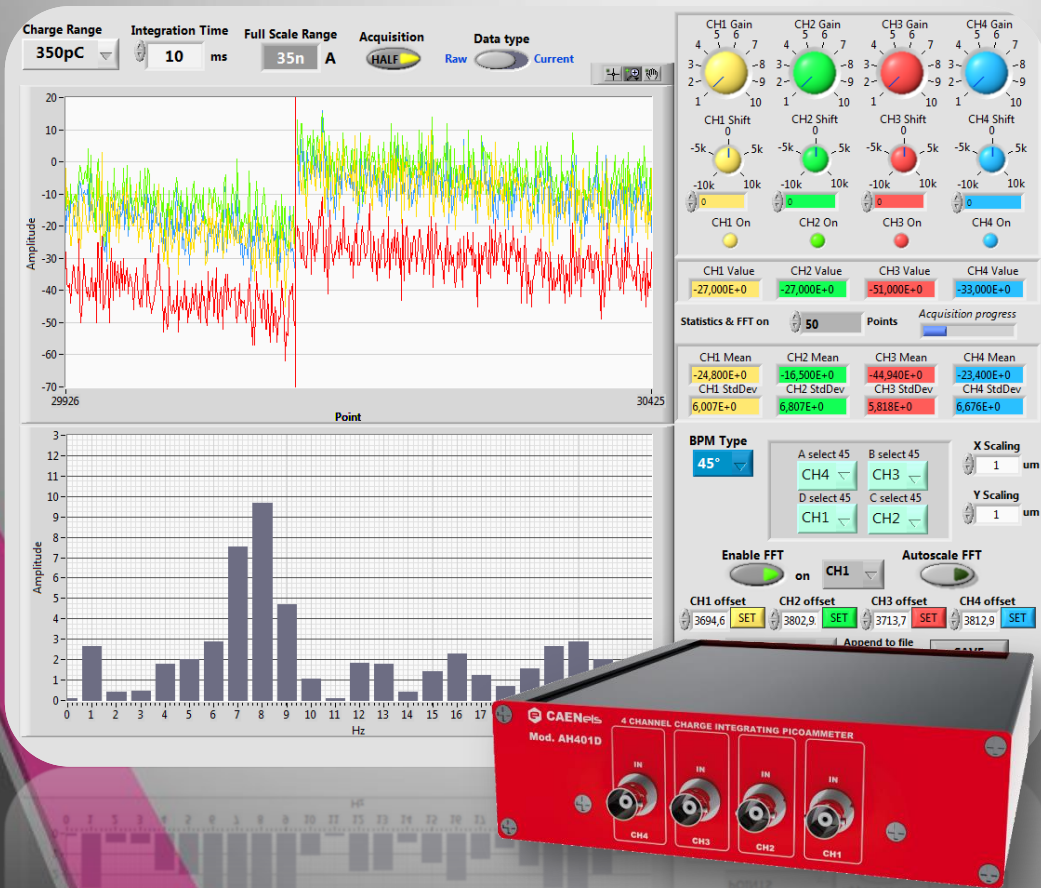


AH401D

Oscilloscope

Quick Start Guide





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1.0	November 5 th 2013	First release of document
1.1	October 29 th 2014	Guide graphics changed



1. Introduction

The free software *AH401D Oscilloscope* makes it easy to set the picoammeter and visualize or save the acquired data. *AH401D Oscilloscope* software is available only for Windows platform. The system requirements are as follows:

-  Windows minimum system requirements:
 - Windows® XP/Windows Vista®/Windows® 7/Windows® 8
 - Intel® or equivalent AMD Athlon® processor
 - 110 MB available HD space
 - Ethernet network card

2. Quick start

The following chapters describe the main functionality of the AH401D Oscilloscope software. The main window of the program is divided in the following sections:

The screenshot shows the AH401D Oscilloscope software interface. It is divided into several sections:

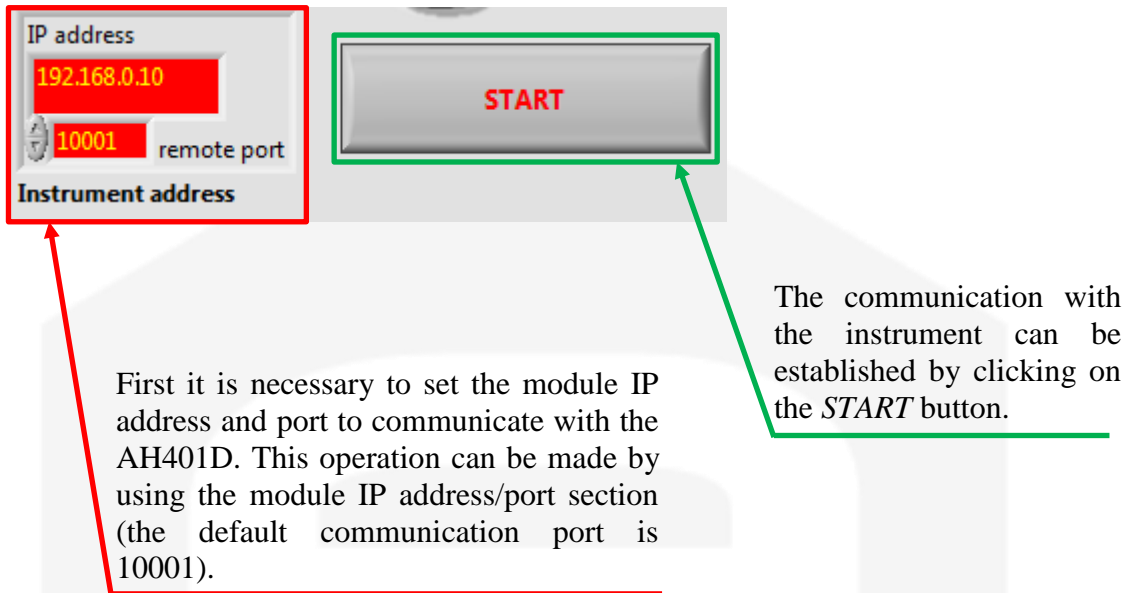
- Acquisition settings:** Located at the top left, it includes controls for Charge Range (350pC), Integration Time (1 ms), Full Scale Range (350n A), Acquisition (HALF), and Data type (Raw, Current).
- Graph settings:** Located on the right side, it includes Signal select (Ch, BP), Autoscale, and Inst. Error. It also features gain and shift controls for four channels (CH1-CH4) and a table of statistics and FFT parameters.
- Channel/BPM and FFT graphs:** The main display area shows a waveform graph (Amplitude vs. Point) and a histogram graph (Amplitude vs. Fz).
- Connection settings:** Located at the bottom right, it includes an EXIT button, an address field (192.168.0.10), and an instrument address field (10001).

Additional settings visible in the interface include:

- Enable FFT:** on
- Autoscale FFT:** on
- CH1 offset:** 3713.1
- CH2 offset:** 3826.1
- CH3 offset:** 3713.5
- CH4 offset:** 3834.4
- POINTS:** 50
- Append to file:** []
- SAVE:** []

2.1 Connection setting

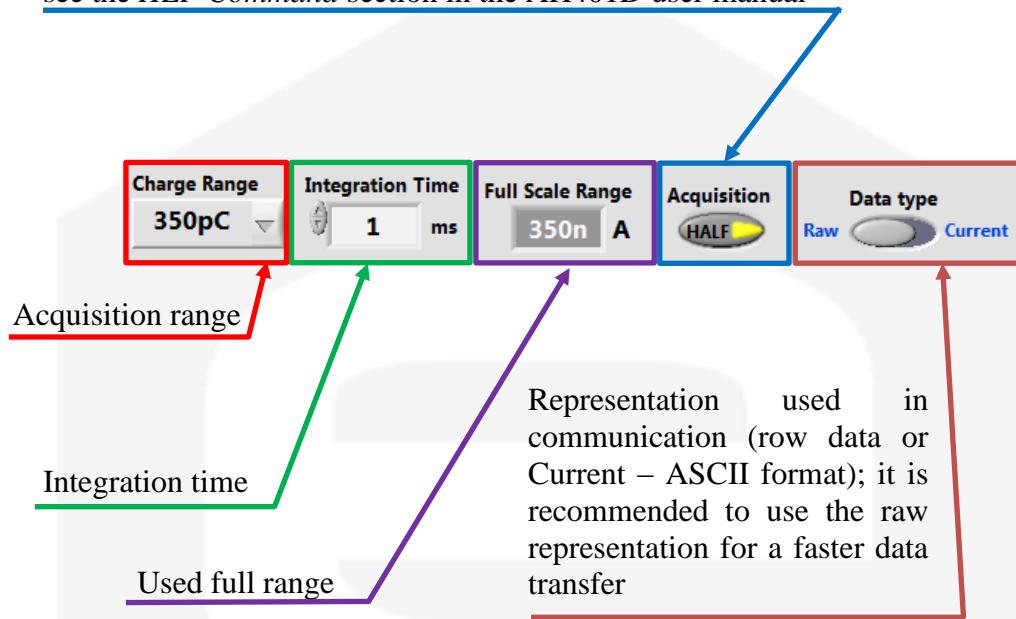
Remote communication is guaranteed by means of an Ethernet 10/100 auto-sensing socket present on each AH401D module rear panel. To establish a connection it is necessary to set the IP address of the instrument and its TCP/IP communication port using the *Connection settings* section present in the main window.



2.2 Acquisition settings

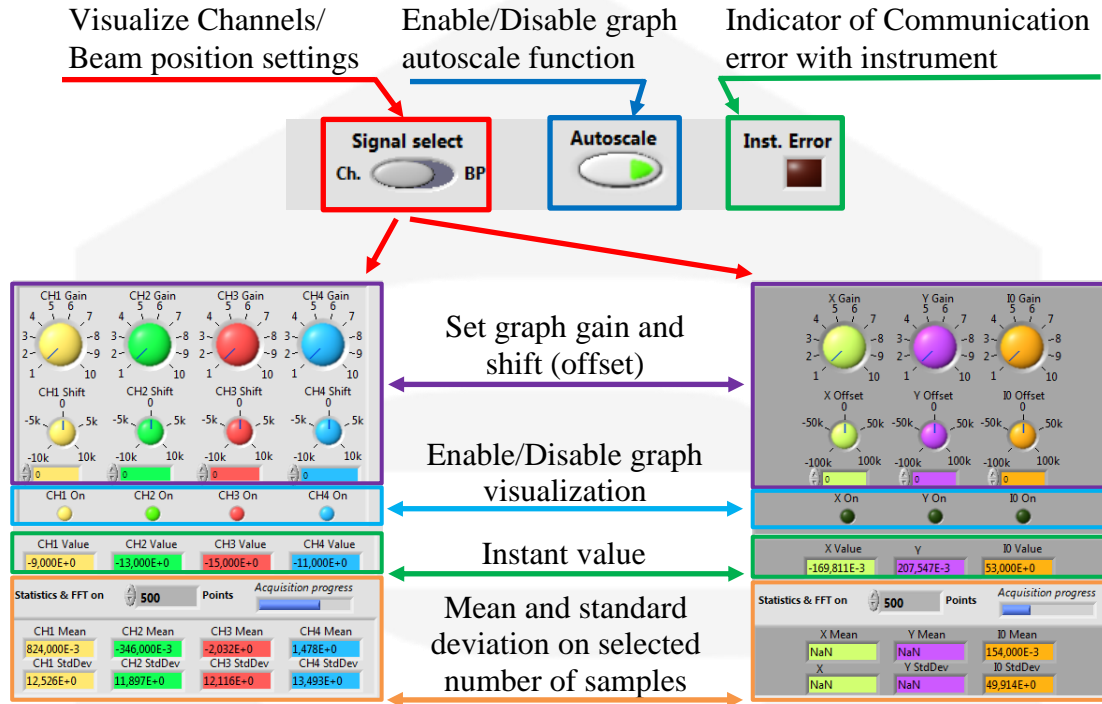
In the upper part of the main window it is possible to configure the *Acquisition settings*:

The purpose of the Acquisition type section is to select whether to process data from both integrator circuits (FULL) - i.e. maximum speed - or only from one integrator circuit (HALF) – i.e. best noise performance. For more information see the *HLF Command* section in the AH401D user manual



2.3 Graph settings

In the upper-right part of the main window it is possible to configure the *Graph settings*. There are two possible graph options sections: one relative to the Channels visualization and one relative to the Beam position. The Channels graph visualization options are relative to the acquired data from the four input connectors; the Beam Position graph visualization options are relative to the X-Y Beam position and its Intensity (I_o):



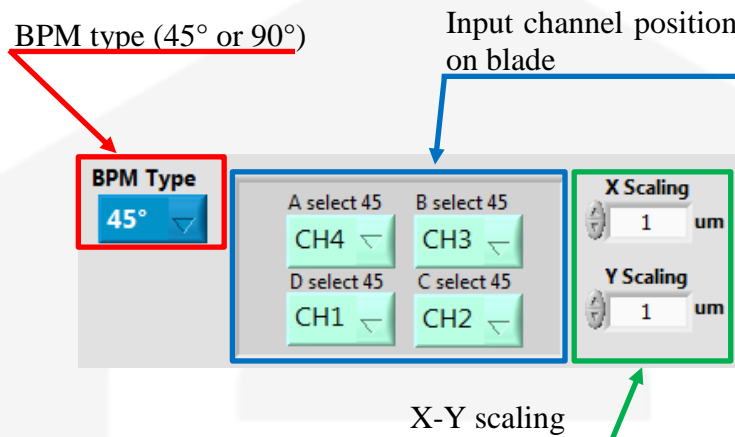
In a standard 90° blade BPM system, the X-Y and Intensity (I_o) of the Beam are calculated with the following formulas (I_A, I_B, I_C and I_D represent the acquired input channels values):

$$\begin{cases} X = \frac{I_B - I_D}{I_B + I_D} \\ Y = \frac{I_A - I_C}{I_A + I_C} \\ I_o = I_A + I_B + I_C + I_D \end{cases}$$

In some cases, where a second BPM is installed on the same beamline, the blade system is rotated CW by 45° in order not to get shadowed by the first blade set and the computation needs to be modified. The equation used in a 45° rotated blade BPM system are the following:

$$\begin{cases} X = \frac{I_B + I_C - (I_A + I_D)}{I_A + I_B + I_C + I_D} \\ Y = \frac{I_A + I_B - (I_C + I_D)}{I_A + I_B + I_C + I_D} \\ I_o = I_A + I_B + I_C + I_D \end{cases}$$

The *Beam Position options* section allows to select the type of BMP blade (45° or 90°), the connection with the four input channels and the X-Y scaling:



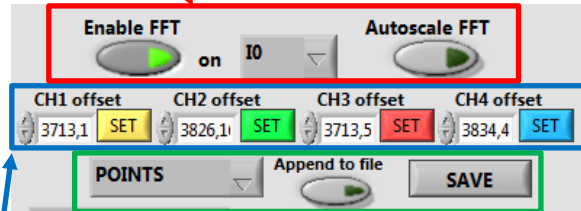
2.4 FFT, Offset Calibration and Save Data settings

In the bottom-right part of the main window it is possible to configure some other settings like:

- *FFT visualization section*: those options allow to enable or disable the FFT visualization; select the channel on which the FFT is calculated and to enable/disable the autoscale in FFT graph (to improve the calculation of FFT it is necessary to increase the number of acquired samples);
- *Offset calibration section*: this section allows to compensate the offset of the acquired data; the offset could be compensated manually or it is possible to use the *SET* button, which takes the mean value of the last acquisition as channel offset. For more information about the offset calibration please see the *Offset Calibration* chapter in the AH401D User Manual;
- *Save data section*: this section allows to save the acquired data. It is possible to select the type of saved data: *POINTS* – to save the acquired data and *STATISTIC* – to save only the mean and standard deviation of acquired data. If append option is disabled every

acquisition will open a save data window; otherwise the data will be “appended” to previous saved data. Two files are created when *SAVE* option is selected: one with saved data and the second with the acquisition settings.

FFT visualization section



Offset calibration section

Save data options