



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-Log⁴ with 4 SmartQ sensor inputs or the V-Log⁸ with the same four sensor inputs plus four additional internal sensors, Light, Air Pressure, Sound and Humidity. Both V-Log⁴ and V-Log⁸ 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-Hub⁴ or V-Hub⁸, 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.



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 Pres-sure, Sound, Humidity	4	2	2	1	—	£241.90
LOG1056	5x V-Log ⁸ USB + charging tray	Yes	—	Yes	5	Yes - Gratnells compatible	—	Light, Air Pres-sure, Sound, Humidity	4	10	10	5	—	£1088.90
LOG1058	V-Log ⁸ USB + Bluetooth	Yes	Yes	Yes	Each	—	Yes - Gratnells compatible	Light, Air Pres-sure, 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 Pres-sure, Sound, Humidity	4	10	10	5	—	£1212.90



LOG1062



LOG1064



LOG3012

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



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

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

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 Carbon Dioxide Sensor



LOG3198



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

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

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



LOG3111



LOG3204

Breathing Rate Belt Pack

The breathing rate belt and pressure sensor pack combines a $\pm 10kPa$ 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

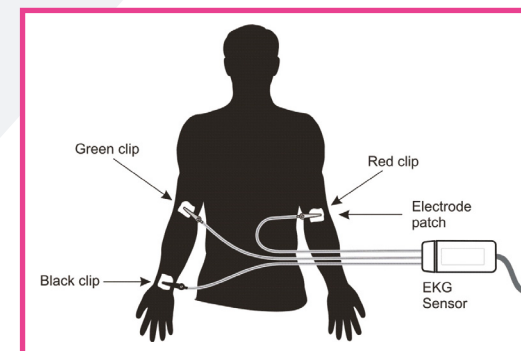
E.C.G. (Electrocardiogram) Sensor

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



LOG3195



LOG3081



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

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 $+110^{\circ}\text{C}$
- -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

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

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

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 $+110^{\circ}\text{C}$
- -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

Chemistry



LOG3234



LOG3270



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

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 120cm³ volume at a drop rate from 23 to 29 drops per cm³

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



Physics 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: $\pm 2.5g$ & $\pm 10g$ / $\pm 25ms^{-2}$ & $\pm 100ms^{-2}$

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



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

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 50,000 μ s

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



LOG3183



LOG3117



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
<u>LOG3222</u>	Current sensor ±100mA	Each	£49.90
<u>LOG3075</u>	Current sensor ±1A	Each	£49.90
<u>LOG3225</u>	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
<u>LOG3294</u>	Voltage sensor ±20V	Each	£43.90
<u>LOG3288</u>	Voltage sensor ±12V	Each	£43.90
<u>LOG3285</u>	Voltage sensor 0-10V	Each	£43.90
<u>LOG3291</u>	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
<u>LOG3102</u>	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
<u>LOG3126</u>	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
<u>LOG3483</u>	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-Log⁴ 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

TEACHING PACKS - KS3/GCSE

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



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



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

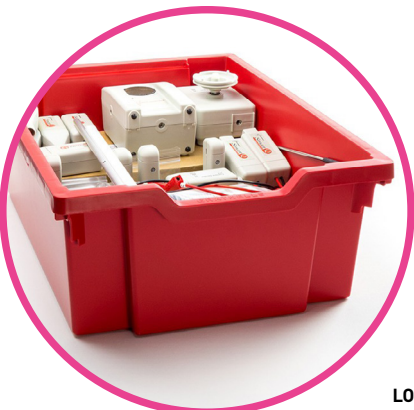
Code	Pack	Price
LOG1072	Each	£1112.11



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	<ul style="list-style-type: none">MixturesEnergy in Endo and exothermic reactionsHuman digestion digestionProperties of ionic compoundsDetermination of bonding propertiesReq prac 4 Temperature change in various chemical reactions	<ul style="list-style-type: none">Factors affecting rates of reactionInvestigation of energy in different alcoholsSpecific heat capacityReq prac 1 Specific heat capacityReq prac 2 Effectivness of different materials as thermal insulators	<ul style="list-style-type: none">Measuring acidity and alkalinityNeutralisation reactionsReq prac 2 Titration of strong acid and strong alkalipH of strong and weak acids at different concentrations	<ul style="list-style-type: none">Speed, Velocity, AccelerationNewtons laws of motionRequired practicalF=MaMomentumConservation of momentumChanges in momentum	<ul style="list-style-type: none">Factors affecting rates of reactionInvestigation of energy in different alcoholsSpecific heat capacityReq prac 1 Specific heat capacityReq prac 2 Effectvness of different materials as thermal insulators	<ul style="list-style-type: none">Required practical 6 Rate of photosynthesisAbiotic factorsReq prac 5 Rates of reaction (thiosulfate)	<ul style="list-style-type: none">Properties of ionic substancesMetals as conductorsElectromagnetismFlemings left hand ruleElectric motors	<ul style="list-style-type: none">All electricity moduleAll circuits moduleReq prac 10 Resitance of a wire and resistors in series and parallelReq prac 4 I-V characteristics of lamp, fixed resistor and diode	<ul style="list-style-type: none">Health issuesResponse to exerciseHeart and blood vessels	<ul style="list-style-type: none">Plant organ systemRate of photosynthesisAbiotic factors	<ul style="list-style-type: none">Penetration distance for alpha, beta and gammaBackground radiation	<ul style="list-style-type: none">OsmosisReq prac 6 Determination of ionic and covalent moleculesReq prac 2 Titration of strong acid and strong alkali	<ul style="list-style-type: none">Req prac 5 Rates of reaction [collection of gas]Boyles law
	EDEXCEL	<ul style="list-style-type: none">EnzymesDetermination of food energy by calorimetryEffect of temperature on limiting rate of photosynthesisEffect of temperature on the rate of decompsitionDetermining properties of ionic and covalent bondingDetermine how changing temperature affects the rate of reactionTemperature in state change	<ul style="list-style-type: none">Temperature change in dissolving, neutralisation and precipitationEndo and exothermic reactionsCore practical Determine the temperature rise by the combustion of alcoholsCore practical Investigate how the nature of the surface affects the amount of thermal energy absorbed or reflectedSpecific heat capacityCore practical Construct a graph for temperature/time for melting ice	<ul style="list-style-type: none">EnzymesCore practical effect of pH on enzyme activityMeasurement of pH in acids and alkalisCore practical - neutralisation of hydrocholric acid using calcium hydroxide or calcium oxide powderAcid /base titrationsCore practical - acid /alkali titration	<ul style="list-style-type: none">Speed,distance and timeAcceleration, distance and timeUse light gate to determine speed Newton's 2nd lawNewtons second law in relation to force, momentum and time	<ul style="list-style-type: none">Core practical F=MaMomentumCollisions and conservation of momentumRecall Gpe and KeCalculate energy in moving objects	<ul style="list-style-type: none">Light intensity effect on photosynthesis rate as a limiting factorPhotosynthesis rate is directly proportinal to light intensityRate of reaction (thiosulfate)Total internal reflection	<ul style="list-style-type: none">Whole of electricity and circuits unitElectromagnetic induction	<ul style="list-style-type: none">Heart rate Cardiac output and stroke volumeEffect of exercise on heart and breathing	<ul style="list-style-type: none">Carbon dioxide as a limiting factor in photosynthesis rateCore practical Investigate the rate of respiration in a living organism	<ul style="list-style-type: none">Background radiationHow a GM tube worksAlpha, beta and gamma penetration and ionisation	<ul style="list-style-type: none">Factors affecting the rate of photosynthesisDetermination of the properties of covalent and ionic bonded chemicalsPresence of ionic electrolytes in waterConductivity of materialsAcid/alkali TitrationAcid/base Titration	<ul style="list-style-type: none">Rates of reaction [gas collection]Boyles law	
	OCR	<ul style="list-style-type: none">EnzymesPAG 5 Effect of temperature on limiting rate of photosynthesisEffect of temperature on the rate of decompositionEnergy from foodPhotosynthesisPAG 4 Effect of temp on enzyme activityComparison of skin to core temperature under different conditions	<ul style="list-style-type: none">Model temperature controlPAG C1 Magnesium and acid at different temperaturesPAG C8 measuring temperature in reactionsPAG C8 Rates of reactionsPAG P5 rate of cooling-temperature changes as state changesSpecific heat capacity of metals and waterComparison of temperature chages in sealed tubes of different gasesSpecific latent heat in water and stearic acid	<ul style="list-style-type: none">EnzymesPAG 4 Effect of changing pH on enzyme activityTitration curvesSalt productionMeasuring pHMeasuring unknown pH'sPAG C6 Acid/alkali titration	<ul style="list-style-type: none">Speed, distance and timeAccelerationNewtons laws of motionPAG 2 Momentum and collisionsPAG 3 Energy in a moving bodyPAG 5 Dangers of a large decelerationObjects falling through a viscous liquidForces as a vector	<ul style="list-style-type: none">PAG 5 Light intensity effect on photosynthesis rate as a limiting factorDigestion of starch by amylase using colorimetryPAG C8Rates of reaction thiosulfate	<ul style="list-style-type: none">All of electricity and circuits unitPAG P5 Specific heat capacityPAG P6 Resistance of a wirePAG P7 I-V characteristicsDifference in AC and DC tracesEnergy in electrical appliancesElectro magnetic induction	<ul style="list-style-type: none">ECG traces in relation to stages in heart functionEffect of exercise on heart rate and breathingRecovery rates	<ul style="list-style-type: none">PAG 5 Carbon dioxide as a limiting factor for photosynthesis	<ul style="list-style-type: none">Activity of alpha, beta and gammaAbsorption distances of alpha, beta and gamma particles	<ul style="list-style-type: none">PhotosynthesisPAG 5 Factors affecting photosynthesis	<ul style="list-style-type: none">Rates of reaction [gas collection]PAG C7PAG C8Pressure difference in warm, room temperature and cold inflated balloons		
A-Level Curriculum	AQA	<ul style="list-style-type: none">Evaporation is coolingTemperature effect on sensitivity of receptorsReq prac 4Rec prac 12Effect of temperature on heart rate of DaphniaPermeability of cell surface membranesBonding and physical propertiesEnthalpy changeEnthalpy of combustionEnthalpy of formationCalorimetry	<ul style="list-style-type: none">Specific heat capacityM Req prac 2Measuring enthalphy changeHess' lawRates of reaction temperature changeChemical equilibriaKcGibbs free energy changeEntropy changeIndentification of estersTemperature associated with a phase change	<ul style="list-style-type: none">Enzyme activityDigestion practicalsReq prac 12Determination of pHPlotting of pH curvesReq prac 9	<ul style="list-style-type: none">Motion along a straight lineNewtons law of motionMomentum-elastic and inelastic collisions and explosions'g' by freefall-Required practicalProjectile motionInterferenceVelocity-time graphsDistance-time graphsTerminal velocity in liquidsSimple harmonic motionMass spring systemReq prac 7	<ul style="list-style-type: none">Determination of an unknown glucose solution using colorimetryReq prac11PhotosynthesisReq prac12Redox reactionsRates of reaction (thiosulfate)Chemical equilibriaIodine clockReq prac 7Req prac 2Youngs slitSingle slitInterferenceFibre opticsTotal internal reflection	<ul style="list-style-type: none">Simple cellsElectrode potentialsReq prac 8Measuring EMF of electrochemical cellsEfficiency of a motor under loadWhole of the electricity moduleReq prac 5Rec prac 6Whole of capacitance unitReq prac 9Rec prac 10	<ul style="list-style-type: none">Pulmonary ventilation rateTidal volumeBreathing rateCardiac otuputHeart ratePressure and volume changesControl of heart rate	<ul style="list-style-type: none">Measure gas exchange volume in a respirometer	<ul style="list-style-type: none">Range of alpha particlesDetection of gamma radiationDetection of cosmic ray showerInverse square lawReq prac 12Measuring half life using protactinium generator	<ul style="list-style-type: none">Potometer for transpiration ratePhotosynthesisReq prac 1Acid/base titrationReq prac 9Bonding and physical propertiesTitrations for redox reactionsReq prac 11Magnetic fieldsMagnetic flux density	<ul style="list-style-type: none">Rates of reaction-gas productionReq prac 7Boyles lawReq prac 8		
	EDEXCEL	<ul style="list-style-type: none">Effect of temperature on enzyme activityCore prac 5 Effect of temperature on beetroot cell permeabilityCore prac 12 Effect of temperature on the initial rate of enzymeCore prac 13 Effect of temperature on the growth of an organismInvestigation into ionic and covalent bonded substancesEnthalpy changeEndo and exothermic reactionsEnthalpy change in reaction, formation, combustion, neutralisation	<ul style="list-style-type: none">Specific heat capacityHess' lawCore prac 8 Effect of temperature on equilibriumKc and KpEffect of temperature on the equilibrium constant and change of equilibrium positionTemperature changes in neutralisationEnthalpy change of solution and hydrationCore prac 12-Calculate thermistor in a potential divider cct to act as a thermostatCore prac 13 Specific latent heat in phase change	<ul style="list-style-type: none">Effect of pH on enzyme activityStrong and weak acidsMeasurement of pHComparison of pH in a serial dilutionTitrationsDetermination of pH in a buffer solutionTitration curvesNeutralisation reactionsCore prac 9Determination of Ka for a weak acid	<ul style="list-style-type: none">Uniform Acceleration in one dimensionDisplacement l velocity time graphsDisplacement in acceleration/ time graphsF=MaNewtons Law of motionp=mvProjectile motionLinear momentum conservationKinetic energy of a moving bodyGpe at the Earths surfaceCore practical 9 Conservation of linear motion in 2 dimensionsElastic/inelastic collisons	<ul style="list-style-type: none">Simple harmonic oscillatorStokes'lawLaminar flowCore practical 10 - Using ICT to analyse small collisionsHarmonic motion in a pendulum/springOscillating object graph to determine velocity at a given pointCore practical 1-Acceleration due to freefallInterferenceCore practical 16-Determine unknown mass at resonant frequencies by the oscillation of a known massFree and forced oscillations	<ul style="list-style-type: none">Core prac 1Digestion of starchRates of reaction (thiosulfate) Iodine clockIodonation of propanoneCore prac 13a and 13bCore prac 8-Determine the wavelength of a laser using a diffraction grating	<ul style="list-style-type: none">Whole of electical circuitsResitivityCore practical 2 determine the restivity of a materialCore practical 3-calculate EMF in a cellBe able to explain the resitivity of different materialsPotential varies in a current carrying wirePotential divider circuitsHow to calculate potential difference and resistance	<ul style="list-style-type: none">Use of thermistors and light dependent resistorsCapacitanceCharge/discharge in a resistor capacitor circuitElectrode potentialsCore prac 10 Investigation of electrochemical cellsCore practical 11 Discharge curve for RC circuitCore prac 12 Calculate thermistor in a potential divider cct to act as a thermostat	<ul style="list-style-type: none">Use ECG traces to identify changes of pressure in the heartCore prac 16Investigate respiration rateUse of ECG's to determine cardio-vascular diseaseCardiac outputCore prac 17Effect of exercise on tidal volume, breathing rate, respiratory minute ventilation and oxygen consumption	<ul style="list-style-type: none">Core prac 15-Absorption of gamma radiation by leadHalf life determination using a protctinium generator	<ul style="list-style-type: none">Core prac 2 Titration to determine vitamin C in foodInvestigation into ionic and covalent bonded substancesCore prac 2Titrations acid/base acid/alkaliNeutralisation titrationsRates of reactions [titrations]	<ul style="list-style-type: none">Rates of reaction [gas collection]Core prac 14 Boyles law	
	OCR	<ul style="list-style-type: none">HSW3+4Effect on enzyme activityPAG 4PAG 5PAG 8Permeability of plant membranesFactors affecting diffusion rateTranspiration ratePAG 11Effect of temperature on endo and EcothermsFactors affecting rate of photosynthesisRespiration of yeast in aerobic and anerobic conditions	<ul style="list-style-type: none">Factors affecting rate of respirationNeutralisationAcids and basesAcid and base titrationsEnthalpy changes of neutralisationEnthalpy change of combustionHess' lawHSW2PAG 3Rates of reaction-temperature changeDetermination of specific heat capacityLatent heat of vapourisationLatent heat of fusionSpecific latent heat of a solid and a liquid	<ul style="list-style-type: none">HSW3+4Effect on enzyme activity NeutralisationAcids and basesAcid and base titrationsBronsted Lowry acids and basespH and H+pH of a buffer solutionpH titration curvesPAG 11	<ul style="list-style-type: none">KinematicsLinear motions and collisionsSimple harmonic oscillationsEnergy of a harmoic oscillatorPAG 1Motion with non-uniform acceleration HWS 4 Investigating factors that affect terminal velocityProjectile motionInterferenceDisplacement, speed, velocity and acceleration	<ul style="list-style-type: none">Displament-time graphsVelocity -time graphs'g' by freefallTerminal velocity in liquidsConservation of momentumCollisions in 2 dimensionsElastic and inelastic collisionsPAG 10Simple harmonic motionRelaton to changes in displacement, velocity and acceleration during SHMEnergy-displacement graph for SHM oscillatorFree and forced oscillations	<ul style="list-style-type: none">HSW3+4Inhibitor effect on enzyme activityPAG 4Serial dilutionCommercial use of plant hormonesFactors affecting rate of photosynthesisRates of reactionPAG 9Equilibrium constant KcRedox titrationsYoungs double slitInterferenceWavelelength determination using a double slit/diffraction gratingPAG 5	<ul style="list-style-type: none">All charge and current moduleEnergy, power and resistanceElectrical circuitsMeasurmnt of cell potentialsPAG 8Potential differenceEMFEnergy transfer in circuitsOhms lawPAG 3I-V relationship in resistor, lamp, thermistor, LEDResistance in relationship to light intesity in LDRResistivityPowerSeries and parallel circuits	<ul style="list-style-type: none">Kirchoffs lawsResistors in series and parallelMultiple sources of EMFInternal resistance of a cellPAG 4Lost voltsPotential dividersPotential dividers with variable componentsCapacitor, capacitance unitField strength unitPermittivityElectrical potentialMagnetic field patterns and strengthMagnetic flux densitySimple AC generationTransformers	<ul style="list-style-type: none">HSW3Vital capacityTidal volumeOxygen uptakeBreathing rateCardiac cycleUse and interpt ECG tracesHormone and nervous mechanisms on heart rateFactors affecting the rate of repirationPAG 4PAG 10PAG 11	<ul style="list-style-type: none">HSW3Transpiration rateRespiration rates in yeast under aerobic and anaerobic conditionsFactors affecting rate of photosynthesisFactors affecting the rate of respirationPAG 4PAG 10PAG 11	<ul style="list-style-type: none">HSW3+4NeutralisationAcid and basesAcid and bases titration	<ul style="list-style-type: none">Rates of reaction-gas productionPAG 8PAG 9Boyles law	

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