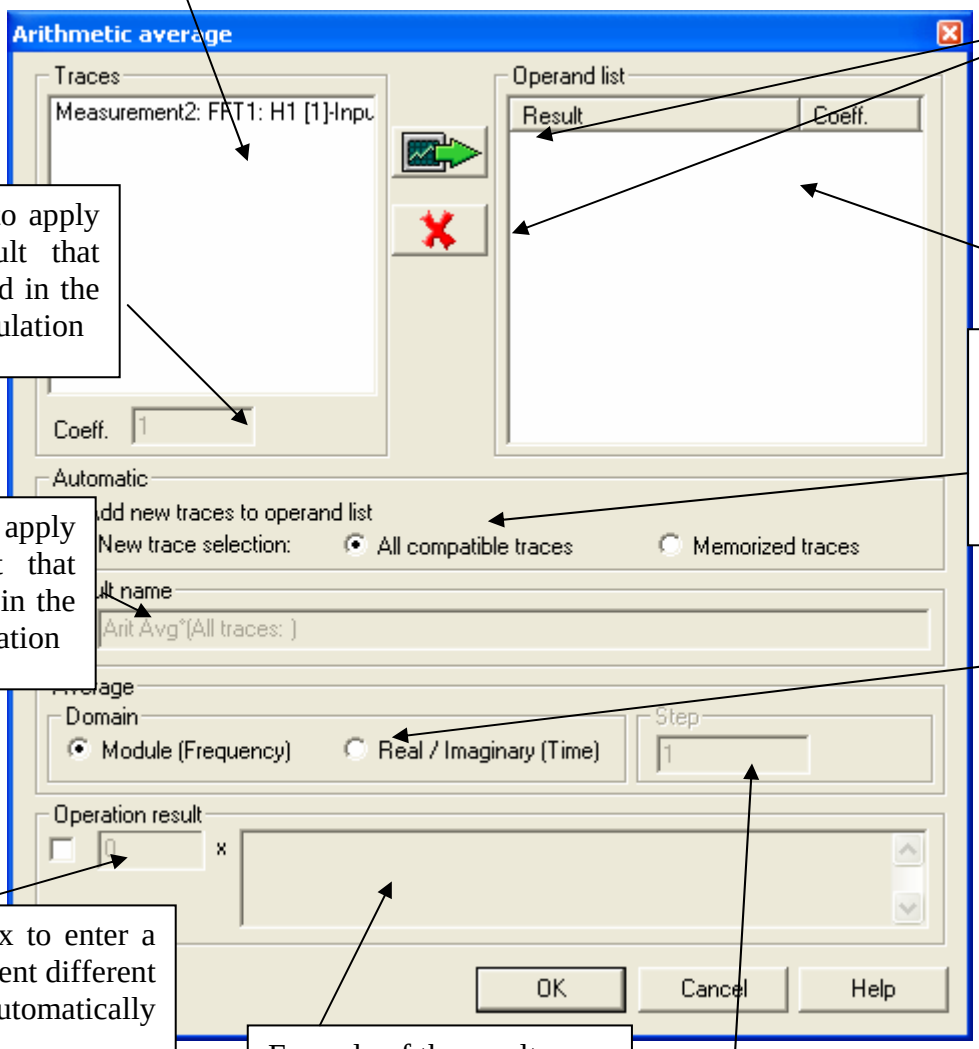
2.3.3.13 Operators

Operators are used to perform calculations using various results. All kind of operators (Arithmetic average, Quadratic average, Linear comparison or dB comparison) is available for any type of results

- **Arithmetic average:** This dialog box is designed to create a new result which is the arithmetic average of several results. This average can be calculated only for results that are in the same window. They must also have the same x-Axis definition.

List of the available results. Once a result has been added to operand list, only the one compatible are displayed. To be compatible, the results must have the same X-axis and unit.

Button to add or remove a result in the operand list.



List of results selected, with the coefficient that is applied to it.

Coefficient to apply on the result that will be added in the average calculation

By checking this box, the operand will be automatically updated if the user add or remove compatible traces

Coefficient to apply on the result that will be added in the average calculation

In case of complex result, the operation can be performed either on the module or the real and imaginary part. In the first case, it corresponds to an average in the frequency, while the second corresponds to an average in the time domain.

Check this box to enter a global coefficient different than the automatically calculated one

Formula of the results

The step is the step between interpolated points that the user defined.

The formula of the calculated result is:

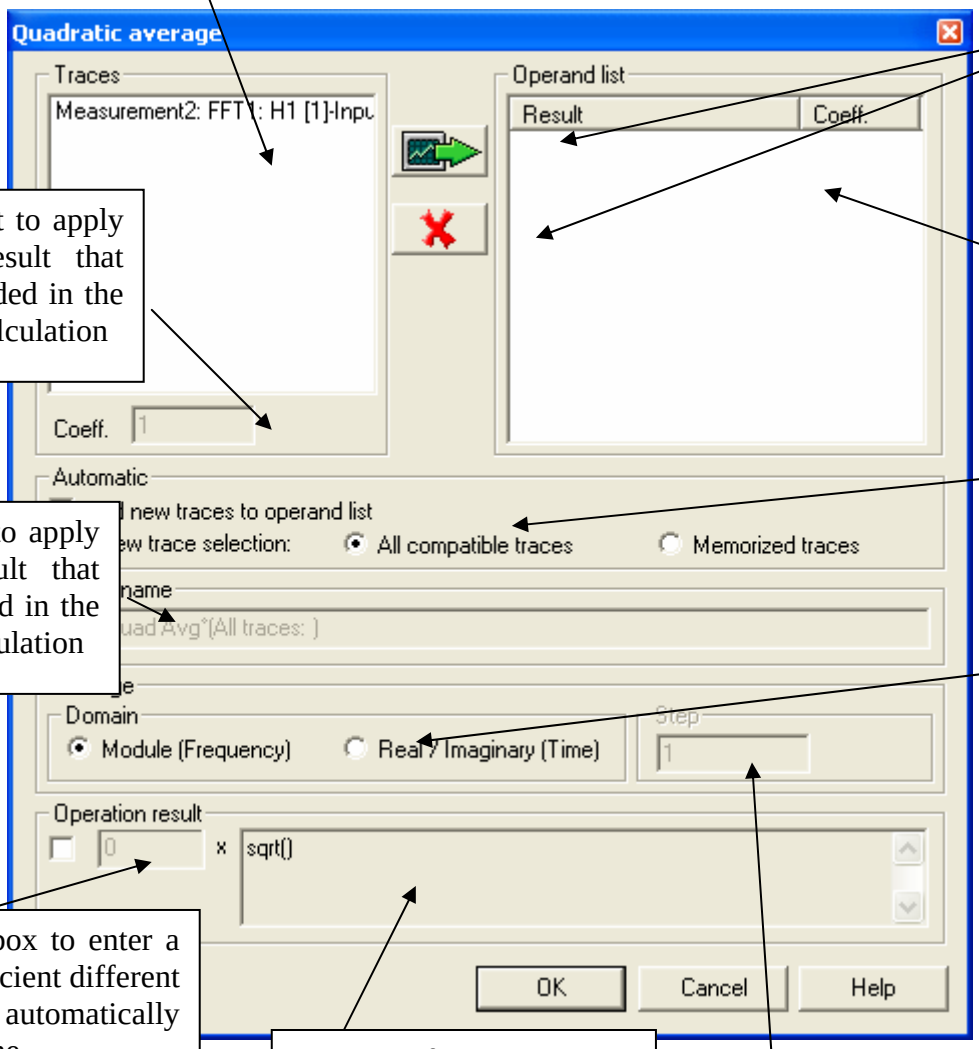
Average_Result = Q × (C1×Result_1 + C2×Result_2 + ... + Cn×Result_n)

The default values of C1, C2...Cn are 1 and the default value of Q is (C1+C2+...+Cn)/n, but all these coefficients can be modified.
To set the C_i coefficient, fill in the "Coef" value and then add one or several results with the button .
To set the Q coefficient, add up all results, check the box below "Operation result", and enter the value.

- **Quadratic average:** This dialog box is designed to create a new result, which is the quadratic average of several results. This average can be calculated only for results that are in the same window. They must also have the same x-Axis definition.

List of the available results. Once a result has been added to operand list, only the one compatible are displayed. To be compatible, the results must have the same X-axis and unit.

Button to add or remove a result in the operand list.



List of results selected, with the coefficient that is applied to it.

Coefficient to apply on the result that will be added in the average calculation

By checking this box, the operand will be automatically updated if the user add or remove compatible traces

Coefficient to apply on the result that will be added in the average calculation

In case of complex result, the operation can be performed either on the module or the real and imaginary part. In the first case, it corresponds to an average in the frequency, while the second corresponds to an average in the time domain.

Check this box to enter a global coefficient different than the automatically calculated one

Formula of the results

The step is the step between interpolated points that the user defined.

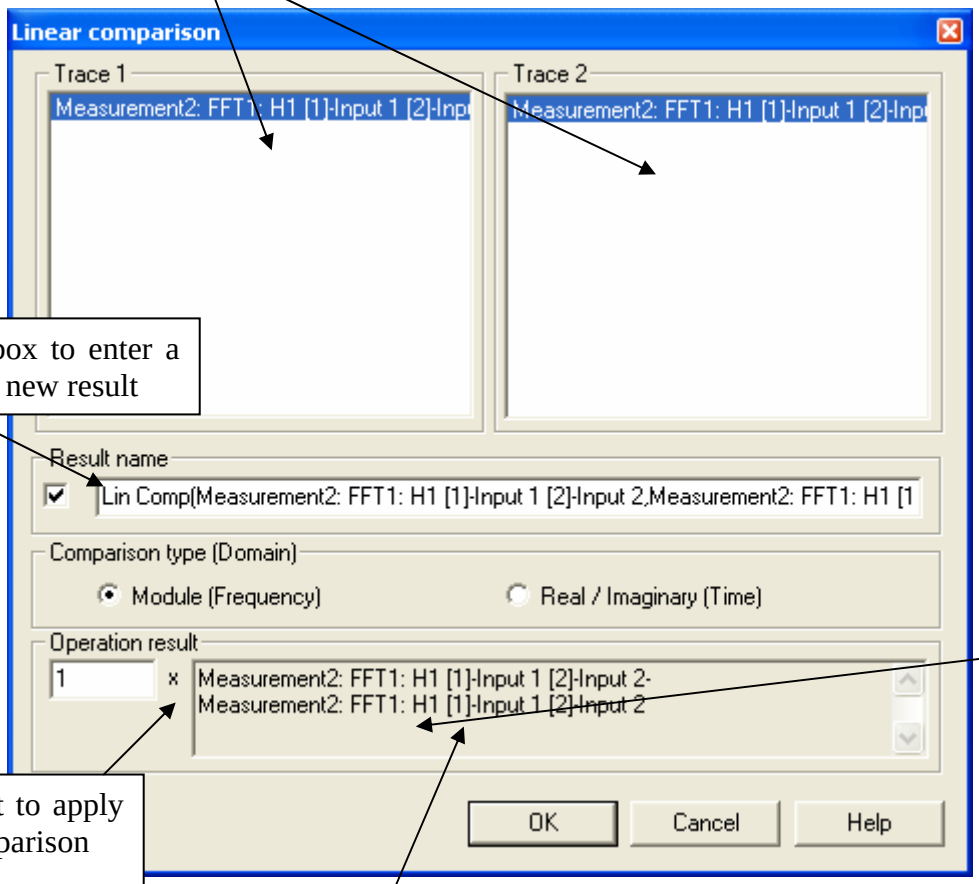
The formula of the calculated result is:

Average_Result = Q × [(C1×Result_1² + C2×Result_2² + ... + Cn×Result_n²)]½

The default values of C1, C2...Cn are 1 and the default value of Q is 1, but all these coefficients can be modified.
To set the C_i coefficient, fill in the "Coef" value and then add one or several results with the button .
To set the Q coefficient, add up all your result, check the box below "Operation result", and enter the value.

- **Linear comparison:** This dialog box is designed to create a new result, which is the comparison of 2 results. This operation can be calculated only for results that are in the same window. They must also have the same x-Axis definition.

List of the available results. Once a result has been added to operand list, only the one compatible are displayed. To be compatible, the results must have the same X-axis and unit.



Check this box to enter a name for the new result

In case of complex result, the operation can be performed either on the module or the real and imaginary part. In the first case, it corresponds to an average in the frequency, while the second corresponds to an average in the time domain.

Coefficient to apply to the comparison

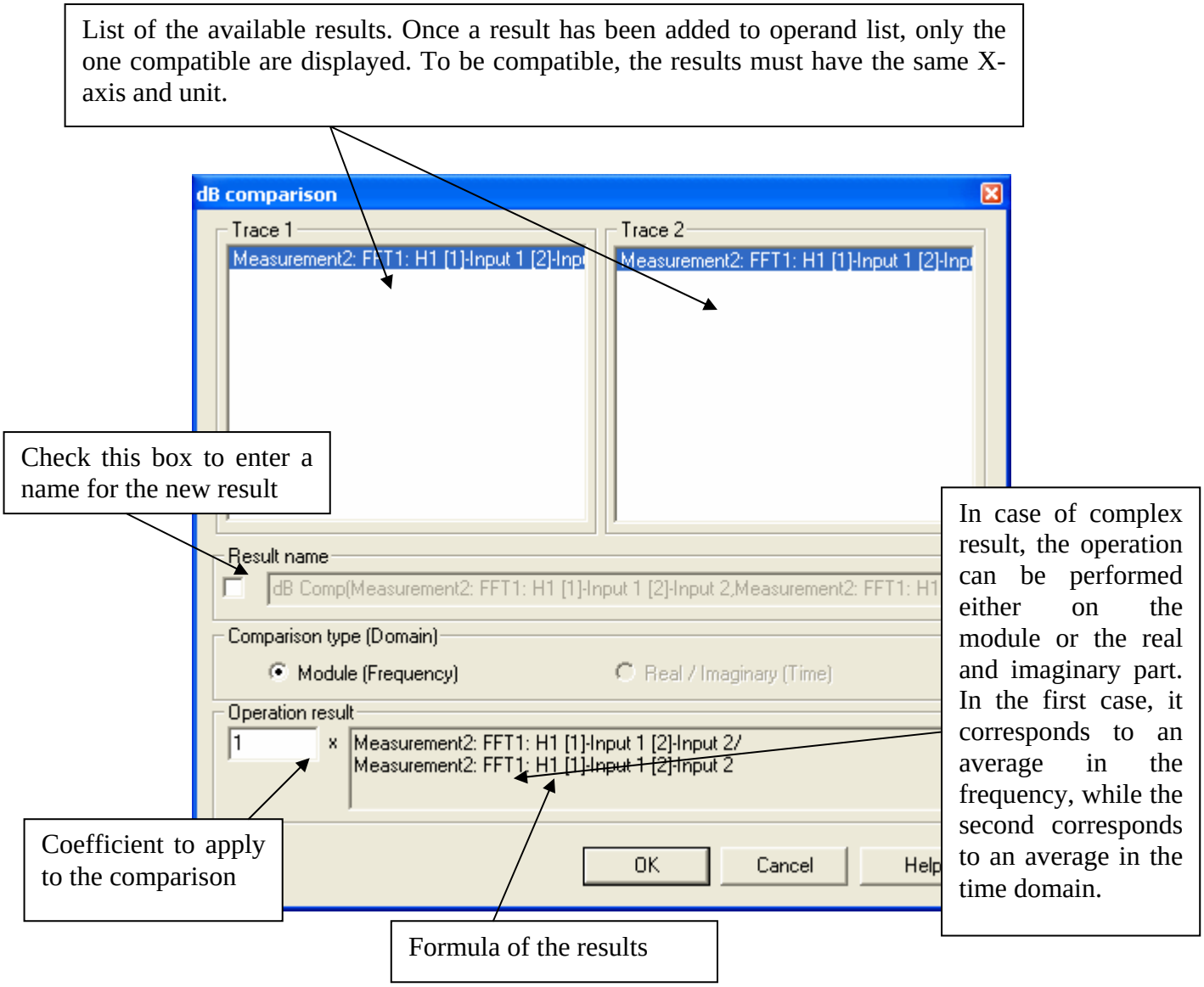
Formula of the results

The formula of the calculated result is:

Comp_Result = Q × (Result_1-Result_2)

The default value of Q is 1, but all of these coefficients can be modified.

- **dB comparison:** This dialog box is designed to create a new result, which is the comparison of two results. The comparison is made so that the result shows the difference between the two results in dB. It corresponds to the calculation of the ratio between the two results. This operation can be performed only on results that are in the same window. They must also have the same x-Axis definition.



The formula of the calculated result is:

Comp_Result = Q × (Result_1/Result_2)

The default value of Q is 1, but all of these coefficients can be modified.

2.3.3.14 Add to Result selection

This command adds all the results displayed in the window to the list of results that must be saved in a measurement. If the result is already on the list, it is not added. Some results displayed cannot be saved (Instant trigger of the front end, profile of a DC input).

2.3.3.15 Copy graph(s)

This command copies the active graph in the format ‘wmf’, this command is not available for 3D Waterfall.

2.3.3.16 Copy bitmap

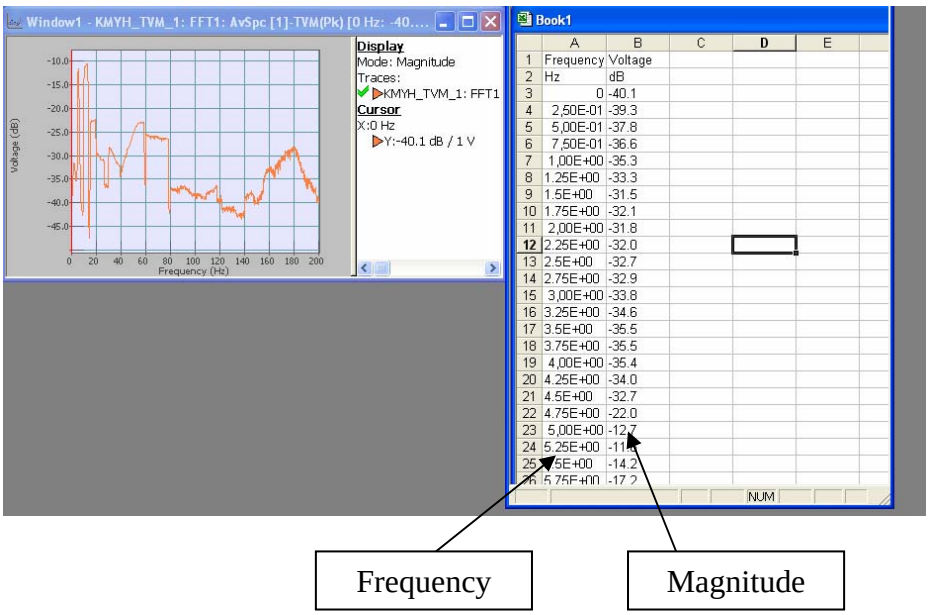
This command copies graph in the format ‘.bmp’

2.3.3.17 Copy data

This command copies data in order to export them in Excel. This will export all point’s values from the active graph. NVGate export values with a point as separator and in engineer mode. This command is available for all spectra and profiles (even waterfall profiles).
If the graph is displayed with complex values, then the ‘copy data’ command allows to export phase and module values.

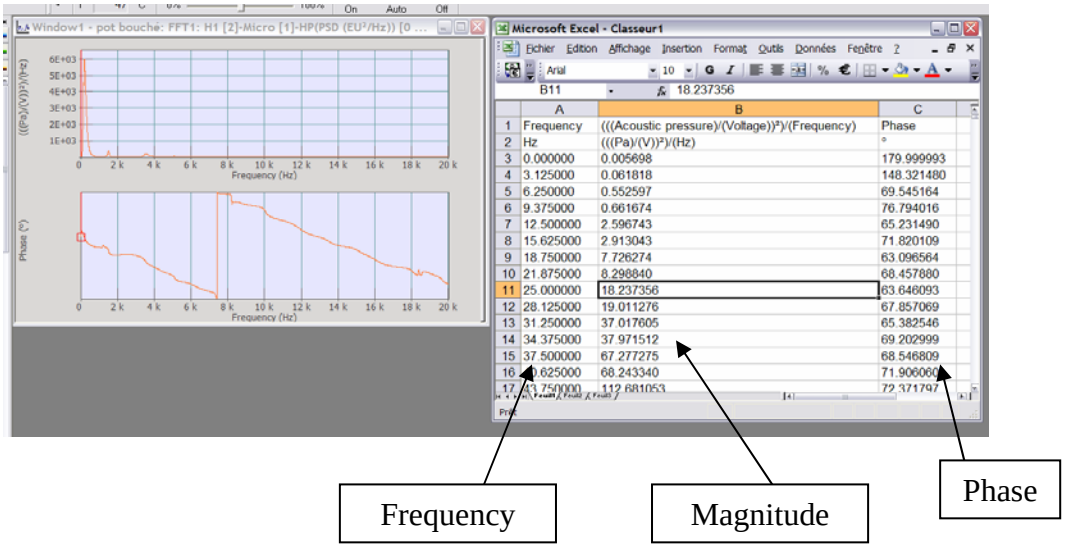
Example:

- Natural values:
  Values displayed are values from the Active trace:



- Complex values:

For complex values the ‘Copy data’ will displayed phase and module values.

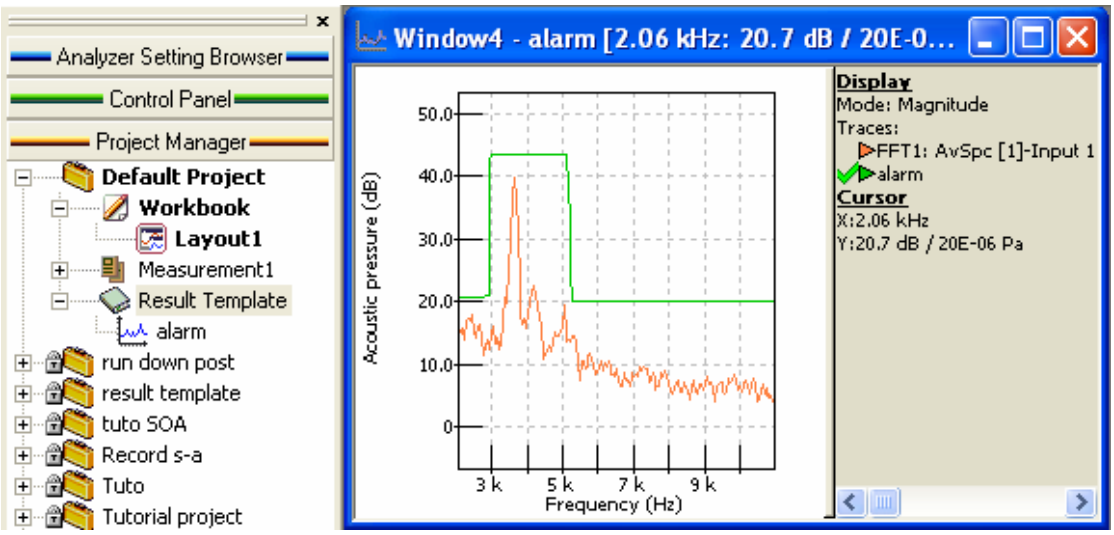


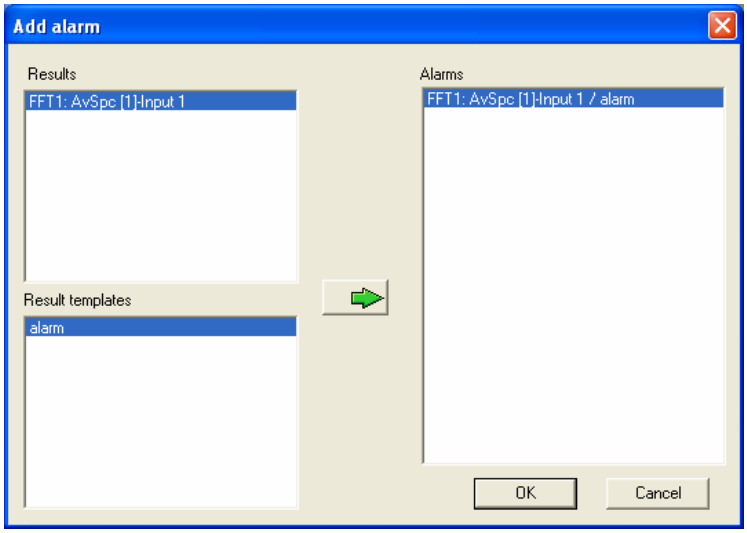
2.3.3.18 Copy to Result template

Adds the result to the project template results. This result is then available for editing and use as a template

2.3.3.19 Add Alarm

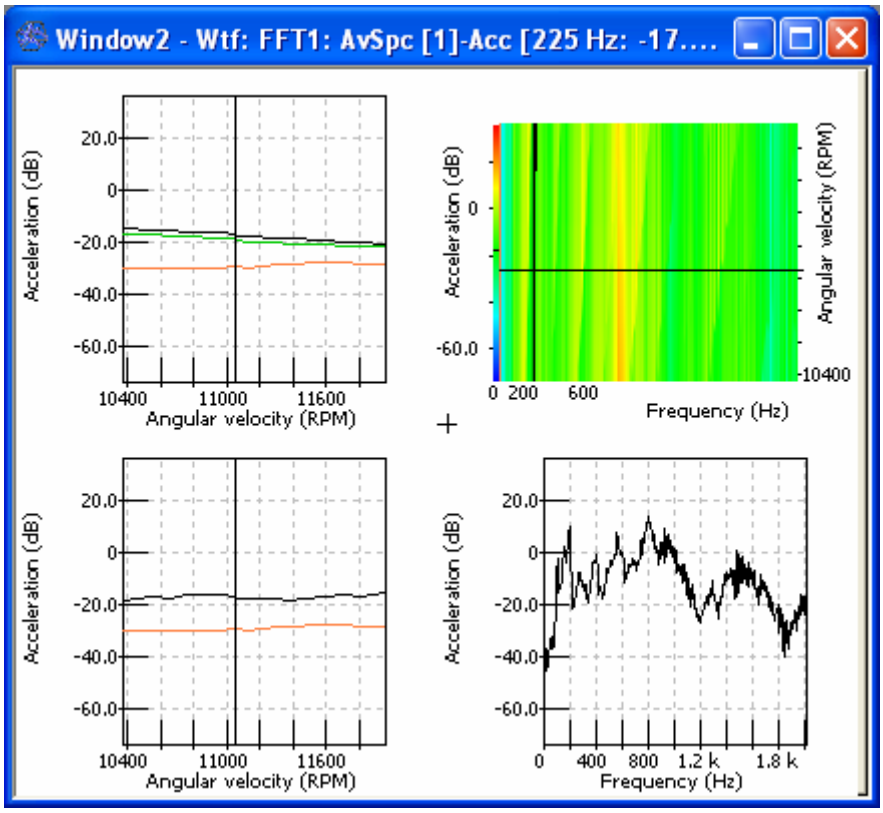
Dialog box to create an alarm. An alarm compares a dynamic signal with a template result. The result of the comparison can be used in the macro to perform certain tests. To make this option available, a result template must be added to the window (using drag & drop for example).
Go to the “Chapter 5: Tools” to see more details about the Result template.



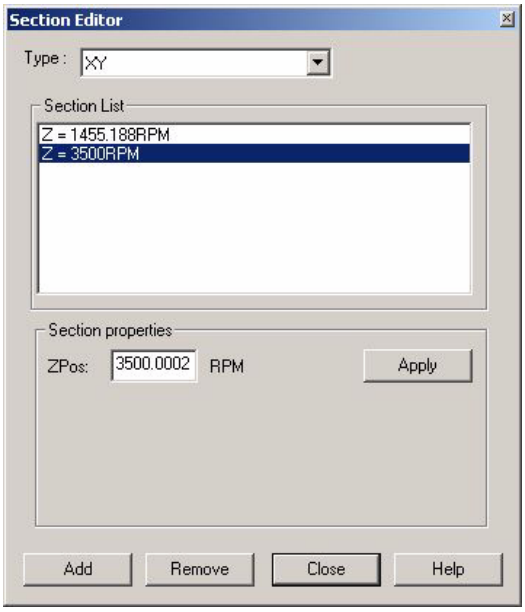


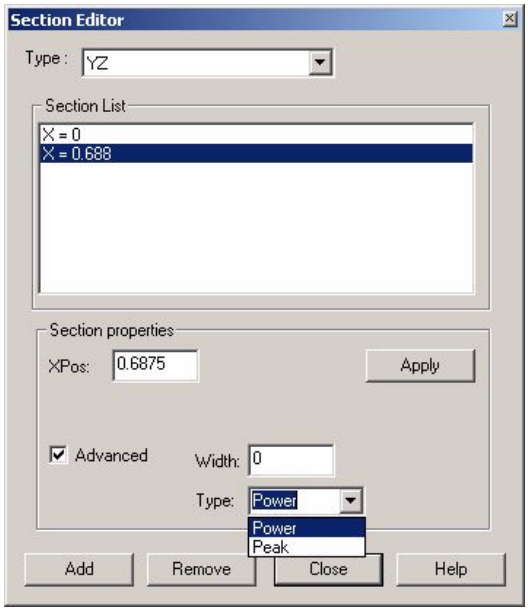
To create an alarm, select a result from the top list, a template from the bottom list and click the Add button. The list on the right displays a list of the existing alarms.

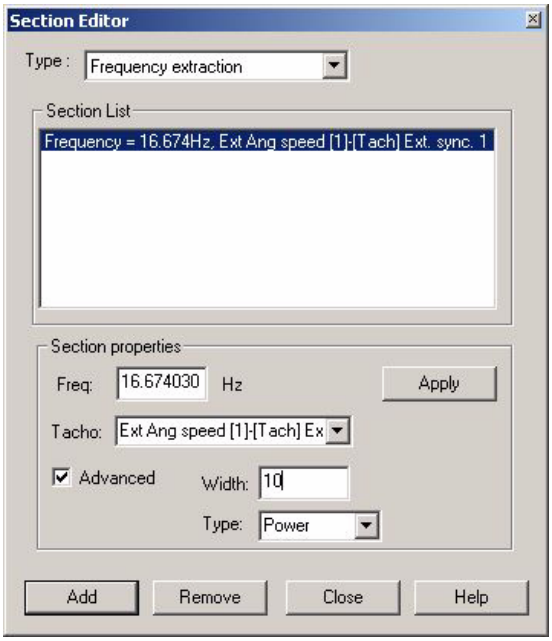
2.3.3.20 Waterfall window menu



- **Add section:** Creates a new section at the current position of the cursor. The extraction section is created only if a tach has been selected in the Waterfall.
- **Select YZ section:** Selects the active trace in the YZ graph. Useful to get the value of the cursor for this section
- **Select XY section:** Selects the active trace in the XY graph. Useful to get the value of the cursor for this section
- **Select extraction section:** Selects the active trace in the extraction graph. Useful to get the value of the cursor for this section
- **Section manager:** This dialog box is used to create and modify sections.
  To modify a section, select the desired type and the desired section then modify the Section properties and click "Apply".
  To create a new section, Select the type, set the desired properties and click "Add"
  To remove a section, select the desired type and the desired section, then click "Remove".





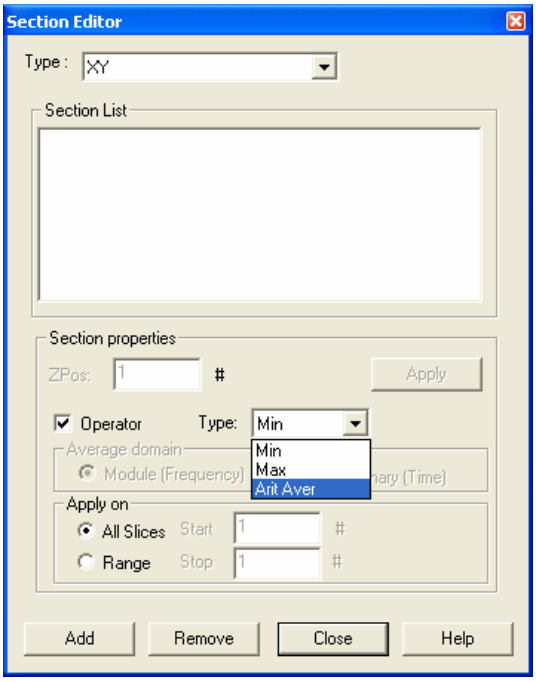


- **Section properties:** The XPos, ZPos, Freq or Order defines the position of the section in the Waterfall.
  When the "Advanced" box is checked, it defines the center of the band.
  The width is used when the "Advanced" box is checked. It defines the bandwidth.
  The advanced sections are:

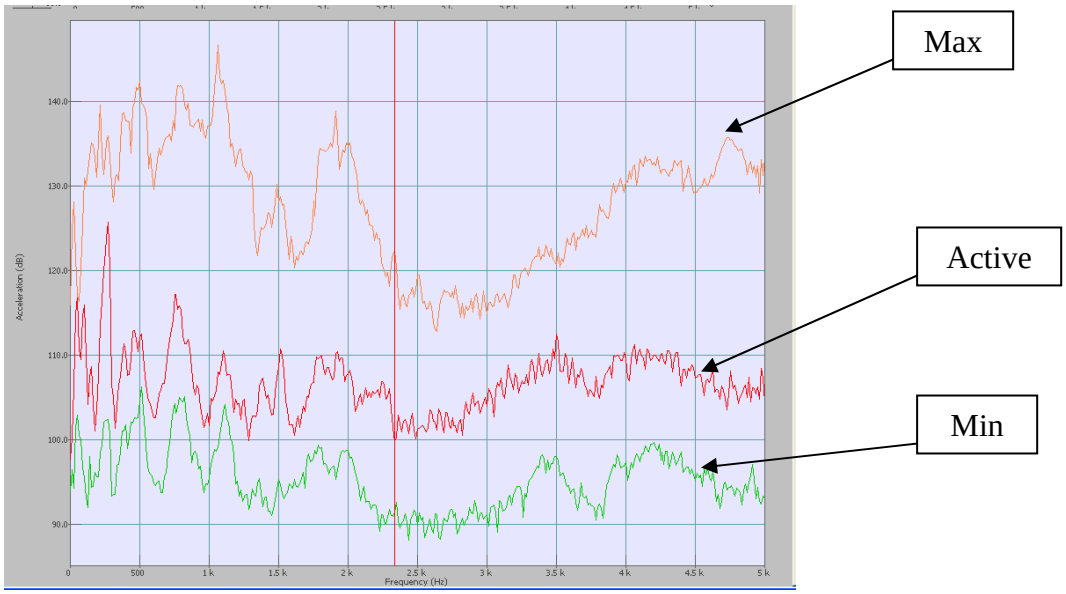
Type	Sections	Type of result	Description
Power	YZ, Order and Frequency extraction sections	Frequency, order and octave spectra	Calculates the power within the band
Peak	YZ, Order and Frequency extraction sections	Frequency, order and octave spectra	Detects the highest value

RMS	YZ sections	Triggered and resampled block	Calculates the RMS value within the band
Average	YZ sections	Triggered and resampled block	Calculates the average value within the band
Min	YZ sections	Triggered and resampled block	Detects the minimum value within the band
Max	YZ sections	Triggered and resampled block	Detects the maximum value within the band

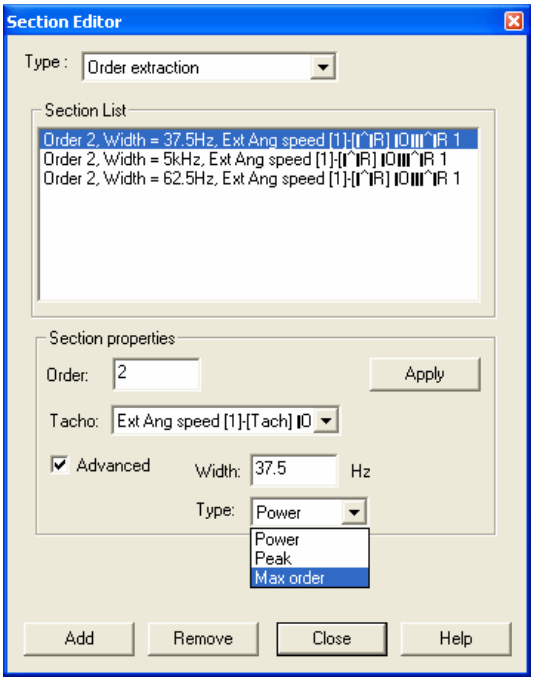
- *Z-Operator*:

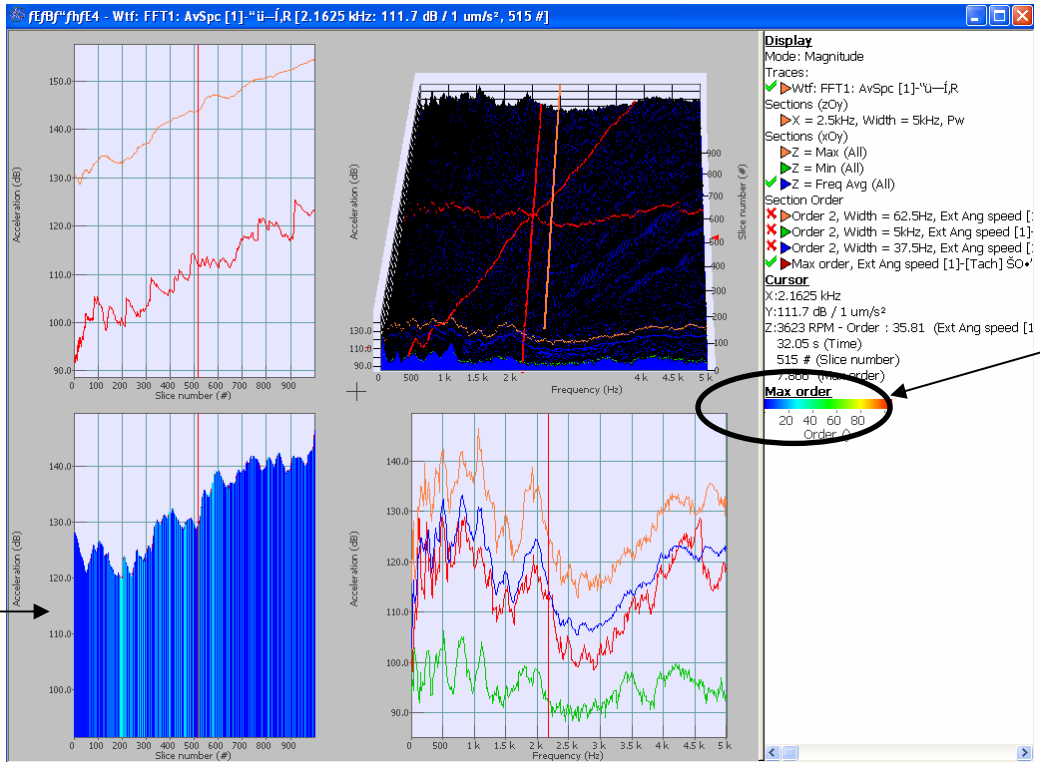


This Operator is available on XY extraction view and 3 operators are available: Min, Max and Arithmetic Average.



- *Order Extraction*:





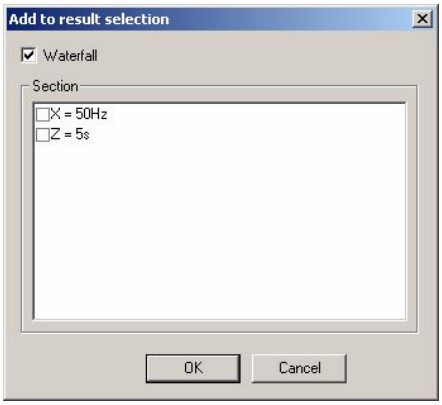
Scale of the max order

Order extraction

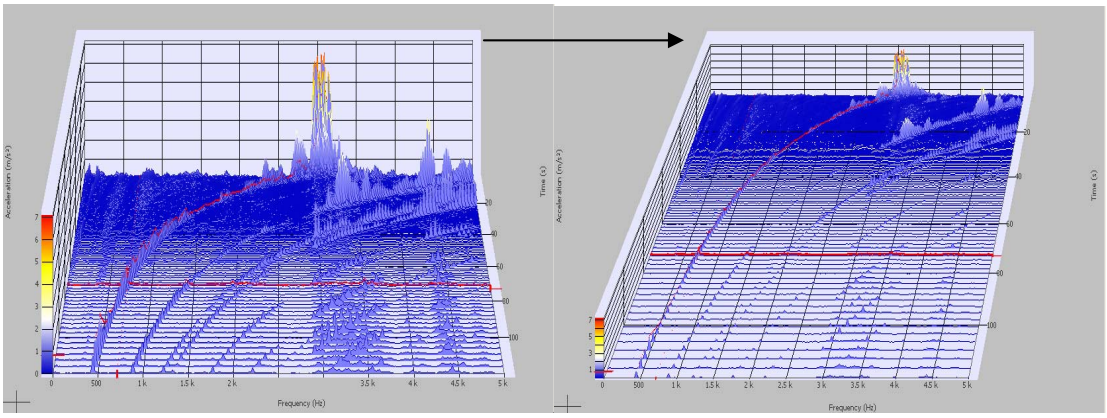
This Operator take data spectrum by spectrum, for each spectrum there is a determination of the max value and of the corresponding order.
Using this operator it is possible to detect on which orders it is useful to work.

Note: The Max Order cannot be saved in result (not available in the ‘Add to result selection’).

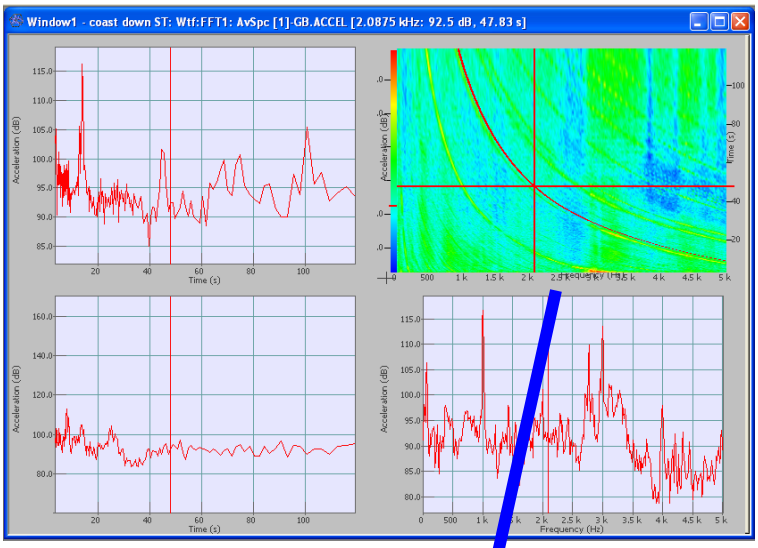
- **View:** Displays all the views or only one of the three or four available views (sections, 3D)
- **Z auto scale:** Adjusts the Z-scale to the current range of the selected reference
- **Select reference:** Reference used for the Z-Axis
- **Select tach:** Selection of the tach that is used for the order or frequency extraction
- **Add to result selection:** Check the Waterfall box to add the Waterfall to the result selection.
  Check the section that must be added to the result selection. These sections will be saved as individual results (spectra, trigger blocks...)



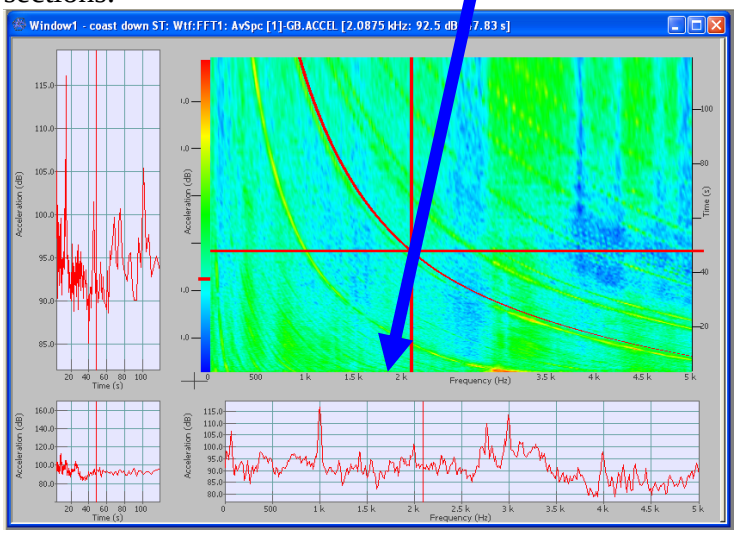
The orientation of the 3D view of the waterfall can be modified by using the rotation button.



A threshold is available on a waterfall by pressing the ’y’ button (or ‘ctrl y’ for more precision).



In ‘all view’ mode, by moving the cross a zoom can be done on a special graph or sections.



2.4 Graph type

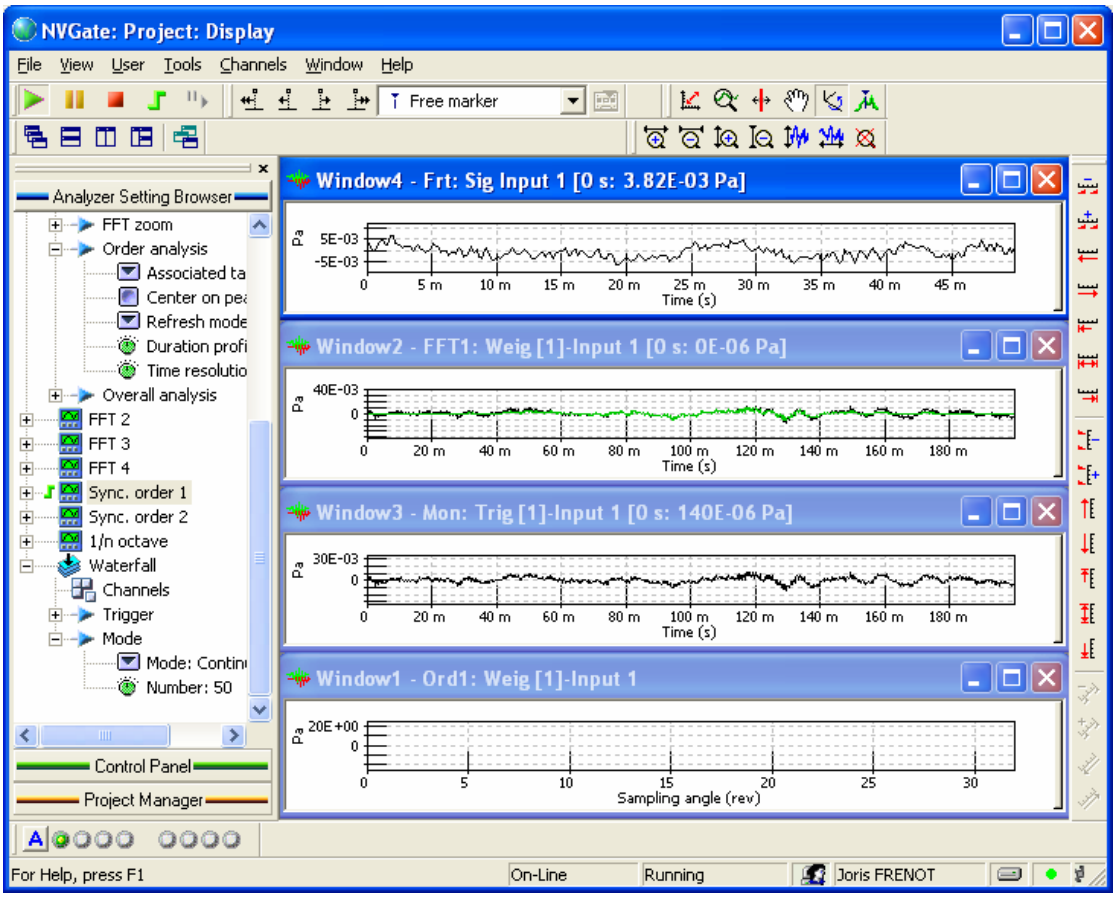
2.4.1 Time

Time graphs display time real signals.

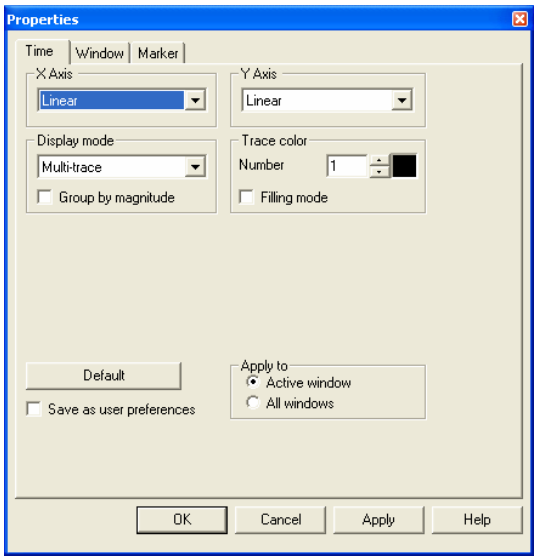
2.4.1.1 Source signals (plug-in/process)

The following results may be displayed as time graphs:

- **Front-end:** Signal.
- **Monitor:** Triggered block.
- **FFT x:** Triggered block, weighted block.
- **SOA x:** Triggered block, weighted block.



2.4.1.2 Properties



- **X-Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y-Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.

- **Display mode**
  - **Multi-graph**: overlays all traces using one graph per trace on the same window.
  - **Multi-trace**: overlays all traces in one graph.
  - **Multi-trace 3D**: overlays all traces in one 3D graph.
  - **Magnitude gathering**: if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - The bottom of the area if Y scale is a dB one or Logarithmic one
    - The 0 value if the Y scale is linear.

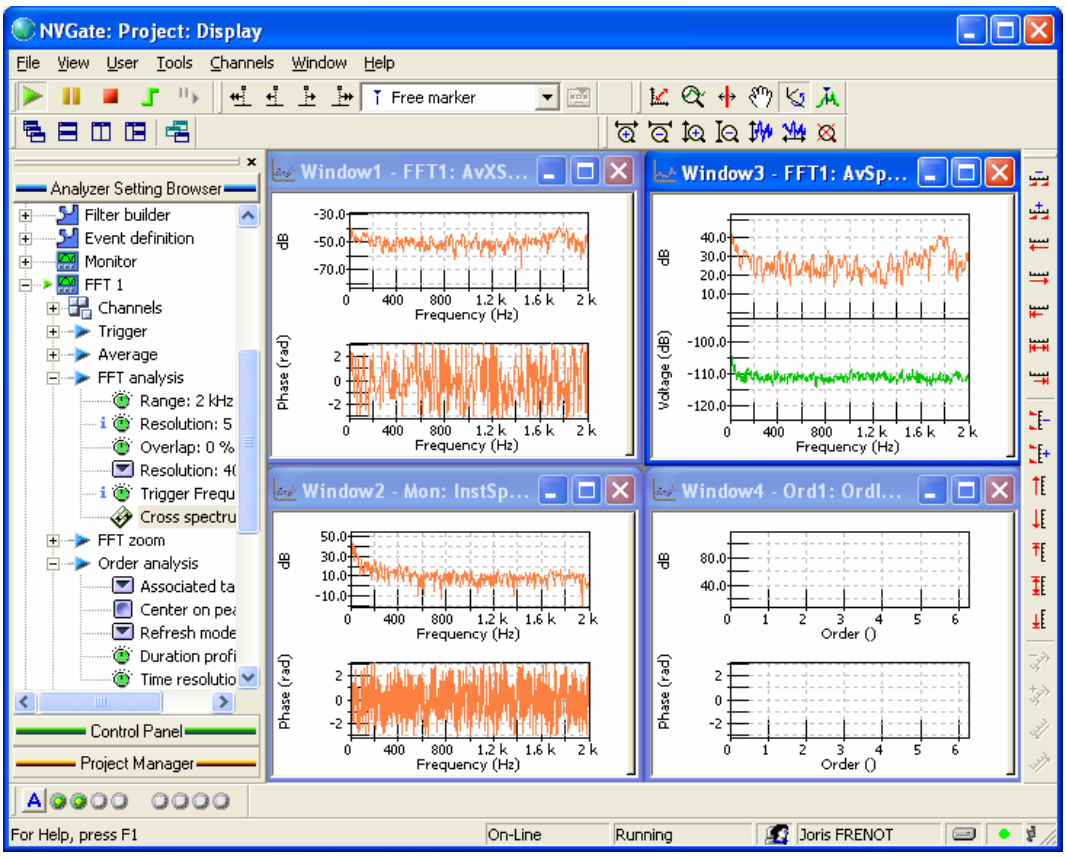
2.4.2 Spectral

Spectral graphs display narrow band (complex) spectra.

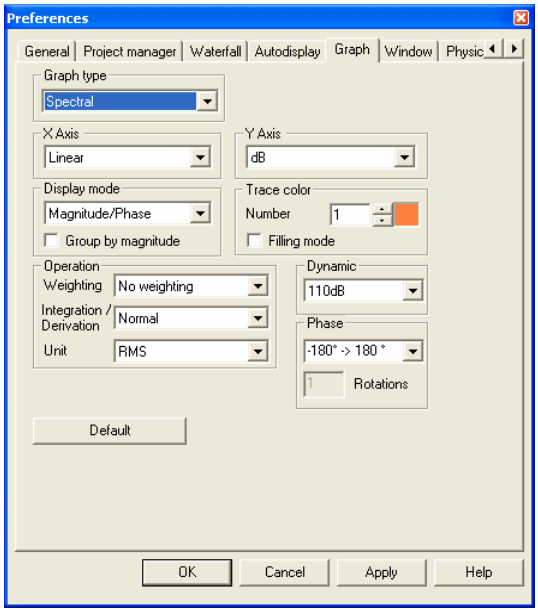
2.4.2.1 Source Signals

The following results may be displayed as spectral graphs:

- **Monitor:** Inst. spectrum, Avg spectrum.
- **FFT x:** Inst. spectrum, Avg spectrum, Inst cross-spectrum, Avg cross-spectrum, FRF H1, FRF H2, spectrum.
- **Sync. order x**: Ord. inst. spectrum, Ord. avg. spectrum, Ord. spectrum.



2.4.2.2 Properties

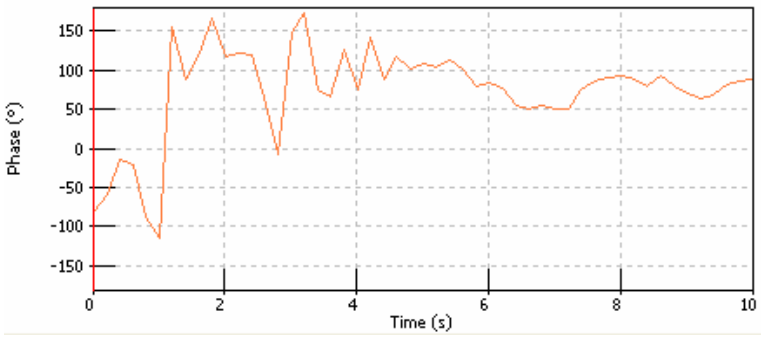


- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
  - **Logarithmic**: uses logarithmic scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.
  - **dB**: uses reference dB scale for Y-axis units.
- **Display mode**
  - **Magnitude:** overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Real part**: overlays all real parts traces on a single graph.
  - **Imaginary part**: overlays all imaginary part traces on a single graph.
  - **Magnitude/phase**: overlays all magnitude traces on the upper graph and all the phase traces on the lower graph.
  - **Real/imaginary**: overlays all magnitude traces on the upper graph and all the phase traces on the lower graph.
  - **Polar**: overlays all complex traces on a polar graph: ρ = magnitude, θ = phase.
  - **Real part 3D**: displays all real part traces as a 3D graph arranged along the Z-axis.
  - **Imaginary part 3D**: displays all imaginary part traces as a 3D graph arranged along the Z-axis.

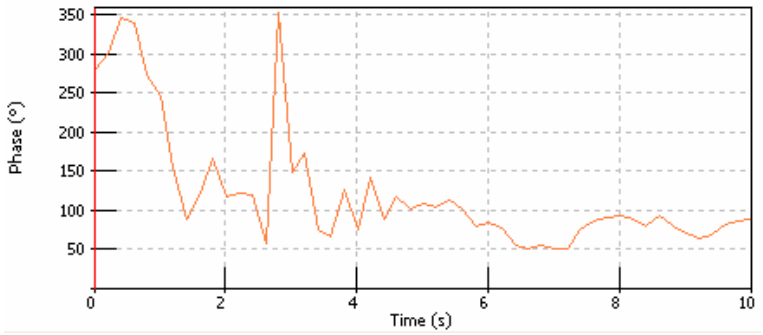
- **Magnitude 3D**: displays all magnitude traces as a 3D graph arranged along the Z-axis.
- **Phase 3D**: displays all phase traces as a 3D graph arranged along the Z-axis.
- **Real part multi-graph**: displays all real part traces using one graph per trace in the same window.
- **Imaginary part multi-graph**: displays all imaginary part traces using one graph per trace in the same window.
- **Magnitude multi-graph**: displays all magnitude traces using one graph per trace in the same window.
- **Phase multi-graph**: displays all phase traces using one graph per trace in the same window.
- **Phase/Magnitude**: overlays all phase traces on the upper graph using 1/3 of window space and all the magnitude traces on the lower graph using 2/3 of the window.
- **Merged Magnitude/Phase**: displays all magnitude and phase part traces as a unique graph.
- **Magnitude gathering**: if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.

- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box:** click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is a dB one or Logarithmic one
    - the 0 value of the Y scale is linear.
- **Dynamics**
  - **90 dB**: resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB**: resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB**: resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.

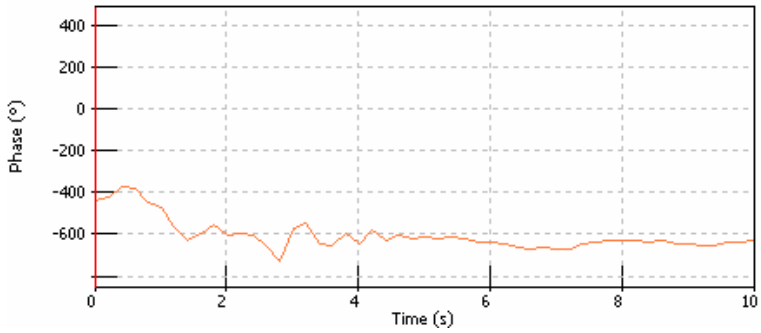
- **Phase**
  - **-180° -> 180°**: sets the phase graph Y-axis between –180° to +180°.



  - **0 -> 360°**: sets the phase graph Y-axis between 0 to +360°.



  - × **Rotations:** sets the number of rotations to be displayed on the Y-axis.



Example for 5 rotations

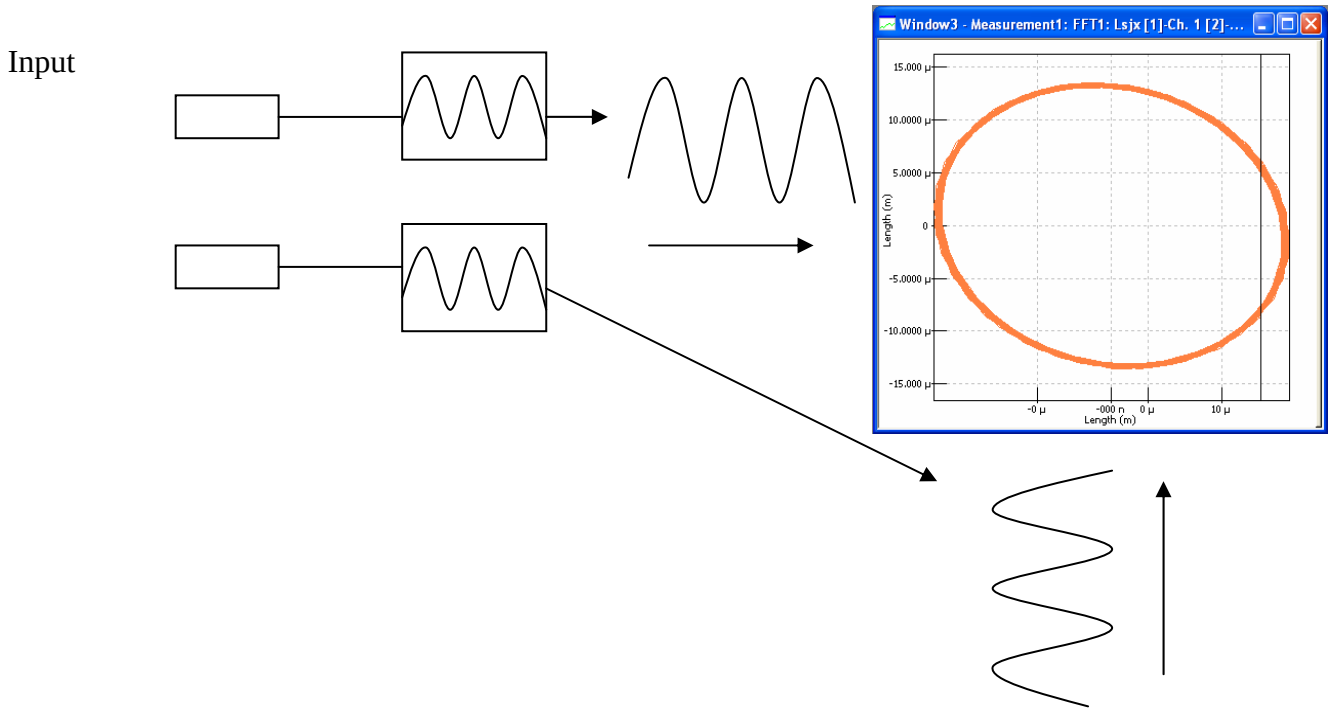
2.4.3 Lissajous

Parametric graph of one triggered block with another one for reference.

2.4.3.1 Source Signals

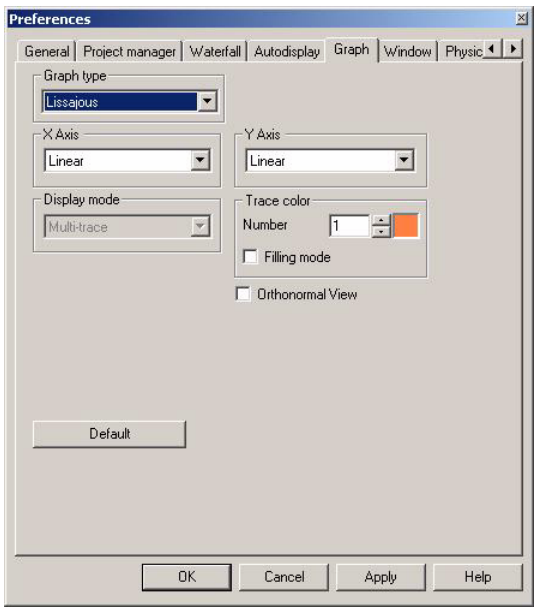
The following results may be displayed into Lissajous graphs:

- **FFT x:** Lissajous.



The perimeter of the Lissajous corresponds of the FFT length's block.
You can use filters on this kind of graph, as integration or a double integration.

2.4.3.2 Properties



- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
- **Display mode**
  - **Multi-trace**: overlays all traces on a single graph.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
- **Orthonormal view**: if checked, the graph is displayed in an orthonormal area.

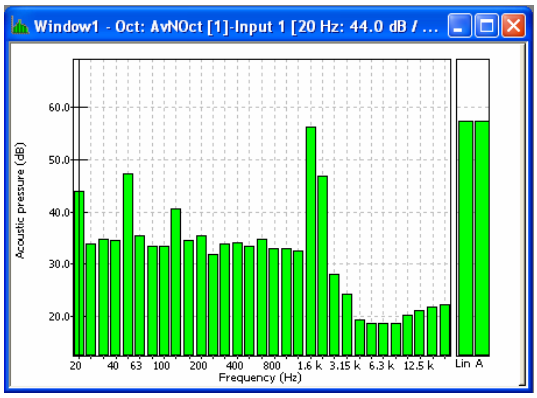
2.4.4 Nth octave

Displays nth octave band graph.

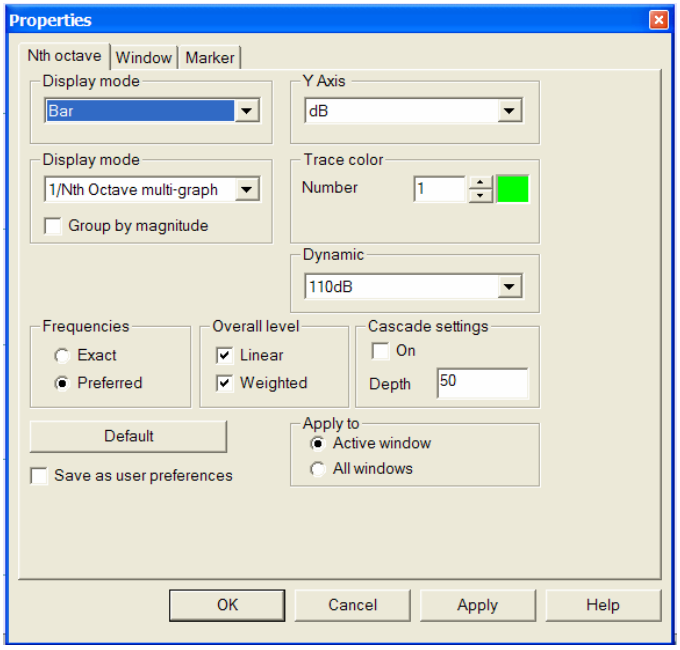
2.4.4.1 Source Signals

The following results may be displayed as nth octave graphs:

- **Nth-Octave:** 1/n octave, Avg 1/n octave.



2.4.4.2 Properties



- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic:** uses logarithmic scale for Y-axis units.
  - **dB:** uses reference dB scale for Y axis units.
- **Display mode**
  - **Bar:** bar representation

- **Step:** step representation.
- **Rectangle:** overlaid rectangle
- **Filled:** overlaid filled rectangles.

- **Display mode**
  - **Multi-trace**: overlays all traces on a single graph.
  - **Multi-graph**: one graph for each trace.
  - **Magnitude gathering**: if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
- **Overall level**
  - **Linear**: if checked, the linear global level is displayed.
  - **Weighted**: if checked and available, the weighted level is displayed.
- **Frequencies**
  - **Exact:** displays exact band center frequency.
  - **Preferred:** displays preferred frequencies, i.e rounded values for the central frequencies. Preferred frequencies are only available for octave and 1/3rd octave windows: in the octave. If this mode is selected in 12th and 24th octave windows, exact frequencies are displayed.
- **Dynamics**
  - **90 dB:** resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB:** resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB:** resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.

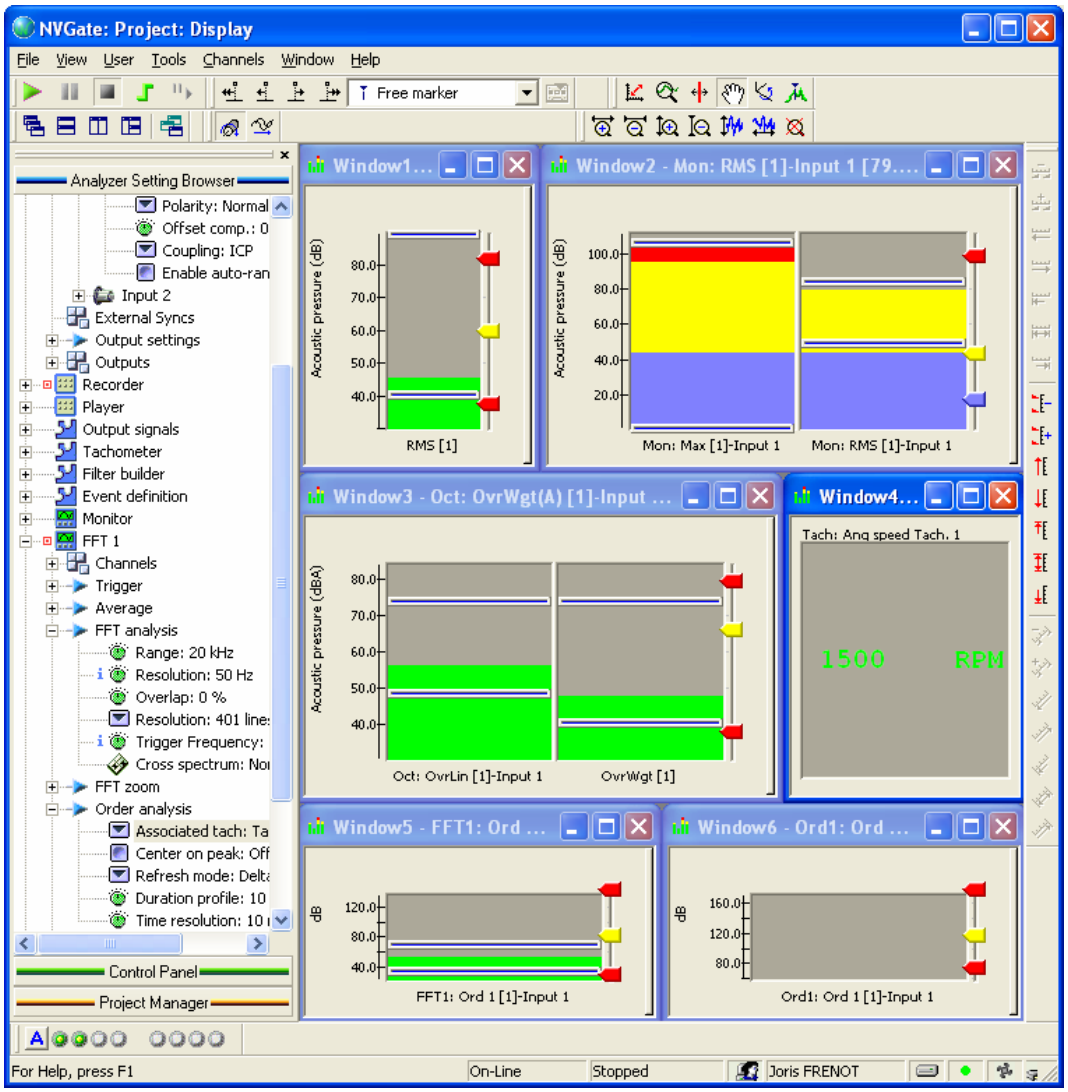
2.4.5 Viewmeter

Displays scalar value graphs.

2.4.5.1 Source Signals

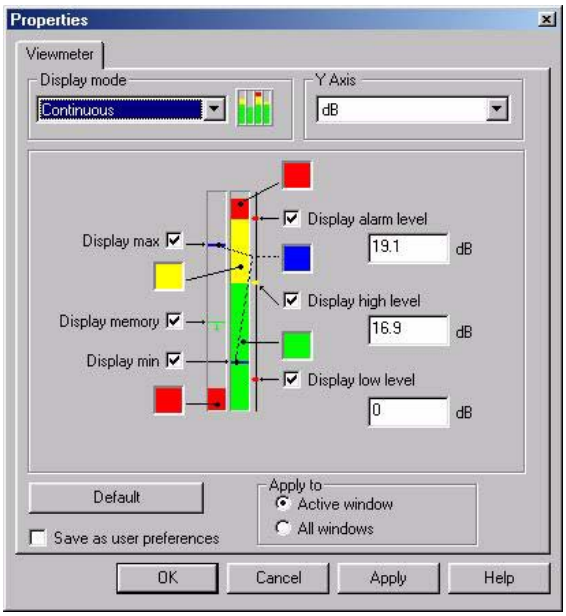
The following results may be displayed as nth viewmeter graphs:

- **Front-end:** DC.
- **Monitor:** DC, Max, Min, Kurtosis.
- **Recorder:** RMS
- **FFT X:** Order & Overall
- **SOA X:** Order & Overall
- **1/n Octave:** Overall values
- **Tachometer:** Angular speed

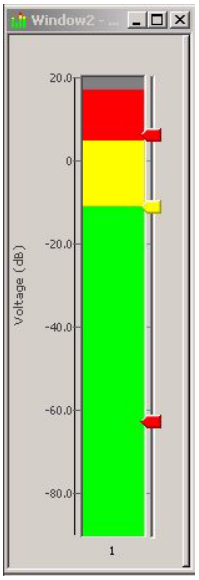


2.4.5.2 Properties

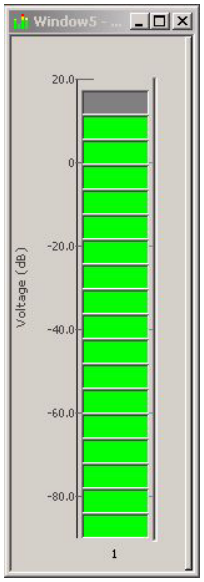
This page defines the way in which the scalar results are displayed.



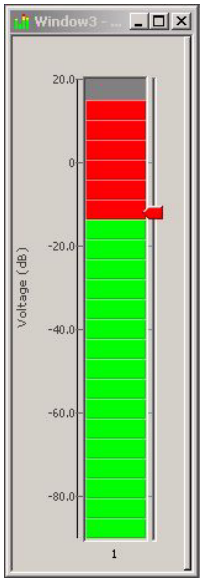
- **Display mode:** There are two types of display:
  - Bar graph



Continuous

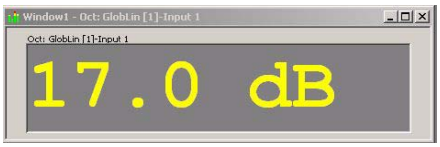


viewmeter

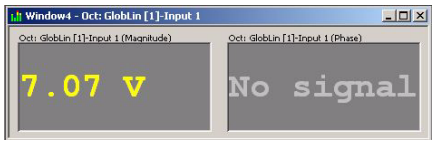


Brick graph

- Digital display



Digital



Module + Phase
The phase can be displayed only for complex scalar result (Order)

- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.
  - **dB**: uses reference dB scale for Y-axis units.
- **Display max, Display min:** Displays the min and the max scalar value as a cursor. The color of the cursor can be freely selected. This property only applies to bar graphs.
- **Display low level:** Changes the color of the display when the value is below this level. The color can be freely selected.
- **Display high level:** Changes the color of the display when the value is higher than this level. The color can be freely selected.
- **Display alarm level:** Changes the color of the display when the value is higher than this level. The color can be freely selected.
- **Brick height:** Defines the height of the bricks for the viewmeter and brick display modes.
- **Save as user preference:** When this box is checked, the value is given as a percentage of the full scale, and may be applied to any graph.

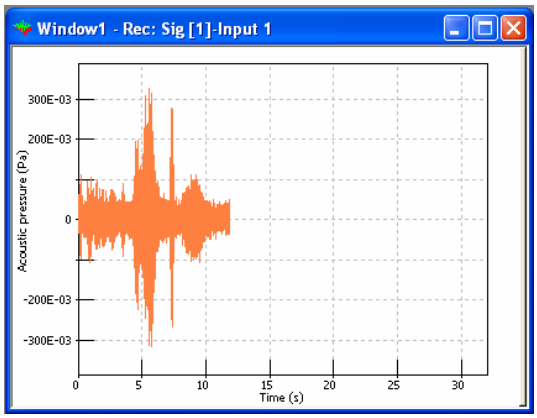
2.4.6 Monitoring

Displays compressed signal graph during recording.

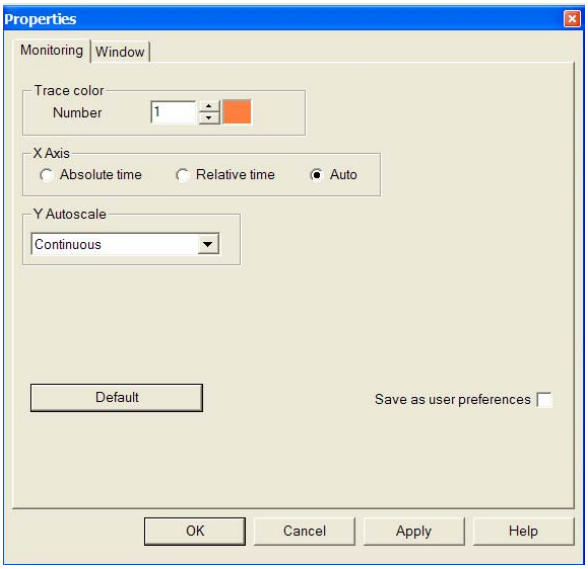
2.4.6.1 Source Signals

The following results may be displayed as nth monitoring graphs:

- **Recorder:** monitoring signal



2.4.6.2 Properties



- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

- **X Axis**
  - **Absolute time**: displays the time from windows format.
  - **Relative time**: displays the duration of the record. The beginning of the record is set to 0.

- **Auto**: selects absolute or relative time depending on the duration of the record. For records smaller than 2s, the relative time is displayed, for others, the absolute time is chosen.

- **Y Autoscale**
  - **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
  - **Disabled**: Y autoscale is not activated.

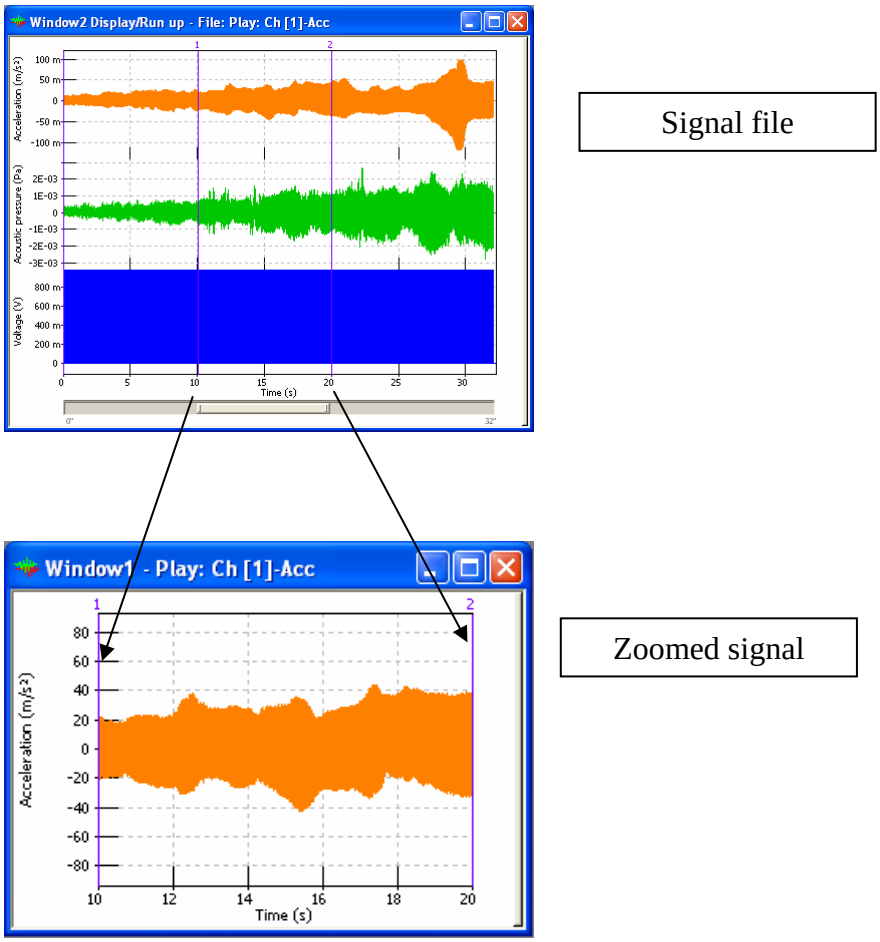
2.4.7 Compressed signal

Displays compressed recorded signal graphs.

2.4.7.1 Source Signals

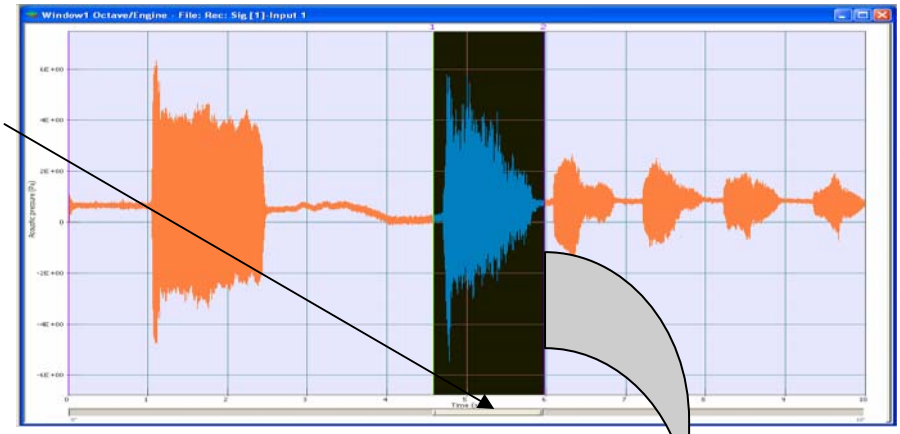
The following results may be displayed as nth compressed signal graphs:

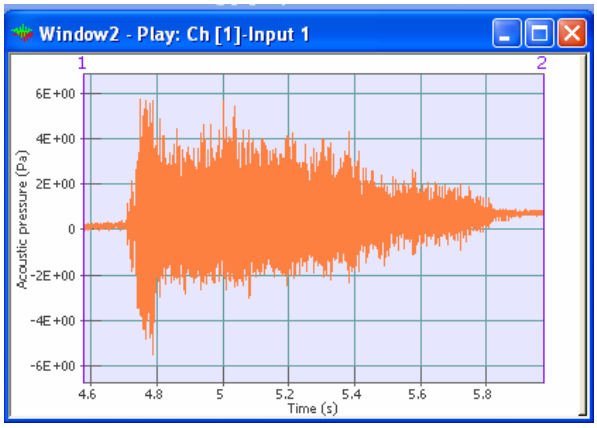
- **Zoomed signal**



This kind of zoom can be done by ‘drag & drop’ the selected zone you want to analyze.

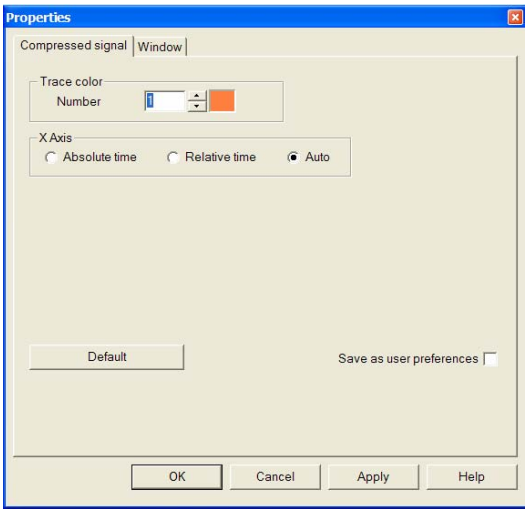
This zone can be moved using the bar below the graph. This zoomed signal can be visualized by adding a new window.





After displaying the zoomed signal, on the recorded signal you can modify your zoom at any time. All change would be displayed automatically in the zoomed signal as soon as you modified your zoomed zone.

2.4.7.2 Properties



- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

- **X Axis**
  - **Absolute time**: displays the time from windows format.
  - **Relative time**: displays the duration of the record. The beginning of the record is set to 0.
  - **Auto**: selects absolute or relative time depending on the duration of the record. For records smaller than 2s, the relative time is displayed, for others, the absolute time is chosen.

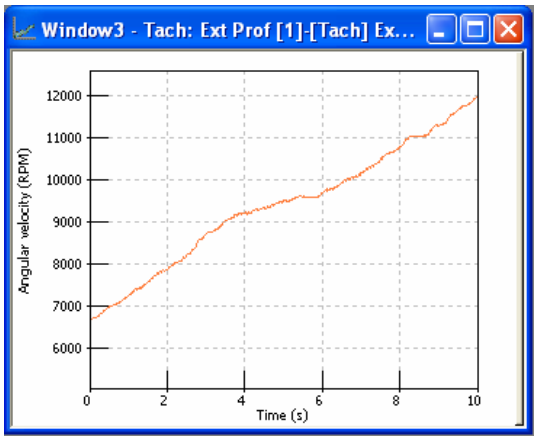
2.4.8 Profile

Displays scalar profile.

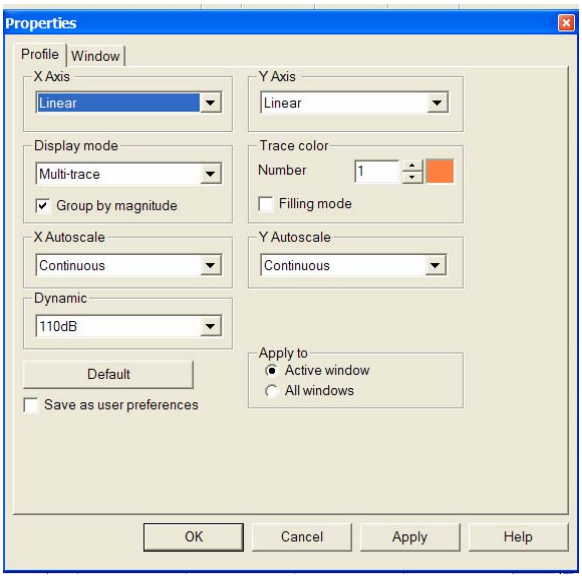
2.4.8.1 Source Signals

The following results may be displayed as nth compressed signal graphs:

- **Monitor**: DC, Max, Min, Kurtosis
- **Front-end**: DC
- **Tachometer**: RPM



2.4.8.2 Properties



- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
- **Display mode**
  - **Magnitude**: overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is dB or Logarithmic.
    - the 0 value if the Y scale is linear.

- **X Autoscale**
  - **Continuous**: the X scale is automatically adjusted to the current min and max x values of the window traces.
  - **Disabled**: X autoscale is not activated.

- **Y Autoscale**

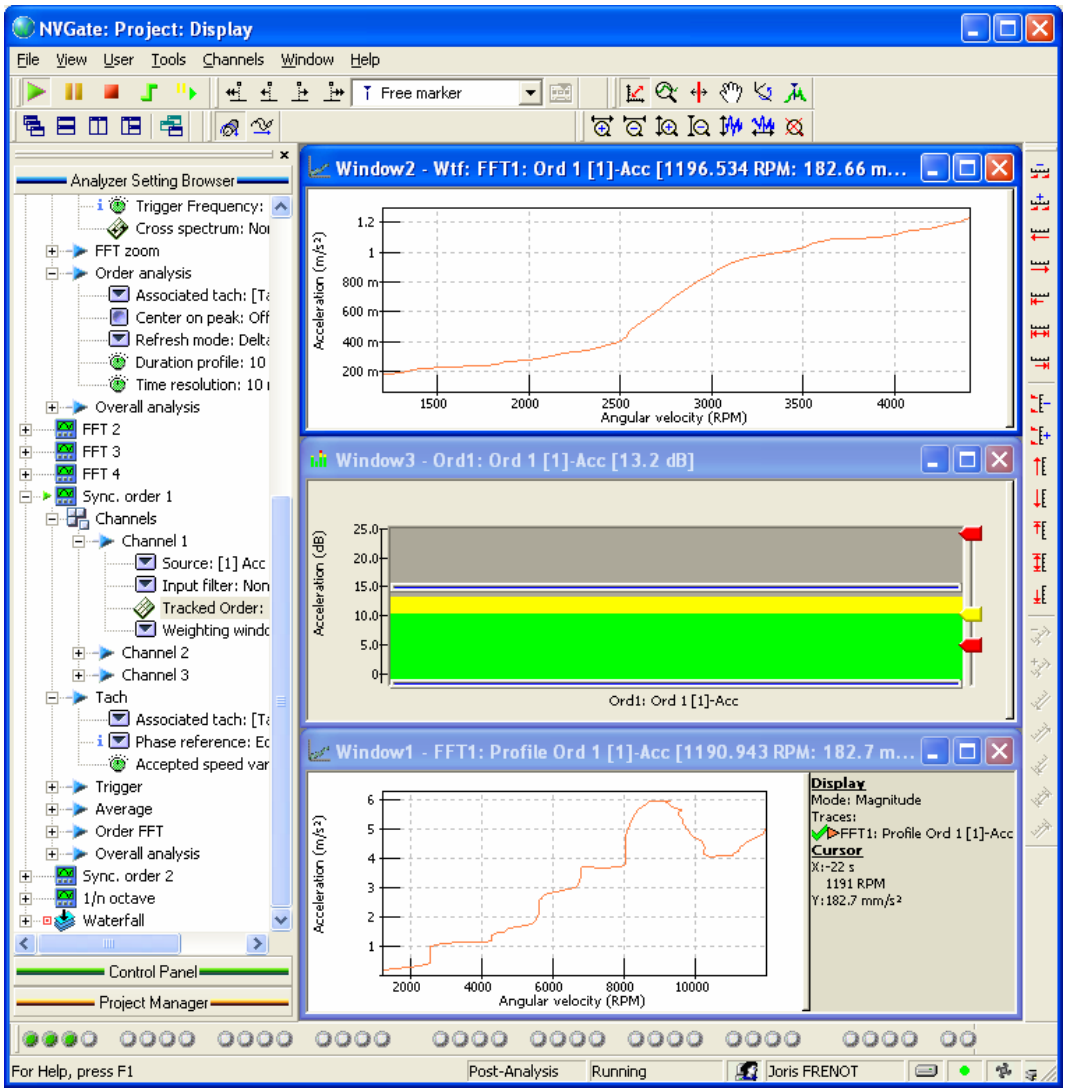
- **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
- **Disabled**: Y autoscale is not activated.

2.4.9 Complex profile

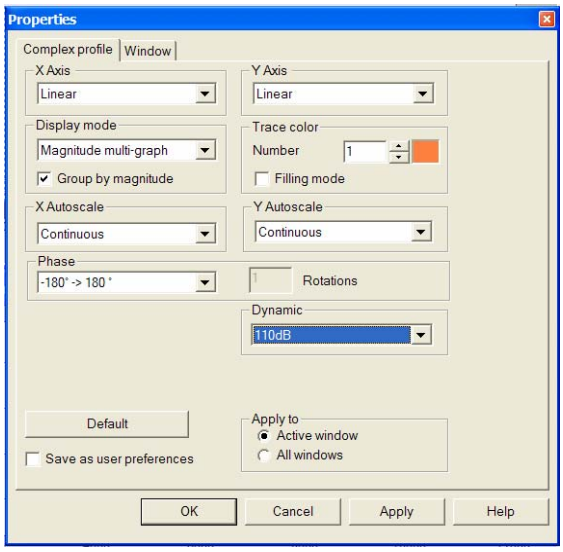
2.4.9.1 Source Signals

The following results may be displayed as complex profile graphs:

- **FFT X:** Order profile
- **Waterfall:** Order profile
- **SOA X:** Order profile



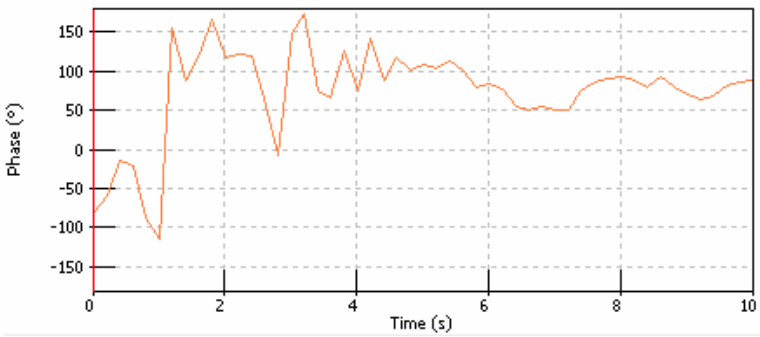
2.4.9.2 Properties



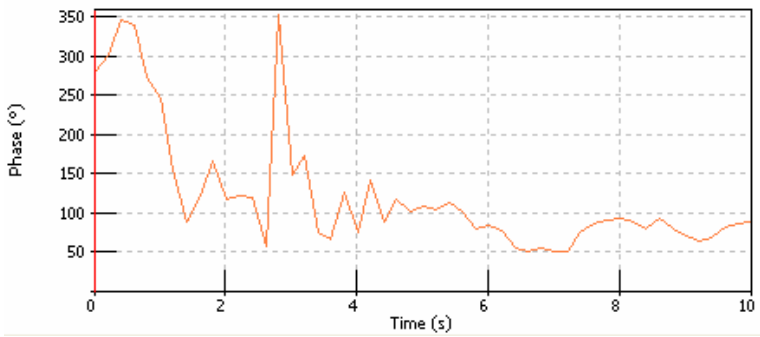
- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.
  - **dB**: uses reference dB scale for Y axis units.
- **Display mode**
  - **Magnitude**: overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Real part**: overlays all real part traces on a single graph.
  - **Imaginary part**: overlays all imaginary part traces on a single graph.
  - **Magnitude/phase**: overlays all magnitude traces on the upper graph and all phase traces on the lower graph.
  - **Real/imaginary**: overlays all magnitude traces on the upper graph and all phase traces on the lower graph.
  - **Polar**: displays in polar coordinates, the phase and the amplitude on a single graph.
  - **Real part multi-graph**: displays all real part traces using one graph per trace in the same window.
  - **Imaginary part multi-graph**: displays all imaginary part traces using one graph per trace in the same window.
  - **Magnitude multi-graph**: displays all magnitude traces using one graph per trace in the same window.

- **Phase multi-graph**: displays all phase traces using one graph per trace in the same window.
- **Phase/Magnitude**: overlays all phase traces on the upper graph using 1/3 of window space and all the magnitude traces on the lower graph using 2/3 of the window.
- **Merged Magnitude/Phase**: displays all magnitude and phase parts traces on a single graph.
- **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.

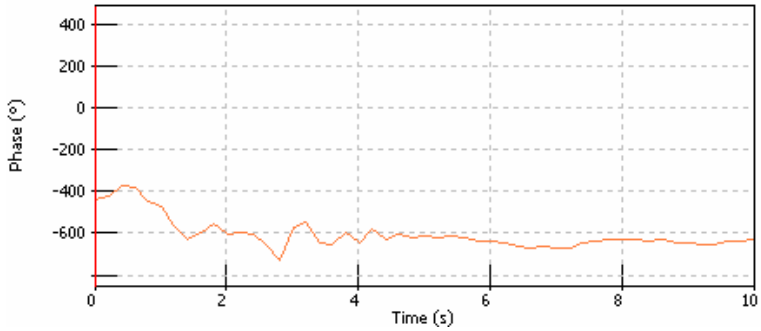
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - The bottom of the area if Y scale is dB or Logarithmic.
    - The 0 value if the Y scale is linear.
- **Dynamics**
  - **90 dB**: resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB**: resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB**: resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.
- **Phase**
  - **-180° -> 180°**: sets the phase graph Y-axis between –180° to +180°.



  - **0 -> 360°**: sets the phase graph Y-axis between 0 to +360°.



- × **Rotations:** sets the number of rotations to be displayed on the Y-axis.



Example for 5 rotations

- **X Autoscale**
  - **Continuous**: the X scale is automatically adjusted to the current min and max x values of the window traces.
  - **Disabled**: X autoscale is not activated.

- **Y Autoscale**
  - **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
  - **Disabled**: Y autoscale is not activated.

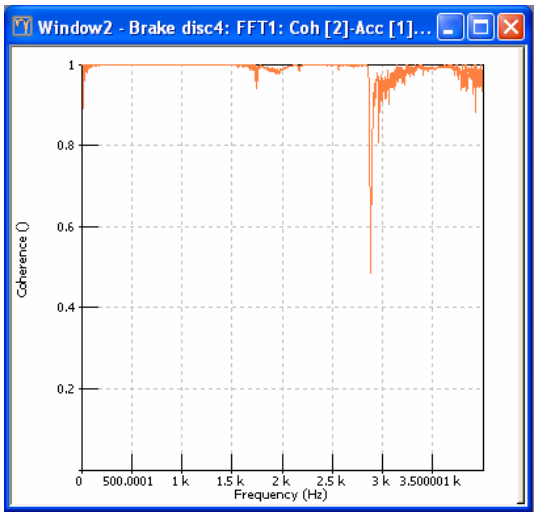
2.4.10 Coherence

Displays coherence graphs.

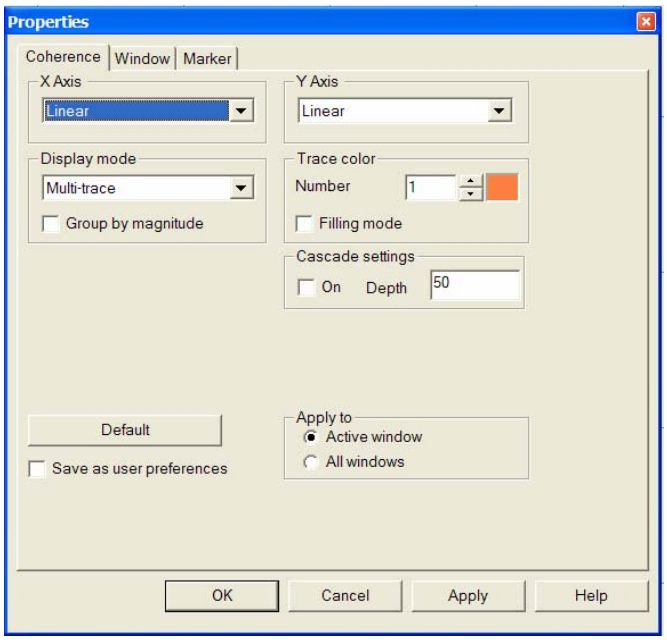
2.4.10.1 Source Signals

The following results may be displayed as coherence graphs:

- **FFT X:** Coherence



2.4.10.2 Properties



- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.

- **Display mode**
  - **Multi-graph**: overlays all traces on a single graph.
  - **Multi-trace**: displays all traces using one graph per trace in the same window.
  - **Time multi-trace 3D**: overlays all traces on a single 3D graph.
  - **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is dB or Logarithmic.
    - the 0 value if the Y scale is linear.

2.5 Scale

This topic deals with all the X and Y graph axis properties. It is possible to change the min and max axis values for example.

2.5.1 Scale mode

2.5.1.1 Toolbar button

The scale mode is selected by clicking on the button from the "Display mode" toolbar.

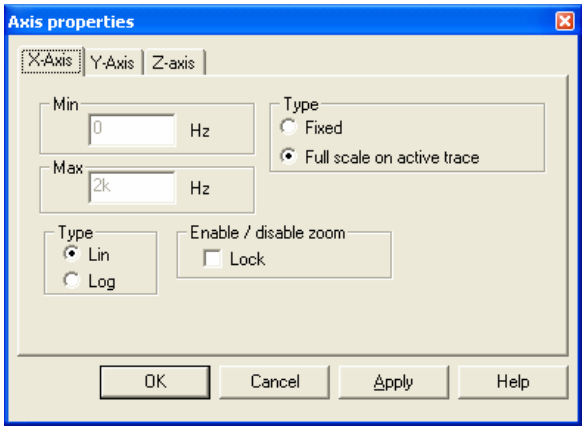
2.5.1.2 Axis operation

Axis scales can be modified using the mouse wheel when the mouse pointer is placed over the corresponding axis in the following way:

- **Center of axis**
  - **Normal**: using the mouse wheel when this icon is displayed will translate the axis scale. When the boundary is reached, the corresponding side of the scale will not change. In this case, the axis will be dilated along the free boundary.
- **Bottom/Top of axis** : Using the mouse wheel when this icon is displayed will dilate the axis along the min or max values.

2.5.2 Axis properties

This dialog box is used to set the axis values and behavior.



2.5.2.1 Min

Enabled only when the "fixed" type is selected. It sets the minimum value assigned to the scale.

2.5.2.2 Max

Enabled only when the "fixed" type is selected. It sets the maximum value assigned to the scale.

2.5.2.3 Type

- **Fixed:** Used to select the min and max scale values.
- **Full scale on active trace:** The minimum and maximum scale values are automatically adjusted to the values of the active trace.
- **Full scale on all traces:** The minimum and maximum scale values are automatically adjusted so that every trace is fully visible.

2.5.2.4 Scale type

Changes the type of scale (Linear, logarithmic or dB). Only the available types are enabled.

2.5.2.5 Enable/disable zoom

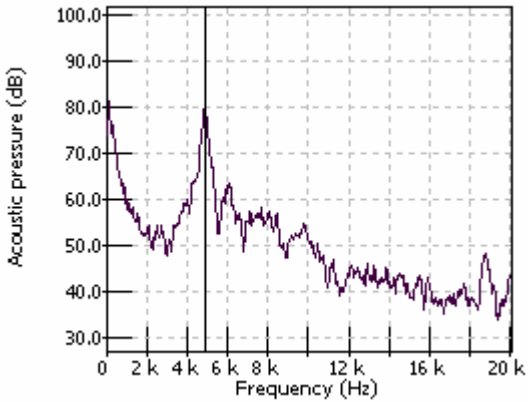
When checked, it is impossible to make any change to the scale.

2.6 Cursors

2.6.1 Style

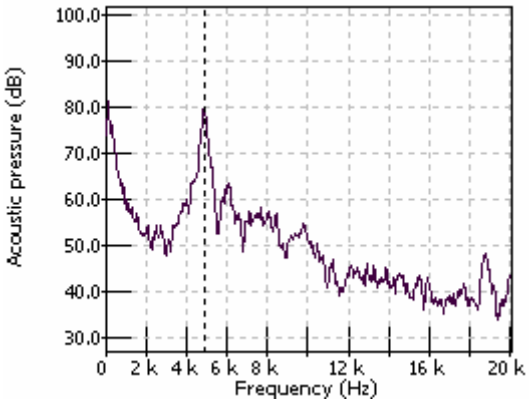
2.6.1.1 Vertical line

Displays a single line.



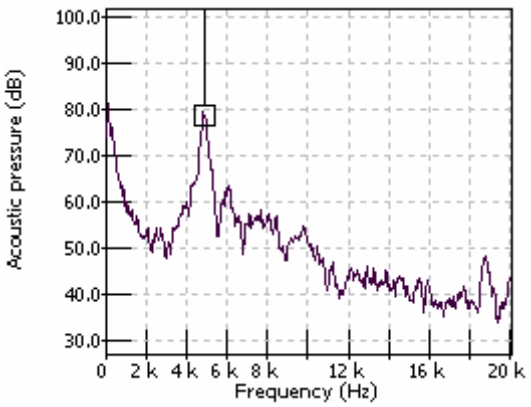
2.6.1.2 Vertical dashed line

Displays a single dashed line.



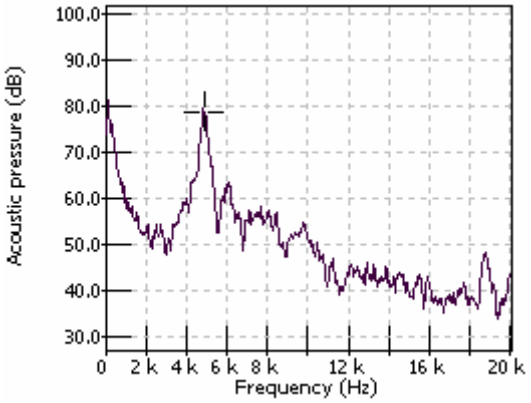
2.6.1.3 Vertical with rectangle

A rectangle is displayed around the selected point.



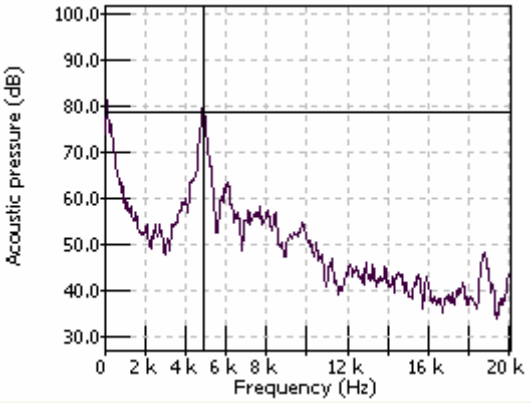
2.6.1.4 Cross hair

No line is displayed but there is a target around the selected point.



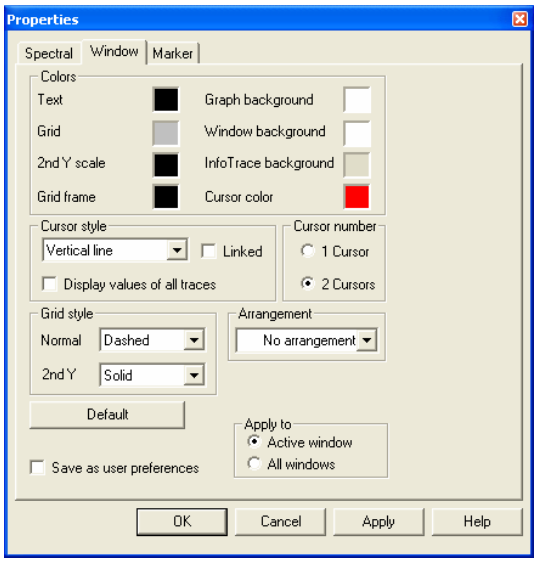
2.6.1.5 Vertical + horizontal

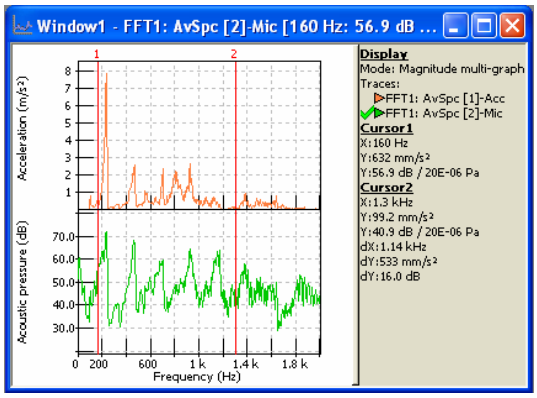
Displays 2 lines, an horizontal and a vertical that cross the selected point.



2.6.2 Dual

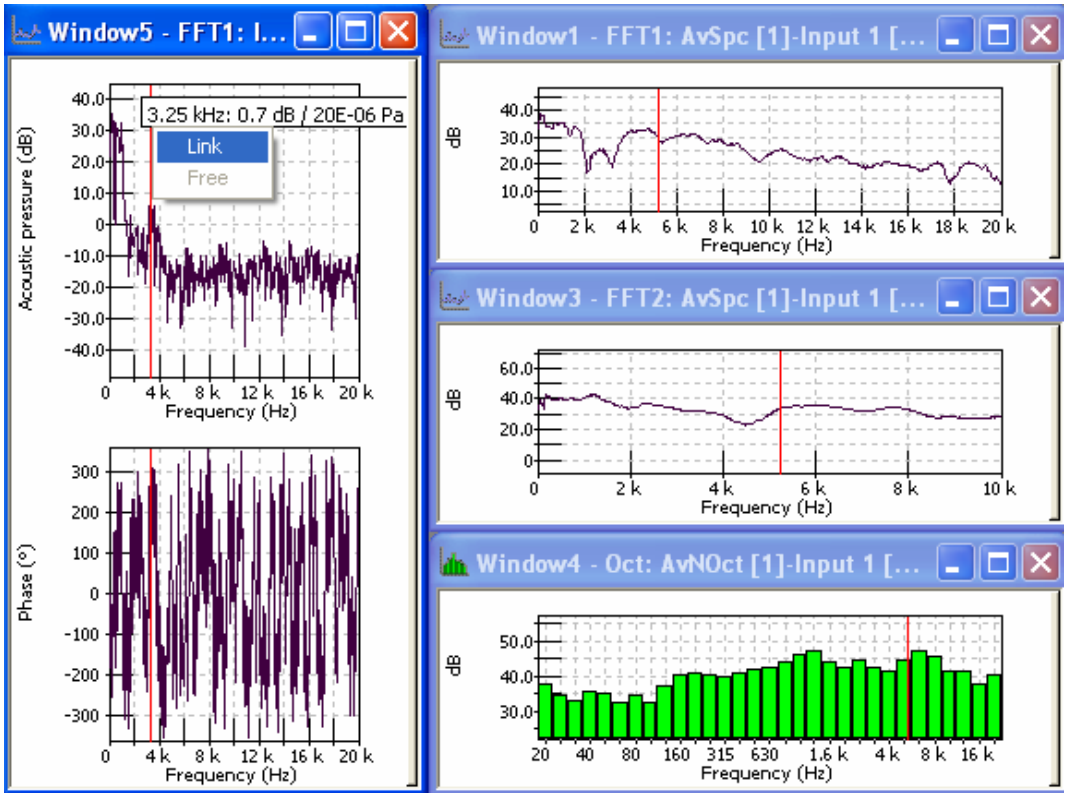
Select 2 cursors from the window properties. That allows to compute delta values on X-axis and Y-axis.



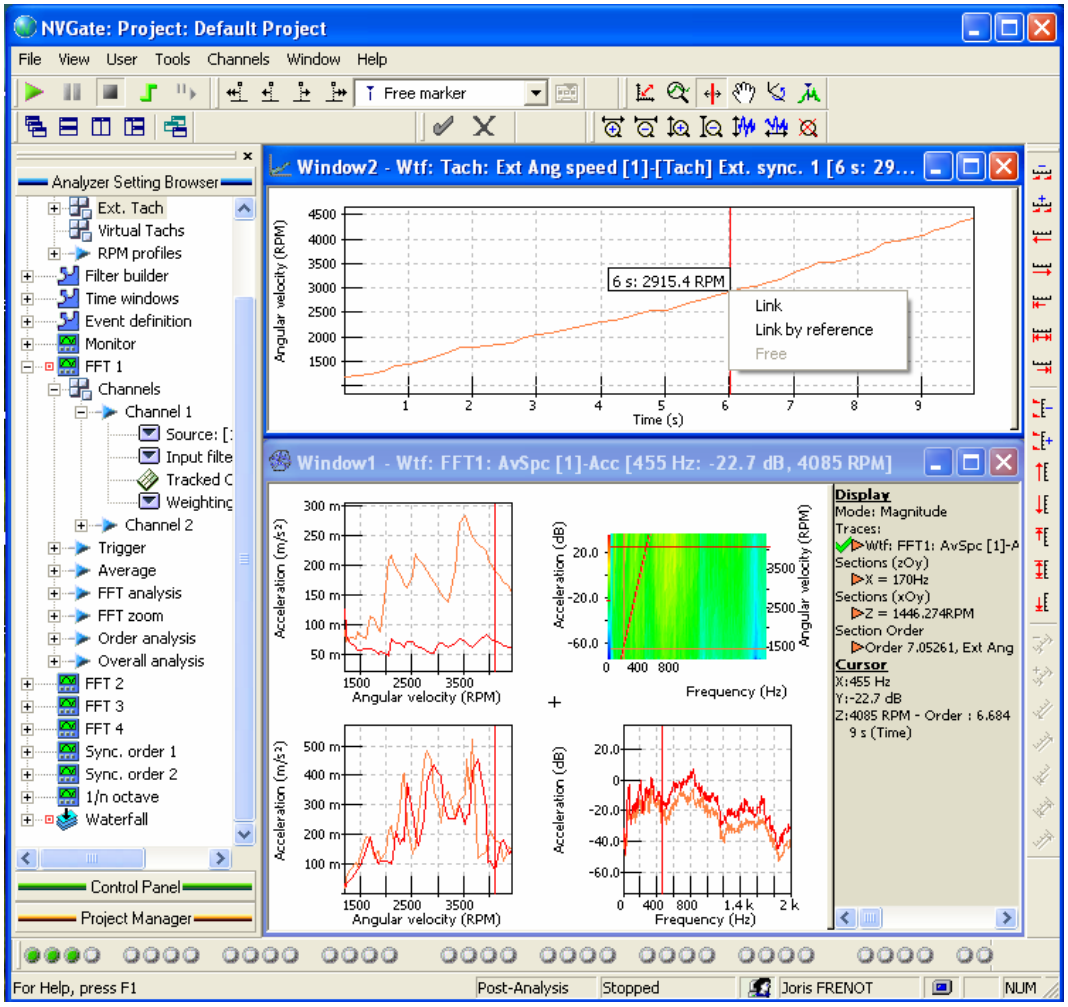


2.6.3 Link

Link the cursors of different graphs that share the same unit on the X-Axis. Once linked, all the cursors move at the same time and the same position.



2.6.4 Waterfall link



2.6.4.1 Link

Link the cursor of different graph that share the same unit on the X-Axis. Once linked, all the cursor moved at the same time and the same position

2.6.4.2 Link by reference

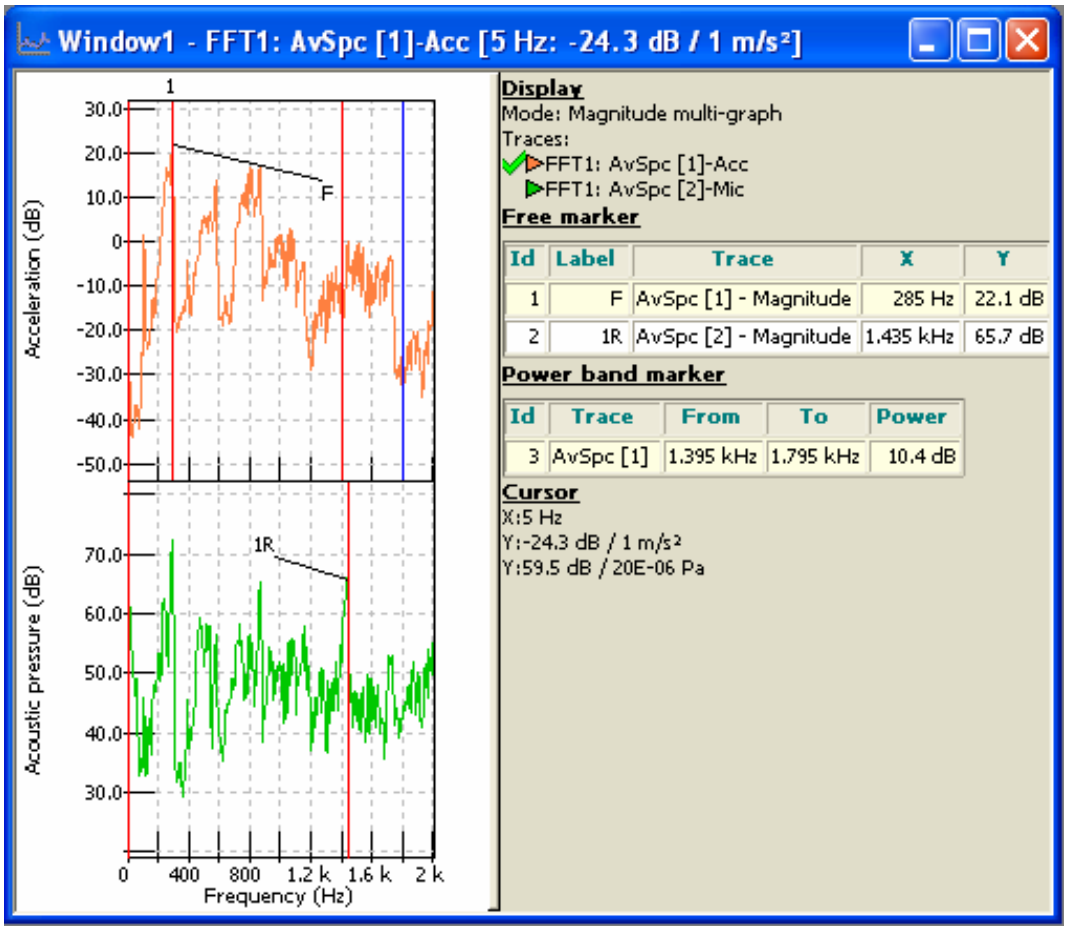
Link the cursor of several Waterfall referring to their internal index. Enables to link cursors that are displayed in graphs that do not share the same unit

2.6.5 Free

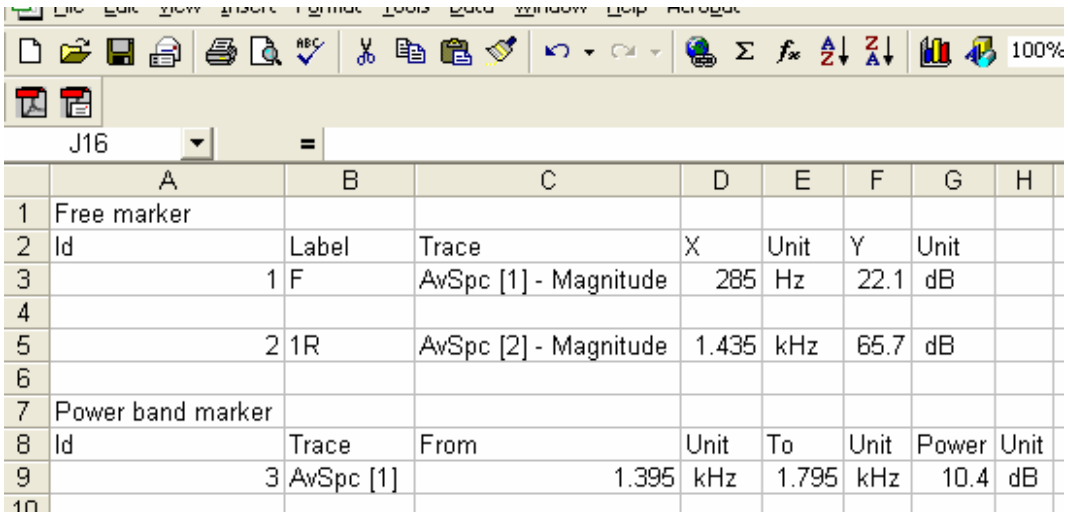
Release a cursor that has been previously linked

2.7 Markers

The markers allow quantifying measurement behaviors such as the band power between 2 frequencies, track signal harmonics or tracking the max amplitude of a signal…



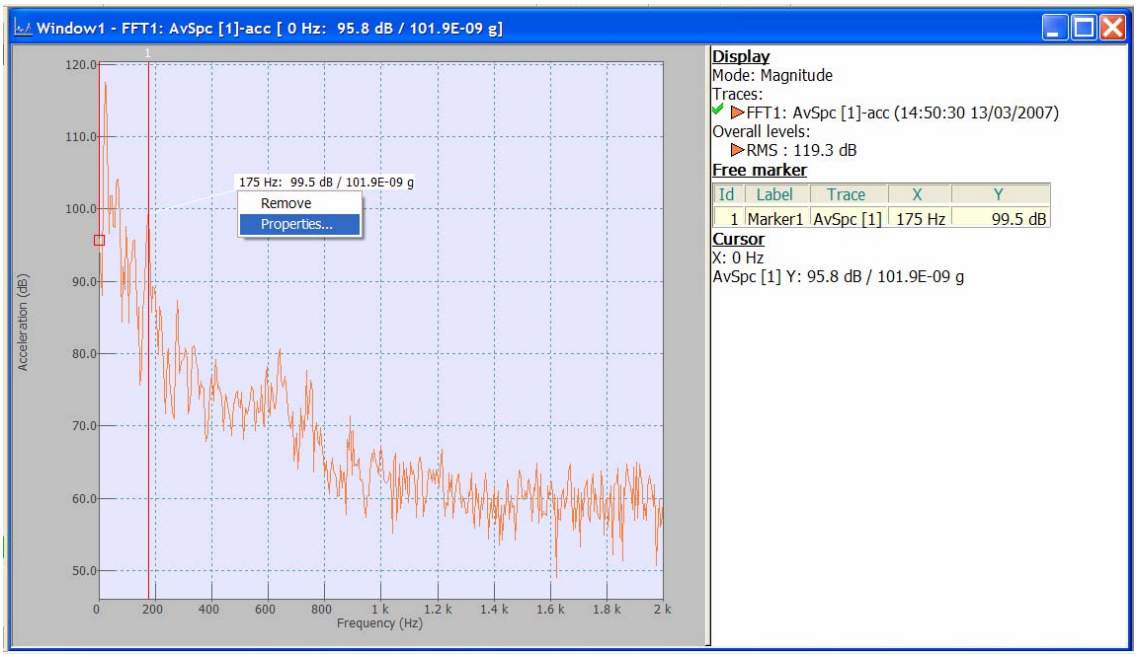
There is also a copy function using the right click from the Infotrace that allows to paste the whole marker table to Word® or Excel®.



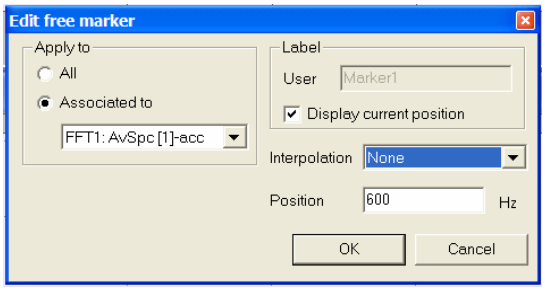
	A	B	C	D	E	F	G	H
1	Free marker							
2	Id	Label	Trace	X	Unit	Y	Unit	
3	1	F	AvSpc [1] - Magnitude	285	Hz	22.1	dB	
4								
5	2	1R	AvSpc [2] - Magnitude	1.435	kHz	65.7	dB	
6								
7	Power band marker							
8	Id	Trace	From	Unit	To	Unit	Power	Unit
9	3	AvSpc [1]	1.395	kHz	1.795	kHz	10.4	dB

2.7.1 Free

When available, a free marker can be placed and moved within a graph to track specific values. A label can be associated with each free marker.
Right clicking on a free maker displays menu including "Properties", which opens edit free maker dialog box.

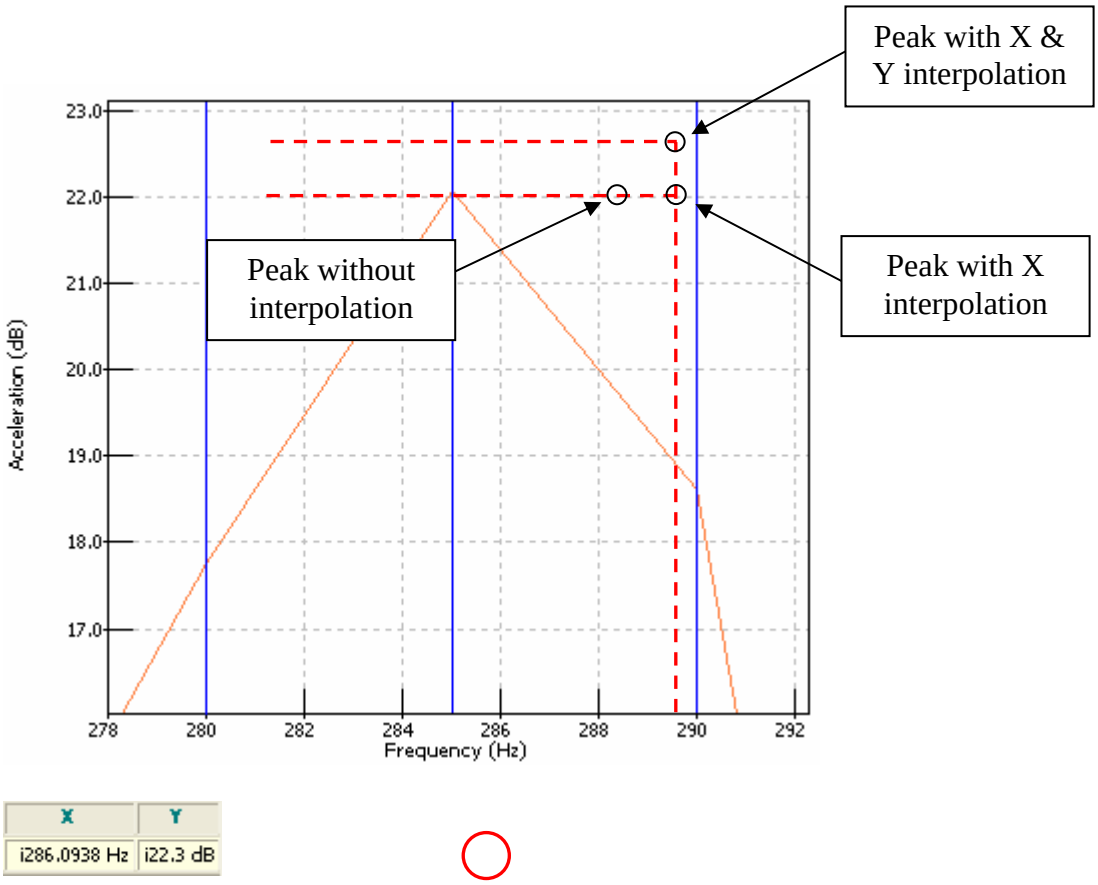


2.7.1.1 Free marker properties



- **Label:** The label associated with the marker. The user can enter directly a name or pick ‘display current position’ to display automatically the coordinates of the selected point.
- **Position:** The X position of the current marker. The position value can be fixed by entering the new value in this box.

- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.



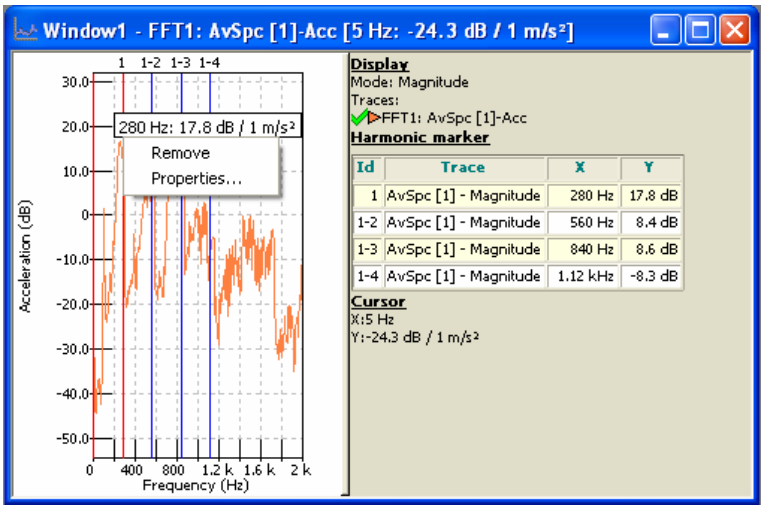
When the interpolation function is active, the interpolated value is preceded by a “i”.

Note: the interpolated values of free markers will be available only if the free marker is placed on a peak. The peak detection criteria are the same as the peak marker adjusted in the User preferences.

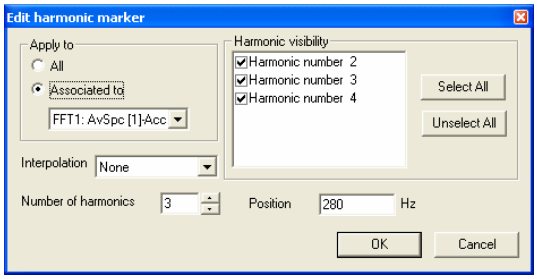
- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated to**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

2.7.2 Harmonic

Computes and displays harmonic values for the selected trace(s).

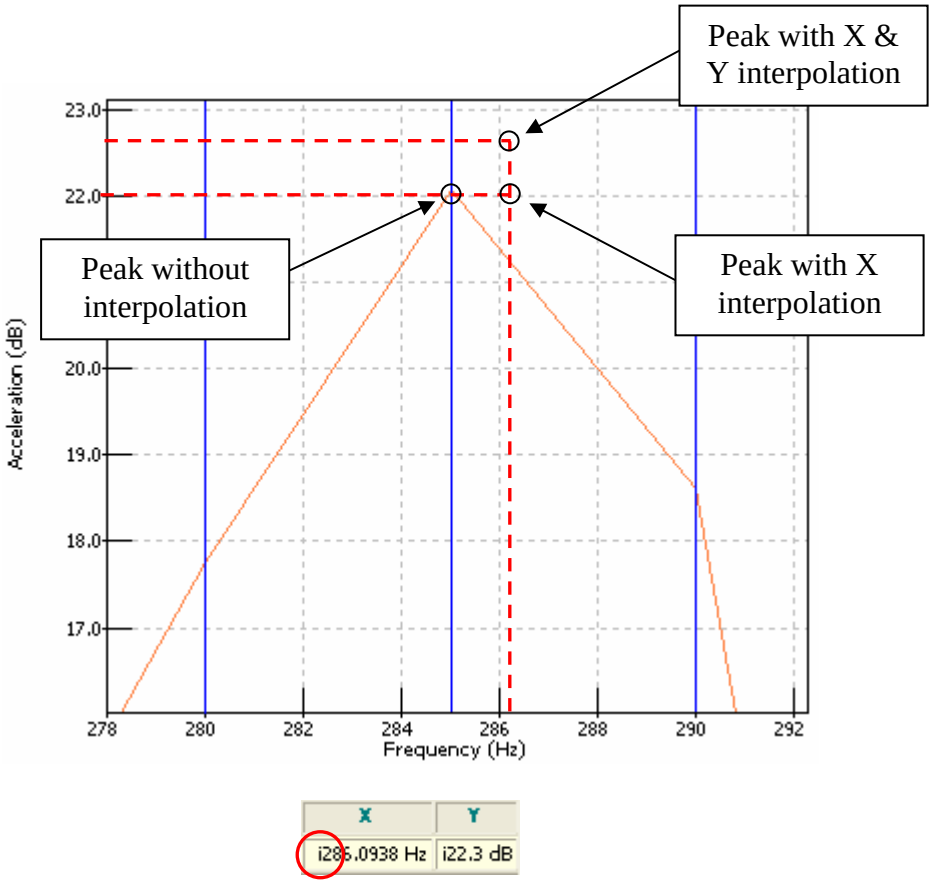


2.7.2.1 Harmonic marker properties



- **Harmonic visibility:** Harmonics checklist. Only checked harmonics will be displayed.

- **Interpolation**
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X&Y**: x and y interpolations are active.



When the interpolation function is active, the interpolated value is preceded by a “i”.

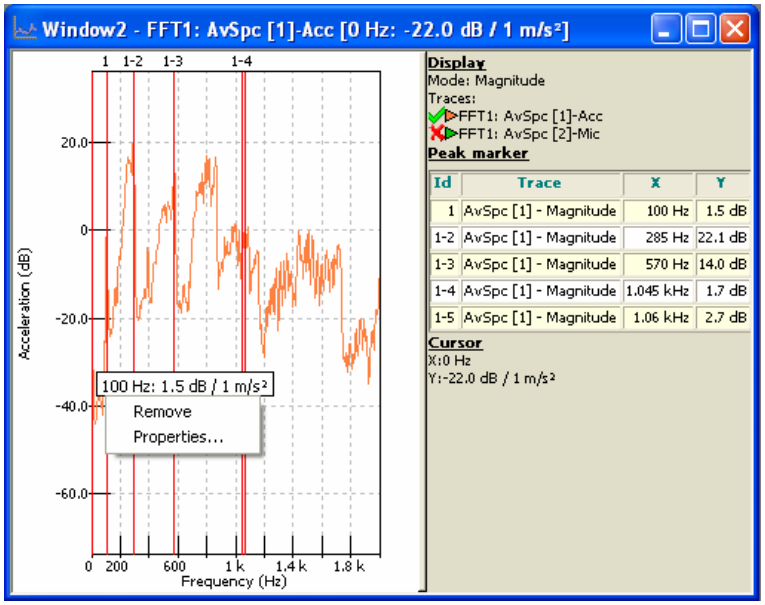
Note: the interpolated values of harmonic markers will be available only if the harmonic marker is placed on a peak.

- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated to**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

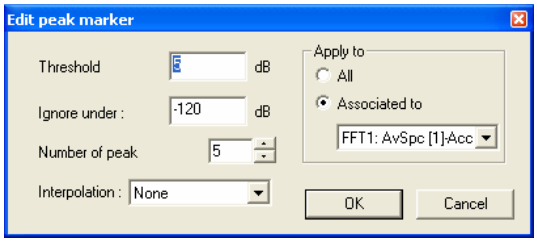
2.7.3 Peak

Computes and displays peak values for the selected trace(s).
A spectrum line is detected as a peak if two following conditions are matched:

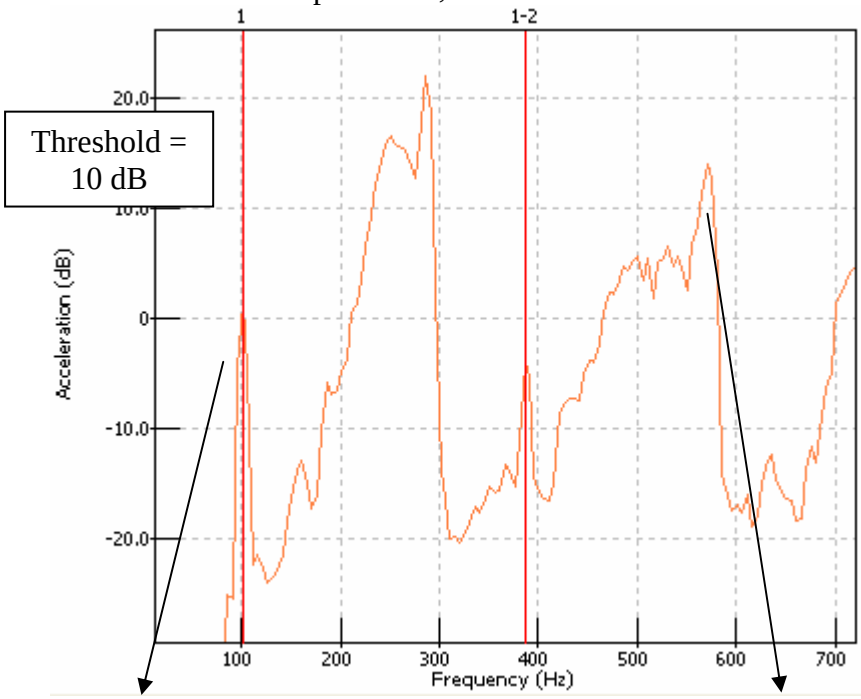
- The 2 adjacent spectrum line levels (N-1, N+1) are lower than the central spectrum line one's
- The 2 following adjacent spectrum line levels (N-2, N+2) are lower than the central spectrum level minus the peak threshold

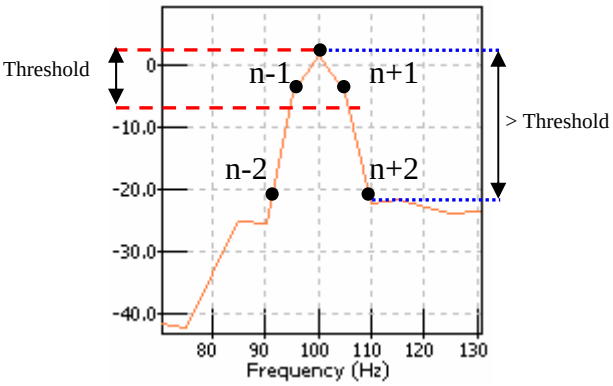


2.7.3.1 Peak marker properties

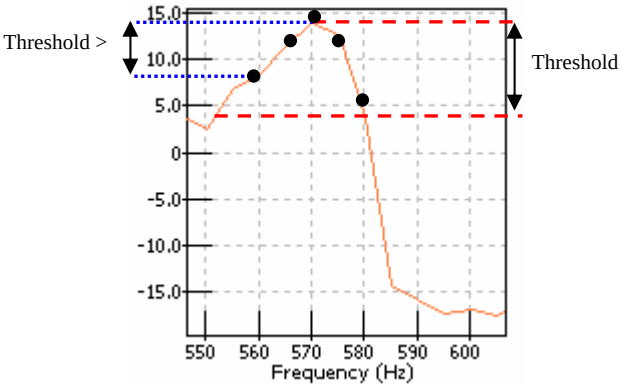


- **Threshold:** In the example below, the “Threshold” is 10 dB.



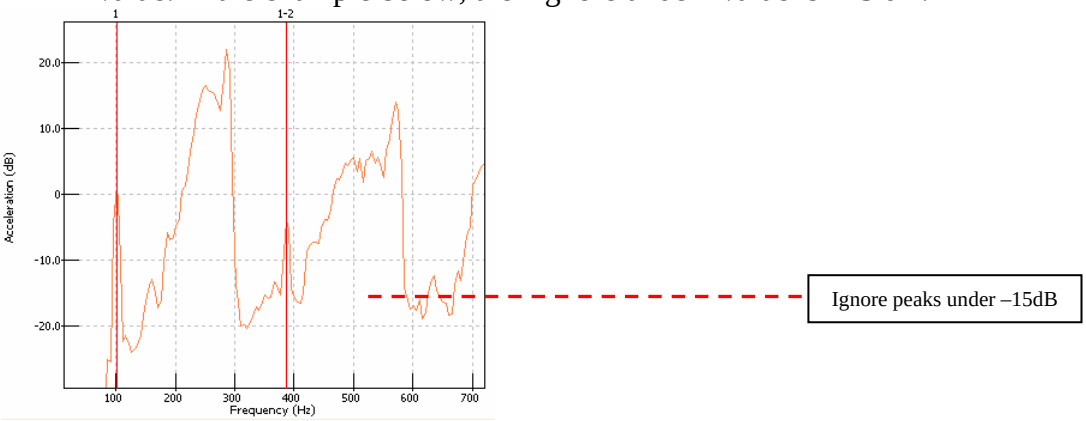


Peak detected

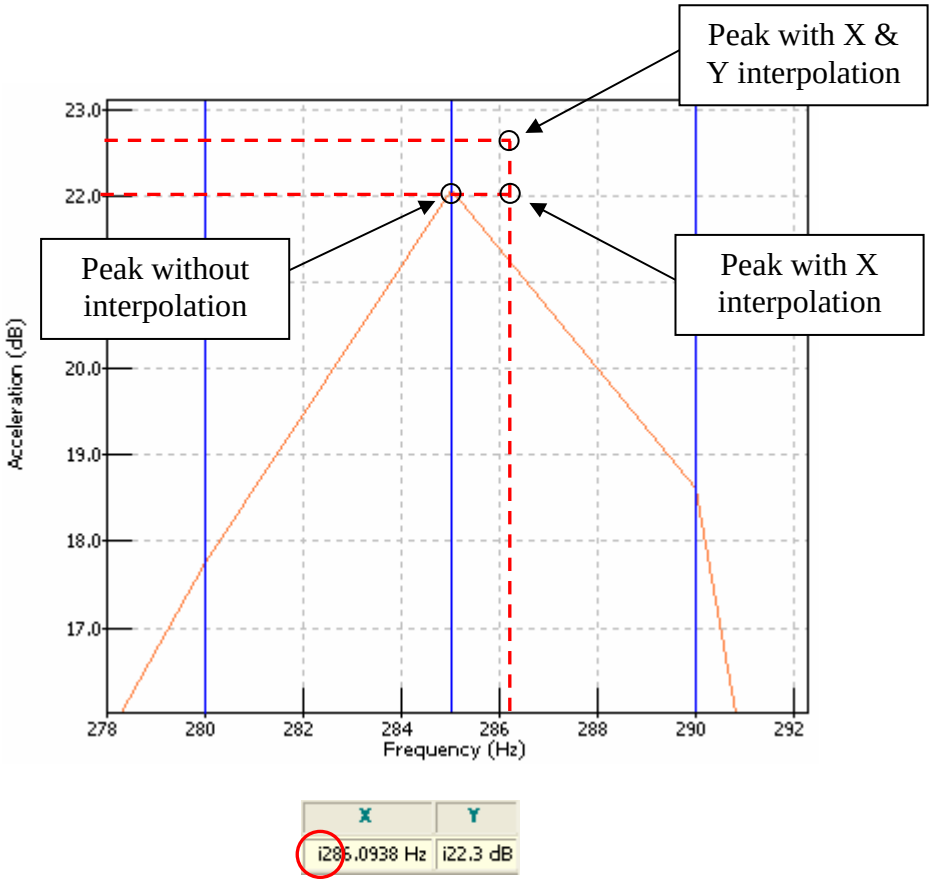


No Peak detected

- **Ignore under:** Does not display the detected peak if the peak is under this value. In the example below, the “ignore under” value is –15 dB.



- **Number of peak:** Number of peaks to be displayed. That will first display the greatest peaks.
- **Interpolation**
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.

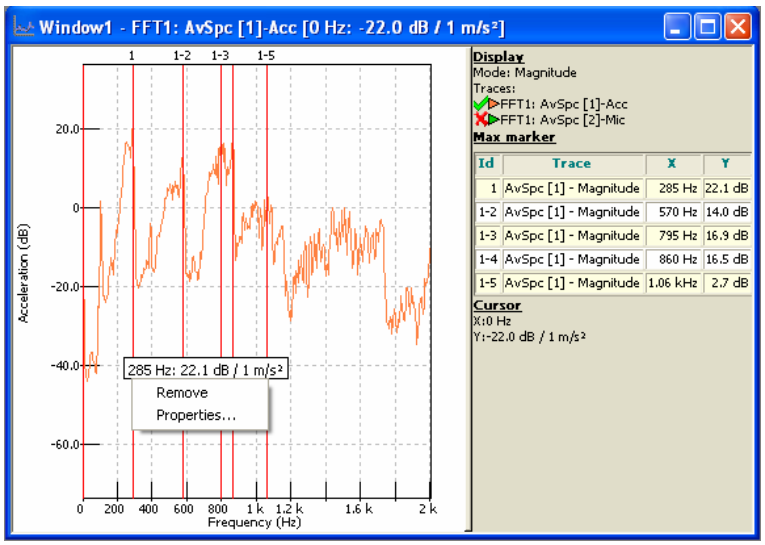


When the interpolation function is active, the interpolated value is preceded by an “i”.

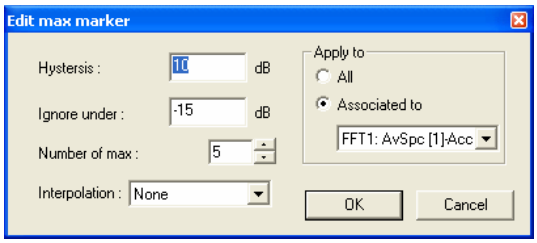
- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated with**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

2.7.4 Max

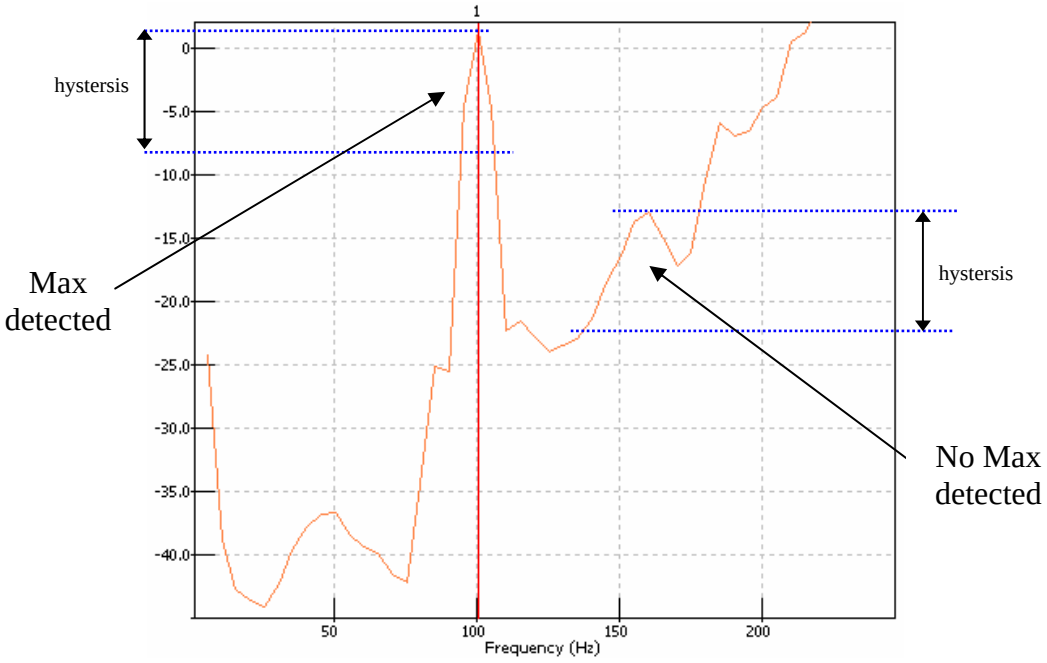
Computes and displays max values for the selected trace(s).
A maximum is defined as a local maximum such that the variation in size of spectral density of ray, in relation to other local maximum surrounding it, is greater than a set threshold



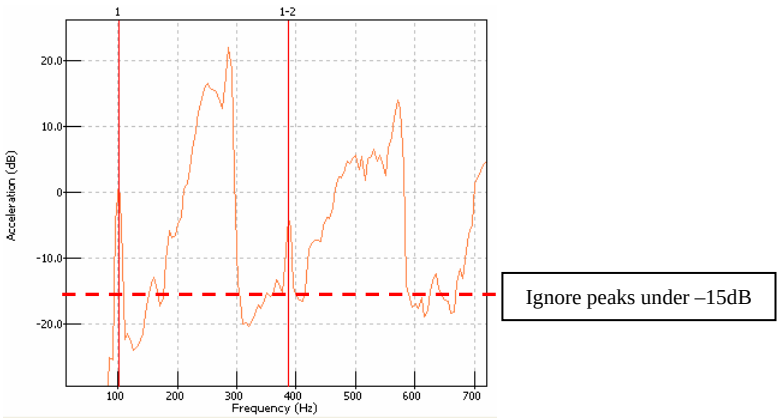
2.7.4.1 Max marker properties



- **Hystersis**

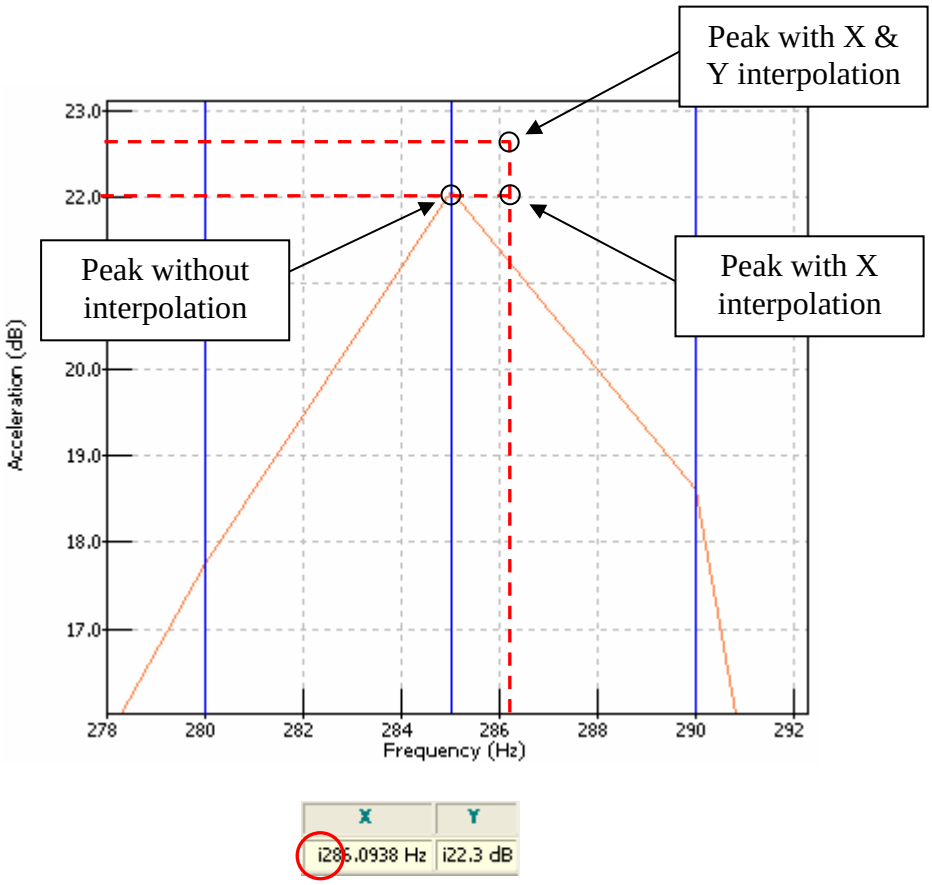


- **Ignore under:** Does not display the detected peak if the peak is under this value. In the example below, the “ignore under” value is –15 dB.



- **Number of max:** Number of max to be displayed. That will first display the greatest max.

- **Interpolation**
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.

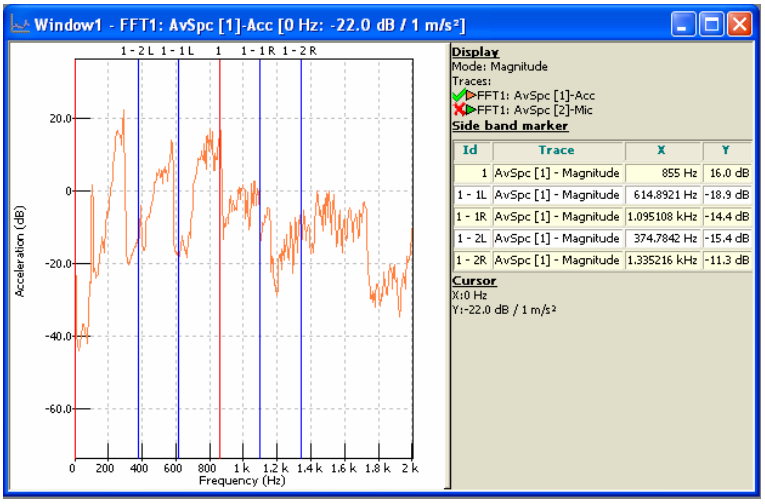


When the interpolation function is active, the interpolated value is preceded by a “i”.

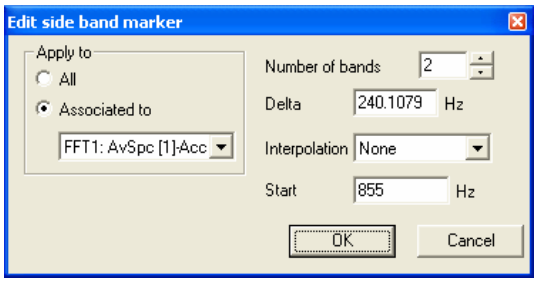
- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated to**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

2.7.5 Side band

Displays values for a central frequency and side frequencies (left and right) defined by a delta value.
The management of **side band markers** selects the assumed **porter** and **the first side band** of modulation. The position of the cursor during the selection of the porter or the first side band is previously interpolated on the frequency axis, taking into account the frequency response of the weighting window used if the Interpolation setting allows this

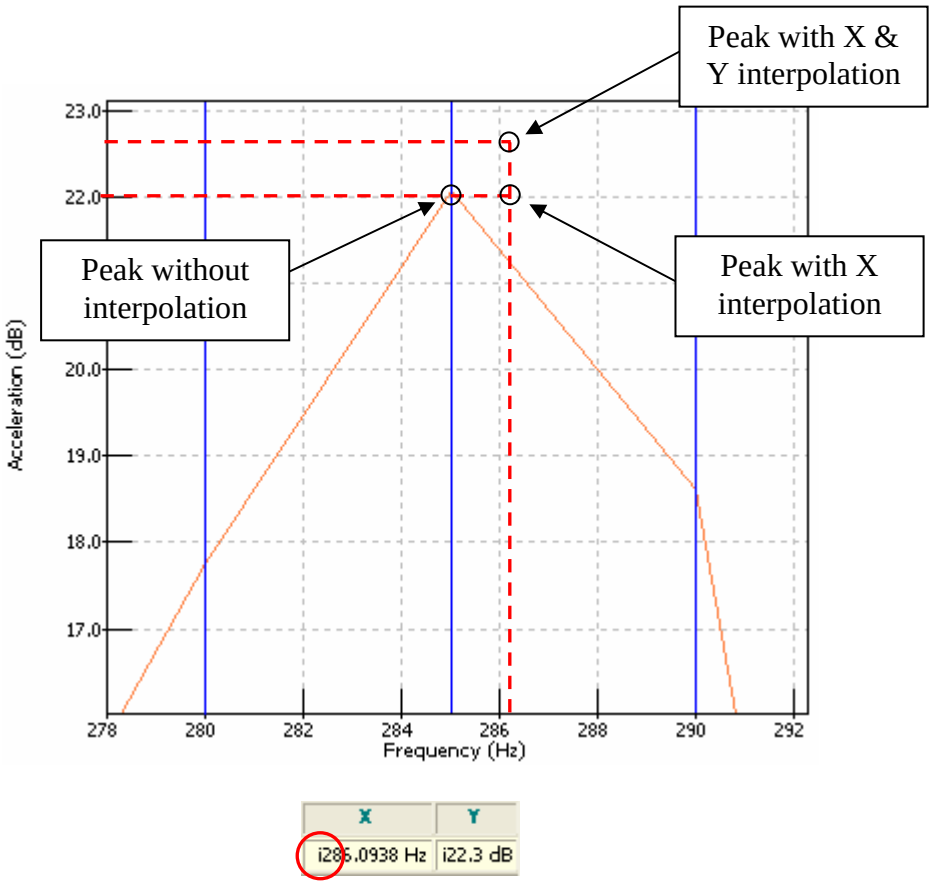


2.7.5.1 Side band marker properties



- **Start:** Central value.
- **Delta:** Range between 2 side frequencies.
- **Number of bands:** Defines the number of bands (on the left and on the right).

- **Interpolation**
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.



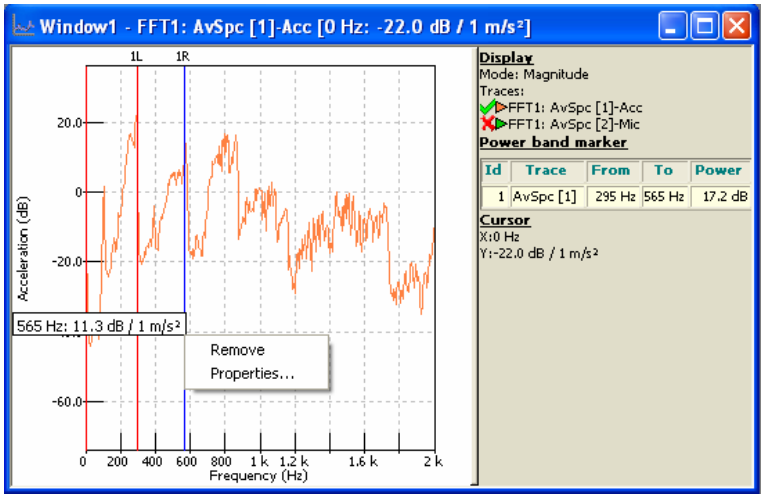
When the interpolation function is active, the interpolated value is preceded by a “i”.

Note: the interpolated values of free markers will be available only if the side band marker is placed on a peak.

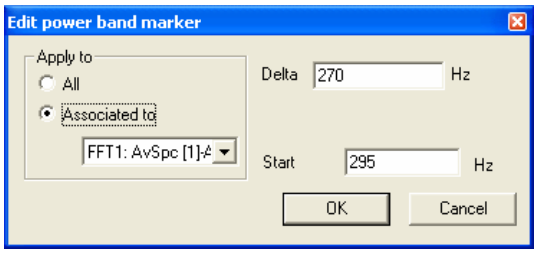
- **Apply to**
  - **All:** the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated with**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

2.7.6 Power band

Computes and displays power in signal range defined by start position and delta.



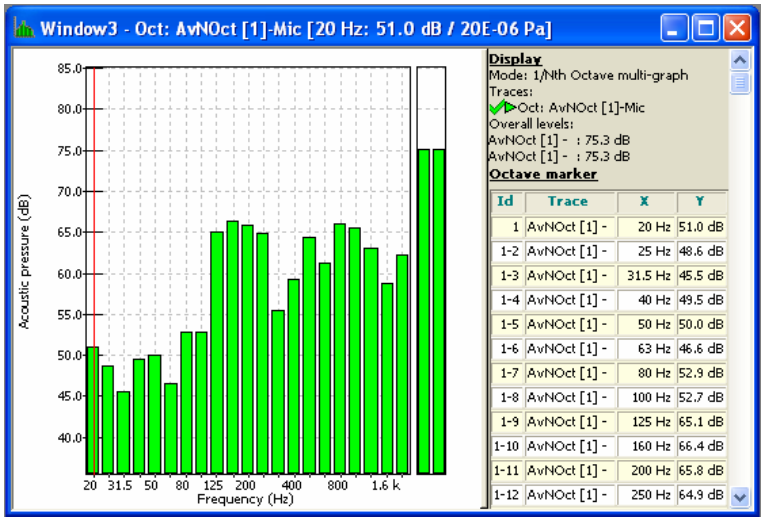
2.7.6.1 Power band marker properties



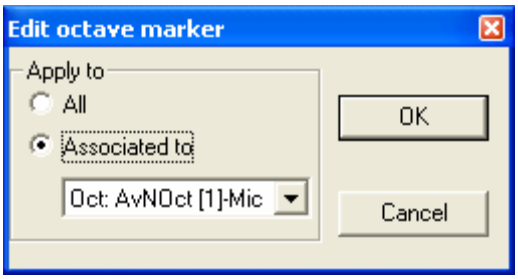
- **Start:** Start value for the power band computation.
- **Delta:** Bandwidth used for the computation.
- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated with**: the marker is associated to only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

2.7.7 Octave

Displays all band values



2.7.7.1 Octave marker properties



- **Apply to**
  - **All**: the marker is associated with all curves of the graph. All Y values will be computed and displayed in the free marker tab.
  - **Associated with**: the marker is associated with only one trace of the graph. If active is selected, the marker is applied to the current active trace of the graph.

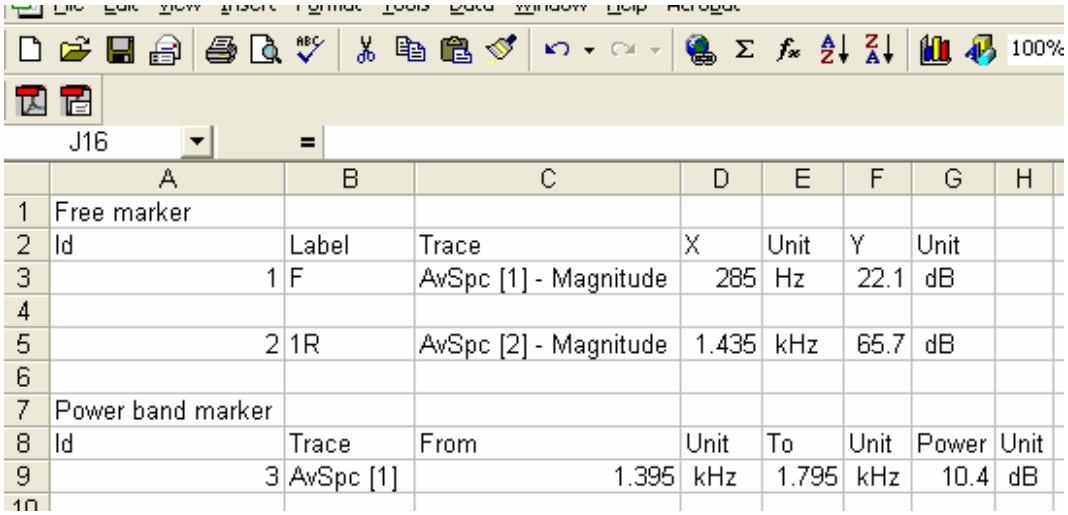
2.7.8 Copy marker

Available in Infotrace area. Used to copy marker data to the clipboard. The data is formatted to be pasted easily in Word® or Excel®.
Example of result with this command:

For Word®:

Free marker
Id Label Trace X Unit Y Unit
1 Marker Sig [1] 0.00141 s 5.453 V

For Excel®:



	A	B	C	D	E	F	G	H
1	Free marker							
2	Id	Label	Trace	X	Unit	Y	Unit	
3	1	F	AvSpc [1] - Magnitude	285	Hz	22.1	dB	
4								
5	2	1R	AvSpc [2] - Magnitude	1.435	kHz	65.7	dB	
6								
7	Power band marker							
8	Id	Trace	From	Unit	To	Unit	Power	Unit
9	3	AvSpc [1]	1.395	kHz	1.795	kHz	10.4	dB

Chapter 3: Hardware Management

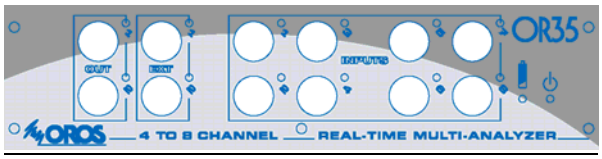
Table of contents:

3.1 Description OR3X analyzers....3-5
3.1.1 OR34-OR35....3-5
3.1.1.1 Front Panel....3-5
3.1.1.2 Back Panel....3-5
OR34....3-5
OR35....3-6
3.1.2 OR36-OR38....3-7
3.1.2.1 Front Panel....3-7
3.1.2.2 Back Panel....3-8
3.2 Battery....3-8
3.2.1 OR36/OR38....3-8
3.2.2 OR35....3-9
3.2.3 OR34....3-10
3.3 Powering On/Off OR3X analyzer....3-11
3.3.1 OR36 – OR38....3-11
3.3.2 OR34 - OR35....3-12
3.4 Front panel menu on OR 36/38....3-13
3.5 Disk management....3-14
3.5.1 Manager....3-14
3.5.1.1 Analyzer ID number....3-14
3.5.1.2 Actions....3-15
3.5.1.3 Download....3-15
3.5.1.4 Format....3-16
3.5.1.5 Mobi-Disc™....3-16
3.6 Stand-alone....3-18
3.6.1 Stand alone features....3-19

3.1 Description OR3X analyzers

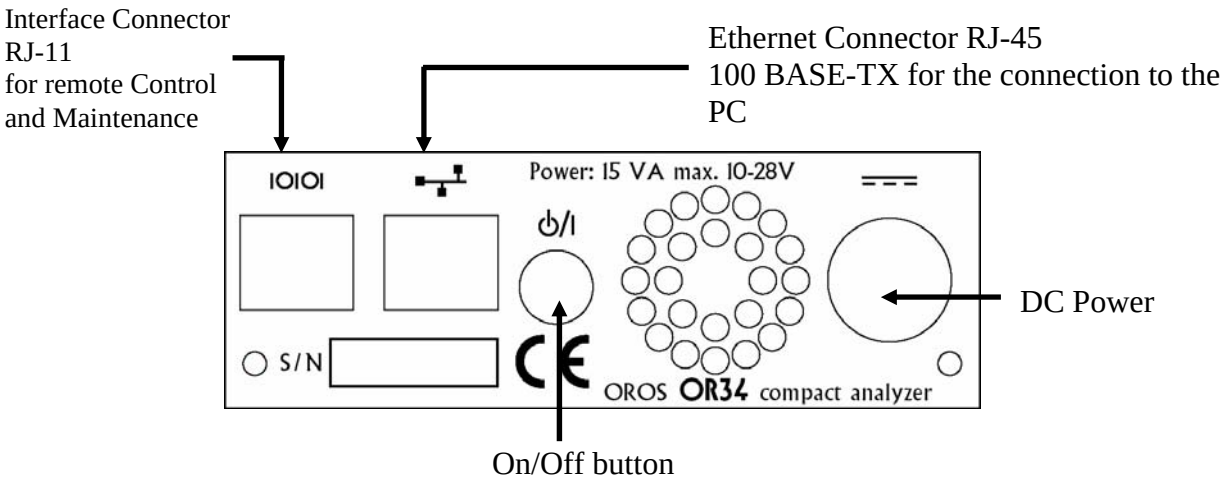
3.1.1 OR34-OR35

3.1.1.1 Front Panel

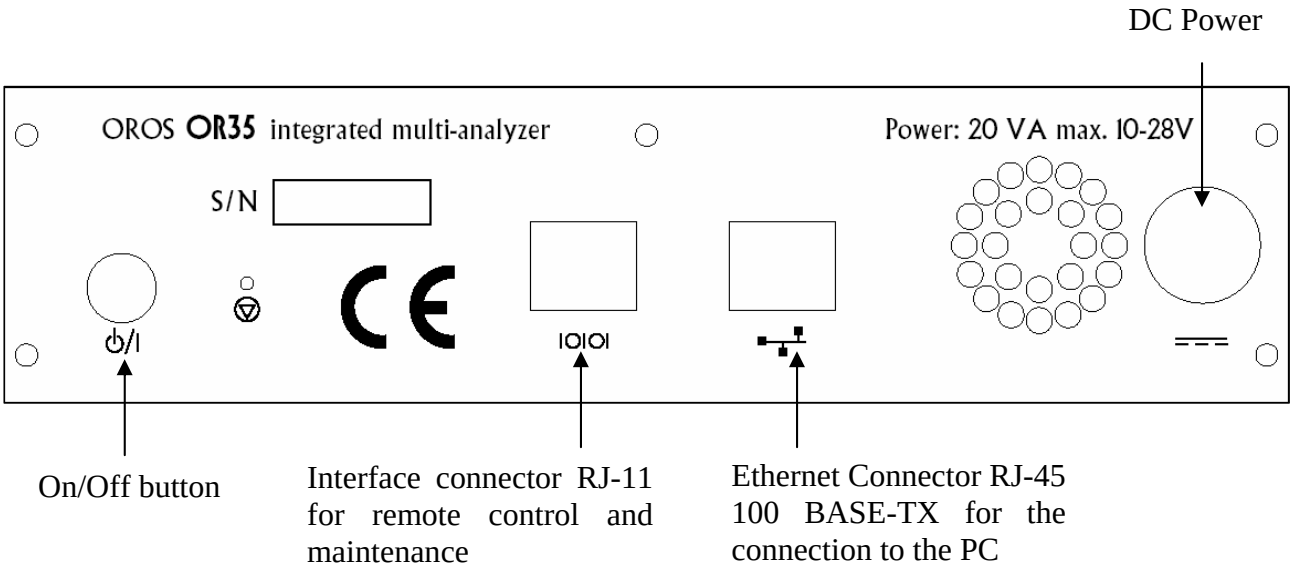
	OR35	OR34
Inputs	1 to 8 Dynamic Inputs	1 to 4 Dynamic Inputs
Out.	Generators 1 & 2	Generator 1
Ext.	External Sync.1 & 2	External Sync.1 & 2
Overview		

3.1.1.2 Back Panel

OR34



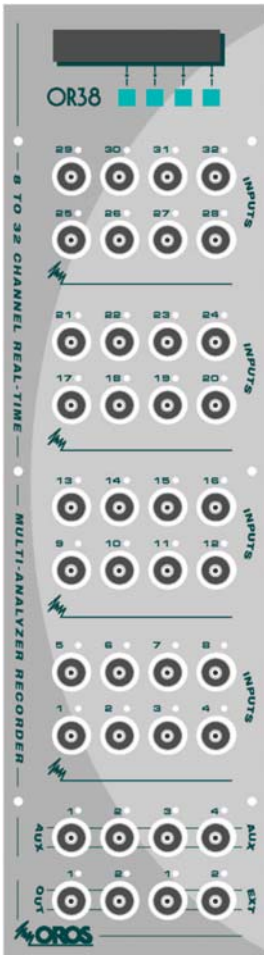
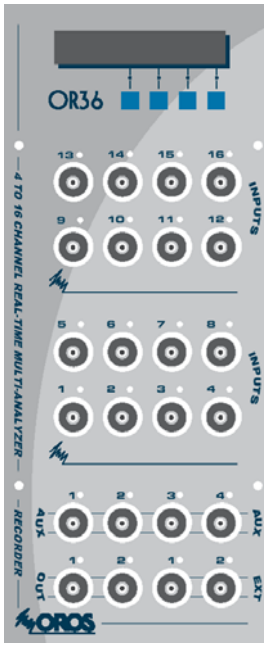
OR35



1 to 4 DC Inputs are available on the back panel.

3.1.2 OR36-OR38

3.1.2.1 Front Panel

	OR38	OR36
Inputs	1 to 32 Dynamic Inputs DC Inputs[1]	1 to 16 Dynamic Inputs DC Inputs[1]
Out.	Generators 1 & 2	Generators 1 & 2
Ext.	External Sync.1 & 2	External Sync 1 & 2
Aux.	Auxiliary connectors[1]1 to 4	Auxiliary connectors[1]1 to 4
Overview		

[1] Depending on the purchased options

3.1.2.2 Back Panel

AC power supply

AC plug

The OR38 hardware can be AC power supplied using the following plug.

3.2 Battery

3.2.1 OR36/OR38

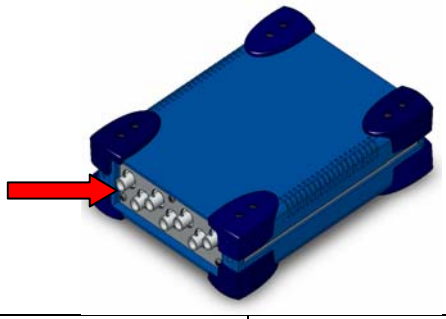
All information about the battery status is displayed on the front panel.
In NVGate the battery status is displayed (100%, 75%, 50%, 25%). When the status of the battery reach 10% a warning is displayed.
At least a if the level reaches the low battery level, NVGate take the hand: that means it saves the current project, then it closes NVGate and stops the hardware.
In that way all measurement and project are safely saved.
Measurements are then saved under the name:…….
If the current project was the default project then the project is renamed as……

3.2.2 OR35

Led Status		***Functions***
Pulse	Battery charge	
		Charge = 100%
		Charge > 75 %
		Charge > 50 %
		Charge > 25 %
		Charge > 10 %
Pulse	Battery discharge	
		Discharge > 75 % of charge
		Discharge > 50 % of charge
		Discharge > 25 % of charge
		Discharge > 10 % of charge
		Discharge < 10 % of charge
Pulse	Error mode	
		Error in charge : - Temperature problem: in maintenace mode. - DCIN voltage <12V: in maintenance mode.

3.2.3 OR34

- **Battery Status: Yellow led on the left**



Led Status		***Functions***
Pulse	Charge	
		Charge = 100%
		Charge > 75 %
		Charge > 50 %
		Charge > 25 %
		Charge > 10 %
Pulse	Discharge	Discharge > 75 % of charge
		Discharge > 50 % of charge
		Discharge > 25 % of charge
		Discharge > 10 % of charge
		Discharge < 10 % of charge
		Discharge

3.3 Powering On/Off OR3X analyzer

3.3.1 OR36 – OR38

Only OR36 and OR38 hardware have LCD screen on the front panel.

To start OR36/OR38 Hardware, press the right-hand button of the Front Panel. "OR3X Powering up" is displayed on the LCD screen.

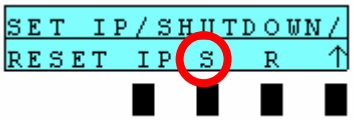
Hardware auto-tests are done until "System OK ↓" appears on the screen.
If auto-tests return an error message, please contact your OROS Agent.

Power off OR36/OR38 Hardware by pressing on the right-hand button of the front panel for "↓", then on the second button for "S" (Shutdown) and confirm by pressing "Y" (Yes).

From the LCD screen:

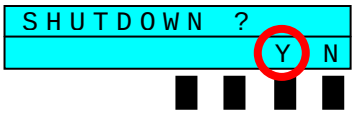
Pressing the right-hand button for "↓". The following menu is displayed:

This menu allows to: shutdown the analyzer (second button for "S")



reset the analyzer (third button for "R")

go back to the first menu (fourth button for "↑").



Answer "Y" for Yes

If OR36/OR38 Hardware does not respond, press the right-hand button until it turns off. Then, power it on again after a few minutes.
Note: This type of shutdown may reduce disk life.

3.3.2 OR34 - OR35

A beep is produced when the hardware is connected to the mains.

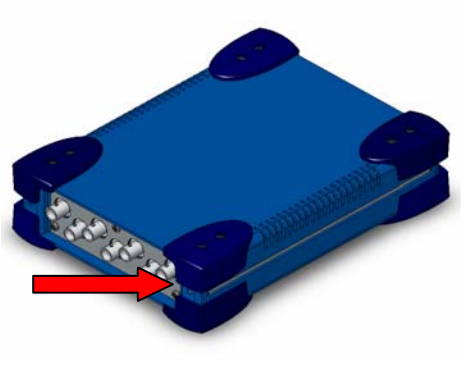
Power on OR34/OR35 Hardware by pressing the power On/Off button of the back panel and wait until a beep is produced (2sec) then release the button. The LED is fast flashing green (system is loading) and then slow flashing green (system OK).

Power off OR34/OR35 Hardware by pressing the power On/Off button of the back panel and wait until a beep is produced (2sec). The LED is flashing red.

If OR34 Hardware does not respond, unplug the main power supply.

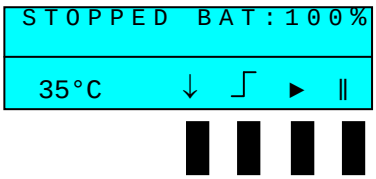
If OR35 Hardware does not respond, unplug the main power supply and press the reset button of the back panel.

- **OR34-OR35 Hardware status: green / red led on the right**



Led Status		*Functions*
Fast flashing green		Powering up OR34 hardware Status : Powering up DSPs
Slow flashing green		DSP take the hand Status : Système OK
Slow flashing Red / Green		Maintenance Mode Status : Serveur Minimum
Fixed red		Error during powering up in normal mode Status : maintenance mode / Serveur minimum
Fixed green		Mode : NVGate is activated Status : The user has launched NVGate

3.4 Front panel menu on OR 36/38



On the front panel are available:

- Status of measurement (stopped, running, paused).
- Status of the battery in percentage.
- Temperature of the analyzer.
- Run, Pause, Trigger button.

You can also navigate in menu with the arrow:

- Settings menu: - FAN (with speed setting)
  - Information (Temperature in °C or F, Voltages, Battery)
  - LCD settings (speaker, backlight, contrast, Beep on key)
  - Network (Connect, IP address number)
- Standard
- Acoustic
- Save menu: results can be saved directly from the front panel (simulated the shortcut of the key board). A message will appear in order to confirm data backup.
- Macro menu: by choosing 0, 1 or 2 you can run the macro corresponding to keyboard shortcut ctrl 0, 1 or 2.

3.5 Disk management

It is possible to work on the disc of the PC, on the disc of the Hardware and also (if available on your system) on an USB disc.

The Disc of the hardware can contain 2048 / 3 → 682 measurements.
Indeed, for each measurement, 3 different files are saved:

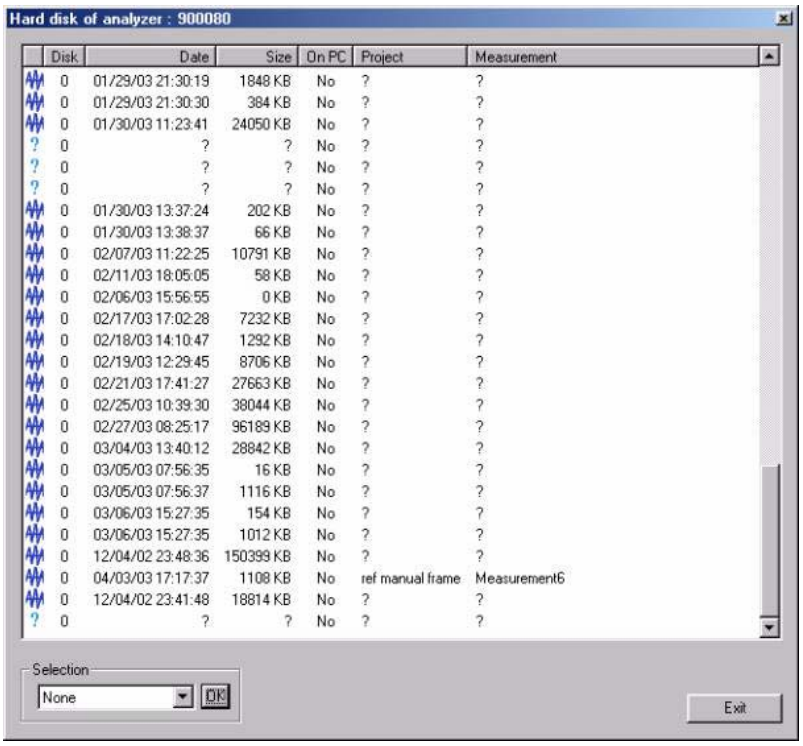
- .oxf: file containing record setting
- .sbl: file containing all data
- .bdc: file containing data organization

3.5.1 Manager

This dialog box is used to clean up the hard disk or to download files.
Note that the disk doesn't run all the time (cf Local standby)

3.5.1.1 Analyzer ID number

The title of the window shows the Analyzer identification number.



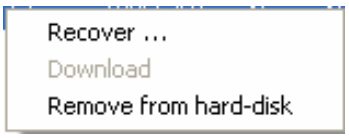
	Disk	Date	Size	On PC	Project	Measurement
	0	01/29/03 21:30:19	1848 KB	No	?	?
	0	01/29/03 21:30:30	384 KB	No	?	?
	0	01/30/03 11:23:41	24050 KB	No	?	?
?	0	?	?	No	?	?
?	0	?	?	No	?	?
?	0	?	?	No	?	?
	0	01/30/03 13:37:24	202 KB	No	?	?
	0	01/30/03 13:38:37	66 KB	No	?	?
	0	02/07/03 11:22:25	10791 KB	No	?	?
	0	02/11/03 18:05:05	58 KB	No	?	?
	0	02/06/03 15:56:55	0 KB	No	?	?
	0	02/17/03 17:02:28	7232 KB	No	?	?
	0	02/18/03 14:10:47	1292 KB	No	?	?
	0	02/19/03 12:29:45	8706 KB	No	?	?
	0	02/21/03 17:41:27	27663 KB	No	?	?
	0	02/25/03 10:39:30	38044 KB	No	?	?
	0	02/27/03 08:25:17	96189 KB	No	?	?
	0	03/04/03 13:40:12	28842 KB	No	?	?
	0	03/05/03 07:56:35	16 KB	No	?	?
	0	03/05/03 07:56:37	1116 KB	No	?	?
	0	03/06/03 15:27:35	154 KB	No	?	?
	0	03/06/03 15:27:35	1012 KB	No	?	?
	0	12/04/02 23:48:36	150399 KB	No	?	?
	0	04/03/03 17:17:37	1108 KB	No	ref manual frame	Measurement6
	0	12/04/02 23:41:48	18814 KB	No	?	?
?	0	?	?	No	?	?

- **Disk:** Hard disk index for analyzers equipped with two hard disks.
- **Date:** Gives the creation date.
- **Size:** Give the file size in KB.
- **On PC:** Indicates whether the file has already been downloaded.

- **Project:** Name of the project containing the measurement associated with the file.
- **Measurement:** Name of the measurement associated with the file.
- **Selection**
  - **None:** Unselects all currently selected files.
  - **Orphan:** Selects all files that do not have associated measurements on the PC. Note that another user or another computer may use these files.
  - **Downloadable:** Selects all files that have an associated measurement on the computer and that have not yet been downloaded.
  - **Recoverable:** Select files that have been recorded on another PC than the PC you are using.
  - **All:** Selects all files.

3.5.1.2 Actions

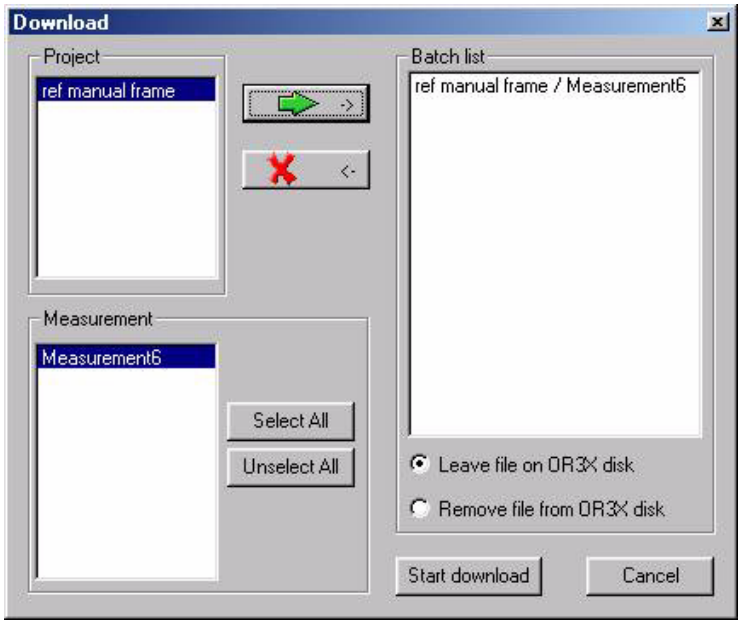
A right click on the selected files displays the following pop-up menu



- **Recover:** Recover the selected files
- **Download:** Downloads the selected files to the computer
- **Remove from hard-disk:** Deletes the selected files from the hard disk

3.5.1.3 Download

This dialog bow is used to select several files for downloading.



- **Project:** List of the projects that contain downloadable measurements.
- **Measurement:** List of measurements within the selected project that contain downloadable signals.
  Use the Add button to add the selected measurement to the batch.
- **Batch list:** List of the signals that have been selected for downloading. Signals are defined by "Project\Measurement".

3.5.1.4 Format

Formats the analyzer hard disk. This command erases all the files stored on the hard disk. Measurement containing signals that have not been downloaded will be lost or unusable.

3.5.1.5 Mobi-Disc™

A removable is available with OR36/38

The Mobi-Disc™ is a removable disc.

- System must be switched off before removing or inserting the Moby-Disc™.

- Always use the analyzer with the correct protective cover:
  - The one with the handle-hole when the Mobi-Disc™ is inserted in the analyzer
  - The one without the handle-hole when no Mobi-Disc™ is inserted in the analyzer.

- Never plug the Mobi-Disc™ to the PC with version 2.30 or lower of NVGate. The Mobi-Disc™ formatted with NVGate V2.30 are not recognized by Windows and then may be reformatted by the operating system.

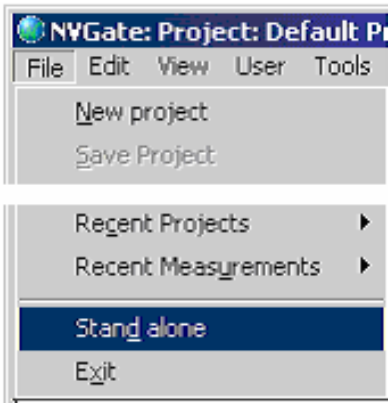
Operation of the Mobi-Disc™ using the USB link will be available with the next software release. The next software release update of NVGate software will be free of charge for customer who bought Mobi-Disc™ with version V2.30 of NVGate.

3.6 Stand-alone*

The stand-alone mode is designed to allow the analyzer to run even if it is not connected to the computer. The analyzer set-up must be done with NVGate® and the project must be saved before exiting using the File\Stand alone menu.

1

2



3

Real-time signal acquisition

The analyzer will then work on its own until the same computer is reconnected to the OR3X hardware and NVGate® is launched. The project that has initiated the stand-alone session is automatically loaded and data that has been collected by the hardware is immediately retrieved. If results have to be saved, a measurement is created to store these results.

4

Retrieving Saved results

It is possible to complete one record during the stand-alone session. To make non-continuous records, use the multi record capabilities of the recorder.
When using the Waterfall in stand-alone mode, the depth of the Waterfall might be adjusted if the amount of data is larger than what the analyzer can store in its internal memory.

If another computer than the one that initiated the stand-alone session tries to connect to the analyzer, it will be informed that a stand-alone session is currently in progress and will ask for confirmation before closing the session

The project used to initiate the stand-alone session should not be used to initiate another stand-alone session using different hardware. Create a new project that uses the workbook of the first project to initiate other session.
The project that has initiated the stand-alone protection is protected until the stand-alone session is finished, meaning that this project should not be used, even in office mode, while the stand-alone session is in progress.
During a stand-alone session, the analyzer settings cannot be changed. The only possible actions are the ones available from the hardware control panel (Run, Stop, Pause, Manual trigger).

Note: When you will start again NVGate® (with no hardware connected or with another hardware), the icon appears in the Project Manager to show that the corresponding project was set-up for a Stand-alone session. So it is not recommended to modify this project in order to avoid any errors during the re-connection.

3.6.1 Stand alone features

- You can run several Stand-alone sessions at the same time with several OR3X hardware.
- You cannot use the macro for a Stand-alone session.
- It is not possible to record time signals with OR35 analyzer.
- When you want to run an OR34/OR35 hardware in the Stand-alone mode, you must click Run from NVGate® before. OR34 and OR35 hardware have no front panel control buttons.
- With an OR34 or OR35 hardware, you cannot record a time signal (because there is no hard disk, only a buffer is available).

Chapter 4: Project Manager

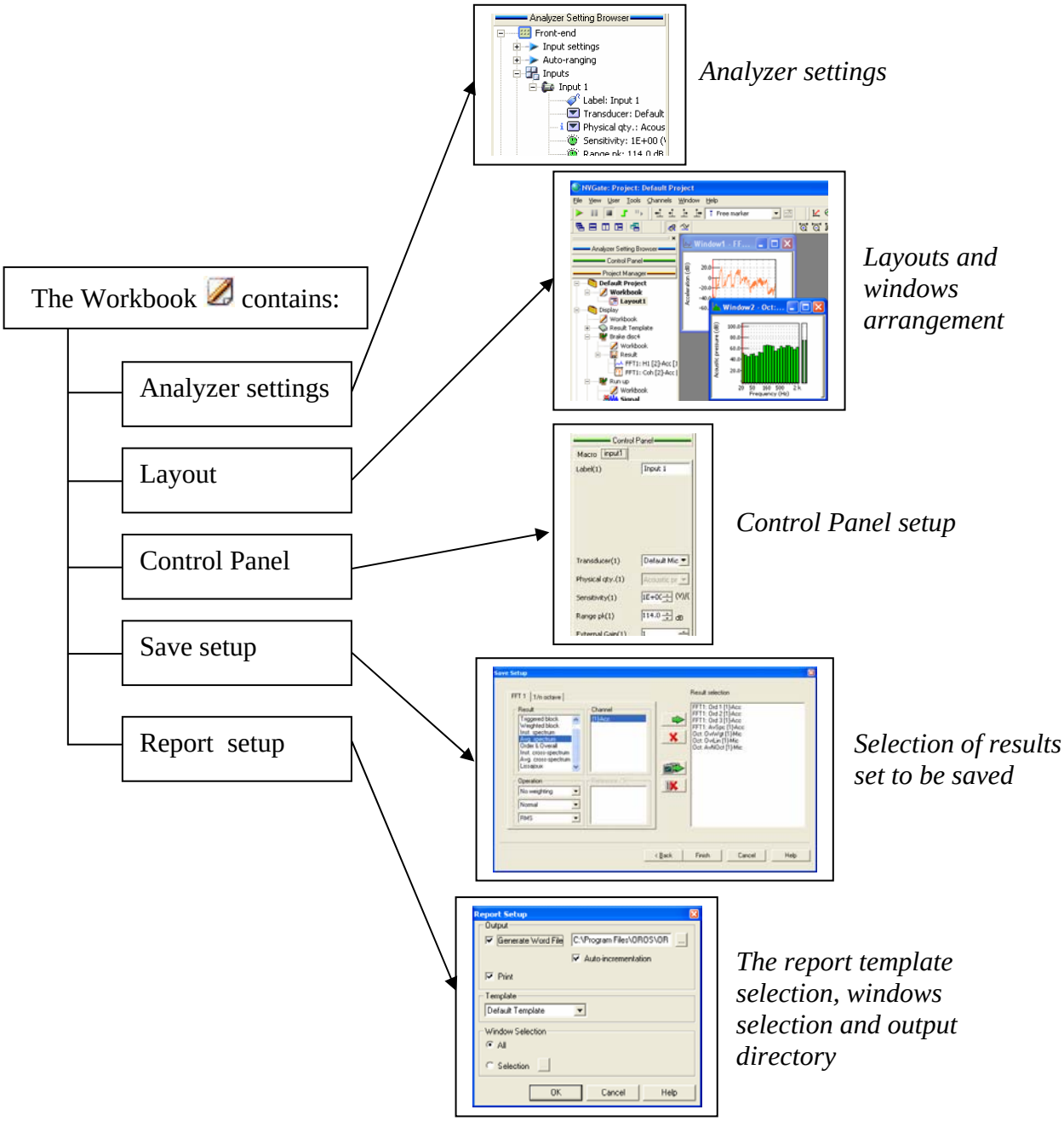
Table of contents:

4.1 Introduction 4-5
4.2 Project manager 4-7
4.3 Item definitions 4-8
4.3.1 Project 4-8
4.3.2 Workbook 4-8
4.3.2.1 Saving 4-8
4.3.2.2 Loading 4-9
4.3.2.3 Activating 4-10
4.3.2.4 Layout 4-10
4.3.3 Result Template 4-11
4.3.3.1 Displaying 4-11
4.3.3.2 Editing 4-11
4.3.4 Measurement 4-11
4.3.5 Imported measurement 4-12
4.3.6 Result group 4-12
4.3.6.1 Displaying 4-12
4.3.6.2 Exporting 4-12
4.3.7 Result 4-13
4.3.8 Signal 4-14
4.3.8.1 Loading 4-14
4.3.8.2 Uploading/Downloading 4-14
4.3.8.3 Exporting 4-15
4.4 Item status 4-16
4.4.1 Protection 4-16
4.4.2 Standalone 4-16
4.4.3 Signal location 4-17
4.4.4 Active Items 4-17
4.5 Load & Save 4-18
4.6 Rules 4-19
4.6.1 Measurement creation 4-19
4.6.2 Recovered project 4-19
4.7 Contextual menu 4-20
4.7.1 General 4-21
4.7.1.1 New project 4-21
4.7.1.2 Remove project 4-22
4.7.1.3 Save active 4-22
4.7.1.4 Options 4-22
4.7.1.5 Clean up 4-24
4.7.1.6 Collapse all items 4-24
4.7.1.7 Expand all items 4-24
4.7.1.8 Auto width 4-24
4.7.2 Project 4-25
4.7.2.1 Change workbook 4-25
4.7.2.2 Properties 4-26
4.7.2.3 Rename 4-26
4.7.2.4 Load 4-26
4.7.2.5 Remove 4-26

4.7.3 Workbook 4-27
4.7.3.1 Load 4-27
4.7.3.2 Partial load 4-27
4.7.3.3 Reload 4-27
4.7.3.4 Partial Reload 4-27
4.7.3.5 Save 4-28
4.7.3.6 Save as Model 4-28
4.7.3.7 Activate 4-28
4.7.3.8 Add Layout 4-28
4.7.3.9 Remove Layout 4-28
4.7.3.10 Properties 4-28
4.7.4 Layout 4-29
4.7.4.1 Rename 4-29
4.7.4.2 Properties 4-29
4.7.5 Measurement 4-29
4.7.5.1 EDIT 4-29
4.7.5.2 Rename 4-30
4.7.5.3 Remove 4-30
4.7.5.4 Properties 4-30
4.7.5.5 Collapse items 4-30
4.7.5.6 Expand items 4-30
4.7.6 Result group 4-31
4.7.6.1 Remove 4-31
4.7.6.2 Export 4-31
4.7.6.3 Properties 4-32
4.7.6.4 Display 4-32
4.7.7 Result 4-33
4.7.7.1 Display 4-33
4.7.7.2 Remove 4-33
4.7.7.3 Properties 4-33
4.7.7.4 Add to template result 4-33
4.7.8 Signal 4-34
4.7.8.1 Preview 4-34
4.7.8.2 Load in Player 4-34
4.7.8.3 Load and preview 4-34
4.7.8.4 Post-Analyze 4-34
4.7.8.5 Download 4-35
4.7.8.6 Upload 4-35
4.7.8.7 Remove 4-35
4.7.8.8 Export 4-35
4.7.8.9 Properties 4-36

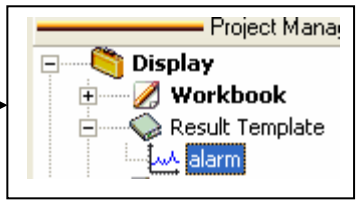
4.1 Introduction

The Project Manager is made up of 3 main parts; the Workbook, the Project and the Measurement.



The Project contains:

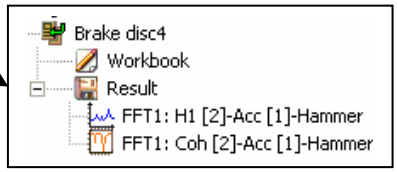
- Current Workbook
- Measurement
- Result template



Can be used in any compatible result window by using drag & drop.

The Measurement contains:

- Workbook → *Workbook at the time when the measurement was done*
- Data

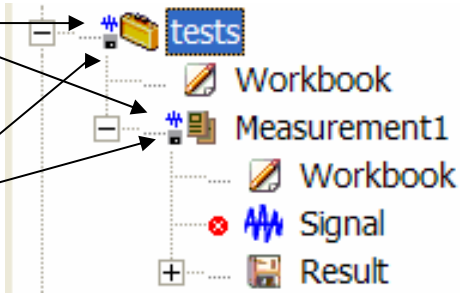


Results

Signals

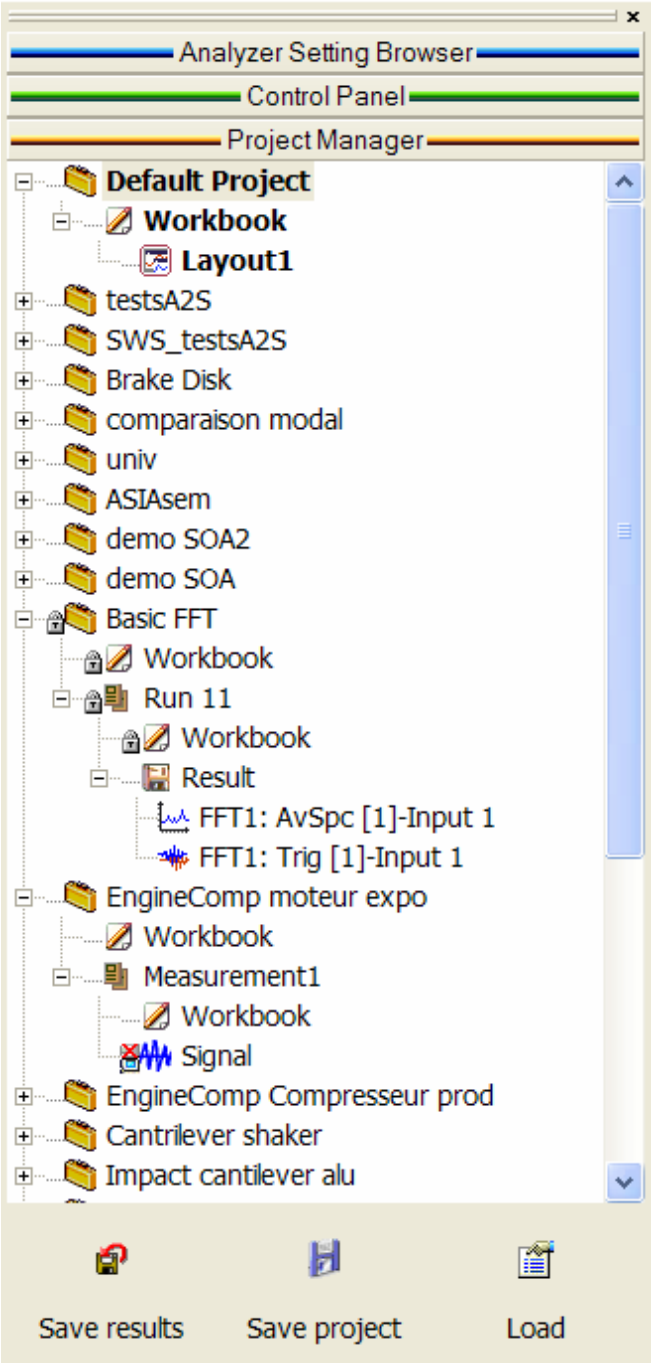
The item indicates if a project/measurement contains a signal file.

The item indicates if a project/measurement contains results.



4.2 Project manager

The Project Manager is used to store all your projects, results, and measurements... There are several display options that enable you to show or hide certain items. You can display some results with drag and drop.



4.3 Item definitions

4.3.1 Project

The project is the highest level of the organizational structure. It contains at least one workbook and can receive an unlimited number of measurements. The project has therefore two main aspects:

- Configuration of the analyzer and the interface using the workbook
- Storage of data using the measurements

There is always one active project. This is this project that receives the new measurements. The project workbook configures the analyzer. To load a project, select the load command in the pop-up menu associated with the project item.

4.3.2 Workbook

The workbook is designed to manage the analyzer and software setup. The table below gives the details of the functions managed by the workbook

Analyzer setup	The value of all analyzer settings.
Layout	All windows displaying results are stored in layouts.
Control panel	The personalization of the control panel
Save setup	All results that must saved when a new measurement is created
Report setup	All information regarding report generation.

4.3.2.1 Saving

The project workbook is saved when the project is saved. This can be done several ways:

- Select the “Save” command in the pop-up menu associated with the workbook or the project item.

- Select the “Save project” command from the file menu

- Use the shortcut “Ctrl + D”

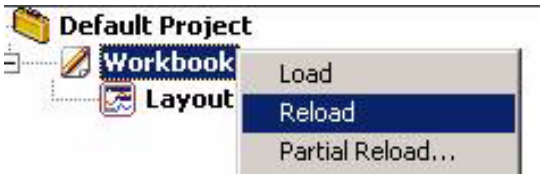
A workbook is created when a measurement is created. This workbook is the copy of the project workbook at the time the measurement is created. This allows you to recover the settings used for a measurement possibly reuse them.

4.3.2.2 Loading

The workbook is automatically loaded when a project is loaded. It is also possible to load the content of any other workbook to the workbook of the active project. This load can be complete or partial and can be done by:

- Selecting the “Load” or “Partial load” command in the pop-up menu associated with the workbook item.

- Selecting the “Reload” or “Partial reload” command in the pop-up menu associated with the active workbook item. In this case, the last saved copy of this workbook is used.



- Select the “Change workbook” command in the pop-up menu associated with the project item.

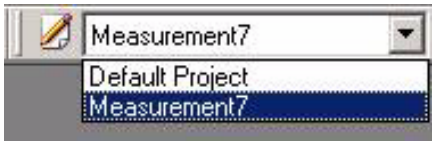
This allows you to select any workbook from project database or any workbook template.

4.3.2.3 Activating

When a measurement is loaded, selecting the appropriate workbook can do the switch between the measurement and the result mode. This selection can be made by:

- Selecting the “Activate” command in the pop-up menu associated with the workbook item.

- Selecting the workbook from the “Active workbook” toolbar.



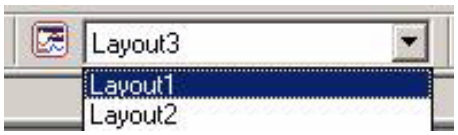
4.3.2.4 Layout

The layout is the part of the workbook that contains the graphic windows. There is no limitation of number of layouts, but the workbook always has at least one layout.

The windows displayed are the active layout windows. There are several ways to select a layout:

- Double-click on the layout item in the project manager.
- Select the load command in the pop-up menu associated with the layout item in the project manager.

- Select the layout from the “Active workbook” toolbar.



- Use the shortcut “Ctrl + Space bar” to switch to the previous active layout.

Notes: The layouts are associated with the analysis mode (Measurement or Result mode) and are available only in the correct mode. Therefore, a name used for a layout in the measurement mode will not be available in result mode.

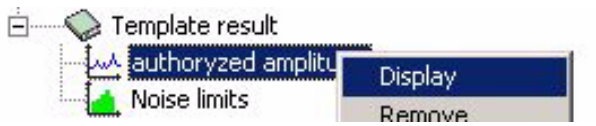
- The selected tabulation of the control panel is related to the layout. This is designed to minimize the selection in the workspace.

4.3.3 Result Template

This item appears when results template are added to the project. They can be added from the result template menu or from the "Add to result template" menu in a window.

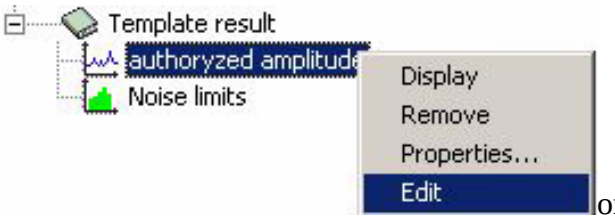
4.3.3.1 Displaying

To display the result template, Double-click on the item or select the "Display" command from the pop-up menu associated with the item

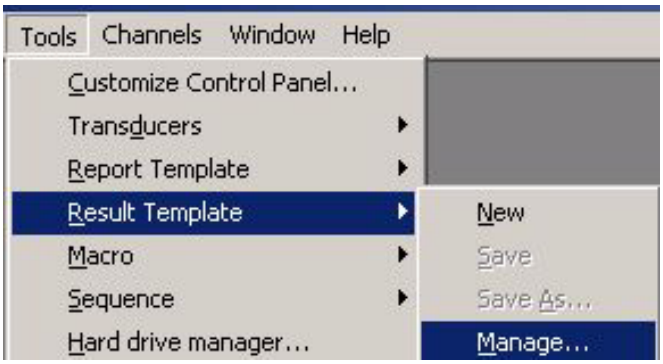


4.3.3.2 Editing

To edit and modify the template result, use the Tools\Result Template\Main menu or the "Edit" command of the pop-up menu associated with the item.



or



4.3.4 Measurement

This item is designed to store data. The data can be of two types:

- Signals coming from the recorder
- Results coming from an analyzer (FFT, Octave, Waterfall...)

A measurement always contains one workbook, which is a copy of the workbook used to create the measurement.

The most important action that can be performed on a measurement is to load it to work in the measurement mode. This can be done from the pop-up menu associated with the item.

4.3.5 Imported measurement

This item comes from the import of a result or a signal file.

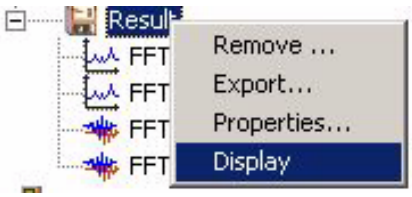
The behavior of this item is similar to the behavior of a usual measurement item. It differs only in that the workbook associated with the measurement is empty. There is no information about the analyzer settings, or about the layouts and other workbook elements.

4.3.6 Result group

This item gathers all results of a measurement. The two main actions that can be performed from this item are:

4.3.6.1 Displaying

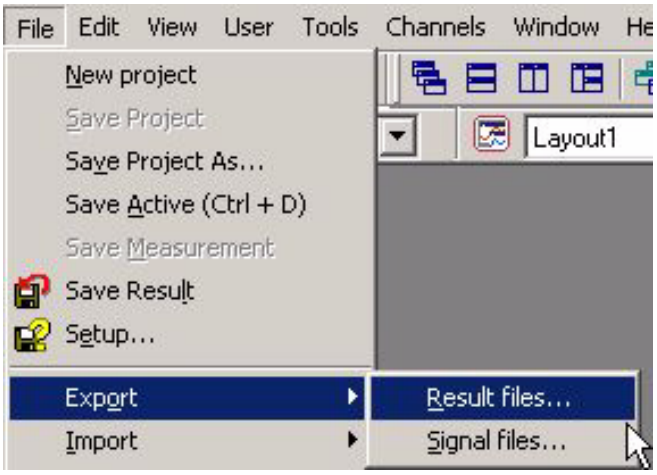
Displays all the results of the measurement.
One window per type of result is created limited by the maximum curve the window can contain. This can be done from the pop-up menu associated with the item.



4.3.6.2 Exporting

Exports all the results of the measurement.
Exports the results in an external format (UFF…). This can be done from the pop-up menu associated with the item.

A command to export the results of several measurements at the same time is also available in the “File” menu.



For more details about the export formats, see the “Export” topic from the “Chapter 7: User Preferences”.

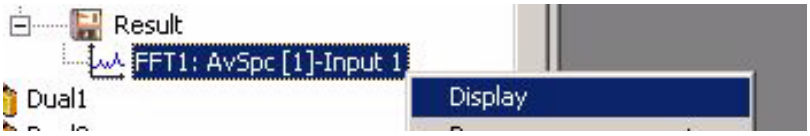
4.3.7 Result

This type of item can belong to a Result group item, a Ref. Result Item or a Template Result item.

The icon associated with the item indicates the results type. The table below lists the different icons that can be found

- Temporal result (triggered block, weighted bloc…)
- Spectral result (Spectrum, order spectrum, FRF…)
- Scalar result
- Profile result (scalar profile, order profile…)
- 3D result (Waterfall of spectrum, triggered bloc, octave spectrum…)
- Octave result
- Coherence result

The main action that can be performed from this item is to display the result.
A new window is created, containing the result. This can be done from the pop-up menu associated with the item. This can also be done by double clicking on the item.

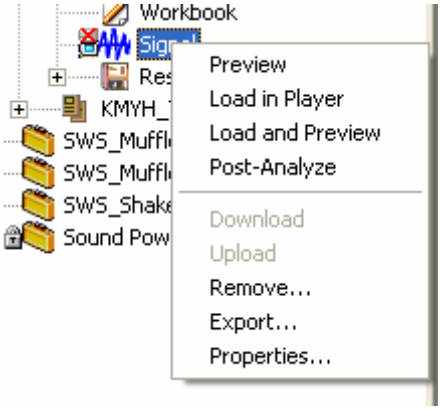


4.3.8 Signal

This item represents a signal file generated by the recorder. Depending on the analysis, the item points to file located on the PC or the analyzer hard disk (see “Signal location” topic p 4-17).
The mains actions that can be performed are:

4.3.8.1 Loading

Loading the file in the player:
Once loaded to the player, the signal can be displayed and post-analyzed. To load the file to the player, select the command “load in player” in the pop-up menu associated with the signal item. The signal file can also be loaded and displayed at once by double clicking on the signal item.

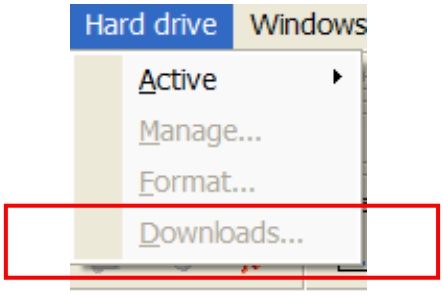


When the analyzer is connected, only files located on the analyzer hard disk can be loaded.
When the analyzer is not connected, only files located on the PC hard disk can be loaded.
In order to post-analyze the selected signal, a shortcut is available by right-clicking on the specified signal.

4.3.8.2 Uploading/Downloading

Upload\Download:
Used to transfer files to\from the analyzer hard disk from\to the PC hard disk. This can be done from the pop-up menu associated with the signal item.

A command to transfer several files at the same time is also available in the “Tools” menu.

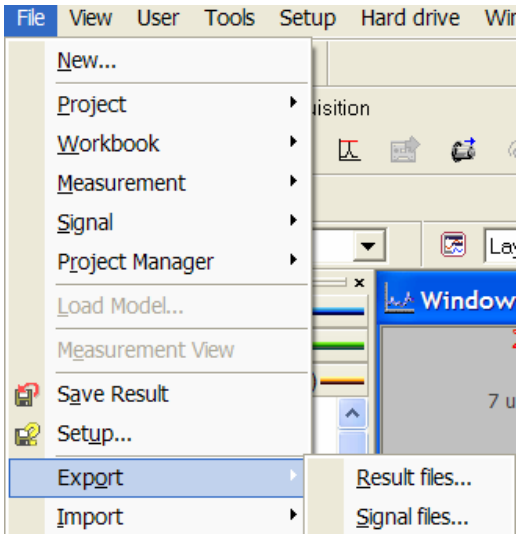


4.3.8.3 Exporting

Export:
Exports the signal file in an external format (wav…).A signal can be exported only when it is located on the PC hard disk. The export can be done from the pop-up menu associated with the signal item.

A command to export several files at the same time is also available in the “File” menu.

For more details about the export formats, see the “Export” topic from the “Chapter 7: User Preferences”.



4.4 Item status

4.4.1 Protection

An icon can appear to the left of the project, workbook, layout and measurement icon. When there is no icon, this means that the item is not protected. The table below explains the meaning of the 6 icons that can be found:

The item is in read-only. This protection can be removed using the properties command by unselecting the read-only protection.

The item does not belong to the current user and is protected by its user. The current user cannot modify this item.

The item does not belong to the current user, but is not protected. The current user can freely use this item.

4.4.2 Standalone

The icon indicates that the project is associated with a stand-alone session. The project cannot be modified, removed or loaded.
The icon disappears once the PC has been reconnected to the analyzer.
If case the stand-alone session has been aborted, the protection on the project can be removed by right-clicking on the project, selecting Properties, pushing the stand-alone button and choosing the Abort Stand-alone session. The icon disappears and the project is free to use.

4.4.3 Signal location

An icon to the left of the Signal icon indicates the location of the signal file. The table below explains the meaning of the 6 icons that can be found:

- The file is only on the analyzer hard disk
- The file is only on the PC hard disk
- The file is on both the PC and the analyzer hard disk
- The file is on the PC and the analyzer is not connected (The file might also be on the analyzer hard disk)
- The file is not on the PC and the analyzer is not connected (The file might also be on the analyzer hard disk)
- The file is not found on the PC or on the analyzer hard disk

4.4.4 Active Items

When the action "Load" is performed for an item, then the item is active (the name of the item is displayed in bold).
An item is active when it is bold. The 4 items that can be active are:

Project	This is the current project. When the analysis mode is “Measurement mode”, the workbook for this project is active
Measurement	This is the current measurement. When the analysis mode is “Result mode”, the workbook for this measurement is active
Workbook	This is the current workbook. Is can belong to the current project or the current measurement depending on this analysis mode
Layout	This is the current layout. The windows displayed belong to this layout.

4.5 Load & Save

A direct access to the main functions of data management is available in the project manager.

The save results button will save the current selection of result in one measurement

The save project will save all current setup

The Load will load the currently selected project or measurement.

4.6 Rules

4.6.1 Measurement creation

The way a new measurement is created is defined in the Save Setup dialog box using the Save Option property.
There are some specific cases where the behavior defined by the Save Option must be overridden:

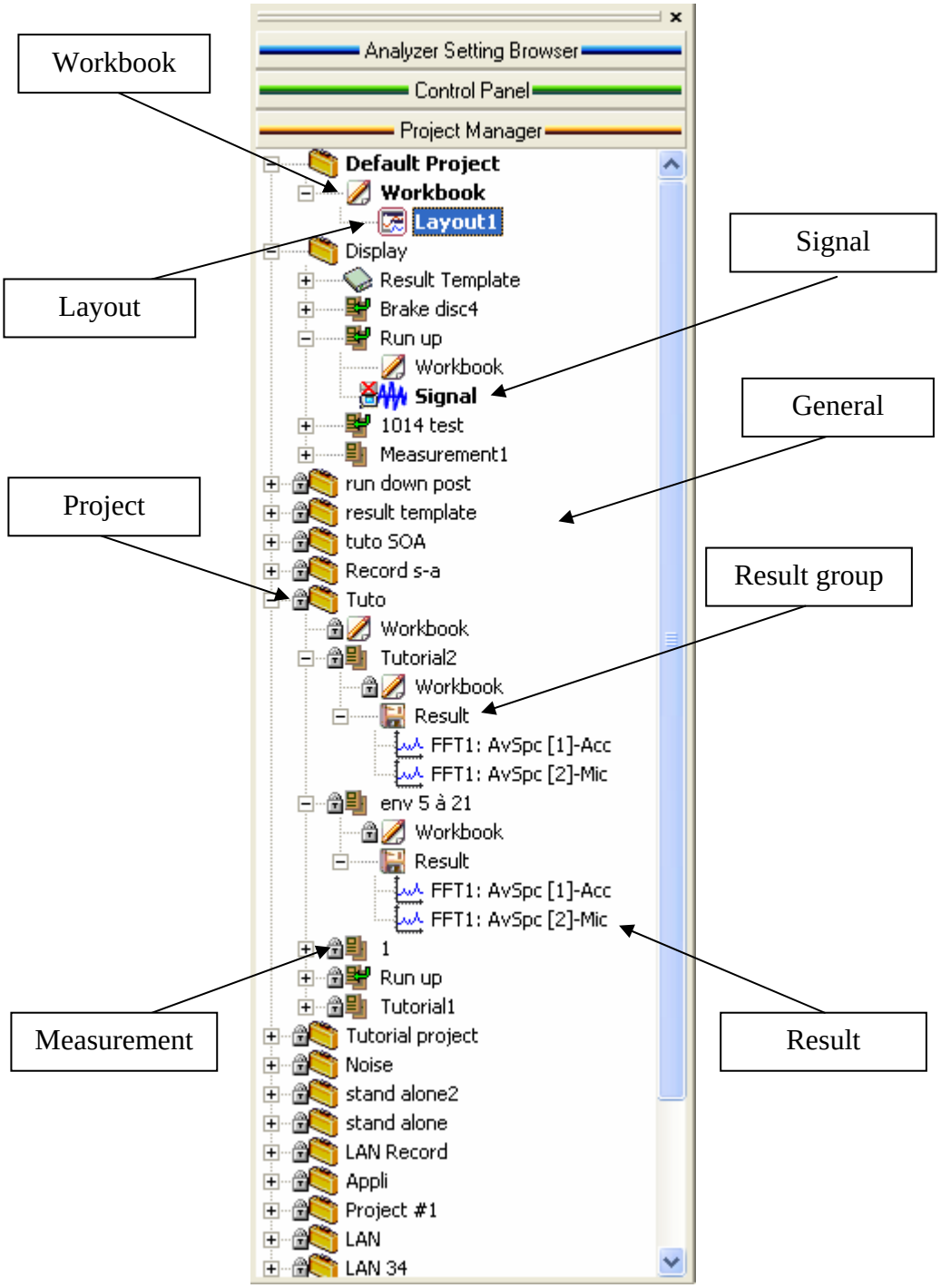
- When the recorder is stopped, a measurement is created, overriding the "**Do not save**" choice
- When the recorder is stopped, the measurement takes an specific name, overriding the "**In default measurement**" choice
- For multi-analysis, the results corresponding to the different plug-ins are saved in separate measurements if the plug-ins do not stop simultaneously. While NVGate® is Running (meaning that at least one plug-in is still running), the measurements are saved with "**With name confirmation**" unless the Save option choice is "Do not save".

4.6.2 Recovered project

Each time NVGate® is not closed correctly and a default measurement is present in the project, the project is automatically loaded when NVGate® is launched, to ensure that no data is lost. If the project was the "Default project", then to the user is prompted to rename this project "Recovered project".

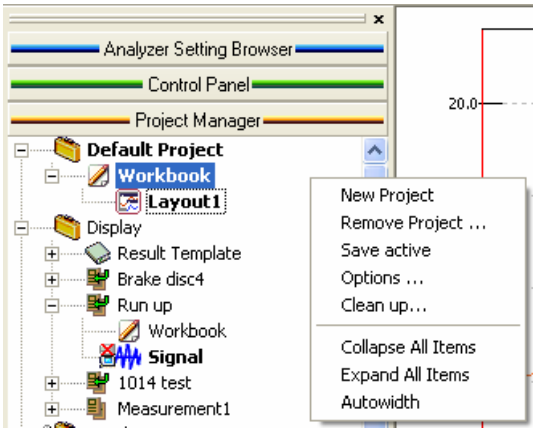
4.7 Contextual menu

The contextual menus are accessible by right clicking on the area.



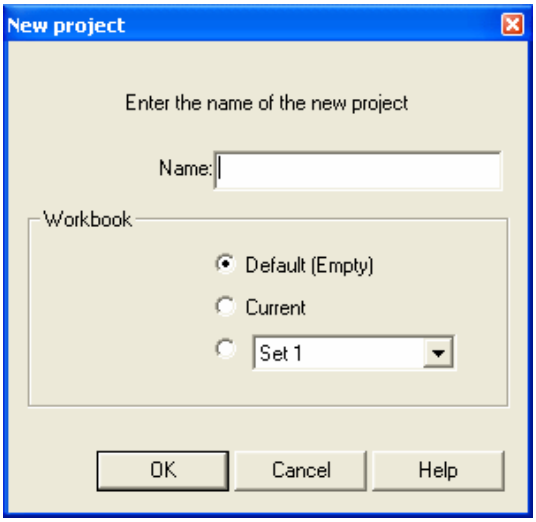
4.7.1 General

Appears by right clicking anywhere on the Project Manager background.



4.7.1.1 New project

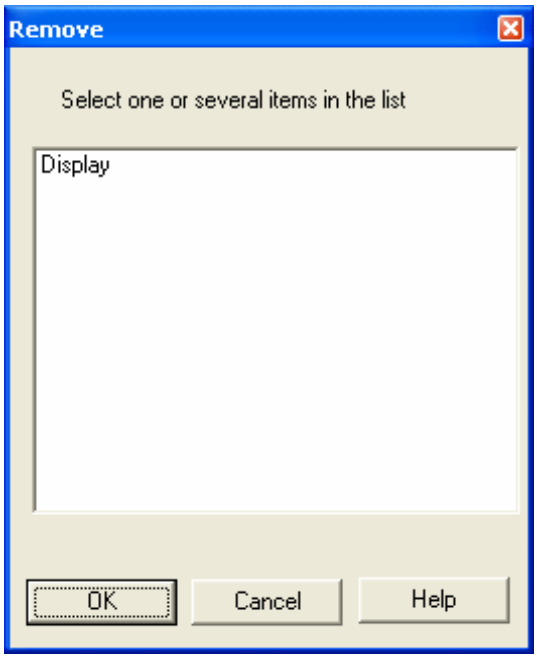
This command opens the following dialog box.



- **Name:** It is necessary to enter a name that is not already used in the project base. The name "Default project" is also not allowed.
- **Workbook**
  - **Default:** All the analyzer settings are set to default and all the windows are closed. The project created will be completely empty.
  - **Current:** The new project is created using the current workbook settings. It is similar to the "Save As" command
  - **Model:** The new project is created using the settings of a model workbook. It is equivalent to creating the project from an empty workbook and then loading a specific workbook

4.7.1.2 Remove project

This command opens the following dialog box.



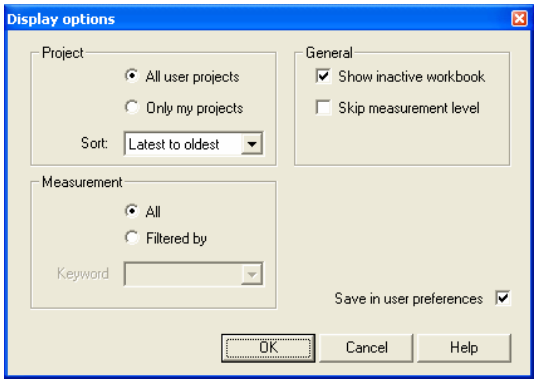
You may also remove one or several projects from the project base. The current project cannot be removed.

4.7.1.3 Save active

This command saves the current project and, if there is a measurement loaded, it also saves the current measurement.

4.7.1.4 Options

This command opens the following dialog box:

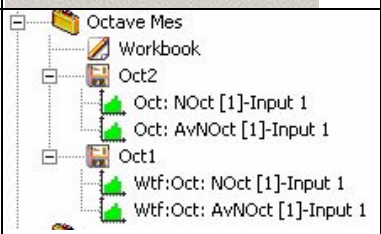
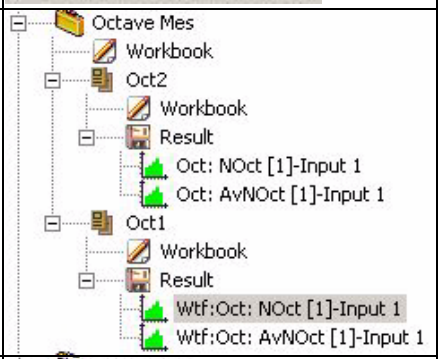
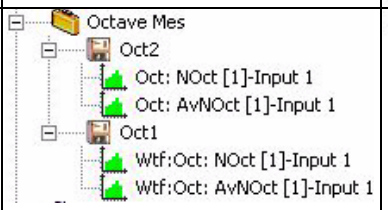
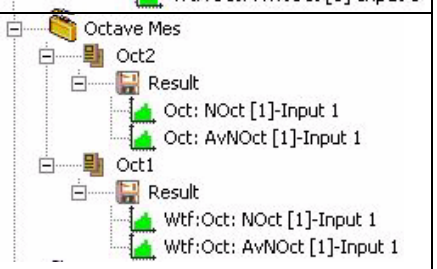


This option is used to modify the way the project manager is presented.

- **Project:** It is possible to hide projects that do not belong to the current user. This is particularly useful when there are multiple NVGate® users on the same PC.

The project can be sorted alphabetically, chronologically or inversely chronologically

- **Measurement:** The measurement can be filtered by keyword. The keywords are assigned to the measurement when it is created, or can be changed in measurement properties. This option is very helpful when organizing measurement campaigns.
- **General:** It is possible to hide all the inactive workbooks and to delete the measurement level. The table below illustrates the differences

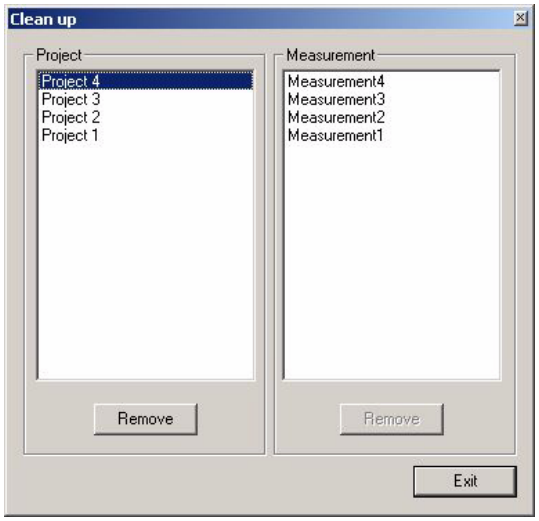
	☑ Skip measurement level	☐ Skip measurement level
☑ Show inactive workbook		
☐ Show inactive workbook		

- **Save in user preferences:**

These settings can be stored in the user preferences and can be set in the preferences. See “Chapter 7: User preferences”.

4.7.1.5 Clean up

The purpose of the following dialog box is to accelerate the cleaning of the project base. It is used to remove projects or measurements.



- **Project:** The list contains all projects except the current one. Once a project is selected, it is possible to remove the full project or to select a measurement to remove. If several projects are selected, it is then only possible to remove the selected project.
- **Measurement:** When one project is selected, the list of project measurements is displayed and available to be removed.

4.7.1.6 Collapse all items

Collapses all the branch of the project manager tree. Only the project items are visible

4.7.1.7 Expand all items

Expands the entire branch of the project manager tree. All the items of the tree are visible. This can make the tree very large.

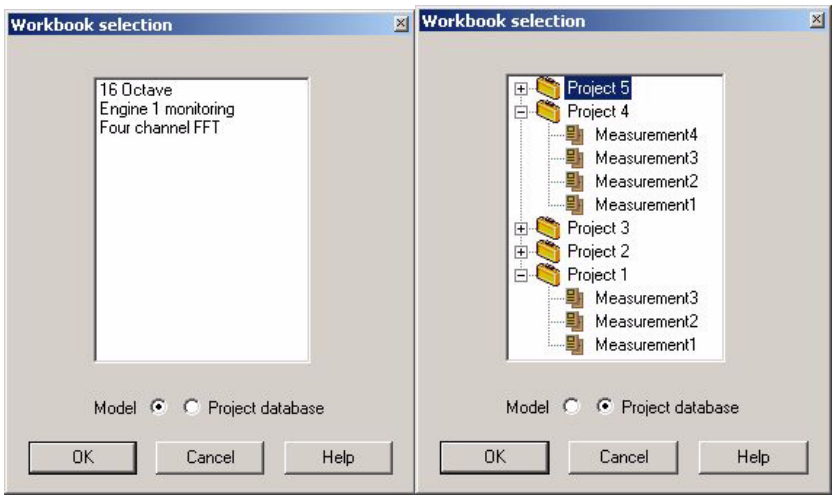
4.7.1.8 Auto width

Adjusts the width of the tree to the widest branch, so that every item is fully visible.

4.7.2 Project

4.7.2.1 Change workbook

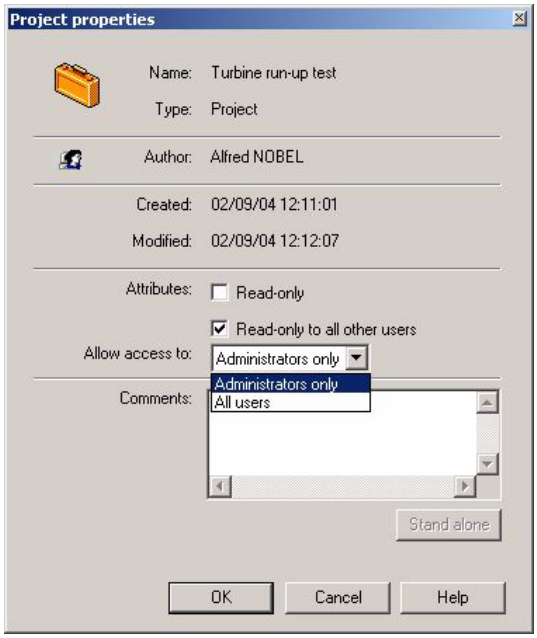
This command is available only on the current project. It is used to load a workbook to the current project. This workbook can come from the workbook library or from the project manager.



- **Save:** This command is available only on the current project. It saves the project workbook.
- **Save as:** This command is available only on the current project. It saves the project with a different name. It is a way of copying the current project.

4.7.2.2 Properties

This command gives general information about the project.



It is possible to modify the project attribute. When "Read-only" is selected, it is not possible to modify the project. When "Read-only to all other users" is selected, the project cannot be modified by another user, but can be used freely.
"Allow access to" property must be set on "All users" to enable restricted users to use this project.

A comments area is available to add information. (Use "Ctrl + Return" to start a new line).
The "Stand alone" button is available only when the project is linked to a stand-alone session. It gives information about the session and may be used to abort the session.

4.7.2.3 Rename

This command is not available on the current project (Use "Save As" instead). It may be used to change the name of the project.

4.7.2.4 Load

This command loads the selected project. The project becomes the current project.

4.7.2.5 Remove

This command removes the selected project. The data contained is lost permanently.

4.7.3 Workbook

4.7.3.1 Load

This command loads the selected workbook to the current project.
Note: when the current project workbook is saved, the initial workbook (the one initially loaded) is not modified.

4.7.3.2 Partial load

This command is similar to the "Load" command, but only parts of the workbook are loaded.

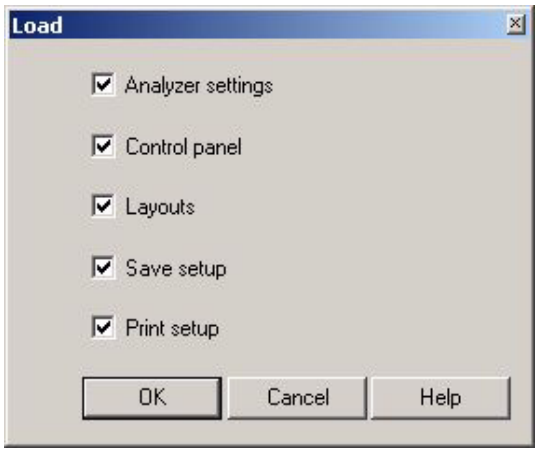
The parts of the workbook that are not selected remain unchanged.

4.7.3.3 Reload

This command is available only for the current project workbook. This command reloads the workbook of the current project workbook. This means that the workbook recovers the setup it had the last time it was saved.

4.7.3.4 Partial Reload

This command is available only for the current project workbook. This command is similar to the "Reload" command, but only parts of the workbook are loaded.



The parts of the workbook that are not selected remain unchanged.

4.7.3.5 Save

This command is available only for the current project workbook. This command saves the workbook.

4.7.3.6 Save as Model

This command is available only for the current project workbook. This command saves the workbook in the workbook library. This makes the workbook available, however the project database will change in the future. The workbook models are available in the "Project\Change workbook" command and in the "New Project" command.

4.7.3.7 Activate

This command is available only for the current project workbook in result mode or for the current measurement in measurement mode. It changes the current mode

4.7.3.8 Add Layout

This command is available only for the current project workbook. It creates a new layout (with the desired name).

4.7.3.9 Remove Layout

This command is available only for the current project workbook. It removes the selected layout. This destroys all the windows that belong to this layout.

4.7.3.10 Properties

This command gives general information about the workbook.

It is possible to modify the workbook attributes. When "Read-only" is selected, it is not possible to modify the workbook. When "Read-only to all other users" is selected, the workbook cannot be modified by another user, but can be used freely.
A comments area is available to add information (Use "Ctrl + Return" to start a new line).

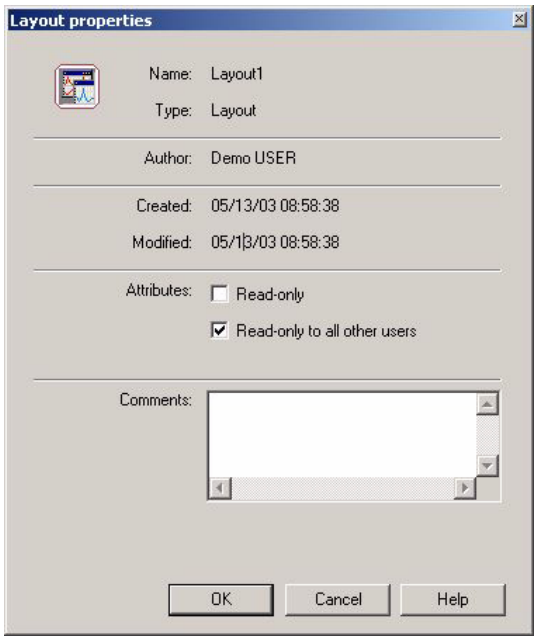
4.7.4 Layout

4.7.4.1 Rename

This command is used to rename the selected layout.

4.7.4.2 Properties

This command gives general information about the layout.



It is possible to modify the layout attributes. When "Read-only" is selected, it is not possible to modify the layout. When "Read-only to all other users" is selected, the layout cannot be modified by another user, but can be used freely.
A comments area is available to add information (Use "Ctrl + Return" to start a new line).

4.7.5 Measurement

4.7.5.1 EDIT

This command loads the measurement. The analysis mode is then set to "Result mode"
The Result editor is used for post-analysis of saved results. It allows to switch between 2 measurement workbooks in order to compare the results.

4.7.5.2 Rename

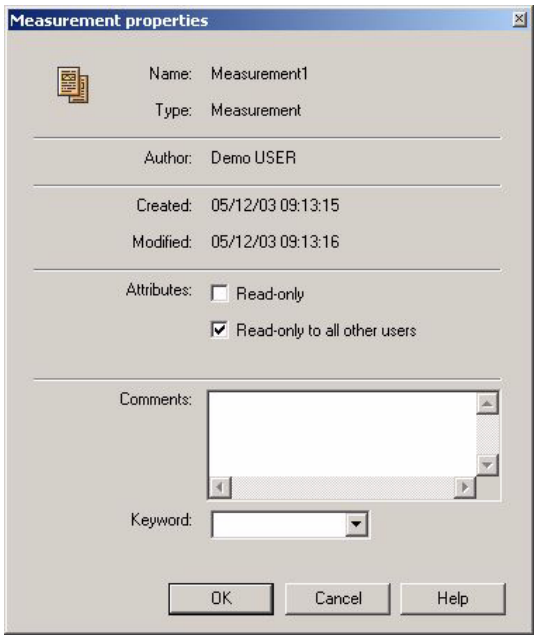
This command is used to rename the selected measurement.

4.7.5.3 Remove

This command removes the selected measurement. The data contained are permanently lost.

4.7.5.4 Properties

This command gives general information about the measurement.



It is possible to modify the measurement attributes. When "Read-only" is selected, it is not possible to modify the measurement. When "Read-only to all other users" is selected, the measurement cannot be modified by another user, but can be used freely.
A comments area is available to add information (Use "Ctrl + Return" to start a new line).
It is possible to set or modify the keyword associated with the measurement. This keyword can be used to filter the measurement in the project manager.

4.7.5.5 Collapse items

This command collapses the entire branch of the selected measurement. Only the measurement item remains visible.

4.7.5.6 Expand items

This command expands the entire branch of the selected measurement. All items (workbook, results...) are expanded and made visible.

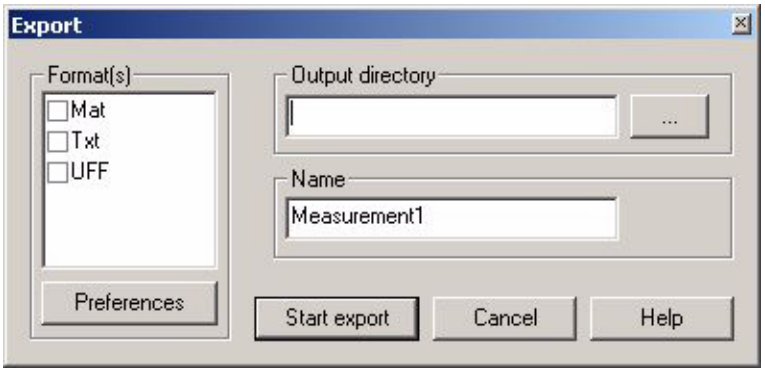
4.7.6 Result group

4.7.6.1 Remove

This command removes all the measurement result. The data are permanently lost.

4.7.6.2 Export

This command is used to export the result in an external format.

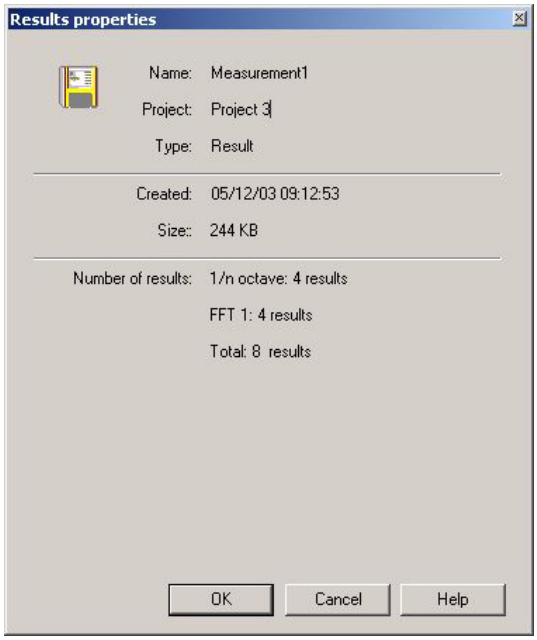


One or several formats may be selected from the list. It is possible to adjust the conversion via the preferences. The output directory is the folder where the new files will be created. The name will be used to create the output files. It should not contain any extension, as one will be added automatically depending on the format.

For more details about the export formats, see the export topic from the “Chapter 7: User Preferences”.

4.7.6.3 Properties

This command gives general information about the results.



All the plug-ins that have provided results are listed, with their corresponding number of results.

4.7.6.4 Display

Displays all the measurement results. One window per type of result is created, limited by the maximum curve that the window can contain.

4.7.7 Result

4.7.7.1 Display

Displays the selected results in a new window.

4.7.7.2 Remove

This command is available only when the measurement is loaded. It is used to remove the result from the measurement.

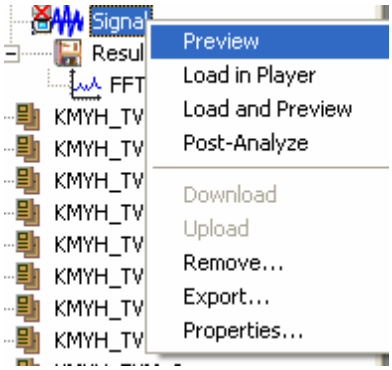
4.7.7.3 Properties

This command gives general information about the result.

4.7.7.4 Add to template result

This command adds the selected result to the template results of the current project.

4.7.8 Signal



4.7.8.1 Preview

This command displays an overview of the signal. This command is available, even if the signal is on the analyzer hard disk and NVGate® is in office mode.

4.7.8.2 Load in Player

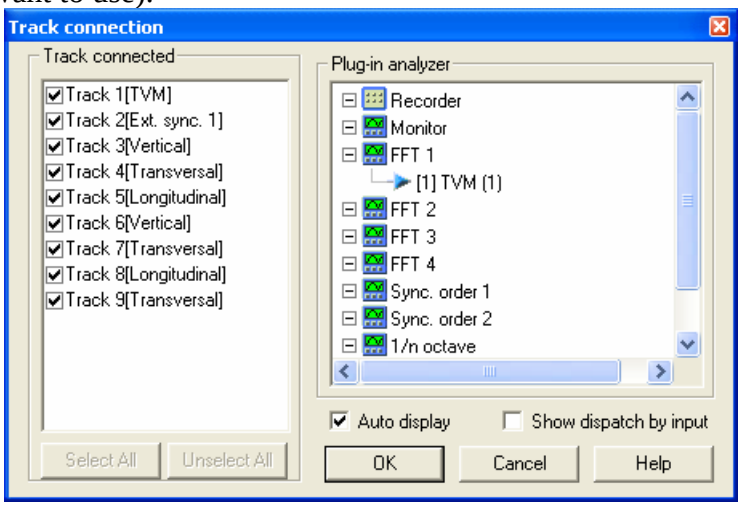
This command loads the signal file to the player. It is then possible to display this signal, play the tracks on output, and perform post analysis.

4.7.8.3 Load and preview

This command combines the two previous commands.

4.7.8.4 Post-Analyze

This command loads the signal in the player and display the menu 'track connections' in order to define your post-analysis (drag and drop connected tracks to the plug-in analyzer you want to use).



If the time signal is recorded on the PC or on the Mobi-disc™, it is highly recommended to be in office mode (hardware inactive) in order to avoid low performances and malfunctions.

4.7.8.5 Download

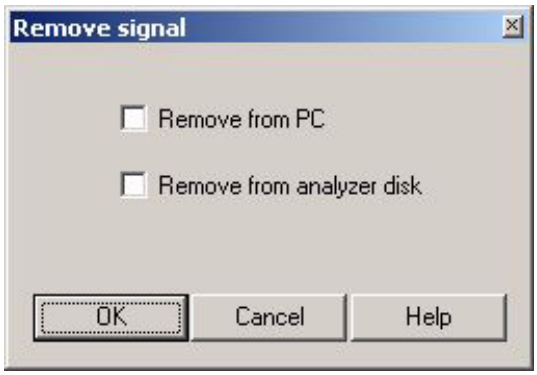
This command is available only when hardware with a hard disk is connected and when the signal has not yet been downloaded. It transfers the recorded signal from the analyzer hard disk to the PC hard disk.

4.7.8.6 Upload

This command is available only when hardware with hard disk is connected and when the signal is not on the hard disk. It transfers the recorded signal from the PC hard disk to the analyzer hard disk

4.7.8.7 Remove

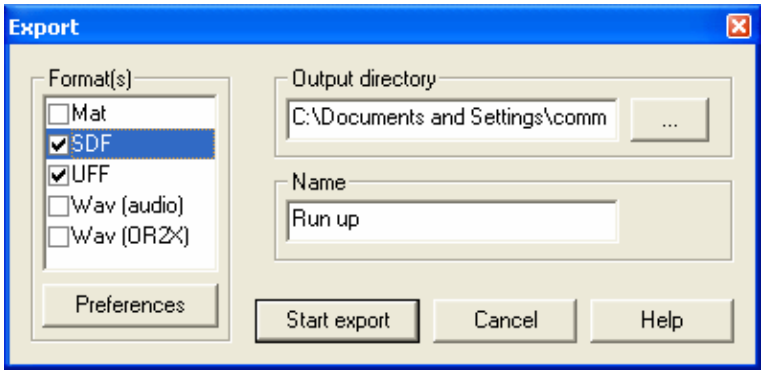
This command enables to remove the selected signal from the PC if the file is on the PC hard disk and from the analyzer hard disk of the hardware if connected and if the file is on the analyzer hard disk.



If, after removal, the file is not on the PC, or on the analyzer, the signal is permanently lost.

4.7.8.8 Export

This command is used to export the signal in an external format.



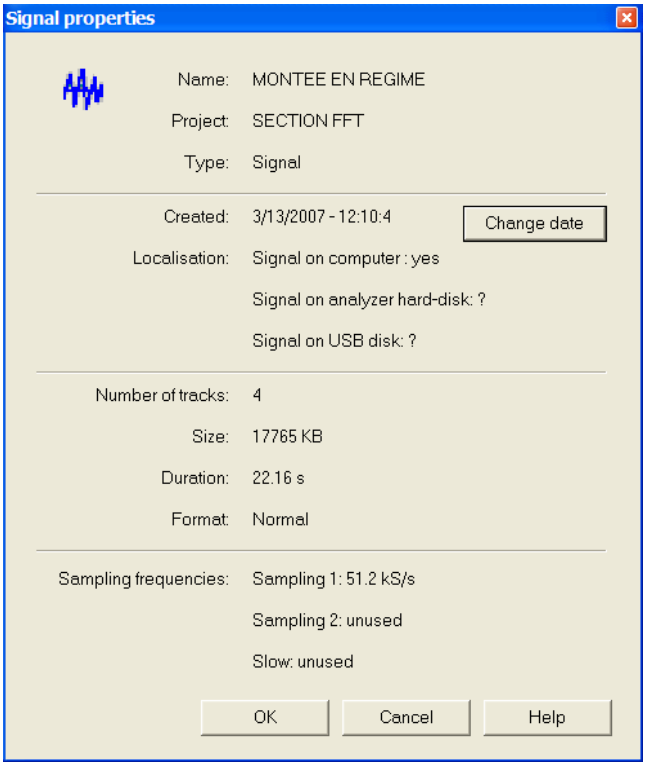
One or several formats may be selected from the list. It is possible to adjust the conversion via the preferences. The output directory is the folder where the new files

will be created. The name will be used to create the output files. It should not contain any extension, as one will be added automatically depending on the format.

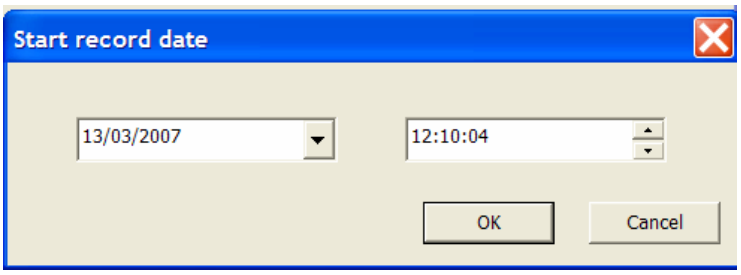
See more details about the export formats in the “Export” topic from the “Chapter 7: User preferences”.

4.7.8.9 Properties

This command gives general information about the result.



Change date: allows to change the date of the beginning of the signal. It used to display the absolute time.



Chapter 5: Tools

Table of contents:

5.1 Customize Control Panel 5-5
5.2 Transducers 5-5
5.2.1 Definition 5-5
5.2.2 History 5-7
5.2.3 Calibration 5-9
5.2.4 History 5-11
5.2.5 TEDS Transducers 5-11
5.3 Report template 5-12
5.3.1 Introduction 5-12
5.3.2 New 5-14
5.3.2.1 Graph contextual menu 5-21
5.3.3 Save as 5-21
5.3.4 Manage 5-22
5.4 Result template 5-23
5.4.1 1/n octave result template settings 5-23
5.4.1.1 Central frequencies 5-23
5.4.1.2 Y axis 5-24
5.4.2 1/n octave result template editor 5-24
5.4.2.1 Graph contextual menu 5-24
5.4.2.2 Edit grid 5-24
5.4.3 Profile result template settings 5-25
5.4.3.1 X axis 5-25
5.4.3.2 Y axis 5-26
5.4.4 Profile result template editor 5-26
5.4.4.1 Graph contextual menu 5-27
5.4.4.2 Edit grid 5-27
5.4.5 Frequency narrow band result template settings 5-28
5.4.5.1 Frequencies 5-28
5.4.5.2 Y axis 5-28
5.4.5.3 Settings 5-28
5.4.6 Frequency narrow band result template editor 5-29
5.4.6.1 Graph contextual menu 5-30
5.4.6.2 Edit grid 5-30
5.4.6.3 Min-Max result template editor 5-31
5.4.6.4 Edit grid 5-32
5.4.7 Order narrow band result template settings 5-32
5.4.7.1 Orders 5-33
5.4.7.2 Y axis 5-33
5.4.8 Order narrow band result template editor 5-33
5.4.8.1 Graph contextual menu 5-34
5.4.8.2 Edit grid 5-34
5.4.9 Save 5-35
5.4.10 Manage 5-35
5.5 Macro 5-35
5.5.1 New 5-36
5.5.2 Manage 5-38
5.5.3 Algorithmic commands 5-40
5.5.3.1 Affectation 5-40

5.5.3.2 Break 5-40
5.5.3.3 Call Macro 5-41
5.5.3.4 Comment 5-41
5.5.3.5 "For" loop 5-42
5.5.3.6 Get Current Time 5-42
5.5.3.7 Get Macro Parameter 5-43
5.5.3.8 Group 5-43
5.5.3.9 If…Then… 5-44
5.5.3.10 Incrementation 5-50
5.5.3.11 Make String 5-50
5.5.3.12 Message box 5-51
5.5.3.13 Periodic loop 5-52
5.5.3.14 Set Macro parameter 5-52
5.5.3.15 Set Parameter Value 5-54
5.5.3.16 Trace 5-54
5.5.3.17 Wait 5-55
5.5.3.18 "While" loop 5-55
5.5.4 Save 5-61
5.5.5 Record 5-61
5.5.5.1 Start record 5-61
5.5.5.2 Stop record 5-61
5.5.5.3 Pause record 5-61
5.5.5.4 Resume record 5-61
5.5.5.5 Stop run 5-61
5.5.6 Editor contextual menu 5-62
5.5.6.1 Macro properties 5-62
5.5.6.2 Setting properties 5-62
5.6 Sequence 5-63
5.6.1 Sequence 5-63
5.6.1.1 Manage 5-63
5.6.1.2 Source format 5-65
5.7 Hard drive manager 5-67
5.8 Format hard drive 5-67
5.9 Download 5-67
5.10 Wizards 5-67
5.11 Alarm Manager 5-67
5.12 Copy bitmap 5-67

NVGate® provides a panel of tools that can be used to define, customize and calibrate a transducer, create macros, import sequences...

5.1 Customize Control Panel

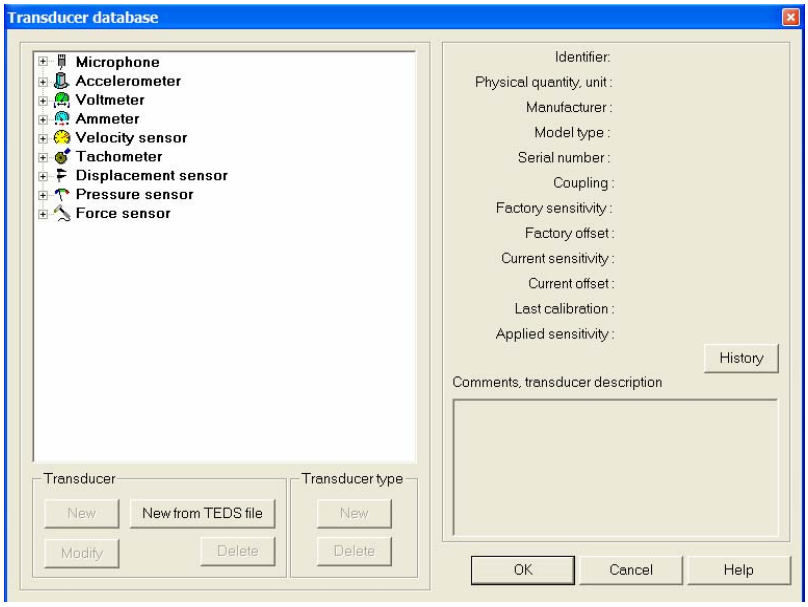
See “Tools” topic from Chapter 6: “User interface”.

5.2 Transducers

The transducer section is used to manage all types of transducers: it is possible to design a new type, calibrate it, and view the history.

5.2.1 Definition

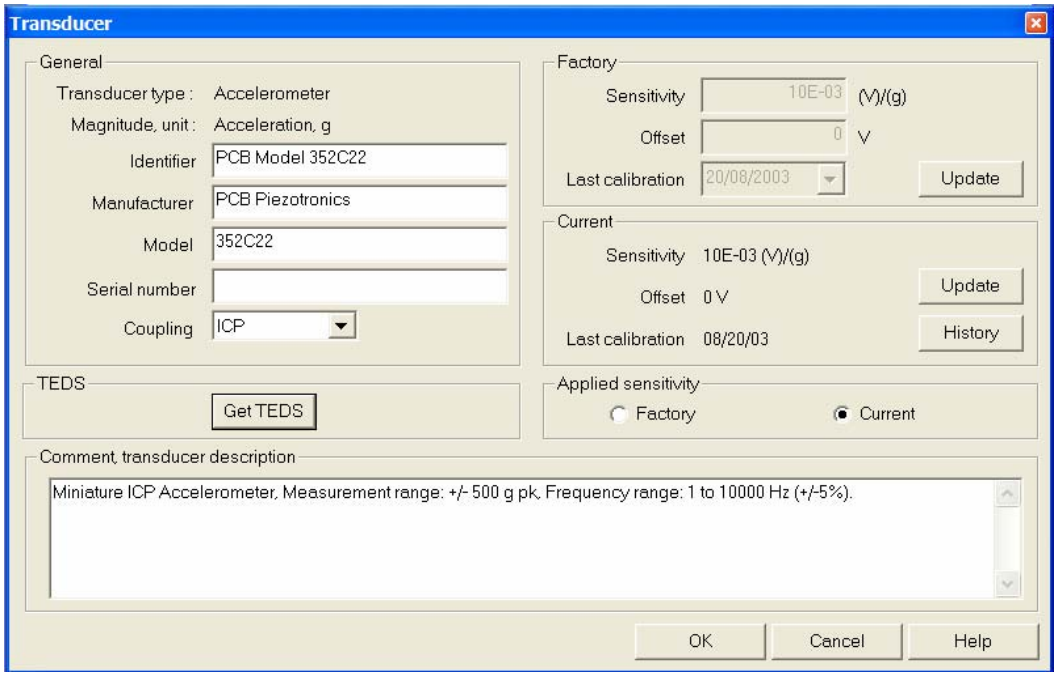
The left side displays all the transducers in the database in a tree form. They are grouped by type. For each type of transducer, there is a default transducer. The right side displays the information about the selected transducer.



- **New:** This button is available when a transducer or a transducer type is selected. It is called the "new transducer" dialog box. If a transducer is selected, all information related to the transducer is applied to the new transducer.

- **New from TEDS file:** This button allows to open a file .ted and so create a new transducer with its characteristics in the transducers database.

- **Delete:** This button is not available when a default transducer is selected. It removes the selected transducer from the database.
- **Modify:** This button is not available when a default transducer is selected. It is used to modify the characteristics of the transducer.



C
an be a pre-defined type (microphone, accelerometer...) or a user-defined type.

- General:

Magnitude, unit: Magnitude and unit associated with the transducer type

Identifier: Name that will be used to identify the transducer. This identifier must be unique. This is the only field that must be filled in. The others contain optional information.

Manufacturer: Name of the company that manufactures the transducer.

Model: Identifies the transducer.

Serial number: Unique identification, this must appear on the transducer itself.

Coupling: When the transducer is connected to an input, this coupling will automatically be set.

- TEDS:

By clicking on **Get TEDS**, a file .ted can be selected to set automatically the characteristic values of the transducer.

- Factory values: Sensitivity, offset, last calibration.

These values can usually be found on the calibration chart of the transducer. For maintenance calibration, use the update button to set the new values

- Current values: Sensitivity, offset, last calibration.

Displays the current sensitivity and offset. The update button may be used to set new values, in the event the transducer is not calibrated with NVGate®.

The history button is used to retrieve all calibrations that have been performed on the transducer.

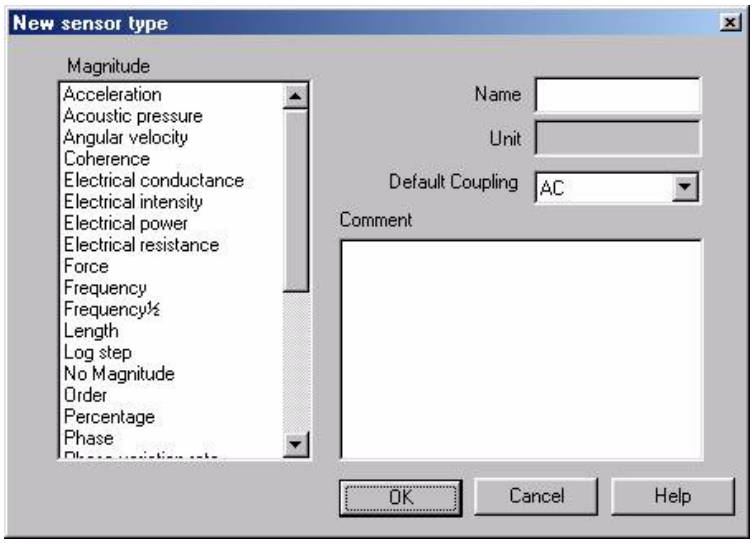
- Applied sensitivity:

Factory: applies sensitivity of the calibration chart of the transducer.

Current: applies sensitivity read on theTEDS file of the transducer.

- Comment, transducer description: Free text area

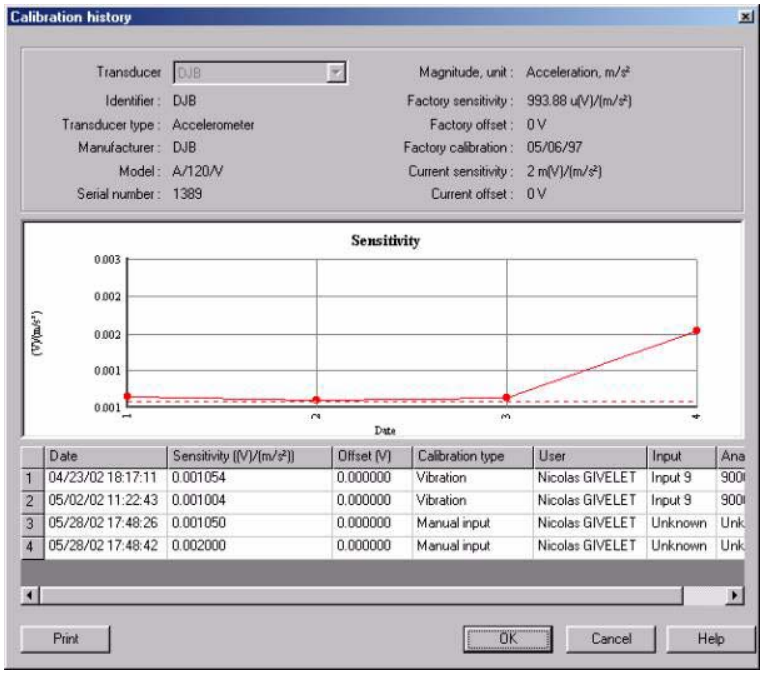
- **New Transducer Type:** This button is available when a transducer type is selected.
  A new transducer type is necessary when the pre-defined type does not fit the needs. It is used to gather transducers with the same magnitude.



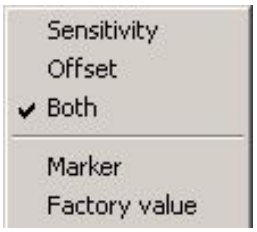
- **Magnitude**: Magnitude that will be associated with the transducer type and all transducers of this type.
- **Name**: This name will be used to identify the type. It must be unique.
- **Unit**: Current unit of the magnitude.
- **Default coupling**: default coupling value that will be used when a new transducer is created. This value can be changed individually.
- **Comment**: Free text area

5.2.2 History

This tool is used to see how transducer sensitivity and offset change over time. Information about every calibration is displayed, making it easy for the user to see if the transducer behavior is constant.



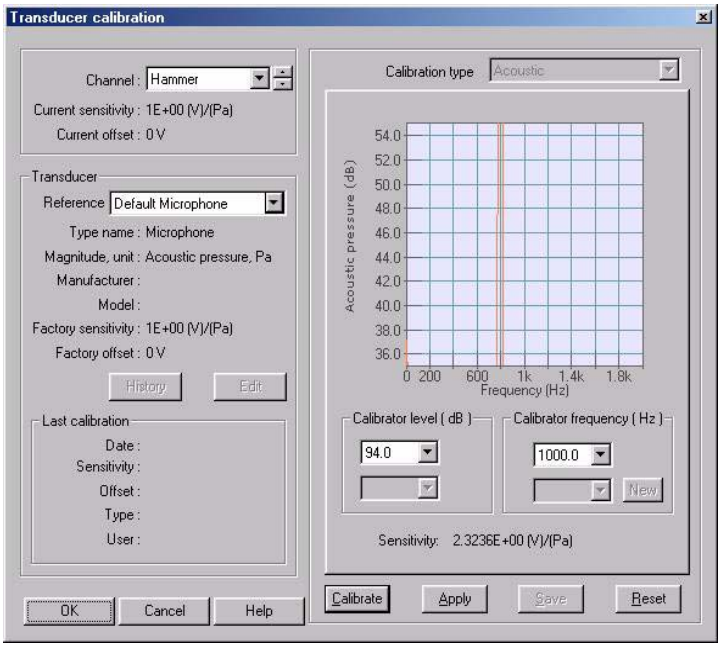
- **Current sensitivity**: This is the sensitivity level obtained during the last calibration. If the transducer has never been calibrated, the factory sensitivity is selected. This sensitivity is used when the transducer is selected on an input
- **Current offset**: This is the offset obtained during the last calibration. If the transducer has never been calibrated, the offset sensitivity is selected. This offset is used when the transducer is selected on an input
- **Graph:** Displays the calibration values. A pop-up menu is available by right clicking on the graph.



It is used to select the sensitivity graph, the offset graph or both. It is also possible to hide/display the factory values. There is also a marker to highlight the calibration.
Other information is explained in the "Transducer" chapter p82.

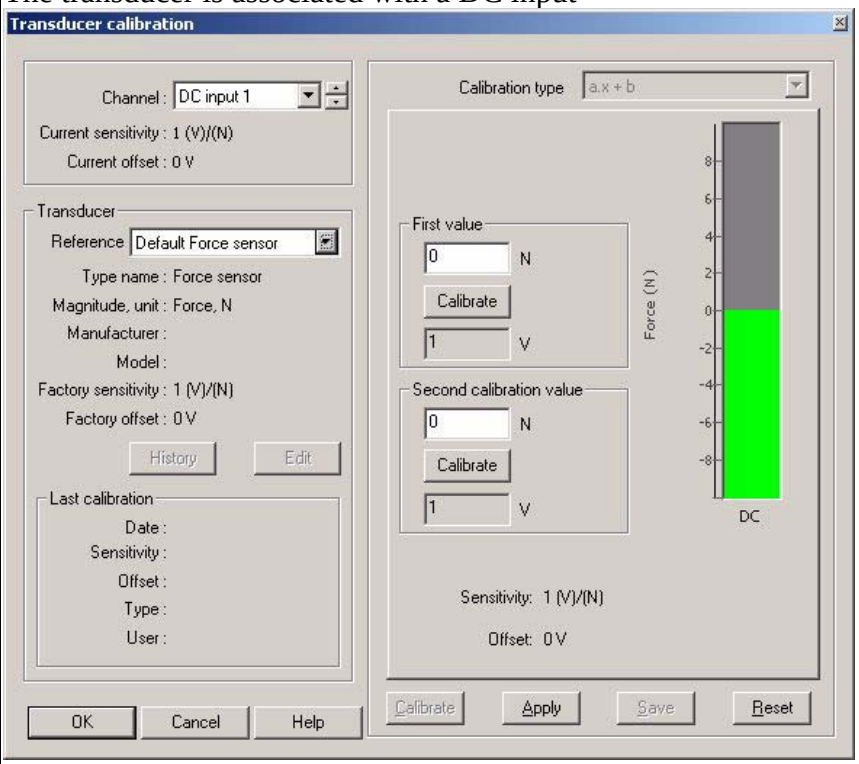
5.2.3 Calibration

This dialog box is used to calibrate the inputs connected to a transducer.

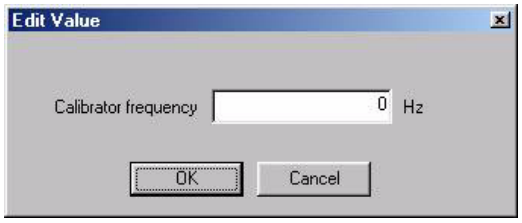


- **Channel:** This is the channel to be calibrated. It can be selected using the drop-down list or the up and down arrow. It is available for calibration of all dynamic and DC inputs. When a channel is selected, the sensitivity and the offset are immediately updated.
- **Reference:** This is the transducer selected on the channel. It is necessary to select a transducer in order to calibrate the input. If the transducer used is not in the list, a default transducer can be used. Information about the transducer is displayed.
- **History:** See "Transducer" chapter p 82. This button is not available when a default transducer is selected, since it does not refer to unique transducer.
- **Edit:** Similar to the "new transducer dialog".
- **Calibration type:** This field is automatically updated, depending on the type of transducer selected.

Calibration type	Description
Acoustic	The transducer is a microphone
Vibration	The transducer is an accelerometer (possible unit in g or in m/s²)
Frequency	The transducer is associated with a dynamic input and is not a microphone or an accelerometer

a.x + b	The transducer is associated with a DC input  The area presents the current level on the DC input and is used to perform the calibration for two values. Once calibration is completed, the new sensitivity and offset are available. • **Apply:** Applies the new sensitivity to the selected channel. • **Save:** Applies the new sensitivity to the selected channel and saves the calibration information. This button is not available for a default transducer. • **Reset:** Restores the current sensitivity of the transducer.

- **Acoustic, vibration and frequency calibration:** The spectrum measured is displayed. The frequency range is linked to the calibrator frequency. It is possible to right click in the plot area to perform an auto-scale on the Y-axis.
- **Calibrator level:** Indicates the level of the calibrator. This values is used to determine the new sensitivity of the transducer
- **Calibrator frequency:** Indicates the frequency of the calibrator. It is used to check that the maximum level measured is at the correct frequency. It is also used to select the best frequency range for the calibration. The most common calibrator frequencies are suggested. It is also possible to choose a user-defined frequency.



- **New:** Used to select a user-defined calibrator frequency
- **Calibrate:** Starts the calibration. The analyzer detects the maximum level, checks that frequency is near the calibrator frequency, and determines the new sensitivity.

Nota bene: In case of 1-DSP analyzer with 4 inputs @ 51,2kHz connected to the octave plug-in, it is not possible to perform the calibration (DSP power limit reached). In such situation, bringing the sampling frequency down to 25,6kHz or disconnecting the inputs from the octave plug-in for the time of the calibration will allow user to calibrate his sensors.

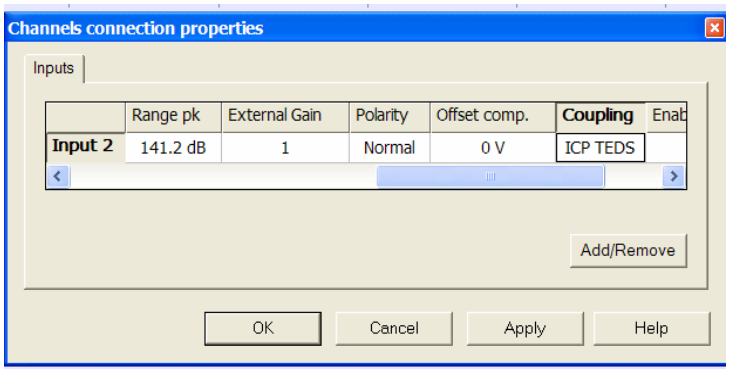
5.2.4 History

See "Transducers" topic p 5-5.

5.2.5 TEDS Transducers

There are two ways to add a TEDS transducer to the transducers data base:

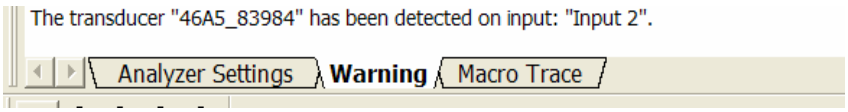
- **Connected a TEDS transducer on a channel**.



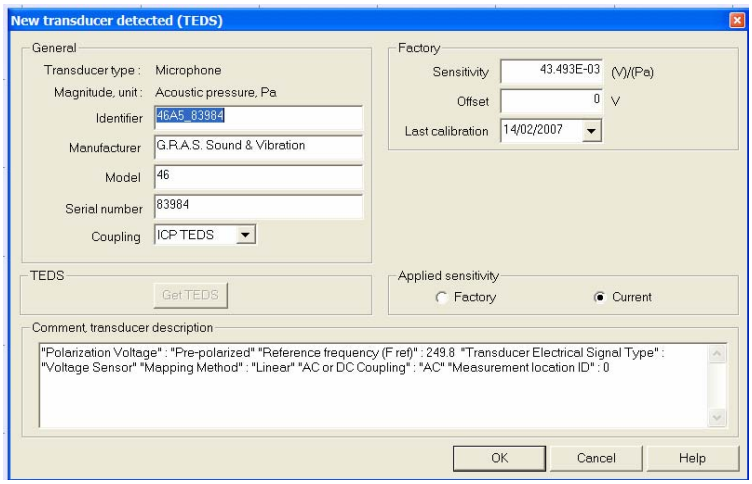
Select ICP TEDS for the input coupling.

All the characteristics of the transducer are automatically detected.

A warning confirms that a new transducer has been detected.

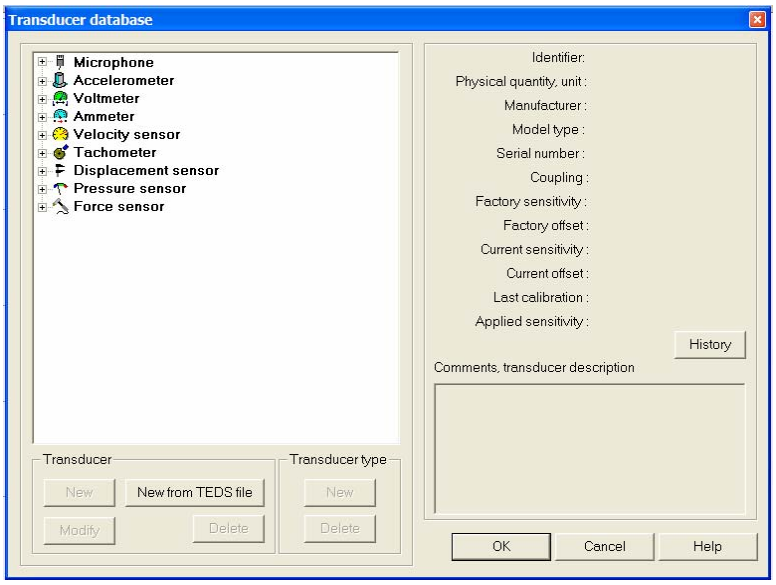


The window below is displayed.



The new transducer is added to the transducer database.

- **Used a TEDS File**



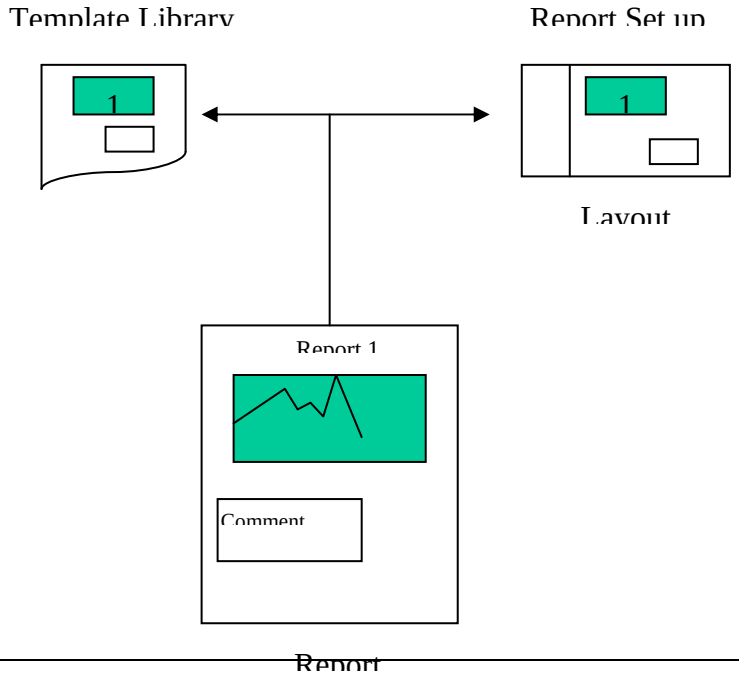
To use a TEDS file, click on **New from TEDS file** in the transducer database window.

By selecting the file, all the characteristics of the transducer become known and it appears in the transducer database.

5.3 Report template

Default report templates are available, but you can create several templates adapted to the kind of report you want and save them in a library to use them for another project.

5.3.1 Introduction



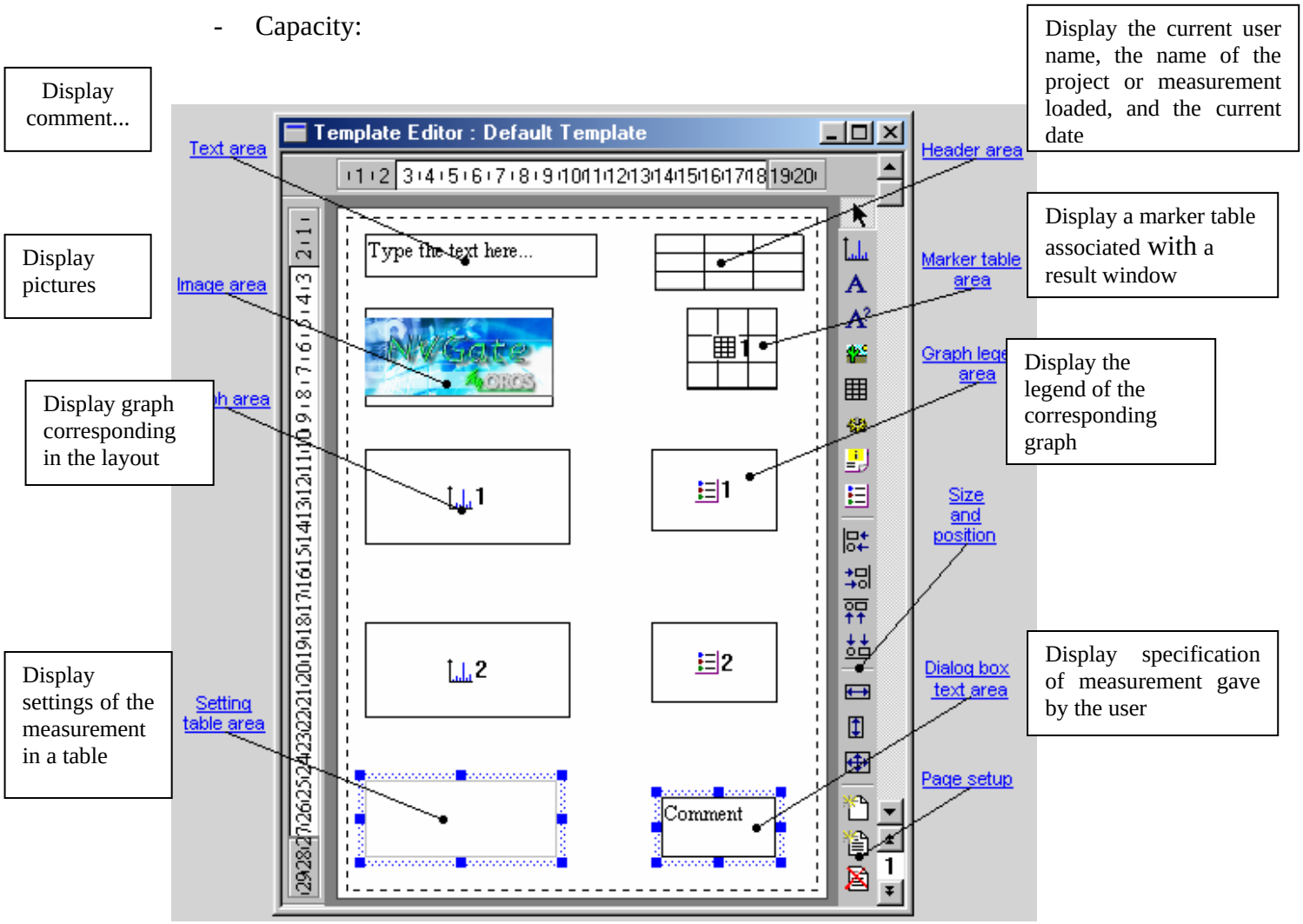
- Procedure:

  1. Choose (from the library) or define a report template dedicated to your measurement.
  2. Associate windows from your measurement to the dedicated area in your template.

These two points can be done once, and then the user can had the dedicated template to the project in order to use it for all measurement in this project.

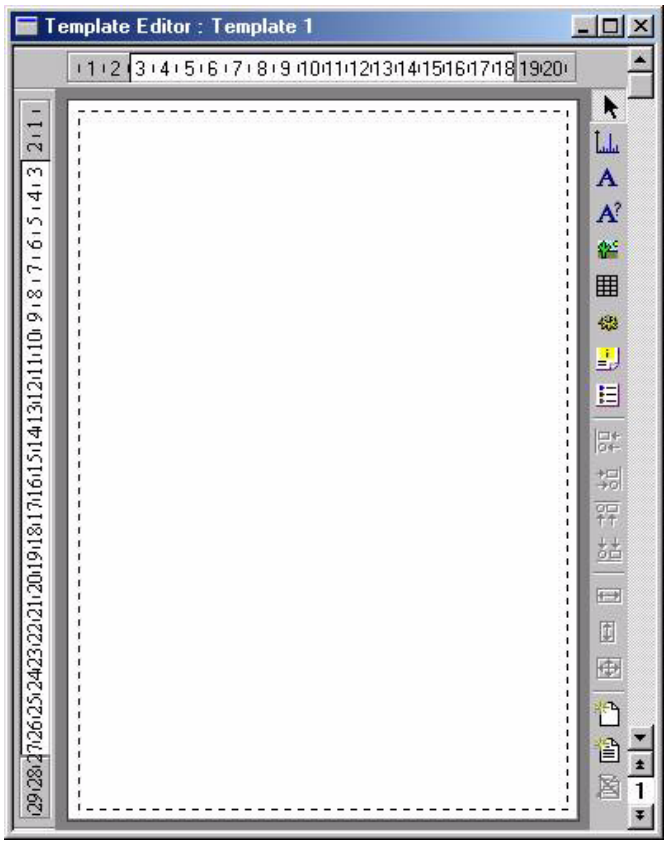
  3. Mesure
  4. Print report

- Capacity:



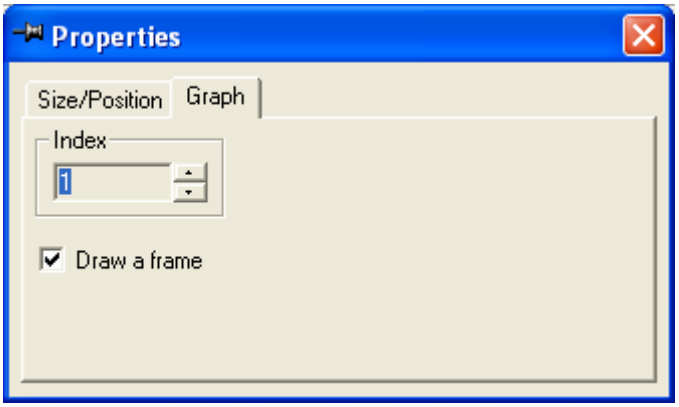
5.3.2 New

Creates a new report template and loads it to the editor.



- **Select** : Switches to object selection mode. Object selection is done by clicking on the object, in the page with the left mouse button. By using Ctrl + left-click it is possible to select several objects for the page set-up.

- **Window area** : A window area is intended to display a result window.
  From the Template Editor, click on the **Window area**. A blue frame appears.
  Click on the **Graph** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the top left corner icon). With the index box, select the number of window you want to insert in the area. You can decide whether to display a frame or not with the "Draw a frame" check box.

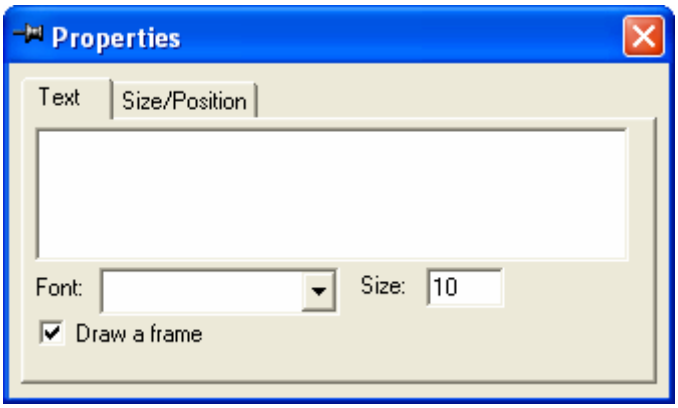


The index property represents the result window to be displayed in the report setup window list.

- **Text area** : Displays a text.

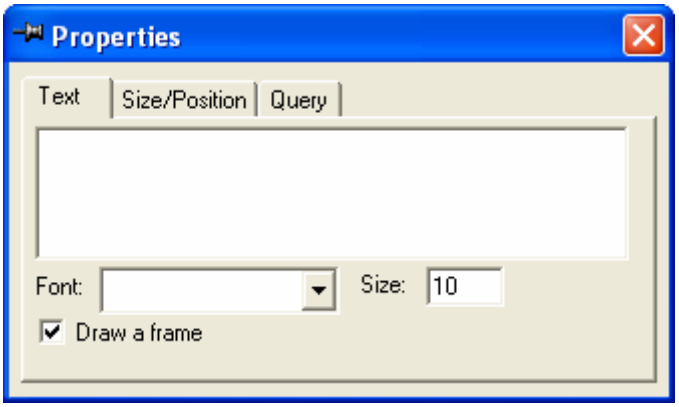
From the Template Editor, click on the **Text area**. A blue frame appears.
Right click on the **Text area**.
Click on the **Text** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the thumbtack on the top left corner). You can decide whether or not to display a frame with the "Draw a frame" check box.

Object properties.



The "Text" sheet is used to specify the text area content.

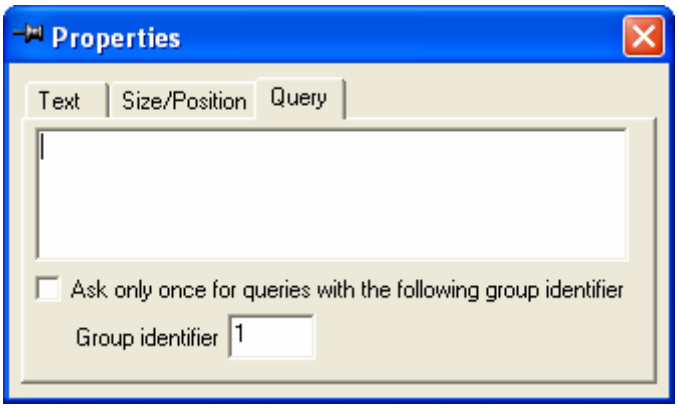
- **Dialog box text area** : During report printing, display a dialog box asking text area's content.
  From the Template Editor, click on the **Dialog box text area**. A blue frame appears.
  Right click on the **dialog box text area**.
  Select **Properties** to set the Size/Position of the area and Text.
  - From the **Text** tab, enter the text you want to display in the dialog box as a message to the user when he will print the report (for example, enter "`Comment`").



The "Text" sheet is used to specify the default text.

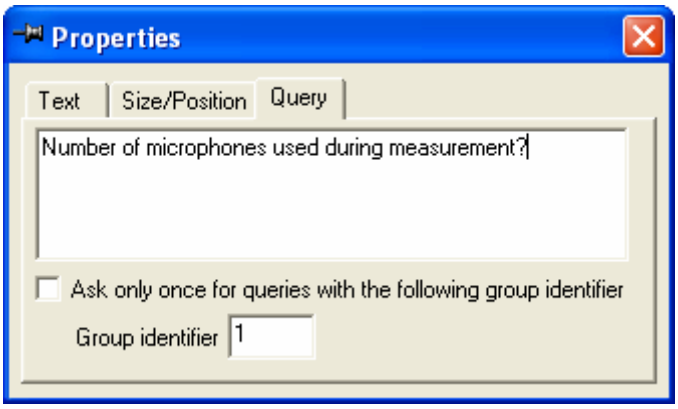
- From the **Query** tab, enter the question or specification asked to the user (for example, enter "`problem encountered?`").

Note: If you want to write several lines, press **CTRL** + **Return** keys at each end of line.

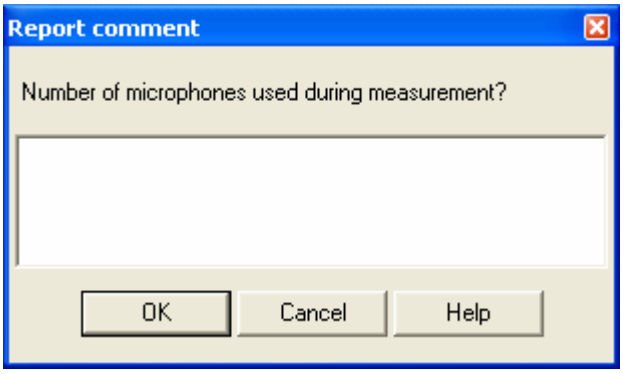


The "Query" sheet is used to specify text prompted by the dialog box during report printing.

Example:



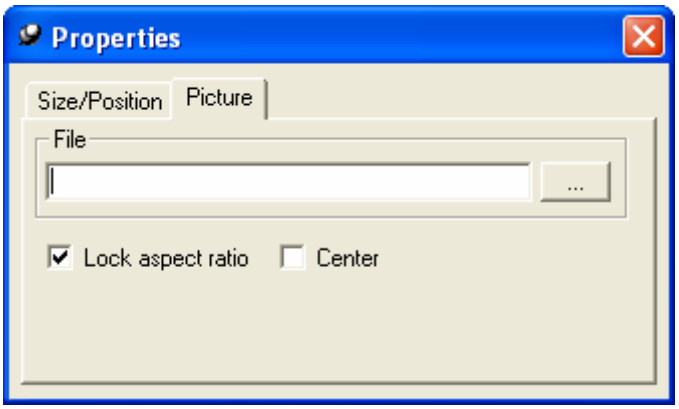
This query will be displayed during the printing of this report template, and the user will enter the answer.



Note: In your report template if there is several dialog boxes, and if queries and answers are the same, it is possible to answer only once and get the same answer in others dialog boxes from the same group (same group identifier number). This is done by checking the 'Ask only once for queries with the following identifier'.

- **Picture area** : Displays a picture.
  From the Template Editor, click on the picture area icon and draw a window with the pointer.
  Click on the **Picture area**. A blue frame appears.
  Right click on the **Picture area**.
  Select **Properties** to set the Size/Position of the area and Bitmap.
  - Click on the **Bitmap** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the top left corner icon) and type the name of the bitmap file (.bmp extension) you want to insert or browse folders by clicking on ...

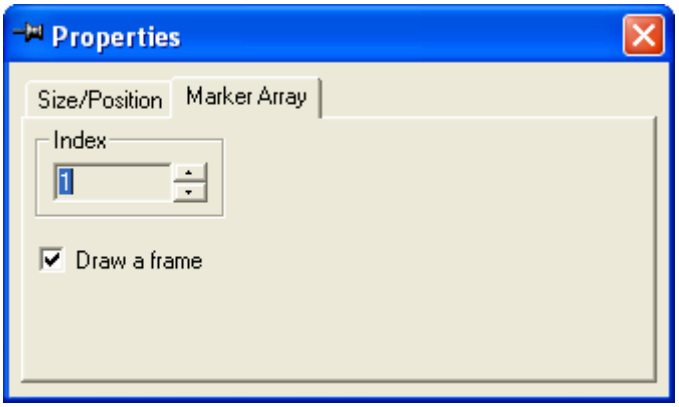
Then click outside the window to return to the Template Editor.



- **Marker table area** : Displays a marker table associated with a result window.

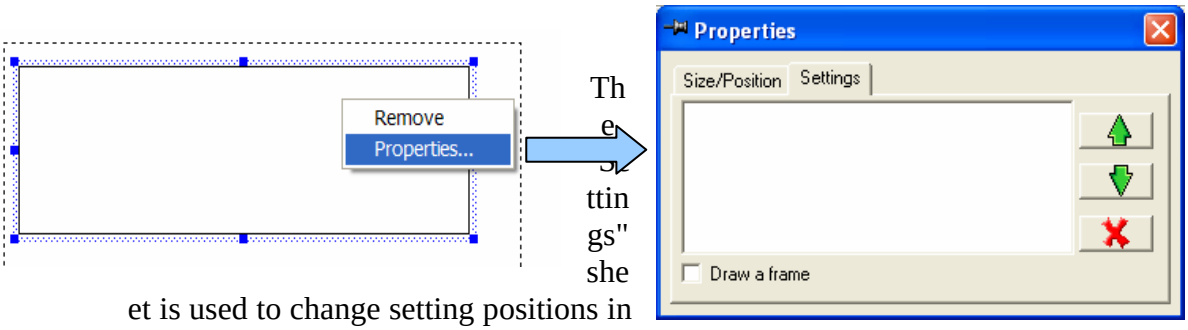
From the Template Editor, click on the **Marker table area**. A blue frame appears.
Right click on the **Marker table area**.
Select **Properties** to set the Size/Position of the area and Marker Array.

- Click on the **Marker Array** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the top left corner icon). With the index box, select the number of window you want to insert in the area. You can decide whether to display a frame or not with the "Draw a frame check" box.



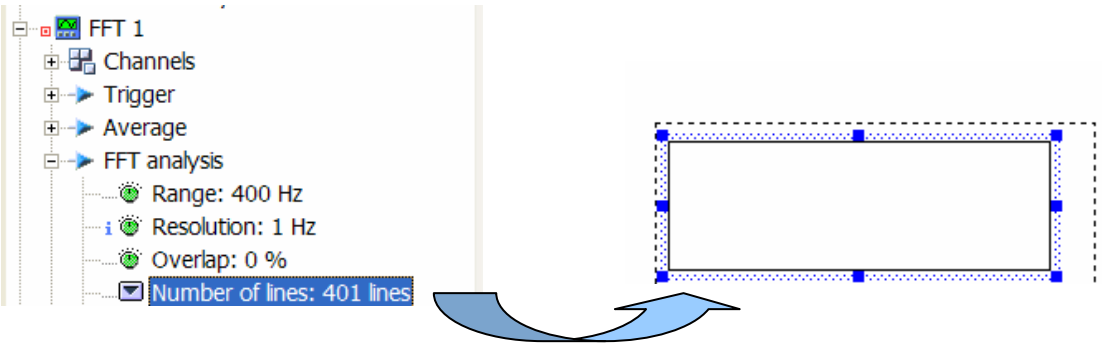
The index property represents the result window to be displayed in the report setup window list.

- **Setting table area** : Displays setting values in table format.
Object properties

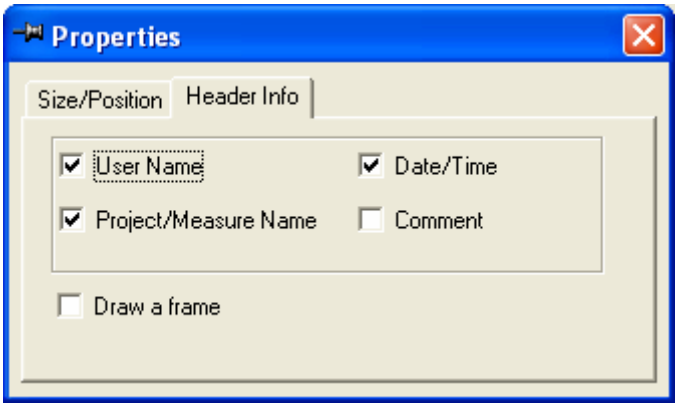


The "Settings" sheet is used to change setting positions in the table, and to remove some settings from the table.
From the Template Editor, click on the Setting table area. A blue frame appears.
Right click on the Setting table area.
Select Properties to set the Size/Position of the area and settings.

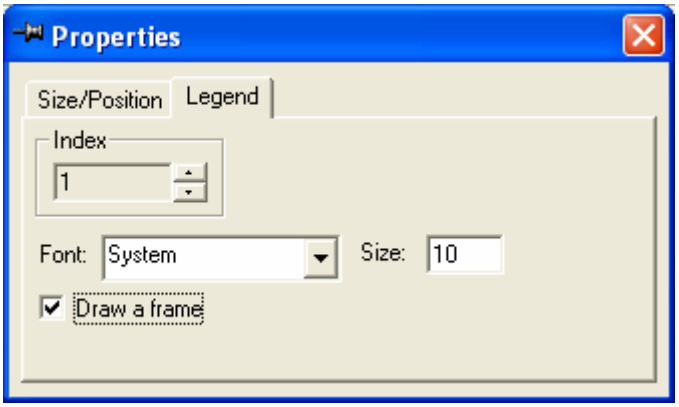
1. Click on the Settings tab and click on the thumbtack icon on the top left corner of the window (this is to keep the focus on it). You can decide whether to display a frame or not with the "Draw a frame" check box.
2. From the ASB, select a setting and add it into the setting table area by using drag & drop (the setting will appear in the setting table area properties window).



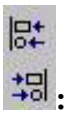
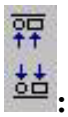
- **Header area** **:** Used to display the current user name, the name of the project or measurement loaded, and the current date.
  From the Template Editor, click on the **Header area**. A blue frame appears.
  Right click on the **Header area**.
  Select **Properties** to set the Size/Position of the area and Header Info.
  - Click on the **Header Info** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the thumbtack on the top left corner). You can decide whether to display a frame or not with the "Draw a frame" check box.

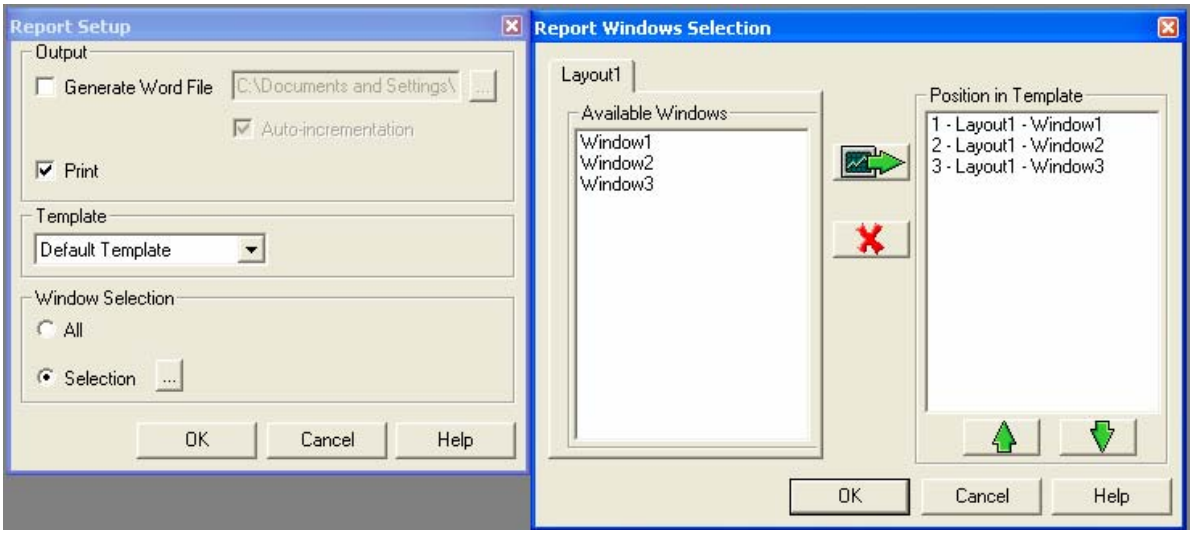


- **Graph legend** **:** Displays a result window graph legend.
  From the Template Editor, click on the **Graph legend area**. A blue frame appears.
  Right click on the **Legend area**.
  Select **Properties** to set the Size/Position of the area and Legend contents.
  - Click on the **Legend** tab (to keep in focus while working outside the "Properties" dialog box, you can click on the thumbtack on the top left corner). The index box is used to assign the window number to the legend area. You can decide whether or not to display a frame with the "Draw a frame" check box.



The index property represents the result window to be displayed in the report setup window list.

- **Align right/left**  **:** Aligns selected objects with the right / left border of the last object selected.
- **Align top/bottom**  **:** Aligns selected objects with the top / bottom border of the last object selected.
- **Apply same** **:** Applies the same width / height / size as the last object selected to the objects currently selected.
- **Add page** **:** Creates a new page, which is inserted after the current page. So you can make a multi-sheet report considering different layouts in your project or different windows. You can associate page 1 to the layout 1 and page2 to the layout 2, and define each part (graph, legend, text…) on each page (using the same template or an other).

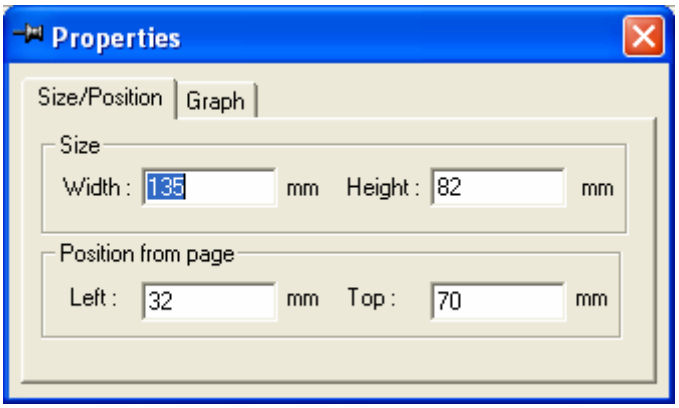


- **Copy page** **:** Makes a copy of the current page and insert it after the current page.
- **Delete page** **:** Deletes the current page. This function is disabled if the current page is the only page.

5.3.2.1 Graph contextual menu

The graph contextual menu is opened by right-clicking on the selected object.

- **Remove:** Remove the selected object.
- **Properties:** Opens the 'Properties" dialog box, in order to edit the properties of the selected object. Whatever the type of selected object is, the dialog box contains a "Size / Position" sheet, which is used to change the position and size of the selected object. The next sheet depends on the type of object.



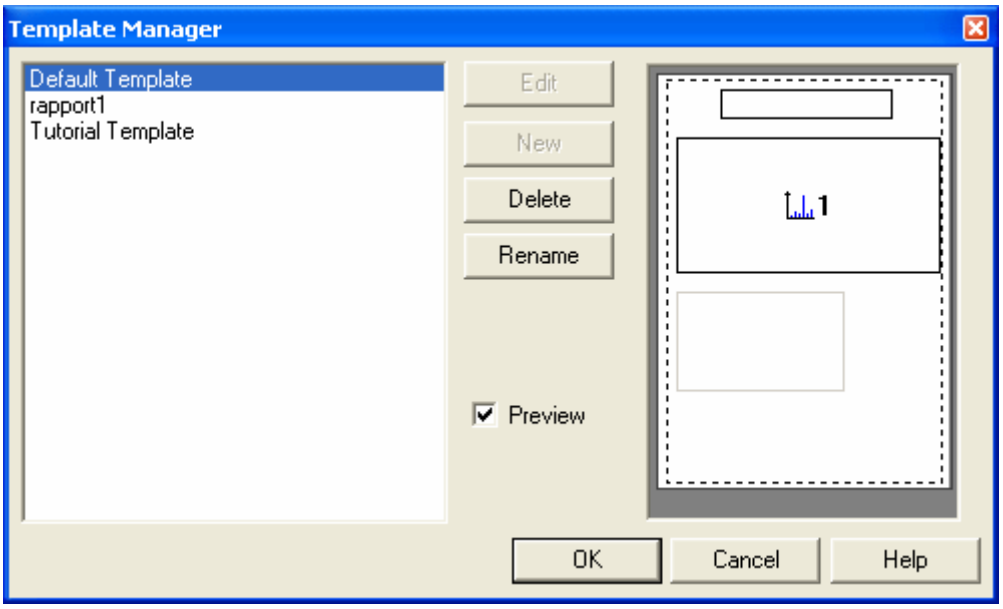
- **Edit:** Edits the template selected in report setup.
  Disabled if no template is selected in report setup or if a template is already being edited.
- **Save:** Saves the template open in the editor.
  Disabled if no template is being edited.

5.3.3 Save as

Saves the template open in the editor with a new name.
Disabled if no template is being edited.

5.3.4 Manage

Opens template manager.



- **Edit:** Edits template selected in template list.
  Disabled if a template is already being edited.
- **New:** Creates a new template and opens it in the editor.
  Disabled if a template is already being edited.

Note: In *File/Print Setup*, the user has the possibility to select the template's orientation. When the project is saved, this orientation will be memorized for all templates created in this project.

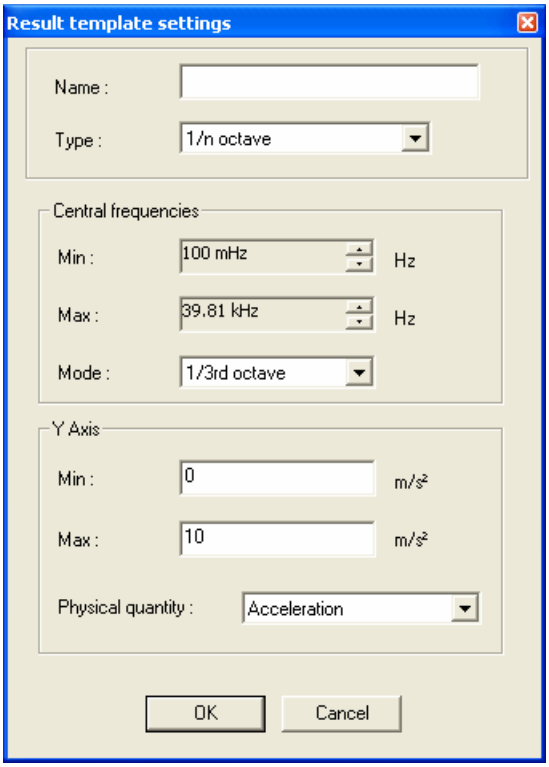
- **Delete:** Deletes template selected in template list.
- **Rename:** Renames template selected in template list.
- **Preview:** The preview option is used to preview the template selected. The preview is displayed in the right-hand part of the dialog box.

5.4 Result template

The Result Template is used to design a signal for comparison between a computed signal and the template.

- **Type** Displays the type of the new result template. The different types are
  - 1/n octave (available if 1/n octave plug-in analyzer is available)
  - Profile
  - Frequency narrow band (available if one or more FFT plug-in analyzer is available)
  - Order narrow band (available if one or more synchronous order analysis plug-in analyzer is available)

5.4.1 1/n octave result template settings



5.4.1.1 Central frequencies

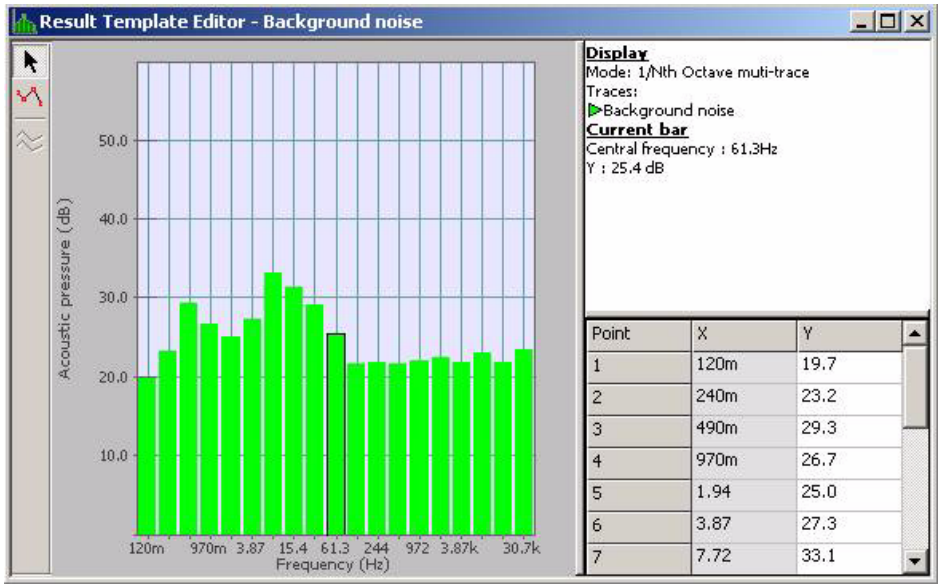
- **Min:** Minimum value on X-axis.
- **Max:** Maximum value on X-axis.
- **Mode:** Defines the number of frequency bands. Available with 1/n octave template result only.
  The possible values are

- Octave
- 1/3rd octave
- 1/12th octave
- 1/24th octave

5.4.1.2 Y axis

- **Min:** Minimum value on Y-axis.
- **Max:** Maximum value on Y-axis.
- **Physical quantity:** Physical quantity represented on Y-axis.

5.4.2 1/n octave result template editor



- **Select a bar** **:** Switches to “Select” mode. Bar is selected by clicking on it. The selected bar can be resized by dragging and dropping.
- **Select all bars** **:** Selects all bars of result template. All bars can be resized by resizing one of them. The same offset is applied to all bars.

5.4.2.1 Graph contextual menu

- **Y scale:** Switches between linear and dB scale on the Y-axis.

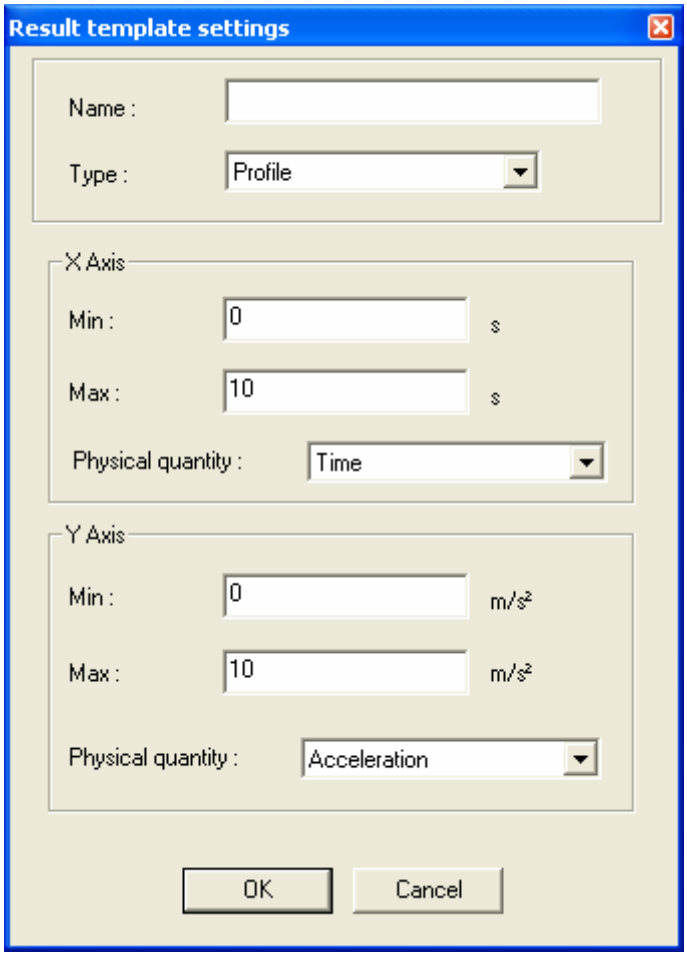
5.4.2.2 Edit grid

- **Select point:** A click on a grid line selects the corresponding point in the graph area.
- **Edit point:** You may double-click on a cell to edit the X-coordinate or Y-coordinate of a point.

The Y-coordinate value is bound by the Y minimum and maximum values.
The X-coordinate value is bound by the previous and next point's X-coordinate.
Clicking on another cell or pressing enter key validates a value.

- **Paste special:** The edit grid or a part of the edit grid may be filled by editing the grid content in Excel®, and then copying and pasting from the clipboard.
  Only selected cells are updated, if the grid content is valid.
  The X-coordinates of the first and last point cannot be edited. The corresponding cells are disabled.
  The values used in the Excel® sheet must be specified in the current units.

5.4.3 Profile result template settings



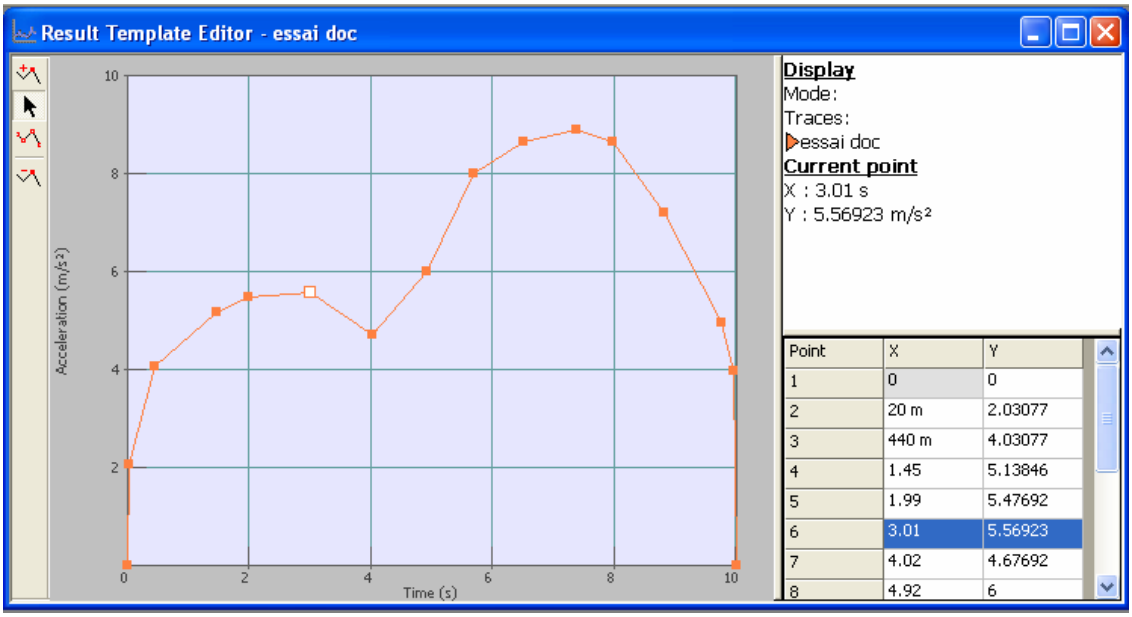
5.4.3.1 X axis

- **Min:** Minimum value on X-axis.
- **Max:** Maximum value on X-axis.
- **Physical quantity**: Physical quantity of the reference (represented on X axis).

5.4.3.2 Y axis

- **Min:** Minimum value on Y-axis.
- **Max:** Maximum value on Y-axis.
- **Physical quantity:** Physical quantity represented on Y-axis.

5.4.4 Profile result template editor



- **Add a point** **:** Switches to “Add point” mode. In this mode, a new point is created by clicking in one of the two graph areas. A point with the same X-coordinate is added to the curve of the other graphic area. The Y-coordinate of this point is calculated by linear interpolation between previous and next point.

- **Select a point** **:** Switches to “Select” mode. A point is selected by clicking on it. The selected point can be moved by dragging and dropping. The drop area is bound by the X-coordinates of the next and previous points, and the Y-axis minimum and maximum values.
  When a point is selected in one of the two curves, the point with same X-coordinate is selected in the other curve. When a point is moved, the point with the same X-coordinate in the other curve is moved also, in order to keep the same X-coordinate.
  The two end points can be translated on the Y-axis only. Their X-coordinates are the X-axis minimum and maximum values, respectively.

- **Select all points** **:** Selects all points on both curves. A curve can be translated on the Y-axis by moving one of its points.

- **Remove selected point** **:** Removes the selected point from both curves. The previous point becomes the new selected point. Not available if all points or one of the end points are selected.

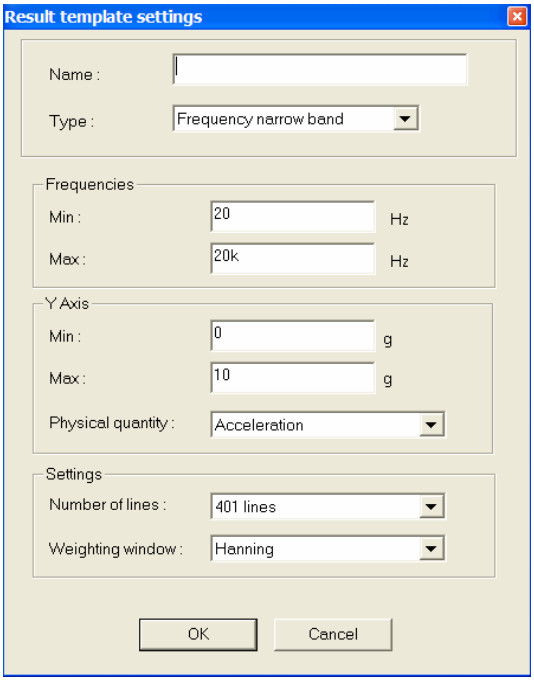
5.4.4.1 Graph contextual menu

- **Add point:** Used to add a point by right-clicking on the desired position. A point with the same X-coordinate is added in the other curve. The Y-coordinate of this point is calculated by linear interpolation between previous and next point.
- **Remove point:** Used to remove the designated point by right-clicking on it. The point with same X-coordinate is removed from the other curve.
  Only available when the user has right-clicked a given point (except end points).
- **Move point:** Used to move the designated point by right-clicking on it. A left click in the graph area determines the new position of the point. The point with the same X-coordinate in the other curve is moved also, in order to keep the same X-coordinate
- **Y scale:** Switches between linear and dB scale on the Y-axis.

5.4.4.2 Edit grid

- **Select point:** By clicking on a grid line, you may select the corresponding point in the graph area.
- **Edit point:** Double-click on a cell to edit the X-coordinate module or phase. A cell can be also edited by selecting it and pressing the enter key.
  The module value is bound by the module minimum and maximum values. The phase belongs to the range [-Pi,Pi]. The X-coordinate value is bound by the X-coordinate of the previous and next points.
  A value is validated by clicking on another cell or pressing the enter key.
- **Paste special:** The edit grid or a part of the edit grid may be filled by editing the grid content in Excel®, and then copying and pasting from the clipboard.
  Only selected cells are updated, if the grid content is valid.
  The X-coordinates of the first and last point cannot be edited. The corresponding cells are disabled.
  The values used in the Excel® sheet must be specified in the current units.

5.4.5 Frequency narrow band result template settings



5.4.5.1 Frequencies

- **Min:** Minimum value on X-axis.
- **Max:** Maximum value on X-axis.

5.4.5.2 Y axis

- **Min:** Minimum value on Y-axis.
- **Max:** Maximum value on Y-axis.
- **Physical quantity:** Physical quantity represented on Y-axis.

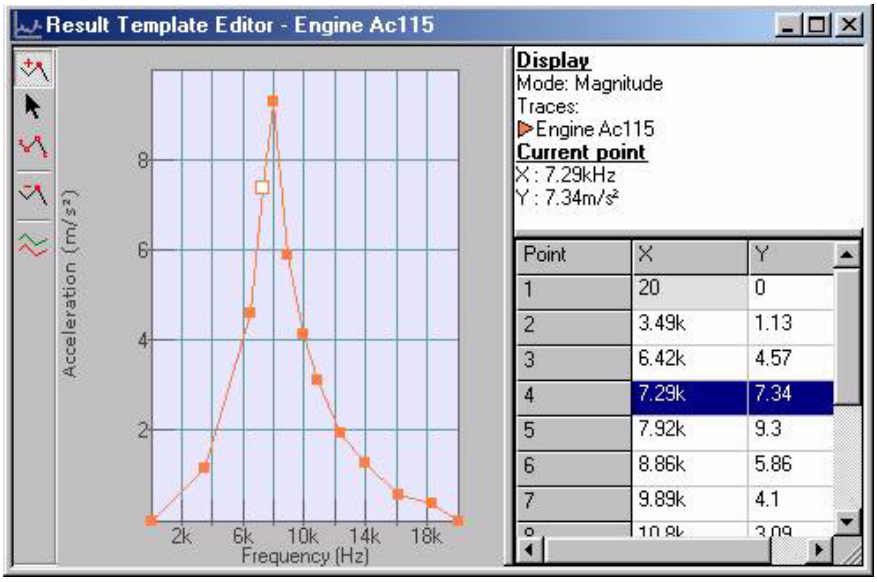
5.4.5.3 Settings

- **Number of lines**: Defines the number of lines.

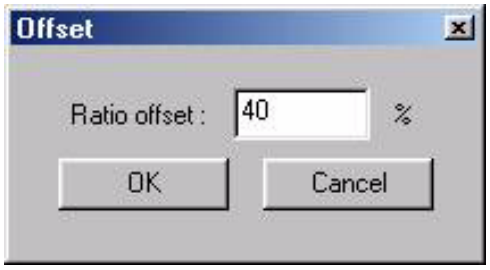
This setting is particularly usefull to exploit **P**ower **S**pectrum **D**ensity or **E**nergy **S**pectrum **D**ensity

- **Weighting window**: defines the weighting window used.

5.4.6 Frequency narrow band result template editor



- **Add a point** : Switches to “Add point” mode. In this mode, a new point is created by clicking in the graph area.
- **Select a point** **:** Switches to “Select” mode. The point is selected by clicking on it. It can be moved by dragging and dropping it. The drop area is limited by the next and previous point X-coordinates, and Y minimum and maximum values. The two end points can be translated on the Y-axis only. Their X-coordinates are the X minimum and maximum values, respectively.
- **Select all points** **:** Selects all points of result template. The entire curve can be translated according to the Y-axis by moving one of its points.
- **Remove selected point** **:** Removes the selected point. The previous point becomes the new selected point.
  Not available if all points or one of the end points are selected.
- **Generate min-max result template** **:** Displays a dialog box used to generate a min-max result template from the result template edited, applying an offset ratio. The min-max result template is made up of two curves: from each point on the result template edited, two points with same X-coordinate are generated, applying the offset ratio negatively and positively on theY-coordinate.



A click on the OK button changes the result template edited to a min-max result template, which is displayed in the editor (see Min-Max result template editor).

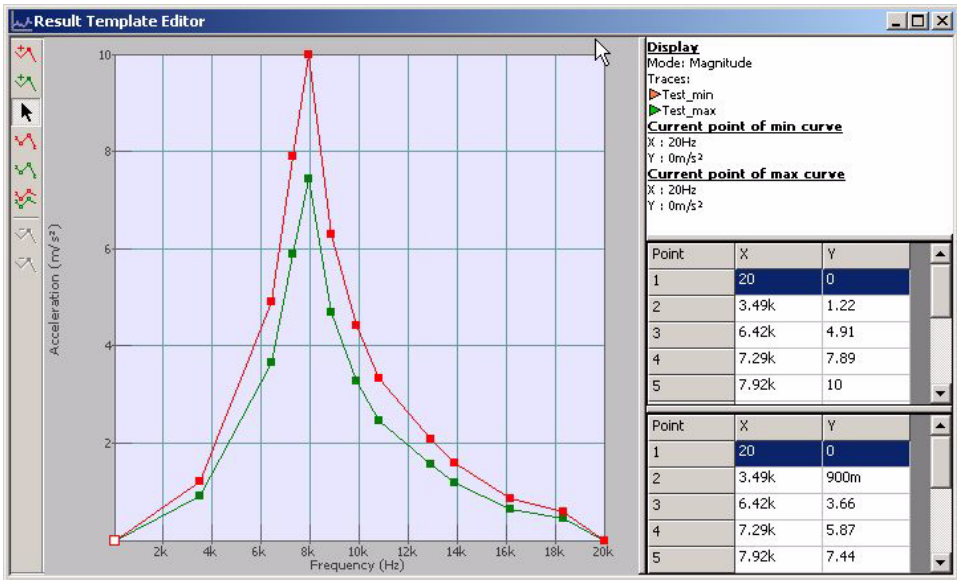
5.4.6.1 Graph contextual menu

- **Add point:** Used to add a point by right-clicking on the desired position.
- **Remove point:** Used to remove the designated point by right clicking on it. Only available when the user has right-clicked a given point (except end points).
- **Move point:** Used to move the designated point by right-clicking on it. A left-click in the graph area determines the new position of the point.
- **Y scale:** Switches between linear and dB scale on the Y-axis.

5.4.6.2 Edit grid

- **Select point:** Clicking on a grid line selects the corresponding point in the graph area.
- **Edit point:** A double-click on a cell is used to edit the X-coordinate or Y-coordinate of a point. A cell can be also edited by selecting it and pressing the enter key.
  The Y-coordinate value is limited by the Y minimum and maximum values.
  The X-coordinate value is limited by the X-coordinate of the previous and next point.
  A value is validated by clicking on another cell or pressing the enter key.
- **Paste special:** The edit grid or a part of the edit grid may be filled by editing the grid content in Excel®, and then copying and pasting from the clipboard.
  Only selected cells are updated, if the grid content is valid.
  The X-coordinates of the first and last point cannot be edited. The corresponding cells are disabled.
  The values used in the Excel® sheet must be specified in the current units.

5.4.6.3 Min-Max result template editor



- **Add a point to top curve** : Switches to “Add point” mode. In this mode, a point is added to the top curve by clicking in the graph area.
- **Add a point to bottom curve** : Switches to “Add point” mode. In this mode, a point is added to the bottom curve by clicking in the graph area.
- **Select a point** : Switches to “Select” mode. A point is selected by clicking on it. The selected point can be moved by dragging and dropping. The drop area is bound by the X-coordinates of the next and previous points, and the Y axis minimum and maximum values. The two end points can be translated on Y axis only. Their X-coordinates are the X-axis minimum and maximum values, respectively.
- **Select all points of top curve** : Selects all points of the top curve. The entire curve can be translated on the Y axis by moving one of its points.
- **Select all points of bottom curve** : Selects all points of the bottom curve. The entire curve can be translated on the Y-axis by moving one of its points.
- **Select all points of both curves** : Selects all points of both curves. Both curves can be translated on the Y-axis by moving one of their points.
- **Remove selected point of top curve**
  Removes the selected point of top curve. The previous point becomes the new selected point.
  Not available if all points or one of the end points are selected.
- **Remove selected point of bottom curve** : Removes the selected point of bottom curve. The previous point becomes the new selected point.

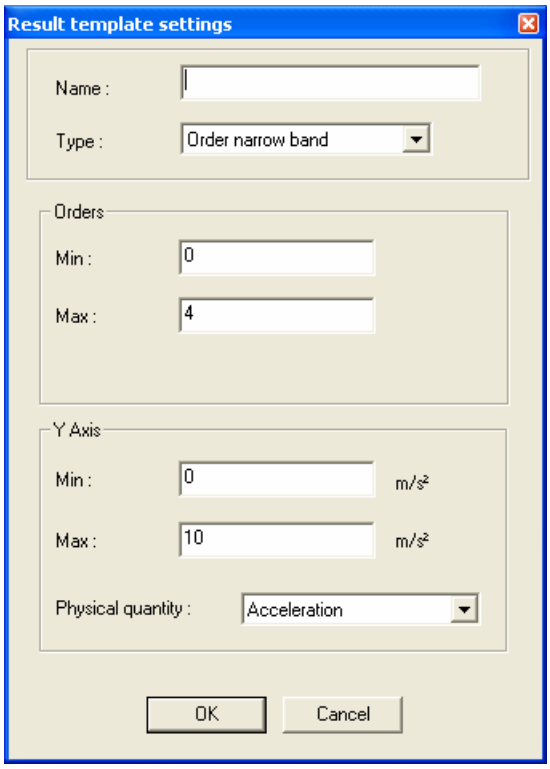
Not available if all points or one of the end points are selected.

5.4.6.4 Edit grid

The editor contains two edit grids, one for each curve. The top and bottom grid are intended to edit the top and bottom curves, respectively.

- **Select point:** By clicking on a grid lines, you may select the corresponding point in the associated curve. A cell can be also edited by selecting it and pressing the enter key.
- **Edit point:** You may double-click on a cell to edit the X-coordinate or Y-coordinate of a point.
  The Y-coordinate value is bound by the Y minimum and maximum values.
  The X-coordinate value is bound by the previous and next point's X-coordinate.
  A value is validated by clicking on another cell or pressing enter key.
- **Paste special:** The edit grid or a part of the edit grid may be filled by editing the grid content in Excel®, and then copying and pasting from the clipbord.
  Only selected cells are updated, if the grid content is valid.
  The X-coordinates of the first and last point cannot be edited. The corresponding cells are disabled.
  The values used in the Excel® sheet must be specified in the current units.

5.4.7 Order narrow band result template settings



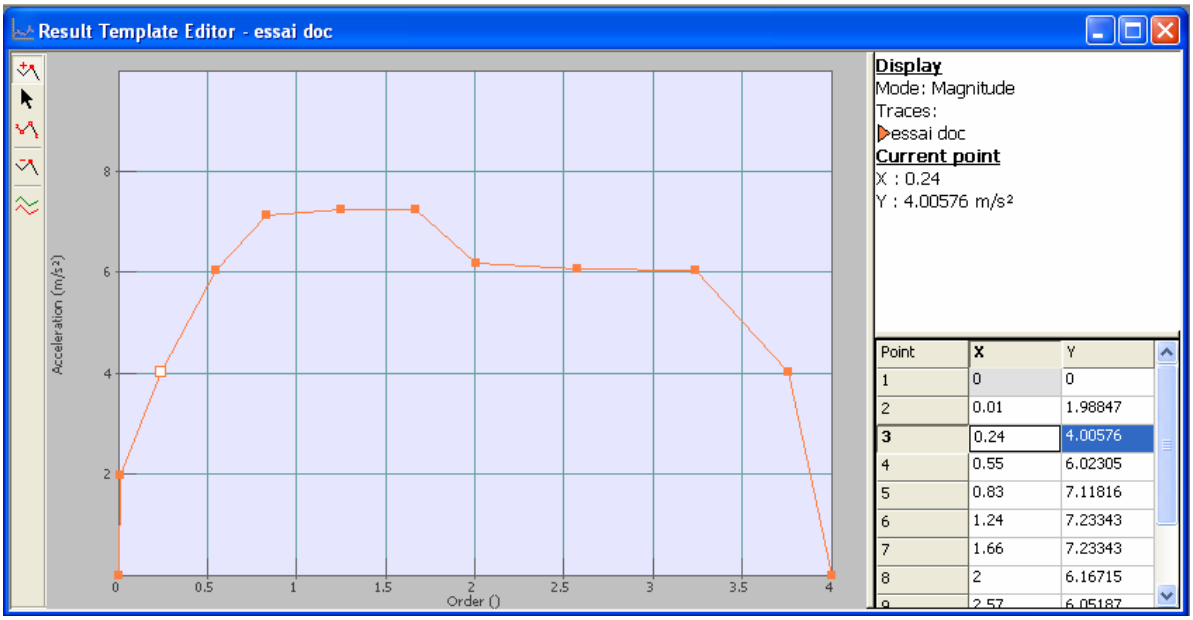
5.4.7.1 Orders

- **Min:** Minimum value on X-axis.
- **Max:** Maximum value on X-axis.

5.4.7.2 Y axis

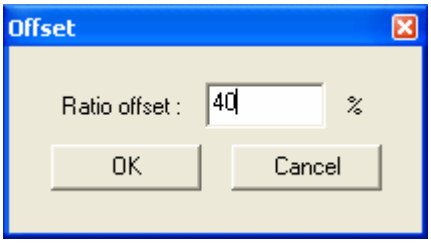
- **Min:** Minimum value on Y-axis.
- **Max:** Maximum value on Y-axis.
- **Physical quantity:** Physical quantity represented on Y-axis.

5.4.8 Order narrow band result template editor

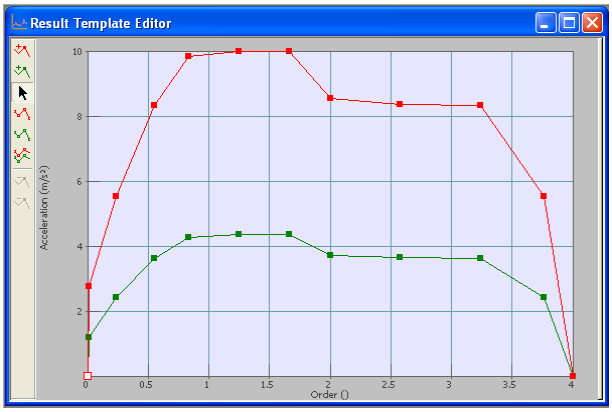


- **Add a point** : Switches to “Add point” mode. In this mode, a new point is created by clicking in the graph area.
- **Select a point** **:** Switches to “Select” mode. The point is selected by clicking on it. It can be moved by dragging and dropping it. The drop area is limited by the next and previous point X-coordinates, and Y minimum and maximum values. The two end points can be translated on the Y-axis only. Their X-coordinates are the X minimum and maximum values, respectively.
- **Select all points** **:** Selects all points of result template. The entire curve can be translated according to the Y-axis by moving one of its points.
- **Remove selected point** **:** Removes the selected point. The previous point becomes the new selected point.
  Not available if all points or one of the end points are selected.

- **Generate min-max result template** **:** Displays a dialog box used to generate a min-max result template from the result template edited, applying an offset ratio. The min-max result template is made up of two curves: from each point on the result template edited, two points with same X-coordinate are generated, applying the offset ratio negatively and positively on theY-coordinate.



A click on the OK button changes the result template edited to a min-max result template, which is displayed in the editor (see Min-Max result template editor).



5.4.8.1 Graph contextual menu

- **Add point:** Used to add a point by right-clicking on the desired position.
- **Remove point:** Used to remove the designated point by right clicking on it. Only available when the user has right-clicked a given point (except end points).
- **Move point:** Used to move the designated point by right-clicking on it. A left-click in the graph area determines the new position of the point.
- **Y scale:** Switches between linear and dB scale on the Y-axis.

5.4.8.2 Edit grid

- **Select point:** Clicking on a grid line selects the corresponding point in the graph area.
- **Edit point:** A double-click on a cell is used to edit the X-coordinate or Y-coordinate of a point. A cell can be also edited by selecting it and pressing the enter key.
  The Y-coordinate value is limited by the Y minimum and maximum values.

The X-coordinate value is limited by the X-coordinate of the previous and next point.
A value is validated by clicking on another cell or pressing the enter key.

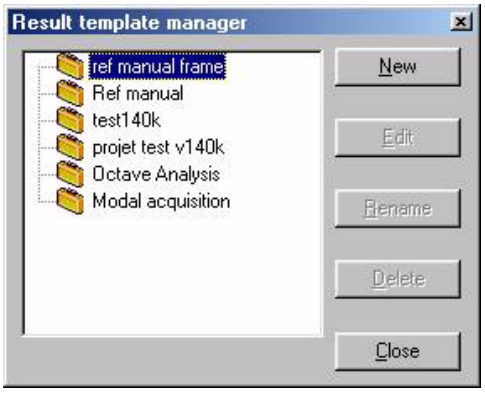
- **Paste special:** The edit grid or a part of the edit grid may be filled by editing the grid content in Excel®, and then copying and pasting from the clipboard.
  Only selected cells are updated, if the grid content is valid.
  The X-coordinates of the first and last point cannot be edited. The corresponding cells are disabled.
  The values used in the Excel® sheet must be specified in the current units.

5.4.9 Save

- **Save:** Saves the result template loaded in the editor in the current project.
- **Save as:** Saves the result template with a new name in the current project.

5.4.10 Manage

The list of result templates is displayed, classified by project.



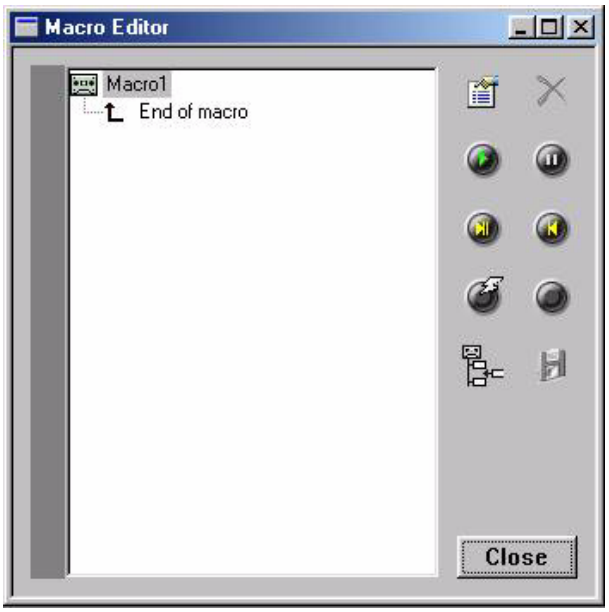
- **New:** Creates a new result template in the project selected in the list. The "Result templates settings" dialog box is displayed, in order to define result templates characteristics.
  Disabled if a template is already being edited.
- **Edit:** Edits the result template selected in the list.
  See "Frequency narrow band result template settings" topic p 5-28.
- **Rename:** Renames the result template selected in the list.
- **Delete:** Deletes the template selected in the list.

5.5 Macro

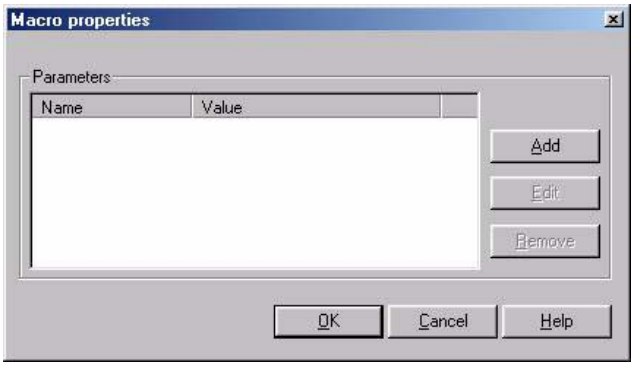
The macro editor is used to create different sequences to automatically adjust the settings in the ASB, or to perform automatic recursive operations...

5.5.1 New

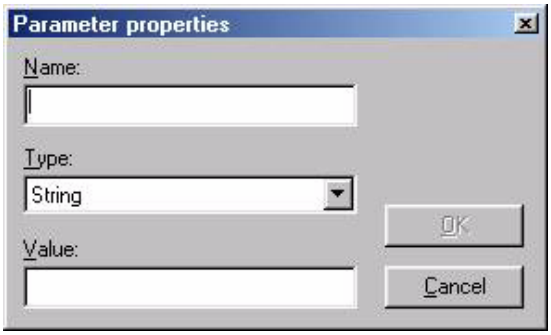
Creates a new macro and loads it in the macro editor. This menu is disabled if another macro is being edited.



- **Properties** **:** Opens a dialog box intended to edit macro properties. Macro properties consist of a set of parameters of different types, which can be used to define macro command properties.
  This command is enabled if the macro item is selected in the macro tree.



- **Add:** Defines a new parameter.



- **Name**: name of the parameter
- **Type**: type of the parameter. The different types available are

Type	Description
Boolean	Parameter that can take only 2 values: True or False. This type of parameter is necessary for the MessageBox command to store the answer of the user. The parameter can then be tested in a "If...Then" command.
File name	Not used
Float	Parameter that can contain a decimal value (1.2, 1.12e6, -0.025, 5,-12387...). It is useful to store constant value that will be used in the macro for test condition (If...then, While) of for other command (Wait, SetParamerValue).
Integer	Parameter that contains an integer value (5, -1024, 6401). Behavior similar to the float parameter, it can be also used in loop commands (For loop, periodic loop)
String	Parameter that contains a string of character. This type of parameter is useful to store constant string and to create string used by NVGate (Measurement name, Report template) or by commands (MessageBox, Trace). Several commands are dedicated to this string parameters (MakeString, GetCurrentTime...)

- **Value**: default value of parameter
- **Edit:** Opens the "Parameter properties" dialog box, which is used to edit the parameter selected in parameters list. It is possible to change the name, the type, or the default value of the parameter. If the parameter is used by one or more macro commands, the type can't be edited (the "Type" combo-box is disabled).
- **Remove:** Removes the selected parameter. If the parameter is used by one or more macro commands, the parameter is not removed and an error message is generated.

- **Delete** **:** Deletes the selected command in the macro tree. If the macro selected contains a set of commands (for example a loop command), a dialog box appears in order to confirm command removal. If removal is confirmed, the command and all commands it contains are deleted.
  This command is enabled if the macro is not running and it is not read-only.

- **Run** **:** Runs the macro from the current command (indicated by execution pointer) to the next breakpoint. If no breakpoint follows, the execution goes to the end of the macro.
  Enable if the macro is not running.

- **Pause** **:** Stops macro execution. The command running is completed, and then execution stops.
  This command is enabled when the macro is running only.

- **Step next** **:** Runs current command (indicated by execution pointer).
  This command is enabled when the macro is not running.

- **Reset** **:** If the macro is running, stops the execution, and then sets the execution pointer to the first command of the macro.

- **Record on-line** **:** Records commands in the macro. The record on-line mode applies the user actions. The commands corresponding to actions are recorded and inserted in the macro before the selected command.
  This command is enabled if the macro is not running and it is not read-only.

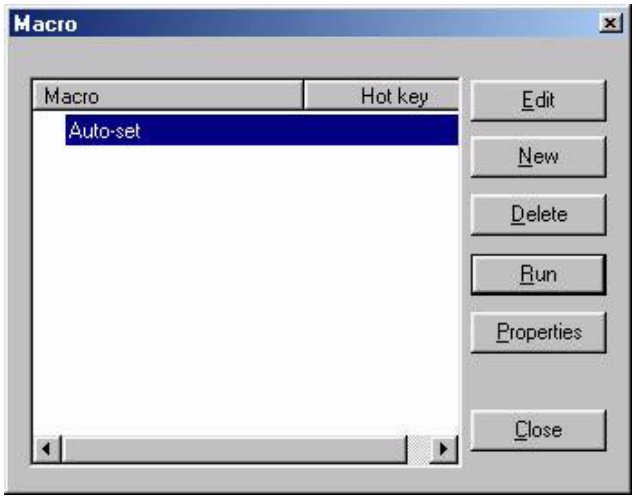
- **Record off-line** **:** Records commands in the macro. The record off line mode applies the user actions only when the macro will start. The commands corresponding to actions are recorded and inserted in the macro before the selected command.
  This command is enabled if the macro is not running and it is not read-only.

- **Insert an algorithmic command** **:** Inserts an algorithmic command before the selected command.
  This command is enabled if the macro is not running and it is not read-only.

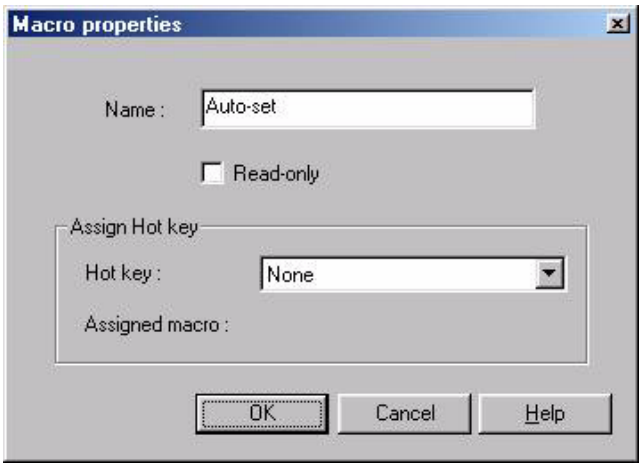
- **Save** **:** Saves the macro.

5.5.2 Manage

Opens the macro manager. Displays the macro list and the associated hot-keys. A hot-key is a shortcut to run the macro.
Note that the three first hot keys are automatically assigned in the “Macro” menu from the OR38/OR36 Front Panel, labeled as “0”, “1” and “2”.



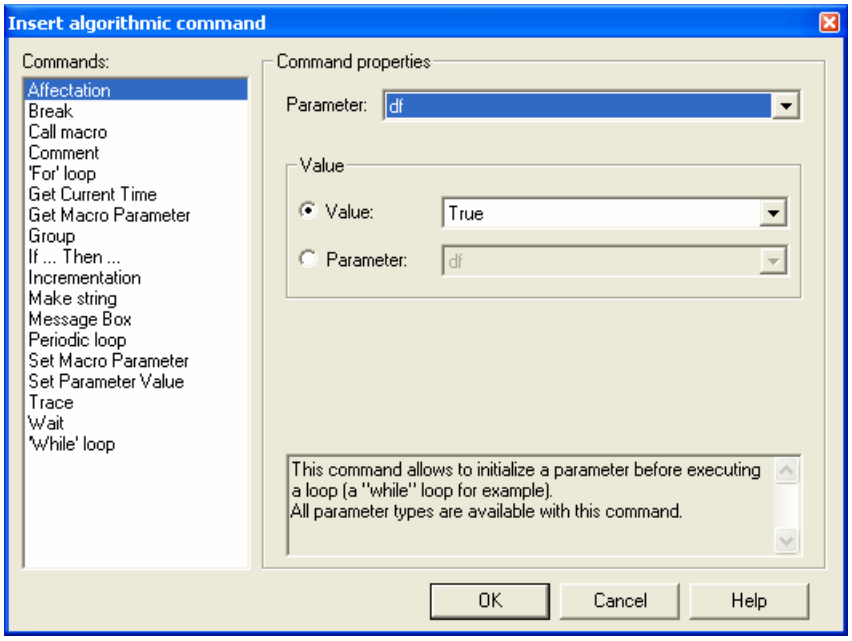
- **Edit:** Edits the macro selected. Available if no macro is being edited, recorded, or executed.
- **New:** Creates a new macro. The new macro is opened in the editor. Available if no macro is being edited, recorded, or executed.
- **Delete:** Deletes the macro selected.
- **Run:** Runs the macro selected. Available if no macro is being executed.
- **Properties:** Edits macro properties (name, read-only flag, and assigned hot-key). Available if no macro is being edited, recorded, or executed.



- **Name:** Changes the name of the macro.
- **Read-only:** If the macro is read-only, the macro can be loaded to the macro editor but can't be modified.
- **Hot key:** Defines a hot-key to run the macro.
- **Assigned macro:** Macro associated with the hot-key selected in "Hot-key" combo-box. If hot-key selected is already assigned, a message is generated when the window is closed, requesting confirmation of the new assignment.

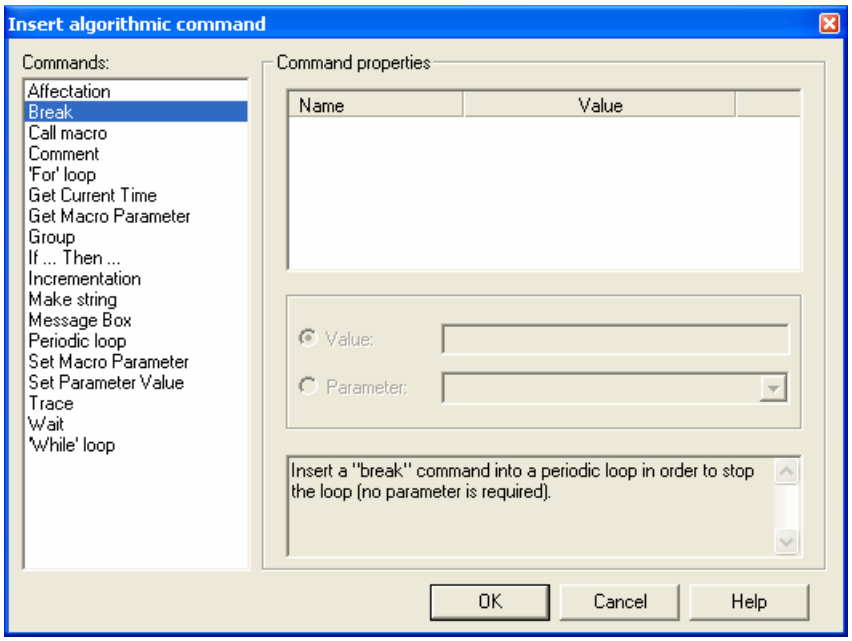
5.5.3 Algorithmic commands

5.5.3.1 Affectation



Sets a value to a parameter. The new value can be defined by a parameter.

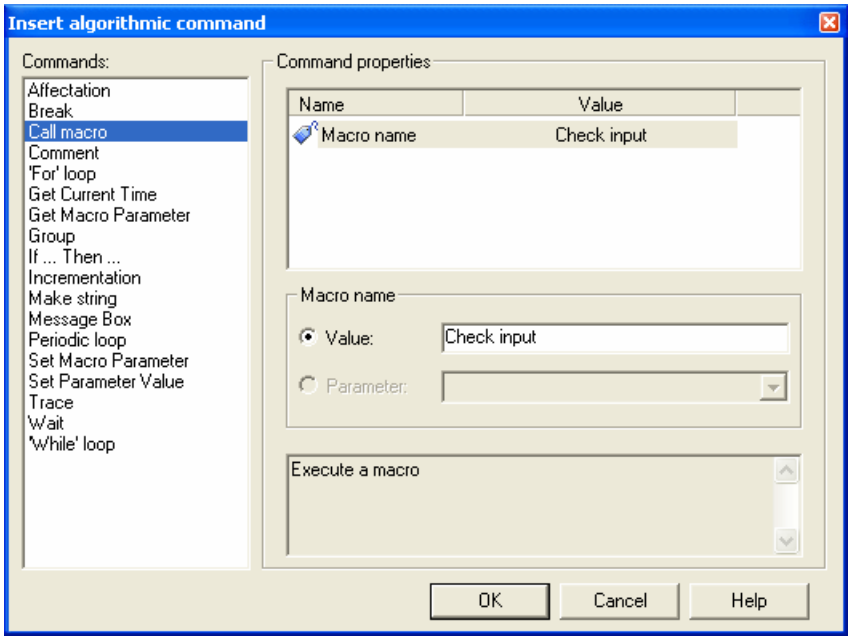
5.5.3.2 Break



Used to exit a loop. It can be used inside a "for" loop to stop before the end of the iteration, inside a "while" loop to exit the loop without fulfilling the condition. It is the only way to exit a "Periodic loop".

5.5.3.3 Call Macro

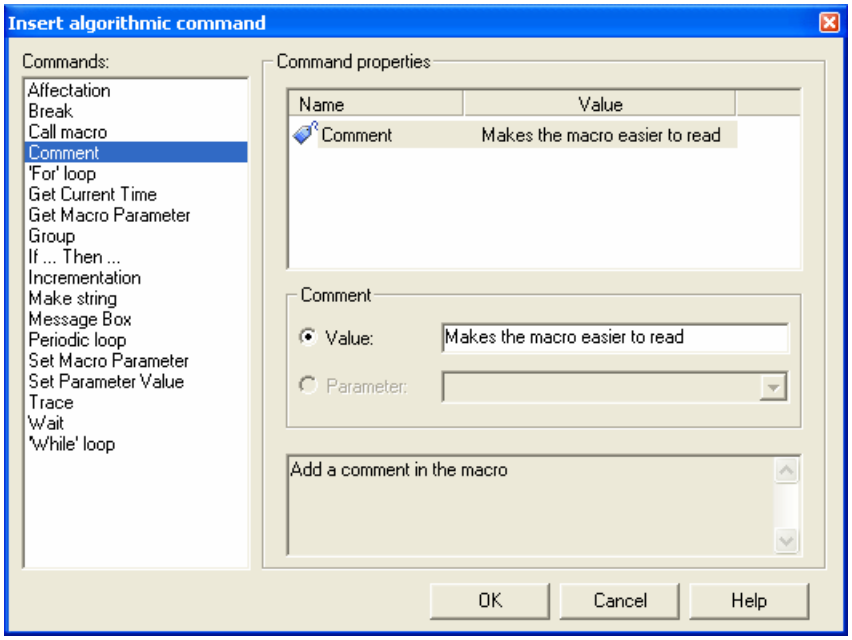
Calls another macro.



The only parameter is the name of the macro that is called. The body of the command is divided into three steps in order to exchange parameters between the calling macro and the called macro.

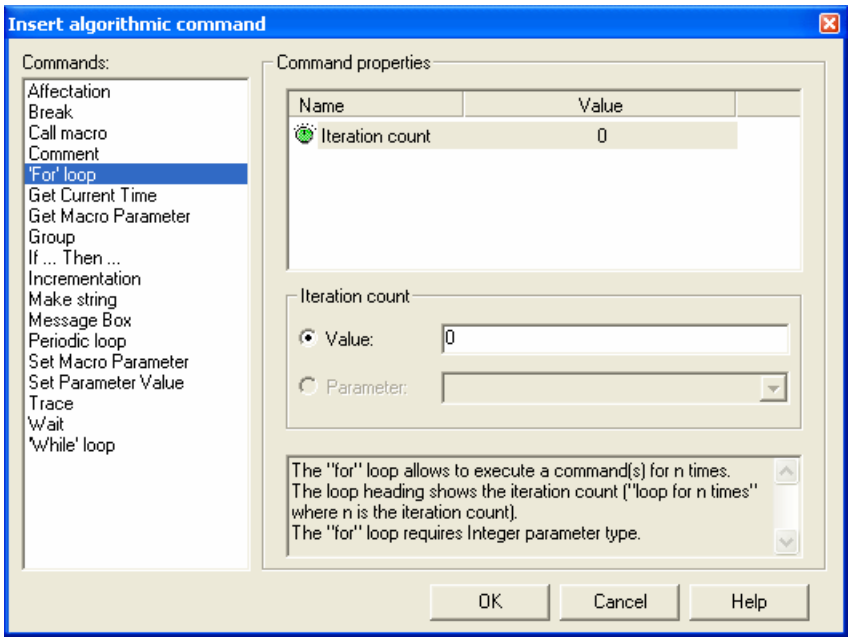
5.5.3.4 Comment

The purpose of this command is to facilitate understanding of the macro. It used to add a comment line to the body of the macro.



The only parameter is the comment

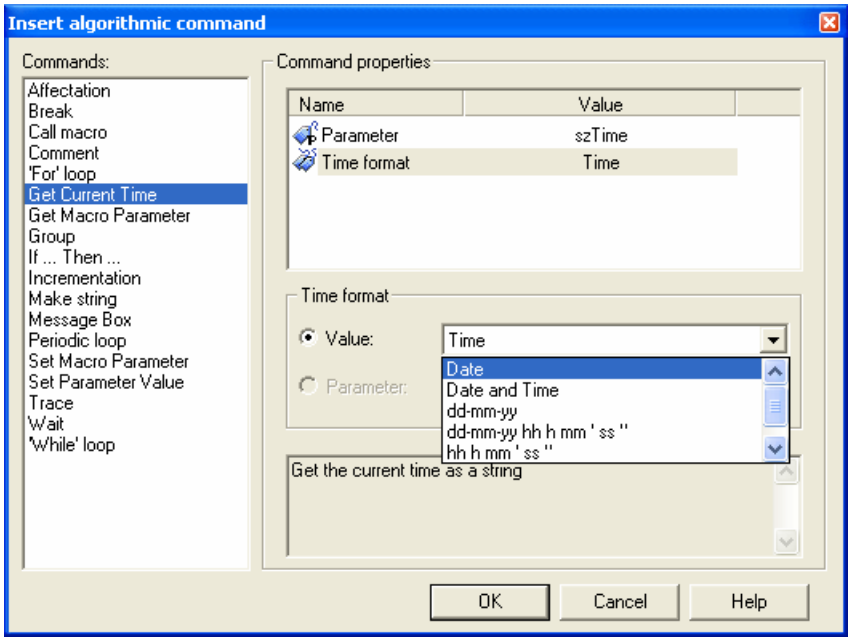
5.5.3.5 "For" loop



Runs a set of commands several times. The number of iterations can be defined by an integer value or by an integer parameter.

5.5.3.6 Get Current Time

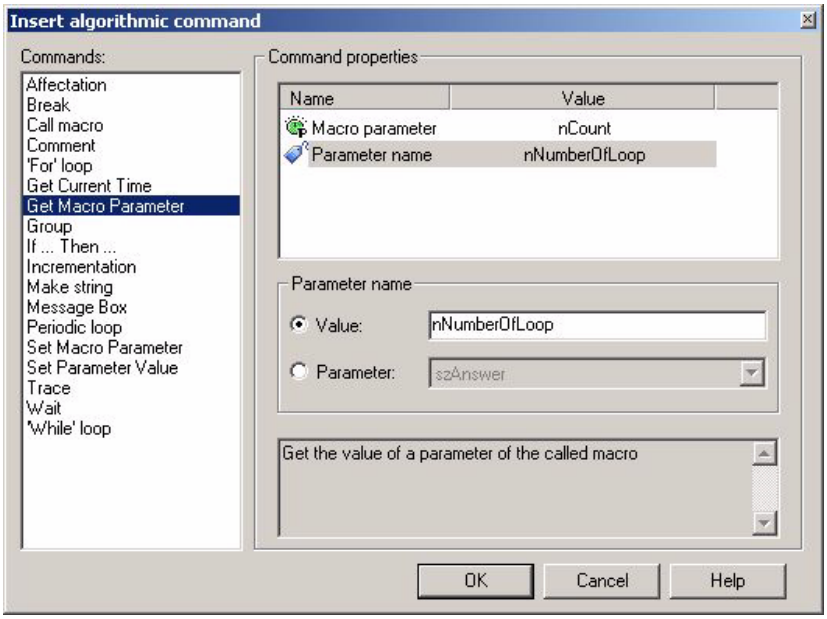
This command retrieves the time and stores it in a string parameter. This string may be use to send a trace, to create a measurement name...



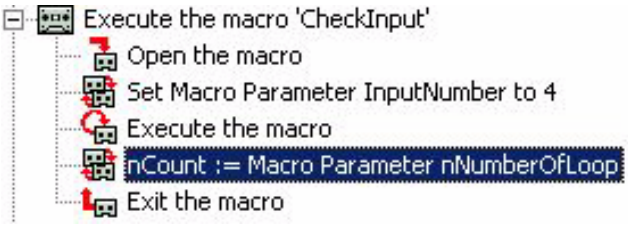
The "Time format" specifies the way in which the time should be written. "Date", "Time" and "Date and Time" use the regional settings of the host computer while the three other formats are fixed formats.

5.5.3.7 Get Macro Parameter

Gets the value of a parameter of a called macro. This command must be inserted between the "Exit macro" and the "Execute macro" commands, inside the body of the "Call Macro" command.



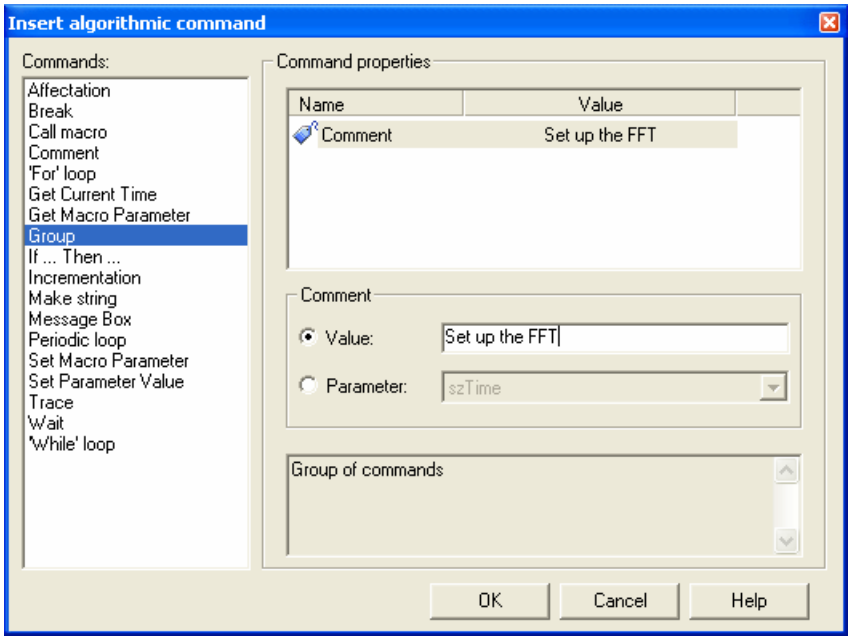
"Macro parameter" is the parameter of the calling macro that will receive the value of the parameter of the called macro.
"Parameter name" is the name of the parameter in the called macro.

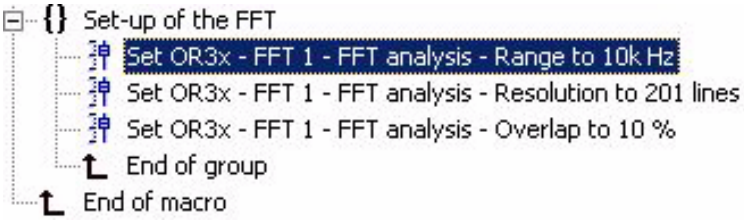


In this example, the command gets the value of the parameter nNumberOfLoop of the macro CheckInput and sets this value to the parameter nCount of the calling macro.

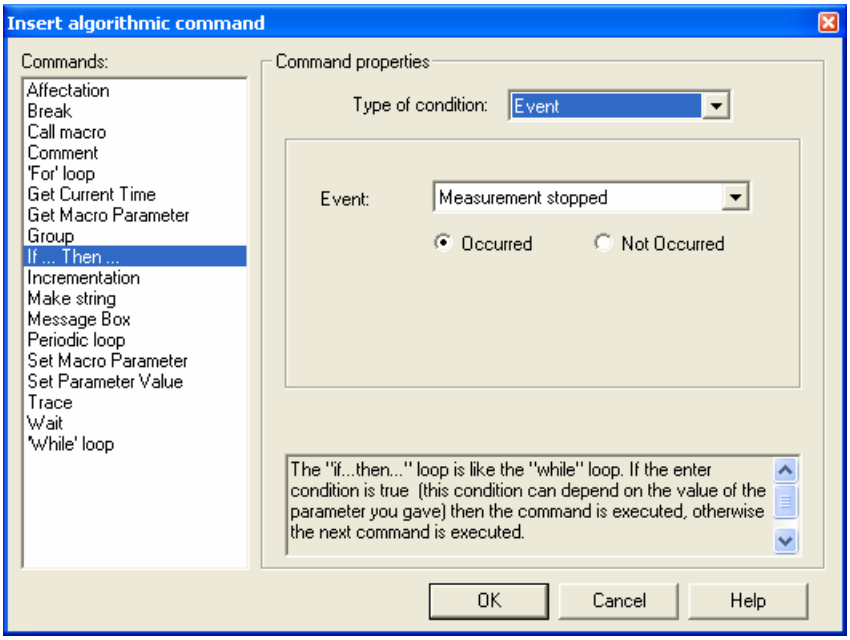
5.5.3.8 Group

The purpose of this command is to facilitate understanding of the macro. It creates a branch that contains a set of instructions. It has no effect during execution, but it helps to organize the macro and facilitates copying and pasting, since all commands are copied at once.





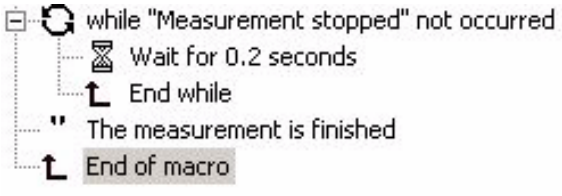
5.5.3.9 If…Then…



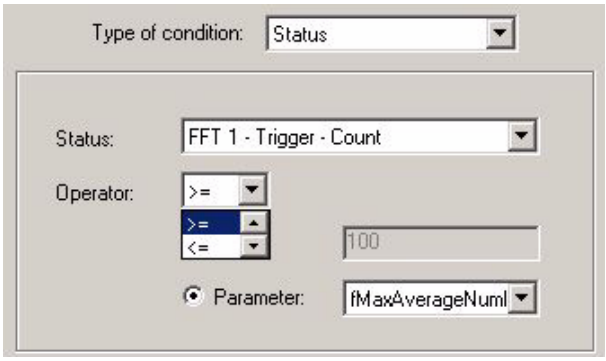
Runs a set of commands according to a condition. The condition can depend on an event, status value or parameter. The event condition can be "event x occurred" or "event x not occurred".

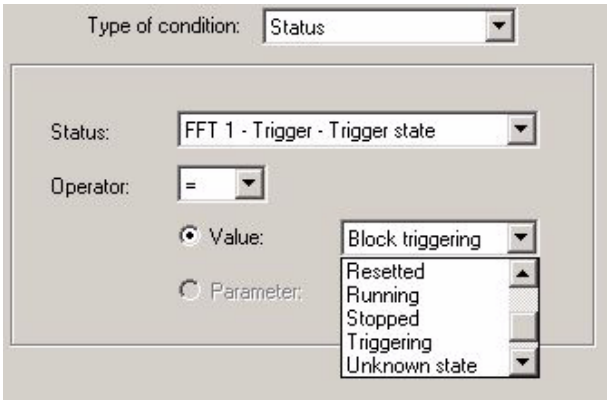
There are five types of conditions:

- **Event:** The event can be "**Measurement stopped**", meaning that the analyzer went from "Running" to "Stopped" or "**Measurement started**", meaning the analyzer went from "Stopped" to "Running". This condition is used to wait for the end of a measurement, for instance.

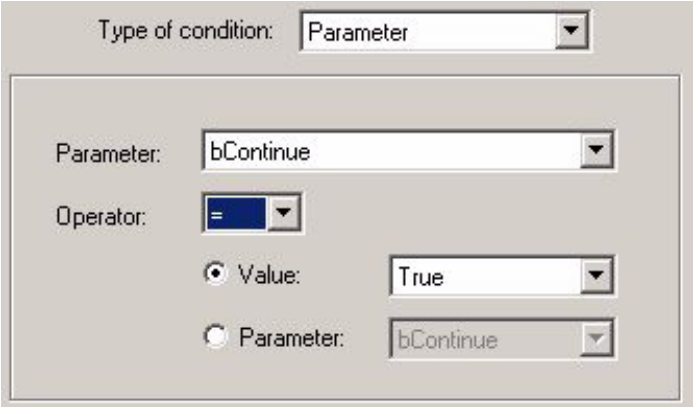


- **Status:** All analyzer statuses can be used for this condition. Depending on the type of status, it is possible to compare its value to a list of possible values or perform a logical test ('=', '!=','<=','>=') with a constant or a parameter.

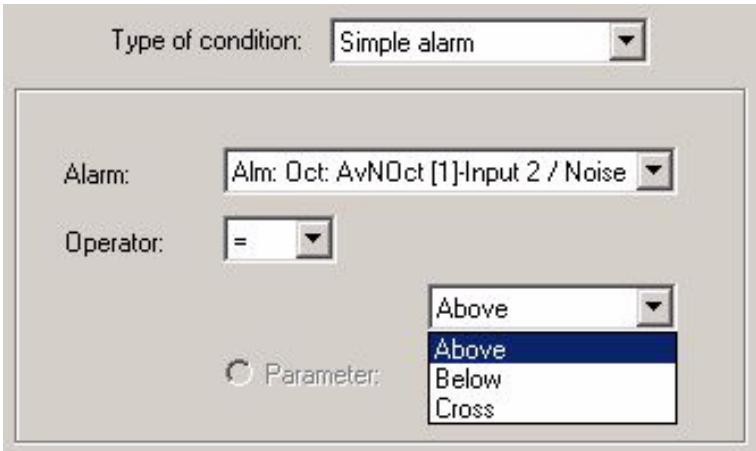


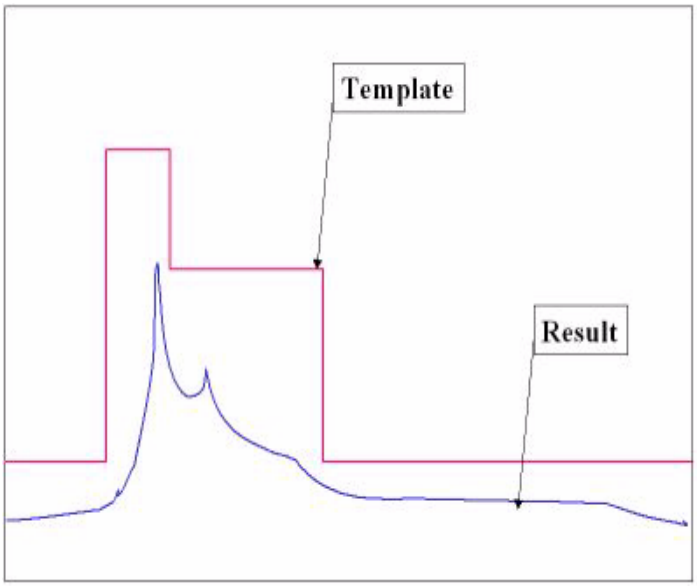


- **Parameter:** The macro parameter of can be compared to a constant or to another parameter.

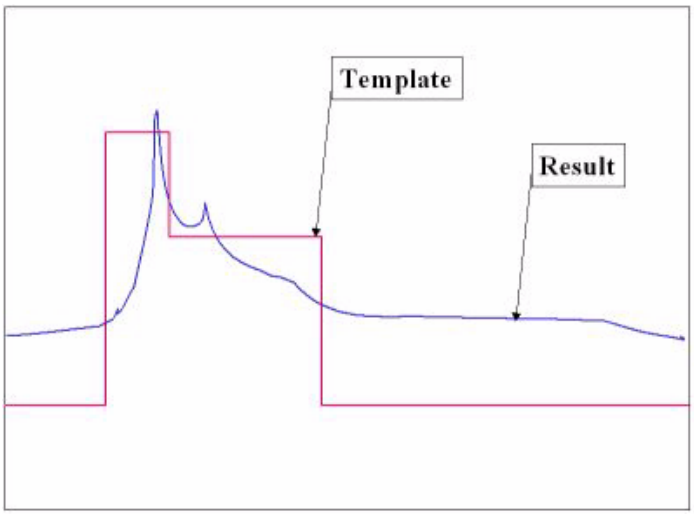


- **Simple alarm:** This condition is available only when at least one alarm on a simple template result has been declared.

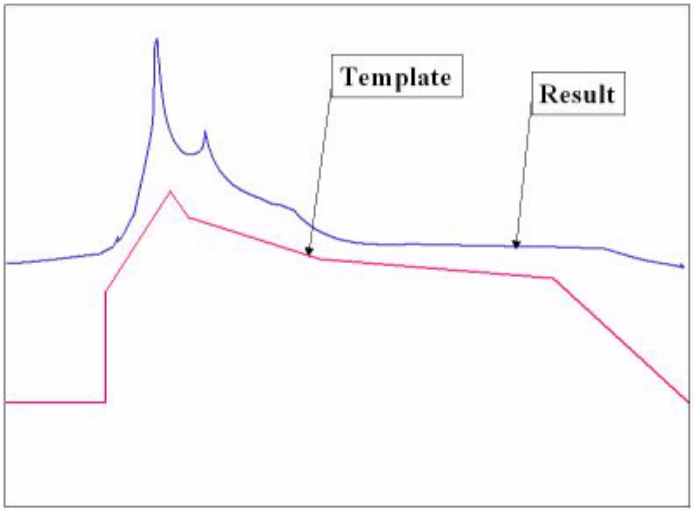




Operator	Test	Condition value
=	Above	False
!=	Above	True
=	Cross	False
!=	Cross	True
=	Below	True
!=	Below	False

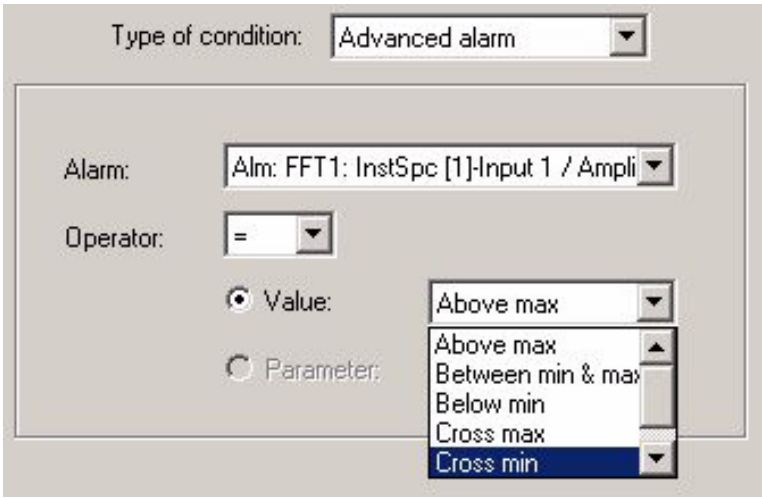


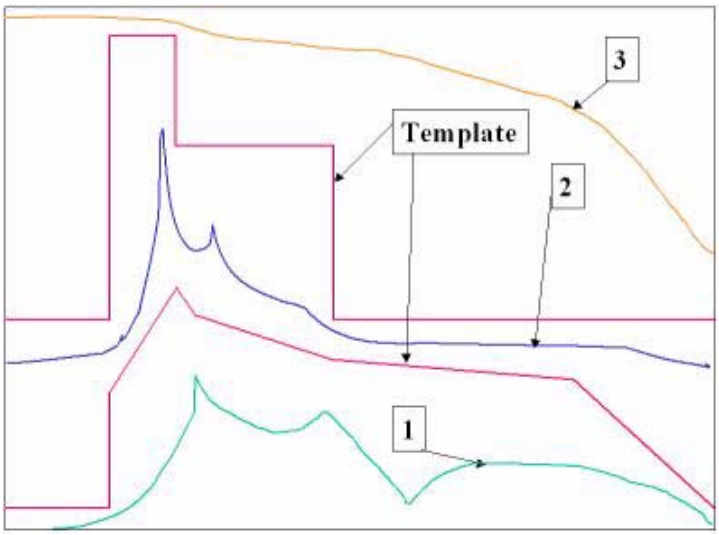
Operator	Test	Condition value
=	Above	False
!=	Above	True
=	Cross	True
!=	Cross	False
=	Below	False
!=	Below	True



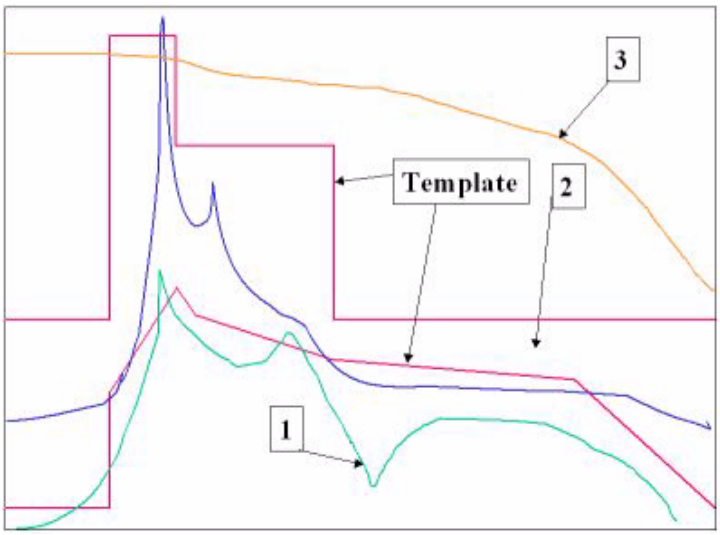
Operator	Test	Condition value
=	Above	True
!=	Above	False
=	Cross	False
!=	Cross	True
=	Below	False
!=	Below	True

- **Advanced alarm:** This condition is available only when at least one alarm on a double template result has been declared.



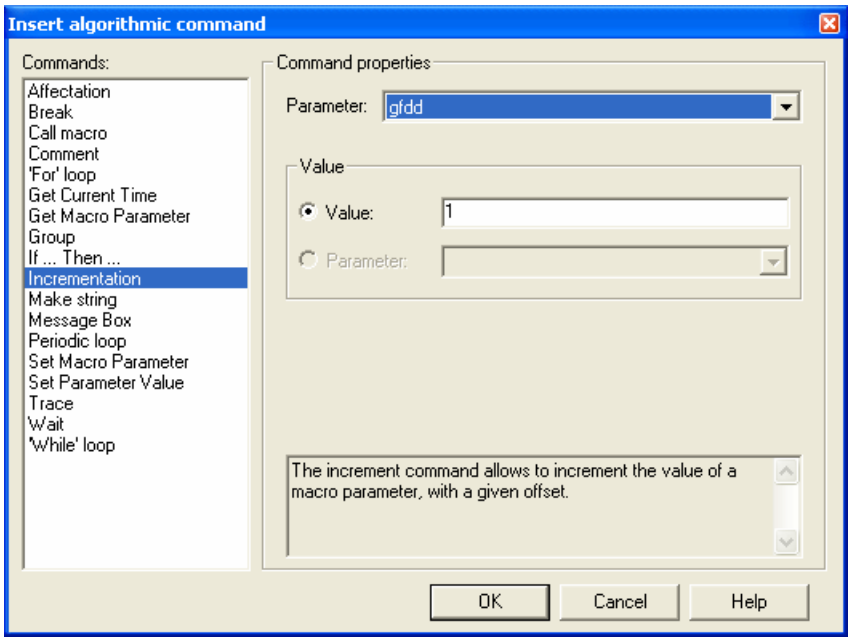


Operator	Test	Condition value for 1	Condition value for 2	Condition value for 3
=	Above max	False	False	False
!=	Above max	True	True	True
=	Cross max	False	False	True
!=	Cross max	True	True	False
=	Between min & max	False	False	False
!=	Between min & max	True	True	True
=	Cross min	True	False	False
!=	Cross min	False	True	True
=	Below min	False	False	False
!=	Below min	True	True	True
=	Cross min & max	False	True	False
!=	Cross min & max	True	False	True



Operator	Test	Condition value for 1	Condition value for 2	Condition value for 3
=	Above max	False	False	True
!=	Above max	True	True	False
=	Cross max	False	False	False
!=	Cross max	True	True	True
=	Between min & max	False	True	False
!=	Between min & max	True	False	True
=	Cross min	False	False	False
!=	Cross min	True	True	True
=	Below min	True	False	False
!=	Below min	False	True	True
=	Cross min & max	False	False	False
!=	Cross min & max	True	True	True

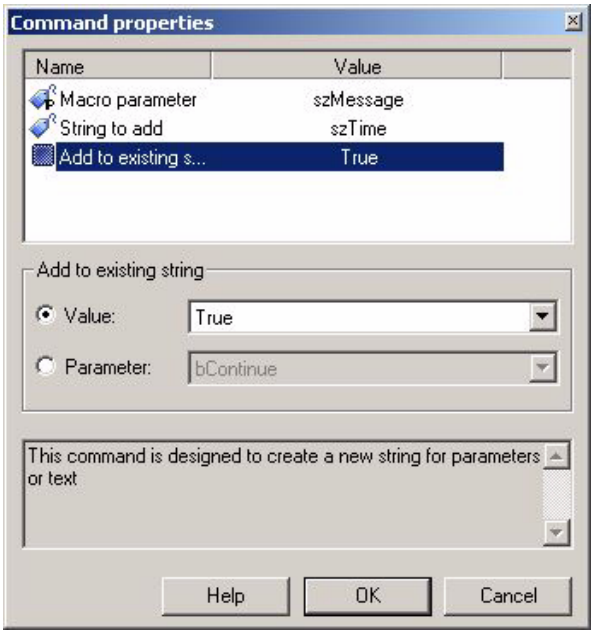
5.5.3.10 Incrementation



The increment command is used to increment the value of a macro parameter with a given offset.
The "Value" group-box allows defining the offset. The offset can be defined by a value or by a parameter of the same type as the parameter incremented.
Available if one or more integer or float parameter is defined.

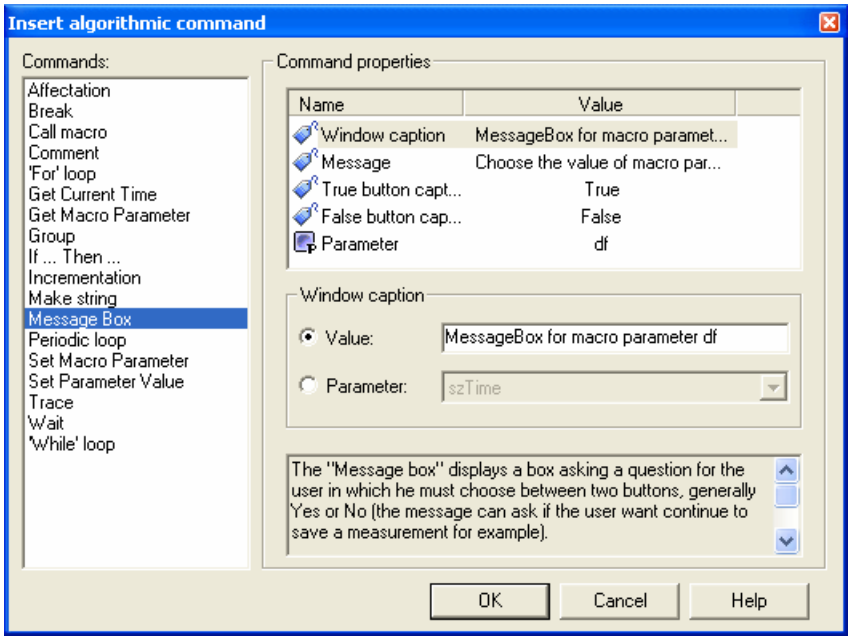
5.5.3.11 Make String

Command used to create a string.



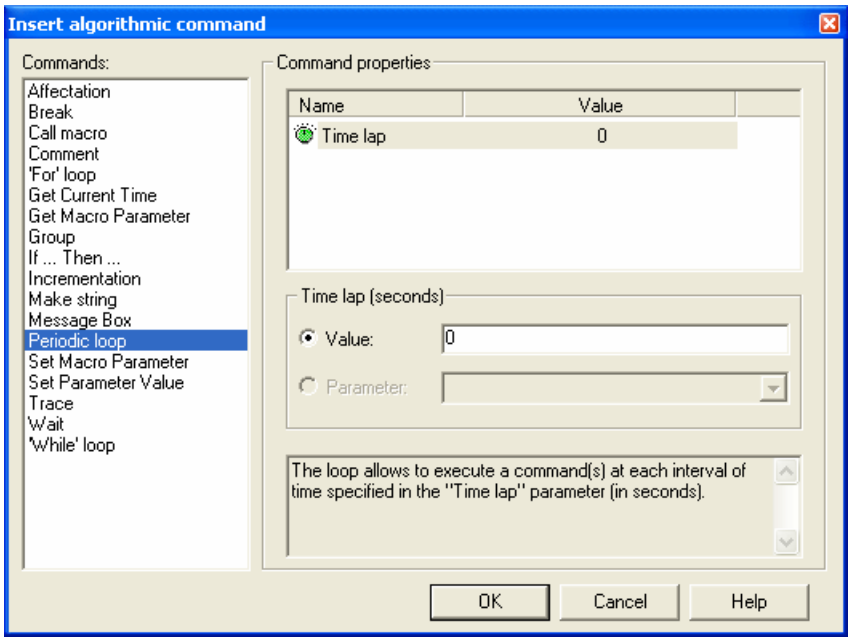
"Macro parameter" is the string that is modified. It can only be a String parameter.
"String to add" is the string that is added to the first parameter. It can be a constant or a parameter
"Add to existing string" is a Boolean parameter that indicates if the second parameter replaces or is added to first one. If the value is false, the command behaves like the Affectation command

5.5.3.12 Message box



Displays a dialog box, which is used to change the value of a Boolean parameter. The box is made up of a message and two buttons ("true" and "false"). It is possible to define the box caption, the message content and the button captions. A click on the "true" button sets the Boolean parameter to "true". A click on the "false" button sets the value to “false”.
When the command is executed, the box is displayed. A click on one of the buttons closes the message box and sets the Boolean parameter value.

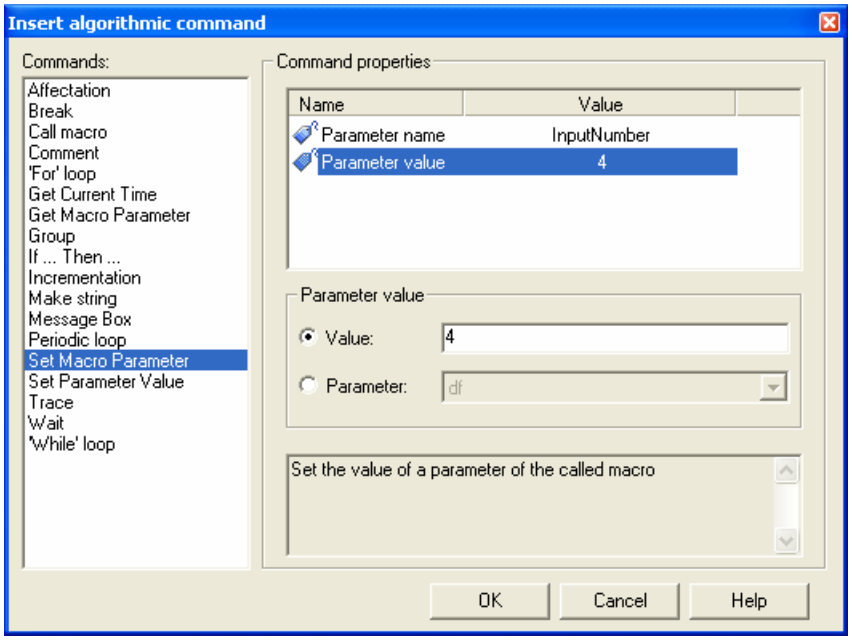
5.5.3.13 Periodic loop



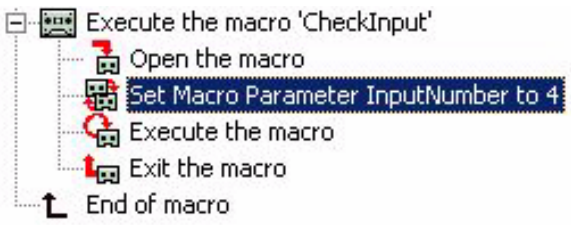
Runs a set of commands at each interval of time specified in the "Time lap" parameter. The time lap is specified in seconds, The "Break" command must be used to exit the loop.

5.5.3.14 Set Macro parameter

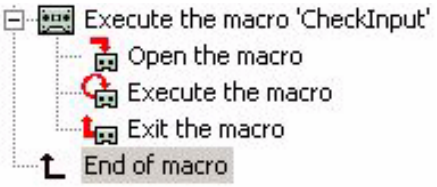
Sets the parameter value of a called macro. This command must be inserted between the "Open macro" and the "Execute macro" commands, inside the body of the "Call Macro" command.



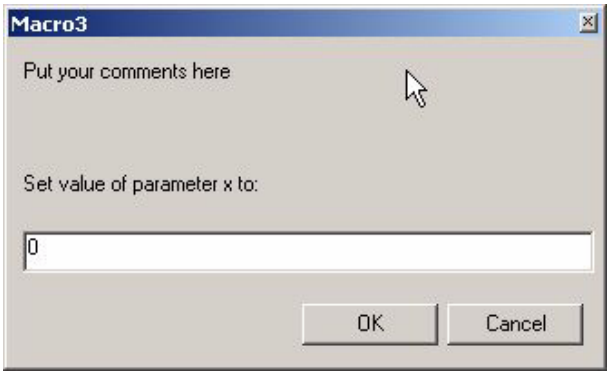
"Parameter name" is the name of the parameter in the called macro.
"Parameter value" is the value the parameter must take.



In this example, the command sets the value of the parameter InputNumber of the macro CheckInput to 4.

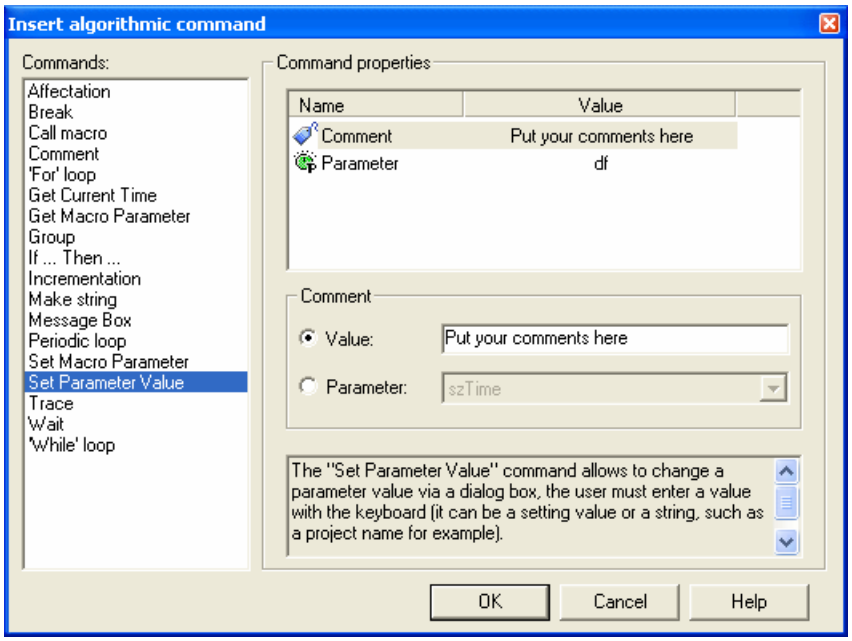


When the macro is running, a dialog box is displayed, which is used to change the value of a parameter.



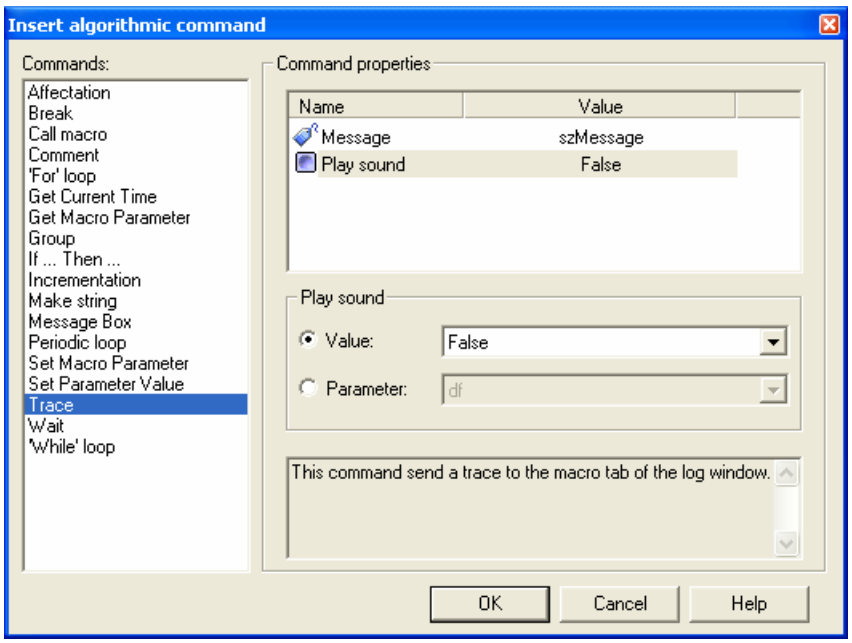
The message generated in the top of the dialog box can be defined in the “command properties”. A control is used to edit the parameter value. A click on the OK button changes the parameter value, and closes the dialog box. A click on the Cancel button closes the dialog box without changing parameter value.

5.5.3.15 Set Parameter Value



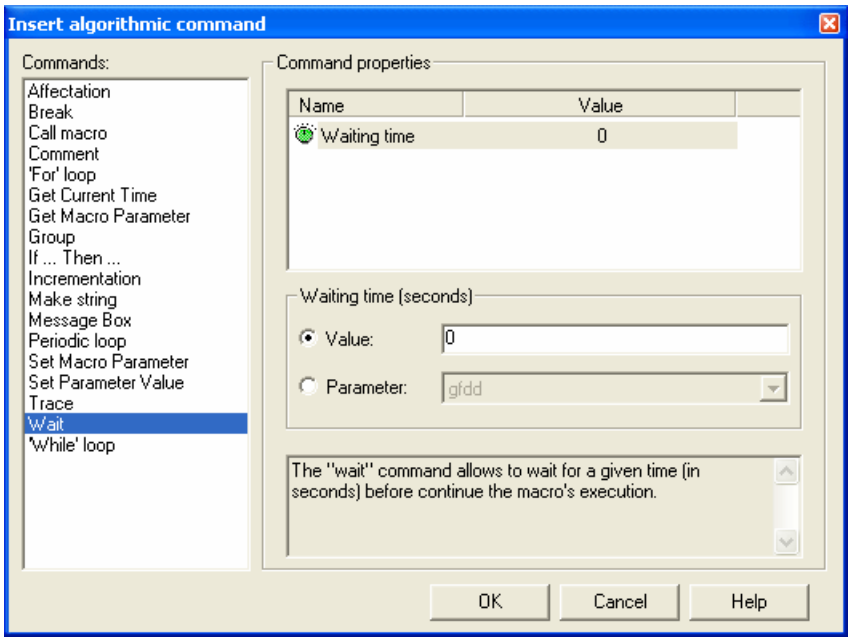
5.5.3.16 Trace

Command used to send a message in the log window.



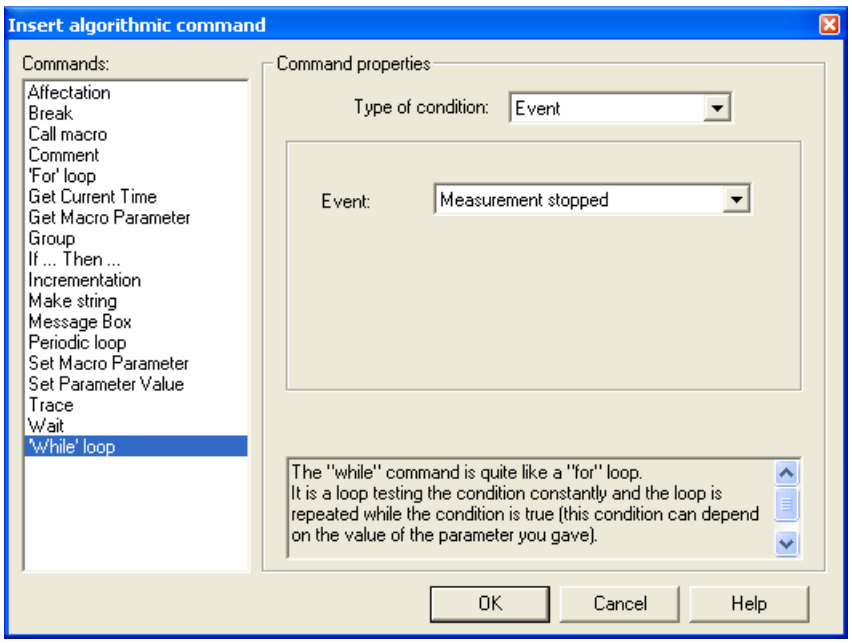
"Message" is the text that is displayed in the log window.
"Play sound" is used to play a sound when the message is sent. The host computer must have speakers connected.

5.5.3.17 Wait



Waits for a given time. The wait time is specified in seconds.

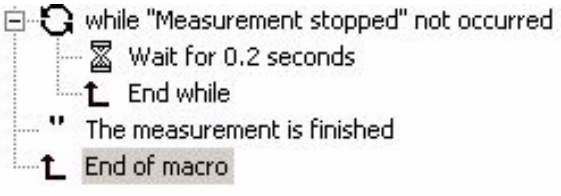
5.5.3.18 "While" loop



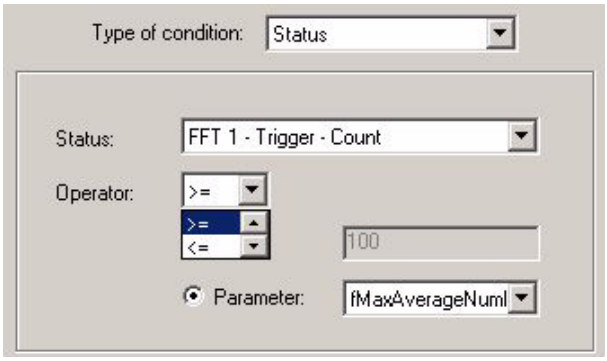
Runs a set of commands several times until the condition is false. The condition can depend on an event, status value or parameter. The event condition can be "event x occurred" or "event x not occurred".

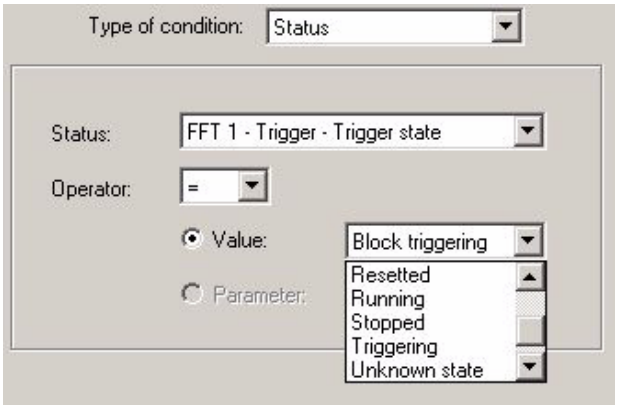
There are five types of conditions:

- **Event:** The event can be "**Measurement stopped**", meaning that the analyzer went from "Running" to "Stopped" or "**Measurement started**", meaning the analyzer went from "Stopped" to "Running". This condition is used to wait for the end of a measurement, for instance.

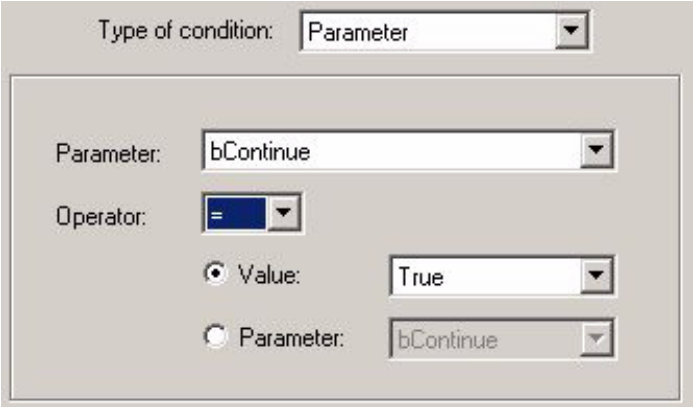


- **Status:** All analyzer statuses can be used for this condition. Depending on the type of status, it is possible to compare its value to a list of possible values or perform a logical test ('=', '!=','<=','>=') with a constant or a parameter.

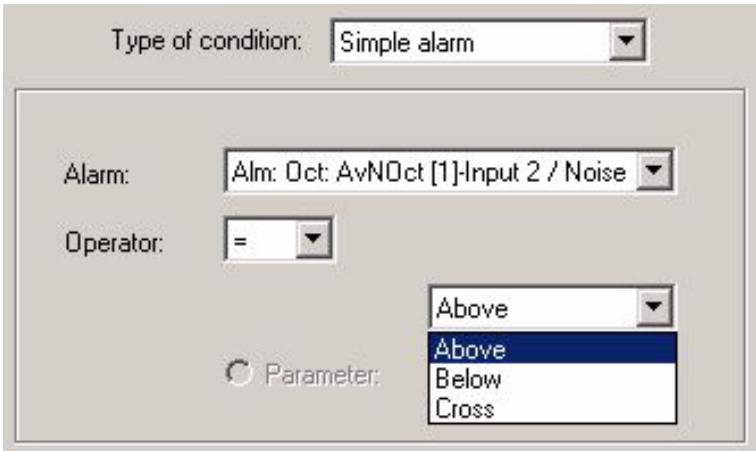


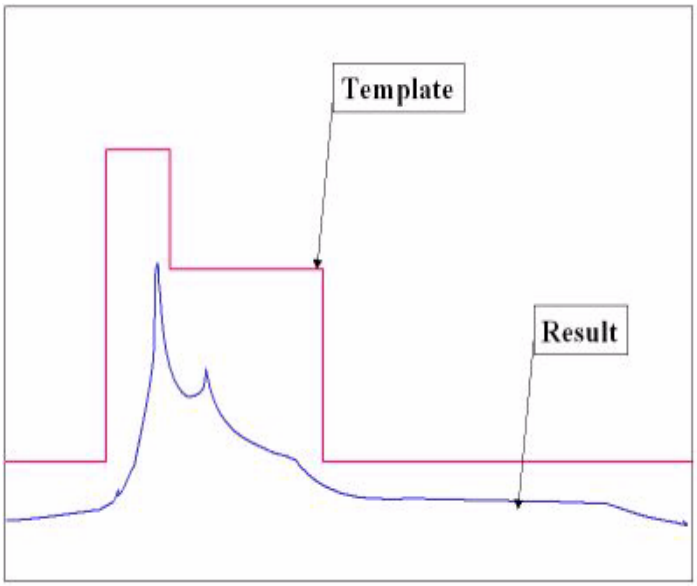


- **Parameter:** The macro parameter of can be compared to a constant or to another parameter.

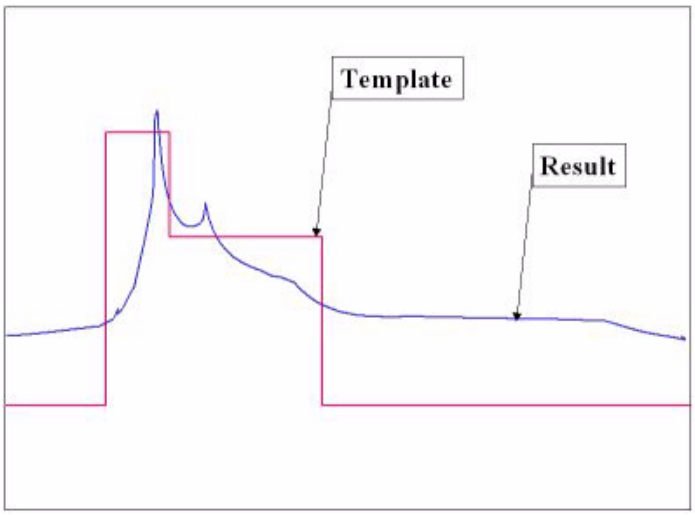


- **Simple alarm:** This condition is available only when at least one alarm on a simple template result has been declared.

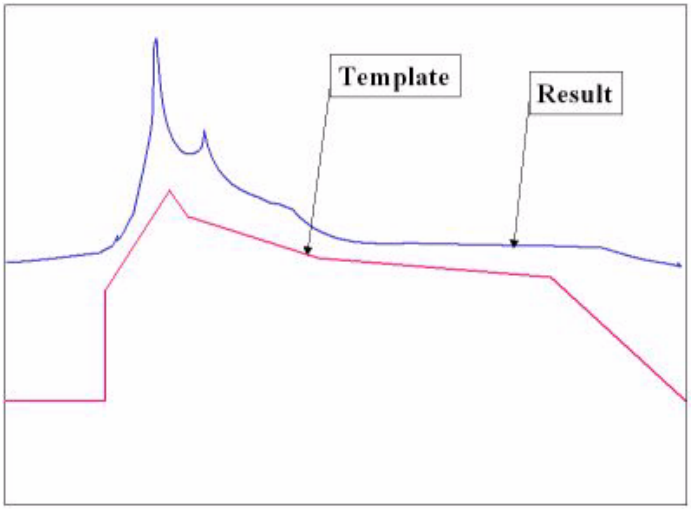




Operator	Test	Condition value
=	Above	False
!=	Above	True
=	Cross	False
!=	Cross	True
=	Below	True
!=	Below	False

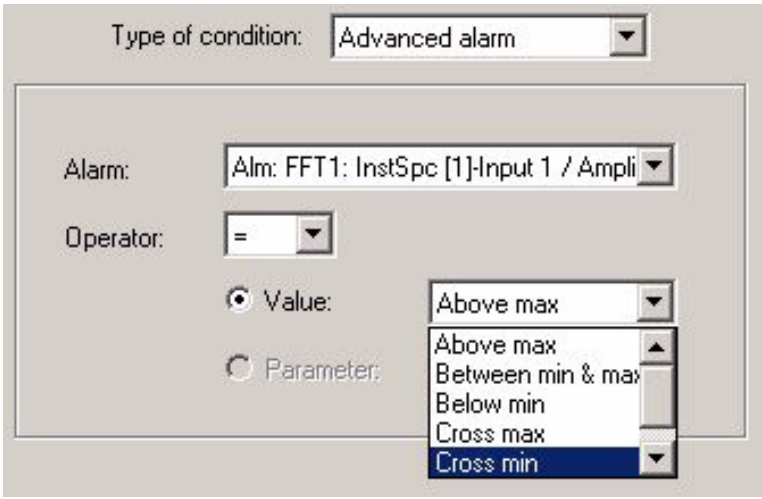


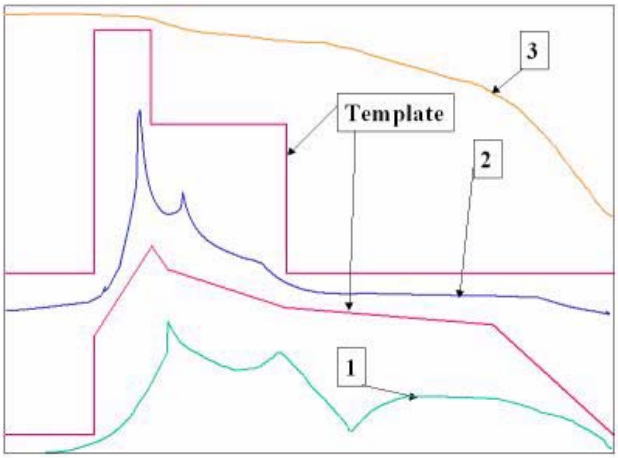
Operator	Test	Condition value
=	Above	False
!=	Above	True
=	Cross	True
!=	Cross	False
=	Below	False
!=	Below	True



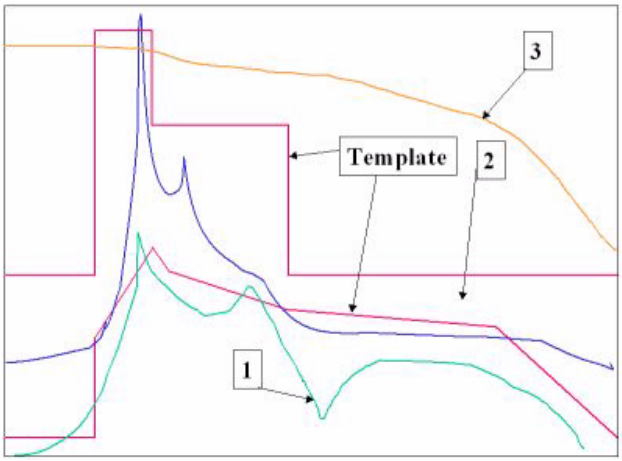
Operator	Test	Condition value
=	Above	True
!=	Above	False
=	Cross	False
!=	Cross	True
=	Below	False
!=	Below	True

- **Advanced alarm:** This condition is available only when at least one alarm on a double template result has been declared.





Operator	Test	Condition value for 1	Condition value for 2	Condition value for 3
=	Above max	False	False	False
!=	Above max	True	True	True
=	Cross max	False	False	True
!=	Cross max	True	True	False
=	Between min & max	False	False	False
!=	Between min & max	True	True	True
=	Cross min	True	False	False
!=	Cross min	False	True	True
=	Below min	False	False	False
!=	Below min	True	True	True
=	Cross min & max	False	True	False
!=	Cross min & max	True	False	True



Operator	Test	Condition value for 1	Condition value for 2	Condition value for 3
=	Above max	False	False	True
!=	Above max	True	True	False
=	Cross max	False	False	False
!=	Cross max	True	True	True
=	Between min &	False	True	False

	max			
!=	Between min & max	True	False	True
=	Cross min	False	False	False
!=	Cross min	True	True	True
=	Below min	True	False	False
!=	Below min	False	True	True
=	Cross min & max	False	False	False
!=	Cross min & max	True	True	True

5.5.4 Save

- **Save:** Saves the macro currently is being edited. Only available if a macro is being edited.
- **Save as:** Saves the macro currently is being edited with a new name. Only available if a macro is being edited.

5.5.5 Record

5.5.5.1 Start record

Records a new macro.

- **Macro name:** Name of the macro.
- **Recording mode:**

Mode	Description
On-line	Commands corresponding to user actions are recorded in the macro.
Off-line	User actions have no effect. Commands corresponding to user actions are recorded in the macro.

5.5.5.2 Stop record

Stops the record. The macro is saved with the name specified in the "Record" dialog.

5.5.5.3 Pause record

Makes a pause in the record. User actions are not yet recorded. Available if macro is being recorded.

5.5.5.4 Resume record

Resumes the record. Available if macro is being recorded and the record has been paused.

5.5.5.5 Stop run

Stops macro execution. Available if macro is running.

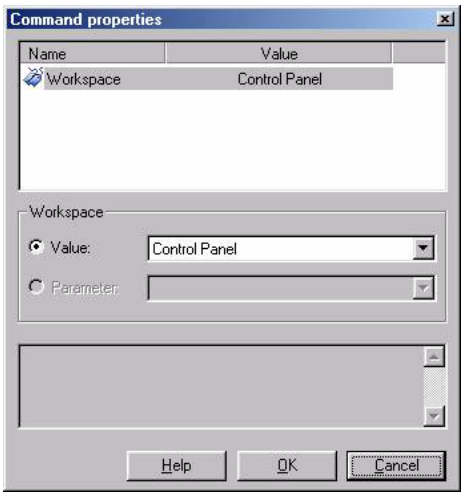
5.5.6 Editor contextual menu

5.5.6.1 Macro properties

See "Macro" topic p5-35.

5.5.6.2 Setting properties

- **Cut:** Removes the command selected and copies it to the clipboard.
- **Copy:** Copies the command selected in the clipboard.
- **Paste:** Inserts the command stored in the clipboard into the macro. The command will be inserted before the command selected.
  If the item selected in the macro tree is an "end of loop" item, the command will be inserted at the end of the loop body.
  If the item selected in the macro tree is the "end of macro" item, the command will be inserted at the end of the macro.
- **Delete:** Deletes the command selected. Available if the item selected in the macro tree is a command item (not "end of loop" or "end of macro item).
- **Toggle break point** BP**:** If a breakpoint is put on the command selected, this command removes it. Otherwise, it sets a breakpoint for this command. Only available if the item selected is a command item.
  Breakpoint has been set. This command is not executed.
  During macro execution (see Run button), the execution stops on the first command where a
- **Run to:** Runs the macro from the current command (indicated by execution pointer) to the selected command, ignoring breakpoints. The selected command is not executed. If the current command is after the selected command, execution goes to the end of the macro, ignoring breakpoints.
- **Jump to:** Sets execution pointer to the selected command.
- **Properties**



Edits command properties.

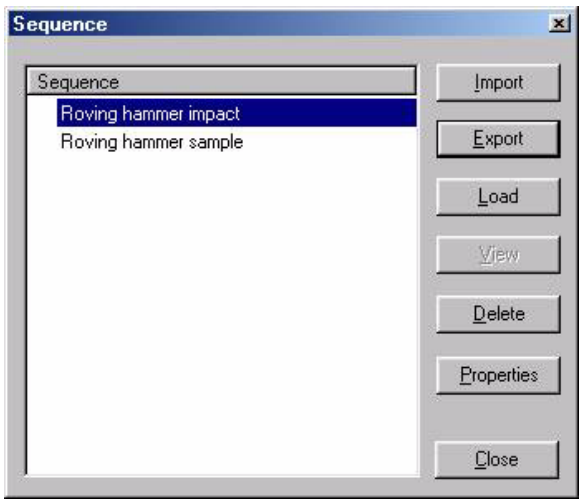
5.6 Sequence

5.6.1 Sequence

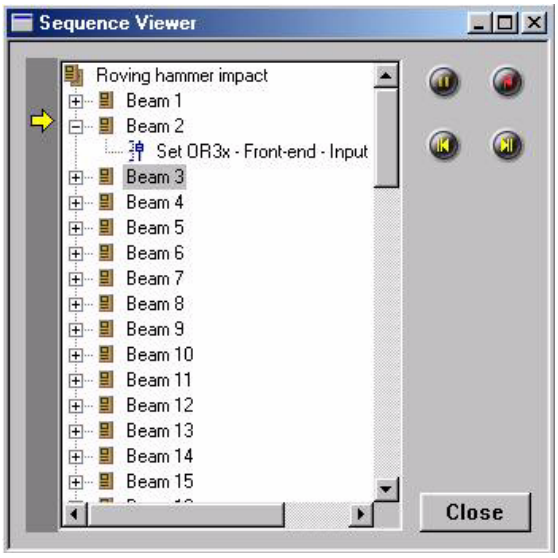
The sequencer is used to import/export/load/view an Excel® file that contains a series of steps. These steps are executed one by one. The sequencer is generally used to operate the Roving hammer impact for modal acquisition, for example.

5.6.1.1 Manage

Opens sequence manager.



- **Import:** Imports a sequence from an Excel® file, to create a sequence in NVGate® format. Sequences in NVGate® format are stored in the “Sequence” directory.
  Names of sequences in NVGate® format are displayed by the sequence manager.
  See Source format for more information about sequences in Excel®.
- **Export:** Exports selected sequence (in NVGate® format) to Excel®.
- **Load:** Loads selected sequence. Only the loaded sequence can be executed or opened in the sequence viewer to perform a modal analysis.
- **View:** Opens the selected sequence in the Sequence viewer. Only the loaded sequence can be opened in the viewer.



A Sequence is a set of acquisitions. Each acquisition is a set of setting modifications, and it is associated to a measurement. When a measurement is performed, the acquisition associated with it, is called the current acquisition and is designated by the execution pointer (yellow arrow to the left of the sequence tree). At the end of each measurement, next acquisition becomes current and is executed to prepare the next measurement. When an acquisition is executed, all settings assigned to it are applied.

- **Run/Pause** **:** When the sequence is not running, it is launched from the current acquisition. The current acquisition is executed to prepare the measurement.
  When the sequence running sequence execution stops on the current acquisition.
  A loaded sequence can also be executed from the Sequence toolbar.

- **Reset** **:** Sets the execution pointer (which designates the current acquisition) to the first acquisition of the sequence.

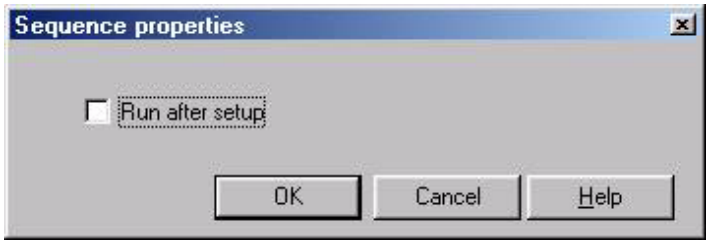
- **Back to previous** **:** The acquisition preceding the current acquisition becomes current and is executed.
  Disabled if sequence is running.

- **Run next** **:** The acquisition following the current acquisition becomes current and is executed.
  Disabled if sequence is running.

- **Jump to:** Accessible by right-clicking on the acquisition. This acquisition becomes current.

- **Delete:** Deletes the selected acquisition.

- **Properties:** Edits sequence properties.



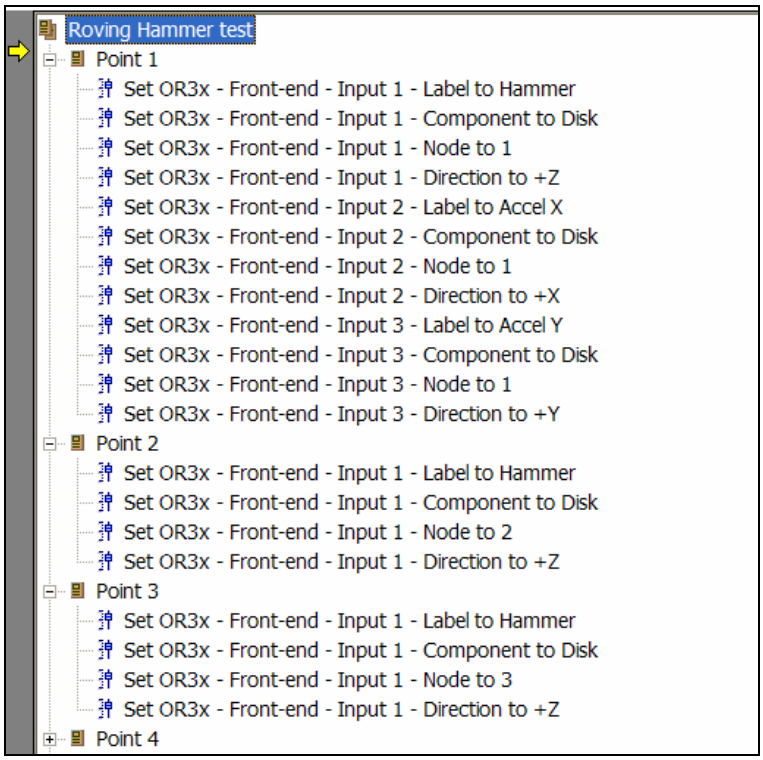
When "Run after setup" is checked, a new measurement is launched automatically after the current acquisition is executed.

5.6.1.2 Source format

"Roving hammer test" sequence in Excel®.

1	Roving Hammer test						
2			Label	Component	Node	Direction	RemoteNodelabel
3	Point 1	Input1	Hammer	Disk	1	+Z	1 +Z
4		Input2	Accel X	Disk	1	+X	
5		Input3	Accel Y	Disk	1	+Y	
6	Point 2	Input1	Hammer	Disk	2	+Z	2 +Z
7	Point 3	Input1	Hammer	Disk	3	+Z	3 +Z
8	Point 4	Input1	Hammer	Disk	4	+Z	4 +Z
9	Point 5	Input1	Hammer	Disk	5	+Z	5 +Z

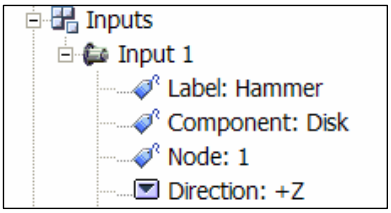
"Roving hammer test" sequence in NVGate®



The first Excel® cell is dedicated to sequence name.
The first column contains the name of acquisitions.

The second column contains, for each acquisition, the key words which identify the NVGate® configuration sub-modules.

Second line is composed of the keywords, which identify the NVGate® configuration's settings.
They can be found in the ASB.



	Exit	
FFT	1 +Z	0/ 3
ON/OFF	LOCK	Reset

Menu 'Impact' of the remote controller

The column called 'Remote Node Label' is the field displayed by the remote controller.

These key words in the excel file, should be also defined in the Sequence.ini file which contains alias definitions. An IDNumber is associated to each setting. It can be retrieved from the ASB in NVGate by using shift + right click on the corresponding setting. Settings aliases could be modified by users.

```
; #### Front-end settings ####

Input sampling          = [001.338.189]
Input i                 = [1.0+i.0]             ; Input 1 = [1.1.0] - Input 2 = [1.2.0] ...

; Modal Settings

Label                   = [XXX.XXX.1]           ; modify input i label
Component               = [XXX.XXX.297]         ; modify input i component
Node                    = [XXX.XXX.255]         ; modify input i node
Direction               = [XXX.XXX.256]         ; modify input i direction
Type                    = [XXX.XXX.257]         ; modify input i type
RemoteNodelabel         = [1.891.134]           ; modify the node field in remote
```

Part of Sequence.ini file

Each couple (sub-module key word, setting keyword) designates a specific setting in the NVGate® configuration. The value to assign to this setting is defined in the corresponding cell.
The semicolon character marks the rest of a line as a comment.

5.7 Hard drive manager

See “Disk management” topic from Chapter 3: “Hardware Management”.

5.8 Format hard drive

See “Disk management” topic from Chapter 3: “Hardware Management”.

5.9 Download

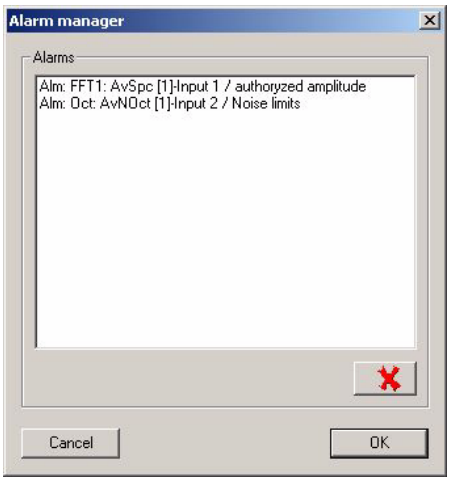
See “Disk management” topic from Chapter 3: “Hardware Management”.

5.10 Wizards

See “Wizards” topic from Chapter 6: “User Interface”.

5.11 Alarm Manager

Opens a dialog box displaying the list of alarms available



Select an alarm and click the remove button to remove the alarm.
To add an alarm, use the Add Alarm command in a graphic window containing a template result and a result coming from a plug-in.

5.12 Copy bitmap

See “Tools” topic from Chapter 6: “User Interface”.

Chapter 6: Menu, Views, Toolbars

Table of contents:

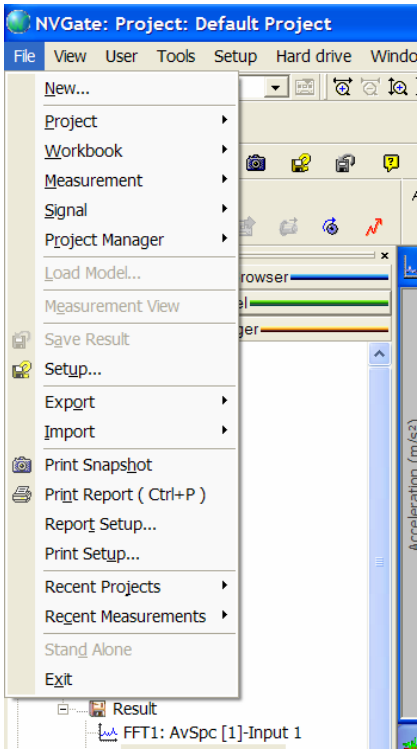
6.1 Menu 6-6
6.1.1 File 6-6
6.1.1.1 New 6-6
6.1.1.2 Project 6-7
6.1.1.3 Workbook 6-8
6.1.1.4 Measurement 6-10
6.1.1.5 Signal 6-10
6.1.1.6 Project Manager 6-11
6.1.1.7 Load Model 6-13
6.1.1.8 Measurement view 6-13
6.1.1.9 Save results 6-13
6.1.1.10 Setup 6-14
6.1.1.11 Export result files / Export signal files 6-17
6.1.1.12 Import 6-18
6.1.1.13 Print snapshot 6-19
6.1.1.14 Print report 6-19
6.1.1.15 Report setup 6-20
6.1.1.16 Print setup 6-22
6.1.1.17 Recent projects 6-22
6.1.1.18 Recent measurements 6-22
6.1.1.19 Stand-alone 6-22
6.1.2 View 6-22
6.1.2.1 Toolbars 6-22
6.1.2.2 Status bar 6-23
6.1.2.3 Workspace 6-25
6.1.2.4 Log window 6-25
6.1.2.5 Analyzer status 6-26
6.1.2.6 Setting grids 6-27
6.1.2.7 Full screen 6-27
6.1.3 User 6-27
6.1.4 Tools 6-30
6.1.4.1 Customize Control Panel 6-30
6.1.4.2 Transducers 6-31
6.1.4.3 Report Template 6-31
6.1.4.4 Result Template 6-31
6.1.4.5 Macro 6-31
6.1.4.6 Sequence 6-31
6.1.4.7 Wizards 6-31
FFT wizards 6-31
Order tracking wizards 6-37
6.1.4.8 Alarm manager 6-43
6.1.5 Setup 6-43
6.1.5.1 Post-analysis 6-43
6.1.5.2 Files 6-44
6.1.5.3 Acquisition 6-45
6.1.5.4 Analysis 6-50
6.1.5.5 Display / Report 6-52
6.1.5.6 Save 6-53

6.1.6 Hard Drive 6-53
6.1.6.1 Active 6-53
6.1.6.2 Manage 6-53
6.1.6.3 Format 6-53
6.1.6.4 Downloads 6-54
6.1.7 Windows 6-54
6.1.7.1 Add/Remove 6-54
6.1.7.2 Freeze / Freeze all 6-56
6.1.7.3 Close all 6-56
6.1.7.4 Refresh all 6-57
6.1.7.5 Auto scale all 6-57
6.1.7.6 X/Z Adjust all 6-57
6.1.7.7 Cascade 6-57
6.1.7.8 Tile 6-57
6.1.7.9 Arrange Icons 6-57
6.1.7.10 Switch Layout 6-57
6.1.7.11 Window 6-57
6.1.7.12 Graph(s) 6-58
6.1.7.13 Info Trace 6-58
6.1.7.14 3D Graph 6-58
6.1.7.15 XY Graph 6-58
6.1.7.16 YZ Graph 6-58
6.1.7.17 Extraction Graph 6-58
6.1.7.18 Windows 6-58
6.2 Views 6-59
6.2.1 Workspace 6-59
6.2.2 Log window 6-59
6.2.3 Analyzer status 6-59
6.3 Toolbars 6-59
6.3.1 Set Up 6-59
6.3.2 Standard 6-61
6.3.3 Window 6-61
6.3.4 View 6-62
6.3.5 Display mode 6-62
6.3.6 Active workbook 6-63
6.3.7 Inputs 6-63
6.3.8 Zoom 6-64
6.3.9 Marker 6-64
6.3.9.1 Move marker 6-64
6.3.9.2 Marker type 6-65
6.3.9.3 Record marker 6-65
6.3.10 Control 6-65
6.3.10.1 Arming of the recorder 6-66
6.3.10.2 Run 6-66
6.3.10.3 Pause 6-66
6.3.10.4 Stop 6-66
6.3.10.5 Manual trigger 6-66
6.3.10.6 Play by step 6-66

6.3.11 Modal 6-66
6.3.11.1 Accept 6-66
6.3.11.2 Reject 6-66
6.3.12 Axis displacement.....6-67
6.3.13 Sequence.....6-68
6.3.14 Link 6-68
6.3.15 Battery.....6-69
6.3.16 Fan.....6-69
6.3.17 Specialized mode 6-69
6.3.17.1 Rotating 6-70
6.3.17.2 Structural 6-70

6.1 Menu

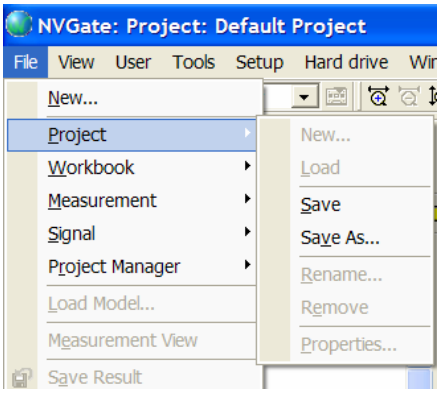
6.1.1 File



6.1.1.1 New

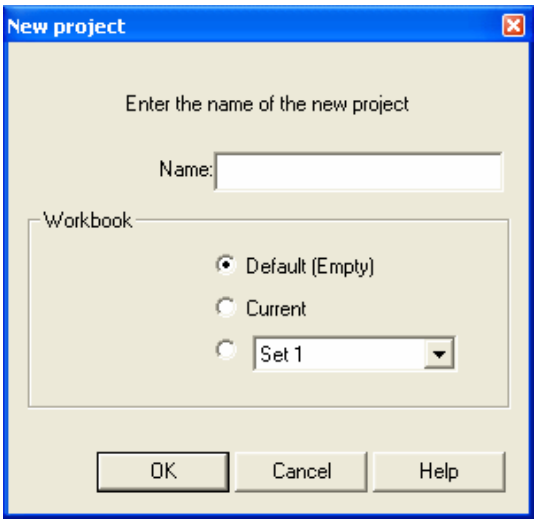
Opens the following “Start ‘n Go” window.

6.1.1.2 Project



Access to this menu allows:

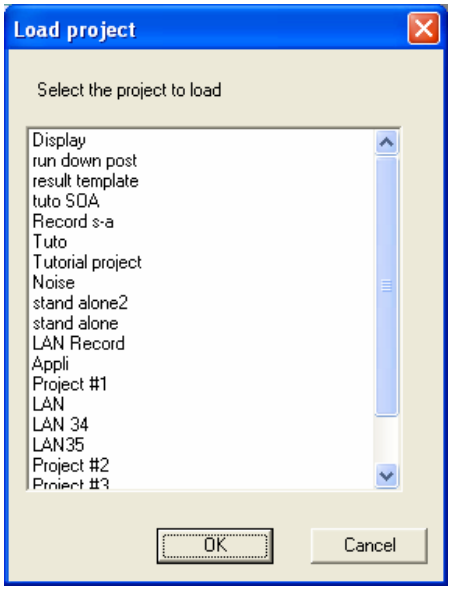
- to create a new project:



The name entered for the project must not already be in use.
The workbook used to create this project can be the default workbook, which means that workbook is empty (no result, no measurement), or the current workbook, which is similar to using Save As or a workbook model stored in in the workbook library.

- to load a project:

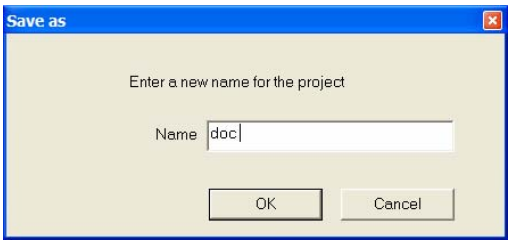
Opens the following dialog box, which is used to load a project. Select a project from the current base.



- Save:

Saves the current project

- Save As:

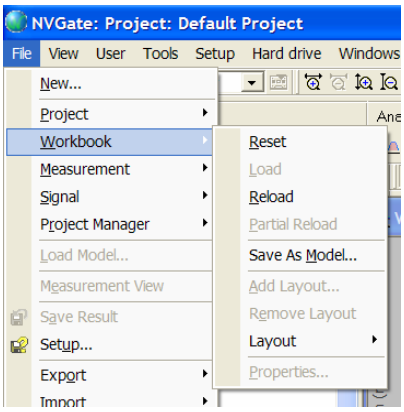


Saves the current project with a new name

- Rename, Remove, properties:

These basics functionalities let the user rename, remove the current project or see properties of the current project

6.1.1.3 Workbook

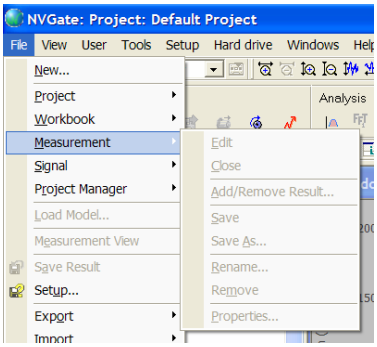


- Reset:
  Resets all changes made in the current workbook. All settings are set to their default values, all windows are closed.
- Load:
  Load the selected workbook in the current project. The workbook selected can be from another project than the current one.
- Reload:
  This command is available only for the current project workbook. This command reloads the workbook of the current project workbook. This means that the workbook recovers the setup it had the last time it was saved.
- Partial reload:
  This command is available only for the current project workbook. This command is similar to the "Reload" command, but only parts of the workbook are loaded.

The parts of the workbook that are not selected remain unchanged.

- Save as Model:
  This command is available only for the current project workbook. This command saves the workbook in the workbook library. This makes the workbook available, however the project database will change in the future. The workbook models are available in the "Project\Change workbook" command and in the "New Project" command.
- Add Layout:
  This command is available only for the current project workbook. It creates a new layout (with the desired name).
- Remove Layout:
  This command is available only for the current project workbook. It removes the selected layout. This destroys all the windows that belong to this layout.
- Layout:
  This menu allow to rename, remove the current layout or to see properties of the current layout
- Properties:
  This command gives general information about the workbook

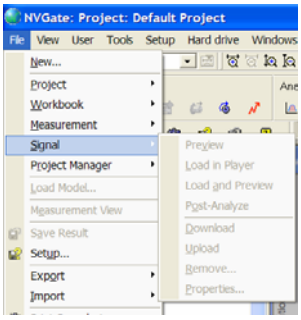
6.1.1.4 Measurement



- Edit: This command loads the measurement. The analysis mode is then set to "Result mode". The Result mode is used for post-analysis of saved results. It allows to switch between 2 measurement workbooks in order to compare the results.
- Close: This command Close the current measurement loaded.
- Add/Remove Result: This command allows to add or remove result to the loaded measurement.
- Save: save the current measurement
- Save As: save the current measurement with a different name

- Rename, Remove, Properties: These basics functionalities let the user rename, remove the current project or see properties of the current project.

6.1.1.5 Signal



- Preview: This command displays an overview of the signal. This command is available, even if the signal is on the analyzer hard disk and NVGate® is in office mode

- Load in Player: This command loads the signal file to the player. It is then possible to display this signal, play the tracks on output, and perform post analysis

- Load and Preview: This command combines the two previous commands

- Post-Analyze: This command loads the signal in the player and display the menu ‘track connection’ in order to define your post-analysis (drag and

drop connected tracks to the plug-in analyzer you want to use).

If the time signal is recorded on the PC or on the Mobi-disc™, it is highly recommended to be in office mode (hardware not connected) in order to avoid low performances and malfunctions

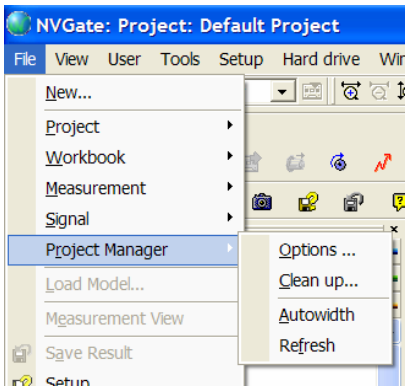
- Download: This command is available only when hardware with a hard disk is connected and when the signal has not yet been downloaded. It transfers the recorded signal from the analyzer hard disk to the PC hard disk

- Upload: This command is available only when hardware with hard disk is connected and when the signal is not on the hard disk. It transfers the recorded signal from the PC hard disk to the analyzer hard disk

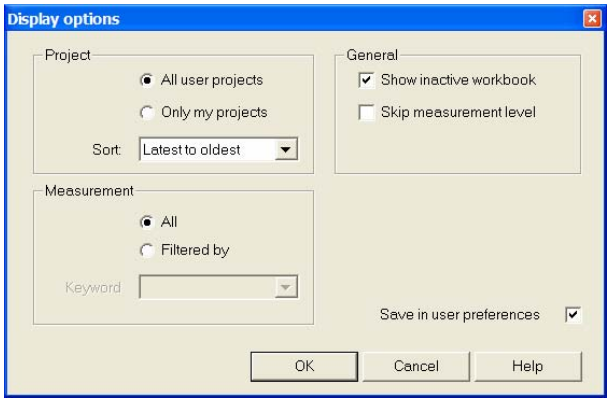
- Remove: This command enables to remove the selected signal from the PC if the file is on the PC hard disk and from the analyzer hard disk of the hardware if connected and if the file is on the analyzer hard disk

- Properties: This command gives general information about the workbook

6.1.1.6 Project Manager



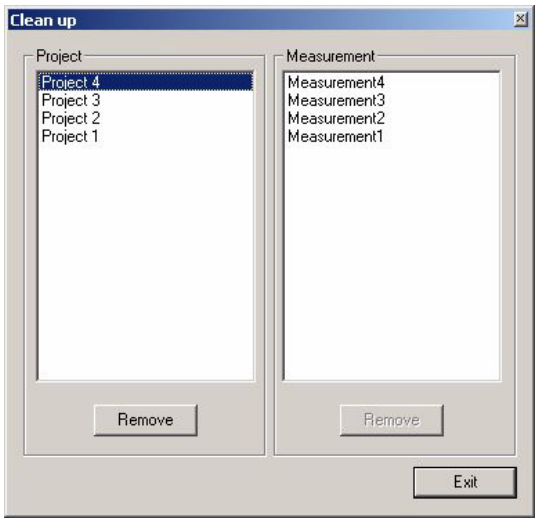
- Options: The following window is displayed



This option is used to modify the way the project manager is presented.

- **Project:** It is possible to hide projects that do not belong to the current user. This is particularly useful when there are multiple NVGate® users on the same PC.
  The project can be sorted alphabetically, chronologically or inversely chronologically
- **Measurement:** The measurement can be filtered by keyword. The keywords are assigned to the measurement when it is created, or can be changed in measurement properties. This option is very helpful when organizing measurement campaigns.
  General: It is possible to hide all the inactive workbooks and to delete the measurement level.
- **Save in user preferences:**
  These settings can be stored in the user preferences and can be set in the preferences.
  See “Chapter 7: User preferences”.

- Clean up: The purpose of the following dialog box is to accelerate the cleaning of the project base. It is used to remove projects or measurements.

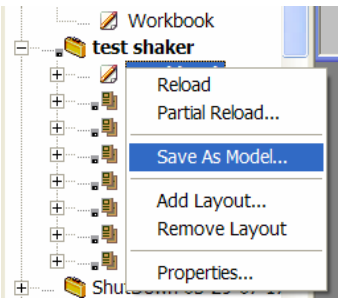


- **Project:** The list contains all projects except the current one. Once a project is selected, it is possible to remove the full project or to select a measurement to remove. If several projects are selected, it is then only possible to remove the selected project.
- **Measurement:** When one project is selected, the list of project measurements is displayed and available to be removed.

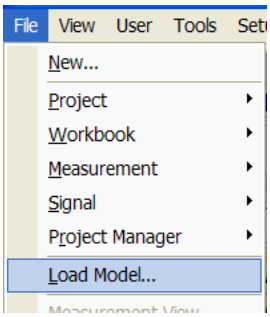
- Autowidth: Adjusts the width of the tree to the widest branch, so that every item is fully visible
- Refresh

6.1.1.7 Load Model

If a project is activated, the user can save the workbook as a model by right clicking on it.



These models are saved in the directory NVGate data\Workbook Library\User.



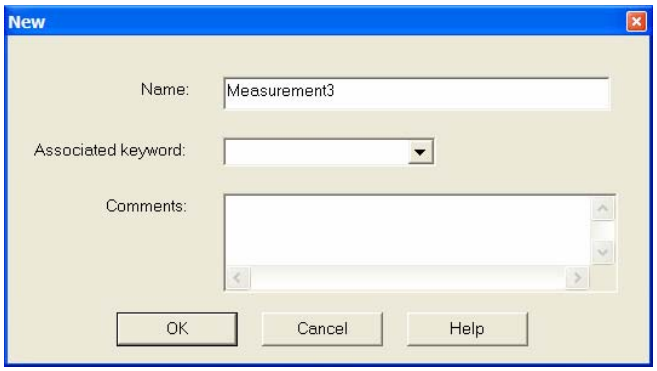
When this base contained models, it's possible to load one of them. All the settings in the worbook are automatically loaded.

6.1.1.8 Measurement view

This command is made to switch between the current instrument group (the project workbook) and the measurement edition layer. This item is available when a measurement is edited.

6.1.1.9 Save results

This command displays the following window

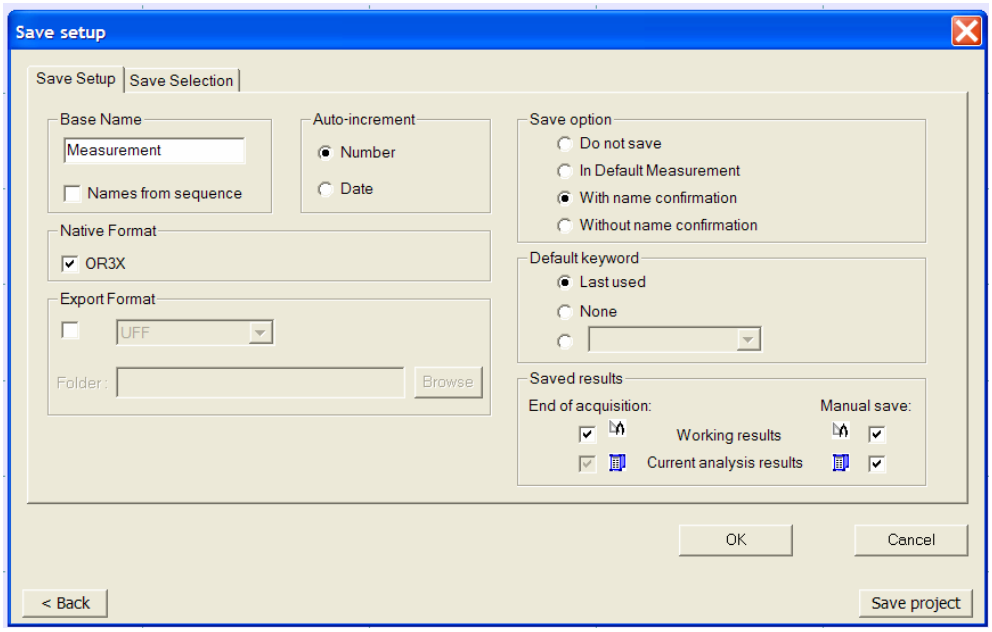


This dialog box is designed to setup the name, associated keyword and also specific comments for the current measurement.

6.1.1.10 Setup

This dialog is designed to set up the way in which new measurements should be saved.

Save setup tab:



- **Base name:** The name the new measurement will have. A suffix is automatically added to the name if the specified name is already in use.

- **Names from sequence:** Select this option to link the measurement name to the corresponding sequence fields of the sequence currently in use.
  See also “Sequence” topic from Chapter 5: Tools.
- **Native format:** Determines whether the measurement should be saved in OR3x format. If not selected, the new measurement will not appear in the project manager.
- **Export format:** Used to export the new measurement in an external format. A folder must be specified to receive the converted result.
  See more details about the export formats in the “Export” topic from the “Chapter 7: User preferences”.
- **Auto-increment:** Used to insure the new measurement has a unique name.

Number	Adds a number to the Base name. The first available increment is used
Date	Adds date information to the Base name. The date format is *mm-dd-yy hh*h*mm*'*ss*"

- **Save option:** This option determines the way in which the measurement will be created when the analyzer stops

Do not save	No measurement will be created. The only way to save the results selected is to perform the Save Result command manually
In default measurement	The measurement is created with the name "Default measurement". If a measurement with this name already exists, it is overwritten.
With name confirmation	A dialog box will be displayed when the analyzer stops. It will suggest a name using a Base name and an auto increment choice.
Without name confirmation	The measurement is created with a name automatically generated from the Base name and the auto increment choice.

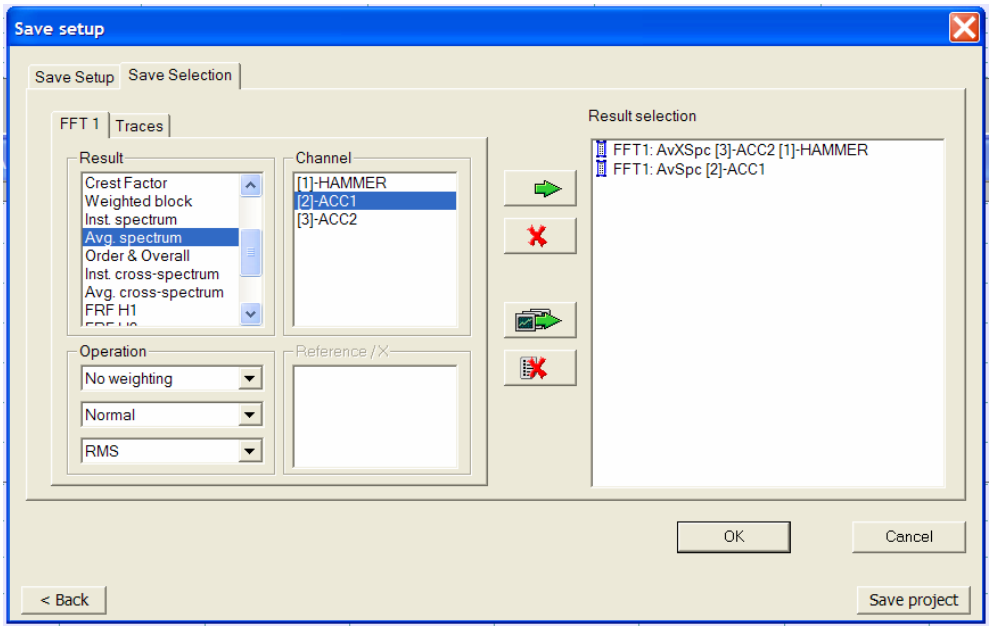
- **Default keyword:** Used to choose the keyword that will be associated with the new measurement. Refer to the preference section for more information.

- **Saved Results**
  - **Current Analysis result:** Results obtained from an acquisition**.**
    - End of acquisition: open automatically a dialog box to save the results when the analyzer stops.
    - Manually: allow to save the results manually.
  - **Working results:** Results obtained after an operation based on current analysis results, for example a result calculated with an operator.

  These results can be only saved manually.

Save selection tab:

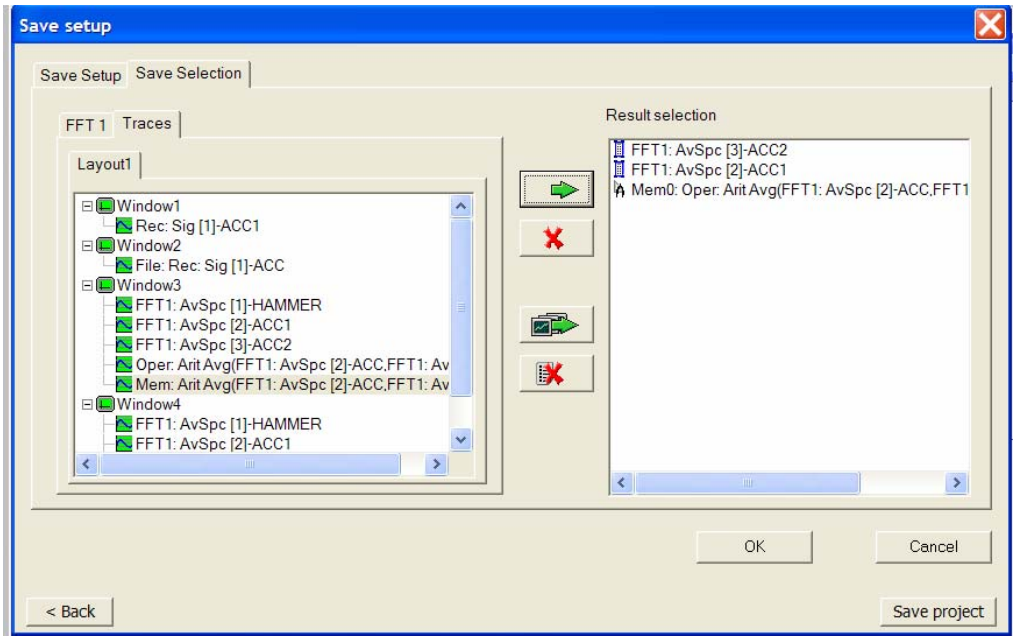
- **Results provide by the plug-ins**



- **Result selection**: List of results provided by the plug-in analyzer selected. Multiple plug-ins may be selected if all results selected are compatible (which means that they can be displayed in the same result window).
- **Channel selection**: List of plug-in analyzer channels connected, available for the result selected.
- **Operation**: in the top combo-box, list of weighting that can be applied to results selected. In the middle combo-box, list of derivation/integration operations which can be applied. In the bottom combo-box, list of display units.
- **Reference / X**: List of plug-in analyzer channels connected. This can be the reference. Available for results that require a reference only (cross-spectrum, for example).
- **Tracked order**: List of tracked orders on channel selected. Available if result selected is an order result.

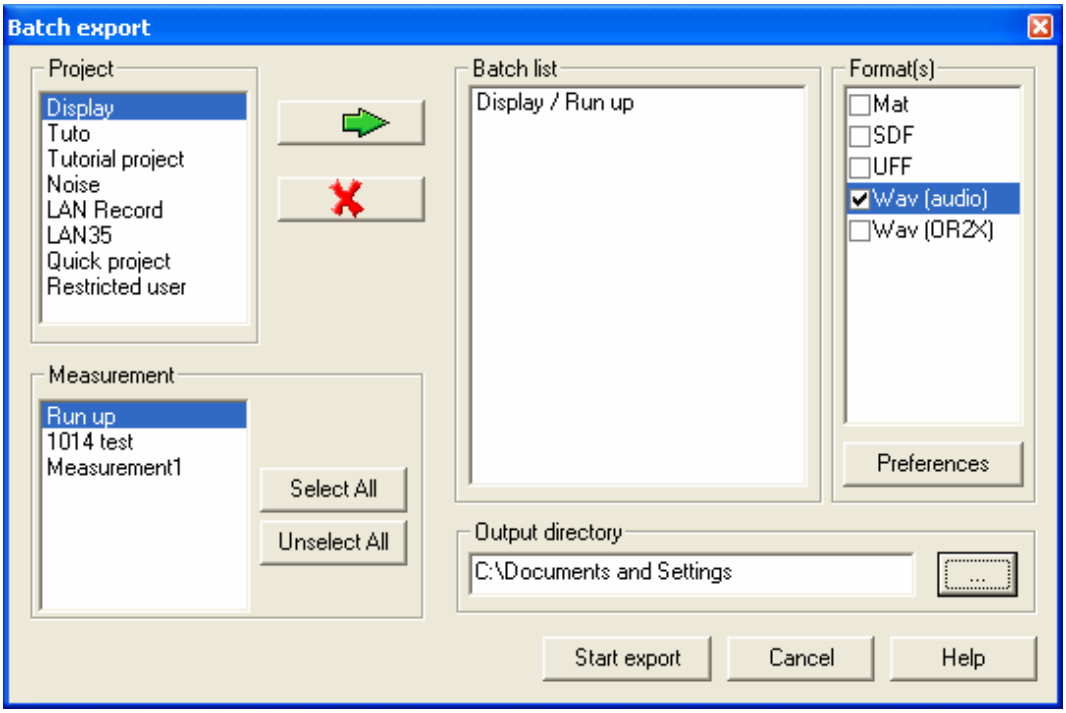
- **Traces**

List of traces available in the project coming from current analysis results and working results.



6.1.1.11 Export result files / Export signal files

These two commands are used to convert one or several measurements to external formats.



- **Project**: Lists the projects that contain measurements. Only one project can be selected.
- **Measurement**: Lists the measurements in the project selected. Select one or several measurements and click on the add button.
- **Batch list**: Contains all the measurements that will be converted. Use the add/remove button to modify list content.
- **Format**: This is the output format. The formats available are :

Result	**Signal**
Mat: to be used with Matlab	Mat: to be used with Matlab
Txt: usable by any text or speadsheet editor	SDF: Standard data format
UFF: Universal File Format	UFF: Universal File Format
	Wav audio: Wav file, resampled to standard audio frequency (44.1, 48, 96 kHz) . To be used by any audio player
	Wav: Standard wav format, usable with OR2X technology

See more details about the export formats in the “Export” topic from the “Chapter 7: User preferences”.

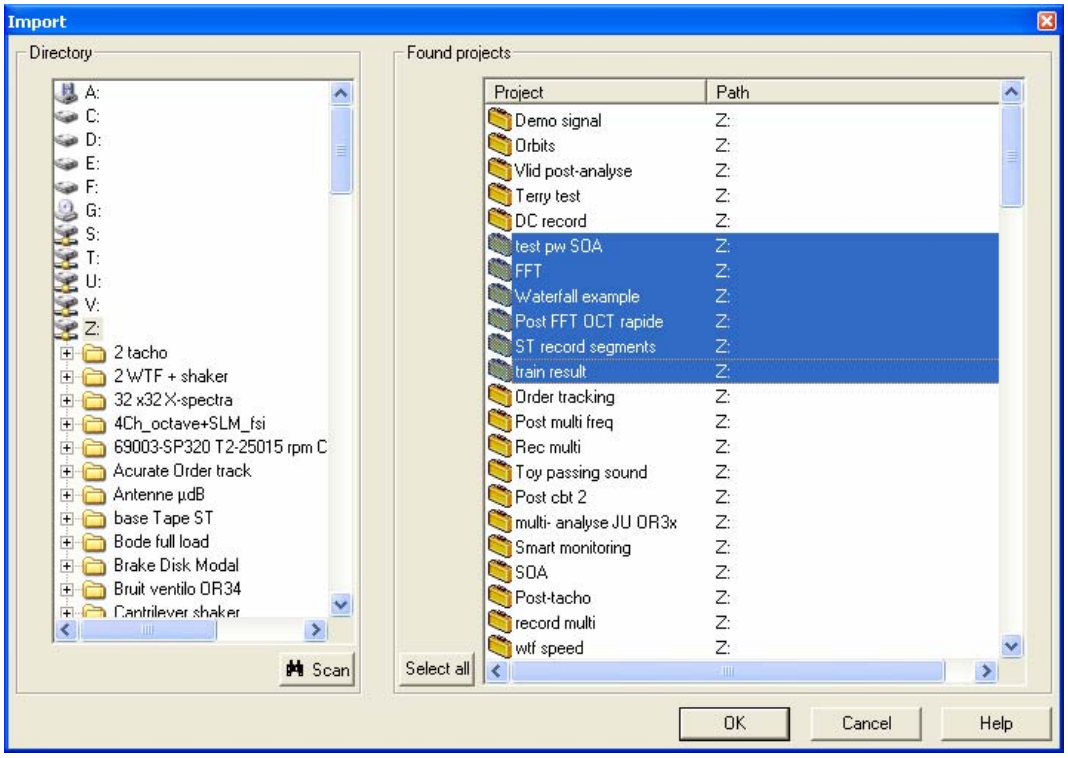
- **Output directory**: The location on the disk where the files will be exported. During the export, a directory will be created for each project, and will contain the exported files corresponding to all selected measurements.

For more details about the export formats, see the export topic from the “Chapter 7 User Preferences”.

6.1.1.12 Import

- **Import Project**

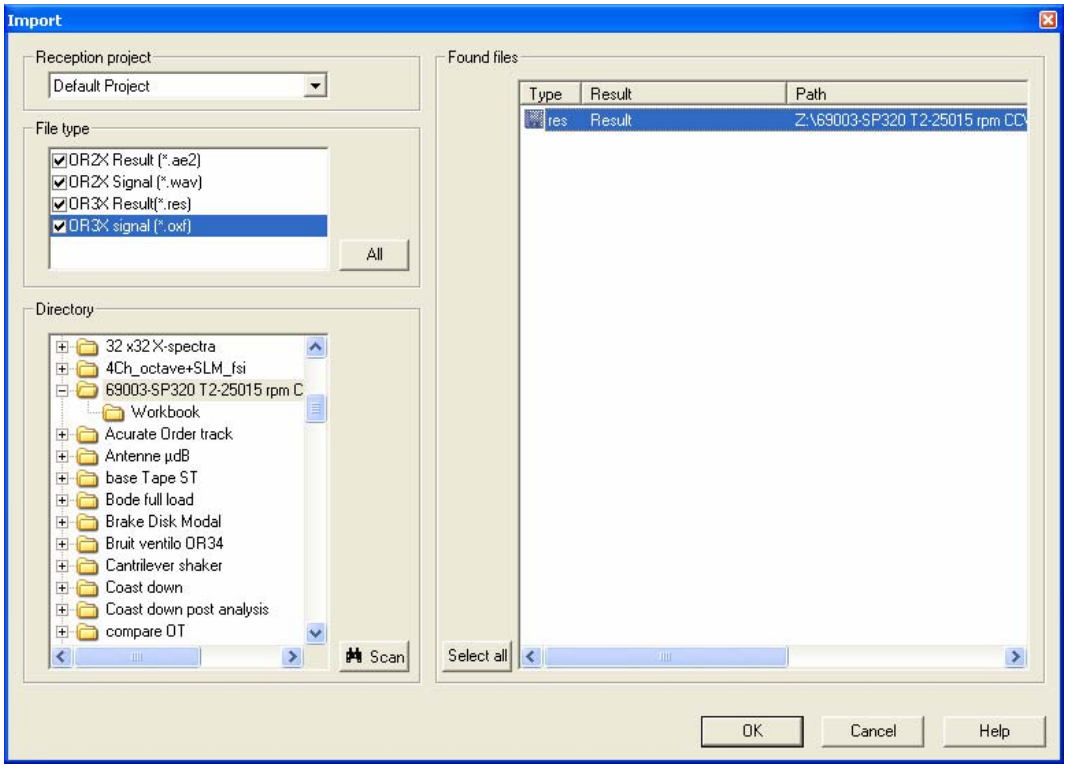
This command is used to import project that are not in the project database. It makes a copy of the project and makes it available to the current user, or whoever created the project. If a project already exists in the project base, a ~ (tilde) will automatically be added.



- **Directory**: Select the directory in which you would like to look for the project. The "found project" list will display all projects that are immediately in the directory selected. If the "scan" button is pressed, all the projects that are contained in the specified directory will be displayed.
- **Found projects**: Displays the list of projects found. Select one or several projects to import.

- **Import Files**

This command is used to import results or signals. It makes a copy of the file and makes it available to the current user, or whoever created the file. The file will be included in a measurement If a measurement already exists in the project, a ~ (tilde) will automatically be appended.



- **Reception project**: Determines which project will receive the new measurement
- **File type**: One or several types can be selected. File type may be OR2X or OR3X
- **Directory**: Selects the directory in which you would like to look for the files. The "found files" list will display all the files that are immediately in the directory selected. If the "scan" button is pressed, all the files that are contained in the specified directory will be displayed.
- **Found files**: Displays the list of files found. Select one or several projects to import.

6.1.1.13 Print snapshot

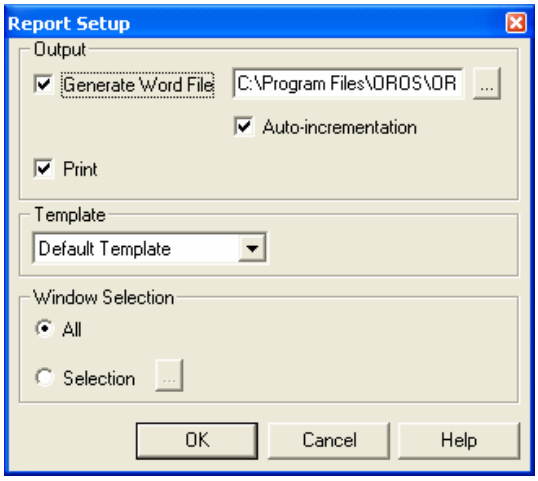
Prints the active window on the default printer.

6.1.1.14 Print report

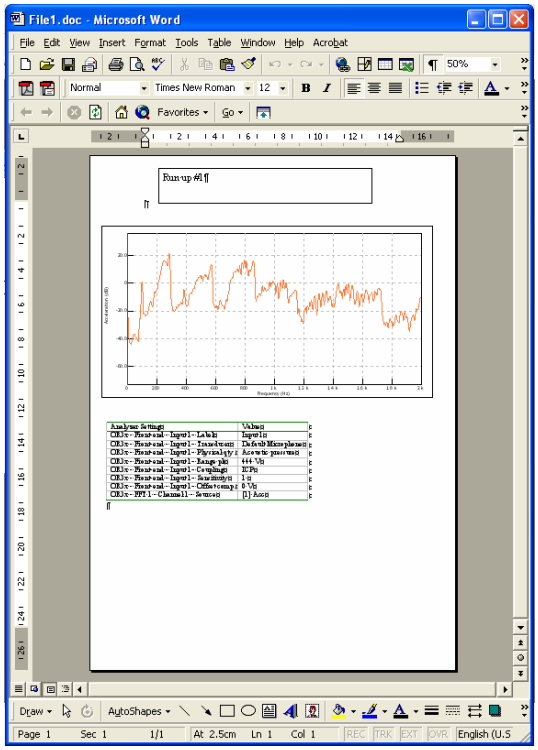
Generates a report. Depending on the choice made in the report setup, it can generate a word file or send this file directly to the default printer.

6.1.1.15 Report setup

Prepares the report for printing.

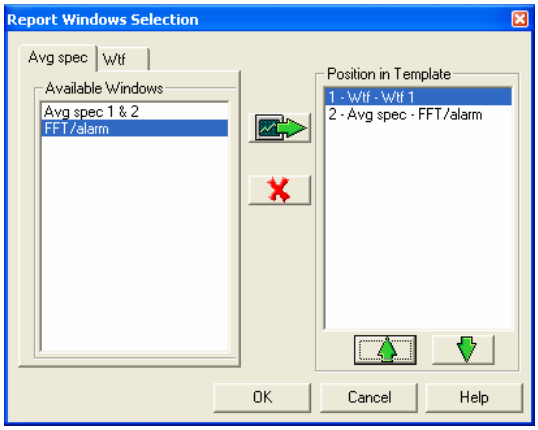


- **Output**
  - **Generate Word file**: Print the report in a word file. The file is automatically saved by default in the C:\Program Files\OROS\OR3X\Report Files directory.



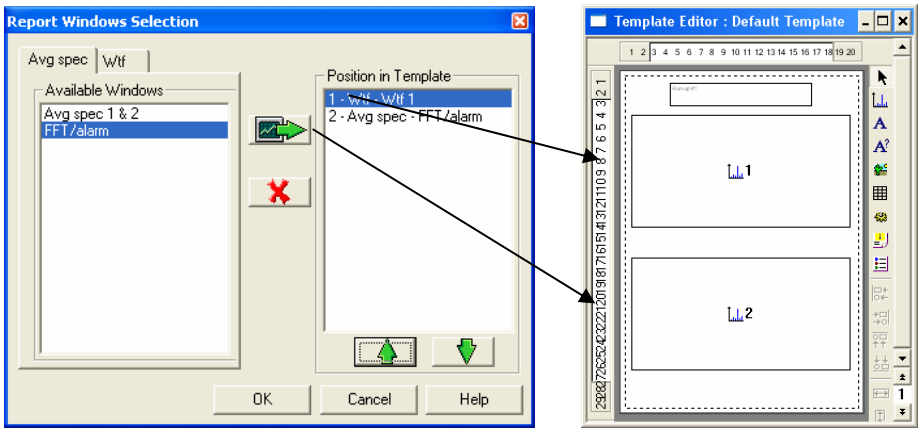
  - **Auto-incrementation**: Name of report is generated, incrementing the index.
  - **Print**: Prints the report on the default printer.
- **Template:** Select the report template to be printed out.

- **Window selection**



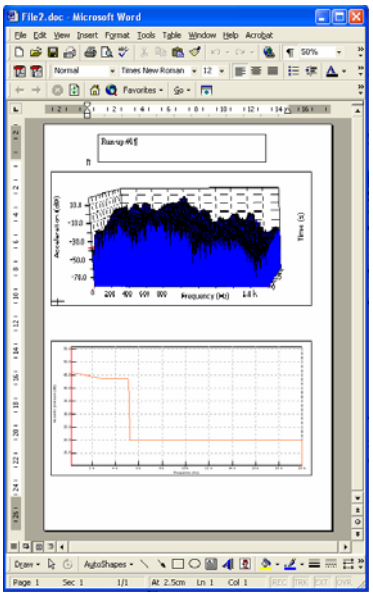
Available windows: this list contains all windows displayed in the workspace

- . The windows are sorted by layouts.
- **Position in template:** sets the position of the window in the report template by using the 2 green arrows.



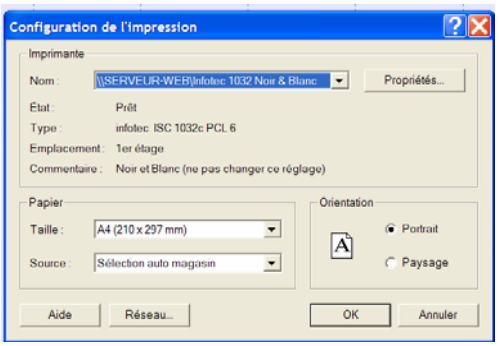
You can also put one graph per page with the multi-sheet report. Actually you can add page to your template and define on graph per page (same for text, results, image…).

Result of the word file generated:



6.1.1.16 Print setup

Selection of the printer and its options.



The user has the possibility to select the template's orientation in this window.
When the project is saved, this orientation will be memorized for all templates created in this project.

6.1.1.17 Recent projects

Displays the list of the most recent projects used by the current user.

6.1.1.18 Recent measurements

Displays the list of the most recent measurements used by the current user.

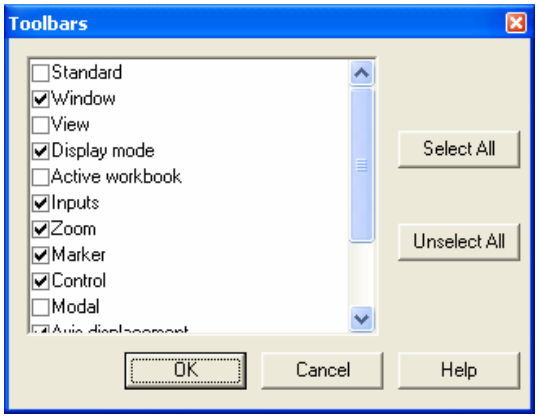
6.1.1.19 Stand-alone

See "Stand alone" topic from "Chapter 3: Hardware".

6.1.2 View

6.1.2.1 Toolbars

Clicking on Toolbars opens the following dialog box:



This dialog box displays all the NVGate® toolbars in a list.
Checked items will be displayed and unchecked items will be hidden.

- Select All: Checks all items on the list
- Unselect All: Unchecks all items on the list
- Ok: Closes the dialog box and applies the modifications

- Cancel: Closes the dialog box, and ignores the modifications

6.1.2.2 Status bar

Clicking on this menu item displays or hides the status bar

This bar contains several fields:

- **Current status:** This field displays a string indicating the current action performed by NVGate®. If there is no action in progress, the string is “For Help, press F1”. When the software is performing a long task, a progress bar is displayed in this field.

  Mode: Indicates what mode is in use

Mode	Description
On-Line	NVGate® is in acquisition mode. This mode is used to make real-time measurements.
Result	NVGate® is in result mode. This mode is used to look at measurements and prepare reports.
Post-Analysis	This mode is available in Office or Connected Operating modes. This mode can be used on-line or off-line. It’s used to post-analyze a recorded signal. To switch to this mode, at least one recorded signal file must be on your OR3X or PC Hard Drive (depending on your initial mode and your file selection). The OR3X or the PC Hard Drive (according to the file selection) sends the recorded signal through the Player module in order to display the signal on the screen. The inputs are no longer accessible at this time; they are replaced by Tracks (find all the information about the recorded channels in the Player module). In this mode, it is also possible to record a recorded signal file that either the OR3X or the PC Hard Drive has sent through the Player module.

- **General status:** Indicates the global status of the Analyzer. The different statuses available are:
  - Stopped
  - Running
  - Paused

- **User rights**

	User with access to all NVGate® functions
	Restricted user. This user is not allowed to modify displays (windows, toolbars...), Analyzer Settings or the Project Manager in NVGate®

- **User name**: The name of the current selected user.
- **Connection mode:** In this field, a bitmap is displayed corresponding to the NVGate®operation mode:

	Office mode. There is no hardware connected.
	Connected mode. The hardware is connected

- Analysis processor status

	The analyzer is working fine
	The acquisition is not in real-time. Result obtained might be wrong.

- **Fan status:** A bitmap indicates the status of the analyzer fan.

	The fan is working.
	The fan is stopped.

- **Power status:** A bitmap indicates how the analyzer is powered.

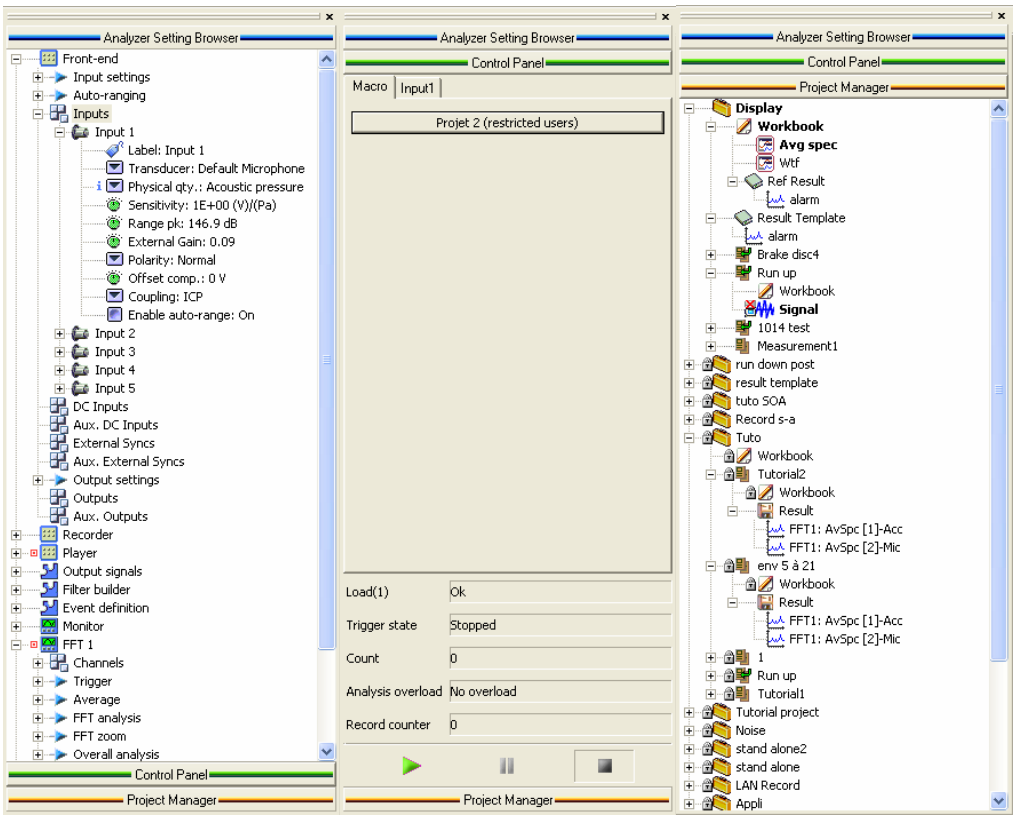
	The analyzer is plugged in
	The analyzer is running on battery

- **Caps-lock status:** Indicates if the Caps-Lock key has been pressed
- **Num-lock status:** Indicates if the Num-Lock key has been pressed
- **Scroll-lock status:** Indicates if the Scroll-Lock key has been pressed

6.1.2.3 Workspace

By default, this window is docked on the left of the screen. It contains three sheets:

- Analyzer Setting Browser window
- Control Panel window
- Project Manager window

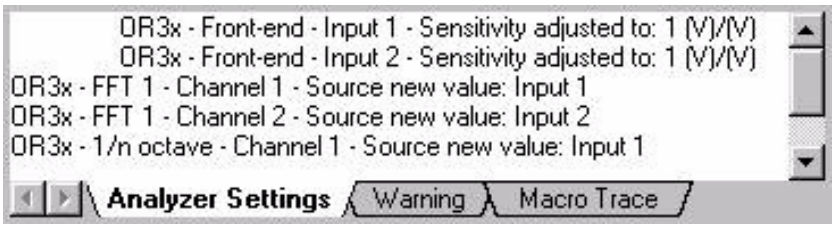


Only one sheet is displayed at a time. The user may switch between sheets by clicking on the title bar of the desired sheet.

The Workspace can be undocked and, moved anywhere on the screen. It can also be docked on the right of the NVGate® window.

6.1.2.4 Log window

This window displays and stores the messages coming from the analyzer: There are 3 tabs in the Log window:



- **The Analyzer Settings tab:** Displays analyzer setting modifications with the following formats:

  User action: *Hardware - Plug-in – Sub-module – setting* new value: *affected value.* When the user changes a setting value.

  Automatic action: *Hardware - Plug-in – Sub-module – setting adjusted to: affected value.* Used when the analyzer automatically adjust a setting value.

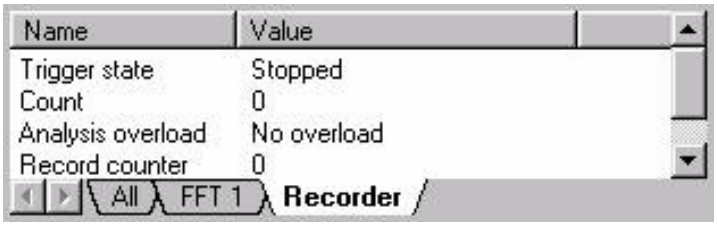
- **The warning tab:** Displays analyzer operation warnings. A beep can be associated with each warning notification.

- **The macro trace tab:** Displays macro execution and editing information. Each macro step execution and macro error is displayed in this window.

The content of each tab can be selected, copied or deleted using contextual menu.

6.1.2.5 Analyzer status

This window displays the status of each analyzer through several visual analyzer states such as "Trigger state", "Analysis overload" and their corresponding values.
The information displayed in this window is selected using the contextual menu of each plug-in analyzer (View state).
See also "Customize Control Panel" topic p 6-30.



For FFT plug in you may read:

- **Block Overload**: corresponds to the instantaneous overload indication within 1 FFT trigger block, for instance during a few milliseconds overload occurred, the current trigger block indicates overload, the following trigger block may not have any overload so indication "no overload” will be seen

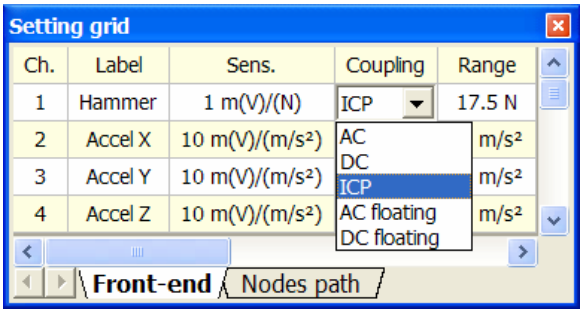
- **Analysis Overload**: corresponds to overload indication over the measurement period. It means that during the whole measurement period there was (or not) an overload.

For instance: during a measurement, a short overload occurs, Block Overload will indicate "Overload on Channel x", Analysis Overload will indicate "Overload on Channel x", after overload occurred, Block Overload will indicate "No Overload", Analysis Overload will indicate "Overload on Channel x".

When pressing run again, Block Overload and Analysis Overload status will be reset.

When using Automatic overload rejection in FFT, Analysis Overload status take into account any occurring overload despite FFT block rejecting them for FFT calculation, the user will anyhow keep a trace of occurred overload.

6.1.2.6 Setting grids



With each predefined setup (quick application) a grid of settings is available. These grids allow direct modification of presented settings. The grid may be hidden or shown by selected it from the 'View' menu.

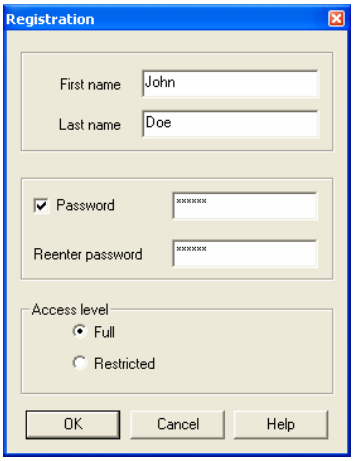
6.1.2.7 Full screen

This button toggles between full-screen mode and normal. In this mode, NVGate® hides toolbars and other windows.

6.1.3 User

This menu is dedicated to the user management

- **New:** Used to create a new user

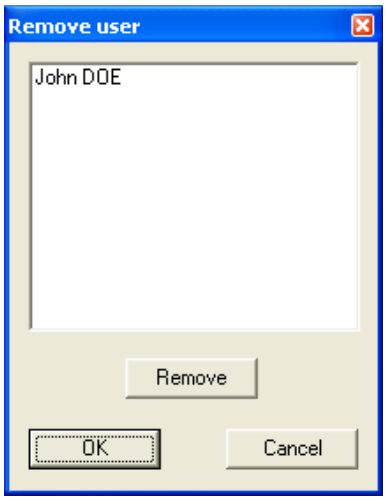


- **First name:** First name of the user may be left empty. The first name is automatically formatted so that the first character is in upper case and the others are in lower case letters.
- **Last name:** Last name of the user. Must be filled in. The last name is automatically formatted in letters.
- **Password:** If selected, the user will have to enter his password to launch NVGate®
- **Access level**

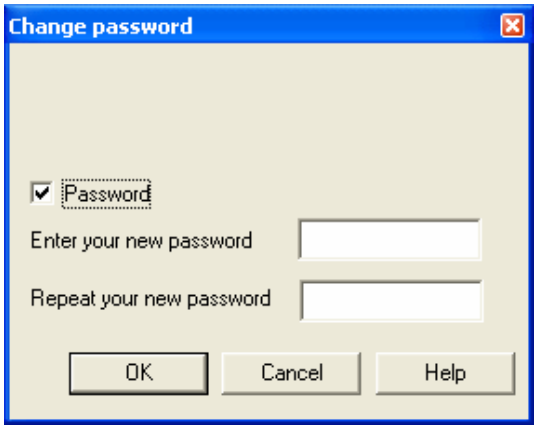
- **Full**: The user is not limited within NVGate®
- **Restricted:** The user is not authorized to access to all the functions of NVGate®. The main characteristics of this type of user are

Authorized actions	**Unauthorized actions**
▪ Create measurements ▪ Modify settings from the Control Panel ▪ Execute macros from the control panel ▪ Load projects from a predefined list ▪ Print reports; Move markers	▪ Save a project ▪ Close or modify the windows ▪ Modify the settings in the ASB ▪ Use the toolbars that have not been authorized by the administrator

- **Change:** Used to change the current user. If the selected user has a password, he must enter the password.
  When the choice of the new user is validated, NVGate® will behave as if the current user has closed NVGate® and a new user has launched NVGate®
- **Remove:** Used to remove a user. The current user must have full access, and is not included in the list



- **Change password:** Used to change the password. If necessary, the user must enter his current password and then enter the new password twice

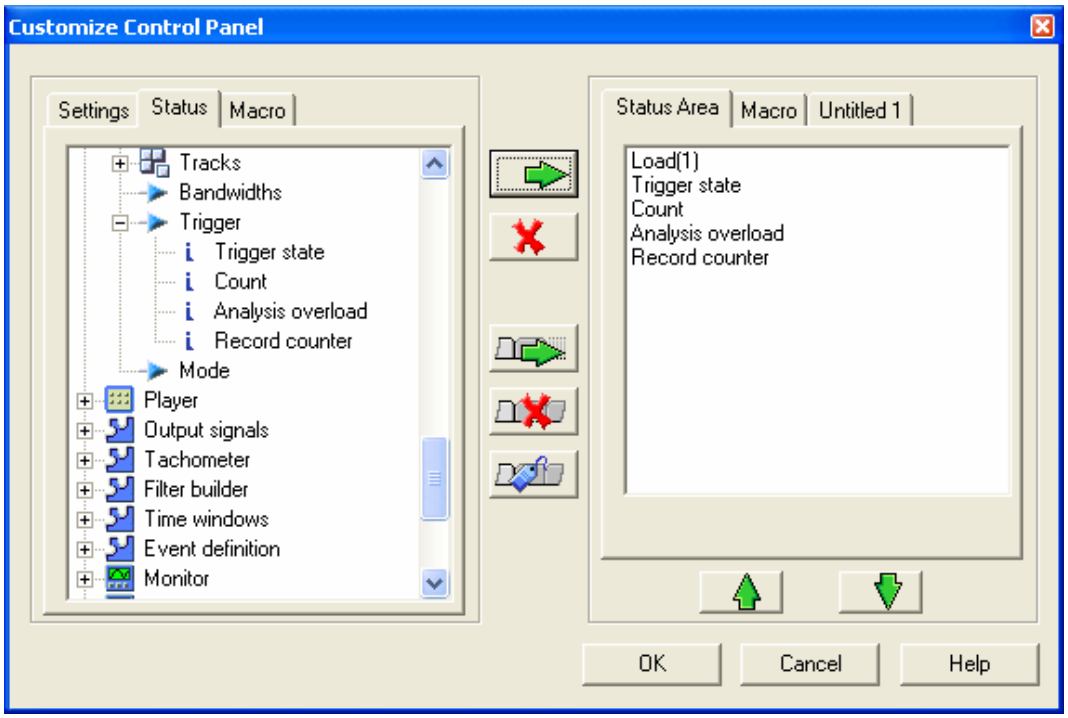


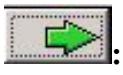
- **Password:** Used to protect the user with a password

6.1.4 Tools

6.1.4.1 Customize Control Panel

The left part of the window contains the items that can be added to the control panel. The right part contains the tabs used to receive and organize these items.



- **Settings tab:** Displays all available settings in tree format similar to the Analyzer Setting Browser. Setting can be added only to the Settings tab.
- **Status tab:** Displays all available settings in tree format similar to the Analyzer Setting Browser. Status can be added to the Status area or to the Settings tab.
- **Macro tab:** Displays the list of available macros. Macros can only be added to the Macro tab.
- **Add to Control panel**  **:** This button adds the item selected (status, setting or macro) from the previous tabs to the control panel
- **Remove** **:** Removes the selected item from the control panel.
- **Create a new tab** **:** Creates a new tab used to contain settings or status.
- **Remove a tab** **:** Removes the selected setting tab.

- **Rename a tab** **:** Changes the name of the selected tab.
- **Status Area:** Displays all statuses that have been selected. The tab can only be used for statuses.
- **Macro Tab:** Displays all macros that have been selected. The tab can only be used for macros.
- **Settings Tab:** Displays all settings and statuses that have been selected.
- **Push up/down the setting/status** **:** Used to change the order of the items in the current tab
  Note:
  - It is possible to change the name of the settings and status by right-clicking on the item and select Rename in the popup menu

  - It is possible to use drag and drop to add items

6.1.4.2 Transducers

See “Transducers” topic from Chapter 5: “Tools”.

6.1.4.3 Report Template

See “Transducers” topic from Chapter 5: “Tools”.

6.1.4.4 Result Template

See “Transducers” topic from Chapter 5: “Tools”.

6.1.4.5 Macro

See “Transducers” topic from Chapter 5: “Tools”.

6.1.4.6 Sequence

See “Transducers” topic from Chapter 5: “Tools”.

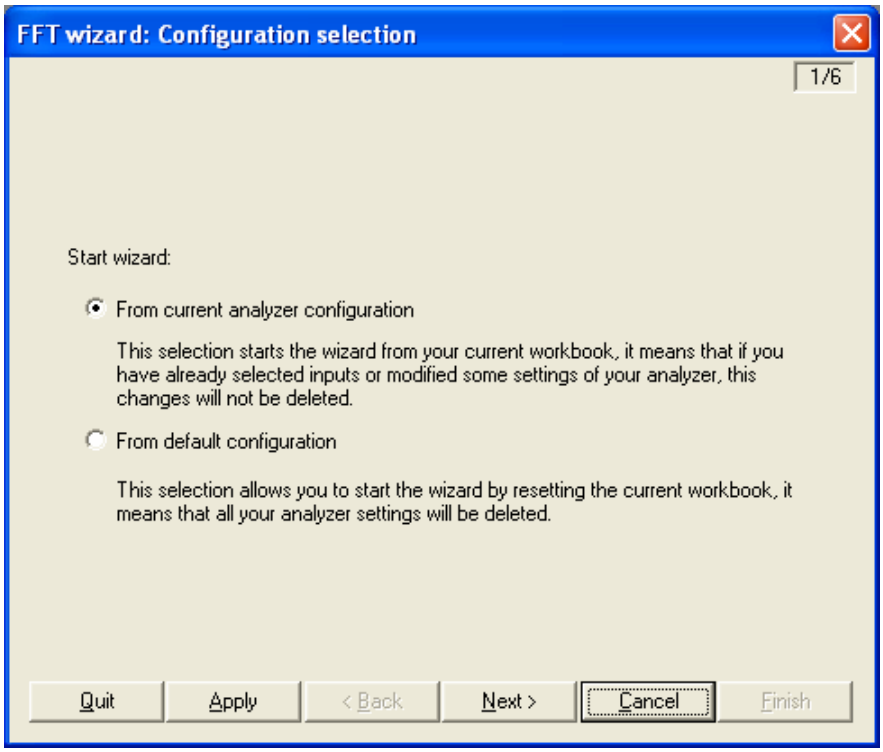
6.1.4.7 Wizards

From the tools menu, two types of wizards are available.

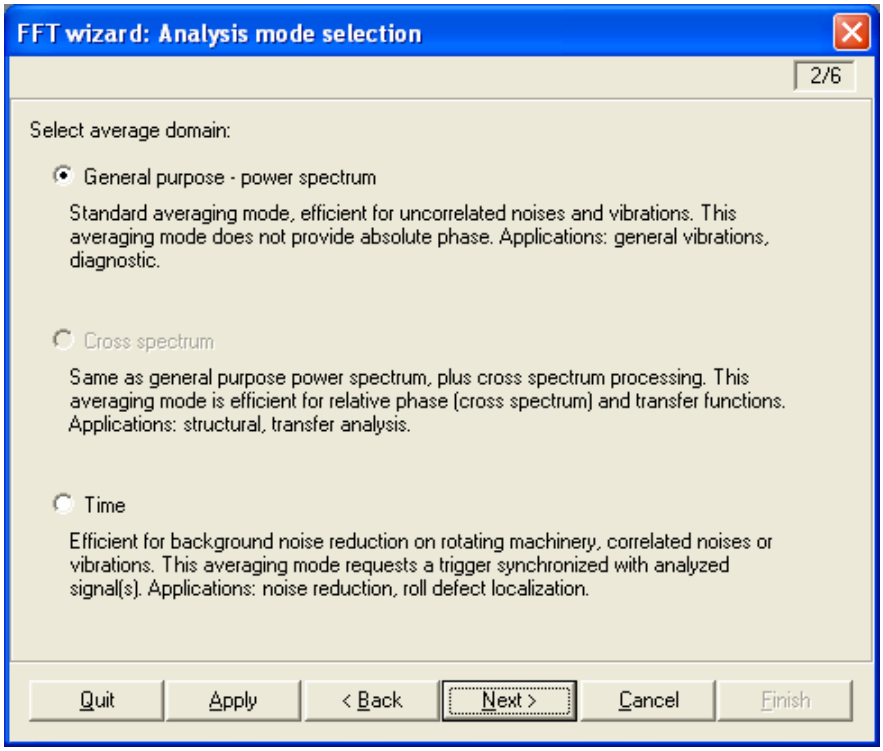
FFT wizards

The wizard leads you through the principal settings of an FFT analysis. The following schemes describe the sequence window to set your FFT measurement. At each step, the workbook, the layout (window displayed) and the control panel will be set automatically with settings of the wizard.

Configuration selection:

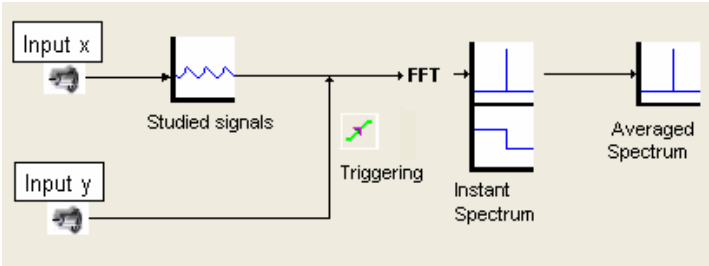


Mode selection:

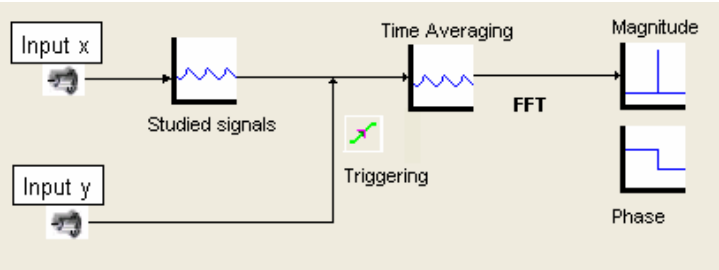


Select the average domain for your measurement.

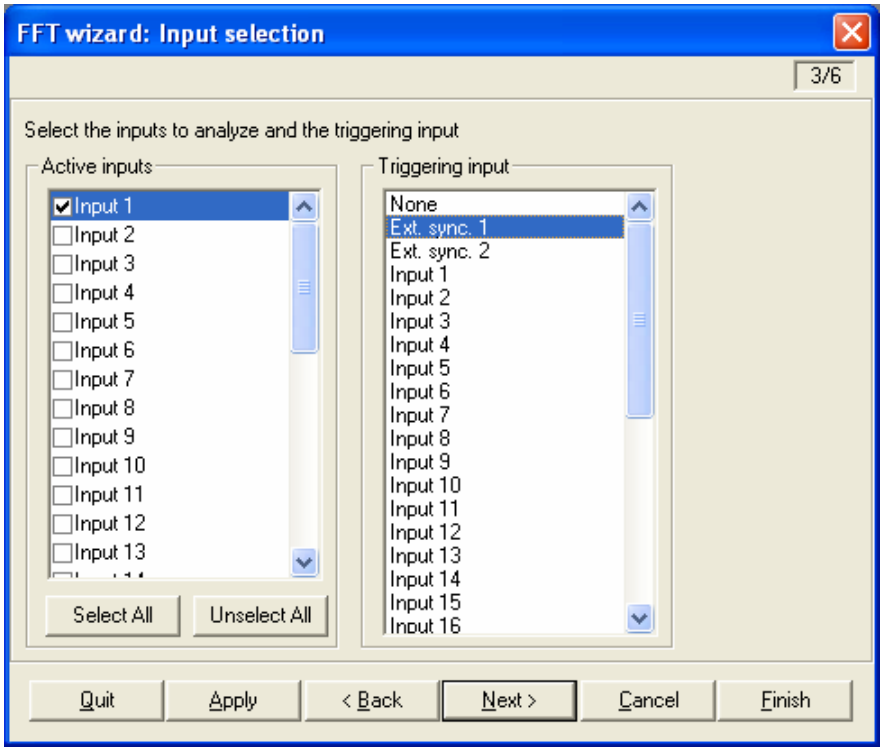
- Spectral: standard averaging mode, efficient for uncorrelated noise and vibrations. This averaging mode does not provide absolute phase (Autospectra). It is efficient for relative phase (Cross spectra). Applications: structural, general acoustic.



- Time: efficient for background noise reduction on rotating machinery or any correlated noise or vibration. This averaging mode request a trigger signal synchronized with studied noise and vibrations.



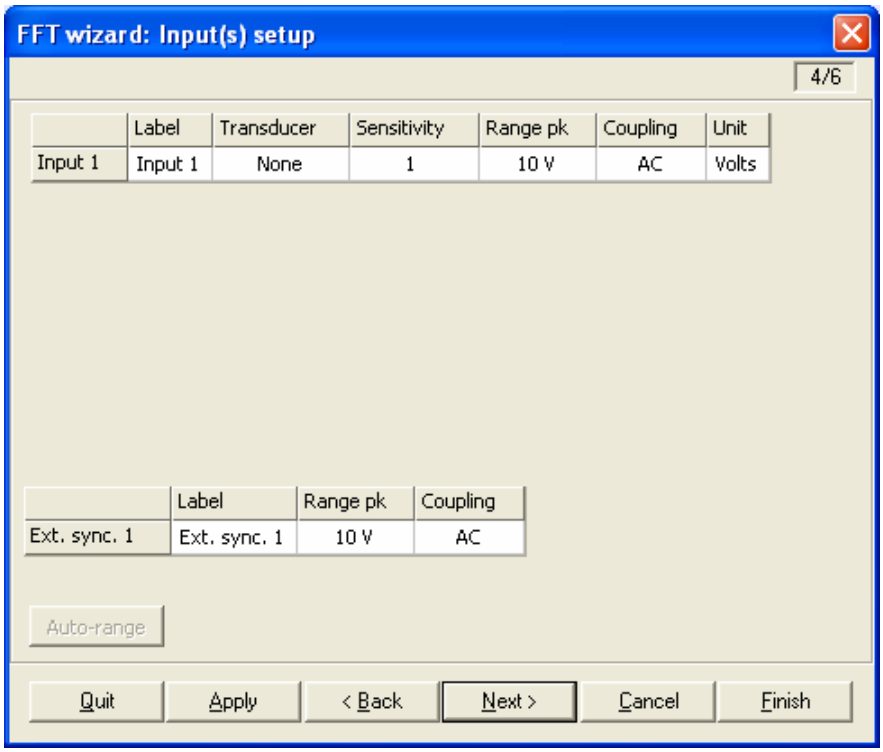
Input selection:



- Active inputs: you can select any of all inputs available from the hardware OR3X used to analyze.
- Triggering input: only one is available, if a second triggering input is checked, the first one would be unchecked. This activation defines in NVGate a trigger in function of the channel type.

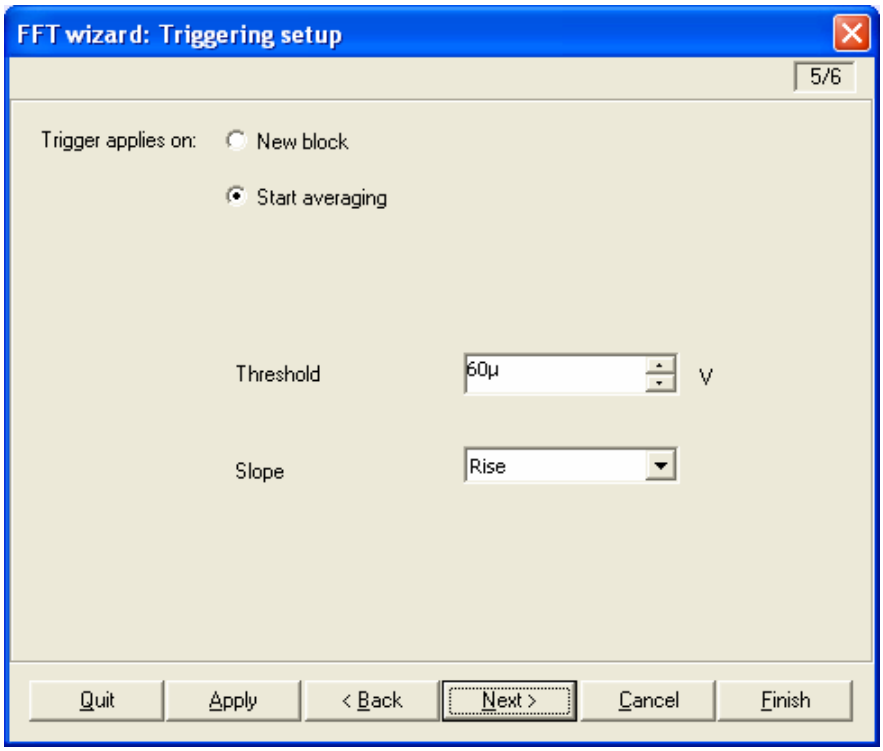
Note: when an input is checked, this input becomes active. If an input is already active (before launching the wizard) and not checked in this dialog box, this input would be still active.

Input setting:



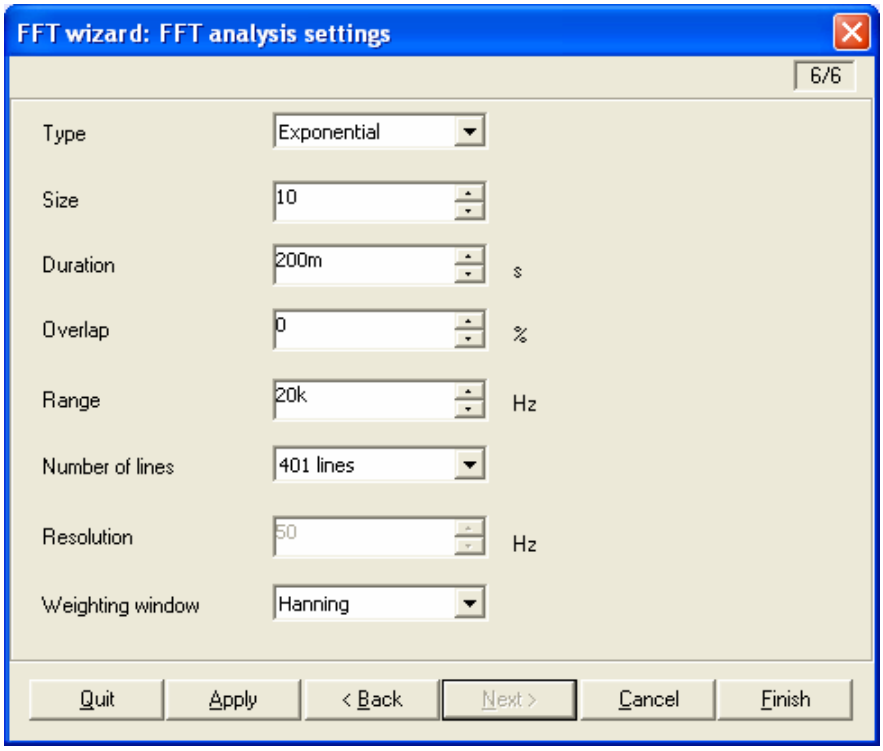
As in the ASB, you can set the properties of the active inputs and of the triggering input. The first table concerns the analyzed inputs, and the second one concerns the triggering input (if selected).

Triggering setting:



Select the triggering setup (if no triggering selected, the FFT wizard is going directly to the next step).

FFT analysis settings:



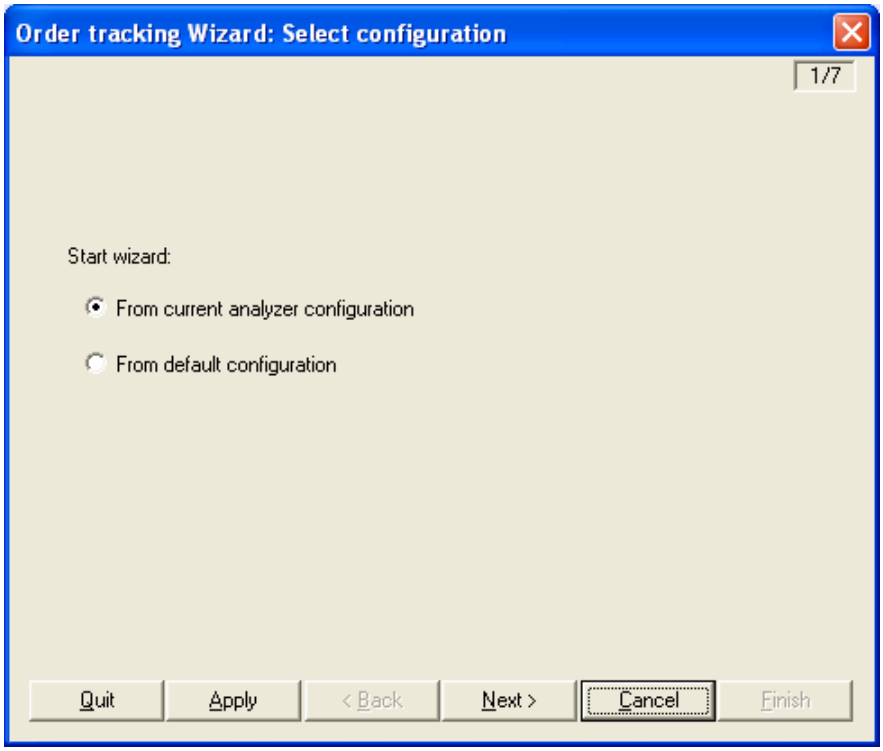
Select the analysis settings.

Note: all others settings available in the ASB but not adjustable in the wizard would be set by default or set to the value defined in the ASB.

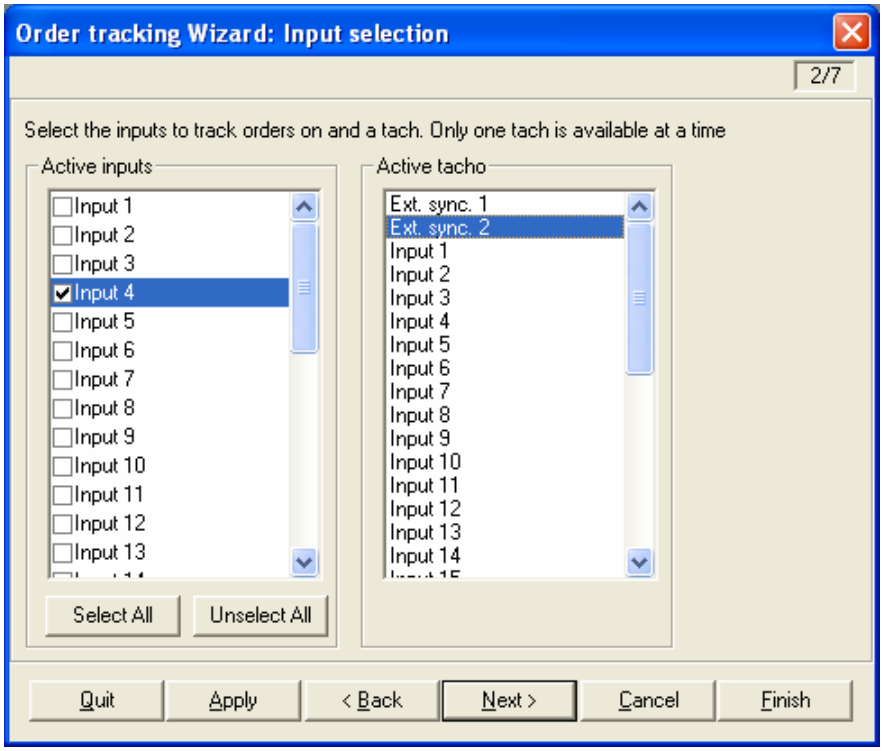
Order tracking wizards

The following schemes describe the sequence window to set your Order tracking measurement. At each step, the workbook, the layout (window displayed) and the control panel will be set automatically with settings of the wizard.

Select configuration:



Input selection:

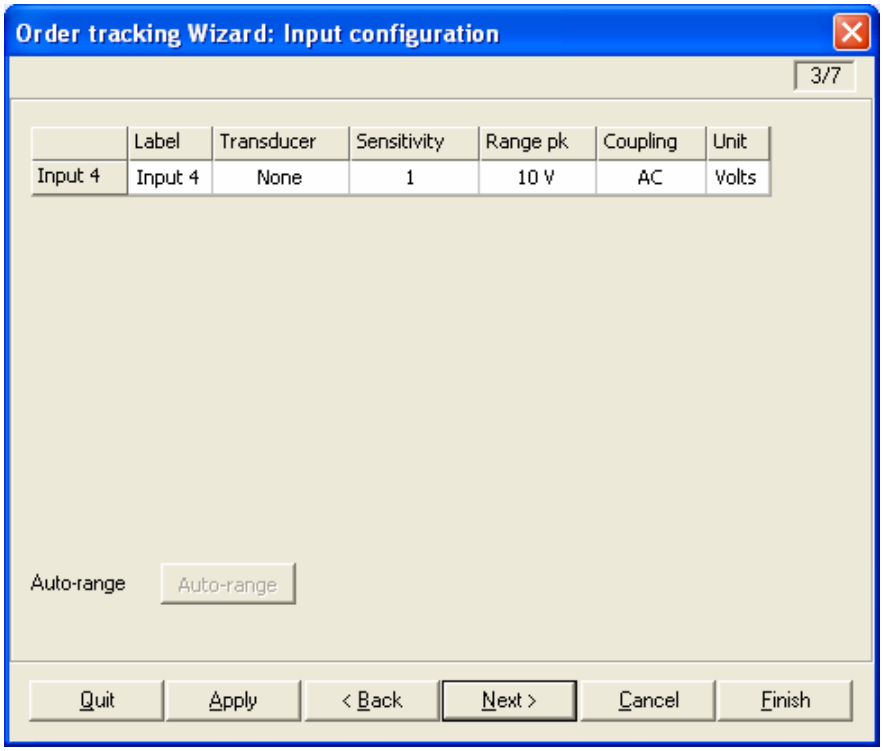


- Active inputs: you can select any of all inputs available from the hardware OR3X used to analyze.
- Tacho input: only one is available, if a second triggering input is checked, the first one would be unchecked. This activation defines in NVGate a trigger in function of the channel type.

Note: when an input is checked, this input becomes active. If an input is already active (before launching the wizard) and not checked in this dialog box, this input would be still active.

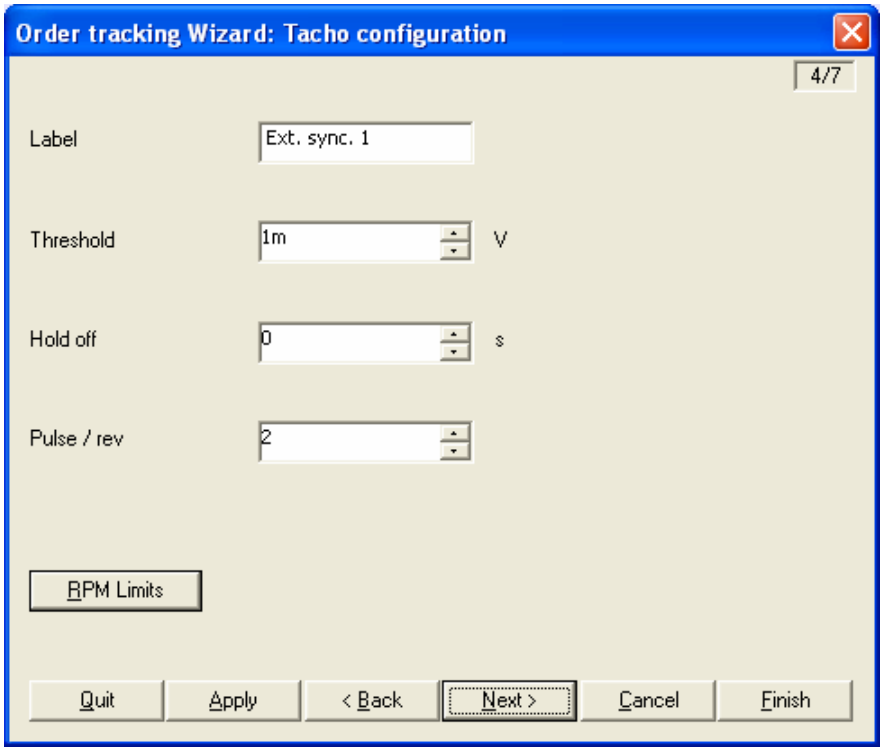
The Tach signal and Tach speed are displayed in the window.

Input configuration:

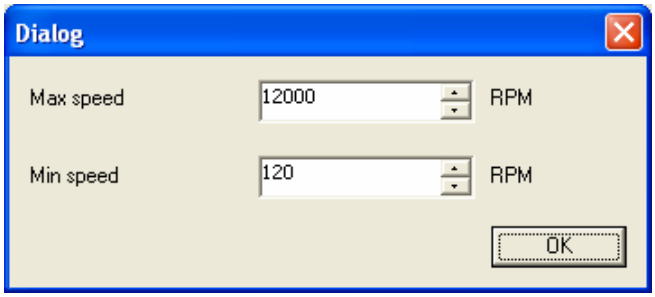


As in the ASB, you can set the properties of the active inputs.

Tacho configuration:

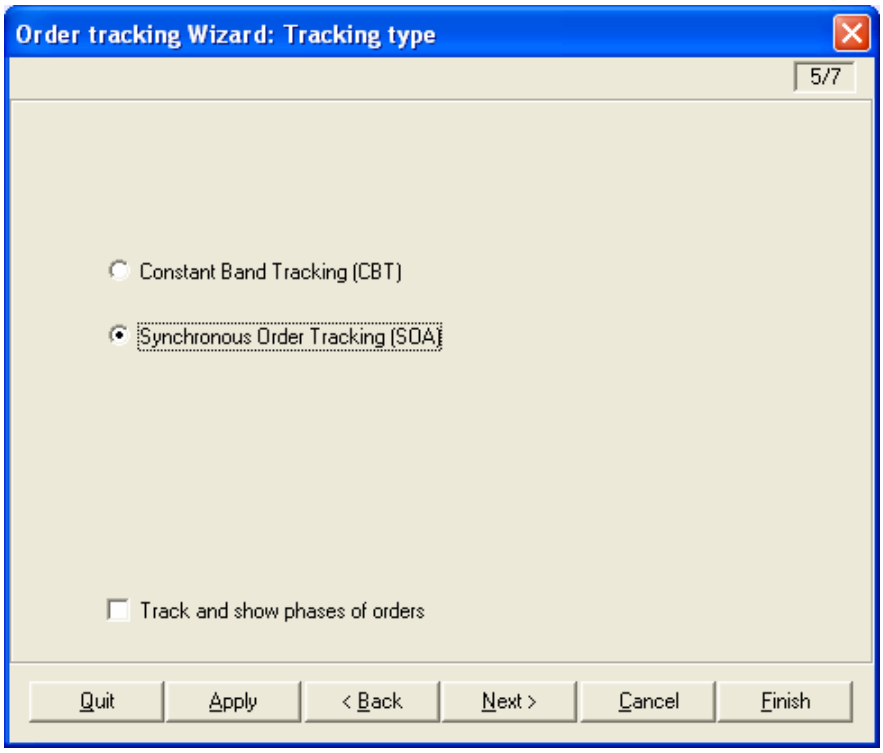


Select the setting of the tacho selected. By clicking on the ‘RPM limits’ button, the max and min speed of the tacho will be available for setting.



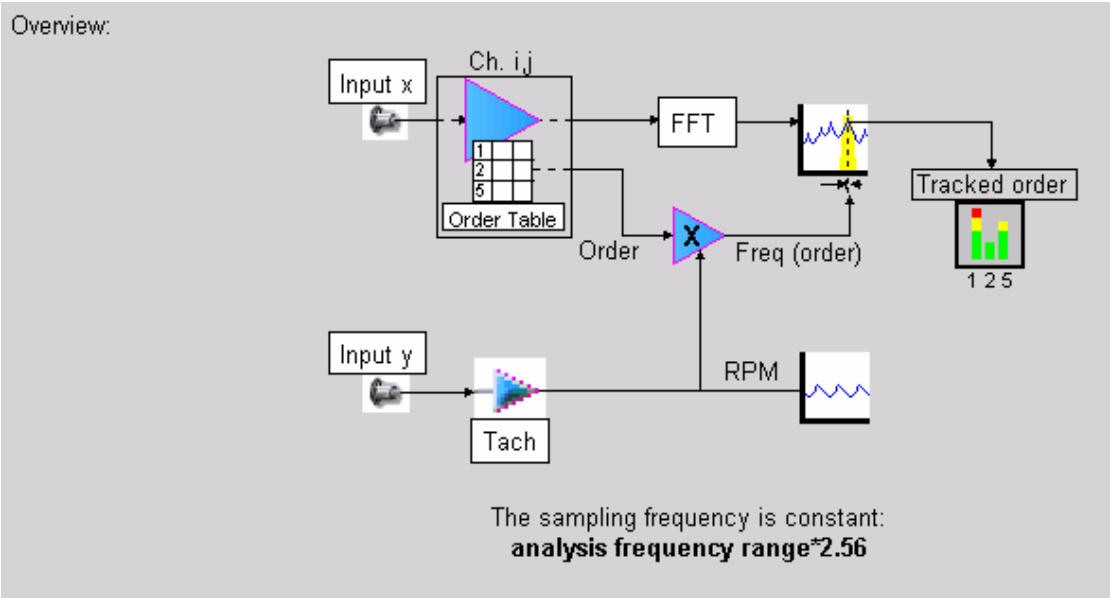
This max and min settings displayed in NVGate a digital viewmeter in RPM.

Tracking type:

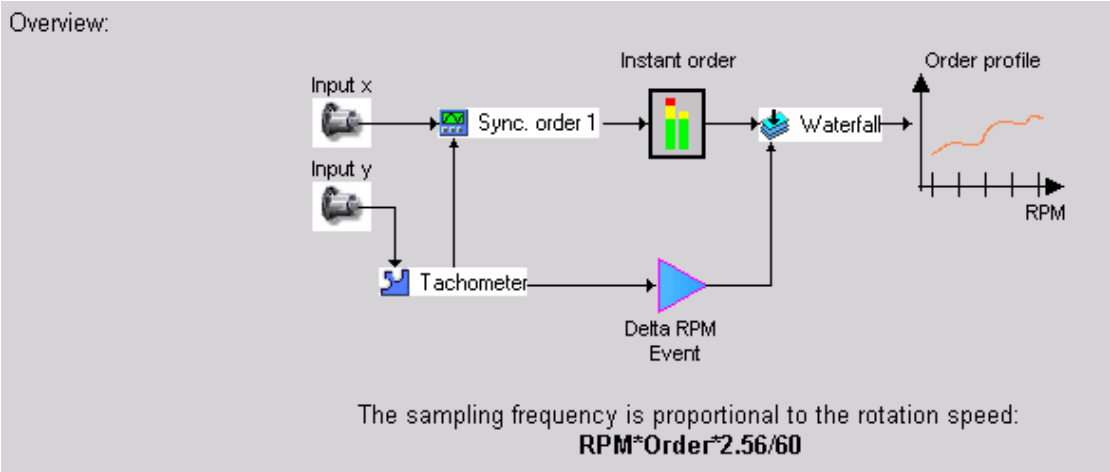


These functions CBT and Synchronous Order Tracking are available if the corresponding configuration is installed on the PC that means FFT for the CBT and SOA for Synchronous Order Tracking.

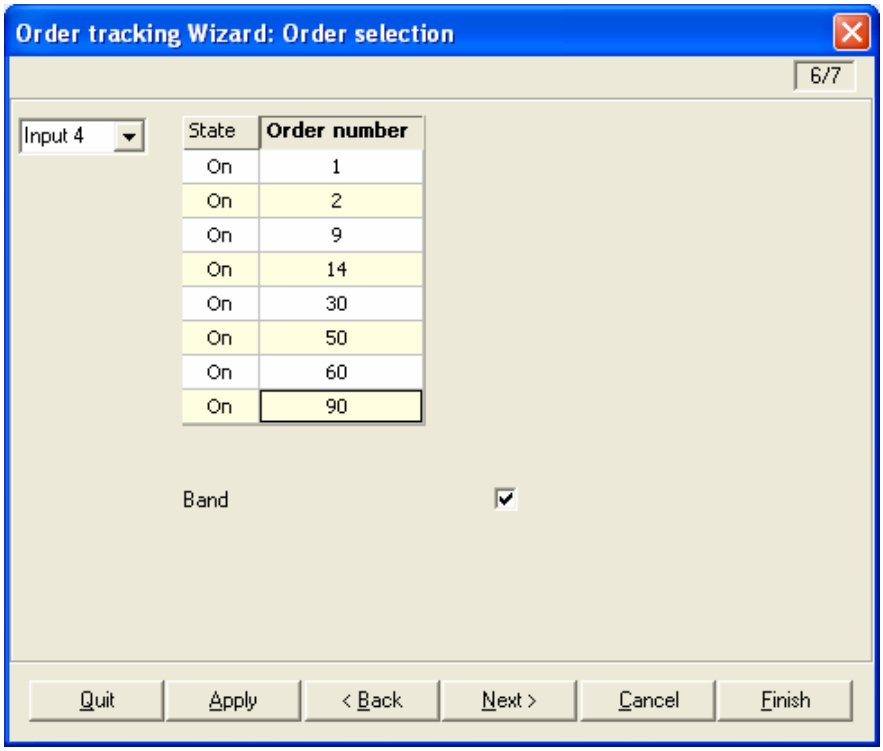
- CBT: the Constant Band Tracking is the study of the vibrations linked to the rotation speed, typically applied in the field of rotating machines. The CBT allows synchronizing the results with FFT sampling frequency.



- Synchronous Order Tracking: the Synchronous Order analysis allows synchronizing the results with tachometer pluses so the analysis is free of random interference.

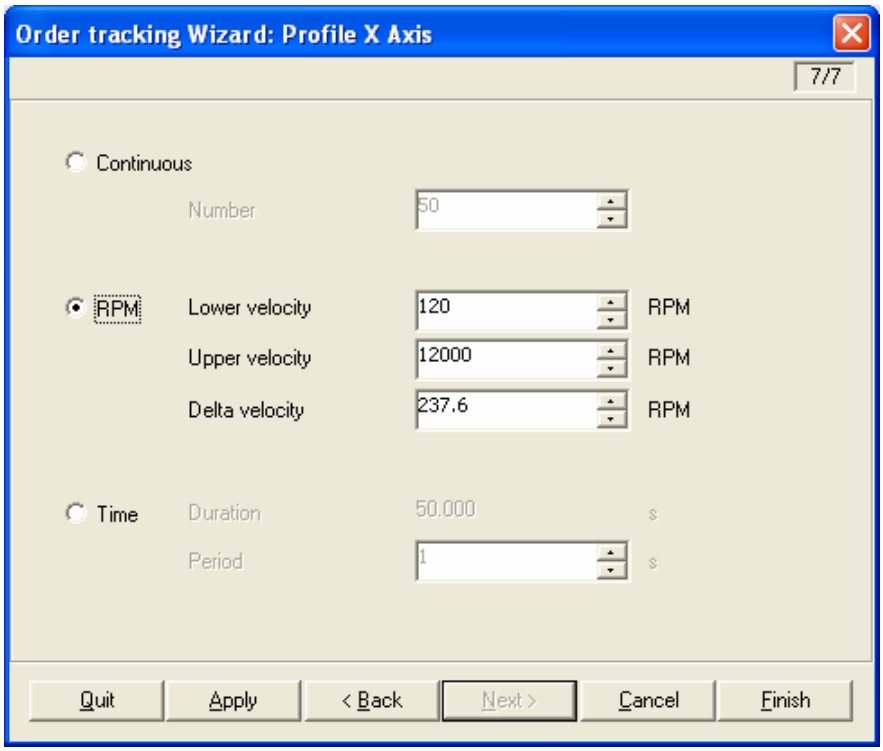


Order selection:



Select up to 8 orders to track.
In CBT mode, the bandwidth is displayed in the table for each order. In function of the max orders number, a bandwidth will be displayed by default (calculated in NVGate: Bandwidth = Max Order*RPMmax).

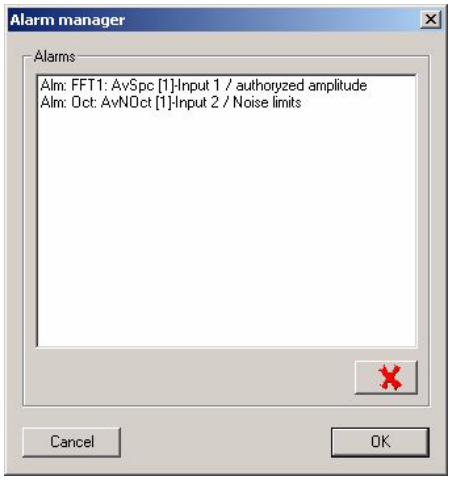
Profile X-axis:



Select the type of acquisition of X-axis of the profile order in mode waterfall

6.1.4.8 Alarm manager

Opens a dialog box displaying the list of alarms available

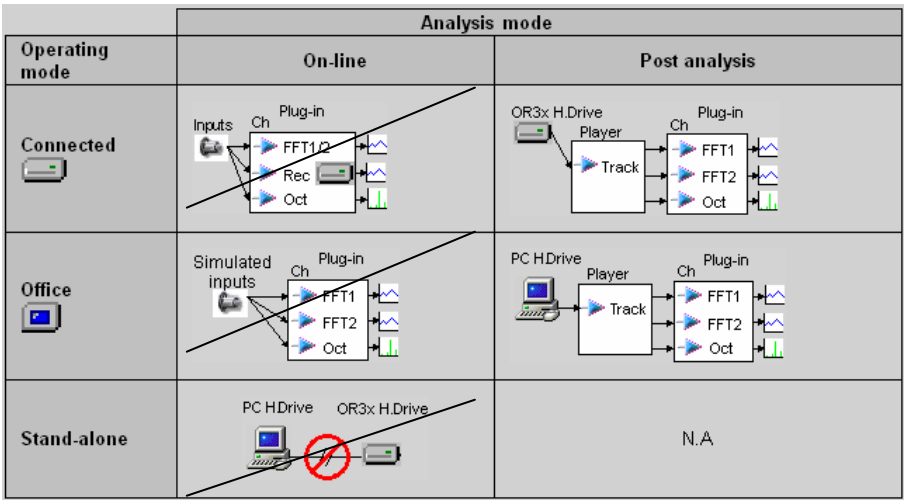


Select an alarm and click the remove button to remove the alarm.
To add an alarm, use the Add Alarm command in a graphic window containing a template result and a result coming from a plug-in.

6.1.5 Setup

The ‘Setup’ menu is a way to access to the same function than by using the ‘setup toolbars’ (see below in this chapter).

6.1.5.1 Post-analysis



The Post analysis mode is used to analyze recorded data. The Post-analysis item must be checked in the "Channels" menu to select the post analysis mode.
The Front-end module and the Output Signals modules are disables in this mode.

The player tracks are completed with the recorded channels of the file selected in the player module. The plug-in analyzer sources are the active player tracks.
For the Synch. Order analyzer, only the tracks with the same signal bandwidth can be plugged. If no track is selected as source for this analyzer, the list contains all the active tracks. Once one track is selected, only the tracks with the same signal bandwidth as this track are displayed in the list.
The recording of any player track is possible.

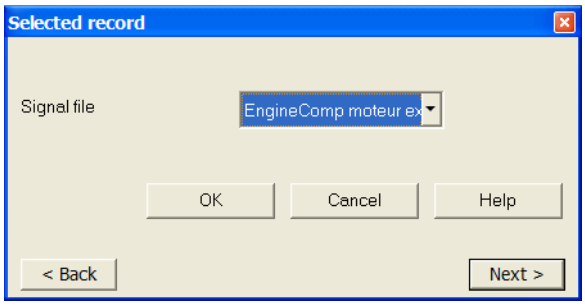
The post-analysis is a reproduction of the standard mode (source + Front end) but with recorded signals through the player.

The post-analysis is available only if:

- In ‘connected’ mode, the specified signal is recorded in the analyzer (not available for OR34/35).
- In ‘office’ mode, the specified signal is recorded on the PC.

6.1.5.2 Files

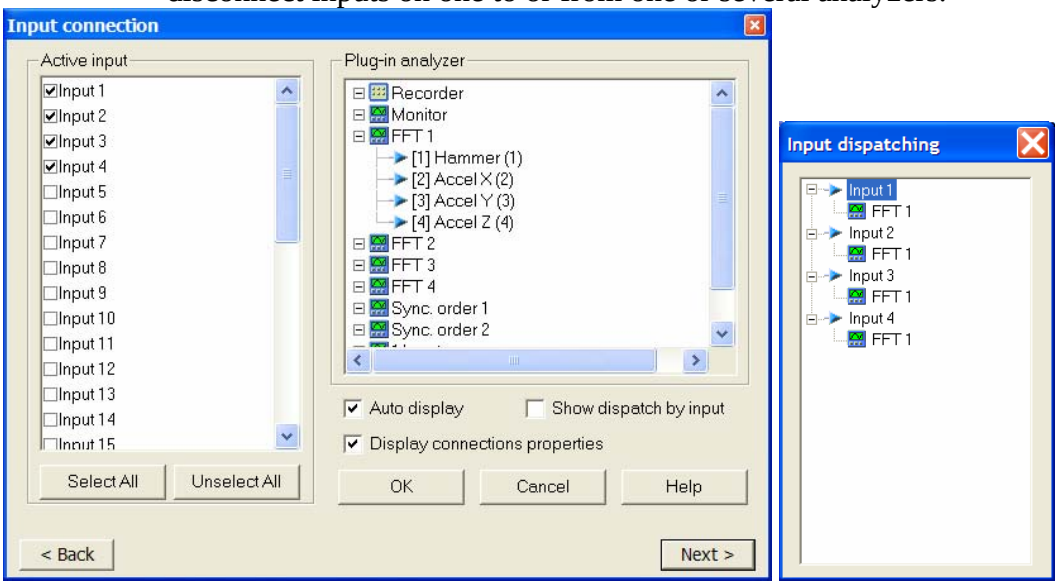
This menu displays the following window:



Recorded signal files are available to be loaded and post-analyzed.

6.1.5.3 Acquisition

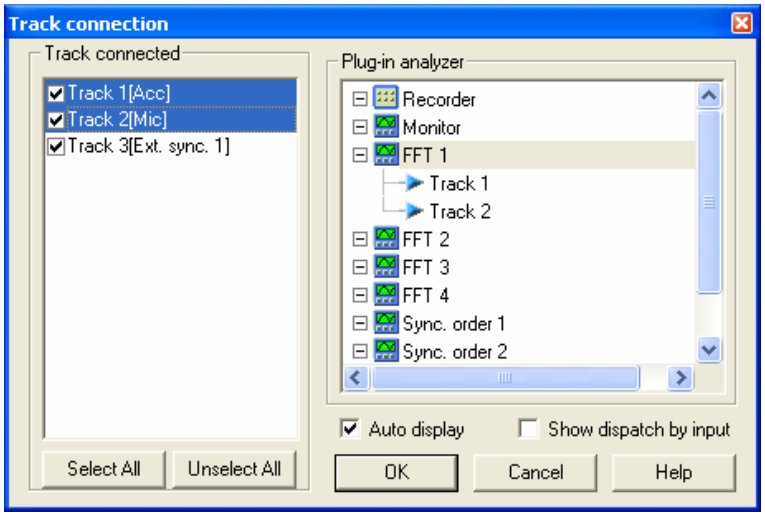
- Inputs: Used to activate or remove one or several inputs and connect or disconnect inputs on one to or from one or several analyzers.



- **Active input:** Lists the available inputs. Check inputs to activate them. Multiple inputs may be selected.
- **Plug-in analyzer:** Lists the available plug-ins and the inputs connected to them. Several inputs can be selected and dragged & dropped on selected analyzers. If an input is dropped on an analyzer, it will be automatically checked.
  Right click to remove selected connections.
- **Show dispatch by input:** If checked, an additional tree representing the dispatch by input: is displayed showing which input is connected to which analyzer.

- Calibration:

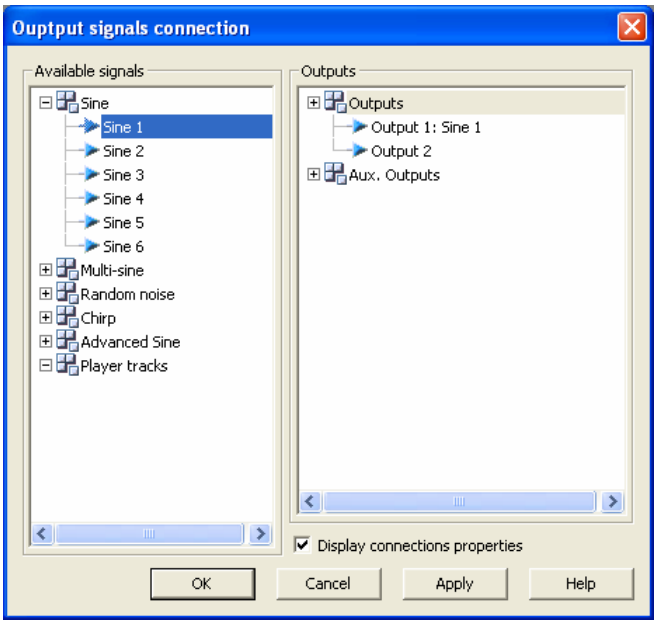
- Player tracks:
  Used to activate or remove one or several tracks and connect or disconnect them to or from one or several analyzers. Player tracks connection dialog is only available in Post analysis mode.



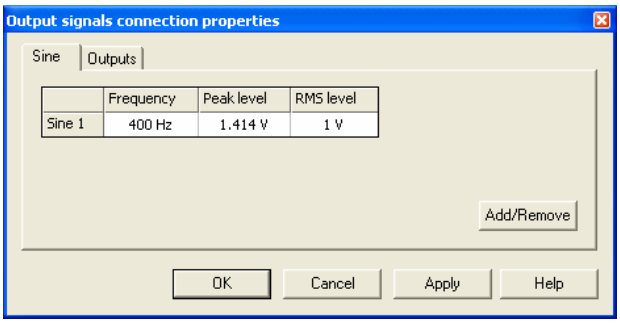
  - **Track connected:** Lists the available tracks. Check tracks to activate them. Multiple tracks may be selected.
  - **Plug-in analyzer:** Lists the available plug-ins and the tracks connected to them. Several tracks can be selected and dragged & dropped on selected analyzers. If a track is dropped on an analyzer, it will be automatically checked.
    Right click to remove selected connections.
  - **Show dispatch by input:** See "Inputs" topic p 6-45.

Note: By right clicking on the signal you want to analyze, you can select ‘post-analyze’ to display the same window in order to connect tracks to specific plug-in analyzer.

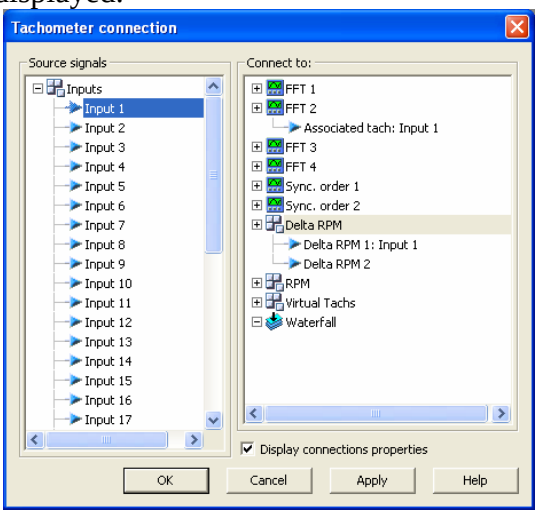
- Outputs Signals:
  This menu is a wizard guiding the user through settings of the output signal. Connections and settings related to the specific output selected will be automatically displayed.



By ‘drag and drop’ the user can connect any available signals to the output or the Aux output. By default if an output signal is dragged and dropped directly on ‘Outputs’ or ‘Aux. Outputs’, the signal will be connected to the first available output.
Properties of all connected signals and outputs will be displayed and available to modify in the following window.

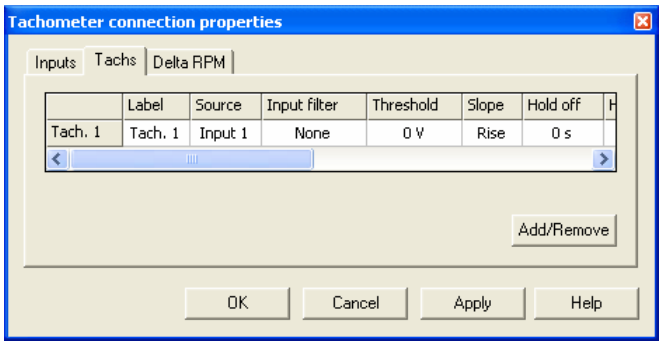


- Tachometers
  This menu is a wizard guiding the user through settings of Tachometers. Connections and settings related to the specific tachometer selected will be automatically displayed.

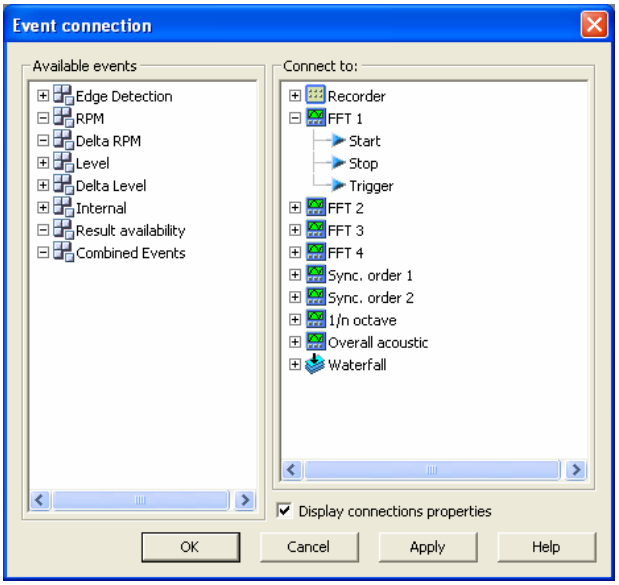


By ‘drag and drop’ the user can connect any source signals to any plug-in. By default if a source signal selected as a tachometer is dragged and dropped directly to the specified connection, the tachometer’s source will be connected to the first available setting.

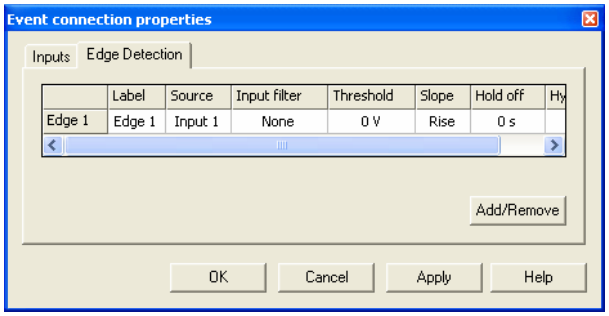
Properties of all connected inputs, tachometers and delta RPM will be displayed and available to modify in the following window.



- Event:
  By this menu it is possible to define an event for the start, stop and/or trigger.



By drag and drop you can define the specific event to the selected plug-in, then all properties linked with the event and the input will be displayed.



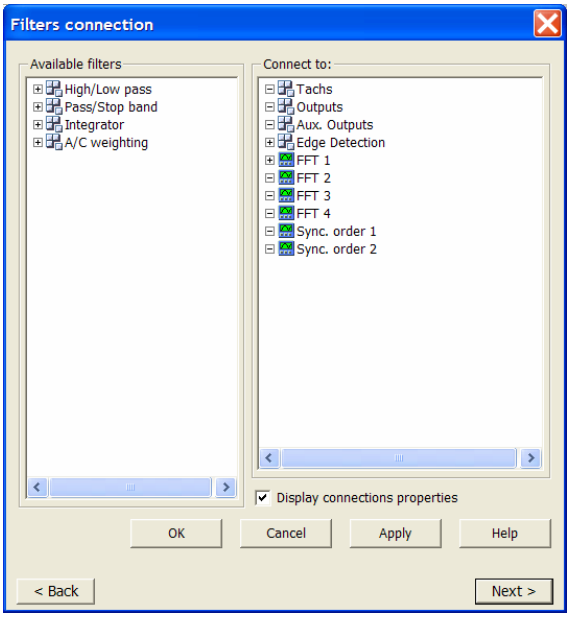
- **Edge detection**: By default the edge detection is connected to the trigger* of the plug-in
- **RPM**: By default the RPM is connected to the start event of the specified plug-in.
- **Delta RPM**: By default the RPM is connected to the trigger* event of the specified plug-in.
- **Level**: By default the RPM is connected to the start event of the specified plug-in.
- **Delta Level**: By default the RPM is connected to the trigger* event of the specified plug-in.
- **Internal**: By default the RPM is connected to the trigger* event of the specified plug-in.
- **Result availability**: By default the RPM is connected to the trigger* event of the specified plug-in.
- **Combined Events**: By default the RPM is connected to the trigger* event of the specified plug-in.

Note: if the trigger event is not available on the selected plug-in the default connection will be done on the start event.
In the case the default value is already defined, the selected event will be connected to first available event.

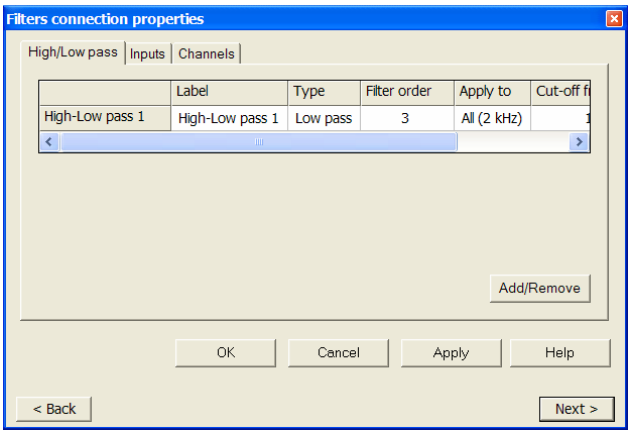
For the Combined Events, the user must add a combination in the ASB in order to be able to connect combined event to selected plug-in.
For RPM or Delta RPM event, a tachometer must be defined (‘Connection’ Tachometers).

6.1.5.4 Analysis

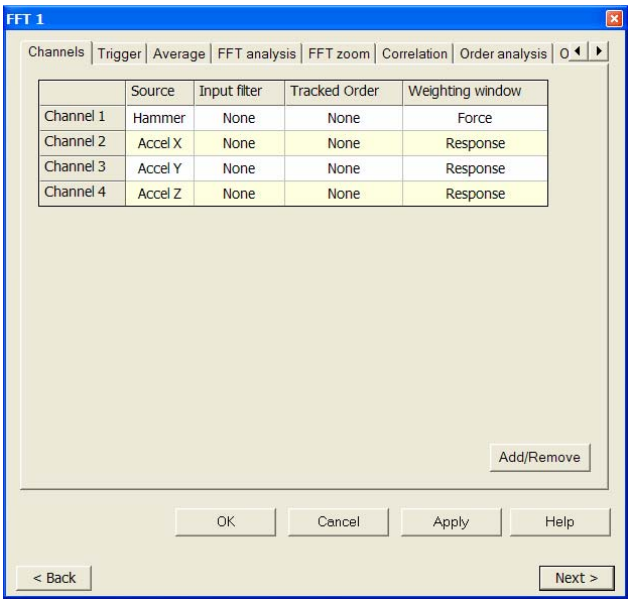
- Filters:



Filters are available only for tachometers, outputs, aux. Outputs, edge detection, FFT, and Sync. Order and only after being activated using the 'Inputs', 'Outputs signals', 'Tachometers' or 'Event' connections previously described.
All filters are available, and by adding any filters to any channel, the properties of filters and channel selected are displayed and filters are applied in the current measurement:



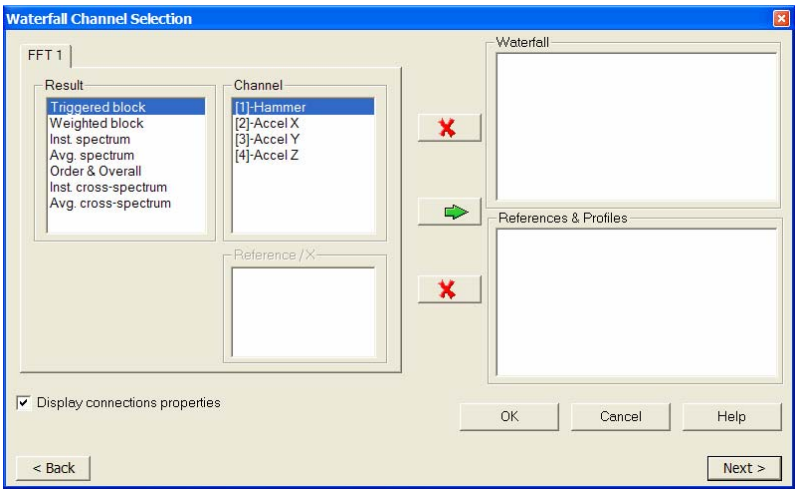
- Plugs-in:



This menu displays settings of connected plug-in (FFTx, SOAx, Octave, Overall acoustic, Recorder and Monitor). See also chapter 1 ‘Analyzer Settings’.

- Weighting windows: installer la V4.22

- Waterfall



- **Plug-in analyzer tab:** A tab is displayed for each plug-in analyzer connected. This displays waterfall source results.
  - **Result**: List of results provided by the plug-in analyzer selected. This can be the source of the waterfall plug-in analyzer.
  - **Channel**: List of plug-in analyzer channels connected, available for the result selected.

- **Reference / X**: List of plug-in analyzer channels connected. This can be the reference. Available for results that require a reference only (cross-spectrum, for example).
- **Tracked order**: List of tracked orders on the channel selected. Available if result selected is an order result.

- **Waterfall:** List of 3D Waterfall displays. These waterfalls can be displayed versus any one of the references selected in the "Reference and profiles" list.
- **References & Profiles:** List of profiles and references provided by the waterfall plug-in. All scalar profiles selected can be used as references, except monitor scalars, sound level meter scalars, and orders.

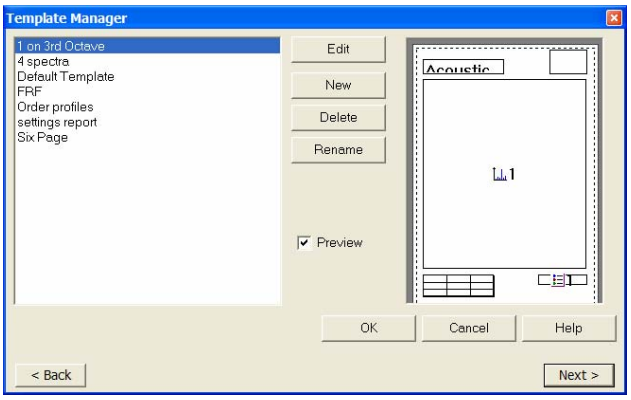
Adds a new Waterfall. If the result selected is a scalar, a new profile is added to the "References and profiles" list. Otherwise, a new Waterfall is added to the "Waterfall" list.
If the Waterfall or profile already exists, the clicking on this button has no effect. If a tracked order is selected, all orders tracked on the channel selected are added.

Removes the selected result from the corresponding list.

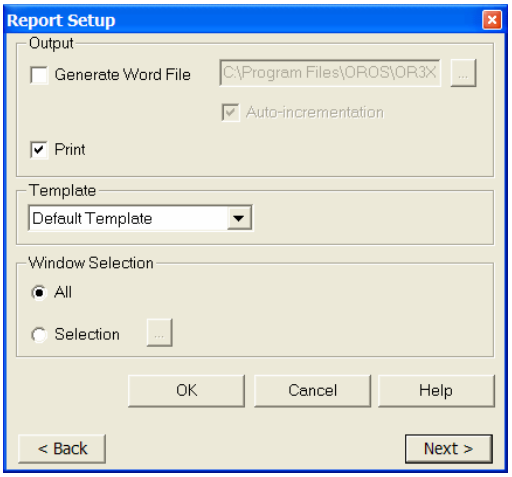
6.1.5.5 Display / Report

- Add/Remove: see Add/Remove windows below in the ‘Windows’ section

- Report Manager:



- Report Setup:



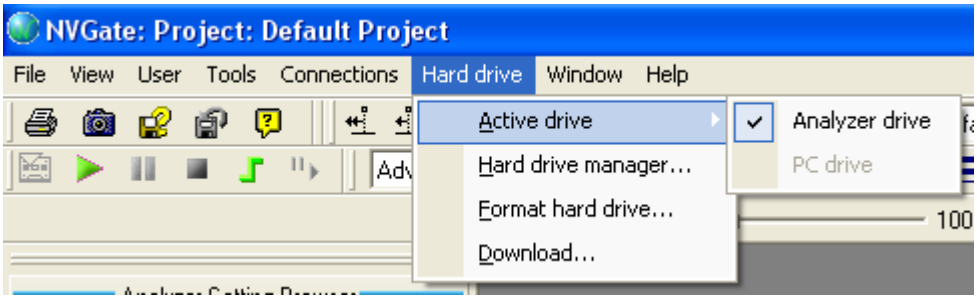
6.1.5.6 Save

- Setup
- Save project
- Export Result Files
- Export Signal Files

6.1.6 Hard Drive

6.1.6.1 Active

This mode is available only in the ‘off-line’ mode.



In office mode two disks are available:

- PC disk
- USB disk compatible detected (the list of these disks is upgraded at every USB connection or disconnection)

6.1.6.2 Manage

See “Disk management” topic from Chapter 3: “Hardware Management”.

6.1.6.3 Format

See “Disk management” topic from Chapter 3: “Hardware Management”.

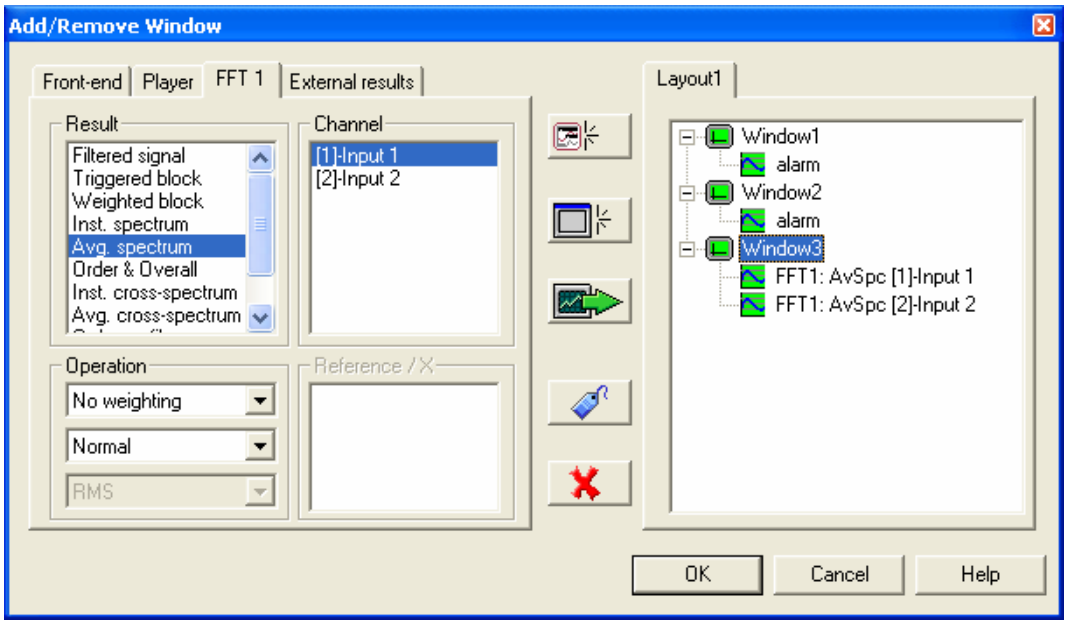
6.1.6.4 Downloads

See “Disk management” topic from Chapter 3: “Hardware Management”.

6.1.7 Windows

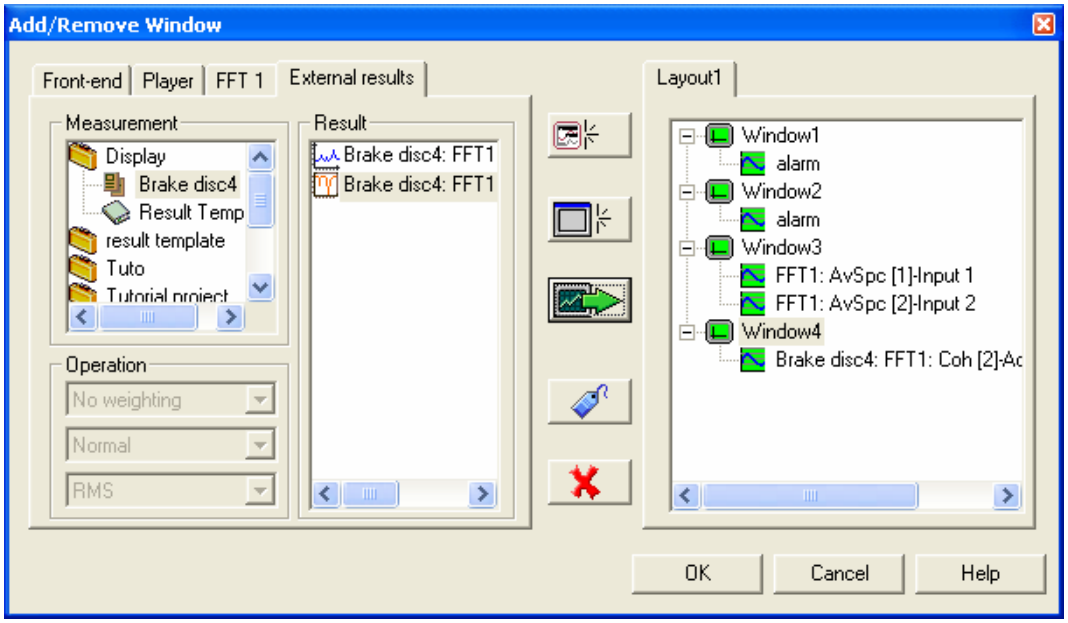
6.1.7.1 Add/Remove

- **Plug-in analyzer tab:** A tab is displayed for each plug-in analyzer connected.



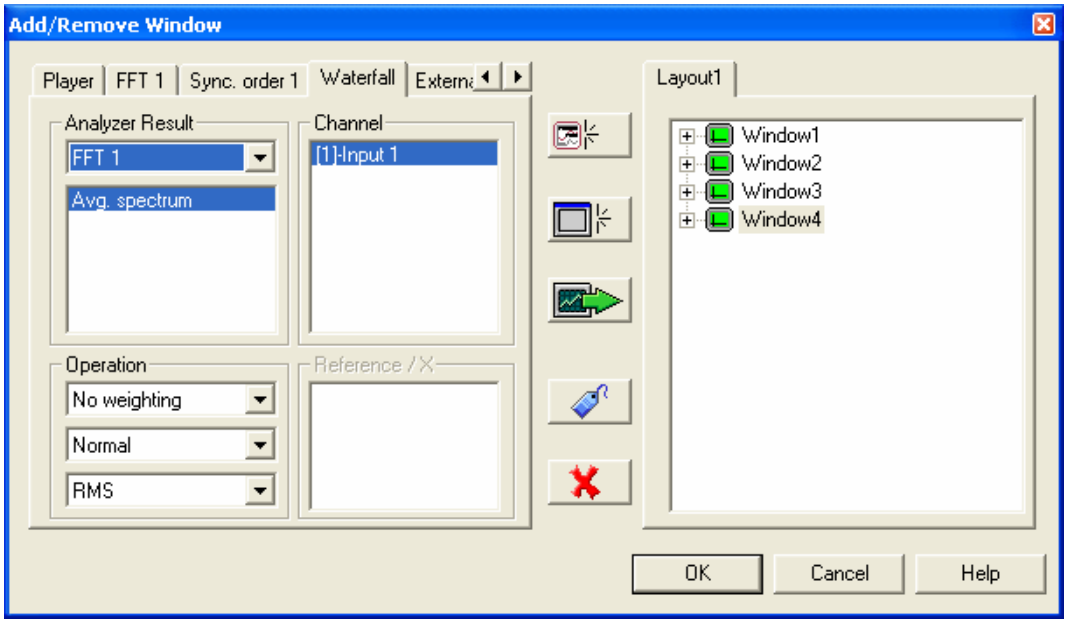
  - **Result selection**: List of results provided by the plug-in analyzer selected. Multiple plug-ins may be selected if all results selected are compatible (which means that they can be displayed in the same result window).
  - **Channel selection**: List of plug-in analyzer channels connected, available for the result selected.
  - **Operation**: in the top combo-box, list of weighting which can be applied to results selected. In the middle combo-box, list of derivation/integration operations which can be applied. In the bottom combo-box, list of display units.
  - **Reference / X**: List of plug-in analyzer channels connected. This can be the reference. Available for results that require a reference only (cross-spectrum, for example).
  - **Tracked order**: List of tracked orders on channel selected. Available if result selected is an order result.

- **External result tab:** The “Externals results” tab allows displays results saved in measurements.



- **Measurement selection**: List of measurements classified by project.
- **Result selection**: List of results saved in the measurement selected. Multiple selections are not available.
- **Operation**: in the top combo-box, list of weighting which can be applied to results selected. In the middle combo-box, list of derivation/integration operations which can be applied. In the bottom combo-box, list of display units.

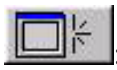
- **Waterfall tab**



- **Analyzer result**: The list of plug-in analyzers connected that provide Waterfall source results is displayed in the combo-box. The list of results

provided by the plug-in analyzer selected, which can be a waterfall source is displayed in the list-box below.

- **Channel selection**: List of plug-in analyzer channel connected, available for the result selected.
- **Operation**: in the top combo-box, list of weighting which can be applied to the results selected is displayed. In the middle combo-box, a list of derivation/integration operations that can be applied is displayed. In the bottom combo-box, a list of display units is displayed.
- **Reference / X**: List of plug-in analyzer channels connected. This can be a reference. Available for results that require a reference only (cross-spectrum, for example).
- **Tracked order**: A list of tracked orders on the channel selected. Available if the result selected is an order result.

- **Layouts/windows/traces**
  - One tab is displayed for each layout. Each tab is made up of a tree showing the windows and results displayed in each window.
  - : Creates a new layout. A dialog box used to name the new layout is displayed by clicking on the button. A new tab is created and selected, corresponding to the new layout.
  -  : Creates a new window, in the layout of the selected tab. A dialog box used to name the new window is displayed by clicking on the button.
  - : Adds the results selected in the window of the layout tab. If the layout does not contain any windows, a new window is created. A dialog box that shows the name of the new window is displayed. If a result is selected in the layout tab, a click on this button has no effect.
  - : Renames the window selected in the layout tab. If no window is selected, a click on this button has no effect and an error message is displayed in a message box.
  - : Deletes the selected window or trace selected in layout tab.

6.1.7.2 Freeze / Freeze all

- **Freeze all:** freeze all active result windows. The results displayed in all windows will not be refreshed.
- **Freeze:** freeze the active results window. The results displayed in this window will not be refreshed.

6.1.7.3 Close all

Close all results windows.

6.1.7.4 Refresh all

Refresh all windows

6.1.7.5 Auto scale all

See chapter2 'Display' p 23

6.1.7.6 X/Z Adjust all

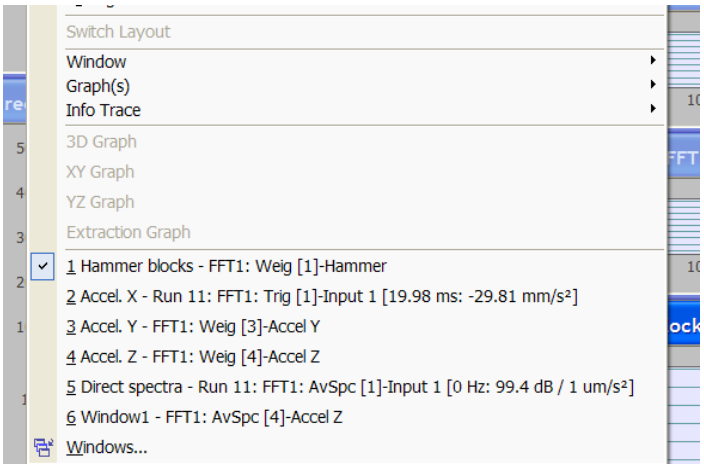
6.1.7.7 Cascade

Cascade arrangement of results windows.

6.1.7.8 Tile

- **Tile horizontally**: tile windows horizontally.
- **Tile vertically:** tile windows vertically.
- **Automatic tile:** organize windows in the best arrangement, considering the type and contents of the results windows.

6.1.7.9 Arrange Icons



6.1.7.10 Switch Layout

This command is available in order to switch from one layout to another layout in the active project.

6.1.7.11 Window

This menu is a way to have access to settings of the corresponding active window. Those settings are available also by right clicking in a window outside of the graph itself, and are explained in the chapter 2 "Display" p18.

6.1.7.12 Graph(s)

This menu is a way to have access to settings of the corresponding graphs in active window. Those settings are available also by right clicking in a window on graphs itself, and are explained in the chapter 2 “Display” p13.

6.1.7.13 Info Trace

This menu is a way to have access to settings of the infotrace of the corresponding active window. Those settings are available also by right clicking in the infotrace itself, and are explained in the chapter 2 “Display” p8.

6.1.7.14 3D Graph

This command is equivalent to a right-click on a 3D graph, making available zoom, scale… To know more about those settings see chapter 2 “Display” ‘Graph menu’ p13

6.1.7.15 XY Graph

This command is equivalent to a right-click on a XY graph, making available zoom, scale… To know more about those settings see chapter 2 “Display” ‘Graph menu’ p13

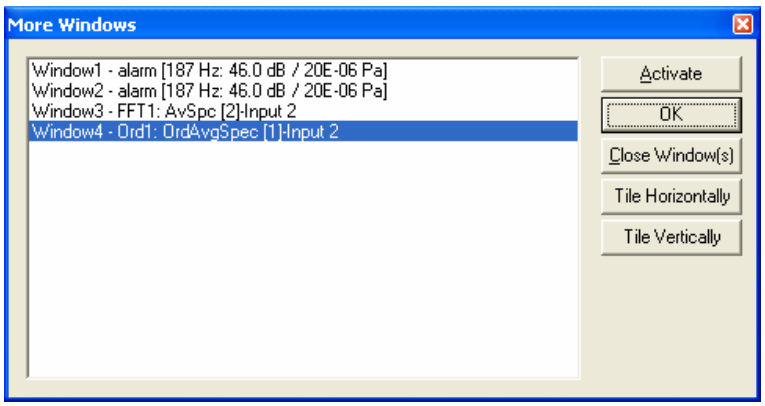
6.1.7.16 YZ Graph

This command is equivalent to a right-click on a YZ graph, making available zoom, scale… To know more about those settings see chapter 2 “Display” ‘Graph menu’ p13

6.1.7.17 Extraction Graph

This command is equivalent to a right-click on an extraction graph of a waterfall, making available zoom, scale… To know more about those settings see chapter 2 “Display” ‘Graph menu’ p13

6.1.7.18 Windows



- **Activate:** makes active the window selected in the list. The selected window becomes the current window.
- **Close window(s):** allows closing the window(s) selected in the list. It is possible to make multi-selection.

6.2 Views

6.2.1 Workspace

Checks/Unchecks this item to display/hide the workspace window.
See "Workspace" topic p 6-25.

6.2.2 Log window

Checks/Unchecks this item to display/hide the log window.
See "Log window" topic p 6-25.

6.2.3 Analyzer status

Checks/Unchecks this item to display/hide the Analyzer status window.
See "Analyzer status" topic p 6-26.

6.3 Toolbars

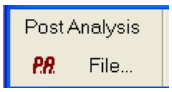
6.3.1 Set Up

Note: more information about each setting is available with this toolbars see the 'Setup' menu above.

The setup steps of the analyzer are reachable directly with this toolbars in order to guide step by step through main setting of the measurement.

This toolbar is a setup wizard, that is to say that steps are scanned using the Next/Previous buttons available in each dialog.
All different steps are grayed until they become available. At any time during a measurement, a dialog box can be called by clicking the relevant button in the setup toolbar.

This toolbars is divided in 5 sections:

- **Post Analysis** : 

in this part of the toolbar, the first button allow the selection of the analysis mode (post-analysis or on-line) and the second button is to load directly a file in the player.

- **Acquisition** :

this section is used for active plugs-in setup. The buttons are respectively:

Input connections

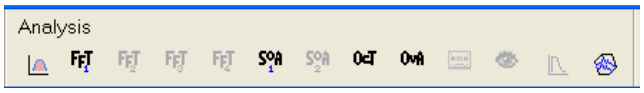
Calibration

Player track connection

Generator setup

Tachometer setup

Trigger setup

- **Analysis** : 

this section is for plugs-in setup
The buttons are respectively:

Filters affectation and settings

FFTs analysis settings

SOAs analysis settings

1/N Octave settings

Overall acoustics level settings

Recorder settings

Monitor setup

Weighting windows setup

Waterfall connections and settings

- **Display & report**:

This section is dedicated to display management; all requested settings are available for display management or report generation through these buttons.
The buttons are respectively:

Add/Remove layouts windows, traces

Report template management and edition

Report setup

- **Save and Export** :

the last section is to manage results and projects saving and also data export.
The buttons are respectively:

Save setup, selection of result to save

Save project, save all current setting in a project

Export result to TXT, UFF, Matlab, SDF

Export signal to TXT, UFF, Matlab, Wav

6.3.2 Standard

- **Print Report** **:** Prints the report specified in the report setup.
See "Print report" chapter p 6-19.

- **Print snapshot** **:** Prints a snapshot of the active result window.
See "Print snapshot" chapter p 6-19.

- **Setup** **:** Specifies the results to save and saves parameters at the end of measurement.
See "Setup" chapter p 6-14.

- **Save result** **:** Saves measurement results displayed in result windows.
See "Erreur ! Source du renvoi introuvable." chapter p Erreur ! Signet non défini..

- **Help topic** **:** Displays the main On-Line Help topics.

6.3.3 Window

- **Cascade** **:** Cascades the result windows.

- **Tile horizontally** **:** Tiles windows horizontally.

- **Tile vertically** **:** Tiles windows vertically.

- **Automatic tile** **:** Organizes windows in the best arrangement according to the type and contents of the result windows.

- **Add/remove window** : Opens the “Add/remove window” dialog box.
  See “Inputs” topic p 6-45.

6.3.4 View

- **Log window** : Shows/Hides the Log window.
  See "Log window" chapter p 6-25.

- **Analyzer status viewer** : Shows/Hides the Analyzer status viewer.
  See "Analyzer status" chapter p 6-26.

- **Workspace** : Show/Hide the Workspace.
  See "Workspace" chapter p 6-25.

6.3.5 Display mode

This toolbar contains specialized tools for the windows
Only one mode can be selected at the same time.

- **Scale mode** : This mode is used to modify scales using in the mouse graph, by moving the cursor on the scale. The cursor shape changes depending on the position of the mouse on the scale. Use the mouse wheel or the Up/Down arrows to change the scale value. If the Ctrl key is pressed, the changes are five times smaller, for more precise adjustment of the value modified.

Mouse cursor	Position on the scale and action
,	On the lower left part of the scale. Only the minimum value of the scale is modified.
,	On the upper right part of the scale. Only the maximum value of the scale is modified.
,	On the center of the scale. Both minimum and maximum values are modified, in the same direction. This performs a translation of the scale
,	On the center of the scale, with Shift key pressed. Both minimum and maximum values are modified, in the opposite direction. This zooms in/out.

- **Zoom mode** : In this mode, left-click drag using the mouse in order to draw a rectangle to zoom into. When the left-button is released, the displayed area corresponds to the area defined by the rectangle.
  If the size of the rectangle is smaller than the active signal precision displayed in the window, the zoom is not completed.

- **Cursor mode** : In this mode, left-click on the cursor and drag it using the mouse in order to move it.

- **Move mode** : In this mode, left click on the window and use the mouse to drag.

- **Rotate the reference** : In this mode, left-click on a 3D window and drag using the mouse to, change the orientation of the view. Left-right mouse dragging rotates the view around the Y-axis, top-bottom dragging around the X-axis.

- **Marker mode** : In this mode, left-double clicking on a window adds the selected type of marker, - if compatible -, to this area at this position.
  In this mode, left-click on the cursor and drag it using the mouse in order to move the selected marker.

6.3.6 Active workbook

- **Workbook:** Used to switch between Measurement / Result modes.
- **Layout:** Changes the active layout.

6.3.7 Inputs

- **Auto-range** : Performs an auto range on the active inputs. It is a shortcut to the action button in the Analyzer Setting Browser Front-end / Auto-ranging / Auto range
- **Input** : Indicates the state of an input.

	The input is not active
	The input is under loaded. Signal is weak
	Normal.

	An overload has been detected, the signal on the input is correct
	The input is overloaded.

A right-click on an active input displays a pop-up menu:

It is used to modify the range or any of the input parameters.

6.3.8 Zoom

This toolbar includes basic functions for modifying zooms in graph. Use the axis adjustment toolbar for more advanced functions.

- **Zoom in X**: Makes the X-scale two times smaller and sets the minimum and maximum values so that the cursor is in the middle of the graph
- **Zoom out X**: Makes the X-scale twice as large and sets the minimum and maximum values so that the cursor is in the middle of the graph
- **Zoom in Y**: Makes the Y-scale twice as small.
- **Zoom out Y**: Makes the Y-scale twice as large.
- **Auto-scale on all**: Adjusts the minimum and maximum values of the Y-scale so that every curve is fully visible
- **Auto-scale X/Z on all**: Adjust minimum and maximum values of the X or Z-scale so that every point on the irregular axis is visible.
- **Zoom 100%**: Restores the default values of every scale of the graph.

6.3.9 Marker

6.3.9.1 Move marker

- **Move marker to the left**: Moves the selected marker of the active window one step to the left, down to the X scale min value maximum.

- **Move marker to the left by 1/32 step** : Moves the selected marker of the active window by 1/32 step to the left, down to the X scale min value maximum. This is allowed only if the current value of the marker is a peak
- **Move marker to the right by 1/32 step** : Moves the selected marker of the active window by 1/32 step to the right, up to the X scale max value maximum. This is allowed only if the current value of the marker is a peak
- **Move marker to the right** : Moves the selected marker of the active window by one step to the right, up to the X scale max value maximum.

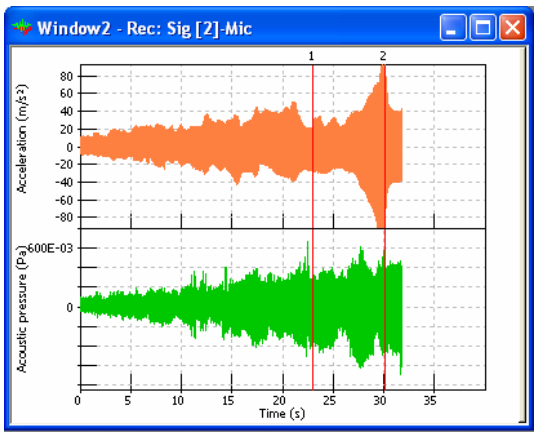
6.3.9.2 Marker type

This list contains the available marker types that can be added to a window. When the marker mode is selected, and the user double-clicks on a window, a marker of the selected type is added to this window if compatible.

6.3.9.3 Record marker

When this button is pressed and the analyzer is recording, a record marker is added to the recorded signal. If there is a recording window, the maker is displayed. During the recording, a comment can be added to the record marker, via the properties dialog box.

See more details about the markers in the “Markers” topic from the “Chapter 2: Display”.



6.3.10 Control

This toolbar is designed to control the analyzer

6.3.10.1 Arming of the recorder

Shortcut Ctrl + Shift + R

6.3.10.2 Run

Shortcut: Ctrl + R
Starts all the analyzers. If the analyzer is already running, it restarts.

6.3.10.3 Pause

Shortcut: Pause
Pauses or cancels the pause in the analysis. If the recorder is running, its starts / finishes a record.

6.3.10.4 Stop

Shortcut: Ctrl + S
Stop all the analyzers

6.3.10.5 Manual trigger

Shortcut: Ctrl + T
Used to start, stop, trigger, manually the analyzer.

6.3.10.6 Play by step

Shortcut: Ctrl + B
Available only in post-analysis, when the file is played by step. The command starts a new step or pauses the current step. It works independently of the Run and Pause commands

6.3.11 Modal

This tool bar is used in modal analysis. It is displayed only when Structural mode has been selected.

6.3.11.1 Accept

Shortcut: Ctrl + Y
Accepts the last acquisition

6.3.11.2 Reject

Shortcut: Ctrl + N
Rejects the last acquisition

6.3.12 Axis displacement

This toolbar is designed to perform all the actions on the three possible axes of a graph

- **Zoom in X** : Shortcut: X + Shift + Home
  Increases the minimum value and decreases the maximum value of the X scale
- **Zoom out X** : Shortcut: X + Shift + End
  Decreases the minimum value and increases the maximum value of the X scale
- **Move left X** : Shortcut: X + Home
  Increases the minimum value and the maximum value of the X scale
- **Move right X** : Shortcut: X + End
  Decreases the minimum value and the maximum value of the X scale
- **Reset min X** : Sets the minimum value of the X scale to its default values
- **Reset min and max X** : Sets the minimum and maximum values of the X scale to their default values
- **Reset max X** : Sets the maximum value of the X scale to its default value
- **Zoom in Y** : Shortcut: Y + Shift + Home
  Increases the minimum value and decreases the maximum value of the Y scale
- **Zoom out Y** : Shortcut: Y + Shift + End
  Decreases the minimum value and increases the maximum value of the Y scale
- **Move up Y** : Shortcut: Y + Home
  Increases the minimum value and the maximum value of the Y scale
- **Move down Y** : Shortcut: Y + End
  Decreases the minimum value and the maximum value of the Y scale
- **Reset max Y** : Sets the minimum value of the Y scale to its default value
- **Reset min and max Y** : Sets the minimum and maximum values of the Y scale to their default value
- **Reset min Y** : Sets the maximum value of the Y scale to its default value
- **Zoom in Z** : Shortcut: Z + Shift + Home

Increases the minimum value and decreased the maximum value of the Z scale

- **Zoom out Z** : Shortcut: Z + Shift + End
  Decreases the minimum value and increases the maximum value of the Z scale
- **Move front Z** : Shortcut: Z + Home
  Increases the minimum value and the maximum value of the Z scale
- **Move back Z** : Shortcut: Z + End
  Decreases the minimum value and the maximum value of the Z scale
- **Reset min Z** : Sets the minimum value of the Z scale to its default value
- **Reset min and max Z** : Sets the minimum and maximum values of the Z scale to their default values
- **Reset max Z** : Sets the maximum value of the Z scale to its default value

6.3.13 Sequence

- **Pause/Run sequence** : button released starts the loaded sequence. Button pressed pauses the sequence.
- **Reset** : pauses the sequence then resets to the first step.
- **Previous** and **Next step** : button pressed moves to next or previous step.
- **Active sequence:** displays the name of the loaded sequence.
- **Step:** displays the name of the current step

See also "Sequence" topic “Chapter 5: Tools”

6.3.14 Link

- **Application:** Displays the application selected within the list of applications available. All applications must be located in the directory Links.
- **Execute** : Executes the application selected from the list on the left.

6.3.15 Battery

This tool bar is used in modal analysis. It is displayed only when Structural mode has been selected.

- **Charge** **:** Indicates the remaining battery charge.
- **Power** **:** Indicates the type of power supply.

	The analyzer is plugged in
	The analyzer is running on

6.3.16 Fan

This tool bar is used in modal analysis. It is displayed only when Structural mode has been selected.

- **Temperature**

: Indicates the temperature inside the hardware
- **Speed**

: Fan Speed, as a percentage of the maximum possible speed
- **Mode**

: Fan operating mode

On	The fan is running continuously
Auto	The fan runs only if needed. It automatically starts when temperature increases
Off	The fan is stopped.

- **Speaker**

: Activates or deactivates the speaker inside the hardware.

6.3.17 Specialized mode

6.3.17.1 Rotating

Mode designed for any rotating machinery. The tach plug-in and the order tracking settings are available.

6.3.17.2 Structural

Mode designed for modal analysis. Used for FRF calculation and various settings, as well as the modal analysis toolbar.

Chapter 7: User Preferences

Table of contents:

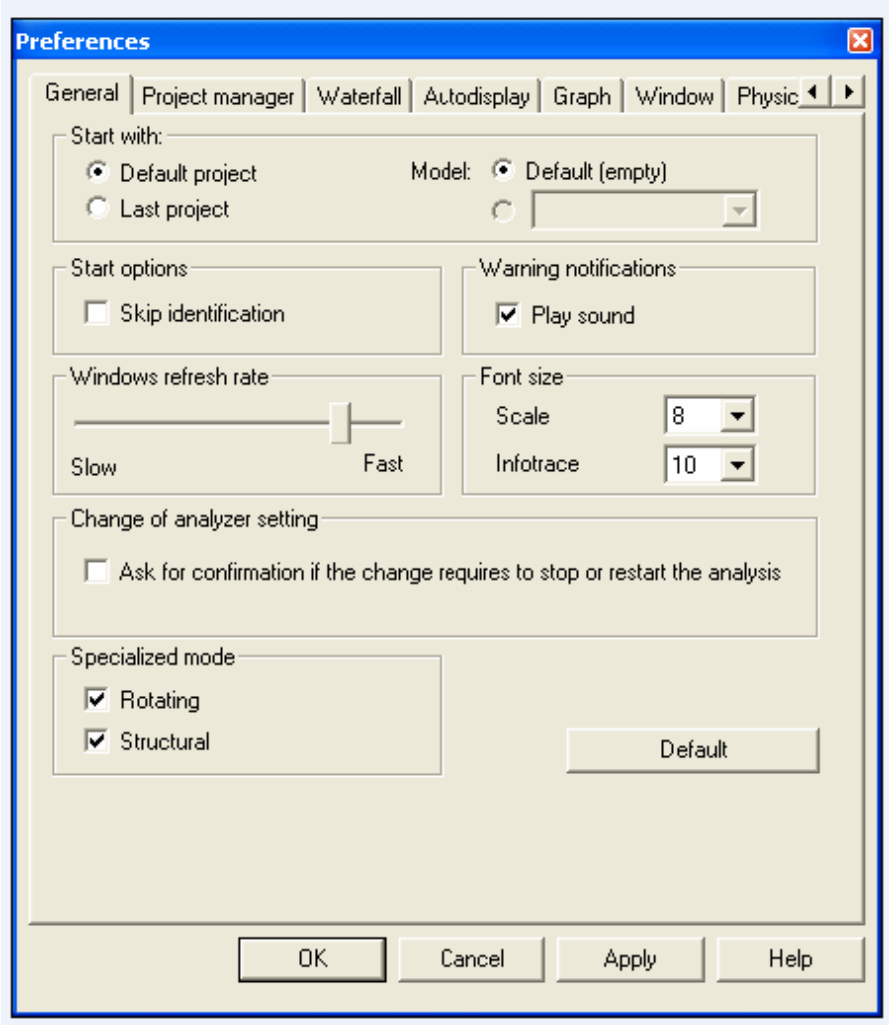
7.1 General ... 7-5
7.2 Project manager ... 7-7
7.2.1.1 Project manager options ... 7-7
7.2.1.2 Measurements displayed ... 7-7
7.2.1.3 General ... 7-8
7.2.1.4 New project ... 7-8
7.3 Save ... 7-9
7.3.1.1 New measurement ... 7-9
7.3.1.2 Saved Results ... 7-10
7.4 Waterfall ... 7-10
7.5 Autodisplay ... 7-17
7.6 Graph ... 7-19
7.6.1 Time ... 7-19
7.6.2 Spectral ... 7-20
7.6.3 Nth octave ... 7-23
7.6.4 Viewmeter ... 7-25
7.6.5 Monitoring ... 7-26
7.6.6 Compressed signal ... 7-27
7.6.7 Profile ... 7-28
7.6.8 Complex profile ... 7-29
7.6.9 Coherence ... 7-32
7.6.10 Lissajous ... 7-33
7.7 Window ... 7-34
7.8 Physical quantity ... 7-36
7.8.1.1 Modify ... 7-38
7.8.1.2 Remove ... 7-38
7.8.1.3 Precision in dB ... 7-38
7.9 Marker ... 7-39
7.9.1 Free Marker page ... 7-39
7.9.1.1 Style ... 7-39
7.9.1.2 Label setup ... 7-40
7.9.1.3 Line setup ... 7-40
7.9.2 Harmonic marker page ... 7-41
7.9.2.1 Style ... 7-41
7.9.2.2 Harmonic ... 7-42
7.9.3 Peak marker page ... 7-43
7.9.3.1 Style ... 7-43
7.9.3.2 Max ... 7-44
7.9.3.3 Sort by ... 7-44
7.9.3.4 Find peak algorithm ... 7-44
7.9.4 Side band marker page ... 7-46
7.9.4.1 Style ... 7-47
7.9.4.2 Marker color ... 7-47
7.9.4.3 Side bands ... 7-48
7.9.5 Max marker page ... 7-48
7.9.5.1 Style ... 7-48
7.9.5.2 Find max algorithm ... 7-50
7.9.6 Power band marker page ... 7-51

7.9.6.1 Style 7-51
7.9.6.2 Power bands 7-52
7.9.6.3 Octave marker page 7-53
7.10 Export 7-54
7.10.1 UFF 7-54
7.10.1.1 Results 7-54
7.10.1.2 Signal 7-55
7.10.2 Mat 7-55
7.10.2.1 Matlab version 7-55
7.10.2.2 Format 7-56
7.10.3 Txt 7-56
7.10.3.1 Generate one file per track 7-56
7.10.3.2 Complex results export 7-56
7.10.3.3 Waterfall export 7-57
7.10.4 Wav (audio) 7-57
7.10.4.1 Frequency 7-58
7.10.4.2 Generate one file per track 7-58

The user preferences are saved in the user file (.usr).

7.1 General

This preferences page is dedicated to general NVGate® setting.

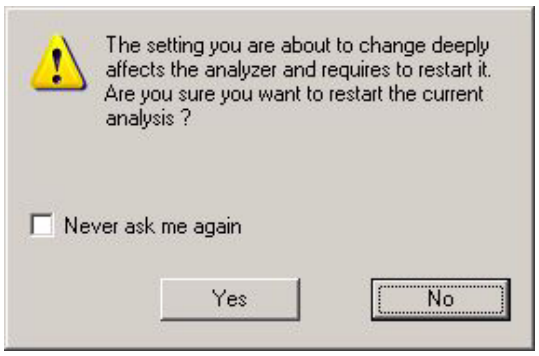


- **Default project:** When this option is selected, a new project called "Default project" is created when NVGate® is launched.
- **Last project**: When this option is selected, the last project used is loaded when NVGate® is launched.
- **Default Model**: This command is only available when the option "Start with default project" is selected. When this option is selected, the new project will be empty and all settings take their default values.
- **Specific Model:** This command is only available when the option "Start with default project" is selected. In this case, the new project is created using a workbook model from the library (using ‘Load Model’). Use this option to create a project with some default settings and displays specific to your needs.

- **Skip identification:** This option bypasses user identification prompt. When selected, the last user is automatically selected. This will not work if the user has a password.
- **Play sound:** Option to produce a sound when a warning or an error is received.

Note: Your computer must have speakers for this option.

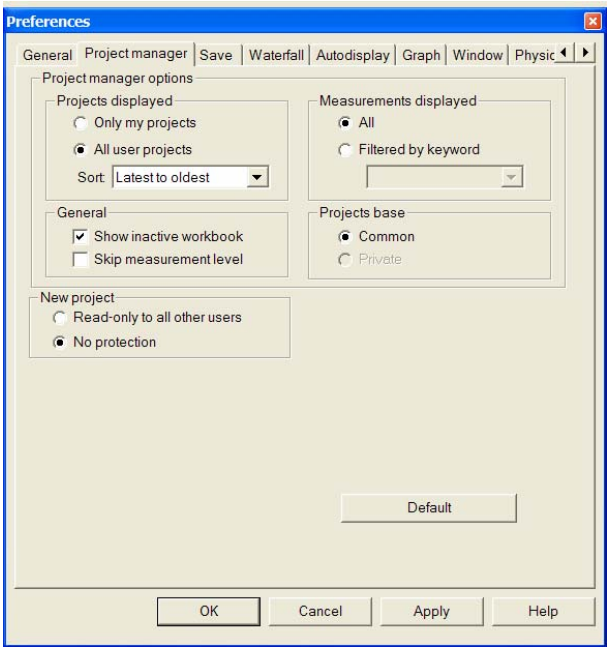
- **Windows refresh rate:** Used to slow down the window refresh rate. This option should be modified only for heavy configurations or when the host computer has a slow processor.
- **Scale:** Modifies the graph scale font size.
- **Infotrace:** Modifies the Infotrace graph font size.
- **Change of analyzer setting:** When an important setting is modified while the Analyzer is running, a message informs the user that this modification will stop the current analysis.
- **Specialized mode:** choose between 'structural' (this mode is dedicated to the acquisition of modal data (through hammer acquisition or signals provided by up to 6 shakers) or 'rotating' (this mode is dedicated to rotating and reciprocating machines).



Select this option to block this message.

7.2 Project manager

This preference page is used to configure the project manager.



7.2.1.1 Project manager options

- **Only my projects:** When this option is selected, only the projects that belong to the current user are displayed. This can be useful when NVGate® is used by many users.
- **All user projects:** When this option is selected, the projects that belong to all users are displayed. This can be used to share data or set-ups between different users.
- **Sort:** The projects can be displayed in three different ways in the project manager:

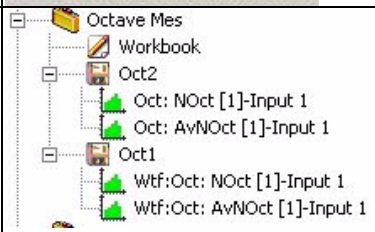
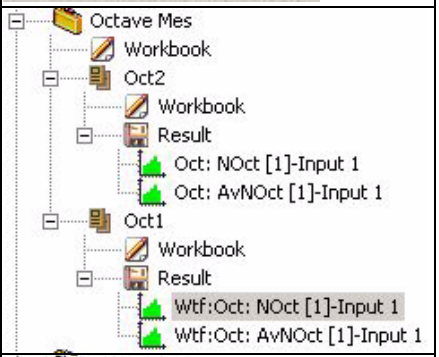
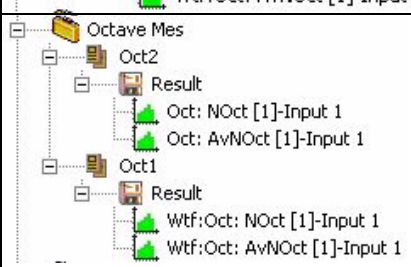
Alphabetical	The projects are classified by their name
Latest to oldest	The projects are classified by date created, with the newest project being at the top of the project manager
Oldest to latest	The projects are classified by date created, with the newest project being at the bottom of the project manager

7.2.1.2 Measurements displayed

- **All:** all measurements are displayed even the measurements that do not belong to the current user.
- **Filtered by keyword:** the measurement can be filtered by keyword. The keywords are assigned to the measurement when it is created, or can be changed in measurement properties. This option is very helpful when organizing measurement campaigns.

7.2.1.3 General

It is possible to hide all the inactive workbooks and to delete the measurement level. The table below illustrates the differences

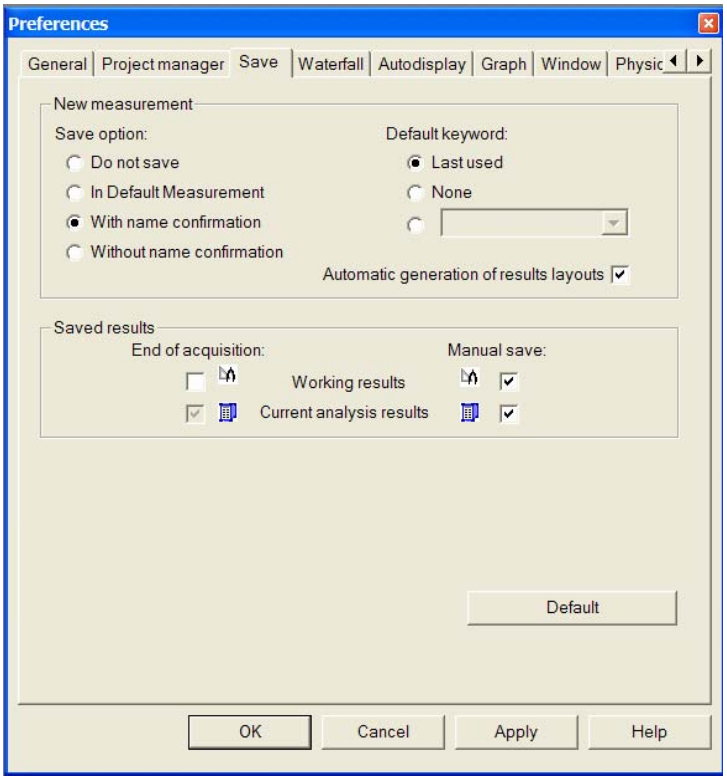
	☑ Skip measurement level	☐ Skip measurement level
☑ Show inactive workbook		
☐ Show inactive workbook		

7.2.1.4 New project

This option sets the default protection that will be applied to a new project. This protection can be modified later via the project properties.

- **Read-only to all other users:** he current user does not want to allow other users to modify his projects. Other users can load the project, but will not be allowed to modify it.
- **No protection:** Any user can freely modify the current user's project.

7.3 Save



7.3.1.1 New measurement

- **Save option:** This option determines the way in which the measurement will be created when the analyzer stops

Do not save	No measurement will be created. The only way to save the results selected is to perform the Save Result command manually
In default measurement	The measurement is created with the name "Default measurement". If a measurement with this name already exists, it is overwritten.
With name confirmation	A dialog box will be displayed when the analyzer stops. It will suggest a name using a Base name and an auto increment choice.
Without name confirmation	The measurement is created with a name automatically generated from the Base name and the auto increment choice.

- **Default keyword:** Used to choose the keyword that will be associated with the new measurement. Refer to the preference section for more information.
- **Automatic generation of results layouts:** by checking this box, measurement will be saved with the corresponding layout and when this measurement will be open it will be possible to modify the current layout.

7.3.1.2 Saved Results

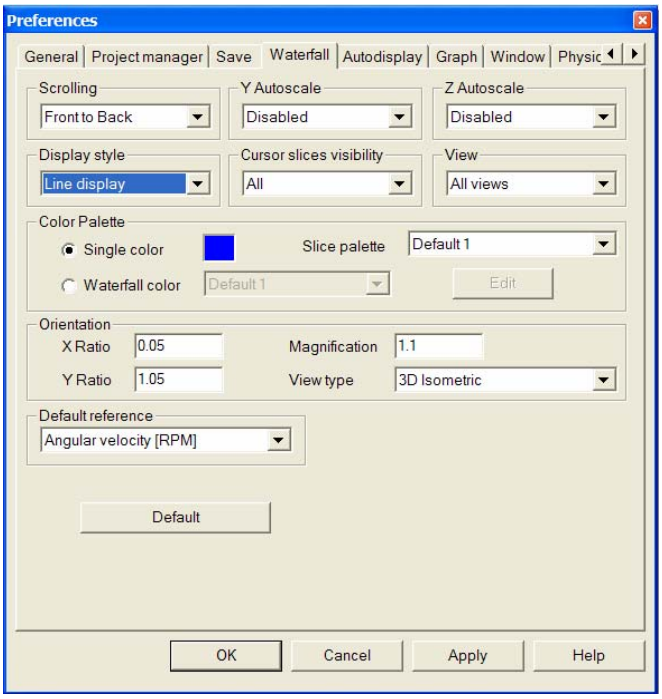
- **Current Analysis result:** Results obtained from an acquisition**.**
  - End of acquisition: open automatically a dialog box to save the results when the analyzer stops.
  - Manually: allow to save the results manually.
- **Working results:** Results obtained after an operation based on current analysis results, for example a result calculated with an operator.

  These results can be only saved manually.

Default: set all the parameters to their default values**.**

7.4 Waterfall

This preference page is dedicated to Waterfall window configuration. Settings specific to the type of result can be modified in the graph preference page.



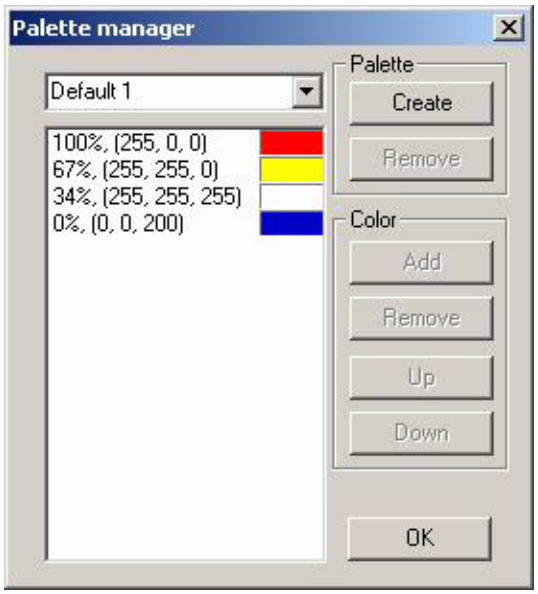
- **Display style**
  Used to select the Waterfall 3D view style. Three display styles are available:
  - Line display: in this mode, each spectrum or block is displayed with a filled plane surface defined by the spectrum points. The fill color is the selected color for single color field.
  - If Waterfall color is activated, the current palette is used to compute the color of the points and an interpolation is used to display the spectrum. If not, the spectrum is black.
  - Point display: in this mode, only points are displayed. There are no links between them. This mode is useful for small computer configurations or for large Waterfalls with many points or a large

depth. If the Waterfall color is activated, the current palette is used to compute the point color. If not, the points get the selected signal color.

- Solid display: this is a colored mode: it displays the Waterfall with interpolation between the points of each spectrum and between two consecutive points with the same x value. This mode is the same one used for the color spectrum view.

- **Scrolling**
  Used to select the scrolling direction. Two are available:
  - **Front to back:** the Waterfall is filled from front to back of the displayed box.
  - **Back to front**: the Waterfall is filled from back to front of the displayed box.
- **Color palette**
  Used to select the color mode used for 3D Waterfall displays. Two modes are available:
  - **Single color:** no color interpolation is used for the points. This color is used for filling the plane in Line mode.
  - **Waterfall color:** if checked, the selected palette is used for the color rendering and for the color spectrogram mode. The edit button displays the palette manager dialog box.

Palette manager
This dialog box is used to create and edit color palette.



Palette

Create: Creates a new palette.

Remove: Removes the selected palette.

Color

Add: Adds a key color to the palette.

Remove: Removes the selected key color from the palette.

Up: The selected key color move up from one step, if possible.

Down: The selected key color move down from one step, if possible.
Each color of the palette can be edited by clicking on a colored area. The percentage can also be edited by double-clicking on the text zone of each color.

- **Z autoscale**
  Used to select an autoscale type. Two kinds are available:
  - Disable: no autoscale is activated.
  - Continuous: when a spectrum is not within the Z scale values, an autoscale is performed with no margin. This mode is not recommended for computers with limited processing power.
- **Y autoscale**
  Used to select an autoscale type. Two kinds are available:
  - Disable: no autoscale is activated.
  - Continuous: when a spectrum is not within the Y scale values, an autoscale is performed with no margin. This mode is not recommended for computers with limited processing power.

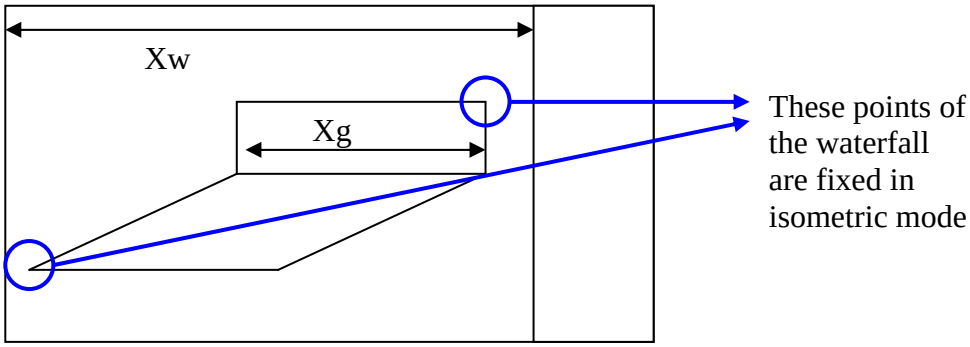
- **Cursor slice visibility**
  Used to choose the default slice visibility. Four choices are available:
  - All: the default slices are displayed in all areas.
  - Only in 3D: the default slices are Display only in the 3D area.
  - Only in 2D: the default slices are Display only in the 2D area.
  - No display: the default slices are not displayed in any area.
- **Default reference**

  Used to select your default reference for your waterfall.

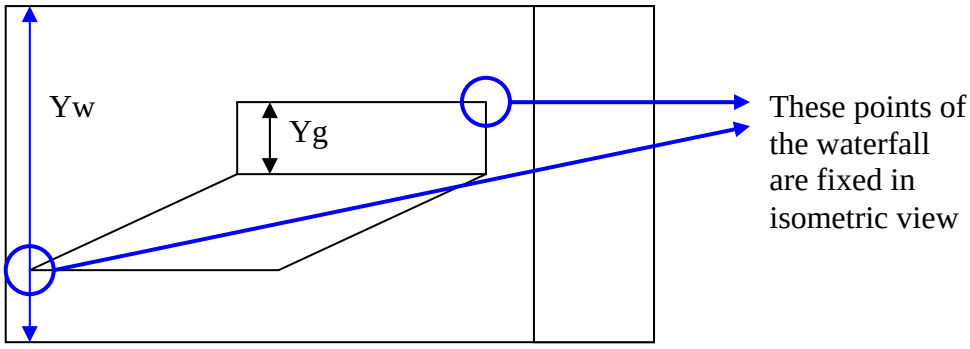
  Note: If the measurement is loaded, then the waterfall is displayed as the measurement has been done.

  If the Waterfall is displayed, then the reference is the one defined in the user preferences.
- **View**
  Used to select a view mode in the Waterfall window: two modes are available:
  - 3D View: only the 3D view is displayed in the window.
  - All views: 3D view and slices areas are displayed in the window.

- **Orientation**
  - X ratio: this setting displays the ratio between the window and the waterfall X-axis size.



  - Y ratio: this setting displays the ratio between the window and the waterfall Y-axis size

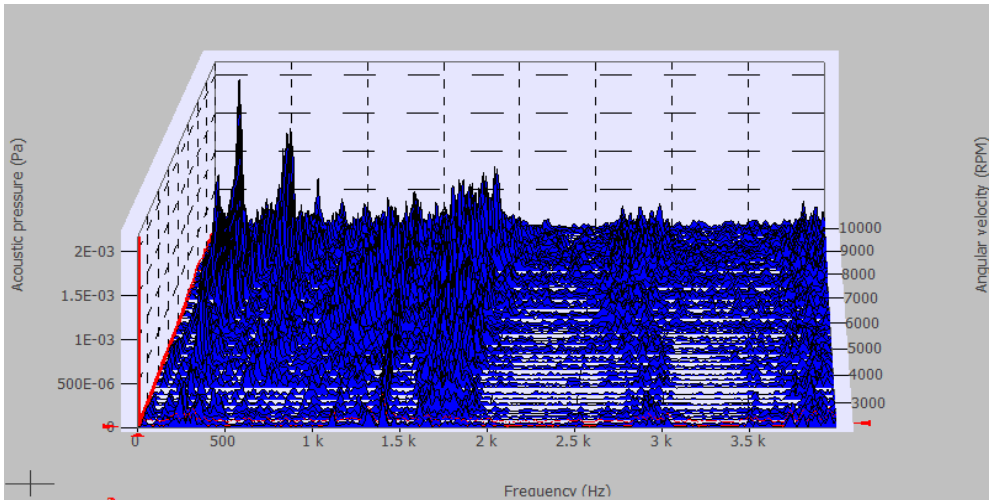


  - Magnification: this setting displays the position of the waterfall in the window in term of depth. The waterfall will be far in the window if the cam factor is large.

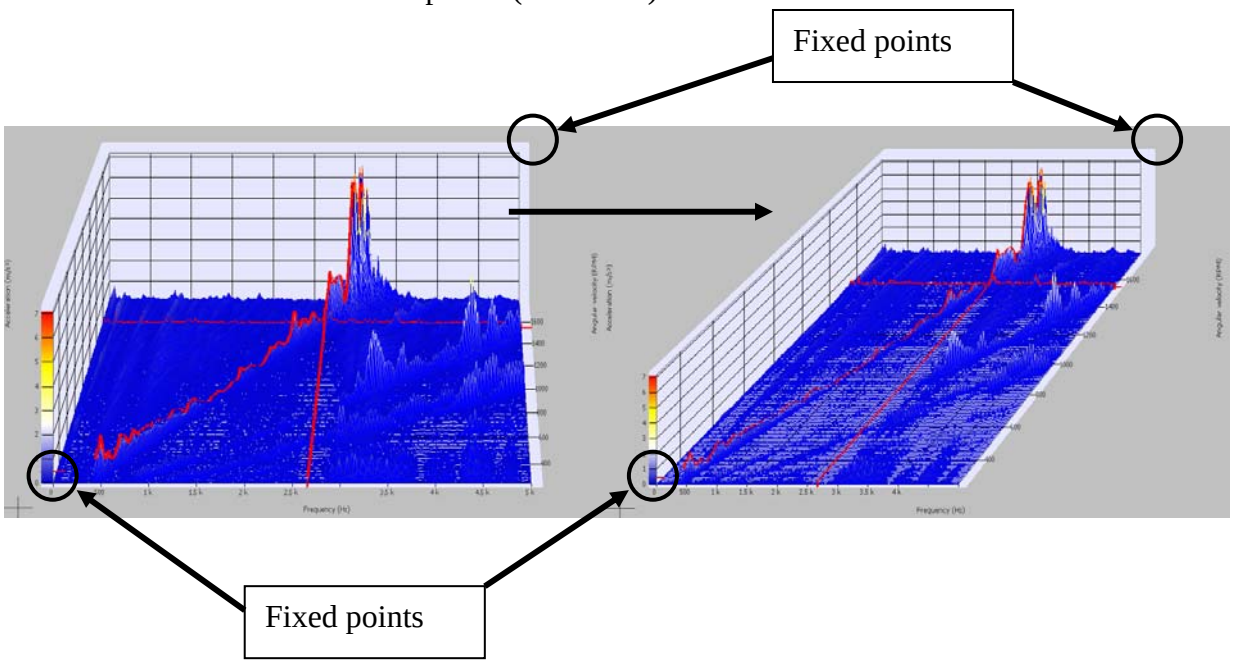
- View type:

-

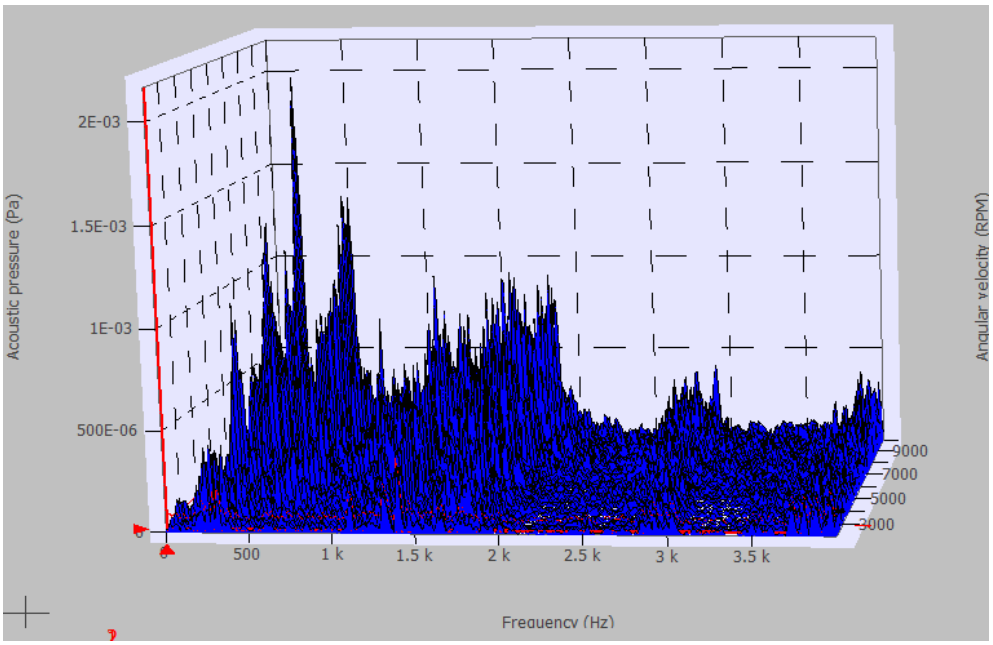
- 3D isometric



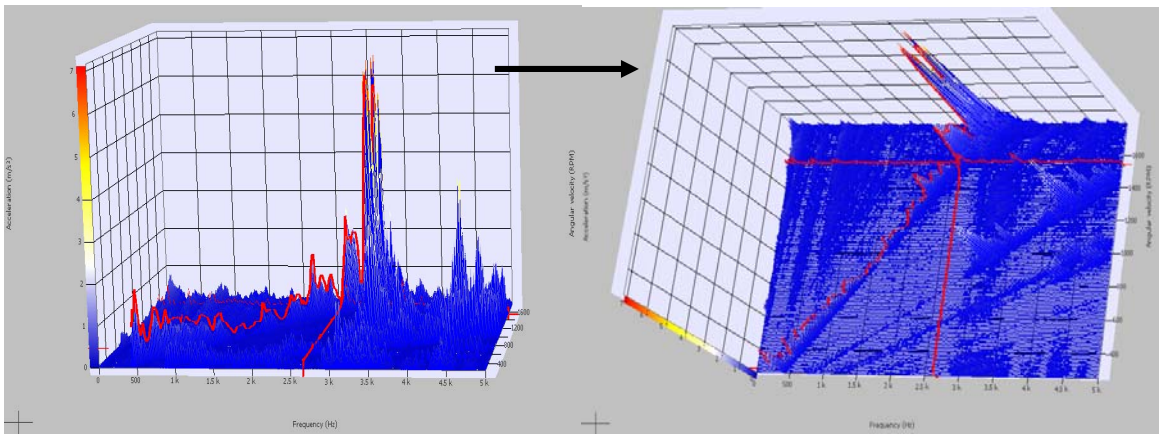
If isometric view is checked: you can change the position and dimension of the waterfall around two fixed points (see above).



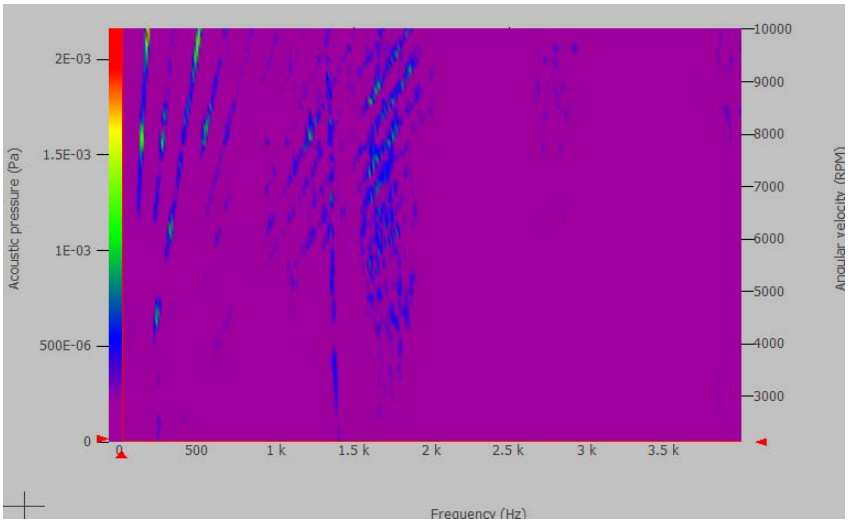
- 3D perspective:



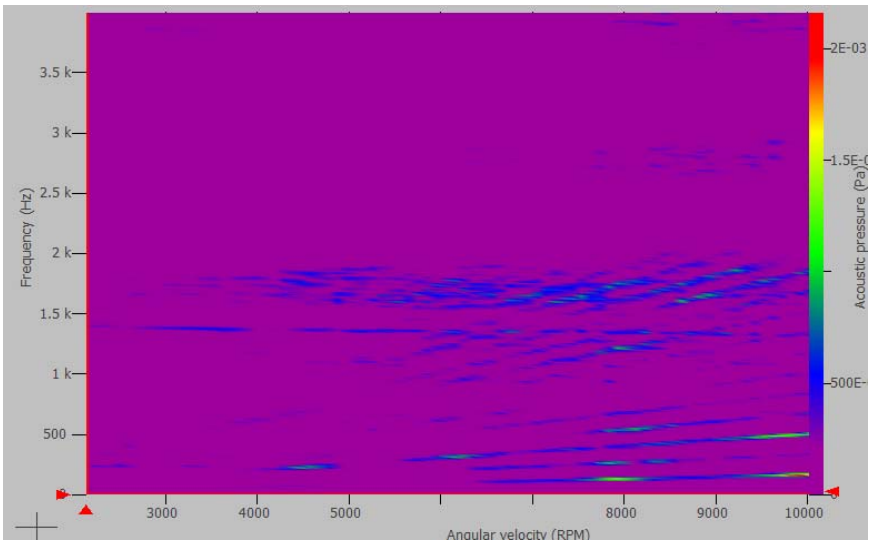
If Perspective is not checked: there is no fixed point, the waterfall can be moved in the 3D space. This view is an orthonormal view.



- Freq/Time Colormap:

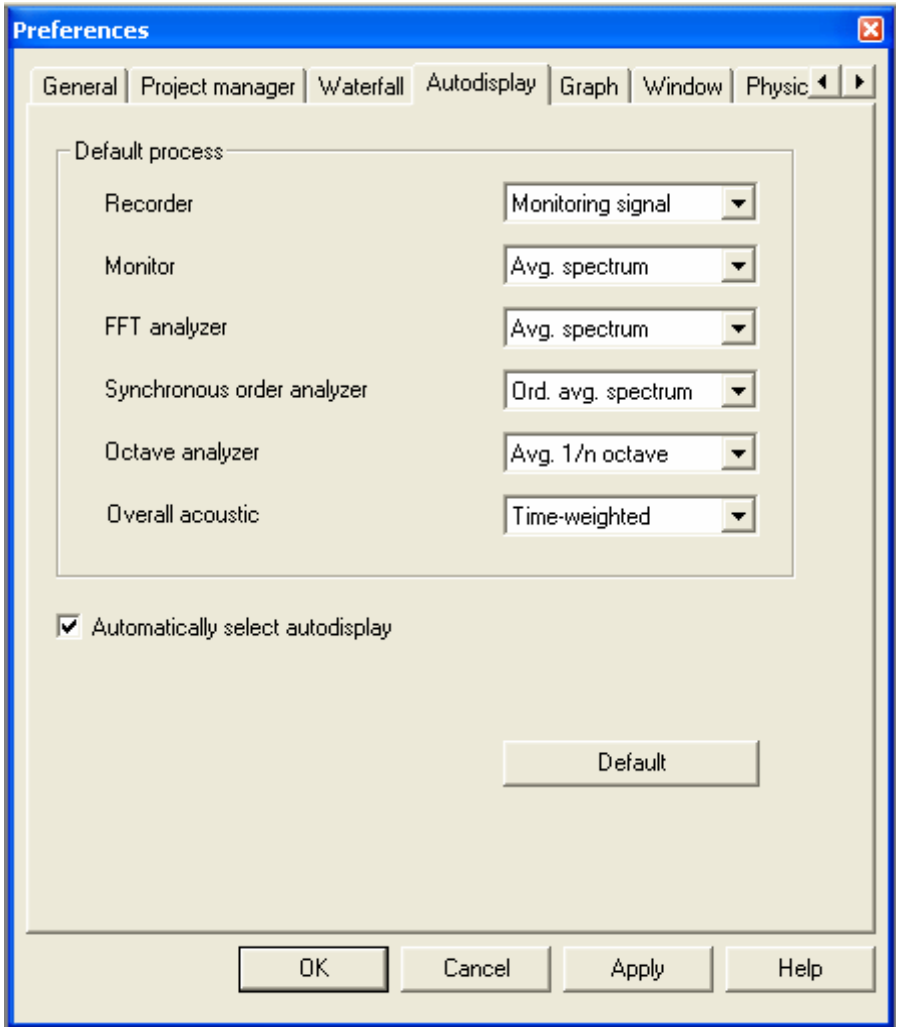


- Time/Freq Colormap:



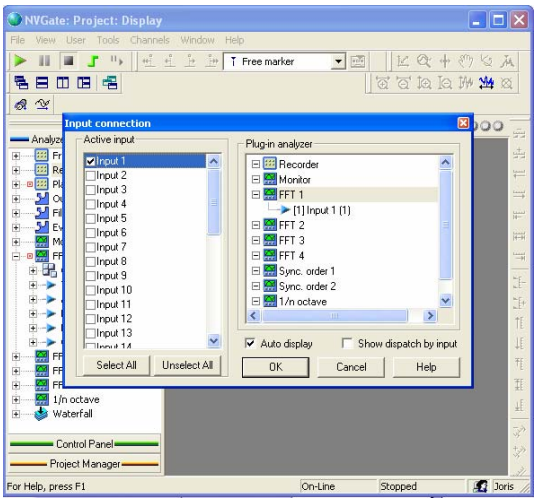
7.5 Autodisplay

This preference page is used to set up the type of result to be automatically displayed after input connections. It is possible to select the “Autodisplay” type of result for each available plug-in analyzer.

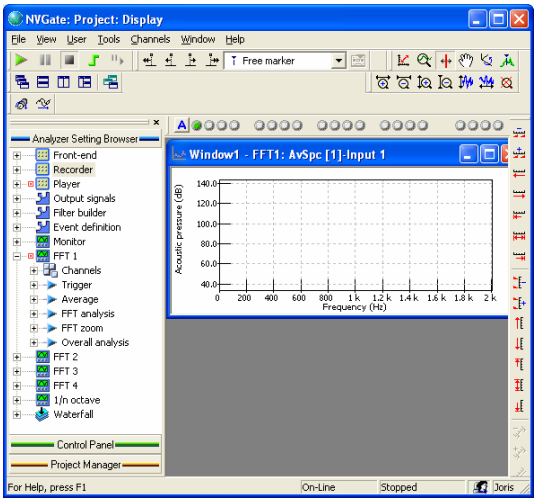


The plug-in analyzers available results are the same as in the “Add/Remove window” dialog.

Example of a FFT Average spectrum result autodisplay:



Input connection



The type of result selected in the autodisplay preferences is automatically displayed

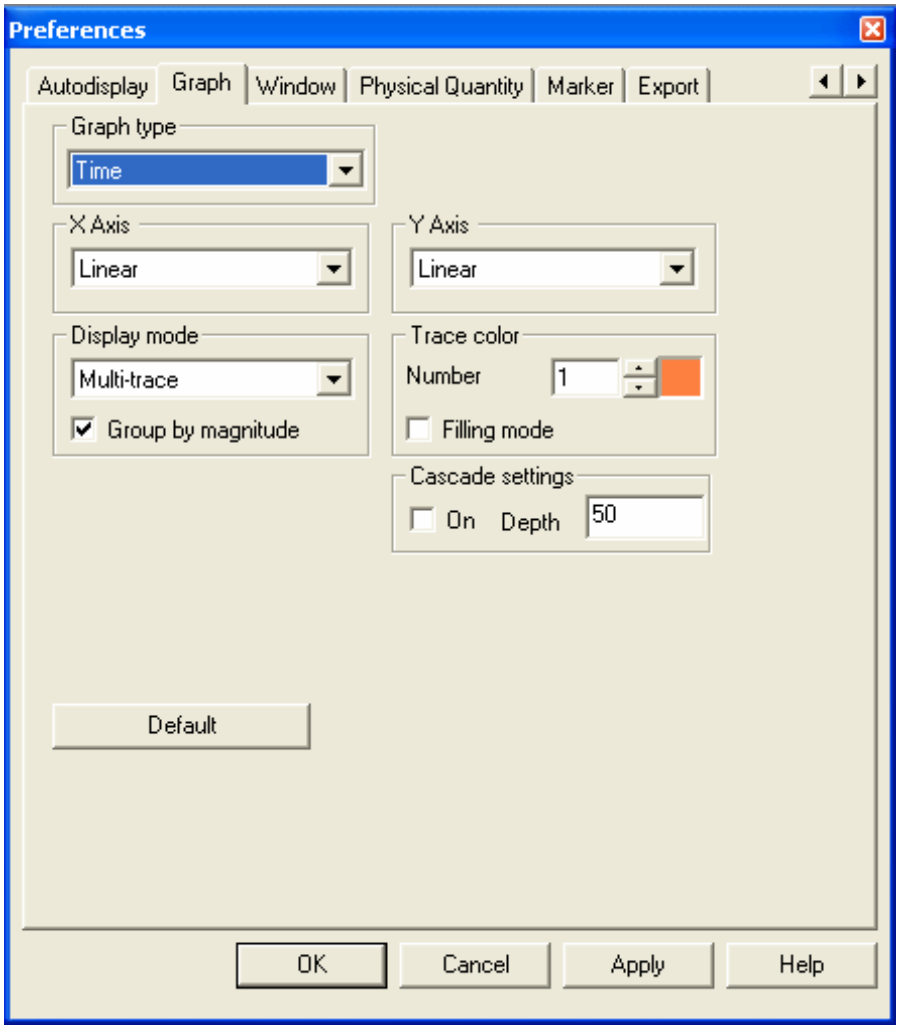
7.6 Graph

This window allows to select the graph desired and change the preferences corresponding to it.

Graph type: Used to select the kind of graph desired.

- Time
- Spectral
-

7.6.1 Time



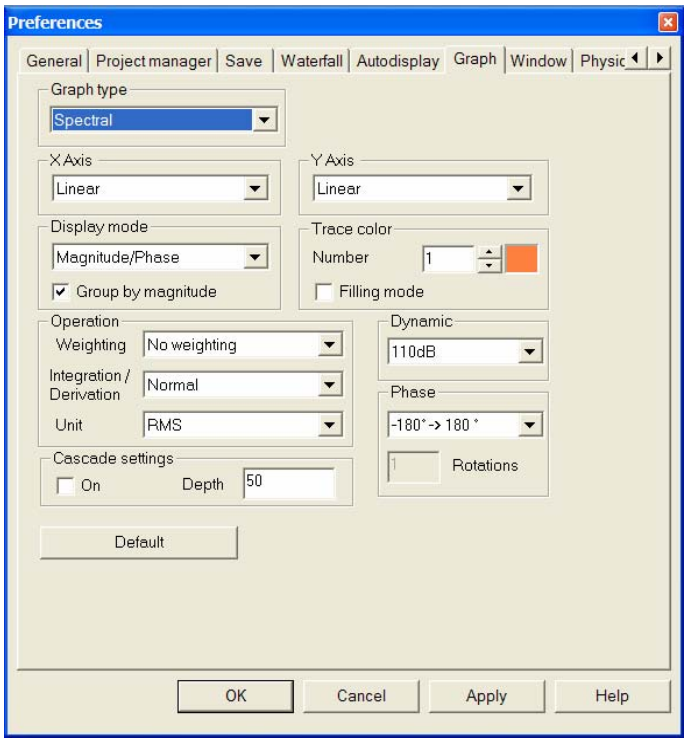
- **Graph type:** Used to select the kind of graph desired in order to change the preferences.
  If Magnitude gathering is active, when the window is in a simple multi trace mode (module, phase, real, imaginary... but not in multi trace module/phase, real/imaginary....), one area is created for each different Y magnitude in the window.

- **X-axis:** Select the X scale type. Two kinds of X scale are available (depending on the kind of window).
  - Linear
  - Logarithmic

- **Y-axis:** Select the Y scale type. Three kinds of Y scale are available (depending on the kind of window).
  - Linear
  - Logarithmic
  - dB

- **Display mode:** Select the display mode to use for this kind of graph. Several display modes are available for each kind of graph.
- **Trace color:** Select the color for each trace of the graph. Only 32 traces can be displayed in the same graph.
  If Filling mode is active, each trace of the window is filled with a color and has a black border. This option is especially useful for multi-graph modes.
- **Cascade settings:** If mode Cascade is 'On' you can select the depth (the Z-axis) of the 3D Cascade view.

7.6.2 Spectral



- **X-axis:** Select the X scale type. Two kinds of X scale are available (depending on the kind of window).
  - Linear
  - Logarithmic

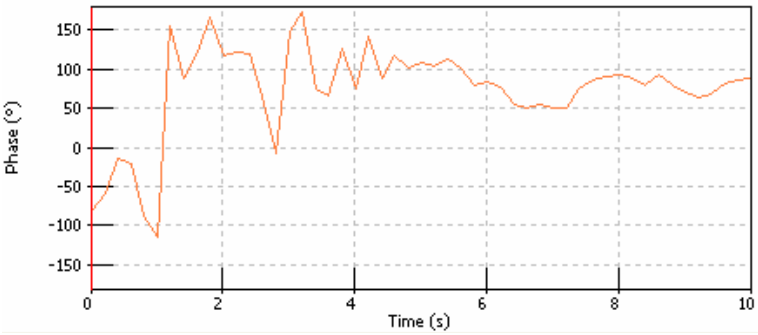
- **Y-axis:** Select the Y scale type. Three kinds of Y scale are available (depending on the kind of window).
  - Linear
  - Logarithmic
  - dB

- **Display mode**
  - **Magnitude:** overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Real part**: overlays all real parts traces on a single graph.
  - **Imaginary part**: overlays all imaginary part traces on a single graph.
  - **Magnitude/phase**: overlays all magnitude traces on the upper graph and all the phase traces on the lower graph.
  - **Real/imaginary**: overlays all magnitude traces on the upper graph and all the phase traces on the lower graph.
  - **Polar**: overlays all complex traces on a polar graph: ρ = magnitude, θ = phase.
  - **Real part 3D**: displays all real part traces as a 3D graph arranged along the Z-axis.
  - **Imaginary part 3D**: displays all imaginary part traces as a 3D graph arranged along the Z-axis.
  - **Magnitude 3D**: displays all magnitude traces as a 3D graph arranged along the Z-axis.
  - **Phase 3D**: displays all phase traces as a 3D graph arranged along the Z-axis.
  - **Real part multi-graph**: displays all real part traces using one graph per trace in the same window.
  - **Imaginary part multi-graph**: displays all imaginary part traces using one graph per trace in the same window.
  - **Magnitude multi-graph**: displays all magnitude traces using one graph per trace in the same window.
  - **Phase multi-graph**: displays all phase traces using one graph per trace in the same window.

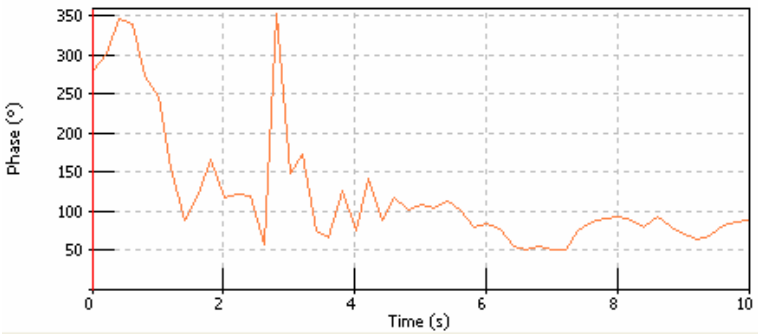
- **Phase/Magnitude**: overlays all phase traces on the upper graph using 1/3 of window space and all the magnitude traces on the lower graph using 2/3 of the window.
- **Merged Magnitude/Phase**: displays all magnitude and phase part traces as a unique graph.
- **Magnitude gathering**: if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.

- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box:** click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is a dB one or Logarithmic one
    - the 0 value of the Y scale is linear.
- **Dynamics**
  - **90 dB**: resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB**: resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB**: resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.

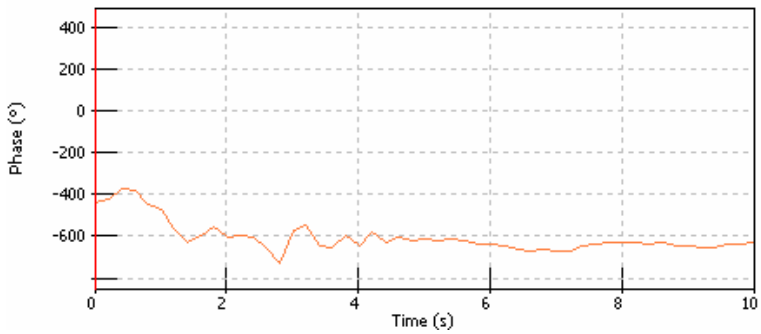
- **Phase**
  - **-180° -> 180°**: sets the phase graph Y-axis between –180° to +180°.



  - **0 -> 360°**: sets the phase graph Y-axis between 0 to +360°.

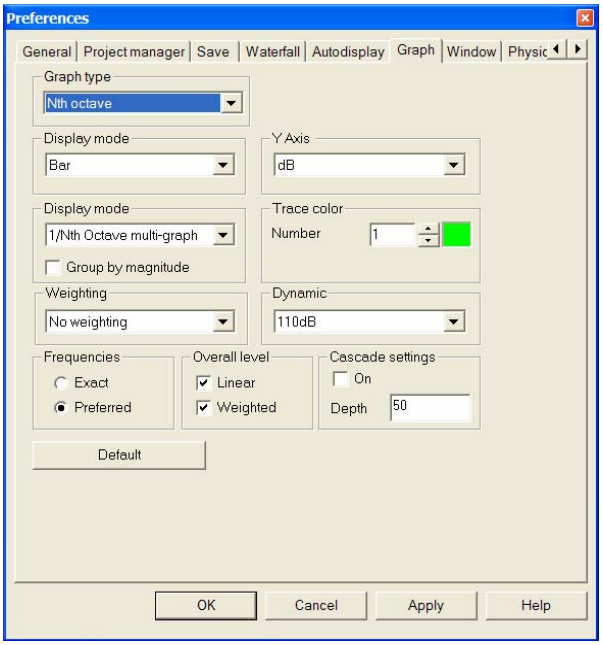


- × **Rotations:** sets the number of rotations to be displayed on the Y-axis.



Example for 5 rotations

7.6.3 Nth octave



- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic:** uses logarithmic scale for Y-axis units.
  - **dB:** uses reference dB scale for Y axis units.
- **Display mode**
  - **Bar:** bar representation
  - **Step:** step representation.
  - **Rectangle:** overlaid rectangle
  - **Filled:** overlaid filled rectangles.

- **Display mode**
  - **Multi-trace**: overlays all traces on a single graph.
  - **Multi-graph**: one graph for each trace.
  - **Magnitude gathering**: if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

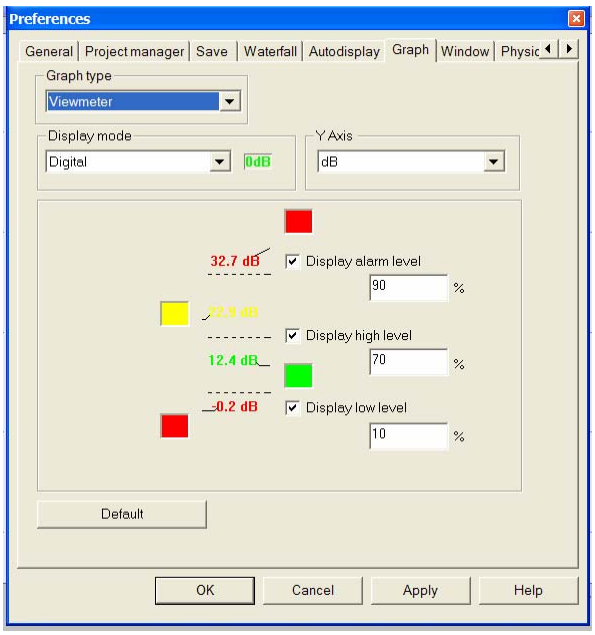
- **Weighting**

  Used to select the type of weighting desired.

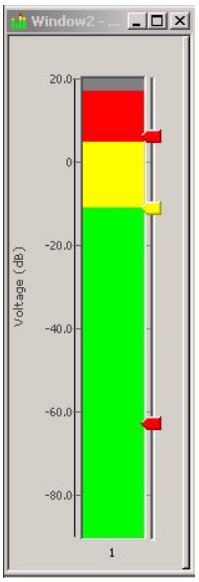
- **Overall level**
  - **Linear**: if checked, the linear global level is displayed.
  - **Weighted**: if checked and available, the weighted level is displayed.

- **Frequencies**
  - **Exact:** displays exact band center frequency.
  - **Preferred:** displays preferred frequencies, i.e rounded values for the central frequencies. Preferred frequencies are only available for octave and 1/3rd octave windows: in the octave. If this mode is selected in 12th and 24th octave windows, exact frequencies are displayed.
- **Dynamics**
  - **90 dB:** resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB:** resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB:** resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.

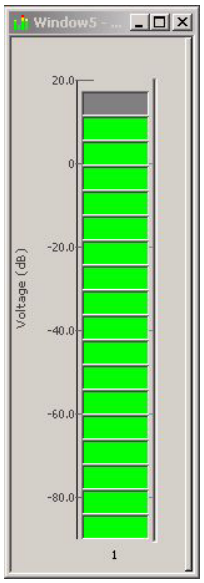
7.6.4 Viewmeter



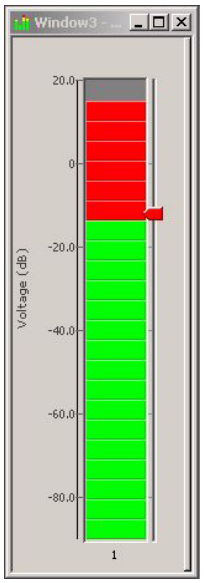
- **Display mode:** There are two types of display:
  - Bar graph



Continuous

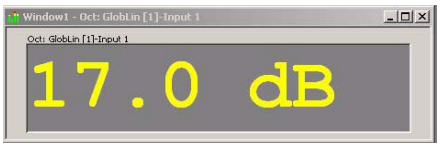


viewmeter

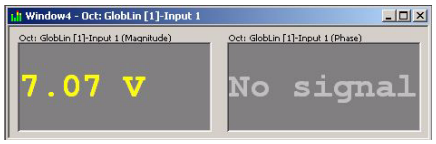


Brick graph

  - Digital display



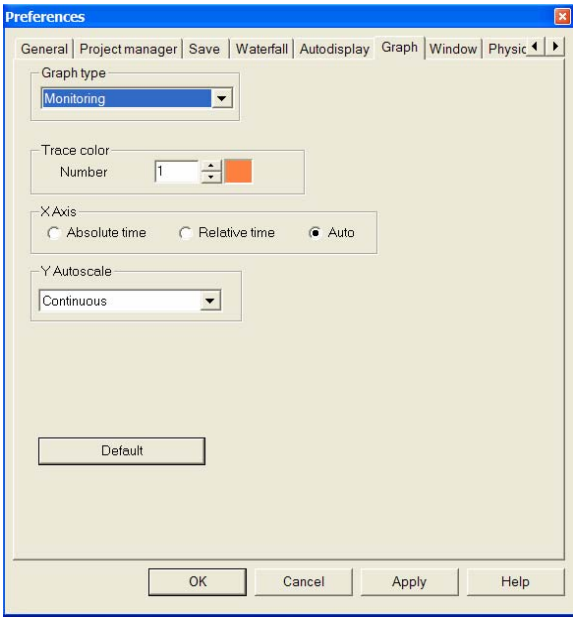
Digital



Module + Phase
The phase can be displayed only for complex scalar result (Order)

- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.
  - **dB**: uses reference dB scale for Y-axis units.
- **Display max, Display min:** Displays the min and the max scalar value as a cursor. The color of the cursor can be freely selected. This property only applies to bar graphs.
- **Display low level:** Changes the color of the display when the value is below this level. The color can be freely selected.
- **Display high level:** Changes the color of the display when the value is higher than this level. The color can be freely selected.
- **Display alarm level:** Changes the color of the display when the value is higher than this level. The color can be freely selected.
- **Brick height:** Defines the height of the bricks for the viewmeter and brick display modes.
- **Save as user preference:** When this box is checked, the value is given as a percentage of the full scale, and may be applied to any graph.

7.6.5 Monitoring

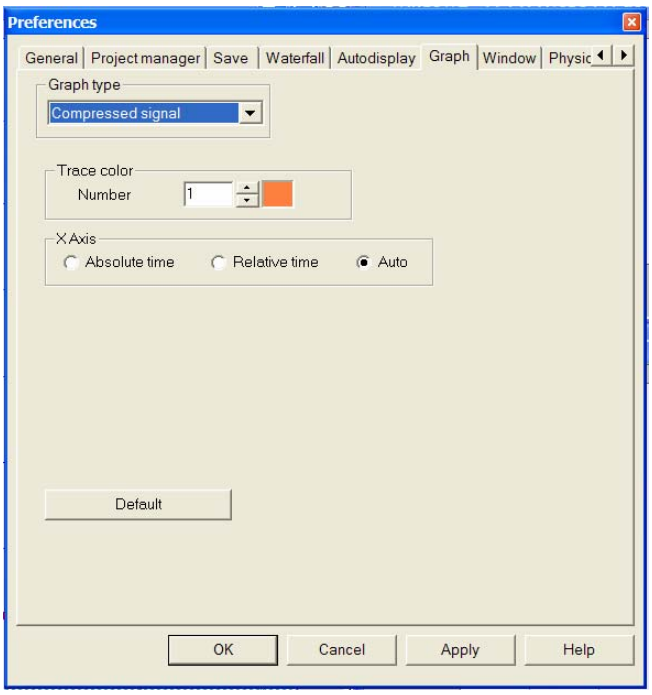


- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

- **X Axis**
  - **Absolute time**: displays the time from windows format.
  - **Relative time**: displays the duration of the record. The beginning of the record is set to 0.
  - **Auto**: selects absolute or relative time depending on the duration of the record. For records smaller than 2s, the relative time is displayed, for others, the absolute time is chosen.

- **Y Autoscale**
  - **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
  - **Disabled**: Y autoscale is not activated.

7.6.6 Compressed signal

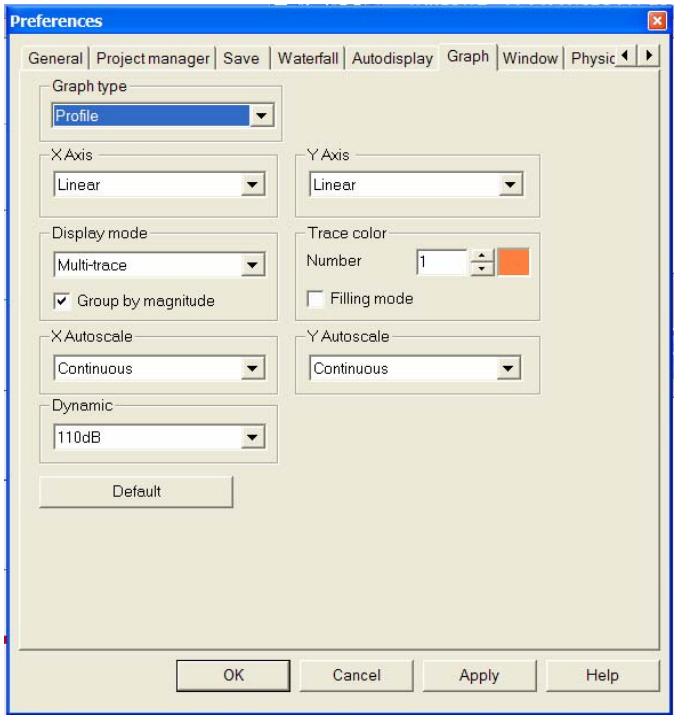


- **Trace color**
  - **Number:** selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

- **X Axis**
  - **Absolute time**: displays the time from windows format.
  - **Relative time**: displays the duration of the record. The beginning of the record is set to 0.

- **Auto**: selects absolute or relative time depending on the duration of the record. For records smaller than 2s, the relative time is displayed, for others, the absolute time is chosen.

7.6.7 Profile

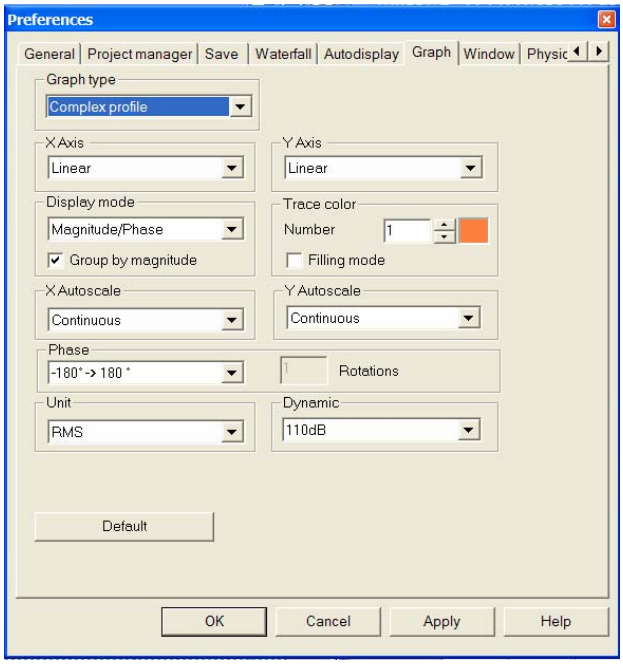


- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
- **Display mode**
  - **Magnitude**: overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is dB or Logarithmic.
    - the 0 value if the Y scale is linear.

- **X Autoscale**
  - **Continuous**: the X scale is automatically adjusted to the current min and max x values of the window traces.
  - **Disabled**: X autoscale is not activated.

- **Y Autoscale**
  - **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
  - **Disabled**: Y autoscale is not activated.

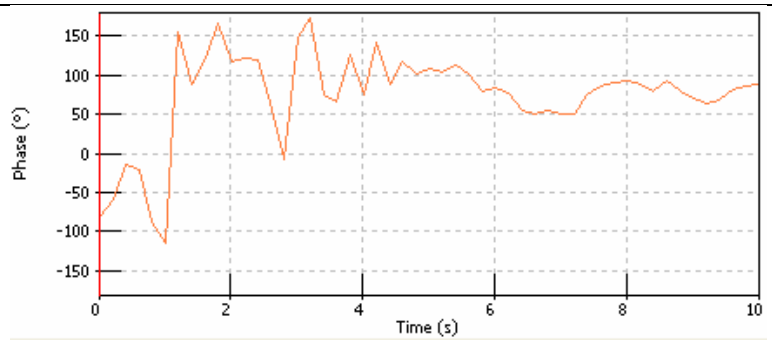
7.6.8 Complex profile



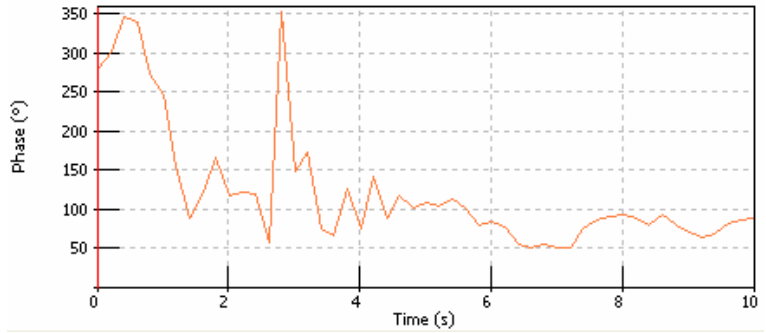
- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
  - **Logarithmic**: uses logarithmic scale for Y-axis units.
  - **dB**: uses reference dB scale for Y axis units.
- **Display mode**
  - **Magnitude**: overlays all magnitude traces on a single graph.
  - **Phase**: overlays all phase traces on a single graph.
  - **Real part**: overlays all real part traces on a single graph.
  - **Imaginary part**: overlays all imaginary part traces on a single graph.

- **Magnitude/phase**: overlays all magnitude traces on the upper graph and all phase traces on the lower graph.
- **Real/imaginary**: overlays all magnitude traces on the upper graph and all phase traces on the lower graph.
- **Polar**: displays in polar coordinates, the phase and the amplitude on a single graph.
- **Real part multi-graph**: displays all real part traces using one graph per trace in the same window.
- **Imaginary part multi-graph**: displays all imaginary part traces using one graph per trace in the same window.
- **Magnitude multi-graph**: displays all magnitude traces using one graph per trace in the same window.
- **Phase multi-graph**: displays all phase traces using one graph per trace in the same window.
- **Phase/Magnitude**: overlays all phase traces on the upper graph using 1/3 of window space and all the magnitude traces on the lower graph using 2/3 of the window.
- **Merged Magnitude/Phase**: displays all magnitude and phase parts traces on a single graph.
- **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.

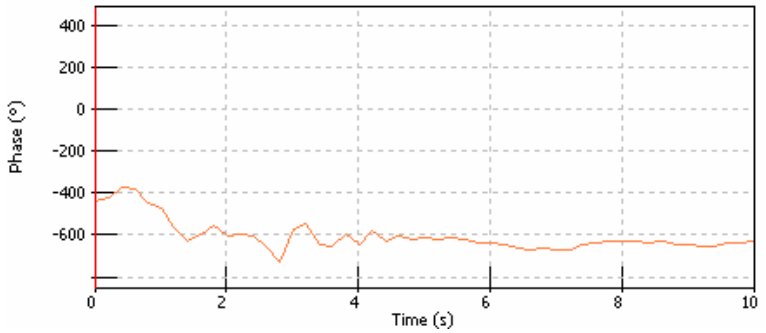
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - The bottom of the area if Y scale is dB or Logarithmic.
    - The 0 value if the Y scale is linear.
- **Dynamics**
  - **90 dB**: resizes the Y-axis to 90 dB dynamics starting from +20 dBV.
  - **110 dB**: resizes the Y-axis to 110 dB dynamics starting from +20 dBV.
  - **130 dB**: resizes the Y-axis to 130 dB dynamics starting from +20 dBV.
  - **150 dB**: resizes the Y-axis to 150 dB dynamics starting from +20 dBV.
- **Phase**
  - **-180° -> 180°**: sets the phase graph Y-axis between –180° to +180°.



- **0 -> 360°**: sets the phase graph Y-axis between 0 to +360°.



- × **Rotations:** sets the number of rotations to be displayed on the Y-axis.

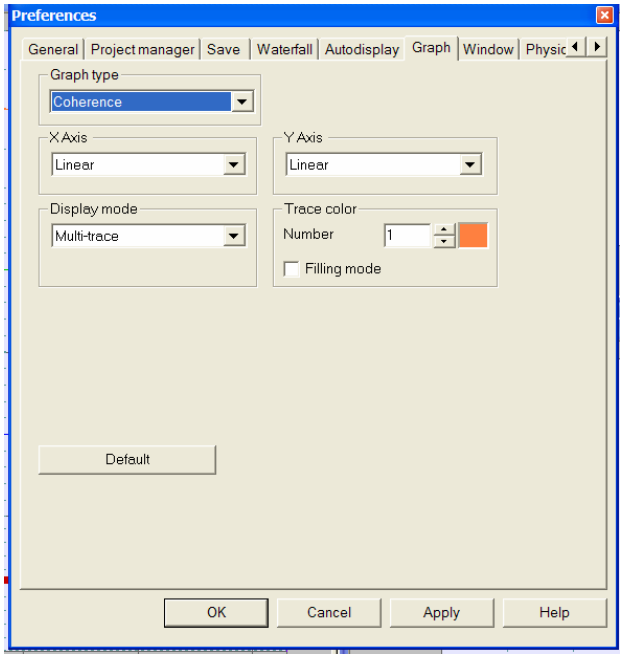


Example for 5 rotations

- **X Autoscale**
  - **Continuous**: the X scale is automatically adjusted to the current min and max x values of the window traces.
  - **Disabled**: X autoscale is not activated.

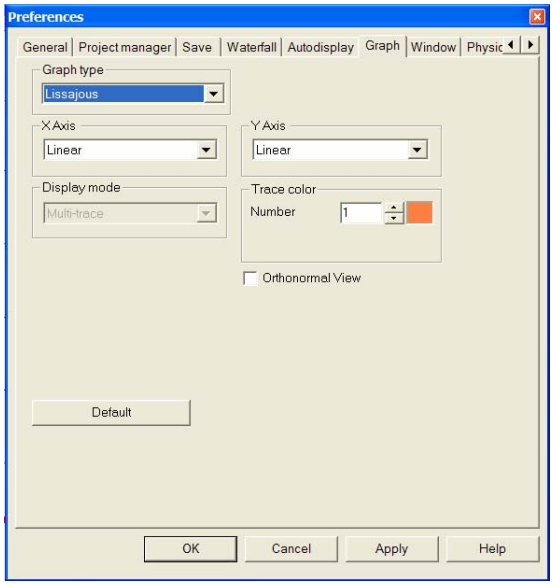
- **Y Autoscale**
  - **Continuous**: the Y scale is automatically adjusted to the current min and max y values of the window traces with a margin to facilitate visibility.
  - **Disabled**: Y autoscale is not activated.

7.6.9 Coherence



- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.
- **Display mode**
  - **Multi-graph**: overlays all traces on a single graph.
  - **Multi-trace**: displays all traces using one graph per trace in the same window.
  - **Time multi-trace 3D**: overlays all traces on a single 3D graph.
  - **Magnitude gathering:** if this mode is activated and when a multi-trace mode is selected, an area is created for each different Y magnitude: all the signals with the same Y magnitude are in the same area. If there is only one different Y magnitude, all the signals are in the same area.
- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.
  - **Filling mode**: if selected, all the curves of the windows are filled from:
    - the bottom of the area if Y scale is dB or Logarithmic.
    - the 0 value if the Y scale is linear.

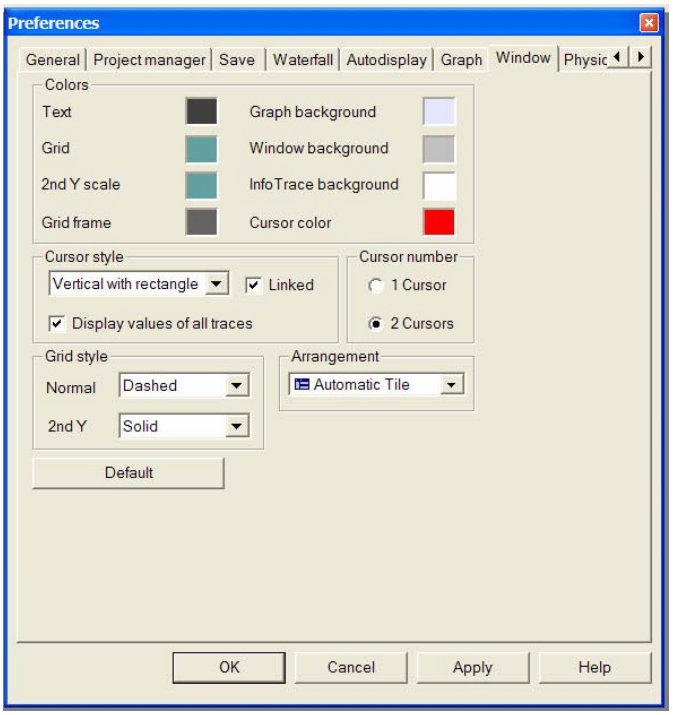
7.6.10 Lissajous



- **X Axis**
  - **Linear**: uses linear scale for X-axis units.
- **Y Axis**
  - **Linear**: uses linear scale for Y-axis units.

- **Trace color**
  - **Number**: selects the trace number for color modification.
  - **Color box**: click on this box to modify the color of the selected trace.

7.7 Window



- **Colors:** Selects the different colors used in graphical displays.

  Text: scale text color in the graph area

  Grid: grid color used in graph area

  Grid frame: color used for the graph area frame

  Cursor: color for the cursors in the graph areas

  Graph background: color used in the graph area background

  Window background: color used for the background of graphical display windows

  Infotrace background: color used for the infotrace background.

- **Cursor style**

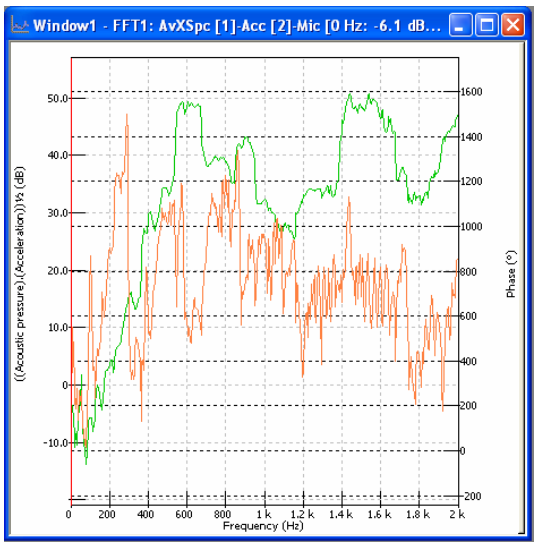
  Style: Selects the cursor style in graphical displays. The available styles are:

  - Vertical line
  - Vertical dashed line
  - Vertical with rectangle
  - Cross-hair
  - Vertical + Horizontal

  Linked: Enables links between the cursors of several windows: when one cursor moves, the other also moves. See cursor menu section for details.

Display values of all traces: if checked, all Y values for each trace will be displayed, not only for the active trace.

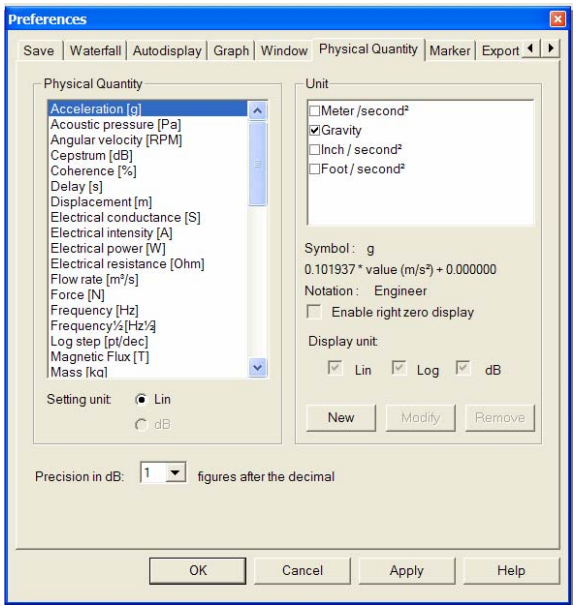
- **Cursor number:** Enables one or two cursors in the graphical display. Each cursor can be moved independently. The information of each cursor will be displayed (if activated) in the infotrace area. With 2 cursors enabled, the x and y difference will be displayed.
- **Grid style:** Selects the grid style in the graphical area for the scale and the second Y scale if available. The double grid is available when “Merged Module/Phase” display mode is selected from the window properties.
  Grid styles available are:
  - No grid
  - Solid
  - Dashed



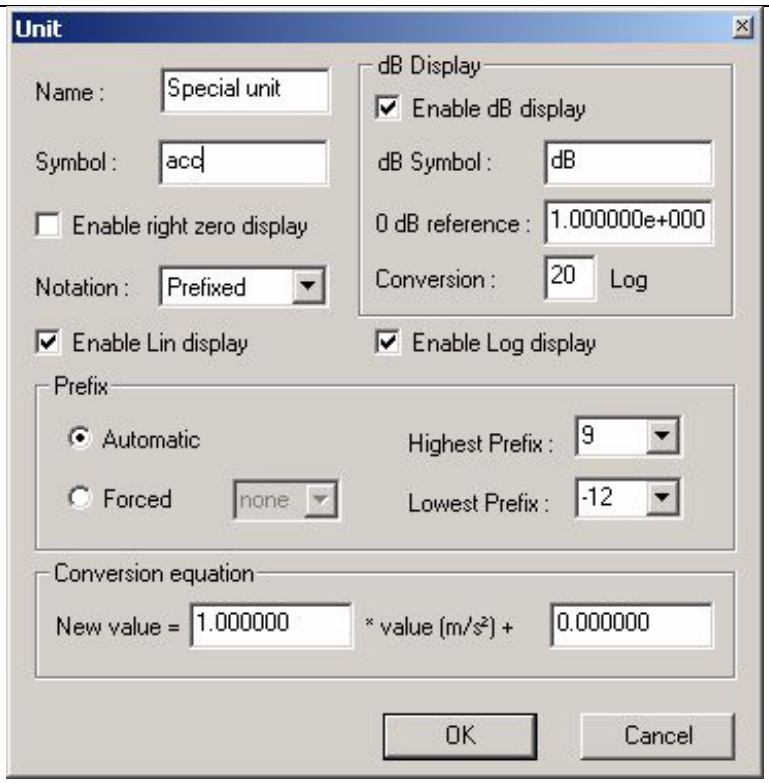
- **Arrangement:** Selects the arrangement style used when a new window is created. Arrangements available are:
  - No arrangement
  - Tile horizontally
  - Tile vertically
  - Cascade
  - Automatic tile

7.8 Physical quantity

This preference page is dedicated to the choice of the units and the associated options.



- **Physical quantity:** Here all quantities that can be managed by NVGate® are displayed. This list cannot be modified.
- **Unit:** Displays the list of available units for the selected quantity. The main information about the unit is displayed just below the list.
- **New:** Use this button to create a new unit for the selected quantity.
  The following dialog box is used to define the units.



Name: Name that will be displayed when the unit is used

Symbol: Symbol that will be used when a value is displayed in this unit

Enable right zero display: If selected, the value will be filled by zero after the decimal

Notation

Fixed: When possible, the value is displayed without any exponent and without a prefix.

Prefixed: Prefix (u, m, k, M) used as exponent preference.

Engineer: Values are displayed with exponents in multiples of 3 (-9,-6,0,3,6,9,12...)

Scientific: Values are displayed with exponents so that only one figure is used before the decimal

Time: Should only be used to display date and time

The following table shows the effect of the notation on the display of three values: 20000 m/s², 70700 m/s², 0.0002091 m/s²

	Fixed	**Prefixed**	**Scientific**	**Engineer**
Right zero display enabled	20000 70700 2.091 E-4	20.00 k 70.7 k 209.1 u	2.000 E4 7.07 E4 2.091 E-4	20.00 E3 70.7 E3 209.1 E-6
Right zero display disabled	20000 70700 2.091 E-4	20 k 70.7 k 209.1 u	2 E4 7.07 E4 2.091 E-4	20 E3 70.7 E3 209.1 E-6

Enable Lin display: Authorizes or not the use of a linear scale when displaying a result with this unit in a graph

Enable Log display: Authorizes or not the use of a logarithmic scale when displaying a result with this unit in a graph

- **dB Display**
  - **Enable dB display:** Authorizes or not the use of dB scale when displaying a result with this unit in a graph
  - **dB symbol:** This symbol will be added to the value when expressed in dB.
  - **0 dB reference:** Value used has the dB scale reference.
    Example 2 E-5 Pa for Acoustic pressure in Pa
  - **Conversion:** Used to convert linear values to dB values.
    Example:

    20 for Acoustic pressure in Pa because dB Value = **20***log (Lin_Value/2e-5), but 10 for the unit representing power.

- **Prefix:** If Automatic is selected, the lowest and highest prefix can be selected from the two lists on the right
  If forced is selected, the value is always displayed with the selected prefix
- **Conversion equation:** Displays the coefficient to use for converting an SI value to a given units.
  Example:

  Value in_ = 0.101936 * Value in SI + 0 where Value in SI is m/s^2
  Value in Celsius = 1* Value in Kelvin - 273.15

7.8.1.1 Modify

Use this button to modify the selected unit. Only units created by the user can be modified. Refer to "New unit" for description of the parameters.

7.8.1.2 Remove

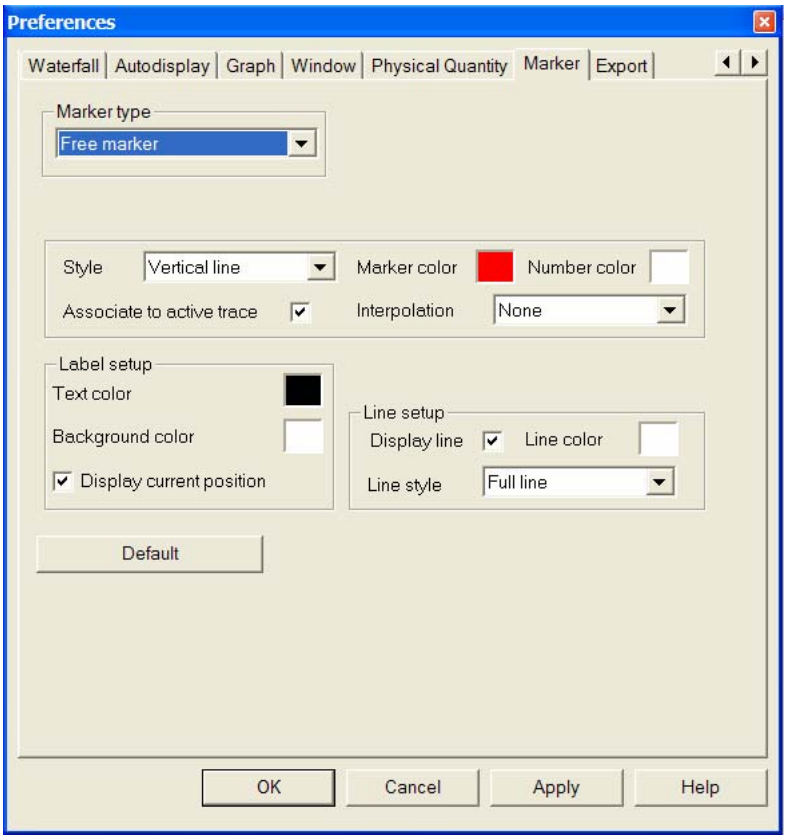
Use this button to remove the selected unit. Only units created by the user can be removed.

7.8.1.3 Precision in dB

General option (applied to every unit) to define the number of figures displayed after the decimal when using dB display.

7.9 Marker

7.9.1 Free Marker page



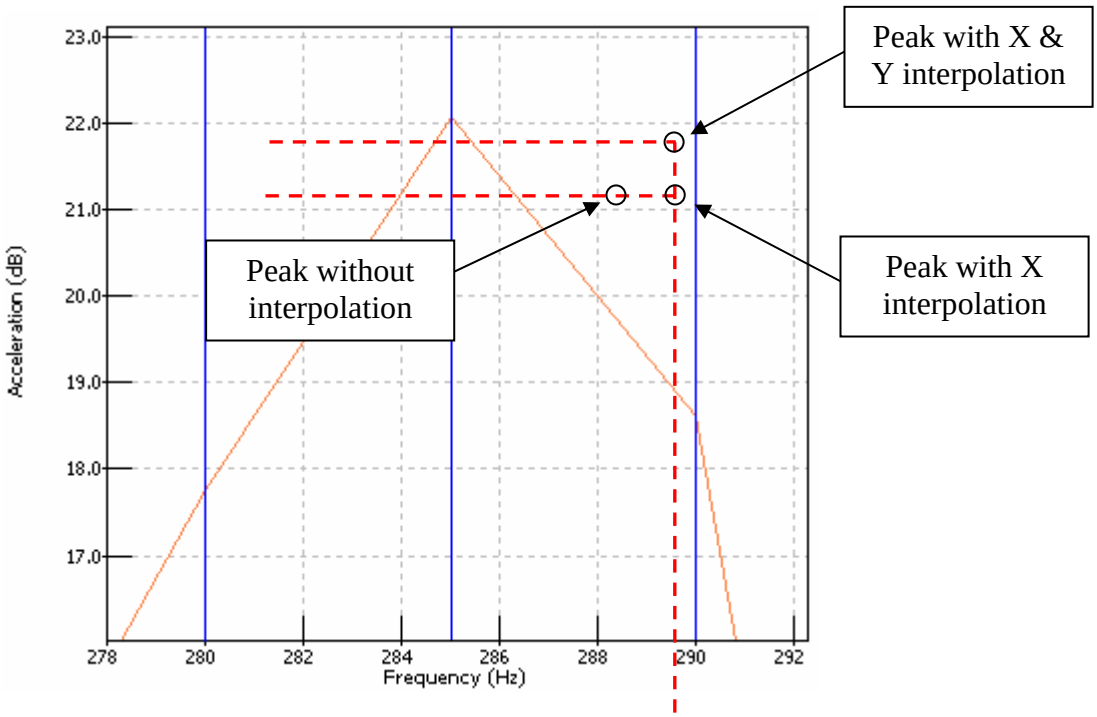
7.9.1.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

- **Marker color:** Selects the marker color used in the graphical area.
- **Number color:** Selects the marker number color used in the graphical area.
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.

- **None**: no interpolation applied.
- **X**: x interpolation is active.
- **X & Y**: x and y interpolations are active.



Note: the interpolated values of free markers will be available only if the free marker is placed on a peak. The peak detection criteria are the same as the peak marker adjusted in the User preferences. The marker can be moved by 1/32 step. The x value is computed with the selected weighted window.

7.9.1.2 Label setup

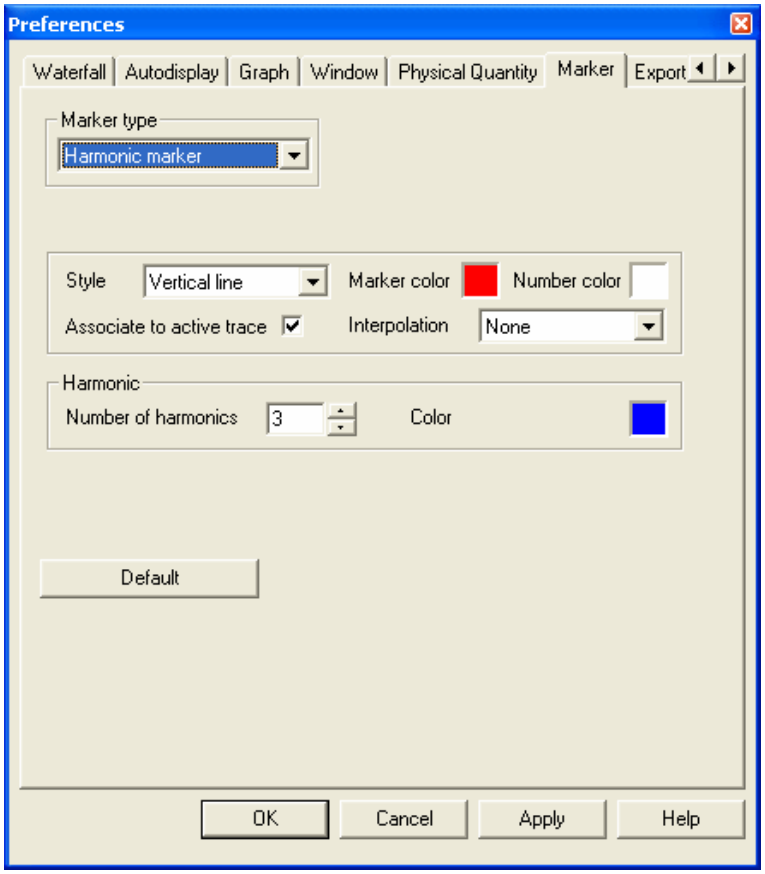
- **Text color:** Selects label color.
- **Background color:** Selects label background color.
- **Display current position:** displays automatically the coordinates of the selected point.

7.9.1.3 Line setup

- **Display line:** If checked, a line between marker and label is displayed
- **Line color:** Selects line color
- **Line style:** Selects line style. Available styles are:
  - Full line
  - Dashed line

For more details on the marker use, see the “Markers” topic from the “Chapter 2: Display”.

7.9.2 Harmonic marker page



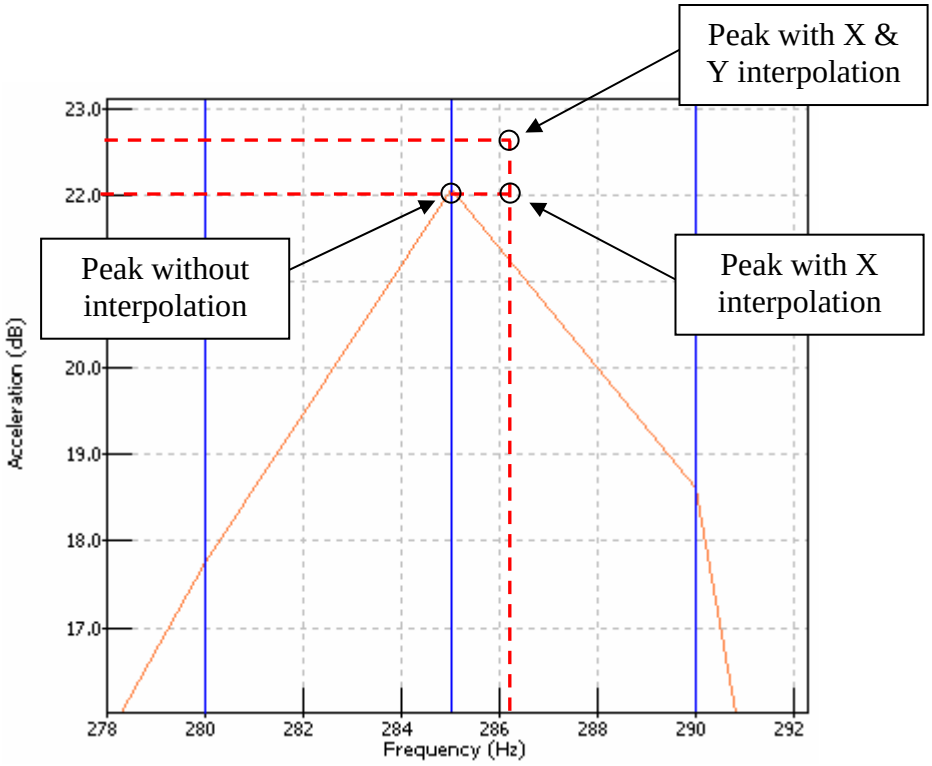
7.9.2.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

- **Marker color:** Selects the marker color used in the graphical area.
- **Number color:** Selects the marker number color used in the graphical area.
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.
  - **None**: no interpolation applied.

- **X**: x interpolation is active.
- **X & Y**: x and y interpolations are active.



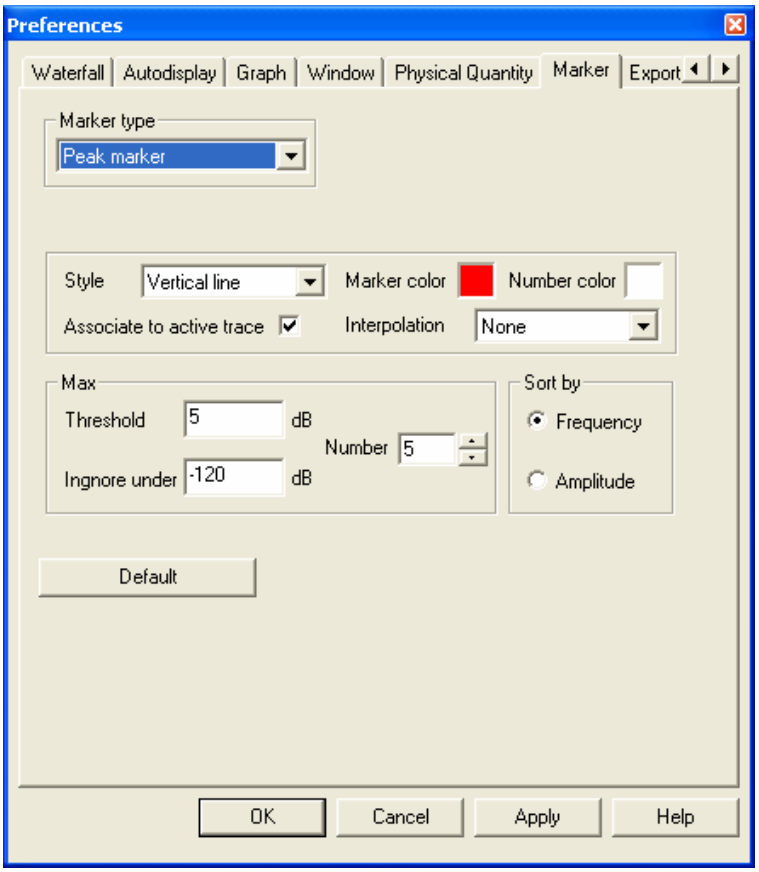
Note: the interpolated values of harmonic markers will be available only if the harmonic marker is placed on a peak. The peak detection criteria are the same as the peak marker adjusted in the User preferences. The marker can be moved by 1/32 step. The x value is computed with the selected weighted window.

7.9.2.2 Harmonic

- **Number of harmonics:** Selects the number of harmonics to find.
- **Color:** Selects harmonics color.

For more details on the marker use, see the “Markers” topic from the “Chapter 2: Display”.

7.9.3 Peak marker page



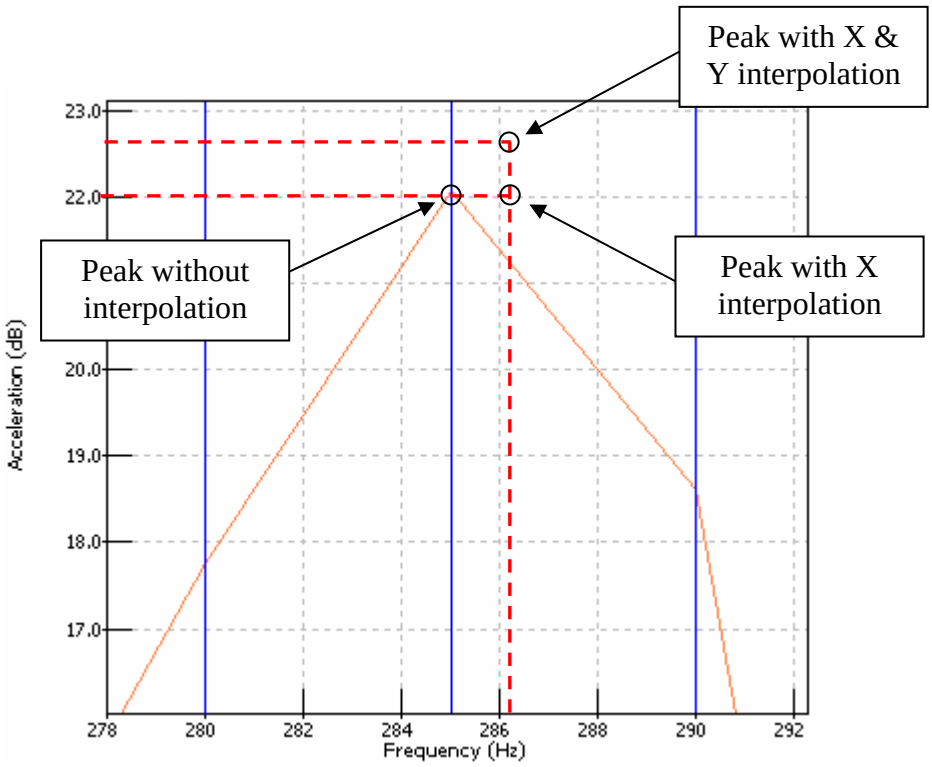
7.9.3.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

- **Marker color:** Selects the marker color used in the graphical area.
- **Number color:** Selects the marker number color used in the graphical area.
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.

- **None**: no interpolation applied.
- **X**: x interpolation is active.
- **X & Y**: x and y interpolations are active.



7.9.3.2 Max

- **Number of peaks:** Selects the number of peaks to find.
- **Threshold:** Defines the threshold used for the detection of peaks.
- **Ignore under:** Defines the absolute threshold used for the detection of peaks.

7.9.3.3 Sort by

In the Infotrace the 'Peak Marker Table' can be sort by:

- **Frequency:** in the marker table, results are displayed from the lowest to the highest frequency.
- **Amplitude:** in the marker table, results are displayed from the highest to the lowest amplitude.

7.9.3.4 Find peak algorithm

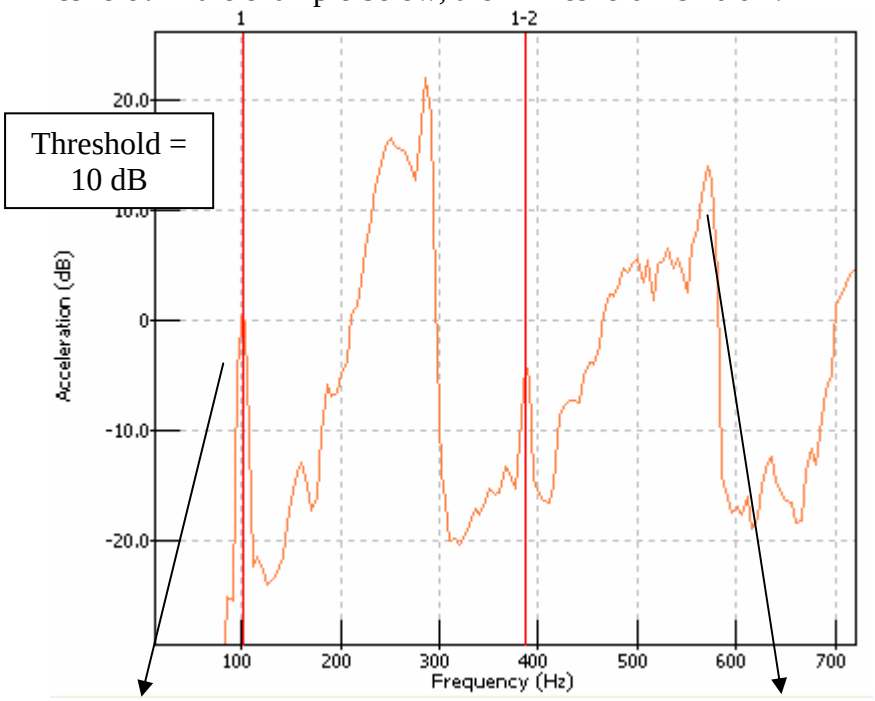
Finding peaks is only available for the Spectrum and Cross Spectrum traces. It looks for the peaks of the selected trace. It can be applied to the current frozen window or to all frozen windows in the workspace.
A spectrum line is detected as a peak if the two following conditions are met:

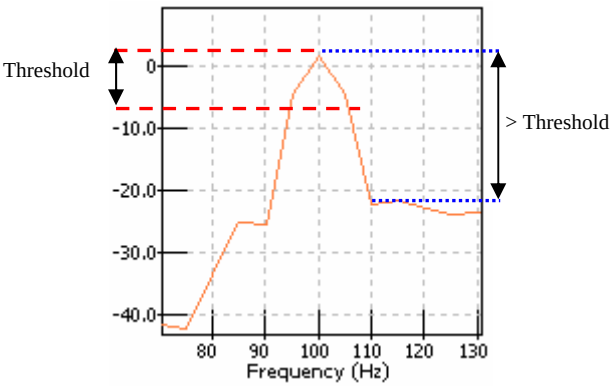
- The two adjacent spectrum line levels are lower than the central spectrum line level.

- The two following spectrum line levels are lower than the central spectrum level minus the peak threshold.

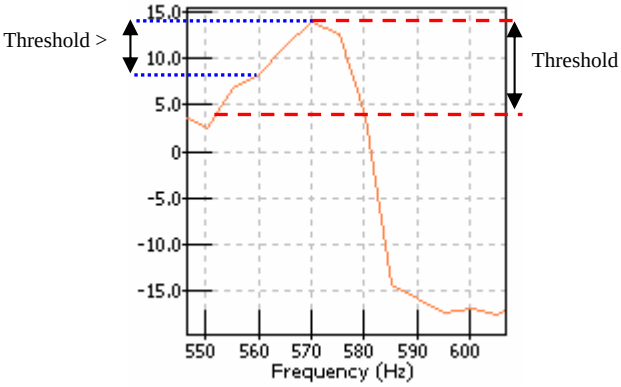
The next two pictures show how peaks are detected. The difference between the two figures is that the second peak threshold is greater than the first one and the peak is not detected.

- **Threshold:** In the example below, the “Threshold” is 10 dB.



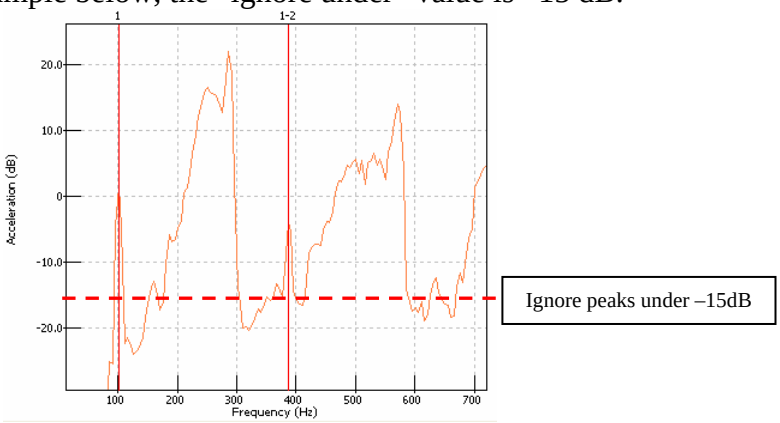


Peak detected



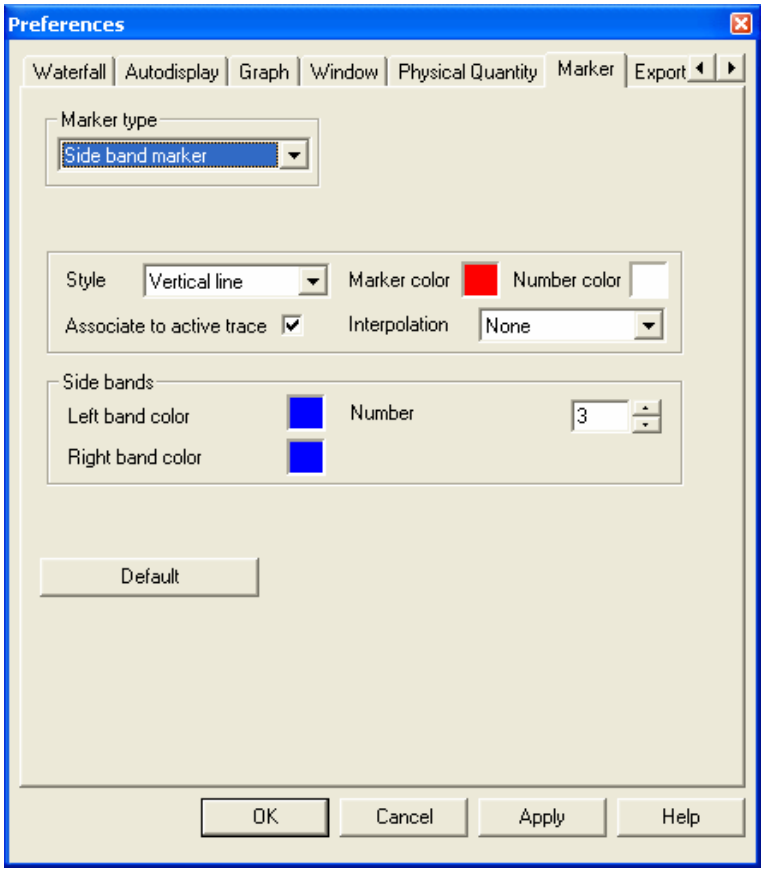
No Peak detected

- **Ignore under:** Does not display the detected peak if the peak is under this value. In the example below, the “ignore under” value is –15 dB.



For more details on the marker use, see the “Markers” topic from the “Chapter 2: Display”.

7.9.4 Side band marker page



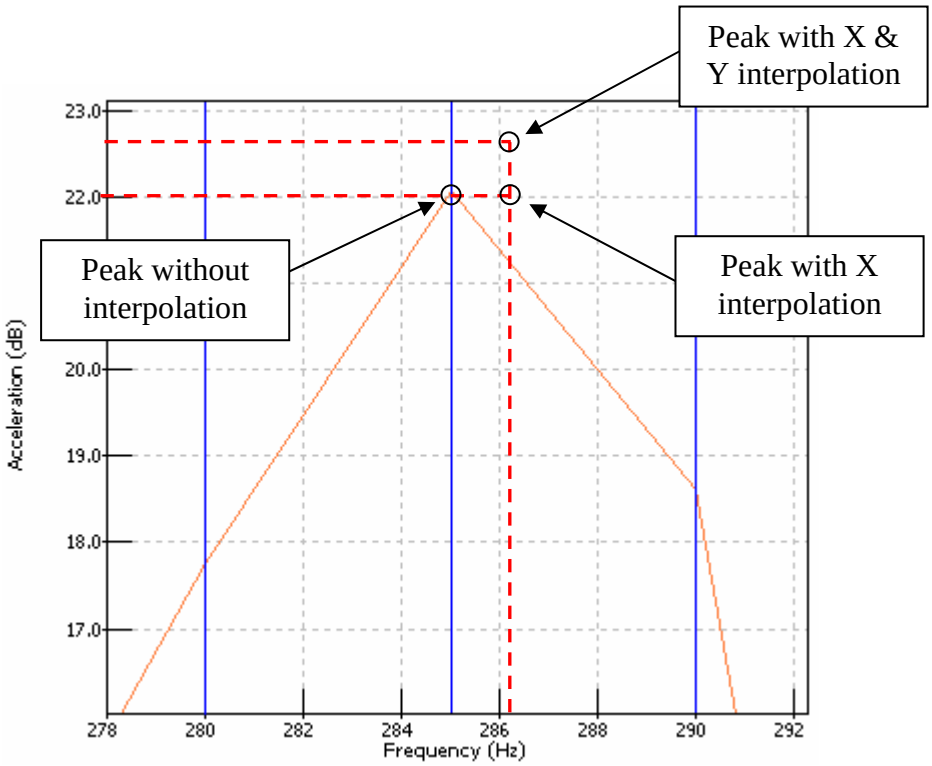
7.9.4.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

7.9.4.2 Marker color

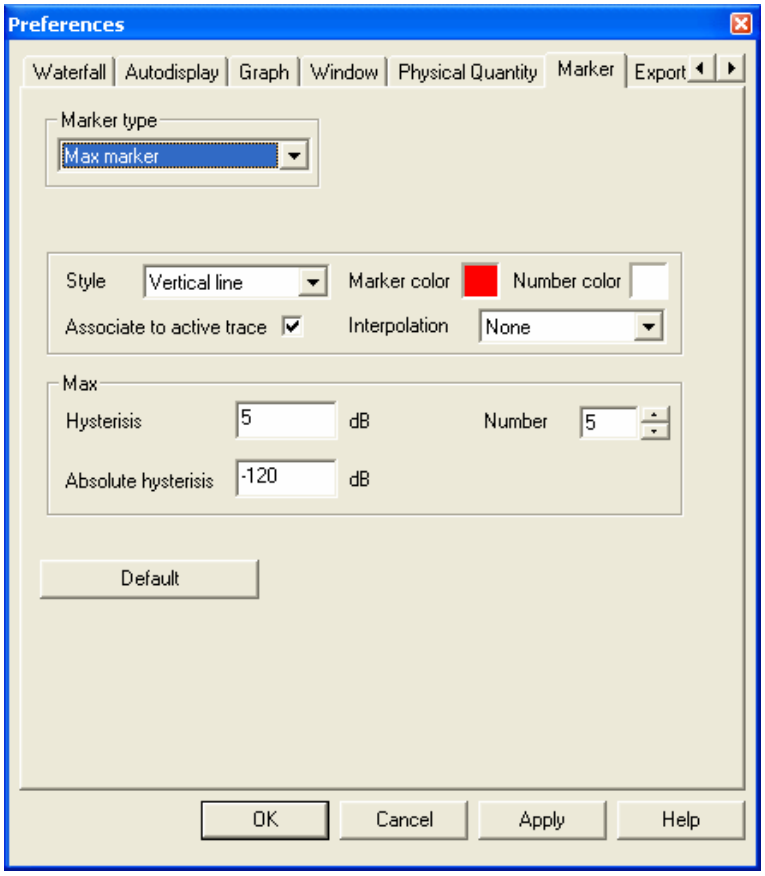
- **Number color:** Selects the marker color used in the graphical area.
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.



7.9.4.3 Side bands

- **Left band color:** Selects left band color
- **Right band color:** Selects right band color
- **Number:** Selects number of side bands to compute.

7.9.5 Max marker page



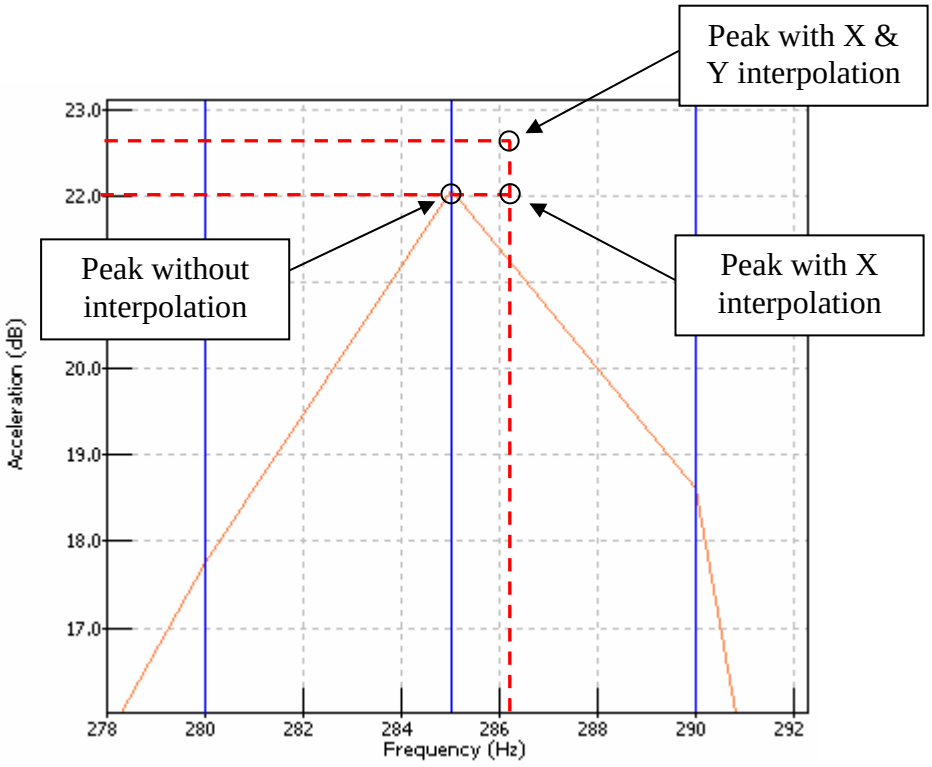
7.9.5.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

- **Marker color:** Selects the marker color used in the graphical area.
- **Number color:** Selects the marker number color used in the graphical area.

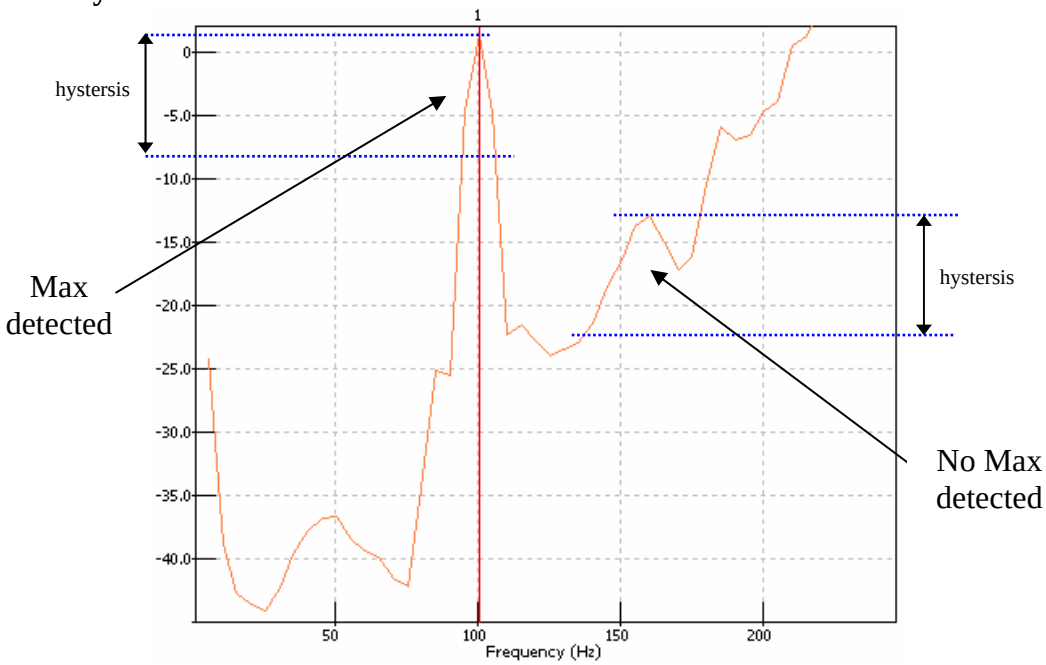
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.
  - **None**: no interpolation applied.
  - **X**: x interpolation is active.
  - **X & Y**: x and y interpolations are active.



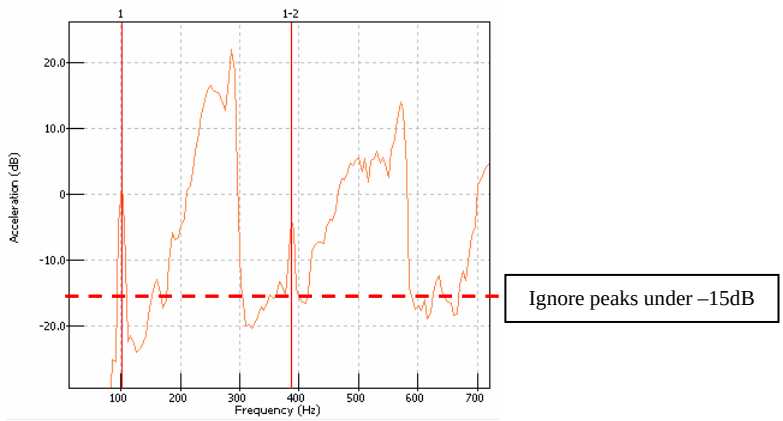
7.9.5.2 Find max algorithm

Looks for the maximum of the selected trace. It can apply to the current frozen window or to all frozen windows in the workspace A maximum is defined as a local maximum such that the variation in size of spectral density of ray, in relation to other local maximum surrounding it, is greater than a set threshold. The following diagram shows how the maxima are searched for different maximum threshold values. In the first figure, the maximum threshold allows to find 2 maximum while in the second figure a larger maximum threshold found only one maximum.

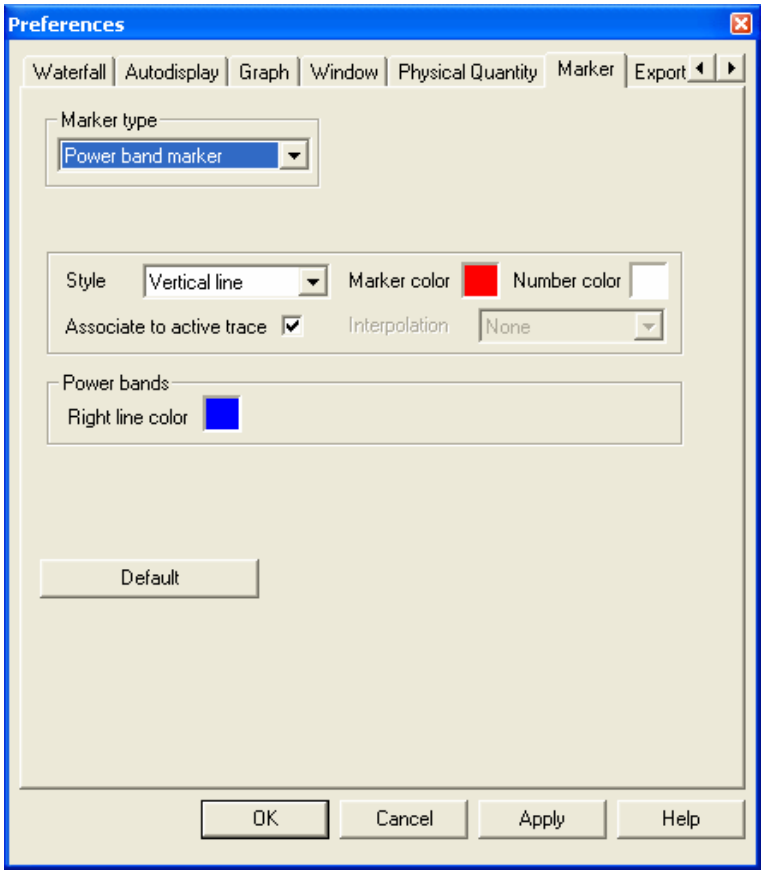
- **Hystersis**



- **Ignore under:** Does not display the detected peak if the peak is under this value. In the example below, the “ignore under” value is –15 dB.



7.9.6 Power band marker page



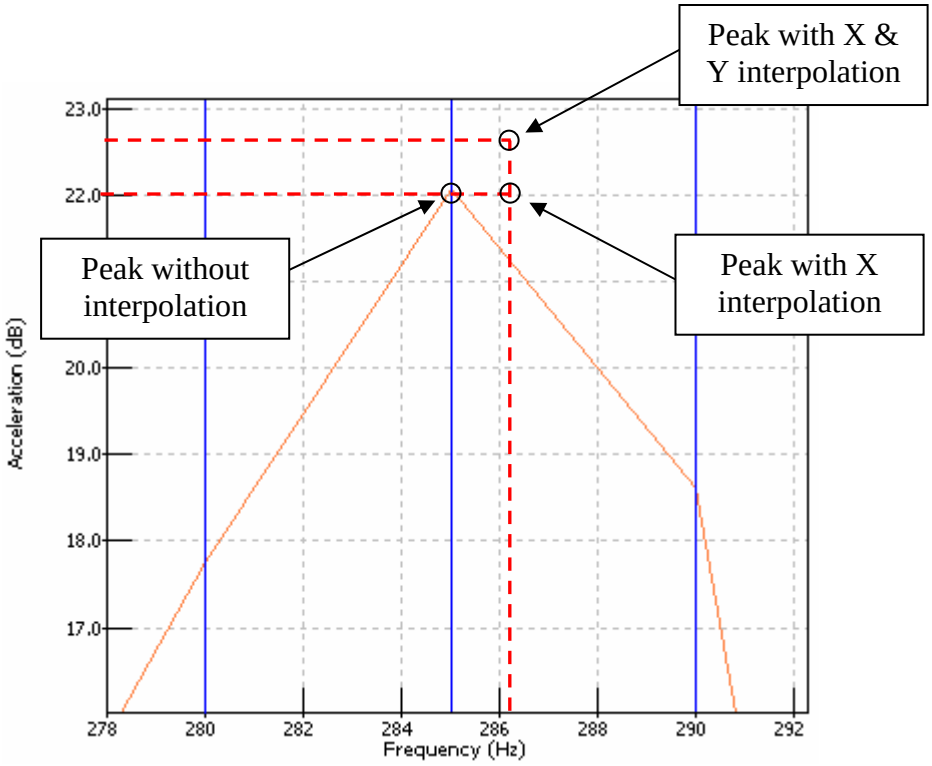
7.9.6.1 Style

Selects marker drawing style used in graphical area. The available marker drawing styles are:

- Vertical line
- Vertical dashed line
- Vertical with rectangle
- Cross-hair
- Vertical + Horizontal

- **Marker color:** Selects the marker color used in the graphical area.
- **Number color:** Selects the marker number color used in the graphical area.
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.
- **Interpolation:** This setting selects the interpolation of values displayed in the marker table.
  - **None**: no interpolation applied.

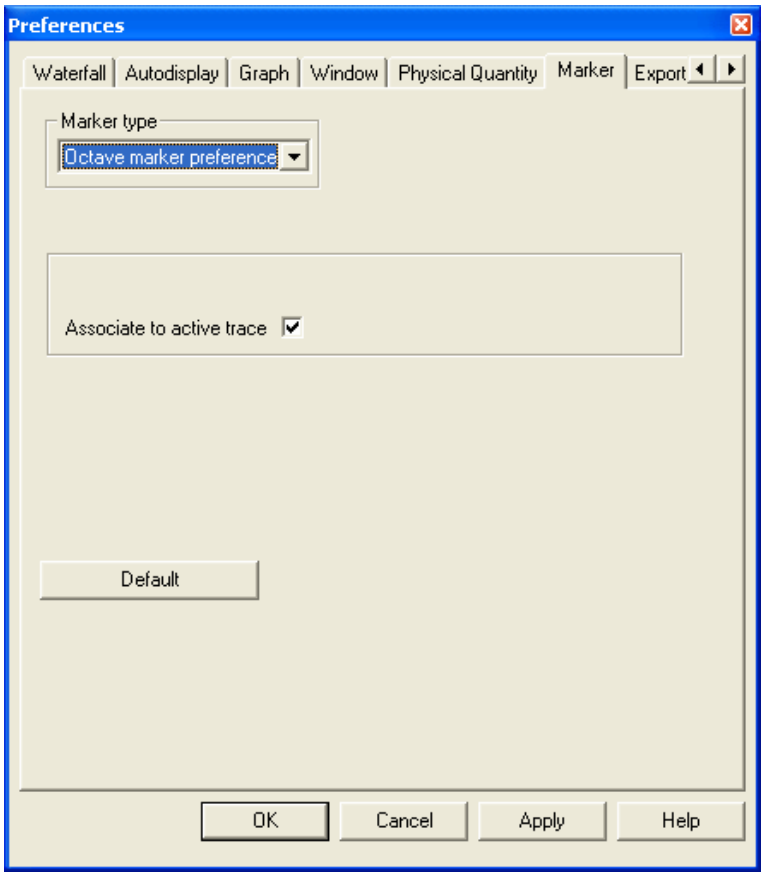
- **X**: x interpolation is active.
- **X & Y**: x and y interpolations are active.



7.9.6.2 Power bands

- **Right line color:** Selects right line color.

7.9.6.3 Octave marker page



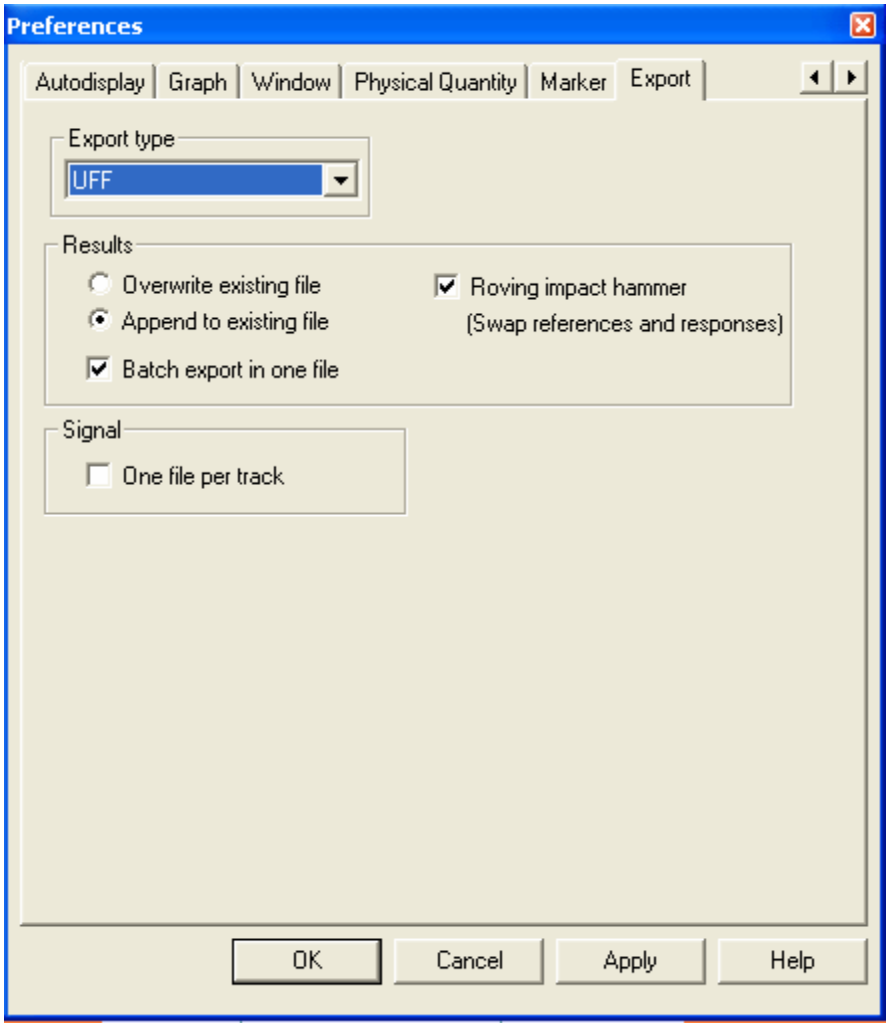
- **Associated to active trace:** If checked, the marker added will be associated with the active trace: the markers display the values only for the active signal. If not checked, the markers display all the values when not associated with a signal.

7.10 Export

This function is used to configure the way data is converted to a specified format.

7.10.1 UFF

UFF58 time export is ASCII so that resulting export file size may quite large. Time to export UFF58 files may be long according to the ASCII file size being exported.



Note: UFF export format also stores the result physical quantity. Please ensure that the software you will use to load the UFF file is set to the same physical quantity as the imported file.

7.10.1.1 Results

- **Roving impact hammer:** This option is used only when converting cross-spectra, FRH, coherence. Depending on the habits, the response and the reference may be different. For instance, to use a UFF converted file in Smart office software, the option must be selected.

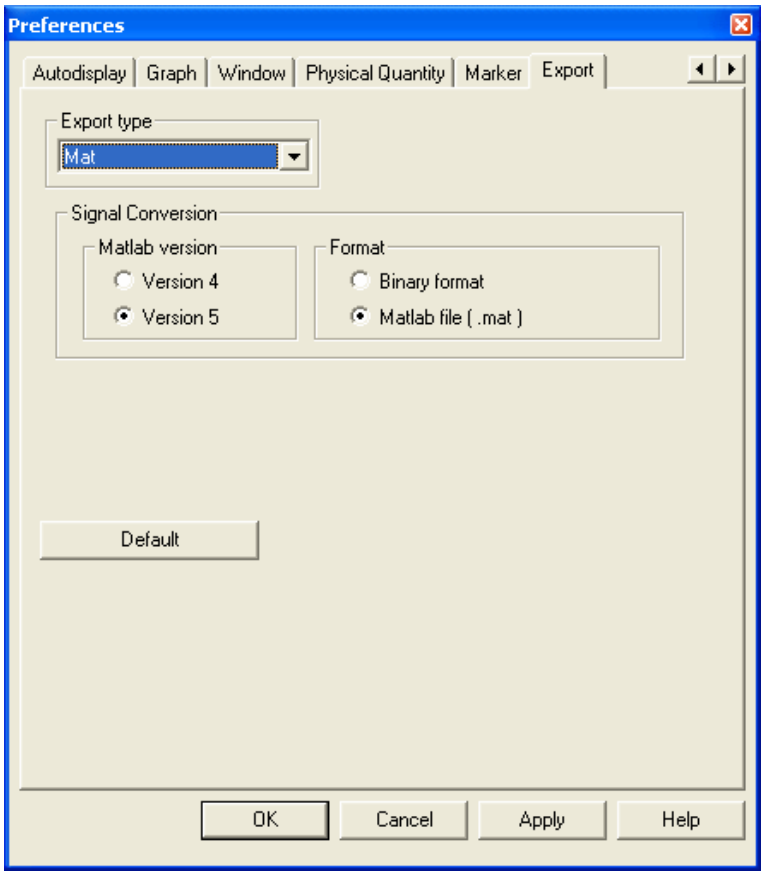
- **Overwrite existing files:** you can overwrite existing files by new results.
- **Append to existing files:** you can append new results to existing files.
- **Batch export in one file:** The same features are associated to batch export, allowing the export of multiple acquisitions (from on project or several ones) in one unique file.

7.10.1.2 Signal

- **One file per track:** When a signal file is converted to UFF, every track is saved in a separate file if this option is selected.

7.10.2 Mat

Matlab export requires that the PC virtual memory be adjusted to double the size of the native OROS time recording.
For instance for a 500Mb OROS time data record to be converted into Matlab, you may need to adjust the PC virtual memory to 1Gb.



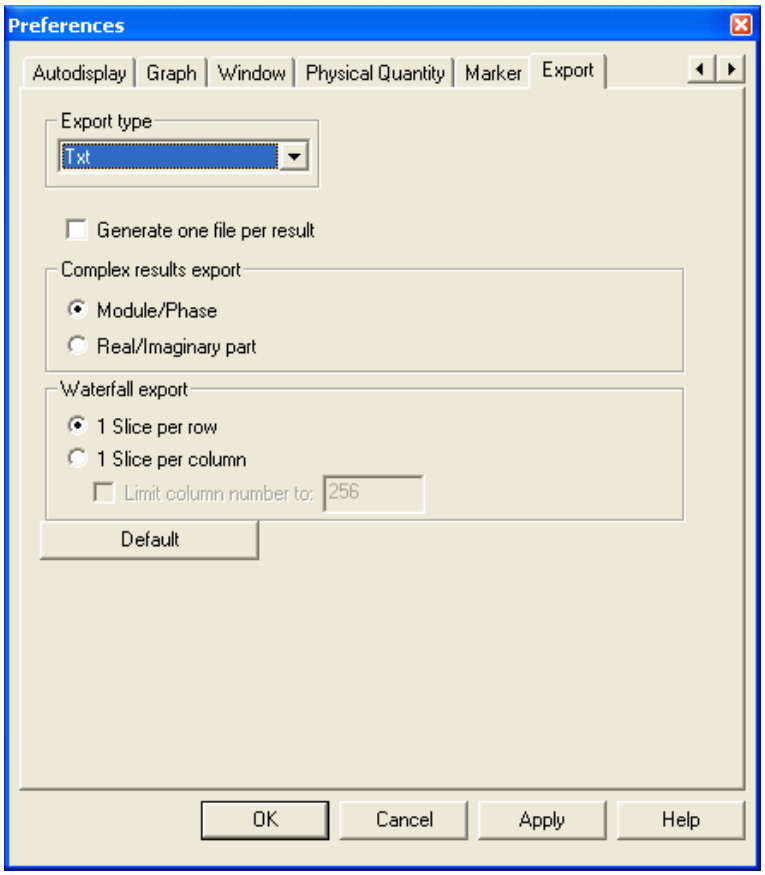
7.10.2.1 Matlab version

Used to select the matlab version of the created file. Refer to your installed version to find out which version you should select.

7.10.2.2 Format

- **Binary format:** The conversion of a signal file generates a matlab file containing the description of the track and one binary file containing the data itself. A procedure for reading the data in matlab has to be written.
- **Matlab file (.mat):** The conversion of a signal file generates a matlab file containing the description of the track and the data itself. Very large file may be difficult to open in Matlab.

7.10.3 Txt



7.10.3.1 Generate one file per track

When a result file is converted to txt, every result is exported to a dedicated file.

7.10.3.2 Complex results export

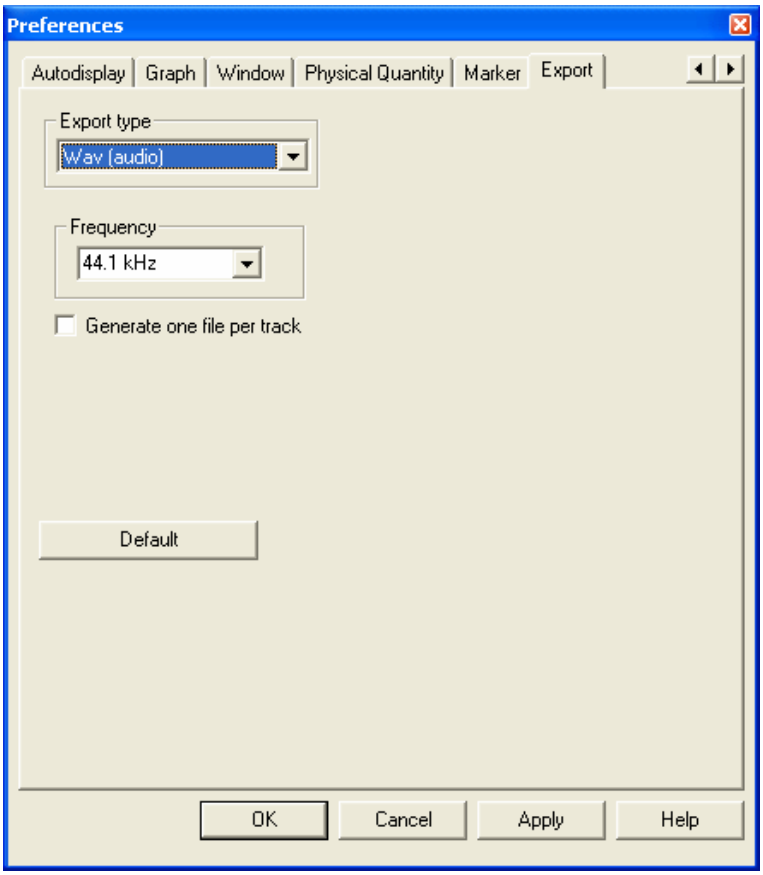
- **Module/Phase:** Complex result are in the Module / phase format.
- **Real/Imaginary part:** Complex results are in Real / Imaginary part format.

7.10.3.3 Waterfall export

- **1 slice per row:** The Waterfall is displayed in the exported file so that each line represents a slice of the Waterfall (a spectrum for instance). If the Waterfall contains 50 slices, and the spectra contain 401 lines, the text file will contain 50 lines and 401 columns.
- **1 slice per column:** The Waterfall is displayed in the exported file so that each column represents a slice of the Waterfall (a spectrum for instance). If the Waterfall contains 50 slices, and the spectra contain 401 lines, the text file will contain 401 lines and 50 columns.
- **Column limitation:** When the one slice per column option is selected, it is possible to specify the maximum number of columns that should be created. If the result contains more slices than this number, it is split. This option should be selected when the file is opened with a spreadsheet editor, because the number of columns in this editor might be limited (256 for Excel).

7.10.4 Wav (audio)

This option only applies to the conversion of signals to audio wav files, not to standard wav files.
Exported wav file sampling frequency depends on OROS native file sampling frequency.
OROS native files containing more than 16 tracks will automatically be exported in single tack wav file (one file per track, despite export preference option being unticked).



Compatibility table (OROS to Wav):

OROS native file sampling frequency (kS/s)	**Wav audio formats (kHz)**
102.4	44.1, 48, 96
65.5536	44.1, 48, 96
51.2	44.1, 48
32.768	44.1, 48
25.6	44.1, 48
20.48	44.1, 48
16.384	44.1, 48
12.8	44.1, 48
10.24	44.1, 48

7.10.4.1 Frequency

Sets the frequency of the converted file. The frequency can be 44.1 kHz, 48 kHz or 96 kHz. It might not be possible to convert the OROS file to the target frequency. It depends on the recording frequency of the OROS file.

7.10.4.2 Generate one file per track

When a signal file is converted to wav, every track is saved in a separate file if this option is selected.

Chapter 8: Operations with Multiple Hardware

Tables of Contents:

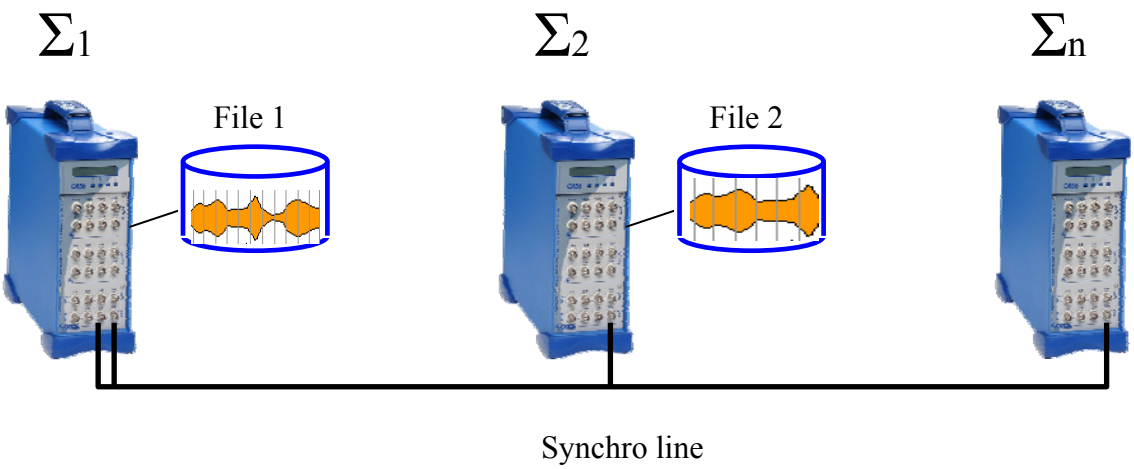
Chapter 8: Operations with Multiple Hardware 8-1
8.1 Introduction 8-4
8.2 Reminder 8-5
8.2.1 Rotating 8-5
8.2.2 Structural 8-6
8.2.3 Overall Levels 8-7
8.3 Track Assembler 8-7
8.3.1 Introduction 8-7
8.3.2 Principe 8-8
8.3.3 Operating Process 8-8

8.1 Introduction

With OROS 3-series it is now possible to make synchronous records on multiple analyzers. After resynchronization the record can be post-analyzed with NVGate as if it was recorded on only one analyzer.
This operation with multiple analyzers is described in 3 steps as explain in the following schemes.

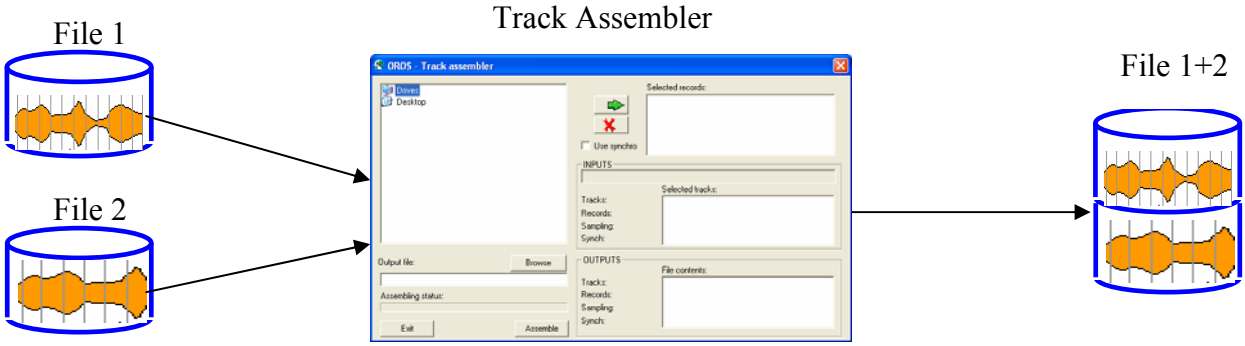
- Step 1:

Record on each analyzer a synchronization signal (the synch line) in addition to the transducer's signal.



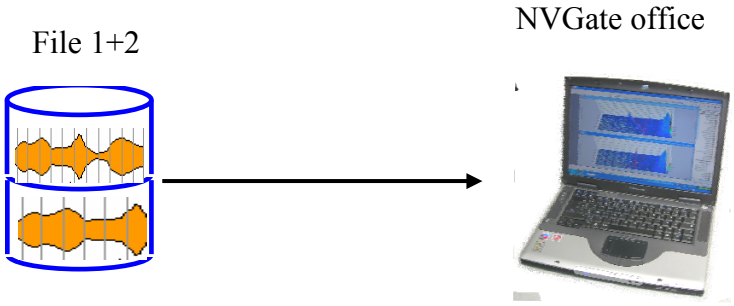
- Step 2:

Select the files to be synchronized and use the 'Track Assembler' software module to gather and synchronize all tracks in a unique file.



- Step 3:

The synchronized records are then available for post-analysis with NVGate office or export to third part software.

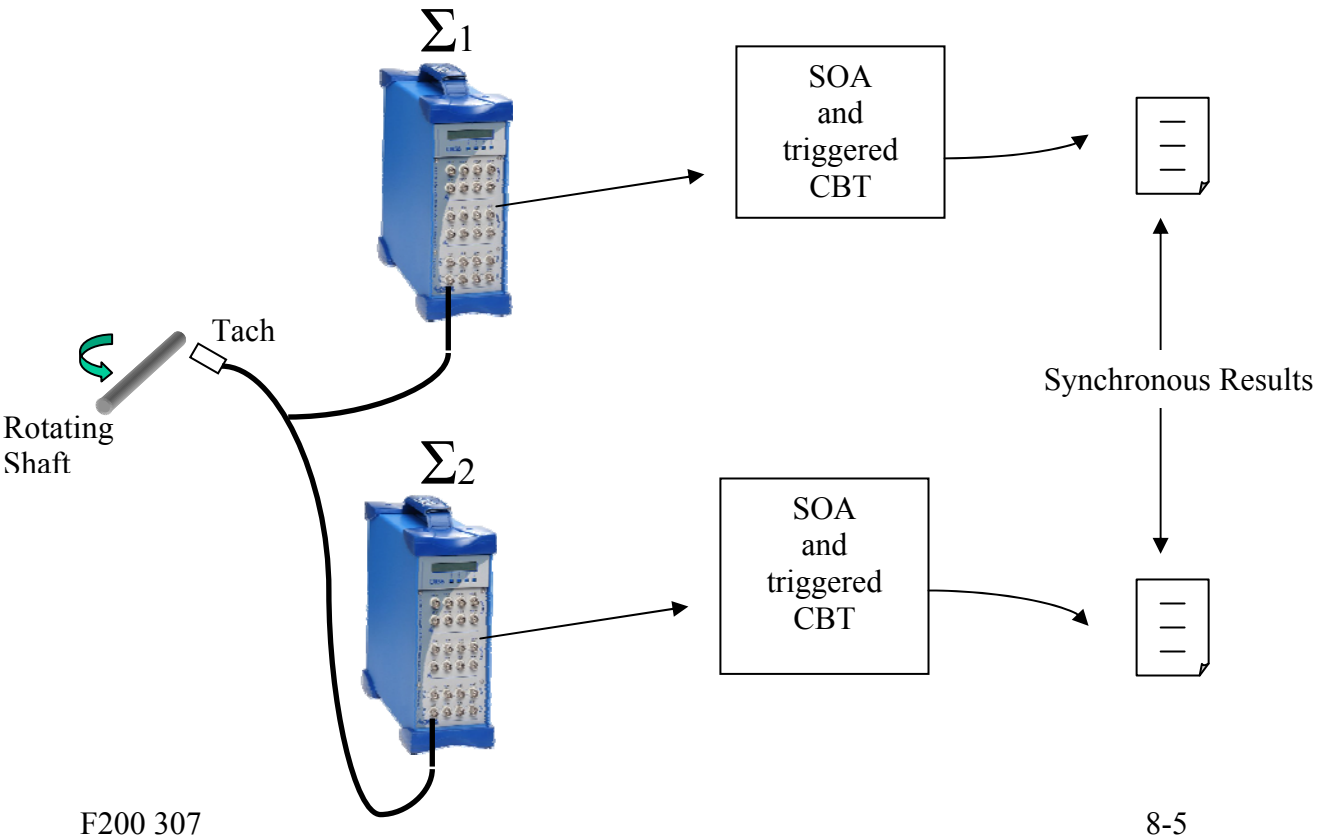


8.2 Reminder

Note that it is not always necessary to synchronize the front end depending on the application. These particular cases are described below.

8.2.1 Rotating

Using the Order Tracking, Distributing the tachometer on each system will replace the synch line.

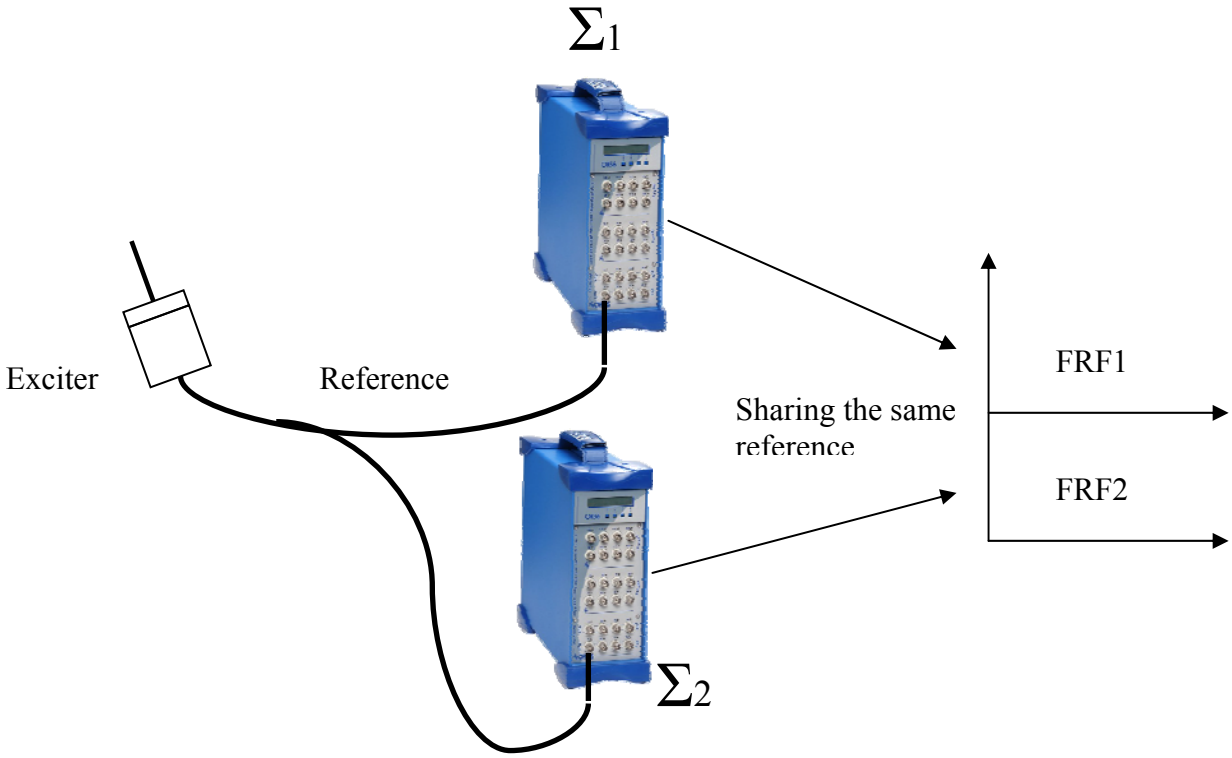


For synchronous order tracking operation (SOA), signals are re-sampled in function of tachometer pulses ensuring accurate phase (of orders) between multiple instruments.

For Constant Band Tracking (CBT), orders are synchronous regarding the RPM speed. The use of the revolution pulses as FFT trigger will provide phase synchronization.

8.2.2 Structural

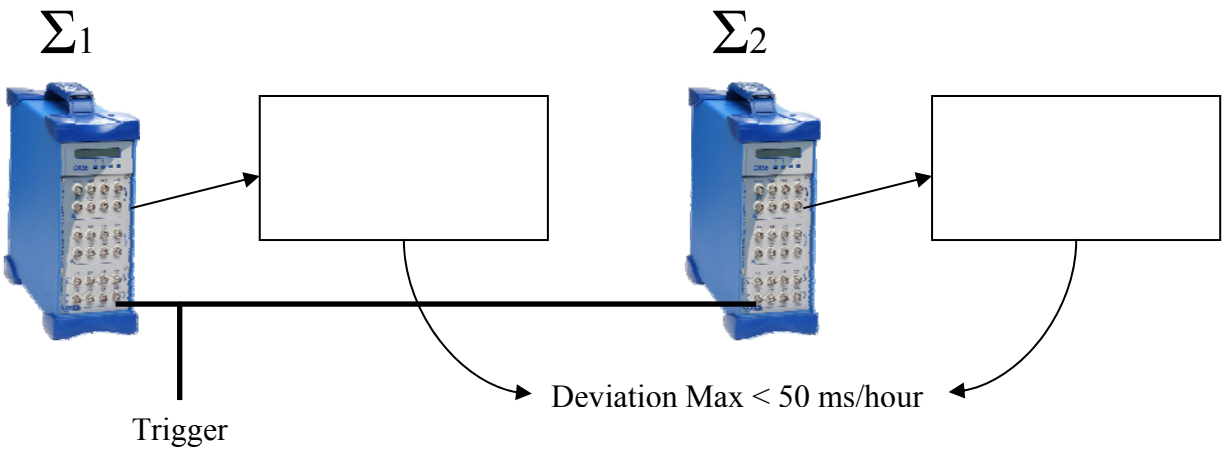
When using X-Functions, sharing the reference(s) on every system will provide synchronous FRFs, X-spectra and Coherences.



This method is generally used with shaker(s) or loud speaker(s) excitation.

8.2.3 Overall Levels

Using multiple analyzers for overall levels (acoustics or vibrations) measurements can provide correct results without synchronization. Since the measurements are triggered with a common event, the level profiles will be comparable at a fixed time. This is due to the stable enough sampling which guarantee a maximum deviation of 100 ms/hour at 20 kHz between different analyzers.



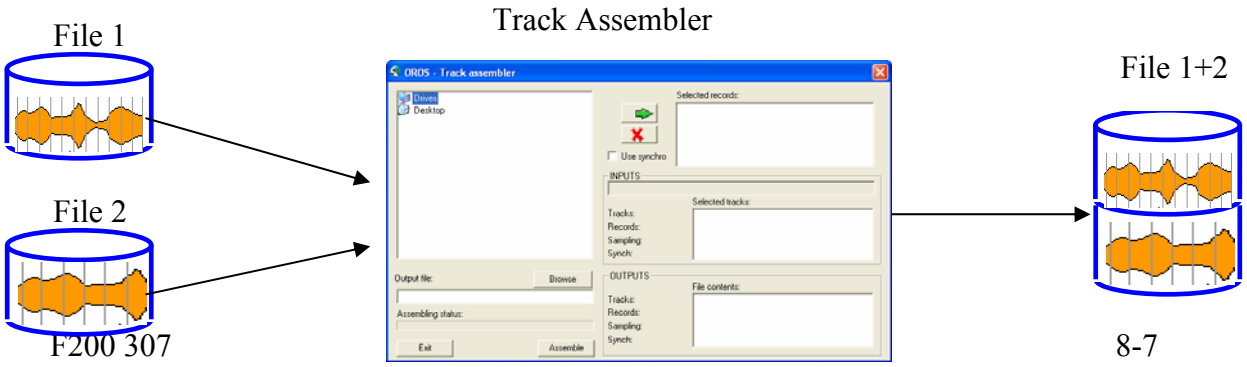
8.3 Track Assembler

8.3.1 Introduction

The assembling method guarantees the same specifications for your measurement as if they were recorded on a unique analyzer (example: 2.19°@20 kHz).

This method synchronizes multiple records in a unique one. For this purpose an external application (‘Track Assembler’) is provided with NVGate.

The ‘Track Assembler’ application is able to gather files with or without sync signals. In the case of missing sync signal the records will be simply assembled together without any phase synchronization.



Note that it is also possible to mix different systems as OROS 3-series and OROS 2-series. For this OROS 2-series records must be imported previously into NVGate (i.e. converted in .oxf format).

8.3.2 Principe

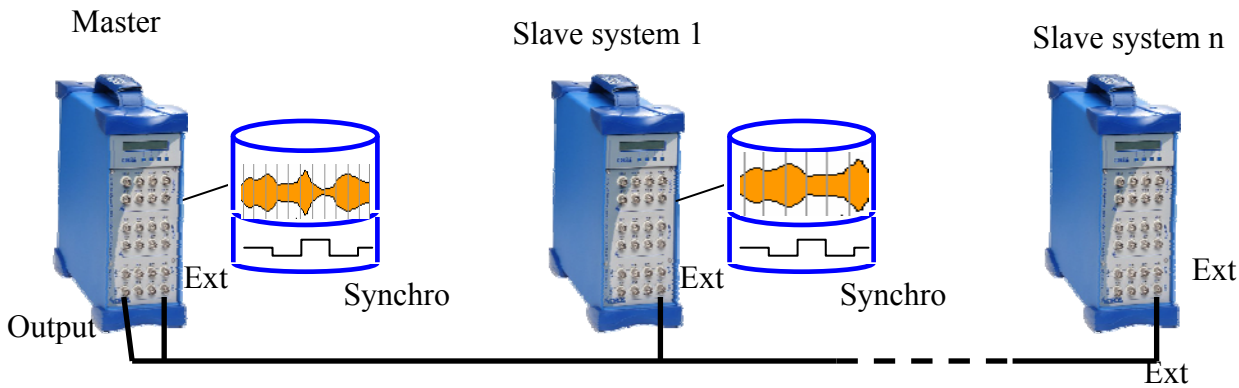
First thing is to record in all files a reference's signal on the external sync input of each analyzer (external sync are over sampled).
Then a resynchronization of the records is made based on the reference's signal, generating a unique file.
Finally this unique file can be post-analyzed with NVGate or exported to third part software.

8.3.3 Operating Process

This part describes the different steps required for a record synchronization.
To know more about the synchro signal see also Chapter 1 "Analyzer settings" p1-54.

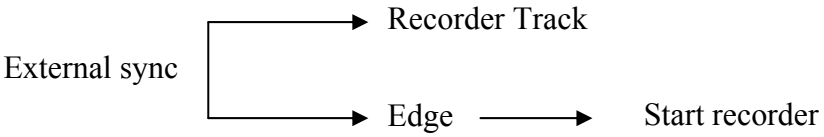
8.3.3.1 A 'Master' system must be defined in order to generate the sync signal (the reference for the synchronization).

8.3.3.2 Distributes this sync signal on every system's External sync (including the Master one).



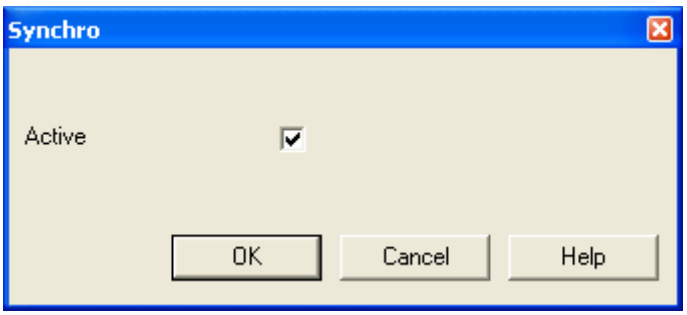
8.3.3.3 Set up recorder plug-in on each system.

- Recorders must have the same sampling Frequency (Fe) for all tracks and for all systems (the best is to select the Front-end sampling frequency)
- Add the External Sync input to the recorder track in order to record the sync signal. Use the External Sync edge detection event to start the recorder; this will synchronize the start of all recorders.
- Coupling DC, threshold: 1V
- Select the 'start to time' mode for the recorder with the same duration on each system (note that if durations are different the synchronization will be done on the smallest duration).

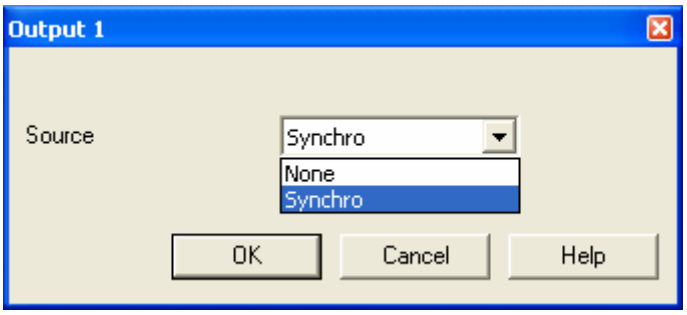


8.3.3.4 Set up the Master system.

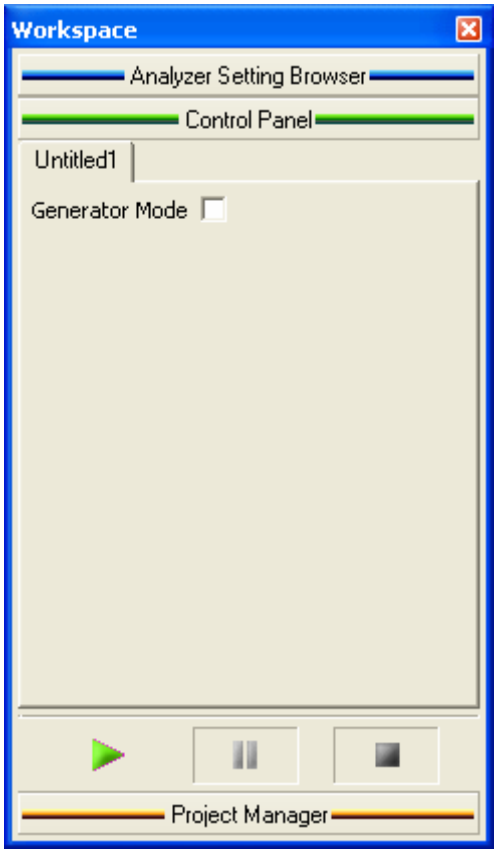
Activate the synchronization signal.



After the activation of the Synch, connect it on Output 1.



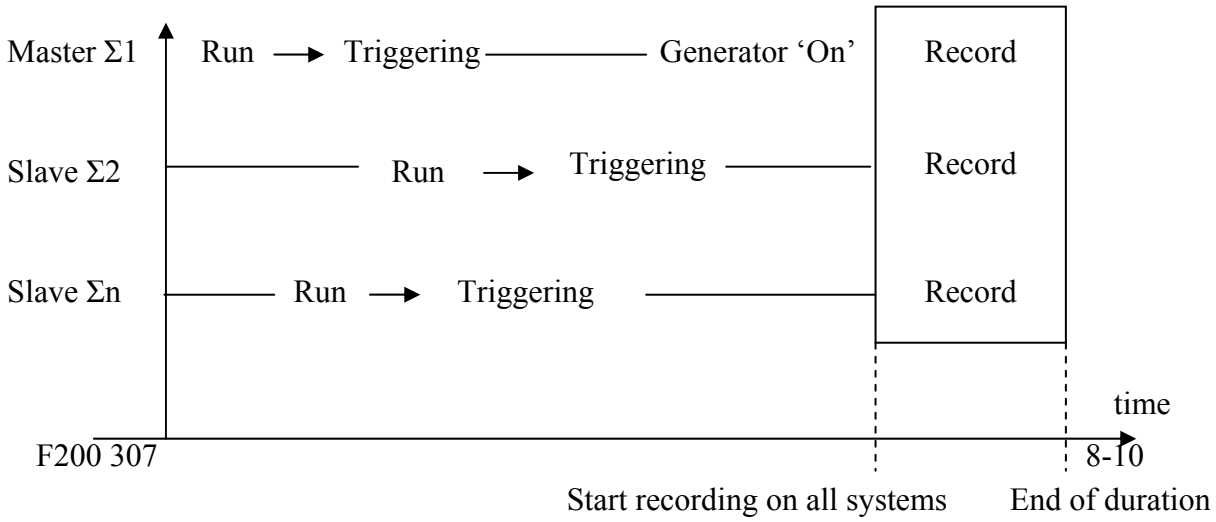
Add the 'Generator mode' setting of the Synch to the Control Panel (right-click on generator mode and select Add to Control Panel) in order to prepare the activation of the generator of the synch signal.



8.3.3.5 Run all analyzers.

After running all recorder plug-in will switch to the 'trigger' state waiting for the activation from the master.

The record on all systems starts with triggering on the reference's signal edge detection.
The records will end automatically after recording duration elapsed.



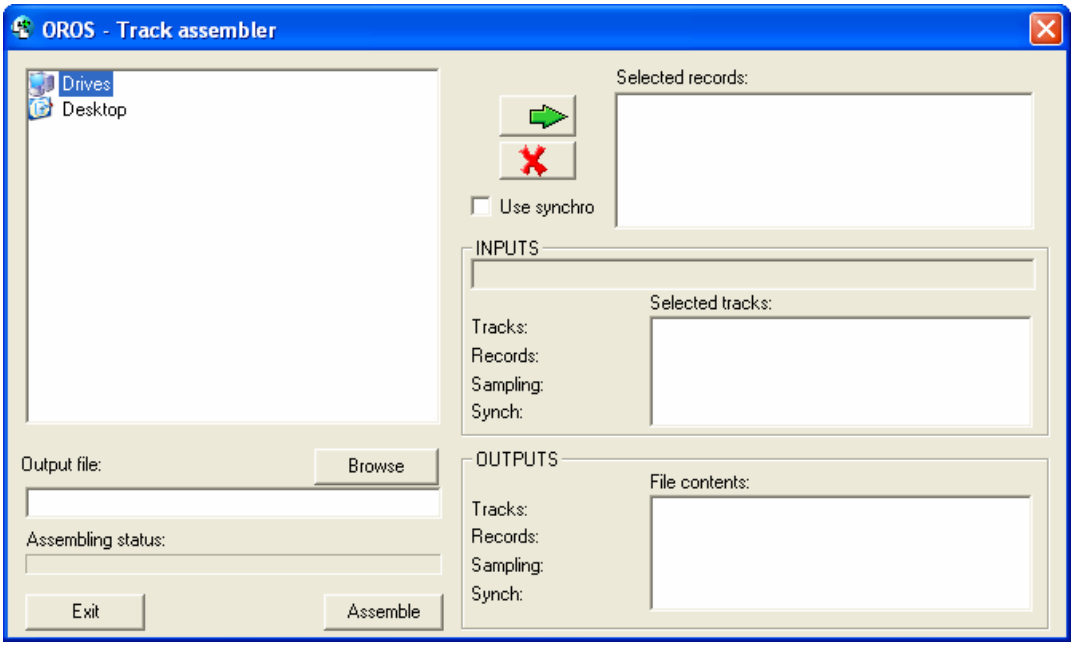
Gather all signals files on one PC (for example the 'Master' one):

- Download to PC if the record is on the disk of the analyzer
- Copy files on the target PC (or let signals files available on the network).

Note: It is advised to export the entire measurement directory to keep a trace of the record set up.

8.3.3.6 Assemble all files: resynchronization

1. Launch 'Track Assembler' software.
2. Select the file (*.oxf) to be assembled using the 'Add' button
3. From each file, choose the channels to be gathered; simply click on unwanted signals in the 'File INPUT' window to unselect it.
4. Select the 'Use Synchro' option if records contain synchronization signals.
5. Choose the output file directory and name.
6. Start file assembling with 'Assemble' button.
7. Close 'Track Assembler' module



8.3.3.7 Post-analyze all synchronized channels:

- Start NVGate office.
- Import concatenated file.

- Post-analyze.

Chapter 9: Remote controller

Tables of Contents:

Chapter 9: Remote controller 9-1
9.1 Introduction 9-3
9.2 Installation Guide 9-4
9.2.1 Contents 9-4
9.2.2 Connections 9-4
9.3 User Manual 9-4
9.3.1 Overview 9-4
9.3.2 Operating the control panel: 9-5
9.4 Modes 9-5
9.4.1 Hardware setup 9-6
9.4.2 Analyzer operation 9-1
9.5 Update 9-4
9.6 Specifications 9-5

9.1 Introduction

OROS 3-Series analyzers feature an advanced and powerful remote controller as an option. This chapter describes the operations with the remote controller.

This device will allow remote controlling the following features:

- Modal analysis: accept / reject for roving impact hammering
- Recorder: start / stop
- Stand alone recorder with multiple records
- Execute macros
- Manual triggering
- Save/reject measurement
- Fan control
- Battery level control

This device is ideally suited for field measurement thanks to its robustness, secured wired connection, bright display and flexibility.

9.2 Installation Guide

9.2.1 Contents

The Remote Controller is a pack containing:

1- A 7-meter cable (RJ11)
2- The Remote Controller
3- This manual

9.2.2 Connections

In order to connect your Remote Controller to the analyzer:

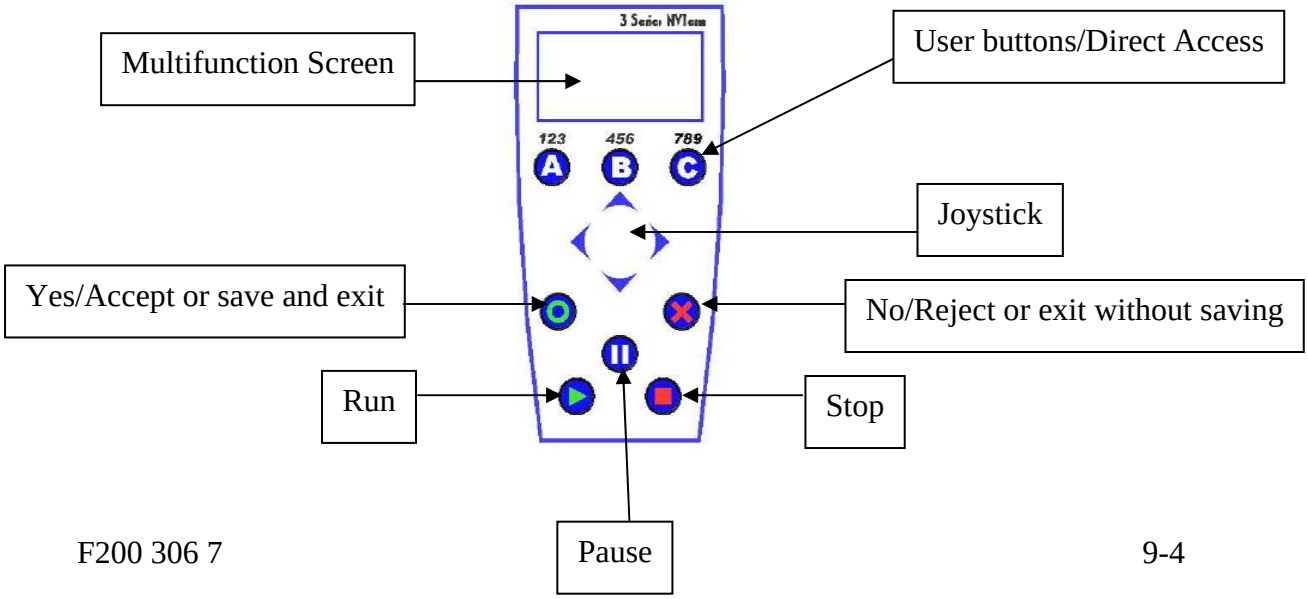
- Start the analyzer
- Plug the Remote Controller cable in the RJ11 connector
- The OROS logo will be displayed on the multi-function screen.

Connect your Remote controller on the back side of the analyzer. Note: this picture is based on an OR38 analyzer.

NOTE:
The Remote controller is operational as soon as it is connected to a powered analyzer. At any time it is possible to plug and unplug the Remote Controller without disturbing the analyzer operation.

9.3 User Manual

9.3.1 Overview



9.3.2 Operating the control panel:

1. **Joystick:**
   a. Use the Joystick to change the highlighted field in the multifunction display.
   b. The current field is selected by clicking in the joystick center.

2. **Buttons:**
   Press the button until the 'click' to activate the corresponding function.

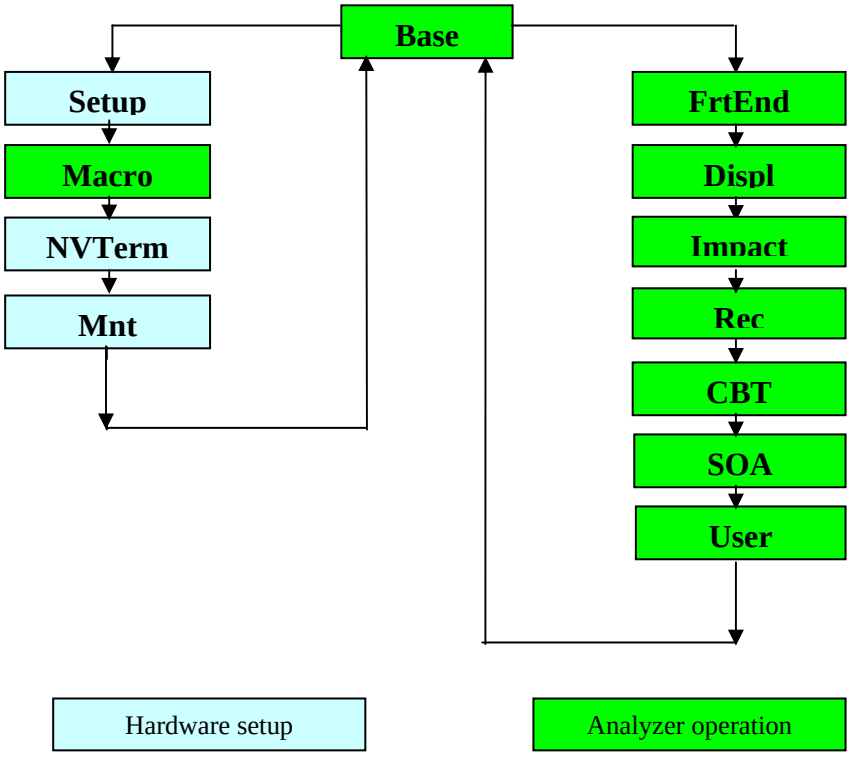
3. **Active screen selection:**
   The navigation is made by using the joystick. The active screen is reached by moving the joystick left or right. The current field (active) is highlighted. To enter the active screen, move down the joystick. To exit the active screen, select the 'Exit' field and press joystick center.

4. **Active screen operation:**
   Inside the active screen, the direct access buttons activate the corresponding fields. Those fields can also be reached by using the joystick.

9.4 Modes

Two different modes are available with your Remote Controller which depends on the status of the instrument. Depending of the current mode, not all the screens are available.

Screen navigation map:



9.4.1 Hardware setup

This mode is activated when the analyzer is launched without NVGate® software running.

Hardware setup main screen

Two menus are available:

- **Setup**: in which you can set up analyzer hardware.
    a. SetIP: Modify the analyzer IP address. Use joystick for digit modification. Use ‘save and exit’ or ‘exit without saving’ buttons for exit
    b. Setfan: set the level of the fan
    c. OFF: switch OFF the analyze

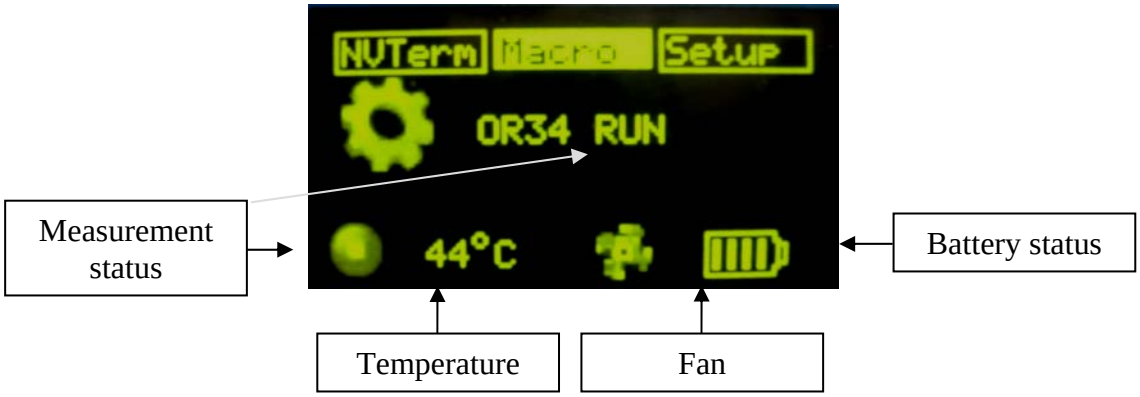
- **NVTerm**:
    a. Beep: activate or deactivate Remote Controller button beep
    b. Luminosity: adjust multifunction screen luminosity
    c. Screensaver: activate or deactivate (protect multifunction screen against screen marks)

- **Mnt**:
    c. reboot the analyzer in maintenance mode

9.4.2 Analyzer operation

This mode is activated when the analyzer is launched and NVGate® software is running.

Analyzer Operation main screen



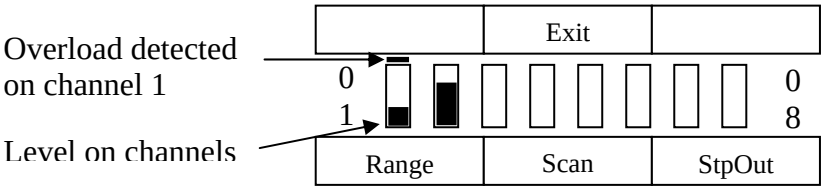
Other menus in addition to hardware setup:

- **Macro**: execute a macro in NVGate.
    a. ‘Macro0’ execute to the macro associated with CTRL + 0 hot key.
    b. ‘Macro1’ execute to the macro associated with CTRL + 1 hot key.
    c. ‘Macro2’ execute to the macro associated with CTRL + 2 hot key.

- **Base**: Basic operations
    a. Fan on/off. Enable/disable the fan for low noise measurement
    b. Trig: Manual triggering (Ctrl + T)
    c. Auto scale: auto scale on all windows

Seven others menus are available:

- **Front End:**



    a. Range: auto range
    b. Scan: allow to visualize all channels.
    c. Stop Output: mutes all the outputs. It corresponds to the emergency stop button.

- **Display:**

	Exit	
Layout : Layout 1		
Scale	Window	Layout

Layout name or window name

a. Scale: auto scale on active window.
b. Window: change the active window.
c. Layout: change the active layout.

- **Impact:**

	Exit	
FFT	On	0/ 3
ON/OFF	Nav.	Reset

This screen is dedicated for sequence option.

a. ON/OFF: run or stop the sequence.
b. NAV: Select Nav. and when Lock is displayed, the joystick allows to navigate in the sequence.

	Exit	
FFT	20 +X	0/ 3
ON/OFF	LOCK	Reset

Node name

Number of measurement

To display the node name, a field should be add in both excel file corresponding to the sequence and the sequence.ini file. More information is given in chapter 5.6: Sequence.

The buttons and on the remote controller allow to:

- Accept or reject the measure when this screen is displayed after the computation of each block.

Accept?

Yes No

- Save or not the measurement when this screen appears.

Save file OK?

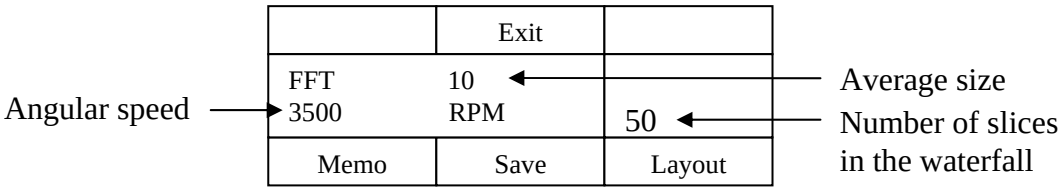
Yes No

c. Reset: go to the beginning of the sequence.

- **Recorder:**

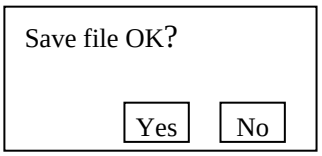
a. Arm: arm the recorder.
b. Trig: manual triggering (Ctrl T)
c. Marker: put a marker on the record window.

- **CBT:**



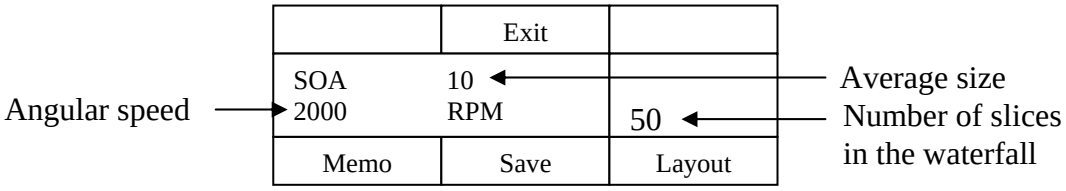
a. Memo: memorize the active trace.
b. Save : save results selected in save setup

This window is displaying:



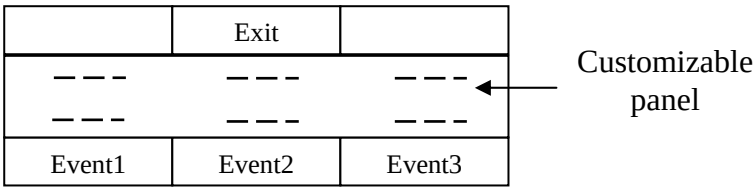
c. Layout: change the active layout.

- **SOA:**



a. Memo: memorize the active trace
b. Save: save results selected in save setup.
c. Layout: change the active layout.

- **User:**



The customizable panel is divided in 6 fields, three columns and two lines.
These fields are defines in the file ‘UserRemoteCtrlWnd’.

Using the codes list, the user can choose the fields he wants to display.

```
;----- Screen : User -----
001 {
        000 {
                Name   = User
                NbArea = 1
                ID     = 6
        }

        ;----- State code of the first area -----
        001 {
                CodeFirstLine  = 0x9    ; User 1 string (first part)
                CodeSecondLine = 0x49   ; User 2 string (first part)
        }

        ;----- State code of the second area -----
        002 {
                CodeFirstLine  = 0xA    ; User 1 string (second part)
                CodeSecondLine = 0x4A   ; User 2 string (second part)
        }

        ;----- State code of the third area -----
        003 {
                CodeFirstLine  = 0xB    ; User 1 string (third part)
                CodeSecondLine = 0x4B   ; User 2 string (third part)
        }

}

;----- Button A description -----
004 {
        Code = 0x53     ; User event 1
        Name = Event1
}

;----- Button B description -----
005 {
        Code = 0x54     ; User event 2
        Name = Event2
}

;----- Button C description -----
006 {
        Code = 0x55     ; User event 3
        Name = Event3
}
```

This file allows to rename the Events:

The events in this panel correspond to the user events in the ASB. When any events are defined, the trigger is done by selecting one of them with the remote controller.

9.5 Update

To update the Remote Controller follow the procedure:

- Exit NVGate® software
- Plug the Remote Controller
- The analyzer is launched but not NVGate® software
- Run the .exe file F222-310-3-FlashNVTerm

a confirmation is asked on the Remote Controller, answer quickly (the question is displayed 5 sec, without any answer the process will be stopped) ‘yes’ in order to start the update.

- This update can take several minutes
- The program stops, no message will appear on the Remote controller
- To end the update unplugged the Remote controller and then plug it again

9.6 Specifications

- Multiple cable length up to 30 m
- Matrix (128x64) bright OLED display
- Start/pause/Stop
- Accept/Reject
- Save/No save
- 3 multifunction keys: digits or menu selection
- Navigation joystick + Direct access function keys
- Standard RJ11 (telephone) cable, easy to replace
- IP 52 case
- Dimension: 62 x 140 x 30 mm ; 2,44’’ x 5,51’’ x 1,18’’
- Weight: 100g