SLUG DATA-LOGGER MANUAL

YieldPoint Inc.

JULY 2009

Warranty and Service Policy

Product Warranty

YieldPoint Inc warrants the instruments described in this manual to be free from defects in materials and factory workmanship to the original buyer. This warranty is contingent upon proper use of the equipment, and does not cover equipment that has been modified or has been subjected to abusive physical or electrical stresses. YieldPoint Inc., agrees to repair or replace, at its sole discretion, any instrument that fails to perform as specified within 6 months after date of the original shipment from the factory, or 3 months after the date of installation, whichever date comes first.

Yieldpoint Inc., reserves the right to make substitutions and modifications in the specifications of equipment that do not materially or adversely affect the performance of the equipment.

New equipment may be returned within 30 days of shipment with prior approval. New items which are less than thirty days old after shipment may be returned for credit, less a minimum restocking and testing charge of twenty percent of the list price upon factory approval only, provided the customer pays all shipping and handling charges. Specially ordered, or modified goods, or goods which have been used or have been unpacked, or goods which have been shipped more than thirty days prior are not returnable.

The information contained in this manual is subject to change without notice. YieldPoint Inc. makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Further, YieldPoint Inc., assumes no responsibility for any errors that may appear in this manual and makes no commitment to update, or keep current, the information contained in this manual.

Service Policy

Units within the warranty period returned for repair, test, and recalibration are serviced at no charge in accordance with the terms of the warranty policy. The Customer pays all transportation and other charges to the factory.

Units out of warranty returned for repair, test, and/or recalibration are handled on a time and material basis. If requested, or if costs exceed 50% of current list price, YieldPoint Inc., advises the customer prior to making the repairs. Such repairs are performed at the customer's expense. Typical test, recalibration, and repairs are 25% of the instrument's current list price. Transportation charges both ways are at the customer's expense.

Please be sure all returns are shipped with the following information included:

1. Your company Name with Billing and Shipping Addresses.

2. A complete description of your problem, or re-calibration data.

3. The contact person at your company, with their telephone and facsimile numbers.

4. Non-Warranty returns additionally need your Purchase Order Number.

Please pack your returned instruments in their original shipping cartons, or in equivalent strong protective shipping cartons.

1. BASICS

The SLUG (sensor Logger for Underground) is a small, low cost Plug 'n Play data-logger that parses data from a YieldPoint digital instruments (that's up to 10 channels) into 32Mb of non-volatile FLASH memory which can then be downloaded later to a PC for further analysis and interpretation.

The SLUG. The black dot indicates SLOT 1. Plugging into Plug with a sensor or the USB download cable will activate the data-logger.

The SLUG has no on/off switch. It turned on by one of two events:

(i) A sensor is plugged into the PORT, or

(ii) The USB download cable is plugged into the PORT.

In both cases the green LED will flash just once for 0.5s.

Should the LED not flash then the batteries should be replaced.

In order to turn off the data-logger the SLUG should be disconnected. This will not cause data or settings to be lost.

1.1. Power Requirements

SLUG is powered from a 9V battery. Using an alkaline batteries the data-logger will operate for more than 60 days while taking 1 reading/hour. A 9V lithium power cells(middle + RHS below) will approximately double the period of operation.

IMPORTANT!!!
The SLUG requires battery power both to log data and to download data to the PC. Data will not be lost during operation if battery drain causes a loss of power, however a fresh battery must be installed before downloading.

In between readings, when it draws 10-30mA, the SLUG4 operates in SLEEP mode and only draws a current of 80µA. Based on the capacity of 9V batteries – alkaline 650mAh and lithium 1200mAh - the life-expectancy can be calculated. The SLUG will operate with battery voltage down to 6.5Vdc, and will not lose data even if the voltage should decline further.

The 3V CR1025 lithium battery provides backup power to the clock and is operational only when the 9V batteries are removed. If the SLUG4 does not retain its date/time after battery changes then this lithium battery should be changed.

1.2. Memory Size

Each SLUG4 has a 32Mb of Flash memory arranged in 8192 Pages of 528 bytes. A sample (one reading from each of the 4 ports) is stored on each page of memory a total of 8,000 samples comprising 32,000 readings. If the number of readings is exceeded the SLUG will stop logging and remain in sleep mode.

2. OPERATION

2.1 SLUG Software

The SLUG data-logger software (same for SLUG and SLUG 4) can be downloaded free-of-charge- from the URL   http://www.yieldpoint.com/slugsetup.exe

The software at this link is continually being upgraded and can be regularly downloaded at no charge. The program is compatible with both Windows XP and Windows Vista operating systems.

2.2. USB Download Cable

Communications between the SLUG4 datalogger and a PC requires a USB download cable (purchased separately).
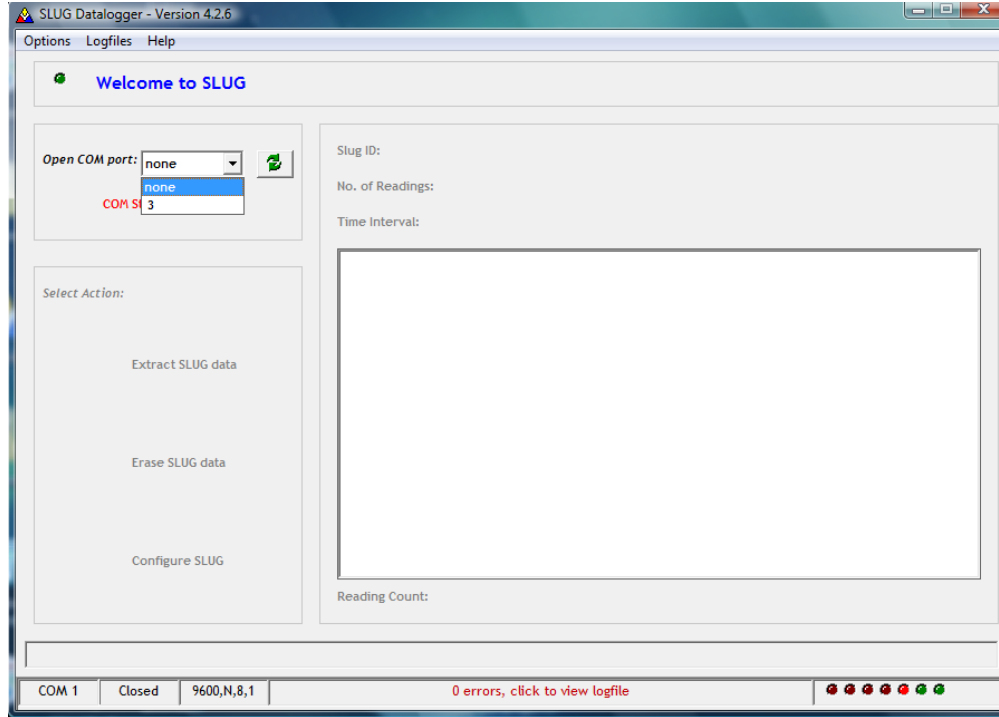
Figure 3. The USB download cable.

Instructions for installing the USB download cable drivers for Windows XP and Windows Vista are available at: http://www.yieldpoint.com/usb/

Once properly installed the driver configures the USB download cable as a virtual serial port. Depending on your computers settings the specific designation may vary between COM4 and COM16.
It is possible to determine which COM port the USB download cable has been assigned by a two step process:
  (i) Unplug the USB download cable and click on the green refresh arrows (Figure 4 STEP1). Use the Open COM Port pull-down list to determine pre-existing COM Ports.
  (ii) Plug in the USB download cable and the click the green refresh buttons. The COM Port assigned will appear.

STEP 1: USB Download Cable disconnected. Click green arrows.

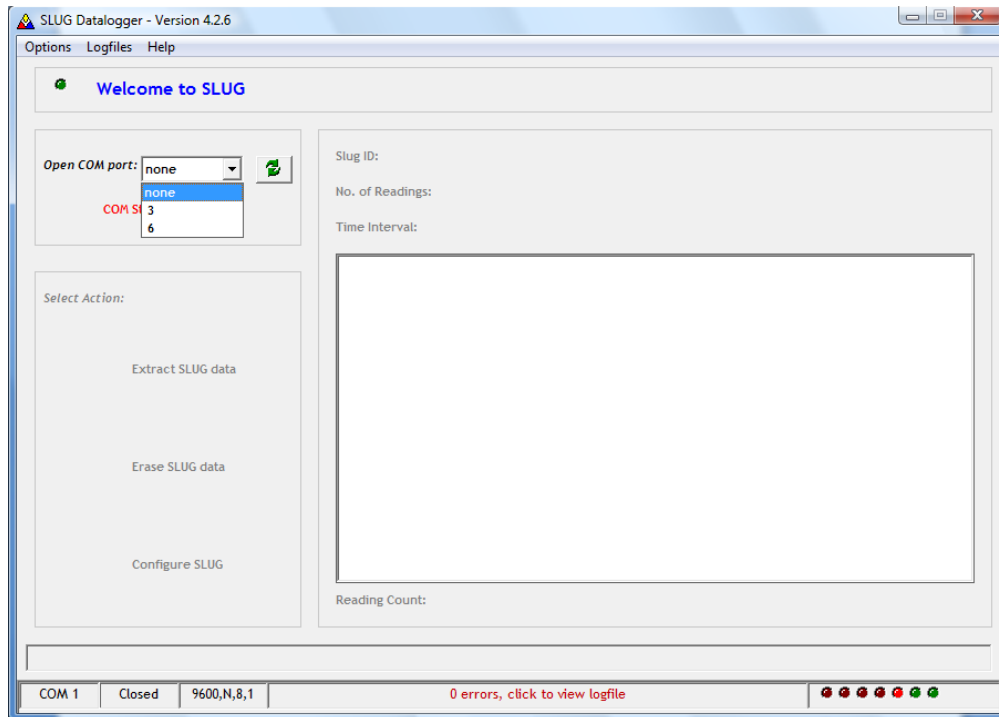**STEP2:** USB download cable connected. Click green Arrows

Figure 4: 2 Step COM Port determination for the USB Download cable. In this case the cable is assigned to COM6

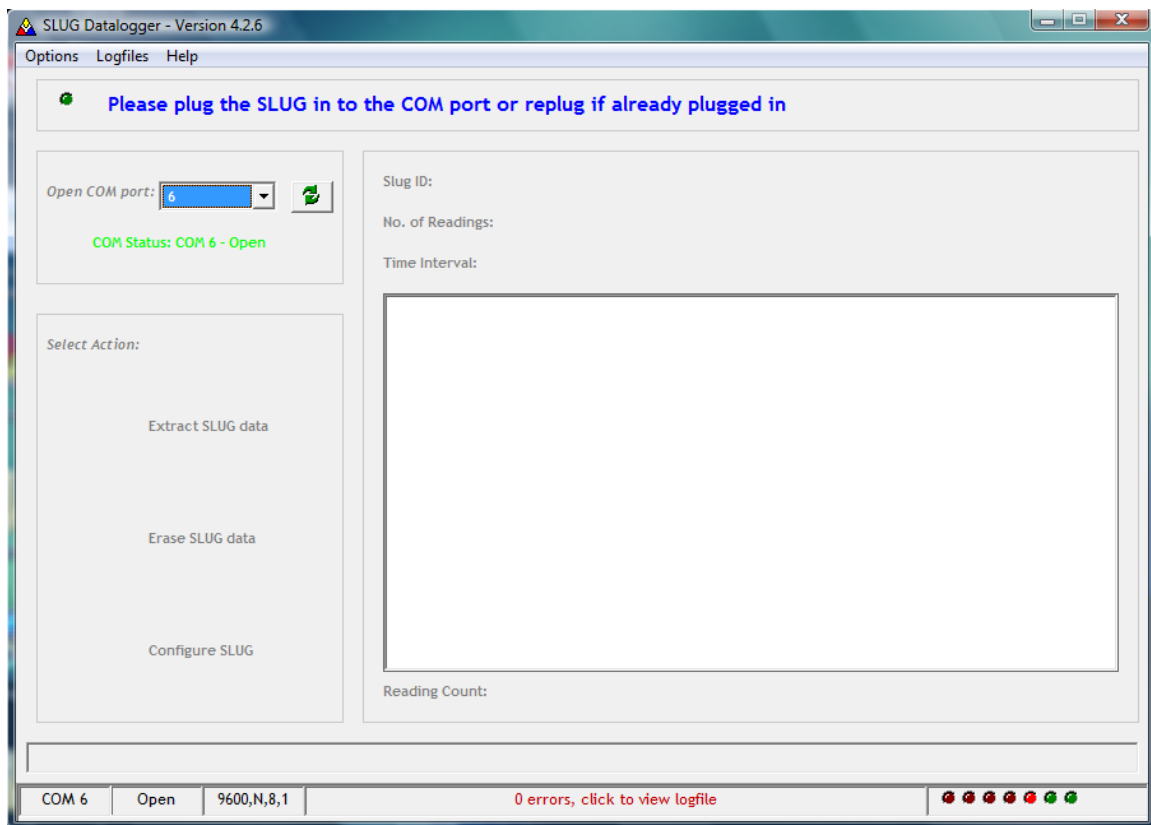To Open the virtual COM Port select COM6 from the pull down menu.

Figure 5: The USB download cable is configured on COM6 and is open. The Software automatically configures the COM Port: **9600,8,N,1.**

2.3 Configure the SLUG

Next connect the SLUG to the 5-pin connector. The Green LED on The SLUG will flash once, and the SLUG software will automatically detect the SLUG and determine its SLUG ID (YYMM-##), the No. of Readings it contains and the Time Interval. The Select Action buttons will activate. A message will alert the user if the SLUG time is more than 1min out of sync with the PC time.
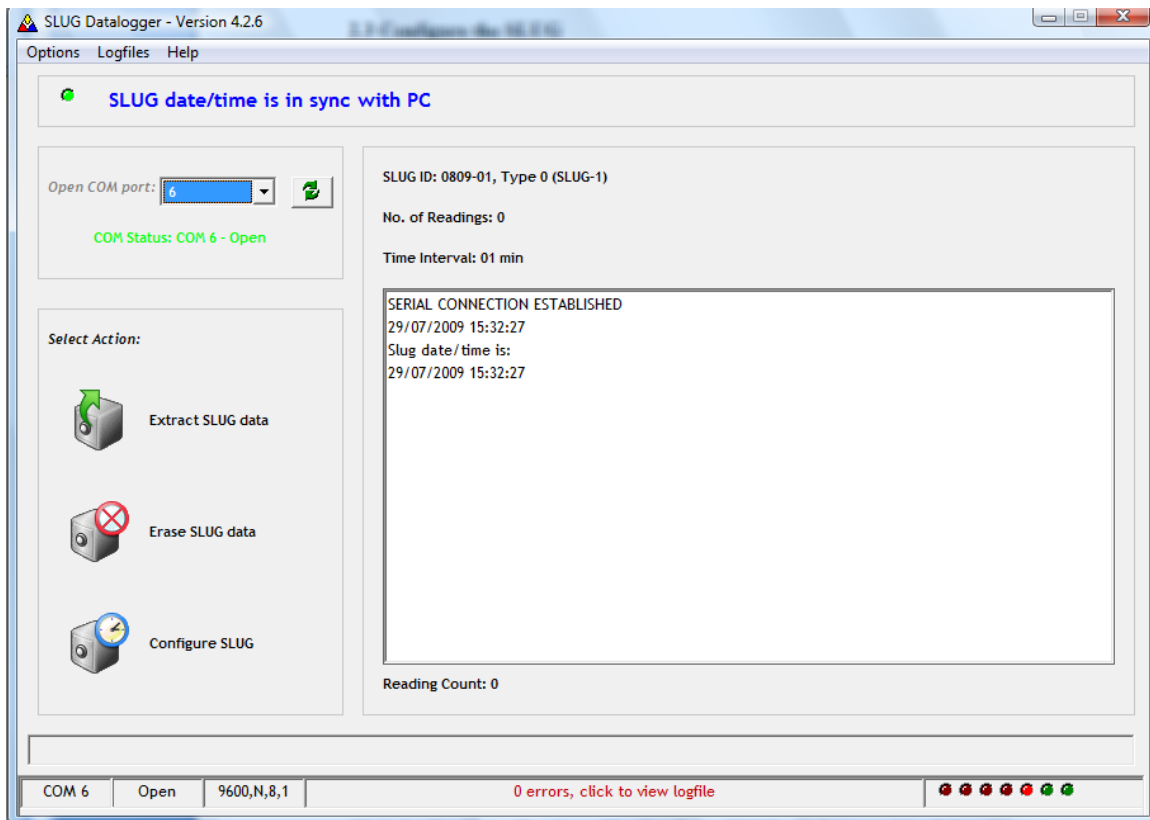

Figure 6: SLUG4 number 0808-06 has been plugged into the download cable.

Click the Configure Slug icon. The Configure SLUG window provides 2 functions:
 (1) to set the reading interval from 1s (or as quickly as possible with no sleep) to 24hr, and
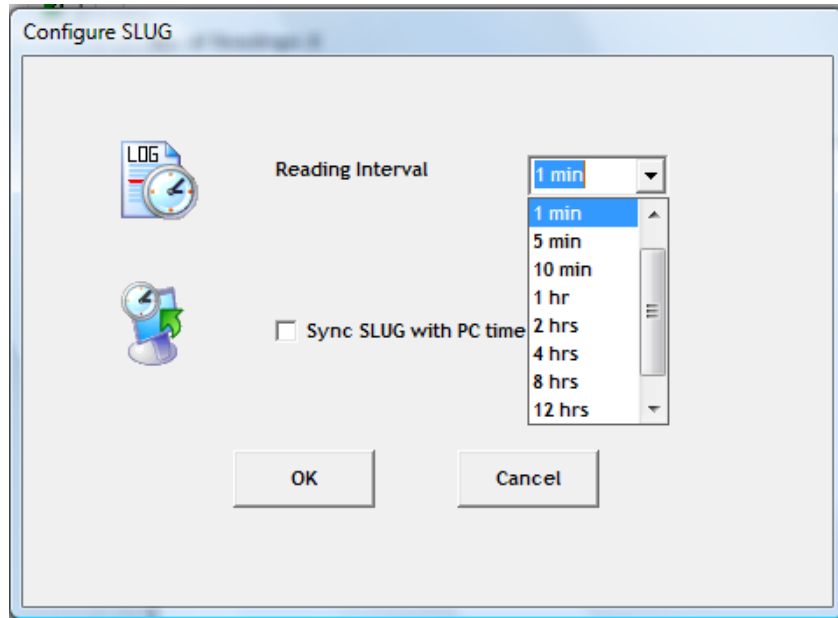(2) to synchronize the SLUG's Internal Clock with PC time.

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Figure 7: The Configure SLUG window. The SLUG4 clock will be synchronized with the PC if the checkbox is checked.

2.4 Collect data with the SLUG4

It is advisable to change the 9V batteries prior to a new data-logging session, and as described above, resynchronise the internal with the new battery attached. If the SLUG4 does not retain the time after unplugging the 9V batteries then the 3V CR1025 lithium battery should be replaced.

To start data-logging sessions simply plug any YieldPoint digital instrument into one of the instrument PORTs(1-4). The data-loggers LED will flash immediately then
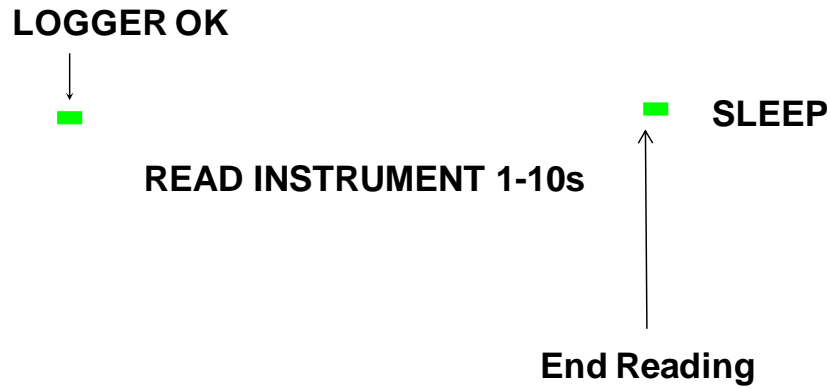
LOGGER OK

↓

  ■ **SLEEP**

↑

READ INSTRUMENT 1-10s

End Reading

Figure 8: The SLUG LED sequence when an instrument is plugged into the PORT.

The SLUG automatically calculated how many channels of information to expect from a given type of sensor.

The logging duration for SLUG data-loggers depends on a number of factors related to battery capacity and memory. Table 1 provides a basic guideline for how long a SLUG or SLUG 4 will continue to log data from various sensors with different types of battery.

Type	Battery	GMM(1hr)	GMM(8 hr)	DETECT 4EX(8hr)
SLUG	1 9V Cu/Zn	34 days	72 days	56days
	1 9V Alkaline	64 days	128days	104days
	1 9V Lithium	200 days	350days	260 days
		4 GMM(1)	4 GMM(8)	4 DETECT 4EX(8)
SLUG 4	2 9V Cu/Zn	24 days	48 days	40 days
	2 9V Alkaline	44 days	38 days	64days
	2 9V Lithium	96 days	132days	128days

Table 1. Approximate Minimum Battery Life for SLUG and SLUG 4 Data-loggers

2.5. Download the Data.

After opening the appropriate Virtual COM port connect the SLUG data-logger to the USB download cable. Serial Communication will be established and the SLUG will inform the software of the number of readings available for download. In this case 23 readings over a 23min interval.
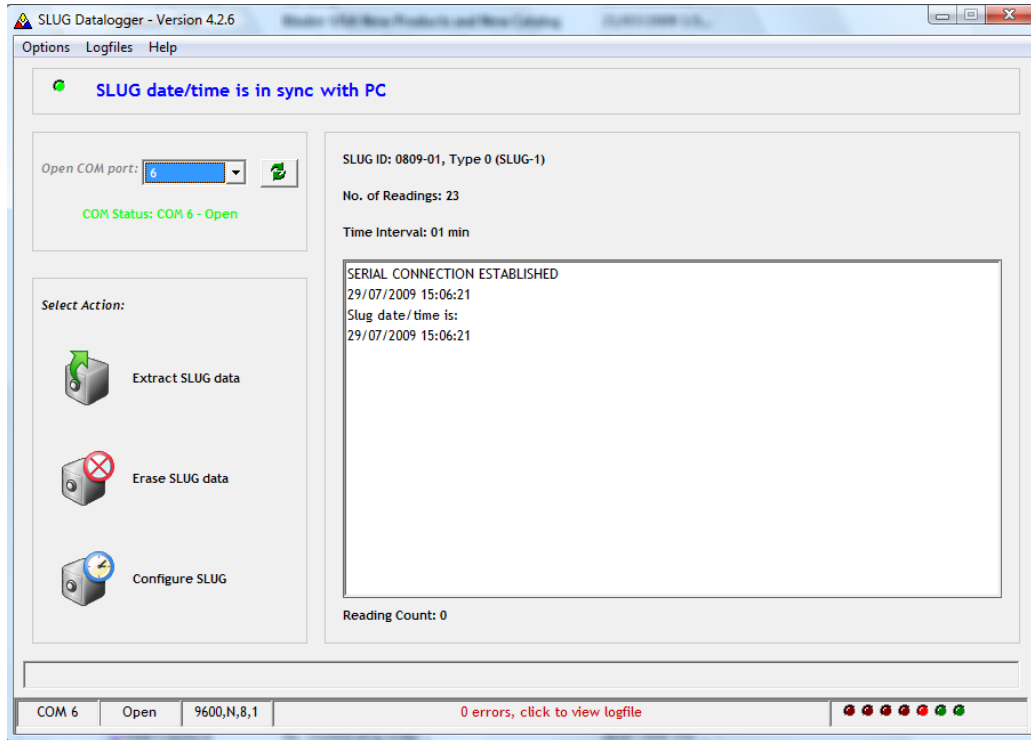

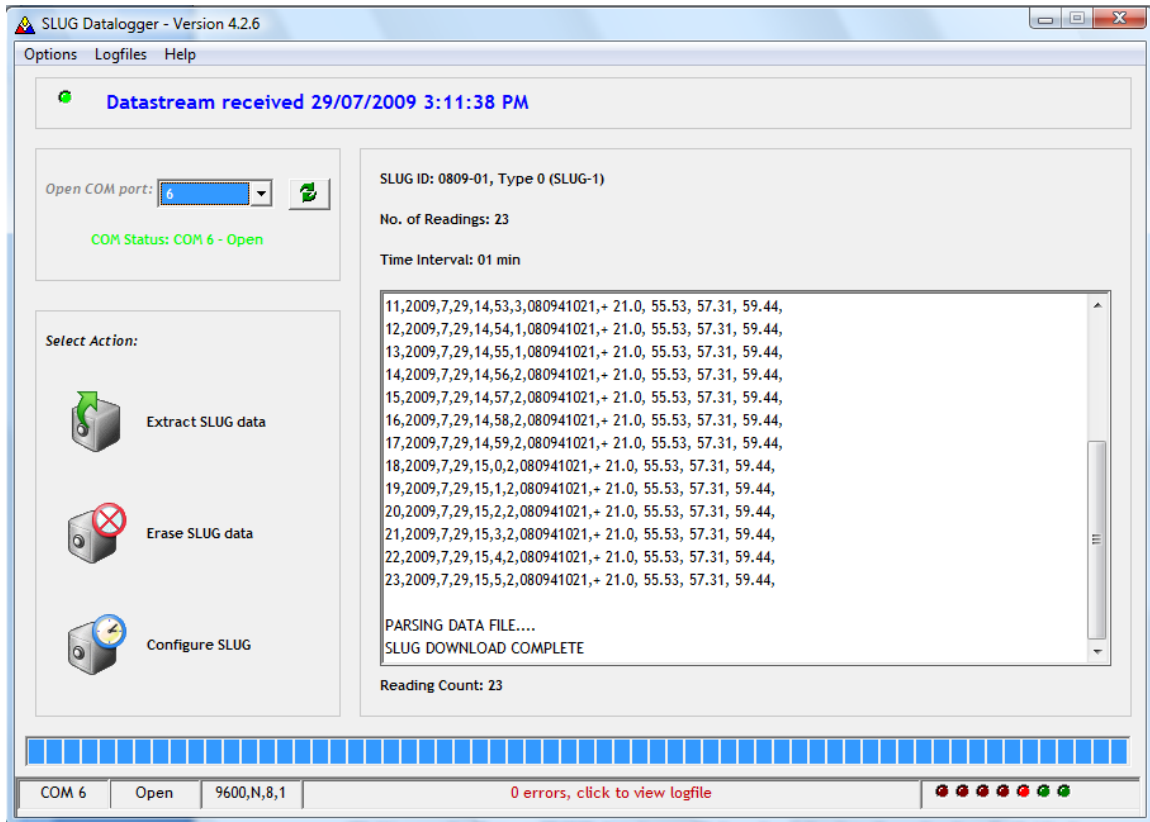**Figure 9:** The software response when a SLUG is plugged into the USB connection.

Figure 10: Data Extraction: 23 readings taken at 1min intervals have been downloaded.

Clicking on the Extract SLUG data icon will download the data from the slug. Individual samples will scroll down the text box. Using the last reading as an example the output string comprises:
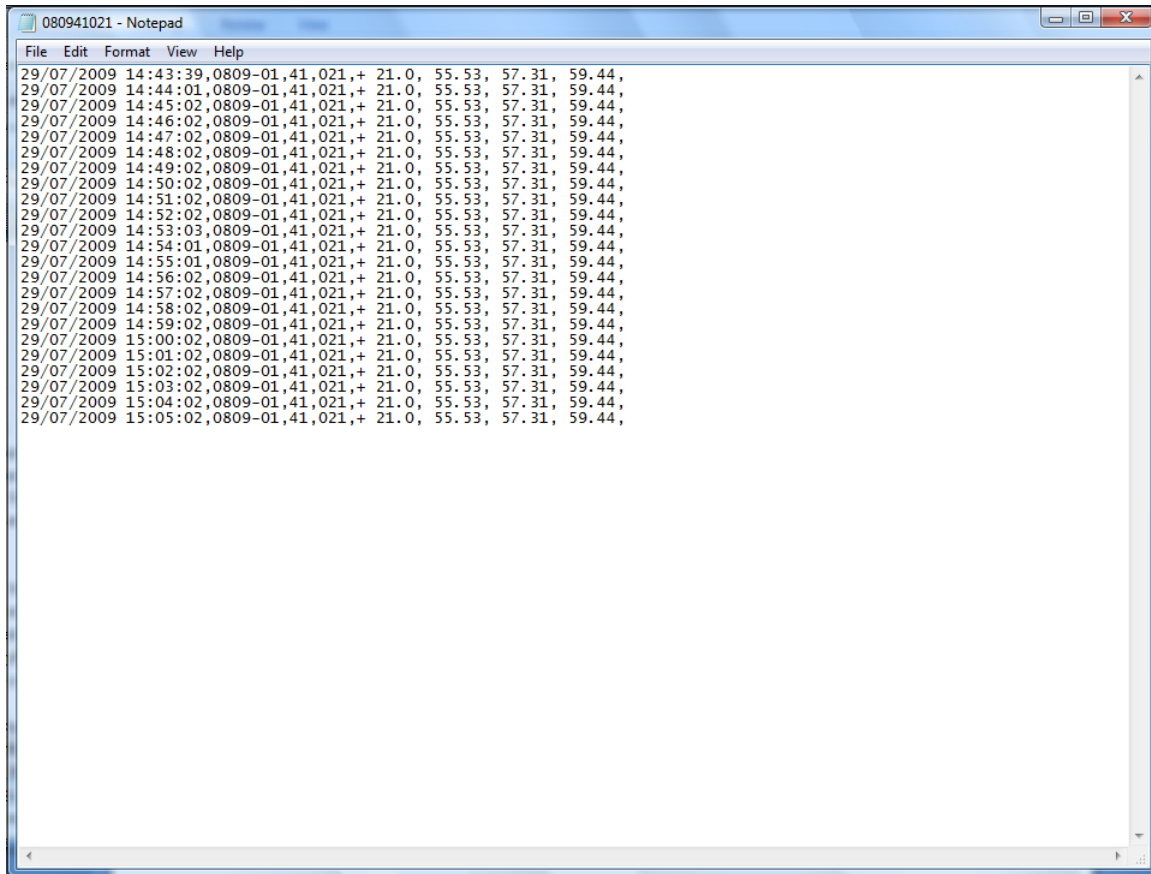
Reading Number(23), YY(2009), MM(7) ,DD(29) ,hh(15) ,mm(5) ,ss(2), SensorID (080941021),Temp (21.0C), Disp1(55.53mm), Disp2(57.31mm), Disp3(59.44mm),

The data is written into a text file with a file name corresponding to the unique Sensor ID and called SensorID.txt.

For windows vista users these are in the folder:

c:\Users\Public\Documents\YieldPoint\Slug\datafiles

The rate of download varies but for 1000 samples the time will exceed 1 minute

```
080941021 - Notepad
File  Edit  Format  View  Help
29/07/2009 14:43:39,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:44:01,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:45:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:46:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:47:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:48:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:49:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:50:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:51:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:52:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:53:03,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:54:01,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:55:01,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:56:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:57:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:58:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 14:59:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:00:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:01:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:02:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:03:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:04:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
29/07/2009 15:05:02,0809-01,41,021,+ 21.0, 55.53, 57.31, 59.44,
```

3.TROUBLESHOOTING

If any problems should arise with your SLUG4 device the following sequence of events should be followed,

(i) Replace the batteries
(ii) Try a different SLUG (or SLUG4) with the download cable
(iii)Try a different download cable if available
(iv)Call YieldPoint for telephone assistance (613 531 4722).