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Find the *Delta-T Devices GP1* at our website: *Click HERE*

GP1 Data Logger

Compact Research-Grade Logger with Differential Voltage Channels, Versatile Relay Channel, Temperature and Counter Channels and WET sensor serial data channel

Quick Start Guide *v4.0*



Delta-T Devices Ltd

Unpacking

The GP1 package contains:

- GP1 Logger (with 9V alkaline battery fitted)
- GP1 to PC serial cable
- DVD with DeltaLINK-PC software and documentation
- This GP1 Quick Start Guide
- Screwdriver and optional security screws (to replace thumb screws)

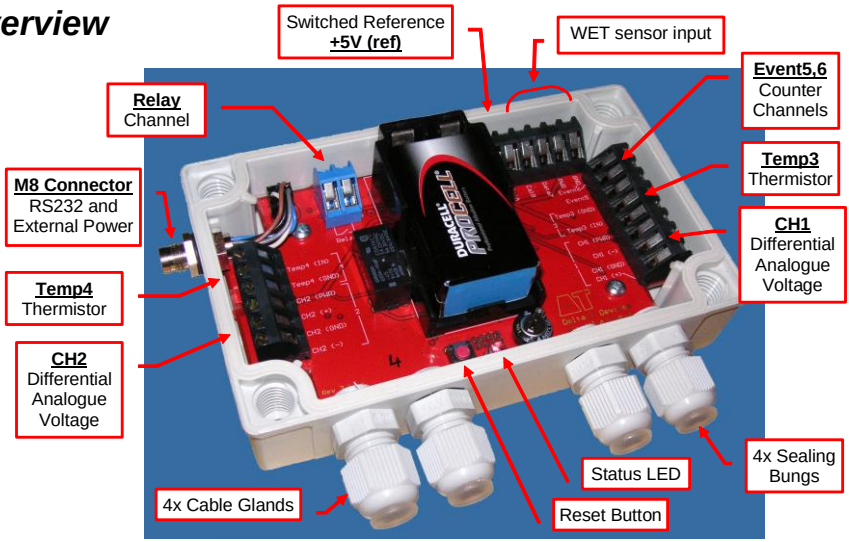
The following accessories are available:

- GP1 Mounting Kit (GP1-MP1) – *stainless steel mounting plate with fittings*
- External power cable (GP1-RSP-M8 or GP1-RSP-D)) – *to power GP1 from 12V to 24V DC*
- Network cabling and connectors – *for networking up to 10 GP1, DL6 or GP2 loggers*
- Annual maintenance kit (GP1-AMK1) – *contains battery, desiccant, M8 connector cover, etc*
- GPRS Modem System – *for remote data collection from GP1, GP2 and DL6 loggers or connection to DeltaLINK-Cloud.*
- Precision Bridge Adapter (GP1-PBA-x50) - *for tensiometers and bridge sensors*

The following sensors are supported:

- Temperature sensor – *±0.2^{0}C 10k thermistor* with 5m lead (ST4-05), 10m lead (ST4-10)
- SM150 Soil Moisture Sensor – *four total may be fitted*
- SM150T, SM300 and ML3 Soil Moisture Sensor – *two total may be fitted*
- BF3 Sunshine Sensor (BF3) or SPN1 Sunshine Pyranometer (SPN1)
- Rain gauge (RG1 or RG2)
- WET sensor (WET-2) - *one may be fitted*
- Tensiometer (SWT4 & SWT5) - *two may be fitted, require GP1-PBA1 adapters*
- Equitensiometer (EQ2 & EQ3) two may be fitted

Overview



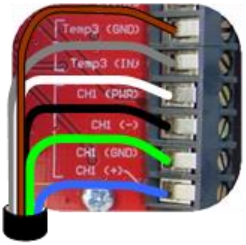
The GP1 has seven input and one output channel: two differential analogue voltage channels, **CH1** and **CH2**; two temperature/resistance channels, **Temp3** and **Temp4**; event counter channels, **Event 5**(fast) and **Event 6**(slow), a serial input channel for one **WET** sensor and a relay output channel **Relay.**

Sensor Wiring

SM150T, SM150, SM300 and ML3 soil moisture probes:

Connect to channels CH1+Temp3 or CH2+Temp4 as follows:

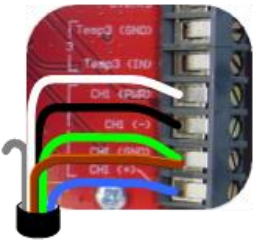
CH1/2 (+)	Blue		Signal HI
CH1/2 (--)	Black		Signal LO
CH1/2 (GND)	Brown		Power 0V or Temp(GND)
	Green		Screen
CH1/2 (PWR)	White		Power V+
Temp3/4 (IN)	Grey		Temperature +



Note: Ensure any pre-fitted wire link is removed between (-) & (GND)

Two more SM150T, SM150, SM300 or ML3 sensors can be added, to Temp3 and/or Temp4 channels to measure soil moisture - if temperature readings are not required[1]:

Temp3/4 (IN)	Blue		Signal HI
Temp3/4 (GND)	Black		Signal LO
CH1/2 (GND)	Brown		Power 0V
	Green		Screen
CH1/2 (PWR)	White		Power V+



Other voltage Sensors:

Connect to channels CH1 or CH2 as follows:

CH1/2 (+)	+ve sensor output
CH1/2 (--)	-ve sensor output
CH1/2 (GND)	Braid or screen, if required Switched power to sensor -ve, if required Link to CH1/2 (--) if the sensor output is single-ended
CH1/2 (PWR)	Switched power to sensor +ve, if required

10K, 2K Thermistor Temperature probes (e.g ST1) and Resistance sensors



Connect to (IN) and (GND) terminals of channel Temp3 or Temp4.
Connect any braid or screen to the (GND) terminal if required.
Note: connection polarity is not important when using thermistors or rain gauges.

BF5 Sunshine sensor and SPN1 Sunshine Pyranometer

See **BF5** and **SPN1 User Manuals**, **Quick Starts** and DeltaLINK programs.

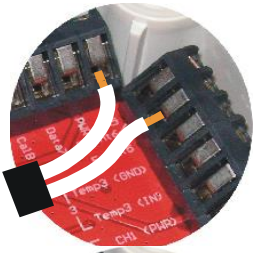
WET sensor

See **WET GP1 Logging Quick Start** installed on your PC under **DeltaLINK, Help, Document Library, GP1 and DL6** or download it from **www.delta-t.co.uk.**

[1] Note: single -ended connection in temperature channels

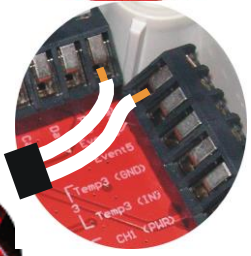
Fast event channel (Event5)

Use **Event5** to monitor fast switch closures or pulses - up to 32 kHz, such as a flow meter.
A flow meter is shown connected to **Event5** and **GND**.



Slow event channel (Event6)

Use Event6 to monitor slower switch closure or pulses (<50Hz) such as a rain gauge.
A rain gauge is shown connected to **Event6** and **GND**.



Note: To conserve battery life use **Event5** for high speed event monitoring, and **Event6** for slow events.

Relay channel

The **Relay** channel is an open/close switch (default condition open). The channel is protected with a resetting poly-fuse and can switch up to 1A.

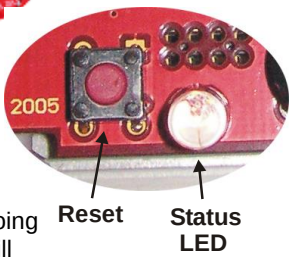


Status LED

Two flashes per ten seconds means the GP1 is logging.
Four flashes in a group indicates an error.

Reset Switch

In the unlikely event of the logger locking up, briefly press the **Reset** button.



After pressing **Reset,** 4 LED flashes indicate that the GP1 is doing a **warm reset**. Program and data are preserved and logging will resume.

Hold **Reset** for more than 5 seconds to initiate a **cold reset**.
The status LED will flash four more times.
Cold reset restores the factory-set default program and deletes all data.

Analogue Channel Considerations

The differential analogue channels accept signals nominally 0 to 2.5V, with a full signal range of -0.2 to +2.7V. Both analogue channels have a (PWR) connection to allow the switched powering of sensors. Sensors can be powered with an adjustable warm-up time prior to taking sensor readings. Power up times in multiples of 1 second are permitted. The (PWR) connections supply sensors with a switched unregulated battery voltage. Sensors requiring a regulated supply may be powered from the switched **+5V (ref)** terminal.

Ensure each voltage input on the (+) or (-) terminals is kept within the permitted input voltage limits (-2.8V to +3.6V relative to logger GND). If powered sensors are not powered by the GP1, ensure these limits are not exceeded. The input signal may need to be referenced to the logger ground. If the signal is floating then fit a 10k resistor between the (-) and (GND) terminals.

Install DeltaLINK-PC

To operate the DeltaLINK software for the GP1 logger you need:

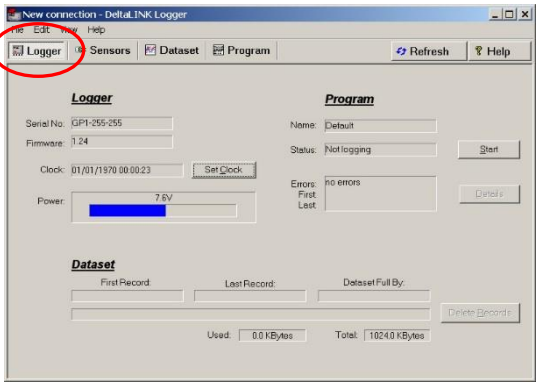
- A PC running Windows 10, 7, XP or Vista
- Microsoft Excel 97 or later for the Excel Dataset Import Wizard
- One free RS232 serial port, or USB-RS232 adapter
- Delta-T Software and Manuals DVD (supplied with GP1) plus DVD reader for software installation (or download at www.delt-t.co.uk
- 50MB of available hard disk space
- GP1 to PC RS232 cable (supplied with GP1)
- Acrobat Reader for reading documentation (free download from www.adobe.com)

1. Insert the Software and Manuals disk into your CD ROM.
2. Select the **Install DeltaLINK 3.6** (or later) link in the Contents page of the Software and Manuals DVD and follow the on-screen instructions.
3. Setup creates a desktop shortcut to **DeltaLINK-PC**, and puts a **Firmware Upgrade** program, a **GPRS Config Utility** and a **Document Library** folder in the DeltaLINK-PC program group.
4. Check the **Release Notes.pdf** in the **Document Library** for latest information.

Start DeltaLINK-PC

1. Connect the GP1 to the PC's serial port (preferably COM1) using the supplied GP1 to PC serial cable[2].
2. Double click on the DeltaLINK icon on the desktop.
3. DeltaLINK attempts to connect to a logger. If successful, DeltaLINK shows information about it in the Logger window.
4. DeltaLINK attempts to use COM1 when first installed.
5. If the connection fails because the GP1 is connected to a different serial port, select **File, Properties**. Click **Add...** to connect to the correct port.





Online Help

Click **Help** from any DeltaLINK window (or press F1) for detailed information about DeltaLINK operation and functionality.
Select **Start**, **Programs**, **DeltaLINK-PC**, **Document Library** to open a folder of application notes and technical documents.

DeltaLINK Cloud

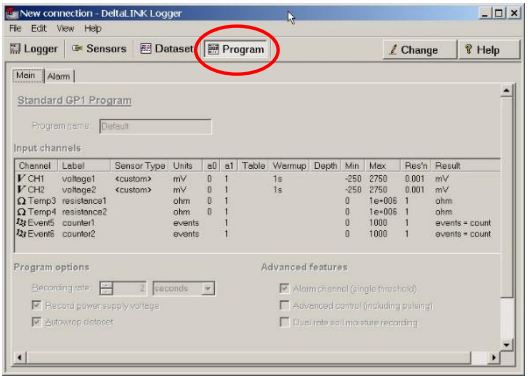
To use our free Cloud service see http://www.delta-t.co.uk/deltalink-cloud/

DeltaLINK-Cloud
www.deltalink-cloud.com

[2] Note: you can also communicate with the GP1 using a modem, see **GPRS Quick Start Guide**.

Program the GP1

1. Select the **Program** window. For a new logger, this will show the GP1's factory-set 'Default' program. Click **Change** to enter your own program settings and name.
2. Right-click the **Input Channels** list to select a sensor type from a popup menu, or select **Edit, Channel** and from the popup menu customize a sensor's properties.
3. Click the **Advanced Features** options to add or remove **Alarm**, **Control and Dual Rate** pages, and enter details in these pages, as required.
4. Click **Apply** to install a modified logging program into the logger.



Pre-configured Programs

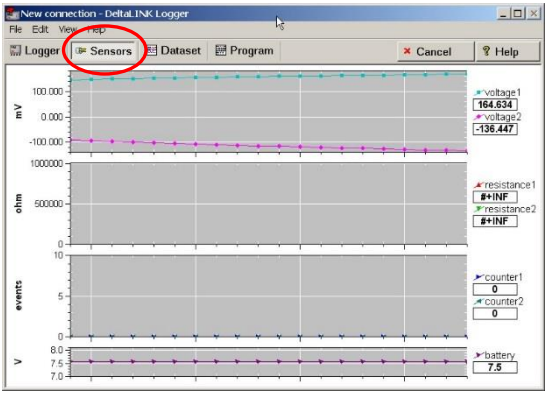
Several pre-configured programs are provided. To use these select **Edit, New Program**, and select one of the pre-configured GP1 program types.
See the online Help for additional details:

- **GP1 Irrigation Monitor and Switch** – for simple irrigation monitoring and control
- **SPN1 and BF3 Sunshine Recorder** – for recording integrated solar radiation
- **WS-GP1 weather station program** - available only on loggers preconfigured at Delta-T as part of a WS-GP1 weather station

Click **Apply** to install the modified logging program into the GP1 logger.

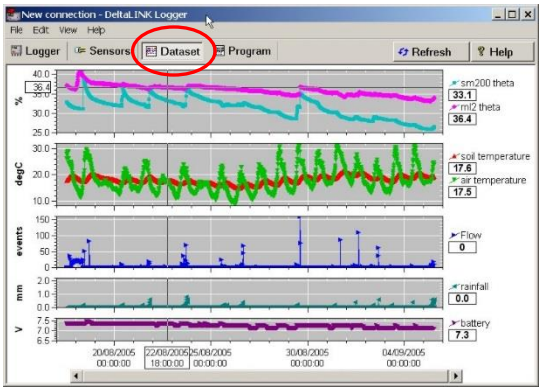
Check Sensor Operation and Start Logging

1. Select the **Sensors** window and click the **Read now** button. The sensor readings will continually refresh on a scrolling time graph.
2. Observe the sensor reading display in the scrolling charts and value panels while adjusting sensor wiring and/or installation conditions.
3. Click the **Cancel** button when finished.
4. Once sensors are setup select the **Logger window** and click **Start** to commence logging.



Retrieve, View and Save Logged Data

1. Select the **Dataset** window. All stored data in the logger will be retrieved and displayed on the screen (it may take a few seconds to upload the data). Click **Refresh** if required.
2. Select **File, Save** to save the data to a dataset file.
3. Select **File, Open** to open and view a dataset file which you have previously saved.
4. To save a dataset file as a ASCII file for importing into other programs, open the file in DeltaLINK, and select **File, Save As…** selecting the appropriate file type to save.

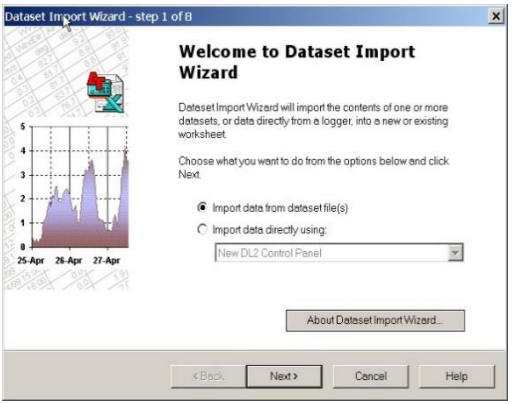


Dataset Import Wizard

Dataset Import Wizard helps you seamlessly import data into MS Excel spreadsheets. Multiple dataset files may be imported and the data interleaved.

To Install Dataset Import Wizard:

1. Select , **All apps**, **Dataset Import Wizard**, **Install Dataset Import Wizard**.
2. If prompted by Excel, select Enable Macros. Note: Excel's security settings must allow macros to run: refer to Excel Help.
3. Dataset Import Wizard will report that it has installed successfully, and will add the Import Dataset(s) to the File menu.
4. To Start Dataset Import Wizard: Start Excel, select **Add-ins, Import Dataset(s)** from the menu, and follow the on-screen instructions.



Note: Prior to Excel 2007, Excel permitted 65,000 rows of data. The GP1 memory can exceed this. If so, either update Excel, or import the data into multiple worksheets.

Custom Sensor Support

DeltaLINK supports the use of custom sensor linearisation tables for using custom sensor types. Refer to the **Document Library** folder for detailed instructions.

GP1 Specifications

		Typical at +20°C	Max -20°C to +60°C	Note
Differential Voltage Channels	Voltage Accuracy	±(0.3mV+0.01% reading)	±(1.6mV+0.05% reading)	over full -0.2V to +2.7V voltage range
	Soil Moisture Accuracy	±0.06%θ (±0.0006 m3/m3)	±0.3%θ (±0.003 m3/m3)	for ML3, SM150 or SM300 (0 - 60%θ) [1]
	Resolution / Input Noise	±0.1mV		effective resolution of readings (typical)
	Input Voltage Range	-0.2 to + 2.7V		
	Input Voltage Limits	-2.8V to +3.6V [2]		each input signal relative to logger GND
Temperature Channels	Temperature Accuracy	±0.07°C	±0.1°C (with GP1 below 30°C if reading -20 to 0°C)	using 10k thermistor (-20 to 60°C) [1]
	Resistance Accuracy	±0.2% of 2 to 100kΩ reading (±0.3% max.)	±0.5% of 2 to 20kΩ reading	
Event Counters	Event counter (Event6)	<50Hz, contact closure or pulse/logic inputs		logic low input <1V, logic high input >1.9V
	High speed counter (Event5)	<33kHz, pulse/logic. <100Hz, contact closure		maximum of ±14V on Event5&6 terminal
Power	Internal Battery Life	1 year typical (alkaline)		9V PP3 battery [3]
	External Power	11 to 24V DC		power via external M8 connector
	Switched Sensor Power	up to 120mA; >10V if external power >13.8V		switched battery or external power
	+5V Reference	5V ±0.6%	5V ±1.6%	switched voltage reference, up to 50mA
Relay Channel	1 x Relay	SPST, <30V DC or <24V AC, 1A resettable fuse		separate ON/OFF conditions adjustable ON duty cycle
Data recording	Logging frequency	1 s to 24 hr		user configurable logging frequency
	Sensor warm-up	multiples of 1 second		user configurable sensor warm-up times
	Internal Flash Memory	>600k readings, typical		non-volatile flash memory
	Communications	RS232 (115kbaud)		comms via external M8 connector
Physical	Environmental	water resistant to IP67		4 cable glands, connector & case
	Size and weight	140 x 105 x 45mm, 280g		including battery
	Temperature	-20 to +60°C		

[1] GP1 accuracy only, NOT including sensor errors
[2] Common Mode Rejection (CMRR) >66dB (78dB typical)
[3] 2x ML2 ThetaProbes with 1 second warm-up, 2x 10k thermistors, and rain gauge, logging once per hour continuous

Product Care and Maintenance

The **battery** can be changed quickly without losing program settings or data, but no additional data will be logged while the battery is removed. Change the battery if the voltage indicated on the **Logger** window of **DeltaLINK** is under 5.5V or below the supply voltage needed for sensors.

Use of rechargeable or zinc-chloride batteries is not recommended.

Two 1g bags of **desiccant** under the PCB protect the logger from condensation. Replace with fresh desiccant GP1 annually to ensure continued logger accuracy and reliability. Keep the cover on and cable glands sealed except when connecting sensors or changing the battery.
Annual maintenance kit (GP1-AMK1) contains desiccant, a replacement battery, spare M8 connector cover cap & lanyard, and spare sealing bungs.

Legal Notices

Please read **Product Usage.pdf** in the **Document Library** folder.
The GP1 product is CE compliant, conforming to EN61326 (1997). This device complies with part 15 of the FCC rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, (2) this device must accept any interference received, including interference that may cause undesirable operation.

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