RED

ReallyEasyData Collectors

RED User Manual

VWR EDUCATION

ReallyEasyData.com

RED
ReallyEasyData Collectors

Table of Contents

Note:

Pictures, images and descriptions in this manual may not exactly correspond with the actual items supplied.

It is also important to note that the experiments in this manual are only suggestions. They are not meant to indicate any limitation of the equipment, which can be used in wide range of experiments, depending on the educational requirement of the teacher.

RED
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1. Introduction

About the RED Collector

The RED Collectors system consists of a portable, icon-based, battery operated data acquisition system for education purposes, supporting a wide range of probes for different physical measurements. The system is based on a Data Acquisition Module (DAQ) that is connected to any of the probes without hardware or software modifications. The RED system supports USB memory sticks for storage of measurement data or direct connection to a PC. Bluetooth wireless interface is supported at the hardware level; specific Bluetooth software functions are not included in the first version of the software. The RED Collector is tethered to its probe. The RED Collector maintains a set of parameters for its probe. The touch-screen interface is intended to allow the user to handle probe functioning and setup quickly and easily. A plug-in temperature probe is supported as a second optional probe. When it is inserted, the tethered probe is disabled and a second set of working parameters are loaded into the interface. The main set of parameters is saved and will be restored as the temperature probe is disconnected. The DAQ and the RED Collectors system (except pluggable temperature, voltage-current and photogate hub can be used with a support rod or tripod stand.

Start Up

Remove the back cover by sliding down and insert the provided battery set

An installed button battery will keep your RED Collector's date and time settings when not in use.

Push the ON/OFF button

- Push button until beep sounds to turn on
- Keep button pushed at least two seconds for shutdown.

1. Introduction (continued)

Getting to Know Your RED Collector

1. Data Collector Unit
2. On/Off button/Toggle switch
3. Touchscreen
4. Tethered cord
5. Probe
6. USB port
7. Charging port
8. Plug-in temperature accessory port

1. Introduction (continued)

Welcome Screen

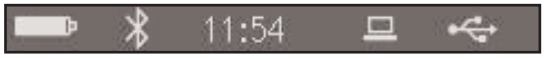
After 3 seconds or push sensor icon to get to main screen

1. Logo
2. Sensor icon
3. Unit item number
4. Date
5. Battery life indicator
6. Bluetooth
7. Time
8. USB icon

Main Screen—Probe Idle

When the unit is left unattended, it will beep and power down in order to save battery life. When the unit is active in free running mode, the screen will dim first and can be relit by simply touching the screen. If unit completely powers down, wait several seconds and then press the On/Off button to turn it back on. If the screen only flashes on, wait several seconds and try again, this time not pressing the button as long.

Status Bar



This bar is common to all screens. From left to right:

- Battery icon
- Bluetooth icon (not currently active)
- Time/Error code (if any)
- PC connection (not currently active)
- USB flash drive status

See pages 25–26 for detailed information on battery/power and error codes.

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1. Introduction (continued)

Main Screen

Main screen—probe idle

Help icon

Information icon

Settings icon

Activate icon (Play)

Record icon
(to collect/acquire data)

Progress bar

Help Icon

Without the RED USB inserted, this icon will bring the user to a list of error codes. Touch the bottom of screen to access second page of error codes. Press On/Off button to return to main screen.

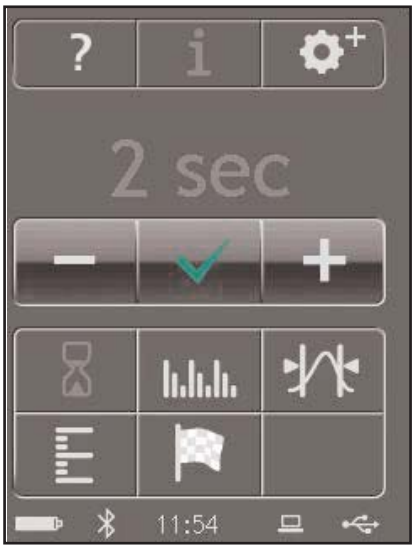
With the RED USB inserted, this icon will bring the user to operating instructions and list of error codes. Touch bottom of screen to access additional pages. Touch top of screen to go back to previous pages. Press On/Off button to return to main screen.

Information Icon

This icon gives the user information on serial number and software version. It also displays current settings for tethered probe (or plug-in temperature probe if applicable).

1. Introduction (continued)

Settings Screen




Back icon


Advanced Settings icon


Decrease icon


Enter icon


Increase icon


Experiment length/duration icon


Sampling rate icon


Range icon


Unit of measurement icon


Acquisition mode icon

Advanced Settings Screen


Time of day


Date


Regional settings


Brightness


Calibration

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2. Running an Experiment

Details of Operation

This details the process used to collect data.

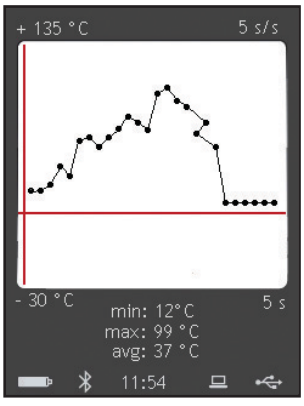
1. Press the green play icon to make the probe free running

2. Sample rate
3. Experiment length
4. Actual measured value
5. Unit of measure
6. Press the “Record” icon when you want to begin collecting data (make sure a USB drive is connected)

- Blue Progress bar denotes data recording in progress

- Once the acquisition is complete, progress bar becomes green and the blue USB icon will blink.

Push On button to toggle between screens



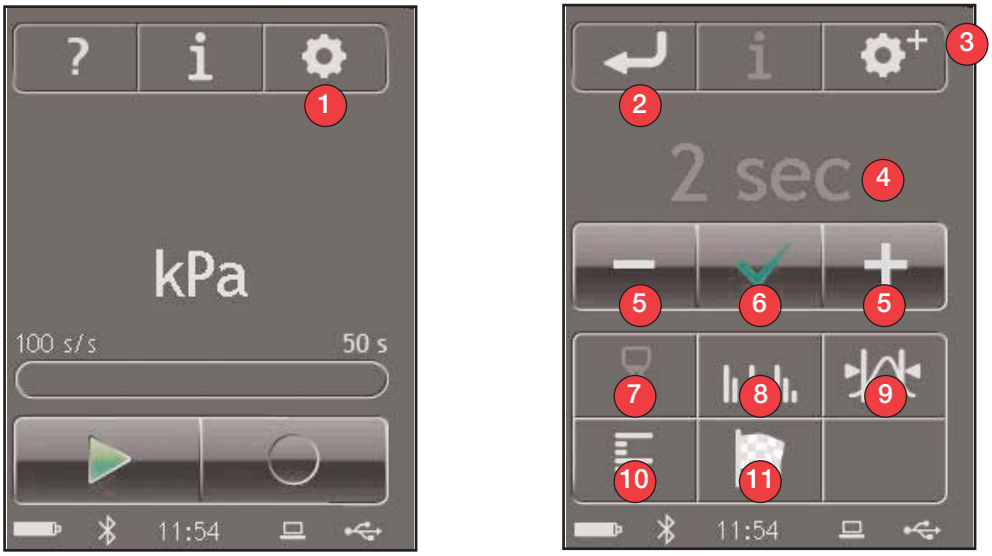
Trend Graph

The Min/Max and Average will be displayed under the trend graph

- Press Blue Stop/Save icon to end experiment
- Press trash icon to discard data

3. Setting Up an Experiment

Settings Screen in Detail



Upper Row:

1. "Settings" icon brings the user to the settings screen.
2. "Back" icon brings the user to the main screen.
3. The plus denotes user has entered the settings screen. Press to go to advanced settings.

Center:

4. Actual value settings for the specified icon (the gray one on the section below. In this case the experiment's length).
5. Use the "–" or "+" icon to scroll through the different choices (the choice will depend on the tethered probe and if the value to be changed is numeric or a fixed choice).
6. "Enter" icon. Press to confirm the actual value settings.

Bottom (clockwise):

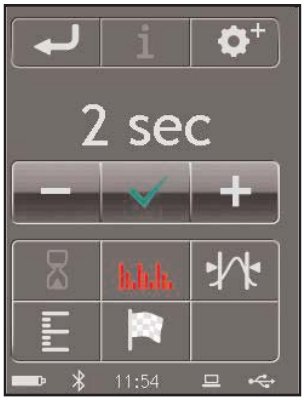
7. Experiment length (Interdependent on the sampling rate value and the available memory). If mode = event base, this option is not active.
8. Sampling rate (Interdependent on the experiment length value and the available memory). If mode = event base, this option is not active.
9. Range (if any). It allows the user choices depending on the tethered probe.
10. Unit of measure. Varies dependent on the tethered probe.
11. Mode (time based or event based). Time based will use experiment length and sampling rate settings. In event mode, the unit will record one data point when the user presses the record button.

3. Setting Up an Experiment (continued)

Acquisition Settings

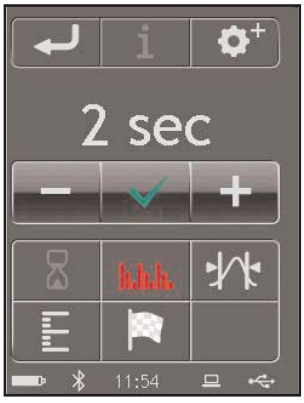
Press to modify the experiment length

Press “–” or “+” to adjust the time the until will record data.



When the experiment length and the sampling rate are not compatible the sampling rate icon becomes red.

There is an 8,000 data point maximum, so the user will need to adjust the experiment length and sampling rate until both icons are showing white.



Once the duration has been chosen, press the green enter icon to set the value.

3. Setting Up an Experiment (continued)

Modifying the Experiment Sample Rate

Press to modify the experiment sample rate

Press “–” or “+” to adjust how many points should be collected per second.

When the experiment length and the sample rate are not compatible the experiment length icon becomes red.

There is an 8,000 data point maximum, so the user will need to adjust the experiment length and sampling rate until both icons are white.

Once the sample rate has been chosen, press the green enter  icon to set the value.

3. Setting Up an Experiment (continued)

Various Probe Settings

Temperature Probe

Press to modify the experimental range


Press “–” or “+” to scroll through the available options.

You can choose between:

1. Temperature (only temperature data will be collected)

2. Temperature Raw (temperature and voltage data will be collected)

Light Probe

You can choose the range of light between:

1. 0–2,000 lux

2. 0–30,000 lux

Voltage/Current Probe

You can choose the between:

1. Voltage

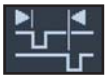
2. Current (Amps)

Photogate

You can choose between:

1. Period: Measures the time elapsed between the two “same slope” events on the same gate.

2. Shadow: Measures the amount of time the beam is obscured.



3. Gate to Gate: Measures the time elapsed between two events (light to dark) on two different gates. If more than two gates are connected to the hub (a single hub supports up to 4 gates) the unit will show the time elapsed between the last and previous one.

4. Pendulum: Measures the period of a pendulum passing through the gate.

3. Setting Up an Experiment (continued)

Modifying Unit of Measurement

Press to modify the unit of measurement.


Press “–” or “+” to scroll through the available options based on the tethered probe.

Once the unit of measure has been chosen, press the green enter icon to set the value.

3. Setting Up an Experiment (continued)

Modifying Acquisition/Recording Mode

Press to modify the acquisition/recording mode.

Press “–” or “+” to toggle between time-based and event-based recording.

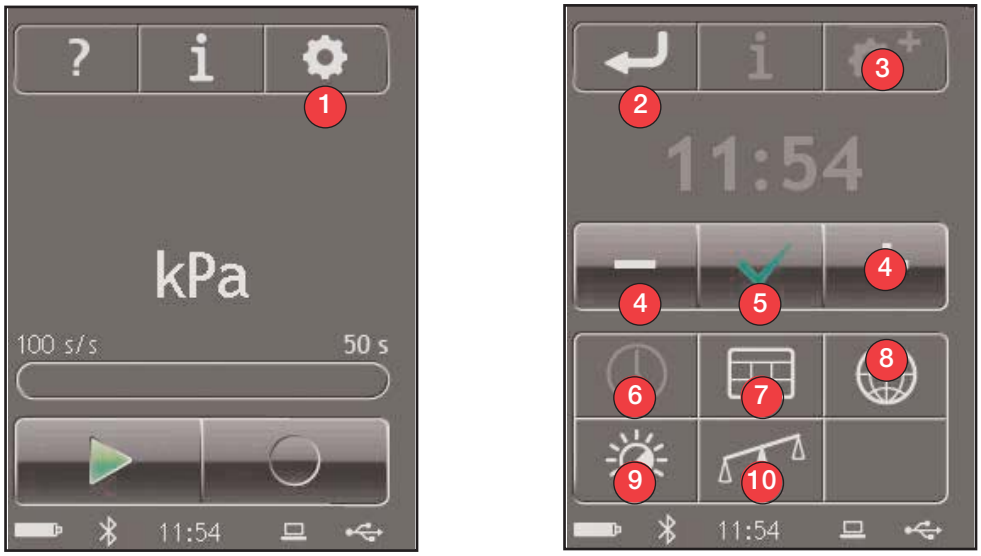
Time Based: Data is acquired using the current sampling rate and duration settings.

Even Based: A single data point is acquired when the user presses the red record icon.

Press the green enter icon to confirm the mode of acquisition.

3. Setting Up an Experiment (continued)

Advanced Settings Screen



1. Press the “Settings” icon twice to access the advanced settings screen.
2. “Back” icon brings the user to the experiment settings screen as well as back to the main screen.
3. A grayed out “+” denotes you are in the advanced settings screen.
4. Use the “–” or “+” icon to decrease/increase the actual value setting.
5. “Enter” icon. Press to confirm the actual value settings.
6. Time in hours and minutes.
7. Date (mm/dd/yyyy or the format chosen in the regional settings).
8. Regional settings (Choice of European or U.S. format for numbers and date.)
9. Brightness of screen.
10. Calibration of unit.

3. Setting Up an Experiment (continued)

Setting Time

Press to set the current time.

Press “–” or “+” to adjust the hour.

Press the green enter icon to set the value and move to the minutes.

Press “–” or “+” to adjust the minutes.

Press the green enter icon to set the value.

3. Setting Up an Experiment (continued)

Setting the Date

Press to set the current date.

Press “–” or “+” to adjust the month.

Press the green enter icon to set the value and move to the day.

Press “–” or “+” to adjust the day.

Press the green enter icon to set the value and move to the year.

Press “–” or “+” to adjust the year.

Press the green enter icon to confirm the date.

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3. Setting Up an Experiment (continued)

Setting Regional Parameters

Press to modify the regional parameters.

Press "–" or "+" to toggle between formats for numbers and date.

Press the green enter icon to set the value.

Setting Brightness

Press to modify the display screen's brightness

Press "–" or "+" to adjust the brightness

Once the brightness has been set, press the green enter icon to set the value.

3. Setting Up an Experiment (continued)

Calibration

The following RED probes have predefined calibration values. For most applications, these values will be sufficient. User may alter these values in advanced settings. To reset the probe to the factory default settings, press the reset button on the back of the data collector using a standard paper clip.

Factory Default Set of Calibration Values

Probe Type	1st Calibration Point	2nd Calibration Point
pH	4 pH	9.18 pH
Gas Pressure	1.1 KPa	101.3 KPa
Force	0 N	49 N
Current/Voltage	0 V–0 A	10 V–0.83 A
Light	0 (range 0–2,000 lux) 0 (range 0–30,000 lux)	850 (range 0–2,000 lux) 10,000 (range 0–30,000 lux)

Calibration Settings

Press to modify the calibration screen

Press "–" or "+" to adjust the first calibration point

Press "–" or "+" to adjust the second calibration point

Press the green enter icon to set the value.

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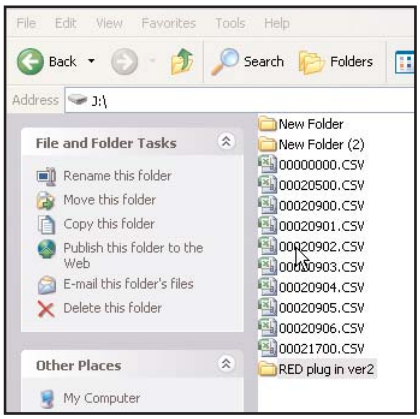
4. Using the USB Drive

Using the USB Drive

- Insert the USB drive in the provided USB slot on the top of the unit
- User will confirm the settings and press green play icon and then the red record icon. When the unit has completed collecting data, press the blue stop/save icon and wait for the USB symbol on screen to stop flashing before removing USB drive.
- Data will be saved as a .csv file
- Remove USB drive and connect the USB to your PC
- Install the Microsoft® Excel plug-in software found on the USB drive
- Begin analyzing the data collected

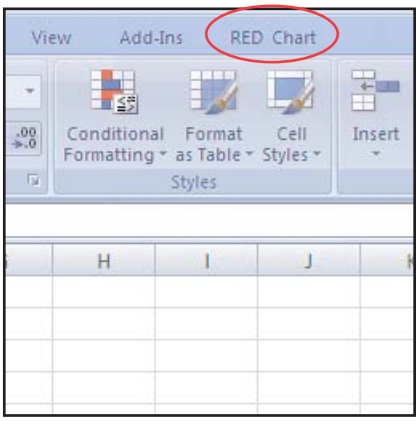
5. Data Analysis

Installing the Software Plug-in to Microsoft® Excel



- With the RED USB drive in your computer, locate the plug-in file.

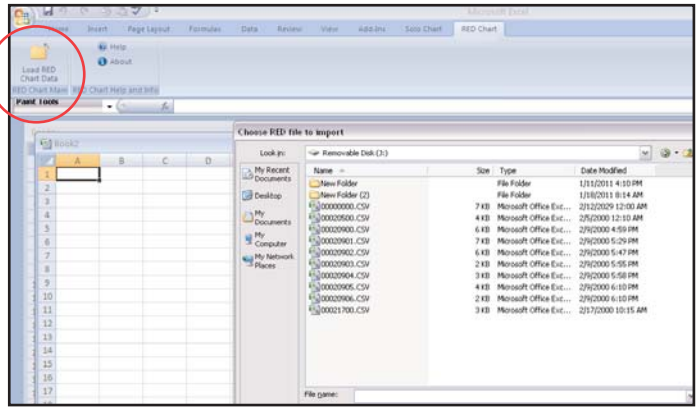
- Follow “Wizard” instructions



- After install is complete, there will be a new menu in Microsoft Excel named “RED Chart.”

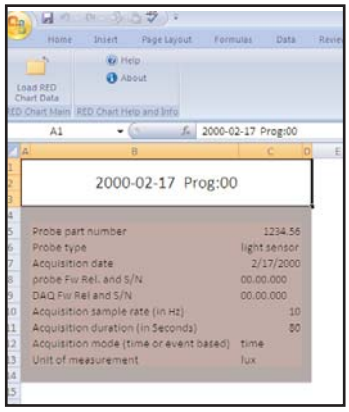
5. Data Display

Opening the .csv file for Viewing Using the Plug-in

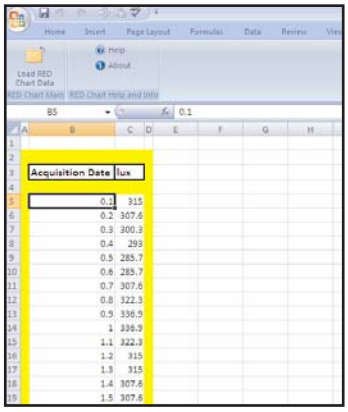


- Open .csv file by navigating to your USB drive from the “Load RED Chart Data”
- Select your .csv file

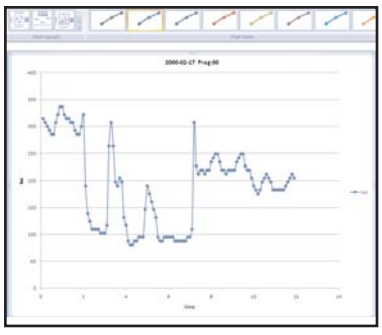
- .csv file will load as three worksheets:
  - RED Chart Main
  - RED Chart Data
  - RED Chart Graph



- RED Chart Main shows a summary of your probe and experiment



- RED Chart Data shows your recorded data



- RED Chart Graph shows a plot of the data vs. time

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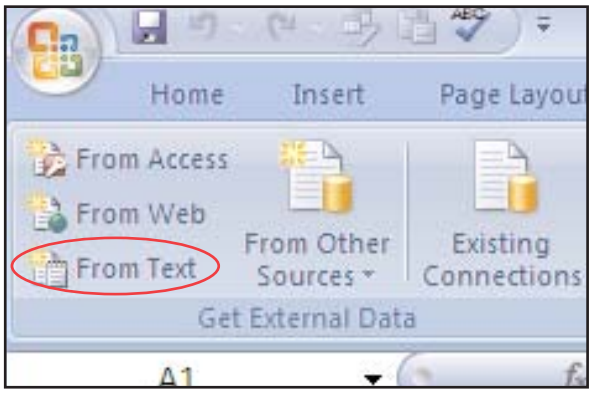
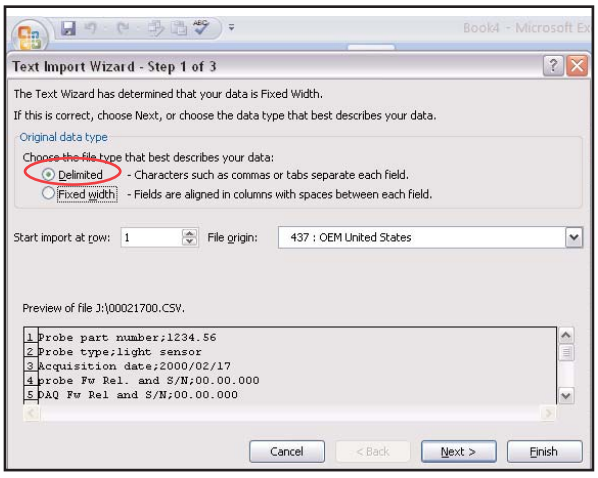
5. Data Display (continued)

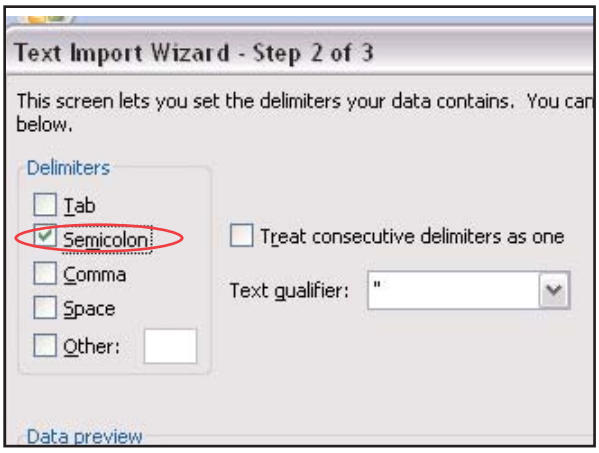
Viewing data on a computer *without* installing the RED plug-in



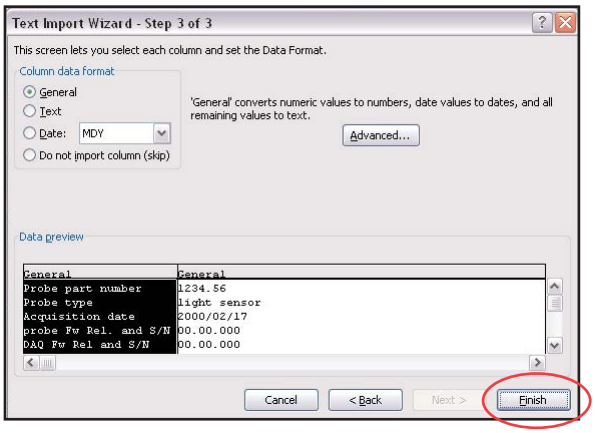
- Acquire data “From Text”
- Browse to file location and select file



- Follow Wizard steps:
  Select “Delimited Characters” and click Next



- Select “Semicolon” (Tab is default)
  and click Next



- Select any adjustments desired keeping
  “General” as your column format
  and click Finish

5. Data Display (continued)

Viewing data on a computer *without* installing the RED plug-in (continued)

	A	B	C
1	Probe part number	1234.56	
2	Probe type	light sensor	
3	Acquisition date	1/1/2000	
4	probe Fw Rel. and S/N	00.00.000	
5	DAQ Fw Rel and S/N	00.00.000	
6	Acquisition sample rate (in Hz)	10	
7	Acquisition duration (in Seconds)	80	
8	Acquisition mode (time or event based)	time	
9	First sample timestamp (full date and time)	2000/01/01 00/00/42	
10	Numeric offset to add to every sample value	0.1	
11	Scale factor that all sampled data must be multiplied for	1	
12	Number of data columns	2	
13	Presence of "raw data" column	n	
14	Unit of measurement	lux	
15	First data line index	17	
16	#		
17	0.1	329.6	
18	0.2	336.9	
19	0.3	344.3	
20	0.4	351.6	
21	0.5	351.6	
22	0.6	358.9	
23	0.7	351.6	
24	0.8	344.3	
25	0.9	336.9	
26	1	329.6	

- Your file will be reported in two columns
- Top part is probe data
- Bottom is collected data

- "First data line index" denotes beginning of collected data with time reported in the left hand column

- From this data you can graph, calculate, or manipulate as necessary

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6. Probe Specifications

Ranges, accuracy, and resolutions

Probe Specifications

Item Number	Probe Type	Range	Accuracy	Resolution
9200009	Temperature	-30 to 135°C	±0.5°C	0.1°C
9200002	Motion	0.15 to 6 m	N/A	1 mm
9200001	pH	0 to 14 pH	±0.2 pH	0.01 pH
9200004	Force	±50 N	±1%	0.02 N
9200005	Photogate	N/A	N/A	0.1 ms
9200006	Current/Voltage	±12V, ±1A	N/A	6 mV, 0.5 mA
9200007	Gas Pressure	0 to 200 kPa	N/A	50 Pa
9200003	Light	0 to 30,000 lx	N/A	0.5 lux
9200008	Microphone (normalized values)	0 to 100	N/A	N/A

Factory default settings

User can restore to factory default setup by pressing the reset button on the back of the RED Data Collector using a standard paper clip.

Temperature

Range	No raw data
Units	°C
Mode	Time
Sample Rate:	10 s/s
Duration	60 s

pH

Mode	Time
Sample Rate:	10 s/s
Duration	60 s

Microphone

Mode	Time
Sample Rate:	100 s/s
Duration	0.16 s

Current/Voltage

Range	Voltage
Mode	Time
Sample Rate:	100 s/s
Duration	0.16 s

Gas Pressure

Units	Bar
Mode	Time
Sample Rate:	1 s/s
Duration	80 s

Force

Units	N
Mode	Time
Sample Rate:	10 s/s
Duration	8 s

Light

Range	0.0–30,000.0
Mode	Time
Sample Rate:	10 s/s
Duration	8 s

Photogate

Range	Shadow

Motion

Units	m
Mode	Time
Sample Rate:	1 s/s
Duration	160 s

7. Managing the Device

Power Options

The RED Data Collectors now ship with an included brick battery. Unit can also operate using three AA batteries.

When the main batteries are discharged or removed, the internal clock and calendar are powered by a coin battery and the settings are stored in memory.

Single Unit Recharge Cord

Recharge your RED Data Collector with ease using this cord that conveniently plugs into a wall or floor socket. Included micro USB allows data collector to recharge while connected to a laptop. Power: 2.1 CA/100–240VAC, 47–63 Hz.

Battery/Power Status Icon

- When Green: Battery has full charge (or unit has access to power)
- When Yellow or White: Battery has half charge
- When Red: Battery is absent or damaged
- When Flashing Blue: Battery is charging

7. Managing the Device

Error codes

The time/error code is identified by a number indicating the error code.
The list of possible error codes is shown below:

Code	Error	Action
0001	The probe doesn't respond correctly	Turn unit off and on again. If the error continues, reset the unit by pushing the reset button on the back. **Warning! By pushing the reset button on the back of the unit, your calibration values and settings will be replaced with factory values.** If the error persists, please contact customer service.
0002	Power up of the probe failed	
0004	The probe generates wrong reply	
0005	Probe wrong type	
0007	The calibration values are wrong	The calibration settings are wrong and must be replaced by new manual calibration values or by reloading the factory calibration values. You can achieve this by resetting the probe by pushing the reset button on the back. **Warning! By pushing the reset button on the back of the unit, your calibration values and settings will be replaced with factory values.** If the error persists, please contact customer service.
0100	No USB device has been detected	Please check if the USB flash drive is securely plugged into the socket or try another kind of USB flash drive. If the error persists, please contact customer service.
0101	Initialization of the USB flash drive failed	Please try to format the USB flash drive (FAT16 or FAT32) or try another kind of USB flash drive. If the error persists, please contact customer service.
0102	Unsupported USB flash drive type	Please try another kind of USB flash drive. If the error persists, please contact customer service.
0103	USB flash drive absorbs too much current	
0104	No USB flash drive detected	Please check if the USB flash drive is securely plugged into the socket. Also, try to format the USB flash drive again, (FAT16 or FAT32) or try another kind of USB flash drive. If the error persists, please contact customer service.
0105	Insufficient space on USB drive to save .csv file	Delete files in order to use the current USB flash drive
0200	Maximum number of acquisitions was reached (100)	Delete files that have been acquired since turning on the unit, in order to use the current USB flash drive.
0201	Cannot write .csv file	If the USB flash drive was unplugged during the acquisition please plug it again. If the error continues, please try another kind of USB flash drive. If the error persists, please contact customer service.

7. Managing the Device

Error codes (continued)

The time/error code is identified by a number indicating the error code.
The list of possible error codes is shown below:

Code	Error	Action
0300	Settings saving: Flash erasure failed	Turn unit off and on again. If the error persists, reset the unit by pushing the reset button on the back. **Warning! By pushing the reset button on the back of the unit, your calibration values and settings will be replaced with factory values.** If the error persists, please contact customer service.
0500	The experiment length and the sampling rate are not compatible	To clear the red error icon, please adjust the experiment length, value, or sampling rate

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates, uses and can radiate radio interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by tuning the equipment off and on; the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the space between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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8. Additional Support

Customer Service

You can reach a customer service representative at any of our preferred distributors.

WARD'S Natural Science
800-962-2660

SK Science Kit & Boreal Laboratories
800-828-7777

Sargent-Welch
800-727-4368

Additional Resources

Training videos and tutorials are available online at reallyeasydata.com.

Professional Development

Need more help developing advanced experiments for the classroom? Learn how to make the most of your RED Data Collectors with hands-on training led by knowledgeable teachers and technicians. You'll gain an in-depth understanding of how the RED Data Collectors work, and discover the multiple applications for each probe. After completing, you'll be ready to confidently implement this technology into your classroom in hands-on, inquiry-based activities. Choose from a variety of professional development options in either live or interactive webinar-based workshops.

To learn more about our professional development options, please contact our Professional Development Coordinator at training@vwreducation.com

RED User Network

Hear from other teachers who use RED successfully in their classroom on facebook.com/reallyeasydata.

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