SDL 5050D
RainHog

Skye Instruments Ltd.,
21 Ddole Enterprise Park,
Llandrindod Wells,
Powys LD1 6DF
UK

Tel: +44 (0) 1597 824811
Fax: +44 (0) 1597 824812

General E-Mail: skyemail@skyeinstruments.com
Sales E-Mail: sales@skyeinstruments.com
Technical E-Mail: technical@skyeinstruments.com

Web Page: http//www.skyeinstruments.com

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1. INTRODUCTION

The *SDL 5050D RainHog* logging system has been specifically designed as a dedicated, easy to use instrument for research and commercial applications. It consists of a central datalogger fitted neatly inside an aerodynamic raingauge, ideal for automatic rainfall monitoring.

The rain data recorded by the *RainHog* is easily opened in Microsoft Excel or other software package, and is ideally suitable for inputting to Decision Support Softwares, for example for irrigation scheduling etc.

The *RainHog* system is compact and easy to install. It will record rain totals, e.g. hourly, daily or other user chosen intervals, or actual rain events if wished.

2. ASSEMBLY AND INSTALLATION

Before installing in the field, it would be wise to set up and familiarise yourself with the operation of the *SDL 5050D RainHog* datalogger in the comfort of your office. Please see Chapter 3 for details.

2.1 RainHog datalogger

The *RainHog* datalogger will have been programmed and assembled ready to use before leaving Skye's factory.

The *RainHog* datalogger fits neatly inside the ARG 100/I tipping bucket raingauge. Undo the three plastic screws near the base of the ARG 100/I raingauge to remove its collecting funnel top.

The datalogger housing has a 5 pin socket marked 'Raingauge'. The short cable and matching plug attached to the inside of the raingauge will have already been connected to this socket before leaving Skye's factory.

The datalogger has a second socket marked RS232. This is a serial port for connecting to the PC and it important to keep it protected with the blanking dustcap when not in use.

2.2 Raingauge

It is important to the correct functioning of the raingauge that it is installed securely and that the top rim of the rain collecting surface is level. The use of a spirit level is advised.

A leveling base plate is available for the ARG 100/I raingauge. You may want to dis-connect the raingauge plug from the *RainHog* datalogger temporarily while you fit the leveling base plate to the gauge (please see Figure 1). Use the three adjustable 'legs' to level the raingauge base, using the spirit level bubble as a guide. Reconnect the 5 pin plug into the Raingauge socket on the datalogger. Replace the raingauge collecting top and tighten the three holding screws (note this only fits in one orientation).

2.3 External Power Supplies

If you have purchased an optional external power supply for the datalogger, for example a Solar Hog solar power unit, a Mains Hog mains power supply or a 12V vehicle battery, this may be connected to the *RainHog* datalogger via the RS232 socket.

If you have purchased the system in a single order from Skye, then there will be hole provided in the side of the raingauge to pass the power cable and connecter through to the datalogger inside. If you are adding the power supply yourself at a later date, you may have to make a hole in the raingauge base for this purpose.

2.3.1 Solar Hog

Mount the Solar Hog on a pole or mast, with the solar panel facing southwards if in the northern hemisphere, or northwards if in the southern hemisphere, to receive the maximum sun exposure for recharging the internal batteries.. Connect the round 8 pin plug into the *RainHog* datalogger's RS232 socket.

To offload data from the *RainHog* you may connect the PC directly to the RS232 socket on the Solar Hog itself, so that the solar power supply to the logger is not interrupted.

2.3.2 Mains Hog

The Mains Hog unit itself must be installed indoors, preferably next to the PC. The long power / data cable should be run outside to the *RainHog* system. Connect the round 8 pin plug into the *RainHog* datalogger's RS232 socket.

The power / data cable has two functions, firstly to supply low voltage (12 volts) power to the *RainHog* system, and secondly to transfer data back to the PC.

Protect this long cable from damage - the easiest solution is to cut a short piece of old hosepipe lengthways and clamp around the cable. Bury the hosepipe just under the surface for maximum protection.

At the Mains Hog unit, connect the short 1m datalead between the RS232 socket on the Mains Hog itself, and the PC serial communication port.

Connect to the mains power supply and switch on. The red LED will light up showing power is present.

2.3.3 12 Volt Vehicle Battery

To power the *RainHog* datalogger with a 12Vvehicle battery you will need to request a special short power / data cable (ACC/1A-DC) so that data can be offloaded from the *RainHog* without interruption of the external power supply.

Connect the round 8 pin plug of this special cable to the *RainHog* datalogger's RS232 socket. Connect the positive and negative 'spade' connectors to the 12V battery terminals. Keep the third connection for use when offloading data to the PC - this must be fitted with a waterproof dustcap and kept off the ground when not in use.

3. OPERATION

The *RainHog* datalogger has no external controls, all functions are accessed via a PC. Due to shipping regulations we cannot despatch the instrument to you operating, so it must be switched on before you start.

3.1 Switching On / Off

If the logger is installed inside the raingauge, lift it out. The datalogger housing has a lid secured by 4 corner screws, undo these and remove the lid.

You will notice that the housing has a "double skin". The inner compartment is sealed against water entering by a soft O ring seal. It is important to keep this O ring clean and intact to ensure water tightness.

The *RainHog* datalogger is operational as soon as power is applied. To switch on locate the two small black button beside the 6 batteries. Press the button marked "PSU Reset" momentarily - you may hear a faint click as it switches on. There is no reason to press the "Reset" button at this time. This is simply in case the logger needs a "reboot" at any time. Carefully replace the lid, making sure that the ribbon is not trapped under the O ring seal, and tighten the 4 screws. Replace inside the raingauge.

If at any time you wish to switch off the instrument, for example if it is not going to be in use in the off season period, simply remove the batteries and replace the lid carefully.

3.2 Installing the Software

The SkyeLynx Standard communications software allows the datalogger to be set up and downloaded. It is supplied in CD format suitable for Windows 95 and above, with a datalead to connect the logger to the PC.

Insert the CD into your CD drive. Follow software installation instructions in the small manual supplied with the CD, choosing the DataHog2 logger options. The SkyeLynx Standard software will automatically install itself, follow instructions on screen as appropriate.

This program will allow you to set up the datalogger's logging intervals, set its internal clock, download recorded data, clear the logger's memory, enter an unique logger ID etc . Please see the following chapters, and SkyeLynx Standard manuals for full details, a copy can be found on the software CD.

3.3 Connecting to the Logger

If the *RainHog* datalogger is installed inside the raingauge, it is not necessary to remove it to connect to the PC, unless of course it is for convenience.

Connect the Skye datalead between the RS232 socket on the *RainHog* datalogger and the serial port of the PC (a USB-serial adapter is available from Skye if the PC does not have a serial port). Remove the protective dustcap and screw the round 8 pin plug into the logger socket gently but not too tight, to ensure a good connection is made.

NOTE - always replace the protective dustcap on the RS232 socket after use, as this socket is not waterproof without it and permanent damage can be caused to the *RainHog* datalogger.

To start the SkyeLynx Standard software, click on START and PROGRAMS. Choose SkyeLynx Standard v#2.6 and the software will automatically initiate. At the first screen, click Continue. Then choose The RS232 serial Communication port on the PC to connect to the logger and choose DataHog2 as the Instrument.

If the datalogger is in log mode and giving a regular audible 'beep' (which is caused by connecting the RS232 datalead) and the PC communication link has been successful, you should see a regular message in the main blue window such as:

<ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!)>
13:07:00 11/07/2001

If you do not see this message, click File and then Return the DataHog to logging (normal) mode. If still no message, then check the logger's batteries or power supply and the communications cable and communication port..

When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is ready to communicate.

3.4 Setting up the Logger

Before installing the *RainHog* datalogger in the field, you will need to set it up to your own logging requirements. The default factory settings will be GMT time, 30 second sample and 30 minute logging intervals. The logger ID will contain the *RainHog* datalogger's unique serial number.

3.4.1 Setting the Logger's Clock

Connect to the logger as described in Section 3.3. After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type 6 to choose menu Option 6 Set Clock and follow the instructions on screen. Remember that the format is important, separators are colons in the time entry and full stops in the date entry. Your entry will be displayed, type Y to confirm. The logger's clock will not be updated until this final Y is received, so use this point to set the clock exactly if required.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press will be confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

3.4.2 Setting the Logging Interval

The DataHog logger can calculate averages or totals of sensor measurement. For rainfall measurement averages are not appropriate and it is usual for only the total rainfall per time interval to be recorded. The logger requires the user to set up two time intervals, a sample time and a storage time. The sample time is only used for averaging data, so it is important to choose identical sample and storage intervals when setting up a raingauge sensor.

Connect to the logger as described in Section 3.3. After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type 8 to choose menu Option 8 Set channel sample and log intervals and follow the instructions on screen. Enter software channel 00 (see your DataHog Hardware Configuration certificate in the Calibration booklet for details).

Enter the sample and storage interval using the codes shown on screen - these must be identical values, e.g. 12 for 30 minute sample and 12 for 30 minute storage or log interval. Your entry will be displayed, type Y to confirm.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press willbe confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

3.4.3 Rainfall Event Logging

In order to save filling up the logger's memory with unnecessary zeros when it is not raining, the system can be set to only store the time and date of each rainfall event.

To use this feature effectively, it is advised to first set up the sample and storage or log intervals both to 10 seconds to maximise rain event resolution.

Connect to the logger as described in Section 3.3. After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type D to choose menu Option D Set channels for non zero / threshold log modes. Enter software channel 00 (see your DataHog Hardware Configuration certificate in the Calibration booklet for details).

Type 01 to choose option non-zero logging. Press the space bar to return to Main Menu, and Escape to Return to Log Mode.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press willbe confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

If you wish to switch off the event logging mode at a later date, repeat this procedure but choose 00 for normal logging mode.

3.4.4 Logging Interval v Memory Capacity

The table below gives an outline of how long the logger memory will take to fill up depending on the logging interval chosen. A 1-channel DataHog logger has a memory of 11,000 datapoints (one datapoint includes time, date plus a reading from the raingauge). The logger's default setting is to overwrite the oldest data once the memory is full, but there is an option to simply stop logging when the memory is full and protect the data already recorded . Please see Option 7 from the Main Menu to disable the memory overwrite function.

1 Minute	5 Minutes	10 Minutes	20 Minutes	30 Minutes	1 Hours	2 Hours	12 hours
7.6 Days	5.4 Weeks	10.9 Weeks	21 Weeks	32 Weeks	64 Weeks	2.5 yrs	15 yrs

3.4.5 Entering the Logger ID

The Logger ID or DataFile Identifier is the logger's unique identifier and its serial number will have been entered before leaving Skye. You may wish to keep this format or change it to your own ID. It is made up of 12 characters (numbers and/or letters), all of which must be entered. The DataFile Identifier is automatically stored within the file whenever the logger's memory is downloaded.

Connect to the logger as described in Section 3.3. After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type 7 to choose menu Option 7 Set datafile I/D, memory overwrite & timed logging intervals. At the sub menu, choose 5 Edit DataFile Identifier. Enter 12 characters using only letters or numbers, do not use spaces, commas, full stops, colons etc. Your entry will be displayed, type Y to confirm.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press will be confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

3.4.6 Check Logger Status

If you have changed any of the above logger settings, it is advisable to check all is correct before leaving to log data.

Connect to the logger as described in Section 3.3. After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type 1 to choose menu Option 1 Display current setup. From the sub menu choose option 1 to check the sample and log intervals, and option 5 to check the time, battery and memory status.

NB the SDL 5050D RainHog cannot display its battery voltage through the software. To check the batteries it is necessary to use a millivolt meter.

A new set of 6 alkaline C cell batteries will measure around 9V (6 x 1.5V). These batteries will give around 4-6 months logging time. If the voltage is around 7V then it is advisable to change the batteries. The logger will stop collecting data when the battery voltage reaches around 6.6V. No stored data or configuration will be lost if the batteries are exhausted as this is backed up by a 10 year internal lithium battery.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press will be confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

3.5 Regular Logger Operations

If the *RainHog* datalogger is installed inside the raingauge, it is not necessary to remove it to connect to the PC, unless of course it is for convenience.

Connect to the logger and start the software as described in Section 3.3. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and the logger is ready to communicate.

3.5.1 Down load Data from Log ger

Click on the large button in the bottom left hand corner of the software screen, marked Off-Load Data. Enter the directory and filename of where the downloaded data is to be saved. The logger will start offloading as soon as you click OK.

When it is finished you can view the downloaded data clicking on the File drop down menu and choosing View a DataFile. Click on the button marked Choose a DataFile and then locate the filename you entered above.

The software will automatically put the logger back into Log Mode. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

3.5.2 Clear Log ger Mem ory

It is advisable to check the data has been downloaded correctly before clearing the logger's memory. Use the View a DataFile feature as described in Section 3.5.1.

After seeing the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message, choose the File drop down menu and choose Wake Up Logger. Wait for the scrolling on the screen to stop and the Main Menu is visible.

When the Main Menu is displayed, type 5 to choose menu Option 5 Reset memory. Type 'R' to reset the logger memory – **NOTE** 'r' will not work, you must type 'R'.

You will see the confirmation message MEMORY RESET COMPLETE. Press ESCAPE to Return to Log Mode.

NB Always remember to press the Escape key to return the DataHog2 to log mode. Your key press willbe confirmed by the message >> RETURNING TO LOG MODE >>. When you see the regular ANY NUMERIC KEY TO WAKE-UP (!0 TO 9!) message this confirms the logger is in Log Mode and it is safe to close the software and disconnect the datalead.

4. MAINTENANCE

4.1 Replacing the Batteries

If the logger is installed inside the raingauge, lift it out. The datalogger housing has a lid secured by 4 corner screws, undo these and remove the lid.

You will notice that the housing has a “double skin”. The inner compartment is sealed against waterentering by a soft O ring seal. It is important to keep this O ring clean and intact to ensure water tightness.

To change the batteries simply pull on the ribbon provided to remove the 6 C type batteries and replace with fresh ones, ensuring that they are good quality alkaline or rechargeable types if preferred.. Make sure the batteries are in the correct orientation, following the diagram fixed to the battery holder. Carefully replace the lid, making sure that the ribbon is not trapped under the O ring seal, and tighten the 4 screws.

4.2 Raingauge

Please ensure the collecting bucket is free from any leaves or debris which may collect in the bucket, to ensure accurate measurements.

A spares kit is available for the ARG 100/I raingauge which contains a replacement filter, filter cap and 3 plastic screws for attaching the rain collecting top to its base. These items may require changing occasionally.

5. TROUBLESHOOTING

If you have problems operating your *SDL 5050D RainHog* system, please try the following tips. If the problems persist please contact Skye's technical help team who will be happy to help you.

Q: THE LOGGER WON'T COMMUNICATE WITH THE PC

1. Check the logger batteries. Do they need replacing? Are they inserted correctly?

2. Check the datalead. Is it gently screwed up into the logger RS232 socket? Is it connected to the correct port of the PC? Do you need a USB - serial adapter for the PC port?

3. Does the logger make a "beep" noise every 10 seconds when the RS232 serial cable is connected? If yes then the logger itself is operational. Check the PC connection and that you have chosen the correct Communications Port.

Q: THE RAINGAUGE IS NOT RECORDING

There could be a several reasons why a raingauge appears to stop working, please check the following:

1. Check that the top rim of the raingauge is level using a spirit level. The inner mechanism may not tip if the gauge is badly leaning to one side.

2. Check the cable between the logger & raingauge is connected and not damaged.

3. Remove the top water collecting part of the raingauge, pour some water in and see if it comes through - the water comes through in slow drips only, this is normal for accurate measurements (preventing splashes outside the measurement buckets). If no water appears, check for blockages - but take care not to widen any of the apertures.

APPENDIX 1 - SPECIFICATIONS

SDL 5050D RainHog

Housing	Grey ABS – sealed to IP65 (when sockets are mated with a plug or dustcap). Fully weatherproof but not submersible.
Operating Environment	-20°C to +70°C. 0-100%RH
Memory	11,000 datapoints (e.g 32 weeks logging at 30 minute intervals) 1 datapoint contains date, time plus a raingauge reading
Log Modes	Averages, totals or event logging
Logging Intervals	10, 20, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes, 1, 2, 3, 4, 6, 12 hours (default setting 30 minutes totals)
Communications	Serial RS232 – will communicate with any PC (USB-serial adapters are available). Windows software provided free of charge with each logger Fast offload to save power
Data	Downloaded files are saved in space delimited ASCII format that can be used with most analysis software, 'Excel', etc.
Power	Internal battery life typically up to 6 months with alkaline batteries. Optional external power via solar & mains power or 12 volt battery
Clock	Real time year, month , date time clock enabling automatic synchronisation of several units. Clock backed by separate lithium battery – no need to re-set when changing main batteries
Inputs	One digital count channel suitable for tipping bucket raingauge
R aingauge.	Tipping bucket raingauge. Interrupt driven

SOFTWARE PC REQUIREMENTS

PC Operating System	Windows 95 / 98 / 2000 / XP
Minimum PC Specification	Pentium class processor 16 Mb RAM 10 Mb Hard Disk Space VGA monitor
R ecommended PC Specification	Pentium 2 processor or better 32 Mb RAM 10 Mb Hard Disk Space SVGA monitor

Figure 1

ARG 100/I RAINGAUGE BASEPLATE ASSEMBLY