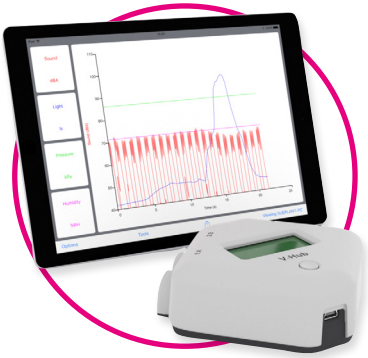
DATA HARVEST

Wireless Sensors & EasySense Software









All equipment is linked to the latest curriculum including GCSE, A Level, IGCSE & IB

2020

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V-Log & V-Hub

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

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.

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

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



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V-LOG & V-HUB

DATA HARVEST

Code	Description	USB Connect-ivity	Bluetooth Connect-ivity	Meter Mode	Pack	Charging Tray	Storage Case	Internal Sensors	Sensor Ports	Long Sensor leads	Short Sensor Leads	USB Leads	Mounting Rods	Price
LOG1062	V-Hub^4 USB + Bluetooth	Yes	Yes	—	Each	—	—	—	4	2	2	1	1	£148.90
LOG1064	5x V-Hub^4 USB + Bluetooth + charging tray	Yes	Yes	—	5	Yes - Gratnells compatible	—	—	4	10	10	5	5	£667.90
LOG1066	V-Hub^8 USB + Bluetooth	Yes	Yes	—	Each	—	—	Light, Humidity, Air Pressure, Sound	4	2	2	1	1	£203.90
LOG1068	5x V-Hub^8 USB + Bluetooth + charging tray	Yes	Yes	—	5	Yes - Gratnells compatible	—	Light, Humidity, Air Pressure, Sound	4	10	10	5	5	£915.90
LOG3012	V-Log^4 USB	Yes	—	Yes	Each	—	Yes - Gratnells compatible	—	4	2	2	1	—	£188.90
LOG1050	5x V-Log^4 USB + charging tray	Yes	—	Yes	5	Yes - Gratnells compatible	—	—	4	10	10	5	—	£848.90
LOG1052	V-Log^4 USB + Bluetooth	Yes	Yes	Yes	Each	—	Yes - Gratnells compatible	—	4	2	2	1	—	£216.90
LOG1054	5x V-Log^4 USB + Bluetooth + charging tray	Yes	Yes	Yes	5	Yes - Gratnells compatible	—	—	4	10	10	5	—	£974.90
LOG3024	V-Log^8 USB	Yes	—	Yes	Each	—	Yes - Gratnells compatible	Light, Air Pressure, Sound, Humidity	4	2	2	1	—	£241.90
LOG1056	5x V-Log^8 USB + charging tray	Yes	—	Yes	5	Yes - Gratnells compatible	—	Light, Air Pressure, Sound, Humidity	4	10	10	5	—	£1088.90
LOG1058	V-Log^8 USB + Bluetooth	Yes	Yes	Yes	Each	—	Yes - Gratnells compatible	Light, Air Pressure, Sound, Humidity	4	2	2	1	—	£269.90
LOG1060	5x V-Log^8 USB + Bluetooth + charging tray	Yes	Yes	Yes	5	Yes - Gratnells compatible	—	Light, Air Pressure, Sound, Humidity	4	10	10	5	—	£1212.90



LOG1062



LOG1064



LOG3012

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Wireless Sensors

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!

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 EasySense2 software.

EasySense2 is the free downloadable software to capture and analyse the data obtained from the connected sensors. EasySense2 works on all platforms: Windows PC, MAC OS, iOS, Android and Chrome Book and is downloadable from the relevant app stores. The wireless sensors connect instantly with no pairing required.

EasySense2 captures data from multiple devices at the same time, with just a click on the start button. The display allows easy comparison of the data on the multiple display. The displays can be changed to present the data in which ever format you choose, line graph, bar chart, numbers etc. The software also includes easy to use tools to analyse the data along with the capture.

Listings

5 Bluetooth Wireless Temperature Sensor
5 Bluetooth Wireless Temperature Sensor - Fast Response
5 Bluetooth Wireless pH Sensor Pack
5 Bluetooth Wireless Motion Sensor
6 Bluetooth Wireless Light and Colour Sensor
6 Bluetooth Wireless Voltage & Current Sensor
6 Bluetooth Wireless Sound Level Sensor

Bluetooth Wireless Temperature Sensor

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.

Ranges:
- –40°C to 125°C
- –40°F to 275°F

Code	Pack	Price
LOG1100	Each	£74.90

Bluetooth Wireless Temperature Sensor - Fast Response

This temperature sensor is extremely responsive as it features an exposed thermistor bead. It is ideal for determining changes in skin temperature, measuring air temperature in tight spaces or when some flexibility is required.

Ranges:
- –40°C to 125°C
- –40°F to 275°F

Code	Pack	Price
LOG3014	Each	£73.94

Bluetooth Wireless pH Sensor Pack

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

It also has a mV range, perfect for experiments on calibrating a pH sensor.

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

Ranges:
- Default calibration 0 to 14pH
- User calibration 0 to 14pH
- ±1,000mV

Code	Pack	Price
LOG1102	Each	£98.90



Bluetooth Wireless Motion Sensor

The Motion sensor is a sonar device that emits ultrasonic pulses which are reflected to and from an object to determine its distance from the sensor. That information can be used to work out the velocity or acceleration of the object. It will capture the motion of running students, falling basketballs and carts on inclined planes. This sensor will work well with the Dynamics System.

Ranges:
- Distance
- Time

Code	Pack	Price
LOG3034	Each	£128.17



Bluetooth Wireless Light and Colour Sensor

This sensor can be used to measure not only the level of light in the visible spectrum but also the primary colours of that light and the UV portion of the electromagnetic spectrum. The sensor also has a built-in white LED that can be used as a light source, especially useful in experiments on reflectivity.

Ranges:
- Ambient light lux
- Fast ambient light lux
- Colour (RGB & LED)
- UV (UV index, nominal UV)

Code	Pack	Price
LOG3026	Each	£83.80

Bluetooth Wireless Voltage & Current Sensor

A combined voltage and current sensor in one package. It can be used to measure both electric current and the potential difference across a component in low voltage AC or DC circuits. The Voltage sensor measures the difference in potential between two points in a circuit, in a range of –20V to +20V. The Current sensor measures the current flowing in a circuit, in a range of –1A to +1A (±1000mA).

Ranges:
- ±20V
- ±1A

Code	Pack	Price
LOG1108	Pack	£124.90

Bluetooth Wireless Sound Level Sensor

This sensor accurately measures sound pressure level in decibels (dB) or examining the frequency content of sound in waveform (mV). The A filter used in the dBA range measures mid-range frequencies to approximate the normal human ear in the range and intensity that it 'hears' sounds. The C filter (dBC range) suits low and high frequency sound levels.

Ranges:
- dBA
- dBC
- mV

Code	Pack	Price
LOG3028	Each	£108.45

Additional Wireless Smart Sensors*

Code	Description	Pack	Price
LOG3016	Bluetooth Wireless Magnetic Field Sensor	Each	£93.66
LOG3020	Bluetooth Wireless Gas Pressure Sensor - Absolute	Each	£98.59
LOG3022	Bluetooth Wireless Gas Pressure Sensor - Differential	Each	£98.59
LOG3032	Bluetooth Wireless Thermocouple Sensor	Each	£123.24
LOG3040	Bluetooth Wireless Force Sensor Accelerometer	Each	£133.10
LOG3038	Bluetooth Wireless Rotary Motion Sensor	Each	£192.25

*For details of the additional sensors please see the website or contact your local area representative

Wired Sensors

Award winning SmartQ technology offering uncompromised levels of accuracy and reliability. 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. For use with the V-Log and V-Hub.

Full range of wired sensors available -
See website for complete listings

Listings

8 - 10 Biology
Carbon Dioxide Sensor - Finger Pulse Oximeter
11 - 13 Chemistry
pH Sensor Pack - Conductivity Pack
14 - 18 Physics
Accelerometer - EM Induction Module
18 Accessories
Spoked Pulley - Long Sensor Lead

Biology





LOG3198

Carbon Dioxide Sensor

This sensor circular lid casing has been cleverly designed to form a sealed chamber when using standard laboratory beakers and conical flasks.

The casing also provides ports for inserting additional sensors into the chamber such as temperature, pH, and O_2. The sensor can be set at two ranges enabling measurement from a wide variety of sources.

Ranges:
- 0 to 10,000ppm
- 0 to 100,000ppm

Applications include:
- Variances in classroom CO_2 levels
- Plant photosynthesis and respiration
- Respiration of small organisms e.g. microbes, maggots
- Measuring human CO_2 production
- Candle in bell jar (measuring CO_2 emissions)

Code	Pack	Price
LOG3198	Each	£277.90





LOG3111

Humidity Sensor

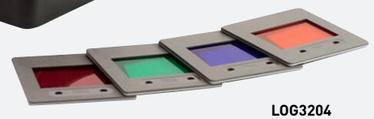
Humidity is the measure of water vapour content relative to the ambient temperature. Useful for environmental and Biology studies. For example, a simple transpiration experiment can be set up and the results analysed in less than 5 minutes.

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

Code	Pack	Price
LOG3111	Each	£81.90







LOG3204

Colorimeter

This self-contained sensor produces consistently excellent results. 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 35mm slides (red, orange, blue and green) that produce light of a specific and consistent wavelength, and a pack of cuvettes with lids.

Ranges:
- 0 to 110% transmittance
- 0.0500 to 1.0500 absorbance

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

Code	Pack	Price
LOG3204	Each	£112.90

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Breathing Rate Belt Pack

The breathing rate belt and pressure sensor pack combines a ±10kPa differential gas pressure sensor and a breathing rate belt to measure the expansion and contraction of a person's chest while they breathe.

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 has 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.

Code	Description	Pack	Price
LOG3195	Breathing rate belt & gas pressure sensor pack	Each	£111.90
LOG3462	Breathing rate belt	Each	£37.90
LOG3096	Gas pressure sensor	Each	£82.90



LOG3195

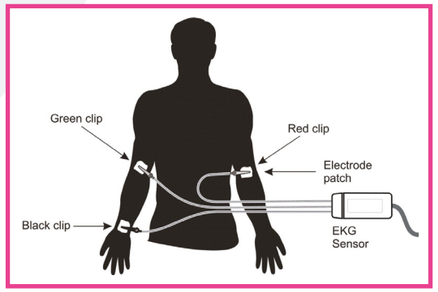


E.C.G. (Electrocardiogram) Sensor

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 (100 included).

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)

Code	Pack	Price
LOG3081	Each	£125.90





LOG3081

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LOG3258

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.

- Range: ±10.0 litres/second

Applications include: • Lung capacity • Fitness profiling • Flow volume loop

Code	Pack	Price
LOG3258	Each	£125.90



LOG3273

Temperature Sensor – 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.

Ranges:
- –30°C to +110°C
- –22°F to 230°F

Applications include:
- Biology: skin surface temperatures e.g. body mapping, changes due to exercise
- Chemistry: universal gas laws

Code	Pack	Price
LOG3273	Each	£38.90



LOG3552

Finger Pulse Oximeter

The Pulse Oximeter can be used to measure human Haemoglobin saturation and Heart Rate through a fingertip. Pulse oximetry uses a light emitter with red and infrared LED that shines through a reasonably translucent site with good blood flow e.g. fingertip. Opposite the emitter is a photo detector that receives the light that passes through the measuring site.

Easy to operate: Put the test subject's finger into the rubber cushions of the clip and then clip the finger. Pressing the on switch button while power is on will change the direction, brightness and contents of the LCD display.

The LCD digital display will show:
- Pulse intensity by a single column bar graph
- Pulse rate as numbers
- SpO_2 (pulse oxygen saturation %) as numbers
- A graphical representation of pulse wave displayed as a line or bar graph

Supplied with a hanging rope. Requires 2 x 1.5 V AAA batteries.

Code	Pack	Price
LOG3552	Each	£58.17

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Chemistry

pH Sensor 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.

- Range: 0 to 14pH

Applications include:

Chemistry:
- Testing acids and alkalis
- Acid-base titrations
- Acid-rain

Biology:
- Enzyme action
- Respiration

Code	Pack	Price
LOG3234	Each	£97.90



LOG3234

Temperature Sensor – 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.

Ranges:
- –30°C to +110°C
- –22°F to 230°F

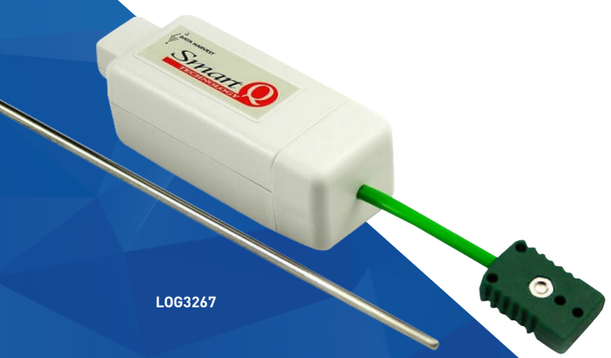
Applications include:
- Cooling rates
- Absorption of energy
- Solar energy
- Insulation investigations
- Animal behaviour
- River and pond studies
- Freezing and melting of water
- Energy content of foods
- Change of state
- Neutralisation reactions
- Greenhouse effect

Code	Pack	Price
LOG3270	Each	£38.90



LOG3270

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LOG3267

Temperature Sensor – 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 3mm AISI 310 stainless steel sheath. It has a one meter long cable that terminates in a mini plug (green to indicate thermocouple 'type K').

- Range: –200°C to +1000°C

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?

Code	Pack	Price
LOG3267	Each	£89.90



LOG3093

Gas Pressure Sensors, Absolute

When the single port is left open, 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.

- Measuring range: 0-110kPa absolute / 0-33in Hg / 500-12,000m altitude

Applications include:
- Atmospheric pressure measurements
- Altimeter
- Vapour pressure of liquids
- Gas laws

Code	Pack	Price
LOG3093	Each	£82.90

Drop & 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.

Ranges:
- 0 to 10,000 count
- 0 to 120cm^3 volume at a drop rate from 23 to 29 drops per cm^3

Code	Pack	Price
LOG3078	Each	£95.90

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.

Ranges:
- 0 to 100µS
- 0 to 1mS
- 0 to 10mS
- 0 to 100mS

Typical investigations:
- Electrolytes and non-electrolytes
- Finding the equivalence point
- Difference between ionic and molecular compounds
- Diffusion of ions through a membrane
- Environment testing for salinity, total dissolved solids or general conductivity in water samples

Code	Pack	Price
LOG3213	Each	£106.90



LOG3078



LOG3213

Physics



LOG3183

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, or dynamic – caused by moving or vibrating the accelerometer.

The lower range sensor can record acceleration in one of 3 axis or the resultant force of the 3 axis, to a maximum of 10g. It will also measure vibration forces and angle.

- Measuring range: ±2.5g & ±10g / ±25ms^2 & ±100ms^2

Code	Pack	Price
LOG3183	Each	£99.90

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

Code	Pack	Price
LOG3117	Each	£46.90



LOG3117





Dynamics System

This self-assembled, matt black anodised 1.2m aluminium incline track and support pillar comes with a low friction cart with its interrupt card and various brackets to form a high quality modular dynamics track.

Sensors are aligned easily to give reliable, repeatable accurate results.

Designed for use with Light Gates, Motion Sensor, Rotary Motion Sensor, Spoked Pulley, Force Sensor, Laser Module and Light Level sensors.

The Dynamics System Contains:
- 1 x 120cm Aluminium track
- 1 x 80cm Vertical pillar and base
- 1 x Low friction Cart
- 1 x Interrupt card for top of cart
- 1 x End reflector card
- 1 x Spoked Pulley
- Large and thin brackets
- Bolts, screws and wing nuts

Suitable for the following experiments:
- Motion - Time, Velocity, Acceleration, Friction
- Newton's 2nd Law
- Forces
- Impulse
- Free fall
- Atwood's Machine
- Pendulum

Code	Pack	Price
LOG3525	Each	£199.90



LOG3525

Motion Sensor

The Motion Sensor can capture the motion of running students, falling basketballs and carts on inclined planes. Featuring a high sample rate of 50Hz.

Ranges:
- Distance: 0.15 to 8m
- Time: 1000 to 50,000µS

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

Code	Pack	Price
LOG3129	Each	£125.90



LOG3129



LOG3222



LOG3294

Current Sensors

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

Code	Description	Pack	Price
LOG3222	Current sensor ±100mA	Each	£49.90
LOG3075	Current sensor ±1A	Each	£49.90
LOG3225	Current sensor ±10A	Each	£49.90

Voltage Sensors – Differential Input

These are 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 e.m.f (LOG3291 only)
- Battery comparisons
- Capacitor charge/discharge
- Ohm's law

Environmental:
- Alternative sources of energy

Code	Description	Pack	Price
LOG3294	Voltage sensor ±20V	Each	£43.90
LOG3288	Voltage sensor ±12V	Each	£43.90
LOG3285	Voltage sensor 0-10V	Each	£43.90
LOG3291	Voltage sensor ±1V	Each	£43.90

Geiger Müller Sensor

Housed in a robust casing, this self-contained sensor detects radiation from alpha, beta and gamma particles. The Geiger Müller sensor is very simple to use, as it does not require an external power source, deriving its power from the data logger.

Ranges:
- Counts per second
- Counts per 10 seconds
- Counts per minute
- Open count
- Pulse output 0 - 100%

Applications include:
- Half life random events
- Radioactivity exposure due to natural radon

Code	Pack	Price
LOG3102	Each	£348.90

Magnetic Field Sensor

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

Code	Pack	Price
LOG3126	Each	£74.90

Laser Module

The Laser Module includes 2 optical slides for investigating diffraction gratings and Young's single and double slits. The laser draws its power from the logger. It produces a red light of 645–665 wavelength.

Applications include:
- Young's slit
- Optics
- Diffraction grating

Code	Pack	Price
LOG3483	Each	£49.90



LOG3102



LOG3126



LOG3483

EM Induction Module

When used in an electromagnetic induction investigation, the best results will be obtained by using with either the ±1 V Voltage or ±100 mA Current sensor.

Teaching Applications:

- Faraday's law of induced e.m.f. (induced by a magnet falling through the wire coil)
- Induced e.m.f. when a magnet spins in a coil
- The effect of speed of the magnet on induced e.m.f, e.g. dropping the magnet from different heights.
- Two Wire Coils can be set at a distance apart equal to their radius in a Helmholtz arrangement to generate an area of uniform magnetic field intensity between the coils. A Magnetic Field sensor (LOG3126) can be used to study the magnetic field along their axis.
- Measuring e.m.f. and change in magnetic field to study how rate of change of magnetic field creates voltage and current.

Code	Pack	Price
LOG3450	Each	£49.30



LOG3450



LOG3456



LOG1048



LOG3426

Accessories

Spoked Pulley

This precision 10 segment, low friction pulley produces excellent results in a Physics lab. It can be attached to a Light Gate, Rotary Motion Sensor or used with the Dynamics System.

When the Spoked Pulley is attached to a Light Gate it's spokes will block the infrared beam of the Light Gate as it rotates and can therefore be used for the continuous recording of time/distance, time/velocity and time/acceleration relationships.

The pulley can also be used as a guide for a pulley cord or to convert movement from one angle to another e.g. on a Rotary Motion sensor.

Code	Pack	Price
LOG3456	Each	£11.83

Bluetooth Smart USB Adaptor

An easy upgrade to add Bluetooth wireless technology (BLE) to your VISION data logger or Windows PC enabling connection via Bluetooth to Windows PC, Tablets & Phones.

If your PC is running Windows 10 or above with BLE and the EasySense2 version of our software you will be able to connect to up to 6 of our Bluetooth devices e.g. data loggers that have BLE connectivity such as V-Hub, V-Log[4] or [8] Bluetooth wireless sensors and dynamics carts.

This adaptor can also be used to add BLE to VISION loggers, Windows 7 or above computers and for customers who are still using the original EasySense software Windows.

Code	Pack	Price
LOG1048	Each	£14.79

Long Sensor Lead

1.5m sensor lead with a male min-din plug at each end. It is used to connect a SmartQ sensor to an EasySense Data Logger.

Code	Pack	Price
LOG3426	Each	£4.93

General Sensor Pack

A starter pack for the whole science department.

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

Code	Pack	Price
LOG3072	Each	£414.90



LOG3072

Biology (11-18) Sensor Pack

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

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

Code	Pack	Price
LOG3051	Each	£486.90



LOG3051

Chemistry (11-18) Sensor Pack

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

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

Code	Pack	Price
LOG3054	Each	£397.90



LOG3054



LOG3063

Physics (11-14) Sensor Pack

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

- 1x Physics eBook
- 2x Push Button Reaction Switch
- 2x Temperature Sensor
- 2x Light Gate
- 3x Current – 100mA
- 1x Current – 1A
- 1x Current – 10A

Code	Pack	Price
LOG3063	Each	£476.90

Physics (11-18) Dynamics Sensor Pack

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

- 2x Light Gates
- 1x Rotary Motion Sensor
- 1x Dynamics

Code	Pack	Price
LOG3060	Each	£480.90



LOG3060

A-Level Biology Teaching Pack

An A-Level Biology sensor pack carefully designed to offer maximum flexibility and subject coverage at an affordable price.

Supplied in a handy Gratnells storage tray.

Includes:

- 1x Colorimeter
- 1x pH pack
- 1x Light Sensor
- 1x Temperature Sensor
- 1x Experiment booklet

Code	Pack	Price
LOG1076	Each	£335.21

A-Level Chemistry Teaching Pack

An A-Level Chemistry sensor pack carefully designed to offer maximum flexibility and subject coverage at an affordable price.

Supplied in a handy Gratnells storage tray.

Includes:

- 1 x Colorimeter Sensor
- 1 x pH Pack
- 2 x Temperature Sensors
- 1 x Drop and Bubble Counter
- 1x Gratnells storage tray with lid

Code	Pack	Price
LOG1074	Each	£405.21

A-Level Physics Teaching Pack

An A-Level Physics sensor pack carefully designed to offer maximum flexibility and subject coverage at an affordable price.

Supplied in a handy Gratnells storage tray.

Includes:

- 1x Light Level Sensor
- 1x Temperature Sensor
- 1x Rotary Motion Sensor
- 1x Rotary Motion Accessory Pack
- 1x Gas Pressure Sensor - Absolute 0 to 700kPa
- 1x Gas Pressure Sensor Accessory Pack
- 1x Motion Sensor
- 1x Force Sensor
- 2x Light Gates
- 1x Interrupt Card Set
- 1x Voltage Sensor - Differential ±12 V
- 1x Current Sensors - ±100 mA
- 1x Current Sensors - ±10 A
- 2x Sound Sensors
- 1x Laser Module
- 1x Gratnells storage tray with lid

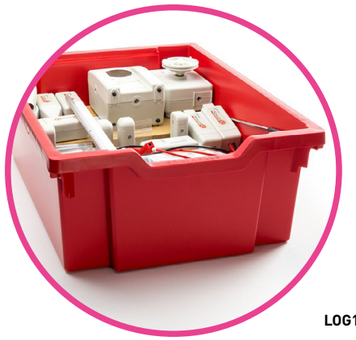
Code	Pack	Price
LOG1072	Each	£1112.11



LOG1076



LOG1074



LOG1072

	Temperature	pH	Motion	Light and Colour	Electricity and Magnetism	Heart and Lung Performance	Carbon Dioxide	Radioactivity	Measurement	Pressure
Codes	LOG3267 LOG1100 LOG3273 LOG3270 LOG3014	LOG1102 LOG3234	LOG3129 LOG3117 LOG3525 LOG3034 LOG3183	LOG3204 LOG3483 LOG3026	LOG3294 LOG1108 LOG3126 LOG3288 LOG3285 LOG3291 LOG3225 LOG3222 LOG3075 LOG3450	LOG3258 LOG3195 LOG3081 LOG3552	LOG3198	LOG3102	LOG3078 LOG2313	LOG3903
GCSE Combined Science and Single Science Curriculum										
AQA	• Mixtures • Energy in Endo and exothermic reactions • Human digestion digestion • Properties of ionic compounds • Determination of bonding properties • Req prac 4 Temperature change in various chemical reactions • Factors affecting rates of reaction • Investigation of energy in different alcohols • Specific heat capacity • Req prac 1 Specific heat capacity • Req prac 2 Effectivness of different materials as thermal insulators	• Measuring acidity and alkalinity • Neutralisation reactions • Req prac 2 Titration of strong acid and strong alkali • pH of strong and weak acids at different concentrations	• Speed, Velocity, Acceleration • Newtons laws of motion • Required practical • F=Ma • Momentum • Conservation of momentum • Changes in momentum • Factors affecting rates of reaction • Investigation of energy in different alcohols • Specific heat capacity • Req prac 1 Specific heat capacity • Req prac 2 Effectivness of different materials as thermal insulators	• Required practical 6 Rate of photosynthesis • Abiotic factors • Req prac 5 Rates of reaction (thiosulfate)	• Properties of ionic substances • Metals as conductors • Electromagnetism • Flemings left hand rule • Electric motors • All electricty module • All circuits module • Req prac 10 Resitance of a wire and resistors in series and parallel • Req prac 4 I-V characteristics of lamp, fixed resistor and diode	• Health issues • Response to exercise • Heart and blood vessels	• Plant organ system • Rate of photosynthesis • Abiotic factors	• Penetration distance for alpha, beta and gamma • Background radiation	• Osmosis • Req prac 6 Determination of ionic and covalent molecules • Req prac 2 Titration of strong acid and strong alkali	• Req prac 5 Rates of reaction (collection of gas) • Boyles law
EDEXCEL	• Enzymes • Determination of food energy by calorimetry • Effect of temperature on limiting rate of photosynthesis • Effect of temperature on the rate of decomposition • Determining properties of ionic and covalent bonding • Determine how changing temperature affects the rate of reaction • Temperature in state change • Temperature change in dissolving, neutralisation and precipitation • Endo and exothermic reactions • Core practical Determine the temperature rise by the combustion of alcohols • Core practical Investigate how the nature of the surface affects the amount of thermal energy absorbed or reflected • Specific heat capacity • Core practical Construct a graph for temperature/time for melting ice	• Enzymes • Core practical effect of pH on enzyme activity • Measurement of pH in acids and alkalis • Core practical - neutralisation of hydrocholric acid using calcium hydroxide or calcium oxide powder • Acid /base titrations • Core practical - acid /alkali titration	• Speed,distance and time • Acceleration, distance and time • Use light gate to determine speed Newton's 2nd law • Newtons second law in relation to force, momentum and time • Core practical F=Ma • Momentum • Collisions and conservation of momentum • Recall Gpe and Ke • Calculate energy in moving objects	• Light intensity effect on photosynthesis rate as a limiting factor • Photosynethesis rate is directly proportinal to light intensity • Rate of reaction (thiosulfate) • Total internal reflection	• Whole of electricity and circuits unit • Electromagnetic induction	• Heart rate Cardiac output and stroke volume • Effect of exercise on heart and breathing	• Carbon dioxide as a limiting factor in photosynthesis rate • Core practical Investigate the rate of respiration in a living organism	• Background radiation • How a GM tube works • Alpha, beta and gamma penetration and ionisation	• Factors affecting the rate of photosynthesis • Determination of the properties of covalent and ionic bonded chemicals • Presence of ionic electrolytes in water • Conductivity of materials • Acid/alkali Titration • Acid/base Titration	• Rates of reaction (gas collection) • Boyles law
OCR	• Enzymes • PAG 5 Effect of temperature on limiting rate of photosynthesis • Effect of temperature on the rate of decomposition • Energy from food • Photosynthesis • PAG 4 Effect of temp on enzyme activity • Comparison of skin to core temperature under different conditions • Model temperature control • PAG C1 Magnesium and acid at different temperatures • PAG C8 measuring temperature in reactions • PAG C8 Rates of reactions • PAG P5 rate of cooling-temperature changes as state changes • Specific heat capacity of metals and water • Comparison of temperature chages in sealed tubes of different gases • Specific latent heat in water and stearic acid	• Enzymes • PAG 4 Effect of changing pH on enzyme activity • Titration curves • Salt production • Measuring pH • Measuring unknown pH's • PAG C6 Acid/alkali titration	• Speed, distance and time • Acceleration • Newtons laws of motion • PAG 2 Momentum and collisions • PAG 3 Energy in a moving body • PAG 5 Dangers of a large decelleration • Objects falling through a viscous liquid • Forces as a vector	• PAG 5 Light intensity effect on photosynthesis rate as a limiting factor • Digestion of starch by amylase using colorimetry • PAG C8 • Rates of reaction thiosulfate	• All of electricity and circuits unit • PAG P5 Specific heat capacity • PAG P6 Resitance of a wire • PAG P7 I-V characteristics • Difference in AC and DC traces • Energy in electrical appliances • Electro magnetic induction	• ECG traces in relation to stages in heart function • Effect of exercise on heart rate and breathing • Recovery rates	• PAG 5 Carbon dioxide as a limiting factor for photosynthesis	• Activity of alpha, beta and gamma • Absorption distances of alpha, beta and gamma particles	• Photosynthesis • PAG 5 Factors affecting photosynthesis	• Rates of reaction (gas collection) • PAG C7 • PAG C8 • Pressure difference in warm, room temperature and cold inflated balloons
A-Level Curriculum										
AQA	• Evaporation is cooling • Temperature effect on sensitivity of receptors • Req prac 4 • Rec prac 12 • Effect of temperature on heart rate of Daphnia • Permability of cell surface membranes • Bonding and physical properties • Enthalpy change • Enthalpy of combustion • Enthalpy of formation • Calorimetry • Specific heat capacity • M Req prac 2 • Measuring enthalphy change • Hess' law • Rates of reaction temperature change • Chemical equilibria • Kc • Gibbs free energy change • Entropy change • Indentification of esters • Temperature associated with a phase change	• Enzyme activity • Digestion practicals • Req prac 12 • Determination of pH • Plotting of pH curves • Req prac 9	• Motion along a straight line • Newtons law of motion • Momentum-elastic and inelastic collisions and explosions • 'g' by freefall-Required practical • Projectile motion • Interference • Velocity-time graphs • Distance-time graphs • Terminal velocity in liquids • Simple harmonic motion • Mass spring system • Req prac 7	• Determination of an unknown glucose solution using colorimetry • Req prac11 • Photosynthesis • Req prac12 • Redox reactions • Rates of reaction (thiosulfate) • Chemical equilbria • Iodine clock • Req prac 7 • Req prac 2 • Youngs slit • Single slit • Interference • Fibre optics • Total internal reflection	• Simple cells • Electrode potentials • Req prac 8 • Measuring EMF of electrochemical cells • Efficiency of a motor under load • Whole of the electricity module • Req prac 5 • Rec prac 6 • Whole of capacitance unit • Req prac 9 • Rec prac 10	• Pulmonary ventilation rate • Tidal volume • Breathing rate • Cardiac otuput • Heart rate • Pressure and volume changes • Control of heart rate	• Measure gas exchange volume in a respirometer	• Range of alpha particles • Detection of gamma radiation • Detection of cosmic ray shower • Inverse square law • Req prac 12 • Measuring half life using protactinium generator	• Potometer for transiration rate • Photosynthesis • Req prac 1 • Acid/base titration • Req prac 9 • Bonding and physical properties • Titrations for redox reactions • Req prac 11 • Magnetic fields • Magnetic flux density	• Rates of reaction-gas production • Req prac 7 • Boyles law • Req prac 8
EDEXCEL	• Effect of temperature on enzyme activity • Core prac 5 Effect of temperature on beetroot cell permeability • Core prac 12 Effect of temperature on the initial rate of enzyme • Core prac 13 Effect of temperature on the growth of an organism • Investigation into ionic and covalent bonded substances • Enthalpy change • Endo and exothermic reactions • Enthalpy change in reaction, formation, combustion, neutralisation • Specific heat capacity • Hess' law • Core prac 8 Effect of temperature on equilibrium • Kc and Kp • Effect of temperature on the equilibrium constant and change of equilibrium position • Temperature changes in neutralisation • Enthalpy change of solution and hydration • Core prac 12-Calculate thermistor in a potential divider cct to act as a thermostat • Core prac 13 Specific latent heat in phase change	• Effect of pH on enzyme activity • Strong and weak acids • Measurement of pH • Comparison of pH in a serial dilution • Titrations • Determination of pH in a buffer solution • Titration curves • Neutralisation reactions • Core prac 9 • Determination of Ka for a weak acid	• Uniform Acceleration in one dimension • Displacement I velocity time graphs • Displacement in acceleration/ time graphs • F=Ma • Newtons Law of motion • p=mv • Projectile motion • Linear momentum conservation • Kinetic energy of a moving body • Gpe at the Earths surface • Core practical 9 Conservation of linear motion in 2 dimensions • Elastic/inelastic collisons • Simple harmonic oscillator • Stokes law • Laminar flow • Core practical 4-Dermination of viscosity • Core practical 10 - Using ICT to analyse small collisions • Harmonic motion in a pendulum/spring • Oscillating object graph to determine velocity at a given point • Core practical 1-Acceleration due to freefall • Interference • Core practical 16-Determine unknown mass at resonant frquencies by the oscillation of a known mass • Free and forced oscillations	• Core prac 1 • Digestion of starch • Rates of reaction (thiosulfate) Iodine clock • Iodonation of propanone • Core prac 13a and 13b • Core prac 8-Determine the wavelength of a laser using a diffraction grating	• Whole of electical circuits • Resitivity • Core practical 2 determine the restivity of a material • Core practical 3-calculate EMF in a cell • Be able to explain the resitivity of different materials • Potential varies in a current carrying wire • Potential divider circuits • How to calculate potential difference and resistance • Use of thermistors and light dependent resistors • Capacitance • Charge/discharge in a resistor capacitor circuit • Electrode potentials • Core prac 10 Investigation of electrochemical cells • Core practical 11 Discharge curve for RC circuit • Core prac 12 Calculate thermistor in a potential divider cct to act as a thermostat	• Use ECG traces to identify changes of pressure in the heart • Core prac 16 • Investigate respiration rate • Use of ECG's to determine cardio-vascular disease • Cardiac output • Core prac 17 • Effect of exercise on tidal volume, breathing rate, respiratory minute ventilation and oxygen consumption		• Core prac 15-Absorption of gamma radiation by lead • Half life determination using a protctinium generator	• Core prac 2 Titration to determine vitamin C in food • Investigation into ionic and covalent bonded substances • Core prac 2 • Titrations acid/base acid/alkali • Neutralisation titrations • Rates of reactions (titrations]	• Rates of reaction (gas collection) • Core prac 14 Boyles law
OCR	• HSW3+4 • Effect on enzyme activity • PAG 4 • PAG 5 • PAG 8 • Permability of plant membranes • Factors affecting diffusion rate • Transpiration rate • PAG 11 • Effect of temperature on endo and Ectotherms • Factors affecting rate of photosynthesis • Respiration of yeast in aerobic and anerobic conditions • Factors affecting rate of respiration • Neutralisation • Acids and bases • Acid and base titrations • Enthalpy changes of neutralisation • Enthalpy change of combustion • Hess' law • HSW2 • PAG 3 • Rates of reaction-temperature change • Determination of specific heat capacity • Latent heat of vapourisation • Latent heat of fusion • Specific latent heat of a solid and a liquid	• HSW3+4 • Effect on enzyme activity Neutralisation • Acids and bases • Acid and base titrations • Bronsted Lowry acids and bases • pH and H+ • pH of a buffer solution • pH titration curves • PAG 11	• Kinematics • Linear motions and collisions • Simple harmonic oscilliations • Energy of a harmoic oscillator • PAG 1 • Motion with non-uniform acceleration HWS 4 Investigating factors that affect terminal velocity • Projectile motion • Interference • Displacement, speed, velocity and acceleration • Displament-time graphs • Velocity -time graphs • 'g' by freefall • Terminal velocity in liquids • Conservation of momentum • Collisons in 2 dimensions • Elastic and inelastic collisons • PAG 10 • Simple harmonic motion • Relation to changes in displacement, velocity and acceleration during SHM • Energy-displacement graph for SHM oscillator • Free and forced oscillations	• HSW3+4 • Inhibitor effect on enzyme activity • PAG 4 • Serial dilution • Commercial use of plant hormones • Factors affecting rate of photosynthesis • Rates of reaction • PAG 9 • Equilibrium constant Kc • Redox titrations • Youngs double slit • Interference • Wavelength determination using a double slit/diffraction grating • PAG 5	• All charge and current module • Energy, power and resistance • Electrical circuits • Measuremnt of cell potentials • PAG 8 • Potential difference • EMF • Energy transfer in circuits • Ohms law • PAG 3 • I-V relationship in resistor, lamp, thermistor, LED • Resistance in relationship to light intesity in LDR • Resistivity • Power • Series and parallel circuits • Kirchoffs laws • Resistors in series and parallel • Multiple sources of EMF • Internal resistance of a cell • PAG 4 • Lost volts • Potential dividers • Potential dividers with variable components • Capacitor, capacitance unit • Field strength unit • Permittivity • Electrical potential • Magnetic field patterns and strength • Magnetic flux density • Simple AC generation • Transformers	• HSW3 • Vital capacity • Tidal volume • Oxygen uptake • Breathing rate • Cardiac cycle • Use and interpt • ECG traces • Hormone and nervous mechanisms on heart rate • Factors affecting the rate of repiration • PAG 4 • PAG 10 • PAG 11	• HSW3 • Transpiration rate • Respiration rates in yeast under aerobic and anaerobic conditions • Factors affecting rate of photosynthesis • Factors affecting the rate of respiration • PAG 4 • PAG 10 • PAG 11	• PAG 7 • Half life of protactinium	• HSW3+4 • Neutralisation • Acid and bases • Acid and bases titration	• Rates of reaction-gas production • PAG 8 • PAG 9 • Boyles law

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