

The **GP2 Data Logger and Controller** is a powerful, weatherproof, research grade data logger with unique features for recording and controlling field experiments.

- 12 differential channels
- SDI-12 capable
- High performance microvolt sensitivity
- Easy to set up and select sensors
- Versatile communication options
- Compatible with DeltaLINK-Cloud data viewing & sharing platform



Overview

The GP2 is a 12 channel field data logger with advanced control capabilities - ideal for demanding research applications and field work. It is weatherproof, rugged, battery powered and comes with 12 differential analog inputs, SDI-12 serial data interface and 2 relays as standard.

For many applications the GP2 is quicker and simpler to set up and install than competitive systems, while still providing access to a rich set of features. It can log most sensor types and accepts voltage, resistance, current, potentiometer, counter, bridge, frequency, SDI-12 and digital state inputs.

The relay outputs can control experiments and applications with exceptional sophistication using the Script Editor.

The GP2 has unique reliability- built on Delta-T's 25 years' experience in designing and manufacturing data loggers.

Flexibility and customisation

The GP2's analog inputs can be fully customised. Each channel can have its own input type and recording parameters. DeltaLINK software gives the user control over recording frequency and units, and provides recording options for sum, total, average, standard deviation, min and max, plus specialised wind options.

Users can add their own custom sensor types to the sensor library, exploiting the GP2's detailed configuration options. The GP2 provides 4 analog input ranges down to microvolt resolution with adaptive auto-ranging, excellent analog accuracy, and configurable sensor power - enabling it to support nearly all analog sensors.

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

Expansion

A GP2-G5-LID Expansion Lid is required if 10 or more cables need to be connected to a GP2 (the standard GP2 Logger has 9 cable glands). The Expansion Lid provides 5 additional general purpose cable glands (see Ordering Information for compatible cable diameters). An Expansion Lid is essential for the connection of analog Profile Probes.

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



The DeltaLINK-Cloud online platform can send live GP2 data to mobile devices in animating dashboard format - see page 19.

Advanced features

Script Editor

The Script Editor creates step by step operations to control simple or complex processes or recording requirements. The sophistication it offers opens up a huge number of potential applications.

- Sophisticated control algorithms
 - create complex and powerful models such as PID (proportional-integral-derivative) control via simple step-by step operation
- No programming language skills are needed
- Custom in-line data processing
 - implement real-time data driven calculations such as dew-point, wind chill factor, evapotranspiration calculation and many more

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. Calculated measurements also allow implementation of custom formulas - including trig functions, common math functions and more.

Simulator

- Test simple or complex conditions, algebraic expressions and record result values
- Create and manipulate variables e.g. for disease risk factor

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.

Your program can be tested against years of data in seconds.

* SDI-12 sensors cannot be simulated.

Sensors / Inputs

- 12 differential (or 24 single-ended) analog inputs configurable as:
 - Voltage
 - Resistance (2-wire or 3-wire)
 - Bridge
 - Potentiometer
 - Thermistor (3-wire)
- 4 digital inputs as:
 - Counters, 2 fast + 2 slow
 - Frequency
 - Digital state
- 62 SDI-12 inputs or a single Delta-T Devices WET Sensor

The GP2 provides a versatile solution for both simple and complex recording and control applications. Simple point and click software makes it easy to configure channel set-up and recording intervals. Delta-T sensors can be selected from a menu.

Dependable quality

The GP2 is rugged, sealed and completely dependable. Its program editor has built-in error checking, and enables the full logger configuration (including advanced features) to be road-tested before activation. Sensor integrity, set-up and connections can also be checked before or during logging by viewing real-time measurements.

Fault tolerance is provided by intelligent statistics (rejecting erroneous sensor measurements), and safety conditions (upper and lower limits on active and rest periods). The relay outputs can be configured as intelligent alarm outputs, and LEDs on the front panel provide a quick visual reassurance that logging is proceeding correctly.

Data storage and power options

Up to 2.5 million readings (typical) can be stored in internal flash memory (4Mb).

The GP2's 6 internal AA batteries are sufficient for ~300k readings. External power (10 - 15 V DC, 2 A) can be connected if required. Delta-T can provide complete systems including enclosures, batteries and solar power (see page 19). An optional mains adapter is also available (type GP2-PSU).

Data collection, logger networks and modem communications

Data can be collected automatically and remotely using DeltaLINK-Cloud via a modem gateway (see page 19). Alternatively, data can be collected manually on-site by laptop via USB/RS232.

Up to 7 GP2 loggers can be networked to create efficient and flexible monitoring and control systems. Networked GP2s share communications and power via an M12 cabling network (see Ordering Information).

Specifications

See page 23



3G-DLC-BX1/SP modern gateway box
(solar panel not shown)



Applications

- Demanding research projects
- Environmental monitoring
- Irrigation control
- PID control
- Soil moisture recording - simple connection to Profile Probes

Control

Up to 6 independent experiments or zones can be controlled and monitored concurrently. Control conditions can range from simple thresholding to sophisticated calculations using the Script Editor. Control parameters (e.g. target soil moisture level) can be adjusted throughout an experiment without interrupting data logging. The number of control relay outputs can be increased from 2 to 6 using the optional Relay Expansion Module.

Ordering Information

GP2 Data Logger Advanced Data Logger and Controller with 12 analog, 4 event, and 2 relay channels, plus 1 WET Sensor channel and SDI-12 interface. Includes DeltaLINK PC Software, USB cable and Quick Start Guide.

Expansion Lid with 5 cable glands type GP2-G5-LID GP2 lid with 5 general purpose cable glands. Each gland accepts either a single cable of 3 mm to 10 mm diam, or 2 cables of 4.5 mm to 3 mm diam (using gland insert). A GP2-G5 Expansion Lid is required if 10 or more cables are connected into the GP2 Logger.

Relay Expansion Module type GP2-RLY Provides 4 extra relay outputs. Increases number of relay channels from 2 to 6.

GP2 Network Power Cable type GP2-NPC For use with GP2-NTP Network T-Piece. Connects to EXT/5W-xx cables to provide power and communications to one or more GP2 Loggers. Length 1 m.

Network T-Piece type GP2-NTP Enables GP2 Data Logger to use M12 network cabling. Connects to EXT/5W-xx M12 cables and to GP2-USB cable.

GP2-PSU Mains Power Supply for GP2 and GP1 Data Loggers Input: 100 - 240 V AC 50 - 60 Hz. Output: 2.5 A, 12 V via screw terminals. Must be protected from weather. Suitable for powering GP2 directly, or via GP2-NPC Network Power Cable. Requires correct IEC mains lead, type PC-UK, PC-EU, PC-US, PC-IN or PC-CN (see below). For GP1 Logger, also requires GP1-RSP-M8 cable.

GP1-RSP-M8 GP1 RS232 and power cable (M8) Combined 1 m RS232 and external power extension cable for GP1. 5-core comms cable terminating in M8 male and female connectors, with 1 m 2-core mains cable. Enables PC serial comms with logger, without interrupting external power supply. Suitable for use with external 12 V battery or with GP2-PSU Mains Power Supply.

Mains lead, national plug to IEC connector types PC-UK, PC-EU, PC-US, PC-IN, PC-CN Connects to GP2-PSU and LBC4 battery.

Mounting Plate type DL-MKT Suitable for GP1, GP2 and DL6. Comprises 320 x 190 mm stainless steel plate and fittings for mounting onto 51 mm tube or flat surface.

Modem Gateways See page 22 for ordering information.

SDI-12 Interface - the GP2's SDI-12 capability enables it to handle large numbers of SDI-12 sensors.

- Huge input capacity for SDI-12 sensors
- Existing analog and digital channels available*
- Highly flexible logger + sensor networks

Ease of Use

- Seamless integration into GP2 Program Editor
- Simple point and click configuration
- Real-time, on-demand readings for diagnostics and reassurance
- Readings from analog and SDI-12 sensors combined in same dataset

Program Editor

DeltaLINK 3.2 (or later) fully integrates SDI-12 functionality into the GP2 Program Editor, facilitating construction of sophisticated calculations and other operations from SDI-12 measurements.

After entering the SDI-12 address and other SDI-12 details, each measurement can feature in Recordings, Custom Formulas, Conditions and Scripts - in exactly the same manner as conventional analog and digital measurements, and without further reference to SDI-12 commands or measurement timings.

Third-party SDI-12 sensors are also supported.

SDI-12 Profile Probes

The SDI-12 Profile Probe is a new digital alternative to the well-established analog PR2 Profile Probe (see page 12). It shares the many strengths of the analog PR2 soil moisture probe, but with the addition of SDI-12 compatibility - allowing integration into new and existing SDI-12 systems.

The SDI-12 enabled GP2 is the natural choice of data logger for the PR2 SDI-12. Up to 50 SDI-12 PR2/6 Profile Probes, or up to 62 SDI-12 PR2/4s, can be connected to a single GP2 SDI-12 Data Logger (subject to cable length and power requirements).

SDI-12 Sensor Library

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. When imported into DeltaLINK, ready-configured SDI-12 measurements can be easily added to a program with a single point and click menu selection.

The SDI-12 library will be continuously updated - please enquire or submit a



SDI-12

request if a sensor of interest is not listed. Users who wish to utilise the full flexibility of SDI-12 devices can generically configure each SDI-12 measurement parameter. An SDI-12 Transparent Mode terminal is provided for directly issuing SDI-12 commands - as required for setting the SDI-12 address, and also for advanced configuration operations such as using SDI-12 extended commands.

Cables and connectors

A field-attachable connector for SDI-12 connects to the rugged Delta-T M12 5-way sensor/RS232 cabling system. The interchangeable extension cables and T-connectors allow an SDI-12 bus to be easily assembled - and also disassembled when diagnosing the cause of SDI-12 bus operation faults. GP2 SDI-12 is compliant with SDI-12 Specification Version 1.3.

The GP2 Logger provides a regulated +12 V, 0.5 A supply, which is switched to optimise power consumption.

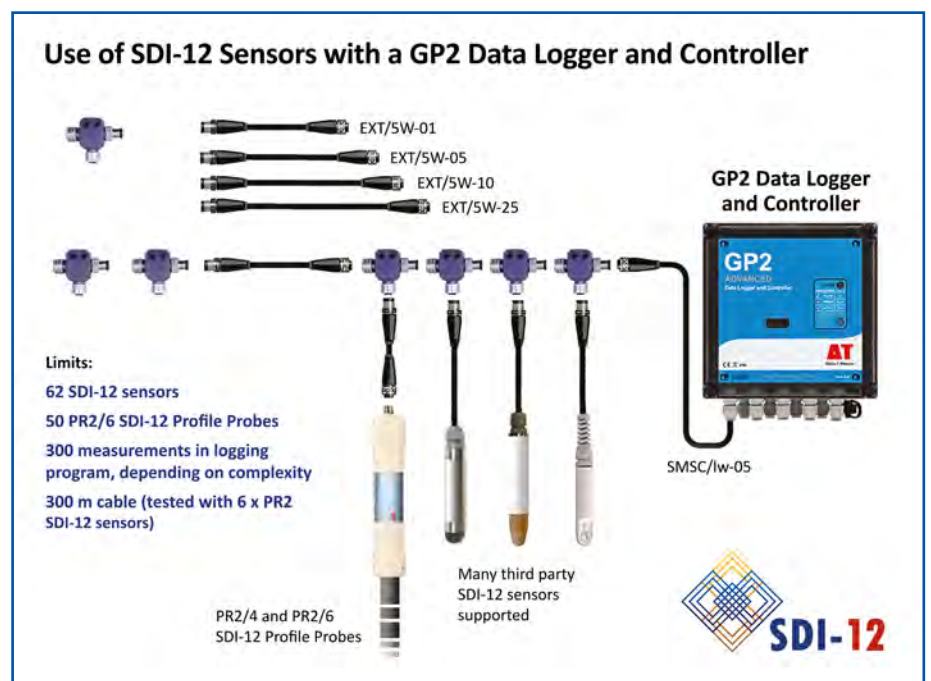
Scheduling

The GP2 firmware takes care of scheduling (including power switching) and issuing the necessary commands to ensure that results are available for the program to process when required. DeltaLINK's 'Read Now' feature provides additional on-demand readings, in real time, for commissioning and diagnostic use - and for reassurance that an installation is functioning as intended.

Upgrading older GP2s to SDI-12 capability

GP2s supplied before March 2016 were not SDI-12 enabled, but can be easily upgraded. The GP2 Logger is already fitted with SDI-12 capable hardware, so the firmware upgrade can be retrospectively applied to all existing GP2 loggers without hardware modification.

To upgrade to SDI-12 simply install the latest version of DeltaLINK software (incorporating SDI-12 firmware upgrade). It is available to download free of charge from the Delta-T website - www.delta-t.co.uk.



* Except for WET Sensor channel

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 their devices, graph and export the uploaded data, share access to data with project collaborators/stakeholders - and use the remote logger control feature to minimise time consuming site visits

The Delta-T GP2, GP1 and DL6 data loggers can all be connected to DeltaLINK-Cloud using the modem gateway. Delta-T modems come with Smart SIM cards that enable us to provide an optimum user experience and support service. Smart SIM cards can connect to multiple providers improving the chance of a stable connection. Data generated by the data loggers can be charted per logger or aggregated and charted for multiple loggers. Charting is customisable and can be saved as reports for future use and shared via a URL link.

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. Device status and errors can also be monitored remotely.

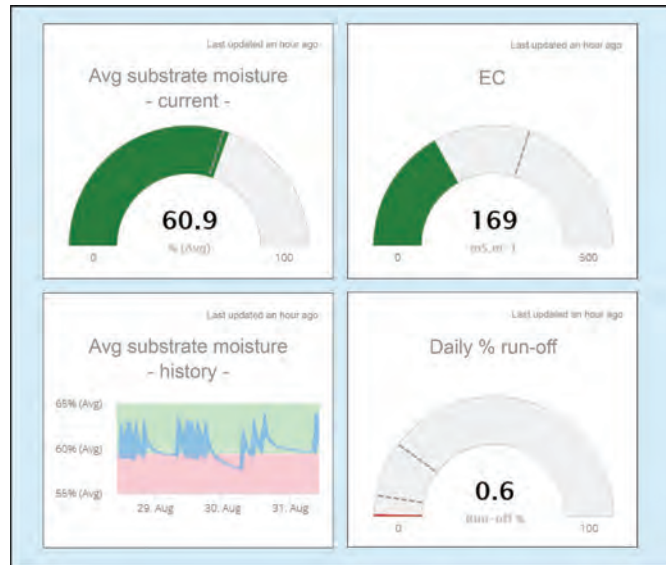
DeltaLINK-Cloud Dashboards

DeltaLINK-Cloud provides display of selected 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 animating 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.

DeltaLINK-Cloud
www.deltalink-cloud.com



Data Dashboards Customisable DeltaLINK-Cloud dashboards provide high impact display of key data (optional at additional cost). Example above created for precision irrigation system.

Remote communications with Delta-T Loggers

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.

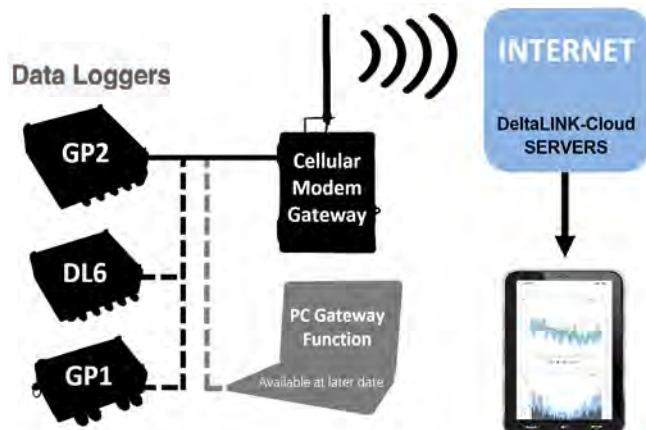
Both systems include an enclosure, battery, quad band modem, smart SIM, battery, cables, antenna and mounting kit for fixing to masts. In addition, the 3G-DLC-BX1/SP version includes a 30W solar panel. Please note that the logger (ordered separately) has to be mounted outside the modem box. A Data Package is also required to complete the system.







Modem gateways and accessories can also be ordered as separate items. This enables users to incorporate the lockable M-ENCL-B2 Enclosure into the system. The M-ENCL-B2 is large enough to house the logger, modem, battery and other accessories. It comes complete with a backplate-mounted 12 V battery wiring system. A Data Package is also required to complete the system.

See page 22 for modem gateway Ordering Information. To ensure the system meets your needs, please request a quotation before ordering.

DeltaLINK-Cloud System



Logger comparison table				
	GP2 	DL6 	GP1 	HH2 Meter 
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 Serial input channel: 62 SDI-12 sensors or a single WET Sensor	6 voltage channels 1 temperature 1 counter -	2 voltage channels 2 temperatures or 2 additional SM150T Sensors ^[3] 2 counters (33 kHz and 50 Hz) 1 WET Sensor	1 water content sensor or 1 WET Sensor - -
Control outputs	2 relay outputs expandable to 6 (1 A)	1 relay (1 A)	1 relay (1 A)	-
Readings stored	2.5 Million	16,000	600,000	1,500
Recording rate	1 second to 24 hours	1 second to 24 hours	1 second to 24 hours	-
Configuration	DeltaLINK	DeltaLINK	DeltaLINK	By keypad
Communication options	USB, RS232, ethernet or modem	USB ^[1] , RS232, ethernet or modem	USB ^[1] , RS232, ethernet or modem	RS232, USB ^[1]
Sensor excitation	Calibrated 3 V reference, +5 V and +12 V regulated, or 5 to 10.5 V (battery or external power), user selectable	1 switched logger power	1 switched logger power 1.5 V precision reference	1 switched battery
Power	6 AA alkaline batteries or external power 10-15 V DC	6 AA alkaline batteries	1.9 V 6LR61 (PP3) alkaline or external power 11-24 V	1.9 V 6LR61 (PP3) alkaline
Battery life^[4] (dependent on usage)	>310k readings, lasting >530 days	>230k readings, lasting >400 days	>76k readings, lasting >130 days	~5k readings
Enclosure rating	IP65	IP67	IP67	IP54
Temperature range	-20 to +60°C	-10 to +50°C	-20 to +60°C	0 to +40°C
Display	-	-	-	2 line x 16 character
Size	225 x 185 x 75 mm	180 x 160 x 70 mm	140 x 105 x 45 mm	125 x 80 x 45 mm
Typical applications	<ul style="list-style-type: none"> • Demanding research projects • Environmental monitoring • Varied control applications 	<ul style="list-style-type: none"> • Monitoring soil moisture profiles • Controlling irrigation 	<ul style="list-style-type: none"> • Monitoring soil moisture • General data logging • Controlling irrigation 	<ul style="list-style-type: none"> • Instantaneous reading of soil moisture / profiles / WET Sensor

Sensor compatibility (maximum number of sensors that could be connected ^[2])				
	GP2	DL6	GP1	HH2 Meter
ML3	✓ (6) with temp / (12) without temp	✓ (1) with temp (5) excl. temp	✓ (2) with temp ✓ (4) excl. temp ^[3]	✓ without temp
SM150T	✓ (6) with temp / (12) without temp	✓ (1) with temp (5) excl. temp	✓ (2) with temp ✓ (4) excl. temp ^[3]	✓ without temp
PR2	SDI-12	(50) PR2/6 (62) PR2/4	-	✓
	Analog	(2) PR2/6 ^[5] (3) PR2/4 ^[5]	(2) PR2/6 (3) PR2/4	✓
WET Sensor	✓ (1)	-	✓ (1)	✓
EQ3	✓ 6 with temp / 12 without temp	✓ (1) with temp (5) excl. temp	✓ (2 as mV only)	✓ (mV only)
Temperature	✓ (12)	✓ (1)	✓ (2)	-
Tensiometers	✓ (12)	-	✓ (2) each requires GP-PBA-X50	-
Counters or Events	✓ (4) 2 fast 2 slow	✓ (1)	✓ (2) 1 fast 1 slow	-
Relay output	✓ (2) expandable to (6)	✓ (1)	✓ (1)	-

[1] With USB to RS232 Adapter Cable type USB-RS232.

[2] With appropriate expansion cards and power supply arrangements.

[3] Temperature channels provide only single-ended inputs so should not be used with long cables or in noisy environments when used with soil moisture sensors. The accuracy figures quoted for GP1 soil moisture readings do not apply to these resistance channels when configured as soil moisture inputs.

[4] Battery life is based on recording the soil moisture and temp outputs from 2 x SM150T Sensors logged every 10 minutes. NB: For the DL6 Logger, data storage may be the limiting factor rather than battery life.

[5] Requires GP2-G5-LID Expansion Lid for analogue PR2