

Oscilloscope Simulator



Manual do Utilizador

Table of Contents

Introduction	3
Software installation	5
Oscilloscope Simulator Interface	16
Pratical Example	38

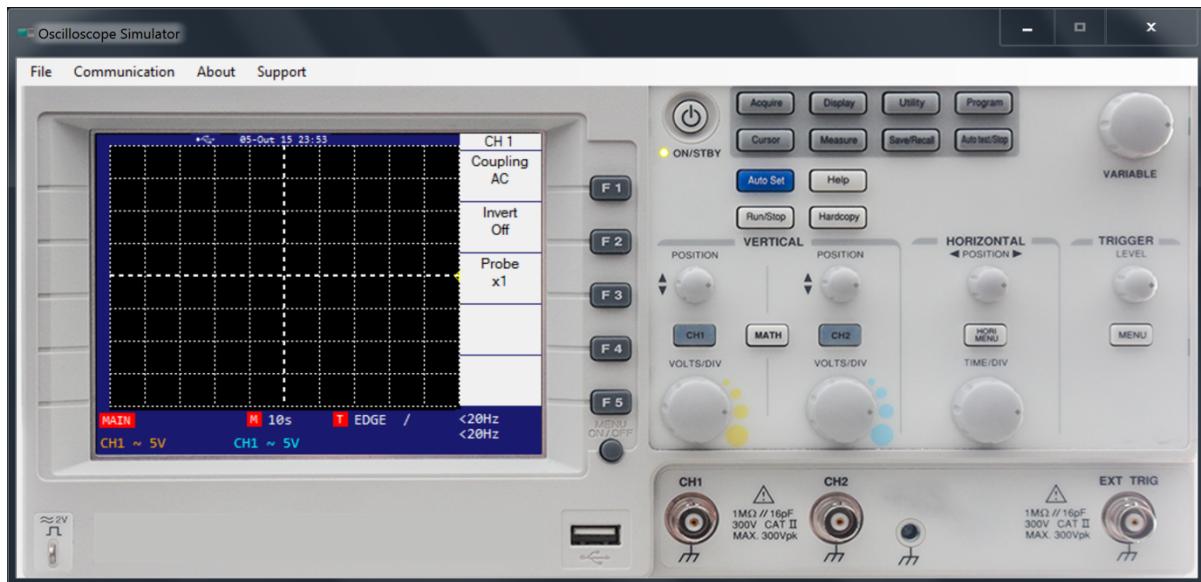
Introduction

Oscilloscope Simulator is an Oscilloscope Simulator software with an integrated Wave Generator.

Oscilloscope Simulator has the ability to capture data from a bench Oscilloscope (GW Insteek GDS-2062) to your PC, via usb connection, and show the waveforms on Oscilloscope Simulator software. This Simulator also allows you to analyze waveforms that were generated by the integrated wave generator and from storage files on your computer in the following formats:

- .xlsx, xls, xlsm
- .txt
- .CSV

You can save all your waveforms, displayed on the simulator screen, on your computer in JPEG and PNG formats. You can also save data in .csv and .txt files



Visão Geral

Osciloscópio

Operative System	<ul style="list-style-type: none">• Windows XP• Windows Vista• Windows 7• Windows 8• Windows 10
Main Features	<ul style="list-style-type: none">• Simulator and Virtual Oscilloscope mode• Control of the virtual panel• Capture Simulator screen to a image file• Save data from the waveforms to a CSV and text file• Collect data from GDS-2062 benchtop Oscilloscope and show the waveforms on the simulator display• Control the benchtop oscilloscope from the graphical interface of the simulator• Display waveforms from excel, csv and text files to the Simulator display• Supports USB physical connection

Instalação do Oscilloscope Simulator

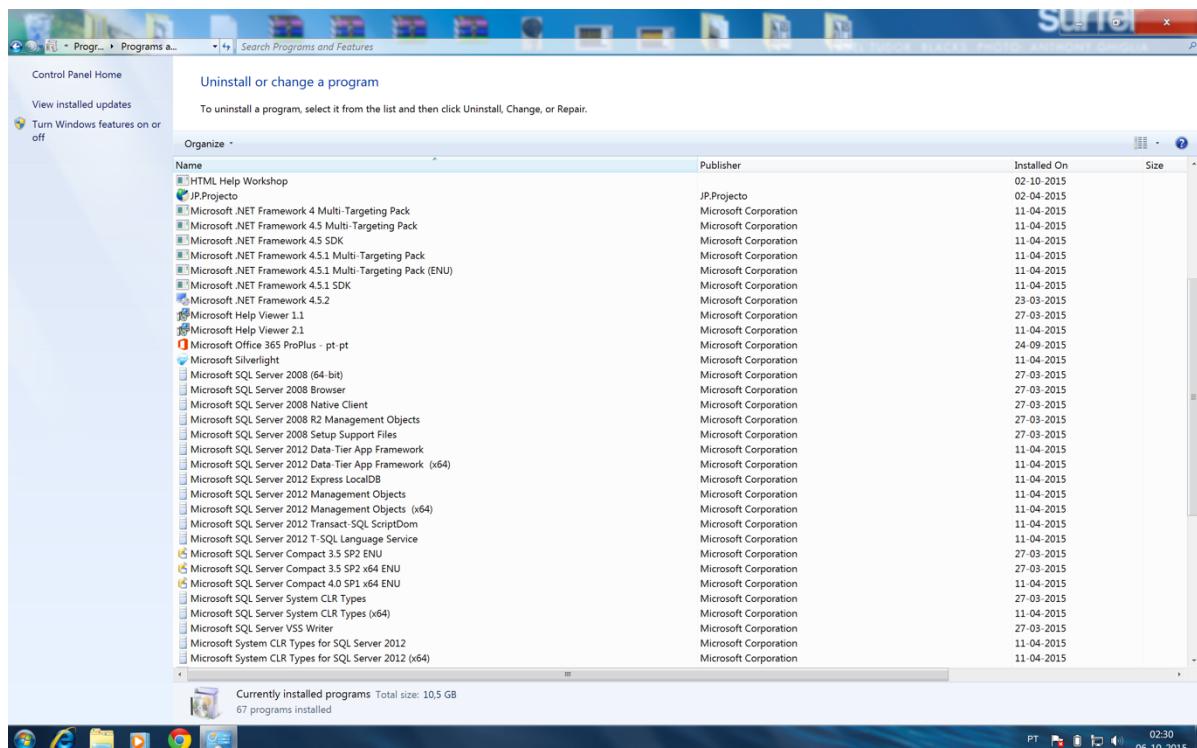
Equipamento Necessário

This tabel represents the required hardware and software to run this application

Item	
Software	<ul style="list-style-type: none"> Windows XP/Vista/7/8/10 Microsoft .NET Framework 4.0 or superior
USB cable	<ul style="list-style-type: none"> USB 2.0, AB type
USB driver	<ul style="list-style-type: none"> Version 1.8.0. (Available in the installation package)

Required software installation

Click the Control Panel > Unistall programm. A listo f all the software installed will appear. Check if you have Microsoft.NET on your computer.

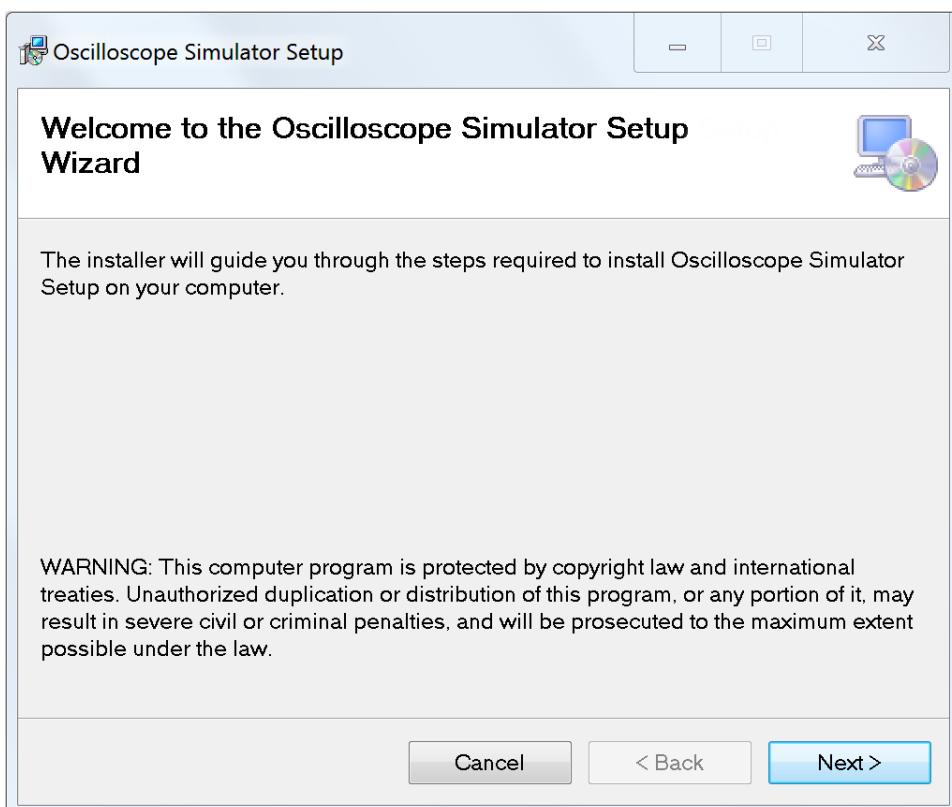


In case you don't, you can download it from Microsoft.

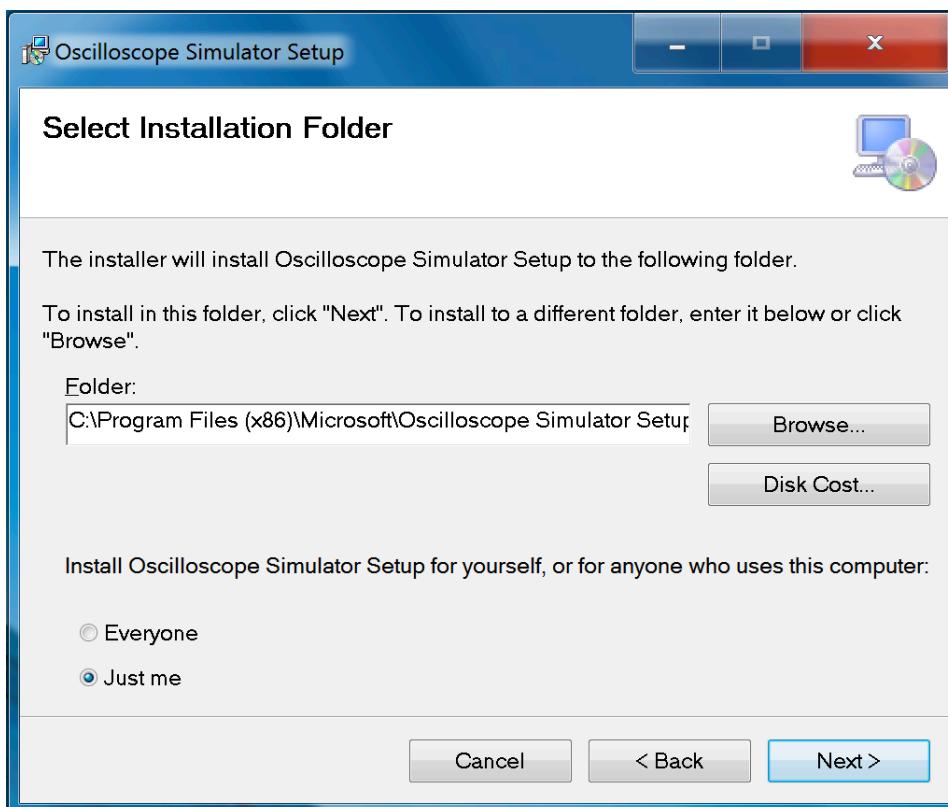
<http://www.microsoft.com/download/en/details.aspx?displayl ang=en&id=17718>

Software package installation

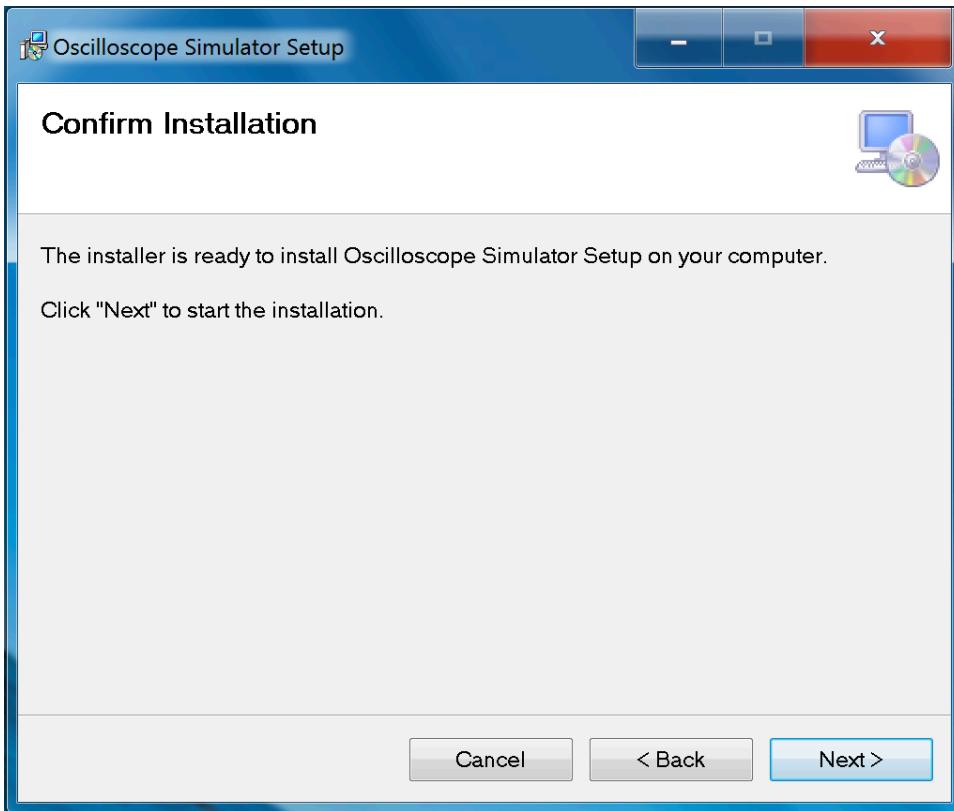
1. Download the installation package.
2. Click the setup.exe. It'll appear a dialogue box, click next to proceed with the installation



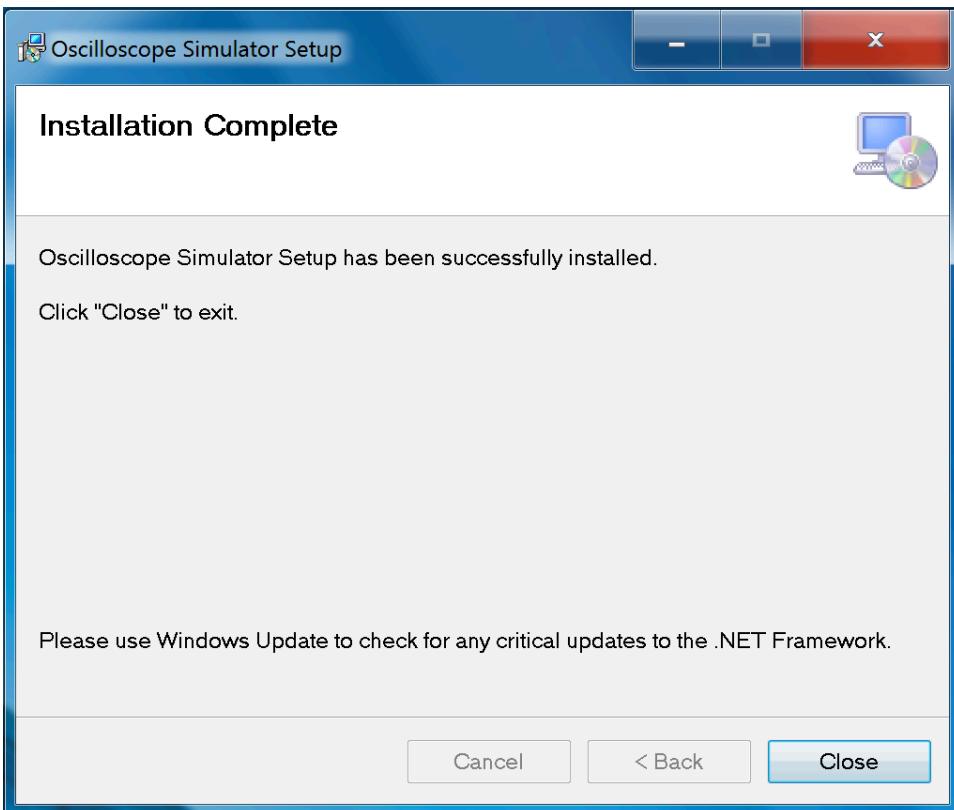
3. Choose the directory where you want to install the Oscilloscope Simulator application. Click Next.
- If you want to change the directory click Browse to search directories and choose the one you want.
 - To determine the space requirements, click the Disk Cost button. A dialog box will appear containing information about the disk space required by Oscilloscope Simulator as well as capacity and free disk space.
 - To control the software access select “Everyone” or “Just me”.



4. Click again on the Next button to start the installation.

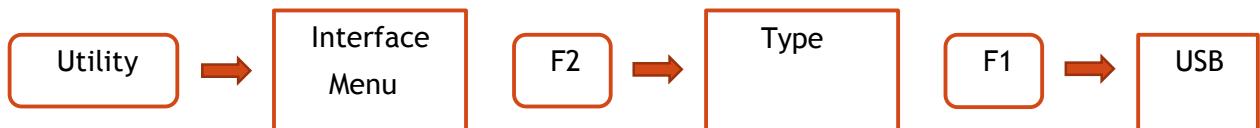


5. To complete the installation process click the Close button

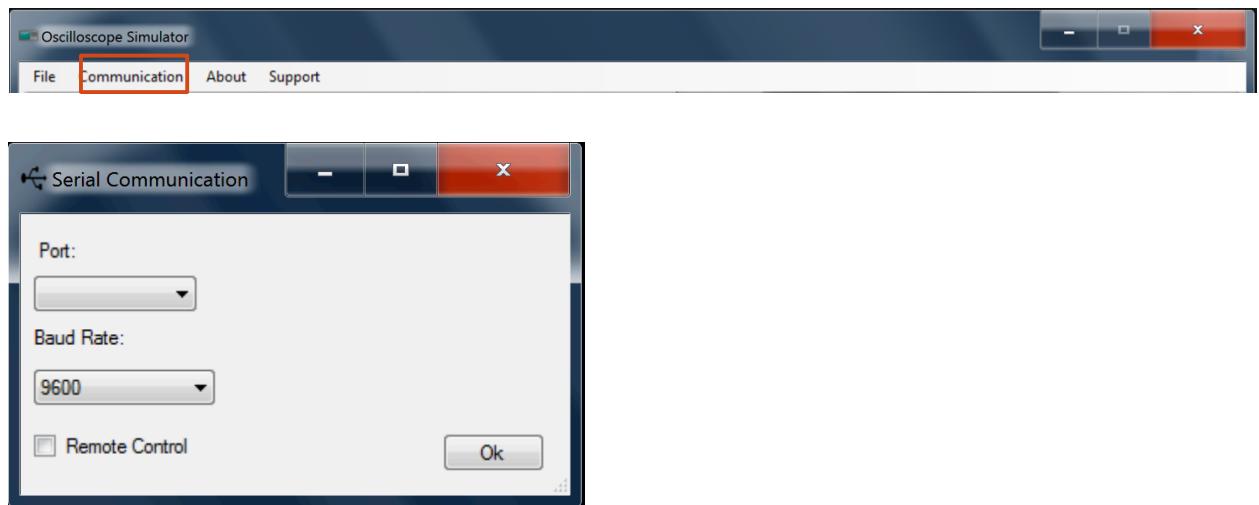


Connect the benchtop Oscilloscope and check the connection

1. Turn on GW instek GDS-2062 Oscilloscope.
2. Press the Utility button on the Oscilloscope front panel, followed by F2 (Type) to select the USB interface.



3. Connect the USB cable between the Oscilloscope and your PC.
4. Go to the Oscilloscope Simulator software, select “Communication”. A box will appear with the communication settings. Open the port option and check if there is any COM port available.

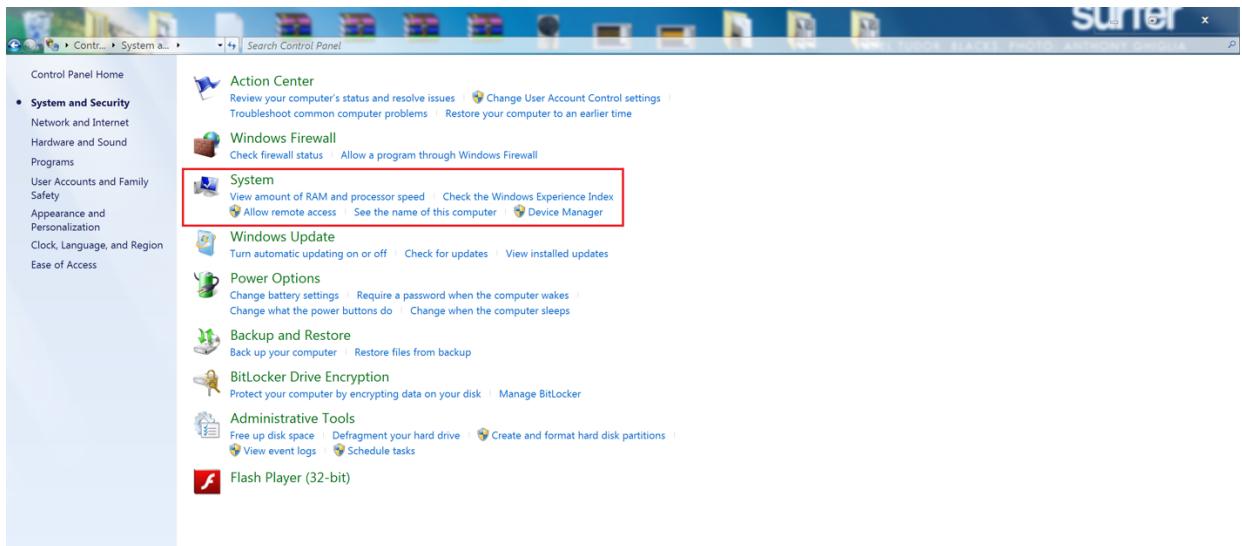


If there is no COM port available you'll have to manually install the USB driver. This driver is in the Files folder in the directory you set for the software installation.

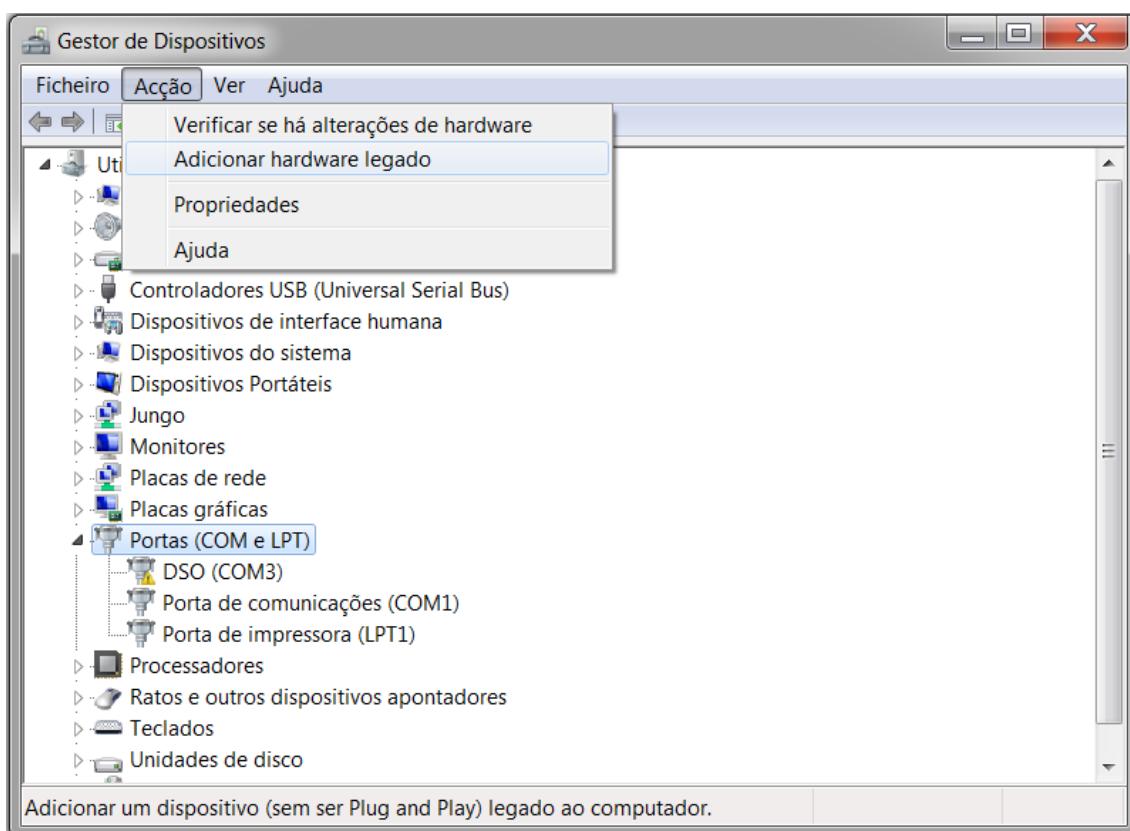
	Name	Date modified	Type	Size
★ Favorites	Files	06-10-2015 03:29	File folder	
Desktop	USB driver	06-10-2015 03:29	File folder	
Downloads	ClassLibrary1.dll	22-09-2015 15:31	Application extensi...	14 KB
iCloud Drive (Mac)	scope_icon	22-09-2015 11:38	Icon	67 KB
Recent Places	Signals.dll	22-09-2015 15:31	Application extensi...	13 KB
Libraries	WindowsFormsApplication1	22-09-2015 15:31	Application	961 KB
Documents	WindowsFormsApplication1.exe	20-09-2015 17:38	XML Configuration ...	1 KB
Music				
Pictures				
Videos				

Installing the USB driver manually

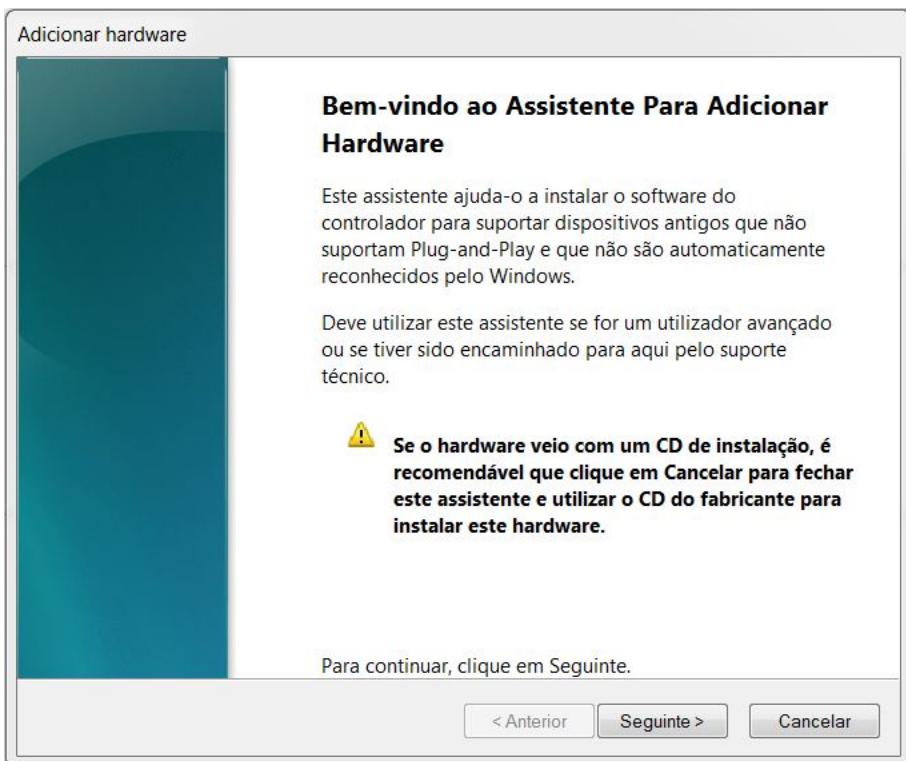
1. Click on the Control Panel of your PC > System and Security > System.



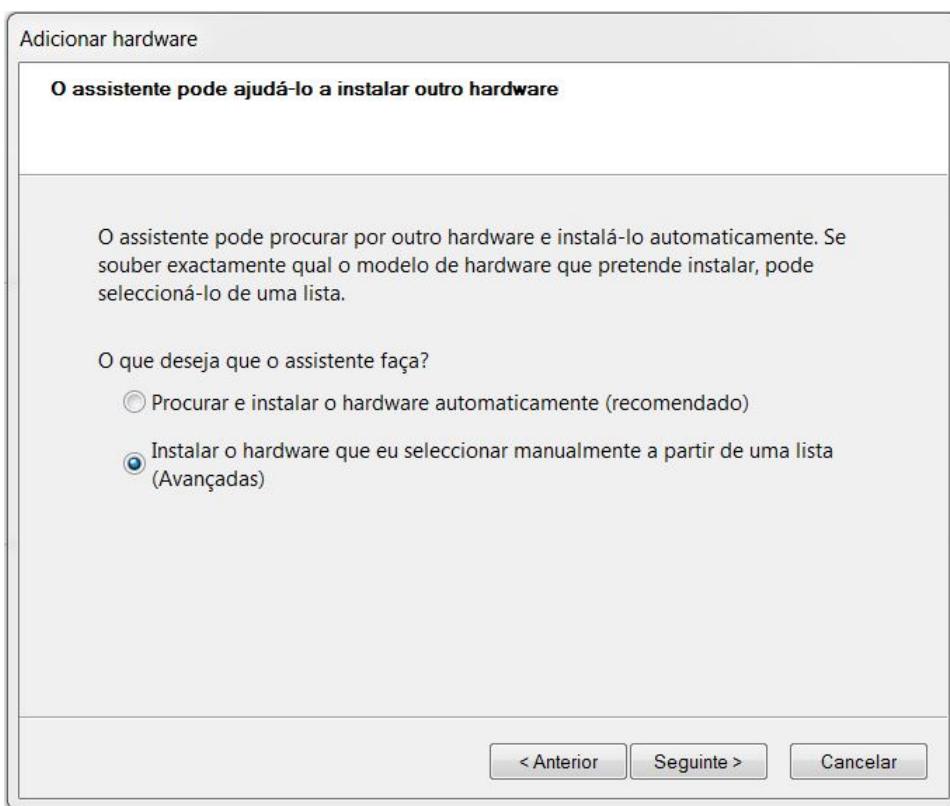
2. Select Device Manager.
3. Select Ports (COM and LPT) and then click Action > Add legacy hardware.



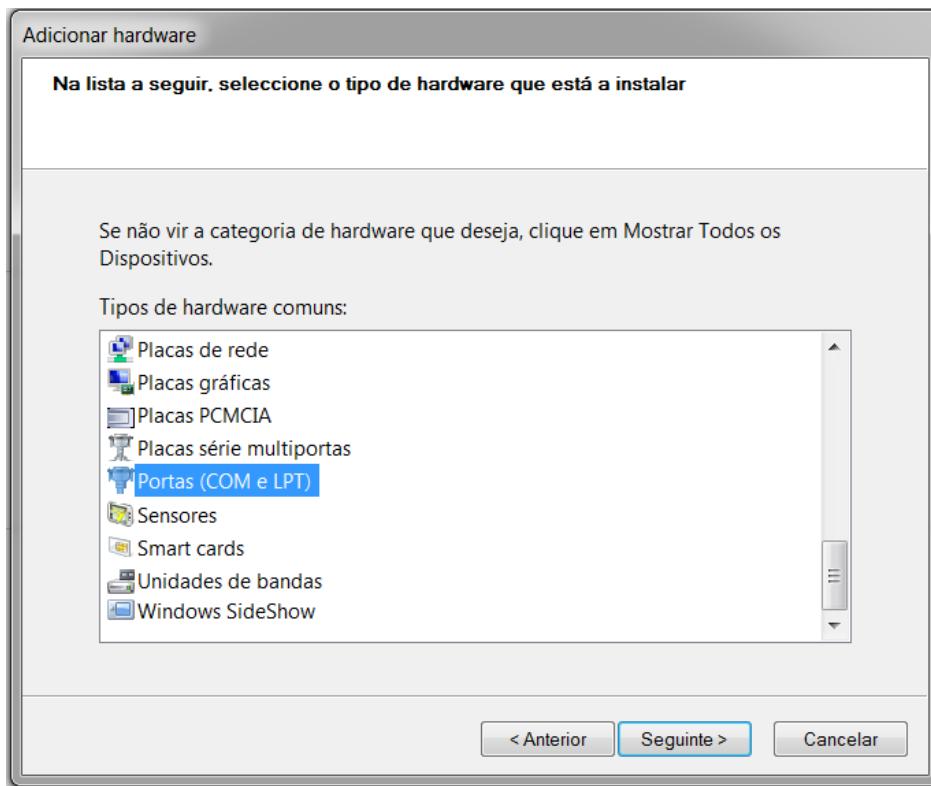
4. You will see the Add Hardware Wizard, click Next.



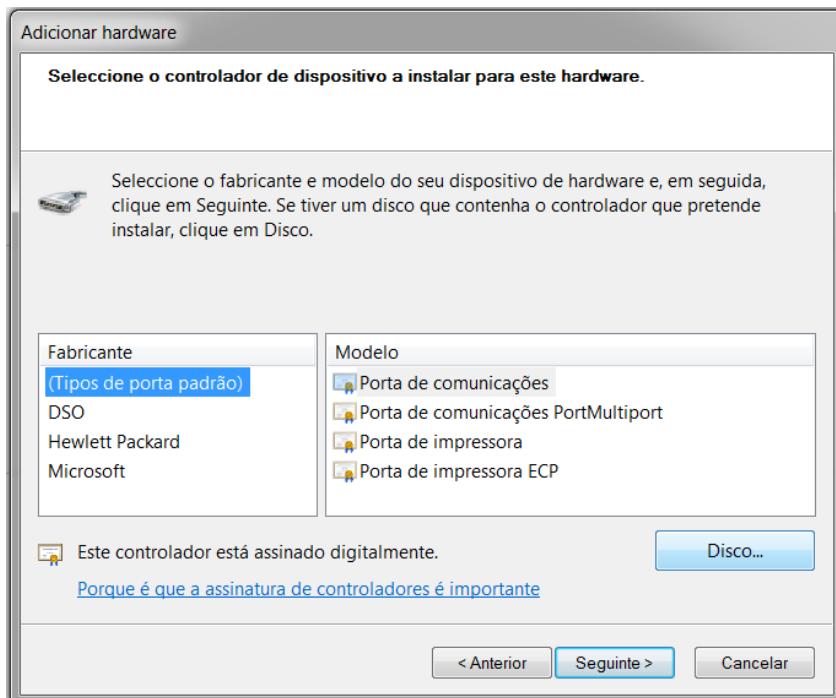
5. Select the hardware manually, for this select the 2^a option.

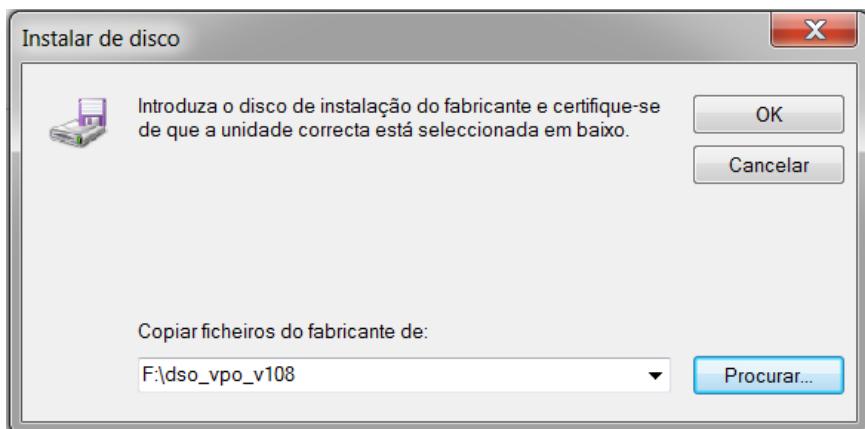


6. Select Ports (COM and LPT) and click Next.

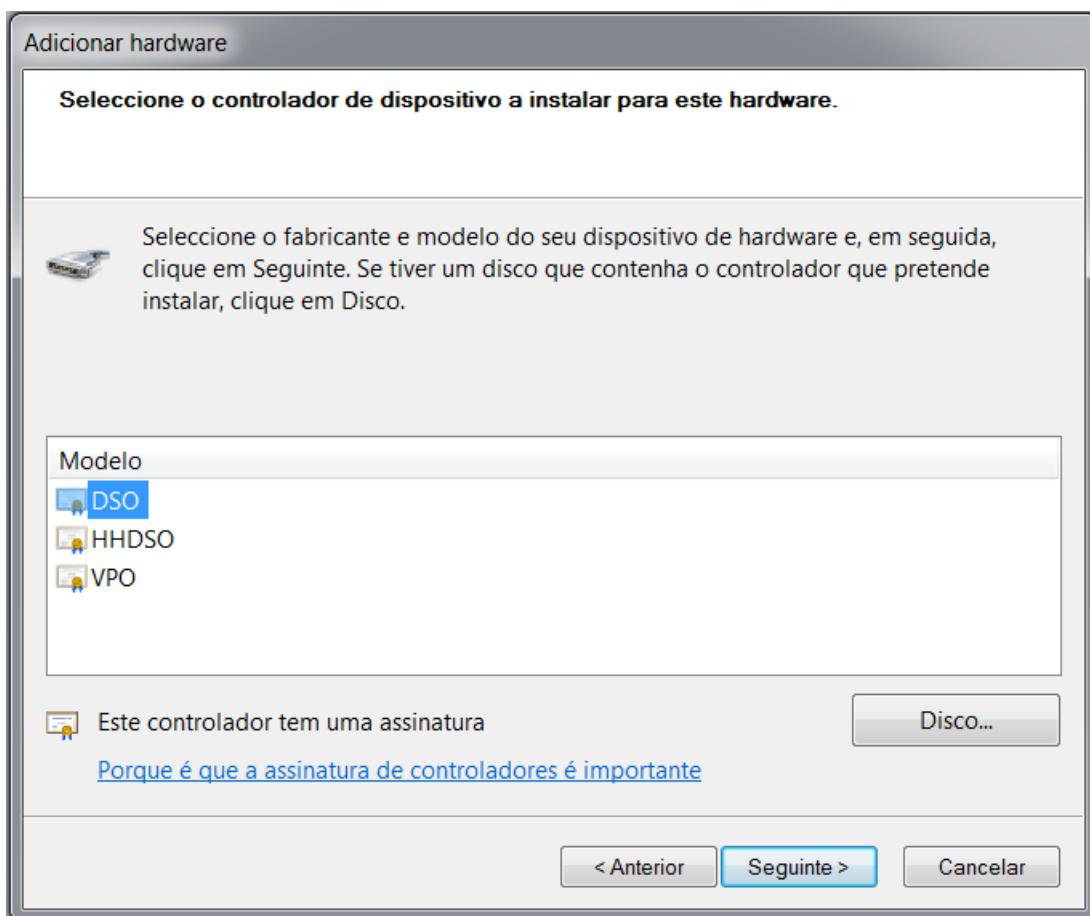


7. Click Disk and select the dso_vpo file that is in the USB driver folder created with the installation of Oscilloscope Simulator. Once you have selected the file do Ok.

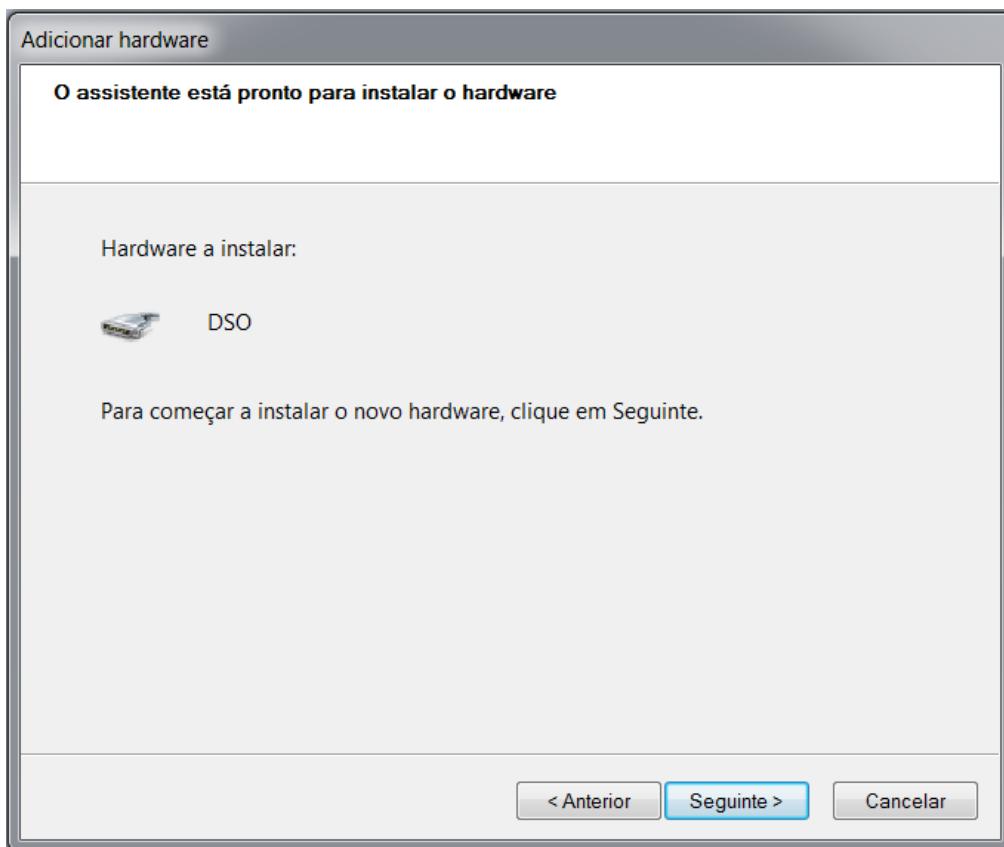




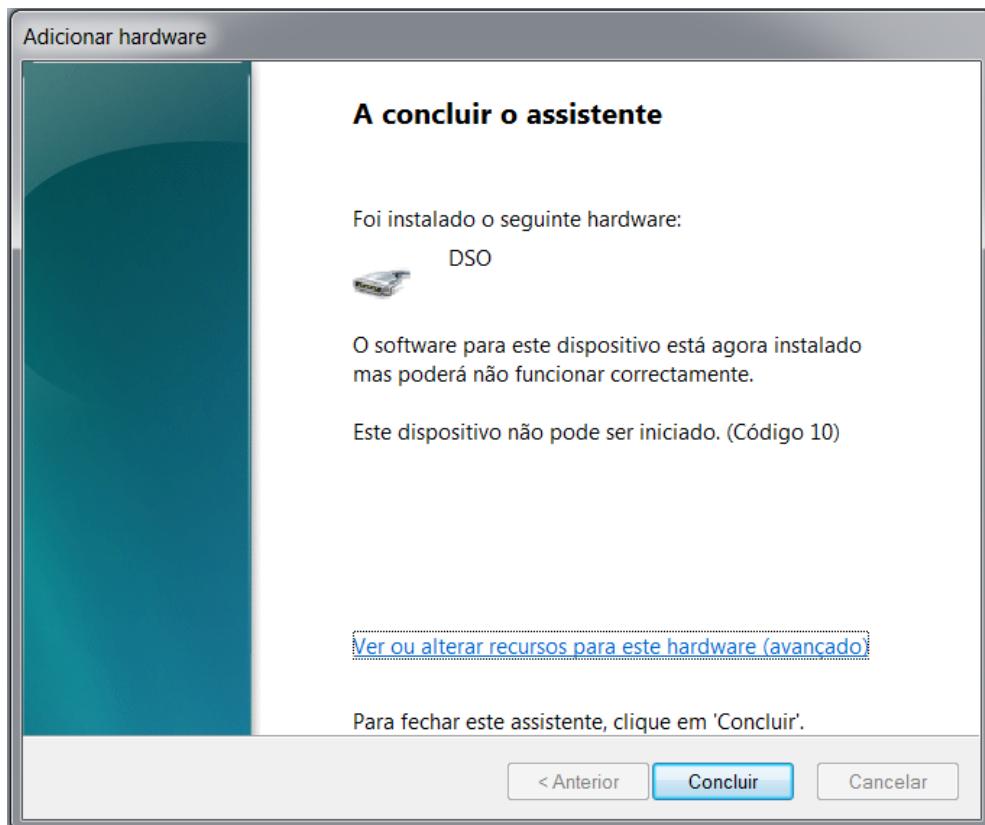
8. Select DSO and click Next.



9. You will see the installation wizard, click Next.



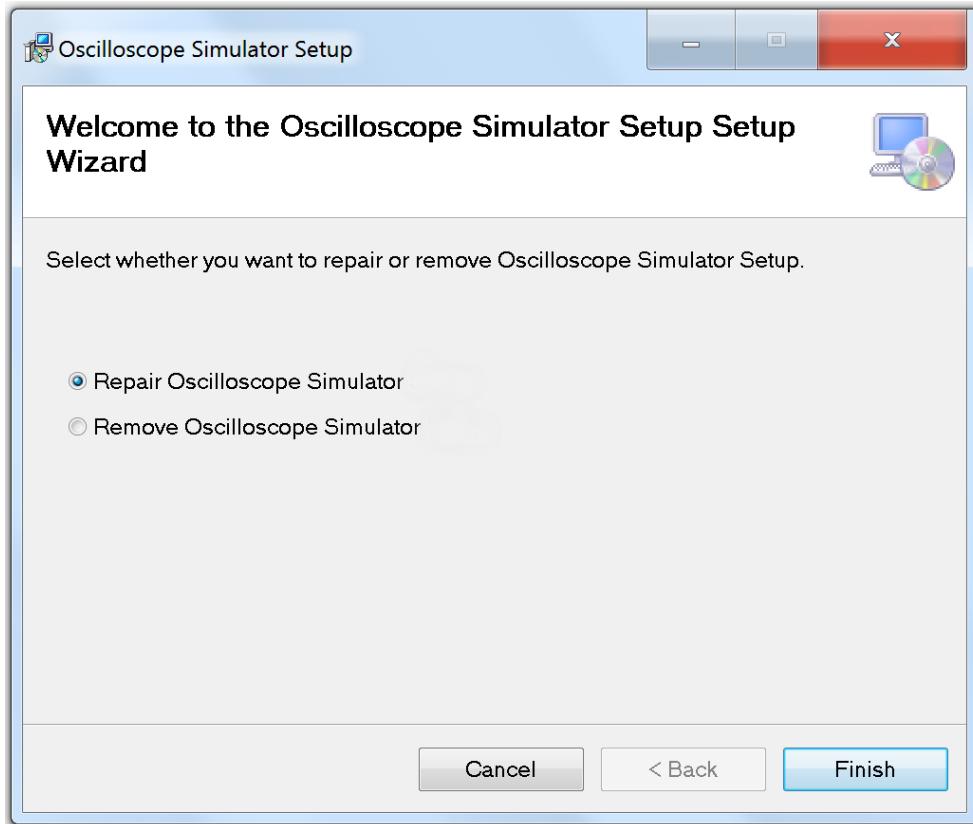
10. Wait a few minutes while the installation is processed. Finally do Finish.



Repair/Uninstall Oscilloscope Simulator

After installing Oscilloscope Simulator it is possible to repair or uninstall the software using the setup.exe file used for installation. You can also remove the Oscilloscope Simulator Control Panel> Uninstall Programs.

1. Click on setup.exe. A window will appear.

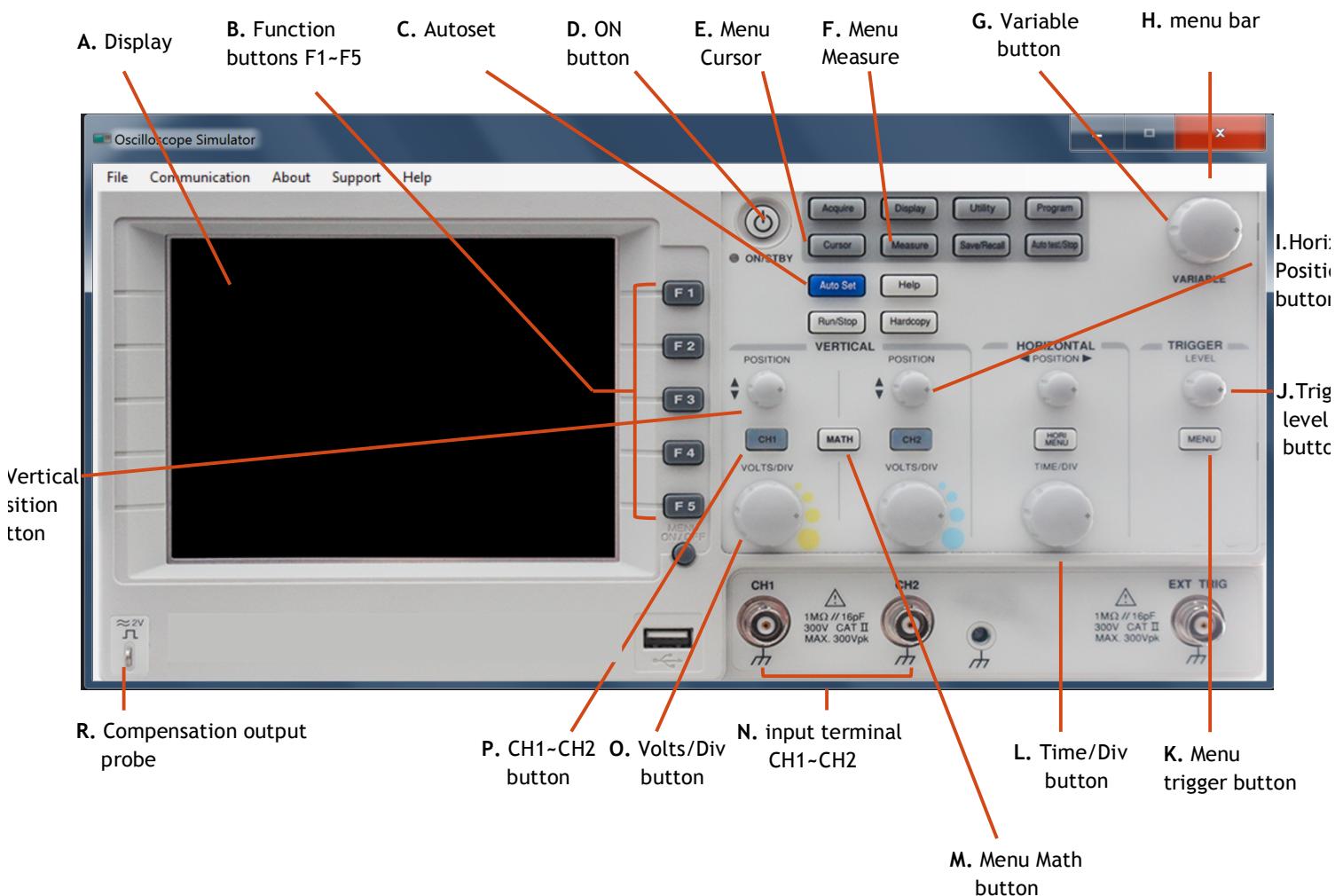


2. Select repair or remove and then click Finish. The process is automatic, when it is finished click Close.

Operation modes

There are two main modes of operation in Oscilloscope Simulator. The simulator mode where the application does not depend on the benchtop oscilloscope and a virtual instrumentation mode that depends on communication with the oscilloscope. Both can be used simultaneously through different channels. That is, you can display in the application panel a Waveform generated in simulation in a channel, and display in the same panel another signal from the oscilloscope on another channel. It is also possible to control the oscilloscope remotely via the simulator GUI.

Interface do Oscilloscope Simulator



Oscilloscope Simulator Panel description

A. Display	Display where waveforms are drawn. Here are the Function menus and status labels from buttons and functions.
B. F1~F5	Related to the functions displayed on the left side of the screen (Function menus) Navigates between the different functions of the different menus.
C. Autoset	Automatically adjusts the vertical and horizontal controls. Therefore the waveform appears well defined without the user needs to manually adjust the vertical and horizontal scale.
D. On button	Press once: On (green indicator). Press again: Off. Note: with the exception of some features, all others Requires that the On button is on (green indicator)
E. Menu cursor button	Activate Cursor Menu.
F. Menu Measure button	Activate Measure Menu. Through this menu you can select the measurement you want to see. Amplitude measurements: Vmáx, Vmin, Vpp, Vrms, Vavg Time/frequency measurements: Period, frequency
G. Variable button	Responsible for the movement of the cursors.

H. Menu bar File, Communication, About, Support, Help

I. Horizontal Position button Moves the waveform to the right or left.

J. Trigger level button Adjusts the trigger level.

K. Trigger Menu button Activate Trigger Menu.

L. Time/div button Adjusts the time scale.
1ns ~ 5s

M. Math Menu button Activate Math menu.
Math operations: Sum (+) and subtraction (-).

N. Input terminal Virtual input cables are connected in this terminal

Note: to see the waveforms you need to connect this
Virtual cables

O. Volts/div button Adjusts the amplitude scale.
2mV ~ 5V

P. CH1~CH2 button Activates the respective channel (CH1 orange indicator, CH2 blue indicator).

Q. Vertical Position button Moves the waveform position up and down

R. Compensation Output probe 2Vpp signal output

Controlo of variable buttons

The variable buttons (or rotating buttons) can be controlled in three different ways using the mouse.



Left button	the left mouse click on a variable button change its position. It will move in clockwise direction
	

Right button	 the right mouse click on a variable button Change its position. It will move in anti-clockwise
	 

Scroll Wheel Rolling the scroll up, the variable button movement will be in clockwise direction

Rolling the scroll down, the variable button
Movement will be in anti-clockwise direction

Note: It will be more advantageous to use the
scroll on G, I, K buttons.

Controlo of the input terminal (N)

This terminal is connected to the oscilloscope (simulator) virtual input cables. It is also in this section that is made the selection of the signal source. These two functions are activated via mouse click on the input terminal you want to use.



Left button



The left mouse click on an input terminal
Connect the virtual cable to the input terminal

Note: without this it is impossible to display the
waveforms



Right button



The left mouse click on an input terminal
Opens a menu to choose the source of the
waveforms

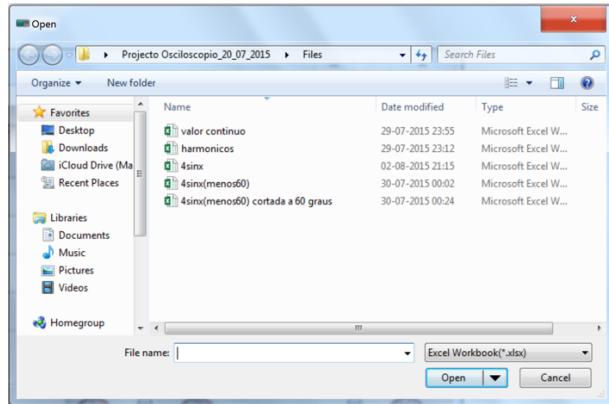


Note: Waveform sources will be discussed
below.

Waveforms Sources

File

Choosing this option will pop up a window to select the file to be read so that its waveform is displayed on the Oscilloscope Simulator display.



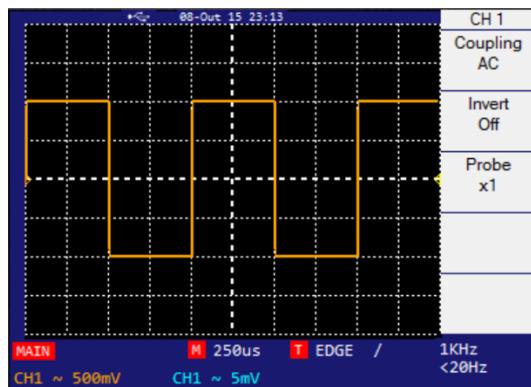
The files must have this formats:

- CSV (.csv)
- Excel (.xlsx, .xls, .xlsm)
- Text document (.txt)

Note: The users can create their own waveforms respecting certain conditions (see below).
Some sample files are in the Files folder created during the application installation.

Calibration

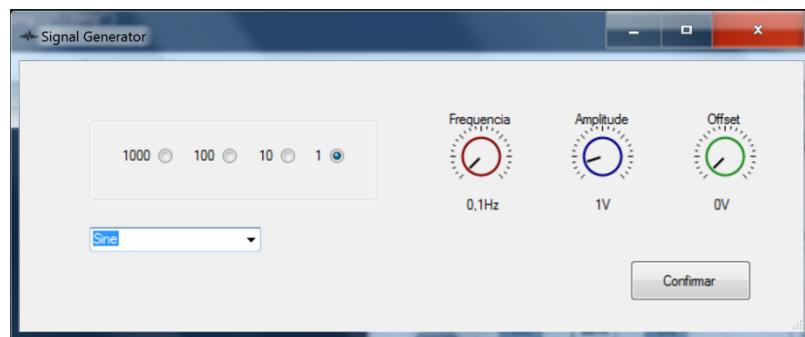
Displays a square waveform - 2 Vpp and 1 KHz frequency.

**Signal Generator**

Selecting this option will pop the waveform generator. It

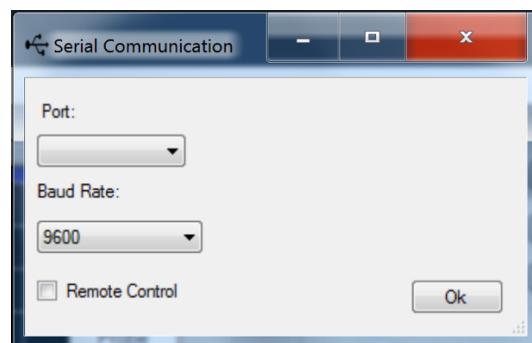
3 variable buttons: frequency, amplitude and offset
4 multipliers: x1, x10, x100, x1000;

The waveforms are selected in the checkbox.
4 waveforms are available: sinusoidal, square, triangular and sawtooth.



Real Oscilloscope

This option will allows the connection between the simulator and the benchtop Oscilloscope (GW Insteek GDS-2062). This way you can display data from the benchtop oscilloscope to Oscilloscope Simulator application. For this option you have to own benchtop GW Insteek GDS-2062 oscilloscope.



Generate waveforms with files

As explained above, when creating files to generate waveforms you should respect the .xlsx, .xls, .xslm, .csv, .txt formats. The waveform must be in one period. You should create two columns: the first correspond time and the second column corresponds to the amplitude. The time difference between each column line must be constant.

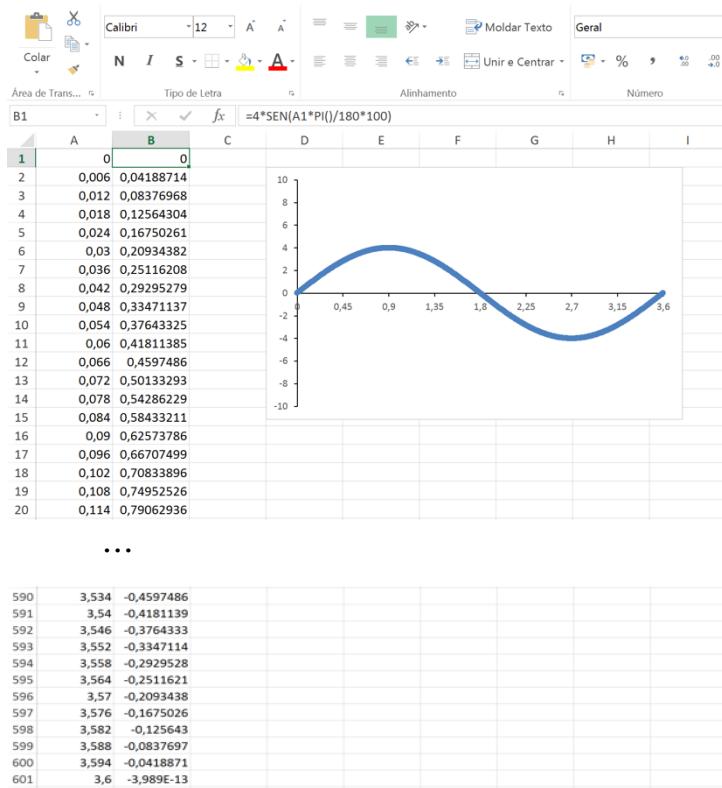
In short:

- Respect file formats listed above;
- Create two columns, first for time and the second for amplitudes
- The columns must not have header
- The time between each sample (each line) must be constant

Note: You must have in consideration the amplitude and time scales range for better visualization.

Example

Let's see at one of the existing sample files in the Files folder (created with the installation)



The time column (first column) is between 0 and 3.6, with a 0.006 constant time interval between each sample.

Row 1 = 0

Row 2 = Row 1 + 0.006

time between samples = 0.006

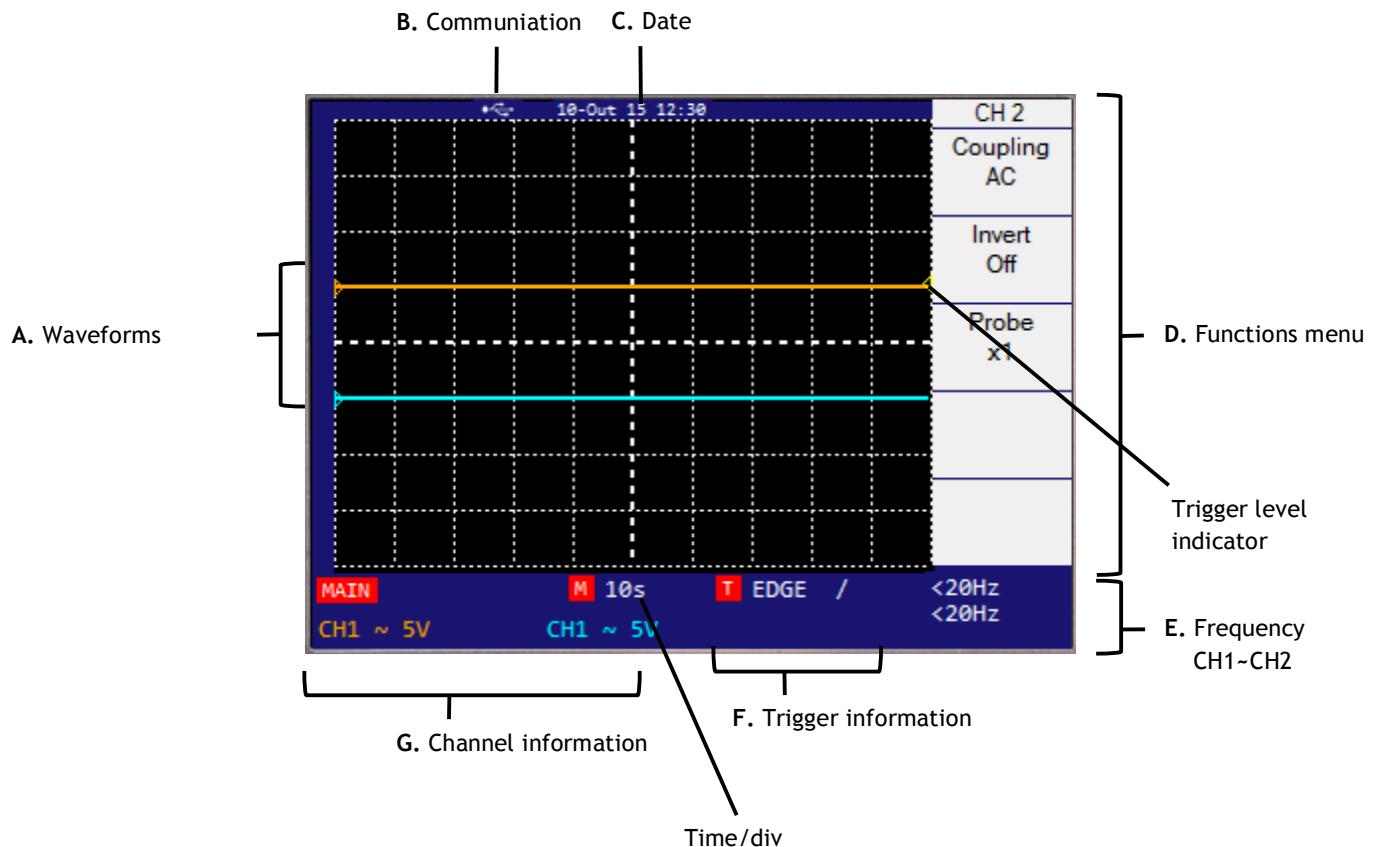
Row 3 = Row 2 + 0.006

Row n = Row n-1 + 0.006

You can choose any time between samples but it must be a constant.

In the second column you will use the equation of the waveform you want to generate.

Display



A. Waveforms

Channel 1: Orange

Channel 2: Blue

B. Communication

Communication Interface

C. Date

days-months-years
hours-minutes

D. Functions Menu

Menu of the activated function

E. Frequency

CH1~CH2

Waveform frequency

F. Trigger information

Slope and trigger type

G. Channel information

CH1 ~ 5V

Channel, coupling mode, time/div scale.

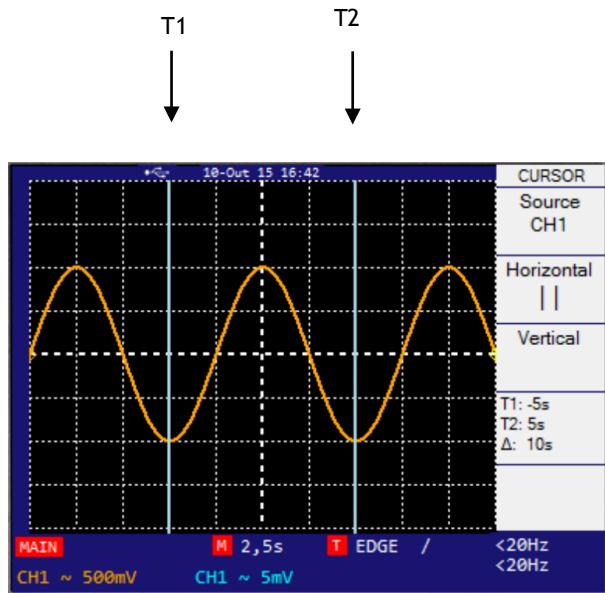
Cursos

Select horizontal cursors

Virtual panel operation



1. Click Cursor button → F1 to choose the source channel.
2. To choose the cursor you want to activate click F2.
3. To move cursors use the Variable button (G).



Source

CH1~CH2 Waveform Channel 1 ~ Channel 2

Horizontal (Cursor type)

Both T1 and T2 are off

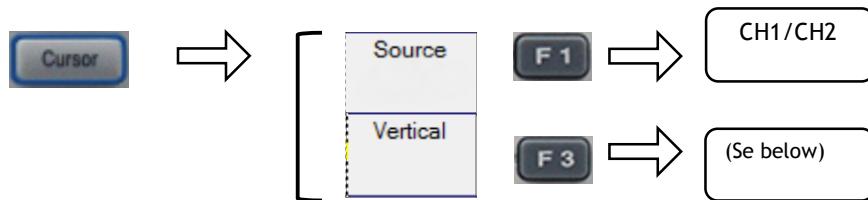
| T1 is activated, T2 is fixed. Variable button(G) only moves T1

| T2 is activated, T1 is fixed. Variable button (G) only moves T2

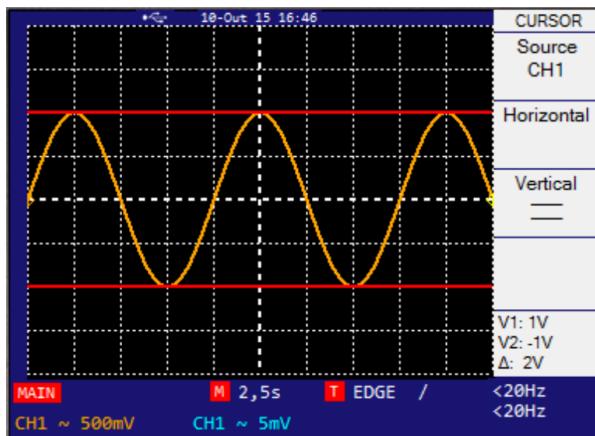
|| Both T1 and T2 are activated. Variable button (G) moves T1 and T2

Select vertical cursors

Virtual panel operation



1. Click cursor button F1 to choose the source channel.
2. To choose the cursor you want to activate press F3.
3. To move cursors use the Variable button (G).



Source

CH1~CH2 Waveform Channel 1 ~ Channel 2

Vertical (Cursor type)

Both V1 and V2 are off

— V1 is activated, V2 is fixed. Variable button(G) only moves V1

— V2 is activated, V1 is fixed. Variable button (G) only moves V2

— Both V1 and V2 are activated. Variable button (G) moves V1 and V2

Vertical

Selecting coupling mode

Virtual panel operation



1. To choose coupling press F1.
-

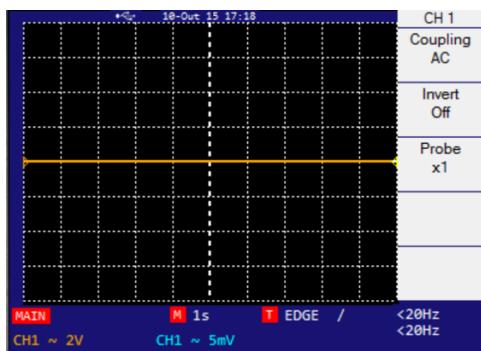
Options available AC - AC coupling

DC - DC coupling

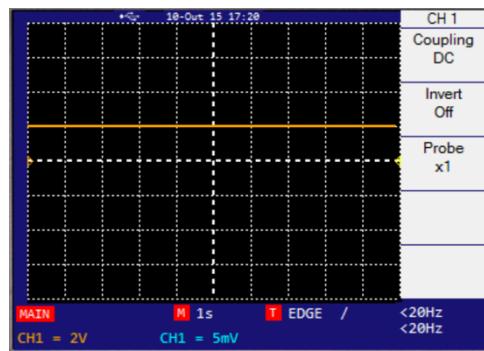
GND - GND coupling

Example 2V signal DC

AC coupling



DC coupling



Invert waveform

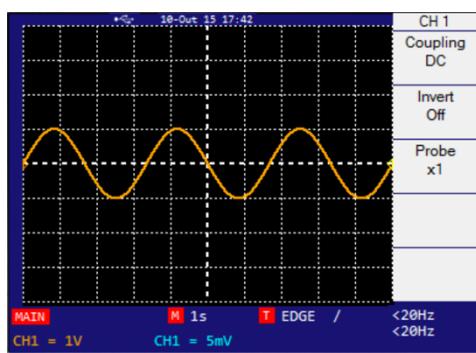
Virtual panel operation



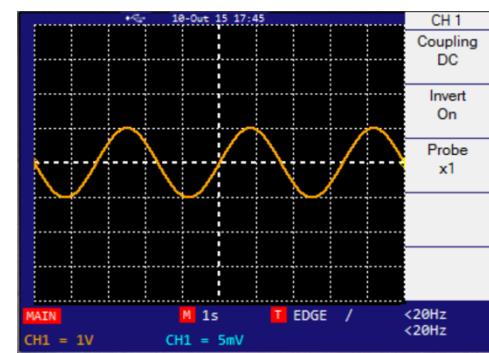
1. Press F2 to invert the waveform
 2. To cancel the effect press F2 again.
-

Exemple

Invert Off

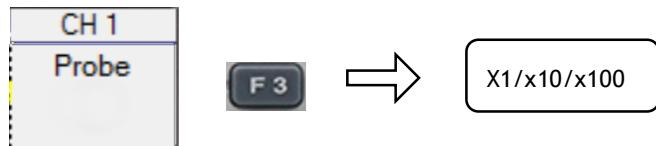


Invert On



Attenuation

Virtual panel operation

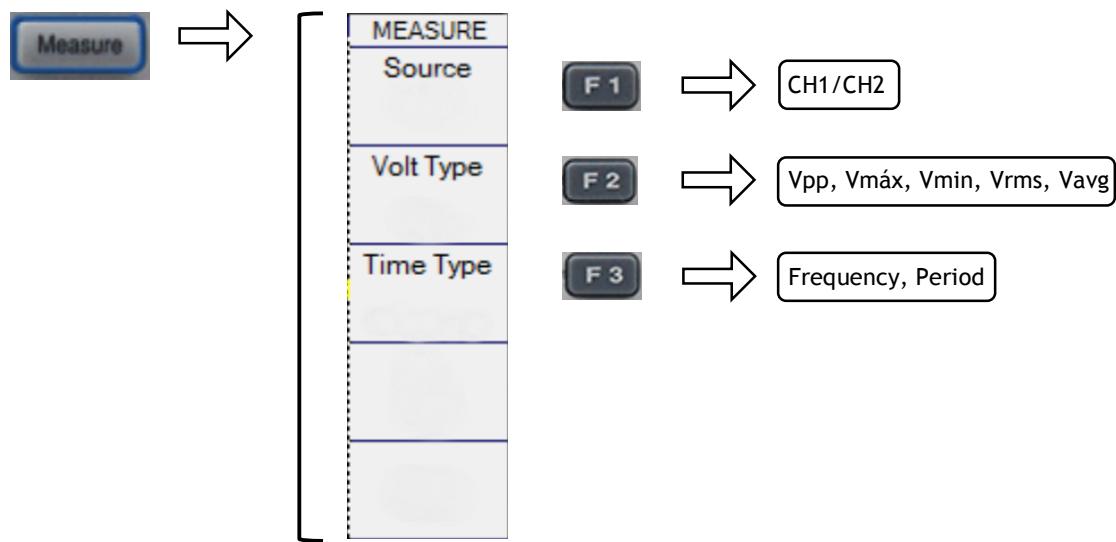


1. Press F2 to choose the attenuation factor.
 2. Adjust vertical scale for a better visualization of the waveform
-

Range	x1	no attenuation
	x10	Attenuation factor 10
	x100	Attenuation factor 100

Automatic measurements

Operação do painel virtual



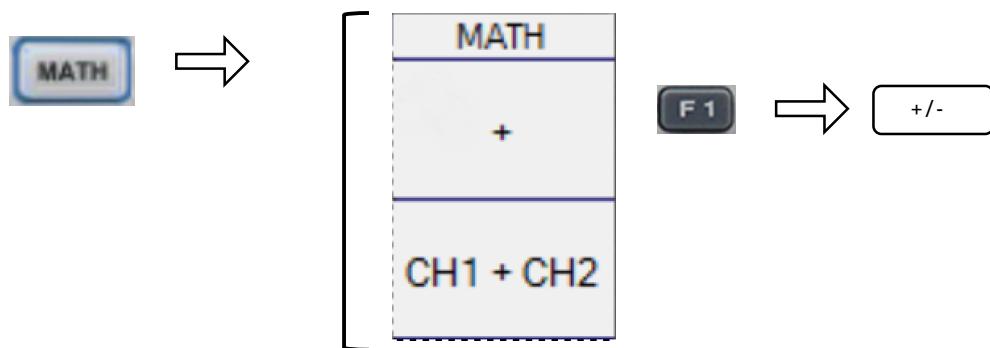
1. Press Measure button.
2. Press F1~F3 buttons to choose between the different measurements.
3. Press Measure button again to disable this option

Measurements	Source	
	CH1-CH2	Channel 1~Channel 2
	Volt Type	
	Vpp	peak to peak voltage
	Vmax	positive peak voltage
	Vmin	negative peak voltage
	Vrms	root mean square voltage
	Vavg	Average voltage
	Time Type	
	Frequency	Waveform frequency
	Period	Waveform period (=1/frequency)

Math

Math operations

Virtual panel operations



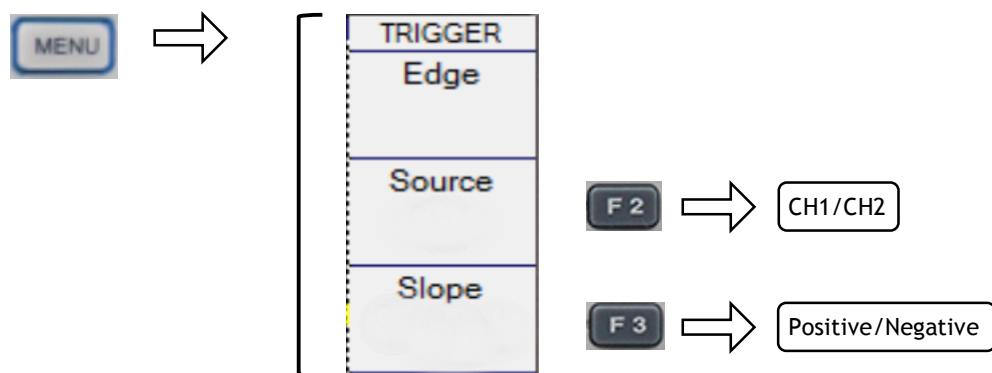
1. Press Math button.
 2. To choose between the operations press F1.
 3. Press again the Math button to disable this option.
-

Math operations	+	Sum
	-	Subtraction
Channels	CH1_CH2	Math operations between Channel 1 and Channel 2

Trigger

Edge Trigger

Virtual panel operation



1. Press Menu button.
 2. Press F2 to choose the source channel.
 3. Press F3 to choose the slope
-

Menu bar

File

Save



Save ▶

- Data
- Screen
- Trace

Data



Data ▶

Pressing data you can save the waveform in a CSV or document text file.

You have to choose the source channel

From CH1

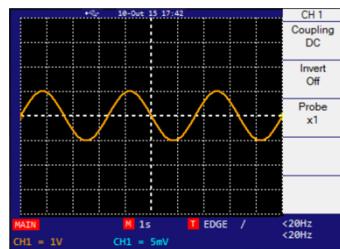
From CH2

Screen



Screen

This option allows you to capture simulator's display
The image will be save as JPEG or PNG file.

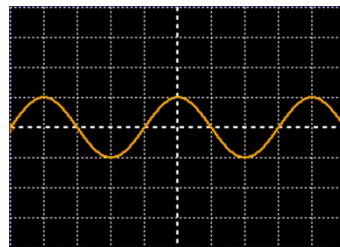


Trace



Trace

This option allows you to capture just the waveform
The image will be save as JPEG or PNG file.



Exit This option close the application.



Exit

Communication

This option opens a dialog box that allows you to configure the communication parameters (discussed above).

About

In this section you can find informations about this project.

Support

User Guide This option will pop this user guide.

Note: This user guide is also in the folder created during the application installation

Help

Short guide to help the user.

Practical Example

In this section will be a small demonstration of the use of the application in order to summarize some parts of this document.

Note: you don't need to follow the same order of events.

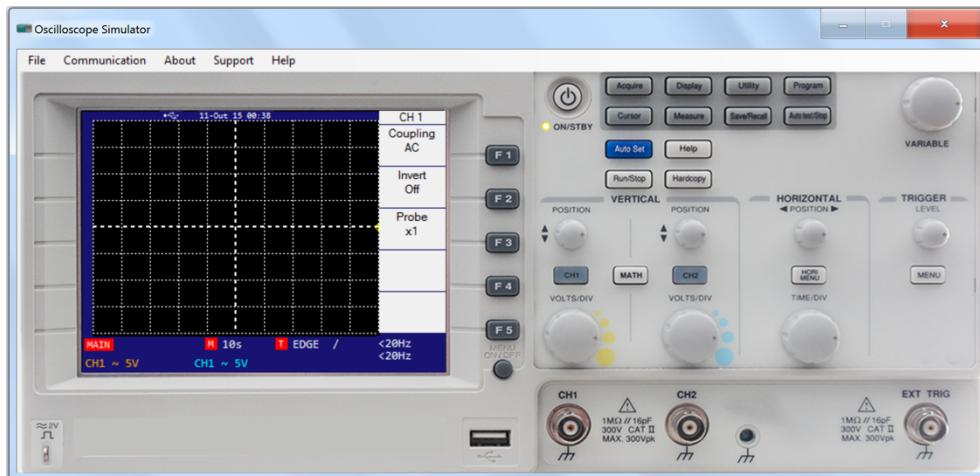
1. Start by opening the Oscilloscope Simulator application. You can use the shortcut created in the installation, present in your workplace.



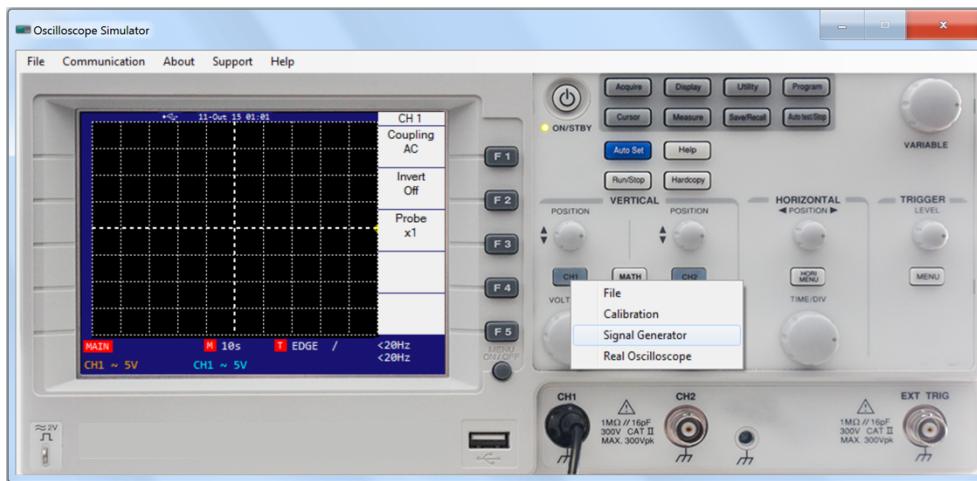
You should see this window



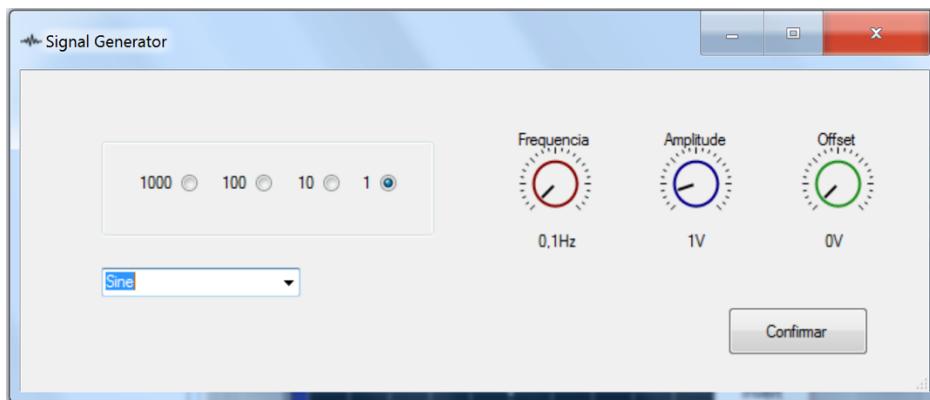
2. First turn on the Oscilloscope Simulator. To do this press once the On button. As you can see the indicator below this button is now green and the display is no longer black.



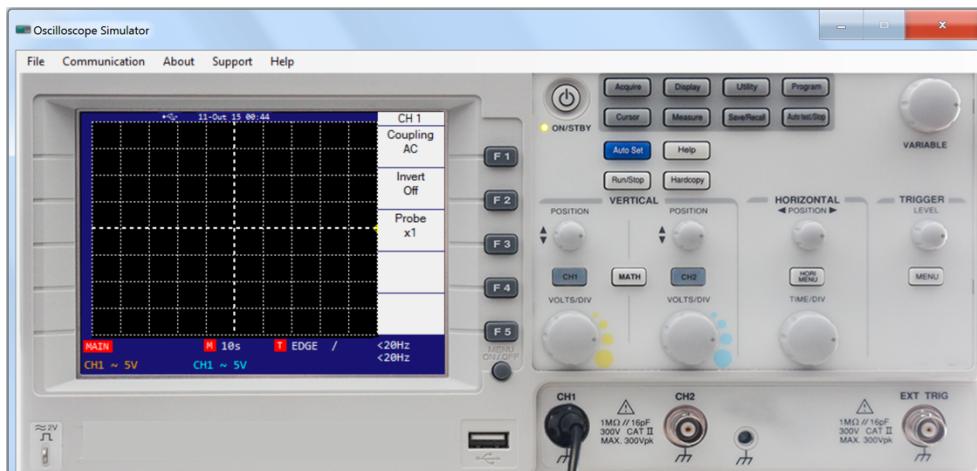
3. Select the waveform source by pressing the right mouse button on the input terminal you want to use. For this demonstration we will use the signal generator and the channel 1.



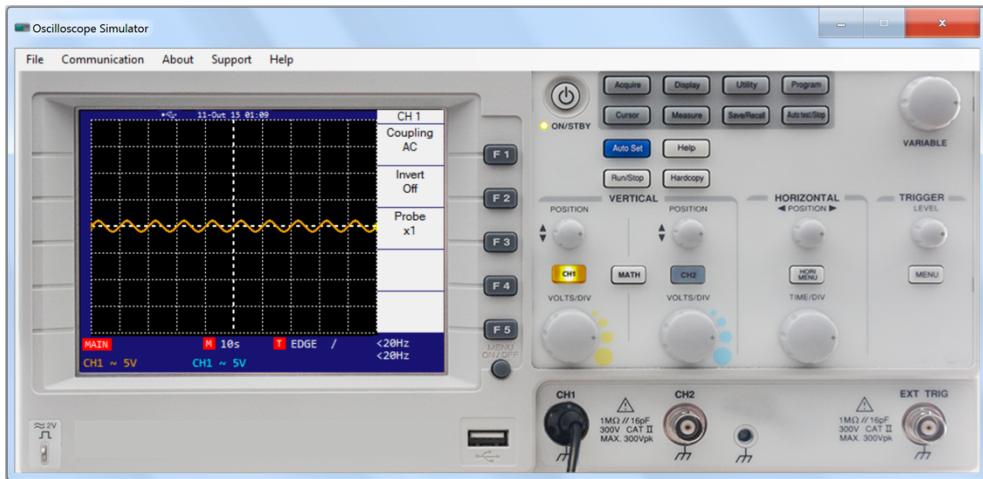
4. Automatically appears a new window, the signal generator. Select the waveform, frequency, amplitude and offset. For this example will be used one sinusoid, frequency of 0.1 Hz, 1V amplitude and offset 0V.



5. Connect the virtual tip to the Oscilloscope input terminal (Channel 1 in this demonstration). To connect you have to click on the input terminal of channel 1 with left mouse button.



- Turn on the channel 1 by pressing channel 1 button with left mouse click. You will see the button turned Orange. At this point you should be able to see the waveform.



- Set the waveform automatically by pressing the left mouse button on the Autoset button.

