DATA HARVEST

VENTUS
Ciencia Experimental

ventusciencia.com

NEW RANGE BLUETOOTH SENSORS

SECONDARY SCIENCE BROCHURE

WARRANTY 5 Year

INTRODUCTION

"Our Aim: To enhance the way teachers deliver educational science through technology"

WHO ARE DATA HARVEST?

Based in the county of Bedfordshire in the United Kingdom, Data Harvest have been producing high quality educational science data logging products since 1985 and were the first company to bring data capture technology to the main stream UK classroom.

Our founder Stephen Allen who was a teacher at Harlington Upper school and a member of Bedfordshire's Advisory service, had a passion for maths and science.

Stephen, along with colleagues, was conscious that many scientific phenomena occur in a timescale that doesn't fit into a typical science lesson; physics experiments often happen in a fraction of a second whilst biology investigations are often lengthy in comparison.

The aim was to use modern technology to capture data from experiments, enabling students to see and understand the scientific theories being studied. The first product that was developed was called the "Measurement Module".

It's often said that data logging is "making the invisible, visible".

In 1982, through Data Harvest's collaboration with Leeds University, a product called VELA was introduced to the education system, designed as a data logger that could be used 'stand alone' or with compatible computers.

The government during the 1980's was keen to encourage schools to use modern technology and launched the scheme "Micros in Schools".

VELA was included in the scheme.

Technology has continued to evolve, allowing for new ways to teach science. We continue to explore the latest technology, enabling us to further enhance the teaching and learning experience.

Data Harvest provides a learning platform called **EasySense** that includes Data Loggers, Sensors, Software & Curriculum Materials; a complete solution allowing teachers to engage with their students through science.

VELA: Versatile Laboratory Aid

CONTENTS

Customer Support

All Data Harvest products are covered by our five year limited warranty and free product support for the lifetime of your product.

WARRANTY 5 Year

British Quality Assured

We design, develop & manufacture our products in the UK and are members of the British Educational Suppliers Association and The Association of Science (ASE).

besa | BRITISH EDUCATIONAL SUPPLIERS ASSOCIATION

The Association for Science Education
Promoting Excellence in Science Teaching and Learning

Award Winning Solutions

We are proud of our success, winning many awards for design, development and supply of high quality solutions for the UK and World education markets.

BETT AWARDS WINNER | era WINNER 2004 | worlddidac Award 2004

BETT Awards   ERA Awards   World Didac Awards

Free Training & Demonstrations

We understand that schools sometimes need a 'refresher' course on their products, which is why we offer training and demonstrations whenever you need updating.

Call: +44 (0) 1525 373666
Email: support@data–harvest.co.uk

EASYSENSE

DATA HARVEST

> "A free learning platform that allows teachers to engage through science"

WHAT IS EASYSENSE?

EasySense was first introduced in 2005 as a free science software solution that provides teachers with all the tools to teach scientific methods and allow students to learn and better understand scientific experiment data using our range of data loggers and sensors.

Over its history EasySense has reached a global audience and continues to feature at the heart of many science lessons in primary and secondary education.

EasySense has grown to include a number of market leading features that benefit teaching and learning.

Fast forward to 2019 and a new version of EasySense has been born. This update is now fully cross–platform compatible which means you can use the exact same toolset on all the major computer platforms such as Windows PC, Mac OS, iOS, Android and Chromebook.

Our developers have been creating the all new EasySense2 software with smarter tools, an intuitive user interface and support for our new Smart Wireless sensors. Further more we provide our flagship software completely free of charge.

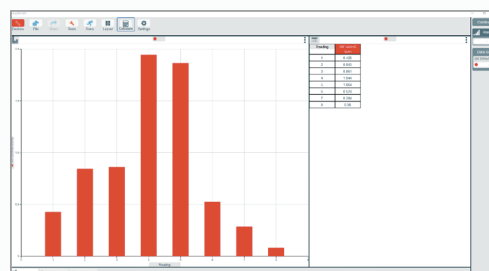**Get Involved! Tell us what extra features you might like.**

EasySense2 - Free Science Software
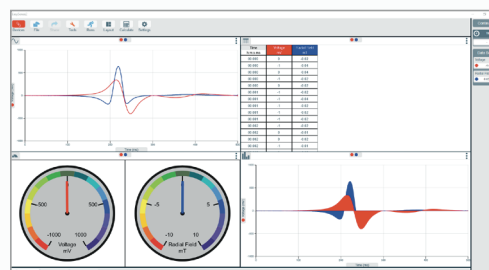data–harvest.co.uk/easysense2

Always keep your products up to date for the latest features.

NEW
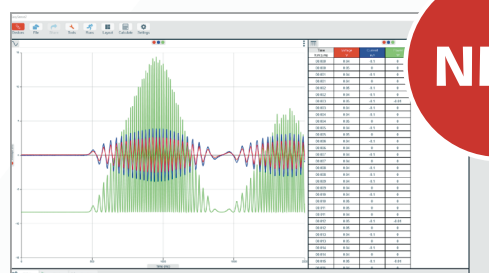
EasySense2 – Voltage, power and current

EasySense2 – Suntan lotions

EasySense2 – Magnet through coil multi screen

EasySense2 is our most advanced science software!

EasySense2

SCIENTIFIC DATA CAPTURE & ANALYSIS SOFTWARE

EasySense2 is our most advanced educational scientific data capture and analysis software!

Designed with teachers and students in mind EasySense2 provides a broad set of tools to capture, display and analyse data from Data Harvest Smart Wireless Sensors and Data Loggers using Bluetooth or USB connectivity.

NEW

Built on our long standing history of science software

The latest version builds on all the features of our tried and tested science software and adds complete cross platform compatibility on all desktop computers, smart phones and tablets; new workflow, smart analysis tools and a redesigned intuitive user interface.

Delivering the results to ensure your lessons run smoothly

We understand that time is critical in today's modern classroom and that you need the right tools to enable you to teach efficiently and effectively. EasySense2 delivers with experience to ensure today's teachers can work smart.
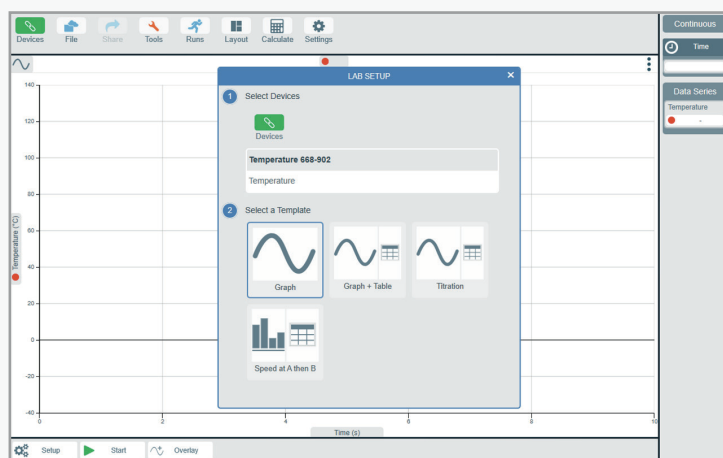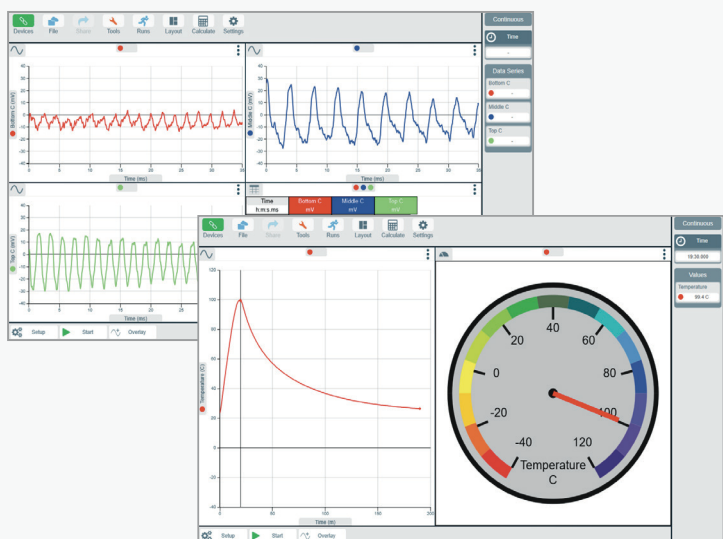
EasySense2 – Lab setup screen

Multi-device data capture

Recording from more than one device is now possible leading to endless possibilities and configurations, providing you with the ultimate flexibility.

EasySense2 is compatible with the following data capture devices: All Smart Wireless sensors, V–Log, V–Hub, VISION, Vu+, Vu

Analysis Tools

Chart Layouts

Just some of the key features:

✓ Capture data from multiple devices at the same time

✓ Run manager — easily turn on and off experiment runs to compare your data

✓ Simple recording modes — just press record and stop whenever you want to

✓ Multi display — combine multiple data views of your captured data series

✓ Data views available: line graphs, gauges, numbers and bar charts

✓ Simultaneously display up to 4 customisable chart layouts

✓ Import and merge multiple files and data sets from devices

✓ Calculations — enhanced tools, perform mathematical operations on recorded data

✓ Import supported experiment files (.ssl) from EasySense1 into EasySense2

✓ Logging modes: continuous recording, Snapshot and Timing

✓ Simple axis selection allows easy XY plots

DATA LOGGING

"Critical thinking, problem solving skills and develop an understanding of the complex natural world around us"

WHAT IS DATA LOGGING?

A simple description of data logging would state that it is a method of capturing sensor data over a given time, however we know that it's much more than this; the process of data logging is a visual learning experience that allows teachers to engage with students through science.

A data logger is a mechanism or a tool that changes the way children see the world around them; it changes students' perceptions by allowing them to understand and make informed decisions through scientific experimentation.

When we start to explore why science is part of the national curriculum it clearly defines that it teaches students critical thinking, problem solving skills and to develop an understanding of the complex natural world around them. As you can see, adopting data logging into your science lessons is more than just a method of capturing data!

As specialists in data logging we know what it takes to ensure teachers and students have the right tools that meet with the requirements of the national curriculum.

Data logging makes the invisible visible; a foundation of why we encourage students to learn science and engage in scientific activities as a core life skill.

COMMON FEATURES ACROSS OUR MULTI-CHANNEL DATA LOGGERS

MAKE YOUR SENSORS WIRELESS

With bluetooth technology and the latest EasySense software our data logging interfaces makes your existing Data Harvest SmartQ sensors work wirelessly with tablets, phones and PCs.

BACKWARDS COMPATIBILITY

Our data loggers work with the entire SmartQ sensor range, providing multi channel USB and Bluetooth data capture.

ONE INTERFACE UP TO 8 SENSORS

Our data loggers can also be configured with 4 internal sensors (Light, Humidity, Air Pressure & Sound) giving you the power to use up to 8 sensors in a single experiment.

REPEATABLE
PHYSICS
EXPERIMENTS

V-Log - Remote Data Logger

PRESS START FOR QUICK EASYLOGGING!

With built–in USB & Bluetooth connectivity, V–Log offers all the remote data logging features you need at a ground breaking price!

V-Log is an exceptionally quick and simple to use data logger. The graphical display features an intuitive menu system with all the data logging options in one place; you can start capturing your science data within seconds!

V-Log Configurations

V–Log is available in two configurations, the V–Log[4] with 4 SmartQ sensor inputs or the V–Log[8] with the same four sensor inputs plus four additional internal sensors, Light, Air Pressure, Sound and Humidity.

Both V–Log[4] and V–Log[8] are available with either built–in USB or both USB & Bluetooth connectivity.

Bluetooth data capture makes it possible for your existing SmartQ sensors to work with tablets, phones and PCs using Bluetooth connectivity.

CONFIGURABLE WITH 4 INTERNAL SENSORS

V-Log Features:

- 4 SmartQ sensor inputs
- Large LCD Display
- 14 Days Remote logging
- Built–in 1300mAh rechargeable battery pack
- Fast logging (50,000 samples per second)
- Memory to store multiple recording sets
- USB Connection
- Logging Modes:
  EasyLog, Fast Logging, Snapshot,
  Remote Logging & Timing

Classroom Pack of 5

Get the most out of your lessons by giving students the chance to work in groups as they discover science together. Our convenient five pack solution also includes our integral USB charging system and a smart Gratnells storage tray.

Charging trays can also be purchased separately which includes a lid and USB charger.

Complete classroom solution

V-Log Options

2404PK	V–Log[4] USB
2406PK	V–Log[4] USB + Bluetooth
100402	V–Log[4] USB 5 Pack
100437	V–Log[4] USB + Bluetooth 5 Pack
2408PK	V–Log[8] USB
2410PK	V–Log[8] USB + Bluetooth
100404	V–Log[8] USB 5 Pack
100438	V–Log[8] USB + Bluetooth 5 Pack
2402	5 Bay V–Log charging tray

V–LOG
PENDULUM

WARRANTY
5 Year

Light

Air Pressure

Sound

Humidity

V-Hub - Smart Sensor Link

OUR LOWEST COST INTERFACE – MAKE YOUR SENSORS WIRELESS!

The V–Hub Sensor link is small and light. It can be mounted on a retort stand along with the experiment apparatus using the supplied mounting rod or directly to the dynamics system using the dynamics extension kit.

V-Hub Features:

With a built–in rechargeable battery, V–Hub powers all of the sensors for a whole class day.

Further more classroom management is simplified as only the V–Hub needs to be charged at the end of the day. V–Hub only shows your connection information. Sensor information and data capture are all taken care of in the latest version of the EasySense2 software.

Bluetooth data capture makes it possible for your existing SmartQ sensors to work with tablets, phones and PCs using Bluetooth connectivity.

V-Hub Configurations

V–Hub is available in two versions, V–Hub[4] or V–Hub[8], the latter features 4 built–In sensors which are Light, Humidity, Pressure & Sound.

Light   Air Pressure   Sound   Humidity

CONFIGURABLE WITH 4 INTERNAL SENSORS
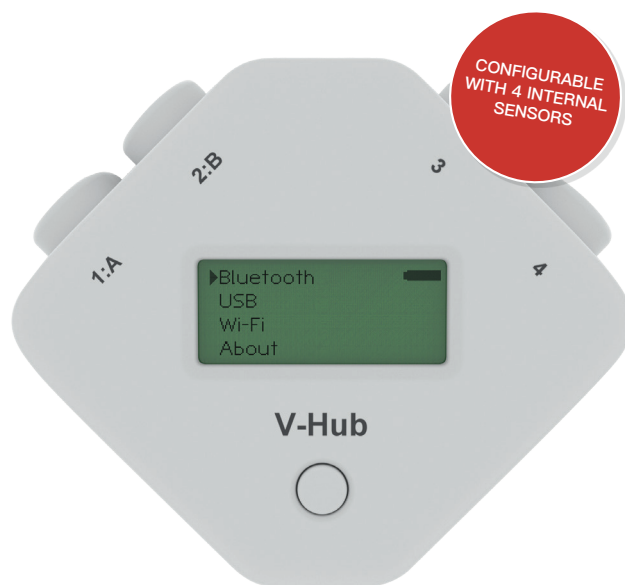
V-Hub

Classroom Pack of 5

Our convenient five pack solution also includes 5 V–Hub data loggers with integral USB charging system and a Gratnells storage tray.

V-Hub Options

2504PK	V–Hub[4] USB, Bluetooth
100432	V–Hub[4] USB, Bluetooth 5 Pack
2508PK	V–Hub[8] USB, Bluetooth
100434	V–Hub[8] USB, Bluetooth 5 Pack
2502	5 Bay V–Hub Charging Tray

Single V-Hub Pack Includes:

- 1x V–Hub[4]/V–Hub[8] Interface (USB & Bluetooth)
- 1x Mini USB cable
- 2x Short SmartQ sensor cables
- 2x Long SmartQ sensor cables
- 1x Mounting rod
- Free download of the full EasySense cross–platform science software from data–harvest.co.uk

V–HUB
& SMARTQ SENSORS

DATA HARVEST

WIRELESS SENSORS

"Smart Wireless Sensors also function as a standalone data logger"

WHY WIRELESS TECHNOLOGY?

Wireless bluetooth technology has really changed the way we do science in the classroom. With the introduction of tablets and smart phones the whole class can work unteathered to the actual data logger interface and provide sharing and collaborating across multiple devices.

For 2019 we have developed a new Smart Wireless range of science sensors. Each new sensor also functions as a data logger on it's own providing a key benefit to working wirelessly.

The new sensors include a huge battery life and can be mixed & matched with existing SmartQ Sensors & Data Loggers!

NEW

WIRELESS
SCIENCE SENSORS

WARRANTY 5 Year

Seriously Smart Wireless!

DESIGNED WITH NEW AND EXISTING CUSTOMERS IN MIND!

A new Smart Wireless range of science sensors that also function as data loggers in their own right using Bluetooth or USB connectivity.

Mix & match existing SmartQ Sensors & Data Loggers with our new bluetooth sensors!

The Power of Smart Wireless

Our Smart Wireless sensors build on the design of our legendary intelligent SmartQ Sensors adding Bluetooth wireless connectivity allowing users to connect to tablets and mobile phones using the new EasySense2 Software.

WIRELESS TEMPERATURE 1100

This general purpose Wireless Temperature sensor is the most commonly used sensor and can accurately measure the temperature of air, water, soil and weak acidic solutions, making it indispensable in all Science Departments.

NEW

WIRELESS PH SENSOR PACK 1110PK

This pack includes the pH Sensor/Adaptor and Glass Electrode.

NEW

WIRELESS VOLTAGE – CURRENT 1130

A combined voltage and current sensor in one package.

NEW

More Sensors On The Way!

We are currently developing an extensive range of new smart wireless sensors.

- Drop/Bubble Counter
- Rotary Motion
- Motion Sensor
- Light Level
- Gas Pressure
- Heart Rate
- Sound
- Infra–Red
- Colorimeter
- Humidity
- Mag Field
- CO2
- Oxygen
- UV
- ECG
- Dynamics Cart
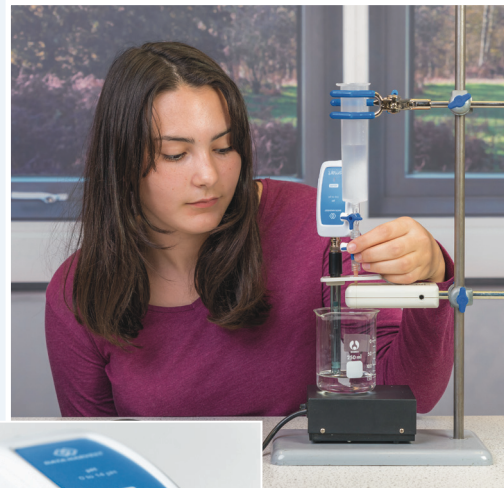
Smart Single Button

To operate the Smart Wireless sensors all you have to do is click the smart button and connect your Bluetooth compatible devices, or click 3 times to start logging.
No setup required. Now that's smart!

Smart Connectivity

Not only do the Smart Wireless Sensors connect to multiple tablets and mobile devices via Bluetooth but they can also connect directly to a desktop computer and be used just like a traditional data logger whilst offering fast data transfer rates.
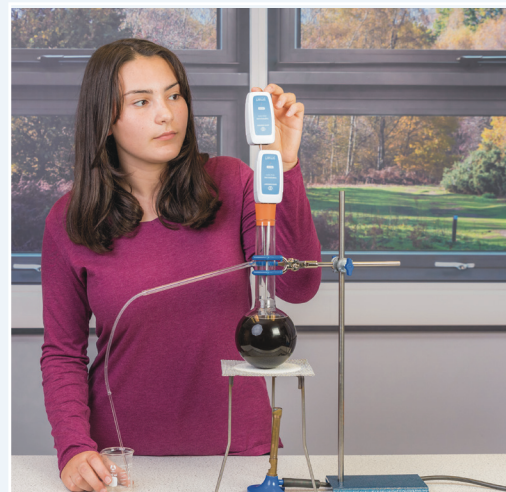
Smart Battery

The Smart Wireless Sensors include a huge 1300mAh battery making it a market leading sensor. A single charge can power the sensor for a whole year not just a class day! Want to know if you have enough battery life available for your next experiment? Simply connect your sensor to EasySense2 and you will instantly see the battery life!

Digital Technology

Our digital sensor technology brings science to the classroom providing you with a robust, accurate and repeatable teaching experience from the start.

Designed for Mobile

With the included Bluetooth connectivity the new Smart Wireless Sensors can connect to Tablets, Mobile Phones, Laptops and Desktop Computers.

Auto Calibration

We have taken the hassle out of setting up your experiments with our pre–calibrated, auto identify sensor technology. Every sensor is ready to use out of the box.

USB Charging

Our Smart Wireless sensors are powered by an internal battery and can be charged via a standard USB charger.

3 CLICKS
TO START LOGGING

SMARTQ SENSORS

"We individually pre–calibrate every single SmartQ Sensor"

SMARTQ TECHNOLOGY

Beneath SmartQ's simple and bright exterior is a revolutionary architecture that dramatically enhances the intelligence, accuracy and value of our entire range of sensors.

Among many of the remarkable improvements of the SmartQ design is the incorporation of a microprocessor that enables our production team to individually calibrate every single sensor digitally. You will be astounded by the accuracy and reliability of our sensors.

- Accelerometer
- Anemometer
- Breathing Rate Belt pack
- Carbon Dioxide Gas
- Charge
- Colorimeter
- Conductivity pack
- Count/Tachometer
- Crocodile Clip Leads
- Current
- Drop & Bubble Counter
- ECG
- Force
- Gas Pressure
- Geiger Muller
- Heart Rate and Pulse
- Humidity
- Infrared
- Light Gate

- Light Level
- Magnetic Field
- Motion
- Dissolved Oxygen
- Oxygen in Air
- pH pack
- Polar Heart Rate
- Push Button Switch
- Rain Gauge
- RF Electrosmog
- Rotary Motion
- Sound
- Speed of Sound pack
- Spirometer
- Stethoscope
- Temperature
- Timing Mats
- Ultra–violet
- Voltage

WARRANTY
5 Year

SmartQ
TECHNOLOGY
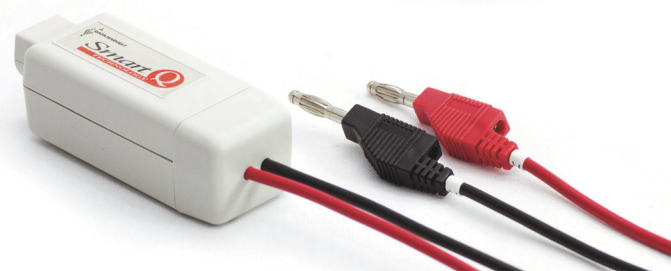
ACCELEROMETER

The accelerometer is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, ordynamic – caused by moving or vibrating the accelerometer.

There are 2 accelerometer sensors, one recording accelerations to a maximum of 10g and one recording accelerations to a maximum of 40g.

The lower range sensor can record acceleration in one of 3 axis or the resultant force of the 3 axis. It will also measure vibration forces and angle. The higher range sensor is restricted to 2 axis and resultant forces of both axis. Both sensors will show the acceleration as multiples of g or as ms–2.

Ideal Companion: Dynamics System see page 40

**Low g Accelerometer
3200**

Ranges:
• ±2.5g 3 axis (xyz)
• ±10g 3 axis (xyz)
• ±25ms^{-2} 3 axis (xyz)
• ±100ms^{-2} 3 axis (xyz)

**High g Accelerometer
3201**

Ranges:
• ±40g 2 axis (xy)
• ±400ms^{-2} 2 axis (xy)

**Dynamics Cart
Kit Included**

BREATHING RATE BELT PACK

The Breathing Rate Belt is wrapped around a person's chest region. Fitted inside the belt is an inflatable air bladder, which is moulded to two rubber tubes. One of these tubes finishes with a hand pump bulb that is used to inflate the air bladder.

The other tube is attached to the Gas Pressure Sensor which monitors the change in pressure during breathing.
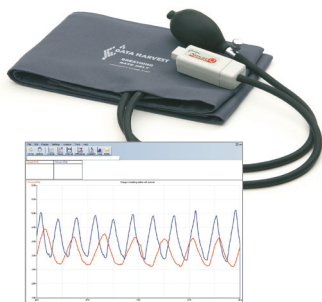
**Breathing Rate Belt Pack
3190PK**

includes:
Breathing Rate Belt
3190

Gas Pressure Differential
3139
Range: ±10kPa

CARBON DIOXIDE

This sensor demonstrates that packaging does make a difference. The upper circular lid casing has been cleverly designed to form sealed chambers using standard laboratory beakers and conical flasks.

The casing also provides ports for inserting additional sensors into the chamber such as temperature, pH, and O2. The actual sensing element resides in a vented capsule that protrudes from the lower side of the sensor. The sensor can be set at two ranges enabling measurementfrom a wide variety of sources.

Applications Include:
• Variances in classroom CO2 levels
• Plant photosynthesis and respiration
• Respiration of small organisms e.g. microbes, maggots
• Measuring human CO2 production
• Candle in Bell Jar (measuring CO2 emissions)

**Carbon Dioxide
3152**
Ranges:
• 0 to 10,000ppm
• 0 to 100,000ppm

CHARGE

Used to measure the amount of charge on a source when the charge available is very small. As in many electrostatic experiments, it can replace a traditional gold leaf electroscope by showing not only the polarity of the charge but also performing quantitative measurements.

It can also measure the potential difference between two points.

Applications Include:

• Magnitude and sign of the charge on different objects
• Electrostatic phenomena
• Simple demonstrations of sign of charge
• Charge sharing between conductors
• Faraday's ice pail investigations
• Electrostatic shielding
• Induced charge
• Charging by induction
• Investigating the relationship 'Voltage is proportional to the charge on an object' by adding charges
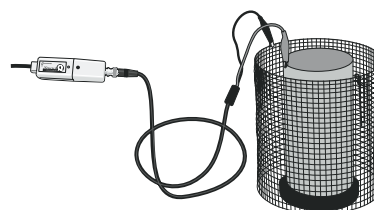
Faraday's ice pail
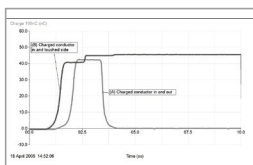
**Charge
3268**
Charge ranges:
• ±10 nCoulomb (nC)
• ±100 nCoulomb (nC)
• ±220 nCoulomb (nC)

Voltage ranges:
• ±0.5 V (500 mV)
• ±2 V
• ±10 V

COLORIMETER

This cleverly designed, self–contained sensor produces consistently excellent results and will appeal to the Biologist and Chemist. Any reaction that causes a change in opacity, or gives a colour change can be used to study rates of reaction.

It is supplied with four 35 mm slides (red, orange, blue and green) that produce light of a specific and consistent wavelength, and a pack of cuvettes with lids.

Applications Include:
• Enzyme concentration versus rates of protein, starch and fat breakdown
• Enzyme inhibition
• Lambert–Beer law
• Acidic breakdown of sodium thiosulphate
• Quantitative analysis of sugar

The sensor's thick, black casing ensures that colorimetric results are not affected by ambient light.

CONDUCTIVITY PACK

This pack contains both the electrode and the SmartQ Adaptor. Set to any of four ranges enabling accurate measurements from very low ionic sources such as deionised or distilled water to very highly conductive solutions including sea water.

The electrode incorporates an in–built temperature sensor that is used to compensate for changes in the conductivity of solutions with temperature.

Typical Investigations:
• Titrations of strong versus weak acids
• Electrolytes and Non–electrolytes
• Finding the equivalence point
• Difference between ionic and molecular compounds
• Diffusion of ions through a membrane
• Environmental testing for salinity, total dissolved solids or general conductivity in water samples

Conductivity electrode

500ml beaker

Deionised water

Piece of Visking tubing approx 10 cm long

Magnetic stirrer
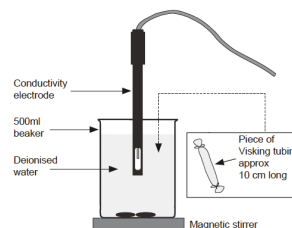
Does the concentration of a solution affect movement across a membrane?

CROCODILE CLIPS (PAIR)

A Crocodile clip lead is normally used attached to a home–made or commercial switch. They can be used singly or in pairs to provide timing and event monitoring/triggering.

Typical Investigations:
• Timing an event with the crocodile clips attached to a 'pupil' designed switch e.g. a pressure mat sensitive enough to detect a small animal
• A Reaction time investigation — using home–made reaction switch with a simple circuit and lamp
• Gravity investigations — record the time from A to B as an object falls using a home–made digital 'target area' as input B

Crocodile clips being connected to a home made pressure pad for investigating free fall.
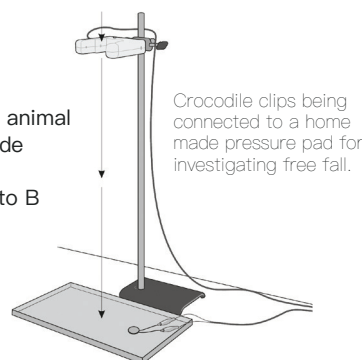
CURRENT – DIFFERENTIAL INPUT

There are 3 Current sensors with different ranges that measure both AC and DC. With differential inputs these sensors can be used anywhere within a circuit and in conjunction with a Voltage sensor.

Applications Include:
• Serial and parallel circuits
• Ohm's Law – resistance in a circuit
• Electrical induction
• Battery life
• Capacitor Discharge and Recharge
• Current surge
• Electrical component characteristics
• Voltage and Current relationships
• Electrolysis

Measuring current in an electrical circuit.

DROP AND BUBBLE COUNTER

This sensor offers exceptional value as it performs a dual role. In Chemistry its primary role is as a drop counter measuring accurately volume during a titration. It can also be used to monitor bubbles produced during gas production from either a chemical reaction or a biological process.

When operating as a drop counter, titrant is uniformly dripped from the supplied reservoir and optically recorded. If desired, the drops can be automatically converted to a volume measurement by following a simple calibration procedure.

As a bubble counter, the sensor optically counts the number of bubbles, from either a chemical or biological source, ascending through the plastic tubing. This method is unique in that it accurately measures the range of gas production.

E.C.G. (ELECTROCARDIOGRAM)

The ECG sensor measures the electrical energy generated during a heartbeat. To record the classic PQRST wave, the sensor's three electrodes are attached to the skin of the user's forearms using disposable ECG patches.

Tip: Fast data sampling (≥50Hz) and 12 bit logger resolution is required to capture the details of the PQRST complex.

Applications Include:
• Comparing the ECG to the waveform produced by the Heart Rate Sensor
• Comparing the ECG of a rested heart to an exercised heart
• What happens to the ECG trace if a sensor lead location is changed?
• Understand the meaning and relationships of the PQRST waveforms
• Investigate the effect of mild stimulants (caffeine)

Supplied with a pack of 100 disposable ECG electrode patches.
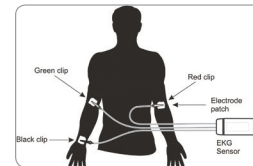
FORCE SENSOR

The sensor measures compression and extension forces applied perpendicular to the beam. Comes complete with accessories to use with the most common investigations.

It is supplied with a 20N spring, cushioned and non–cushioned stops, and a hook. It can be clamped to a stand, or attached to the Dynamics System.

The hook is used with the spring for simple harmonic motion investigations, with stretchy rubber for bungee jumping, and with a stiff wire for investigating centripetal force in a pendulum.

The cushioned and non–cushioned stops are used when investigating collisions and crumple zones, where a car or trolley on a ramp collides with the sensor.

Applications Include:
Physics:
• Simple harmonic motion in a spring
• Centripetal force in a pendulum
• Bungee (impulse, momentum, conservation of energy and resultant forces)
• Newton's laws of motion e.g. action and reaction
• Frictional forces
• Hooke's law
• Resultant forces — static and dynamic
• Collision impact
• Investigating the effectiveness of crumple zones
• Buoyant force (flotation and resultant forces)
• Forces and moments in levers
• Triangle of forces
• Demonstration balance

Biology:
• Investigating tree girth (Force sensor used as a dendrometer)
• Muscle fatigue test
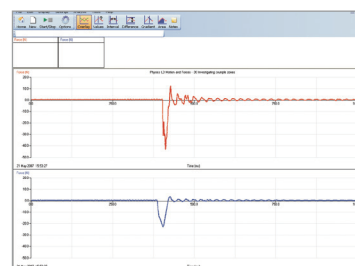
VISIT US
ONLINE

data-harvest.co.uk

- Secure Online Ordering
- Free Software
- Teaching Materials
- Manuals & User Guides
- Updates
- Newsletters
- Hints & Tips
- Training Videos
- Support & Advice

NEW

EasySense2 - Now Available

DOWNLOAD OUR LATEST FREE SCIENTIFIC
DATA CAPTURE & ANALYSIS SOFTWARE

SEE PAGE 4 FOR MORE INFORMATION

GAS PRESSURE – ABSOLUTE

These two sensors measure the total pressure on a system. When the single port is left open, then the sensor measures the atmospheric pressure. However when the sensor is connected to a sealed system, then it adds the system's pressure effect (negative or positive) to the atmospheric value. The 3210 sensor can also be used as an altimeter.

Applications Include:
- Atmospheric pressure measurements
- Altimeter
- Vapour pressure of liquids
- Gas Laws
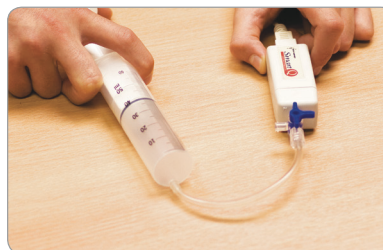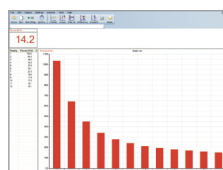
A very simple way of investigating Boyle's Law. The sensor records the pressure in the plunger as the syringe is pulled back.

GAS PRESSURE – DIFFERENTIAL

These sensors measure the differential pressure between two ports. If one is left open, measurement will be relative to atmospheric pressure.

Blowing into one port will produce a positive value, whereas blowing into the other port will produce a negative value.

Applications for 3139:
- Experiments involving a Manometer
- Breathing rate (+Breathing Rate Belt 3190)
- Production of gases in an enclosed atmosphere during photosynthesis of an aquatic plant
- Osmosis investigations
- Rate of Transpiration investigations
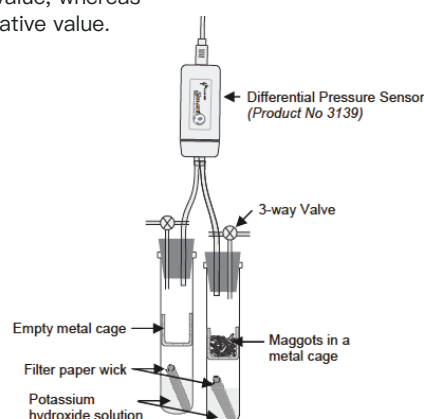
Differential Pressure Sensor (Product No 3139)

3-way Valve

Empty metal cage

Maggots in a metal cage

Filter paper wick

Potassium hydroxide solution

GAS PRESSURE ACCESSORY PACK

A selection of tubing elements and valves which will allow the user to make gas tight connections to a SmartQ Gas Pressure sensor.

This pack contains:
- 1x 1m PVC tube 3mm bore x 1mm wall thickness
- 1x 1m of nylon pneumatic tube
- 4mm O.D x 2.5mm I.D
- 4x Large pipette tips
- 4x Small pipette tips
- 1x Straight push fit connector
- 1x Tee piece push fit connector
- 2x 3–way stop cocks
- 1x 20ml Syringe
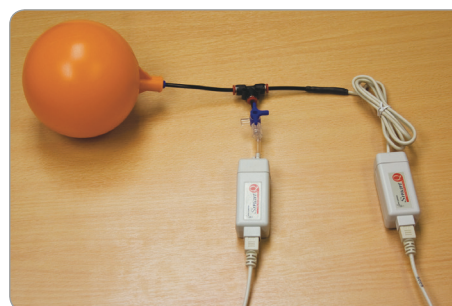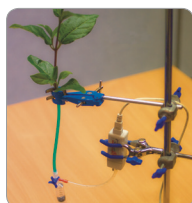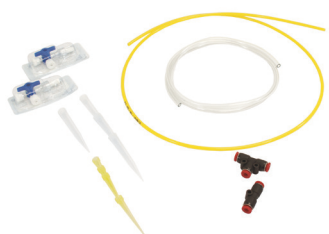
Accessory kit being used with a ball cock, Pressure and Temperature sensor to investigate Charles Law.

GEIGER MULLER

Housed in a robust casing, this self–contained sensor detects radiation from Alpha, Beta and Gamma particles. The Geiger Muller sensor is very simple to use, as it does not require an external power source, deriving its power from the Data Logger.

Applications Include:
- Half life Random events
- Radioactivity exposure due to natural radon
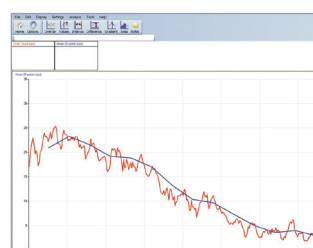
Radioactive decay of Protactinium
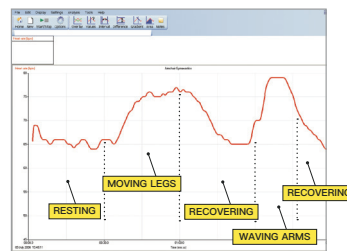
HEART RATE & PULSE WAVEFORM

Pupils of all ages are keenly interested in how physical and mental stress affects their heart rate. The sensing clip (pleth) can be attached to a finger or ear lobe to measure either blood flow (pulse waveform) or heart rate (beats per minute).

It works best if the test subject keeps the finger with the sensing clip absolutely still.

Tip: To monitor strenuous activity, see the Polar Heart Rate sensor.

Applications Include:
- Heart rate changes due to activity
- Recovery rate
- Pulse rate
- Effect of food (chocolate) or mild stimulants (caffeine)
- Effect of music on pulse rate
- The effect of the strictest teacher entering the room!

Heart Beats: Changes due to mild activity

HUMIDITY

Humidity is the measure of water vapour content relative to the ambient temperature. Useful for environmental and Biology studies. For example, a simple transpiration experiment can be set up and the results analysed in less than 5 minutes.

Applications Include:
- Water vapour expelled through the skin and breath
- Transpiration of plants
- Weather studies
- Determining dew point
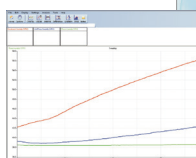
INFRARED

All warm objects emit infrared radiation. This sensor, therefore, can be used to detect the location of any warm item or living organism. When set to its most sensitive mode, the sensor can detect very low IR emissions, such as the heat trail left on a bench top after you move your hand away.

This multi–range sensor detects the energy from radiant sources from UV to Far Infrared. It adds another dimension to heat loss and energy transfer experiments.

Applications Include:
- Investigating radiant energy from different surfaces e.g. heat from a Leslie's cube
- Black body studies (radiance range)
- Efficiency of insulation
- Study inverse square law – verifying that heat radiation from source is inversely proportional to the square of its distance
- Heat distribution along a metal rod
- Hershel's discovery of infrared experiment
- Investigating Stefan–Boltzmann's radiation law using a tungsten lamp
- Infrared in the environment
- Illustration of non–contact thermometry
- Comparing warm and cold blooded animals
- Where do we lose heat? (head, face, hands etc.)
- Locating a hot body e.g. a burnt match
- Using infrared to locate a disaster victim
- Residual heat from different surfaces e.g. finger print on worktop
- Efficiency of electric light bulbs

Thermal imaging.

Finding where a natural disaster victim is trapped.

INTERRUPT CARD SET

The Interrupt card set consists of 3 cards used with Light Gates.

- A single interrupt card – a 100x100mm black plastic square.
- A double interrupt card – 180x80mm.
  Made from clear polycarbonate, printed with two black stripes.
- A multi–segmented interrupt card
  (also known as a picket fence) – 500x55mm.
  Made of clear polycarbonate, printed with twelve black stripes.

Applications Include:
- Picket fence for investigating gravity
- Other interrupt cards for time, velocity and acceleration measurements

LASER MODULE

The laser module includes 2 optical slides for investigating diffraction gratings and Young's single and double slits. This low cost laser module is housed in a strong plastic case and features a safety on/off switch. The laser draws its power from the Logger.

It produces a red light of 645 – 665nm wavelength.

Use with the Light level sensor, the Rotary Motion sensor, the linear track from the accessory kit, all mounted on the Dynamics System for accurate data collection during optic experiments.

Applications Include:
- Young's Slit
- Optics
- Diffraction Grating

Laser mounted on the Dynamics System investigating diffraction patterns
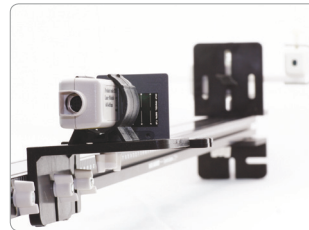
LIGHT GATE

The SmartQ Light Gate is a digital switch–type sensor that has two states, ON and OFF. The Light Gate has an infrared transmitter and receiver that detects objects passing through the 'gate'. Light Gates can be used singly or in pairs for time, speed, velocity and acceleration measurements.

Make the most of Light Gates by using them with the Dynamics System and the Interrupt Card Set.

Applications Include:
- Dynamics experiments that involve calculating time, speed, velocity, acceleration using an inclined plane or air track
- Acceleration due to gravity
- Pendulum investigations
- Measuring the time period of an oscillating body
- Impulse and change in momentum
- Centripetal force in a pendulum

LIGHT LEVEL

Light Level
3124

Ranges:
- 0 to 1,000 Lux
- 0 to 10,000 Lux
- 0 to 100,000 Lux
- 0 to 1k Lux Fast response
- 0 – 110% Transmission

This 5 range sensor cleverly measures light levels from 0 through to 100,000 Lux.

Four of the ranges are for general purpose use as they have filtering incorporated to eliminate the unwanted effects of modulation from room lighting (50Hz).

The fast response range has no filtering and will clearly show the modulation on an incandescent or fluorescent light. Point the sensor at a computer monitor to observe its refresh time.

- Centripetal force in a pendulum

Applications Include:
- Inverse Square Law
- Environmental monitoring
- Colorimeter experiments
- Yeast growth
- Absorption of light
- AC modulation

MAGNETIC FIELD

Explore the nature and strengths of magnetic fields of solenoids and permanent magnets with this robust sensor which houses two switchable Hall effect transducers to measure accurately both Radial and Axial magnetic fields.
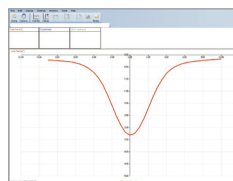
Applications Include:
Physics:
- Magnetic field in a wire coil
- Magnetic field in a Slinky Spring
- Magnetic field of magnets
- Magnetic field of a solenoid

General:
- Mapping a magnetic field
- Exploring electromagnets

Variation of field strength along the axis of a coil.

MOTION

The Motion sensor can capture the motion of running students, falling basketballs and carts on inclined planes. Featuring a high sample rate of 50Hz, this sensor works well with the Dynamics System.

Applications Include:
- Students running
- Simple harmonic motion
- Excellent introduction to distance/time graphs
- Newton's Second Law
- Elastic and inelastic collisions
- Impulse and momentum
- Speed of sound
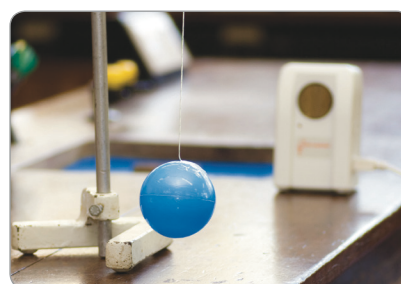
DISSOLVED OXYGEN PACK

This pack contains both the oxygen adaptor and the electrode. The sensor measures dissolved oxygen levels in water. It has built–in automatic temperature compensation.

Ideal for field studies and measuring oxygen levels around photosynthesising aquatic plants.

Applications Include:
- Photosynthesis
- Ecosystem monitoring
- The effect of temperature on O2 levels
- Water quality

OXYGEN IN AIR

Oxygen in Air sensor measures the partial pressure of oxygen (ppO2) and converts it to an oxygen concentration. It has temperature and barometric pressure compensation which ensures accurate oxygen concentration readings and enables use over a wide environmental range.

Unlike electrochemical sensors, this sensor is non–depleting which gives a maintenance free lifetime of around 5 years.

Once exhausted, the sensor can be returned to Data Harvest to have the sensing element replaced (charges apply).

Applications Include:
Biology:
- O2 levels in inhaled and exhaled air
- Changes in environmental atmosphere
- Changes in photosynthesising plants
- Change in Oxygen levels over respiring organisms

This sensor is not for use in liquid. For aquatic applications use the Dissolved O2 Pack (3130PK)

Photosynthesising plant

PH PACK

The pH adaptor and general pH electrode combine to form the immensely popular SmartQ pH sensor pack. The SmartQ pH sensor has both a pre–set calibration range (so the sensor is ready for immediate use) and a user calibration range.

The electrode in this pack is a general purpose plastic bodied glass non–refillable electrode, suitable for most investigations.

Applications Include:
Chemistry:
• Testing acids and alkalis
• Acid–Base titrations
• Acid rain

Biology:
• Enzyme action
• Respiration

Environment:
• Water quality

Complete Pack

POLAR HEART RATE EXERCISE SENSOR

This sensor is used to monitor heart rate in beats per minute during and after exercise. It consists of a belt that is worn around the ribcage against the skin, and a SmartQ Heart Rate receiver.

The heart rate information is transmitted wirelessly from the belt to the receiver, which can be up to 80 cm apart.

Applications Include:
• Monitor heart rate before, during and after vigorous activity
• Monitor the speed at which the heart rate returns to normal following exercise (recovery rate)
• Investigate the effects of a mild stimulant such as caffeine in cola or coffee on heart rate
• Check for baroreceptor reflex: that is changes in heart rate for a person when reclined, sitting, standing or moving, caused by the heart pumping blood to different levels

PUSH BUTTON REACTION SWITCH

Fitted with a red LED, a pair of these switches can be used to test students' reaction times. One switch can be used for manual marking of events during data logging activities.
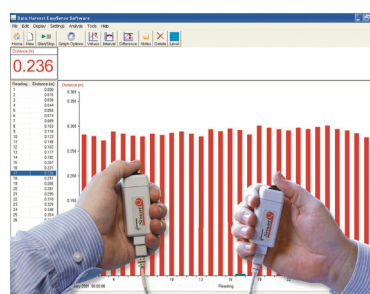
Applications Include:

Physics:
• Stopwatch Start/Stop
• Introducing speed

Biology:
• Reaction times

General:
• Walking a set distance
• Recording the time taken by a vehicle to pass from one point to another

Reaction times.

NEW WIRELESS BLUETOOTH SENSORS NOW AVAILABLE

See page 14 for more details

RF ELECTROSMOG

The SmartQ RF Electrosmog detector is a broad bandwidth RF (Radio Frequency) detector. It can detect RF over the frequency range 50 MHz to 3 GHz. This means it is suitable for measuring the RF that comes from Bluetooth, Wi–Fi, microwave ovens and mobile phones.

The detector does not distinguish the frequency of the RF source, some discrimination of frequency can be achieved with design of the antenna.

The F–type connector allows the user to make and attach antennae that are more specifically tuned to a particular frequency.

What Is Electrosmog?
Electrosmog is a term applied to the background, invisible, electromagnetic radiation resulting from the use of both wireless technology and mains electricity.

The most common sources of RF Electrosmog are:
• Cordless phones (DECT mobile landline)
• Cordless baby alarms
• Mobile/cellular phone masts/towers/transmitters
• Mobile/cellular phones
• Wireless networks — Wi–Fi
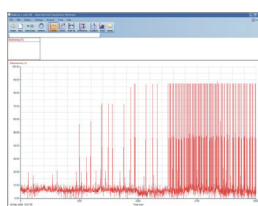• TV senders
• Remote controls for Cars, alarm systems

Applications Include:
• Mobile phones
• Microwave smog
• RF Interference

Measuring RF from a communications mast.

Ideal Companion:
• **Key Fob – RF Transmitter**
  3158

ROTARY MOTION SENSOR

This 8 range sensor is a must for every Physics department.

It is highly accurate with an extremely low friction pulley capable of measuring a variety of motions including: pendulum, angular, linear (pulley) and linear (using the Linear Rack accessory).

The sensor can be used on its own or coupled with the linear rack and another SmartQ sensor, such as Light Level, to investigate the Inverse square law and Young's Slits. If this sensor is used for measuring motion, it is best used with the Dynamics System.

The optional accessory kit (see below) widens even further the range of investigations this sensor can achieve.

Applications Include:
Physics:
• Motion with kinetics trolley
• The study of pendulum motion
• Simple harmonic motion

When used with the Accessory Kit:
• Conservation of Angular momentum
• Moments of inertia
• Pendulum investigations
• Gravitational rotational energy
• Frictional torque
• Rotational collisions
• Rotational inertia
• Newton's Second Law in its rotational form
• Tracking movement in a circle
• Linear displacement of an object

Biology and Chemistry when used with the Accessory Kit:
• Linear movement of gas syringe plunger

ROTARY MOTION ACCESSORY KIT

This is an optional accessory kit that comprises of:

- Pendulum with two adjustable masses.
- A 250mm plastic rack which allows for the accurate measurement of linear displacement. It can be used with a Light Level sensor and the Laser Module to accurately measure distance moved in Young's single and double slit experiments. Similarly, attaching a Magnetic Field sensor, an accurate plot of field strength versus distance can be obtained.
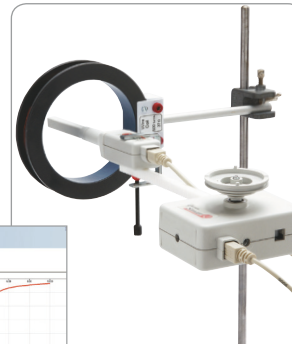- Two discs for studying Angular Momentum.

Applications Include:
Physics:
- Pendulum studies
- Conservation of angular momentum
- Rotational inertia — using the discs
- Circular movement — using the discs
- Linear motion — using the linear rack and Light sensor e.g. inverse square law

Chemistry and Biology:
- Linear movement e.g. gas syringe plunger movement
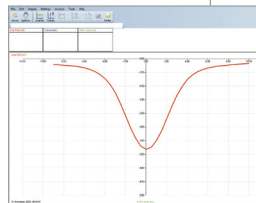
Magnetic field within a coil is plotted against position.

SOUND LEVEL

This dual range sensor accurately measures both sound pressure level in decibels (dBA) or waveform (mV). To make the measurements meaningful to learners, the sensor has been designed to approximate the normal human ear in the range and intensity that it 'hears' sounds.

Applications Include:
- Sound frequency
- Speed of sound
- Sound insulation
- Sound decay
- Air resonance
- Ear design
- Animal activity studies
- Noise pollution indoors and outdoors
- Sound waves: Monitoring the effect of altering frequency and amplitude, wave forms of musical instruments, etc.

Ranges:
- 40 to 110dBA
- Waveform ±2000mV
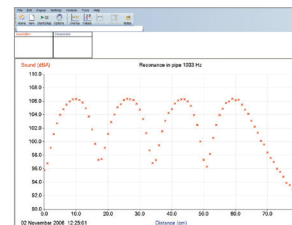
The graph shows the sound pressure levels in an open pipe when resonated at four times the natural frequency of the tube.

SPEED OF SOUND PACK

The speed of sound pack contains two SmartQ Stethoscope sensors. The difficulty of recording the speed of sound in solids with traditional sound sensors has been with the positioning of the sensors on the test surface, involving clamp stands, sticky tape and pieces of modelling clay.

The SmartQ Stethoscope sensor has a shape that allows the sensor to be placed directly onto the surface; no additional apparatus is required.

The bell structure of the Stethoscope sensor is more effective in isolating the sounds being recorded from the environment and makes collection of the data simple and repeatable.

Applications Include:
- Investigating the speed of sound through different mediums such as air, wood, metal, plastic and water.
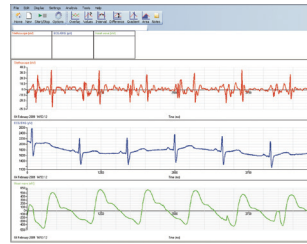
STETHOSCOPE PACK

The pack contains a SmartQ Stethoscope sensor and a conventional binaural stethoscope (to help students to locate their heart manually). The Stethoscope sensor allows you to record the heart sounds and the echoes of the beat in the circulation.

With the addition of an ECG sensor and a Heart Rate sensor a full physiology of the heart cycle can be recorded and analysed.

Applications Include:
• Sound level changes In a heart beat
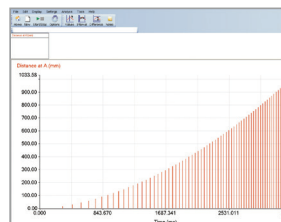
SPOKED PULLEY

This precision 10 segment, 50mm diameter very low friction pulley attaches to either the Light Gate, Rotary Motion sensor or directly to the Dynamics System where it can be used for the continuous recording of time/distance, time/velocity and time / acceleration relationships.

Applications Include:
• Motion detection
• Atwoods engine

Motion down an inclined plane

Spoked Pulley
3177

SPIROMETER

The Spirometer measures air flow whilst the user breathes. The air flow data can be converted to volume using a simple function in the EasySense software.

The Spirometer comes with 1 nose clip and 4 flow head filters – one 'fixed' and three for test subjects. A flow head contains an antibacterial and antiviral filter to lessen the possibility of cross contamination between subjects.

The flow head is for a test subject's use only and should be regarded as a 'disposable' item.

Replacement parts are available: Pack of 10 replacement flow head filters (3269) and pack of 5 nose clips (3264).
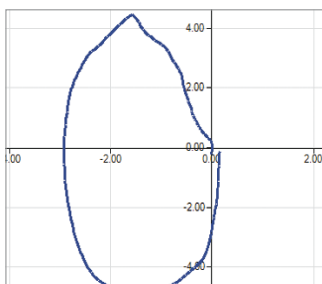
Applications Include:
• Lung capacity
• Fitness profiling
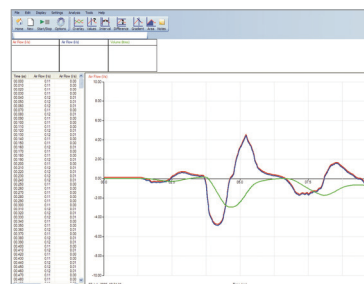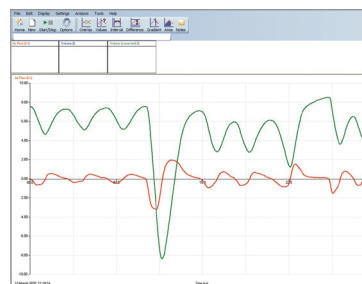• Flow volume loop

Spirometer
3267

Range: ±10.0 litres/second

Flow volume loop is achieved by plotting flow rate against volume.

Flow from the Spirometer with lung volume being derived by the Post Log function 'Spirometer flow to volume'.

Lung capacity.

COUNT/TACHOMETER ADAPTOR

Offering a wide variety of modes, the Count/Tachometer adaptor will accept any Data Harvest SmartQ digital sensor e.g. Light Gate, Crocodile Clips, Push Button switches via the din plug connector.

For added versatility a 3.5 mm jack plug can used to connect any switch e.g. a magnet and reed switch or a foot switch.

To make life easier we have selected some accessories to give immediate results: an anemometer to measure wind speed in miles per hour or metres per second and a rain gauge to measure rainfall in mm.

Applications Include:
Use the Count/Tachometer sensor to:

• Measure distances and speed of a road bicycle
• Attach an anemometer and rain gauge to make the core of a logging weather station
• Use push switches to count events
• Study circular motion
• Use it to act as trigger for other sensors e.g. start recording once the door is opened
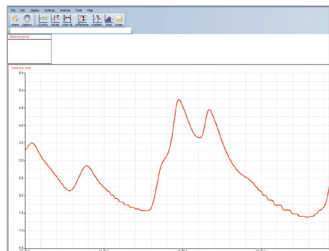
Typical graph monitoring wind speed.

An improvised weather station using the Count Tachometer with the Rain Gauge and Anemometer connected to a data logger for long term recording.

ANEMOMETER

The Anemometer is constructed using a high quality ball bearing, stainless steel hardware, UV stable plastic, and durable anodized aluminium hemispherical cups that are weight matched.

Requires count/tachometer

RAIN GAUGE

A `tipping bucket' type rain gauge. As rain falls the water runs down through the collecting funnel into a self–emptying spoon which tips and empties each time the equivalent of 1 mm of rain has fallen. Total rainfall is measured by counting how many times the bucket tips.

Requires count/tachometer

## TEMPERATURE – GENERAL PURPOSE

This general purpose Temperature sensor is the most commonly used sensor in the range. It can accurately measure the temperature of air, water, soil and weak acidic solutions, making it indispensable in all Science Departments.Housed in a stainless steel tube, it is resistant to dilute acids.

Applications Include:
• Cooling rates
• Absorption of energy
• Solar energy
• Insulation investigations
• Animal behaviour
• River and pond studies
• Freezing and melting of water
• Energy content of foods
• Change of state
• Neutralisation reactions
• Greenhouse effect
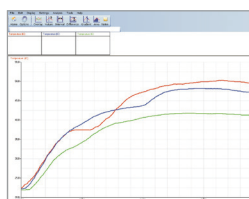
Food as a fuel: Comparing the energy provided by 3 different cooking oils.

TEMPERATURE – FAST RESPONSE

This sensor is extremely responsive as it features an exposed thermistor. It is ideal for determining changes in skin temperature, or for measuring air temperature in tight spaces.
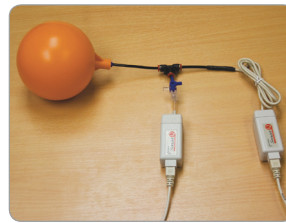
Applications Include:
Biology:
• Skin surface temperatures
  e.g. body mapping, changes due to exercise.
Chemistry:
• Universal gas laws

This Temperature sensor is ideal for measuring the temperature inconfined spaces. Here it is shown in a Charles Law experiment.

TEMPERATURE – HIGH RANGE

The wide temperature range of this sensor enables it to be used in a variety of experiments e.g. melting points and flame profiles. The thermocouple junction is housed at the end of a 200 x 3 mm AISI 310 stainless steel sheath. It has a one meter long cable that terminates in a mini plug (green to indicate thermocouple 'type K').

Applications Include:
Physics:
• Profile of a Bunsen flame
• Comparing the temperature of different flames e.g. candles
• Melting point of copper, bismuth or other solids
Chemistry:
• Temperature of dry ice or liquid air
General:
• What temperature does popcorn pop?

TIMING MATS (PAIR)

These large mats (58 cm x 17 cm) are on/off switches, and are activated by stepping onto them; one mat starts the timer, the other stops the timer.
A favourite activity for younger children is to find out how long they can stay in the air when they jump.

Applications Include:
• How long can I stay in the air when I jump?
• How fast can I hop, walk, and run?
• How many jumps can I do in a minute?

ULTRA–VIOLET

This multi–range sensor is sensitive to both UVA and the harmful UVB band of the spectrum, and allows topical investigations into the efficiency of suntan creams, UV protection of clothes etc.

Applications Include:
Physics:
• UV protection of clothing
• Investigating the UV variations along
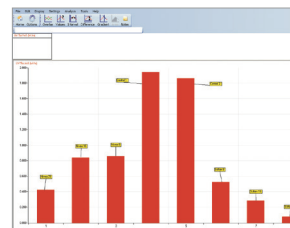 a fluorescent tube v light output
Biology:
• Testing suntan creams and sunglasses
Chemistry:
• Fluorescent rocks and dyes
Environment:
• Investigating the effect of cloud cover on UV measurements

VOLTAGE – DIFFERENTIAL INPUT

There a 4 Voltage sensors that measure the potential energy across any component for both DC and low voltage AC circuits. The 4mm plugs attach to most of the standard available electronic kits. With differential inputs, these sensors can be used anywhere within a circuit.
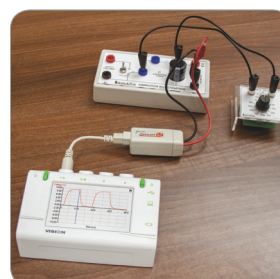
Applications Include:
Physics:
• Series and parallel circuits
• Current and voltage relationships
• Resistance
• Electrical characteristics
• Induced emf (3162 0nly)
• Battery comparisons
• Capacitor charge/discharge
• Ohm's law
Environmental:
• Alternative sources of energy

TEACHING PACKS

"Our most popular sensors for Physics, Biology & Chemistry"

COMPLETE PACKS FOR ALL SCIENCES

We have created a selection of teaching packs that contain our most popular sensors, providing a range of sensors, apparatus and matching teaching materials based around core biology, physics and chemistry subjects for students aged 11–18 and supplied as electronic books in the PDF format.

- General Sensor Pack
- Physics (11–14) Sensor Pack
- Physics (14–18) Motion & Forces Sensor Pack
- Physics (11–18) Dynamics Sensor Pack
- Physics (14–18) Light Sound & Pressure Sensor Pack
- Physics (14–18) Electricity & Heat Sensor Pack
- Biology (11–18) Sensor Pack
- Chemistry (11–18) Sensor Pack
- A Level Physics Teaching Pack
- A Level Chemistry Teaching Pack
- A Level Biology Teaching Pack
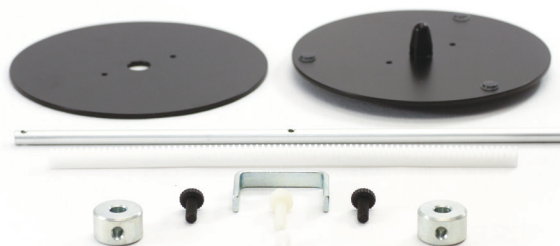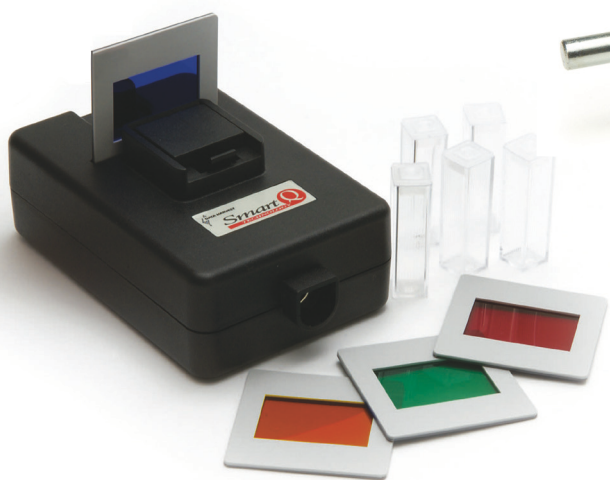
V–LOG
TITRATION

PHYSICS (11–14) CSP005

Physics curriculum pack that includes sensors and an eBook of curriculum materials.
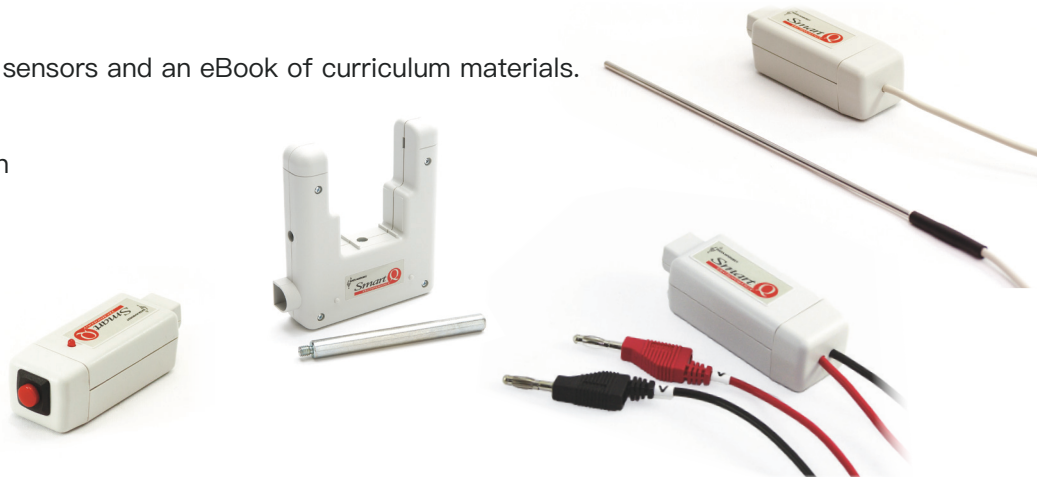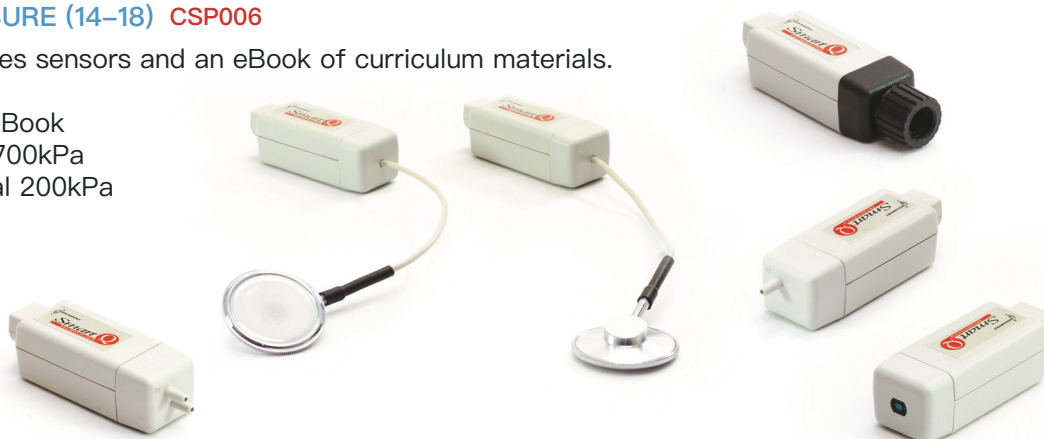
- 1 x Physics eBook
- 2 x Push Button Reaction Switch
- 2 x Temperature Sensor
- 2 x Light Gate
- 3 x Current – 100mA
- 1 x Current – 1A
- 1 x Current – 10A

PHYSICS LIGHT, SOUND & PRESSURE (14–18) CSP006

Physics curriculum pack that includes sensors and an eBook of curriculum materials.

- 1 x Light, Sound & Pressure eBook
- 1 x Gas Pressure – Absolute 700kPa
- 1 x Gas Pressure – Differential 200kPa
- 1 x Infrared
- 1 x Light Level
- 1 x Sound Level
- 1 x Speed of Sound Pack

PHYSICS ELECTRICITY & HEAT (14–18) CSP007

Physics curriculum pack that includes sensors and an eBook of curriculum materials.

- 1 x Electricity & Heat eBook
- 2 x Voltage – Differential 12V
- 1 x Magnetic Field – 10mT
- 2 x Temperature Sensor
- 3 x Current – 100mA
- 1 x Current – 1A
- 1 x Current – 10A

PHYSICS MOTION & FORCES (14–18) CSP003

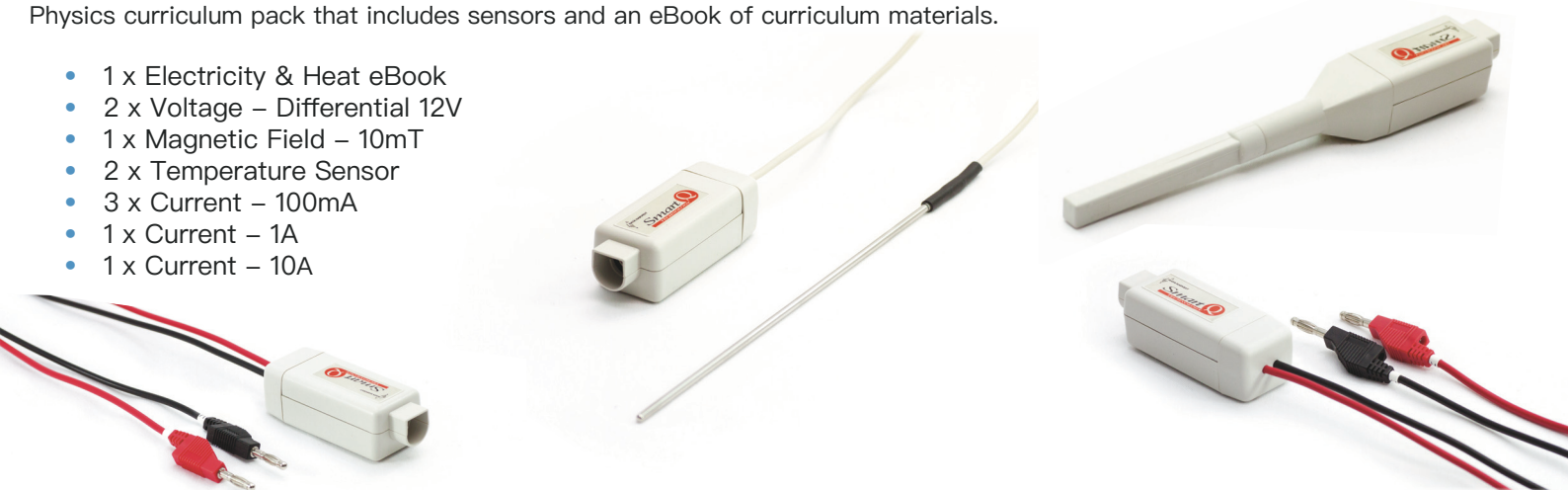Physics curriculum pack that includes sensors and an eBook of curriculum materials.

- 1 x Motion & Forces eBook
- 1 x Rotary Motion Accessory Kit
- 1 x Rotary Motion Sensor
- 1 x Force Sensor
- 2 x Light Gates

DYNAMICS (11–18) CSP004

Physics curriculum pack that includes sensors and an eBook of curriculum materials.

- 2 x Light Gates
- 1 x Rotary Motion Sensor
- 1 x Dynamics System
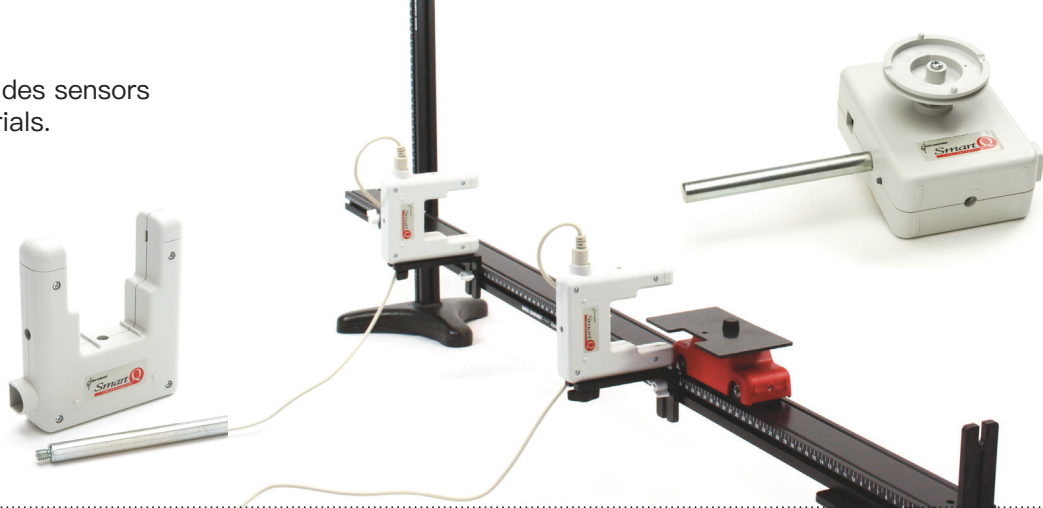
BIOLOGY (11–18) CSP001

Biology curriculum pack that includes sensors and an eBook of curriculum materials.

- 2 x Biology eBooks
- 1 x Heart Rate and Pulse Waveform
- 2 x Push Button Reaction Switch
- 1 x Temperature Sensor – Fast response
- 2 x Temperature Sensor
- 1 x Timing Mats (Pair)
- 1 x Colorimeter
- 1 x Humidity

CHEMISTRY (11–18) CSP002

Chemistry curriculum pack that includes sensors and an eBook of curriculum materials.

- 2 x Chemistry eBooks
- 1 x Gas Pressure – Differential 200kPa
- 1 x Colorimeter
- 1 x pH Pack
- 2 x Temperature Sensor

GENERAL SENSOR PACK GSP2

A starter pack for the whole science department

- 3 x Temperature Sensor
- 1 x Light Level
- 1 x pH Pack
- 2 x Light Gates
- 1 x Voltage – Differential 20V

Free Teacher Guides

"Selected materials from our extensive experiment archive"

A–Level Practical Skills Matches

The second edition of the "A Level practical skills matches" eBook contains selected materials from our extensive experiment archive. All of the experiments included are matched to the new practical skills assessments that are specified in A–Level teaching from 2015.

Data loggers are an integral part of the Ofqual and government orders. Data logging is embedded in the new specifications created by the English examination boards.

This free download document provides:
- Links between key practical & apparatus skills to Data logging
- Teaching and lab technician preparation guidance
- Examples of how to use data collected in practical work to mathematically model the supporting theory
- A full description of the advanced mathematical functions within the free EasySense software

The 52 Activities in the eBook download include:

PHYSICS
- Interference of light: (Young's single & double slit)
- Simple harmonic motion
- Acceleration due to gravity (by free fall)
- Capacitor: time constants, energy and charge
- EMF
- Gas laws

BIOLOGY
- Membrane permeability
- Photosynthesis

CHEMISTRY
- Titration
- Enzyme reactions & study
- Rates of reaction
- Rate order

Free download at data-harvest.co.uk

DATA HARVEST
Committed to Science and Technology

Updated 2016

A Level Practical Skills Matches
(first teaching 2015)

D0249/2

A LEVEL PHYSICS TEACHING PACK CSP009

A large set of sensors for A Level Physics with storage tray and lid.

- 1 x Current Sensor – 100mA
- 1 x Current Sensor – 1A
- 1 x Force Sensor
- 1 x Gas Pressure Sensor – Absolute 700kPa
- 1 x Gas Pressure Sensor Accessory Pack
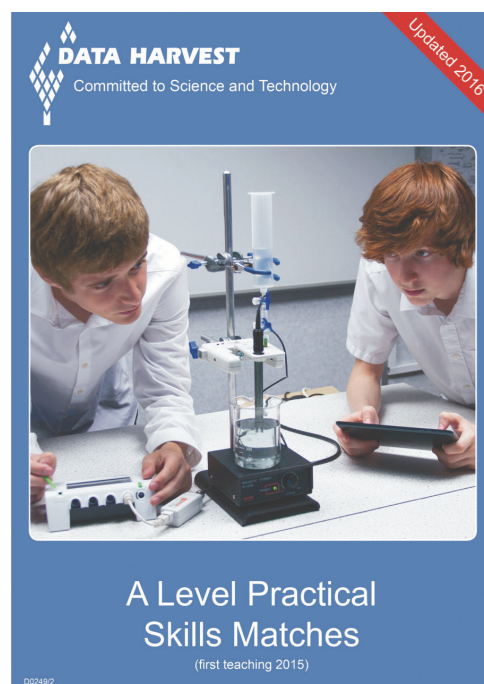- 1 x Interrupt Card Set
- 1 x Laser Module
- 1 x Light Level Sensor
- 1 x Motion Sensor
- 1 x Rotary Motion Accessory Kit
- 1 x Rotary Motion Sensor
- 1 x Temperature Sensor
- 1 x Voltage Sensor – Differential 12V
- 2 x Light Gates
- 2 x Sound Level Sensors

A LEVEL CHEMISTRY TEACHING PACK CSP010

A practical set of sensors for A Level Chemistry with storage tray and lid.

- 1 x Colorimeter Sensor
- 1 x Drop and Bubble Counter
- 1 x pH Pack
- 2 x Temperature Sensors

A LEVEL BIOLOGY TEACHING PACK CSP011

A practical set of sensors for A Level Biology with storage tray and lid.

- 1 x Colorimeter Sensor
- 1 x Light Level Sensor
- 1 x pH Pack
- 1 x Temperature Sensor

GCSE Practical Skills Matches

The GCSE practical skills matches have been written to show how data logging can be used naturally in many of the GCSE required practical assessments.

The matched worksheets have been specifically re–written to follow the format and spirit of the joint examination boards' handbook of required practicals for the GCSE science qualifications, first teaching in September 2016.

Each matched practical has:
- An indication of the key practical skills covered by the activity
- A student instruction sheet
- Teachers / technicians preparation and help, including apparatus list, practical guidance & sample captured data (where appropriate)

PHYSICS
- Specific heat capacity
- Thermal insulation
- Resistance: Variance in wire (Length & diameter)
- V–I Characteristics: Filament bulb, ohmic resistor, diode and light emitting diode
- Acceleration: Measured with light gates (mass & force)
- Sound waves: Frequency, period, speed in a solid
- Radiation: Leslies cube

CHEMISTRY
- Neutralisation
- Temperature changes
- Acid alkali: Displacement & thermometric
- Rates of reaction

BIOLOGY
- Enzymes: Protease digestions
- Photosynthesis: Light intensity
- Reaction Times

DATA HARVEST
Committed to Science and Technology

GCSE Required
Practical Activities

Free download at data-harvest.co.uk

DATA HARVEST

DYNAMICS SYSTEM

"Demonstrate basic speed, velocity & acceleration"

WHAT IS A DYNAMICS SYSTEM?

The Data Harvest Dynamics System is far more than a simple ramp. It's a set of high quality tools that allows presentation of all mechanics work during pre–examination for GCSE & A level studies that provides accurate and repeatable results. The system is quick to setup and easily folds away for storage.

With the addition of a pair of SmartQ Light gates, it can be used to demonstrate basic speed, velocity and acceleration.
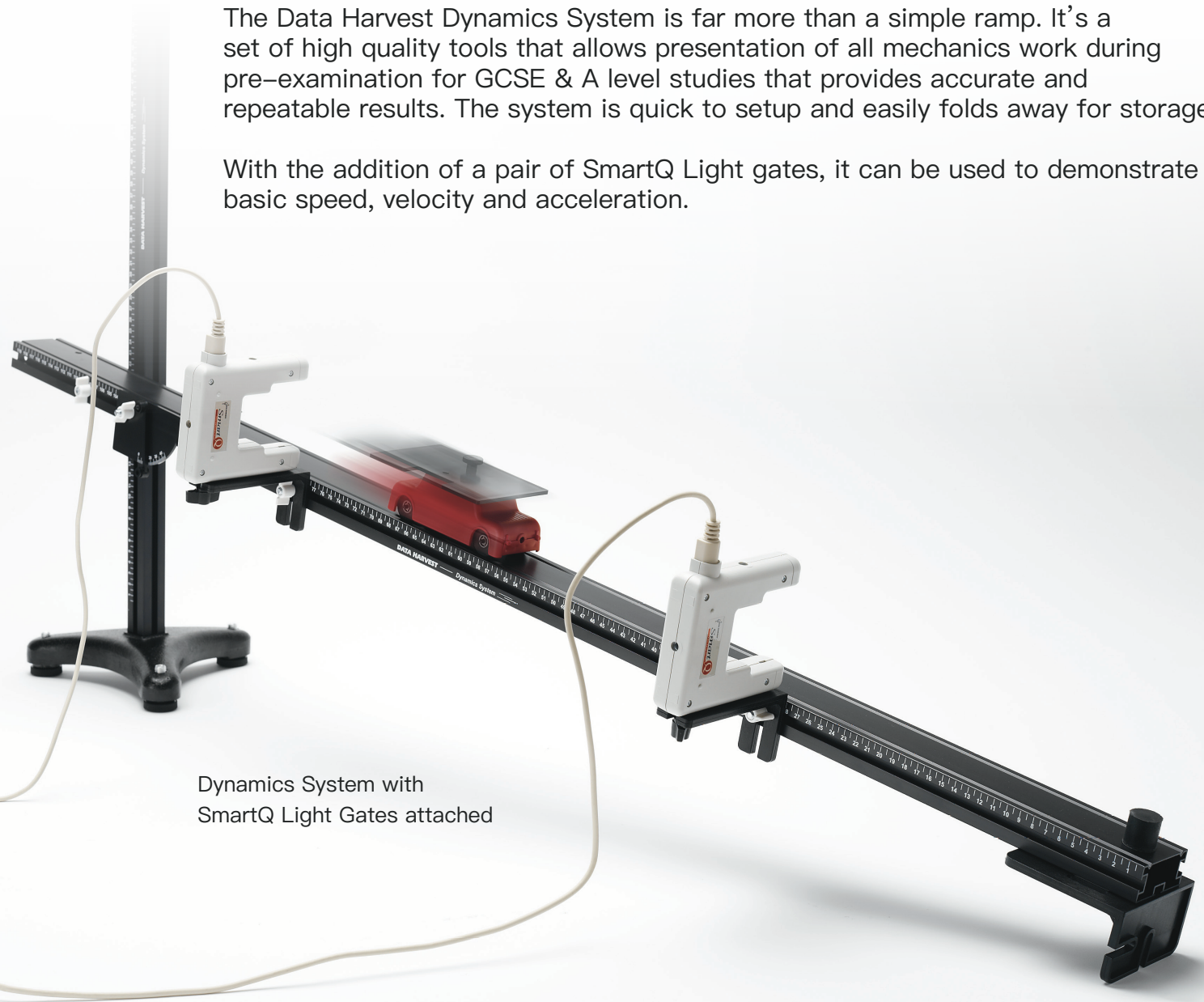
Dynamics System with
SmartQ Light Gates attached

EXPLORE
DYNAMICS

Dynamics System 3800

A MODULAR DYNAMICS TRACK FOR REPEATABLE RESULTS!

This self–assembled, smart black anodised aluminium track and support pillar comes with a low friction red cart, spoked pulley and various brackets to form a high quality, modular dynamics track.

A Solid Investment

Very few investments made in the physics lab will provide more learning opportunities than the Data Harvest Dynamics System.

Features:

- Robust anodised aluminium construction
- 1.2m long incline track
- SmartQ sensors fit easily and are aligned for reliable measurements
- Accurate and repeatable results
- Saves valuable lesson time
- The Dynamics System is so versatile it could be called a Physics Work Station
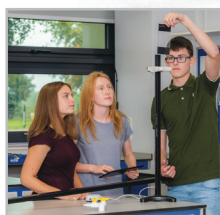
Spring attached for Elastic collisions

Rubber and solid bumpers

Single and double interrupt card

Magnets for both elastic and inelastic collisions

Masses attached for Newton's 2nd Law

Reflector for Motion Sensor

Pack Includes:

- 1x Aluminium Track
- 1x Vertical Pillar & Base
- 1x Low Friction Cart
- 1x Interrupt Card (for top of cart)
- 1x End Reflector Card
- 1x Spoked Pulley
- Large & Thin Brackets
- Bolts, Screws & Wing Nuts

Optional Extension Kit

Extends the range of investigations

3801

This extension kit allows for further dynamics investigations and advanced physics work including collisions, dynamic forces and advanced pendulum work.

- Motion: Use the spring to roll a cart up a slope
- Pendulum: Light Gate and simple pendulum
- Collisions: Elastic and inelastic
- Light Gates, Motion & Force sensors
- Use Force Sensor and a Light Gate to investigate crumple zones
- 2 Force and a Motion sensor with a cart oscillating horizontally

Extension Pack Contains:
An extra cart, magnets and holders, springs, an end reflector card, pendulum bob, slotted mass set, mass retainers, sensor clip, plus an interrupt card set.

EXPLORE
TIMING

SMART MICROSCOPES

"Designed for Education, easy to use and perfect for all ages"

SMART MICROSCOPES

With connection to PC, Apple Mac and Tablets, these high resolution devices finally offer a way for everyone to see the object at the same time. With high quality optics, included fully featured software, multiple magnifications and a range of accessories. Designed for Education, easy to use and perfect for all ages. It's everything the modern school needs!

- Identify parts of plants and animals
- Observe life cycle changes
- Compare different types of rock
- Examine pond water

- View prepared slides
- Examine clothing and textiles
- Explore Owl pellets
- Investigate sand and soil contents

- Take Pictures
- Record Video
- Measure
- Compare

5M (5 Megapixel)
SMSS225
10x – 200x magnification
USB PC & Mac
Includes:
- Scope
- Stand
- Software site licence

Windows | OS X

5M 500x (5 Megapixel)
SMSS227
500x magnification
USB PC & Mac
Includes:
- Scope
- Stand
- Software site licence

Windows | OS X

iGo 2
SMSS325
Wi–Fi to iPad & Android
Includes:
- Scope
- Rechargeable batteries
- Battery charger
- Free app download

iOS | Android

Metal Stand	Gooseneck Stand	Backlit Stand	Lens Tip Set	Cradle
SMSS341	SMSS319	SMSS342	SMSS321	SMSS323
For 5M, 5M 500x & iGo	For 5M & 5M 500x	LED lit. X, Y & Z controls	4 Tips: 15x 30x 50x & 150x	3 Tips: 15x 23x & 40x
	IGO Gooseneck Stand			
	SMSS335			

SEEING
THE DETAILS

WARRANTY
1 Year

GENECON

"Understand the power and efficiency of electricity"

EXPLORING ELECTRICITY

Have fun while learning about generating electricity. Use the hand–held Dynamo in a simple demonstration of converting mechanical energy into electrical energy. With a range of accessories available, Genecon is an amazing hands–on way to learn about electricity.

EXPLORING ELECTRICITY CLASS PACK 900103PK

The exploring electricity pack is the ideal choice for students to learn the key concepts of electricity through a fun and interactive experience.

The Exploring electricity class pack presents an engaging way for children to investigate electricity topics, but also offers much more. Children will love making electricity using the Genecon and investigating what it will do.

It is a well thought out kit that complements existing equipment and fully supports an investigative approach to science.
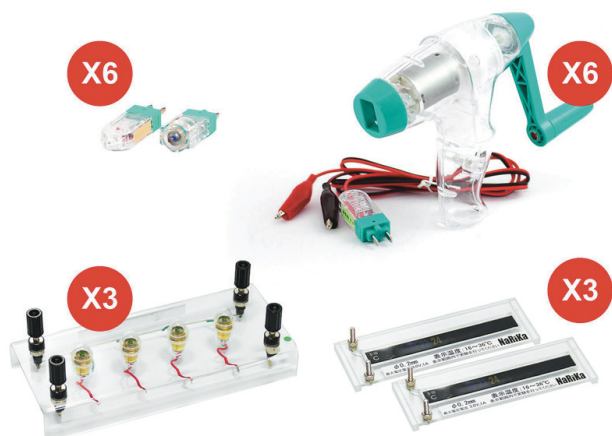
Pack Includes:

- 6x Genecon
- 6x Lamp + LED
- 3x Lamp Load
- 3x Thermo Power
- 1x Gratnells Tray & Lid
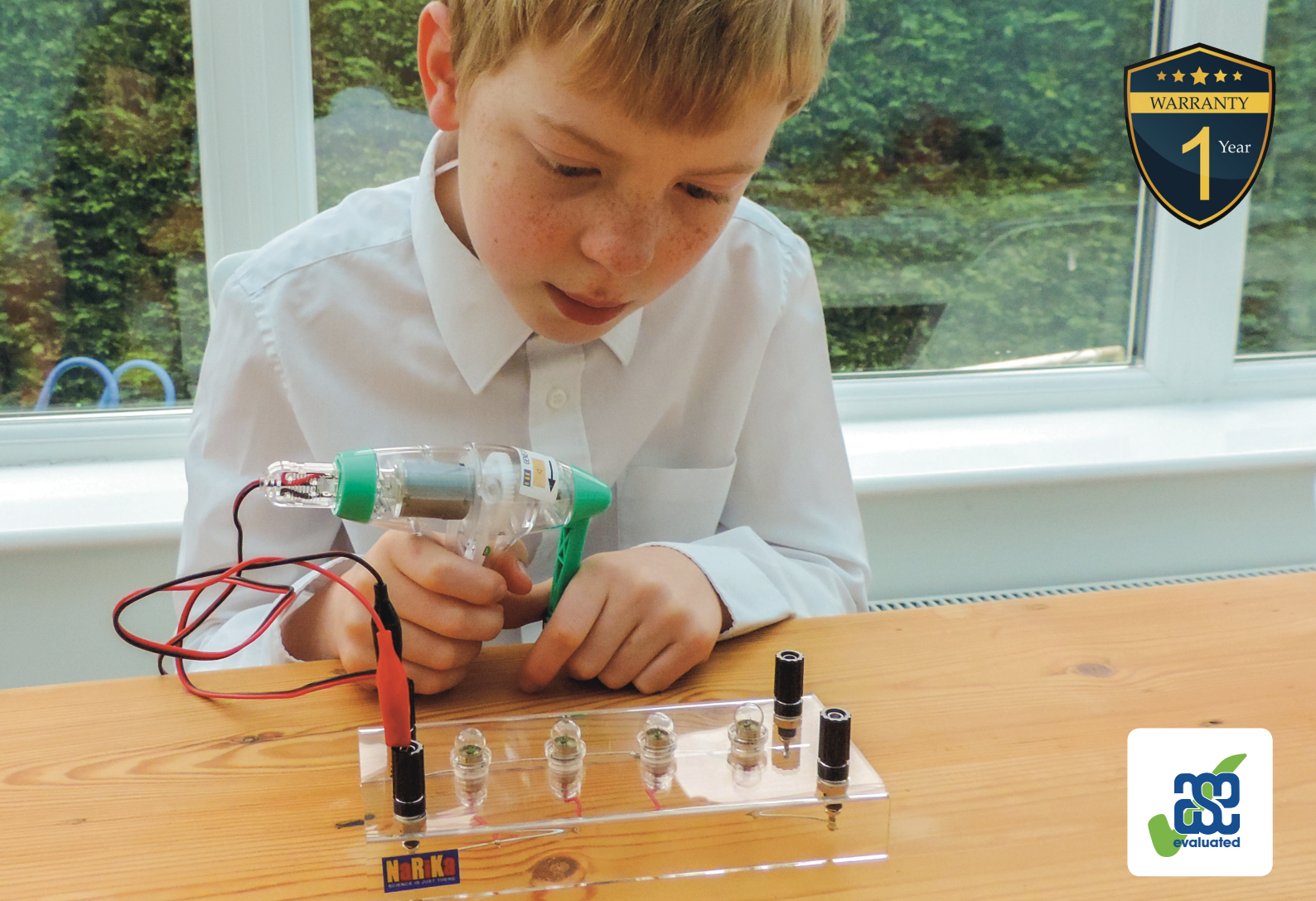
HAND HELD DYNAMO (GENECON V3) 3904

Turning the handle generates electricity.

Perfectly suited to experiments that explain the mechanism of power generation in an easy and fun way. The clear body allows the mechanism to be seen while in use.

LAMP & L.E.D NRK001

A filament lamp and an LED module. Allows comparisons to be made between the characteristics of the Lamp and the LED.

HEAT COMPARISON THERMOMETERS NRK006

Wind the handle to feel how much energy is required. Generate electricity and change the temperature display. Additionally compare the difference between the two units with different diameter wires.
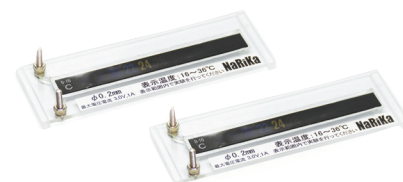
LAMP LOAD NRK007

Four low voltage lamps connected in parallel. Feel the increase in power and energy needed to keep the lights on as more bulbs are added to the circuit by simply screwing them into the holders.

DATA HARVEST