

## Curriculum ideas

There are many curriculum ideas and experiments for using DCP sensors with RCX available free on the Lego Dacta web site at [www.lego.com/dacta/robofab](http://www.lego.com/dacta/robofab)

## The LogIT System

The Microsense sensors used with the DCP LEGO sensor adapter are just part of a complete datalogging system called LogIT. Some of the dataloggers and sensors available are listed below but for more information or demo software of the LogIT dedicated datalogging system or the details of your nearest distributor please see our web site [www.dcpmicro.com](http://www.dcpmicro.com)

### •LogIT family dataloggers

LogIT LIVE - low cost real time sensor interface

LogIT SL - remote data logger - stores data in its own memory

LogIT DataMeter 1000 - Remote data logger and meter in one unit - stores & displays data

### •Software

PC Windows, Macintosh, eMate, Windows CE, Psion, BBC

### •Sensors

HiTemp wire type Temperature sensor -10 to +110°C (as supplied with starter packs)

ProTemp sensor - long stainless steel robust probe (-10 to +110°C)

K-Type thermocouple adapter for using standard K thermocouples (-50 to +1100°C)

Light Level sensors (0-100%) - also measures infra red radiation

Sound Level sensor (50-100dB)

LUX light level sensor - wide range reading in LUX (0 - 25000 LUX)

pH amplifier adapter to enable standard pH electrodes to be used

Dissolved Oxygen probe set with probe and amplifier (0 - 200% saturation)

Conductivity probe set including probe and amplifier (10 $\mu$ S - 20mS)

Ultrasonic Ranger - dynamically measures and displays distance or speed of sound

Position sensor - measures rotation 0 - 340° very low torque (eg pendulum, plant growth)

Light gate set - pair of light gates for timing investigations

Light switch sensor and Infra red source - to make your own light gates

Voltage Measurement probe with set of plugs and probes (+/- 25V DC)

Current measurement probe with set of plugs and probes (+/- 1A DC)

Designer sensor set with analogue & digital adapters for using own design sensors

Humidity sensors (Range 1 - 100% R.H.)

Heart Rate monitoring - wireless or ear or finger clip pulse rate

Air Pressure sensor - absolute / barometric pressure measurement (0 - 200kPa)

Magnetic Field probe - for electromagnetic field investigations (-90mT to +90mT)

Balance interfaces - to connect balances with suitable output to measure mass etc

**LEGO:** [www.lego.com/dacta/robofab](http://www.lego.com/dacta/robofab)

**Sensors:** [www.dcpmicro.com/lego](http://www.dcpmicro.com/lego)



[www.dcpmicro.com](http://www.dcpmicro.com)

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# LEGO DCP sensor adapter



The DCP LEGO sensor adapter adapter allows standard Microsense® sensors to be used with LEGO® RCX® and RoboLab version 2 extending sensing possibilities and allowing RCX to be used as a data logger as well as a controller.

## Which Microsense sensors can I use?

The current Microsense sensors which are supported in RoboLab 2 are shown over leaf. But be sure to download the latest sensor updates files of RoboLab 2 from the Dacta or DCP web site as there are enhanced sensor updates since the release of RoboLab 2.0 (see [www.dcpmicro.com/lego](http://www.dcpmicro.com/lego))

## Where can I get the sensor adapter and sensors?

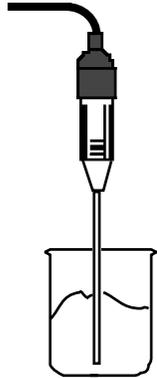
The sensor adapter and RoboLab 2 are exclusively available from your LEGO Dacta dealer (see [www.lego.com/dacta](http://www.lego.com/dacta)) and the DCP Microsense sensors are available from some Dacta dealers or from DCP LogIT datalogging system distributors worldwide - see [www.dcpmicro.com](http://www.dcpmicro.com) for contact details. Please note that DCP Sensors are only supported in version 2 of Robolab.

## How does it work?

The adapter is far from just a LEGO 4 stud connector wired straight into a DIN socket! Although it looks very simple, the DIN socket of the adapter actually contains many micro-components (including 2 amplifiers, a voltage regulator, 6 diodes, resistors etc!) mounted on both sides of a miniature circuit board. This microcircuitry regulates power from the RCX into a voltage suitable for the DCP Microsense sensors and also converts the output from the sensor into a signal suitable for the the RCX - all of this down just 2 wires! We made it small in order for it to fit right into the sensor socket so that the overall system remains compact and sensors can be hand held or used in a stand etc.

# °C

## PROTEMP TEMPERATURE



Melting Ice

**Range:**  
-30°C to +130 °C

**Resolution:**  
Better than 0.1°C

**Probe Length:**  
180mm stainless steel

**Typical Accuracy with RCX**  
+/- 2 %

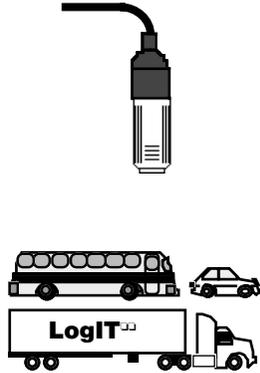
**Suggested Investigations:**

- Temperature during changes in state
- Temperature during fermentation
- Conduction; convection; radiation
- Cooling curves
- Cooling by evaporation
- Insulation
- Gas laws (with pressure sensor)
- ..... and many more.

DCP Part N°  
D100047

# dB

## SOUND LEVEL



Noise Pollution

**Range:**  
50dBA - 100dBA

**Frequency Response:**  
Standard A-weighted

**Response Time (damping):**  
approx 0.5 seconds

**Typical Accuracy with RCX**  
+/- 5 %

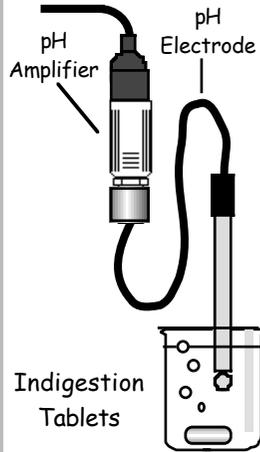
**Suggested Investigations:**

- Sound travel (absorption) through different materials
- Reflected sound
- Noise pollution
- Amplitude of sound with distance
- Enables sound levels to be 'visualised' and compared - useful for special needs requirements
- Studying sound in a vacuum

DCP Part N°  
D100060

# pH

## pH AMPLIFIER ADAPTER



Indigestion  
Tablets

**Range:**  
0-14 PH

**Resolution:**  
0.1 PH

**Typical Accuracy with RCX**  
+/- 2% + electrode accuracy

**Suggested Investigations:**

- Rates of reaction involving pH change e.g. souring of wine or yoghurt making
- Environmental monitoring
- Acid based titration
- Study of interaction between acids and alkalis e.g. With indigestion tablets.

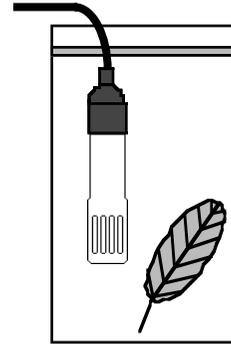
**Note:**  
Uses a standard pH Electrode with BNC plug

Amplifier + Electrode set:  
DCP Part N° - D100086

DCP Part N°  
D100056

# %RH

## RELATIVE HUMIDITY



Transpiration  
of a leaf

**Range:**  
1-100% Relative Humidity

**Resolution:**  
0.1 % R.H.

**Temperature Range:**  
-20°C to 80°

**Typical Accuracy with RCX**  
+/- 2 %

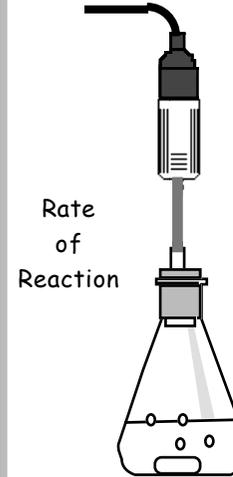
**Suggested Investigations:**

- Rate of transpiration and humidity
- Environment studies (weather)
- Moisture in breath
- Moisture from burning fuels
- Evaporation

DCP Part N°  
D100077

# kPa

## AIR PRESSURE



Rate  
of  
Reaction

**Range:**  
0-200kPa (approx 0-30 psi)

**Typical Accuracy with RCX**  
+/- 5 %

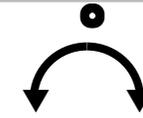
**Suggested Investigations:**

- Gas laws - pressure, volume & temperature (used with ProTemp Sensor)
- Fermentation
- Rates of reaction - gas

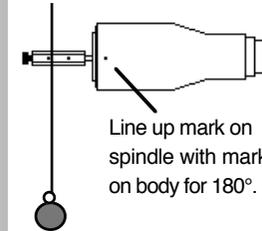
**Note:**

- Take care not to bend the nylon pressure port. Use flexible silicone tubing or to connect to port.
- To connect to a flask or similar push the barrel of a 1ml syringe through a hole in a stopper then join tubing supplied to barrel.

DCP Part N°  
D100080



## ROTARY POSITION



Line up mark on  
spindle with mark  
on body for 180°.

Studying Pendulums

**Rotation Span range:**  
0-360° (340° measured)

**Torque:**  
0.25 oz-in max

**Maximum Load:**  
50 grams

**Typical Accuracy with RCX**  
+/- 2 %

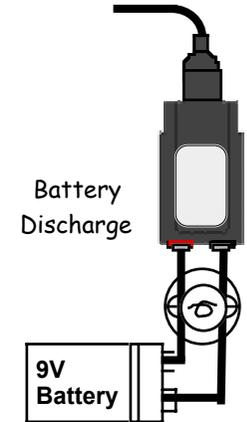
**Suggested Investigations:**

- Harmonic motion e.g. pendulum
- Auxanometer - Plant growth
- Tensile strengths
- Expansion / elasticity of materials
- Rise of bread dough
- Connect to Spirometer for breath rate
- Air resistance
- Expansion/elasticity of materials

DCP Part N°  
D100059

# V dc

## VOLTAGE MEASUREMENT



Battery  
Discharge

9V  
Battery

**Range:**  
-24V dc to +24V dc

**Resistance over probes:**  
410kΩ

**Typical Accuracy with RCX**  
+/- 4%

**Suggested Investigations:**

- Measuring effect of solar cell or electric motor
- Voltage in a circuit
- Induced emf (use with large coil & magnet)
- Potential difference measurement across resistor or lamp etc.
- Battery discharge
- Capacitor discharge

**Note:**  
Supplied complete with a set of 4mm probes and clips.

DCP Part N°  
D100045