



# AV ACQUISITION

DUALCHANNEL DATA ACQUISITION  
MODULE WITH CONFIGURABLE  
GAIN

USER MANUAL

2017

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## 1. Introduction

**AV ACQUISITION 2001** (AVA 2001) is a universal, portable data acquisition module, which allows to record electrical signals with sampling frequency up to 96 kHz and resolution of 16 or 24 bits.

Due to compact size and small weight, robust design, very good operational parameters, as well as simple handling, the device is perfectly suited for measurements conducted both in the lab and in the field.

The AVA 2001 module features unique input circuits, which allow to select the type of connection:

- » DC, for measurements with constant voltage, or variable with constant component
- » AC, allowing to eliminate the constant component
- » IEPE, for measurements using various types of sensors made in the IEPE standard, such as accelerometers, microphones, etc.

The device allows to select signal GAIN of 1x (0 dB), 10x (20 dB) or 100x (40 dB) independently for each channel.

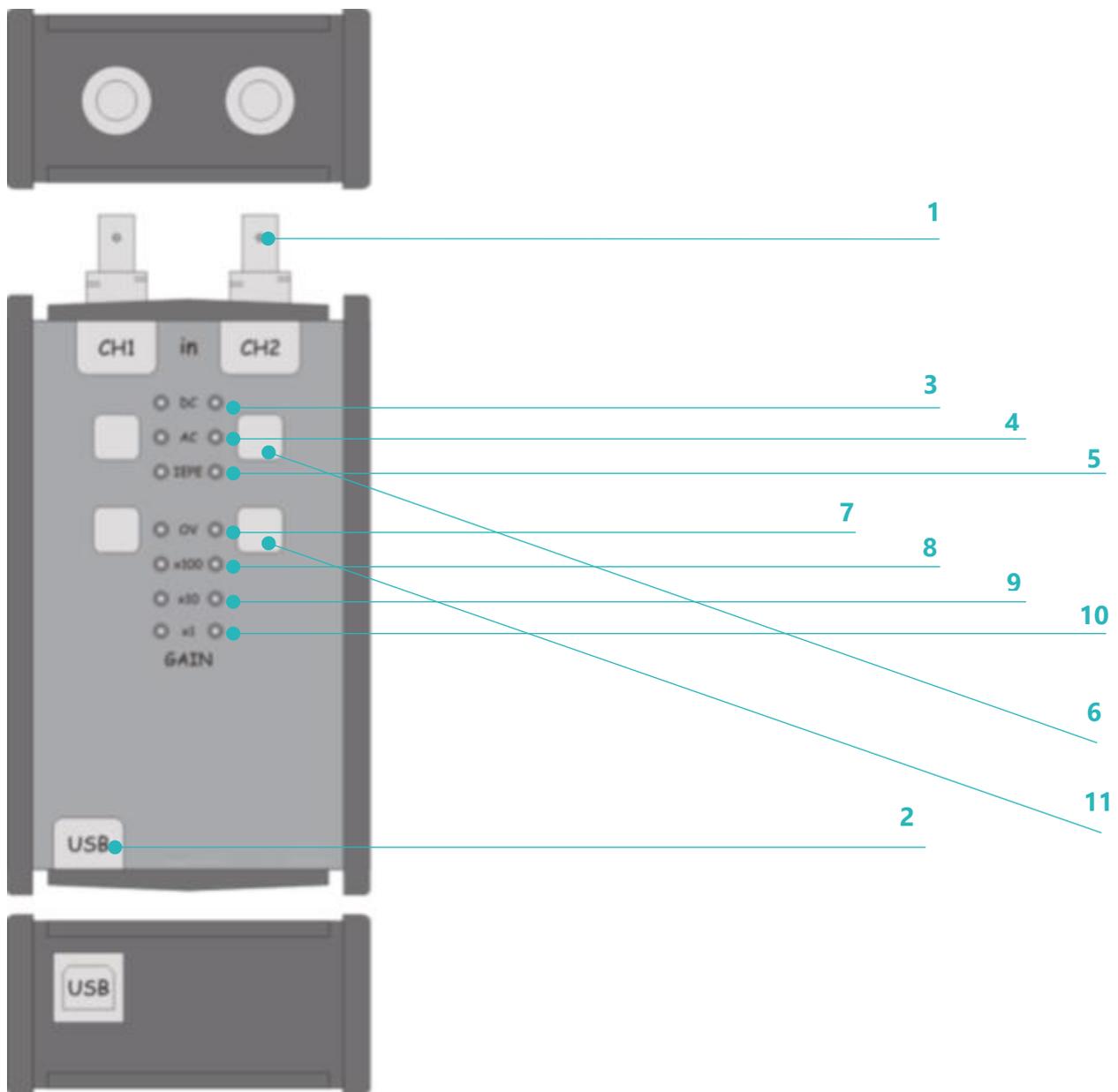
The device is powered up, and communicates with computer through USB port. The installation of the module does not require any additional drivers – after connecting to a computer, the operating system installs the necessary drivers automatically.

## 2. Technical data

Parameters	
Number of channels	2
Input connectors	BNC
Input type	DC, AC, IEPE
Input impedance	<ul style="list-style-type: none"> <li>• AC: 220 k<math>\Omega</math></li> <li>• DC: 220 <math>\Omega</math></li> <li>• IEPE (ICP<sup>®</sup>): 110k<math>\Omega</math></li> </ul>
IEPE (ICP <sup>®</sup> )	24 VDC, 2.4 mA
Crosstalk	<ul style="list-style-type: none"> <li>• 1 kHz sinusoid: &lt; -120 dB</li> <li>• 10 kHz sinusoid: &lt; - 90 dB</li> <li>• 20 kHz sinusoid : &lt; - 86 dB</li> </ul>
THD	typically: -88 dB max: -70dB (at F =48 kHz, input signal: 1 kHz sinusoid)
SNR	92 dB
A/C converter	multi bit Delta - Sigma 16 bit (optionally 24 bit)
Sampling frequency	44.1 kHz, 48 kHz (16 bit, 24 bit) 96 kHz (only for 16 bit)
Anti-aliasing filter	digital decimation

<b>Anti-aliasing filter gain</b>	<ul style="list-style-type: none"> <li>• 0-0.39 F: <math>\pm 0.1</math> dB</li> <li>• 0.55-0.63 F: 75 dB</li> <li>• 0.1425 F: 0.25 dB</li> <li>• 0.45 F: 3 dB</li> <li>• 0.5 F: 17.5 dB</li> </ul>
<b>Communication interface</b>	USB
<b>Power supply</b>	USB port
<b>Power consumption</b>	approx. 300 mA
<b>Dimensions</b>	60 x 100 x 30 mm
<b>Weight</b>	250 g

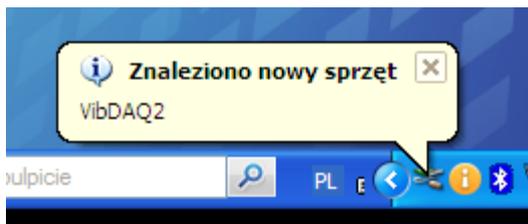
### 3. Description of elements of the AVA 2001 module



Pic. 1 » The view of AVA 2001 module

1	BNC input connector	
2	USB B connector	
3		DC
4	Diode signaling operational mode	AC
5		IEPE
6	Operational mode selection button	
7	Diode signaling exceeding measurement range	
8		100x (40 dB)
9	Diode signaling gain level	10x (20 dB)
10		1x (0 dB)
11	Gain selection button	

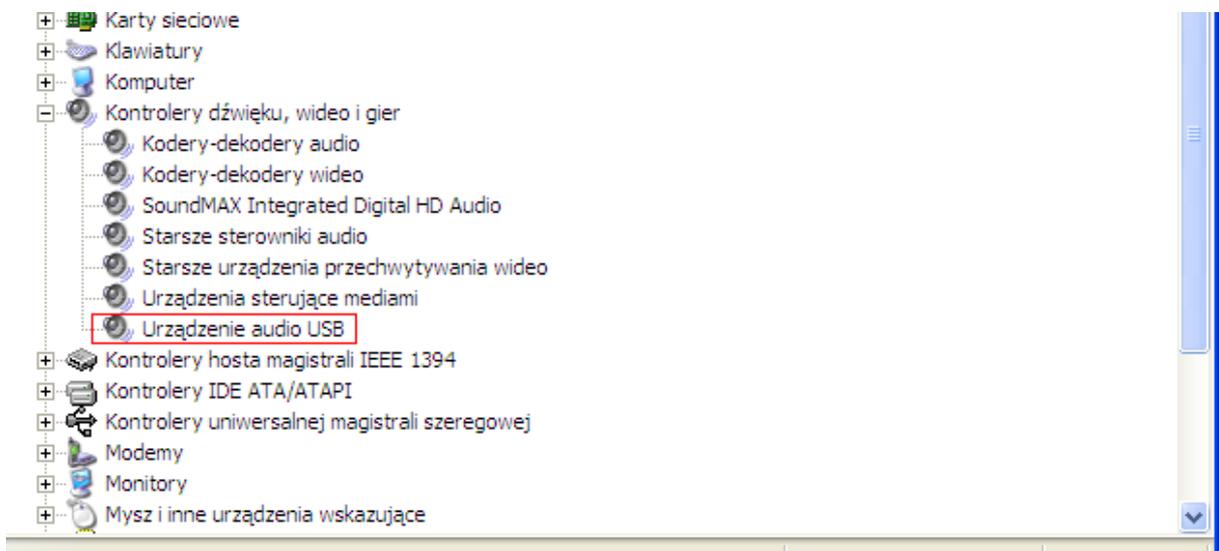
## 4. Installation in Windows XP



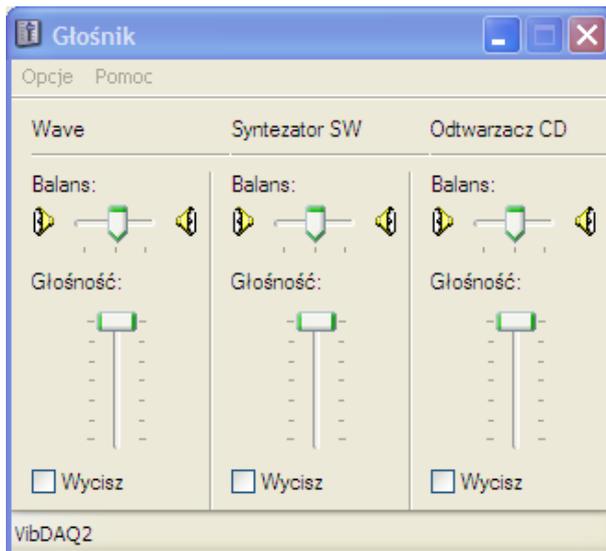
Pic. 2 »Found new hardware

Installation of the module in Windows XP is limited to connecting it to computer's USB port. The operating system will then detect the new hardware (pic. 2), and install necessary drivers. After the installation process is finished, the new device will appear in the device manager, in the group of "Sound, video and game controllers" under the name "USB Sound Device" (pic. 3).

The next step is proper volume level selection. It should be done by double clicking on the speaker icon in the system tray. In the window presented on pic. 4 click the *Options* menu and select *Properties*. The *Properties* window presented on pic. 5 allows to select the sound device and its settings.

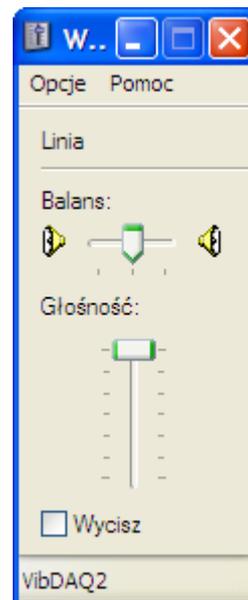
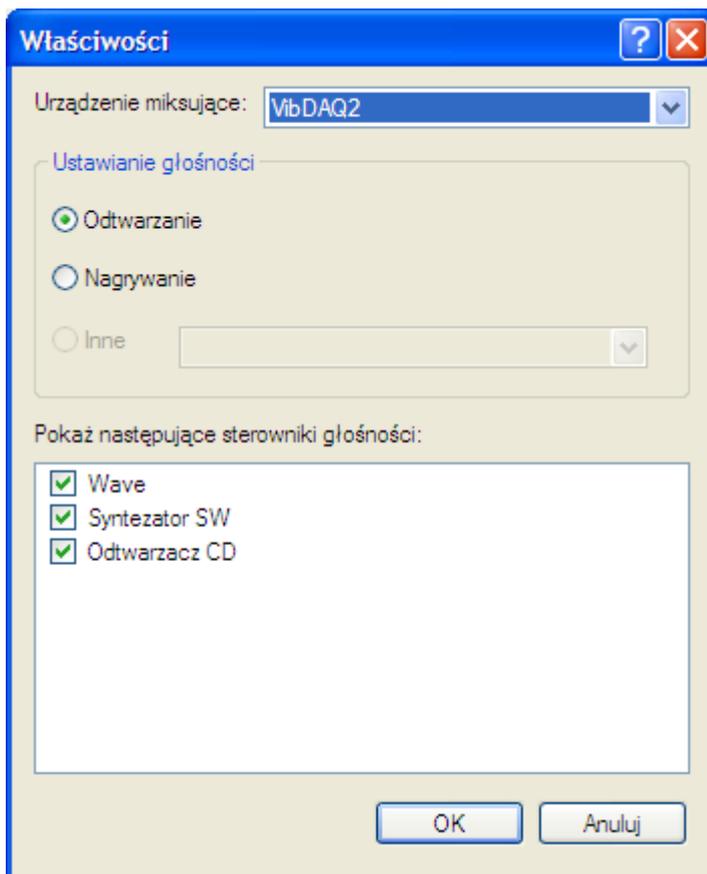


Pic. 3 » VibDAQ2/AVA 2001 in device manager



Pic. 4 » Volume adjusting

From the „Mixer device” drop down menu select VibDAQ2/AVA 2001, and then in the “Adjust volume for” field select “Recording”, as shown in pic. 4. It will cause the “Volume control” window to appear for the AVA 2001 module, where it is necessary to select the maximum volume level, and centered balance. **Skipping this step may cause the measurement results to be underestimated (pic. 5).**

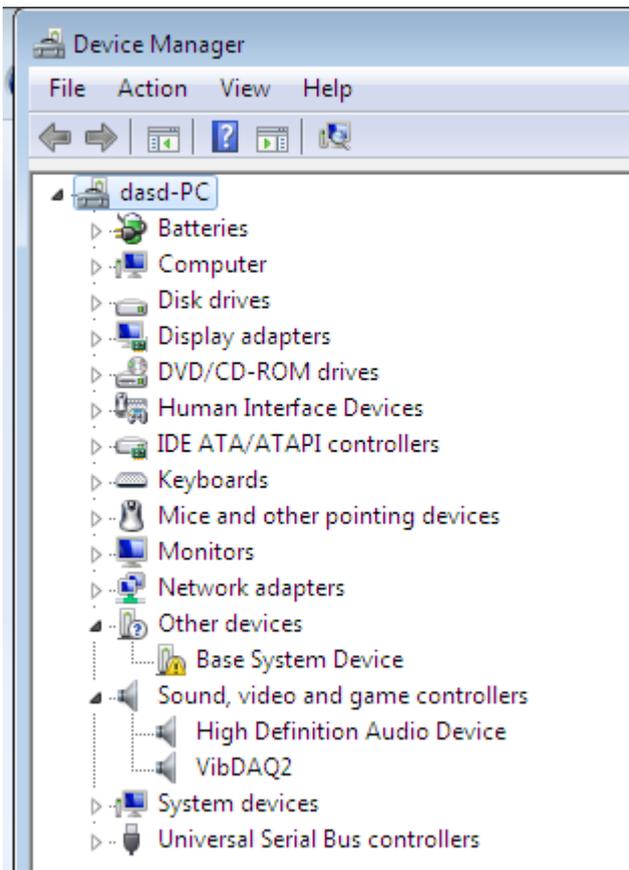


Rys. 5 » Volume control window

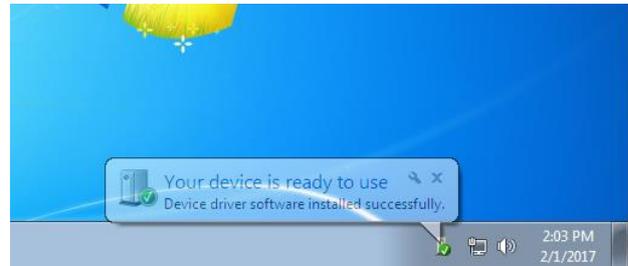
## 5. Installation in Windows 7

Installation of the module in Windows 7 is done the same way as in Windows XP. After connecting the device, the operating system will detect the new hardware and will install necessary drivers. After the installation process is finished, the new device will appear in the device manager, in the group of "Sound, video and game controllers".

The next step is proper volume level selection. It should be done by right clicking on the speaker icon in the system tray. From the context menu select *Recording devices* (pic. 8), in the *Sound* window, which will then appear, select the VibDAQ2/AVA 2001 device (pic. 9), and click on the *Properties* button. In the *Properties* window (pic. 10), in the *Levels* tab select the maximum volume level with the slider, and then equalize the balance by clicking the *Balance* button, and selecting with sliders the value of 100 for both channels (pic. 11).



Pic. 7 » VibDAQ/AVA 2001 in the device manager



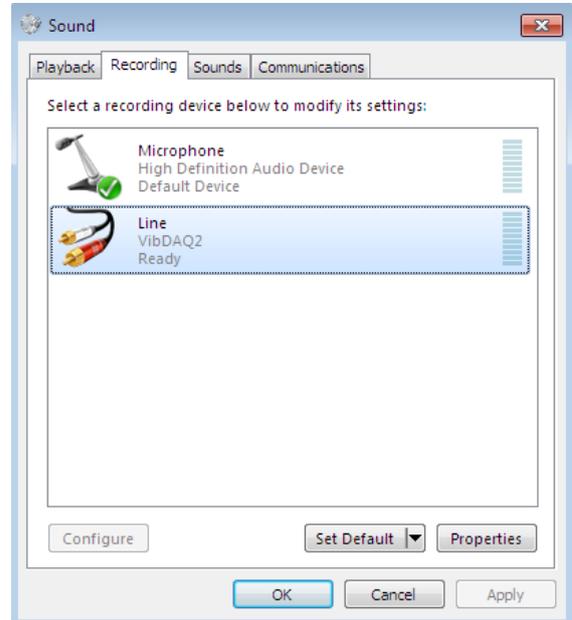
Pic. 6 » Installation of the drivers

**Skipping this step may cause the measurement results to be underestimated.**

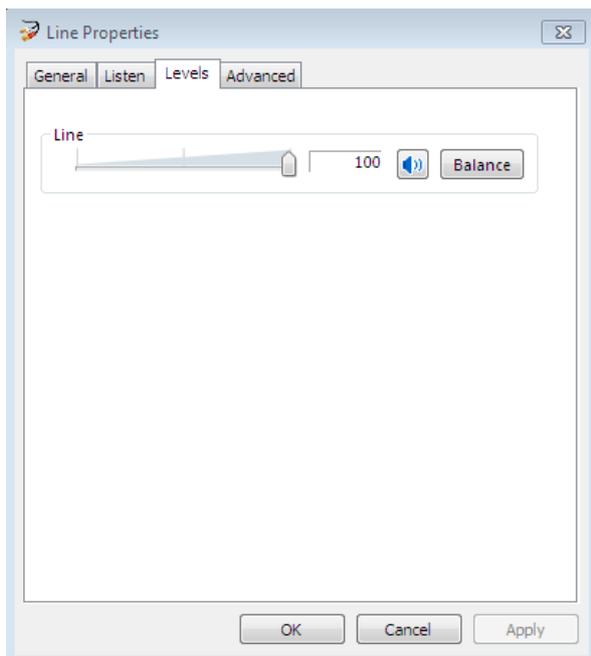
After completing the above described procedure, the module is ready to work.



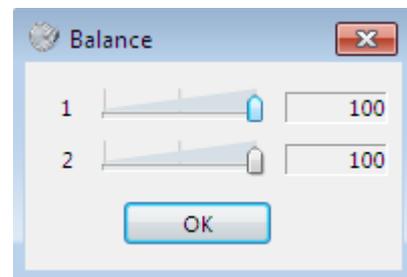
Pic. 8 » Selecting recording devices



Pic. 9 » Recording devices selection window



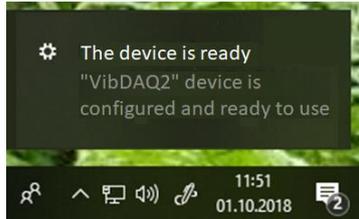
Pic. 10 » Recording volume level selection



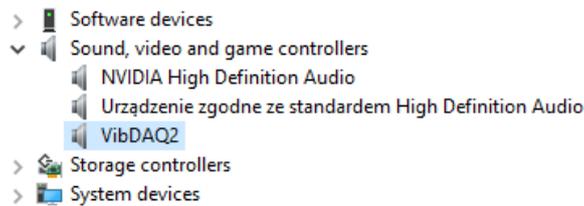
Pic. 11 » Setting up balance

## 6. Installation in Windows 10

After connecting AVA 2001 to computer's USB port, the operating system will detect the new hardware and install necessary drivers automatically (pic. 12). After the installation process, the new device will appear in the Device Manager, in the „Sound, video and game controllers” group , under “VibDAQ2” name (pic. 13).

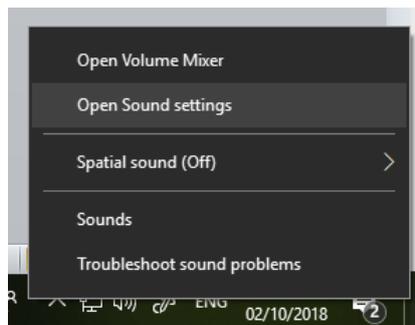


Pic. 12 » Drivers installation

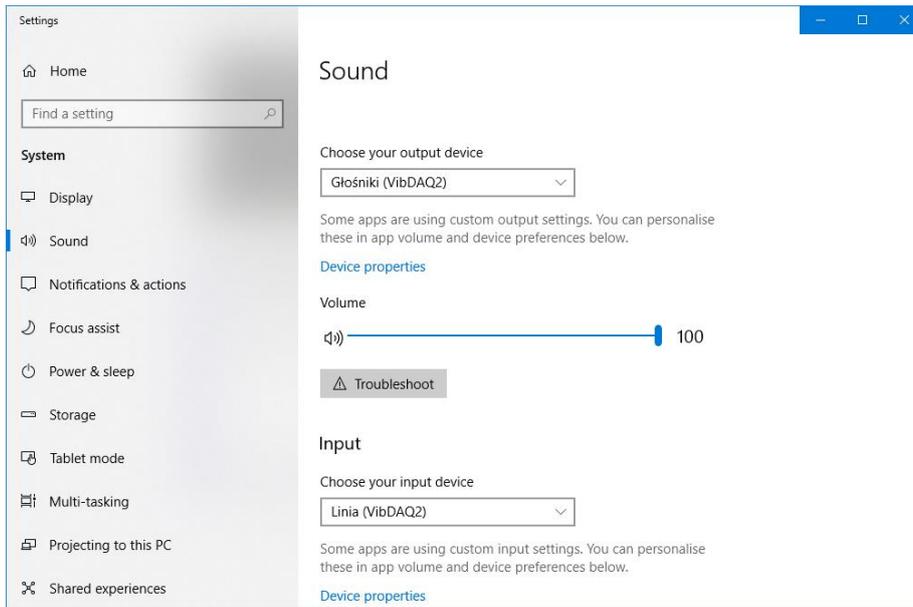


Pic. 13 » AVA 2001 (old name: VibDAQ2) in Device Manager

The next step is to set the volume level properly. It should be done by right click on the speaker icon on the Windows taskbar. From the menu that showed up, choose *Open Sound settings* (pic. 14) option, then, from the *Sound window*, choose AVA 2001 (VibDAQ2) device (pic. 15) and click on *Device properties*.

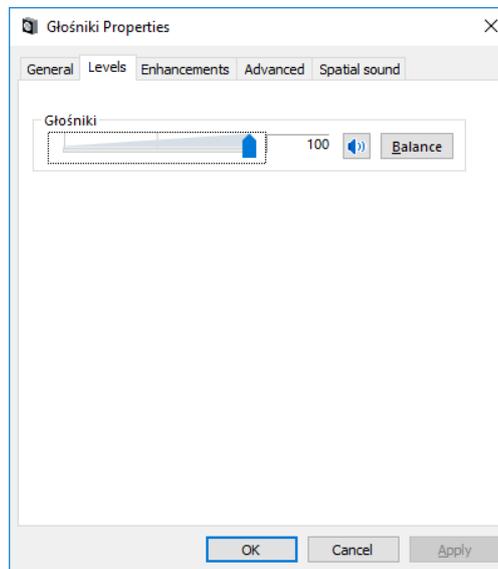


Pic. 14 » Selection of device type

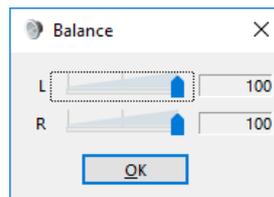


Pic. 15 » Selection of recording device window

In the *Properties* window (pic. 16), on the *Levels* tab, it is necessary to set maximum volume level and centered balance by clicking on the *Balance* button and setting maximum value (100) for both channels (pic. 17).



Pic. 16 » Recording level settings



Pic. 17 » Balance window

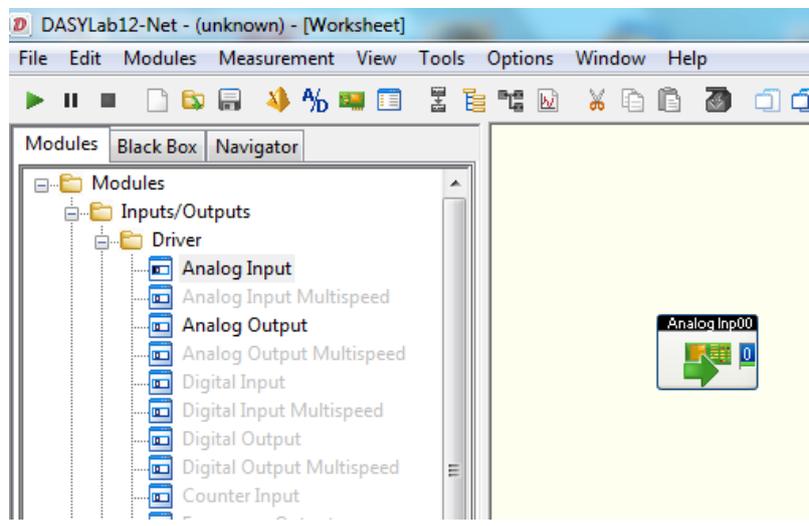
**Skipping this step may cause the measurement results to be underestimated.**

When the above steps are done, the AVA 2000 module is ready to work.

## 7. Using the module in DasyLAB

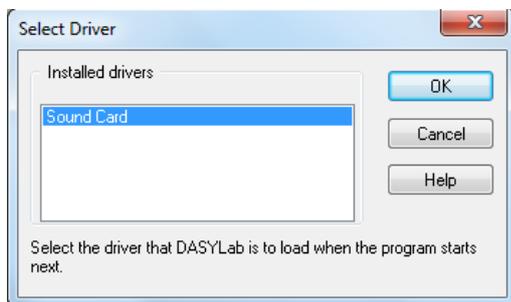
Below is described a step by step procedure of creating simple project in the DasyLAB software, which can be used to visualize measured signals.

DasyLAB does not require any additional drivers to work with the AVA 2001 module – it is visible right after launching the software. In order to perform measurements in the DasyLAB software, connect the AVA 2001 module to the computer, select the maximal recording volume level (see pic. 5, 10 or 15), and then launch DasyLAB.



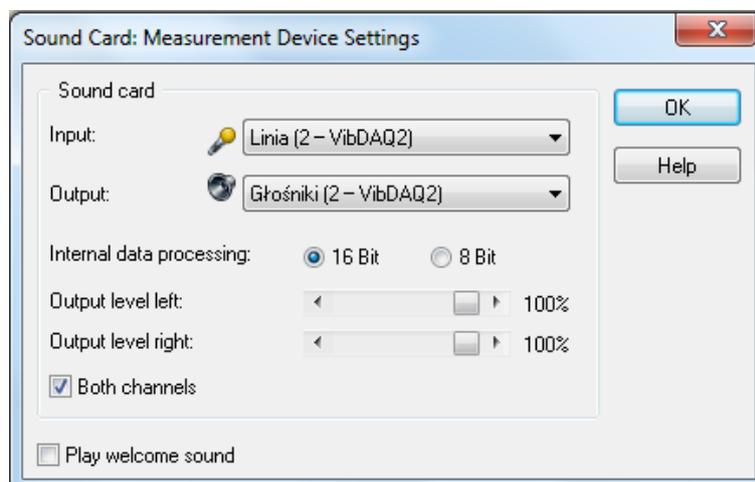
Pic. 18 » Selecting input module

Pic. 18 presents a part of software's main window. Before using the AVA 2001 module in the software, it is necessary to properly configure the driver and the sampling parameters. In order to do it, select

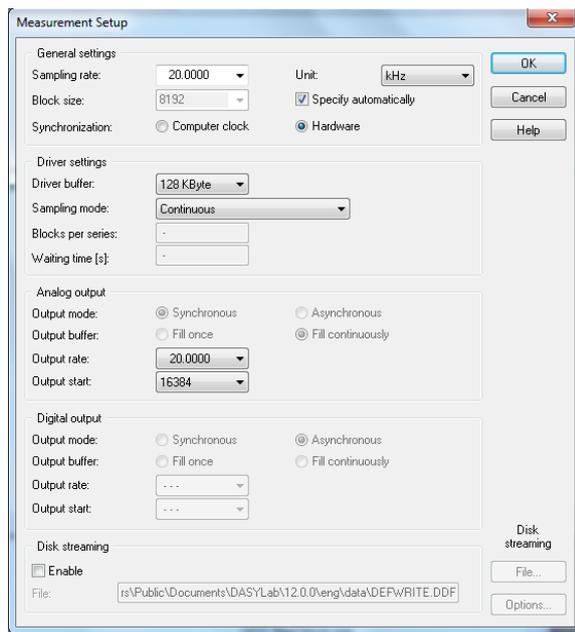


Pic. 19 » Select Driver window

*Measurement* → *Select Driver* from the menu, and the *Sound Card* option (pic. 19), and then in the *Sound Card: Measurement Device Settings* window (*Measurement* → *Hardware Driver* → *Setup*) select the AVA 2001 device and select the options as on pic. 20.



Pic. 20 » Measurement device setting window

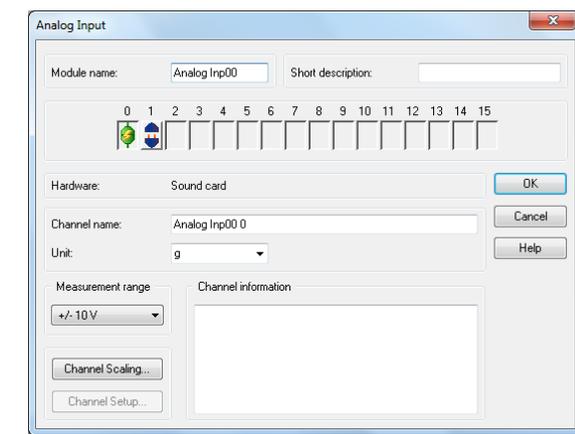


Pic. 21 » Measurement setup window

The last stage of configuration is selecting the sampling parameters. It can be done in the *Measurement Setup* window (*Measurement* → *Measurement Setup* → *Driver*) shown on pic. 21. In the *Sampling rate* field it is possible to input or select desired sampling frequency. **The maximal sampling frequency of the AVA 2001 module available in DasyLAB is 48 kHz.**

After completing the above described procedure, it is possible to create a project and start the measurements.

In order to do this, open the following folders: *Modules* -> *Inputs/Outputs* -> *Driver*, and then drag the *Analog Input* module onto the workspace (pic. 18). By default only one input channel is active. After double clicking on the module in the workspace, the *Analog Input* configuration window will appear, where it is possible to activate the second channel, select measurement range and change channel names (pic. 22). The window allows to configure the following parameters:



Pic. 22 » Analog input window

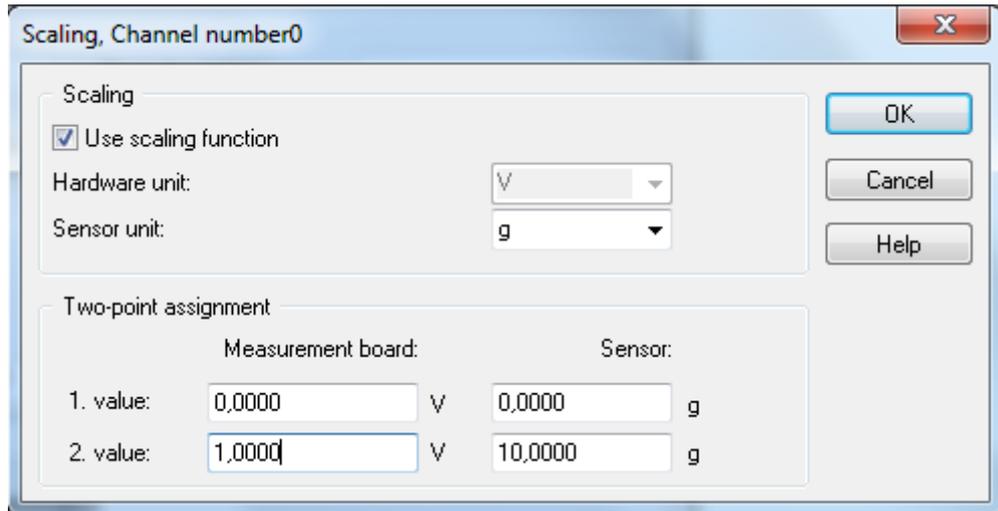
- » Change the name of the module and add its short description.

- » Enable/disable input channels. Available input channels are labelled with socket and connector icon. Pic. 22 shows a situation, when channel 0 is enabled (there is a symbol of a lightning on the connected socket and connector), while channel 1 is disabled – socket and connector are disconnected.

It is possible to enable channel 1 by double clicking on its icon, which will then also change into connected socket and connector. The channel can be disabled by double clicking again on its icon.

- » Change name, unit and measurement range of each channel. The measurement range for the AVA 2001 module is  $\pm 10V$ .

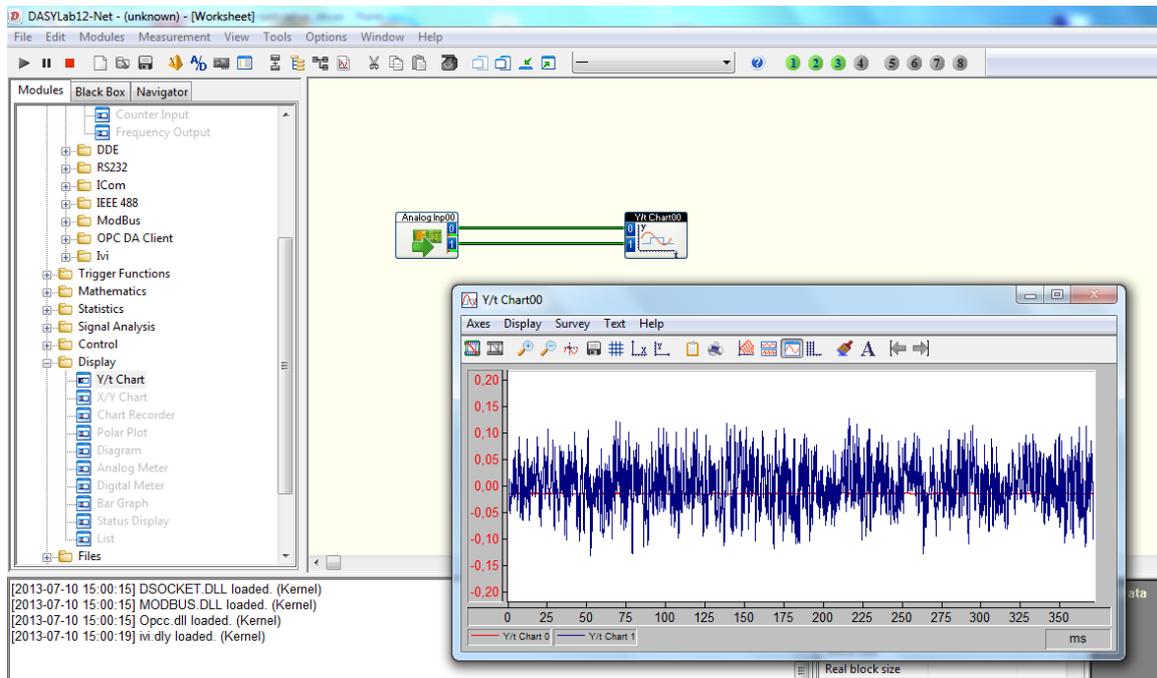
- » Scale the measurement results; clicking on the *Channel Scaling* button opens up the *Scaling* window shown in pic. 23. Selecting the *Use scaling function* field allows to scale the measurement result, so that the input module instead of the voltage in [V] displays the measured value in proper units. The *Sensor unit* field allows to enter the unit symbol. Below it there is a field used to define the scaling function: in an example shown in pic. 23 input voltage of 0 [V] is equivalent to acceleration of 0 [g], while voltage of 1 [V] is equivalent to acceleration of 10 [g]. The change of the scaling is confirmed by clicking the OK button.



Pic. 23 » Scaling window

All above settings apply to the channel, which icon (connected socket and connector) is highlighted in green. Clicking on a channel launches edition of its settings; this also changes its icon into green.

After completing the above described procedure, the module is ready to work. Further signal processing depends on requirements of individual application. One of the simplest methods of visualization in DasyLAB is displaying the time signal. Proper block is in the following folder: *Modules* → *Display* → *Y/t Chart*. After dragging it onto the workspace, the signal from the AVA 2001 module can be connected to it, and then the project can be launched (green triangle symbol on DasyLAB's toolbar). Pic. 24 presents the program's window when a simple project is running. The *Y/t Chart00* window shows the time signal from a microphone connected to the input of the AVA 2001 module's second channel.



Pic. 24 » Time signal recorded with the AVA 2001 module

## 8. Using the module in LabVIEW

Access to the AVA 2001 module in the LabVIEW software is possible through the *Sound Input Read.vi* subprogram.

Pic. 25 presents a diagram of the *Continuous Sound Input.vi* virtual device available a sample program in LabVIEW. Three blocks are important

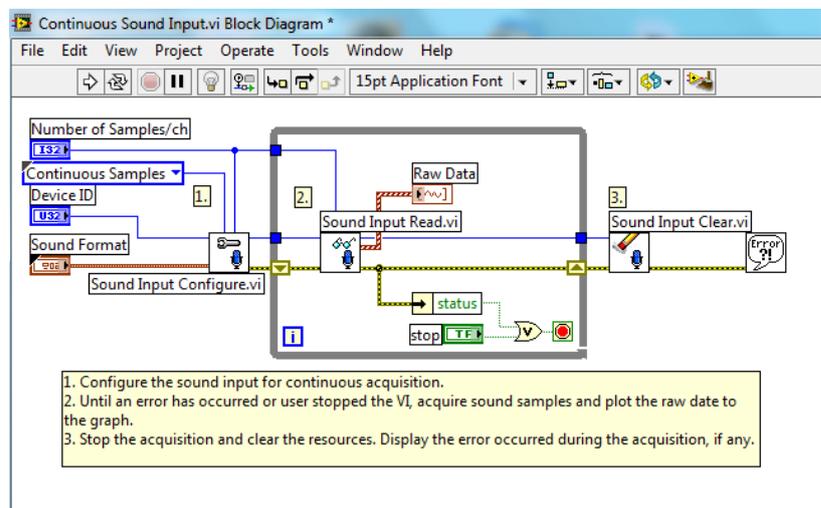
- » Sound input Configure.vi
- » Sound Input Read.vi
- » Sound Input Clear.vi

The *Sound Input Configure* block configures the sound card is use – in this case the AVA 2001 module. The parameters which are transferred to the *Sound Input Configure* block are the number of samples per channel, device's number, and the *Sound Format*, which carries the information about sampling frequency, resolution and the number of channels.

The device's number should be selected according to the computer's configuration. Usually the built-in sound card is visible under number 0, while AVA 2001 under number 1.

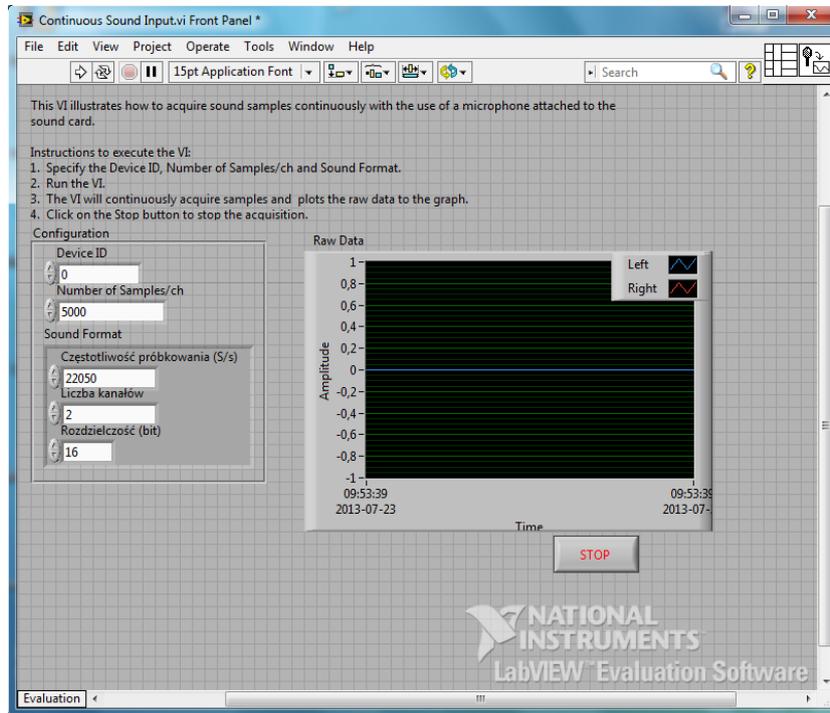
The *Sound Input Read* block is used to read the data. The parameters transferred to it are: Task ID from the *Sound Input Configure* block and the number of samples per channel. The output data, in the form of audio data table for each channel, is transferred to the *Raw Data* time signal window. The audio data returned from the block take a value from the range between -1 and 1, regardless of the gain level selected on the AVA 2001 module. This fact should be taken into account while creating your own programs.

Outside of the DO..LOOP loop there is the *Sound Input Clear* block, which task is to free the resources. This is where the Task ID parameter is transferred form the *Sound Input Read* block.



Pic. 25 » Block diagram of the *Continuous Sound Input.vi* sample project

Pic. 26 presents the panel view of the *Continuous Sound Input.vi* program.



Pic. 26 » Panel of the Continuous Sound Input.vi sample project

## 9. Recycling

### 9.1. Hazardous Materials

AVA 2001 system does not use any hazardous materials outlined by RoHS. These regulations confirm that lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ether, or other battery related materials are limited to no more than trace amounts.



### 9.2. Recycling Facilities

When decommissioning out of use devices, minimize the impact of the waste created. Refer to local waste removal administration for current information on proper material collection and recycling.