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Delta-T Devices

New Products

Data Logger & Controller
GP2 - High performance field data logger

Soil Moisture & Temperature Sensor
ML3 – The next generation of ThetaProbe

Weather Station
WS-GP2 - Advanced Weather Station

GP2 Data Logger & Controller

ML3 ThetaProbe

WS-GP2 Weather Station

ML3 ThetaProbe Soil Moisture and Temperature Sensor

The next generation of ThetaProbe

The new ThetaProbe has extra features, improved performance and a new look. With its 1% accuracy the ThetaProbe continues to set the standard for soil moisture measurement but now also measures soil temperature.

- **Soil moisture with ± 1% accuracy**
  - gold standard performance

- **New built-in temperature measurement**
  - ± 0.5°C accuracy

- **New adaptable cable system**
  - extendable, easy handling

- **New white body**
  - reduces radiative heating

- **Improved performance in saline soils**
  - usable in soils up to 2000 mS.m^{-1}

Patents
UK patent 2300485B
US patent 5804976

What's new?

Since the ThetaProbe was introduced 18 years ago it has seen many improvements. The new ML3 is the latest step in that evolution. The addition of a thermistor sensor enables the simultaneous logging of soil temperature with soil moisture. A new cabling system makes it simple to extend or replace cables. With a choice of 1m, 5m, 10m and 25m extensions, flexible configurations are now possible. ML3 cables and connectors are buriable (environmentally protected to IP68).

The ML3's salinity response has been improved - its output has been characterised at EC values up to 2000 mS.m^{-1}. The temperature range has also been improved with tests demonstrating that the ML3 can operate at temperatures as low as -40 degrees C.*

* Non-flexing cables
** HH2 does not provide temperature indication
[1] Figures apply to sensor only and exclude logger or cabling error

Data logging & readout

The ML3 can be logged by any Delta-T data logger, including the new GP2 (see opposite). In fact any logger that can provide 5 - 15V DC excitation power and will accept the 0 - 1V output signal is suitable.

For portable applications the ML3 connects to the HH2 Moisture Meter** and they can be ordered together as the convenient ThetaKit.

ML3 ThetaProbe - Brief Specs

Water content	
Accuracy	±0.01 m^3.m^{-3}
Range	0 to 0.5 m^3.m^{-3}
Salinity range	< 0.035 m^3.m^{-3} 50 to 500 mS.m^{-1}
Temperature	
Accuracy	± 0.5°C, 0 to +40°C ± 0.75°C, -20 to +60°C [1]
Output	0 to 1.0V differential
Power	5 to 15V, 20mA for 1s
Sample vol.	~60 x 30mm diameter
Size	170 x 40mm diameter
Environmental	IP68, -40 to +70°C

Ordering Information

ML3	**ML3 ThetaProbe Sensor** *NB: Order cable separately*
ML3 ThetaKit	Includes ThetaProbe type ML3, 4 spare rods, HH2 Meter, RS232 cable, insertion kit, user manuals and case.
Cable Options	
SMSC/sw-05	5m cable terminating in bare wires for connection to GP1, GP2, or DL6
SMSC/lw-05	5m cable terminating in bare wires for connection to DL2e.
SMSC/d-HH2	1.5m cable, M12 to 25-way D-socket, for connection to an HH2.
EXT/5W-01 EXT/5W-05 EXT/5W-10 EXT/5W-25	1m, 5m, 10m, and 25m extension cables, M12 connector to M12 connector.

ML3 ThetaKit

GP2 Data Logger & Controller

Research-grade logging - sophisticated control

A powerful and rugged, yet easy to use 12 channel field data logger and controller with flexible input and relay options.

- **12 differential channels**
  - compatible with most sensor types

- **Ideal for demanding research applications**
  - weatherproof and battery powered

- **Flexible configuration**
  - expandable relay and cable entry options

- **Powerful Script Editor**
  - advanced control and recording capabilities

- **Unique simulator feature**
  - checks program validity before real-world activation

For more information please see GP2 data sheet

Building systems with the GP2 Data Logger

The GP2 is the ideal data logger for field work, for applications ranging from agronomy, meteorology and hydrology to eco-physiology and soil science. (Please see back page for details of the WS-GP2 Weather Station). We can supply complete systems including sensors, enclosures, solar power and communications options.

The GP2 Logger is compatible with all Delta-T sensors. For the Delta-T WET Sensor there is a dedicated input channel and for the PR2 Profile Probe there is an optional dedicated lid.

Delta-T has decades of experience of instrumentation for environmental research and can advise on all aspects of system specification.

Introducing the GP2

The GP2 is a new multi-channel data logger and controller that is easy to use, versatile and reliable. It can log most sensor types and accepts voltage, resistance, current, potentiometer, counter, frequency, and digital state inputs.

DeltaLINK software helps the user set up logging sequences and provides control over reading frequency, sensor type, thresholds, units and much more. Delta-T sensors can be selected from a menu.

Flexibility

As needs change, the GP2 can grow and adapt. A range of expansion lids is available with additional cable entry points and configurations, including dedicated Profile Probe connectors or wider diameter cable entry glands.

The number of programmable control relay outputs can be increased from 2 to 6 using the optional Relay Expansion Module. Up to 7 GP2 Data Loggers can be networked to allow the construction of complex monitoring and control systems.

Communications

The GP2 can store up to 2.5 million readings, held in non-volatile flash memory. Data can be easily collected by laptop using the USB connection or remotely using the GPRS modem options.

Up to 7 GP2s can be networked together to share communications. Delta-T plans to introduce an SDI-12 option in the future.

GP2 Advanced Features

SCRIPT EDITOR

This powerful software feature creates step by step operations to control simple or complex processes or recording requirements. It can also implement models, useful in areas such as disease prediction or multi-zone irrigation. This degree of sophistication, including the ability to apply PID control, means the potential applications are numerous and varied.

The editor interface is easy to use – no programming language is involved.

VIRTUAL CHANNELS

Data can be processed to obtain max, min, sum etc. and the results logged to a virtual channel. Calculations can be made using any channel combination.

SIMULATOR

This unique software feature allows logging programs to be tested before real-world activation. For applications involving weather data, irrigation or soil moisture recording, the environmental variables can be changed to test how the program responds. Years of logging time can be simulated in just a few minutes.

WS-GP2 Weather Station

Advanced, rugged and highly flexible weather station

The new WS-GP2 Weather Station is ideal for research and environmental monitoring applications

Being based on the versatile GP2 Data Logger, systems can be specified to meet application requirements. Users can select the optimal combination of sensors, logger, power and communications.

- **Unattended weather recording at remote and exposed sites**
- **Designed for use in severe weather conditions**
- **Wide choice of sensors, including soil moisture**
- **GPRS modem communications**

GP2 Data Logger - Brief Specs

	Specification		Range / Note
Analog accuracy	-0.17 to +2.7V	0.005% + 115µV	at 25°C
	±23mV	0.022% + 12µV	
	-0.17 to +2.7V	0.04% + 150µV	-20°C to +60°C
	±23mV	0.08% + 27µV	
Accuracy other	See detailed specification in GP2 User Manual		
Readings	2.5 million (approximately)		depends on program settings
Logging frequency	1s to > 24 hours		
Logging status	Flashing LED		
Environmental	-20°C to +60°C, IP65		

Sensors

The standard WS-GP2 includes sensors to measure rain, solar radiation, wind speed and direction, soil temperature, relative humidity and air temperature.

The GP2 Logger has the power and flexibility to handle almost any environmental sensor, which means the weather station can be as simple or as complex as your application requires. Even after installation, it's easy to expand or adapt the system – by adding solar power, for example. Optional sensors include barometric pressure, soil moisture, soil EC, UV, PAR, albedo, net radiation, total and diffuse radiation, evaporation and surface wetness.
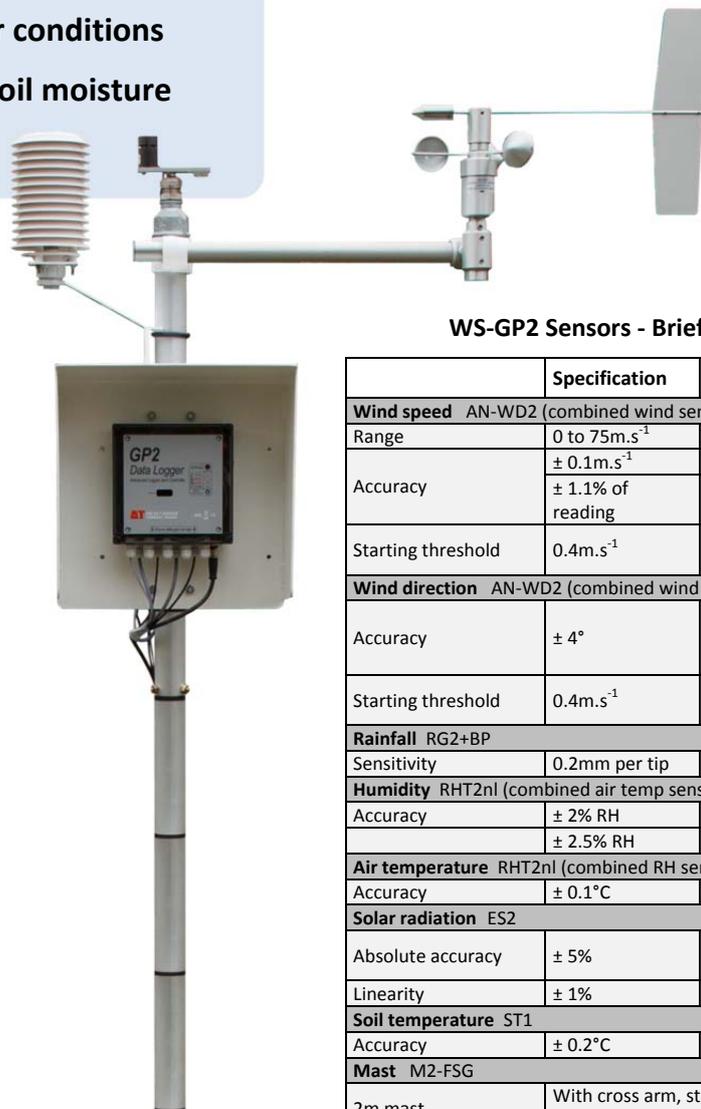
Data handling

Data can be easily collected by laptop via USB, or remotely using the GPRS modem options. Delta-T plans to introduce an SDI option in the future. DeltaLINK Software makes it easy to set up recording intervals and to view and download stored data.

Presentation options include wind rose, gusts and average (including direction and vector average).

WS-GP2 Sensors - Brief Specs

	Specification	Range / Note
Wind speed AN-WD2 (combined wind sensor)		
Range	0 to 75m.s^{-1}	
Accuracy	± 0.1m.s^{-1}	Up to 10m.s^{-1}
	± 1.1% of reading	Over 10m.s^{-1}
Starting threshold	0.4m.s^{-1}	-30°C to +70°C if icing minimal
Wind direction AN-WD2 (combined wind sensor)		
Accuracy	± 4°	mechanical: 0 to 360° electrical: 0 to 356°
Starting threshold	0.4m.s^{-1}	-30°C to +70°C if icing minimal
Rainfall RG2+BP		
Sensitivity	0.2mm per tip	up to 360 mm.hr^{-1}
Humidity RHT2nl (combined air temp sensor)		
Accuracy	± 2% RH	5 to 95% RH
	± 2.5% RH	<5% and >95% RH
Air temperature RHT2nl (combined RH sensor)		
Accuracy	± 0.1°C	0 to 70°C
Solar radiation ES2		
Absolute accuracy	± 5%	At 20°C (optimal conditions)
Linearity	± 1%	0 to 2 kW.m^{-2}
Soil temperature ST1		
Accuracy	± 0.2°C	-10 to +65°C
Mast M2-FSG		
2m mast	With cross arm, stakes, steel guy wires, baseplate & logger canopy	

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