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AV ACQUISITION 8001

8-CHANNEL DATA ACQUISITION
MODULE WITH GAIN

USER MANUAL

2018

Table of contents

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1. Introduction

AV ACQUISITION 8001 (AVA 8001) is a universal, portable 8-channel data acquisition module designed to operate with IEPE standard sensors. The module has 16-bit resolution and sampling frequency up to 100 kS/s. The provided drivers allow operation with DASYLab®, LabVIEW™ and Matlab®.

Module characteristics:

- » operation with eight IEPE standard vibration sensors
- » sensor circuit functional check – warnings of possible open and short circuits
- » communication through USB port
- » smooth installation
- » compact dimensions

2. Contents of the package

The package contains:

- » AVA 8001 module
- » CD with drivers
- » suitcase
- » USB cable
- » power supply
- » user manual

3. Technical data

| Parameters		
Number of channels		8
Input type		IEPE 2.4 mA 24V
Resolution		16 bit
Sampling frequency		Up to 100 kS/s per channel; combined sampling frequency for all active channels is max. 400 kS/s
Measurement range		±10V, ±5V, ±2V i ±1V (selected by software)
Crosstalk		-80 dB (within 0 - 25 kHz band)
Maximum absolute error	**range ±10V**	±5,66 mV
	range ±5V	±2,98 mV
	range ±2V	±1,31 mV
	range ±1V	±0,68 mV
Power supply		5 V DC from external power supply
Communication		USB 1.1, USB 2.0
Humidity		0..90%, non-condensing
Operating temperature range		0..+70°C
Dimensions		230x110x40 [mm] (length x width x height)

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4. Measurement accuracy

Total measurement accuracy is affected by 3 types of errors:
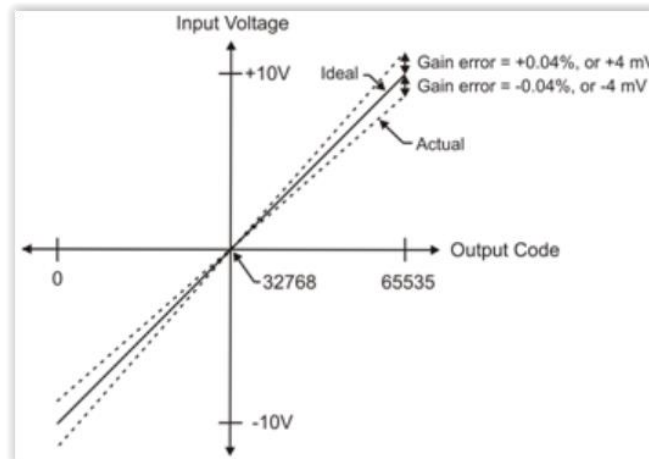
» Offset

» Gain

» Non-linearity

The main source of errors of the unit is the error related to offset and gain. The non-linearity error is negligibly small and may be overlooked. The device is equipped with a 16-bit ADC converter, which transforms analog signals into values ranging from 0 to 65525. The following is an ideal characteristic for a ±10 V range.
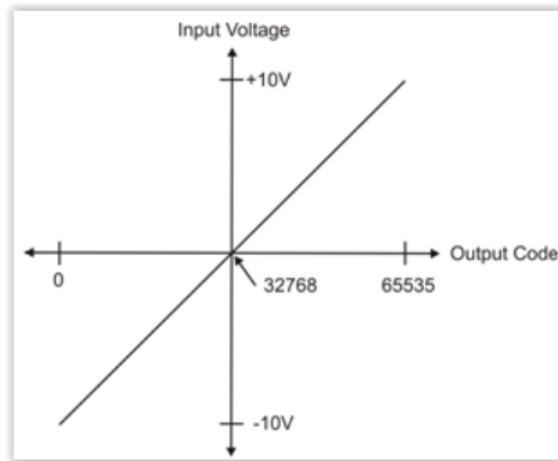

The offset error is measured in the mid-point of the measurement range. In an ideal case, an input signal of 0V should cause the converter to return the value of 32768. Any other result means an offset error. For the ± 10 V range, the maximum offset is ± 1.66 mV.
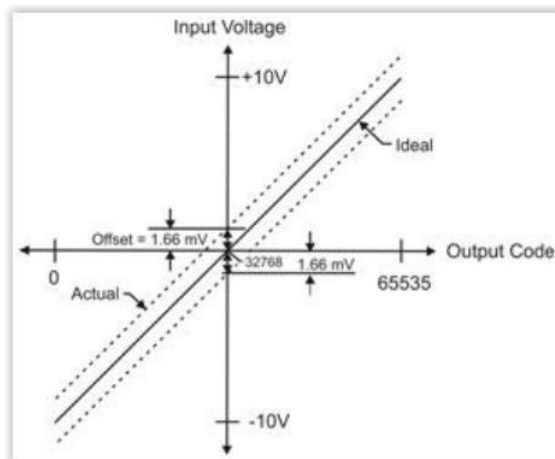
The gain error is related to the difference between the slope of the real characteristics and the ideal characteristics and is expressed as a percentage. For the ± 10 V range, the gain error is ±0.04%.

Adding the offset and the gain errors produces the device's total measurement error.
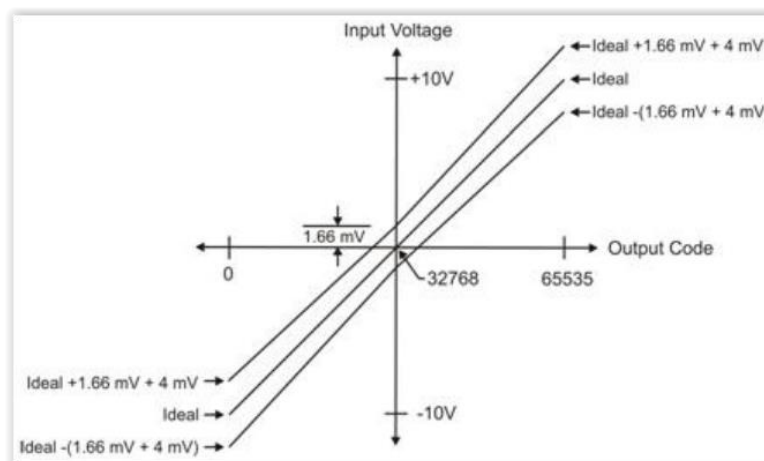
# 5. Description of connectors and status lights

Inputs – BNC inputs used to connect IEPE standard sensors

Sensors Error – red diodes, lighting up indicates open or short circuit in the marked channel.

Power – red diode, when shining continuously signals, that the device is connected to the computer and is ready to operate

USB – USB type B plug for connection with a computer

6. Installation in Windows 7
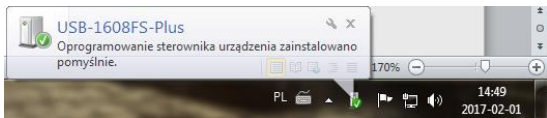
AVA 8001 does not require the installation of any drivers in the operating system. The operating system detects a new device automatically when connected and displays it in the hardware manager as a USB HID interface device. The figure besides presents a correctly detected AVA 8001 module in the hardware manager of Windows ® 7.

Some computers, especially laptops, may limit power supply to USB devices. This may result in a fault of the AVA module, e.g. sensor circuit check may operate incorrectly.

Attention

When connected computer limits power supply to USB devices, the AVA module may operate incorrectly. Make sure that the computer is able to supply current of at least 400 mA.
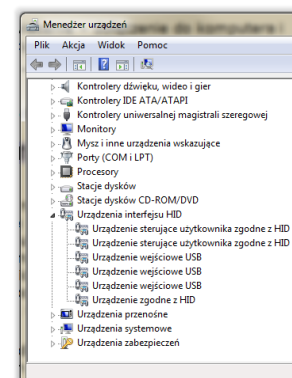
7. InstaCal

To install the InstaCal utility software run the *Icalsetup.exe* file located in the */InstaCal/* folder on the supplied CD. The software will request permission to unpack and to install. Click *OK* and *Setup* in a sequence of windows that will appear to access the installer window. Then click the *Next* button twice (without changing the access path) to confirm that you wish to launch installation and then click *Install*.

When installation is complete, click the *Finish* button to close the installer window. Restart the computer to apply the changes.

After the restart run the InstaCal software (*Start > All programs > Measurement Computing > Instacal*) when the AVA module is connected to the computer. A window will appear with a list of measurement cards which have been detected. Mark the item named USB-1608FS, click *OK* and close InstaCal.
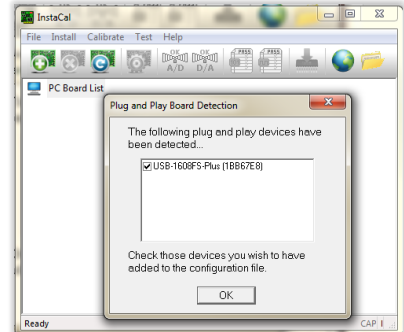
The above procedure should be carried out once before using the data acquisition module for the first time in data acquisition software.

8. Configuration of DASYLab® 16

Before starting to work with the AVA module in DASYLab®, it need to be configured properly in the Configurator (by default: *Start > All programs > DASYLab > Configurator*). In the program's window, in the *Packages* tab, the *Measurement Computing* option should be marked. If it is not marked, please mark it, and click the *Enable* button to launch the installation of drivers in DASYLab®. In a sequence of windows that will appear, click *Next*, *Next*, *Install* and *Finish* respectively.

The above procedure should be carried out only once when using the module for the first time.
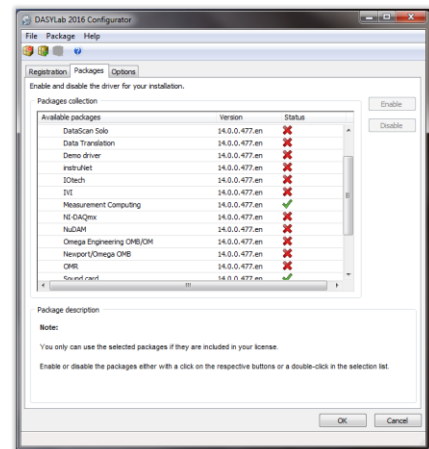
9. Using the AVA 8001 module in DASYLab® 16

After running properly configured DASYLab® software the analog inputs will be available to the user. The inputs are listed in the following tab: *Modules > Inputs/Outputs > MCC-DRV*. The in AVA 8001 module 8 analog inputs are available.

To use an analog input, just drag it inside the worksheet (or you may double-click it and indicate the module's position on the worksheet). A window will appear as shown in the figure below. Mark *All Channel 0..7* and confirm your choice by clicking the *OK* button.
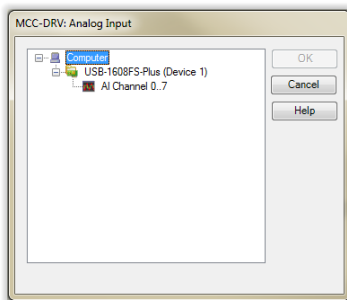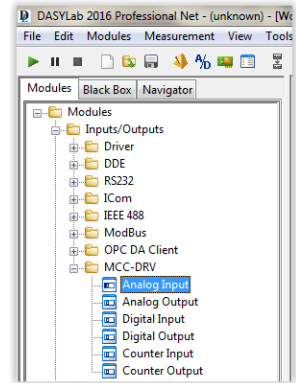
The user can configure the number of active analog inputs, measurement range separately for each channel as well as the sampling frequency.

Double-clicking the analog input window on the worksheet opens the window shown below. This window needs to be discussed in detail, as it gives the user the option to configure the AVA module parameters for operation in DASYLab. The following areas can be distinguished:

1. You can enter your own module name in the *Module name* field and provide a short description in the *Description* field.
2. It is possible to activate analog inputs in this area. The symbol with disconnected blue sockets stands for an inactive input. A double-click on the symbol activates the corresponding input and switches the symbol to connected sockets with a lightning.

    A single click on the active input changes its color from red to green. The changes of settings, which are explained in the following points, refer to the input marked in this way.

    The next figure presents a situation, in which four input channels are active, while the first is marked for editing settings.
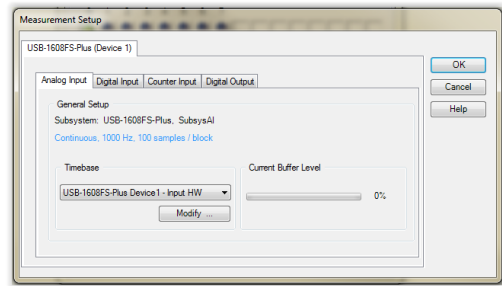
    If necessary, an input can be deactivated by double right-clicking the icon of the active input.
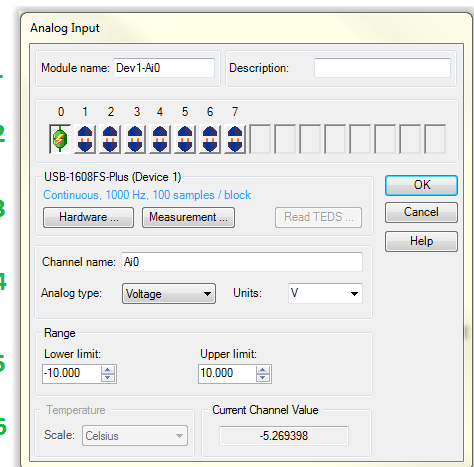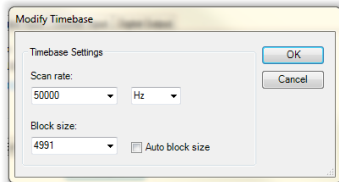
Attention

Inputs should be activated in sequence – activating some of them while omitting the others, e.g. activating inputs 0 and 3 and leaving inputs 1 and 2 inactive, may cause data loss.

3. This area contains *Hardware* and *Measurement* buttons. The *Measurement* button is more important for configuration of the module. Its window, shown in the adjacent figure, allows changing the sampling frequency. The *Analog Input* tab presents the current sampling frequency and the size of data buffer. To change these settings, select *USB-1608FS, DeviceX – Input HW* in the *Timebase* field and then click

the *Modify* button. This will open the window shown in the figure. In this window, in the *Scan rate* field it is possible enter required sampling frequency, select the proper unit, and in the *Block size* field it is possible to select proper size of data buffer.

Attention

The sampling frequency for individual channel cannot exceed the value of 100 kHz, while the sum of sampling frequencies for all active channels is maximum 400 kHz. An attempt to set too high sampling frequency results in error message and a proposal to set the highest possible frequency.

Clicking the *Hardware* button opens a window of the AVA module hardware settings.
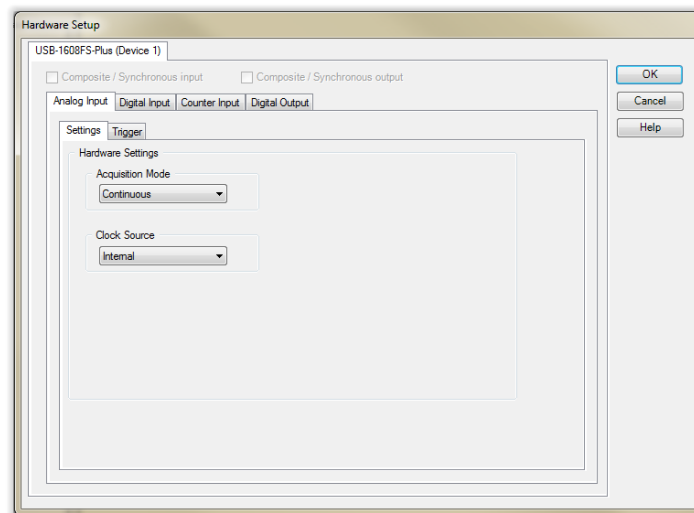
The only relevant tab here is *Analog Input*. After clicking the following tabs will be displayed: *Settings* and *Trigger*.

In the *Settings* tab, in the *Acquisition mode* field it is possible to select one of the following options: *N samples* or *Continuous*. By selecting *N samples*, the user may enter in the *Sample count* filed the number of samples, which the AVA module should collect after the measurement is triggered. The module will stop working after collecting the defined number of samples.

The situation is different if the *Continuous* option is selected, as then the module will feed data continuously to the computer.

When clicking on the *Trigger* tab, make sure that the *Trigger Enable* field is marked.

4. This area features the *Channel name* field where you can enter the name of the channel selected. In the *Analog type* field the *Voltage* option should selected, while in the *Units* field the selection should be *Volt.*

5. In this field it is possible to set gains and so the measurement range. The AVA 8001 module is equipped with input amplifiers configured by software, individually for each channel. The measurement range of each channel may be set to ±10V, ±5V, ±2V or ±1V. Limit values should be entered in the *Lower limit* and *Upper limit* fields as required. The numbers should be equal in the absolute value. When different values are entered, for example -1V and 2V, the program will signal an error and will suggest that the greater of them, for example -2V and 2V, is used.

6. The *Current Channel Value* field presents values of measurement in progress.

Once the above parameters are set as required, the AVA module is ready for operation in DASYLAb. A description of the use of the program itself is beyond the scope of this manual, whose only purpose is to show how to prepare the module for signal processing and measurement data transmission to a computer.

10. Recycle

10.1. Hazardous Materials

AVA 8001 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.

10.2. 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.