



apogee[®]
INSTRUMENTS

CHLOROPHYLL CONCENTRATION METER | MC-100

Features

Linear Output in Absolute Units

Calibrated to measure chlorophyll concentration in units of μmol of chlorophyll per m^2 . This eliminates problems with relative measurements like SPAD, which is not linearly related to chlorophyll concentration.

Non-destructive Measurements

The meter measures the ratio of red and near infrared transmittance with a sample rate of less than 3 seconds, resulting in measurements that are non-destructive and nearly instantaneous. This facilitates rapid measurement of multiple leaves and monitoring of the same leaves over time.

Typical Applications

- Chlorophyll concentration determination in plant leaves
- Assessment of nutrient status, fertilizer requirements, evaluation of stress, and optimization of harvest

Graphs

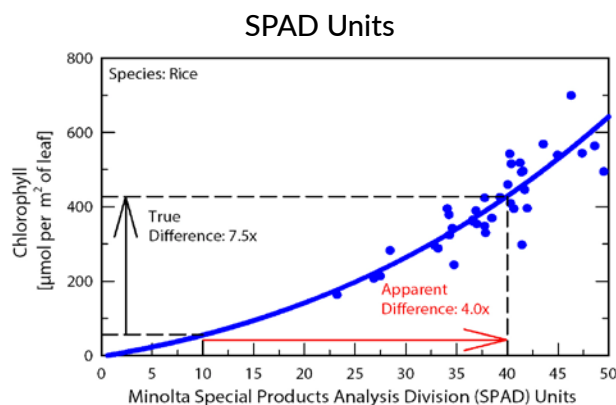
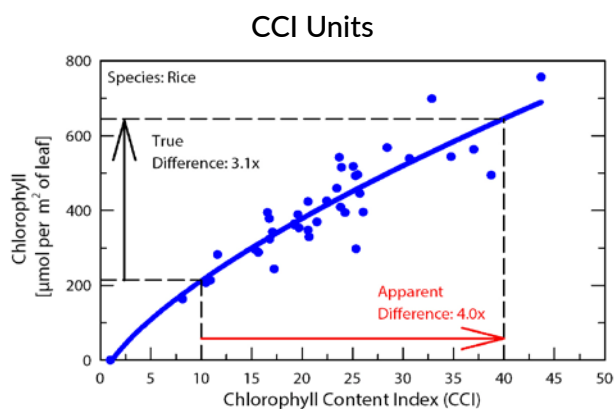
Chlorophyll meters typically output an index that is non-linearly related to chlorophyll concentration (e.g., CCI or SPAD). The MC-100 outputs an estimate of actual chlorophyll concentration in units of μmol per m^2 of leaf surface, thus, changes in the displayed output reflect true changes in chlorophyll concentration. For example, doubling a measured chlorophyll concentration represents an actual doubling in a plant leaf, whereas a doubling of a relative index does not necessarily represent a doubling of actual chlorophyll concentration in the leaf. This concept is illustrated for CCI and SPAD index measurements of rice leaves in the graphs to the right.

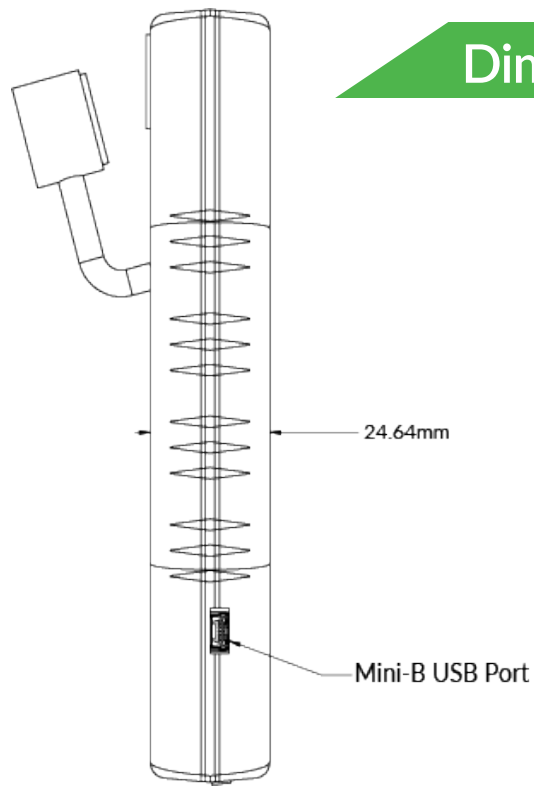
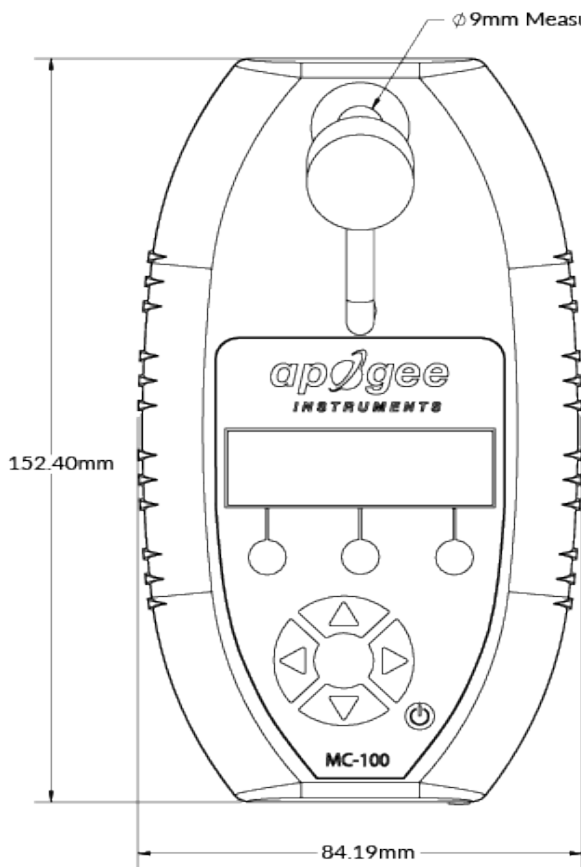
Parry, C, Blonquist Jr., J.M. & Bugbee, B. 2014. In situ measurement of leaf chlorophyll concentration: analysis of the optical/absolute relationship. *Plant and Cell Environment* 37:2508-2520.

Measure absolute chlorophyll in μmol of chlorophyll per m^2 U.S. Patent No. 9733179

Storage Capacity and Geo-referencing

Memory allocated to data storage allows for 160,000 logged measurements. A mini USB port allows for direct connection to a computer to download data. An RS-232 port is available for external GPS connection, allowing field data to be geo-referenced. Storage capacity of geo-referenced data is 94,000 measurements.





Dimensions

Direct Chlorophyll Determination

Offers 25+ crop-specific settings with a general (generic) setting for all others:

- Barley
- Boxelder
- Cannabis
- Coffee
- Corn
- Crab Apple
- Crimson King Maple
- European Birch
- Forsythia
- Grapevine
- Japanese Maple
- Kahlrabi
- Lettuce, cultivar Buttercrunch
- Lettuce, cultivar Waldman's Green
- Lilac
- Norway Maple
- Paper Birch
- Pea
- Pepper
- Purple Leaf Sand Cherry
- Quaking Aspen
- Rice
- Sorghum
- Soybean
- Spinach
- Strawberry
- Tomato
- Wheat

Product Specifications

	MC-100
Default Display Unit	μmol of chlorophyll per m^2 of leaf surface
Optional Display Units	CCI, SPAD
Measurement Area	63.6 mm^2 (9 mm standard diameter); 19.6 mm^2 (5 mm diameter with reducer)
Resolution	$\pm 10 \mu\text{mol m}^{-2}$ chlorophyll concentration using generic equation
Linearity	$\pm 1 \%$
Repeatability	$\pm 1 \%$
Sample Acquisition Time	Less than 3 s
Storage Capacity	8 MB for up to 160,000 data measurements; 94,000 data measurements with GPS data entries
User Interface	50 mm by 15 mm graphic display screen, 8 push buttons for control and data manipulation
Data Output	Mini-B USB port provided for main data transfer
External GPS Option	RS-232 port (GPS location data is saved with each measurement)
Operating Temperature	0 to 50 C
Temperature Drift	Temperature compensated source and detector circuitry over full range
Power Requirement	Standard 9 V DC alkaline battery
Dimensions	152 mm length, 84 mm width, 25 mm height
Mass	210 g
Warranty	1 year against defects in materials and workmanship