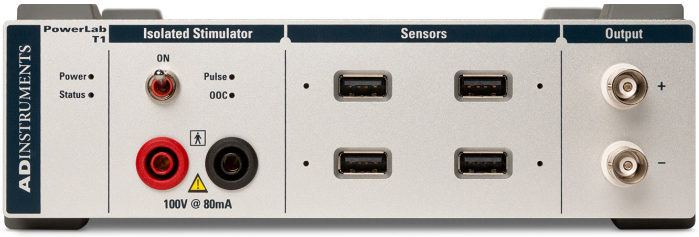
PowerLab Sensors Quickstart with LabChart 9 for Education

Record physiological data in real time with the PowerLab T1, PowerLab Sensors, and LabChart 9. Choose from a range of settings from the content library, configure settings, or create new settings in LabChart 9. Compatible with Windows OS.

Education PowerLab T1 and PowerLab Sensors

PowerLab T1 features an Isolated Stimulator which can output up to 80mA, analog outputs (non-isolated), and 4 USB inputs to which the PowerLab Sensors can be connected for the best possible synchronization between high-frequency signals.

When using multiple sensors for high-frequency sampling, we recommend using the PowerLab T1 or USB hub to ensure optimal synchronization.





PowerLab Sensors are data acquisition hardware for recording physiological signals in education, including ECG, EMG, EEG, EOG, spirometry, respiratory rate, pulse, and more. They can be connected directly via a USB port on the computer or the PowerLab T1.

LED Status Indicators for PowerLab Sensors

The LED appears on the lead-end of the biopotential sensor and GSR sensor, or on the USB-end of all other sensors. Status indicators for the PowerLab T1 differ from that below. Refer to the PowerLab T1 Owner's Guide for more information.

Status indicator	Meaning
Blue	The sensor has been detected by LabChart 9.
Light blue flashing	The sensor is sampling.
Green	The sensor is idle, initialized, and waiting for a command from the computer.
Orange flashing	Sensor firmware is being updated. Do not unplug the sensor until the status light turns green or blue.
No light	There may be a problem with the power source or power cable. Check connections and cables.

Getting Started

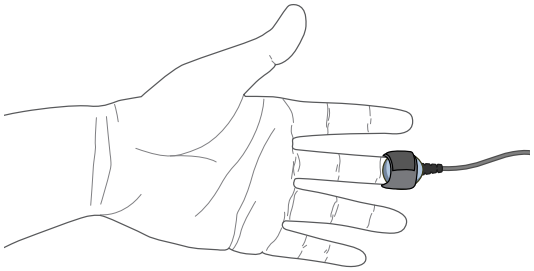
You will need a finger pulse sensor. Get started by connecting the sensor via a USB port on the computer or the PowerLab T1, then open LabChart 9.

When you first open LabChart, you will see the Welcome Center which is used to manage LabChart files. Here, you can create new files, open recently recorded files, open settings files, and access commonly used LabChart support features.



1. Open a New file.
2. Attach the finger pulse sensor to the distal part of the volunteer's middle finger, firmly but not too tight.

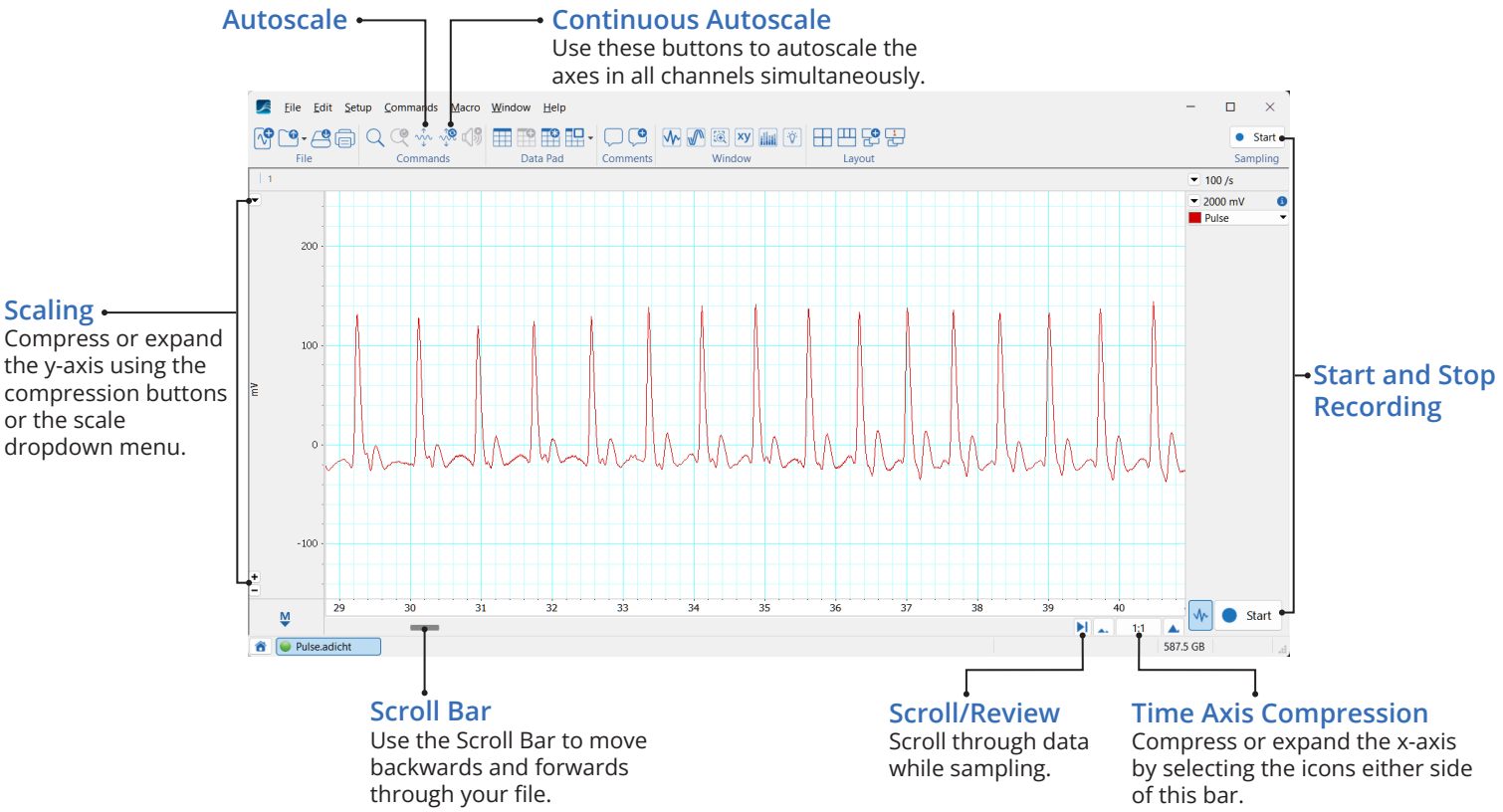
If the velcro strap is too loose, the signal will be weak, intermittent, or noisy. If the velcro strap is too tight, reduced blood flow to the finger may weaken the signal and could cause discomfort.



Display

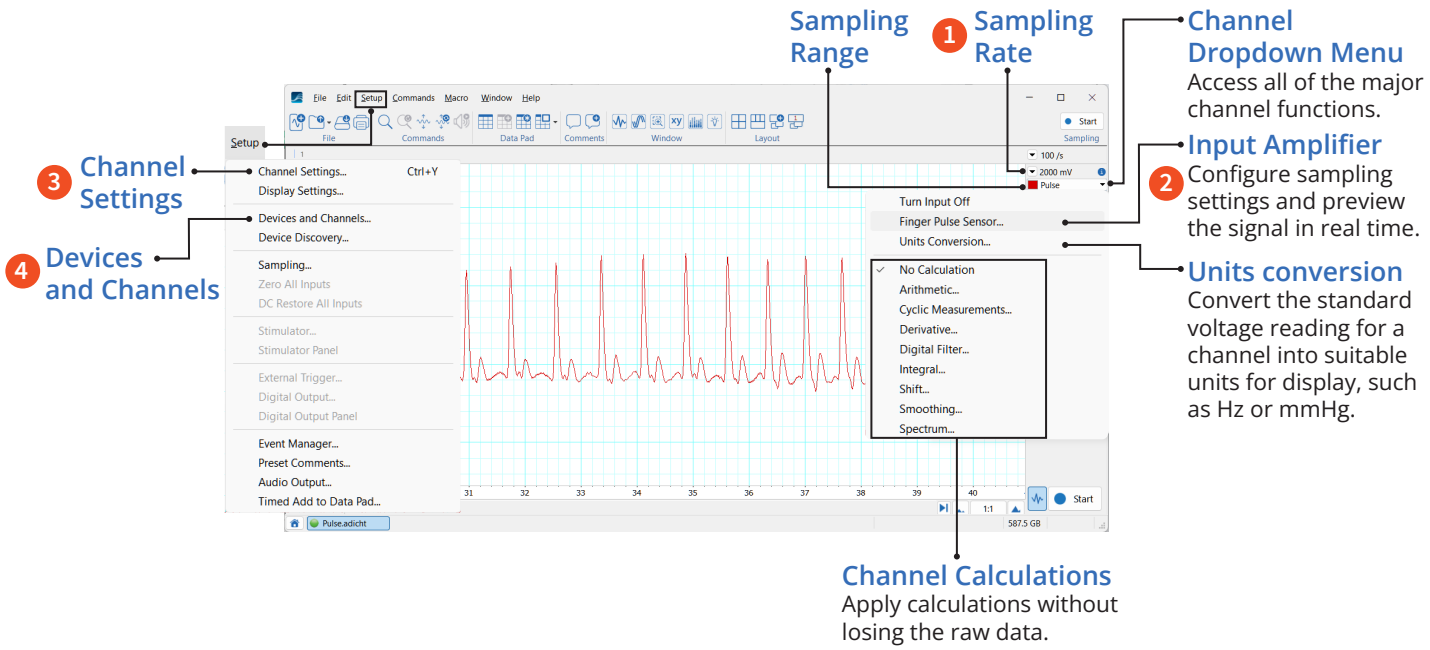
Rest your hand on a table and sit as still as possible to minimize signal artifacts due to movements.

1. Select Start to record. After 60 seconds, select Stop.
2. Explore the following controls on your screen to change the way that your signal displays.



Recording Setup

Some sensors have configurable settings that you can modify to suit your sampling needs. Explore the following controls:



1 Sampling Rate

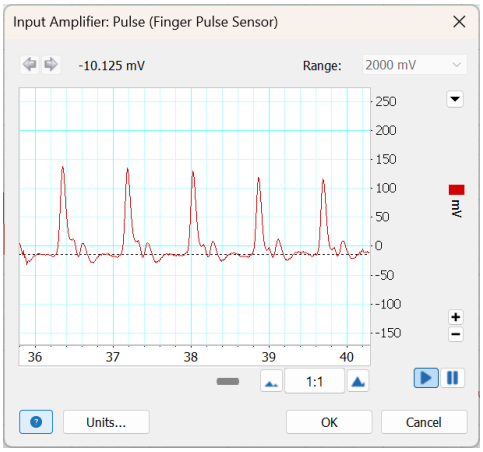
When the sensor digitizes a signal, it records the voltage of the analog signal at discrete instants of time. The number of times that this happens per second is known as the sampling rate. The sampling rate should be set high enough to capture all significant changes in the signal, but low enough to avoid excessive over-sampling. Configurable sampling rate settings are available for the biopotential M2, 12-lead ECG, and analog adaptor only.

2 Input Amplifier

Select the sensor name to open the Input Amplifier. Here, you can set up recording parameters, and preview the signal using your chosen settings. Range and zeroing are two controls that you may need to use often:

Range. Use the Range dropdown list to adjust the sensitivity of the recording. Configurable sampling range settings are available for the biopotential M2, 12-lead ECG, and analog adaptor only.

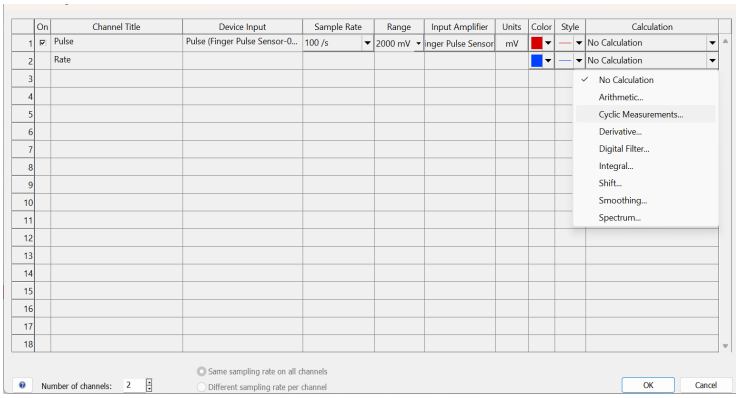
Zeroing. Sensors almost always produce a small amount of signal in the equilibrium or rest state, and this offset from zero needs to be removed. The Zero button will appear in the Input Amplifier for the spirometer, force, and GSR sensor.

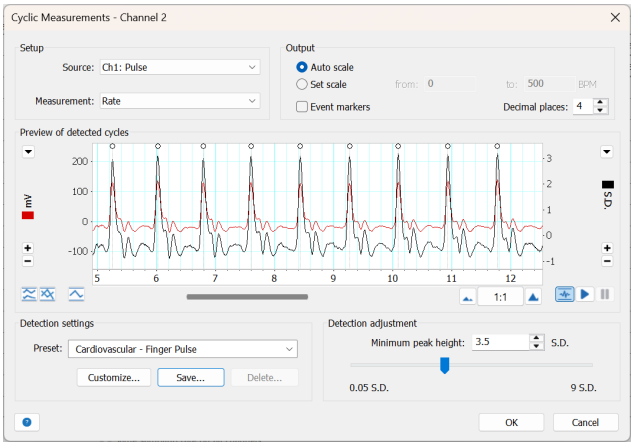


Some sensors such as the biopotential sensor have many configurable settings such as Sampling Rate, Range, and AC coupling which allows you to record many different kinds of signals (e.g. EEG, EMG, ECG, EOG) and experiments (e.g. EMG recorded during muscle contraction, versus EMG in response to nerve stimulation). In contrast, the skin temperature sensor has only one Sampling Rate option as temperature is a slow changing signal.

3 Channel Settings and Calculations

You can apply calculations to channels of recorded data. The calculated data are generated and displayed dynamically, so that they can be created, modified and removed as necessary. One of the most commonly used is Cyclic Measurements.



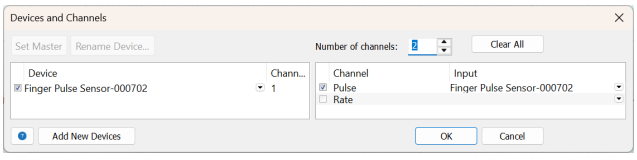


Use Cyclic Measurements to calculate heart rate from the raw pulse data in Channel 1.

1. Select Setup > Channel Settings dialogue to view all Channel details.
2. Increase the Number of Channels to 2.
3. Change the Title of Channel 2 to Rate.
4. In Channel 2, select Cyclic Measurements from the Channel dropdown menu.
5. In the Cyclic Measurements dialog choose the Cardiovascular - Finger Pulse preset from the detection settings panel.
6. Ensure that source is set to Channel 1, and measurement is set to Rate. Select OK.

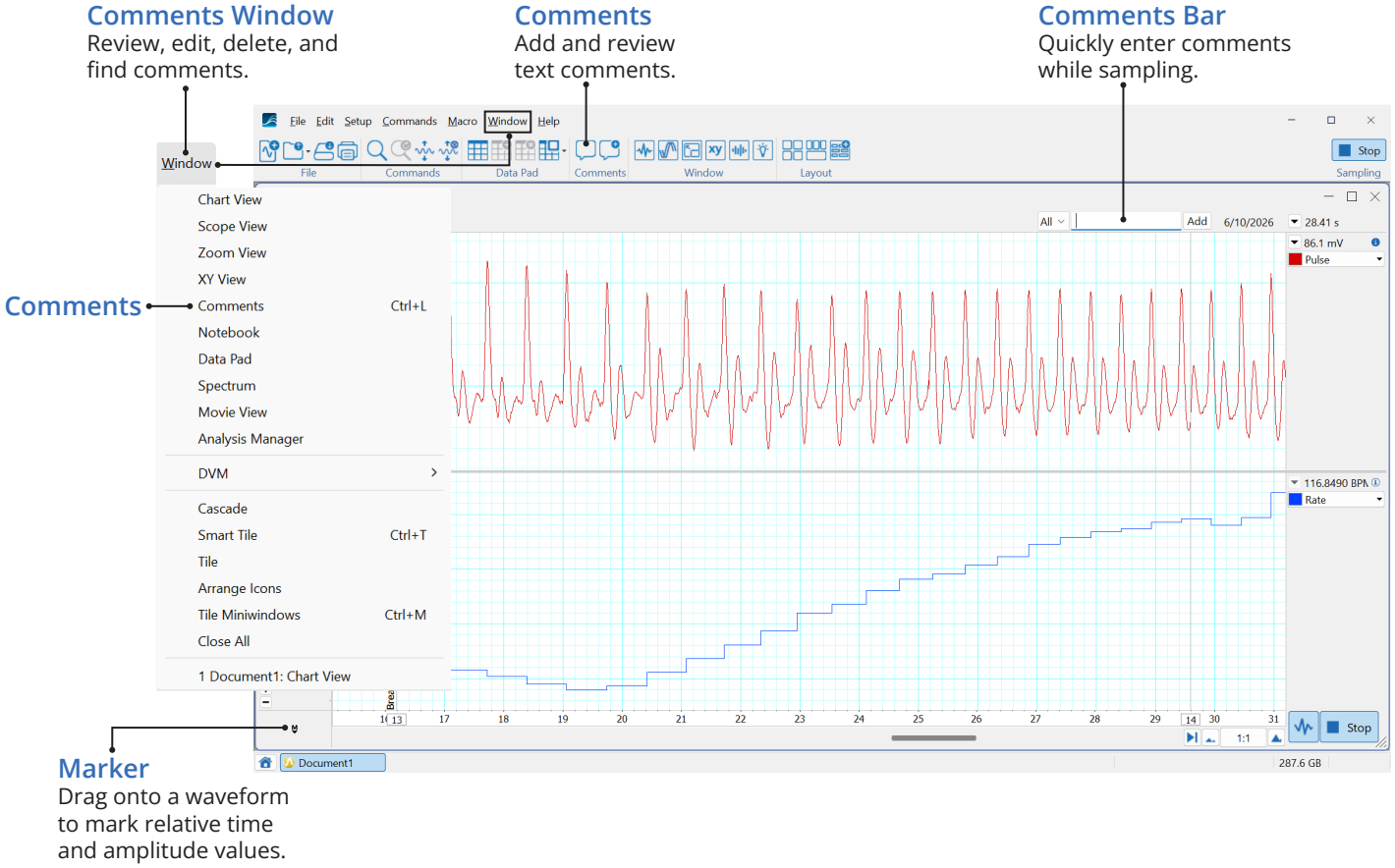
4 Devices and Channels

Select Setup > Devices and Channels dialogue to change which devices are enabled, or if you want to change the order that the signals appear on screen. The channels appear in the order that they are listed. Select the drop down arrow to select the signal that you want in each channel.



Recording and Analysis

The following controls are commonly used when recording data. Explore them on your own screen:



Adding Comments

Comments allow you to annotate your data, and they provide a quick and accurate method of locating places of interest.

1. Start recording and type “Breath hold” into the Comments Bar.
2. After a few seconds of recording, inhale deeply and hold your breath, then press the Enter key or select Add.
3. After 15–30 seconds of breath hold, start breathing and press the Enter key or select Add to add a blank comment. Wait a few seconds, then Stop recording.
4. Open the Comments Window from the Window drop down menu to view a list of all comments in the recording. This feature is particularly useful for navigating through data over the course of an experiment.

Save/Export

Save the current file
Choose File > Save.
Save your data as a LabChart data file.
Files saved into the LabChart Gallery will appear in the Welcome Center.

Export data
1. Choose File > Export.
2. Choose the file type to export from the dropdown list.
3. Choose an appropriate name and location, and select Save.