



DataHog2+



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DataHog2+

1.0 Introduction

The SDL 5000 series of DataHog2+ dataloggers comprise an electronically advanced datalogging system for a variety of environmental sensors.

The logger is centred on a high performance generation 8 bit microprocessor (μ p). This has the ability to perform all the mathematical and logging tasks and then close down to conserve power.

Depending on the datalogger model there are one or more analogue to digital converters which render the signals from the sensor into a digital form that can be handled by the microprocessor. These have a resolution of 15 bits which means that analogue signals such as light, which vary over several decades, can be properly handled and give adequate resolution of measurement over the required range.

Many versions of the DataHog2+ are available, with different combinations of voltage, current and digital inputs. This manual covers all models, and so will include sections that are not applicable to individual units. Please check those parts of the manual that apply to your model and type of your unit and ignore inapplicable sections.

In normal logging mode the μ p will be 'woken up' by the clock at regular 10 second intervals. The μ p will keep track of real time by counting the number of times it is woken up and storing the time in the RAM while the μ p is asleep! Once woken up, the microprocessor will perform the tasks required of it (depending on the logging mode previously selected) and then when these are complete will return to 'sleep' to conserve power.

The microprocessor can communicate with the user's host computer via its built in RS232 interface, and can be controlled by instructions sent via this. It also gives some feedback to the user via the audio transducer (beeper) built in.

Immediately before the μ p closes down to 'sleep' mode, if there is a plug connected to the 8 pin RS 232 socket, then it will 'listen' for a command from the user for a period of about 1 second. During this time, preceded by an audible 'beep', any numeric character sent to the DataHog2+ will cause it to enter terminal (or Main Menu) mode.

The datalogger is usually contained in a polycarbonate housing, which is sealed to IP 65. The sockets, when mated to a matching plug or blanking unit are also weatherproof to IP65.

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Do not panic! Although some sections of this manual may at first sight appear involved and complex, you quite probably may never need to read them. Your DataHog2+ datalogger is supplied set up with all scaling factors configured for the sensors it is supplied with. After connecting the power supply, the DataHog should start working. If in doubt, check the section of the manual you think appropriate, and if trouble persists phone or email Skye or your sales Agent. We will do our best to help. A quick phone call or email may save you hours of pondering. Good Luck!

!!! Don't forget

A DataHog2+ needs power to operate. It cannot work with a flat battery or without being connected to a 12v supply.

If your DataHog2+ seems unresponsive, it quite possibly just has a flat battery - so first check the state of the 12 volt battery - see Appendix 2

DataHog2+ logger is a DataHog2 with additional electronics for extra storage of the data on a removable multi-media card. DataHog2+ will still store data in its internal memory at the same time, but will also store data on the Multi-Media (SDHC) card. There is no need to offload the data from the internal memory storage, as a copy will have been made on the SDHCHC card. If for any reason the SDHCHC card has become corrupted, then please refer to Section 3.2.5 for instructions on how to offload the data from the internal storage module.

A datalead and SkyeLynx Comms, PC software will also have been supplied. These will only be required if you wish to change any of the DataHog configurations, such as sample and log times. Please refer to Section 3 for instructions on how to accomplish this task.

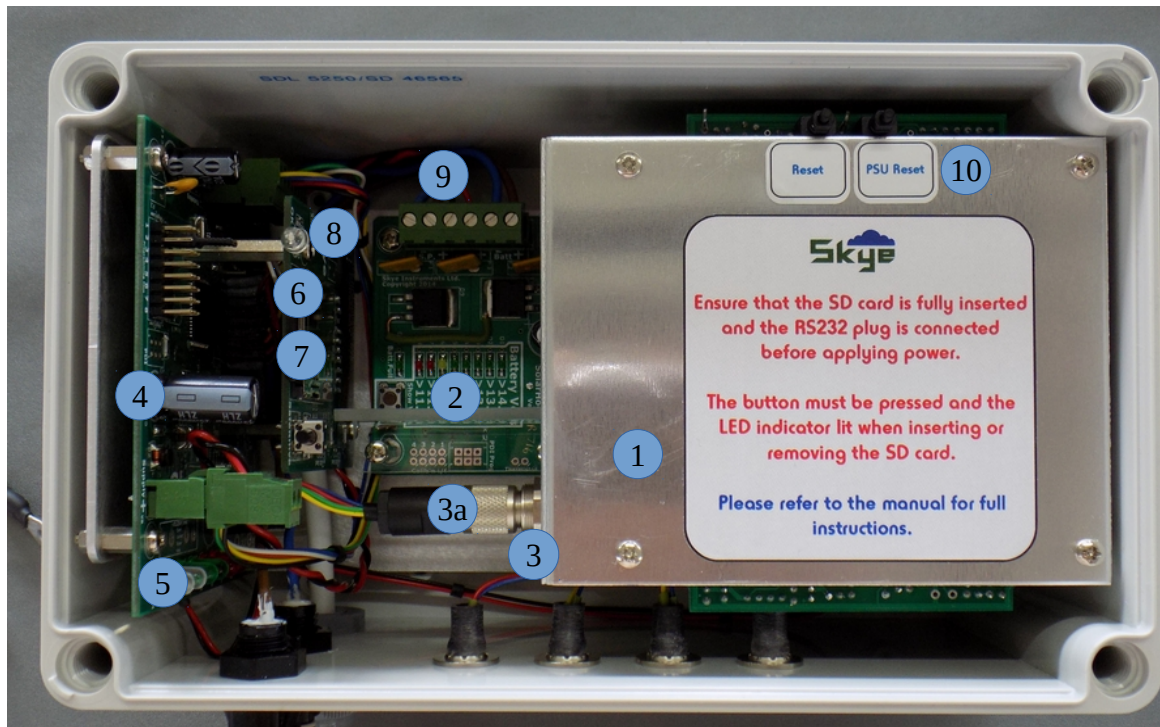
The logger has been set up at Skye with as much information as possible for immediate operation. Where supplied with Skye sensors the appropriate scaling factors, zero offsets, gains etc have already been entered, as shown on the Hardware Configuration Certificate which is supplied with your system. The default logging interval is 30 minutes, but this can be changed by connecting the logger to an Android mobile phone or Tablet with the FTDI UART app installed, or to a laptop/PC running Windows.

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2.0 OVERVIEW AND QUICK START

The DataHog2+ comprises the DataHog2 datalogger with the addition of the DHLC3 electronics to provide a datalogger which stores data on a removable Multimedia (SDHC) card.

2.1 Inside the Enclosure



- 1 Underneath this metal plate are the DataHog2 electronics
- 2 Solar Panel regulator
- 3 8 pin socket. For normal operation the plug - 3a - will be plugged into this socket.
For changing any configurations & set-ups, this plug is removed and the plug from the datalead is inserted.
- 4 DHLC3 electronics board
- 5 Row of Activity/Function LEDs
- 6 SDHC card holder
- 7 Push button for activating the blue LED for SDHC card removable
- 8 Blue LED
- 9 Power supply connection block. Connection from the 12V battery which is then distributed to the unit
- 10 PSU reset. Only used on rare occasions. The main reason for pressing this will be when the DataHog2+ is used with a PC for accessing the setup menu. After removing the plug from the DHLC3 board (3a) and then plugging in the 8 pin connector from the datalead (which will be connected to the PC), the PSU reset

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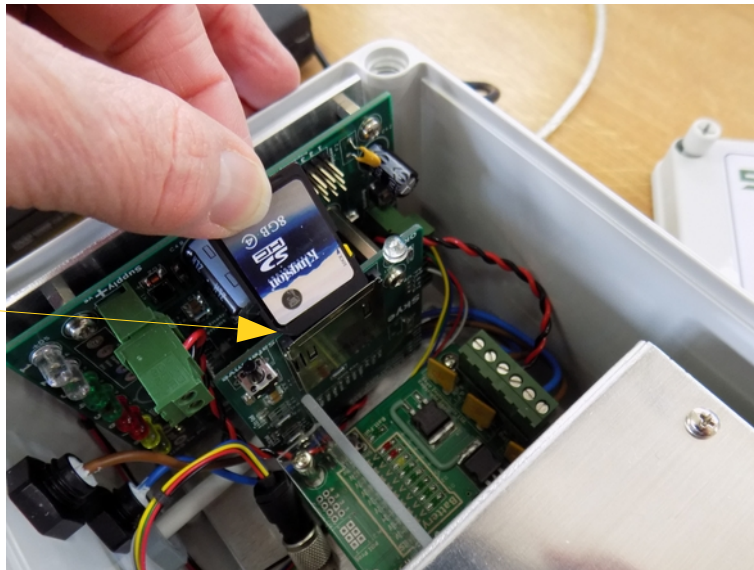
will need to be pressed. A faint click will be heard. If no click is heard then there is a problem with the power supply.

2.2 SDHC Card - overview

The SDHC card needs to be formatted (FAT 16 or 32) on a PC. The maximum size of SDHC card that can be used is 32GB and the type is SDHC Class 4.

To insert the SDHC card hold the top of the card with the notched end at the bottom and facing towards the inside of the enclosure

Notched end



Slide the SDHC card into the holder and push down until you hear a click. The card is now in place.

To remove the card, gently press down on the card and then let go. This will release it from the locking mechanism

2.2.1 Removing & Inserting the SDHC Card in Use

The SDHC card is located inside the enclosure and is quite visible when the lid has been removed.

PLEASE DO NOT ATTEMPT TO REMOVE THE SDHC CARD WITHOUT FOLLOWING THESE INSTRUCTIONS

- 1) Press the button next to the SDHC card/SDHC card holder.
- 2) A blue LED will light up. This will be alight for 1 minute and 20 seconds, which should be ample time to remove the SDHC card and insert a new one. Only remove the SDHC card when the LED is alight. If you attempt to remove the SDHC card while the blue LED is off, then you can damage or corrupt the SDHC card.

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The DHL3 buffers datastrings whilst this LED is alight so no data is lost. Data in the buffer will be sent to the SDHC card 5 seconds after the LED goes out.

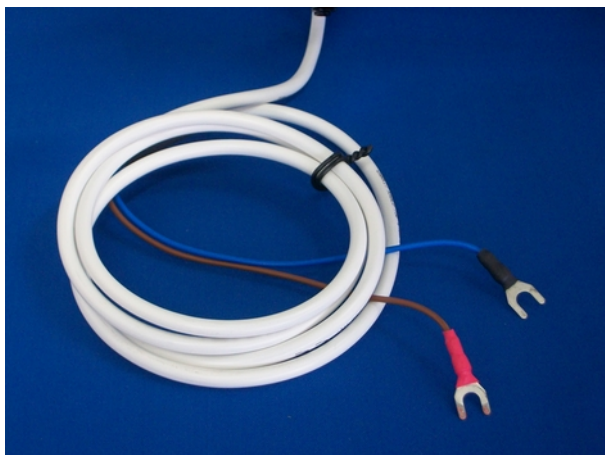
At the configured logging interval the DataHog sends a 'datastring'. This datastring contains the date and time of the stored data, channel number and data:

```
09:56:50 05.04.16 00 061.6 01 010.68 02 0658.51 03 007.65 04 0006.17 05 00265 06 0000.00 07 0984.78
```

This 'datastring' is stored on the SDHC card in a 'day file'. A new day file is automatically created at midnight. Day files are a space delimited text file and easily read by any spreadsheet software. Please refer to Appendix 7 for details of the SDHC card structure.

2.3 Power Supply

The unit requires an external 12 volt power supply for operation. The white cable from the enclosure should be connected to the battery terminals



← To negative terminal of the battery

← To positive terminal of the battery

2.3.1 Solar Power



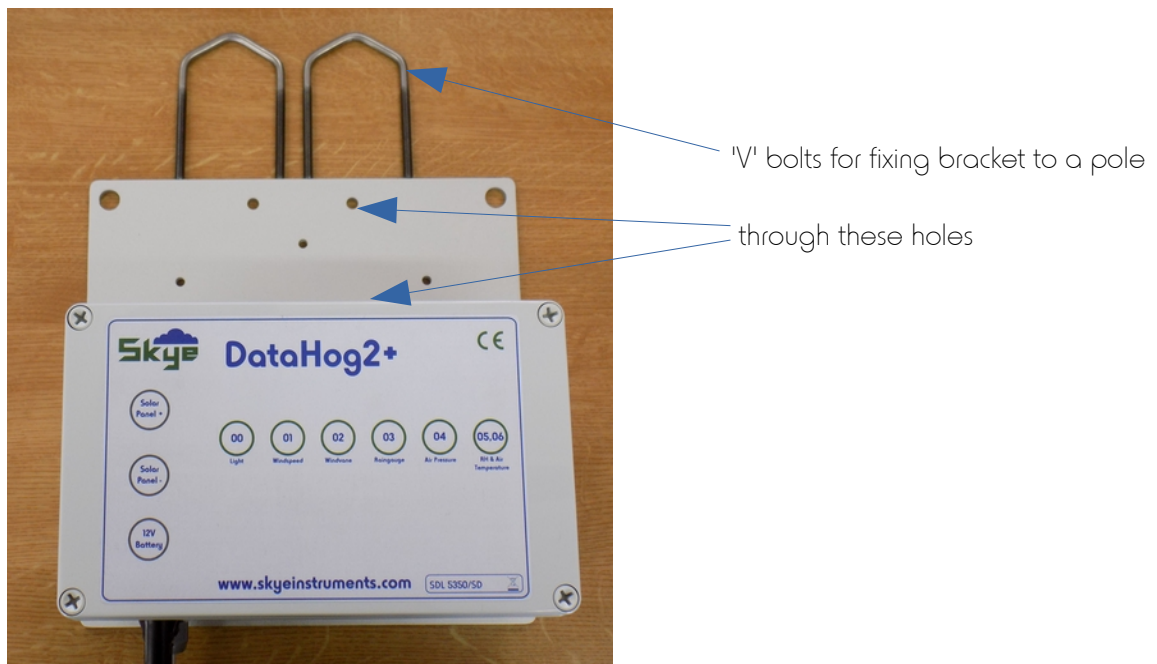
Connectors from the solar panel click into these connectors on the enclosure. A tool is supplied to aid the removal of these connectors should it be necessary

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Please refer to Appendix 6 for instructions on how to mount the solar panel on a pole.

2.4 Pole Mount/Bracket for the DataHog2+ SKM 225A

If a pole mount has been ordered at the same time as the DataHog2+, then the enclosure will be pre-mounted on the bracket. Connection holes, accessible by removing the lid of the enclosure, line up with holes in the mounting plate. A pair of 'V' bolts plus nuts etc are supplied so that the unit can be fixed to a pole.



2.5 Activity LED Lights

There are 8 coloured LED lights which light up and flash in different sequences depending on the intended function or activity.

When the power supply is first connected all the LEDs will continually flash in turn, until the DataHog has undergone its setup routine. When this has happened the DataHog will settle into its normal operating routine as follows:

- LED 1 - DataHog 'wake-up' string is detected
- LED 2 - DataHog 'datastring' detected
- LED 3 - Complete 'datastring' successfully received
- LED 4 - 'Datastring' stored on the SDHC card successfully
- LED 5 - Indicates a search is being made for the 'datastring' but none was found
- LED 6, 7 & 8 - SDHC card storage attempt failed.

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2.5.1 Trouble-shooting LED Sequences

LEDs 6, 7 & 8 continuously flash

Indicates a full SDHC card.

In this scenario, LEDs 1,2,3,4 & 5 will not light even though the DataHog is still running. No storage will be taking place on the SDHC card as it is full, but the DataHog will continue to store to its internal memory as long as that isn't also full.

No buffering will be taking place and all datastrings will be lost until a new card is inserted.

If, by mistake, a full SDHC card is inserted instead of a blank one, then the above LED sequence will occur.

LEDs 6,7 & 8 continuously flash and LEDs 1,2,3,4 & 5 flash according to the datastrings generated by the DataHog

This indicates either no SDHC card is present or the SDHC card is faulty.

No buffering occurs and all datastrings will be lost until a new card is inserted.

LEDs 6,7 & 8 giving a single flash and LEDs 1,2,3,4 & 5 flash according to datastrings generated by the DataHog

This sequence occurs if the SDHC card is removed whilst the unit is running. Please note that in this situation the SDHC card could have been corrupted. See section 2.2 for details on how to remove the SDHC card safely.

No buffering occurs and all datastrings are lost until an SDHC card is inserted.

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The rest of this manual is a very detailed description of the DataHog2, how it operates, how to configure the many settings, plus wiring information of the many sensors which can be used. Some parts will not be applicable to the DataHog2+. DataHog2+ does not have any internal batteries, so please disregard any reference to internal batteries in the following pages.

Changing any of the configuration settings can be achieved by using the SkyeLynxComms software and datalead supplied with your system. Unplug the connector shown as no. 3 in the photo above and plug in the 8 pin plug on the end of the datalead

Please note. The DataHog2+ must be powered before connecting a datalead and pc.

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3.0 DataHog2

3.1 Internal (on-board) Memory

The DataHog2+ loggers all have solid state, battery backed Random Access Memory.(RAM). This stores all the logged data and also calibration factors etc. The on-board lithium cell should provide back-up power for approximately ten years. Because of this memory back-up, data is retained when the main batteries are flat or disconnected for replacement, but no logging is possible from this back-up power. It should be noted though that it is good practice to offload data from the unit before the main batteries are exhausted if at all possible.

Depending on the model of 5000 series, the RAM may hold up to 11,001 records of data and time (1 record includes date, time and a measurement of each channel) or nearly 30,000 measurements each with a time and date stamp, in 121,020 bytes. The amount of spare memory can be checked in Options 1 then 5 from the Main Menu. The following table gives a useful guide to the number of bytes used per channel and records available at different logging intervals:

TABLE OF INTERNAL (ON-BOARD) MEMORY SIZE AND USAGE

The internal memory of your DataHog2+ is split between a few locations required for housekeeping and the bulk of the storage capacity which is devoted to data storage. The data is stored in a format that is constant. Basically the data from each channel that has been gathered at one time is stored together with the date and time at which the data was obtained. Thus the channel data (from 1 to 8 channels) plus the time is a set number of records. Clearly the fewer the number of channels in use, the greater the number of records available for storage. The table below shows the maximum number of records for different numbers of channels in use and illustrates the time before memory is full at different logging intervals.

Channels	Bytes per record	Records available	Logging 1 min.	Interval 10 min	30 min	2 hrs
1	11	11,001	7.6 days	10.9 wks	32.7 wks	2.5 yrs
2	15	8,068	5.6 days	8.0 wks	24.0 wks	1.8 yrs
3	19	6,369	4.4 days	6.3 wks	18.9 wks	1.5 yrs
4	23	5,261	3.6 days	5.2 wks	15.6 wks	1.2 yrs
5	27	4,482	3.1 days	4.4 wks	13.3 wks	1.0 yrs
6	31	3,903	2.7 days	3.8 wks	11.6 wks	46 wks
7	35	3,457	2.4 days	3.4 wks	10.2 wks	41wks
8	39	3,103	2.1 days	3.0 wks	9.2 wks	37 wks
9	43	2,814	1.95 days	2.8 wks	8.3 wks	33 wks
10	47	2,574	0.78 days	2.5 wks	7.6 wks	30 wks
11	51	2,372	1.64 days	2.3 wks	7.0 wks	28 wks
12	55	2,200	1.52 days	2.2 wks	6.5 wks	26 wks
16	71	1,904	1.18 days	1.4 wks	5.0 wks	20 wks

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25	103	1,175	19.6 hours	8.1 days	3.5 wks	14 wks
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3.2 Channels

There are two 'types' of channels with DataHog2+, hardware channels and software channels. The former is the electronic hardware that is fitted to your DataHog2+. The hardware that you have will be shown in the front of this manual in the "Hardware Configuration Certificate". There are potentially 54 hardware channels, though only a total of 16 can ever be in any one DataHog2+. Channels can be used for a variety of inputs as is shown on your certificate, eg. voltage, current, digital, etc. The electronic components will be different in each case according to which input type that channel has been dedicated.

The connections for external sensors to the hardware channels will be marked on the Hardware Configuration Certificate located in the Calibration Certificates booklet provided with each logger. The connections and calibration for those sensors that require it, will be covered in subsequent sections of the manual.

3.2.1 Voltage Input Channels

In reality each is a differential amplifier (that is an amplifier which measures the voltage difference between both its inputs) but which has been arranged so that each of its inputs may be used as a separate channel if required. Usually only one or two of these channels will be fitted on any logger, though the full list is shown below.

Hardware Channel Number	Function and Description
0	Single ended Voltage Input, gain = 1, 10,100, or 1000
1	Single ended Voltage Input, gain = 1, 10,100, or 1000
2	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 2 uses the connections of channels 0 and 1)
3	Single ended Voltage Input, gain = 1, 10,100, or 1000
4	Single ended Voltage Input, gain = 1, 10,100, or 1000
5	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 5 uses the connections of channels 3 and 4)
6	Single ended Voltage Input, gain = 1, 10,100, or 1000
7	Single ended Voltage Input, gain = 1, 10,100, or 1000
8	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 8 uses the connections of channels 6 and 7)
9	Single ended Voltage Input, gain = 1, 10,100, or 1000
10	Single ended Voltage Input, gain = 1, 10,100, or 1000
11	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 11 uses the connections of channels 9 and 10)
12	Single ended Voltage Input, gain = 1, 10,100, or 1000
13	Single ended Voltage Input, gain = 1, 10,100, or 1000
14	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 14 uses the connections of channels 12 and 13)

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15	Single ended Voltage Input, gain = 1, 10,100, or 1000
16	Single ended Voltage Input, gain = 1, 10,100, or 1000
17	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 17 uses the connections of channels 15 and 16)
18	Single ended Voltage Input, gain = 1, 10,100, or 1000
19	Single ended Voltage Input, gain = 1, 10,100, or 1000
20	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 20 uses the connections of channels 18 and 19)
21	Single ended Voltage Input, gain = 1, 10,100, or 1000
22	Single ended Voltage Input, gain = 1, 10,100, or 1000
23	Differential Voltage Input, gain = 1, 10,100, or 1000 (note that channel 23 uses the connections of channels 21 and 22)

3.2.2 Current Input Channels

Note that each of these is a separate input to a current amplifier which can have any of eight different feedback resistors. The effect of these resistors is to set the scaling of the channel. The full scale of the DataHog2 is reached when 2.000 volts is applied to the Analogue to Digital converter by this current amplifier. The ratio of current in to voltage out (to the A/D converter) is set by this feedback resistor. It's precise value is given in the configuration certificate for each DataHog2. The ratio of current in to voltage out is given by the following:-

Current in for F/S voltage out (2.000) = 2.0000 volts / feedback resistor value (Megohms)

The individual resistors fitted are very stable in value, but each has a slightly different value. See the configuration certificate for the actual values fitted, but nominal values for each 'current gain' setting (resistor value Megohms / F/S input currents) are as follows:-

- | | | | |
|-------------------|------------------|----------------|------------------|
| 0) 0.005M / 400uA | 1) 0.01M / 200 A | 2) 0.05M/ 40uA | 3) 0.1M / 20uA |
| 4) 0.5M / 4uA | 5) 1.0M/ 2uA | 6) 5.0M/ 0.4uA | 7) 10.0M / 0.2uA |

Again, only one or two of these are usually fitted, but the full list is as follows:-

Hardware Channels Number Function and Description

25	Current Input - 'current gain' settable as above, 0) to 7)
26	Current Input - 'current gain' settable as above, 0) to 7)
27	Current Input - 'current gain' settable as above, 0) to 7)
28	Current Input - 'current gain' settable as above, 0) to 7)
29	Current Input - 'current gain' settable as above, 0) to 7)
30	Current Input - 'current gain' settable as above, 0) to 7)
31	Current Input - 'current gain' settable as above, 0) to 7)
32	Current Input - 'current gain' settable as above, 0) to 7)
33	Current Input - 'current gain' settable as above, 0) to 7)
34	Current Input - 'current gain' settable as above, 0) to 7)

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35	Current Input - 'current gain' settable as above, 0) to 7)
36	Current Input - 'current gain' settable as above, 0) to 7)
37	Current Input - 'current gain' settable as above, 0) to 7)
38	Current Input - 'current gain' settable as above, 0) to 7)
39	Current Input - 'current gain' settable as above, 0) to 7)
40	Current Input - 'current gain' settable as above, 0) to 7)

N.B. a) Current channel inputs are intended for use with Skye Instruments light sensors and so show a positive reading for a negative current input with respect to ground. If these channels are used with a sensor giving a positive current output with respect to ground, then the DataHog will show a negative current.

b) Current sourcing sensors that can apply greater than 2 volts to these inputs when they are not active, may cause errors on other channels.

3.2.3 Internal Temperature Channel

This is fitted only as an integral air temperature sensor, or as the 12th thermistor channel where 12 thermistor channels are required. If it is fitted, it may be addressed as channel 45, and will give an output as per a standard thermistor channel

Hardware Channel Number Function and Description

45	Thermistor only channel. Scale as a thermistor (10K)
----	--

3.2.4 Digital Input Channels

Low speed inputs. These accept switch closure inputs or 5 volt pulse inputs. The maximum counting rate is 300 pulses per second.

N.B. Digital channels may only be ascribed to one software channel.

Hardware Channel Number Function and Description

48	Counting channel. Max count = 65535 before rollover
49	Counting channel. Max count = 65535 before rollover
50	Counting channel. Max count = 65535 before rollover
51	Counting channel. Max count = 65535 before rollover
52	Counting channel. Max count = 65535 before rollover
53	Counting channel. Max count = 65535 before rollover

Note that with a sampling time of 1 hour, the maximum count rate is approximately 18 per second if a rollover is to be avoided with a sensor such as windspeed, sample times should be kept below 10 mins to avoid rollover.

3.2.5 Internal Relative Humidity Channel – earlier models of DataHog2 only

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This hardware is simply addressed as hardware channel 54. As for all other hardware channels it may be ascribed to any or all of the 25 software channels.

Hardware Channel Number	Function and Description
54	'Built in' Relative Humidity Channel.

3.2.6 Software Channels

The second type of channel or rather use of the word 'channel' is the software channel. This simply refers to the way that the software has been configured to look at the hardware. For example, if a hardware channel is fitted to the DataHog2+ it may be treated and read from the software as software channel 0 - 24 depending on how the software is configured. Many DataHog2+ s use a preset configuration option, but all can be individually configured to use available hardware channels as the user desires.

e.g. more than one software channel can read from a single hardware channel, this is especially useful if each software channel is set with a different gain for readings over a wide range.

NOTE - each digital hardware channel should not have more than one software channel assigned to them, as once they have been 'read' by the first software channel the counter is returned to zero.

3.2.7 Relay Output Channels

These channels can be fitted at the time of ordering your DataHog2+. Up to 4 relay outputs are available, which can be assigned to any software channel. More than one can be assigned to a single software channel if a "window" threshold is required.

The relay contacts are gold plated for low level relay switching and hence are for light duty, low inrush switching only. They are not suitable for direct mains connection, inductive loads or loads over 0.5amps. Slave relays should be used if these ratings are to be exceeded. The built-in relays have a very low contact resistance, and are suitable for dry switching circuits.

3.3 Calibration

Calibration of the sensor depends on the model in question, some units, for example with curve matched thermistor temperature sensors, will not need specific calibration, this being set at the time of manufacture. Others with external light sensors, or RH probes can be easily calibrated in software.

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Sections later in this manual give specific details for calibration of the various channel and sensor options. Please note that this manual contains the instructions for all models and options. Please ignore those that do not apply to your specific unit.

3.8 Firmware

As previously mentioned, the units are designed for low power operation, and this is at least in part achieved by switching off as much of the circuitry for as long as possible. This means, amongst other parts of the unit, the RS232 interface (which has a high current requirement), and hence the communication channel with you, the user, is switched off for most of the time.

However the software has been arranged so that in most modes there is a period of 'listening' on the RS232 to see if you wish to 'talk' to the unit. This period is generally immediately after the microprocessor has done the tasks required of it during each 'wake up' period (every ten seconds). In most cases a message is sent from the DataHog2+ via RS232 requesting a response. An audible beep generally precedes the second or so that the unit spends listening.

The DataHog2+ will only spend this extra time with the RS232 interface switched on if it 'thinks' that there is someone likely to want to 'talk' to it. The microprocessor monitors the 'plug detect' line - pin 6 socket 1 - and if this is shorted to ground, as by a suitably wired datalead connected to the RS232 input, then it will 'listen'.

N.B. If for any reason a connection lead is used without the 'plug detect' pin connected to ground, then, although in most modes some data will be sent FROM the 5000 series DataHog2+, it will not respond to characters sent from the host computer TO the DataHog2+.

During the listening period if any numeric character is sent to the unit at the correct baud rate it will immediately stop what it is doing and enter 'terminal' or Main Menu mode. The unit will then send a 'menu' to the host with various options. These options are listed in subsequent sections.

The baud rate for current software versions is 9600 Baud. Other details are 8 data bits, stop bits, no parity, and xon/xoff flow control.

4.0 OPERATION

4.1 Initial Set Up

The logger has been set up at Skye with as much information as possible for immediate operation. Where supplied with Skye sensors the appropriate scaling factors, zero offsets, gains etc have already been entered, as shown on the Hardware Configuration Certificate at the front of this manual. In many cases the user simply needs to set the sampling and storing periods desired and start logging.

4.1.1 Firmware Overview

Firmware means the programme that is running within the DataHog2+ itself, not on the PC. This programme is stored in a 'ROM' (Non-volatile Read Only Memory) chip.

The DataHog2+, as previously mentioned, is designed to save power when possible, and thus will 'sleep' for long periods compared to the time it spends working. Essentially, it has two modes of operation which are referred to as Logging Mode and Main Menu mode.

4.1.2 Logging Mode Overview

To conserve power the DataHog2+ shuts down circuits not currently in use whenever possible. In Logging Mode the operation is cyclic. It is 'woken' after approx. 8 seconds by the internal clock, it will collect and store data from channels according to the various settings made by the user in Main Menu mode.

'Listening' is a strange term, but the DataHog2+ is simply monitoring its RS232 input for any numeric character sent by a computer connected to it. As soon as the DataHog2+ receives such a character (assuming it arrives within the one second listening period) the DataHog2+ will leave logging mode and enter the Main Menu mode. If the character arrives too late, then the DataHog2+ will simply go back to 'sleep' and listen again about 10 seconds later.

4.1.3 Main Menu Mode Overview

Main Menu mode is entered when a character is received as described above. This can be achieved by using the SkyeLynx Comms software and choose Wake Up Logger.

The DataHog2+ transmits the Main Menu showing the various functions and setup choices it has to offer. These are described further in section 3.2. In essence, each option will either

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display status, offload data, configure and calibrate the logger, etc, returning the user to the Main Menu when the individual task is completed.

Main Menu mode can only normally be left and Logging Mode re-entered by pressing Escape on the PC keyboard.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2 Main Menu Mode Options

This is accessible from the SkyeLynxComms software

Main Menu mode is entered from Logging Mode by choosing File and Wake Up Logger, or by pressing a numeric key on the keyboard during the 'listening' period of the DataHog2+, 1 second after the ANY NUMERIC KEY TO WAKE UP message is seen. A menu of options is displayed as below and may be selected from by typing the menu option number or letter:

SKYE INSTRUMENTS LTD. MINIMET SERIES

SEND CHARACTER SHOWN TO SELECT ITEM
<ESC> RETURNS TO LOGGING

- MAIN MENU -

- 0) DISPLAY READINGS FROM ALL ACTIVE CHANNELS
- 1) DISPLAY CURRENT SETUP
- 2) DISPLAY SOFTWARE VERSION
- 3) OFFLOAD 24HOUR DATA SUSDHCHCARY
- 4) OFFLOAD DATA
- 5) RESET MEMORY
- 6) SET CLOCK
- 7) SET DATAFILE I/D, PLUS MEM OVERWRITE & TIMED LOGGING MODES
- 8) SET CHANNEL SAMPLE & LOG INTERVALS
- 9) SET AX+B CALIBRATION FACTORS
- A) SET CHANNEL CONFIGUR'NS
- B) SET INT'NL RH% SENSOR CALIB'N
- C) SET ALARM RELAY(S)
- D) SET CHANNELS FOR NONZERO / THRESHOLD LOG MODES
- E) ENTER 'LOG ON DEMAND' MODE

In general upper case characters are expected. <Escape> will cancel almost all operations before changes take effect!

Not all of these options apply to all models of the DataHog2+ family and consequently, those functions that do not apply to a particular unit will be found to be inoperative.

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Selecting such an inappropriate option will simply redisplay the Main Menu, or an explanatory message.

NOTE – always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data.

4.2.1 Option 0 - Display Readings From All Active Channels

This menu option will display instantaneous readings from all active channels each time the space bar is pressed on the PC keyboard, whatever logging intervals, thresholds or time modes have been set. Storage of readings does not occur when using this Option. See Section 3.2.15 for the Log on Demand mode, if logging is required. Escape cancels this mode and returns to the Main Menu.

NOTE - beware of irregular instantaneous readings from certain sensors which depend on a timed reading, e.g. windspeed, this will give metres per time interval of the space bar press in this mode.

NOTE – always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.2 Option 1 - Display Current Setup

This option displays a sub-menu requesting the user to select which items to display, as below. This is very useful to check logger configuration, memory status and battery voltage.

SELECT THE ITEM REQUIRED

- 0 - CHANNEL CONFIG'N AND SCALING
- 1 - SAMPLE AND LOG INTERVALS
- 2 - LOG MODE AND THRESHOLDS
- 3 - AX+B SCALING FACTORS
- 4 - ALARM RELAY SETUP
- 5 - TIME, BATTERY, MEMORY & TIMED LOG STATUS
- 6 - RETURN TO MAIN MENU

Option 0 displays each software channel, which is active alongside its associated hardware channel, gain, termination and scalecode.

Option 1 displays each software channel, which is active with its chosen sampling and storage times.

Option 2 displays each software channel, which is active, with its associated scalecode, logging threshold and logging mode.

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Option 3 displays each software channel, which is active with its full scale value, zero offset count and scalecode.

Option 4 displays each relay output (even if not fitted), which software channel it is assigned to and its threshold setting. (NOTE - logging and relay thresholds are two completely separate items, do not confuse, see Sections 3.2.13 and 3.2.14). Check your configuration certificate if in doubt as to which is fitted.

Option 5 displays current time and date, current battery voltage, total free data memory, full memory capacity, chosen logging start / stop times and whether timed logging is enabled or disabled, plus chosen memory full option. (Fresh batteries will have a voltage of 9 volts, logging will stop around 6 volts. Memory capacity is given in bytes, please see section 2.3 for conversion to number of records.)

See Appendix I for a summary of codes for gains, scalecodes, sample and logging times.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.3 Option 2 - Display Software Version

This mode displays the version of the current logger software along with Skye contact details for help or service. Please note that the current address, email address, web page, telephone numbers etc are to be found on the cover of this instruction manual.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.4 Option 3 - Offload 24 hour data summary

This option will display a summary of data for a chosen 24 hour period, e.g. previous day. You are asked to enter a date and the summary is calculated from midnight to midnight for that day (if records for that date are held in memory), and displayed as maximum, minimum and mean values for each active channel.

A total is also given for digital channels - however, this total is given as unscaled (raw count) data, with a maximum display of 999999 before 'rollover'. This is because a total count can potentially be a very large number when scaled into units.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

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4.2.5 Option 4 - Offload Data - internal DataHog memory only

This menu option will offload all data stored in the DataHog internal memory only from the start of memory to the latest record. Please refer to Appendix XX for details on accessing the data on the SDHC card

Using the **SkyeLynx Comms** provided with the DataHog logger, simply click on 'Off-Load Data' button and this operation will be done automatically for you. You are prompted for a filename, enter as required (e.g. data1234.txt) and click OK.

The data you have saved consists of a stream of data records. A record is the data collected from each active channel at a particular time. The first item in the datapoint is the date and time of the series of readings. This is given in the form: DD:MM:YY:Hrs:Mins:Secs. The data starts with the lowest numbered active channel. A space separates this data from the next active channel/data, until all channel data is sent. A carriage return and line feed terminates the datapoint.

If the memory full option has been set to overwrite when full (see Chapter 3.2.8), and the datalogger memory has become full and been overwriting the latest records in a continual loop, you may find that the latest records will be in the middle of this data file, not at the very beginning.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.6 Option 5 - Reset internal DataHog memory

A routine that will clear all the data in the DataHog internal memory, leaving it clear for new records. Use with caution as this will remove all stored data. Use the Escape key if you do not want to clear the memory.

Full instructions are given on screen, you must enter 'R' (not 'r') to complete the memory reset procedure. The process will be confirmed on screen, before the logger returns to the Main Menu.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.7 Option 6 - Set clock

This routine allows the user to set the logger's internal clock in real time. It is initially set at Skye to GMT and the logger's clock is backed by an internal lithium battery. In some instances you may find that the clock will 'drift' by about 5 minutes in a 6 month period, so occasional adjustments may be necessary.

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Full instructions are given on screen. Enter the required time first in the format HH:MM:SS, and press Y to confirm. Note that the clock starts only when the date is confirmed and entered, so you may choose to set the time 10 seconds or so ahead at this point.

Enter the required date in the format DD.MM.YY and press Y to confirm. You will receive a confirmation message that the clock is now running, and will return to the Main Menu.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.8 Option 7 - Set Datafile Identifier, Plus Memory Overwrite & Timed Logging Modes

This option displays a sub-menu requesting the user to select which options to set, as below:

SELECT ITEM REQUIRED

- 0 - ENABLE MEMORY OVERWRITE
- 1 - DISABLE MEMORY OVERWRITE
- 2 -
- 3 - SET LOG START / STOP TIME
- 4 -
- 5 - EDIT DATAFILE IDENTIFIER
- 6 - RETURN TO MAIN MENU

Option 0 - Enable memory Overwrite will enable the DataHog2+ 's memory to overwrite in a loop, so that the oldest records are overwritten with the latest data. Your choice is confirmed on the screen.

Option 1 - Disable Memory Overwrite will disable the overwrite option so that the DataHog2+ will stop logging and emit a regular series of beeps (at each logging interval) when the memory is full. Your choice is confirmed on the screen.

Option 2 is not available.

Option 3 - Set Log Start / Stop Time allows logger setup if a timed logging period is required, and displays a further submenu as follows:

- 00) - DISABLE LOGGING START / STOP TIME
- 01) - ENABLE LOGGING START / STOP TIME
- 02) - ENTER THE LOGGING START TIME
- 03) - ENTER THE LOGGING STOP TIME

Option 00 is used if timed logging is not required, or is to be disabled. Confirmation that normal logging mode has been resumed is seen on screen.

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Option 01 enables the logger to use the start / stop times entered in Options 02 and 03. Confirmation is again seen on screen. Ensure that the stop / start times are correct before leaving this submenu.

Option 02 allows the user to enter a date and time when the DataHog2+ will begin its logging sequence.

Option 03 allows the user to enter a date and time when the DataHog2+ will end its logging sequence. The stop date /time must be later than the start date/time or logging will not occur. Also make sure that Option 01 is used to enable this timed logging mode.

NOTE - The DataHog2+ 's date and time clock uses the last 2 digits of the year only, e.g. 96 for 1996. So in the year 2000 the DataHog2+ 's clock will reset to 00, and so a timed logging period beginning in 1999 and ending in 2000 will be ignored.

Option 4 is not available.

Option 5 - Edit Datafile Identifier allows the user to enter and edit 12 characters to identify this DataHog2+ logger. These characters will be automatically printed at the head of datafile when data is offloaded. This is particularly useful if the user is collecting data from more than one system. Your 12 characters will be repeated on screen for your confirmation before continuing.

The default Datafile Identifier setting entered at Skye includes the logger serial number, e.g. 12345xxxxtxt where the serial number is 12345. SkyeLynx Standard, WizzCom, SkyeLynx Auto and Deluxe Software packages uses this datafile identifier in filenames for data storage.

Option 6 - Return to Main Menu will exit this sub-menu and return to the logger Main Menu

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.9 Option 8 - Set Channel Sample And Log Intervals

This option changes the basic logging mode function of the DataHog2+. The user can choose sampling and logging intervals for each individual software channel.

The sampling interval is where a reading is taken from the software channel and stored in temporary memory. At the chosen logging (storage) interval, the total of the sampled readings will be divided by the number of samples and the single averaged measurement stored in memory with the appropriate time and date. If sample and log times are equal, the averaging process is irrelevant, and readings are stored directly, i.e. 'spot' logging at a total count, as advised for rainfall channels.

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Both sampling and logging (storage) intervals can be chosen from 10 seconds to 12 hours, in any combination and can be different for each software channel if desired. However, different storage channels for each sensor can result in data which is difficult to sort into columns in a spreadsheet such as Excel.

Beware, as it is possible to choose a sampling time which is equal to or greater than the logging interval. Where logging time is shorter than sampling time, erroneous or zero data may be stored.

Options available are all visible on screen. In the current software version these options are displayed as codes, a summary of options and codes is given below and in Appendix I.

You will first be asked the software channel you wish to configure, enter channel number 00 to 24. The submenu below will then ask you to choose the sampling time for that channel:

ENTER THE SAMPLING TIME TO USE

ENTER THE NUMBER (01 TO 18) FOR THE PERIOD REQUIRED

01 -	10 - 10 min
02 -	11 - 20 min
03 -	12 - 30 min
04 - 10 sec	13 - 1 hour
05 - 20 sec	14 - 2 hour
06 - 30 sec	15 - 3 hour
07 - 1 min	16 - 4 hour
08 - 2 min	17 - 6 hour
09 - 5 min	18 - 12 hour

Enter the code for the sampling time required. A second, similar submenu will then be displayed showing identical codes for choosing the storage time at which the sampled readings will be averaged and stored. Enter the code as before.

The routine will now display a summary of your chosen codes for the sampling and storage times. Press Y to accept and confirm if correct, and return to Main Menu. Repeat the procedure for each channel as necessary. When Main Menu mode is terminated and logging initiated, the DataHog2+ will 'go to sleep' and commence the new logging function mode at the next wake-up period.

When logging parameters such as light measurement or wind speed, where the values change greatly and fast, then averaging many frequently taken samples is the only practical mode. Long storage intervals can be used with short sampling times without losing much data. Spot logging (i.e. choosing identical sampling and storage intervals) may seriously misrepresent the true data, for example a cloud may cover the sun for just a few seconds in an hour, but if a spot logging interval occurs at this point then the user is not told of the high levels throughout the rest of the hour. Averaged logging avoids this problem.

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NOTE - to record total rainfall it is necessary to set identical sample and log times. This will give an accumulative rainfall measurement, otherwise an average or mean measurement would be recorded, and the 'average' value may fall below the storage resolution in some cases.

Spot logging also has use in sampling slowly changing parameters, especially when measurements have to be synchronised with various events, processes or other measurements.

The DataHog2+ logger is factory set to 30 seconds sample and 30 minutes storage intervals as default (except for raingauge channels which have both sample and storage intervals set at 30 minutes). The user can change these settings as preferred.

When a RS232 datalead is connected to the DataHog2+ and it transmits its 'wake up' message every 10 seconds to the PC, it will also transmit sensor readings each time a channel is logged (but not each time a channel is sampled). So if the user requires the DataHog2+ to log as well as transmitting data, simply set the logging interval to the transmitting interval required and link up to the PC. Alternatively use Option E from the Main Menu, Log on Demand mode - see Section 3.2.15. Remember that RS232 communication drains the DataHog2+'s internal batteries at a greater rate than remote logging, and an external power supply should be considered for long term operation in this mode.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.10 Option 9 - Set AX+B Calibration Factors

This routine sets the calibration factors for channels using the 'Ax+B' scaling, e.g. channels for light sensors, anemometers, raingauges etc. Its function is to convert raw data from the sensor into empirical units for ease of use. This option can be applied to each channel individually as appropriate.

It is advisable to first set up the Channel Configuration using Option A (see Chapter 3.2.11) before setting the Ax+B scaling.

On choosing '9' from the Main Menu you are first asked to enter the software channel to configure, choose from channel number 00 to 24. The following submenu is then displayed:

ENTER THE NUMBER FOR UNITS REQUIRED TO GIVE FULL SCALE
Calculate the Full Scale as follows

- a) For Voltage Input channels 1 - 23
$$F/S = (\text{SENSOR OUTPUT [Units per mV]} / \text{GAIN}) * 2000$$

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b) For Current Input channels 25 - 40

$$F/S = 2.000 / (\text{SENSOR OUTPUT } [\mu\text{A per Unit}] * \text{Feedback Resistor } [\text{Megohms}])$$

c) For Digital channels 48 - 53

$$F/S = \text{SENSOR OUTPUT } [\text{Units per } 19,000 \text{ pulses}]$$

Enter 5 digits AND a decimal point

Leading zeros NOT permitted

Calculate the full scale as instructed for the type of channel chosen and enter in the required format above. You will then see a second submenu displayed:

ENTER THE OFFSET COUNT AND THEN ITS SIGN WHEN PROMPTED

The count is calculated as follows

a) For Voltage Input channels 1 - 23

$$\text{Offset count} = \text{SENSOR OFFSET (mV)} * \text{GAIN (1, 10, 100, 1000)} * 9.5$$

b) For Current Input channels 25 - 40

$$\text{Offset count} = \text{sensor offset } (\mu\text{A}) * \text{FEEDBACK RESISTOR (Megohms)} * 9500$$

c) For Digital channels 48 - 53

Offset count usually zero, but may be used as a threshold

ENTER THE OFFSET COUNT REQUIRED (MAX = 9999)

Again, the appropriate zero offset figure should be entered, calculated as instructed. You will then be prompted to enter the sign of the offset (+ or -) and a summary of your entries for that software channel will be displayed for you to accept, reject or redo. Acceptance or Escape will return to the Main Menu, Redo will restart the option sequence. Repeat the procedure for each channel as necessary. If the offset entered is zero, the sign is irrelevant, but a + or - must be entered in order to move on.

If there is no sensor offset or the offset is zero, please enter 0000 and +.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.11 Option A - Set Channel Configurations

This routine will enable the user to set up each individual software channel to match the sensor it is logging. As the user goes through the process a series of submenus will be displayed giving choices for the type of channel, voltage, current, digital, RH etc, the gain, type of output required etc.

Firstly the user will be asked to enter the software channel to be configured from 00-24. The following menu will than be displayed:

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ENTER THE HARDWARE CHANNEL TO USE (00 TO 54)

- 0 - 23 - VOLTAGE INPUTS FOR +/-2V TO +/-2mV AS SET BY GAIN:-
- 25 - 40 - CURRENT INPUTS FOR +/-400uA TO +/-2uA AS SET BY GAIN:-
- 45 - INTERNAL TEMPERATURE REFERENCE
- 48 - 53 - DIGITAL COUNT CHANNELS
- 54 - INTERNAL HUMIDITY CHANNEL

SEE YOUR CONFIGURATION CERTIFICATE OR MANUAL

Refer to the DataHog2+ Hardware Configuration Certificate in the Calibration Certificate booklet to check which hardware channels have been fitted to your logger. Enter the hardware channel number 00 to 54.

Depending on the type of channel you have chosen to configure, a different series of submenus will be displayed.

4.2.11a Voltage Inputs 0 - 23

Enter the hardware channel you wish to configure 0 - 23 and you will then be asked to specify the gain to use as below:

ENTER GAIN TO USE

SELECT THE VOLTAGE GAIN

- | | | |
|---------------|-----------|-----|
| 0 - GAIN*1 | +/- 2.0V | F/S |
| 1 - GAIN*10 | +/- 200mV | F/S |
| 2 - GAIN*100 | +/- 20mV | F/S |
| 3 - GAIN*1000 | +/- 2.0mV | F/S |

Enter the gain appropriate for your voltage output sensor as shown. NB - do not connect a sensor with a higher output than 4.5 volts, as this may damage your DataHog2+ 's circuitry.

You will then be requested to choose the termination suitable for this voltage channel. Termination is only really applicable to differential voltage channels, but must be set for all voltage channels. See the submenu below:

ENTER THE TERMINATION TO USE

SELECT THE TERMINATION. (SELECT '0' AS DEFAULT)

- 0 - NO INPUT GROUND RETURN
- 1 - A+ INPUT HAS GROUND RETURN
- 2 - B- INPUT HAS GROUND RETURN

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Enter your choice of termination 0, 1 or 2. Choose option 0 for no input ground return, as default or if in doubt.

Option 1 terminates the positive differential input (Pin 4 of the sensor socket) to ground, and Option 2 terminates the negative differential input (Pin 3 of the sensor socket) to ground. This termination, chosen in software, enables the use of a 100 ohm resistor to ground the chosen connection.

The following menu is displayed requiring the entry of the scalecode to use . The scale code will determine how the data will be handled by the DataHog2+ and how it will be displayed and offloaded.

ENTER THE SCALE CODE TO USE

SELECT THE SCALING REQ'D FOR THIS SOFTWARE CHANNEL

- 0 - RAW DATA COUNT 6 -
- 1 - Ax + B SCALING
- 2 - THERMISTOR (10K)
- 3 - INTERNAL RH%
- 4 - WINDVANE
- 5 - CHANNEL OFF

Enter your chosen scalecode (usually Option 1 - Ax + B for voltage channels), and the software will then display all the choices you have made for this voltage channel. If correct, press Y to accept and return to Main Menu.

If you have chosen Option 1 - Ax + B, remember to set this scaling in Option 9 - Enter Calibration Factors from the Main Menu, see section 3.2.10 of this manual for more details.

If at any time you wish to switch off a software channel, e.g. to increase logging capacity, choose Option 5 - Channel Off from the Scalecode menu above.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.11b Current Inputs 25 - 40

These channels are usually used for Skye light sensors or other photodiode type sensors.

Enter the hardware channel you wish to configure 25 - 40 and you will then be asked to specify the gain to use as below:

ENTER THE GAIN TO USE

SELECT THE FULL SCALE CURRENT FEEDBACK RESISTOR

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- | | |
|--------------------|------------------|
| 0 - 0.005M (400uA) | 4 - 0.5M (4.0uA) |
| 1 - 0.01M (200uA) | 5 - 1M (2.0uA) |
| 2 - 0.05M (40uA) | 6 - 5M (400nA) |
| 3 - 0.1M (20uA) | 7 - 10M (200nA) |

The feedback resistors are shown with nominal values in the submenu above, exact figures for the resistors fitted to your DataHog2+ are given on the Hardware Configuration Certificate. Choose the gain suitable for your current output sensor.

Note that the true 'full scale' current is calculated as follows using the values given on the calibration configuration certificate:-

$$\text{Full scale current } (\mu\text{A}) = \frac{2 \text{ (volts)}}{R \text{ (megohms)}} = \frac{2}{0.497} = 4.024$$

The routine will now ask you to enter the scalecode for this software channel.

ENTER THE SCALE CODE TO USE

SELECT THE SCALING REQ'D FOR THIS SOFTWARE CHANNEL

- | | |
|----------------------|-----|
| 0 - RAW DATA COUNT | 6 - |
| 1 - Ax + B SCALING | |
| 2 - THERMISTOR (IOK) | |
| 3 - INTERNAL RH% | |
| 4 - WINDVANE | |
| 5 - CHANNEL OFF | |

Enter your chosen scalecode (usually Option 1 - Ax + B for current channels), and the software will display all the choices you have made for this current channel. If correct, accept and return to Main Menu.

If you have chosen Option 1 - Ax + B, remember to set this scaling in Option 9 - Enter Calibration Factors from the Main Menu, see section 3.2.9 of this manual for more details.

If at any time you wish to switch off a software channel, e.g. to increase logging capacity, choose Option 5 - Channel Off from the Scalecode menu.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.11c Internal Temperature Reference - 45

This hardware channel will be chosen if your DataHog2+ is fitted with an integral air temperature sensor. It can also be used as a 12th channel of thermistor temperature in some cases.

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Enter hardware channel 45. No gain needs to be chosen for this channel so the submenu to choose the scalecode is immediately displayed

ENTER THE SCALE CODE TO USE

SELECT THE SCALING REQ'D FOR THIS SOFTWARE CHANNEL

- 0 - RAW DATA COUNT 6 -
- 1 - Ax + B SCALING
- 2 - THERMISTOR (10K)
- 3 - INTERNAL RH%
- 4 - WINDVANE
- 5 - CHANNEL OFF

Choose Option 2 - Thermistor (10K). The software will then display all the choices you have made for this internal temperature reference channel. If correct, accept and return to Main Menu.

If at any time you wish to switch off this software channel, e.g. to increase logging capacity, choose Option 5 - Channel Off from the Scalecode menu.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.11d Digital Count Channels 48 - 53

Enter the hardware channel you wish to configure. No gain needs to be set for digital channels so the submenu to choose the Scalecode is immediately displayed:

ENTER THE SCALE CODE TO USE

SELECT THE SCALING REQ'D FOR THIS SOFTWARE CHANNEL

- 0 - RAW DATA COUNT 6 -
- 1 - Ax + B SCALING
- 2 - THERMISTOR (10K)
- 3 - INTERNAL RH%
- 4 - WINDVANE
- 5 - CHANNEL OFF

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Choose the scalecode desired (usually Option 0 - Raw data count or Option 1 - Ax + B scaling for digital channels). The software will then display all the choices you have made for this digital channel. If correct, press Y to accept and return to Main Menu.

If at any time you wish to switch off a software channel, e.g. to increase logging capacity, choose Option 5 - Channel Off from the Scalecode menu.

Note that although more than one software channel may be ascribed to a hardware channel, eg. voltage, perhaps with two different gains, it is not advisable to do so for digital channels. At each Sample time, the accumulated digital counts are 'read' by the logger and the counter is then re set to zero. If more than one software channel is used with a digital channel, the higher number software channel will return counts accumulated only between the first and second scans of the hardware channel (usually less than 1 second).

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.11e Internal Humidity Channel - 54

Not relevant to the DataHog2+

ENTER THE SCALE CODE TO USE

SELECT THE SCALING REQ'D FOR THIS SOFTWARE CHANNEL

- | | |
|----------------------|-----|
| 0 - RAW DATA COUNT | 6 - |
| 1 - Ax + B SCALING | |
| 2 - THERMISTOR (IOK) | |
| 3 - INTERNAL RH% | |
| 4 - WINDVANE | |
| 5 - CHANNEL OFF | |

Choose Option 3 - Internal RH%. The software will then display all the choices you have made for this internal temperature reference channel. If correct, accept and return to Main Menu.

If at any time you wish to switch off this software channel, e.g. to increase logging capacity, choose Option 5 - Channel Off from the Scalecode menu.

Remember, when configuring channels yourself, that there must be a suitable hardware channel fitted in your DataHog2+ for the configuration you set. For example, it is no use to configure software channel on say relative humidity, if there is no integral relative humidity hardware in your logger. Check the Hardware Configuration Certificate if in doubt.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

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4.2.12 Option B - Internal RH% Sensor Calibration

Not relevant to the DataHog2+

4.2.13 Option C - Set Alarm Relay(S)

This option will only be available for models which have relay outputs fitted at the time of ordering. Up to 4 relays can be fitted to each DataHog2+. These are changeover relays, single pole with all 3 contacts, off, common and on, (contacts 1, 2 and 3 - see chapter 4 for pin connections) available to the user.

Each relay may be assigned to any software channel of the DataHog2+, more than one relay can be assigned to a single channel to give a 'window' threshold if required.

Option C will first ask the user to specify which relay to set, and then which software channel to use as a threshold. The relay threshold must then be entered using the same format as the full scale for that channel - an example is given on screen.

Leading zeros are required and the format must be adhered to. Invalid characters will restart this sequence. Note that sometimes there may be internal rounding of figures due to multiple linearisation tables and the set positions may deviate from the input values by one least significant bit.

Your choices and threshold value is repeated on screen for your confirmation.

NOTE - for humidity, no sign (+ or -) is needed, only one decimal place is required, format is xxx.x (e.g. 099.9). For thermistor channels the format is xxx.xx plus a + or - sign (e.g. +100.00). All other channels must be entered as raw data, e.g. +19000 - however, these are redisplayed for confirmation as scaled values if the channel being configured is set up as AX+B. (See Appendix 5 for a table of wind direction degrees against raw data count for the Vector W200P windvane.)

The relays will switch whenever the channel to which they are assigned is sampled i.e. at each sample time.

e.g. if the sample code is set to 30 seconds (code 06) then it will compare the threshold value with the channels reading every 30 seconds and switch accordingly.

When the logger's other functions are used, e.g. offload in Main Menu mode, the relays will remain in their last set position. They will hold this position until the logger reverts to its normal 'sleep / sample / store' mode. As soon as the Main Menu mode is left and the first sample occurs, the relay assigned to the sampled channel will take on its new position, if its threshold or the reading from the channel have altered.

To disable switching a relay, assign to an unused channel or set the threshold to a value outside the normal operating range, above or below, depending on the desired contact position.

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NOTE - alarm relay thresholds are very different from the logging thresholds described in Section 3.2.14 below and must not be confused.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.14 Option D - Set Channels For Non Zero / Threshold Log Mode

This option allows the user to set up the DataHog2+ for normal logging, logging only if data is not zero, or logging above or below a set threshold. Each software channel can be individually configurable, but only one mode can be set at any one time. On choosing Option D from the Main Menu, you are asked to enter the software channel you wish to set, choose from 00 to 24. The following submenu is then displayed:

CONFIGURE CHANNEL FOR -
00) - NORMAL LOGGING
01) - NON-ZERO LOGGING
02) - LOGGING ABOVE THRESHOLD
03) - LOGGING BELOW THRESHOLD

Option 00 - in normal storage mode, the DataHog2+ will store every measurement at the chosen log storage) intervals. Your choice of normal logging is confirmed on screen.

Option 01 - in non-zero storage mode, a measurement is only stored in memory if it does not have a raw data value of zero. This option is a memory saving procedure and prevents the memory being filled up with unnecessary zeros - most applicable to digital channels. Your choice of non-zero logging is confirmed on screen.

NOTE - it is not advised to use the non-zero storage mode option with relative humidity and temperature channels. The raw data values for these sensors are not zero at 0% and 0°C. Similarly for voltage or current channels as these may have a zero offset. This option is really designed for use with digital channels only, where the absence of a 'count' has a clear meaning and is usually a significant event, eg. a tipping bucket raingauge.

Option 02 - this mode can be used to offset readings if wished, data is stored only when readings are above the set threshold. You are asked set this threshold by entering it in the same format as the full scale value for the chosen software channel - an example is given on screen. A + or - sign and leading zeros are required.

Option 03 - this option is similar to Option 02 above, except data is stored only when readings are below the set threshold. You are asked set this threshold by entering it in the same format as the full scale value for the chosen software channel - an example is given on screen. A + or - sign and leading zeros are required.

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Your choices and threshold setting are redisplayed for confirmation before returning the Main Menu mode.

NOTE - for humidity, no sign (+ or -) is needed, only one decimal place is required, format is xxx.x (e.g. 099.9). For thermistor channels the format is xxx.xx plus a + or - sign (e.g. +100.00). All other channels must be entered as raw data, e.g. +19000 - however, these are redisplayed for confirmation as scaled values if the channel being configured is set up as AX+B.

An exception in this case is setting up logging thresholds for a windvane channel. The same routine is displayed, requesting the threshold value as raw data, i.e. +19000, but the value in degrees (0-359, entered as +00000 to +00359) is expected. See Appendix 5 for wind direction in degrees v raw data values.

Repeat this procedure for each software channel in turn, as required. All channels are set to normal logging by default before leaving Skye.

NOTE - logging thresholds are very different from the alarm relay thresholds described in Section 3.2.13 above and must not be confused. They are separate values, treated and stored separately by the DataHog. Even if identical values are required for relay and log thresholds on the same channel, each must be individually entered.

NOTE - always press Escape to leave Main Menu mode and return to Log Mode. Else the logger will not record any data and batteries will drain quickly.

4.2.15 Option E - Enter 'Log On Demand' Mode

This menu option displays and logs in memory instantaneous readings from all active channels each time the space bar is pressed, (or the ASCII character equivalent to the space bar is sent to the DataHog2+) whatever logging intervals, thresholds or time modes have been set. ESCAPE cancels this mode and returns to the Main Menu.

NOTE - beware of irregular instantaneous readings from certain sensors which depend on a timed reading, e.g. windspeed, this will give metres per time interval of the space bar press in this mode.

Note also, with some communications software associated with Windows, two or three erroneous characters will precede the readout of the channel number of the RH% channel. The channel number and value will be correct and these characters should be ignored. They will not appear in the stored data.

4.3 Care For Your DataHog2+

Do not allow the logger to be even partially immersed in water. Keep the connectors either mated with a waterproof plug or cover, when exposed to weather. Protect the inside of the logger from damp, rain etc.

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It is advisable to replace the silica gel pack inside the enclosure at least once a year. The gel pack can be refreshed by warming in an oven above 100 deg C for an hour to drive off the water. Remove from the oven and place in a small air tight container to cool until it is reinstalled in the logger.

5.0 CONNECTIONS

The DataHog2+ datalogger will have the following sockets on the outside of the enclosure:

- 5 pin sockets for sensor connections. The number will be determined by the number of sensors to be connected
- Connection to a 12 volt battery
- Connection to a solar panel (if supplied)

The RS232 datalead supplied with your DataHog2+ is configured to connect to a PC. It will also work with USB adapters and other types of computer - see communication lead diagram Figure 1.

The connection for this is inside the enclosure.

Details of all socket pinouts are in the following sections. The pin numbers referred to are as marked on the socket and matching plug. How to dismantle and assemble the matching plugs are shown in Figure 2. Pin identification is shown in Figure 3.

The sensor inputs are wired internally to the appropriate hardware channel, as shown on the DataHog2+ Hardware Configuration Certificate.

5.1 RS232 Connector

The diagram Figure 2 shows the connections for the datalead to join the DataHog2+ to a 25 or 9 pin standard COM or serial port of a PC.

The function of the pins in the DataHog2+ 8 pin RS232 socket are as follows:-

Pin 1	Tx data	Data leaves the DataHog2+ here
Pin 2	Rx data	DataHog2+ reads data on this pin
Pin 3	Ground	Earth or common for power supply (P.S.U.) or signal
Pin 4	Ext supply +ve	A pin for connecting an external power supply between 8 and 15 volts. As long as this supply is higher than 10 volts there is no need to remove the normal internal batteries (N.B. not the RAM backup). They can be left to act as a backup for maintaining full operation when the external supply is interrupted, since no current will be drawn from them as long as the external supply is above 10 volts.
Pin 5	P.S.U. Reset	This pin, when shorted <u>momentarily</u> to the ground pin (pin 3), will duplicate the action of the P.S.U. Reset

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		button. This allows full remote operation of the logger. Do <u>not</u> connect permanently, or excess current will be drawn.
Pin 6	Plug Detect	This pin when shorted to the ground pin, will allow the microprocessor to know that a plug is connected to the DataHog2+ and hence force the DataHog2+ to 'listen' at regular intervals for user commands. This can be permanently connected to the ground, but the lowest current consumption and hence longest battery life is achieved by removing the communication lead and hence disconnecting this from ground.
Pin 7	not used	
Pin 8	not used	

5.2 Light Sensors

i) Sockets for single channel light sensors

Pin 1	-	not used
Pin 2	-	not used
Pin 3	-	not used
Pin 4	-	signal output (negative current) channel input
Pin 5	-	ground and cable screen

ii) Sockets for SKR 110 / SKR 1800 2 channel light sensors

Pin 1	-	n/c
Pin 2	-	n/c
Pin 3	-	signal output (negative current) 2nd channel
Pin 4	-	signal output (negative current) 1st channel
Pin 5	-	ground (common) and cable screen

iii) Sockets for SKR 1850/SKR 1860 un-amplified 4 channel light sensors

Pin 1	-	signal output (negative current) 1st channel
Pin 2	-	signal output (negative current) 2nd channel
Pin 3	-	signal output (negative current) 3rd channel
Pin 4	-	signal output (negative current) 4th channel
Pin 5	-	ground (common) and cable screen

5.3 Temperature Sensors (Thermistors)

Sockets for connection of single thermistors

Pin 1	-	n/c
-------	---	-----

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Pin 2	-	thermistor connection (positive excitation)
Pin 3	-	n/c
Pin 4	-	n/c
Pin 5	-	thermistor connection (ground) and cable screen

5.4 Single Ended Voltage Sensors

N.B. Be sure that the DataHog2+'s channel is specified for the voltage you are intending to connect as an input. Do not use sensors with a voltage output greater than +/- 4.5V as these may damage the DataHog2+'s circuitry.

Also no more than 5 mA (10-15mA maximum total over all sockets) may be drawn from the 5 volt supply pin. Offset errors may occur with high ground current and long leads.

Pin 1	-	positive excitation (5.000 volts)
Pin 2	-	0- maximum input voltage (from sensor or customer's equipment)
Pin 3	-	not used
Pin 4	-	not used
Pin 5	-	ground and cable screen

5.5 Differential Voltage Sensors

Sockets for connection of a differential voltage / bridge type sensor, e.g. an air pressure barometer, soil moisture tensiometer, water level sensor, thermopile pyranometer etc

N.B. Be sure that the DataHog2+'s channel is specified for the voltage you are intending to connect as an input. Do not use sensors with a voltage output greater than +/- 4.5V as these may damage the DataHog2+'s circuitry.

Also no more than 5 mA (10-15mA maximum total over all sockets) may be drawn from the 5 volt supply pin. Offset errors may occur with high ground current and long leads.

Pin 1	-	positive excitation (5.000 volts)
Pin 2	-	not used
Pin 3	-	negative going input
Pin 4	-	positive going input
Pin 5	-	ground and screen of cable

5.6 Digital Sensors

Sockets for connection of a reed switch closure type sensor, e.g. raingauge or wind speed anemometer

Pin 1	-	not used
Pin 2	-	sensor switch connection (positive excitation)
Pin 3	-	not used
Pin 4	-	not used
Pin 5	-	sensor switch connection, ground and cable screen

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5.7 Potentiometer Sensors

Sockets for connection of a potentiometer type sensor, e.g. a 1 kohm wind vane. Please note it is only possible to configure the DataHog2+ logger to decode ONE windvane.

Pin 1	-	not used
Pin 2	-	Voltage reference
Pin 3	-	not used
Pin 4	-	Wiper of potentiometer
Pin 5	-	ground

5.8 Special Socket - RH & Air Temperature Sensors

This socket combines 2 single-ended voltage channels, it is not a differential voltage input.

a) For two 0-IV outputs, e.g. SKH 2060 or 2065

Pin 1	-	positive excitation (5.000 volts)
Pin 2	-	not used
Pin 3	-	0-IV RH input
Pin 4	-	0-IV Temperature input
Pin 5	-	ground and screen of cable

b) For one 0-IV output and one thermistor output, e.g. SKH 2070

Pin 1	-	positive excitation (5.000 volts)
Pin 2	-	not used
Pin 3	-	0-IV RH input
Pin 4	-	10 kohm thermistor Temperature input
Pin 5	-	ground and screen of cable

5.9 Relay Output

Pin 1	-	normally off	} joined when the threshold is above the reading
Pin 2	-	common	
Pin 3	-	normally on	} joined when the threshold is below the reading

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6.0 SKYELYNX COMMS SOFTWARE

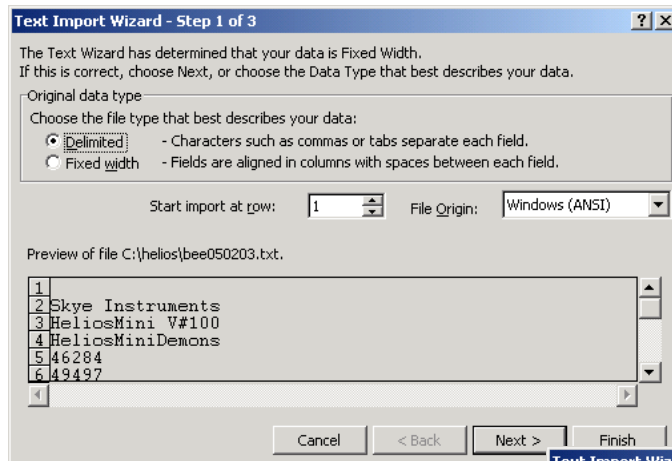
The DataHog2+ logger is supplied with SkyLynx Comms software for easy communication to set up, operate and download data from memory. Please refer to the separate manual for instructions.

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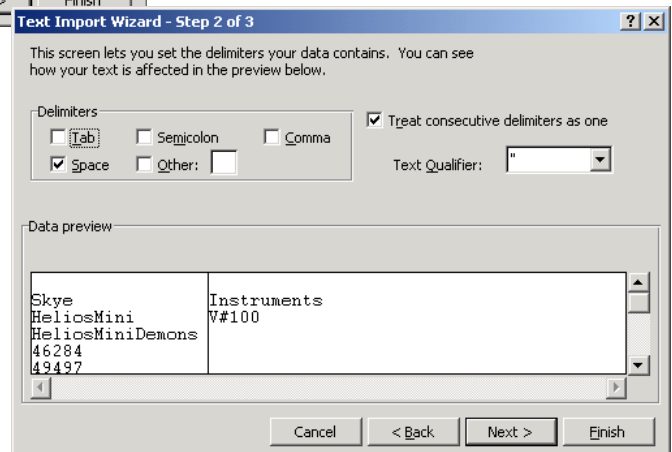
7.0 IMPORTING DATA INTO EXCEL

Once you have logged some data and offloaded this into a file, you may use Microsoft Excel to easily view, graph and tabulate the data as follows:

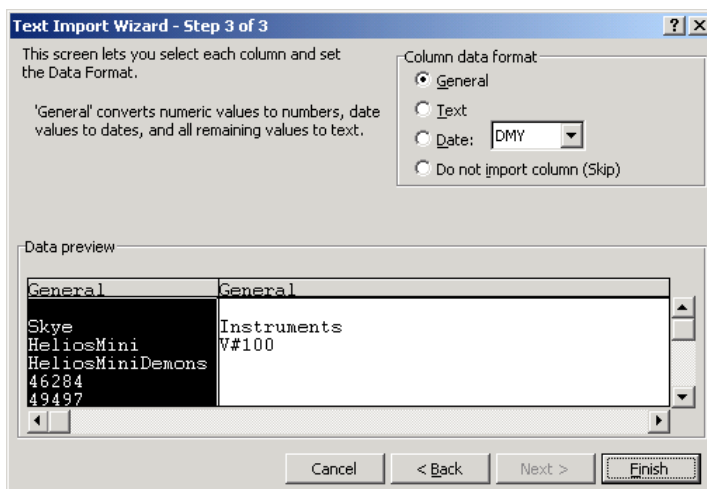
1. Open Excel. Click File, Open and choose the file offloaded from your DataHog2+ logger.
2. Go through the Text Import Wizard steps 1 to 3 as shown below:



Step 1
Choose 'Delimited' file type and click Next



Step 2
Choose the 'Space' delimiter (not Tab) and click Next.



Step 3
Click Finish

The data is now in columns in Excel ready to graph etc as usual.

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8.0 POWER SUPPLY OPTIONS

1) BATTERY POWER

Skye DataHog and MiniMet loggers are fitted with Duracell alkaline batteries as standard. These will have a lifetime of 4-6 months depending on operating temperature, frequency of logging and data download. These batteries are an operational power source only, all data and logger configuration is stored by a lithium battery backed RAM chip, unaffected by the state of the operational power supply.

DataHog2+ requires a separate 12 volt supply and does not have internal batteries

2) SOLAR POWER (Optional)

The ACC/5 Solar Hog solar power supply is designed for use with a DataHog or MiniMet logger. It consists of a small solar panel, trickle rechargeable batteries, waterproof enclosure and pole mount and fixings. (The pole mount can be bolted to a wall or vertical surface if preferred.) The Solar Hog powers the logger through the RS232 socket and so has its own RS232 socket for downloading data without interruption of the power supply. This option is ideal for remote installations visited occasionally for download with a laptop PC.

For DataHog2+ there are choices of solar power depending on the location of the unit. Please contact sales.

3) MAINS POWER (Optional)

a) Maximum 50m distance between mains supply and logger

The ACC/9 Mains Hog consists of a voltage transformer which runs off mains power (please specify 110V or 220V) and provides a 12V supply to the logger. The Mains Hog itself is installed indoors (for safety reasons) and only the 12V power cable runs outdoors to the logger. This cable has 2 purposes, to take the 12V power to the logger, and also to act as a data transfer cable. The 12V cable plugs into the logger's RS232 socket (the logger's internal alkaline batteries remain installed to provide backup in case of power failure). The indoor Mains Hog also has a RS232 socket which connects to the PC, (using the standard data cable supplied with the logger) for data transfer. This means that the logger can be easily accessed from the PC at any time.

b) Maximum 1km distance between mains supply and logger

The ACC/9B Mains Hog with Signal Boosters is similar to the standard Mains Hog but also has provisions for overcoming low data signals and voltage drop over long cable lengths. In this case the Mains Hog has rechargeable batteries fitted to provide back up in case of power failure, and the logger's internal alkaline batteries are removed. The Mains Hog is again installed indoors next to a PC plus a second unit is located out at the logger installation (which plugs into the logger's RS232 socket) to provide a boost to the return data signals. The dual purpose power / data cable runs between the two as before.

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** Please remember that long cables act like an aerial for picking up electrical noise. Ensure that the cable length does not run alongside other electrical installations, such as large switching machinery etc. to eliminate data transfer problems **

For DataHog2+ please contact sales.

FIG. 1 ACC/1A RS232 DATALEAD

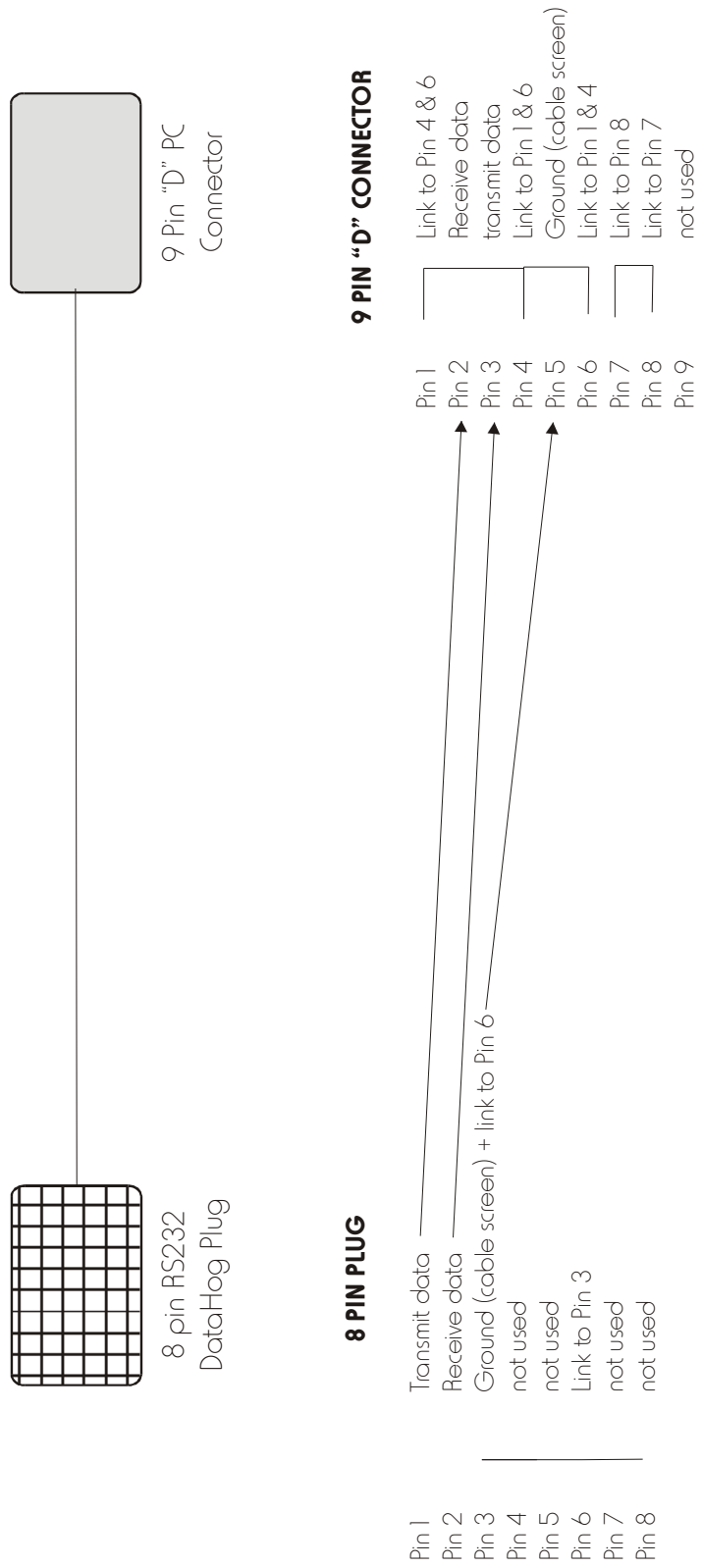
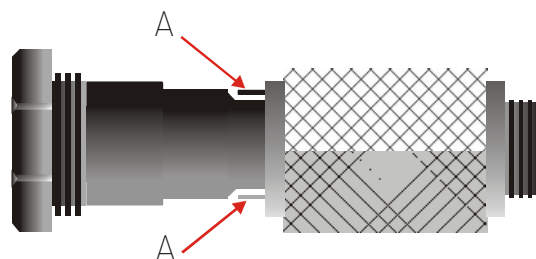
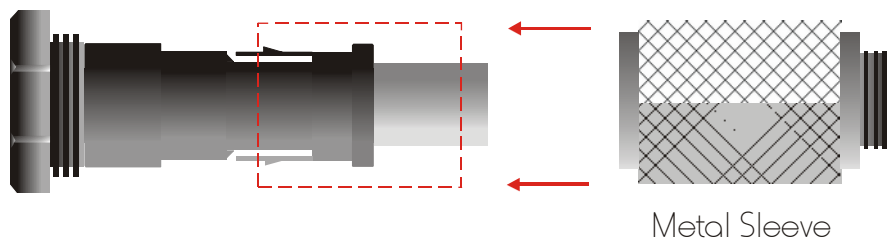
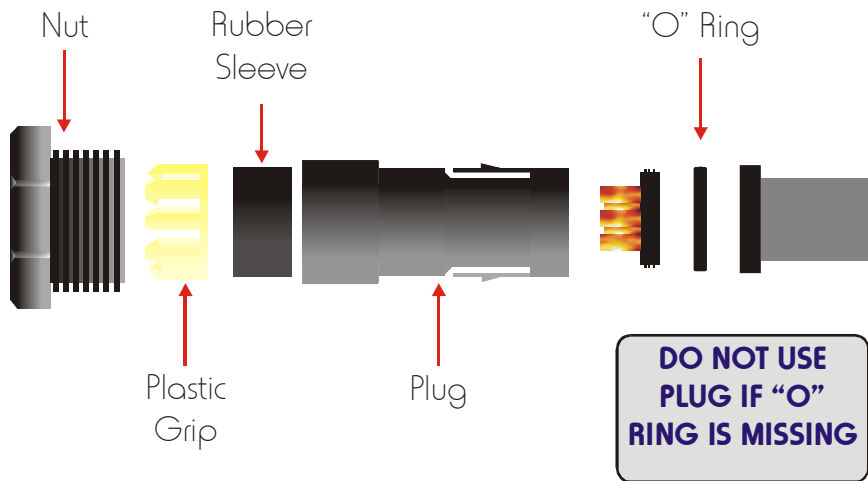
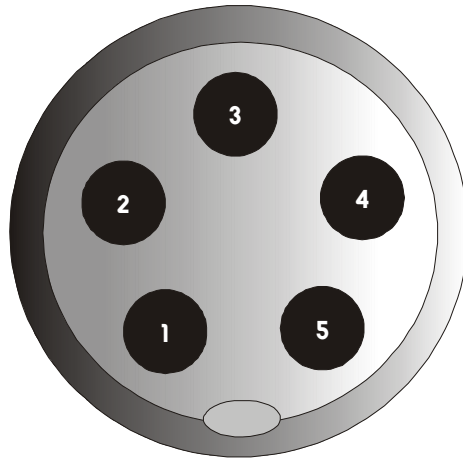


FIG. 2 SUB MINIATURE PLUGS



TO REMOVE METAL SLEEVE, PRESS IN POINTS MARKED "A" ON DIAGRAM AT THE SAME TIME

FIG. 3 DATAHOG SOCKETS – PIN IDENTIFICATION



5 PIN SOCKETS
Front (outside) view of socket



8 PIN SOCKETS
Front (outside) view of socket

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APPENDIX 1 - SUMMARY OF CODES USED IN CHANNEL CONFIGURATION

1) VOLTAGE CHANNELS (all types)

a) GAIN

00 - GAIN*1	+/- 2.0V	F/S
01 - GAIN*10	+/- 200mV	F/S
02 - GAIN*100	+/- 20mV	F/S
03 - GAIN*1000	+/- 2.0mV	F/S

b) TERMINATION

00 - No input ground return
01 - A+ has ground return
02 - B- has ground return

2) DIGITAL INPUT CHANNELS

a) GAIN - NOT APPLICABLE FOR DIGITAL CHANNELS

b) TERMINATION - 00 for any digital channel

3) SCALECODE - applicable to all channels

- 00 - Raw data count
- 01 - Ax + B
- 02 - Thermistor (10K)
- 03 - Internal RH%
- 04 - Windvane
- 05 - Channel off

4) SAMPLING AND LOGGING INTERVAL CODES - applicable to all channels

- 04 - 10 sec
- 05 - 20 sec
- 06 - 30 sec
- 07 - 1 min
- 08 - 2 min
- 09 - 5 min
- 10 - 10 min
- 11 - 20 min
- 12 - 30 min
- 13 - 1 hour
- 14 - 2 hour
- 15 - 3 hour
- 16 - 4 hour
- 17 - 6 hour
- 18 - 12 hour

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APPENDIX 2 - SETTING UP FULL SCALE VALUES FOR DIGITAL CHANNELS

The DataHog2+ can be set up to download measurements as raw data or as scaled data in the user's preferred engineering units. Measurements are always stored as raw data in the DataHog's memory and calculated into units, if required, at the time of downloading. So if the full scale value is changed at any time, the entire memory will be recalculated using the new values at the next data offload.

To enter a new full scale value, choose 'Option 9 - Enter AX+B calibration factors' from the DataHog's Main Menu (see Chapter 3.2.10 in the DataHog2+ manual also). Enter the software channel number you wish to configure and you will see a submenu displayed.

Item c) in this menu corresponds to digital channels with hardware channel numbers 48-53. The Full Scale Value for raw data (counts) is 19,000. To convert raw count values to the preferred units simply multiply the 'unit per pulse' by 19,000 (see examples below).

REMEMBER - VALUES NEED TO BE ENTERED AS 5 DIGITS PLUS A DECIMAL POINT - LEADING ZEROS CANNOT BE USED.

I. WINDSPEED SENSORS

This example illustrates use with the Vector Instruments A100R anemometer which gives 1 pulse per 1.25 metres windrun (nominal, each sensor is individually calibrated and supplied with a certificate).

Therefore Full Scale Value = 1.25 metres x 19,000 = **23750**. metres windrun

Measurements downloaded with the full scale value entered as 23,750 will be recording metres windrun per recording interval. To convert windrun to metres per second, the full scale value must be divided by the number of seconds in each recording interval.

NOTE - if averaged readings are being taken, e.g. windspeed is SAMPLED every 30 seconds but LOGGED every hour, then the SAMPLE TIME must be taken as the recording interval.

e.g. to record windspeed in metres per second when the DataHog2+ is set to record anemometer pulses at 30 seconds SAMPLING TIME and 1 hour LOGGING TIME:

Full scale value = 23,750 metres windrun / 30 seconds = **791.67** metres per second

To enter this figure follow these steps:

- 'Wake up' the DataHog as usual to reveal the Main Menu.
- Press '9' to choose 'Option 9 - Set Ax+B calibration factors'

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- Enter the software channel for the wind speed channel (see hardware Configuration Certificate, e.g. '00')
- Enter the new Full Scale Value as calculated above - your entry must be 5 digits plus a decimal place, with no leading zeros, e.g. '945.57'
- Enter the offset count as '0000'
- Enter the offset sign as '+'
- The figures you have just entered will be displayed for you to confirm. If OK, press 'Y' and you will return to the Main Menu
- Press ESCAPE to return the DataHog2+ to logging mode. The 'ANY KEY TO' message should appear every 10 seconds again.

2. RAINGAUGE

This example illustrates use with Environmental Measurements ARG 100 tipping bucket raingauge, which has a pulse of nominally 0.2 mm per tip. (See actual calibration figure per tip written inside each raingauge).

Therefore Full Scale Value = $0.2 \text{ mm} \times 19,000 = 3800.0 \text{ mm}$

To enter this figure follow these steps:

- 'Wake up' the DataHog as usual to reveal the Main Menu.
- Type '9' to set Ax+B calibration factors.
- Enter the Software Channel number for the raingauge channel.
- Enter the Full Scale Value as calculated above and 0000 for the Zero Offset value with a + sign.
- The entries you have made will be displayed for your to confirm if correct.
- Type Y to confirm and return to the Main Menu.
- Don't forget to press ESCAPE when finished, to return the DataHog

NOTE - it is not advisable to use low sampling times to average rainfall readings, as low rainfall periods may average out below the resolution of the datalogger and produce a zero reading. It is more usual to make the SAMPLE and LOGGING TIMES identical so that a total amount of rainfall is recorded, rather than an average figure.

e.g. to set the DataHog2+ up to record total rainfall in mm per hour, set the full scale value to 3800.0 as above (adjusted for the individual raingauge calibration) and set SAMPLE TIME to 1 hour and also LOGGING TIME to 1 hour.

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APPENDIX 3 - SETTING UP FULL SCALE VALUES FOR DIFFERENTIAL VOLTAGE CHANNELS

The DataHog2+ can be set up to download measurements as raw data or as scaled data in the user's preferred engineering units. Measurements are always stored as raw data in the DataHog's memory and calculated into units, if required, at the time of downloading. So if the full-scale value is changed at any time, the entire memory will be recalculated using the new values at the next data offload.

To enter a new full-scale value, choose 'Option 9 - Enter AX+B calibration factors' from the DataHog's Main Menu (see Chapter 3.2.10 in the DataHog2+ manual also). Enter the software channel number you wish to configure and you will see a submenu displayed.

Item a) in this menu corresponds to voltage channels with hardware channel numbers 1-23. The Full Scale Value is calculated by dividing the sensor output (in units per mV) by the chosen gain, and multiplying the result by 2000 (see example below).

REMEMBER - VALUES NEED TO BE ENTERED AS 5 DIGITS PLUS A DECIMAL POINT - LEADING ZEROS CANNOT BE USED.

You will also need to enter the offset count for your sensor. Option 9 will continue to prompt you for its value. Calculate the offset count by multiplying the sensor offset by the chosen gain and by 9.5. Enter this value and its sign (+ or -).

IN THIS CASE - LEADING ZEROS ARE PERMITTED BUT DECIMAL POINTS ARE NOT.

I. TENSIO METERS

This example illustrates use with the Skye electronic tensiometers which have a sensitivity of approximately 1 mV per 20 hPa, offset -0.20 mV (these are nominal values, each tensiometer is individually calibrated and supplied with a certificate).

e.g. for a gain of 10,

$$\begin{aligned}\text{Full Scale Value} &= (\text{Sensor output [Units per mV]} / \text{Gain}) * 2000 \\ &= (20 / 10) * 2000 \\ &= 4000.0\end{aligned}$$

$$\begin{aligned}\text{Offset count} &= \text{Sensor offset (mV)} * \text{Gain} * 9.5 \\ &= -0.20 * 10 * 9.5 \\ &= -0019\end{aligned}$$

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However, the user can also choose to take into account the length of the column of water in each tensiometer, by adding this into the offset count. This static pressure of water is more significant with longer tensiometer lengths. Please see the SKT 600 Series Tensiometer manual for a full explanation of this, and a table of pressures equivalent to tensiometer lengths.

e.g. for a tensiometer with 600 mm acrylic shaft length, static pressure of water column is 61.5 hPa (sensitivity 1 mV per 20 hPa)

From the sensor sensitivity, $61.5 / 20 = 3.075$ mV

So an additional offset count of 3.075 mV must be taken into account

Additional offset count = $3.075 * 10 * 9.5 = 292.1$

Hence new offset count = $285.1 + (-19) = 273.1$

ENTER as **+0273**

NOTE : When a tensiometer is supplied together with a DataHog logger directly from Skye Instruments, the shaft length and static water pressure is calculated and entered into the offset count ready for use. See the Hardware Configuration Certificate in the DataHog manual, which specifies which tensiometer is for use with which channel.

However, if the tensiometer is to be used horizontally or non-vertically, the user will need to recalculate and re-enter the sensor offset as appropriate.

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APPENDIX 4 - SETTING UP POTENTIOMETER INPUTS

The DataHog2+ can be set up to download measurements as raw data or as scaled data in the user's preferred engineering units. Measurements are always stored as raw data in the DataHog's memory and calculated into units, if required, at the time of downloading. So if the full-scale value is changed at any time, the entire memory will be recalculated using the new values at the next data offload.

Potentiometer inputs on the DataHog2+ are usually used for windvane sensors and generally labelled as such. If the DataHog2+ was bought directly from Skye, with its sensors, then all inputs will have been set up with calibration data already entered, ready for use. However, it is possible to configure this input for any suitable potentiometer sensor as described below.

The potentiometer input will supply a sensor excitation of nominally 1.3 V, and accept a maximum signal of $\pm 2V$. The exact excitation for each DataHog2+ is individually measured and given on the Hardware Configuration Certificate at the front of the logger manual (only when supplied for sensors other than a windvane). The potentiometer itself must have a minimum of $1k\Omega$ resistance. A raw data count of 0-12,288 (user scaled as wished) can be set over the whole rotation of the potentiometer.

To enter a new full scale value, choose 'Option 9 - Enter AX+B calibration factors' from the DataHog's Main Menu (see Chapter 3.2.10 in the DataHog2+ manual also). Enter the software channel number you wish to configure and you will see a submenu displayed. Item a) in this menu corresponds to voltage channels with hardware channel numbers 1-23. The potentiometer inputs are essentially special voltage inputs and should be set up as such. The Full Scale Value is calculated by dividing the sensor output (in units per mV) by the chosen gain, and multiplying the result by 2000 (see example below).

REMEMBER - VALUES NEED TO BE ENTERED AS 5 DIGITS PLUS A DECIMAL POINT - LEADING ZEROS CANNOT BE USED.

You will also need to enter the offset count for your sensor. Option 9 will continue to prompt you for its value. Calculate the offset count by multiplying the sensor offset (see example below) by the chosen gain and by 9.5. Enter this value and its sign (+ or -).

IN THIS CASE - LEADING ZEROS ARE PERMITTED BUT DECIMAL POINTS ARE NOT.

Pin Connections for a Potentiometer Input

Pin 1	n/c
Pin 2	1.3 V nominal sensor excitation
Pin 3	n/c
Pin 4	potentiometer wiper connection
Pin 5	ground and screen connection

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The following example shows the user how to set up a potentiometer channel when using the Delta T EVI evaporation pan and gauge, but this can be applied to any suitable potentiometer sensor.

I. EVAPORATION PAN

a) Initial measurement of potentiometer values

Set up the appropriate DataHog2+ channel to read voltage. Check the software channel and hardware channel for the potentiometer input from the Hardware Configuration Certificate, e.g. software channel 05, hardware channel 03.

Choose Option A - Set Channel Configurations from the Main Menu. Follow the on screen instructions and enter the software channel number (e.g. 05), hardware channel number (e.g. 03 for a voltage input). Enter the Gain as 00 (for a full scale of +/- 2.0V), Termination Code 00 (no input ground return), and Scalecode 01 (Ax + B scaling).

Choose Option 9 - Set AX+B Calibration Factors. Enter software channel (e.g. 05), enter a Full Scale as 2000.0, enter an Offset Count as 0000 and +.

Connect the potentiometer to the DataHog2+ input. Set the potentiometer at one end of its travel. Choose Option 0 from the DataHog2+ Main Menu and press <SPACEBAR> to take a measurement. Make a note of this mV reading.

Set the potentiometer to the other end of its travel and press <SPACEBAR> as above and again make a note of the measurement. Press <ESCAPE> to return the Main Menu.

b) Set up of DataHog2+ Full Scale and Offset Count

Subtract the lowest mV reading, measured as above, from the highest, to obtain the potentiometer's output range.

e.g. $1234.5 \text{ mV} - 1.2 \text{ mV} = 1233.3 \text{ mV}$

This figure can be used to calculate the Full Scale value to be entered in Option 9 from the Main Menu. The engineering units to be used is also included in this calculation, and is required in the format "units per mV".

From the example above, if evaporation is to be measured over a range of 0-25 inches, and 1233.3 mV is the potentiometer's output range, then

$$\text{units per mV} = 25 / 1233.3 = 0.020271 \text{ inches per mV}$$

Calculate the DataHog2+ / MiniMet2's Full Scale value as shown in Option 9 from the Main Menu.

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Enter as follows:

e.g. $F/S = 0.020271 / 1 (\text{Gain}) * 2000 = 40.5416$

Enter in the required format as 40.542

The lowest of the 2 voltage readings measured in a) above is the potentiometers zero offset. Use this reading to calculate the DataHog2+ / MiniMet2's Offset Count. Calculate and enter as shown in Option 9 from the Main Menu

e.g. If lowest voltage reading was 1.2 mV
Offset Count = $1.2 * 1 (\text{Gain}) * 9.5 = 11.4$
Enter in the required format as 0011 and +

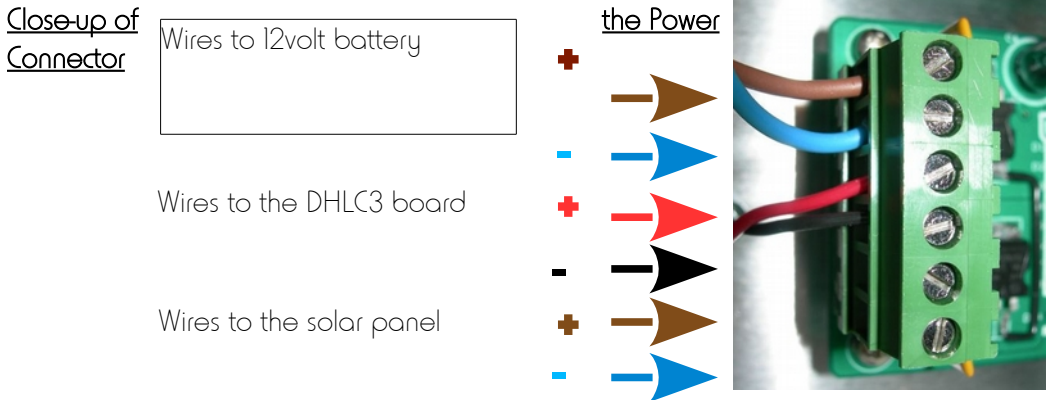
DataHog2+

APPENDIX 5 SOLAR PANEL REGULATOR BOARD

If the DataHog2+ unit has been supplied with a solar panel, then inside the enclosure, at the bottom, will be a Solar Panel Regulator Board. This board prevents overcharging of the 12v battery from the solar panel



The board incorporates a push button which, when pressed will light up LEDs and show the voltage level of the battery. When the battery is full the green LED labelled Batt.Full will light up.



Take care when connecting the 12 volt battery cables. Ensure that you do not reverse the connections

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APPENDIX 6 FITTING THE SOLAR PANEL TO THE MAST



Parts kit for connecting the Solar Panel enclosure to the mast



- 1) Screw the dome nuts onto one end of the studding.
- 2) Place a nylon washer underneath and then insert the studding through the top holes of the solar panel pole mount, through the spacers, which clamp the pole and then fit the nut.
- 3) Repeat for the bottom holes of the solar panel pole mount.
- 4) Tighten the nuts.
- 5) The assembly should now be tight on the mast.



- 6) Raise the moveable half of the solar panel bracket into the horizontal position. The solar panel can now be bolted onto the bracket.

IMPORTANT - Ensure that the wires from the solar panel are insulated and not able to touch anything at any time.

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9) To attach the solar panel, first remove the 2 centre bolts on the bars at the rear of the solar panel. Line the empty screw holes up with the solar panel mast bracket with the black box on the solar panel at the hinge end.

Replace the 2 bolts and tighten with the adjustable spanner.



10) The assembly should be angled to obtain maximum sunlight throughout the year before being fully tightened.

11) The solar panel should now be covered temporarily (the cardboard packing, a thick jacket or refuse sack are ideal) to ensure no voltage is produced.

12) Now connect the solar panel



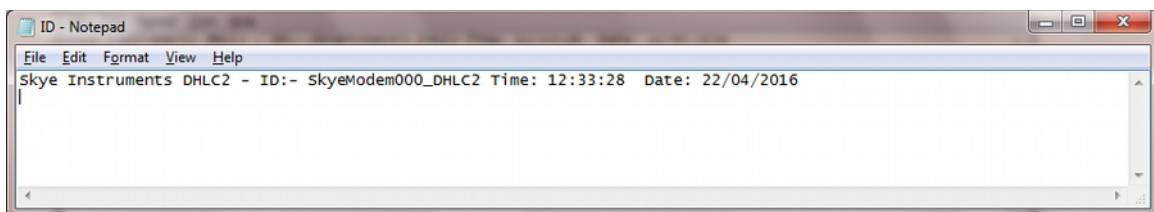
The solar panel has two white cables with a connector on each end. These connectors mate with the two sockets on the DataHog2+ enclosure. Click these connectors into place.

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APPENDIX 7 FILES ON THE SDHC CARD

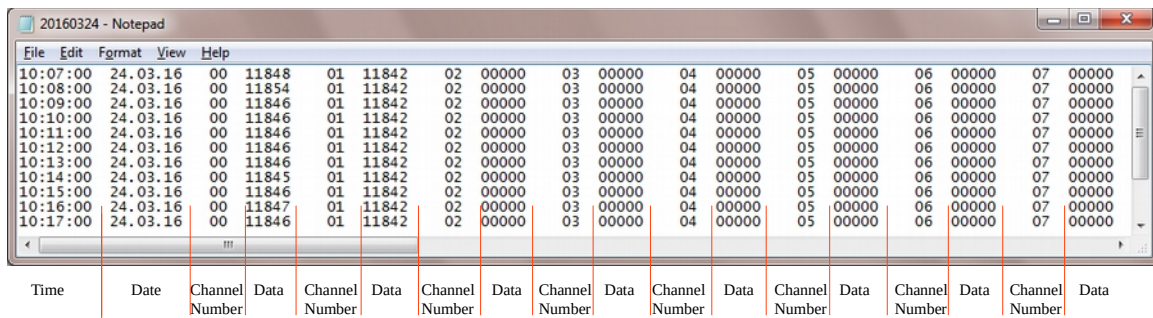
The SDHC card can be 'read' by any PC with a built-in multi-media card reader or by an external card reader which usually plugs into a USB port.

When the card is inserted into the reader, you will then normally be presented with the standard Windows menu giving you options on what you want to do with the files. If you choose 'view files', then a standard folder structure is displayed. In the 'root' will be the file "ID.txt".



In this file a line is created every time the DataHog2+ is powered, ie switched off and then on. It is an identifier to show the ID of the unit, which is customisable, and the time and date that the unit was started.

There will also be a Year folder. Double-clicking on the Year folder will then give access to day files for that year. The file name is in the format yyyy:mm:dd. This is a text file.



Time	Date	Channel Number	Data	Channel Number	Data	Channel Number	Data	Channel Number	Data	Channel Number	Data	Channel Number	Data	Channel Number	Data	Channel Number	Data
10:07:00	24.03.16	00	11848	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:08:00	24.03.16	00	11854	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:09:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:10:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:11:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:12:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:13:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:14:00	24.03.16	00	11845	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:15:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:16:00	24.03.16	00	11847	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000
10:17:00	24.03.16	00	11846	01	11842	02	00000	03	00000	04	00000	05	00000	06	00000	07	00000

Within each Day File will be a line of data from your DataHog2+ for every logging point. This file can be imported into any spreadsheet or text handling programme and manipulated as required.