Ward's Single Probes

When All You Need is One

INTRODUCTION

The Ward's Single Probes platform was designed for the classroom with ever-changing needs in mind. Users can select from three different operational settings, allowing you to tailor the platform to your unique experiment needs.

Handheld Mode, as the name implies, allows students to collect and analyze data directly onto the Ward's Single Probes Base Unit while on the move. This setting allows students to hone their scientific skills with as little restrictions as possible.

USB Mode is an alternate option for analyzing data on a larger screen.   This is especially helpful for teachers who are reviewing results with the class post-experiment.   The Base Unit connects directly to a computer where experiments can be uploaded and analyzed.

Wi-Fi Mode, is accessible with the purchase of the Ward's Single Probes Wi-Fi Module, and allows data to be streamed directly to laptops, tablets, and smart phones.   Wi-Fi mode is extremely helpful for collecting field or classroom data without the need to interact directly with the Base Unit.

QUICK START

1. Connect any Ward's Single Probes sensor to the top of the Ward's Single Probes Base Unit.
2. Press the power button on the side of the Ward's Single Probes Base Unit.
3. The screen will automatically engage and display the icon associated with the Ward's Single Probes sensor you are using. Data readings will automatically start to display on the screen.
4. On your home screen you have the option to view the data in four different formats by using the buttons on the bottom of the screen.
5. Use the arrow keys to toggle between the screens: default screen and secondary screen.
6. To record data, move forward one screen by touching the arrow button and then touch the red **record** button at the bottom of the screen.
7. You can change experiment parameters by touching the sensor icon to switch between the sensor that is currently connected to the Base Unit and the built-in ambient temperature sensor. To change units of measure, touch the unit of measure currently displayed.
8. You can remove your sensor and connect a different sensor at any time; the system will automatically recognize and configure for the sensor that is plugged in. When no sensor is connected to the Base Unit, the built-in ambient temperature sensor is the default.

OVERVIEW OF SCREENS

Default State
The following appears on the Ward's Single Probes
Base Unit upon startup:
Sensor Icon – This indicates the type of sensor and
data you are collecting.
Data Reading – This is a live readout of the data being
monitored.
Unit of Measure – This displays the units of measure
on the data reading.
Date – Date for time and date stamping your data.
Time – Time for time and date stamping your data.
Battery Level – Indicates level of battery left to use.
Graph Type – Three icons for different visual displays
of data.
Arrow – Allows you to flip between screens.

Graph Type
The Ward's Single Probes platform allows users to
select from several different graphical displays for
their data.   This helps students with all different
backgrounds to better understand the data that they
are collecting.   You will see four icons at the bottom
of the screen that show the different graph types
which you can select
1. Digital Numeric – The default setting, this shows
    the numeric reading of data real time.
2. Analog Dial Graph
3. Bar Graph
4. Line Graph

Secondary Screen

1. Select the arrow on the bottom right corner of the home screen to see a second screen with the following options while your data continues to display live: Load Experiments – Load data from previous experimental runs.
2. Record – Red button allows you to record and save your experiment
3. Tools – Allows you to change settings.

RECORDING DATA AND SETUP

Prior to collecting data, users should select the experimental settings that best conform to your experiment design. To set experimental parameters touch the record button. Then set the following

Duration – Set the total amount of time that you want your experiment to run for.

Sampling Rate – Set the time interval between collected data points.   Please note that sampling rate is dependent upon the duration selected.

Once these settings have been established, touch the **record** button to begin recording data. Each data file will carry a time and date stamp.

To change the **unit of measure** touch the unit of measure on the home screen, then select your desired unit.

Ambient temperature is the default sensor reading when no external sensor is plugged in to the Base Unit. To **change the sensor being displayed when an external sensor is connected,** touch the sensor icon and you can select between the connected sensor and built-in ambient temperature sensor.

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Tools

By selecting the gear icon on the secondary screen you can change the following:

Time

Date

Language

BASE UNIT OPERATION: BASIC OPERATING PROCEDURE

Start Up & Base Unit Operation

Press and hold the button on the left side of the unit for a couple of seconds until the welcome screen appears. Then the screen will transition from the welcome screen to the default screen which displays live data.

1. Connect any Ward's Single Probes external sensor by plugging it directly into the top of the handheld Base Unit.
2. Press the **Power** button located on the right side of the Base Unit to turn the system on.
3. You'll be greeted with a welcome screen for two seconds which displays the icon for your connected sensor.
4. After two seconds, you'll be brought to the home screen. At the top of the screen you will see your currently connected sensor icon. In the middle of the screen you will see the current readings from the sensor. At the bottom of the screen you will see four buttons:
    a. Analog Dial Graph – Selecting this will show your real time data in the form of a dial.
    b. Bar graph – Selecting this will show you your real time data in the form of a live bar graph

   c.   Line Graph – Will show your real time data in the form of a line graph (this graph type allows you to see the history of your data in real time as well).

   d.   Arrow – This allows you to flip to the data record screen.

Record Data
1. Press the **arrow** key at the bottom right of the home screen.
2. Press the red **record** button.
3. Enter the duration (length) of the experiment you would like to run.
4. Select the desired sampling rate (number of data points taken over a period of time). Note that the sampling rate is dependent upon the duration.
5. Press **record** and you are now saving the experimental run.
6. Pressing **stop** halts the recording (Note your data is still saved, you can store up to 20 experimental runs).
7. Once a run is complete you will see a line graph showing your experiment.   A time indicator on your screen will notify you how much time is left in your experimental run.
8. Press the **back** button to begin collecting more data or setting up another experiment.

Note: You do not need to erase experimental runs, the 21st run will overwrite the first run.

Load Experimental Data
Using the Ward's Single Probes Base Unit, you can easily recall any of your previous 20 experiments from the internal memory.   This allows you to view and analyze the results for much easier comparison.

To load results from the internal memory, select the load experiment button (three horizontal lines) from the main secondary screen.   You'll be presented with your previous experiments in order from most the most recent collection to the earliest collection.

After selecting the experiment you would like to examine, it will automatically recall from memory and load onto the on-screen graph.

Connecting Sensors

To connect a Ward's Single Probes sensor to the Ward's Single Probes Base Unit, simply plug the sensor into the top of the Base Unit – USB port side facing the display. The top edge of the sensor will form a flush edge with the base unit. You can connect and disconnect sensors at any time; however it is recommended that this not be done while data is being recorded.

Shut Down & Maintenance/Storage

- To shut down the unit, press and hold the button on the side. You will see a shutdown screen wishing you goodbye, your data will be saved before the unit turns off. After using Ward's Single Probes, be sure to wipe away any excess material from the Base Unit and sensors.
- Store in the box as close to room temperature as possible and out of direct sunlight.
- Charge the Base Unit by plugging the micro USB cable (included with Ward's Single Probes Base Unit) into the Base Unit and the USB end into a computer or USB port.

Screen Settings

- Note that this is a resistive, pressure-sensitive screen, not an optical or capacitive screen. The screen reacts to the pressure of your touch.
- Welcome screen appears two to three seconds after holding the **power** button.
- The sensor recognition screen appears two seconds after the welcome screen
- Power-saving dimming of the screen occurs after screen is idle for two minutes. To bring back, simply tap the unit. The unit continues to stream live data or record while dimmed.
- The unit will power off after four minutes of no activity where the unit is streaming data, but not recording.

Included in Package:

- Ward's Single Probes Base Unit with built-in ambient temperature sensor
- USB cable Base Unit for charging the Base Unit or operating with a computer
- Instruction manual

OPERATION WITH DIRECT USB CONNECTION TO PC

Ward's Single Probes can be run from a PC or Mac when not connected to Wi-Fi. To operate with direct USB connection, you will need to do the following:

1. Install the Ward's Single Probes client executable from: www.wardsci.com/singleprobes
2. Insert USB cable Base Unit into the Base Unit micro USB input and connect the opposite end to the USB port on your computer.
3. Turn the Base Unit on.
4. Open a browser window (we recommend you use Google Chrome as your default browser)

5. Double click the Ward's Single Probes icon that appears on your desktop.
6. You will now be able to control your Base Unit and sensor completely through the PC/Mac. Please note that when in this direct connection mode you cannot control the Base Unit on the Base Unit touch screen itself. You will see on the Base Unit a CPU icon appears which indicates you are in USB control mode.
7. Once you are in the USB control mode all of the icons and software have the same meaning and function as seen in the handheld control mode.

OPERATION WITH WI-FI CONNECTION TO ANY DEVICE

Ward's Single Probes can be run and viewed from any Wi-Fi enabled device such as an iPad, iPhone, laptop, Android, or other Wi-Fi enabled devices. Once plugged into the Base Unit, the Wi-Fi Module broadcasts a self-contained Wi-Fi network specific to that Wi-Fi Module. No Internet or external network needs to be present in order for this to function. If there is a network present you can choose to connect to that said network, or keep your own self-contained network.

1. Plug any Ward's Single Probes Sensor into your Base Unit
2. Plug the Ward's Single Probes Wi-Fi Module into the bottom of the Base Unit
3. Allow 2-3 minutes for the Wi-Fi Module to boot up
4. Once the network is established you will be able to view the network in the setting of any Wi-Fi enabled device
5. The network will appear as Ward's XXXX with the XXXX numbers corresponding to the specific Wi-Fi Module in use

6. Please note that the Wi-Fi Module does consume a great deal of power; You can run from the stand-alone battery in the Base Unit, but it is recommended for any long duration use that you plug the Base Unit into the wall or computer using the USB cable provided with the Base Unit
7. In your wireless device settings connect to the Ward's network specific to your Wi-Fi Module.
8. Give the connection 1-2 minutes to establish a connection.
9. Then open a browser on your device and go to the website: **www.wards1.com**.
10. Once on the website, select **Control Mode**. This allows the user to completely manage and run Ward's Single Probes from a wireless device.
11. Other users can log onto the website to view the experiment data controlled by the primary user; this is known as **View Mode.** The user in Control Mode can "release" Control Mode and another viewer can select it to take over control of the experiment.
12. **The software seen through the browser window uses the same graphic user interface as the display shown on the Base Unit handheld screen and direct USB connection on a computer**

WI-FI TROUBLESHOOTING
If you have an issue connecting to and using the Wi-Fi Mode we recommend the following:
- Use Google Chrome as you default browser
- Clear your browser cache
- If there has been significant use or attempts clear the cache of the browser, turn off the Base Unit while Wi-Fi Module is connected and then power back on.

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SCREEN RUNNING WARD'S SINGLE PROBES (SAME FOR DIRECT USB CONNECTION & WI-FI)

A – Touch/Click to change the sensor being viewed

B – Touch/Click to change the units of measure

C – Touch/Click to view all four graph types at once

D – Touch/Click to view only digital numeric data stream

E – Touch/Click to view line graph

F – Touch/Click to view bar graph

G – Touch/Click to view dial graph

H – Touch/Click to record

I – Touch/Click to view saved data on Wi-Fi device

J – Touch/Click to view saved data on PC/Mac via direct USB connection

K - Tools

SAMPLES LESSONS

Sample lesson plans can be found here, or by navigating the Wards website:

Technology>Wards Single Probes>Activity Guide

Voltage

Ward's Single Probes Voltage Sensor

Range	Resolution	Sample Rate
± 20 V	± 0.01 V	10,000

Introduce and explore electricity concepts and safely measure electrical voltage with the Ward's Single Probes Voltage Sensor. This sensor easily and accurately measures the voltage of electronic circuits using two banana plugs, included with the sensor. Requires Ward's Single Probes Base Unit, available separately.

Possible applications include: Testing batteries and electronic circuits, measuring the potential of chemical cells, studying electronic components, and more.

Current

Ward's Single Probes Current Sensor

Range	Resolution	Sample Rate
± 2.500 A	1 mA	10,000

Introduce and explore electricity concepts and safely measure electrical current with the Ward's Single Probes Voltage Sensor. This sensor easily and accurately measures the current of electronic circuits using two banana plugs, included with the sensor. Requires Ward's Single Probes Base Unit, available separately.

Possible applications include: Testing batteries and electronic circuits, measuring chemical cells, studying electronic components, and more.

Temperature

Ward's Single Probes Temperature Sensor

Range	Resolution	Sample Rate
-40 to 140°C	0.1°C	100
-40 to 284°F	0.2°F	

One of the most versatile sensors for a variety of grade levels and teaching topics, the Ward's Single Probes Temperature Sensor makes it easy for students to collect valuable thermal data to supplement a wide variety of experiments. Requires Ward's Single Probes Base Unit, available separately.

Some possible applications include: Building your own thermometer, earth and weather science studies, studying chemical reactions, and more.

Light

Ward's Single Probes Light Sensor

Range	Resolution	Sample Rate
0-1000 lx	1 lx	10,000
0-6000 lx	1 lx	
0-150,000 lx	22 lx	

Measure the intensity of light in the darkest of classrooms to brightest school yards with the Ward's Single Probes Light Sensor. It's easier than ever for students to collect and record light data for experimentation and analysis. Requires Ward's Single Probes Base Unit, available separately.

Possible applications include: Earth science and weather science studies, behavior of light and light filters, photosynthesis, and many more.

pH

Ward's Single Probes pH Sensor

Range	Resolution	Sample Rate
0 – 14 pH	0.01 pH	100

pH measurements are fast, reliable, and safe with the Ward's Single Probes pH Sensor. This flexible and durable sensor allows students to easily measure the pH of pure chemicals and dynamic chemical reactions alike. Range: 0 – 14 pH; Resolution 0.01 pH. Requires Ward's Single Probes Base Unit, available separately. Possible applications include: Analysis of chemical reactions in real time, Analysis of static chemicals, Environmental monitoring, and Water quality testing.

Pressure

Ward's Single Probes Pressure Sensor

Range	Resolution	Sample Rate
0 to 7 atm	0.01 atm	
0 to 100 psi	0.1 psi	100
0 to 700 kPa	0.1 kPa	
0 to 7 bar	0.01 bar	

Explore properties of gas and easily incorporate hands-on digital data collection with the Ward's Single Probes Pressure Sensor. This durable sensor connects easily to a variety of containers and apparatus, making it easy to use with any lesson. Requires Ward's Single Probes Base Unit, available separately.

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Possible applications include: Boyle's Law, Chemical reaction analysis, Ideal gas laws, Studying the periodic table, and more.

Force

Ward's Single Probes Force Sensor

Range	Resolution	Sample Rate
± 10 N	0.01 N	10,000
± 50 N		
± 1,000 g	1 gram	10,000
± 5,000 g		

Demonstrate force, gravity, and energy in a way that's safe, hands-on and fun with the Ward's Single Probes Force Sensor. The unique design of this sensor enables both pushing and pulling experiments so students can see, feel, and understand force concepts while measuring data digitally.   Requires Ward's Single Probes Base Unit, available separately. Possible applications include: Beginning force measurements, Spring forces, Friction analysis, Gravitational force analysis, and more.

Sound

Ward's Single Probes Sound Sensor

Range	Resolution	Sample Rate
40 – 110 dB	0.1 dB	10,000
0 – 4095 signal	1	

Explore the science of sound while measuring both intensity and waves with the Ward's Single Probes Sound Sensor. Two operational modes make it easy to measure both sound-pressure (decibels) and frequency. Requires Ward's Single Probes Base Unit, available separately.

Possible applications include: Measuring the noise level of a classroom, examining the frequency of a car horn, studying the nature of sound waves, and many more.

Motion

Ward's Single Probes Motion Sensor

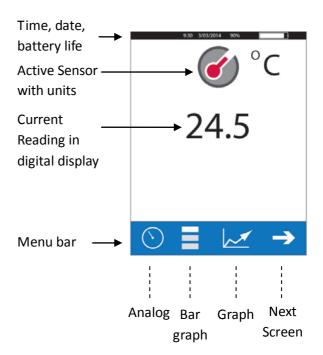| Range	Resolution	Sample Rate
0.25 – 6 m	1mm	100
± 10 m/s	0.21 m/s	
± 100m/s^2	0.46 m/s^2	

This versatile sensor allows students to measure the distance, velocity, and acceleration of moving objects, making it easy to connect hands-on motion experiments to digital data collection and analysis. Requires Ward's Single Probes Base Unit, available separately.

Possible applications include: Distance vs. time graphs, studying gravity, determining the velocity of moving objects, analysis of walking, and many more.
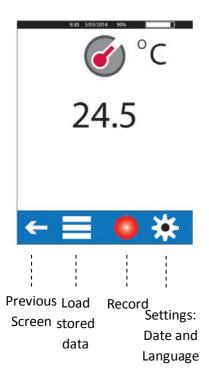
Quick Start Guide

Time, date, battery life

Active Sensor with units

Current Reading in digital display

Menu bar

Analog   Bar graph   Graph   Next Screen

9:30   3/03/2014   90%

°C

24.5

Previous Load   Record
Screen stored   Settings:
        data   Date and
                      Language

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CONTACT INFORMATION

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