CCM-200 *plus*
Chlorophyll Content Meter

For the non-destructive determination of chlorophyll content

Now with GPS

Lightweight, battery portable

Rapid chlorophyll screening

Used and cited worldwide

160,000 data sets stored

Data averaging

Discover new applications

Researchers are constantly finding novel uses for the CCM200 *plus*. From analysing growth substrates (Malik G. Al-Ajlouni et al., 2017) to algal bloom monitoring (below).

Measuring algal blooms in rivers and lakes with the CCM200plus. Tiffany Trent, John Hendrickson, Matthew C. Harwell (2017)

Field device

The battery portable CCM-200 *plus* provides fast, non-destructive chlorophyll content determinations in the field. Each measurement takes only 2-3 seconds to perform.

Chlorophyll content is expressed in relative CCI (Chlorophyll Content Index) units. Published documentation is available advising how CCI units can be converted into absolute chlorophyll concentrations.

The CCM-200 *plus* provides fast, accurate and reliable chlorophyll determinations on living plant material, in any location.

Now with GPS!

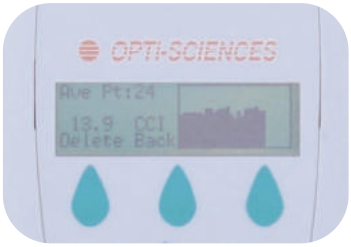
Whether outdoors or indoors, the integral GPS module automatically works with several GPS systems around the world. The CCM200 *plus* now houses a GPS module which acts autonomously to 2.5m CEP. DOM format (shown below) or DEC data output.

Sample	Time/Date	Units	Reading	Lat	Lon	DOP	# Sat
1	04/06/2011 22:44	CCI	26.9	51 45.61964N	000 00.16028W	5.5	3
2	04/06/2011 22:44	CCI	18.3	51 45.62265N	000 00.16122W	5.5	3
3	04/06/2011 22:44	CCI	22.4	51 45.64614N	000 00.16495W	2.9	4

Data averaging

Data may be recorded as:

- Single measurements
- 2-30 measurements averaged (with graphing)
- 10-30 measurements averaged with applied sigma 2 standard deviation (with graphing).
- For the exclusion of anomolous data points.



Proven measurement technique

Chlorophyll has distinct optical absorbance characteristics that the CCM-200 *plus* exploits to non-destructively measure relative chlorophyll concentrations. Strong absorbance bands are present in the blue and red regions but not the green or infrared bands.

The CCM-200 *plus* employs precision LED technology to measure the amount of energy absorbed in the red band. An estimate of the amount of chlorophyll present in the 1cm^2 sample area is then made. Absorbance in the infrared band is used to quantify and account for leaf thickness, providing a highly accurate CCI value.

Large internal memory

- Store up to 160,000 chlorophyll content measurements
- Review all stored data on the display
- Quickly and easily transfer data to a PC via USB
- Output measurements individually or as the complete .csv storage file.

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Technical Specification

Measured parameters: Optical absorbance in two different wavebands: 653nm (Chlorophyll) and 931nm (Near Infra-Red) providing CCI value

GPS data: Selectable, DOM or DEC format stored to the data file per measurement. Acts autonomously up to 2.5m CEP.

Measured area: 1cm diameter circle

Resolution: 0.1 CCI unit

Repeatability: +/- 1 %

Sampling acquisition time: 2-3 seconds

Source: Custom 2 wavelength LED module

Detectors: 2 silicon photodiodes with integral amplifiers for absorbency measurements, power monitoring and temperature compensation

Data modes: Single point, selectable 2-30 point average and a statistical 10-30 point protocol that disregards data beyond a 2 sigma standard deviation

Storage capacity: Up to 160,000 measurements

User Interface: 128 x 32 pixel graphic display, 8 keys for measurements, data manipulation, beep signal status and warnings

Output: USB 1.1 and RS232. By single measurement or complete storage file

Operating temperature range: 0-50^{o}C

Temperature compensation: Temperature compensated source and detector circuitry for minimal drift over full range

Battery: 9V alkaline battery

Auto off interval: 4 minutes (with no key press or download)

Dimensions: 152 x 82 x 25 mm