
User Manual

Soil Moisture Logger Type DL6



DL6-UM-1.3



Delta-T Devices Ltd

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CE conformity

See page 35

Author

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Versions

User Manual Version: 1.3 Nov 04

It is intended for use with the following:

Windows PC DL6 Control Panel software version 1.50,

Pocket DeltaLINK software version 1.50

DL6 logger serial numbers DL6 03-06 or later.

These latest versions add support for PR2 Profile Probes and the Pocket PC.

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Introduction

This manual describes how to use the DL6 Soil Moisture Logger.

What it measures

Up to six soil moisture sensors, plus one temperature and one rain gauge reading can be recorded on 8 channels. Up to 16000 sets of readings can be stored.

It can read various combinations of soil moisture sensors, e.g. six ThetaProbe sensors (types ML1, ML2 & ML2x) or one 6 channel Profile Probe (type PR2 or PR1) or one 4 channel Profile Probe plus two ML2 sensors.

It can read one 2k thermistor temperature sensor and one tipping bucket type rain gauge.

What it is used for

It can record soil moisture over a few hours, days or months.

It can signal low or high soil moisture or temperature via an alarm output.

It can be used to monitor the effectiveness of irrigation or rainfall.

A fast logging mode is provided to capture soil moisture changes and soil wetting fronts following rainfall events.

Advantages

Easy to use PC and Pocket PC software.

Cost effective, optimised to work with Delta-T soil moisture sensors and designed specifically to help soil moisture monitoring.

Weatherproof socket for PR2 Profile Probe cables simplifies connection.

What's New?

This version of the DL6 adds support for PR2 Profile Probes and also includes Pocket PC to simplify programming, inspection and data collection in the field.

See also: Versions on page 2.

Hardware Installation

Unpacking

You should have the following:

Part		Sales Code	Description
Logger		DL6	Soil moisture Logger with battery, software, RS-232 cable and this manual
DL6 Software		DL6-SW1	Windows software on CD
Serial Cable		DL6-RS232	4-way IP67 connector to 9 pin D connector. Length 2m.

Your consignment may also have some or all of the following

Mounting Kit		DL6-MKT1	1m stainless steel post, mounting plate, bolts, nuts, screws, cable ties
Spares Kit		DL6-SP	Includes: fuse, desiccant, battery holder, cable glands, bungs and O rings
Spare alkaline batteries		DL6-BAT	6 x AA alkaline cells *
Spare Lithium batteries		DL6-ELB	6 x AA lithium cells *

* see Batteries on page 30.

Flashing LED

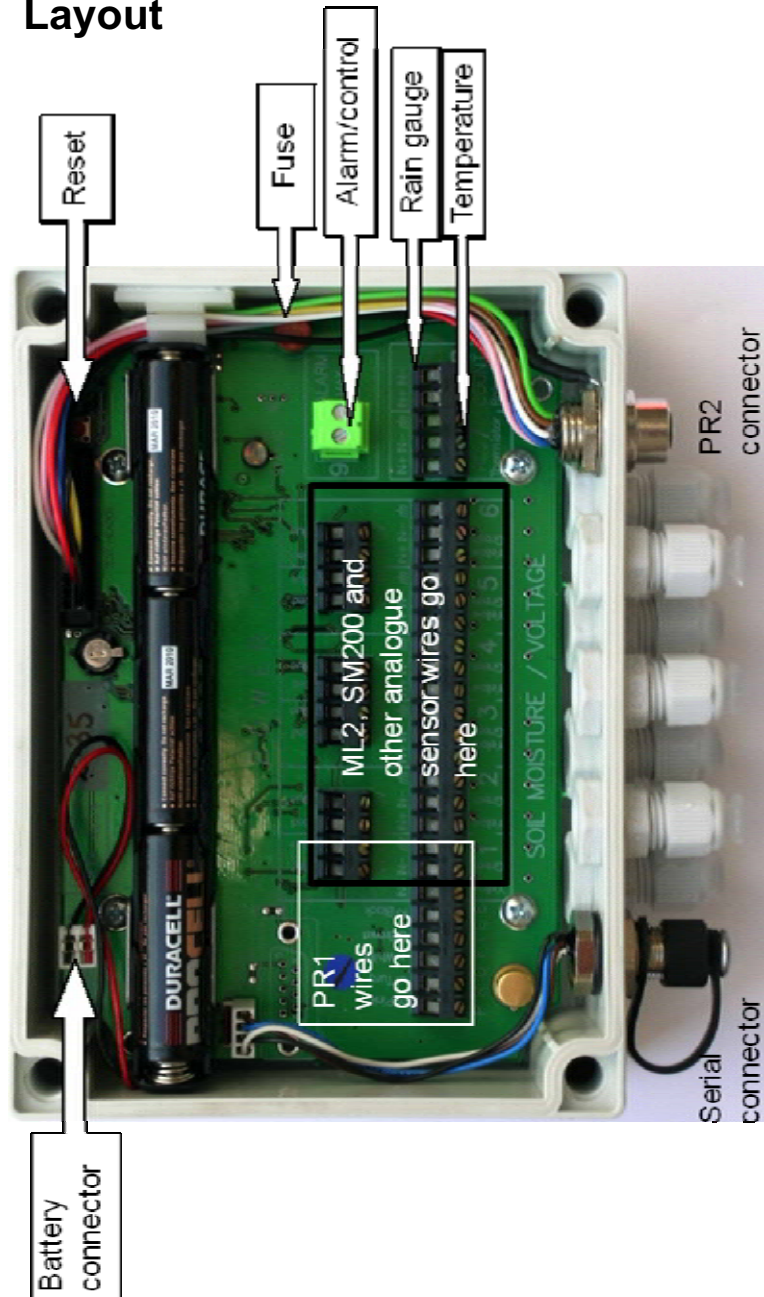
Tap the Logger - the LED should flash.

It will not flash or communicate if the battery is low or if a program is not installed.

Logging	Error	Sequence	Meaning
No	No		The logger is not logging. There is no error.
Yes	No		The logger is logging. There is no error.
No	Yes		The logger is not logging. There is an error.
Yes	Yes		The logger is logging. There is an error.

Note: The logger also flashes when it resets.
See: Reset the Logger on page 32.

Layout



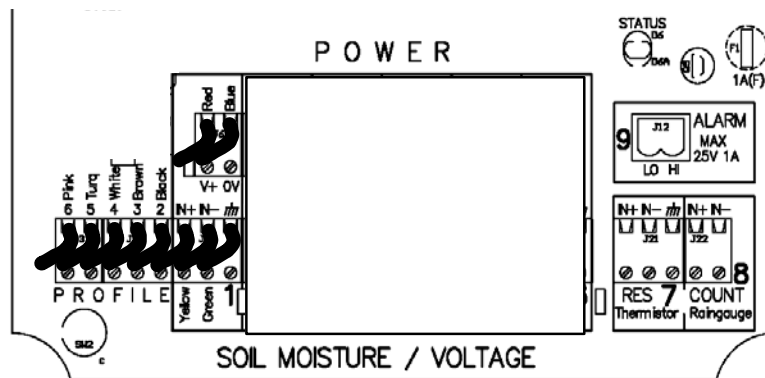
Connecting sensors

Warning: If using screw terminals strip 1cm of bare wire - less than this risks making a poor contact.

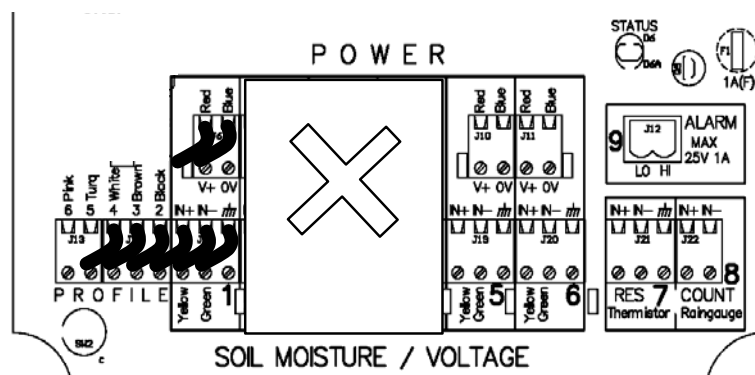
Profile Probes

Profile Probe PR2/4 and PR2/6: Use the connector provided.
Do not connect any other sensors to channels 1-4 or 1-6 respectively.

Profile Probe PR1/6: Connect to channel 1, PROFILE and POWER terminals according to the colours printed beside the terminals. Do not connect any other soil moisture or voltage sensors to channels 1 to 6.

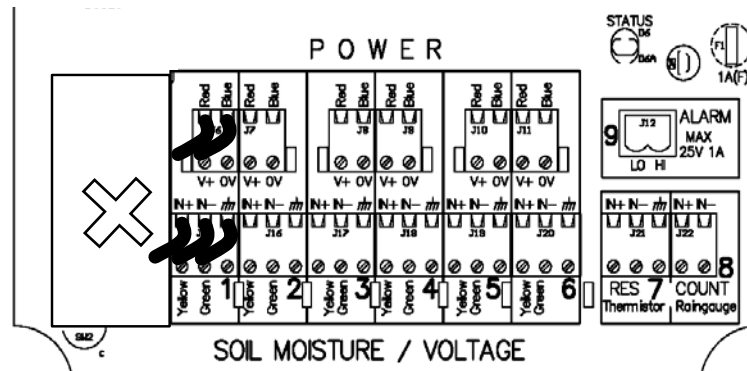


Profile Probe PR1/4: Connect to channel 1, PROFILE and POWER terminals according to the colours printed beside the terminals. Connect additional soil moisture or voltage sensors to channels 5 and 6 if required. Do not connect other sensors to channels 1 to 4.



ThetaProbe ML2, ML2x & ML1

Connect up to 6 ML2s to channels 1 to 6 and POWER terminals according to the colours printed beside the terminals.



The diagram shows one ML2 connected to channel 1.

Other voltage sensors

Connect to channels 1 to 6 and POWER terminals as follows:

IN+	Signal HI
IN-	Signal LO (see note *)
///	Braid or screen, if required
V+	Power V+, if required
0V	Power 0V, if required

Note: To avoid ground loops, connect Signal LO to /// if and only if the sensor output is electrically isolated from both /// and 0V.*

2k thermistor probes (e.g. ST1)

Connect to channel 7 IN+ and IN-. Connect any braid or screen to the /// terminal if required

Resistance sensor

Connect to channel 7 IN+ and IN-. Connect any braid or screen to the /// terminal if required.

Rain gauge (e.g. RG2)

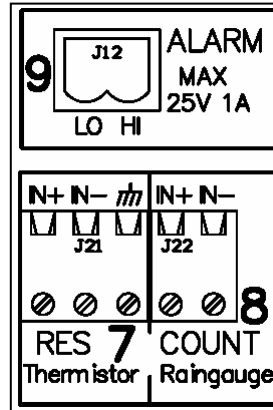
Connect to channel 8 IN+ and IN- terminals. Connect any braid or screen to the /// terminal (channel 7) if required.

Pulse output sensor

Connect to channel 8 IN+ and IN-. Connect any braid or screen to the /// terminal (channel 7) if required.

Alarm output

Connect to channel 9 HI and LO



Note: The alarm output switches only when the logger reads an analogue sensor e.g. soil moisture or temperature.

Software

Software Installation

Items required

To operate the logger from your PC you need the following:

1. A PC running one of the following:
Windows 95 + Internet Explorer 5.0 or later,
Windows NT 4.0 + SP6 + Internet Explorer 5.0 or later,
Windows 98,
Windows ME,
Windows 2000, or
Windows XP
2. Microsoft Excel 97 or later is required for the Dataset Import Wizard.
3. One free 9-way RS232 serial port.
4. CD ROM drive for installation.
5. At least 10 MB of hard disk space.
6. Logger PC RS232 cable: type DL6-RS232.
7. DL6-SW1 software distribution disk.

Installing DL6 Software

Insert the distribution disk in your CD ROM drive.

If Autorun is enabled on your PC your CD will automatically start to lead you through the installation process.

If Autorun is not enabled you will need to start the install program as follows:

1. From the **Start** menu select **Settings, Control Panel**.
2. In **Control Panel**, select **Add/Remove Programs**.
3. In **Add/Remove Programs, Properties**, select the **Install/Uninstall** tab.
4. Click **Install**, and follow the on-screen instructions.

Setup installs the following:

- DL6 Control Panel
- DL6 Firmware Upgrade program
- Install Data Import Wizard
- DL6 User manual

Check DL6 to PC Communications

Connect the DL6 to your PC with the DL6-RS232 cable.

Select **Start, Programs, DL6 Logger, DL6 Control Panel**.

The first time you do this a

Connection Properties

dialog appears.

Accept the default serial

Port or change it to suit your

PC, and click **OK**.

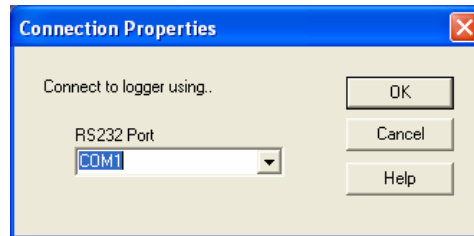
If the logger can

communicate, then the DL6

Control Panel will be

displayed, populating the Logger tab with information about the logger.

If you see something like this you have successfully established communication with the logger!



Note the following:

Start: used to start (and stop) logging

Set Clock: used to synchronise the logger clock with the PC.

Dataset Full By: estimates the date and time when the logger will be full.

Refresh: contacts the logger and refreshes the information on this tab.

Details: displays warnings and error messages recorded while logging.

Can't communicate? See Troubleshooting

Program the DL6

1. Select **Start, Programs, DL6 Logger, DL6 Control Panel.**

2. Select the **Program** tab on the DL6 Control Panel.

3. Select **Change** to edit the program.

4. Right click on channel 1 and select a sensor from the list - e.g. Profile Probe PR2/4.

Observe that channels 1 to 4 are automatically populated with parameters when a PR1/4 is selected.

If using 2 ThetaProbes, be sure to name each with a different label in the program.

5. Enter a Program Name
6. Enter a Recording Rate.

7. Double-click on each sensor channel to inspect and edit sensor parameters

See also: Channel Properties on p.18

Upload Program to Logger

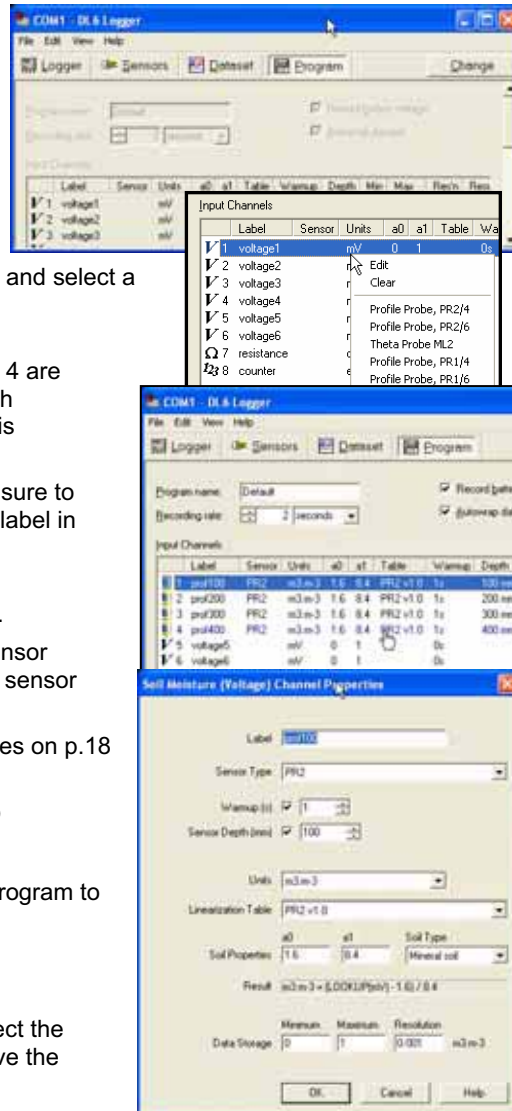
Select **Apply** to send the program to the logger.

Save Program

From the **Program** tab select the **File, Save** command to save the program to disk.

Start/Stop Logging

In the Logger tab toggle the **Start/Stop** button.



Alarm Channel

Channel 9 is a switch which may be used to signal when the soil moisture or temperature meets a particular condition.

Expand the **Program tab** window. Click on **Change** to enable program editing. Double-click on the row for channel 9 in the **Alarm Output** box to open the **Alarm Channel Properties** dialog.

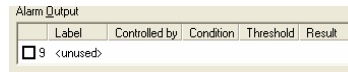
Label: Enter a useful label.

Controlled by: Select one sensor from the drop-down box.

Condition: options are: Less than or Greater than.

Threshold: Enter a numerical value.

Select **OK**. The alarm condition parameters should appear in the Program tab.



	Label	Controlled by	Condition	Threshold	Result
☐	9	<unused>			



Label: Switch the sprinkler ON

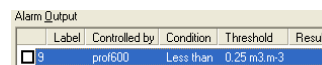
Controlled by: prof600

Condition: Less than

Threshold: 0.25

State:

OK Cancel



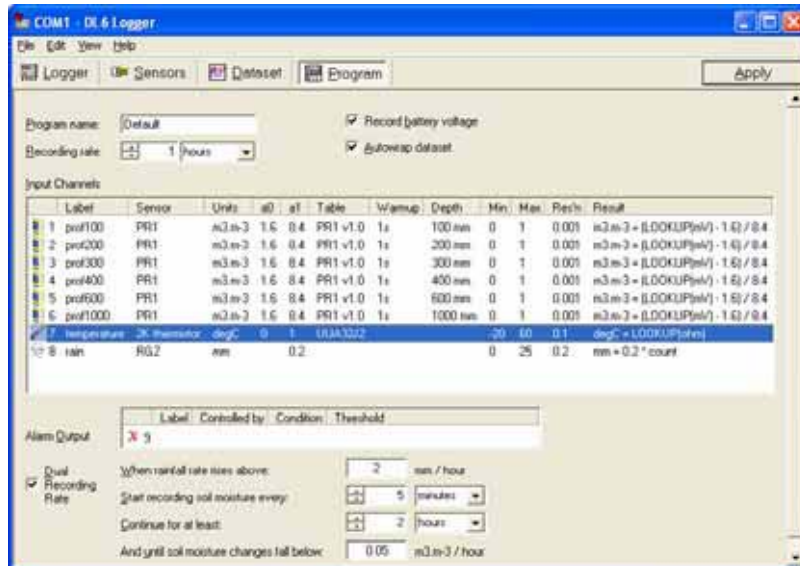
	Label	Controlled by	Condition	Threshold	Result
☒	9	prof600	Less than	0.25 m3 m-3	

Note once the condition is met it stays in that state until the next logging interval, when it is re-assessed.

For instance: if you are logging once per hour the relay will switch on for at least one hour.

For more details select **DL6 Control Panel, Help**.

Dual Recording Rate



Accelerated recording can be started when the **rate of rainfall** exceeds a given threshold. This lets you record occasional fast events – such as the penetration into the soil of a wetting front.

Expand the **Program** tab window, click on **Change** to enable program editing.

Check the **Dual Recording Rate** box to enable dual rate recording.

Two conditions may be set for the duration of the accelerated logging

1. Continue for a specified period of time beyond the **last** reading above the rate of rainfall threshold (e.g. in mm/hr)
2. And also wait until the **rate of change** of **all** soil moisture sensor readings fall below a given rate in the selected moisture units (e.g. in $\text{m}^3.\text{m}^{-3}/\text{hr}$).

When rainfall rate rises above: Enter the rate of rainfall above which the faster rate of recording should start e.g. 2 mm/hr.

For your guidance:

A low rate (0.1 mm/hour) will activate fast recording for nearly all rainfall events.

A medium rate (1mm/hr) will activate fast recording only for medium and heavy rain events.

A high rate (5mm/hr) will activate fast recording only for very heavy rain events.

Start recording soil moisture every: Enter the faster rate of recording readings. This should be an integer sub-multiple of the normal recording rate e.g. 5 minutes (for the 1 hour normal rate shown above).

Continue for at least: Enter how long you want accelerated recording to last e.g. 2 hours.

Note this time interval will only start after the rate of rainfall falls **below** the threshold again, (not from the start of fast recording.)

And until soil moisture changes fall below: Use this if you wish to keep recording at the faster rate beyond the set time delay, if soil moisture readings from any sensor are still changing faster than normal.

Enter the rate here - e.g. $0.05 \text{ m}^3 \cdot \text{m}^{-3} / \text{hr}$

This is the rate of change for any of the soil moisture sensors.

Fast logging will continue until all soil moisture sensors fall below this rate (provided that the time-delay is not still in effect).

For your guidance:

$0.05 \text{ m}^3 \cdot \text{m}^{-3} / \text{hour}$ is a very high rate of change,

$0.005 \text{ m}^3 \cdot \text{m}^{-3} / \text{hour}$ is a medium rate of change,

$0.0005 \text{ m}^3 \cdot \text{m}^{-3} / \text{hour}$ is slow.

You must enter a rate in the box.

If you enter 0 fast recording will never stop.

If you do *not* want this option to take effect use a very high rate of change.

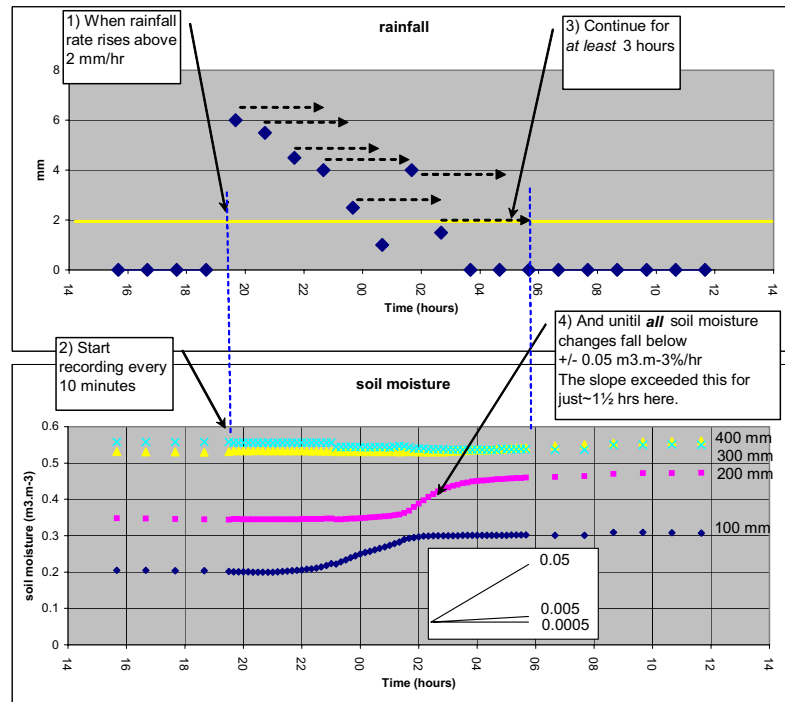
Note these guidance values are not absolute. They depend on your local soil or weather conditions and experimental needs.

Note: Every tip of the rain gauge is temporarily stored with a time stamp of when it occurred.

At every tip, the DL6 looks at the time stamp of the previous tip, and calculates the rate.

This refreshes the "continue for X hours" condition, every time the rate is above the threshold value.

Example of accelerated logging



Channel Properties

Each row of the **Program** tab in the **DL6 Control Panel** lists the channel properties, these define how raw data from a sensor is to be converted into engineering units.

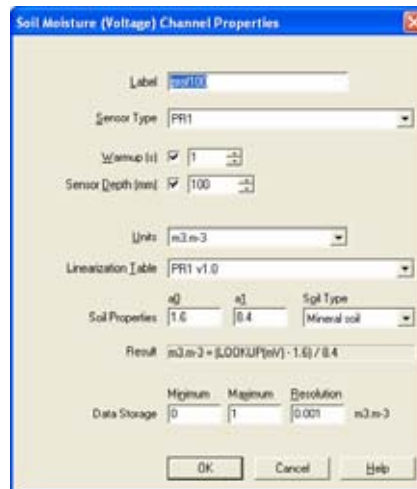
In **Program** tab, if necessary, click on **Change** to enable program editing. Double click on any of channels 1 to 6 to display the **Soil Moisture (Voltage) Channel Properties** dialog.

This example shows the channel properties for a PR1/4 Probe.

Soil Properties: Two linear coefficients a_0 and a_1 are used to convert measured soil permittivity* into moisture content. This conversion depends on the soil type.

Two standard **Soil Types** are provided: Mineral or Organic soils.

*Footnote: Our soil moisture sensors actually measure the *square root* of permittivity, converting that to moisture by the use of these two coefficients.



About a_0 and a_1 .

These parameters are used with the selected sensor-specific **Linearisation Table** in the DL6, to convert the sensor mV output into soil moisture readings. They are a convenient and efficient way of describing the calibration curves for different soil types without the memory overhead required for a unique table for every different soil.

For optimum accuracy you should obtain soil-specific calibration coefficients for your soil as described in your sensor user manual.

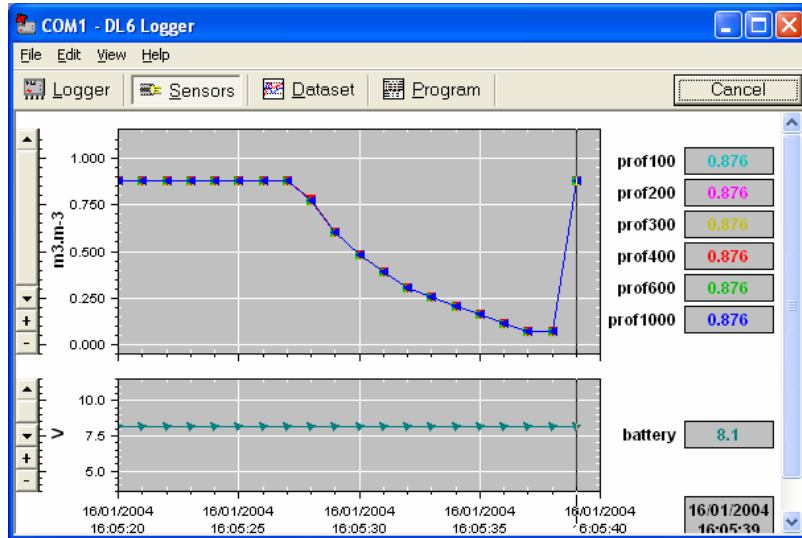
You may skip this step by choosing the Mineral or Organic Soil Types. You lose some accuracy but it is easier. Their soil coefficients are permanently installed in the DL6.

Data storage- Maximum, Minimum and Resolution.

These can be used to scale charts, select a suitable number of decimal places, and control the amount of memory used. The default values are optimised for the standard sensors.

Verifying Sensor Operation

In the **Sensors** tab of the DL6 Control Panel select **Read now**,
The readings will continually refresh a scrolling graph.



Datasets: retrieving, viewing, saving

From the **DL6 Control Panel** Select the **Dataset** tab.

Select **Refresh** to retrieve and view the dataset.

Select **View, Chart** or **View, Table** to view it as a graph or table

Select **File, Save** to save the dataset as a “.dt6” type data file.

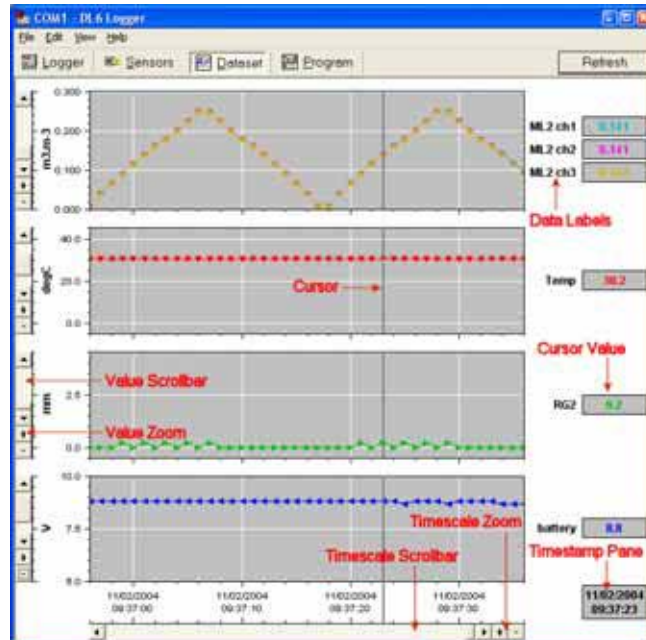


Chart and **Table** views of the data.

The screenshot shows the 'COM1 - DL6 Logger' window with the 'Dataset' tab selected in Table view. The table has columns for 'Label', 'prof100', 'prof200', 'prof300', 'prof400', 'prof600', and 'prof1000'. The 'Label' column contains timestamps and units. The other columns contain numerical values.

Label	prof100	prof200	prof300	prof400	prof600	prof1000
Units	m3.m-3	m3.m-3	m3.m-3	m3.m-3	m3.m-3	m3.m-3
16/01/2004 16:08:53	0.876	0.876	0.876	0.876	0.876	0.876
16/01/2004 16:08:54	0.876	0.876	0.876	0.876	0.876	0.876
16/01/2004 16:08:55	0.876	0.876	0.876	0.876	0.876	0.876
16/01/2004 16:08:56	0.876	0.876	0.876	0.876	0.876	0.876

See also: Dataset Import Wizard on page21.

To save data as an ASCII text file, first save it as a dataset file. This will activate the **Dataset Viewer**. From the Dataset Viewer use the **Save As** command (File menu) to save the dataset as a comma-, tab or space-separated file, for importing into other programs.

Dataset Import Wizard

This PC program assists importing saved datasets into Microsoft Excel™. It is good for quick graphs, and for managing large amounts of data. It is not an irrigation management program, but if you are comfortable with Excel you can do quite a lot with it. For instance, you can customise Excel to create weekly graphs of water content vs. depth - some people use this to help find the Refill Point.

To install Dataset Import Wizard into Excel

Set Macro security

Before installing on PCs using XP, 2003 or later, ensure macro security is set to medium or lower – as follows:-

Start Excel and select **Tools, Options**, select **Security Tab, Macro Security**, and select **medium** or **low** then **ok**. (Medium displays warning and option to disable macro before it runs).

To install the Wizard into Excel

Select Start menu, Programs, DL6 Control Panel, Install Dataset Import Wizard.

Dataset Import Wizard should report that it has installed itself. The Excel **File** menu should now contain an additional command, **Import Dataset(s)**. It will remain in the File menu, available each time you start Excel.

To Import Data into Excel

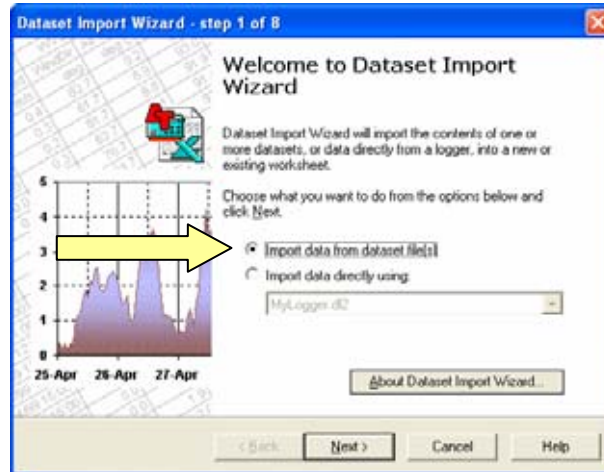
The wizard cannot import data directly from the DL6 (only from the DL2e).

So, before running the Wizard, retrieve and save a dataset file to your PC as follows:

Within the **DL6 Control Panel, Datasets** tab, press **Refresh** to get all the data from the logger, then save the dataset, using the **File. Save As** command. The file will be saved with a “.dt6” extension to the filename.

(Continued on next page)

Then go to **Excel**, select **File, Import Dataset(s)** to display the opening page of the Dataset Import Wizard, select the **Import Data from Dataset File(s)** option.



See also the onscreen instructions and online **Help** of the Data Import Wizard. (This was written primarily for DL2e data logger users).

To manually install Dataset Import Wizard

Try this if the automatic installation process does not work.

Start **Excel** and select **Tools, Add-Ins**.

In the Add-Ins dialog, click **Browse** and select **DTImpWiz.xll** in your **C:\Program Files\Common Files\Delta-T** directory.

Dataset Import Wizard should report that it has installed itself. The Excel File menu should now contain an additional command, Import Dataset(s), which starts the Dataset Import Wizard. It will remain in the File menu, available each time you start Excel.

Pocket DeltaLINK

DeltaLINK for the Pocket PC is similar to the DL6 Control Panel software for your desktop PC. It provides a complete set of facilities for setting up the logger, performing sensor checks, and retrieving, viewing and saving data as dataset files.

Software Installation

Items required

1. Pocket PC with Active Sync version 3.7.1 or later.
2. PC running Windows 98...XP or later
3. Pocket DeltaLINK kit for DL6.

To install DeltaLINK

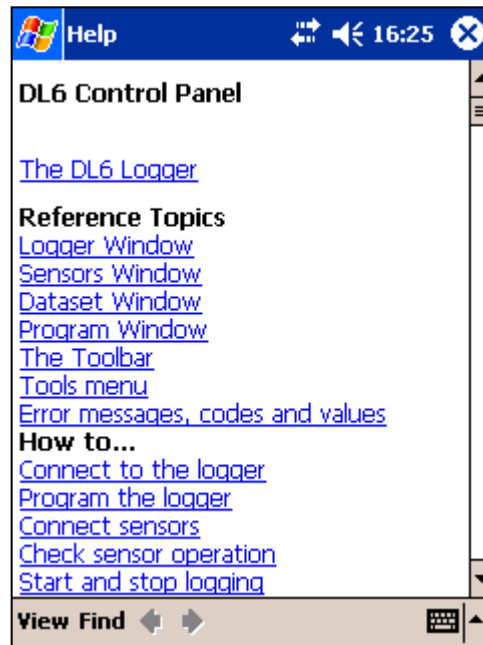
Insert CD and follow the on-screen instructions,
or start Setup.exe.

Read the readme.txt file if you get stuck.

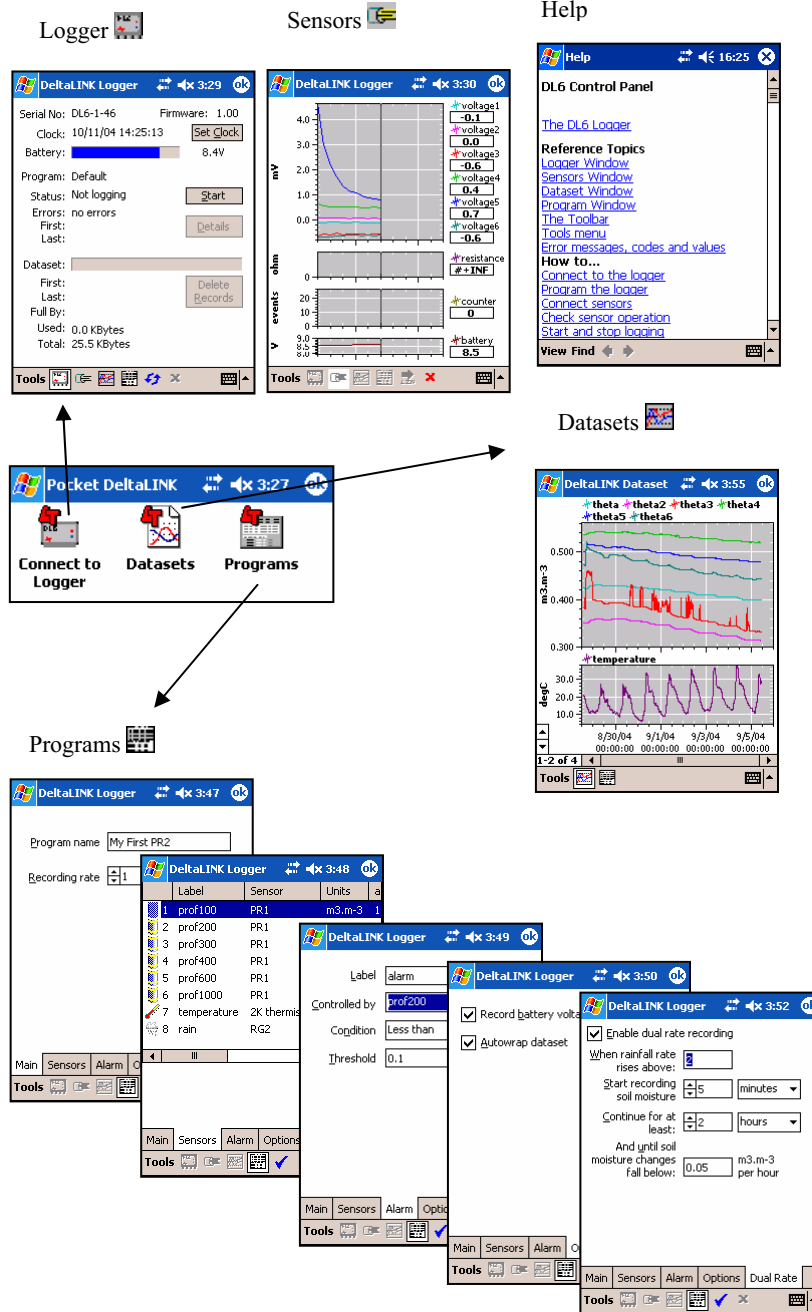


On-line help

From the Pocket PC Start menu select **Help > Pocket DeltaLINK** to display online Help

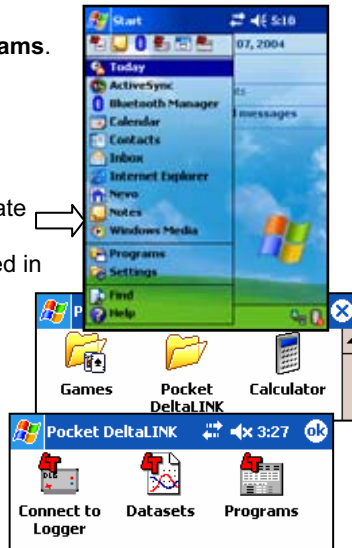


DeltaLINK Navigation



To start DeltaLINK

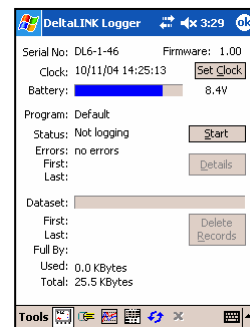
1. Tap the **Start** Menu icon, select **Programs**.
2. In the Programs folder, select **Pocket DeltaLINK**.
3. In the DeltaLINK folder, tap one of the following icons:
 - a. **Connect to Logger** to communicate with a DL6 Logger
 - b. **Datasets** to inspect datasets stored in the Pocket PC
 - c. **Programs** to edit DL6 programs offline.



Connecting to the logger

To connect to the logger:

1. Connect the logger to your Pocket PC with the cable supplied.
2. From the Pocket PC **Start** menu select **Programs > Pocket DeltaLINK > Connect to Logger**.
3. If you have a fresh installation, enter appropriate Connection Settings.
4. If you have previously used Pocket DeltaLINK, it attempts to connect to a logger using the serial port which was last used.
5. If the logger is connected to a different serial port from the one that was last used for a logger connection, Pocket DeltaLINK reports that a logger is not connected.
Select **Tools > Connection...** to modify Connection Settings.
6. In Connection Settings, select the RS232 serial port from the Port list (or type the name of the serial port if it is not listed) and tap **OK**.
7. If the connection is successful, DeltaLINK displays the Logger window, containing information about the current state of the logger.



Programming the logger with DeltaLINK

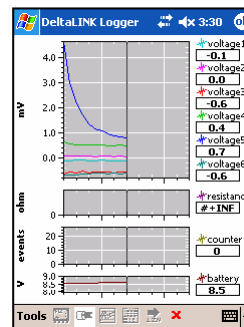
To program the logger:

1. Connect to the logger.
2. In the Logger window ensure that the logger is not logging and delete any data from the logger's memory: tap **Stop** and/or **Delete Records**, as required.
3. Tap  to select the Program window and tap  to start making changes to the program.
4. To import a program file select **Tools > Import Program...**, or alternatively, make any program changes directly in the Program window.
5. When finished, tap  to install the program in the logger. Then select the Sensors window  to check sensor connections, and tap **Start** in the Program window when ready to start logging.
6. To cancel changes that you have made in the Program window, select **Tools > Undo Changes**.

Checking sensor operation

To verify sensor operation:

1. Connect to the logger and select the Sensors window .
2. Tap  and observe the sensor readings displayed in the scrolling strip charts and value panels while adjusting sensor wiring and/or installation conditions.



Starting and stopping logging

To start or stop logging:

1. Connect to the logger.
2. In the Program window, tap **Start** or **Stop**, as required.

Retrieving and viewing logged data

To retrieve and view logged data:

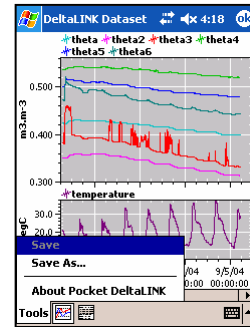
1. Connect to the logger.
2. Select the Dataset window which retrieves and displays all data stored in the logger.
3. Select **Tools > Save** to save the data to a dataset file.

You can later open a dataset file to save the dataset as a comma-, tab- or space-separated ASCII file for importing into other programs.

Viewing Dataset Files

To open a dataset file, from the Pocket PC Start menu select **Programs > Pocket DeltaLINK > Datasets**, and select a dataset file in the displayed list.

To save a dataset file as a comma-, tab- or space-separated ASCII file for importing into other programs, select **Tools > Save As....**



Working with Program Files

To open or create a new program file:

1. From the PDA Start menu select **Programs > Pocket DeltaLINK > Programs**.
2. Tap an existing program file, or **New** to create a new program.
3. When finished making changes, select **Tools > Save** or **Tools > Save As...** to save the program file changes.

To program the logger from a program file:

1. Connect to the logger.
2. Stop logging and delete all dataset records
3. Select the Program window, and select **Tools > Import Program...**

To save a program the logger to a program file:

1. Connect to the logger.
2. Select the Program window, and select **Tools > Save...**
3. To save a program from a dataset file to a program file:
4. Open a dataset file.
5. Select the Program window, and select **Tools > Save**.

Specifications

Note: The DL6 conforms to mandatory EU regulations regarding electromagnetic emissions and susceptibility. The full analogue accuracy is not maintained in strong RF fields, but is unaffected by GSM 900 MHz phone pulse simulations. See CE & EMC Conformance page 32

Inputs/outputs	Number	Range	DL6 Accuracy logger -10 to +50°C	Notes
Analogue channels (soil moisture)	6	0.0 - 0.1 m ³ .m ⁻³	±0.001 m ³ .m ⁻³	Applicable to : ML2 (up to 100m cable) PR2 (up to 100m cable) PR1 (up to 25m cable) Mineral & organic soil calibrations
	6	0.1 - 0.6 m ³ .m ⁻³	±1% of reading	
Analogue channels (DC voltage)	6	-10 to 1150 mV Common mode range -0.2 to 3V	±(0.3mV + 0.2% of reading) + common mode error: 0.25mV/V	Logger can read either volumetric water content or voltage (not both)
Temperature channels	1	sensor -20 to +60°C	±0.4°C	Using ST1 or ST2 thermistor or other 2k thermistor
Event counter channels (using rain gauge)	1	-	0.2mm	Using RG2, max 5 events/second
Sensor excitation	6	5 -9V at 120mA	-	Uses internal battery voltage supply
Alarm out	1	1A, 25V DC/AC	-	Isolated relay switching 2A max *

Feature	Full scale	Notes	Feature	No. / rating	Notes
Logging frequency	1s to 24hr	User selectable with accelerated logging option	PC connection	1	Via RS232 connection (USB to RS232 converters are available)
Accelerated logging	1s to 24hr	User selected - rain gauge or event triggered	Battery lifetime	1yr	6 alkaline AA cells last for up to one year (depends on logging frequency)
Reading capacity	16k readings	Auto-wrap or stop logging user selectable	Environ- mental	IP67	-20 to +60°C Operating -10 to +50°C Full accuracy

28 ● Specifications

* Alarm relay rated 2A but the fuse is 1A. Alarm out should support brief 2A

Spares Kit type DL6-SP

This includes a fuse, desiccant, battery holder, cable glands & O rings, bungs to replace cables in empty cable glands, sleeving for narrow cables (not shown).

Note : Contents subject to change without notice.



Mounting Kit type DL6-MKT1

Includes the following:

- Stainless steel Mounting Post 1m long
- Stainless steel Mounting Plate
- M6 stainless steel bolt, star washer and nut x 2
- M4 stainless steel screw, star washer and nut x 4
- Cable tie x 2
- Mounting instructions for posts & walls



Maintenance, Troubleshooting, Storage

Batteries

The battery can be changed quickly without losing program settings or data, but no data will be recorded while the battery is being changed.

If you change the battery when logging is due you will simply miss a record.

Battery Life: A DL6 reading a full set of powered sensors once an hour (e.g. 6xML2, 1x Thermistor, 1x Rain gauge) should last over a year. This would be shortened by more frequent sensor readings, temperature extremes or prolonged communications. Lithium batteries (type DL6-ELB) give greater life than the alkalines at the temperature extremes: below 0°C and above 50°C.”

Change the battery when the **Voltage** indicated on the **Logger** tab of the **DL6 Control Panel** indicates under 6.6V. (This represents the battery voltage under load, i.e. powering all sensors.)

Changing Battery

If the battery expires the LED will no longer flash when you tap the logger.

You might need to press **reset** to restart the logger if the battery goes completely flat.....going flat may cause it to lose time also.

After changing the battery check that the LED flashes or check the battery voltage indicated on the DL6 Control Panel, Logger tab.

If not press the Reset button inside the logger - you may also need to stop logging and update the logger's clock

Desiccant

Indicator paper in the lid turns from blue to pink if the humidity goes above 70%RH. This indicates it is time to change or regenerate the white desiccant bag.

Protect the desiccant when the logger is open by temporarily storing it in a sealed plastic bag. Do this if the air is very humid. It will extend the life of the desiccant.

When replacing the lid take care not to trap the desiccant bag.

To regenerate the desiccant

The desiccant pack can be regenerated by heating. Remove the pack from the DL6 and heat in an oven for a few hours at 105 to 120°C. Allow it to cool down in a sealed polythene bag, away from moisture, before reinstalling it.

Recalibration Period

We recommend the DL6 is returned every 1 year to Delta-T for recalibration.

Problems

Problem Reports

Always try to isolate the source of the difficulty. This may fall into one of the following areas. It will help considerably if you can mention as many relevant details as possible. In particular:

- A description of the fault, its symptoms, or error messages
- Details of the logging program and of devices connected to it.
- Details of any PC you are using
- Software version numbers and hardware serial numbers (see below)

Locating version and serial numbers

The Logger serial number and firmware version are displayed on the Logger tab of the DL6 Control Panel (once communications are established with the logger). The PC software version number is displayed in Help, About DL6 Control Panel.

Troubleshooting

Flashing LED

The logger should flash if you tap it.

It will not flash or communicate if the battery is low.

Logging	Error	Sequence	Meaning
No	No		The logger is not logging There is no error
Yes	No		The logger is logging There is no error
No	Yes		The logger is not logging There is an error
Yes	Yes		The logger is logging There is an error

Not Responding

Check cables and connectors

If using the RS232 cable check that you are using a null modem cable, and that it is plugged into the same serial port on your PC that you have selected in the DL6 Control Panel.

If Logging, check the sensor cable and compare it with the logger wiring connection diagram.

Check also the sensor configuration in the logging program, including any warm-up relay program configuration.

Check battery voltage

See Batteries on page 30

Reset the Logger

If the logger locks up it can be freed up by pressing and releasing the reset button. You should expect to see 4 LED flashes, indicating a **warm reset**.

For a **cold reset** hold down the button until you see four additional flashes after about 5 seconds.

Warm reset means that the program and the data are preserved and if you are logging it will resume logging.

Cold reset restores the default program and deletes all data.

Still stuck?

- Remove all power for at least one day, then re-power.
- Check the fuse.

The battery can be changed without losing program settings or data, but no data will be recorded while the battery is being changed.

If you change the battery when logging is due you will simply miss a record.

Storage

Remove the batteries if the logger may be stored for more than a year, because the batteries may run down and leak.

On recovery from long term storage see Batteries on page 30.

Warranty and Service

Terms and Conditions of Sale

Our Conditions of Sale (ref: COND: 1/00) set out Delta-T's legal obligations on these matters. The following paragraphs summarise Delta-T's position but reference should always be made to the exact terms of our Conditions of Sale, which will prevail over the following explanation.

Delta-T warrants that the goods will be free from defects arising out of the materials used or poor workmanship for a period of **twelve months** from the date of delivery.

Delta-T shall be under no liability in respect of any defect arising from fair wear and tear, and the warranty does not cover damage through misuse or inexperienced servicing, or other circumstances beyond our control.

If the buyer experiences problems with the goods they shall notify Delta-T (or Delta-T's local distributor) as soon as they become aware of such problem.

Delta-T may rectify the problem by replacing faulty parts free of charge, or by repairing the goods free of charge at Delta-T's premises in the UK, during the warranty period,

If Delta-T requires that goods under warranty be returned to them from overseas for repair, Delta-T shall not be liable for the cost of carriage or for customs clearance in respect of such goods. However, we much prefer to have such returns discussed with us in advance, and we may, at our discretion, waive these charges.

Delta-T shall not be liable to supply products free of charge or repair any goods where the products or goods in question have been discontinued or have become obsolete, although Delta-T will endeavour to remedy the buyer's problem.

Delta-T shall not be liable to the buyer for any consequential loss, damage or compensation whatsoever (whether caused by the negligence of the Delta-T, our employees or distributors or otherwise) which arise from the supply of the goods and/or services, or their use or resale by the buyer.

Delta-T shall not be liable to the buyer by reason of any delay or failure to perform our obligations in relation to the goods and/or services, if the delay or failure was due to any cause beyond the Delta-T's reasonable control.

Service and Spares

Users in countries that have a Delta-T Distributor or Technical Representative should contact them in the first instance.

Spare parts for our own instruments can be supplied from our works. These can normally be despatched within a few working days of receiving an order.

Spare parts and accessories for sensors or other products not manufactured by Delta-T, may have to be obtained from our supplier, and a certain amount of additional delay is inevitable.

No goods or equipment should be returned to Delta-T without first obtaining the agreement of Delta-T or our distributor.

On receipt at Delta-T, the goods will be inspected and the user informed of the likely cost and delay. We normally expect to complete repairs within a few working days of receiving the equipment. However, if the equipment has to be forwarded to our original supplier for specialist repairs or recalibration, additional delays of a few weeks may be expected.

Technical Support

Technical Support is available on Delta-T products and systems. Users in countries that have a Delta-T Distributor or Technical Representative should contact them in the first instance.

Technical Support questions received by Delta-T will be handled by our Tech Support team. Your initial enquiry will be acknowledged immediately with a "T number" and an estimate of time for a detailed reply (normally a few working days). Make sure to quote our T number subsequently so that we can easily trace any earlier correspondence.

In your enquiry, always quote instrument serial numbers, software version numbers, and the approximate date and source of purchase where these are relevant.

Contact details:

Tech Support Team
Delta-T Devices Ltd
128 Low Road, Burwell, Cambridge CB5 0EJ, U.K.
email: tech.support@delta-t.co.uk
Web site: www.delta-t.co.uk
Tel: +44 (0) 1638 742922
Fax: +44 (0) 1638 743155

CE & EMC Conformance



Certificate of Conformity

Delta-T Devices Ltd has tested the DL6 Soil Moisture Logger & declares it conforms with the following Standards:

EMC EN 61326, comprising:

TEST	Standard	Level	Type
ESD	IEC 1000-4-2	4kV	Contact
	IEC 1000-4-2	8kV	Air
EM field	IEC 1000-4-3	3V/m	
Burst	IEC 1000-4-4	0.5kV	
Surge	IEC 1000-4-5	1kV	
Conducted RF	IEC 1000-4-6	3V	

Safety: 73/23/EEC Low Voltage Directive

Date of Approval: 19/3/2004

Test Engineer & authorised representative: T.K.Bragg

Signed:  Date: 22/3/2004

As Chair of the Management Committee, I, Peter Cockerton, certify that T.K.Bragg is our authorised representative:

Signed:  Date: 22/3/2004

CE conformity

The DL6 conforms to EU regulations regarding electromagnetic emissions and susceptibility and is CE marked by Delta-T Devices Ltd.

Warning

To maintain conformance to CE standards, the equipment must be used as described in this manual. Modifications to the equipment may invalidate CE certifications.

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