



# ECH<sub>2</sub>O Soil Sensor With DataHog Interface

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# 1 INTRODUCTION

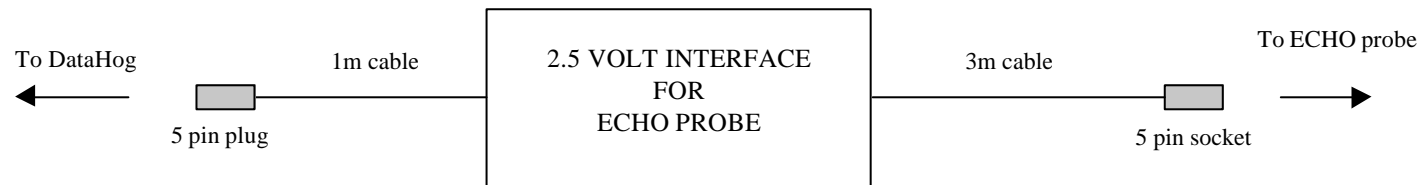
The ECH<sub>2</sub>O probes requires a small interface to be compatible with the Skye DataHog logger. This interface includes a stabilised power supply and RF suppression.

If you have purchased your ECH<sub>2</sub>O probes with a DataHog logger from Skye Instruments, then we will have already set up the logger to read directly in volumetric water content for you.

For more accurate readings you may want to calibrate the probe to your exact soil conditions, please see the ECH<sub>2</sub>O probe instruction manual for details. The instructions and diagrams contained in this ECH<sub>2</sub>O probe adapter manual will help you make the necessary adjustments to the DataHog2 datalogger.

## ADP/4 SINGLE ECHO PROBE 2.5 VOLT INTERFACE

NOTE - this interface is intended for use with a standard DataHog 2 single ended voltage socket with the **standard 5V** sensor excitation supply and an ECHO probe



### 5 Pin Plug to DataHog

Pin 1	5V supply	Red
Pin 2	ECHO	Blue
Pin 3	n/c	
Pin 4	n/c	
Pin 5	Ground	Grey

### 5 Pin In-Line Socket to ECHO Probe

Pin 1	2.5V supply	Red
Pin 2	+ve signal	Blue
Pin 3	n/c	
Pin 4	n/c	
Pin 5	Ground	Grey

Cable near socket will be labelled  
**ECHO probe**

### 5 Pin Plug fitted to ECHO Probe

Pin 1	2.5V supply	Red
Pin 2	+ ve signal	White
Pin 3	n/c	
Pin 4	n/c	
Pin 5	Ground	Bare wire

No damage will occur if ECHO probe  
is connected directly to the DataHog but calibration  
may be incorrect and CE mark invalid

**EXAMPLE: HOW TO SET UP SINGLE ENDED VOLTAGE SOCKETS FOR ECHO PROBES**

***HARDWARE CONFIGURATION CERTIFICATE***

**DATAHOG2 TYPE :**     SDL 5200           **SERIAL NO.:**           0801 229xx           **Certificate Issue Date:**   23.08.01  
 -----

Software Channel No.	Hardware Channel No.	Socket No.	Configured for Input Type	Gain Code	Termination Code	Scale Code	Full Scale Value	Zero Offset	Units	Sensor Serial No and/or Calibration Factor (when supplied by Skye)
00	00	1	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
01	02	2	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
02	06	3	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
03	09	4	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.

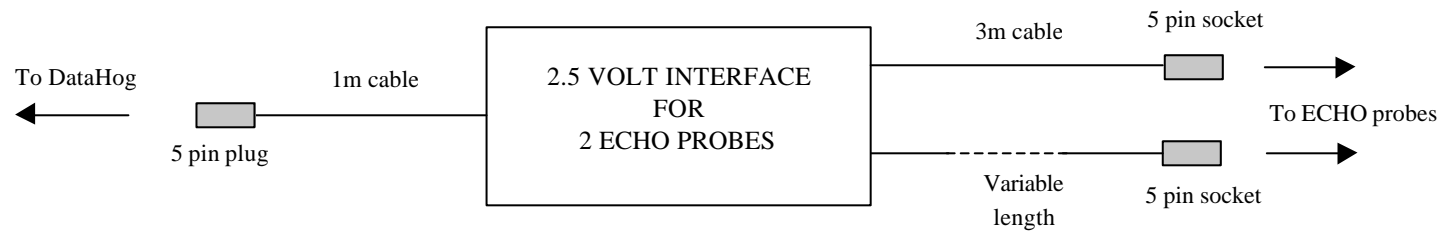
Feedback Resistors Fitted for Current Type Channels

Gain	0	1	2	3	4	5	6	7
Resistor Value	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	MΩ	MΩ

**Eprom Version**     Example     **Datafile Identifier**    Examplexxxxx

## ADP/3 DOUBLE ECHO PROBE 2.5 VOLT INTERFACE / Y ADAPTER

NOTE - this interface is intended for use with a standard DataHog 2 differential voltage socket (set up as 2 single ended voltage inputs) with the **standard 5V** sensor excitation supply, and two ECHO probes



### 5 Pin Plug to DataHog

Pin 1	5V supply	Red
Pin 2	n/c	
Pin 3	ECHO 2	Green
Pin 4	ECHO 1	Blue
Pin 5	Ground	Grey

### 5 Pin In-Line Socket to ECHO Probe

Pin 1	2.5V supply	Red
Pin 2	n/c	
Pin 3	n/c	
Pin 4	+ ve signal	Blue
Pin 5	Ground	Grey

Cable near socket will be labelled  
**ECHO 1 Pin 4** or  
**ECHO 2 Pin 3**

### 5 Pin Plug fitted to ECHO Probe

Pin 1	2.5V supply	Red
Pin 2	n/c	
Pin 3	n/c	
Pin 4	+ ve signal	White
Pin 5	Ground	Bare wire

No damage will occur if ECHO probe is connected directly to the DataHog but calibration may be incorrect and CE mark invalid

**EXAMPLE: HOW TO SET UP DIFFERENTIAL VOLTAGE SOCKETS FOR ECHO PROBES**  
**HARDWARE CONFIGURATION CERTIFICATE**

DATAHOG2 TYPE :   SDL 5550/4F   SERIAL NO.:   0801 229xx   Certificate Issue Date: 23.08.01  
 -----

Software Channel No.	Hardware Channel No.	Socket No.	Configured for Input Type	Gain Code	Termination Code	Scale Code	Full Scale Value	Zero Offset	Units	Sensor Serial No and/or Calibration Factor (when supplied by Skye)
00	00 (pin 4)	1	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
01	01 (Pin 3)	1	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
02	03 (Pin 4)	2	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
03	04 (Pin 3)	2	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
04	06 (Pin 4)	3	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
05	07 (Pin 3)	3	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
06	09 (Pin 4)	4	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
07	10 (Pin 3)	4	S.E Voltage	00	00	01	2000.0	0000	mV	Echo probe etc.
08										

Feedback Resistors Fitted for Current Type Channels

Gain	0	1	2	3	4	5	6	7
Resistor Value	kΩ	kΩ	kΩ	kΩ	kΩ	kΩ	MΩ	MΩ

Eprom Version   Example   Datafile Identifier   Examplexxxxx





## DataHog2 loggers and 10cms ECH<sub>2</sub>O Probes

These instructions show how to configure the Skye DataHog2 logger to read volumetric water content directly from a 10 cms ECH<sub>2</sub>O probe.

1. Calculate the Full Scale Value (FSV) and Zero Offset (ZO) figures for the Ax+B scaling function in the DataHog2 as below:
  - a) Page 14 of the ECH<sub>2</sub>O probe manual gives its standard calibration as shown by the equation  $\theta \text{ (m}^3/\text{m}^3) = 0.000936 * \text{mV output} - 0.376$
  - b) The DataHog2 FSV for voltage channels is calculated as  
[(Sensor Output in units per mV) / Gain ] \* 2000  
i.e. for a 2000 mV range voltage input, with a Gain of 1 (Gain Code 00)  
FSV = [ (0.000936) / 1 ] \* 2000 = **1.8720**
  - c) The DataHog2 ZO for voltage channels is calculated as  
Sensor Offset in mV \* Gain \* 9.5  
The sensor offset in the ECH<sub>2</sub>O probe equation is 0.376 m<sup>3</sup>/m<sup>3</sup>  
To convert this to mV, divide the 2000 mV range by the FSV and multiply by the sensor offset, i.e. (2000 / 1.8720) \* 0.376 = 401.71 mV  
So the ZO = 401.71 \* 1 \* 9.5 = **3816**
2. Enter these new FSV and ZO figures into the DataHog2 using Option 9 of the Main Menu.
3. Check the configuration is correct in Option 1 of the Main Menu.

For each ECH<sub>2</sub>O probe you should have its individual Software Channel and hardware channel number, but the following values should be the same for each channel:

Gain Code	00
Termination Code	00
Scale Code	01
Full Scale Value	1.8720
Zero Offset	3816

Units will now be volumetric water content  $\theta \text{ (m}^3/\text{m}^3)$ .

It is advisable to make a note of your changes on your DataHog2 Hardware Configuration Certificate. It is also recommended to clear the logger's memory before recording any data in the new units, to avoid confusion.

NOTE – don't forget to press ESCAPE to return the DataHog2 to Log Mode before closing the software and disconnecting the RS232 datalead.

## DataHog2 loggers and 20cms ECH<sub>2</sub>O Probes

These instructions show how to configure the Skye DataHog2 logger to read volumetric water content directly from a 20 cms ECH<sub>2</sub>O probe.

4. Calculate the Full Scale Value (FSV) and Zero Offset (ZO) figures for the Ax+B scaling function in the DataHog2 as below:
  - d) Page 14 of the ECH<sub>2</sub>O probe manual gives its standard calibration as shown by the equation  $\theta \text{ (m}^3/\text{m}^3) = 0.000695 * \text{mV output} - 0.29$
  - e) The DataHog2 FSV for voltage channels is calculated as  
[(Sensor Output in units per mV) / Gain ] \* 2000  
i.e. for a 2000 mV range voltage input, with a Gain of 1 (Gain Code 00)  
FSV = [ (0.000695) / 1 ] \* 2000 = **1.3900**
  - f) The DataHog2 ZO for voltage channels is calculated as  
Sensor Offset in mV \* Gain \* 9.5  
The sensor offset in the ECH<sub>2</sub>O probe equation is 0.29 m<sup>3</sup>/m<sup>3</sup>  
To convert this to mV, divide the 2000 mV range by the FSV and multiply by the sensor offset, i.e. (2000 / 1.39000) \* 0.29 = 417.27 mV  
So the ZO = -417.27 \* 1 \* 9.5 = **3964**
5. Enter these new FSV and ZO figures into the DataHog2 using Option 9 of the Main Menu.
6. Check the configuration is correct in Option 1 of the Main Menu.

For each ECH<sub>2</sub>O probe you should have its individual Software Channel and hardware channel number, but the following values should be the same for each channel:

Gain Code	00
Termination Code	00
Scale Code	01
Full Scale Value	1.3900
Zero Offset	3964

Units will now be volumetric water content  $\theta \text{ (m}^3/\text{m}^3)$ .

It is advisable to make a note of your changes on your DataHog2 Hardware Configuration Certificate. It is also recommended to clear the logger's memory before recording any data in the new units, to avoid confusion.

NOTE – don't forget to press ESCAPE to return the DataHog2 to Log Mode before closing the software and disconnecting the RS232 datalead.