



# CLAB

Data-logger for Computers and CASIO Graphic Calculators



CLAB is an easy-to-use portable data-logger for Mathematics, Science and Technology Education. It can be used with CASIO Graphic Calculators, with a PC computer and standalone, in the field and in the classroom. A wide range of sensors is available to be connected to CLAB.

CLAB is equipped with its own processor and memory, enabling measurements at high sampling rates up to 100 000 Hz with accurate independent timing. It has FLASH memory to allow easy upgrade of the internal system software and to store measured data. CLAB also has a built-in 3-Axis Accelerometer.

CLAB is delivered with a USB cable, USB power adapter and two sensors: Temperature and Voltage.



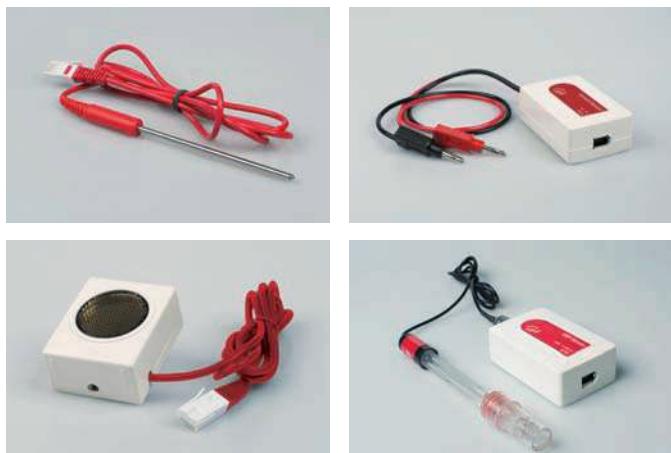
CMA Centre for Microcomputer Applications  
[www.cma-science.nl](http://www.cma-science.nl)

<b>Power</b>	Rechargeable battery Charging via USB from computer or via the USB power adapter
<b>Status information</b>	Two multicolor LEDs, for showing battery and measurement status One buzzer
<b>Processor</b>	PIC32MZ (512 kB SRAM)
<b>Memory</b>	2 MB Flash
<b>Resolution</b>	12-bits
<b>Sampling rate</b>	Max. 100 000 Hz
<b>Sensor inputs</b>	Three sensor inputs, analog BT (right-hand) inputs
<b>Calculator connection</b>	3-pin jack connector to CASIO Graphic Calculator
<b>Computer connection</b>	USB mini port
<b>Calculator software</b>	CASIO E-CON software
<b>Computer software</b>	Coach Lite (free) or Coach (licensed required) version 6.6 or higher
<b>Built in</b>	3-Axis Accelerometer
<b>Sensors included</b>	Temperature and Voltage sensors



## Sensors for CLAB

For connecting sensors CLAB has three sensor inputs. These inputs support all analog CMA sensors and automatically identify these sensors. CMA offers a wide range of sensors. Especially for CLAB a new CMA Ultrasonic Motion Detector and a Photogate are available.



## Using CLAB with a CASIO Graphic Calculator

When using CLAB with a CASIO Graphic Calculator, such as CASIO fx-CG20, fx9860GII or ClassPad II (fx-CP400), CLAB is controlled by the E-CON software running on the calculator. The collected data are transferred in real-time to the calculator and the measurement can be followed on the calculator screen.

E-CON is a menu-driven calculator application developed by CASIO. It allows configuring experiments with CLAB, collecting the data via connected sensors, graphing and processing the collected data.



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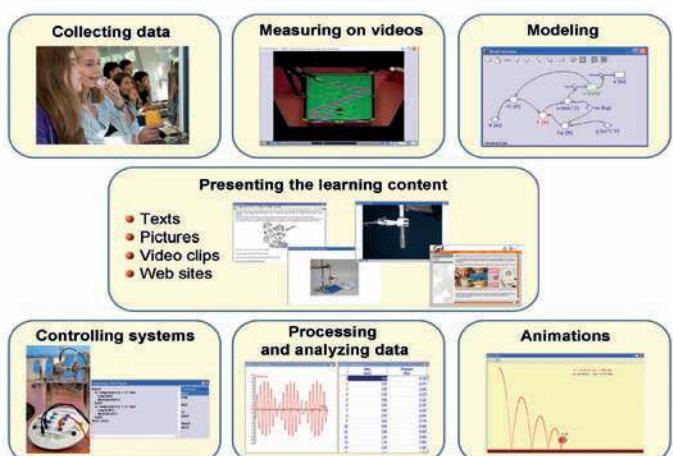
## Using CLAB with a computer

When using CLAB with a PC computer, CLAB is controlled by the Coach software running on the computer. The collected data are transferred in real-time to the computer and the measurement can be followed on the computer screen.

Coach software is a multimedia learning and authoring environment for Science, Mathematics and Technology Education that facilitates an inquiry-based approach to education. It is a product of CMA based on over 25 years of research and development.

Next to the data collection with sensors it allows to:

- process and analyze the collected data,
- synchronize a video, recorded during the experiment, with experimental data,
- measure on digital videos and images,
- compare the measured data with a dynamical model describing the phenomena,
- enrich the measured data by adding an animation visualizing the experiment.



## Using CLAB standalone

When using CLAB as a standalone device, the experimental setup is prepared using the E-CON application on a calculator or the Coach software on a computer and uploaded to CLAB. The power button of CLAB is used to start and stop the prepared experiment. LEDs and a buzzer give feedback about the status of the data collection.

The measured data are stored in the CLAB memory and can be downloaded into a calculator or a computer after the measurement is finished. Using E-CON or Coach the collected data can be further analyzed and processed.

