Delta-T Devices

www.delta-t.co.uk

Soil Moisture Measurement

The **DL6 Data Logger** is optimised for use with Delta-T soil moisture sensors.

- High accuracy 8 channel data logging
- Ideal for Profile Probes, ThetaProbes and SM150Ts

Overview

The DL6 can record data from:

- 6 Soil water content sensors (or other analog voltages)
- 1 Temperature sensor
- 1 Pulse counter (e.g. rainfall)

The DL6 can be used with combinations of ThetaProbes, SM150Ts and Profile Probes as well as a temperature sensor and raingauge. It is well suited to both research applications and environmental monitoring.

Applications

- Monitoring soil moisture
- Profile Probes

Brief Specification (full spec on page 23)	
Voltage range	-0.01 to +1.15 V differential
Accuracy	± 0.3% ± 0.3 mV
Resolution	0.2 mV
Temperature	± 0.4°C
Pulse counter	50 Hz max
Relay output	<25 V DC/AC, 1 A fuse
Sensor excitation	Switched battery 5 to 9 V, 120 mA max
Reading storage	16,000 non-volatile
Connections	8 cable glands, 8-way PR2 connector, RS232 connector
Environmental	Waterproof (IP67)-10 to +50°C
Size, weight	180 x 160 x 70 mm, 830 g
Battery type, life	6 alkaline AA cells, ~1 year

Ordering Information	
DL6	Data Logger with DeltaLINK-PC software and RS232 cable.
DL-MKT	Mounting Plate 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.
USB-RS232	As page 21.

Modem Systems for Delta-T Data Loggers - enabling access to DeltaLink-Cloud

Ordering Information

3G Modem Gateway - Complete Systems with Pre-assembled Modem Boxes

A choice of 2 modem box solutions for 3G communications - one with battery and solar power, the other with just a battery. Please note that the logger (ordered separately) has to be mounted outside the modem box - on a mast pole for example.

Typical application: provides "plug-and-play" modem communications and (if ordered) solar power to Delta-T Weather Stations. Easy set-up.

Order code and description	Solar power
3G-DLC-BX1/SP 3G/2G Modem Gateway Box with Solar Power and Smart SIM Solar powered 3G/2G Modem Gateway box with battery and Smart SIM. For use with GP2, GP1 and DL6 Loggers*. Includes 3G/2G quad band modem with 30 W solar panel, solar regulator, Smart SIM, 10 Ah sealed lead acid battery, and 1 m comms and power extension cable. Supplied with mounting bracket for solar panel and mounting kit for fixing modem box to tubular masts or poles (42 - 51 mm diameter). Includes antenna with mounting bracket/ground plane and 5 m coaxial cable. NB: Mounting pole/mast and data package must be ordered separately (see below).	✓
3G-DLC-BX1/B 3G/2G Modem Gateway Box with Battery and Smart SIM 3G/2G Modem Gateway Box with battery and Smart SIM. For use with GP2, GP1 and DL6 Loggers*. Includes all items in 3G-DLC-BX1/SP system, except for solar power items.	✗

* Modem Boxes for use with a GP2 or DL6 logger require an additional cable to be ordered. For GP2, order GP2/GP1-M8 cable. For DL6, order GP1/DL6-M8 cable.

3G Modem Gateway - Flexible Standalone Options

3G modem gateway standalone options for use with GP2, GP1 and DL6 Loggers. Can be installed in M2-ENCL-B2 Enclosure or other suitable enclosure (metal only).

Typical application: adds modem communications and (if ordered) solar power to a Delta-T Logger and sensors system, or to a WS-GP2 Weather Station. Enclosure provides security for logger, battery and modem and enables system expansion and customisation.

Order code and description	Solar power	Enclosures
MD-3G-DLC 3G/2G Modem Gateway for GP2, GP1 and DL6 Loggers Quad band 3G/2G modem (requires protection from weather). Supplied with Smart SIM installed. Includes antenna with mounting bracket/ground plane and 5 m coaxial cable antenna must fitted onto a metal enclosure). NB: Mounting pole/mast, enclosure, battery, solar power and Data Package must be ordered separately.	Add SOL4-KIT2 and LBAT4, if required	Requires M-ENCL-B2
M-ENCL-B2 Enclosure and 12 V wiring kit Lockable IP53 steel enclosure for mounting onto Delta-T poles and masts. Includes backplate mounted 12 V wiring system, trunking and 12 cable glands (as standard, more available on request). Dimensions 500 (h) x 400 (w) x 250 (d) cm. The cost of the enclosure includes the fitting and partial pre-wiring of logger power supplies and modems ordered at the same time.	Add SOL4-KIT2 and LBAT4, if required	-
SOL4-KIT2 Solar powered charging system 30 W solar panel with mounting kit, regulator and cabling.	Requires LBAT4	Requires M-ENCL-B2
LBAT4 10 Ah Rechargeable lead acid battery With spade terminals. Requires protection from weather.	-	Requires M-ENCL-B2
LBC4 Charger for LBAT4 battery For indoor use only	-	-

Data Packages
Provide access to 3G/2G services worldwide

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. (The Delta-T MD-GPRS-DLC Modem is supplied with a Smart SIM that can connect to multiple 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).

Mountings and Support Poles
Enable convenient and secure access to hardware

The Modem Gateway Systems and the M-ENCL-B2 Enclosure are designed to be attached to a Delta-T mast or support pole. However, some customers may prefer to provide their own mountings (requires tubular mast/pole 42-51 mm diameter). In the case of the M-ENCL-B2, it is also possible to mount it on a suitable wall or fence. If the modem enclosure is located in a weatherproof area with mains power available, the modem and GP2 can be powered by a GP2-PSU mains power supply (see page 17 for details). To ensure you are supplied with a complete and compatible system we strongly recommend that you request a quotation, providing as much information as possible about your requirements.

DL6 Logger & Logger Comparison

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)	6 voltage channels	2 voltage channels	1 water content sensor or 1 WET Sensor
		1 temperature	2 temperatures or 2 additional SM150T Sensors [3]	
	4 digital inputs as: Counters, (2 fast + 2 slow), Frequency, Digital state	1 counter	2 counters (33 kHz and 50 Hz)	
	1 Delta-T WET sensor channel			
	Serial input channel: 62 SDI-12 sensors or a single WET Sensor	-	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	• Demanding research projects • Environmental monitoring • Varied control applications	• Monitoring soil moisture profiles • Controlling irrigation	• Monitoring soil moisture • General data logging • Controlling irrigation	• 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