



Fourier Education 2012 Catalog

EXPERIENCE SCIENCE!
www.FourierEdu.com



NEW
FOR 2012

TERRA NOVA



page 86

Solar & Wind Renewable Energy Science Education Kit

Encouraging students to explore sustainable energy solutions and discover the benefits of solar and wind power can go a long way to improving the quality of life on Earth. Fourier is pleased to introduce, TERRA NOVA, renewable energy science education kits, which provide teachers and students the tools needed to effectively investigate this important subject.

Weather Station™



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A great tool for teaching earth science & monitoring local weather.

Content Viewer

A multimedia reference guide and curriculum to assist in using NOVA LINK and the MultiLab data analysis software.





Preparing a new generation of students to advance scientific discovery and technological innovation has become a major goal for ministries of education across the globe. Many countries have identified and adopted STEM (Science, Technology, Engineering and Mathematics) education as the answer to meet these challenges. STEM provides the basic building blocks for students to gain the knowledge and experience for future careers.

Current research, by EUN Schoolnet, shows that when STEM subjects are approached with technology-based learning tools, students have demonstrated: increased enthusiasm for science courses, they gather accurate data more quickly which saves time and they are better able to grasp abstract science concepts. Fourier is committed to providing teachers, and students of all age groups, with a comprehensive STEM-based solution.

Fourier strives to create learning environments that inspire and excite students. Technology is the means to generate and stimulate student creativity. It is, of course, up to teachers to harness ICT and utilize it in a way that best suits their classroom. Addressing new and upcoming subjects in science is just one example of how proper use of technology can have a massive impact on learning and the student's motivation.

We, at Fourier, have witnessed a sharp increase in demand among environmental science teachers for tangible solutions to teach renewable energy. This year, Fourier introduces renewable energy science education kits, TERRA NOVA™, which provide teachers and students with the tools needed to investigate renewable (solar & wind) energy. Students will be able to learn exactly how these technologies work and will be inspired to explore alternative energy technologies beyond the classroom and their impact on everyday life. These tools may well serve as the basis and inspiration for many students to seek out a career in a STEM related profession.

Fourier is always ready to address any questions you have about our products and would love to hear from you. Please feel free to share your experiences with us.

Sincerely,



Ken Zwiebel

CEO / Fourier Education

Fourier Education Worldwide



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Argentina
Belarus
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Brazil
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Chile
China
Colombia
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Cyprus

Denmark
Egypt
El Salvador
Finland
France
Georgia Republic
Germany
Ghana
Greece
Honduras
Hong Kong
Hungary
India
Indonesia

Ireland
Israel
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Ivory Coast
Japan
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Kazakhstan
Latvia
Lithuania
Macau
Macedonia
Malaysia
Malta
Mexico
Netherlands

New Zealand
Nigeria
Norway
Panama
Philippines
Poland
Portugal
Romania
Russia
Serbia
Singapore
Slovakia
South Africa
South Korea

Spain
Sri Lanka
Sweden
Switzerland
Taiwan
Thailand
Turkey
Ukraine
United Kingdom
United States
Uruguay
Venezuela
Vietnam

A Science Learning Solution for All



“Since the NOVA5000s were introduced in the Shining Star Project in the Greater Clark Schools, participating schools have all reported an increase in mathematics and science scores on the state’s standardized exams as well as greater participation and interest in science classes using the NOVA5000.

The successful integration and adaptation of NOVA5000 data loggers led the highly successful Floyd Central High School to also invest in Fourier’s data loggers and probeware. One teacher has reported to me that, The students just can’t use them enough.”

Dr. James E. Hollenbeck, Ph.D.

Associate Professor, Indiana University Southeast

Indiana , USA

Experience Science! with Fourier

Science learning through innovation is what Fourier is all about. Fourier’s range of data loggers and sensors, together with the MultiLab data analysis software and accompanying pedagogic content, enable students to learn about the world around them and to explore the why and how of everyday events. Fourier’s hands-on and easy-to-use solutions are suitable for students of all ages.



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Data Loggers

Fourier's standalone and computer-compatible data loggers are designed to engage and excite students of all ages to explore ideas and concepts relevant to their everyday life. Increased student enthusiasm for science courses, gathering accurate data quickly and helping

students to learn and grasp often-abstract science concepts are among the key benefits that students gain when working with computerized science labs.

The NOVA5000s have been a wonderful addition to my science classroom. The students love using them, as data collection with various probeware is easier and more reliable for the students. Students are able to take their data from table format and instantly display the data in several different ways, such as a line graph or pie chart and can then visualize and analyze their results. They can easily insert their data tables and graphs into a word document, or even a power point presentation, and all of this on one machine!

Students can send their data and documents to a wireless printer, use the internet to research topics and can even use the Nova as a presentation tool. The students find the NOVA5000s to be easy to learn and fun to use and always ask where they can get one."

Nancy Kawecki Nega

S.T.E.M. Consultant

Dupage County Regional Office of Education

Illinois, USA

If you are looking for a solution that is:

1. A robust **standalone** data logger for school science labs without computers
2. A compact and portable device, for use **in the classroom** or **in the field** with a battery life of up to eight hours
3. Able to connect up to eight sensors simultaneously for conducting comprehensive scientific experiments
4. **Loaded with** computer-like features such as: **Office compatible tools**, multimedia capabilities and **Wi-Fi connectivity**.

Then **NOVA5000** is the best solution for you!



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If you are looking for a solution that is:

1. An **affordable**, compact data logger for school **science labs with computers**
2. Able to connect up to eight sensors simultaneously for conducting comprehensive scientific experiments
3. Powered by a USB port, no batteries required
4. Capable of delivering a sampling rate of 10,000 samples per second

Then **NOVA LINK** is the best solution for you!

If you are looking for a solution that is:

1. A **Wireless** one-channel data logger
2. Working concurrently with Fourier's NOVA LINK data logger
3. Capable of delivering a sampling rate of 10,000 samples per second

Then **NOVA AIR** is the best solution for you!



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If you are looking for a solution that is:

1. An affordable, user-friendly, **standalone** data logger with a graphical LCD screen
2. Equipped with **USB connectivity** for advanced data analysis on a computer
3. Able to record data from up to 8 sensors simultaneously and collect up to 99 experiments in its internal memory
4. Equipped with a 7.2V NiCd rechargeable battery and an AC/DC Adaptor

Then **MultiLogPRO** is the best solution for you!

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If you are looking for a solution that is:

1. A standalone data logger designed for **primary and middle school students**
2. Equipped with **five built-in sensors**: temperature, pressure, sound, humidity & light; two external sensors can also be connected
3. Powered by the user-friendly EcoLab™ data analysis software, specifically designed for young students
4. Powered by two 1.5 V rechargeable batteries or AC/DC adaptor

Then **EcoLogXL** is the best solution for you!

If you are looking for a solution that is:

1. An affordable, compact data logger designed to work with HP graphing calculators (no computer required)
2. Real time experiments – on calculator and / or computer
3. Collect data simultaneously from up to 8 sensors
4. Bundled with the full version of MultiLab Software for advanced data analysis
5. Works with Fourier's over 65 sensors

Then **StreamSmart 410** is the best solution for you!

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Key Features:

- A portable computerized science lab for data collection with a 7" touch screen
- Collect data from up to 8 sensors simultaneously
- MultiLab™ 3.0 data analysis software (full version)
- Extensive library of science workbooks and curriculum support
- Over 65 sensors to perform hundreds of experiments
- Allows students to create sophisticated, MS Office-compatible lab reports
- Printer & projector connectivity
- Multimedia synchronized presentation of video and data from the sensors
- Interactive periodic table and simulation of scientific experiments
- Internet access for additional science resources

NOVA⁵⁰⁰⁰

The Ultimate Portable Computerized Science Lab

The award-winning NOVA5000™ is a portable, standalone data logger that runs on Windows CE and provides students with a wide range of PC-like functionality. The NOVA5000 comes bundled with the full version of the MultiLab data analysis software and is compatible with Fourier's over 65 sensors, enabling students to perform hundreds of scientific experiments in Biology, Chemistry, Physics and Environmental Science.

Among the features that set the NOVA5000 apart are its 7" touch screen, the ability to collect data from up to eight sensors simultaneously, connectivity with a projector and printer and more! In addition to MultiLab, the NOVA5000 comes bundled with an interactive periodic table, unit converter, interactive simulations and a suite of user-friendly MS Office compatible applications for creating lab reports.

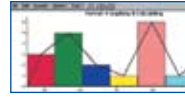
Whether in the lab or in the field, the NOVA5000 ensures that students enjoy and experience science.





The NOVA5000™ science solution supports a number of compatible software applications and tools, which may be purchased separately:

1. Portrait 4 Graphing & Calculating



Portrait 4 provides vivid color plots and a simple interface, making Portrait 4 accessible to a broader range of learning styles.

2. Inside Math: Vocabulary & Concepts



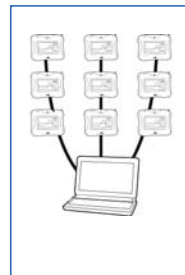
Inside Math brings a highly visual, hands-on context for connecting math vocabulary and essential concepts.

3. Inspiration Concept Mapping



Inspiration gives students and educators a familiar tool for gathering information and developing ideas, helping achieve clearer thinking, better writing, and improved performance across the curriculum.

4. LanSchool Class Management



LanSchool improves learning in a computer based classroom by returning control back to the teacher, removing distractions, demonstrating skills and monitoring student progress.

Software included with NOVA5000:

1. Virtual Labs



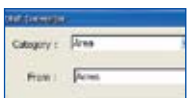
JustAsk provides interactive simulations of scientific concepts while manipulating variables and observing the respective changes.

2. Periodic Table



This interactive version of the Periodic Table displays the detailed properties of each element.

3. Unit Converter



Convert a broad range of units commonly used in science and math.

4. SoftMaker Office Tools



- TextMaker: comprehensive word processor



- PlanMaker: powerful spreadsheet program

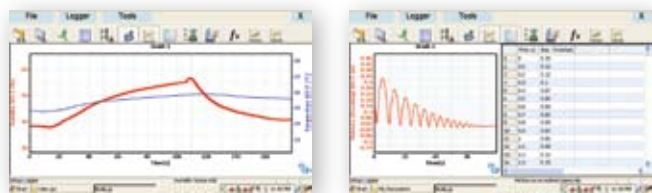


- SoftMaker Presentations: create multimedia presentations



Fourier introduces MultiLab™ 3.0 for NOVA5000™

MultiLab™ for NOVA5000 features a more user-friendly Graphical User Interface (GUI), improved functionality, additional new functions and new sensor parameters.



Among the GUI improvements to the MultiLab CE software are finger-touch navigation, eliminating the need for a stylus. In addition, users can now view two sets of data simultaneously, including graph, table and 4 meter views. In terms of functionality, MultiLab 3.0 also enables all sensors to be set up in one dialog box and the software features two Y axes. Thus, when data is collected from two sensors, the graph has two Y axes, with each sensor having its own Y axis along with its own scale.

New functions in this version of MultiLab include: a dynamic slope/tangent line, slope function and area function, all of which further enhance the experiment analysis and understanding process for the student. Improved sensor parameters have also been included in this release, including: Ohaus Balance, Distance and Rotary Motion sensors.

Technical Specification

- **Inputs**
 - Auto ID mode: Up to 4 simultaneous analog inputs or 4 digital inputs with automatic sensor identification
 - 8 Inputs mode: Up to 8 simultaneous analog inputs or 4 simultaneous digital inputs and 4 analog inputs
- **Outputs**
 - 4 digital control outputs
- **Sampling Resolution: 12-bit**
- **Sampling Rate A/D up to 10 ksps:**
 - 1 sensor = 20 Ksps
 - 2 sensors = 2 x 10 Ksps
 - 3 sensors = 3 x 6.6 Ksps
 - 4 sensors = 4 x 5 Ksps
 - * Sampling Rate calculation = $20K \div \text{number of sensors}$
- **Processor: Marvell PXA320, 624 MHz**
- **Operating System: CE.NET 5.0**
- **Screen Resolution:**
7" touchscreen - (800 x 480 pxl, 65,000 colors, 400 cd/m2)
- **RAM: 128 MB**
- **Flash memory: 1GB**
- **Graphic Accelerator: Built-in 2D**
- **Ethernet port: 10/100**
- **Integrated WiFi: 802.11 b/g**
- **USB ports: 3**
- **Power Supply:**
AC Adapter/Battery charger; Rechargeable battery pack (up to 8 hours)
- **USB Cable: 5 ft (1.5 m), included**
- **Dimensions: 9.33" x 7.32" x 1.7"**
- **Weight (including battery): 2.4 lbs (1,090 gr.)**
- **Standards Compliance: CE & FCC**

Bundled Software

Science Applications

- MultiLab™ data collection and analysis software
- Virtual Lab
- Interactive Periodic Table
- Unit Converter
- CalcCE scientific and statistical calculator

Productivity Tools

- SoftMaker Office Suite: TextMaker, PlanMaker & SoftMaker Presentation (Word, Excel & PowerPoint compatible)
- Internet Explorer 6.0
- Windows Media Player 9
- NOVANotes (for audio, sketch and note taking)
- WordPad
- Flash 7 plug-in
- Printer drivers (for printers with PCL support)
- PrintBoy printing application
- Microsoft Transcriber with character recognition
- Sound Recorder
- NOVAPaint

Optional Software Applications

- Inspiration concept mapping software
- Portrait-4 scientific graphic calculator
- Inside Math
- LanSchool
- Java plug-in

Optional Accessories

- Cable adapter for Vernier sensors
- Mini USB keyboard and/or Mini USB mouse
- NOVA WebCam
- NovaScope Digital Microscope
- NOVA5000 carrying case

Key Features:

- Plug-n-play data logging (auto sensor detection)
- High frequency online sampling rate up to 10,000 samples per second
- Simultaneous data collection from up to 8 sensors
- Works with Fourier's over 65 scientific sensors
- Powered by USB port
- Bundled with the FULL version of MultiLab Data analysis software



Now including:

Fourier's Content Viewer

A multimedia reference guide and curriculum to assist in using NOVA LINK and the MultiLab data analysis software.





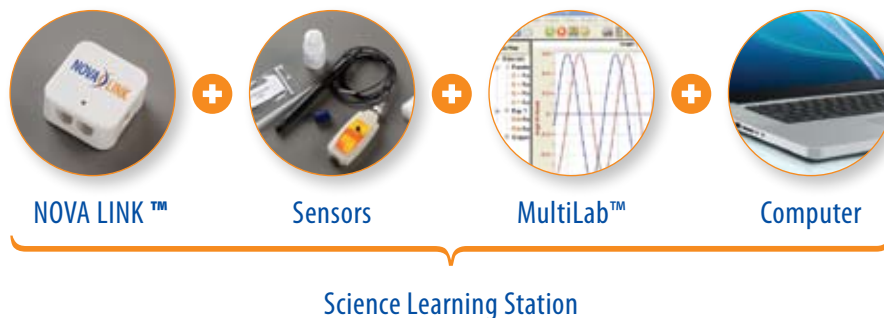
Turns any Computer Into a Science Lab



- 1 Four sensor ports
Allows connectivity of up to 8 sensors
- 2 One mini USB port
Tethers conveniently to any computer
- 3 LED light indicator
Indicates unit is connected and ready to log

Fourier's NOVA LINK data logger (formerly USBLink) is transforming science education across the globe. NOVA LINK is a budget-friendly sensor interface, converting any computer into a science learning station. NOVA LINK enables students to directly experience and understand otherwise intangible science principles and helps them present and relate scientific concepts to the real world. Included with NOVA LINK is the full version of Fourier's award winning MultiLab™ data analysis software.

Together, NOVA LINK and MultiLab unlock an advanced set of science discovery tools covering the full spectrum of the science project cycle in as little as one lesson.



MultiLab Software Features

(Full description on page 44):

- Graph, video, table and meter displays
- Multimedia reports of your experiment with data, video, audio and text files
- Online or recorded video stream of the actual experiment
- Recording audio comments
- Online data transfer and display of data in real-time
- Math analysis functions



Technical Specification

- **Inputs**
 - Auto ID mode:
Up to 4 simultaneous analog inputs or 4 digital inputs with automatic sensor identification
 - 8 Inputs mode:
Up to 8 simultaneous analog inputs or 4 simultaneous digital inputs and 4 analog inputs
- **Outputs**
 - USB 2.0 specification compliant
 - 4 Digital Control Outputs
- **Sampling Resolution:** 12-bit
- **Sampling Rate A/D up to 10 ksp/s:**
 - 1 sensor = 10 ksp/s
 - 2 sensors = 2 x 5 ksp/s
 - 3 sensors = 3 x 3.3 ksp/s
 - 4 sensors = 4 x 2.5 ksp/s
 - * Sampling rate calculation = $10K \div \text{number of sensors}$
- **Features**
 - Works with all Fourier analog and digital sensors
 - LED that will indicate device connection and will blink while sampling
 - Variety of mechanical interfaces for attaching to computer LCD or standard laboratory stand
- **Power Supply:** Powered by USB port
- **Dimensions:** 57 x 57 x 20 mm
- **Weight:** 73 gr
- **Standard Compliance:** FCC, CE
- **Accessories:**
 - Cable adapter for Vernier sensors
 - Com. Cable
 - Splitter Cable



Key Features:

- Plug n' Play
(sensor auto-detect function & simple pairing process)
 - Sampling rate of 10,000 samples / second
 - Range of up to 10 meters
 - Memory capacity of 100,000 samples
 - Supported platforms:
 - WIN-PC (XP/7)
 - iOS (planned for mid-2012)
 - Works concurrently with Fourier's NOVA LINK data logger
 - Tri-color LED indicating active device connection and sampling status
- (Some features will be supported during 2012)*



Wireless Science!



NOVA AIR™ is a compact wireless one-channel data logger designed to transmit data from Fourier's sensors to computers. With NOVA AIR, teachers and students have the ability to conduct a wider range of scientific experiments that were previously unapproachable due to the limitations of cables and cords. Utilizing Bluetooth® technology, NOVA AIR delivers real-time performance and increased reliability during experimentation, and its internal memory enables ultra-fast sampling rates which are highly beneficial when performing complex experiments.

NOVA AIR works seamlessly with the full range of over 65 Fourier sensors and provides the means to use them outdoors for a variety of activities. NOVA AIR also includes an internal rechargeable battery that lasts up to 4 working hours and can be charged via a standard mini-USB connector, which also serves as a backup communication interface when the battery is discharged.

Fourier plans to add iOS device compatibility (iPad / iPhone / iPod Touch) for NOVA AIR in mid-2012.

MultiLab Software Features (full description on page 44):

- Graph, video, table and meter displays
- True multimedia reports of your experiment with data, video, audio and text files
- Online or recorded video stream of the actual experiment
- Recording audio comments
- Online data transfer and display of data in real-time
- Automatic and manual data download
- Math analysis functions



Technical Specification

- Wireless (Bluetooth) data logger
- Mini USB (Type B) communication port
- 1 Mini DIN sensor port for 1 sensor (in Auto Detect mode or Manual Define mode)
- Sampling resolution: 12-bit
- Sampling rate: Up to 10,000 samples / second
- Memory capacity of 100K samples
- Auto ID for all Fourier analog and digital sensors
- Works with all Fourier sensors
- Tri-color LED indicating:
 - Device connection
 - Sampling
 - Battery status
- Powered by a rechargeable battery or by USB port
- Battery life: up to 4 hours
- Supported platforms:
 - Windows XP, 7
 - iOS (iPad/iPhone/iPod Touch) planned for mid-2012
- Weight: 56g

Typical Experiments

- Circular motion
- Relative motion of two carts
- Collisions
- Project-based inquiry for outdoor activities
- Water quality
- Measure noise level in schoolyard





Key Features:

- Graphic display
- Compatible with over 65 sensors
- Powerful data analysis software
- Multimedia reports of experiments with data, video and text files
- Experiment guides covering: Physics, Biology, Chemistry, and Environmental Science

MultiLogPRO™

An Affordable,
User-Friendly,
Standalone Data Logger



MultiLogPRO™ is an affordable, user-friendly, standalone data logger useful for teaching science from middle school through college. Among MultiLogPRO's features are: an LCD graphical screen with 12-bit resolution, 128K internal memory and a built-in timing module to measure time, speed and acceleration.

MultiLogPRO is so user-friendly, anyone can begin an experiment in seconds. This data logger can collect data simultaneously from up to 8 sensors and store up to 99 experiments in its internal memory. MultiLogPRO comes equipped with a rechargeable battery, an AC/DC Adaptor and also includes a backup memory battery allowing samples data to be saved for up to 10 years.

For more advanced data analysis, MultiLogPRO requires a computer.

MultiLab Software Features (Full description on page 44):

- Graph, video, table and meter displays
- True multimedia reports of your experiment with data, video, audio and text files
- Online or recorded video stream of the actual experiment
- Recording audio comments
- Online data transfer and display of data in real-time
- Automatic and manual data download
- Math analysis functions

Technical Specification

- **Inputs**
 - Auto ID mode:
 - Up to 4 simultaneous analog inputs
 - Up to 2 simultaneous digital inputs
 - 8 sensors mode:
 - Up to 8 simultaneous analog inputs
 - Up to 2 simultaneous digital inputs
 - Over 65 external sensors available
- **Outputs**
 - RS232 PC Host Interface at 19,200 bps
 - USB communication
- **Sampling:**
 - Capacity: 104,000 samples
 - Rate: Variable, from 1 Sample/Hour to 20,800 Sample/Sec
 - Resolution: 12-bit (1024 Levels)
- **Features**
 - Keypad: Enables manual programming
 - LCD Graphic display: 64 x 128 pixels, shows logger setup and measured data
 - Automatic sensor recognition (for 4 inputs)
 - Automatic self test: Reports system status
 - Trigger: Programmable or manual
 - Calibration: Auto calibration of sensors offsets
 - Built-in timer for delayed logging
 - Memory backup battery: Data saved up to 10 years
 - Built-in clock & calendar: Keeps track of time and date of all stored data
 - Built-in 7.2V rechargeable battery
 - Event recording
 - Timing module for measuring time, speed and acceleration with stopwatch feature
- **Power Supply:**
 - Voltage: Internal 7.2V NiCd battery or External 9V to 12V DC input
 - Battery life: 100 hours (no sensor connected)
- **Software:** MultiLab
- **Operating Temp. Range:** 0 to 50 °C
- **Dimensions:** 185 x 100 x 32 mm
- **Weight:** 450 gr
- **Standards Compliance:** FCC, CE
- **Optional Accessories:**
 - Com. Cable 1.5 m
 - Com. Cable 30 m
 - Female to female adaptor
 - Sensor Cable 1.5 m
 - Sensor Cable 10 m
 - Splitter Cable
 - MultiLogPRO carrying case



Key Features:

- LCD Display
- 5 built-in high quality sensors: Temperature, Light Intensity, Barometric Pressure, Humidity and Sound Level
- Sampling from up to 7 sensors simultaneously
- Auto-ID of two external sensors
- USB and Serial Ports
- Sampling rate from 2/hour to 50/second of sampling memory
- Up to 4 stored experiments
- Powered by 2 x 1.2 V AAA rechargeable battery or AC/DC power adapter

EcoLogXL™

A user-friendly Science Lab for Primary & Middle School Students



Fourier's EcoLogXL is a user-friendly, compact, pocket-sized data logger designed for primary and middle school science education. Featuring five built-in sensors and an LCD display window, EcoLogXL puts a miniature weather station in the palm of your hand. Additional features of EcoLogXL include USB ports, 10-bit sampling resolution and three intuitive buttons to monitor changes in temperature, light, sound, humidity and pressure. The simplicity of EcoLogXL is that it can function as a standalone data logger or be connected to a computer. Its portability makes it ideal for use in both the classroom and the field.

EcoLab Software Features (Full description on page 54):

- Graph, video, table and meter displays
- Enrich lab reports by adding audio, video and text
- Online or recorded video stream of actual experiments
- Record audio comments
- Online data transfer & display in real-time
- Automatic and manual data download
- Easily export data to Excel
- Data analysis tools: Integral, Slope, Smoothing (averaging), Statistics
- Measurement readings are facilitated by locating cursors on the graphic display
- Advanced zooming and panning tools
- Predict tool – enables you to graphically predict the results
- Workbooks – lab manuals with quick EcoLab setup programming
- Text annotation

Technical Specification

- **Inputs**
 - 5 built-in sensors:

Sensor	Range	Resolution
Temperature	-10 to 50 °C	0.1 °C
Sound	50 to 110 dB	1.0 dB
Light	0 to 5,000 Lux	5.0 Lux
	0 to 100 Klux	100 Lux
Humidity	0 to 100 %	0.5 %
Pressure	0 to 200 kPa	0.2 kPa
 - 2 x Auto-ID external plug-in sensors
 - Simultaneous sampling of up to 7 sensors
- **Outputs:** Serial & USB connection
- **Sampling:**
 - Resolution: 10-bit
 - Rate: 50 samples per second max logging speed
- **Memory Capacity:** 4 x 1,000 samples
- **Power Supply:** 2 x 1.2 V AAA rechargeable battery power (built-in charger) or AC/DC power adapter
- **Battery Life:** 1 month in standby mode
- **Features**
 - Display: 2 x 16 Character LCD Display
 - 3 button control panel: Stop, Run and Scroll samples
 - Digital timing: Accurate to 2 decimal places from A to B
- **Software:** EcoLab
- **Operating Temp. Range:** 0 to 50 °C
- **Dimensions:** 106 x 60 x 19 mm
- **Weight:** 80 gr
- **Standards Compliance:** FCC, CE
- **Optional Accessories:**
 - Com. Cable 1.5 m
 - Com. Cable 30 m
 - Mini USB Com. Cable
 - EcoLogXL carrying case



Key Features:

Perform real-time data streaming

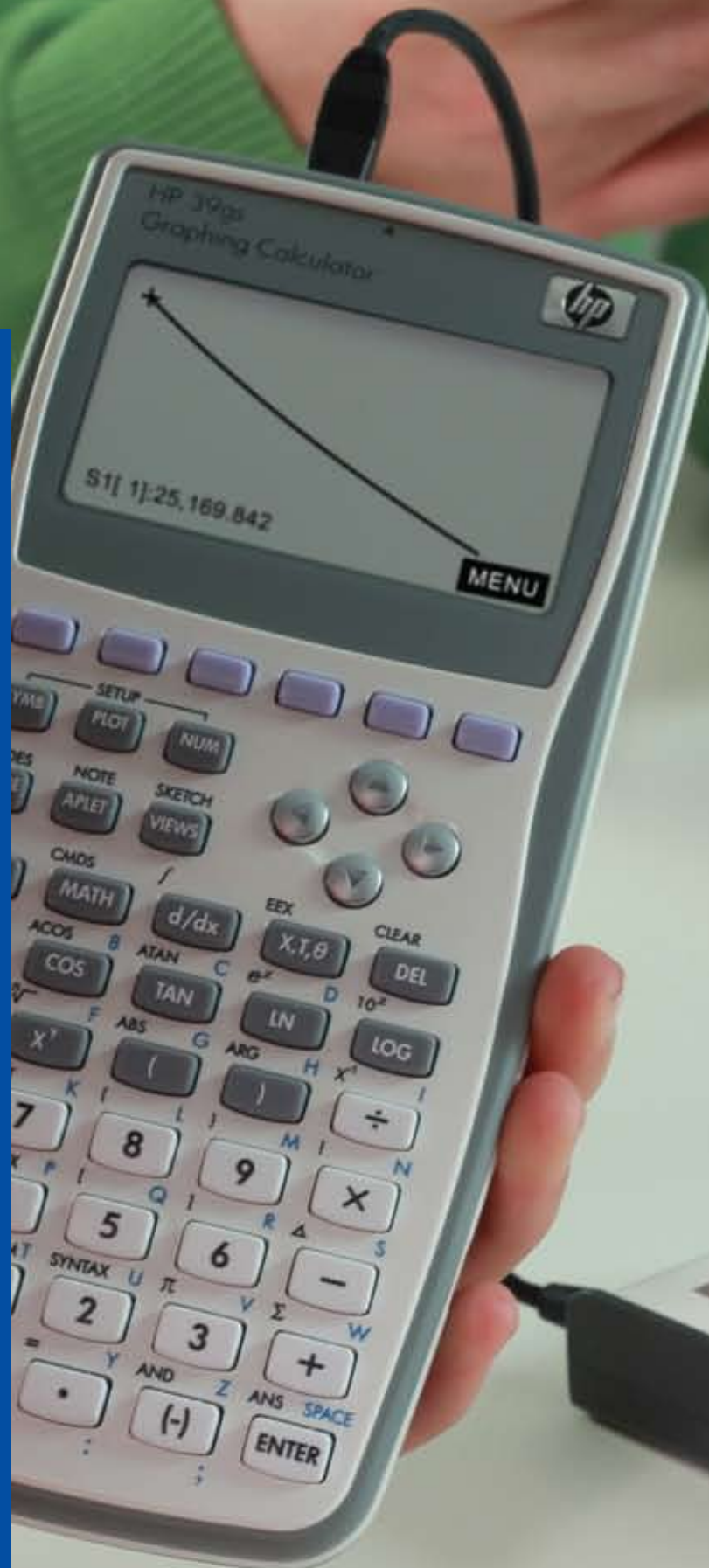
- Collect data from up to four sensors
- Easily collect data points at up to 5,700 samples/second
- Obtain the optimal view of the data stream in real-time

Set up quickly and easily

- Connect to the HP 39/40gs/50g Graphing Calculator and any of Fourier's 65 sensors
- Save class time with virtually no setup or experiment trial runs

Perform your experiments with ease and flexibility

- Lightweight and ultra-compact
- Easily choose among four different data capture modes
- Select just the data you want to export



HP Mobile Calculating Lab (MCL)

HP StreamSmart 410

Brings math and science to life with Mobile Calculating Lab solutions

The HP StreamSmart 410, a 4-channel data streamer, helps math and science students visualize experiment results by streaming data in real-time.

Just plug it into the HP 39gs, 40gs or 50g, Graphing Calculators with any of Fourier's 65 sensors and start streaming data.

Technical Specification

- **Mechanical:**
 - Channels: 4 x 8-pin mini-DIN ports
 - Supported Sensors: 65 Fourier sensors
 - Connectivity:
 - Mini-Serial cable (attached): connects to HP 39gs/40gs/50g graphing calculator
 - Mini-USB port: connects to Windows-based PC (XP, Vista, Windows 2007)
 - Stream rate 5,000 and more samples/sec maximum real-time rate
- **Features:**
 - Device:
 - LCD activity indicator light
 - All ports accept either digital or analog sensors
 - Plug-and-play operation on compatible Fourier sensors
 - Software:
 - HP Aplet software: Captures 1-4 data streams simultaneously and exports data for analysis in the calculator statistics Aplet, with 9 fit models and summary statistics
 - HP Calculator software: Virtual HP 39gs/40g/50gs calculator on your PC (Windows XP, Vista)
- **Power:**
 - Battery: Rechargeable
- **Dimensions & weight:**
 - Weight: 150 g, 5.3 oz
 - Dimensions (L x W x D)
10 x 8.7 x 2.4 cm
3.94 x 3.43 x 0.94 in
 - Material: Plastic
- **Supported HP Calculators:**
 - HP 39gs Graphing Calculator
 - HP 40gs Graphing Calculator
 - HP 50g Graphing Calculator

“The portable NOVA5000 laboratory is a wonderful tool for creative work the students perform. It gives the students opportunity to implement their research work, demanding laboratory experiments far beyond the scope of school program. Implementation of the portable NOVA5000 laboratory in schools for the youths of Ukraine, will improve the quality of students' knowledge, especially in the field of natural sciences and ecology.”

Professor Verbitsky,
Dr. of Pedagogical Sciences
Principle of the National Center
of Nature and Ecology
Ukraine





Bundles

Fourier is committed to providing teachers with an all-encompassing science education solution. Our sensor bundles are designed to address a variety of scientific topics within the subjects of Biology, Chemistry, Physics and Environmental Science. All of Fourier's sensor bundles include an experiment book that features a number of commonly used experiments which are designed for use with the bundled sensors. Additional experiments can be found in other experiment books in the Fourier curriculum library. The bundles are designed for maximal performance with all of Fourier's data logging devices*.

* Excluding EcoLogXL™



Biology



Biology Starter Bundle

NBS001

Covers 20 Experiments

in Fourier's Biology book

Typical Experiments:

1. Plant physiology
2. Cell process
3. Environment

Bundles include:

		Quantity	Part Number	Details on Page
	Biology * Experiment Book	1	BK102/ BK029	100/ 102
	Sensor Cables Pack of 4	1	13706	90
	Humidity 5% Accuracy	1	DT014	66
	Light Multi Range	1	DT009-4	69
	pH Adapter & Electrode	1	DT016A	70
	Pressure 150 to 1,150 mB	2	DT015	72
	Temperature -25 to 110 °C	2	DT029	75
	CO₂	1	DT040A	59
	Colorimeter	1	DT185A	60
	Heart Rate Pulse	1	DT155A	65
	Humidity 5% Accuracy	1	DT014	66
	Oxygen Adapter & Electrode	1	DT222A	69
	Spirometer	1	DT037A	74

* Available for NOVA5000 / NOVA LINK & MultiLogPRO.

Biology Comprehensive Bundle

NBC001

Covers 35 Experiments

in Fourier's Biology book

Typical Experiments:

1. Plant physiology
2. Cell process
3. Human physiology
4. Environment



Chemistry



Chemistry Starter Bundle

NCS001










Covers 15 Experiments

in Fourier's Chemistry book

Typical Experiments:

1. Boyle's Law
2. Acid rain
3. Acid-base titration
4. Exothermic reaction
5. Endothermic reaction
6. Freezing and melting water
7. Saltwater conductivity

Bundles include:

		Quantity	Part Number	Details on Page
	Chemistry* Experiment Book	1	BK103/ BK030	100/ 103
	Sensor Cables Pack of 4	1	13706	90
	Conductivity	1	DT035A	103
	pH Adapter & Electrode	1	DT016A	70
	Temperature -25 to 110 °C	2	DT029	75
	Colorimeter	1	DT185A	60
	Oxygen Adapter & Electrode	1	DT222A	69
	Pressure 150 to 1,150 mbar	1	DT015	72
	Pressure 0 to 700 kPa	1	DT015-1	72
	Temperature TC-K 0 to 1,200°C	1	DT025	75
	Voltage Triple-Range	1	DT019	77

* Available for NOVA5000 / NOVA LINK & MultiLogPRO.

Chemistry Comprehensive Bundle

NCC001

Covers 25 Experiments

in Fourier's Chemistry book

Typical Experiments:

1. Acid-base titration
2. Endothermic reactions
3. The Lambert-Beer Law
4. Chemical equilibrium
5. Saltwater conductivity
6. The Ideal Gas Law
7. Boyle's Law
8. Energy content of fuels
9. Endothermic reactions
10. Exothermic reactions
11. Exploring a candle flame
12. Electrochemical cell



Environmental Science

Environmental Science Starter Bundle

NSS001











Covers 15 Experiments

in Fourier's Environment book

Typical Experiments:

1. Greenhouse effect
2. Measuring noise
3. Ventilation influence
4. Sunlight & temperature
5. Radiation
6. Tilt & temperature

Bundles include:

		Quantity	Part Number	Details on Page
	Climate and Noise in Urban Areas *	1	BK209	101
	Environmental Science & Water Quality **	1	BK039	103
	Sensor Cables Pack of 4	1	13706	90
	Humidity	1	DT014	66
	Light Multi Range	1	DT009-4	67
	Sound Level	1	DT320	74
	Temperature -25 to 110 °C	2	DT029	75
	CO ₂	1	DT040A	59
	Oxygen Adapter & Electrode	1	DT222A	69
	pH Adapter & Electrode	1	DT016A	70
	Temperature TC-K 0 to 1,200 °C	1	DT025	75

* For NOVA5000

** For NOVA LINK & MultiLogPRO

One book per bundle

Environmental Science Comprehensive Bundle

NES001

Covers 20 Experiments

in Fourier's Environment book

Typical Experiments:

1. Greenhouse effect
2. Acid rain
3. Measuring noise
4. Ventilation influence
5. Vegetation shading & wall temperatures
6. Sunlight & temperature



Physics



Physics Starter Bundle

NPS001

Covers 35 Experiments

in Fourier's Physics book

Typical Experiments:

1. Mechanics
2. Electricity & magnetism
3. Sound and waves

Bundles include:		Quantity	Part Number	Details on Page
	Physics * Experiment Book	1	BK101/ BK031	102/ 104
	Sensor Cables Pack of 4	1	13706	90
	Current ± 2.5 A	1	DT005	61
	Distance	1	DT020-1	62
	Force	1	DT272	63
	Magnetic Field	1	DT156	70
	Microphone	1	DT008	69
	Voltage ± 25 V	1	DT001	76
	Current ± 250 mA	1	DT006	61
	Force	1	DT272	63
	Light Multi Range	1	DT009-4	67
	Photogate	2	DT137A	71
	Microphone	1	DT008	69
	Pressure 0 to 700 kPa	1	DT015-1	72
	Rotary Motion	1	DT148A	73
	Temperature -25 to 110 °C	1	DT029	75
	Voltage ** Triple-Range	1	DT019	77

* Available for NOVA5000 / NOVA LINK & MultiLogPRO.

** DT019 in place of DT001 in the Comprehensive Bundle

Physics Comprehensive Bundle


NPC001

Covers 55 Experiments

in Fourier's Physics book

Typical Experiments:

1. Mechanics
2. Electricity & magnetism
3. Sound and waves


Middle School Science		Quantity	Part Number	Details on Page
	Middle School Experiment Book	1	BK061	104
	Sensor Cables Pack of 4	1	13706	90
	Distance	1	DT020-1	62
	Force	1	DT272	63
	Heart Rate Pulse	1	DT155A	65
	Humidity	1	DT014	66
	Magnetic Field	1	DT156	70
	pH Adapter & Electrode	1	DT016A	70
	Photogate	2	DT137A	71
	Pressure 0 to 700 Kpa	1	DT015-1	72
	Sound Level	1	DT320	74
	Spirometer	1	DT037A	74
	Temperature -25 to 110 °C	1	DT029	75

Bundle MS001N

Covers 22 Experiments in Fourier's Middle School Experiment Book

Typical Experiments:

1. Acid rain
2. Exothermic & endothermic actions
3. Force, mass & acceleration
4. Motion
5. Boyle's law

Basic Science		Quantity	Part Number	Details on Page
	Sensor Cables Pack of 4	1	13706	90
	Current ±2.5A	1	DT005	61
	Distance	1	DT020-1	62
	Heart Rate Pulse	1	DT155A	65
	Humidity	1	DT014	66
	pH Adapter & Electrode	1	DT016A	70
	Temperature -25 to 110 °C	1	DT029	75
	Voltage ±25V	1	DT001	76

Bundle BSS001

Covers 40 Experiments

Typical Experiments:

1. Motion
2. Velocity
3. Measuring the free fall acceleration
4. Resistors in series and in parallel
5. Endothermic and exothermic reactions
6. Acid-base titration
7. Regulation of human body: loss of heat through sweat
8. Production: heat loss measured at fingertips
9. Effect of exercise: temperature and heart rate
10. Greenhouse effect
11. Effect of sunlight on temperature of pavements

Math in Science

		Quantity	Part Number	Details on Page
	Math in Science* Student Guide	1	BK145/ BK083	101/ 103
	Math in Science* Teacher Guide	1	BK146/ BK082	101/ 103
	Sensor Cables Pack of 4	1	13706	90
	Distance	1	DT020-1	62
	Force	1	DT272	63
	Microphone	1	DT008	69
	Pressure 0 to 700 Kpa	1	DT015-1	72
	Temperature -25 to 110 °C	1	DT029	75

* Available for NOVA5000 / NOVA LINK & MultiLogPRO.

Bundle MSM001N

Covers 17 Experiments in Fourier's Math in Science Book

Typical Experiments:

1. Keep the Pace: linear function
2. Taking the Plunge:
function of two proportional parameters
3. Standing Tall: statistical parameters
4. From Weight to Wealth: linear function - positive slope
5. Down the Drain: linear function – negative slope
6. Bouncing Ball: different forms of quadratic equation

"The NOVA5000 makes teaching effective, helps the teacher to provide concrete evidences for concepts, makes (science) classes interesting and increases students' participation."

Dr. Nithila, Assistant Professor in Physical
Science, St. Christopher's College of Education
India



MultiLogPRO™ Bundle

Bundles include:

MultiLogPRO Starter Bundle

USA: DB529-USA

UK: DB529-UK

EU: DB529-EU

AU: DB529-AU

		Quantity	Part Number	Details on Page
	MultiLogPRO	1	529-USB(TI)	22
	MultiLab Data Analysis Software	1		44
	MultiLab Guide for NOVA LINK & MultiLogPRO	1	BK023	
	USB Cable	1	DT180	90
	Serial Com Cable	1	DT135	90
	AC/DC Adaptor	1	Based on Location	90
	Sensor Cables Pack of 4	1	13706	90
	Biology Experiment Book	1	BK029	93
	Chemistry Experiment Book	1	BK030	93
	Physics Experiment Book	1	BK031	93
	Carrying Case	1	DT061	91

MultiLogPRO Comprehensive Bundle

USA: DB5290-USA

UK: DB5290-UK

EU: DB5290-EU

AU: DB5290-AU

Bundle configurations are subject to change without notice



EcoLogXL™ Bundle

Bundles include:

EcoLogXL Starter Bundle

USA: ECL2S-USA

UK: ECL2S-UK

EU: ECL2S-EU

		Quantity	Part Number	Details on Page
	EcoLogXL Logger, Sensors & Accesories	1	ECL25	24
Includes EcoLogXL Data Logger, 5 Internal Sensors: Temperature, Pressure, Light, Sound and Humidity.				
	EcoLab Software (PC)	1		50
	EcoLab User Guide	1	BK045	
	USB communication cable	1	DT239	90
	AC/DC adapter.	1	DT267	90
	EcoLogXL Experiment Book	1	BK046	
	Carrying Case	1	DT240	91
	Temperature External, -10 to 110 °C	2	DT241	83

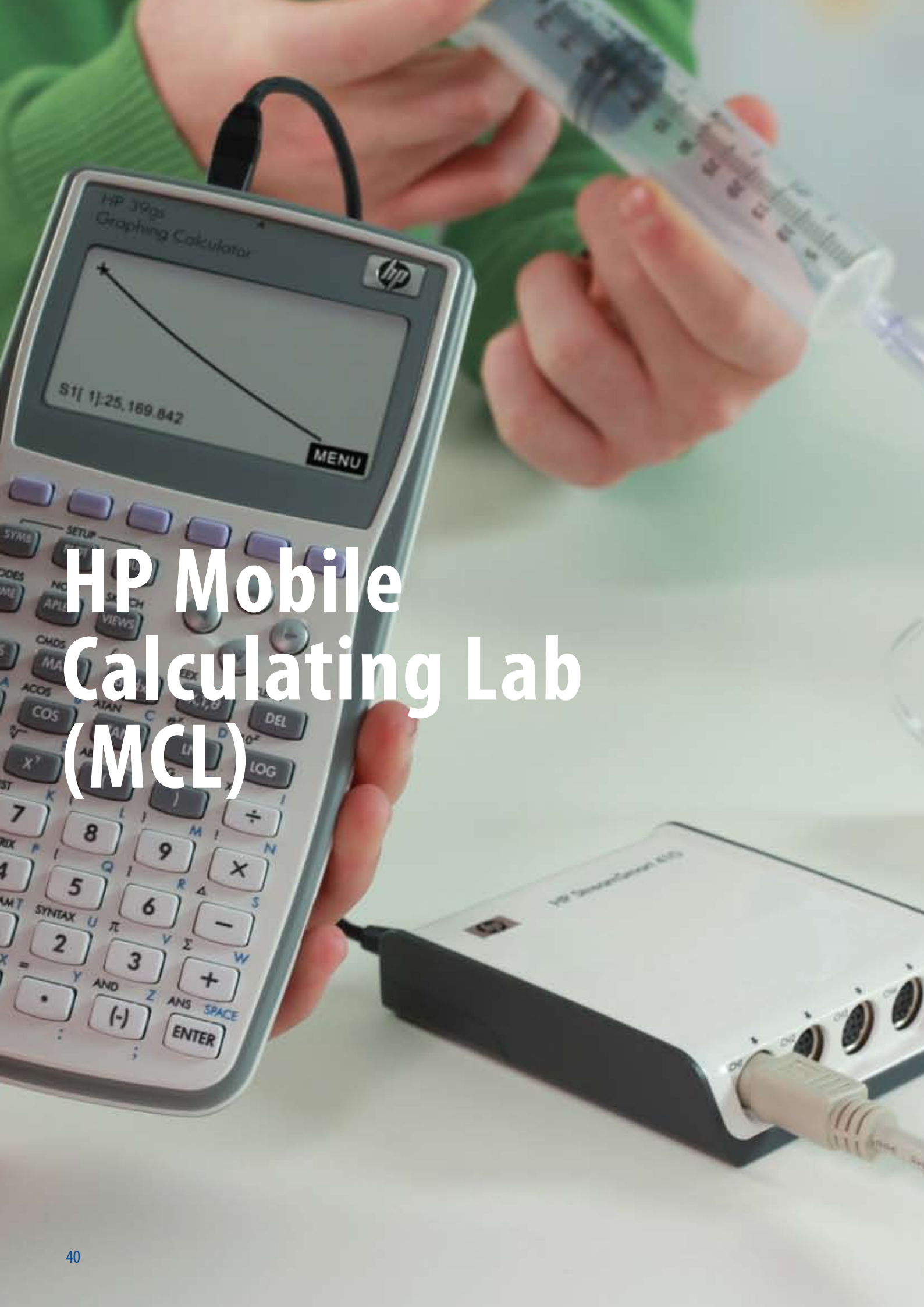
EcoLogXL Comprehensive Bundle

USA: ECL2T-USA

UK: ECL2T-UK

EU: ECL2T-EU

Bundle configurations are subject to change without notice



HP Mobile Calculating Lab (MCL)

Bundles include:

HP-MCL
Starter Bundle
P/N: HP-MCL-Starter

		Quantity	Part Number	Details on Page
	HP 39gs/40gs/50g Graphic Calculator	1		24
	Stream Smart 410	1	SS410	24
	Math Activity Book*	1	BK134	
	Sensor Cable 1.5m	2	DT022	
	Distance	1	DT020-1	62
	Pressure 0 to 700 Kpa	1	DT015-1	72
	Light Multi Range	1	DT009-4	67
	Microphone	1	DT008	69
	Temperature -25 to 110 °C	1	DT029	75
	Activities for Science Book*	1	BK131	
	Sensor Cable 1.5m	2	13706	
	Force	1	DT272	63
	Humidity	1	DT014	66
	pH Adapter & Electrode	1	DT016A	70
	Photogate	2	DT137A	71

HP-MCL
Advanced Bundle
P/N: HP-MCL-Advanced

* One book per bundle

Bundle configurations are subject to change without notice
Please contact a Fourier Salesperson for ordering information



“The NOVA5000 keeps the children engaged in class, creates a passion for the subject, makes the class interesting and satisfactory. Improves logical thinking and enables children to apply scientific skills to real-time situations and natural phenomenon.”

Manju. S, Science Teacher,
Boaz Public School
India

Software

All of Fourier's data loggers come with the full version of our award-winning MultiLab™ data analysis software. MultiLab enables teachers and students to quickly and easily analyze collected data and create a variety of lab reports to summarize the experiment.

The data analysis and evaluation process is enhanced by MultiLab's diverse formats including meters, tables and graphs. Younger students can create fun, brightly colored reports; while more advanced students can take advantage of the built-in templates for more complex experiments.

MultiLab also enables students to analyze their data with sophisticated analysis tools including curve fitting, statistics and both integral and derivative analysis wizards.

The built-in Video Motion Analyzer converts any motion movie into position data for further analysis and the unique video and audio features allow students to view online or recorded movies of the experiment processes.

Linux
New for 2012

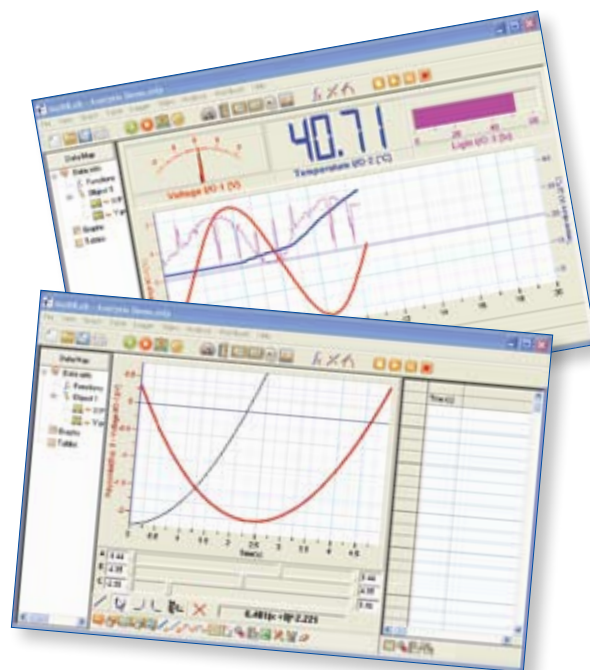
MultiLab™

(PC / Mac / Linux)

Powerful and user-friendly
data analysis software with
audio and video capabilities

MultiLab™ is a comprehensive data analysis program that provides everything students need in order to collect, present (in graphs, meters and tables) and investigate data with sophisticated analysis tools and view online or recorded video movies of the actual experiment.

The software windows can display a graph, table, video and a navigation pane, called the Data Map. All four windows can be displayed simultaneously or any combination of the four, as needed.



MultiLab™ Key Benefits:

- **Defining Sensor Properties** for sensors that produce more than one measurement or where data is displayed in different units; for example velocity and acceleration with a Distance Sensor.
- **The Timing Wizard** is used to take direct measurements of time, velocity or acceleration with one or two Photogate Sensors and is essential for conducting collision experiments.
- **Predicting Tool** allows students to plot predictions of experiment results and compare this to the actual data as it is plotted in real-time.
- **Excel Export/Import Feature** is MultiLab's sophisticated lab reporting tool for displaying recorded data in Excel.
- **Record Your Own Experiment** (data & video) with a standard webcam to document your experiment and create video lab reports.
- **Multimedia Lab Reports** can be easily created by importing graphs and tables from MultiLab into Office applications like Word and PowerPoint.
- **Video Motion Analyzer** converts any motion movie into position data and applies MultiLab's advanced math functions to analyze the motion.

MultiLab™ Key Features:

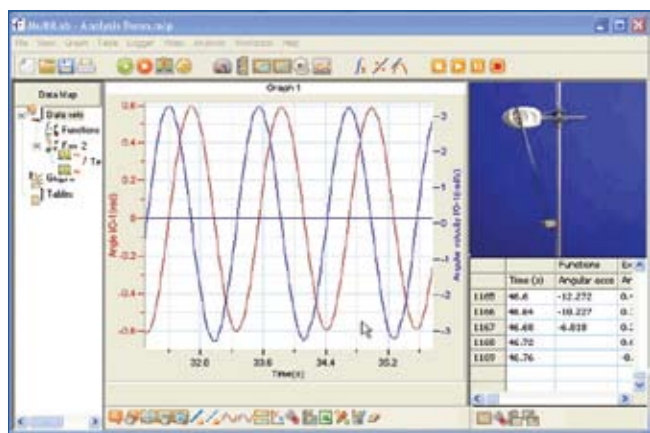
- Intuitive and easy-to-use
- Online streaming of sensor data display
- Collect data from multiple sensors simultaneously
- Multiple sensor displays: graphs, tables and meters
- A large suite of math functions for analyzing the data
- Excel compatible (import / export data)
- Online display of streaming sensor data from NOVA AIR
- A rich pedagogic library of experiments developed by science education experts
- Educational Workbooks featuring multiple experiments and guide manuals
- Multimedia-synchronized recording of video and data from the sensors
- Video Motion Analyzer that converts any motion movie into position data
- Works seamlessly with Office applications
- Localized interface solution for over 15 languages
- Operating Systems:
Windows XP / Windows 7 (32 & 64 bit) / Mac / Linux

(Functionality may vary between platforms)

A Rich Library of Video Experiments

Fourier's experiment library in MultiLab contains over 20 pre-recorded video experiments that serve as an instructional setup guide for both students and teachers. These experiments also contain synchronized data and video streams which can be used for review either before or after conducting their own experiments. MultiLab's video experiment library also provides an alternative to performing dangerous, costly or time-consuming experiments. When writing the lab reports, students can use data from their own experiment or use MultiLab's video data to revise and clarify points from the experiment.

MultiLab's video library is a proven and useful resource in teacher training and in demonstrating setup and procedures, helping them to better plan objectives and visualize guided class experiments.



MultiLab Workbook Tool

MultiLab's Workbook Tool contains a library of experiment guides that gives students a step-by-step preview of the lab activity to be conducted. All parameters for each included experiment are pre-set in MultiLab making data collection a click away.

Teachers can add their own experiments to the MultiLab software and pre-configure settings accordingly, thus saving valuable classroom instruction time and resources.

Video Motion Analyzer

MultiLab's Video Motion Analyzer is a great tool for measuring true motion parameters such as position, velocity and acceleration, which cannot normally be measured via sensors. Science experiments that can be analyzed include: motion (including investigations in dynamics trolleys), acceleration & deceleration, free fall, motion of a ball and simple harmonic motion.

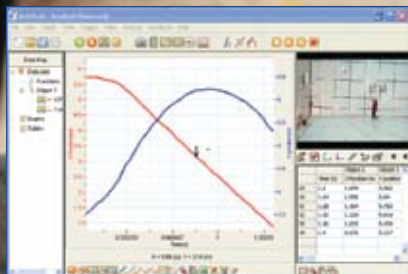
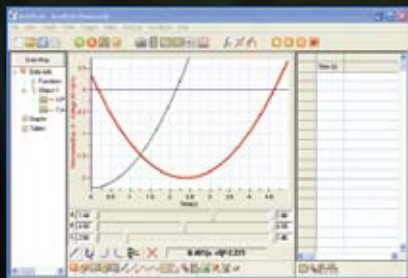
- Capture position and time from video movies
- Convert movies into data sets
- Analyze data with MultiLab's analysis tools
- Capture single-body motion or two-body motion

Scan the movie from a known dimension such as the height of a basketball hoop. The motion is plotted by simply clicking the mouse on the object as it moves frame-by-frame through the movie. For longer videos or particularly high numbers of frames per second, there is also the option to step through a number of frames at one time. The motion of two bodies can be analyzed by using the left mouse button for one object and the right button for the other and the coordinate axes can be rotated if required.

Having captured the motion, all the tools within the MultiLab are then available to analyze the video. Thus position, velocity and acceleration can all be directly measured from a digital video clip without the use of a data logger or external sensors!

Video clips can be recorded directly from within the software and in addition, QuickTime and AVI videos can be imported.





MultiLab™ 3.0 for NOVA5000

Enhances
any science
curriculum

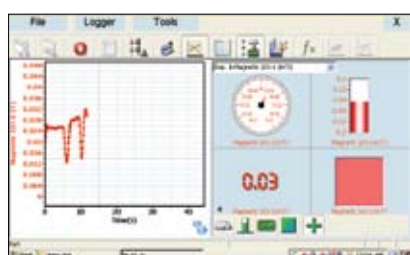
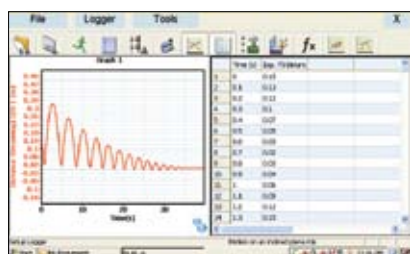
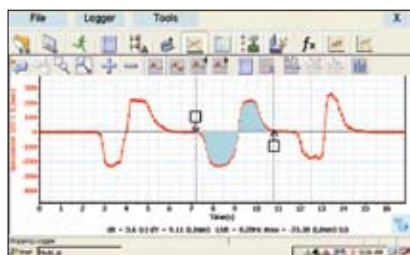
Key Features:

- Easy navigability, enhanced finger touch interface
- Collect data from multiple sensors simultaneously
- Multiple sensor displays: graphs, tables and meters
- A rich pedagogic library of experiments developed by science education experts
- Digital education workbooks featuring multiple experiments and guide manuals, included
- Works seamlessly with Office applications
- Localized interface solution for over 15 languages

MultiLab is a robust data analysis program that provides easy-to-use tools for students to:

- Collect data
- Analyze the data with sophisticated analysis tools
- Create multimedia lab reports
- View videos of experiments, complete with sensor data

The new MultiLab™ 3.0 for NOVA5000™ features a more user-friendly Graphical User Interface (GUI), improved functionality, additional new functions and new sensor parameters.



MultiLab™ 3.0 Key Benefits:

- **Easy Navigability**
 - Finger-touch navigation, eliminating the need for a stylus
 - Represent data in different formats at the same time by toggling between graph, table and 4 meter views
- **Improved Functionality**
 - Set up all sensors in one dialog box
 - Collect data from two sensors, with each sensor having its own Y axis along with its own scale
 - Create XY graphs at the push of a button
 - Open data from different files in the same graph
 - New toolbar for graph
- **New Features**
 - Dynamic slope/tangent line – slope function that enables students to see the slope line and the slope value of any desired point of the graph
 - Area function to present the area under the graph, between two points on the graph, with the calculated area figure displayed
- **More Sensor Compatibility**
 - Use the Ohaus balance 200gr ± 0.01 gr as a sensor. Students can view the mass changes in graph, table and meter views and conduct investigations into conservation of mass, rate of a chemical reaction, magnetic force, mass vs. density and evaporation
 - Measure velocity and acceleration with the Distance Sensor. Students can investigate the velocity and the acceleration vs. time of a moving body, with parameters now directly displayed
 - Improved parameters measured with the Rotary Motion Sensor. Students can investigate angular velocity and the angular acceleration of a pendulum, as well as Newton's Second Law by measuring the distance, velocity and acceleration of a moving body

Multimedia capabilities

Unique video and audio features allow students to produce complete multimedia lab reports with real-time, synchronized, annotated graphs and video.

Workbook Tool

The MultiLab 3.0 Workbook Tool gives students a step-by-step preview of the lab activity to be conducted, and then automatically configures the software and sets up the NOVA5000™ for data collection. Use existing Workbooks or create new ones.

Predicting Tool

The Predicting Tool allows students to plot predictions of experimental results and then watch as the actual data is plotted in real-time along side their forecasted graph.

Export/Import Data to Excel

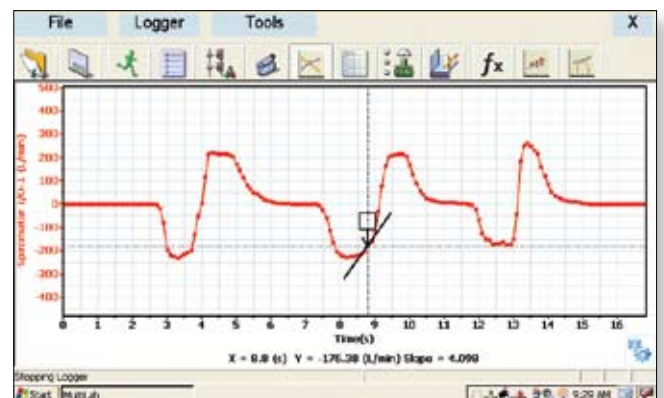
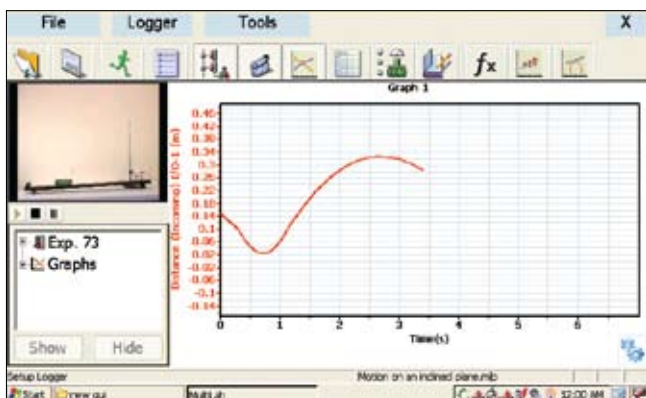
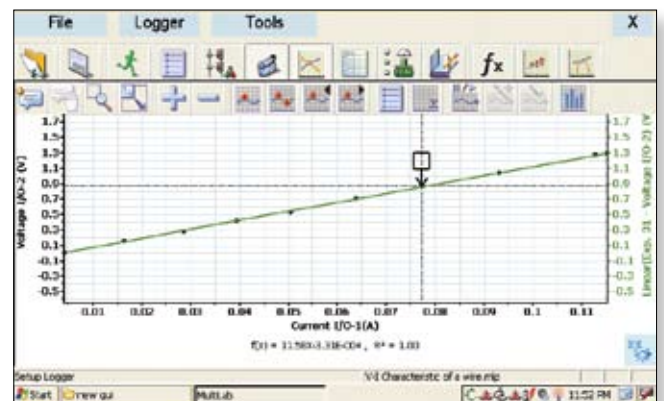
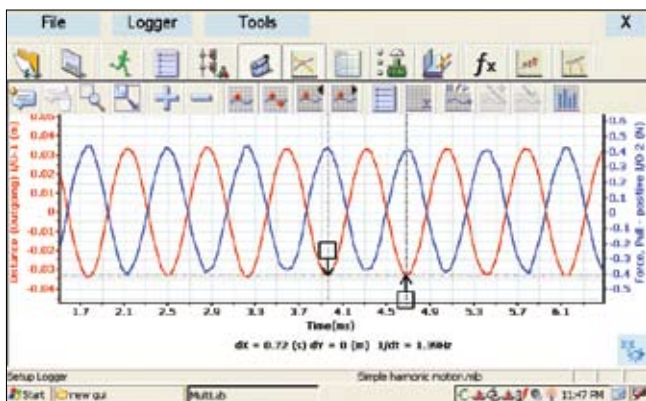
MultiLab's dynamic flexibility allows students to export/import data to Excel for more robust lab reporting capabilities.

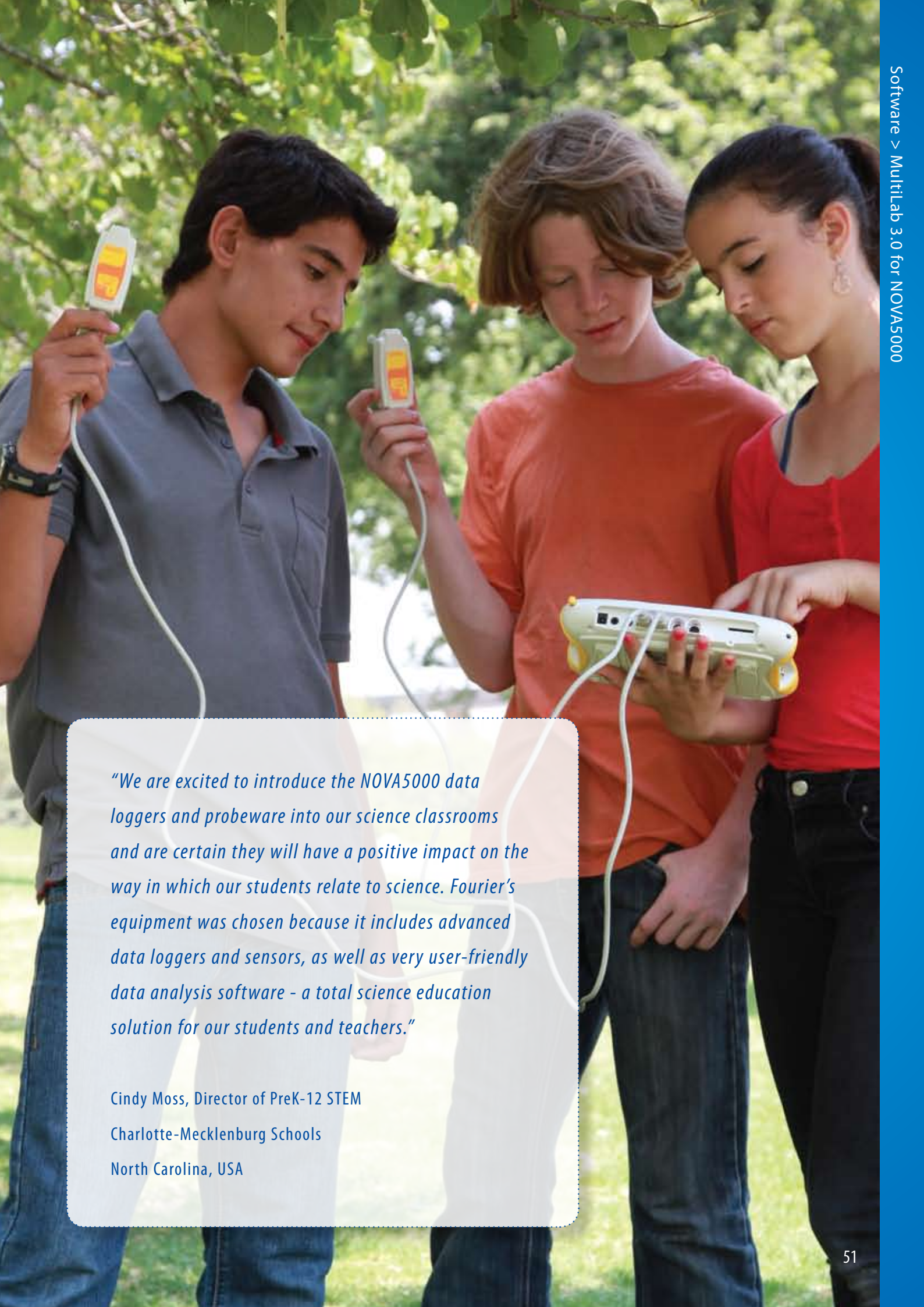
Online Experiment Library

MultiLab's online Experiment Library contains twenty two in-house experiments developed by the Fourier pedagogic team, as well as previous experiment files created by other classes. These videos are highly useful in preparing students for new experiments by demonstrating equipment setup and procedure, as well as examining the data results and discussing what expectations students can have for the results of their own experiments. All of the experiments include full experiment data with audio, and can display synchronized data and video streams.

Additional benefits of the Experiment Library include:

- An alternative to dangerous, costly, or time consuming experiments
- Students can use their own experiment or the library's to revise and clarify points when creating lab reports
- An instructional resource to improve teacher-guided class experiments by demonstrating setup and procedure and enabling teachers to plan objectives based on their results



A photograph of three students outdoors in a grassy field with trees in the background. On the left, a young man in a grey polo shirt holds a white NOVA5000 data logger with a yellow and red sensor. In the center, a young man in an orange t-shirt holds a similar device. On the right, a young woman in a red t-shirt holds a white NOVA5000 data logger with a yellow and red sensor. All three students are looking at their devices with interest.

"We are excited to introduce the NOVA5000 data loggers and probeware into our science classrooms and are certain they will have a positive impact on the way in which our students relate to science. Fourier's equipment was chosen because it includes advanced data loggers and sensors, as well as very user-friendly data analysis software - a total science education solution for our students and teachers."

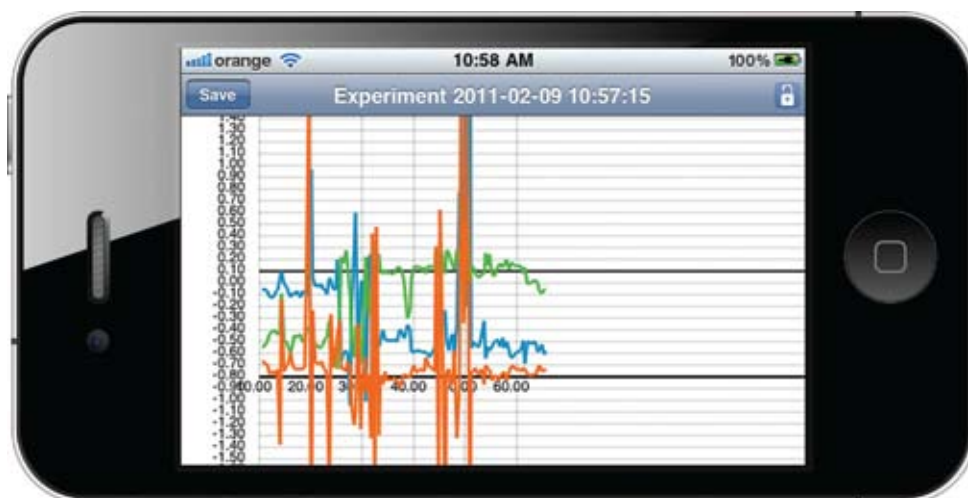
Cindy Moss, Director of PreK-12 STEM
Charlotte-Mecklenburg Schools
North Carolina, USA

Planned
for mid-2012



MiLAB™

Data Analysis Mobile App
for iPad, iPhone & iPod Touch



MiLAB™, Fourier's mobile app for iOS products, is based on Fourier's user-friendly MultiLab™ data analysis software.

MiLAB™ Key Features:

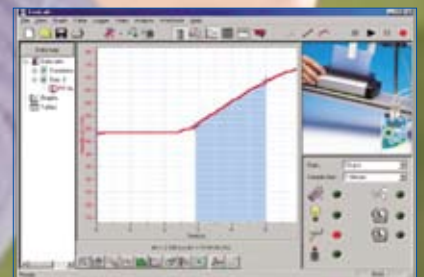
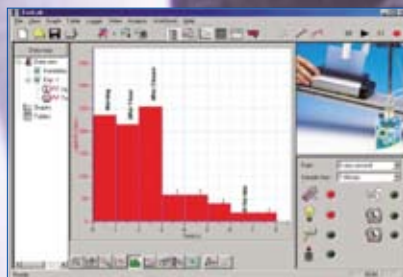
- Advanced data analysis tools
- Multiple displays: graphs, tables and meters
- Real-time data measurement via the built-in accelerometer or by connecting any of Fourier's over 65 sensors to NOVA AIR™

Together with Fourier's NOVA AIR™ Bluetooth® enabled, one-channel data logger, MiLAB™ unlocks a world of scientific experiments for teachers and students alike.



EcoLab™ for EcoLogXL

Making Science
Learning Enjoyable
for Young Students



Ecolab PC/Mac screen shots

The EcoLab data analysis software, for use with the EcoLogXL data logger, is designed to make science learning enjoyable for younger students. Using EcoLab, students can display their data in creative, colorful formats with easy-to-use data analysis tools. EcoLab engages students with a wide range of multimedia analysis tools, including audio and video features that allow students to view and share online or recorded movies of their experiments.

Students will find EcoLab to be a very user-friendly introduction to data measurement and meters (including analog, bar, digital and color). EcoLab's intuitive dashboard provides real-time readings, indicated by a change of color.



Among EcoLab's features is the ability to auto-export data to Excel or other Office-compatible applications. In addition, it includes a pedagogical tool for teachers called Workbook, which contains HTML worksheet templates. Workbook is a lab template that gives students a step-by-step preview of the activity and automatically configures EcoLab accordingly, so that the student can begin collecting data. Students can add notes or answer questions in text files directly from the Workbook window and add them to the project report.

EcoLab also comes with automatic analysis tools such as linear fit, slope, area and statistics, allowing students to perform a range of data analysis, adding pedagogic value to their experiments. Also featured is data pattern prediction which pauses the online data display, enabling students to record on screen predictions, and then allow the real data to resume downloading; students can then compare the real results with their prediction.

EcoLab Features

- Graph, video, table, four types of meter displays
- Multimedia reports of experiments with data, video, audio and text files
- Online or recorded video stream of the actual experiment
- Record audio comments
- Works with USB port
- Automatic COM port recognition
- Real-time online data transfer display
- Automatic and manual data download
- Stores data on hard disk
- Quick export of data to Excel
- Data Analysis: Integral, Slope Smoothing (averaging), Statistics
- Measurement readings are facilitated by locating cursors on the graphic display
- Advanced zooming and panning tools
- Predict Tool – graphically predict the results
- Workbooks – lab manuals with quick EcoLab setup
- Text annotation
- Operating Systems:
 - Windows XP / 7
 - Mac OS 10.4 - 10.6







Sensors

A primary component of any computerized science lab is the sensor. Fourier provides over 65 durable sensors, suitable for conducting hundreds of different types of experiments in the fields of Biology, Physics, Chemistry and Environmental Sciences.

Fourier's sensors deliver a high level of measurement accuracy across a wide range of parameters, both in the classroom and in the field.

Be sure to check our website for the most up to date list of available sensors!

* Most sensors connect to data loggers using the DT022 cable. EcoLogXL sensors require the DT097 cable.

			Biology 	Chemistry 	Environmental Science 	Physics 	Page
General	Acceleration	DT138				•	58
	Ammonium Sealed Electrode	AC020A	•	•	•		58
	Anemometer (Wind Speed & Direction)	AC012A	•		•		58
	Calcium Sealed Electrode	AC019A	•	•	•		59
	Chloride	AC018A	•	•	•		59
	CO ₂	DT040A	•	•	•		59
	Colorimeter	DT185A	•	•			60
	Conductivity	DT035A	•	•	•		60
	Control Switch	DT110/DT111		•		•	60
	Current (±2.5 A)	DT005		•		•	61
	Current (±250 mA)	DT006		•		•	61
	Drop Counter	DT293	•	•			61
	Distance	DT020-1	•			•	62
	EKG	DT189A	•				63
	Electrostatic Charge	DT261A				•	63
	Flow Rate	DT254	•		•		63
	Force	DT272				•	64
	Geiger Muller Counter	DT116		•	•	•	64
	Heart Rate (Exercise)	DT298A	•				64
	Heart Rate (Pulse)	DT155A	•				65
	Humidity (5% Accuracy)	DT014	•		•		66
	Light (Multi Range)	DT009-4	•	•	•	•	67
	Light (0 to 300 lx)	DT009-1	•	•	•	•	68
	Magnetic Field	DT156			•	•	68
	Magnetic Field - Dual Axis	DT036			•	•	68
	Microphone	DT008			•	•	69
	Nitrate Sealed Electrode	AC017A	•	•	•		69
	Oxygen	DT222A	•	•	•		69
	pH	DT016A	•	•	•		70
	Photo Gate	DT137A				•	71
	Potassium Sealed Electrode	AC008A	•	•	•		72
	Pressure (0 to 700 kPa)	DT015-1		•		•	72
	Pressure (150 - 1,150 mbar)	DT015	•	•	•	•	72
	Rain Collector	AC013A			•		73
	Rotary Motion	DT148A	•			•	73
	Smart Pulley	DT122A				•	73
	Soil Moisture	DT171A	•		•		74
	Sound Level	DT320			•	•	74
	Spirometer	DT037A	•				74
	Temperature PT-100 (-200 to 400 °C)	DT027	•	•	•	•	75
	Temperature (-25 to 110 °C)	DT029	•	•	•	•	75
	Temperature TC-K (0 to 1,200 °C)	DT025	•	•	•	•	75
	Turbidity	DT095A	•	•	•		76
	Voltage (±25 V)	DT001		•		•	76
	Voltage (±2.5 V)	DT002		•		•	76
Voltage (0 to 5 V)	DT003		•		•	77	
Voltage (Triple Range)	DT019		•		•	77	
EcoLogXL	Conductivity	DT035A	•	•	•		78
	Current (±2.5 A)	DT005		•		•	78
	Current (±250 mA)	DT006		•		•	79
	Distance (for EcoLogXL only)	DT187A/B	•			•	79
	Heart Rate (Exercise)	DT298A	•				79
	Heart Rate (Pulse)	DT155A	•				80
	pH	DT016A	•	•	•		81
	Oxygen	DT222A	•	•	•		82
	Photo Gate	DT137A				•	82
	Spirometer	DT037A	•				83
	Temperature TC-K (0 to 1,200 °C)	DT025	•	•	•	•	83
	Temperature (-10 to 110 °C) for EcoLogXL only	DT241	•	•	•	•	83
Voltage (±25 V)	DT001		•		•	84	
Voltage (±2.5 V)	DT002		•		•	84	

Acceleration DT138



Description

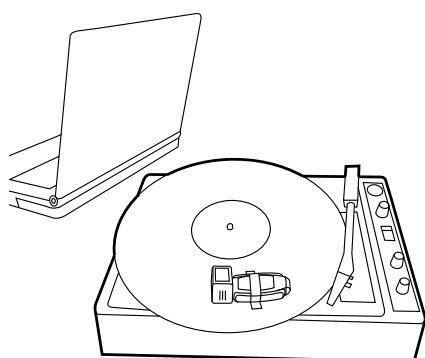
The Acceleration Sensor is a high accuracy accelerometer measuring accelerations from -5 g to +5 g. It measures gravitational forces and acceleration-induced forces in the same way. At rest the sensor measures 1 g when pointing downward, -1 g when pointing upward and zero when positioned horizontally.

Common usage

The Acceleration Sensor is used in various experiments in Physics both in the lab and outdoors. In the laboratory, the Acceleration Sensor is used to measure accelerations of a moving cart, pendulum, falling bodies, etc. Outdoors, the Acceleration Sensor can be used to measure acceleration of cars, amusement park rides, bungee jumpers, etc.

Specifications

- Range: ± 5 g (± 49 m/s²)
- Resolution (12-bit): 0.0025 g or 0.025 m/s²
- Default Sample Rate: 10 samples per second
- Maximum Sample Rate: 100 samples per second
- Accuracy: ± 0.02 g
- Equipped with an offset calibration screw



Ammonium Sealed Electrode AC020A



Description

The Ammonium Electrode is a PermaFil (non-refillable), Ion-selective electrode. The reference chamber is gel-filled and sealed. No reference fill solution is required. The electrode measures Ammonium ions in aqueous solutions simply, quickly, economically, and accurately and is used to conduct water quality studies.

Common usage

Ion-selective electrodes are used in a wide variety of applications for determining the concentrations of various ions in aqueous solutions. Ion-selective electrodes can be used in the following areas:

- Conducting water quality studies
- Determining the concentration of ammonium ions in aqueous solutions
- Pollution monitoring

Specifications

- Concentration Range: 1 M to 5×10^{-6} M or 0.1 ppm to 18,000 ppm
- Resolution (12-bit): 0.15 mV
- Ph Range: 4 to 10 pH
- Temperature Range: 0 to 50 °C
- Minimum Sample Size: 3 mL in a 50 mL beaker
- Reproducibility: $\pm 4\%$
- Default Sample Rate: 10 samples per second
- Electrode Resistance: 1 to 4 M Ω
- Interfering Ions: K⁺, Na⁺

The Ion Selective Electrode Adapter AC021 is also available for purchase separately

Anemometer (Wind Speed & Direction) AC012A



Description

The Anemometer is actually two sensors mounted onto one arm, capable of measuring wind speed and wind direction.

Common usage

The Anemometer is used in various experiments in Climatology and Environmental Studies.

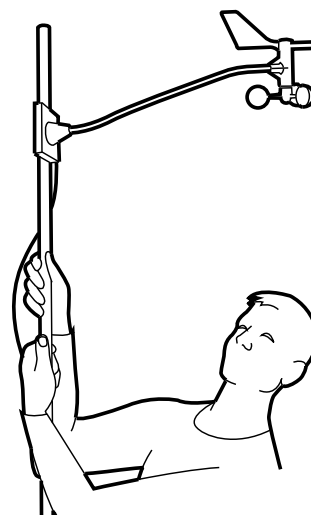
Specifications

Wind speed

- Range: 4 km/h to 280 km/h; 2.5 mph to 174 mph
- Resolution: 0.1 km/h
- Accuracy: $\pm 5\%$
- Sampling Rate: Up to one sample per second
- Data Logger Input Type: Digital

Wind Direction

- Range: 0° - 360°
- Resolution: $\pm 0.09^\circ$
- Accuracy: $\pm 7^\circ$
- Sampling Rate: Up to one sample per second
- Data Logger Input Type: Digital



Calcium Sealed Electrode AC019A



Description

The Calcium Electrode measures Calcium ions in aqueous solutions and is a PermaFil (non-refillable), Ion-selective electrode. The reference chamber is gel-filled and is sealed. No reference fill solution is required.

Common usage

Ion-selective electrodes are used in a wide variety of applications for determining the concentrations of various ions in aqueous solutions. Some main areas in which ion-selective electrodes have been used include conducting water quality studies, determining the concentration of ammonium ions in aqueous solutions, pollution monitoring, agriculture, food processing, detergent manufacturing and many more.

Specifications

- Concentration Range: 1 M to 5×10^{-7} M or 0.02 ppm to 40,000 ppm
- Resolution (12-bit): 0.15 mV
- pH Range: 2.5 to 11 pH
- Temperature Range: 0 to 40 °C
- Minimum Sample Size: 3 mL in a 50 mL beaker
- Reproducibility: $\pm 4\%$
- Default Sample Rate: 10 samples per second
- Electrode Resistance: 1 to 4 M Ω
- Interfering Ions: Pb^{2+} , Hg^{2+} , Si^{2+} , Fe^{2+} , Cu^{2+} , Ni^{2+} , NH_3 , Na^+ , Li^+ , Tris^+ , K^+ , Ba^+ , Zn^{2+} , Mg^{2+}

The Ion Selective Electrode Adapter AC021 is also available for purchase separately



Chloride AC018A



Description

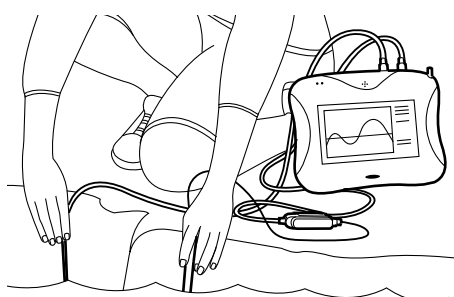
The Chloride Electrode measures total free chloride in aqueous solutions and is a PermaFil (non-refillable), Ion-selective electrode – the reference chamber is gel filled and sealed. No reference fill solution is required. The Chloride Electrode set (AC018A) consists of a PermaFil combination electrode (AC018), which combines the Ion-selective electrode and the reference electrode as well as Fourier's ISE amplifier (AC021).

Common usage

Ion-selective electrodes are used in a wide variety of applications for determining the concentrations of various ions in aqueous solutions. Ion-selective electrodes are commonly used in conducting water quality studies, determining the concentration of ammonium ions in aqueous solutions, and foodstuffs, to name a few.

Specifications

- Concentration Range: 1 M to 5×10^{-6} M or 1.8 ppm to 35,500 ppm
- Resolution (12-bit): 0.15 mV
- pH Range: 2.0 to 12.0 pH
- Temperature Range: 0 to 80 °C
- Minimum Sample Size: 3 mL in a 50 mL beaker
- Reproducibility: $\pm 2\%$
- Default Sample Rate: 10 samples per second
- Electrode Resistance: Less than 1 M Ω
- Interfering Ions: CN^- , Br^- , I^- , OH^- , S^{2-}



CO₂ DT040A



Description

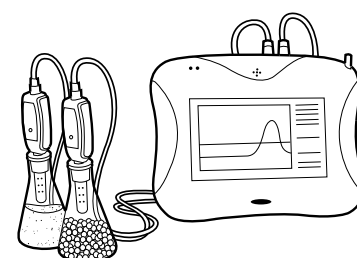
The CO₂ Sensor measures carbon dioxide concentration (ppm) in gases such as air. It is a solid electrolyte sensor which offers high selectivity to CO₂ with low dependency on humidity. A range of 350 to 5,000 ppm of carbon dioxide can be detected, making it ideal for indoor air-control applications. It is supplied with a 100 mL plastic sampling bottle and a rubber stopper (12244).

Common usage

Typical experiments include: measuring increases in carbon dioxide levels from small animals and insects, changes in carbon dioxide concentration in a plant terrarium during photorespiration, photosynthesis cycles and cellular respiration of peas and beans.

Specifications

- Range: 350 to 5,000 ppm
- Accuracy: $\pm 20\%$ at 1000 ppm
- Resolution (12-bit): 8 at 350 ppm; 100 at 5,000 ppm
- Recommended Sampling Rate: 10 samples per second
- Response Time: 90 seconds (to 90% of final value)
- Current Consumption: Approx. 50 mA
- Normal Operating Temperature Range: -10 to 50 °C
- Normal Operating Humidity Range: 5 to 95%
- Storage Temperature Range: -20 to 60 °C
- Storage Humidity Range: 5% to 90%



Colorimeter DT185A



Description

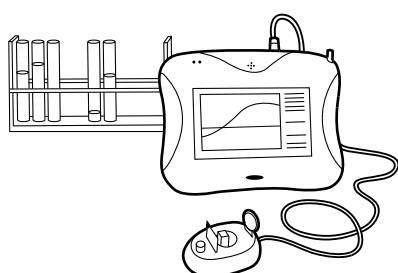
The Colorimeter measures the intensity of light transmitted through a sample at a selected wavelength.

Common usage

The three colorimeter wavelengths enable students to determine concentrations of diluted solutions. It may also be used to characterize chemical reactions when compounds are formed or decomposed showing absorption in one of three colors.

Specifications

- Transmittance: 20% - 90%
- Accuracy $\pm 10\%$
- Resolution (12-bit): 0.03 %
- Wavelengths:
 - Blue (480 nm)
 - Green (500 nm)
 - Red (650 nm)
- Cell Volume: 3.5 cc
- Cell Width: 1 cm
- Features: Calibration knob



Conductivity DT035A



Description

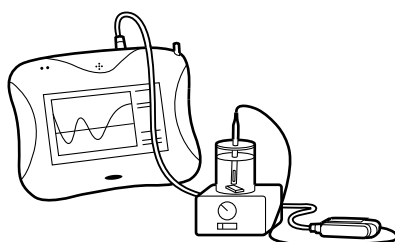
The Conductivity Sensor is designed to measure conductivity of liquids and solutions and consists of a conductivity electrode, an adapter and a connecting wire.

Common usage

The Conductivity Sensor is used for various experiments in Biology and Chemistry. By using the Conductivity Sensor you can demonstrate changes in conductivity when dissolving salts in water, or monitor bodies of water for pollution. The Conductivity Sensor can also be used for water salinity testing.

Specifications

- Range: 0 to 20 mS
- Accuracy: $\pm 8\%$ over entire range
- Resolution (12-bit): 5 μS
- Conductivity Cell Material: Carbon, 2-Cell
- K Cell Value: 1.0
- K cell Value Tolerance: $\pm 20\%$
- Temperature Range: 0 to 80 $^{\circ}\text{C}$
- Minimum Sample Size: 25 mL
- Response Time for 95% of Reading: 5 seconds
- Default Sample Rate: 10 samples per second
- Features: Equipped with an offset calibration screw



Control Switch DT110/DT11



Description

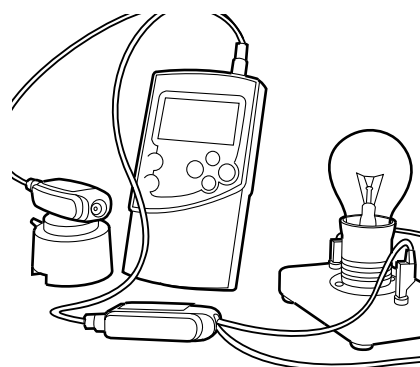
The Control Switch connects to the same data logger input/output channel as the sensor and opens or closes an electrical circuit when the sensor passes certain pre-defined values. The black cords and plugs identify the Normally Closed (NC) Control Switch; the red cords and plugs identify the Normally Opened (NO) Control Switch.

Common usage

Control Switch uses in experimentation include processing a heat source (as a simple thermostat), opening or closing a light source according to the environmental light intensity and marking the turning point in titration by opening a lamp upon passing this point.

Specifications

- Maximum Switch Load: 240 V and 3 A
- Data Logger Input Type: Digital
- Recommended Sensor Usage: Operate while the AC/DC adapter powers the data logger



Current (± 2.5 A) DT005



Description

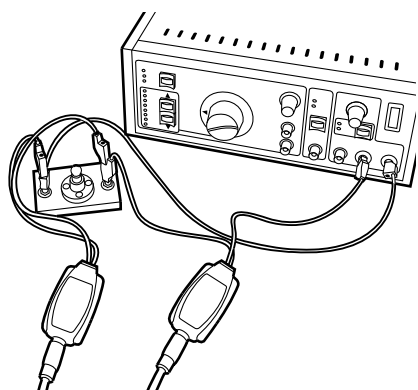
The Current Sensor is an ampere meter, measuring current values between -2.5 and 2.5 amperes. It is capable of measuring both direct and alternate current and includes two durable banana plugs for easy connection.

Common usage

The Current Sensor is used in various electricity experiments such as EMF and internal resistance, Ohm's Law, or the study of current characteristics of a light bulb and a diode.

Specifications

- Range: ± 2.5 A
- Input Current: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): 1.25 mA
- Default Sample Rate: 10 samples per second
- Input Resistance: 0.1Ω
- Maximum Input Current: 5 A



Current (± 250 mA) DT006



Description

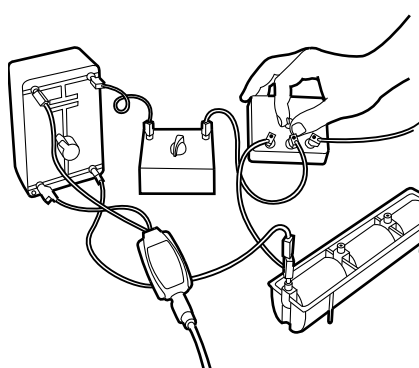
This sensor is an ampere meter, measuring current values between -250 and 250mA. It is a differential sensor, capable of measuring both direct and alternate current and includes two durable banana plugs for easy connection.

Common usage

This Current Sensor is used in various electricity experiments such as EMF and internal resistance, Ohm's Law, or the study of current characteristics of a light bulb and a diode.

Specifications

- Range: ± 250 mA
- Input Current: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): $\pm 125 \mu\text{A}$
- Default Sample Rate: 10 samples per second
- Input Resistance: 1Ω
- Maximum Input Current: 1.7 A



Drop Counter DT293



Description

The Drop Counter is an optical sensor that accurately records the number of drops of titrant added during a titration. The Drop Counter software can automatically convert the number of drops into volume. In conjunction with the pH and temperature sensors the equivalence point in the titration can be determined.

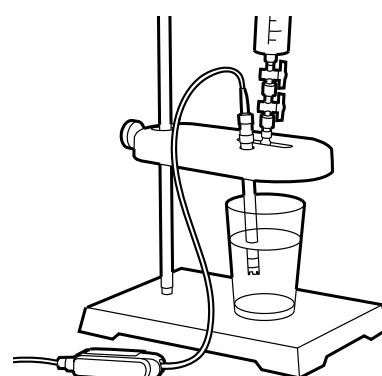
The Drop Counter can also be used for conductimetric or potentiometric titrations using our Conductivity Probe or Ion-selective Electrodes.

Common usage

- Simple count activities
- Collecting pH vs. Volume data in a typical acid–base titration
- Collecting Conductivity vs. Volume data in a typical conductimetric titration
- Collecting Temperature vs. Volume data or monitoring temperature simultaneously with pH

Specifications

- Range: Volume 0 – 4095 * volume of one drop
- Range: Drop Counter 0 - 4095
- Detector Rise Time: < 70 ns
- Detector Fall Time: < 70 ns
- Resolution (12-bit) - Drop Counter: 1
- Resolution (12-bit) - Volume: 1 * volume of one drop
- Sampling Rate for Titration: Up to every second
- Infrared Source: Peak at 890 nm
- Used Data Logger Port: Digital



Distance

DT020-1



Specifications

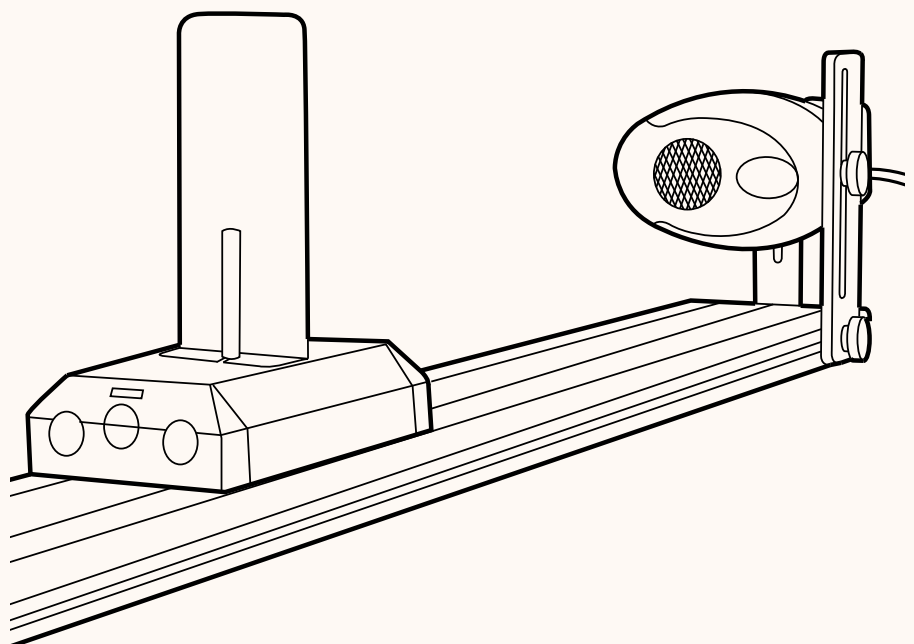
- Range: 0.2 to 10 m
- Accuracy: 2% over entire range
- Resolution (12-bit): 2.44 mm
- Sampling Rate: Up to 50 samples per second
- Receiver Viewing Angle: $\pm 15^\circ$ to $\pm 20^\circ$
- Features: Reports position, velocity and acceleration
- Data Logger Input Type: Digital
- Recommended Sensor Usage: Operate while the AC/DC adapter powers the data logger

Description

This digital Distance Sensor measures the distance between the sensor and an object in the range of 0.2 to 10 m. The sensor is supplied with a mounting rod and can sample data at up to 50 times per second.

Common usage

Topics such as the harmonic motion of a spring and free fall acceleration can be explored using this Distance Sensor. It is used for various experiments in Physics and mechanics.



EKG DT189A



Description

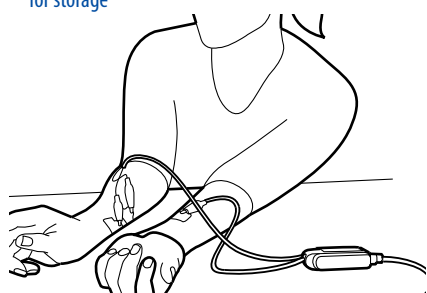
The EKG (Electrocardiogram) Sensor measures cardiac electrical potential waveforms (voltages produced during contractions of the heart). Utilizing this sensor enables students to investigate the electrical signals generated by their own heart. It consists of Fourier's plastic sensor case and three electrode leads and also comes with a package of one hundred silver/silver chloride electrode patches that can be attached to the skin. The sensor's circuitry isolates the user from the possibility of electrical shock.

Common usage

The EKG Sensor is used to record the heart's electrical activity. Typical experiments include monitoring personal electrocardiogram, that compare EKG graphs at rest and after activity or investigating EKG with different body positions.

Specifications

- Range: 0 to 5 V
- Resolution (12-bit): 1.23 mV
- Recommended Sample Rate: 100 samples/sec
- Voltage Protection: 4 kV
- Isoelectric Line (Gain):
1 mV body potential = 1 V sensor output
- Maintenance: The electrodes should be kept refrigerated in a clean, dry, airtight container for storage



Electrostatic Charge DT261A



Description

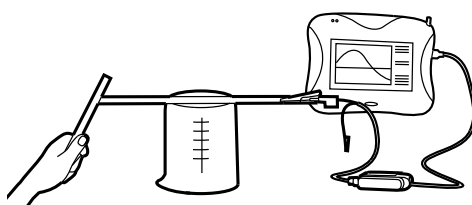
This is a dual range, all purpose Electrostatic Charge Sensor that can be used in many electrostatic experiments. Among this sensor's advantages are that it is not affected by humidity and can perform quantitative measurements and indication of charge polarity. The Electrostatic Charge Sensor is housed inside Fourier's plastic sensor case and is equipped with a zero button and range switch. In most cases, it will replace the traditional electroscopes.

Common usage

Typical experiments with the Electrostatic Charge Sensor include measuring the charge produced by friction, the charge by induction and investigating conductive and insulating materials and wave patterns changes, quantifying the charge on a capacitor plate as well as exploring the relationship between the charge and the voltage drop across a parallel plate capacitor.

Specifications

- Range: $\pm 0.25 \mu\text{C}$, $\pm 0.025 \mu\text{C}$
- Resolution (12-bit): 0.12 nC for $\pm 0.25 \mu\text{C}$
- 12.2 pC for $\pm 0.025 \mu\text{C}$
- Default Sample Rate: 10 samples per second
- Input Capacitance: 0.1 μF
- Input Resistance: $10^{12} \Omega$
- Input Over Voltage Protection: $\pm 60 \text{VDC}$
- Features: Zero button range switch



Flow Rate DT254



Description

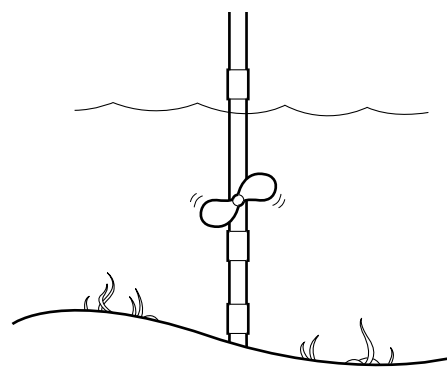
The Flow Rate Sensor measures the velocity of flowing water in a river, stream or canal. It is equipped with a telescopic handle and protective housing.

Common usage

The Flow Rate Sensor can be used to study the discharge, flow patterns and sediment transport of a stream or river. Typical experiments include measuring water velocity, determining discharge, calculating the stream flow or determining what size particles stay in motion at a particular flow.

Specifications

- Range: 0 to 4.0 m/s
- Resolution (12-bit): 0.0012 m/s
- Accuracy: 1% of full-scale reading
- Response Time: 98% of full-scale reading in 5 seconds;
- 100% of full-scale in 15 seconds
- Operational Temperature Range: 0 to 70 °C



Force DT272



Description

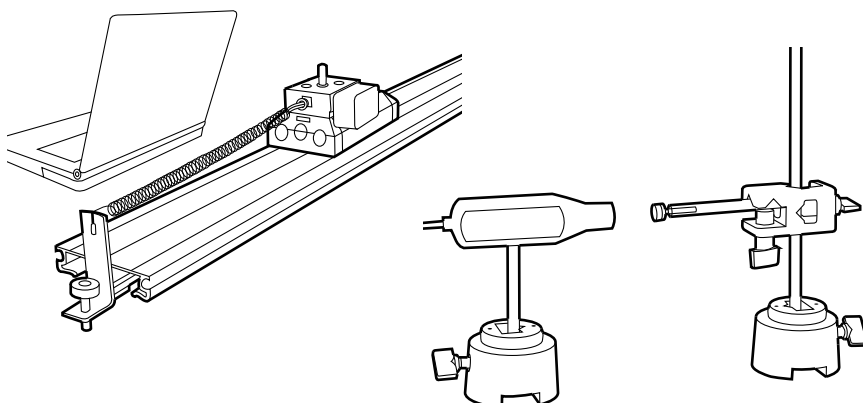
The Force Sensor is a popular force dual range sensor, capable of measuring pushing and pulling forces. It has two ranges: ± 10 N or ± 50 N. It can be easily mounted on a stand or dynamics cart, or used as a replacement for a hand-held spring scale. The sensor is supplied with mounting rod, collision bumper, hook and cart mounting bracket.

Common usage

This sensor can be used to study friction, simple harmonic motion, impact in collisions, or centripetal force.

Specifications

- Range: - 10 N to +10 N
- - 50 N to +50 N
- Accuracy: $\pm 2\%$ over entire range
- Resolution (12-bit) for ± 10 N:
- Resolution (12-bit) for ± 50 N: 0.005 N, 0.025 N
- Default Sample Rate: 10 samples per second



Geiger Muller Counter DT116



Description

The Geiger Muller Counter has a built-in Geiger Muller tube, sensitive to alpha, beta and gamma radiation and is designed especially for automatic measurements of radiation. This sensor includes a mounting rod and a protective cap and is equipped with a power indicator and a buzzer, which emits an audible signal with each pulse that is recorded.

Common usage

The Geiger Muller Counter Sensor is used in experiments such as demonstrating the random nature of radioactive radiation, measuring Activity vs. Distance of a radioactive source and investigating the effect of different absorbers on radiation.

Specifications

- Range: 0 to 4,096 Bq
- Resolution (12-bit): 1 Bq
- Sensitivity: Alpha, beta, gamma
- Window Thickness: 1.5 to 2.0 mg/cm₂
- Window Material: Mica

Heart Rate (Exercise) DT298A



Description

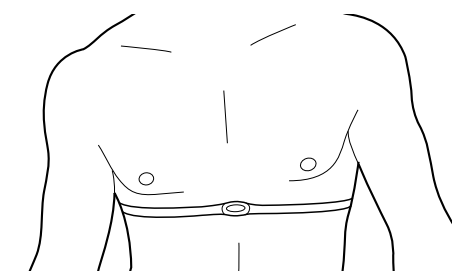
This sensor is ideal for measuring one's heart rate before, during and after exercise and is comprised of a wireless transmitter belt and a Pulse Receiver Module that plugs into the data logger. The Heart Rate Sensor, specifically the transmitter belt, senses the electrical signals generated by the heart and each heart beat sends an electrical signal to the Receiver Module, enabling the heart rate to be measured.

Common usage

Typical experiments performed using this sensor include comparing heart rates, evaluating heart rates of different individuals, comparing that of athletes vs. inactive individuals, monitoring the heart rate before, during and after brief vigorous activity (e.g. pushups) and monitoring the speed at which the heart rate returns to normal following exercise (recovery rate).

Specifications

- Range for NOVA5000 & MultiLogPRO Waveform: 0 – 5 V
- Pulse: 0 – 200 bpm (beats per minute)
- Transmitter Range: 80 cm
- Waveform Resolution (12-bit): 1.25 mV
- Max. Sampling Rate: 100 samples/sec
- Data Logger Input Type: Digital



Heart Rate (Pulse)

DT155A



Specifications

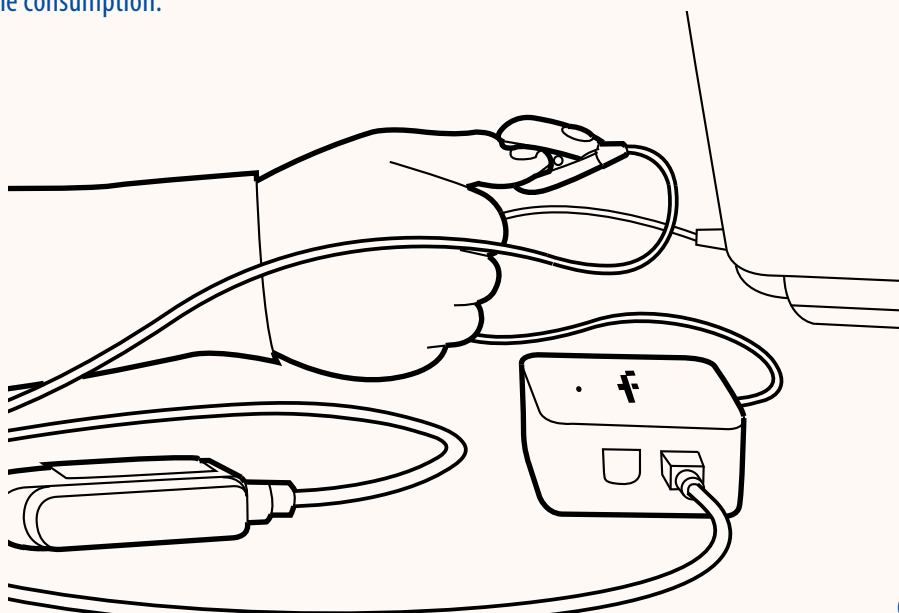
- Range for MultiLogPRO
 - Waveform: 0 – 5 V
 - Pulse: 0 – 200 bpm (beats per minute)
- Range for NOVA5000
 - Pulse: 0 – 200 bpm (beats per minute)
 - Waveform Resolution (12-bit): 1.25 mV
 - Pulse resolution: 1 bpm (beats per minute)
 - Max. Sampling Rate: 100 samples/sec
 - Data Logger Input Type: Digital

Description

The Heart Rate Sensor monitors the light level transmitted through the vascular tissue of the fingertip and the corresponding variations in light intensities that occur as the blood volume change in the tissue. It is so easy to use, even in large classes every student can have an opportunity to use this sensor. This sensor includes a finger clip.

Common usage

Typical experiments include: comparing the heart rate of athletes and sedentary people, checking a person's heart rate before and after brief vigorous aerobic activity and checking a person's heart rate before and after caffeine consumption.



Humidity (5% Accuracy)

DT014



Specifications

- Range: 0 to 100 % RH*
- Accuracy: $\pm 8\%$ (10 to 90 % RH*)
- Resolution (12-bit): 0.05 % RH*
- Sensor Storage:

Avoid exposure to sunlight

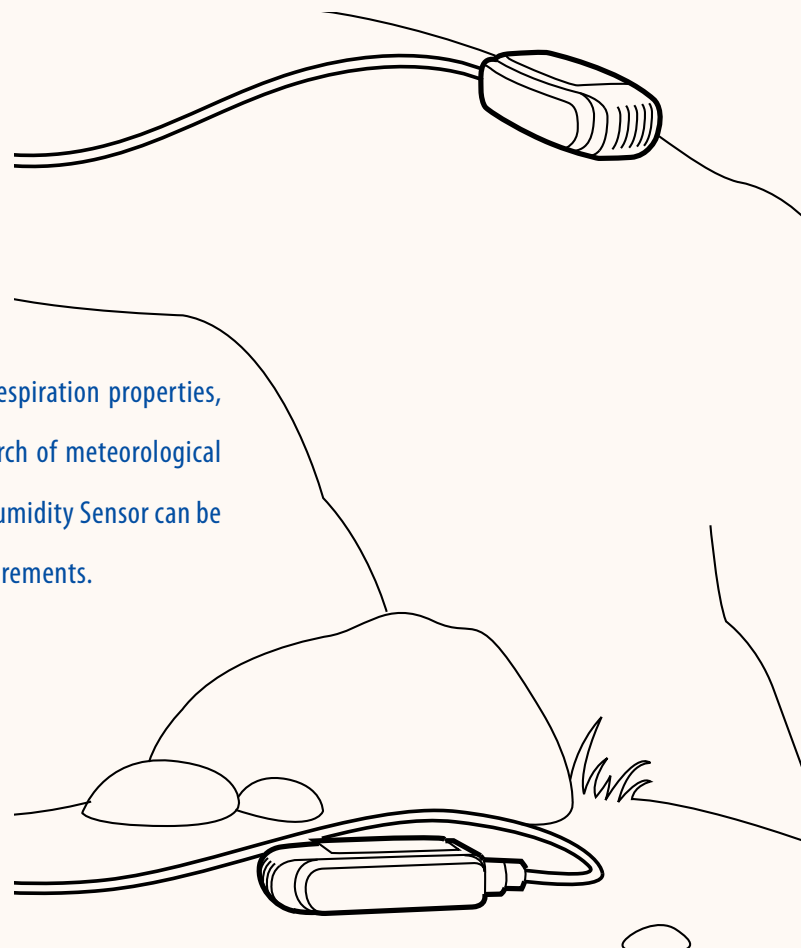
* RH = Relative Humidity

Description

This Humidity Sensor has a measuring range of 0-100% relative humidity and comes equipped with a zero offset calibration screw.

Common usage

Typical experiments performed using this sensor are body respiration properties, the exploration of biotic conditions outdoors, and the research of meteorological connections between humidity, temperature and light. The Humidity Sensor can be used for biological, environmental and meteorological measurements.



Light (Multi Range)

DT009-4



Specifications

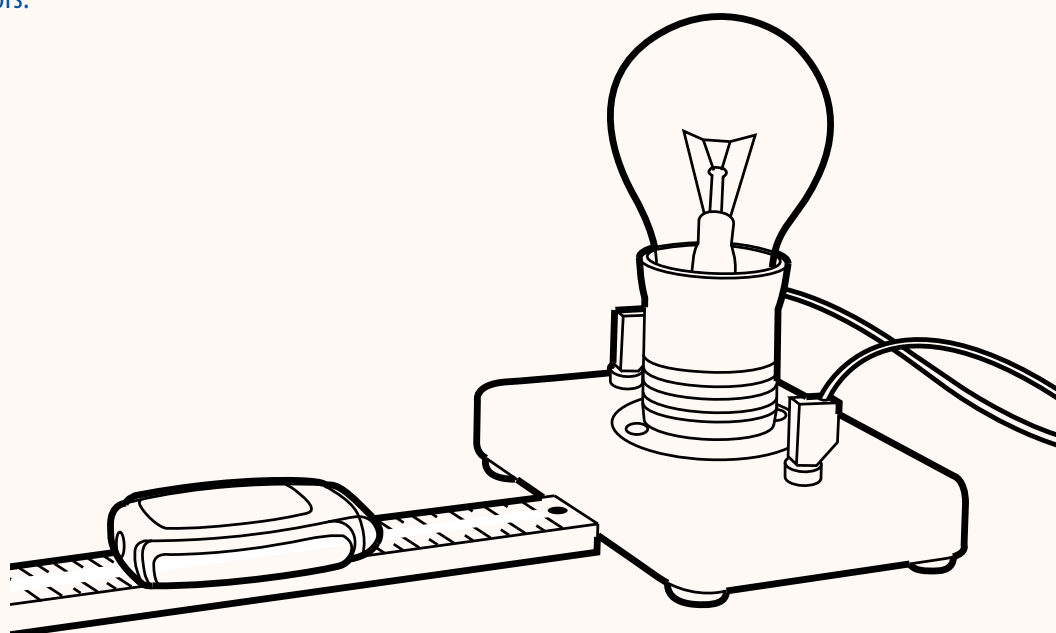
- Range:
 - 0 to 600 lx;
 - 0 to 6,000 lx;
 - 0 to 150 klx
- Accuracy: $\pm 4\%$ over entire range
- Resolution (12-bit):
 - For: 0 to 600 lx: 0.15 lx
 - For: 0 to 6000 lx: 1.5 lx
 - For: 0 to 150 klx: 37 lx
- Default Sample Rate: 10 samples per second
- Spectral Response: Visible light

Description

This all-purpose, high precision, quick response Light Sensor is designed to measure three ranges of light, 0 to 600 lx, 0 to 6 klx and 0 to 150 klx making it ideal for both indoor and outdoor light measurements.

Common usage

This sensor can be used in experiments indoors that examine bulb intensities, light absorbance, photosynthesis and more. Experiments measuring solar radiation, among others, can be conducted outdoors.



Light (0 to 300 lx) DT009-1



Description

This high precision, quick response Light Sensor, ideal for indoor light measurements, is designed for measurements in the range of 0 to 300 lx.

Common usage

This sensor can be used in experiments such as light interference, bulb intensities, light absorbance, photosynthesis and more.

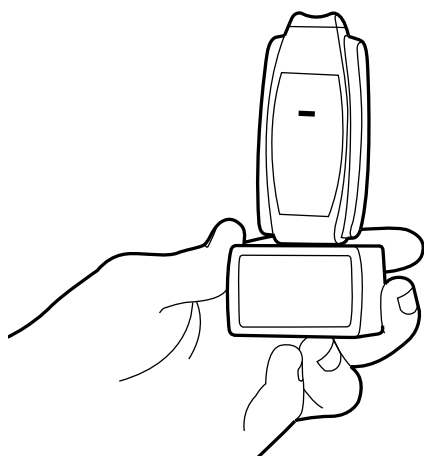
Specifications

For NOVA5000

- Range: 0 to 300 lx

For MultiLogPRO

- Range:
 - 0 to 300 lx, 0
 - 0.44 W/m²
- Accuracy: $\pm 4\%$ over entire range
- Resolution (12-bit): 0.075 lx
- Default Sample Rate: 10 samples per second
- Spectral Response: Visible light



Magnetic Field DT156



Description

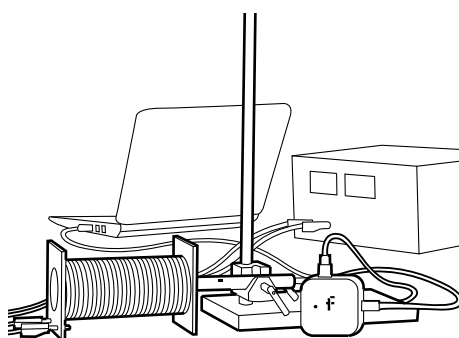
Fourier's Magnetic Field Sensor is two sensors in one. Its low resolution range is used to explore the nature and strengths of the magnetic fields of solenoids and permanent magnets, while its high resolution range is used to explore the Earth's magnetic field.

Common usage

This sensor can be used for a variety of interesting experiments such as measuring the earth's magnetic field or studying the magnetic field near a permanent magnet, near a current-carrying wire or inside a solenoid.

Specifications

- Range: ± 10 mT; ± 0.2 mT
- Accuracy: $\pm 6\%$ over entire range
- Resolution (12-bit):
 - For: ± 10 mT: 5 μ T
 - For: ± 0.2 mT: 0.1 μ T
- Default Sample Rate: 10 samples per second
- Feature: Equipped with an offset calibration screw



Magnetic Field - Dual Axis DT036



Description

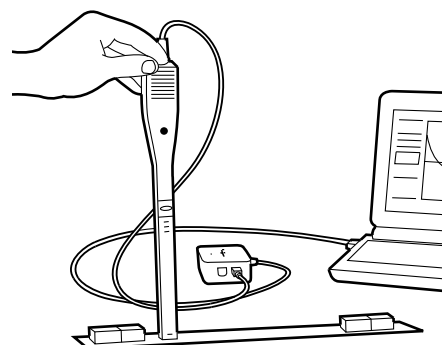
Housed within a slim, compact casing, this sensor performs dual axis measurement via the two Hall Effect probes, placed at right angles to each other. The axial magnetic field measures the magnetic field along the axis of the magnetic sensor and the radial magnetic field is measured at a right angle to the magnetic field (perpendicular to the sensor's axis).

The sensor is sensitive enough to capture the vertical and horizontal component of Earth's magnetic field and exceeds the accuracy required for the measurements of coils.

Common usage

Fourier's Dual Axis Magnetic Sensor can be used in experiments such as: investigating magnetic field patterns around magnets and coils, explore the relationship between the field due to a coil and the current in the coil, investigating the relationship between the field due to a coil and the number of turns in the coil and more.

Detailed specifications upon availability.



Microphone DT008



Description

This Microphone Sound Sensor has an output of ± 2.5 V. The Microphone is designed to study the properties of sound waves from voices and musical instruments and can also be used for measuring the speed of sound. It is not a noise level sensor.

Common usage

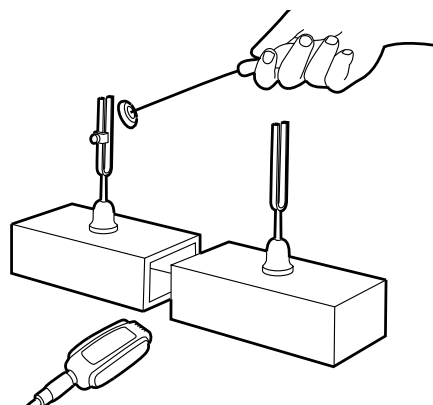
Used for the study of sound properties, typical experiments include sound speed through air and other materials, Sound Beats and harmonic properties of sound.

Specifications

- Frequency Range: 35 to 10,000 Hz
- Range: ± 2.5 V
- Resolution (12-bit): 1.22 mV
- Maximum Sample Rate: 20,000 samples per second

Note:

Sampling rate must be 5 times the test frequency



Nitrate Sealed Electrode AC017A



Description

The Nitrate Electrode is a PermaFil (non-refillable), Ion-selective electrode, with a sealed, gel-filled reference chamber. No reference fill solution is required. This sensor is used to conduct water quality studies and easily and accurately measures nitrate ions in aqueous solutions. The Nitrate electrode set (AC017A) consists of a PermaFil combination electrode (AC017) (this combines the Ion-selective electrode and the reference electrode) and Fourier's ISE amplifier (AC021).

Common usage

Ion-selective electrodes are used in a wide variety of applications to determine the concentrations of various ions in aqueous solutions. Some of the main areas in which Ion-selective electrodes have been used include water quality studies, ammonium concentrations, pollution monitoring, agriculture and food processing, among others.

Specifications

- Concentration Range: 1 M to 7×10^{-6} M or 0.1 ppm to 14,000 ppm
- Resolution (12-bit): 0.15 mV
- pH Range: 2.5 to 11 pH
- Temperature Range: 0 to 50 °C
- Minimum Sample Size: 3 mL in a 50 mL beaker
- Reproducibility: $\pm 4\%$
- Default Sample Rate: 10 samples per second
- Electrode Resistance: 1 to 4 M Ω
- Interfering Ions: ClO_2^- , ClO_3^- , I^- , F^-

* RH = Relative Humidity

The Ion Selective Electrode Adapter AC021 is also available for purchase separately

Oxygen DT222A



Description

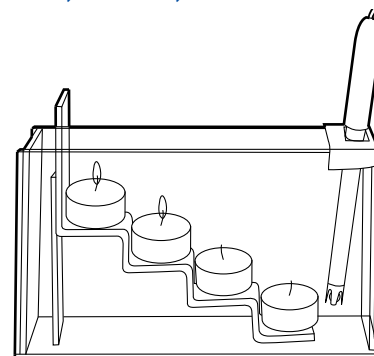
This Oxygen Sensor is a galvanic oxygen electrode, capable of measuring % O_2 in air and O_2 concentration in aqueous solutions in mg/L. The sensor consists of a galvanic oxygen sensitive electrode with a processing unit (oxygen adaptor, equipped with a calibration knob). The range can be determined directly on the data logger or via the MultiLab™ software.

Common usage

The Oxygen Sensor can be used to perform a wide variety of experiments in order to determine changes in % O_2 in air and dissolved oxygen levels (especially in aquariums), photosynthesis and respiration of plants and monitoring human respiration.

Specifications

- Range: 0 to 12.5 mg/L DO_2 ; 0 to 25 % O_2
- Accuracy: $\pm 7\%$ over entire range
- Resolution (12-bit):
 - 0 to 12.5 mg/L/0.003 mg/L
 - 0 to 25 % 0.007%
- Temperature Compensation: No
- Response Time for 95% of Reading: Up to 2 minutes
- Default Sample Rate: 10 samples per second
- Electrolyte: Sodium Hydroxide solution



pH DT016A



Specifications

- Range: 0 to 14 pH
- Accuracy: $\pm 2\%$ over entire range, after temperature compensation
- Resolution (12-bit): 0.004 pH
- Temperature Compensation: Yes
- Operating Temperature: 0 to 50 °C
- Response Time for 95% of Reading: 10 seconds
- Default Sample Rate: 10 samples per second

Description

The pH sensor is capable of measuring the entire range of 0 - 14 pH and is used for various experiments in Biology, Chemistry and Environmental Science. This sensor can replace the traditional pH meter and in addition, it automatically collects the pH data and the pH changes during chemical reactions and displays these changes in a graph. The pH sensor (DT016A) consists of the Fourier Systems adaptor (DT017) and a pH electrode (DT018) and is equipped with an automatic temperature compensation system.

Common usage

The pH Sensor is used for various experiments in Biology, Chemistry and Environmental Science. Common experiments include: measuring the pH of bodies of water over long periods of time, diffusion of liquids, acidification of milk, or acid-base titration, and more.

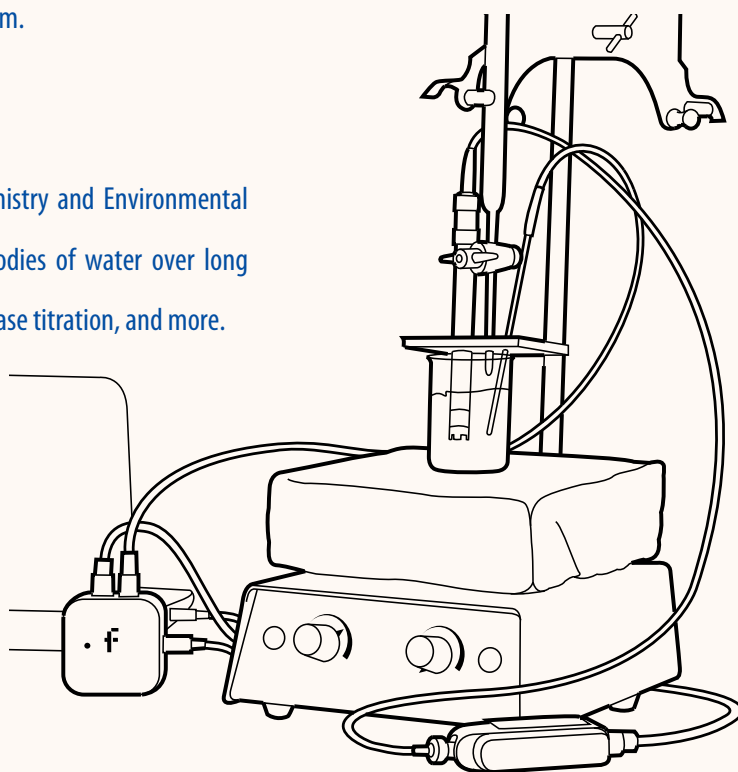


Photo Gate

DT137A



Specifications

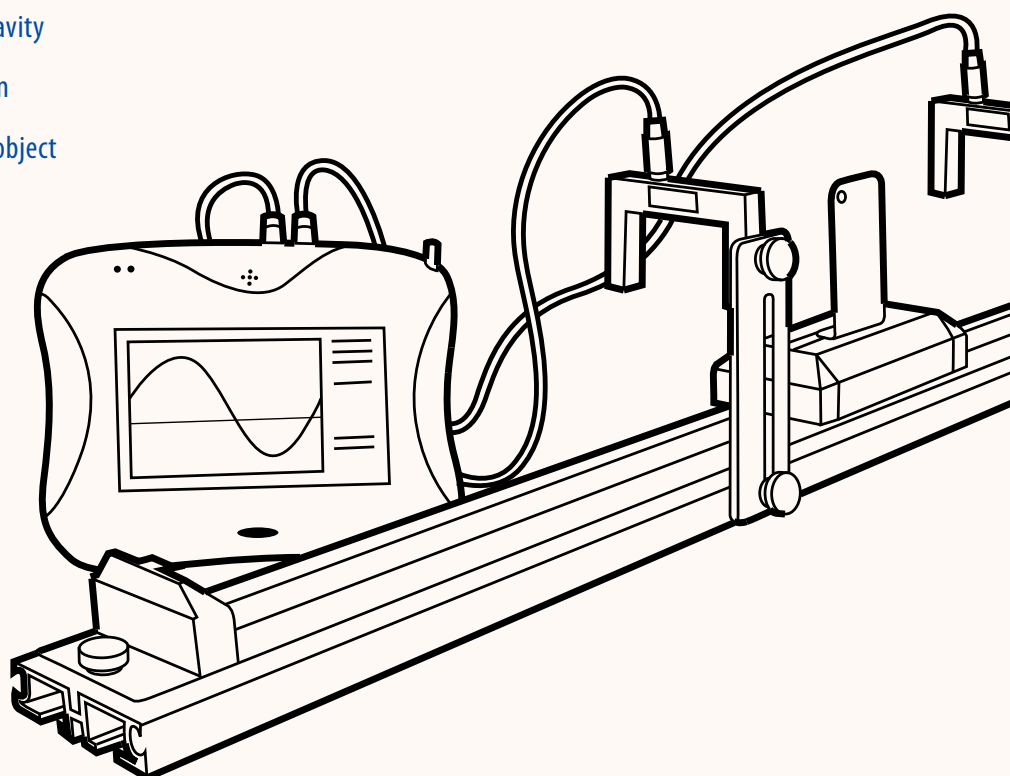
- Range: 0 to 5 V
- Detector rise time: 180 ns
- Detector fall time: 180 ns
- Parallax error: For an object passing within 1 cm of the detector, with a velocity less than 10 m/s, the difference between the true and effective length is less than 1 mm
- Infrared source:
Peak at 800 nm

Description

This general-purpose Photo Gate Sensor is commonly used to measure the time it takes for an object to pass between its arms. It is used for a wide variety of experiments in Physics and physical science classes.

Common usage

- Measuring acceleration due to gravity
- Studying the swing of a pendulum
- Measuring the speed of a rolling object
- Measuring the speed of objects undergoing collisions



Potassium Sealed Electrode AC008A



Description

This Potassium Electrode is a PermaFil (non-refillable) Ion-selective electrode, with a sealed, gel-filled reference chamber. No reference fill solution is required. The electrode is used to conduct water quality studies by measuring Potassium ions found in aqueous solutions.

The Potassium Electrode Set (AC008A) consists of PermaFil combination electrode (AC008) (this combines the Ion-selective electrode and the reference electrode) and Fourier's ISE amplifier (AC021).

Common usage

Some of the main areas in which Ion-selective electrodes have been used include water quality studies, determining the concentration of ammonium ions in aqueous solutions, pollution monitoring and agriculture & food processing.

Specifications

- Concentration Range: 1 M to 7×10^{-6} M or 90.04 ppm to 39,000 ppm
- Resolution (12-bit): 0.15 mV
- pH Range: 2.0 to 12.0 pH
- Temperature Range: 0 to 40 °C
- Minimum Sample Size: 3 mL in a 50 mL beaker
- Reproducibility: $\pm 2\%$
- Default Sample Rate: 10 samples per second
- Electrode Resistance: 10 to 20 M Ω
- Interfering Ions: Cs⁺, Nh⁴⁺, Ti⁺, H⁺, Ag⁺, Tris⁺, Li⁺, Na⁺

The Ion Selective Electrode Adapter AC021 is also available for purchase separately

Pressure (0 to 700 kPa) DT015-1



Description

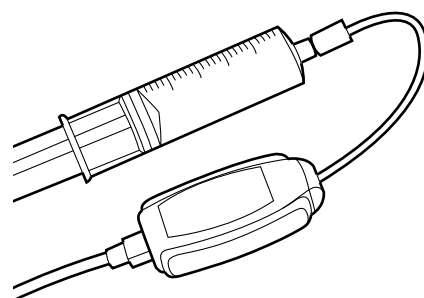
The Pressure Sensor (0-700 kPa) is an absolute gas pressure sensor. It measures applied external pressure relative to zero pressure reference sealed inside the sensor. The Pressure sensor's range is 0-700 kPa (0-6.9 atm or 0-7,000 mbar). Included with this sensor are a plastic tube with a Luer Lock Connector, suitable for experiments in small containers as syringes and valves.

Common usage

The Pressure Sensor is commonly used in Biology and Chemistry experiments, such as demonstrating Boyle's Law, Gay-Lussac's Law or measuring the rate of a chemical reaction.

Specifications

- Range: 0 - 700 kPa
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): 0.18 kPa
- Default Sample Rate: 10 samples per second
- Response Time (for 90% change in reading): 1 ms
- Operating Temperature: 0 to 85 °C



Pressure (150 - 1,150 mbar) DT015



Description

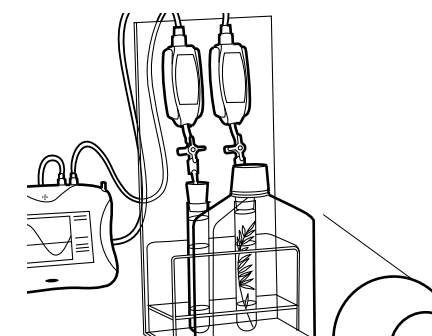
The Pressure Sensor (150-1,150 mbar) is an absolute gas pressure sensor that measures applied external pressure relative to zero pressure reference sealed inside the sensor.

Common usage

The Pressure Sensor can be used as an altimeter (measuring your current height) and as a barometer for various meteorological measurements. Typical uses include investigating the evaporation of water from terrestrial plants – transpiration, measuring the photosynthesis rate in water plants, measuring the respiration rate of germinating seeds, investigating the effect of light on photosynthesis rate and as well as examining the Ideal Gas Law.

Specifications

- Range: 150 to 1,150 mbar
- Accuracy: $\pm 1\%$ over entire range
- Resolution (12-bit): 0.25 mbar
- Default Sample Rate: 10 samples per second
- Response Time (for 90% change in reading): 1 ms
- Operating Temperature: 0 to 85 °C



Rain Collector AC013A



Description

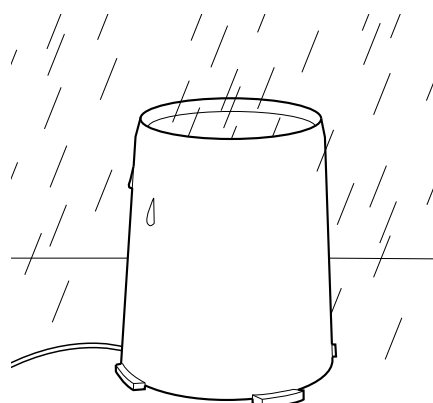
Fourier's Rain Collector is designed in accordance with the guidelines of the World Meteorological Organization. The Rain Collector consists of a collection cone and two tipping buckets.

Common usage

The Rain Collector is used in a variety of experiments in the areas of Climatology and Environmental Studies to measure the rainfall.

Specifications

- Range: 0 to 819 mm
- Resolution (12-bit): 0.02 mm
- Accuracy: ± 0.2 mm
- Data Logger Input Type: Digital



Rotary Motion DT148A



Description

This Rotary Motion Sensor measures angular position in very high resolution and counts the sensor pulley turns. It can also be used to measure linear motion with a resolution of 0.1 mm. This is done by rolling the pulley along a plane, or by hanging a string over the pulley. The Rotary Motion Sensor comes with a 3-step pulley and mounting rod. An optional accessory is also available: a pendulum that consists of a long light aluminum rod and two brass masses which can be attached at any point on the thin rod.

Common usage

Fourier's Rotary Motion Sensor is a sensitive, accurate angular and linear position sensor. Common experiments include: acceleration, pendulum, harmonic motion, torque, moments of inertia and for very accurate linear position in two slits laser interference.

Specifications

- Range: $\pm 128^\circ$
- Resolution (12-bit): 0.062°
- Accuracy: $\pm 0.125^\circ$
- Maximum Speed: 1 m/s
- Default Sample Rate: 10 samples per second
- 3-step Pulley Radius: 0.025 m, 0.015 m, 0.005 m
- Direction of Motion: Indicates
- Data Logger Input Type: Digital

Smart Pulley DT122A



Description

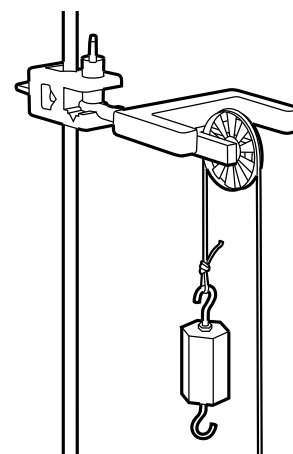
This Smart Pulley is comprised of a pulley and Photo Gate Sensor. It is used to measure the speed of a string suspended over the pulley by measuring the tangent velocity of the pulley.

Common usage

Primarily used in Physics mechanics experiments, the Smart Pulley is used to measure velocity and acceleration of moving objects and to learn Newton's laws of dynamics. Typical experiments include examining dynamics carts motions on a track, Newton's second law and the motion of an Atwood's machine.

Specifications

- Range: 0 to 99 m/s
- Accuracy: 0.05 m/s
- Resolution (12-bit): 0.024 m/s
- Max. Sampling Rate: 100 m/s
- Timing Interval: $< 5 \mu\text{s}$
- Parallax Error: For an object passing within 1 cm of the detector, with a velocity less than 10 m/s, the difference between the true and effective length is less than 1 mm.
- Infrared Source: Peak at 800 nm
- Data Logger Input Type: Digital



Soil Moisture DT171A



Description

Fourier's high-performance and high-accuracy Soil Moisture Sensor measures soil moisture from 0 to 200 centibar (cb). By measuring the soil moisture's electric resistance, this sensor converts data into calibrated readings of soil water suction. Included with this sensor are the soil moisture sensor, Fourier's adaptor and a BNC/ alligator cable.

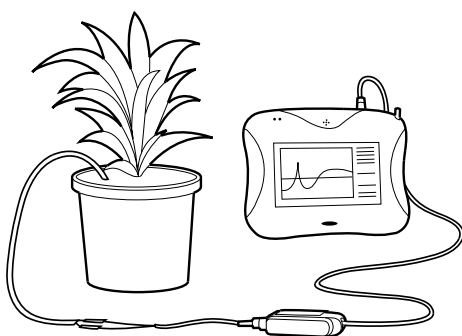
The sensor consists of two concentric electrodes embedded in a reference granular matrix material. The matrix material is surrounded by protective synthetic membrane and held in a stainless case.

Common usage

The Soil Moisture sensor is used to optimize irrigation and warn of plant stress at the dry or wet ends of the scale.

Specifications

- Range: 0 to 200 cbar, 0 to 200 kPa
- Accuracy: $\pm 2\%$ over entire range
- Resolution (12-bit): 0.05 cbar
- Default Sample Rate: 10 samples per second
- Operating Temperature Range: 0 to 40 °C (32 to 105 °F)



Sound Level DT320



Description

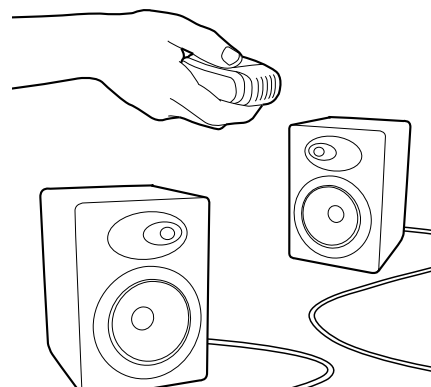
The Sound Level Sensor measures sound in decibels (dB) within the range of 45 to 110 dB, and is ideal for measuring environmental noises and room acoustics. This sensor includes a special voltage filter to screen out any noise that may come from the data logger's voltage line. There are three amplifying stages in this sensor and it automatically switches between stages, for maximum range and flexibility.

Common usage

Measuring sound level, investigating environmental noises and room acoustics, and studying sound isolation are just some of the common uses of the Sound Level Sensor.

Specifications

- Range: 45 to 110 dB
- Accuracy (at 23 °C ± 5 °C): ± 3 dB
- Resolution (12-bit): 0.05 dB
- Recommended Logging Rates: 10 or 25 samples per second
- Response Time: 20 ms
- Frequency: 31.5 to 8,000 Hz
- Operating Temperature: 0 to 50 °C (32 to 122 °F)
- Operating Humidity: Max. 90% RH (0 to 35 °C)



Spirometer DT037A



Description

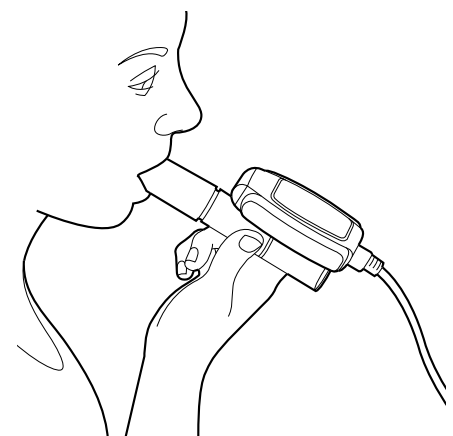
The Spirometer is a breathing sensor which allows students to conduct experiments in physiology. Based on air speed, the Spirometer calculates the airflow rate and lung capacity of the user breathing into the sensor. The results are shown in liters per minute. The Spirometer sensor consists of Fourier's sensor case, a unique breath sensor tube and removable single-use plastic nozzle.

Common usage

Typical experiments with the Spirometer Breathing Sensor would include investigating the lung capacity of athletes versus non-athletes, comparing lung capacity of smokers versus non-smokers and other general respiratory experiments.

Specifications

- Range: ± 315 L/min, ± 5.25 L/sec
- Accuracy: $\pm 8\%$ over entire range
- Resolution (12-bit): 0.16 L/min
- Default Sample Rate: 10 samples per second



Temperature PT-100 (-200 to 400 °C) DT027



Description

The PT-100 Temperature Sensor is a Platinum Resistance Thermometer (PRT) which offers high accuracy over a wide temperature range (from -200 to 400 °C). This sensor also includes Fourier's adaptor. It is ideally suitable for water and other chemical solution temperature measurements and due to the sensor's wide range (-200 to 400 °C), it can also be used as a thermometer for experiments in Chemistry, Physics, Biology, Earth Science, Environmental Science.

Common usage

The Temperature Sensor is commonly used in the research of extremely low temperatures and it is also a very powerful sensor for monitoring liquid gases and other materials.

Specifications

- Accuracy: $\pm 2\%$ over entire range
- Resolution (12-bit): 0.15 °C
- Default Sample Rate: 10 samples per second
- Response Time (for 90% change in reading):
 - 20 seconds in liquid
 - 40-60 seconds in air
- Feature: Equipped with an offset calibration screw
- Sensing Element: Located inside the sensor's tip

Temperature (-25 to 110 °C) DT029



Description

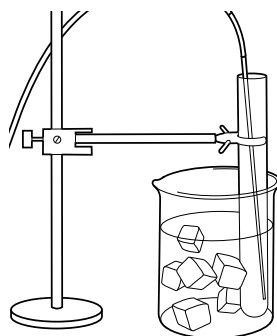
Fourier's stainless steel Temperature Sensor is both simple and durable. It is covered with a protective isolating material, making it significantly stronger than a traditional glass thermometer. The sensor connects directly to the data logger using a standard mini-din cable.

Common usage

With a range of -25 °C to 110 °C, it can be used for experiments in Chemistry, Physics, Biology, Earth Science, and Environmental Science. It is particularly well suited for conduction water and other chemical solution temperature measurements.

Specifications

- Accuracy: $\pm 2\%$ over entire range
- Resolution (12-bit): 0.03 °C
- Default Sample Rate: 10 samples per second
- Response Time (for 90% change in reading):
 - 20 seconds in liquid
 - 40 to 60 seconds in air
- Sensing Element: Located inside the sensor's tip



Temperature TC-K (0 to 1,200 °C) DT025



Description

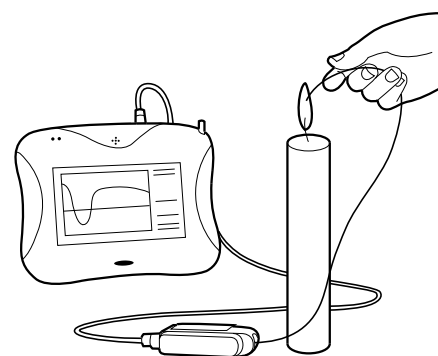
The Temperature TC-K sensor has a range of 0 to 1,200 °C and provides highly accurate measurements, with a maximum error of 2% over the entire range.

Common usage

The Temperature TC-K sensor is used to measure high temperature experiments such as monitoring chemical processes that occur in high temperatures, measuring the different temperatures in a flame or simply monitoring ovens.

Specifications

- Accuracy: $\pm 2\%$ over entire range
- Resolution (12-bit):
 - 0.3 °C
 - 0.55 °F
- Default Sample Rate: 10 samples per second



Turbidity DT095A



Description

Turbidity is the measure of the cloudiness of water - the cloudier the water, the greater the turbidity. Turbidity in water is caused by suspended matter, which will deflect (or scatter) light as it passes through the sample. The Turbidity Sensor takes measurement of the scattered light as compared to the amount of light scattered by a standard. Included with the sensor are 15 empty cuvettes and one bottle containing 100 NTU Formazin Standard.

Common usage

Because Turbidity affects water quality, this sensor can be used to examine the effect of turbidity on human health, industrial processes and the environment.

Specifications

- Range: 0 to 200 NTU
- Accuracy: 20% over entire range
- Resolution (12-bit): 0.25 NTU
- LED Wavelength: 875 nm
- Standard: Formazin 100 NTU
- Default Sample Rate: 10 samples per second

Voltage (± 25 V) DT001



Description

This Voltage Sensor is a differential sensor, capable of measuring both direct and alternate current. The sensor has two durable banana plugs for easy connection, as well as floating inputs, allowing one to connect any number of voltage sensors to a circuit without shortening them.

Common usage

The Voltage Sensor can be used in conducting experiments such as capacitor charging and discharging, studying of voltage characteristics of a light bulb and a diode, measuring magnetic induction, EMF and damped oscillations.

Specifications

- Range: ± 25 V
- Input Voltage: AC or DC
- Accuracy: ± 3 % over entire range
- Resolution (12-bit): 12.5 mV
- Maximum Sample Rate: 20,000 samples per second
- Input Resistance: 250 k Ω
- Maximum Input Voltage: 60 V

Voltage (± 2.5 V) DT002



Description

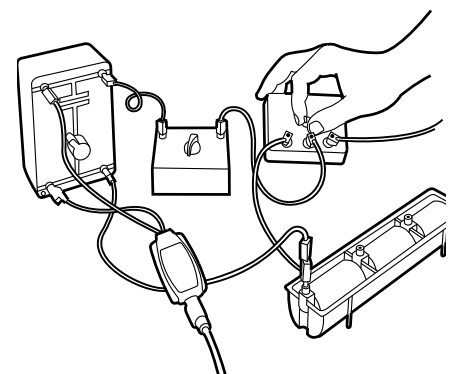
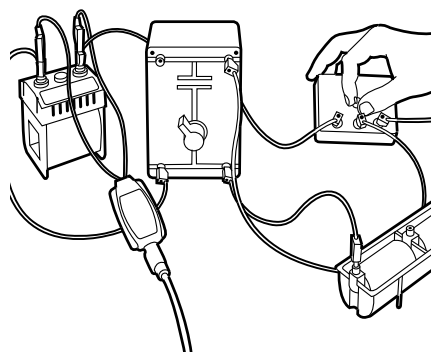
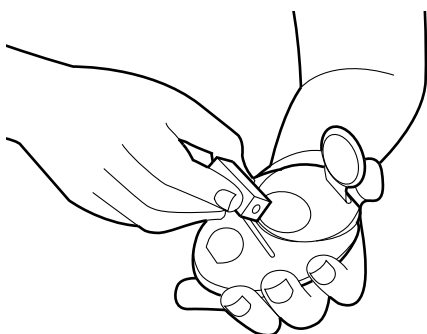
This Fourier sensor is a regular voltage sensor, measuring between -2.5 and 2.5 Volts. It is a differential sensor, capable of measuring both direct and alternate current. The sensor has two durable banana plugs for easy connection. The Voltage Sensor also has floating inputs, allowing any number of voltage sensors to a circuit to be connected, without shortening them.

Common usage

The Voltage Sensor is typically used in experiments such as capacitor charging and discharging, studying the voltage characteristics of a light bulb and a diode, EMF and damped oscillations.

Specifications

- Range: ± 2.5 V
- Input Voltage: AC or DC
- Accuracy: ± 3 % over entire range
- Resolution (12-bit): 1.25 mV
- Sensor Inputs: Differential and floating
- Input Resistance: > 1 M Ω
- Maximum Input Voltage: 60 V



Voltage (0 to 5 V) DT003



Description

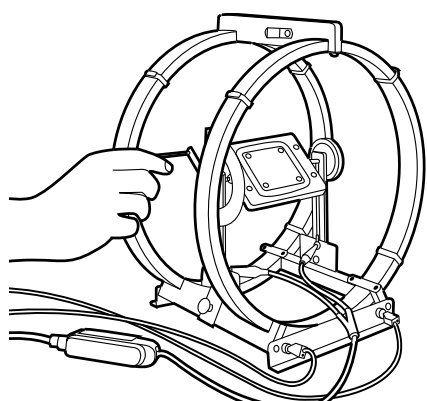
This regular Voltage Sensor measures voltage between 0 and 5 Volts. It has two durable banana plugs for easy connection. The sensor has floating inputs, which means that any number of voltage sensors can be connected to a circuit without shortening them.

Common usage

This Voltage Sensor is used in experiments such as capacitor charging and discharging, studying voltage characteristics of light bulb and diode, EMF and damped oscillations.

Specifications

- Range: 0 to 5 V
- Input Voltage: DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): 1.25 mV
- Sensor Inputs: Floating
- Input Resistance: $>1\text{ M}\Omega$
- Maximum Input Voltage: 60 V



Voltage (Triple Range) DT019



Description

A high precision, quick response sensor, Fourier's Voltage (triple range) Sensor is three sensors in one body. It is designed to take measurements in the ranges of: $\pm 1\text{ V}$, $\pm 10\text{ V}$ and $\pm 25\text{ V}$. The sensor is equipped with a switch for selecting the desired voltage range, and comes with two durable banana plugs for easy connection; and floating inputs, to connect any number of voltage sensors to a circuit without shortening them. This sensor is only compatible with Fourier's NOVA LINK data logger.

Common usage

This is a precise differential sensor, capable of measuring both direct and alternate voltage current and is suitable for use in a wide range of experiments in Physics and Chemistry. Typical Experiments performed using this sensor include: EMF and internal resistance, V-I characteristics of a wire, a light bulb and a diode, Connections of batteries, Resistance of a wire – Ohm's Law and many more.

Specifications

- Range: $\pm 1\text{ V}$, $\pm 10\text{ V}$, $\pm 25\text{ V}$
- Input Voltage: AC or DC
- Accuracy:
 - For: $\pm 1\text{ V}$ 1%
 - For: $\pm 10\text{ V}$ 1%
 - For: $\pm 25\text{ V}$ 2%
- Resolution (12-bit):
 - For: $\pm 1\text{ V}$ 0.5 mV
 - For: $\pm 10\text{ V}$ 5 mV
 - For: $\pm 25\text{ V}$ 12.5 mV
- Maximum Sample Rate: 10,000 samples per second
- Input Resistance: $1\text{ M}\Omega$
- Maximum Input Voltage: 200 V

EcoLogXL Sensors



Conductivity DT035A



Description

The Conductivity Sensor is designed to measure conductivity of liquids and solutions. It detects conductivity in the range of 0 to 20 mS (millisimens). It consists of a conductivity electrode, an adapter and a connecting wire.

Common usage

The Conductivity Sensor is used for various experiments in Biology and Chemistry. By using the Conductivity Sensor you can demonstrate changes in conductivity when dissolving salts in water, or monitor bodies of water for pollution. Conductivity Sensor can also be used for water salinity testing.

Specifications

- Range: 0 to 20 mS
- Accuracy: $\pm 8\%$ over entire range
- Resolution (12-bit): 5 μS
- Conductivity Cell Material: Carbon, 2-Cell
- K Cell Value: 1.0
- K cell Value Tolerance: $\pm 20\%$
- Temperature Range: 0 to 80 °C
- Minimum Sample Size: 25 mL
- Response Time for 95% of Reading: 5 seconds
- Default Sample Rate: 10 samples per second
- Features: Equipped with an offset calibration screw

Current ($\pm 2.5\text{ A}$) DT005



Description

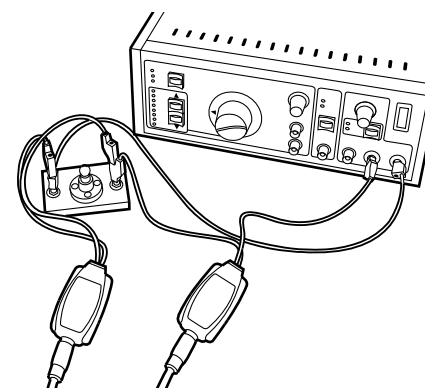
The Current Sensor is an ampere meter, measuring current values between -2.5 and 2.5 amperes. It is capable of measuring both direct and alternate current and includes two durable banana plugs for easy connection.

Common usager

The Current Sensor is used in various electricity experiments such as EMF and internal resistance, Ohm's Law, or the study of current characteristics of a light bulb and a diode.

Specifications

- Range: $\pm 2.5\text{ A}$
- Input Current: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): 1.25 mA
- Default Sample Rate: 10 samples per second
- Input Resistance: 0.1 Ω
- Maximum Input Current: 5 A



Current (± 250 mA) DT006



Description

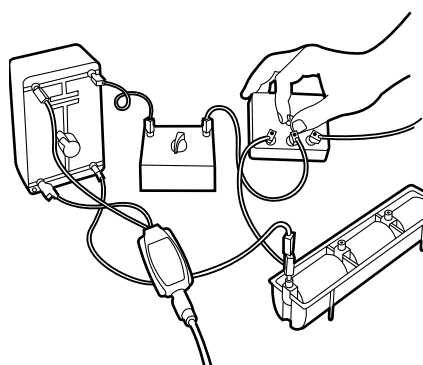
This sensor is an amper meter, measuring current values between -250 and 250 mA. It is a differential sensor, capable of measuring both direct and alternate current and includes two durable banana plugs for easy connection.

Common usage

This Current Sensor is used in various electricity experiments such as EMF and internal resistance, Ohm's Law, or the study of current characteristics of a light bulb and a diode.

Specifications

- Range: ± 250 mA
- Input Current: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution (12-bit): ± 125 μ A
- Default Sample Rate: 10 samples per second
- Input Resistance: $1\ \Omega$
- Maximum Input Current: 1.7 A



Distance (for EcoLogXL only) DT187A/B



Description

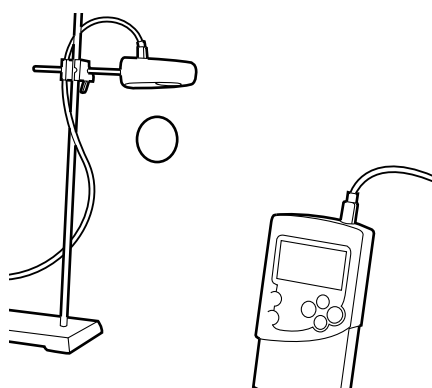
This analog Distance Sensor measures the distance between the sensor and an object and can sample data at up to 25 times per second, making it excellent for motion and movement experiments.

Common usage

The Distance Sensor functions according to the same principle as a sonar system. An ultrasonic loudspeaker and microphone are located inside the sensor's case. When the capacitor is discharged, the loudspeaker emits an ultrasonic pulse which hits the closest item (within range) to the sensor, and returns as an echo which can be processed and calculated.

Specifications

- Range: 0.4 m – 6 m
- Accuracy: 1% over entire range
- Resolution: 5.5 mm
- Sampling Rate:
 - 20 samples per second for distance up to 3 m
 - 10 samples per second for distance above 3 m
- Receiver Viewing Angle: $\pm 15^\circ$ to $\pm 20^\circ$
- Data Logger Input Type: Analog
- Features: Equipped with a reset button



Heart Rate (Exercise) DT298A



Description

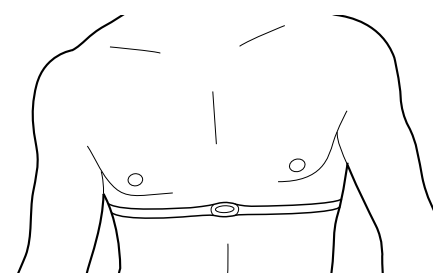
This sensor is ideal for measuring one's heart rate before, during and after exercise and is comprised of a wireless transmitter belt and a Pulse Receiver Module that plugs into the data logger. The Heart Rate Sensor, specifically the transmitter belt, senses the electrical signals generated by the heart and each heart beat sends an electrical signal to the Receiver Module, enabling the heart rate to be measured.

Common usage

Typical experiments performed using this sensor include comparing heart rates, evaluating heart rates of different individuals, comparing that of athletes vs. inactive individuals, monitoring the heart rate before, during and after brief vigorous activity (e.g. pushups) and monitoring the speed at which the heart rate returns to normal following exercise (recovery rate).

Specifications

- Range for NOVA5000 & MultiLogPRO Waveform: $0 - 5$ V
- Pulse: $0 - 200$ bpm (beats per minute)
- Transmitter Range: 80 cm
- Waveform Resolution (12-bit): 1.25 mV
- Max. Sampling Rate: 100 samples/sec
- Data Logger Input Type: Digital



Heart Rate (Pulse)

DT155A



Specifications

- Range: 0 – 5 V
- Waveform resolution: 5 mV
- Max. Sampling Rate: 50 samples/sec
- Data Logger Input Type: Digital

Description

The Heart Rate Sensor monitors the light level transmitted through the vascular tissue of the fingertip and the corresponding variations in light intensities that occur as the blood volume change in the tissue. It is so easy to use, even in large classes every student can have an opportunity to use this sensor. This sensor includes a finger clip.

Common usage

Typical experiments include: comparing the heart rate of athletes and sedentary people, checking a person's heart rate before and after brief vigorous aerobic activity and checking a person's heart rate before and after caffeine consumption.

pH DT016A



Specifications

- Range: 0 to 14 pH
- Accuracy: $\pm 2\%$ over entire range, after temperature compensation
- Resolution (12-bit): 0.004 pH
- Temperature Compensation: Yes
- Operating Temperature: 0 to 50 °C
- Response Time for 95% of Reading: 10 seconds
- Default Sample Rate: 10 samples per second
- Feature: Equipped with an offset calibration screw
- Sensor Storage: Store the pH electrode in its storage solution when not in use

Description

The pH sensor is capable of measuring the entire range of 0 - 14 pH and is used for various experiments in Biology, Chemistry and Environmental Science. This sensor can replace the traditional pH meter and in addition, it automatically collects the pH data and the pH changes during chemical reactions and displays these changes in a graph. The pH sensor (DT016A) consists of the Fourier Systems adaptor (DT017) and a pH electrode (DT018) and is equipped with an automatic temperature compensation system.

Common usage

The pH Sensor is used for various experiments in Biology, Chemistry and Environmental Science. Common experiments include: measuring the pH of bodies of water over long periods of time, diffusion of liquids, acidification of milk and more.

Oxygen DT222A



Description

This Oxygen Sensor is a galvanic oxygen electrode, capable of measuring % O₂ in air and O₂ concentration in aqueous solutions in mg/L. The sensor consists of a galvanic oxygen sensitive electrode with a processing unit (oxygen adaptor, equipped with a calibration knob). The range can be determined directly on the EcoLogXL data logger or via the MultiLab™ software.

Common usage

The Oxygen Sensor can be used to perform a wide variety of experiments in order to determine changes in % O₂ in air and dissolved oxygen levels (especially in aquariums), photosynthesis and respiration of plants and monitoring human respiration.

Specifications

- Range: 0 – 25 % O₂
- Accuracy: ±7 % over entire range
- Resolution: 0.025 %
- Temperature Compensation: No
- Response Time:
90% response in less than 30 seconds
- Default Sample Rate: 10 samples per second
- Membrane: Teflon
- Electrolyte: Sodium Hydroxide solution
- Features: Equipped with an offset calibration knob

Photo Gate DT137A



Description

This general-purpose Photo Gate Sensor is commonly used to measure the time it takes for an object to pass between its arms. It is used for a wide variety of experiments in Physics and physical science classes.

Common usage

- Measuring the acceleration due to gravity
- Studying the swing of a pendulum
- Measuring the speed of a rolling object
- Measuring the speed of objects undergoing collisions

Specifications

- Range: 0 V – 5 V
- Detector Rise Time: 180 ns
- Detector Fall Time: 180 ns
- Parallax Error:
For an object passing within 1 cm of the detector, with a velocity less than 10 m/s, the difference between the true and effective length is less than 1 mm
- Infrared Source: Peak at 800 nm
- Data Logger Port: Digital

Spirometer DT037A



Description

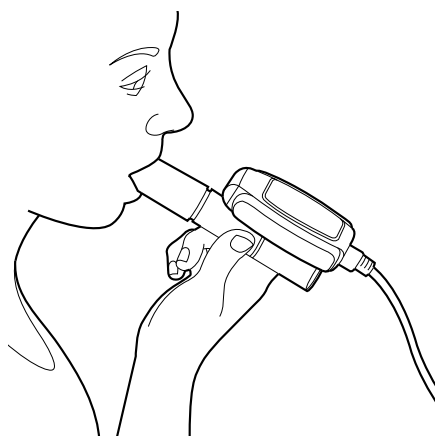
The Spirometer is a breathing sensor which allows students to conduct experiments in physiology. Based on air speed, the Spirometer calculates the airflow rate and lung capacity of the user breathing into the sensor. The results are shown in liters per minute. The Spirometer Sensor includes a unique breath sensor tube and removable single-use plastic nozzle.

Common usage

Typical experiments with the Spirometer Breathing Sensor include investigating the lung capacity of athletes versus non-athletes, comparing lung capacity of smokers versus non-smokers and other general respiratory experiments.

Specifications

- Range: ± 315 L/min
- Accuracy: $\pm 8\%$ over entire range
- Resolution: 0.64 L/min
- Default Sample Rate: 10 samples per second



Temperature TC-K (0 to 1,200 °C) DT025



Description

The Temperature TC-K sensor has a range of 0 to 1,200 °C and provides highly accurate measurements, with a maximum error of 2% over the entire range. It includes 20 cm thermocouple wire.

Common usage

The Temperature TC-K sensor is used to measure high temperature experiments such as monitoring chemical processes that occur in high temperatures, measuring the different temperatures in a flame or simply monitoring ovens.

Specifications

- Range:
 - 0 °C - 1200 °C
 - 32 °F - 2192 °F
- Accuracy: $\pm 2\%$ over entire range
- Resolution:
 - 1.2 °C
 - 2.2 °F
- Default Sample Rate: 10 samples per second
- Feature: Equipped with an offset calibration screw

Temperature (-10 to 110 °C) DT241



Description

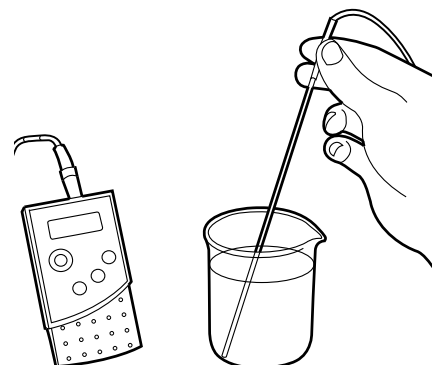
This Temperature Sensor is compatible with the EcoLogXL data logger. The sensor is coated with isolating material for better durability. It measures temperature between -10 °C and 110 °C, and has an accuracy of ± 1 °C. It is highly suitable for conducting water and other chemical solution temperature measurements.

Common usage

The Temperature Sensor can be used in experiments such as examining endothermic reactions or the combined gas law. Its durable construction makes it suitable for use in long-term measurements on bodies, in water or outdoor temperature.

Specifications

- Dual range:
 - -10°C to +110°C (14°F to 230°F)
 - -10°C to +50°C (14°F to 122°F)
- Resolution: 0.2°C
- Accuracy: ± 1 °C
- Resistant to mild chemical solutions



Voltage (± 25 V) DT001



Description

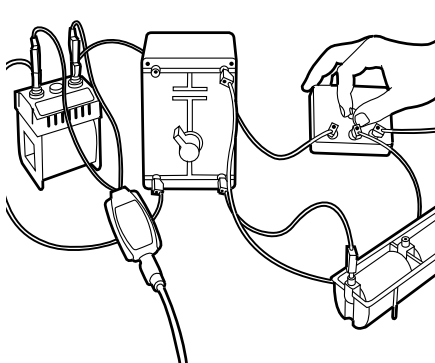
This Voltage Sensor is capable of measuring between -25 and 25 volts. It is a differential sensor, capable of measuring both direct and alternate current. The sensor has two durable banana plugs for easy connection, as well as floating inputs, allowing one to connect any number of voltage sensors to a circuit without shortening them.

Common usage

The Voltage Sensor can be used in conducting experiments such as capacitor charging and discharging, studying of voltage characteristics of a light bulb and a diode, measuring magnetic induction, EMF and damped oscillations.

Specifications

- Range: ± 25 V
- Input Voltage: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution: 50 mV
- Maximum Sample Rate: $20,000$ samples per second
- Input Resistance: 250 k Ω
- Maximum Input Voltage: 60 V



Voltage (± 2.5 V) DT002



Description

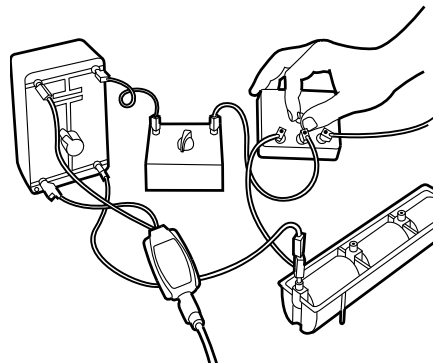
This sensor is a regular voltage sensor, measuring between -2.5 and 2.5 volts. It is a differential sensor, capable of measuring both direct and alternate current. The sensor has two durable banana plugs for easy connection. The Voltage Sensor also has floating inputs, allowing any number of voltage sensors to a circuit to be connected, without shortening them.

Common usage

The Voltage Sensor is typically used in experiments such as capacitor charging and discharging, studying the voltage characteristics of a light bulb and a diode, EMF and damped oscillations.

Specifications

- Range: ± 2.5 V
- Input Voltage: AC or DC
- Accuracy: $\pm 3\%$ over entire range
- Resolution: 5 mV
- Sensor Inputs: Differential and floating
- Input Resistance: >1 M Ω
- Maximum Input Voltage: 60 V





A student with dark hair is looking at a white science kit device with a yellow handle. The device has a screen displaying a red line graph. A hand is pointing at the screen with a yellow pen. The background is blurred, showing another person's face.

Science Kits

Fourier is proud to supplement its core science education solution with accessory kits that expand and enhance the science learning experience for both teachers and students. TERRA NOVA, introduced this year, is comprised of 3 kits that explore solar energy, wind energy and a combination of the two. These hands on kits will advance the exploration of alternative energy technologies and their impact on everyday life.

In addition, Fourier has re-introduced the Weather Station with an upgraded version of the WeatherLab software. It is a sturdy, solar-powered, wireless unit for teaching Earth Science to middle school and high school students, featuring 6 built-in sensors.

Fourier's Dynamics System is an ideal accessory for the high school Physics laboratory that lets students perform hands-on activities in the field of Mechanics, and it is also well suited for teaching Motion to Middle School students.



TERRA NOVA

Solar & Wind Renewable Energy Science Education Kits

Encouraging students to explore sustainable energy solutions and discover the benefits of solar and wind power can go a long way to improving the quality of life on Earth. Fourier is pleased to introduce, TERRA NOVA, renewable energy science education kits, which provide teachers and students with the tools needed to effectively investigate this topic.



Solar Energy Kit

P/N: TN001

The Solar Energy Kit will introduce students to the basic concepts of solar energy and its properties and enable them to explore the different parameters that impact the electricity produced. Included in the TERRA NOVA Solar Energy Kit is a unique circuit board upon which students can connect a number of solar modules and electronic components, either in a series or in parallel, in a simple and easy-to-use setup.

Wind Energy Kit

P/N: TN003

The Wind Energy Kit aims to teach students to explore and understand the parameters of wind energy and how to convert it into electricity. A powerful and compact fan, especially designed for this kit, is included, as well as a profile rail and wind turbines that can accommodate blades of different numbers.

Solar & Wind Energy Premium Kit

P/N: TN005

With the Solar and Wind Energy Premium Kit, the two most prevalent sources of renewable energy can now be investigated in one user-friendly kit. Students will be able to compare and contrast the benefits of either technology and develop a better understanding of how and when to use either technology.



	Component	Solar Energy Kit (P/N: TN001)	Wind Energy Kit (P/N: TN003)	Solar & Wind Energy Premium Kit (P/N: TN005)
1	Case			✓
2	Plastic tray with cover	✓	✓	
3	Large main board	✓		✓
4	Small main board		✓	
5	2 circuit diagrams (series and parallel connection)	✓		✓
6	Buzzer module	✓	✓	✓
7	Potentiometer module	✓	✓	✓
8	Diode module	✓	✓	✓
9	Resistance module			✓
10	3 small solar modules (0,5V, 420mA)	✓		✓
11	1 large solar module (0,5V, 840mA)	✓		
12	4 solar cell covers	✓		✓
13	Illumination module	✓		✓
14	Savonius rotor module			✓
15	Wind turbine module with 2 blades		✓	✓
16	Additional 3- and 4-blades wind rotor		✓	✓
17	Wind machine module		✓	✓
18	Profile rail for wind machine		✓	✓
19	Power supply for illumination module and wind machine (including key for adjusting voltage)	✓	✓	✓
20	CD with offered experiments	✓	✓	✓

Weather Station™

A great tool for teaching earth science & monitoring your local weather

Fourier's Weather Station is a sturdy, solar-powered, wireless unit for teaching Earth Science to middle school and high school students. This, easy-to-use station features 6 built-in sensors: ① Temperature, ② Humidity, ③ Barometric Pressure, ④ Rain Collector, ⑤ Wind Speed and ⑥ Wind Direction.

The weather station features a wireless ⑦ data transmitter that transmits data to a receiver connected to the PC USB or serial port, with a range of 300 meters.



Specifications			
Input	Sensors	Range	Accuracy
	Temperature	-40 to 60°C	±0.2°
	Humidity	0 to 100 % RH	±1.5%
	Barometric Pressure	1500 to 1150mBar	±15mB
	Rain Collector	819mm	±0.2mm
	Wind Speed	5 to 282km/h	±5km/h
	Wind Direction	0 to 360 °	±7°
Output	USB, Serial or RF connection		
Sampling Rates	From 1 sample per hour to 1 sample per second		
Sample Memory	104,000 samples		
Display	2 lines x 16 characters		
Power Supply	Solar Panel + rechargeable battery or external power		
Software	WeatherLab™ 2.5		
RF Transmission	Frequency: 433MHz		
	Range: 300m (75m indoors)		
	Power: 10dBm		
	ETS 300 - 220 compliance		
Standards Compliance	CE, FCC compliant		

Weather Station Key Features:

- Robust meteorological apparatus with 6 sensors
- Weather Lab™, user-friendly data analysis software
- Wireless data transmission up to 300 meters
- Solar-powered
- Carrying case for field installation

WeatherLab™ 2.5

Analyzing the data with the WeatherLab software enables students to create monthly weather reports, view real-time data, compare results with earlier data, perform functions like average, minimum, maximum and export data to spread sheets.

This allows users to easily configure different types of stations by selecting different sensors.



In addition, the WeatherLab application allows students to present data in a number of different views, such as, meter, graph and table. Recorded data can also be exported to Excel for further analysis and mathematical manipulation.

WeatherLab Key Features:

Real-time Data

- Real-time live weather data monitoring with eight simultaneous graph and meter displays - for example:
 - Temperature
 - Humidity
 - Barometric Pressure
 - Rainfall
 - Wind Speed
 - Wind Direction
- Option to define and display other vendor sensors
- Daily monthly, yearly rain bars
- Wind direction represented by compass rose, frequency or vector graphs
- Daily minimum and maximum temperature readings
- Dew point calculations

Archived Data

- Archive station data reports: calculating totals and averages
- Data viewing in single or multiple graph and table modes
- Analyze weather trends
- Data display tools: zoom, marker, and pan
- Print or export data to Excel



Dynamics System

Fourier's Dynamics System provides teachers and students with an ideal tool for performing hands-on activities in the field of Mechanics. Featuring a low-friction track for accurate and multipurpose experimentation, the Dynamics System provides the complete solution for the Physics laboratory.

The Dynamics System is also an excellent tool for teaching Motion to Middle School students. The Dynamics System is fully compatible with all Fourier's data loggers.



Common teaching topics:

- Kinematics
- Dynamics
- Newton's Laws
- Collisions
- Impulse and Momentum
- Mechanics Energy Conservation
- Simple Harmonic Motion



Ideal for use with the following sensors:

- Distance Sensor
- Dual Access
- Photogate
- Magnetic Sensor
- Force Sensor
- Smart Pulley

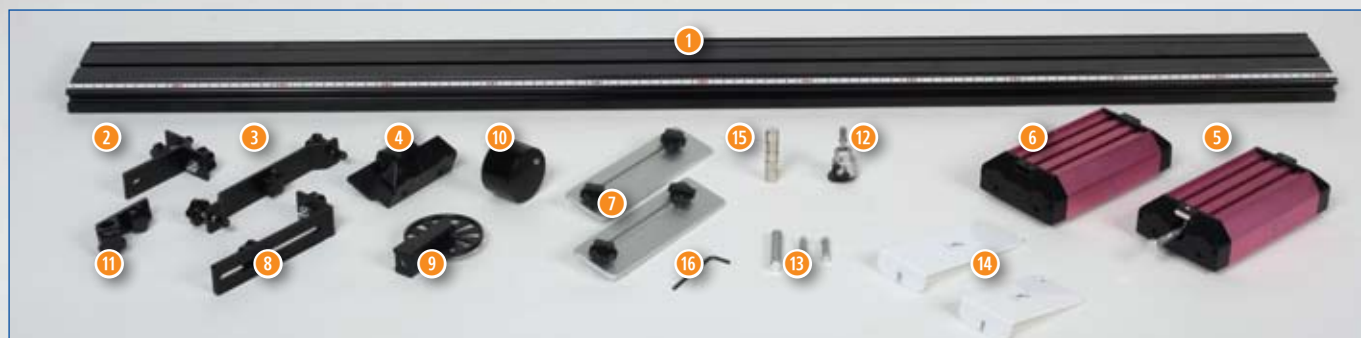


Typical experiments:

- Motion with constant velocity
- Motion on an Inclined Plane
- Motion under Constant Acceleration
- Coefficient of Friction
- Newton's First Law
- Newton's Second law
- Conservation of Mechanical Energy
- Momentum Conservation in Collisions
- Energy Conservation in Collisions
- Inelastic Collisions and Elastic Collisions
- Impulse and Momentum
- Oscillation on an Inclined Plane
- Simple Harmonic Motion
- And more...



The Dynamics System includes:



- | | | |
|-------------------------|---|---|
| 1. 1.2 m track | 7. Two brackets for Photogate and Distance sensor | 12. Distance sensor fastener for cart |
| 2. Single-foot end stop | 8. Pulley bracket | 13. Generic Fasteners (one large and two small) |
| 3. Double-foot stand | 9. Pulley | 14. Two flags |
| 4. Adjustable end stop | 10. 500 g mass | 15. Two sets of Neodymium magnets |
| 5. Plunger cart | 11. Rod clamp | 16. Mini wrench |
| 6. Standard cart | | |



Accessories

Complementing Fourier's science education solutions is a full range of accessories designed to further enhance the science learning experience.

Also included in this section are cases, cables and adaptors for all of Fourier's data loggers as well as a number of add-on products specifically designed for the NOVA5000 such as a the NOVAScope and mini keyboard & mini mouse.

NOVA5000™ Accessories



AC/DC adaptor for NOVA5000
Part Number: NovaCRG
12458 - US / 12460 - EUR /
12457 - UK



Carrying Case (Blue)
Part Number: NovaCAS-B



Carrying Case (Yellow)
Part Number: NovaCAS



Carrying Case (Large)
Part Number: NovaCAS-L



Mini USB Keyboard
Part Number: MiniKBD



Mini USB Mouse
Part Number: NovaMUS



NOVAScope
USB Microscope
Magnification 50x or 200x
Part Number: DT338



NOVA5000 Sensor Cable Pack
Part Number: DT315



Rechargeable battery pack
for NOVA5000 (up to 8 hours)
Part Number: Nova4AH



Stylus (Blue) Qty 30
Part Number: 12781



Stylus (Yellow) Qty 30
Part Number: 12780



USB WiFi dongle
for NOVA5000 SX
Part Number: NovaWIFI



Webcam
Part Number: DT339

Cables



EcoLogXL MAC Com. Cable
Part Number: DT044



EcoLogXL Sensor Cable
Part Number: DT097



Female to Female adapter
Part Number: DT129



MAC comm cable
Part Number: DT046



MultiLogPRO PC Com. Cable 30 m
Part Number: DT146



PC Serial Cable 1.5 m
Part Number: DT135



Sensor Cable 1.5 m
Part Number: DT022



Sensor Cable 10 m
Part Number: DT057



Sensor Cable 25 cm
Part Number: DT206



Sensor Cable for Anemometer (Wind Speed & Direction)
Part Number: DT341



Sensor Cable Pack
Part Number: DT170



Sensor Cable Pack
4 Sensor Cables for NOVA LINK
Part Number: 13706



Sensor Cable Pack
NOVA5000 sensor cables
Part Number: DT315



Splitter Cable
Part Number: DT011



USB Comm Cable
Part Number: DT180



Vernier Adaptor -BT Connector
Part Number: DT085



Vernier Adaptor DIN Connector
Part Number: DT023



Mini USB Cable for EcoLogXL
Part Number: DT239

Experiment Equipment



Pressure Kit

Part Number: 13877

This kit contains all of the accessories needed to perform chemistry and biology experiments using any of Fourier's pressure sensors.



Picket Fence

Part Number: DT260

Miscellaneous



AC/DC adapter

Part Number:
MultiLogPRO:
DT246 - US / DT245 - EUR
DT282 - UK

EcoLogXL:
DT268 - US / DT267 - EUR
DT269 - UK / DT294 - JP



Rechargeable battery for MultiLogPRO

Part Number: 12070



Rechargeable battery for EcoLogXL

Part Number: 11304



WebCam

Part Number: DT339



Carrying case for MultiLogPRO

Part Number: DT061



Carrying case for the EcoLogXL

Part Number: DT240

Pedagogic Content



In addition to Fourier's data loggers, software and sensors, the company has developed a rich library of proprietary science activity books, workbooks and multimedia content. Our experiment packs, CDs and manuals are bursting with over 200 student activities.

All of these activities include equipment checklists, setup procedures and step-by-step instructions for successful experimentation. Many topics include a detailed teacher's guide as well.

Students are encouraged to evaluate their data and demonstrate to teachers that scientific concepts have really been understood via data analysis exercises with

graphs, content equations and questions. Feedback from teachers has indicated that they love Fourier's "Further Suggestions" section containing helpful hints enabling students to broaden the scope of an experiment and explore the wider scientific concept.

Recent pedagogical research has shown that introducing multimedia elements into a hands-on science curriculum increases student interest, involvement and motivation for learning science, both in school and at home. To that end, Fourier provides teachers with a multimedia experiment library, included with the MultiLab software. This library includes video experiments, workbooks, and simulations.

Subject / Logger	NOVA5000	NOVA LINK	MultiLogPro	EcoLogXL
Biology	<p>Experiments in Biology P/N: BK102, Page 100</p> <p>NOVAScope™ Activities P/N: BK211, Page 100</p>	<p>Experiments in Biology P/N: BK029, Page 102</p>		
Chemistry	<p>Experiments in Chemistry P/N: BK103, Page 100</p> <p>NOVAScope™ Activities P/N: BK211, Page 100</p>	<p>Experiments in Chemistry P/N: BK225, Page 102</p>	<p>Experiments in Chemistry P/N: BK030, Page 103</p>	
Environmental Science	<p>Exploring Climate Change P/N: BK 232, BK 233, Page 101</p> <p>Climate & Noise in Urban Areas P/N: BK 209, BK 210, Page 101</p> <p>NOVAScope™ Activities P/N: BK211, Page 100</p>	<p>Environmental Science & Water Quality P/N: BK055, Page 103</p>		
Math	<p>Math Functions in Science P/N: BK145, BK146, Page 101</p>	<p>Math in Science Experimentation P/N: BK082, BK083, Page 103</p>		
Physics	<p>Experiments in Physics P/N: BK101, Page 102</p>	<p>Experiments in Physics P/N: BK031, Page 104</p>		
Renewable Energy		<p>Experience Solar & Wind Energy with TERRA NOVA P/N: BK223, BK224, Page 104</p>		
General Science		<p>Middle School Activities P/N: BK061, Page 104</p>		<p>Experiments with EcoLogXL P/N: BK046, Page 105</p>
		<p>Fourier Sensors Guide P/N: BK021, Page 105</p>		
Digital Content	<p>Pages 104 - 106</p>			

NOVA5000 Experiments in Biology

P/N: BK102



Logger: NOVA5000

Description

The NOVA5000 Biology experiment book has 30 student experiments divided into five subject groups: Plant Physiology, Cell Processes, Microorganisms, Human Physiology, and Environment.

For user convenience we have added an index in which the experiments are sorted according to sensors. As with all Fourier experiments, you'll find a brief description of the concept and theory as well as equipment lists, setup procedures, experiment procedures, data analysis, questions and further suggestions.

Experiments in:

- Physiology
- Perspiration
- Heat Transfer
- Photosynthesis
- Acidification of Milk
- Fermentation
- Heart Activity
- Dissolved Oxygen Levels
- Environmental Studies

NOVAScope™ Activities

P/N: BK211



Logger: NOVA5000

Description

This booklet, designed for students (grades 3-9), contains five experiments that demonstrate a variety of uses of the NOVAScope™ in different areas of science teaching: Biology, Geology and Chemistry.

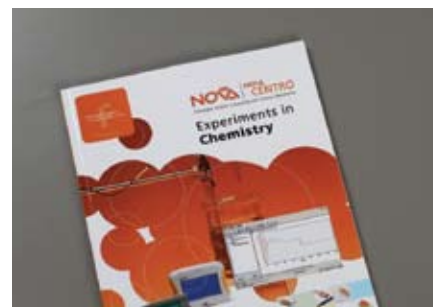
The experiments are structured in an inquiry and problem solving approach in order to increase students' interest. Each experiment is formatted in two versions: a Teacher Guide, which includes more detailed information about the setup of the experiments, expected results and answers to questions, and a Student Guide.

Experiments in:

- Who Is the Criminal?
- Which Soil Is Best to Grow a Camelia?
- Where Is the Embryo?
- Where Are the Stomata?
- What Fabrics Are Made of?

NOVA5000 Experiments in Chemistry

P/N: BK103



Logger: NOVA5000

Description

The NOVA5000 Chemistry experiment book presents more than twenty key Chemistry experiments divided for the user convenience according to the required probeware, as well as by topic. The book contains concept, setup and analysis as well as questions and further suggestions. Experiments cover endothermic reactions, acid-base titration, oxidation and energy contents of food to name just a few.

Experiments in:

- Acid Base Reactions
- Exothermic Reactions
- Endothermic Reaction
- Gas Laws
- Equilibrium
- Energy
- Colorimetry

Exploring Climate Change: How CO₂ Impacts our Lives

P/N: Teacher BK232, Student BK233



Logger: NOVA5000

Description

In order for students to effectively study the Environment, it is necessary to look at both natural processes and human activity. This book includes 10 experiments that explore the impact of CO₂ concentration on the atmospheric temperature.

Experiments in:

- Effect of Human Activity on Atmospheric CO₂ Concentration
- Photosynthesis and Atmospheric CO₂ Concentration
- CO₂ Penetration from the Ocean
- Effect of Calcite Dissolution on Water Acidity

Climate & Noise in Urban Areas

P/N: Teacher BK209, Student BK210



Logger: NOVA5000

Description

This book contains 11 activities that enable teachers and students to explore three main topics that relate to urban areas: Urban Heat Islands, Noise Pollution and Air Pollution.

Experiments in:

- Measuring Sound Noise in an Open Space
- Protection from Noise Pollution
- Effect of Sunlight on Pavement Temperature
- Air Pollution and Acid Precipitation

NOVA5000 Math Functions in Science

P/N: Teacher BK146, Student BK145



Logger: NOVA5000

Description

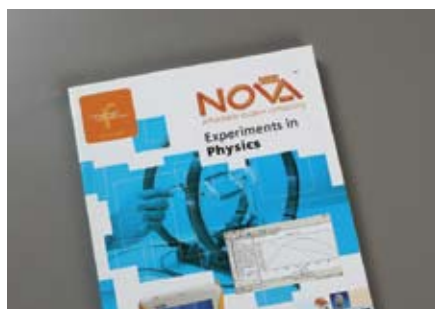
Providing an even more comprehensive teaching and learning tool for middle and high school mathematics. Offering the latest in mathematical analysis learning techniques and modeling, the experiment books and teacher guide helps math concepts become tangible through hands-on practice. Activities are integrated with the MultiLab CE software, facilitating query-based math exploration and include:

Experiments in:

- Calculating the basic function coefficients, such as:
linear, quadratic, power, sinusoidal, and exponential functions
- Plotting the manual line fit of the basic function on the graph
- Applying automatic curve fit to the graph

NOVA5000 Experiments in Physics

P/N: BK101



Logger: NOVA5000

Description

The NOVA5000 Physics experiment book has been written and designed by teachers with the specific needs of the school Physics lab in mind. Fourier's extensive range of physics probeware can be used in experiments covering mechanics, electricity, magnetism, sound, light and waves to name a few.

Experiments in:

- Mechanics
- Electricity
- Magnetism
- Sound
- Light
- Waves

Experiments in Biology

P/N: BK029



Loggers: NOVA LINK, MultiLogPro

Description

Biology experiment books are filled with activities that make real-time measurements of human physiology, biological catalysis, osmosis and photosynthesis, to name a few. Humidity, temperature, heart-rate, light, pressure, pH and EKG are just some of the sensors used in the experiments.

Experiments in:

- Physiology
- Perspiration
- Heat Transfer
- Photosynthesis
- Acidification of Milk
- Fermentation
- Heart Activity
- Dissolved Oxygen Levels
- Environmental Studies

Experiments in Chemistry

P/N: BK225



Loggers: NOVA LINK, MultiLogPro

Description

This Experiments in Chemistry Book, design exclusively for use with NOVA LINK, is an updated version that features activities that incorporate Fourier's Pressure Kit (P/N 13877), as opposed to needles. Twenty basic and advanced experiments are included, such as:

Experiments in:

- Acid Base Reactions
- Gas Laws
- Exothermic & Endothermic Reactions
- Food Energy

Experiments in Chemistry

P/N: BK030



Loggers: NOVA LINK, MultiLogPro

Description

The Fourier Chemistry experiment book covers 20 crucial Chemistry experiments, among them reduction and oxidation reactions, matter-states, chemical catalysts, thermochemistry, gas laws and acid-base reactions. Experiments engage the use of pH electrodes, temperature, pressure, conductivity and colorimeter sensors, thermocouples and more.

Experiments in:

- Acid Base Reactions
- Exothermic Reactions
- Endothermic Reaction
- Gas Laws
- Equilibrium
- Energy
- Colorimetry

Environmental Science & Water Quality

P/N: BK039



Loggers: NOVA LINK, MultiLogPro

Description

Students can experiment in the field and then collaborate in innovative projects using sophisticated data analysis to measure a number of elements including weather changes, effects of pollution on their environment and the cleanliness of their water. This helps students develop an understanding of the value of a clean environment and a respect that water is essential for life.

Experiments in:

- Experiment samples:
- Stream Flow
- Temperature Test
- pH Test
- Dissolved Oxygen Test
- Turbidity Test

Math in Science Experimentation

P/N: Teacher BK082, Student BK083



Loggers: NOVA LINK, MultiLogPro

Description

Providing an even more comprehensive teaching and learning tool for middle and high school mathematics. Offering the latest in mathematical analysis learning techniques and modeling, the experiment books and teacher guide helps math concepts become tangible through hands-on practice. Activities are integrated with the MultiLab CE software, facilitating query-based math exploration.

Exercises in:

- Displaying data in different formats, such as graphs, tables, and meters
- Calculating the basic function coefficients, such as: linear, quadratic, power, sinusoidal, and exponential functions
- Plotting the manual line fit of the basic function on the graph
- Applying automatic curve fit to the graph

Experiments in Physics for NOVA LINK and MultiLogPRO

P/N: BK031



Loggers: NOVA LINK, MultiLogPro

Description

We've added 36 new experiments to the Fourier Physics experiment book, with activities in mechanics, electricity, magnetism, sound, light and waves. Students will become familiar with experiment tools that include distance, force, rotary motion, voltage, current, magnetic field and sound sensors, as well as temperature sensors, photo-gates, capacitors/resistors, solenoids and much more.

Experiments in:

- Mechanics
- Electricity
- Magnetism
- Sound
- Light
- Waves

Experience Solar & Wind Energy with TERRA NOVA

P/N: Teacher BK223, Student BK224



Loggers: NOVA LINK, MultiLogPro

Description

Designed for use with Fourier's TERRA NOVA Renewable Energy Kits, these books will guide both teachers and students in understanding the properties of solar energy cells and wind power. These books contain 25 activities that explore the conditions and variables that generate clean, renewable energy, such as:

Experiments in:

- Dependence of a solar cell on illumination density
- The effect of shade on solar cells
- IV characteristics of a solar cell
- Dependence of wind speed on a the output voltage of a turbine

Middle School Activities for NOVA LINK and MultiLogPRO

P/N: BK061



Loggers: NOVA LINK, MultiLogPro

Description

The Middle School Activities book answers the need for targeted activities for students between grades 7-10 according to specific curriculum needs and interests.

Experiments in:

- Measuring Acid Rain
- Radiation
- The Slant of the Sun's Rays
- The Heart as a Pump
- Motion
- Tilt and Temperature
- The Pressure's Getting Higher
- Mapping a Magnet's Force Field

Experiments with EcoLogXL

P/N: BK046



Logger: EcoLogXL

Description

Students can make sense of their surroundings with these simple and fun-filled science projects with pictures, graphs and questions that make the earth sciences come alive. The Fourier EcoLogXL experiment guide helps advanced concepts in geology, ecology, climatology, meteorology and environmental sciences become easy to understand.

Experiments in:

- Light
- Heat Loss
- Photosynthesis
- The Green House Effect
- Night Dew
- Physiology
- Temperature and Humidity
- Sound Waves

Fourier Sensors Guide

P/N: BK021



All loggers

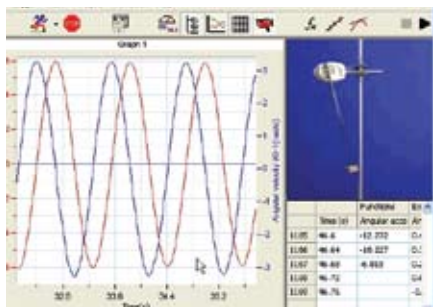
Description

Fourier offers more than 65 external sensors for data collection systems. Using these sensors students can conduct almost any experiment in science fields including Biology, Physics, Chemistry and Environmental Sciences, both in the Lab and in the field.

Experiments in:

- Physiology
- Heat Loss
- Photosynthesis
- Acid Based Reaction
- Exothermic and Endothermic Reaction
- Gas Law
- Mechanics
- Electricity
- Magnetism
- Sound Waves
- And many more

Video Experiments



Description

Fourier's experiment library in MultiLab contains over 20 pre-recorded video experiments that serve as an instructional guide for both students and teachers. The video experiments contain synchronized data and video streams which can be reviewed either before or after conducting their own experiments. MultiLab's video experiment library also provides an alternative to performing dangerous, costly or time consuming experiments. MultiLab's video library has also proven to be a useful resource in teacher training and in demonstrating setup and procedure, helping them to better plan objectives and visualize guided class experiments.

Virtual Labs



Description

JustAsk's simulations are bundled with the NOVA5000 adding another ideal tool in the mobile science laboratory. Students have the opportunity to prepare themselves prior to the real experiments, as well as understand their results after running the lab experiment. The simulations may be played continuously or one step at a time; and various controllers allow manipulating object's properties and initial conditions. Physical properties are graphically displayed while running the simulations, and may be saved from one run to another.

HTML Workbooks



Description

The EcoLogXL and MultiLogPRO Workbooks are an online library of experiment manuals called "Worksheets," that appear in web page format within each software. At the click of a button each Worksheet includes an experiment template that automatically configures the software and product being used. Students can use Fourier-produced Worksheets, create their own, or modify Fourier's existing Worksheets to meet their own class specifications.

Content Viewer for NOVA LINK



Description

A multimedia curriculum & quick reference guide to using NOVA LINK and the MultiLab data analysis software. It also comes with a dynamic periodic table and presentations that cover Biology, Physics and Chemistry, as well as experiment simulations.

Pedagogical Training & Technical Support

As with any technological application, in order for the user to maximize the full potential, a firm command of its usage is necessary. To that end, Fourier is proud to offer pedagogical and technical support for teachers implementing Fourier's science learning solutions in the classroom. Fourier's training

	NOVA LINK		NOVA5000™	
Type of Training	Basic	Comprehensive	Basic	Comprehensive
Time Frame	1 Day	2 Days	1.5 Days	2 days
Data Logger	Logger overview & connection to PC	<u>As basic course</u>	Logger overview, Wi-Fi & LAN connectivity, touch screen calibration and productivity tools (brief overview)	<u>As basic course</u>
Software	MultiLab™ - Introduction to Fourier's digital curriculum tools, installation, experiment setup, data views, graph editing, math functions & working with Workbook	<u>Basic course plus:</u> Advanced analysis tools, timing wizard module, creating video experiments, video motion analysis and more	MultiLab™ CE – Introduction to Fourier's curriculum, installation & overview, experiment setup, data views, graph editing, math functions and working with Workbook	<u>Basic course plus:</u> MultiLab™ CE - advanced analysis tools and timing wizard module
Sensors	Overview of Fourier's sensors, working with sensors that are not auto detected and maintenance & working procedures	<u>Basic course plus:</u> Defining new sensors, calibrating sensors and more	Introduction to Fourier's sensors, working with sensors that are not auto-detected, pH , oxygen and conductivity sensors and maintenance & working procedures	<u>Basic course plus:</u> Defining new sensors and calibrating sensors
Experiment	Performing basic experiment in Physics, Biology and Chemistry	<u>Basic course plus:</u> Performing experiments in Physics, Biology and Chemistry	Performing basic experiment in Physics, Biology and Chemistry	<u>Basic course plus:</u> Performing 3 experiments in each of the following: Physics, Biology & Chemistry
Additional Tools				Text Maker, Plan Maker, Portrait 4, Inside Math and LANSchool

programs offer much more than instruction in how to operate our products - it is an integral part of teacher professional development and an important tool for applying new pedagogical approaches to prepare students for the challenges that lie ahead. Our pre-defined training courses are designed

to provide two levels of training, basic and comprehensive, and Fourier also offers custom-tailored pedagogical courses such as curriculum mapping and creating new experiments for our science learning stations.

EcologXL	MultiLogPRO™	
Comprehensive	Basic	Comprehensive
1 Day	1.5 days	2 Days
A standalone data logger - different modes of taking data, saving experiments, PC connect ability / downloading data and experiment setup . Logger overview, measurements modes and battery care	Product overview, working in standalone mode, data views and connectivity to PC and downloading data	<u>As basic course</u>
EcoLab™ - Installation & overview, experiment setup, data views, graph editing functions, math functions, working with Workbook and introduction to Fourier's curriculum	MultiLab™ - installation & overview, experiment setup, data views, graph editing functions, math functions, working with Workbook and introduction to Fourier's curriculum	<u>Basic course plus:</u> MultiLab™ - advanced analysis tools, timing wizard module, creating a Workbook, creating video experiments, video motion analysis, and an introduction to Fourier's digital curriculum tools
Introduction to Fourier's sensors and working with sensors that are not auto detected	Introduction & overview of Fourier's sensors, working with sensors that are not auto detected, pH, oxygen and conductivity sensors and maintenance procedures	<u>Basic course plus:</u> Calibrating, defining new sensors, and more
Performing basic experiment in Physics, Biology and Chemistry	Performing basic experiment in Physics, Biology and Chemistry	<u>Basic course plus:</u> Performing 3 experiments in each of the fields: Physics, Biology and Chemistry

Technical Training	
Basic	Comprehensive
1 Day	2 Days
MultiLab™ and EcoLab™ - Installation & basic overview of data analysis software	<u>Basic course plus:</u> MultiLab™ and EcoLab™ - Defining new sensors, sensor calibration, creating Workbooks and more.
MultiLogPro™, EcoLogXL™ & NOVA LINK – Overview of data loggers hardware and operation	<u>Basic course plus:</u> MultiLogPro™, EcoLogXL™ & NOVA LINK – Recording video experiments.
NOVA5000™ - Overview of features and operation, including productivity tools	<u>Basic course plus:</u> NOVA5000™ - Wi-Fi and Lan connectivity, touch-screen calibration, NOVA5000 testing procedure and more.
MultiLab™ CE - Overview	
Sensors – Introduction to Fourier's sensors	<u>Basic course plus:</u> Sensors – Maintenance, working procedures and troubleshooting.





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