AT

Delta-T Devices

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

Based on the versatile GP2 Data Logger and Controller, users can select the optimal configuration of sensors, power options and communications.

- **Unattended weather recording at remote and exposed sites**

- **Wide choice of sensors**

- **Compatible with DeltaLINK-Cloud online data viewing and sharing platform**

- **SDI-12 capability**

- **Calculates full Penman-Monteith ET equation**

GP2 Data Logger & Controller

Applications

- Meteorology
- Climate change monitoring
- Environmental compliance
- Eco-physiology

- Water resource studies
- Waste management
- Crop trials
- Agro-meteorology

WS-GP2
Weather Station

WS-GP2 Weather Station with optional modem box

Standard sensors include:

- **Rain**
- **Solar radiation**
- **Wind speed and direction**
- **Soil temperature**
- **Relative humidity**
- **Air temperature**

Flexibility

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 and evaporation.

Storage, communication and power

The GP2 can store 2.5 million readings (typical) in FLASH memory. Data can be collected by laptop via USB/RS232 or remotely using the cellular modem options (see right).

The GP2 has 6 alkaline AA internal batteries as standard with external battery and solar power options available. Up to 7 GP2s can share power and communications using an M12 cabling network.

Advanced features and customisation

For researchers interested in evapotranspiration (see back page), degree days, disease prediction, wind chill factor, dew point, PID control or other custom algorithms the GP2's advanced features open up exciting possibilities.

Analog inputs can be fully customised: each channel can have its own input type and recording parameters. DeltaLINK software gives the user control over reading frequency, thresholds and units, and provides recording options for average, min and max, plus specialised wind options - including wind rose, gusts and wind averaging (with direction and vector average).

Users can add their own custom sensor types to the sensor library, exploiting the GP2's detailed configuration options. The GP2 provides 4 input ranges down to microvolt resolution with adaptive auto-ranging, excellent analog accuracy, and configurable sensor excitation - enabling it to support nearly all analog sensors. There is also an SDI-12 Sensor library (see back page for more SDI-12 details).

Calculations based on the measurements from several input channels can be recorded and displayed as additional virtual channels (calculated measurements).

Remote communications

DeltaLINK-Cloud Modem Gateway options

To connect Delta-T Loggers to DeltaLINK-Cloud, customers need to purchase a modem gateway and a data package.

The 3G-DLC-BX1/SP and 3G-DLC-BX1/B are "plug and play" modem gateway systems that can upload your logger's status# and data automatically to DeltaLINK-Cloud.

Both systems include an enclosure, battery, quad band modem, smart SIM, battery, cables, antenna and mounting kit for fixing to masts. In addition, the 3G-DLC-BX1/SP version includes a 30 W solar panel.

Please note that the logger (ordered separately) has to be mounted outside the modem box. A Data Package is also required to complete the system. To ensure the system meets your needs, please request a quotation before ordering.

3G-DLC-BX1/SP and 3G-BX1/SP Modem Box

Data Packages

To connect to local network services, customers need to purchase a Data Package. Delta-T modem gateways are supplied with a Smart SIM that can connect to multiple network providers, maximising the chance of a stable connection being established. For almost all locations with network coverage, the Smart SIM will be able to make a connection. (Data Packages enable the Smart SIM to connect to specific networks; they do not relate to geographical zones).

Data Packages are supplied in blocks of 120MB; each Package is valid for use for up to 3 years from the date of purchase and line rental is included in the Package cost. To ensure the Data Package is able to access the appropriate networks, please request a quotation, stating the precise location required.

Typical data capacity requirements:

● Weather Station sending 10k data recordings/day – 35 MB per year (typical light usage)

● Weather Station sending 20k data recordings/day – 70 MB per year (typical medium usage)

WS-GP2 Weather Station

DeltaLINK-Cloud
www.deltalink-cloud.com

DeltaLINK-Cloud is a sophisticated and secure online data viewing, management and sharing platform for Delta-T Devices data loggers.

- **Remote data monitoring on mobile devices**
- **Animated live data dashboard graphics**
- **Easy data sharing for collaborative projects**
- **Powerful charting and reporting features**
- **Smart SIM card provided - for easy set-up**
- **Secure and encrypted**
- **Remote management of multiple sites**
- **Multi-language (Fr, De, Es, 中文)**

DeltaLINK-Cloud is an advanced, yet easy to use, online solution that enables remote viewing, management and sharing of sensor data.

The platform allows users to monitor the status of the logger, graph and export the uploaded data and to share access to data with project collaborators/stakeholders.
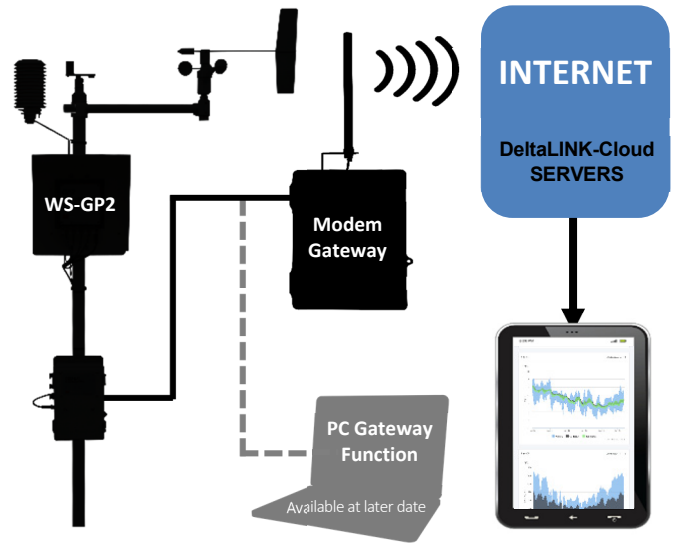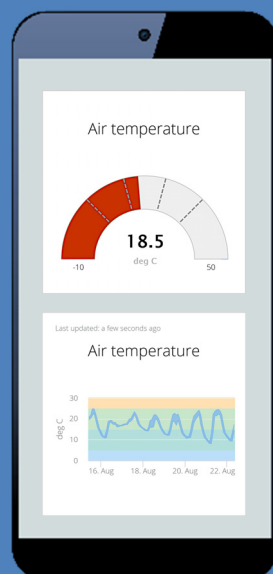
The remote logger control feature and DeltaLINK software enables users to remotely control the program, start or stop logging, modify program settings, set the logger's clock, or delete a dataset - minimising the need for time consuming site visits.

Data generated by the data logger can be charted alone or aggregated and charted for multiple loggers. Charting is customisable and can be saved as reports for future use and then shared via a URL link.

DeltaLINK-Cloud Dashboards

DeltaLINK-Cloud can display data using simple graphical devices known as widgets. Dashboards enable users to control the type, colour and position of widgets, ensuring that critical data is displayed clearly and with maximum impact.

These high quality animated data visualisations transform the ability of teams to identify and respond to trends or incidents, such as a threshold being exceeded. Dashboards are quickly linked to relevant data sources and can be viewed remotely on smart devices, enabling users to view and share real-time sensor data on-screen.

INTERNET
DeltaLINK-Cloud SERVERS

WS-GP2

Modem Gateway

PC Gateway Function
Available at later date

Air temperature
18.5
deg C
-10   50

Last updated: a few seconds ago
Air temperature

Weather Station TESTIMONIALS

"We have two Delta-T weather stations in Kazakhstan that have been working in extreme environmental conditions for many years: +40 to -30 C and dusty."

Prof. T W Tanton
Head of Environmental Research Group,
Southampton University

"Just to let you know that all of the Delta-T Devices weather stations we ordered have been working sweetly and are very durable against extremely strong gusts. A colleague came to visit the other day and now wants to order the same brand."

Shiyu Jiang, Research Assistant
Architectural Science Group,
Cardiff University

"We have 6 weather stations in the field. We ordered another 2 earlier this year. The 6 stations in the field have run constantly for several years and are robust and very reliable. We would have no hesitation in recommending Delta-T as a supplier of weather monitoring equipment."

Mr John Swaney
Scottish Agricultural College

Calculation of full ASCE/FAO 56 Penman-Monteith evapotranspiration equation

The WS-GP2 Weather Station and DeltaLINK Software (versions 3.7 and later) enables the full ASCE/FAO-56 Penman-Monteith equation for calculating reference evapotranspiration (ETo).

ETo is calculated by the GP2 Data Logger using the available measurements of relative humidity, wind speed, solar radiation, and air temperature. This ET implementation includes the ability to vary crop albedo/LAI, canopy resistances, crop height and sensor heights.

The functionality can be easily accessed by users as a selectable recording option within DeltaLINK. Calculated ET can be recorded as hourly and daily values – and may be used in further bespoke calculations or to guide field irrigation decisions.
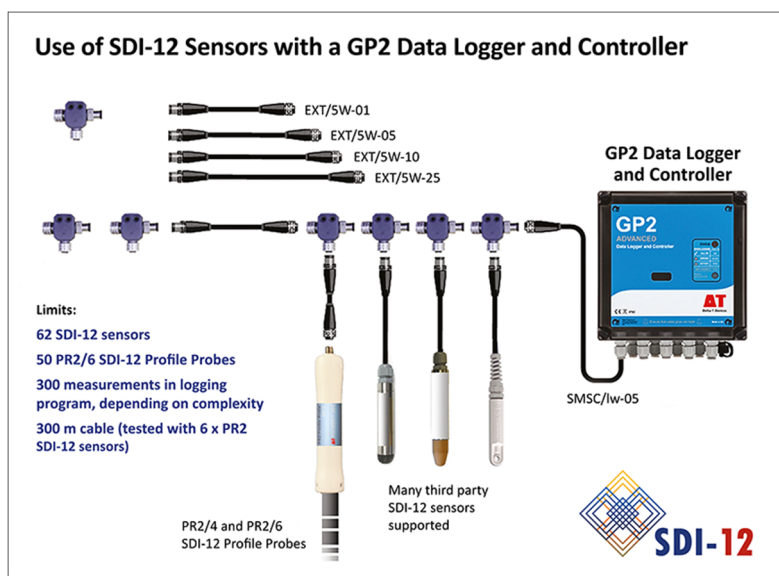
SDI-12 enabled

The GP2 Data Logger comes with SDI-12 capability as standard, which greatly increases the number of sensors that can be added to a WS-GP2 system.

An SDI-12 sensor library containing SDI-12 sensor configurations and installation notes for widely used SDI-12 sensors is available for download from www.delta-t.co.uk.

SDI-12 is seamlessly integrated into the GP2 Program Editor, simplifying the construction of sophisticated calculations and other operations from SDI-12 measurements.

- **Huge additional input capacity for SDI-12 sensors**
- **Existing analog and digital channels remain available ***
- **Highly flexible logger + sensor networks**
- **Easy point and click configuration; firmware handles scheduling and issuing commands**
- **Real time, on-demand readings for diagnostics and reassurance**

* Delta-T WET Sensor channel not available with SDI-12

Use of SDI-12 Sensors with a GP2 Data Logger and Controller

EXT/5W-01
EXT/5W-05
EXT/5W-10
EXT/5W-25

GP2 Data Logger and Controller

Limits:
62 SDI-12 sensors
50 PR2/6 SDI-12 Profile Probes
300 measurements in logging program, depending on complexity
300 m cable (tested with 6 x PR2 SDI-12 sensors)

SMSC/lw-05

PR2/4 and PR2/6 SDI-12 Profile Probes

Many third party SDI-12 sensors supported

WS-GP2 Sensors - Brief Specifications

	Specification	Range / Note
Wind speed AN-WD2 (combined wind sensor)		
Range	0 to 75 m.s^{-1}	
Accuracy	± 0.1 m.s^{-1}	Up to 10 m.s^{-1}
	± 1.1% of reading	Over 10 m.s^{-1}
Starting threshold	0.4 m.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	0.4 m.s^{-1}	-30°C to +70°C if icing minimal
Rainfall RG2+BP		
Sensitivity	0.2 mm 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		
2 m mast	With cross arm, stakes, steel guy wires, baseplate and logger canopy	

GP2 Data Logger - Brief Specifications

	Specification		Range / Note
Analog accuracy	-0.17 to +2.7 V	0.005% + 115 µV	at 25°C
	±23 mV	0.022% + 12 µV	
	-0.17 to +2.7 V	0.04% + 150 µV	-20°C to +60°C
	±23 mV	0.08% + 27 µV	
Accuracy other	See detailed specification in GP2 User Manual		
Readings	2.5 million (approximately)		depends on program settings
Logging frequency	1 s to > 24 hours		
Logging status	Flashing LED		
Environmental	-20°C to +60°C, IP65		
Power	6 AA alkaline batteries or external power 10-15 V DC		
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		
	1 Delta-T WET sensor channel *OR* 1 x SDI-12 digital bus Interface Unlimited virtual channels		