v s instrument pvt. ltd.

INSTRUMENTATION FOR AGRICULTURAL RESEARCH

AN ISO 9001:2015 Certified Company

Meteorology | Plant Science | Soil Science | Solar

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iFL Integrated Fluorometer and Gas Exchange System

Technical Specifications	
Gas Exchange System	CO_2:0-3000ppm, H_2O:0-75mbar, PAR:External 0-3000µmol m^{-2} s^{-1}
Temperature	Leaf: -5°C to 50°C, Chamber: -5°C to 50°C
Excitation Source	Saturation pulse: White LED with 690nm filter 0-7,500 µmol m^{-2} s^{-1} Modulating light: 660nm LED with 690nm short pass filter
Actinic Light	White LED 0-2,000µmol m^{-2} s^{-1}
Detection Method	Pulse modulation
Detector	PIN photodiode with 700 - 750nm filter
Sampling Rate	10 to 10,000 points per second
Test Duration	Adjustable 20 seconds - 4,000 hours
Data Storage	2GB internal memory for thousands of data sets and traces. Removable SD cards
Digital Output	SD cards, USB and HDMI
User Interface	Large, colour, menu driven, graphic touch screen display (14.5cm x 8.5cm)
Battery	7.0Ah 12 V lead acid battery. Up to 8 hours of battery life as iFL system
Leaf Chamber	30cm x 8cm x 16cm
Automatic Environmental Control	CO_2 control, H_2O control Temperature control, PAR control

Portable Photosynthesis System (Portable IRGA) with in-built Microclimate Control for CO_2, Temperature, Light and RH.

1. IRGA Housed in the Plant Leaf Chamber
2. Plant Leaf Chamber (Broad)
3. Stomatal Conductance, Transpiration, Photosynthetic Rate, Ci, Atmospheric, Pressure and all chlorophyll fluorescence parameters
4. Gas exchange measurements can be presented in either ppm/mbar or µmolmol^{-1}/mmolmol^{-1}

Powerful Chlorophyll Fluorometer:

A variety of highly accurate fluorescence plant stress tests can be performed including :

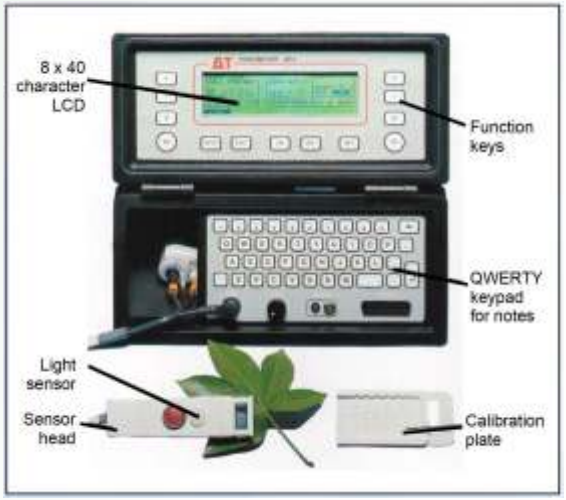
- Yield (Y)II with Multiflash-Fm' correction
- Rapid Light Curves
- Quenching Protocols
- Hendrickson Model
- Fv/Fm

AP4 Automatic Porometer

The AP4 Porometer measures stomatal aperture in terms of leaf conductance to water vapour

- Portable Instrument for Measurement of Stomatal conductance/Resistance, PAR, RH & Leaf Temp
- Inbuilt Data Storage for 1500 data sets with facility for 30 character note with each reading
- Display : 8x40 Character LCD display
- Qwerty Keypad for easy operation
- Calibration Plate as standard accessory

Technical Specifications	
Conductance	Conductance :: mmol/m^2/s OR mm/s Resistance :: s/cm , s/m, m^2s/mol
Parameters Measured	Stomatal Conductance / Resistance, PAR (Photosynthetically Active Radiation), RH, Leaf Temperature.
Conductance Range	5.0 -1200 mmol m^{-2} s^{-1}
Accuracy	+/-10%
RH	0-100%
Cup temp.	-5 to 55 deg C
PAR Flux	0-2500 µmol m^{-2} s^{-1}
Battery Life	20 hours (Rechargeable battery)
Sensor Head	Cup : Slot 205 x 1705 mm rounded ends



Sunscan Plant Canopy Analysis System

Introduction

The SunScan plant canopy analyzer system uses field measurements of Photo-synthetically Active Radiation (PAR) in crop canopies to provide valuable information about Leaf Area Index (LAI) and biomass production

Features

- Battery operated PAR base instrument to measure and calculate the Leaf Area Index PAR (Photosynthetically Active Radiation) & related parameters
- Sunscan can be used as Line Quantum Sensor too
- Usable in clear, cloudy and changeable weather conditions
- Data Storage : 1 Million Readings
- Display : 1/4 VGA sunlight Readable colour screen
- Data Download through USB Cable/ Direct USB Drive port using any Pen drive
- Operating System : Android PDA

Parameters Measured

- Direct & Diffuse Incident Light
- Leaf PAR Absorption
- Canopy Leaf Angle Distribution
- Canopy Leaf Area Index
- Solar Zenith Angle
- Transmitted Fraction

Data Analysis and Storage : The RPDA3 is an exceptionally robust handheld PDA which collects and analyses readings from the SunScan Probe. Raw readings, and derived functions such as LAI, can be displayed, reviewed and stored in the field by the SunData Software; groups of readings can be averaged if required

Technical Specifications	
Active area	1m x 13mm wide, sensor spacing 15.6mm
Spectral response	400 - 700 nm (PAR)
Measurement time	120 ms
Maximum reading	2500 µmol m^{-2} s^{-1}
Resolution	0.3 µmol m^{-2} s^{-1}
Linearity	better than 1%
Accuracy	± 10%
Analogue output	1 mV per µmol m^{-2} s^{-1}
Serial interface	RS232, 9 pin female 'D' connector
Environmental	IP65, 0 - 60° C working temp
Size & Weight	1300(l) x 100(w) x 130(h), 1.7kg
Probe	The probe has an array of 64 PAR sensors embedded in a 1m long probe

WS-GP2 Automatic Weather Station

The advanced WS-GP2 Automatic Weather Station is based on the powerful GP2 Data Logger. It is an ideal solution for research and environmental monitoring applications at remote and exposed sites. The WS-GP2 provides a highly rugged and flexible system – users can select the optimal combination of sensors, logger, power and communications.

Sensors

The standard WS-GP2 includes sensors to measure Rain, Solar Radiation, Soil Temperature, Wind Speed and Direction, Relative Humidity and Air Temperature. Other sensors are also available like Soil Moisture, Net Radiation, Direct and Diffused Light, Sunshine Hours, PAR, Pressure etc.

Calculation of full Penman-Monteith evapotranspiration equation

Technical Specifications	
Input connections	12 differential (or 24 single-ended) analog inputs configurable as: Voltage, Resistance (12 3-wire or 24 2-wire), Bridge (12), Potentiometer (12) 4 digital inputs as: Counters, (2 fast + 2 slow), Frequency, Digital state and SDI12 sensors.
Readings stored	2.5 Million
Configuration	DeltaLINK
Communication options	USB, RS232 and GPRS - Cloud
Power	6 AA alkaline batteries and external 12V, 7Ah with solar power charging.
Temperature range	-20 to +60°C Accuracy: ±0.1°C
Wind speed AN-WD2 (combined wind sensor)	Range 0 to 75 $m.s^{-1}$ Accuracy ± 1.1% of reading
Wind direction AN-WD2 (combined wind sensor)	Accuracy: ± 4° Range : 0 to 360°
Rainfall	Sensitivity: 0.2 mm per tip
Humidity	Accuracy: ± 2% RH Range : 5 to 95% RH
Air temperature	Accuracy: ± 0.1°C Radiation Shield: 0.5 °C
Solar radiation	Absolute accuracy: ± 5% Temperature: <0.2% / °C
Mast	2m mast With cross arm, stakes, steel guy wires, baseplate and logger canopy

AM400-Leaf Area Meter

The AM400 is a compact and portable leaf area meter. It can measure leaves any shape and unlimited length.

Technical Specifications	
Measured Parameters	Leaf area, Maximum length, Maximum Width, Perimeter, Mean Area, Accumulated Area, Ratio and Shape Factor
Scanner	Contact image sensor array with integral RGB lamp.
Scanning Speed	Up to 20 mm/sec
Maximum Measurement Width	183 mm
Maximum Measuring Length	3 m
Precision / Repeatability	+/- 1% Linear, +/- 2% Area,
Resolution	0.016 sq. mm
Memory	Approx. 2,000 data sets

Features

- Portable, non-destructive, all-in-one scanning unit
- Portable Li-ion 6.7Ah long lasting battery

MaxiMet GMX501 Compact Weather Station (SDI-12)

GMX501 compact weather station is simple to install, use and maintain.

Technical Specifications		
Measured Parameters	Measures Wind speed and Direction, Temperature, Humidity, Pressure and Solar Radiation, Rainfall.	
Wind Speed	Range : 0-60 m/s	Accuracy: 40-60 m/s
Wind Direction	Range: 0-360°	Accuracy: 40-60 m/s
Air Temperature	Range: -40°C to +70°C	Accuracy: ±0.3°C
Relative Humidity	Range: 0-100% RH	Accuracy: ±2%
Barometric Pressure	Range : 300-1250 hPa	Accuracy: ±0.4 hPa
Global Solar Radiation	Wavelength sensitivity : 300-3000 nm	Output range: 0-1600 W/m^2
Rainfall	0.2mm/tip	
Communication Options	RS232, SDI-12, GPRS Deltalink cloud options	
Additional Parameters	Soil Moisture, Soil Temp, PAR, Net Radiation etc.	
Data Storage	2500000 data sets	

LCi-T Portable Photosynthesis System (IRGA)

- Light weight, battery operated with color touch screen LCD display with built in GPS
- Measured Parameters : CO_2, Water Vapour, PAR, Leaf & Air Temp., Stomatal Conductance, Transpiration, Photosynthetic Rate, Ci, Atmospheric Pressure, Flow Rate GPS Location etc.
- Wide Variety of Leaf Chambers to suit all type of samples like for Broad, Narrow, Conifer, Canopy, Soil CO_2, Fruits Chamber
- IRGA Housed in the Plant Leaf Chamber for Fast response

Technical Specifications	
Co_2	0-2000 ppm, 1ppm resolution. Differential open system, auto zero, Automatic pressure and temperature compensation.
H_2O	0-75mbar, 0.1 mbar resolution
RH Sensors	Two Laser trimmed highly accurate sensors.
PAR	0-3000 µmol m^{-2} s^{-1} Silicon photocell
Chamber Temperature	-5^{0}C to 50^{0}C. Precision thermistor +/- 0.2deg C Accuracy
Direct Leaf temperature	-5^{0}C to 50^{0}C Energy balance or self-positioning microchip thermistor
Flow Rate in PLC	100ml to 500ml min^{-1}
PAR control by LED Light unit	Up to 2500 µmol m^{-2} s^{-1} by White LED array.
Flow rate to leaf chamber	68 to 340µmol m^{-2} s^{-1}
Warm up time	5 minutes @ 20°C
Display	Colour WQVGA touch sensitive LCD All real time data, calculations and graphs are clearly presented on the high definition, colour LCD
Recorded Data	8 GB Removable SD cards, Up to 32GB supported Data is downloaded either directly from the SD card or USB output
Battery	2.8Ah 12V lead acid battery Up to 10 hours between charges

LCpro-T Portable Photosynthesis System (IRGA)

- Light weight, battery operated with Graphical Display and Micro climate control for CO_2, Water Vapour, Light & Temperature
- **Controls** - CO_2 : 0-2000ppm, RH : 0-75mb, PAR : upto 2000 µmols m^{-2} sec^{-1}
- Temp Control : ±15°C from ambient
- Measured Parameters : CO_2 , Water Vapour, PAR, Leaf & Air Temp., Stomatal Conductance, Transpiration, Photosynthetic Rate, Ci, Atmospheric Pressure with GPS Location.
- Wide Variety of Leaf Chambers to suit all type of leaf samples like for Broad, Narrow, Conifer, Canopy, Soil CO_2 , Fruits Chamber
- Data Storage : 16 GB SD Card, downloading through USB port or Card reader

Technical Specifications	
Co_2	0-3000ppm, 1ppm resolution
H_2O	0-75mbar, 0.1mbar resolution
PAR	0-3000µmol m^{-2} s^{-1} Silicon photocell
Operating Temperature Range	5°C to 45°C
Chamber Temperature	-5°C to 50°C
Direct Leaf Temperature	-5°C to 50°C
Flow Rate to Leaf Chamber	100 to 500ml min^{-1}
Warm Up Time	5 minutes @ 20°C
Battery	7.5Ah 12V Lithium-ion battery Up to 16 hours between charges
Rs232 Output	9 Pin "D" type
Interchangeable Chambers	Broad Leaf Chamber, Narrow Leaf Chamber, Conifer Leaf Chamber, Small Leaf Chamber, Soil / Small Plant Chamber, Versatile Chamber, Fruit Chamber.
Display	WQVGA touch sensitive LCD Display

Enhanced Performance

- ✓ Light unit control integrated into the console
- ✓ Enhanced, elevated CO_2 control, expert gas circuitry and dedicated soda lime column,
- ✓ GPS to record location and elevation data
- ✓ Instant touch key response
- ✓ Automatic screen-dimming function and energy efficient components to save power
- ✓ Choice of light units; one supplied as standard: Red Green Blue (RGB) LED light unit White LED light unit

CCM300 Chlorophyll Content Meter

A lightweight hand-held device for the accurate and easy determination of chlorophyll content in very small leaves and difficult to measure intact samples.

Features:

Battery Back up to 8 hours Useful for Conifer & Needles, Grasses, Fruits, Moss, small leaves, cactus, lichens and Arabidopsis.

- Non Destructive
- In-built Data Storage and downloading facility
- Built-in data Logger with USB port
- Useful for Improving Nitrogen Management
- Fast Response
- Data Averaging Facility
- Touch Screen, Color Graphic LCD

Technical Specifications	
Measuring Area	Fiber optic probe 3mm diameter
Output	mg/m^2
Resolution	0.01 or 1 mg/m^2
Sampling Acquisition Time	Each measurement takes only 5 seconds to perform and is presented as Chlorophyll. Fluorescence Ratio (CFR) or relative chlorophyll content in mg/m2
Source	One LED Blue 460nm diode
Storage	2GB internal Memory, Data Averaging facility
Data modes	Single point, 2-30 Averaging
Output	USB 1.1 and RS232
Display	Touch Screen LCD Color Graphic display.
Battery	2x AA Rechargeable batteries
Operating Temp	0-50°C

CCM200 Plus Chlorophyll Content Meter

- Light weight, field portable, battery operated instrument for measurement of relative chlorophyll content as Index value In-built GPS Facility
- LCD Graphic Display, internal Memory for 1,60,000 data sets
- Data Averaging facility, Data Download through USB port
- Battery : 9v Alkaline Battery
- Resolution : 0.1 CCI
- Repeatability : ± 1%
- Weight : 162 g

Technical Specifications	
Measured parameters	Optical density difference at two wave lengths 653nm (Chlorophyll) and 931nm (Near Infra-Red)
Measuring Area	1 cm diameter circle
Accuracy	+/- 1 CCI unit
Source	Two LED's
Data modes	Single point, 1-30 Averaging and Statistical 10-30 protocol.
Output	USB 1.1
Auto Off interval	4 minutes (if no key is pressed
Display	16 x 2 LCD Display, 5 keys for operation
Operating Temp	0-50° C
User Interface	128 x 32 pixel graphic display, 8 keys for measurements, data manipulation, beep signal status and warnings
GPS option	The single pin RS232 port is used for GPS. Location data is saved with measuring data for each measurement in the measuring file

Large Internal Memory

- 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

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 anomalous data points.

OS5p+ Pulse Modulated Chlorophyll Fluorometer

Field Potable, Battery Operated, Light Weight for Measurement of Chlorophyll Fluorescence Parameters

- Y Y(II): Quantum photosynthetic yield (light adapted quantum yield of PSII)
- Fo: Minimum fluorescence
- Fm: Maximal fluorescence
- Fv: Variable fluorescence
- FV/FM: Photochemical efficiency
- Fv/Fo: More sensitive detector of plant stress than Fv/Fm
- Fms (Fm'): Maximal fluorescence under steady state conditions (Fm')
- Fs: Fluorescence signal prior to saturation pulse (F')
- qP: Photochemical quenching
- qN: Non-photochemical quenching
- NPQ: Non-photochemical quenching
- Y(NO): Non-photoprotective heat dissipation
- ETR: Electron transport rate (with PAR clip)
- PAR: Photosynthetic Active Radiation (with PAR clip)
- qE, qT, qL, qM, qZ: Quenching relaxation parameters

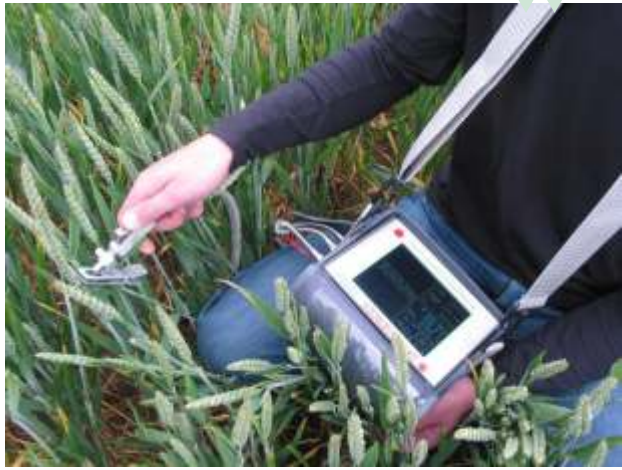
qL: Photochemical quenching
Y(NPQ): Photo-protective heat dissipation
Ft: Current fluorescence readout
rETRMAX: Leaf photosynthetic capacity
T: Leaf temperature (with optional PAR sensor)
Strasser OJIP parameters: O, J, I, P, t100µs, t300µs, Mo, PIABS, A, tFM

Technical Specifications	
Excitation Sources	Saturation pulse: White LED with 690nm filter 0-15,000 µmols m-2 s-1, 7,500 µmols m-2 s-1 with PAR clip Modulating light: Two channel 660nm(red) and 450nm(blue) LED
Actinic Light	White LED 0-5800 µmols m^{-2} s^{-1},0-1850 µmols m^{-2} s^{-1} with PAR clip
Detection Method	Pulse modulation
Detector	PIN photodiode with 700-750nm filter
Sampling Rate	Auto-switching from 1 to 10,000 points per second, Depending on phase of test
Test Duration	Adjustable 0.1 seconds - 12 hours
Data Storage	1Gb internal memory for thousands of data sets and traces
User Interface	Graphic, backlit, color, touch screen
Digital Output	Smart cards and USB
Battery	Internal 12V, rechargeable Nickel metal Hydride battery providing

OS1p Modulated Chlorophyll Fluorometer

Field Potable, Battery Operated, Light Weight for Measurement of Fluorescence Parameters

- Large Graphic, colour, touchscreen LCD Display 1GB Data Storage capacity
- USB, RS232, Ethernet Connectivity
- 12 hours continuous operation with single charge. Light weight, just 1.4 Kgs
- User Selectable and changeable fluorescence analysis protocols



Technical Specifications	
Saturation Pulse	LED with 690nm filter. 11,000uE
Modulating Light	660nm LED with 690nm filter
Actinic Light	LED to 3,000 uE
Measuring Light	660nm
Detection Method	Pulse modulation
Detector	PIN photodiode with 700-750nm filter
Sampling Rate	Auto-switching from 10 to 10,000 points per second depending on phase of test
Test Duration	Adjustable 2 seconds - 16 hours
Data Storage	1Gb internal memory for thousands of data sets and traces. Digital output: Smart cards and USB
User Interface	Graphic, backlit, color, touch screen display(114mmx89mm)
Battery	Internal 12V, rechargeable Nickel metal Hydride battery providing up to 12 hours of continuous operation
OS1p Parameters	Y(II): Quantum Photosynthetic Yield (F/Fm'), Fo: Minimum fluorescence, Fm: Maximal fluorescence, Fv: Variable fluorescence, Fv/Fm: Maximum photochemical efficiency, Fv/Fo: More sensitive stress detector than Fv/Fm, Fm': Maximal fluorescence under steady state conditions, Fs: Fluorescence signal prior to saturation pulse (F') NPQ: NPQ, Y(NPQ), Y(NO) lake model parameters, Ft: , Current fluorescence readout, ETR: Electron transport rate (with optional PAR sensor), PAR: Photosynthetic Active Radiation (with optional PAR sensor), T: Leaf temperature (with optional PAR sensor), rETRmax: Leaf photosynthetic capacity, Ik: Minimum saturation level RLC: Rapid light curves α: Initial slope of line at low PAR values, relating ETR to PAR. Used as a measure of quantum efficiency, Im: Intensity at rETRmax
Digital Output	Smart cards and USB

Optional PAR Clip: Digital PAR clip provides both Photosynthetic Area Radiation measurements and highly accurate leaf temperature using modern thermistor technology accurate to ± 0.5oC. Its bottom opening design allows for a more convenient one-handed operation

OS30p+ Stress Screening Device (Chlorophyll Fluorometer)

Rapid Plant Stress Screening Device

The OS30p+ is a modulated Fluorometer with a calibrated red actinic LED light source designed to provide optimal measurement of both FV/FM and Stresser Protocol OJIP parameters.

Features :

- Built in-Fiber optic Probe
- LCD Graphical Display
- Light weight leaf clips with shuttle
- Integral Data Storage & Downloading
- Easy one Hand Operation

Technical Specifications	
Test Modes	Fv/Fm, OJIP
Displayed Parameters	Fo, Fm, Fv/Fm, Fv/Fo, O, K, J, I, P, tFm, A, Mo and PI/ABS
Excitation/Actinic Source	Solid state 660nm source. Saturating 525-6,000µE
Detectors and Filters	A PIN photodiode with a 700nm-750nm bandpass filter
Test Duration	Fv/Fm: 0.1-1.5 seconds. OJIP: 3-300 seconds
Sampling Rate	Up to 10µS
Digital Output	USB
Storage Capacity	Up to 160,000 data sets and hundreds of experimental traces
Power Supply	Rechargeable NiMH battery pack
Battery Life	8 hours of continuous operation
User Interface	Display: Colour graphic display Keypad: 10 key dedicated function keypad

Dark adaption clip

Dark adaption clips are designed to provide an affordable yet reliable measuring solution for large populations of plants. The clips are built with sturdy and weather resistant yet cost effective materials. Flexible gaskets automatically seal the sample area from any light.

ACM-200Aplus Anthocyanin Meter

Anthocyanin Content Meter::Light weight, hand held battery operated device for the accurate and easy determination of Anthocyanin Content.

- Non Destructive
- In-built Data Storage and downloading facility.
- Built-in data Logger with USB port.
- Useful for Improving Nitrogen management
- Fast response.
- Data Averaging facility
- Alpha Numeric Graphic LCD
- Data Storage capacity of 1,60,000 data sets Case Study

Technical Specifications	
Optical Density Difference at Two Wave Lengths	530nm (Anthocyanin) and 931nm (Near Infra-Red)
Measuring Area	1 cm diameter circle
Accuracy	+/- 1 ACI unit
Sampling acquisition time	2-3 seconds
Resolution	0.1 CCI Unit
Source	Two LED's
Data modes	Single point, 1-30 Averaging and Statistical 10-30 protocol
Output	USB 1.1 and RS232
Auto Off interval	4 minutes (if no key is pressed)
Display	128 x 32 pixel graphic display, 8 keys for measurements, data manipulation, beep signal status and warnings
Battery	9 V alkaline cell
Operating Temp	0-50° C
Detector	Silicon photodiode
GPS location	In Built GPS

Fv/Fm Meter - A compact and affordable Fv/Fm meter for dark adapted measurements

A compact and affordable Fv/Fm meter for dark adapted measurements Fv/Fm is a test that allows the measurement of the maximum potential quantum efficiency of Photosystem II if all capable reaction centers are open.

- Accurate and reliable performance
- Rapid measurement of large populations
- Lightweight, ergonomic design
- Lightweight dark adaption clips
- Graphic Fv/Fm trace display
- 2Gb of on-board memory
- USB output

The measurements of Fv/Fm can be made in under 2 seconds.
The memory is capable of storing hundreds of thousands of complete data sets.
The Fv/Fm meter is a lightweight, hand-held fluorometer for the rapid measurement of quantum efficiency of PSII.

Technical Specifications	
Fast measurements	Fv/Fm, Fv/Fo, Fo, & Fm
Light sources	Red LED Saturation flash array up to 6,000 umoles
Sensors	Pin Photodiode with a 700nm to 750nm band pass filter
Red modulated light source	Modulated frequency is set at the factory. The red LEDs peak at 660nm with a cut off filter at 690nm
Storage Capacity	2 Gigabyte of non-volatile flash memory, supporting almost unlimited data sets
Power Supply	8 hours
Operating temperature range	0^0C to 50^0C
Dark adaptation clips	10 dark adaption clips are included

MPM 100 Multi Pigment Meter

Multiple Wavelength Pigment Meter

- Measures : **Chlorophyll Content, Anthocyanin Content, Flavonol Content & NFI(Nitrogen-Flavonol Index)**
- The MPM-100 or "Multi-Pigment-Meter", uses a combination of techniques to measure these very different parameters, in proven ways, at the same time
- Standard LED wavelengths
- Chlorophyll content: T850nm / T720mm
- Flavonol content: F660nm / F325nm
- Anthocyanin content: F660nm / F525nm
- NFI: (T850nm/T720nm) / (F660nm/F325nm)

Technical Specifications	
Measurement Area	9.5mm diameter circle
Distance from edge of measuring head to measurement area	9mm
Repeatability	+/-1%
Noise	<+/-2%
Fluorescence Detector	Single channel Si Photodiode with detection from 720nm to 900nm range
Transmittance Detectors	Single channel Si Photodiode with diffuser to measure from 405nm to 950nm
Detection	Modulated light digitally controlled to minimize background detection
Storage Capacity	4GB of non-volatile flash memory
Modes	Single point measurement, averaging of 2 to 8 measurements, median and mean values
User Interface	240 x 320px color touchscreen
GPS Location accuracy range	0.3m to 2.5m. Longitude, latitude, number of satellites and DOP

Plant Stress Kit

Compact and affordable Y (II)/ETR & Fv/Fm meters One case, two instruments. One for measuring light adapted Quantum Yield of PSII or Y(II) and one for dark adapted Maximum Potential Quantum Efficiency of PS (II) or Fv/Fm

Technical Specifications	
Parameters Measured	Y(II), ETR, PAR, Leaf temperature, FMS, Fv/Fm, Fv/Fo, Fo, Fm, Ft
Light Sources	Saturation pulse: 7,000umols white LED 6,000umol red LED
Modulated light	Red: 660 nm LED with 690 nm short pass filter
Data Storage	2GB
Output	USB comma delineated files may be opened in Excel
Display	Graphic black and white display 132 x 32 pixels
Sampling rate	Auto-switching from 1 to 10,000 points per sec, depending on test & on phase of test
Power	Lithium-ion USB battery pack with 8 hour life

Green Seeker

Handheld crop sensor is an active light source optical sensor that is used to measure plant biomass and display as NDVI (Normalized Difference Vegetation Index)

Technical Specifications	
Optical	RED660 nm NIR 780 nm
Field of View	10” at 24”, 20” at 48”
Operating Height	24” – 48”
Power	Battery 3.7V DC nominal, Charging 5V DC, 320 mA max
Connectivity	Bluetooth
Connectors Remote	Trigger Switch Port 2.5 mm Stereo phone jack
Operational Range	(10 °C - 50 °C)

WET Sensor Kit (Soil Moisture, EC & Soil Temperature)

WET Sensor Kit - The WET Kit measures and displays 3 important variables that influence plant growth: water content, temperature and pore water conductivity (ECp) – the EC of the water available to the plant.

Senor Unit	i Sensing Technology: FDR based ii Battery: 9V
Electrical Conductivity	i Range : 0-300mS/m ii Accuracy: +/-10(ECB)
Soil Moisture	i Range: 0- 100% ii Accuracy: +/- 3%
Temperature	i Range : -5°C to 50°C ii Accuracy: +/- 1.5ºC
Display Unit Type	LCD
Data Storage	1500 readings

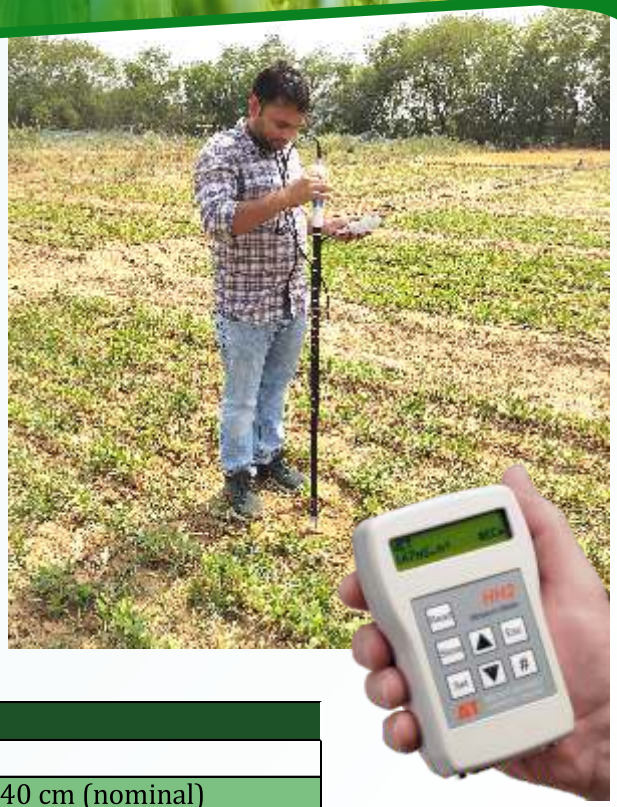
WET150 Kit (Soil Moisture, EC & Soil Temperature)

- WET150 Kit is a portable and rugged solution for researchers who need to assess moisture and salinity conditions in soils and substrates.
- The Kit makes fast soil/substrate measurements of three crucial variables that influence plant growth: moisture content, temperature*, and electrical conductivity (EC) – a strong indicator of the general nutrient level
- The WET150 Sensor comes complete with calibrations for mineral and organic soils plus perlite, coir, peat, and mineral wool substrates soils

Volumetric Water Content	Accuracy : ± 0.03m3.m-3 (3%) RANGE: Full range: 0 to 1.0 m3.m-3
Soil Temperature	Accuracy : ± 0.5°C (0°C to +40°C range) ± 0.7°C (-20°C to +60°C range)
EC (Bulk Conductivity)	Accuracy : ± (10mS.m-1 + 6%) Range : from 0 to 1200 mS.m-1

PR2 Profile Soil Moisture Meter

PR2 Profile Probe Sensors are available as the PR2/4, measuring at 4 depths down to 40 cm, or the PR2/6 measuring at 6 depths down to 100 cm. The nominal sensing depths are 10, 20, 30, 40, 60 and 100 cm.



HH2 Moisture Meter

Moisture Meter with integral 25-pin D-connector for sensor or PC connection. Includes connector cap, battery, user manual with PC software and RS232 Data Transfer cable assembly. RS232 – USB adapter cable compatible to USB ports for data transfer.

User Selectable output unit : $m^3.m^3$, %vol., mv
Battery Life : ~ 5000 readings
Display : 2 line x 16 Character LCD Display
Data Storage : 1500 data sets
Access Tubes 10 No as Standard supply

PR2 Profile Probe Specifications	
Model types	PR2/4 and PR2/6
Sensing depths	PR2/6: 10, 20, 30, 40, 60, 100 cm PR2/4: 10, 20, 30, 40 cm (nominal)
Measurement	Volumetric soil moisture content θV ($m^3.m^{-3}$ or % vol)
Range	Accuracy figures apply from 0 to 0.4 $m^3.m^{-3}$ Full range is from 0.0 to 1.0 $m^3.m^{-3}$
Accuracy	± 0.04 $m^3.m^{-3}$
Soil sampling volume	Vertically: ~95% sensitivity within ± 50mm of upper ring of each pair. Horizontally: ~95% sensitivity within a cylinder of radius 100mm.
Environment	0 to 40°C
Response time	Full accuracy achieved within 1 second
Access Tubes	Sensors are used through pre-installed Access Tubes to minimize the soil disturbance.

ACE Soil CO_2 Exchange System / Soil Respiration System

Soil respiration can be defined as the net CO_2 production of a soil. The amount of gas exchange taking place is frequently used as an indicator of microbial soil activity and so is used to characterise the "health" of that soil. The rate of soil flux is influenced by a variety of environmental parameters especially organic matter content, soil moisture and soil temperature.

Measurement of CO_2	Standard range nominally 40.0 mmols m^{-3} (0-896ppm at standard temperature and pressure) 0.05mmols m^{-3} resolution (1ppm). Infrared gas analyser housed directly adjacent to soil chamber. Differential open or closed system.
Measurement of PAR	0-3000µmols m^{-2} sec^{-1}. Silicon photocell
Measurement of Soil Temperature	6 selectable inputs for thermistors
Measurement of Soil Moisture	Selectable inputs for commercially Available sensors
Flow Control to Chamber	200ml – 5L min-1. (200-3700µmols^{-1})
Flow Control Accuracy	+/- 3% of f.s.d.
Display	240 x 64 dot matrix LCD
Programming	Each ACE Station has a user-friendly interface driven by only 5 keys
Recorded Data	Removable Compact Flash cards
Internal Battery	12V 7 Ah
Power Supply	12V 7 Ah
RS232 Output	SD Card and Rs232
Closed Chamber Volume	2.6L
Open Chamber Volume	1.0L
Soil Collar Diameter	23cm

Portable Soil Moisture Meters

ML3 - THETA PROBE SOIL MOISTURE METER

- Battery operated, portable instrument for measurement of Soil Moisture content
- Direct insertion in the soil
- Extension Tubes upto 1 meter can be used for deeper depth
- Inbuilt Data Storage facility
- Digital display. % Volumetric, $m^3.m^3$
- Operated through 9V battery
- Accuracy: ± 1 %
- Frequency: 100MHz
- Maximum Sensor length: 6 cm

SM150T SOIL MOISTURE KIT

- Battery operated, portable instrument for measurement of Soil Moisture
- Digital Display
- Research grade sensor at a greater price
- Robust and Durable
- Moisture accuracy is 3% (after soil specific calibration)
- Built-in temperature sensor achieves 0.5°C accuracy
- Please note that the HH150 Meter supplied with the SM150 Kit is a readout-only device. If PC connectivity for data storage and download is a requirement, the SM150T should be used with the HH2 Moisture Meter instead.
- NB: When used in portable mode the SM150T Sensor does not provide temperature indication

Sunshine Sensors /Pyranometer

BF5 measures Global and Diffuse radiation and sunshine duration No routine adjustment or polar alignment is required.

- No moving parts, no shade rings
- Outputs can be set to Energy ($W.m^{-2}$), PAR ($\mu mol.m^{-2}.s^{-1}$) or Lux

Spectral Range	400 - 700nm
Range	0-2000W/m^2
Output	PAR / ENERGY / LUX (User selectable)
PAR	0-2500 micromol/m^2/s Energy : 0-1250 W/m^2
Illuminance	0-200klux
Compatible	GP2 Data logger
Temperature Range	-20 to + 50degree C
Data Logger	Gp2 Logger for Data Storage and continuous data recording and monitoring

SPN1 Pyranometer is a precision solar radiation measurement instrument with a ground glass dome, and is designed for long-term outdoor exposure.

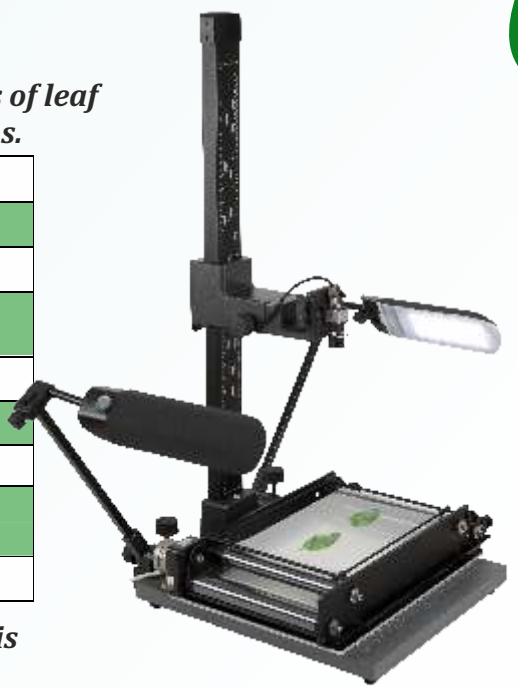
- It measures Global (Total) Diffused and Sunshine hours
- No moving parts, shade rings or motorized tracking is required

Spectral Range	400 nm – 2700nm
Range	0-2000 W/m^2
Resolution	0.6 $W.m^{-2}$ =0.6 mV
Temperature range	-40 to + 70°C
Non-linearity	< 1%
Sunshine status threshold	120 $W.m^{-2}$ in the direct beam
Response time	100 ms (typical)
Data Logger	Gp2 Logger for Data Storage and continuous data recording and monitoring

Leaf Area Meter (WinDIAS)

Leaf Area Meter (Windias)- WinDIAS provides rapid measurement and analysis of leaf area and leaf features – ideal for plant pathology and phenotyping applications.

Throughput	(Leaves/hour)~800
Resolution	2048 x 1536 pixels
Minimum Object Size	1 pixel
Maximum Sample Area	250 x 290 mm (conveyor), 250 x >1000 mm (long leaf mode) Width : 25cm :: Length : 1 Meter
Accuracy	±4% typical
Diseased/Healthy Area	Contrast Dependent
Calibration	Static measurements: against a ruler
Conveyor Belt	The Conveyor Belt Unit works with WinDIAS to provide a rapid and convenient method of handling large batches of leaves.
Image file formats	.jpg, .bmp and .tif



NR2 Net Radiometer *Net radiometer is a thermopile sensor head which is exposed to both the downward and upward Fluxes of radiation*

Measuring Range	-0.5 to +1(kW/m^2)
Operating Temp	-40 to 60°C
Sensitivity	100mV per (kW/m^2)
Field of View	180°upper and lower sensor
Compatible	GP1 Data logger. Data Storage capacity for 6,00,000 data sets. Data logging interval option from1 sec to 24 hours
Accuracy	±5% at 20°C
Spectral Response	0.25-60 µm

Sap Flow System

For sap flow/xylam Flow study. Useful for Crops and Trees.
Different TDP Needles & Gauges are available to suit all type varieties.

- Easily inserted and removed for reuse
- Constant heat, thermal dissipation method; not heat pulse
- Continuous measurement method
- No waiting periods and no heat pulses
- Stainless steel needles that are Teflon coated
- Compatible with most data loggers
- Differentially wired T- type thermo couples
- Electronics & connectors sealed / weather proofed.
- Wires directly to data logger, one differential channel each
- Ten ft. cables, sensor insulation, and manuals included

Hydraulic Conductance Flow Meter (HCFM)

HCFM is designed to perform quantitative root and stem analysis without having to dig up roots or drag limbs back to the lab.

Technical Specifications	
Stem Ranges	1 mm to 36 mm diameters
Flow Rates	0.01 to 350 grams/hr in 5 overlapping ranges
Conductance	7.7E-08 to 3.5E-04 Kg s^{-1} MPa^{-1}
Data Interface	USB powered
Capacity	24 oz. Degassed Water
Maximum Pressure	90 psi (620 kPa)
Air Gas Tank	Tank 6 cu. ft. (170 liter) with CGA-580 Valve & Connector

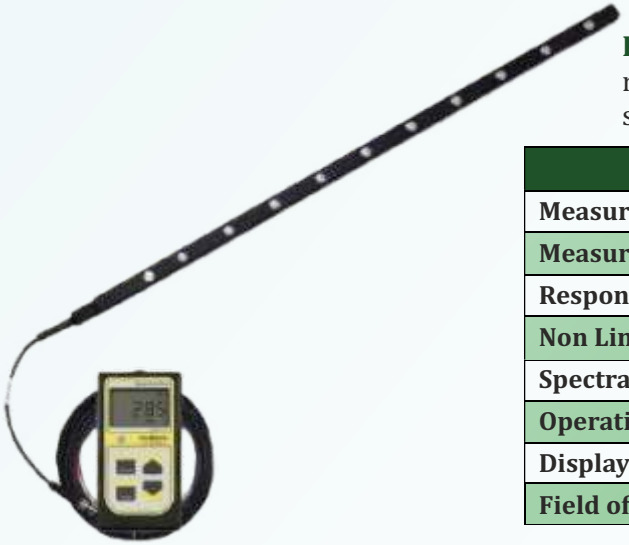
MI210 Infrared Radiometer

High-accuracy, non-contact surface temperature measurement

INFRARED RADIOMETER

Field portable, battery operated instrument for measurement of non-contact surface/Canopy Temperature measurement.

Technical Specifications	
Measurement Repeatability	+ /- 0.1°C
Accuracy	+ /- 0.2°C (-30 to 65°C)
Response Time	0.6 seconds
Spectral Range	8 to 14 µm
Operating Temperature	0 to 50°C



Line Quantum Meter - Field portable, battery operated instrument for measurement of PAR(Photosynthetically Active Radiation). The MQ-301X has a separated sensor bar with 10 sensors connected to a hand-held meter via cable.

Technical Specifications	
Measurement Area	70 cm (10 sensors @ 7cm each)
Measurement Repeatability	Less than 0.5 %
Response Time	Less than 1 ms
Non Linearity	Less than 1 % (up to 2500 µmol m^{-2} s^{-1})
Spectral Range	370 nm to 650nm
Operating Temperature	-10 to 60°C
Display	LCD digital display
Field of View	180°

PR2 SDI-12 Profile Probe Soil Moisture

PR2 Profile Probe Sensors are available as the PR2/4, measuring at 4 depths down to 40 cm, and PR2/6 measuring at 6 depths down to 100 cm.
The nominal sensing depths are 10, 20, 30, 40, 60 and 100 cm.

GP2 SDI - 12 Data Logger

The PR2 SDI-12 is fully compatible with the new SDI-12 enabled GP2 Data Logger and Controller - with simple point & click configuration. In addition to SDI-12 input, the GP2 can log 12 analogue channels.

- Multiple PR2 SDI-12s can connect to a compatible data logger via a single cable
- Enables the creation of low cost highly flexible sensor networks
- Compatible with existing PR2 access tubes and augering kits
- Flexible integration with 3rd party SDI-12 hardware
- Low power design; ideal for remote sites

Technical Specifications	
Sensor	PR2 and PR2 SDI-12
Measurement	Volumetric water content
Accuracy	Accuracy ± 0.04 $m^3.m^{-3}$ (4%) With soil-specific calibration
Soil moisture measurement range	0 to 0.4 $m^3.m^3$
Salinity range	50 to 400 $mS.m^{-1}$
Temperature range	0 to 40°C
Output	0 to 1.0 V
Sample volume	~95% sensitivity within a cylinder of diameter 200 mm

Delta-T Devices Ltd., UK
www.delta-t.co.uk

ADC BioScientific Ltd., UK
www.adc.co.uk

Our Principals

Dynamax Inc., USA
www.dynamax.com

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