DATA LOGGER
GEOLOGGER LINX

INSTRUCTION MANUAL

GEO SENSE

CONTENTS Page 2

CONTENTS contd...

1.0 INTRODUCTION

This manual is intended for all users of the **GeoLogger Linx** data loggers and provides a guide for its installation, operation and maintenance.

It is VITAL that personnel responsible for the installation and use of the GeoLogger Linx READ and UNDERSTAND the manual, prior to working with the equipment.

1.1 General Description

The **GeoLogger Linx™** is a range of low cost, battery-powered data loggers designed for reliable unattended monitoring. Available as single channel, four channel or eight channel suitable for up to 8 vibrating wire sensors and their associated thermistors.

It can be automatically configured using a text file via USB connection or by manual inputs and data can be easily downloaded.

1.2 Theory of Operation

Vibrating wire sensors comprise of a tensioned wire held between two restraining ends. As the restraining ends move the tension in the wire changes. The vibrating wire frequency generator within the **GeoLogger Linx™** generates voltage pulses in the magnet/coil at the centre of the gauge and measures the resonant frequency of vibration. These frequencies are then stored within the data logger and can be then be downloaded as a csv file.

1.3 Software

The **Geosense® Linx™** software provides the interface to configure and download the data and is provided on the USB supplied with the unit. It is also available as a free download at www.geosense.co.uk/downloads/software/linxsoftware

As part of continual improvement updates to the software may occur and should be downloaded to ensure the current version is being used.

Details of installation are shown on page 13.

1.4 Firmware

As part of continual improvement firmware updates may be required and should be downloaded to ensure the current version is being used.

Details of installation are shown on page 44.

1.5 Host system requirements

1.5.1 Hardware

- Desktop or laptop computer with USB port
- USB cable A to Mini B
- Resource USB containing initial software

1.5.2 Windows operating system

The following Microsoft™ Windows operating systems can be used:-

- Windows 7
- Windows 8
- Windows 10

1.5.3 Drivers

1.6 EMC - Electro Magnetic Compatibility

EMC is the electromagnetic interaction of electrical and electronic equipment with other electrical and electronic equipment. All electronic devices have the potential to emit and be affected by electromagnetic fields. With the reduction in size of electrical components and the ever increasing amount of electrical & electronic devices such as mobile phones, two-way radios, safety control systems, signalling, generators, welding equipment, power cables etc in all environments, especially construction sites, there is a huge potential for devices to interfere with each other.

The **GeoLogger Linx** has been designed and tested for EMC under the relevant CE marking directives to ensure compliance and reliable operation.

1.7 Philosophy of operation

Geocal Files

All Geosense vibrating wire sensors manufactured after 01/03/2016 are sent with geocal files which contain calibration information. These files can be imported into each channel of the Linx logger leaving only the Sensor Name and Site Zero Information to be inputted manually.

For sensors without geocal files these can be created by manually inputting the sensor information and exporting the factors. This can be useful when inputting calibration factors on site is not ideal.

Disconnected Operation

Unlike other products the Linx has been designed to enable users to run the software when disconnected from the data logger. This feature allows sensor information to be inputted and saved as a .geocal file for quick upload to the logger when on site.

WARNING: All changes made in the software for both sensor configuration and logger configuration must be **UPLOADED** to the Logger for them to take effect. Even when the logger is connected changes to configurations are not automatically made.

Starting and Stopping Logging Mode

The Linx logger can be put in standby by turning the Logging Status to “OFF”. The Logger Status is always displayed at the bottom right corner of the software when connected to a logger. This can be useful when logging is not required for long periods.

Downloading Data

On connecting with the Linx Logger all available sensor configuration information is downloaded to the software. This allows direct download of data in engineering units.

If for any reason sensor information is missing or incorrect it can be altered on the software prior to download to ensure correct data reduction is performed.
Scenario 1: At time of installation all sensor information is correctly uploaded to data logger.
To Download: User connects to logger navigating directly to data download where information is downloaded in Engineering Units

Scenario 2: At time of installation all sensor information is uploaded however with some mistakes (Channel 1 contains the wrong calibration factors)
To Download: User Connects to logger and navigates to channel 1 sensor config, correct factors are inputted, uploaded and then data is collected.

1.7 Philosophy of operation contd…

Scenario 3: At time of installation no sensor information is uploaded to the logger.
To Download: User Connects to logger and navigates to **sensor config**, correct factors are inputted, uploaded and then data is collected.

NOTE: During download the sensor configuration information on the software is used for converting to engineering units, if required the user can update the sensor information in the software and download without uploading sensor information to the logger in order to validate the sensor information. Once the information is validated it is recommended the correct factors are uploaded to the logger, failure to upload will result in previous sensor information being displayed when next connecting to the logger.

Append Data
The Append data function performs the same function as data download however gives the ability to append the data onto another file. This is useful when a logger has been wiped of its memory when a new configuration is uploaded.

NOTE: Data Append will append all downloaded data to a file and NOT just new data. If logger memory is not wiped after each download, duplication of data will occur.

Real Time Readings
Real Time Readings are not logged and serve as a tool to ensure sensors are connected and functioning as expected during installation or monitoring. A Key is used to allow easy identification of sensor configuration status:

RED: No sensor connected

ORANGE: Sensor connected with no calibration information

GREEN: Sensor connected with calibration information

2.0 CONFORMITY

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www.geosense.co.uk

Declaration of Conformity

We Geosense Ltd at above address declare that the equipment detailed below, complies with the requirements of the following EU Directives:-

- Low Voltage Directive 2014/35
- Electromagnetic Compatibility Directive 2014/30/EU
- Radio Equipment Directive 2014/53/EU
- Restriction on the use of certain Hazardous Substances (RoHS2) 2011/65/EU
- Waste electrical and electronic equipment (WEEE) 2012/19/EU

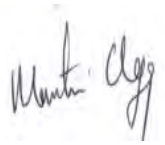
Equipment description:	**Data Logger**
Make/Brand:	**Geosense**
Model Numbers:	**GeoLogger Linx 1,4,8 & Linx Connect 1, 4**

Compliance has been assessed with reference to the following harmonised standards:

EN 61326-1:2006 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

A technical file for this equipment is retained at the above address.



Martin Clegg
Director

December 2020

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www.geosense.co.uk

Declaration of Conformity

We Geosense Ltd at above address declare that the equipment detailed below is in conformity with the following UK Regulations and their corresponding Statutory Instruments:-

- Electrical Equipment (Safety) Regulations 2016
- Electromagnetic Compatibility Regulations 2016
- Radio Equipment Regulations 2017
- Restriction on the use of certain Hazardous Substances in Electrical & Electronic Equipment Regulations 2012

Equipment description:	**Data Logger**
Make/Brand:	**Geosense**
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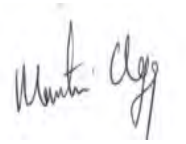
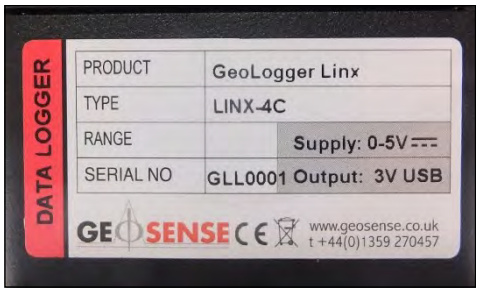


Martin Clegg
Director

December 2020

3.0 MARKINGS



Geosense® GeoLogger Linx is labelled with the following information:-

Manufacturers telephone number & website address

Product group: Data logger

Product type: GeoLogger Linx, GeoLogger LinxConnect

Model: Linx-1C,Linx-4C,Linx-8C, LinxConnect 1,4

Input supply: 6 Volt DC (battery), 3V USB

Output: 3V USB

Serial number:

UKCA, CE & WEEE mark

4.0 DELIVERY

This section should be read by all users of the **GeoLogger Linx.**

4.1 Packaging

Geosense® GeoLoggers are packed for transportation to site. Packaging is suitably robust to allow normal handling by transportation companies. Inappropriate handling techniques may cause damage to the packaging and the enclosed equipment. The packaging should be carefully inspected upon delivery and any damage MUST be reported to both the transportation company and **Geosense®** .

4.2 Handling

Geosense® GeoLoggers are precision measuring instruments. They and their associated equipment should always be handled with care during transportation, storage and installation.

Once the shipment has been inspected (see below), it is recommended that **Geosense® GeoLoggers** remain in their original packaging for storage or transportation.

Cable should also be handled with care. Do not allow it to be damaged by sharp edges, rocks for example, and do not exert force on the cable as this my damage the internal conductors and could render the installation useless.

DO NOT DROP AS THIS MAY CAUSE DAMAGE TO INTERNAL COMPONENTS

4.3 Inspection

It is important to check all the equipment in the shipment as soon as possible after taking delivery and well before installation is to be carried out. Check that all the components detailed on the documents are included in the shipment. Check that the equipment has not been physically damaged.

4.4 Storage

Geosense® GeoLoggers contain electronics and batteries and whilst they are designed for outside use and mounted within a waterproof (IP66) enclosure the internal circuit board can be affected by excessive moisture, dust and temperature. When not in use they should be stored in a cool, dry location.

The units are battery powered and therefore should be disconnected if not in use to avoid discharging.

DISCONNECT BATTERY WHEN NOT IN USE

5.0 INSTALLATION

This section of the manual is intended for all users of the **GeoLogger Linx** and is intended to provide guidance with respect to their installation.

5.1 Location

Prior to installing a **Geosense® GeoLogger Linx** it is essential to establish and confirm details of the installation to be carried out. Some of the main considerations are listed below :-

- **Location** - it should be placed in a suitable location where it cannot be damaged (avoid areas where moving machinery may occur)
- **Mounting**- it can be mounted to any surface using suitable screws in the four mounting holes in the main body.
- **Water ingress** - whilst the enclosure is rated to IP66 care should be taken to ensure that it is not placed in a location where it can be submerged as this will cause damage to the unit. Therefore if placing below ground in a manhole cover or equivalent there must be sufficient drainage to ensure against the unit being submerged.

5.2 Batteries

DO NOT ALLOW UNIT TO BE SUBMERGED AS THIS MAY CAUSE DAMAGE TO INTERNAL COMPONENTS

The following batteries can be used:-

- 4 x 1.5V C Alkaline cells which are rated for operating temperatures of –18 to +55 degrees Celsius*.
- 4 x 3.6V C Lithium cells which are rated for operating temperatures of –60 to +85 degrees Celsius*.

* Operation at extreme temperatures may lead to reduced capacity and lower voltage readings at the beginning of pulses

The standard battery provided is Alkaline which is suitable for most applications but in extreme cold conditions Lithium may be required for extended use.

ALKALINE BATTERIES ARE SUPPLIED AS STANDARD

LITHIUM BATTERIES ARE CATEGORISED AS “DANGEROUS GOODS”

WHEN FITTING BATTERIES ENSURE THE CORRECT POLARITY

5.3 Installing Linx™ software

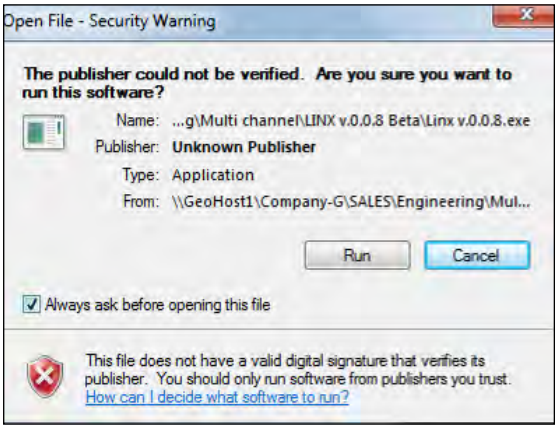
The **Linx™** software is loaded onto the USB supplied with the unit.

It can also be downloaded from the Geosense website www.geosense.co.uk/downloads/Linxsoftware

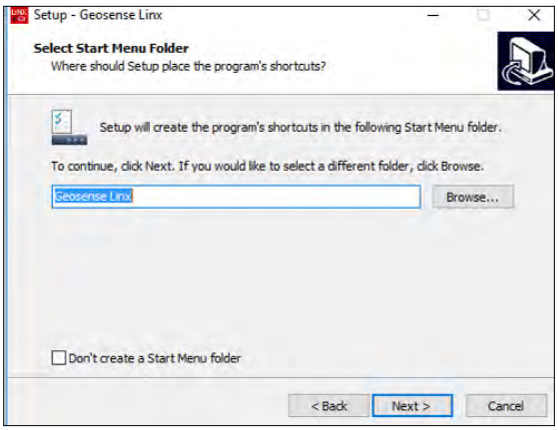
To install the software:-

1. Turn on the host device (PC, laptop or Windows tablet)
2. Insert the USB stick into a USB port on the host device
3. Double click on the setup.exe file and follow the instructions to complete the software installation

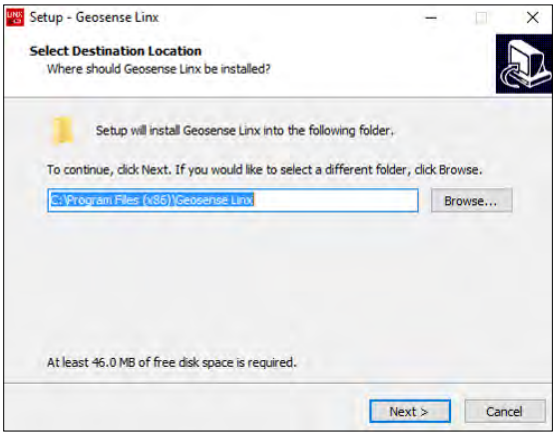
This message may show but please ignore and select **RUN**



The default location for storing the software will be C:\Program Files (x86)\Geosense Linx

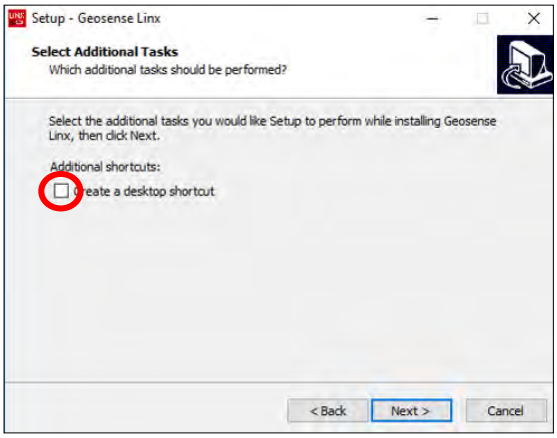


If another location is required use the Browse… and choose the required location

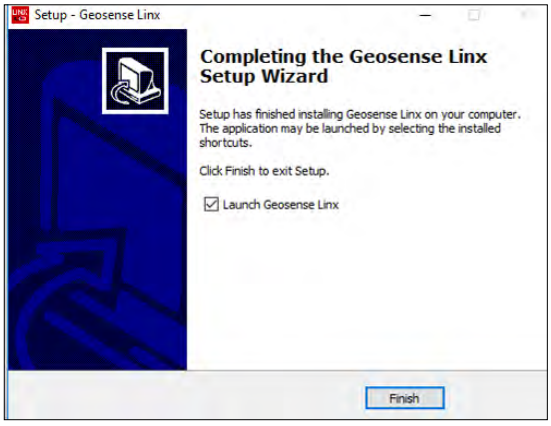


5.3 Installing Linx™ software contd...

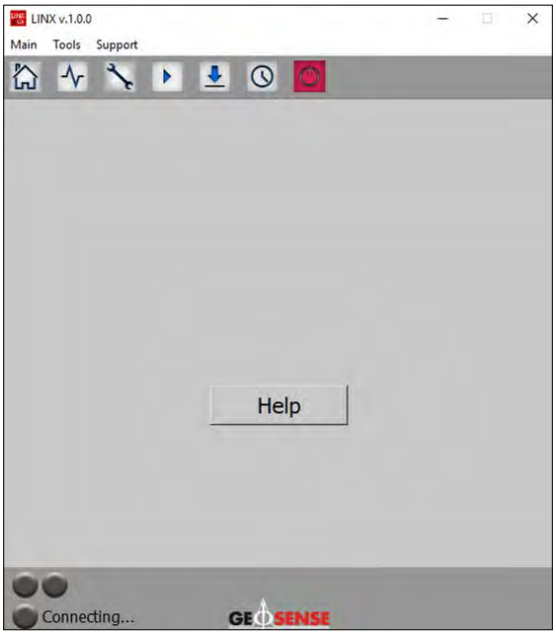
If a desktop shortcut is required tick the box



Once the download time bar has finished click on the Finish button. For software version > V1.0.3 an option to installed the correct drivers will appear. Although this is not always required it is recommended that users follow the instructions to install the drivers.



The home page of the **Linx™** software will then automatically appear and it is ready to use.

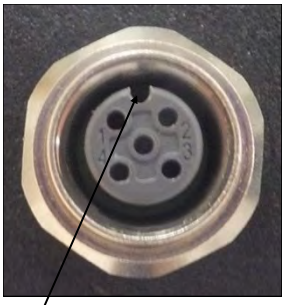


TO ENSURE THE CORRECT DRIVERS ARE INSTALLED THE LINX SOFTWARE MUST BE DOWNLOADED BEFORE CONNECTING TO A LINX LOGGER

6.) OPERATION

The **GeoLogger Linx™** can be fitted with female quick connectors or cable glands

6.1 Quick Connectors



THE SLOT ON THE FEMALE CONNECTOR MUST BE ALIGNED WITH THE PEG ON THE MALE CONNECTOR

REMOVE THE PROTECTIVE CAP TO ACCESS THE CONNECTOR

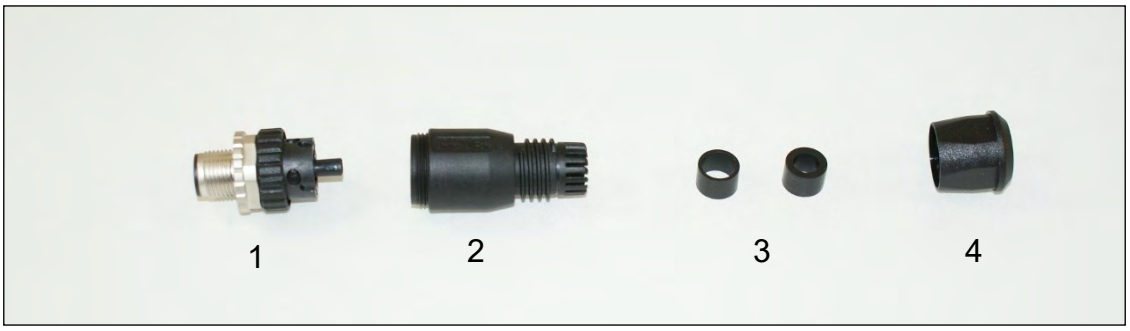
Geosense sensors can be ordered with male quick connectors (see below) to allow quick and easy installation in the field

If sensors are not already fitted with the quick connectors they can be supplied with the Linx Logger and be easily be fitted in the field (see next page)

6.) OPERATION contd...

6.1 Fitting Quick Connectors contd...

Connectors comprise of the following components:-



1 - Coupling 2 - Housing 3 - Grommet(s) 4 - Locking nut

Remove from the packaging and fit connectors as follows:-

STEP 1

Unscrew and remove the locking nut

STEP 2

Holding the black ribbed collar unscrew the housing

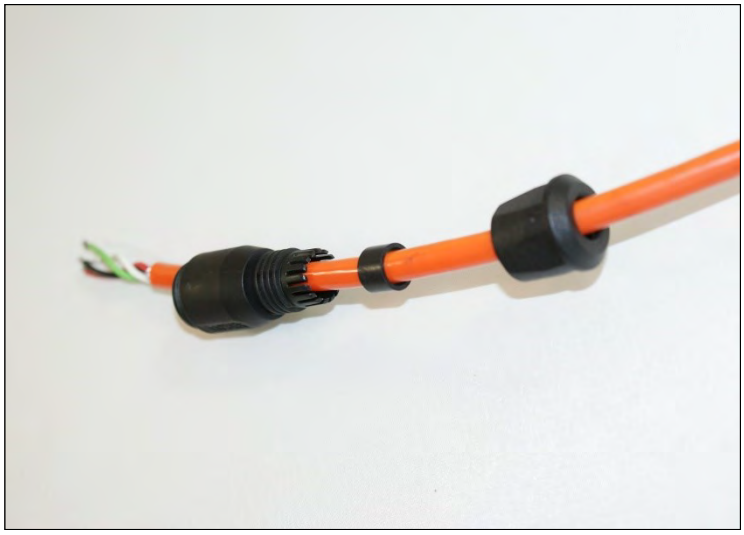
6.) OPERATION contd...

6.2 Fitting Quick Connectors contd...

STEP 3

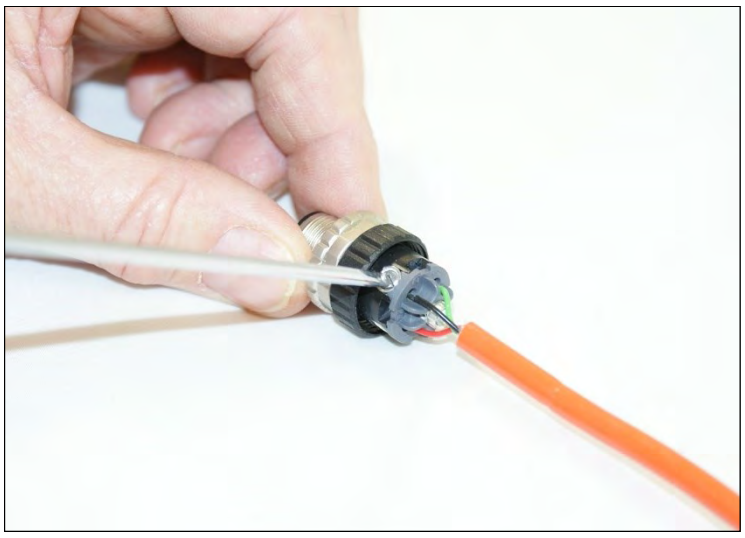
NOTE: The connector is supplied with two sizes of grommet 4-6mm & 6-8mm. The appropriate size should be selected to fit the cable diameter.

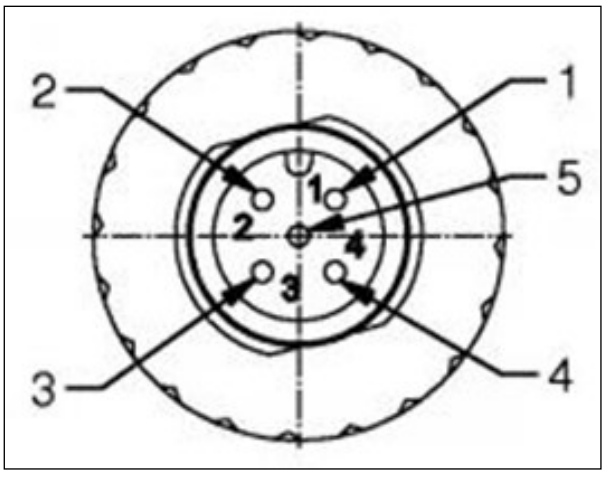
Feed the cable through the locking nut, grommet and housing



STEP 4

Wire the conductors into the coupling as shown below





Connector position 1 vibrating wire
Connector position 2 vibrating wire
Connector position 3 thermistor
Connector position 4 thermistor
Connector position 5 shield

6.) OPERATION contd...

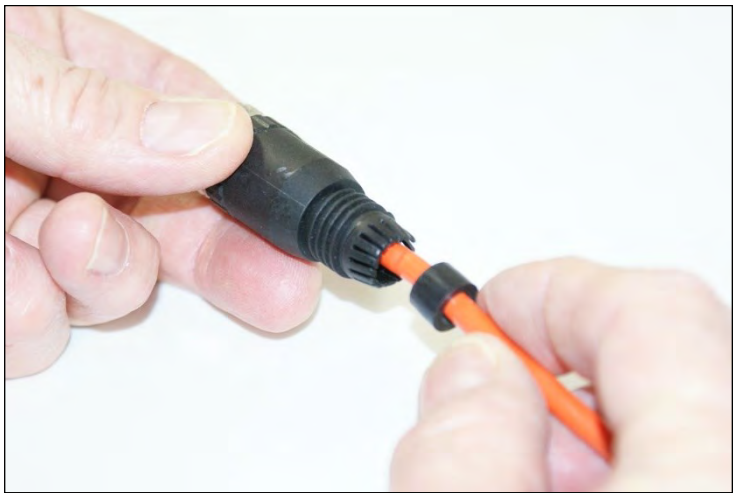
6.2 Fitting Quick Connectors contd...

STEP 5

Once wiring is complete screw the housing back onto the coupling

STEP 6

Fit the grommet into the back of the housing



STEP 7

Screw the back nut onto the housing and fully tighten

6.) OPERATION contd...

6.3 Cable glands

A 2.5mm terminal screwdriver and 20mm open ended spanner with be required.

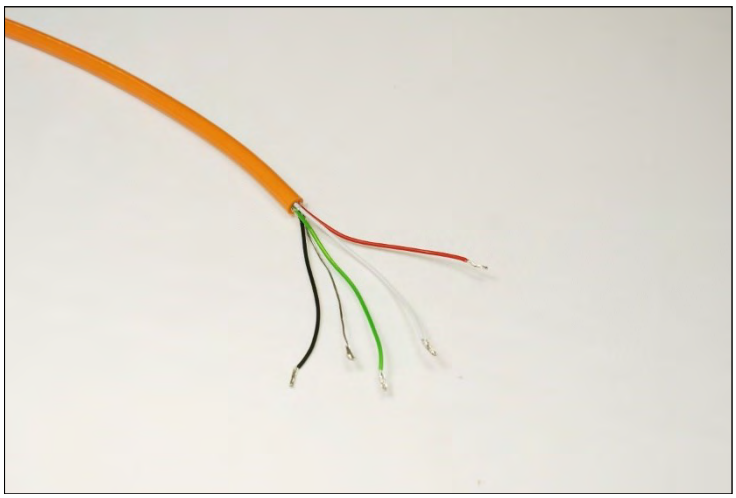
STEP 1

Each cable gland is supplied with a blanking plug which must be removed to allow cabling.

LEAVE PLUG IN IF CHANNEL NOT USED

6.) OPERATION contd...

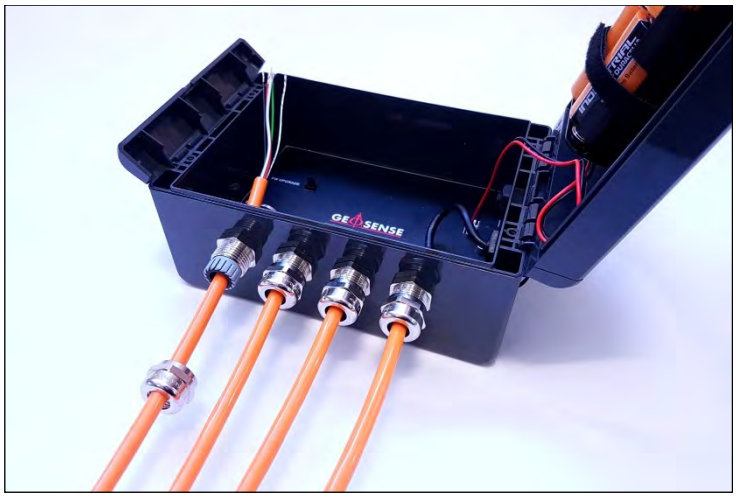
6.3 Cable glands contd...



STEP 2

Remove approximately 75mm of the sensor cable outer sheath

Remove approximately 10mm of each individual conductor outer sheath and fix into the individual terminals in the removable male part of the green terminal block

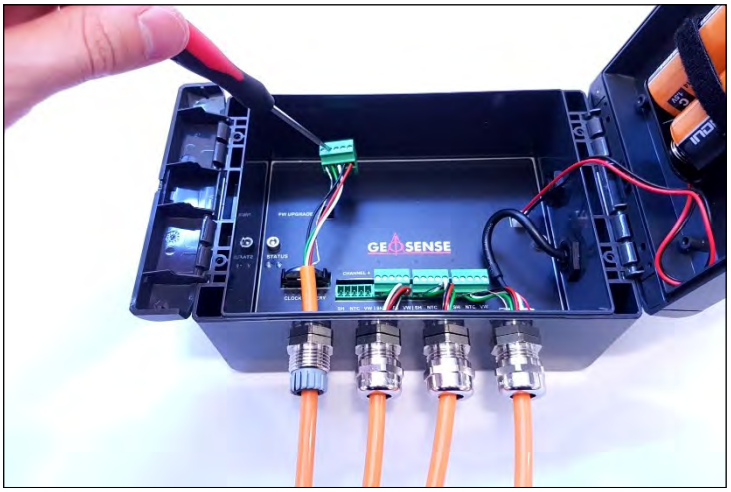


STEP 3

Pass the cable through the gland to allow it to be wired into the male half of the removable green terminal block.

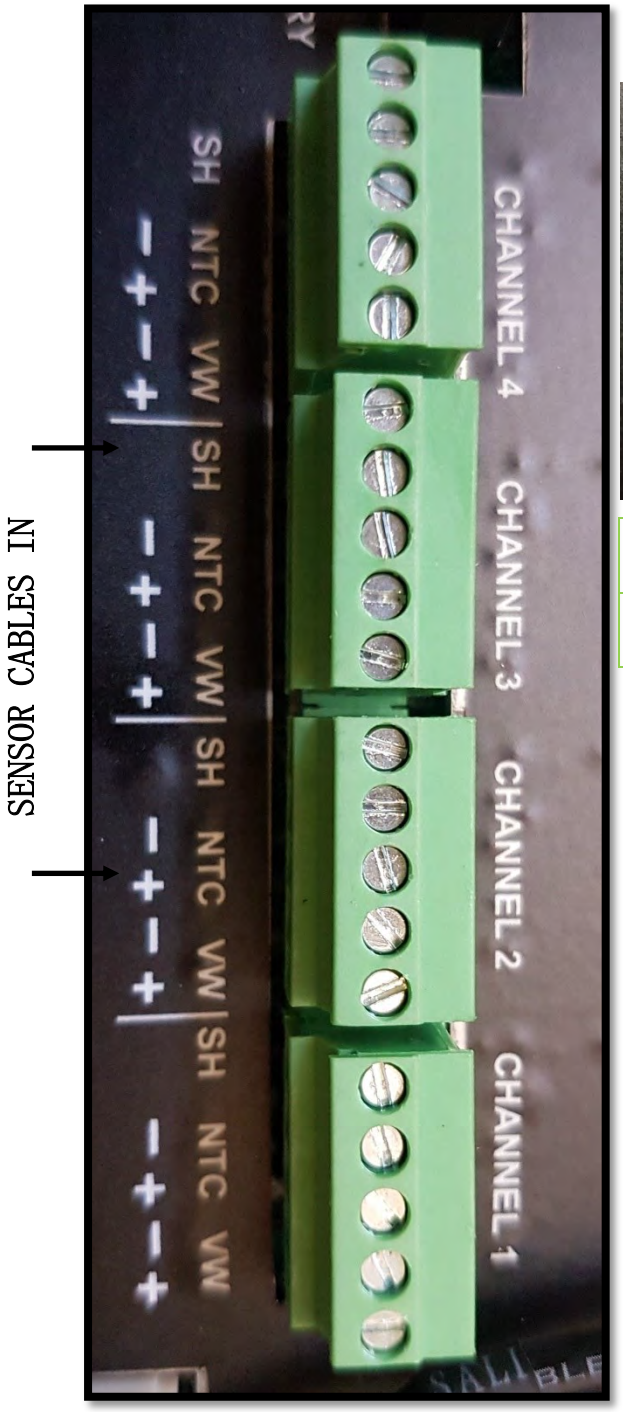
THE MALE PART OF THE TERMINAL BLOCK IS REMOVABLE

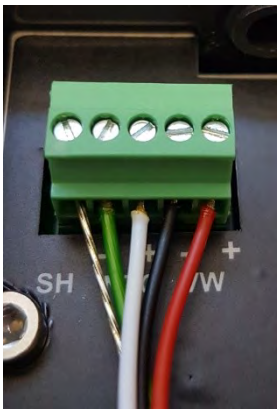
For wiring details see next page



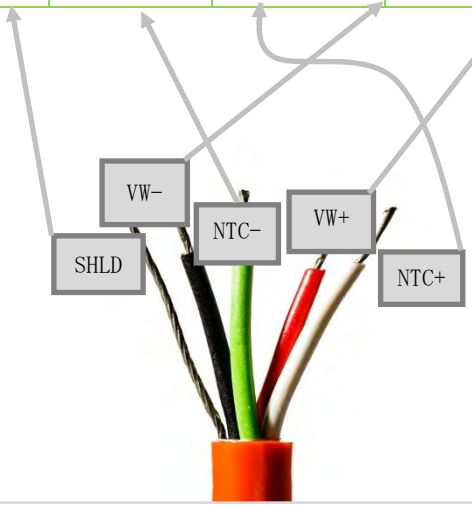
6.) OPERATION contd...

6.3 Cable glands contd...





SH	NTC- (thermistor)	NTC+ (thermistor)	VW-	VW+
Drain wire	Green	White	Black	Red



Note (from left to right)

Single channel loggers have wiring block configuration:

SH; NTC-; NTC+ ; VW-; VW+

Four or eight channel loggers have wiring block configuration:

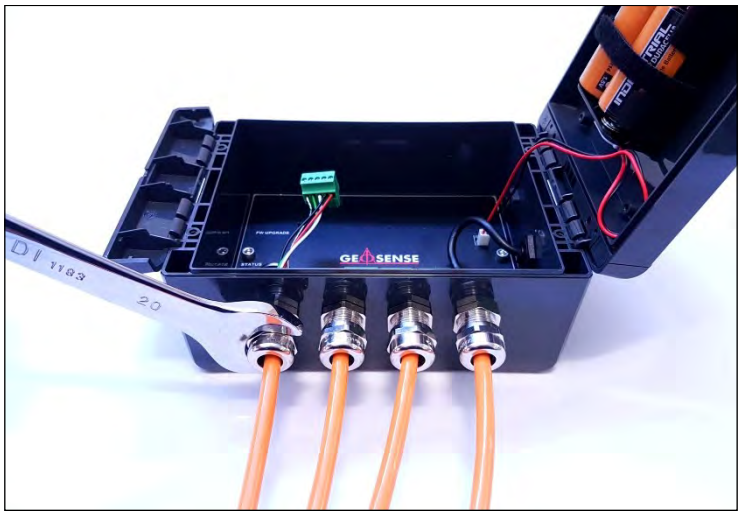
SH; NTC-; NTC+ ; VW-; VW+

6.) OPERATION contd...

6.3 Cable glands contd...

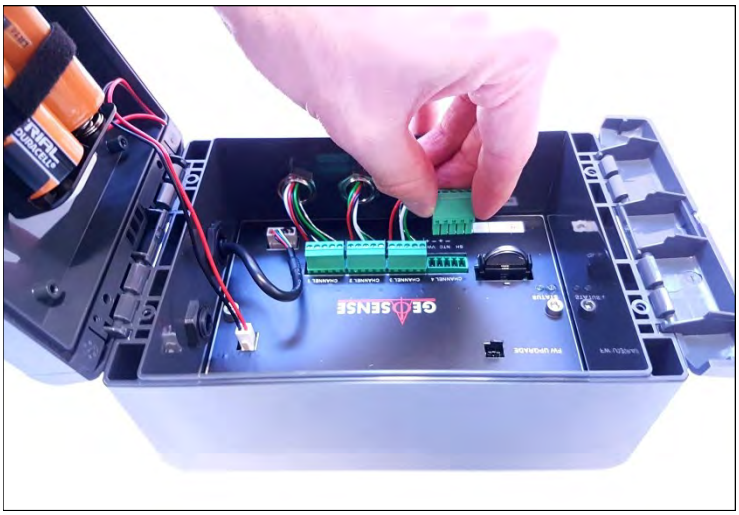
STEP 5

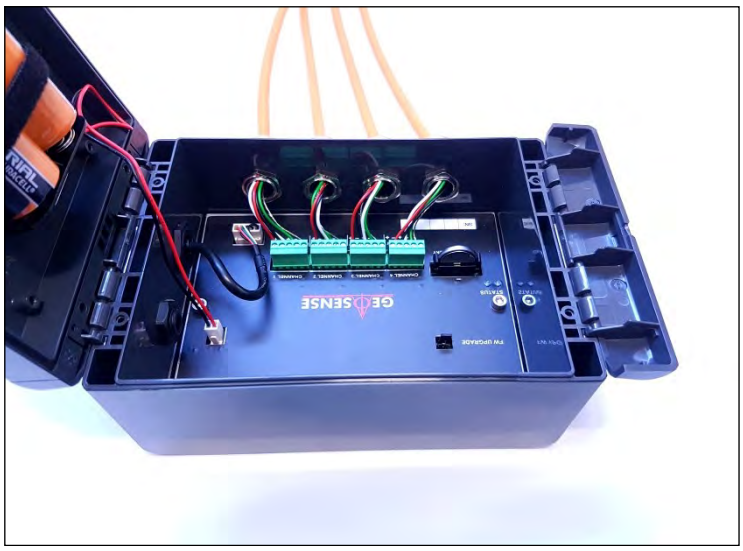
Once all channels are wired into the green male terminal block fully tighten the cable gland to prevent the cable from moving



STEP 6

Once the cable gland is tight place the male terminal block into the female block attached to the printed circuit board.





6.4 Running the software

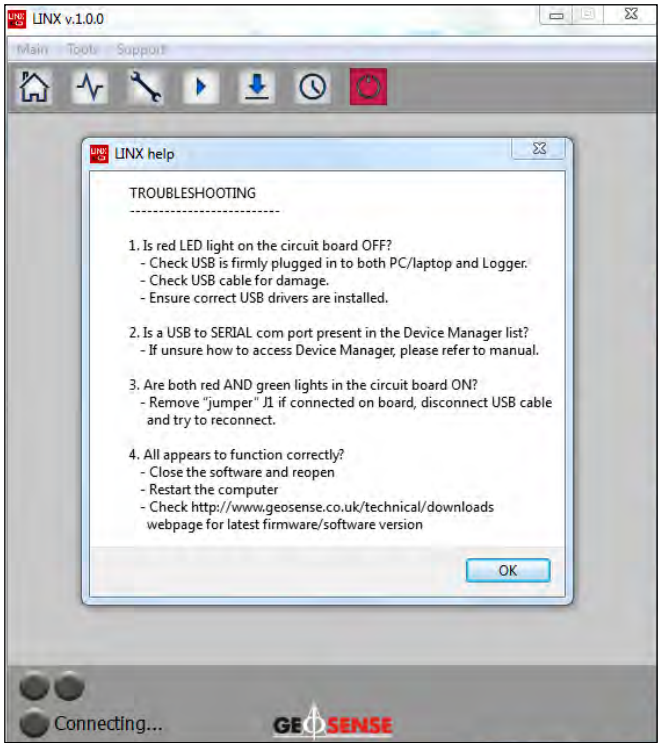
Connect the USB cable to **both devices** before using the **Linx™** software.

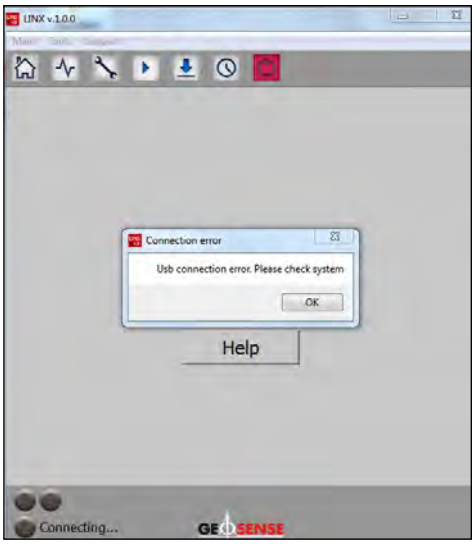
Open the software on the host device and the following screen could be shown:

CONNECT BOTH DEVICES BEFORE STARTING THE SOFTWARE

A successful connection is confirmed and this message will be shown every time the “Home” icon is pressed

During the connection of the two devices the red lights in the bottom left will flash and once the connection is successful the green light will remain on

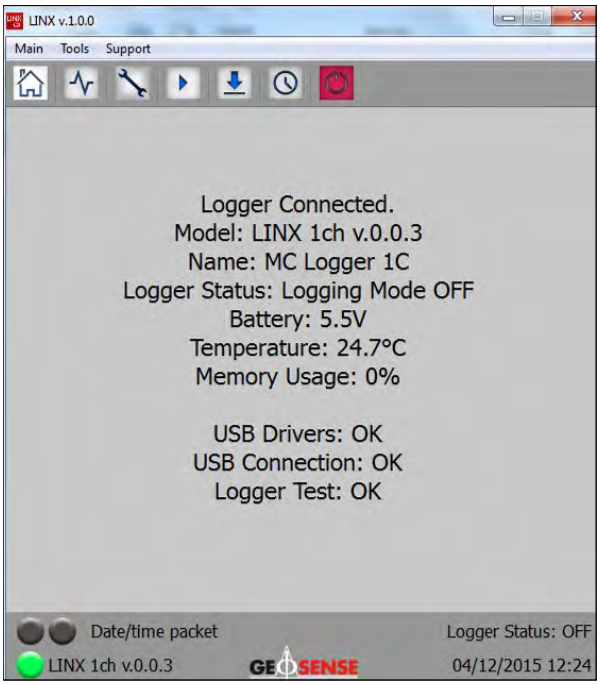




This means that the host & data logger are not connected.

Select the Help tab for problem diagnosis

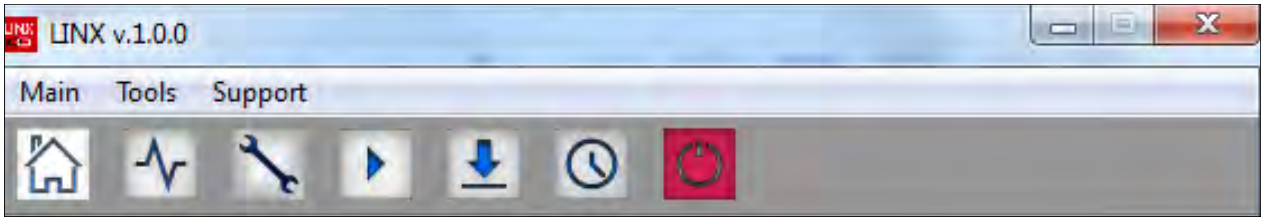
6.4.1 Home page



The following information is provided:-

- Logger connection status
- The data logger model & firmware version
- The type of logger
- Logging status
- Battery health
- Temperature of the logger
- Memory usage
- Status of the Drivers
- Status of the USB connection
- Status of the automatic logger operation test

6.3.2 Menu icons



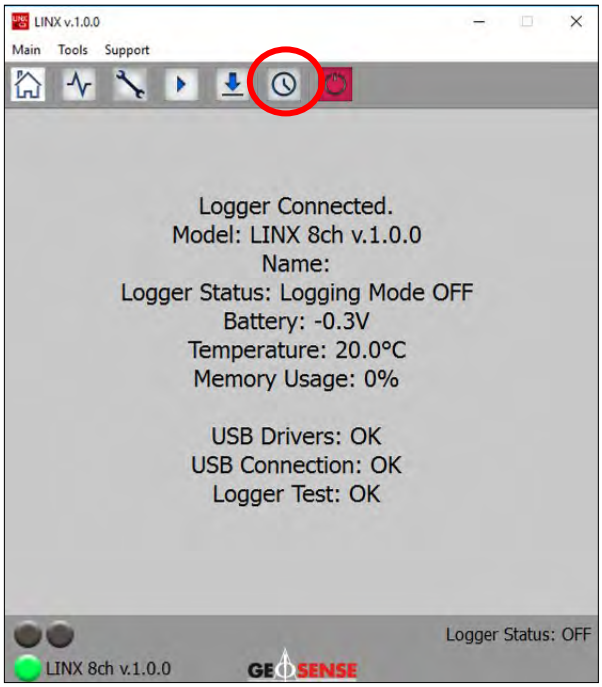
1. **Home page**
2. **Real time** - allows real time checking of the sensors
3. **Sensor config** - full configuration of the sensors including Engineering units
4. **Logger config** - set logging intervals and dates
5. **Download data** - download & append data in raw or Engineering unit format
6. **Time sync** - synchronise the date & time from the host device to the logger
7. **Exit** - closes the software

6.4.3 Synchronising date & time

SYNCHRONISE THE DATE & TIME BEFORE CONFIGURING THE Linx™ LOGGER

Before starting you will need to synchronise the date & time of the **Linx™** logger.

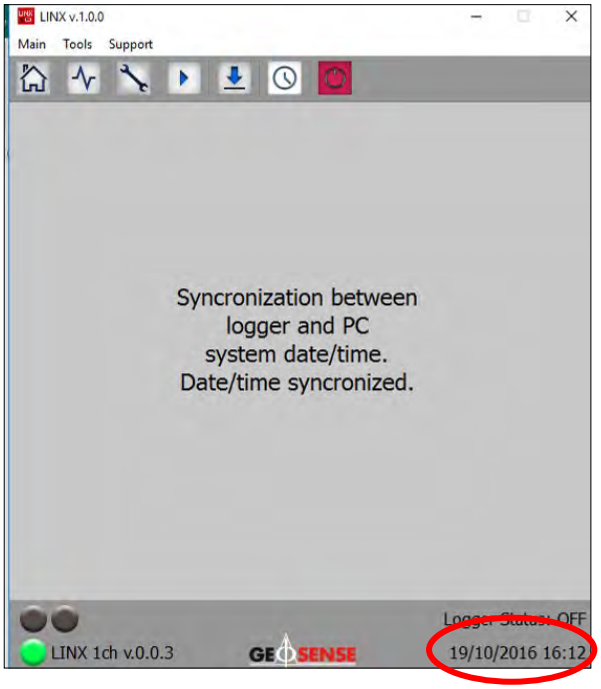
To synchronise click on the clock icon.



Synchronisation is confirmed by the message on the screen

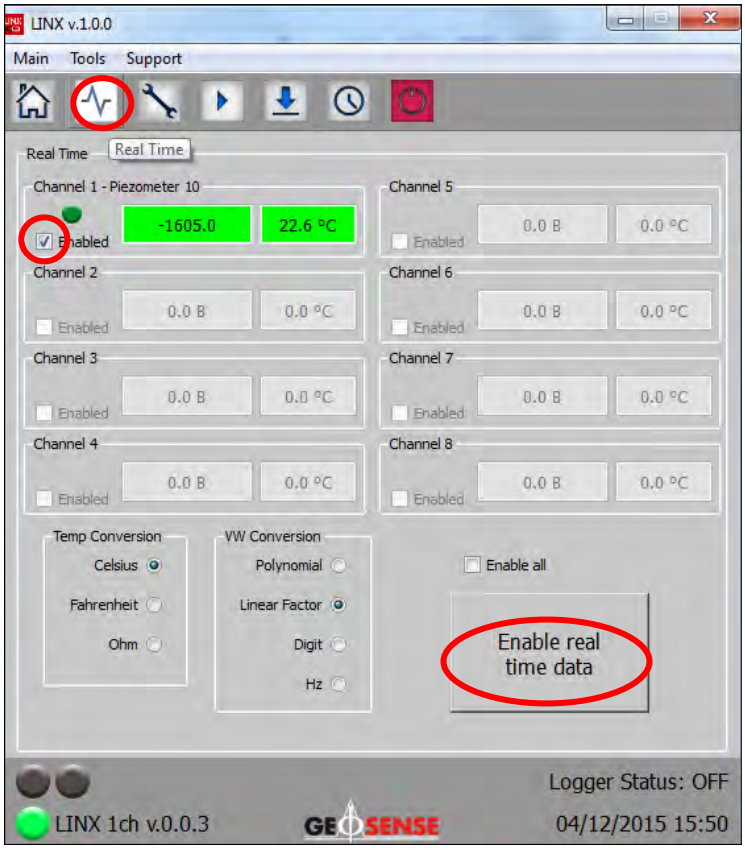
Date/time/syncronized

The date and time are then displayed in the bottom right of the screen



6.5 Real time readings

Select the **Real Time** icon

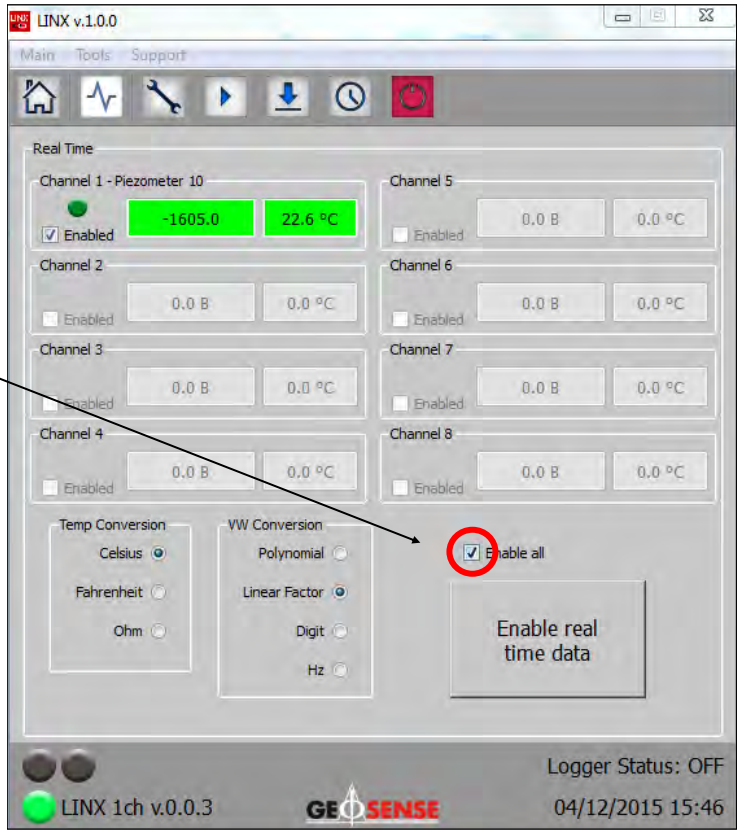


This allows you to see real time readings to confirm that each sensor is working or where real time readings are required.

To start real time readings select

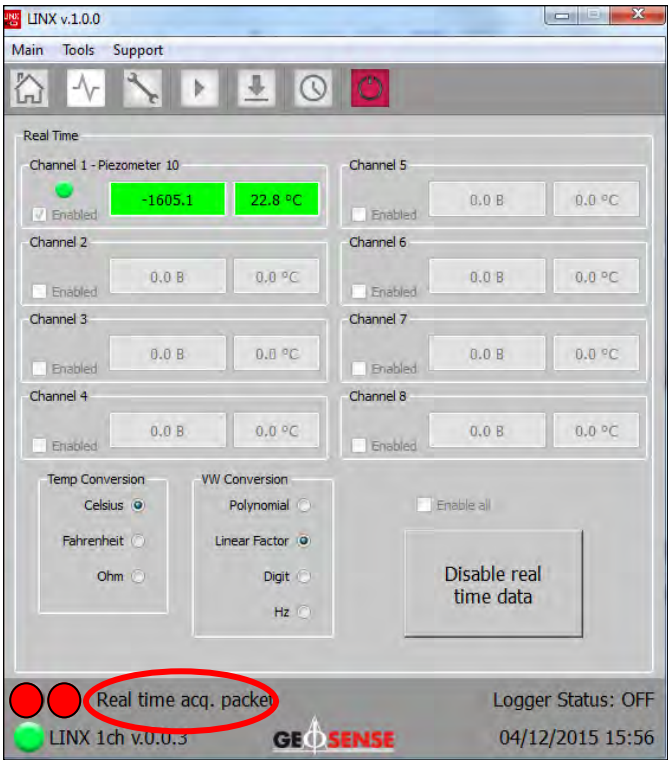
Enable real time data

Or you can select the **Enable all**



NO DATALOGGING OCCURS IN THIS MODE

6.5 Real time readings contd….



Confirmation that this mode is working can be seen by the message

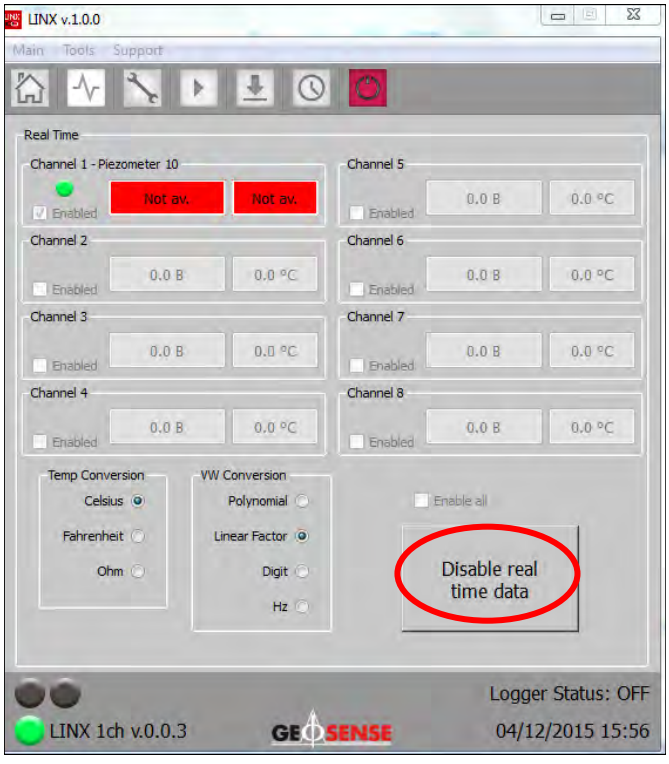
Real time acq. Packet

And the two red buttons will flash as each reading is taken

Box highlighted in **red** means no sensor is connected

Box highlighted in **green** means sensor configuration is completed

Box highlighted in **orange** means sensor connected but configuration is not completed



To stop real time select

Disable real time data

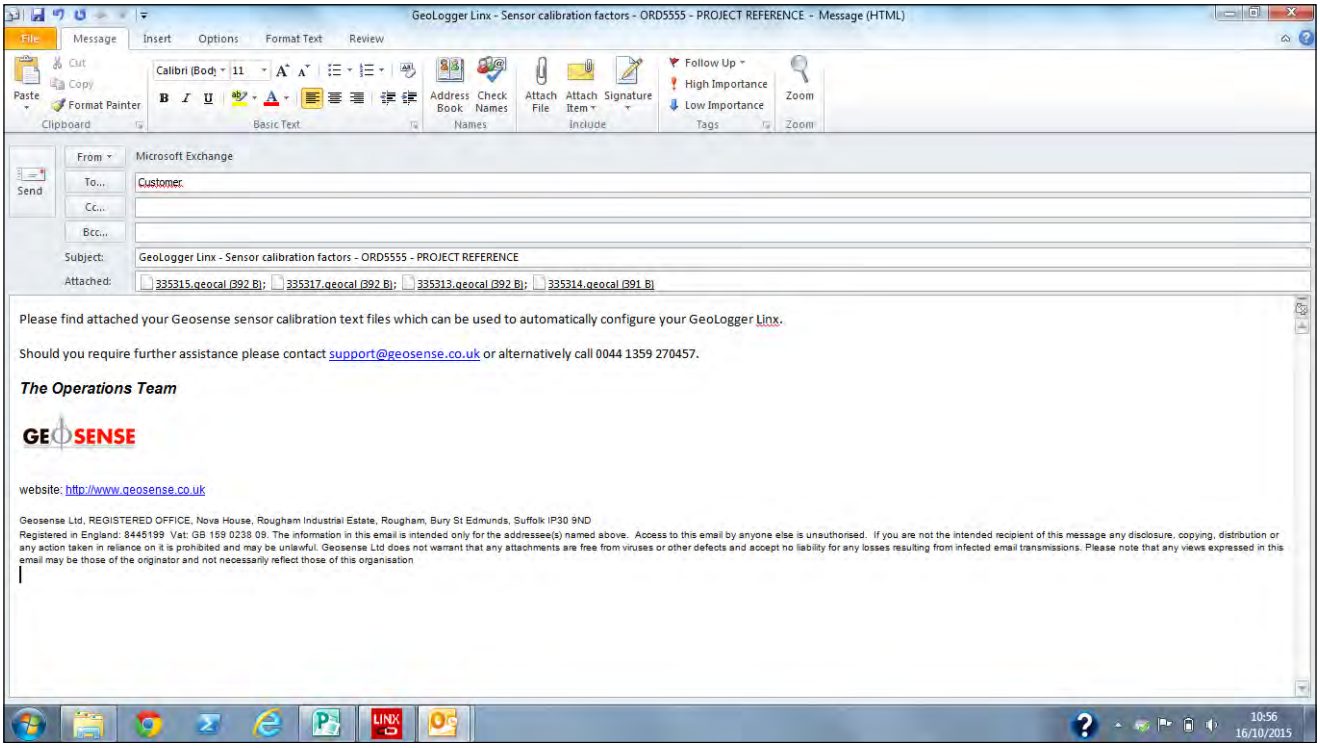
6.6 Sensor configuration

6.6.1 Cal file input & linear

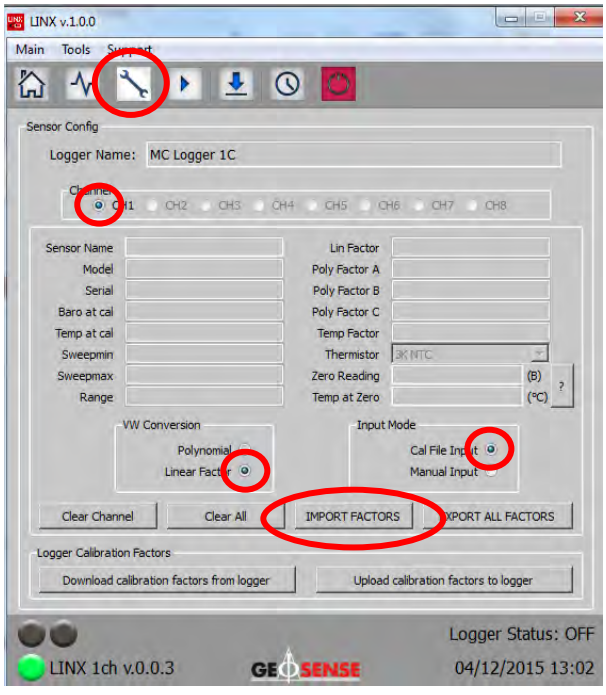
This mode allows the linear factors from the Geosense calibration sheet to be automatically inputted into the software.

The calibration information is provided using a text file that will have been forwarded by email at the time of supply (see below).

It is recommended to place all these text files into one location for ease of loading.



Select **Sensor config** icon



Select the channel to be configured

Select **Linear factor** AND

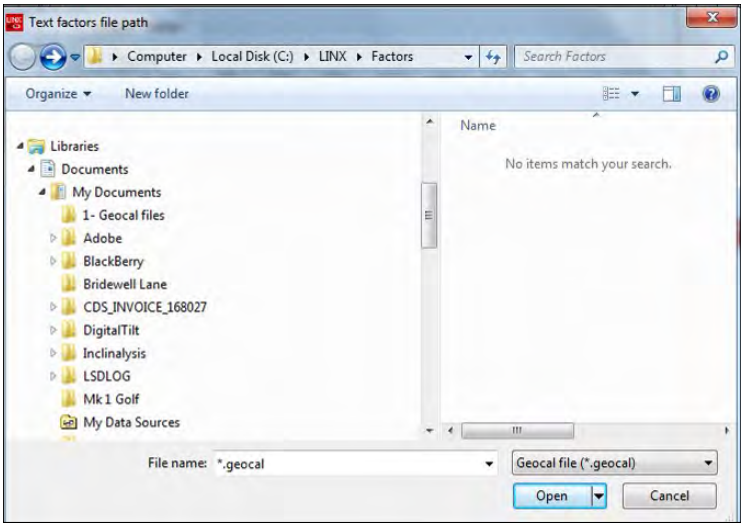
Cal file Input

Select **IMPORT FACTORS**

6.6.1 Cal file input & linear contd...

Search for the relevant Geosense Calibration file (.geocal) and select **Open**

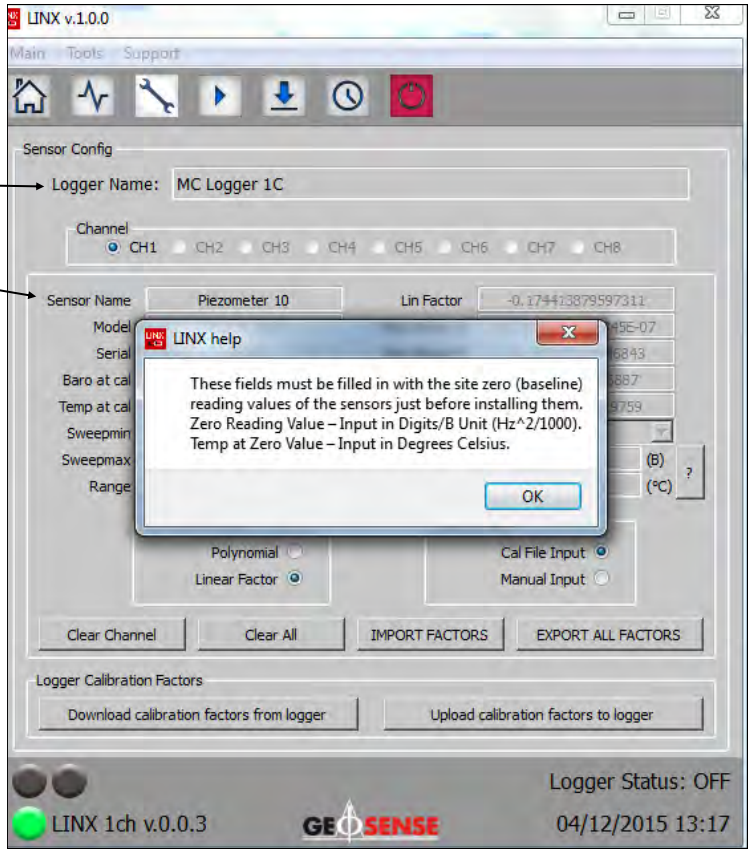
This will import all the calibration factors



Once the calibration factors have been uploaded fill in the following fields:-

- Logger name
- Sensor name

- Zero reading
- Temperature at zero

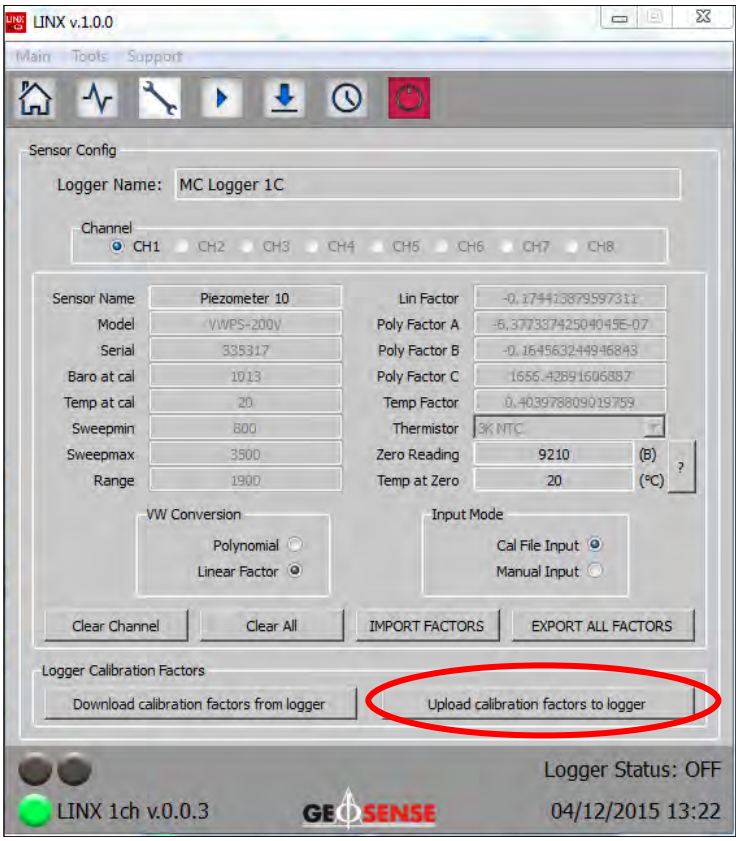


REPEAT FOR ALL CHANNELS AS NECESSARY

6.6.1 Sensor configuration - Cal file input & linear contd...

Once all the information has been entered into all the necessary channels select

UPLOAD CALIBRATION FACTORS TO LOGGER



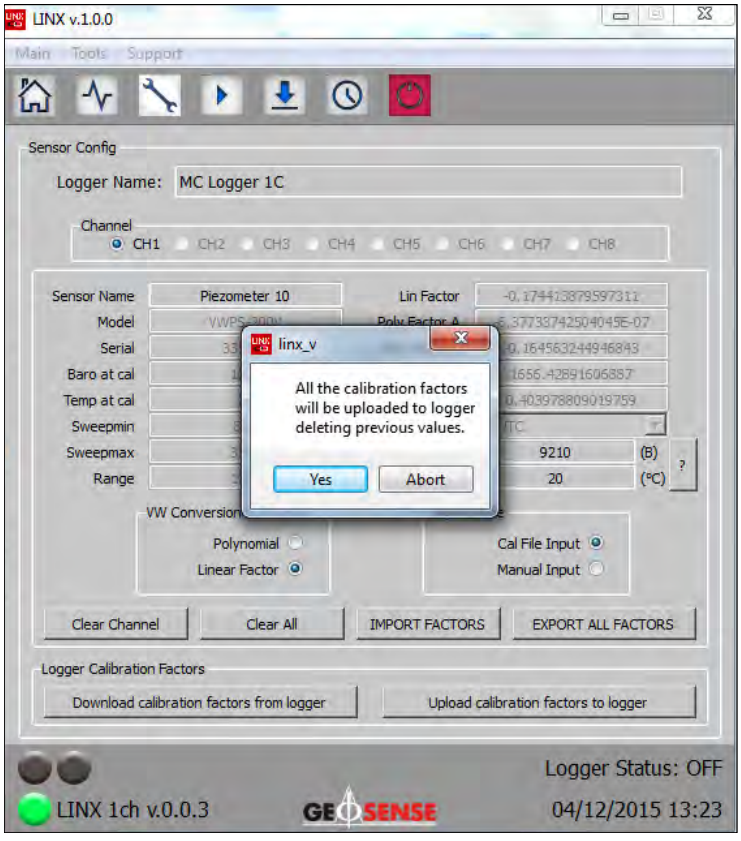
DEFAULT IS

Linear Factor & Cal file Input

At this stage you have the option to confirm or to cancel

To confirm select **YES.** All the entered data will then be uploaded to the logger

To cancel select **Abort.** This will take you back to the previous screen

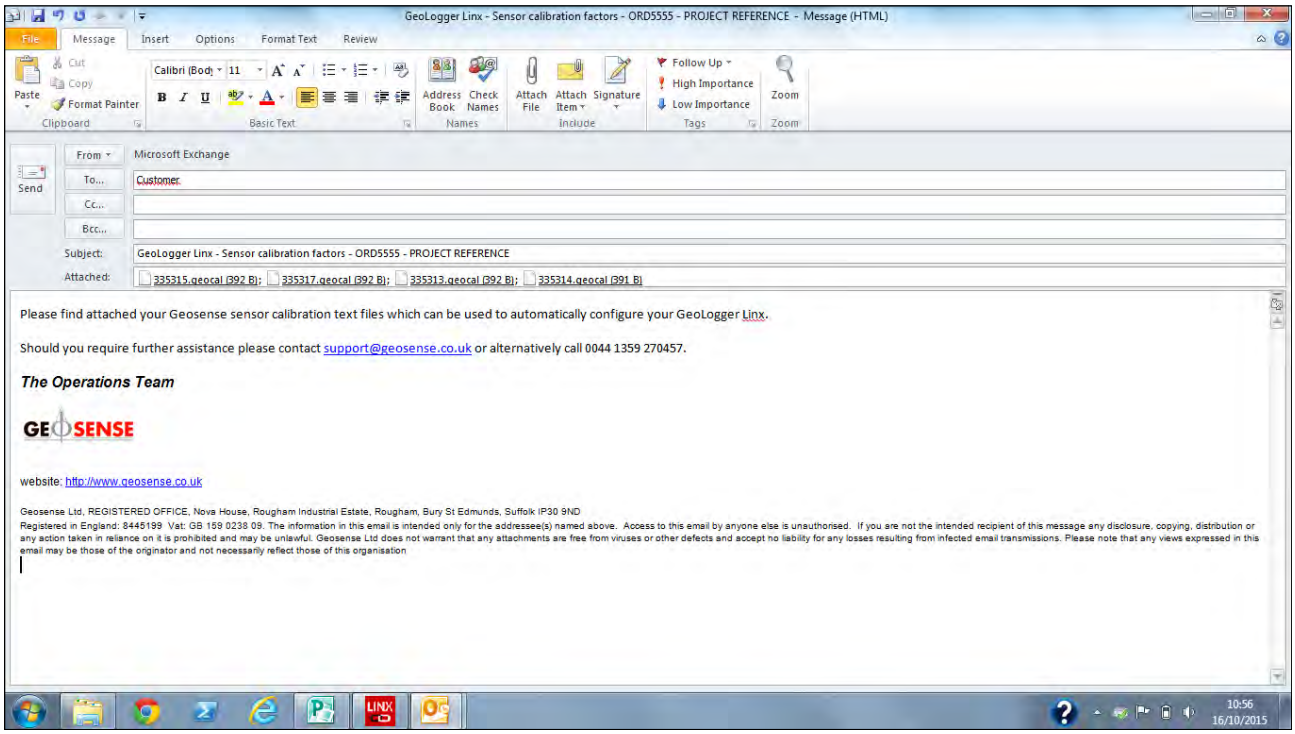


6.6.2 Sensor configuration - Cal file input & polynomial

This mode allows the information from the Geosense calibration sheet to be uploaded automatically into the software.

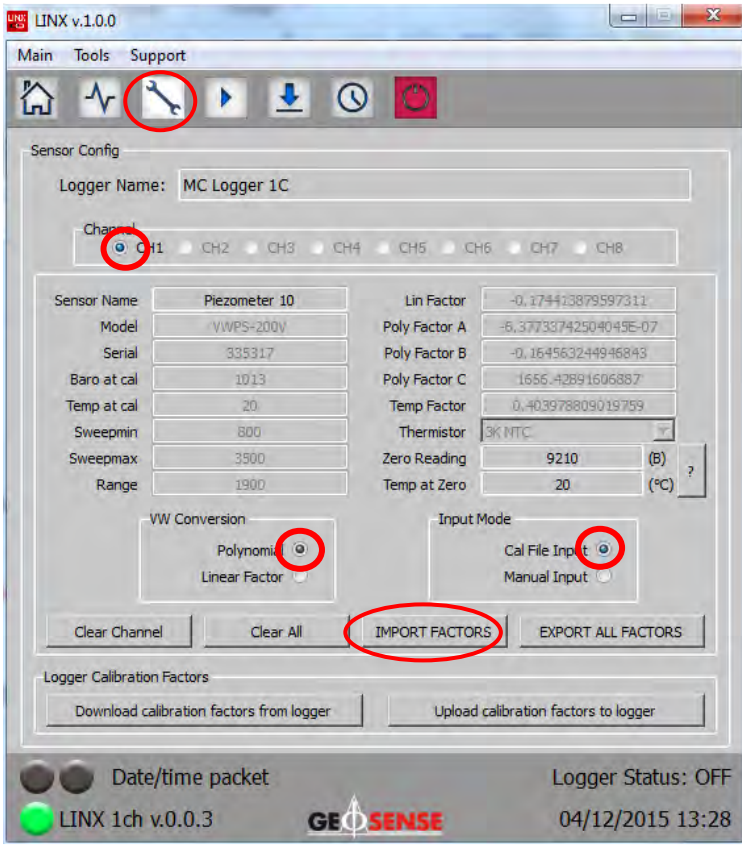
The calibration information is provided using a text file that will have been forwarded by email at the time of supply (see below).

It is recommended to place all these text files into one location for ease of loading.



6.6.2 Sensor configuration - Cal file input & polynomial contd...

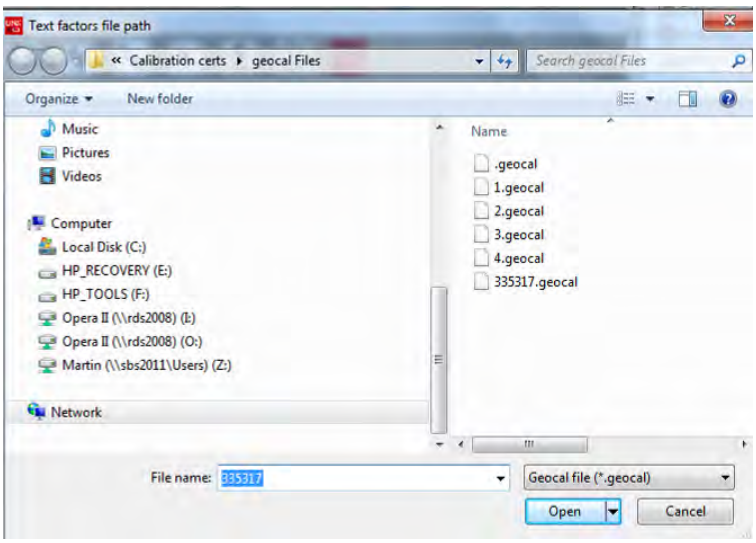
Select **Sensor config** icon



Select the required channel to be configured

Select Polynomial & Cal File Input

Select **IMPORT FACTORS**

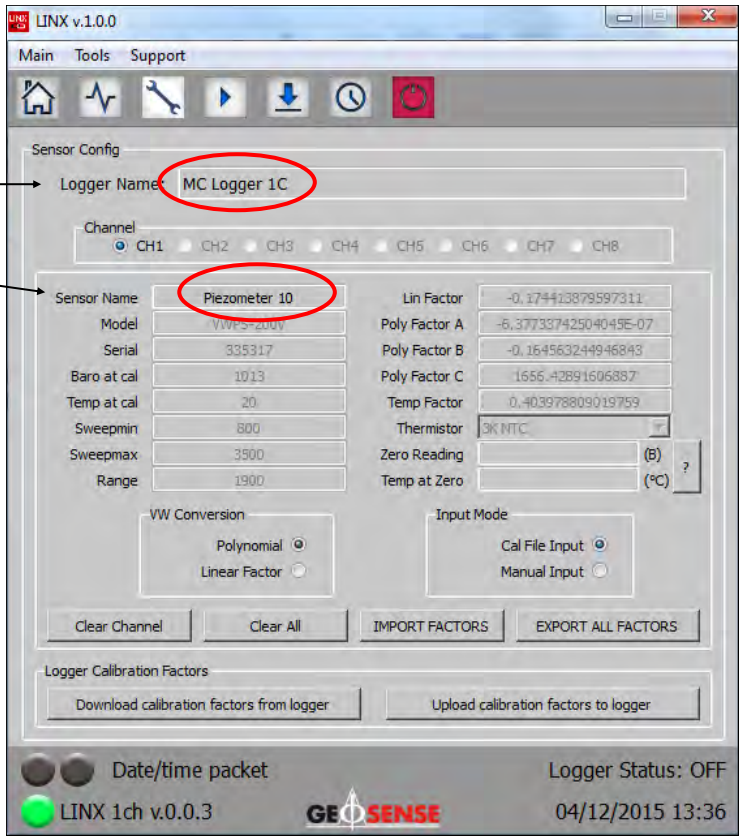


Search for the relevant Geosense calibration file (geocal) and select **Open**

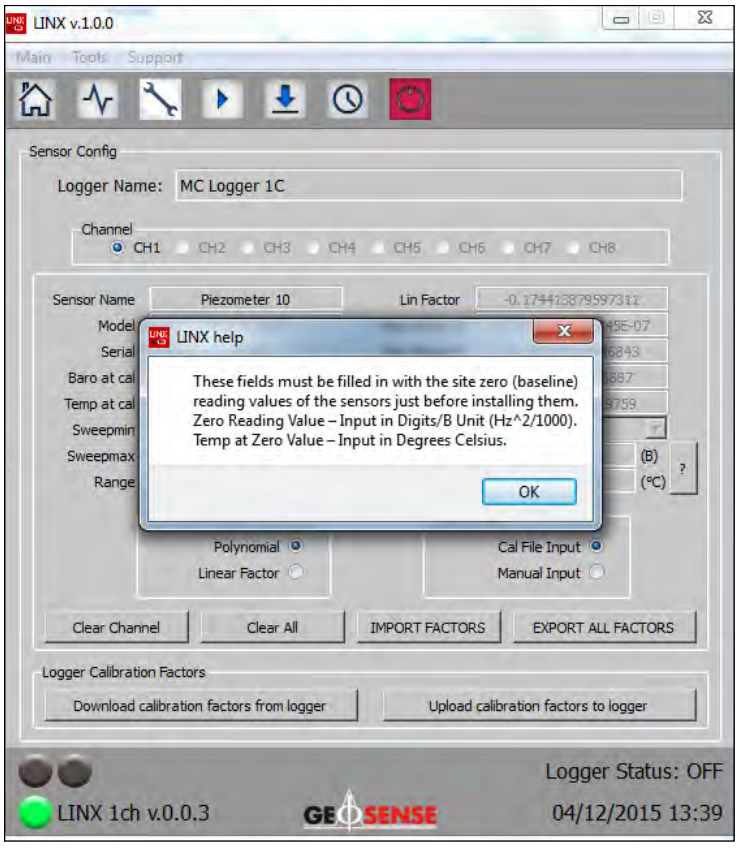
6.6.2 Sensor configuration - Cal file input & polynomial contd...

Once the calibration factors have been loaded fill in the following fields:-

- Logger name
- Sensor name



- Zero reading
- Temperature at zero



6.6.2 Sensor configuration - Cal file input & polynomial contd...

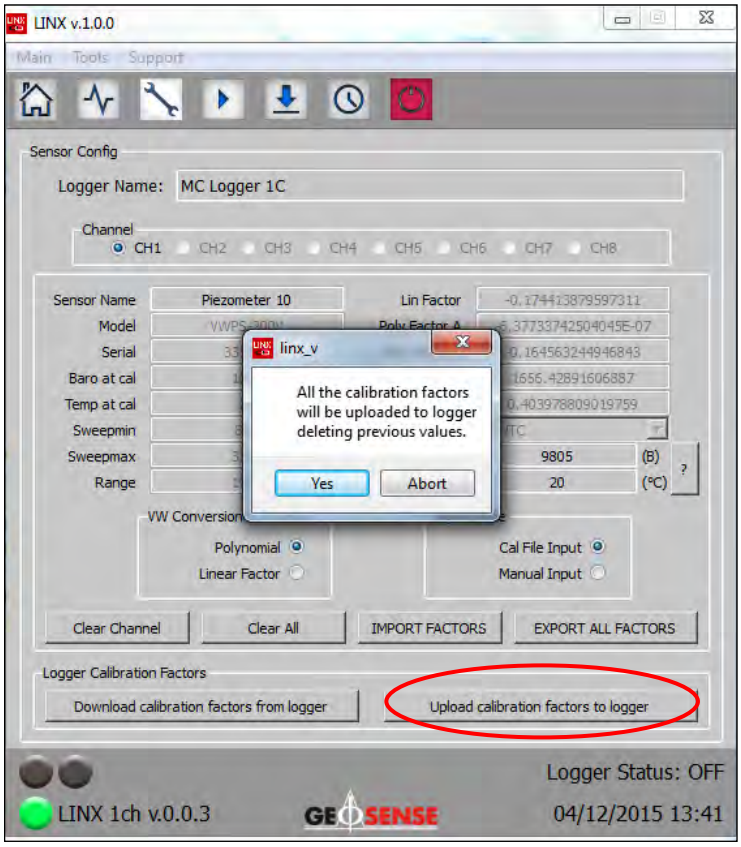
Once all the information has been entered select

UPLOAD CALIBRATION FACTORS TO LOGGER

REPEAT FOR ALL THE REQUIRED CHANNELS

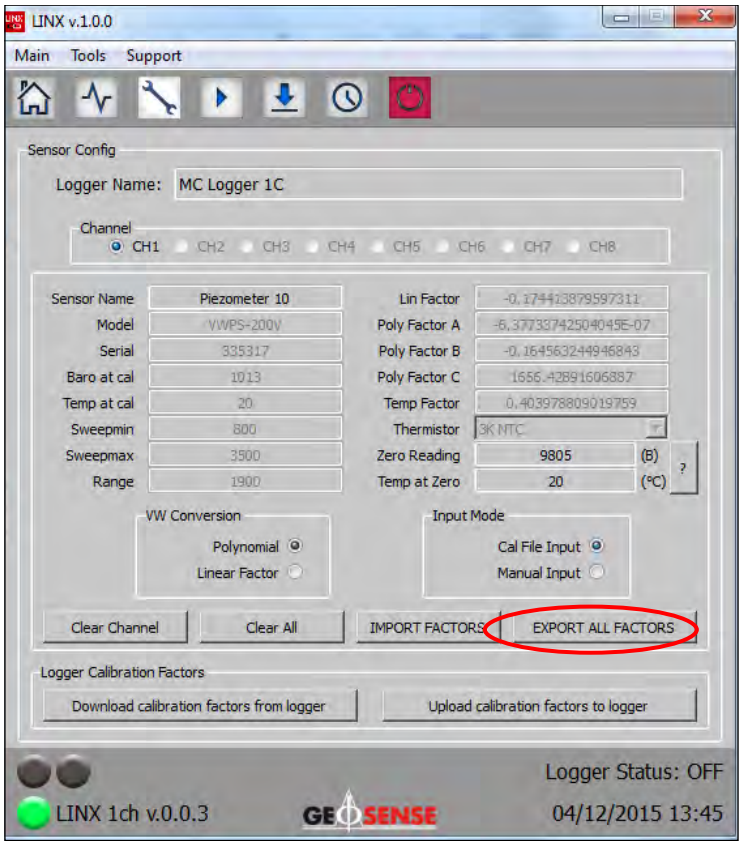
At this stage you have the option to confirm or to cancel

To confirm select **YES.** All the entered data will then be uploaded to the logger



NOTE 1

All calibration factors can be exported from the software to your computer as a back up if required



6.6.2 Sensor configuration - Cal file input & polynomial contd...

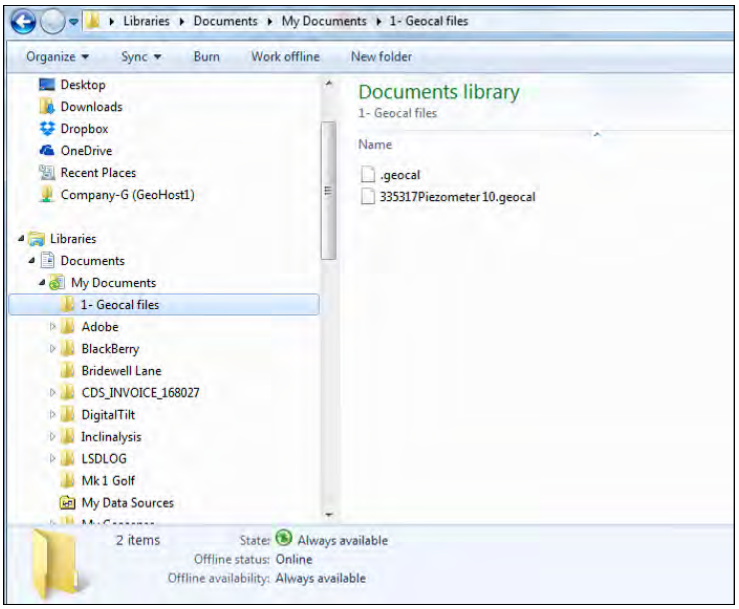
NOTE 1 contd…

Once **EXPORT ALL FACTORS** has been selected it will open the browser on your computer

Select the required location

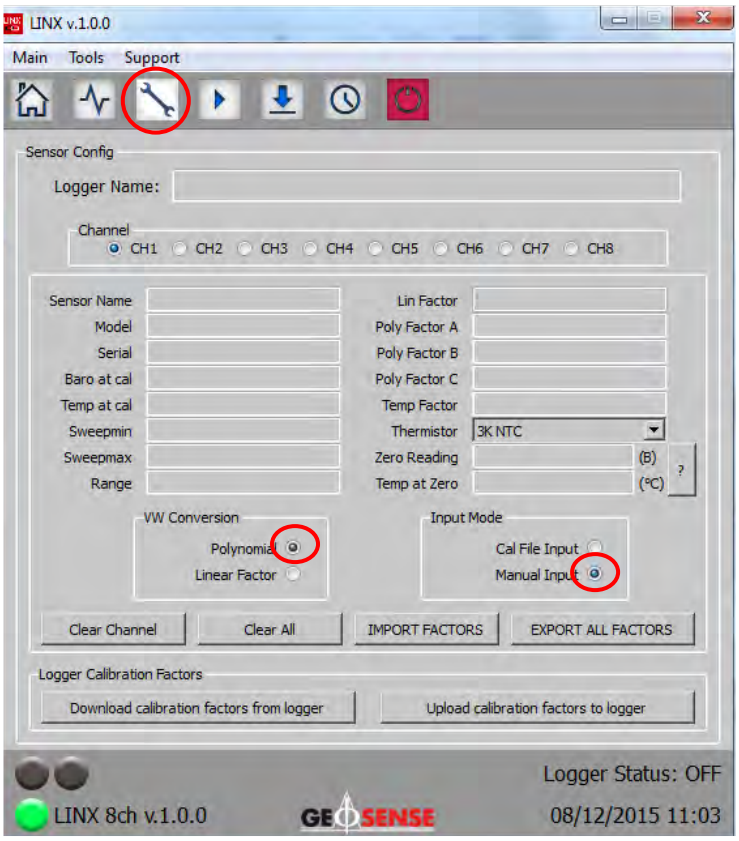
Click on **Select Folder**

This will then save the text file with the calibration factors into this location



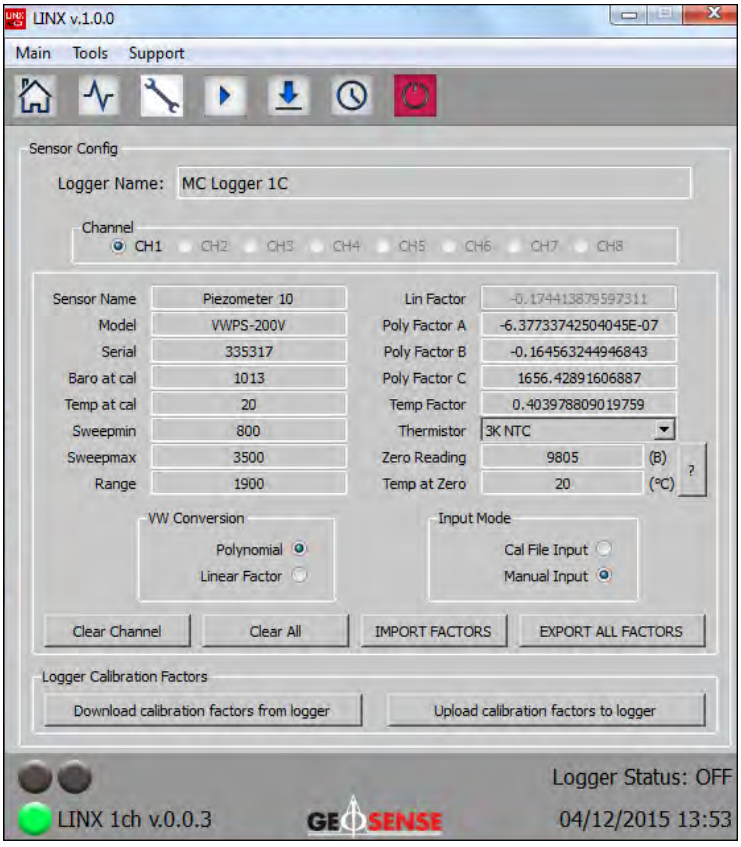
6.6.3 Sensor configuration - Manual & polynomial

Select the **Sensor config** icon



Select **Polynomial** in the VW conversion box

Select **Manual input** in the Input mode box



Fill in all the available fields including all the values from the calibration sheet provided with each sensor.

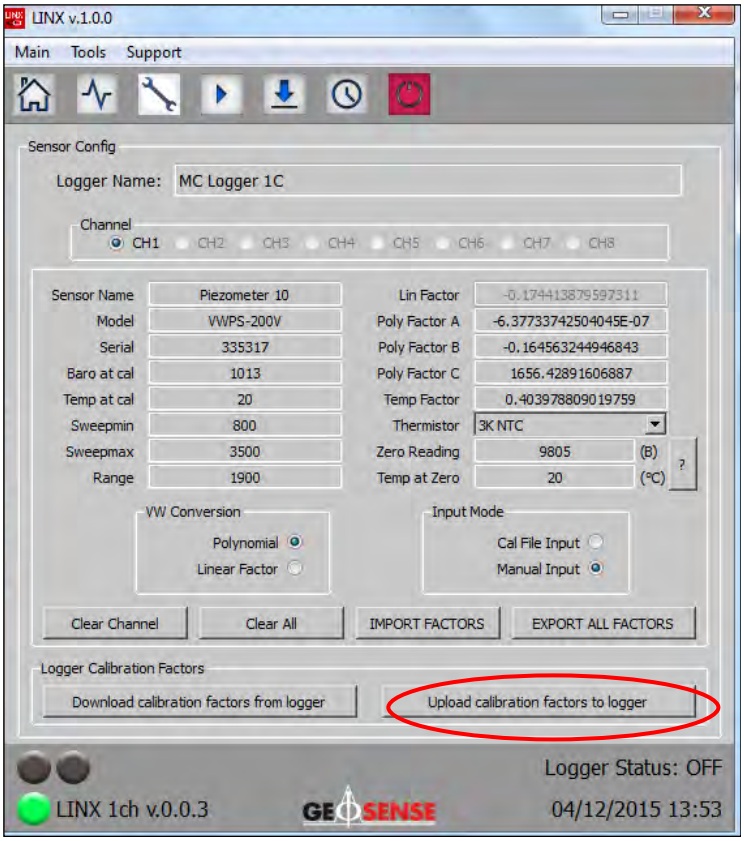
NOTE: The sweep range can be found on the individual sensor data sheet

REPEAT FOR ALL CHANNELS AS NECESSARY

6.6.3 Sensor configuration - Manual & polynomial contd...

Once all the data has been inputted select

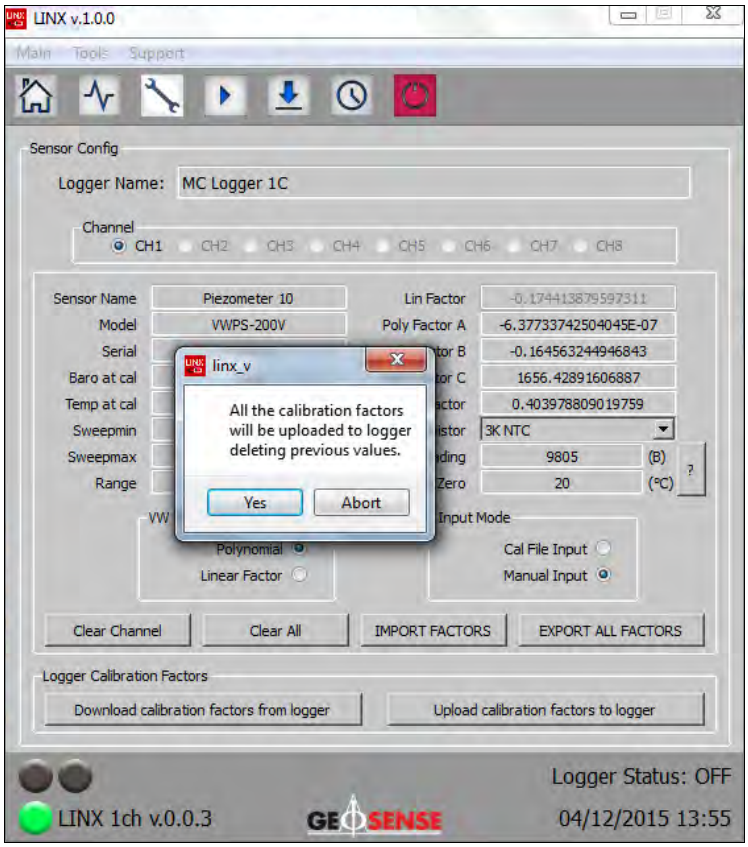
UPLOAD CALIBRATION FACTORS TO LOGGER



At this stage you have the option to confirm or to cancel

To confirm select **YES.** All the entered data will then be uploaded to the logger

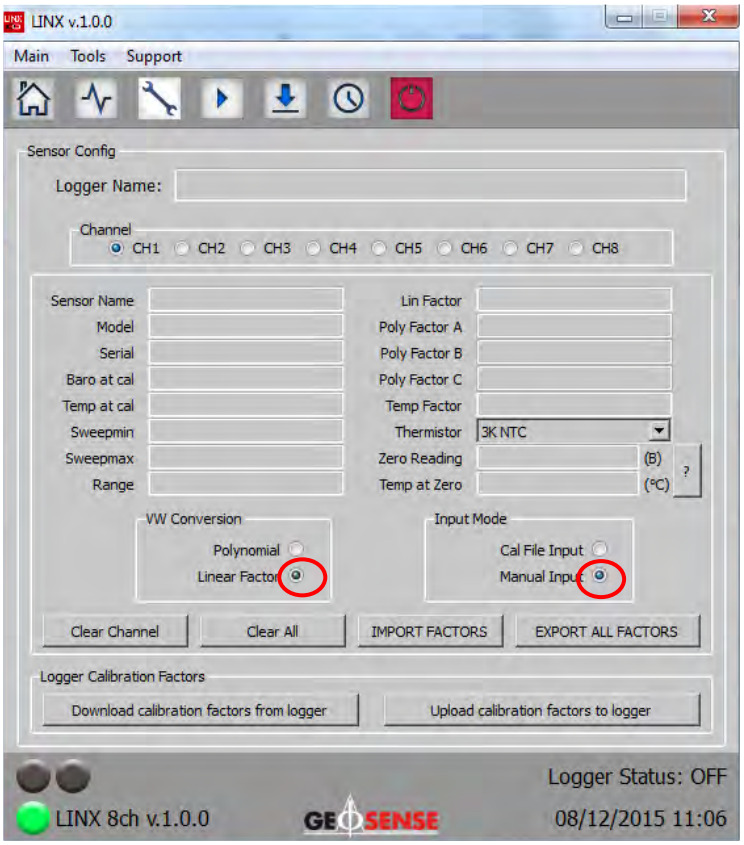
To cancel select **Abort.** This will take you back to the previous screen



6.6.4 Sensor configuration - Manual & linear

Select **Linear** in the VW conversion box

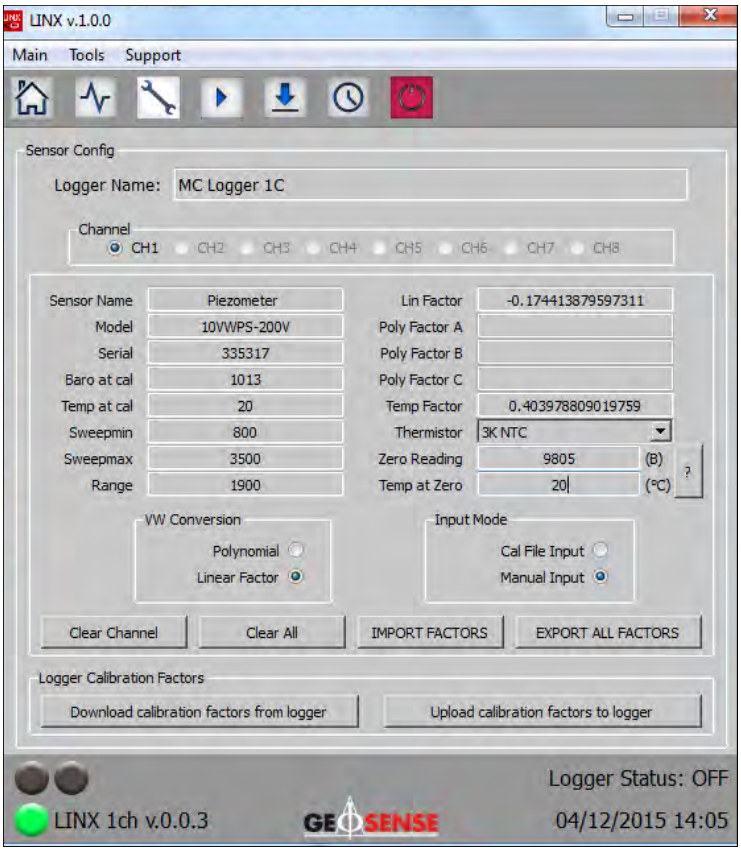
Select **Manual input** in the Input mode box



Fill in all the fields including all the values from the calibration sheet provided with each sensor.

NOTE: The sweep range can be found on the individual sensor data sheet

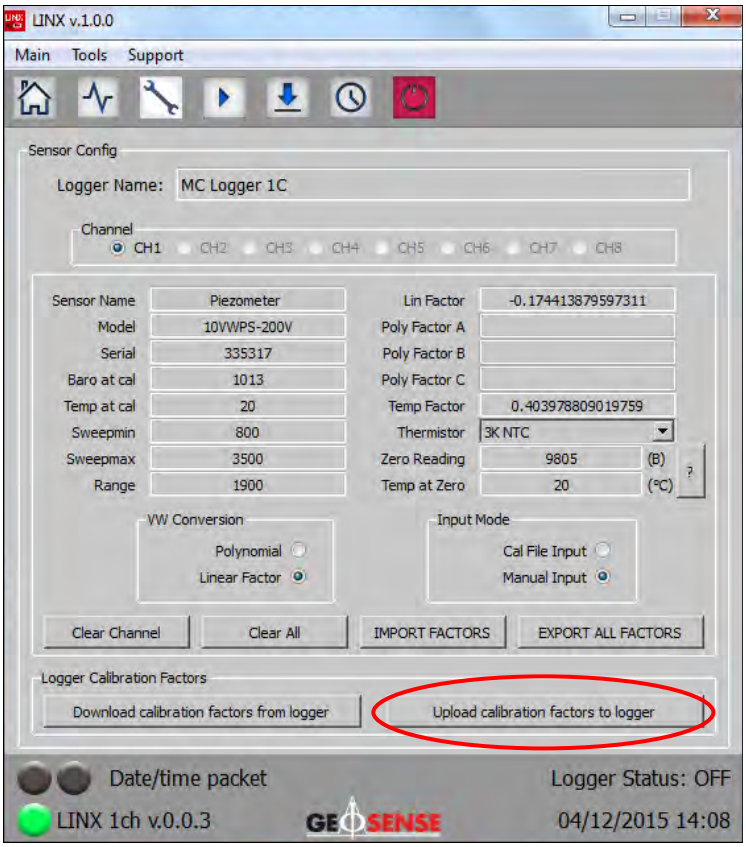
REPEAT FOR ALL CHANNELS AS NECESSARY



6.6.4 Sensor configuration - Manual & linear contd...

Once all the data has been inputted select

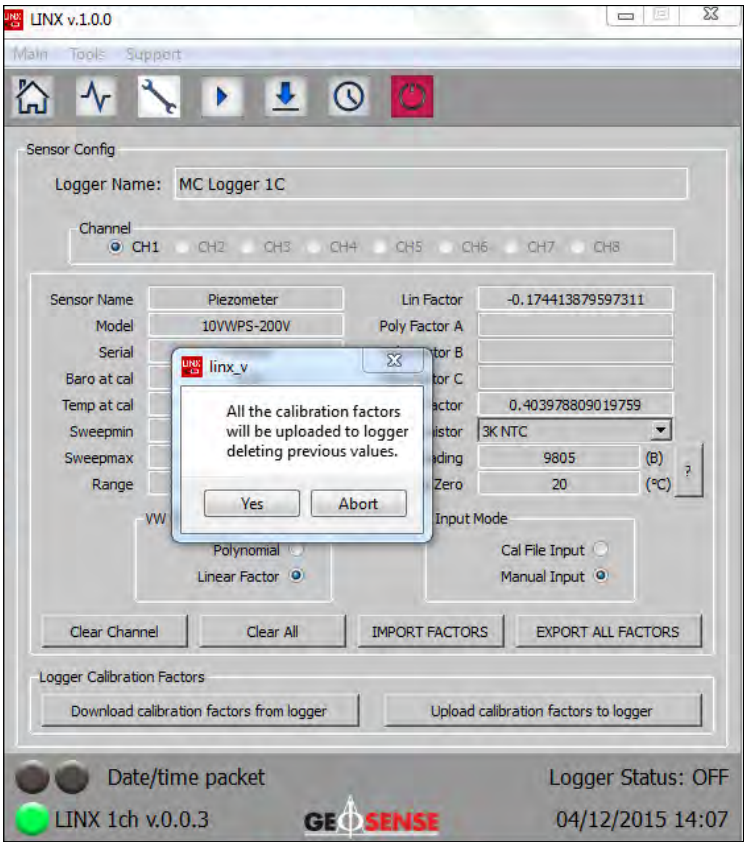
UPLOAD CALIBRATION FACTORS TO LOGGER



At this stage you have the option to confirm or to cancel

To confirm select **YES.** All the entered data will then be uploaded to the logger

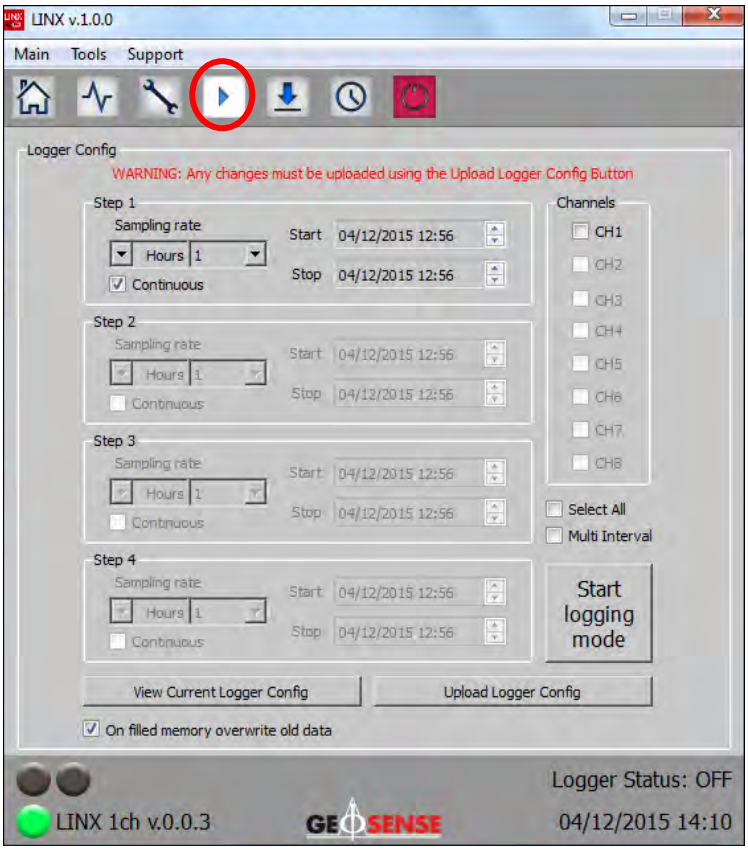
To cancel select **Abort.** This will take you back to the previous screen

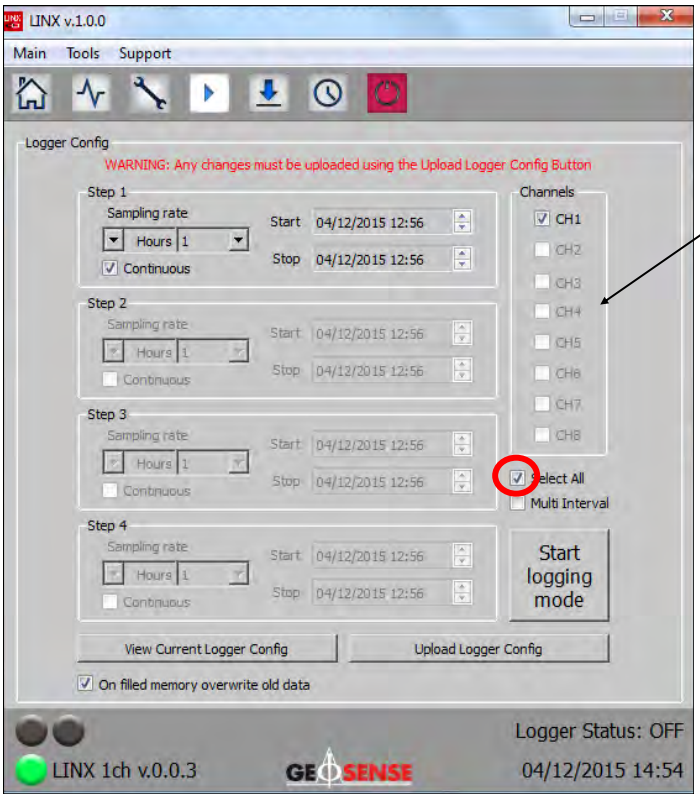


6.7 Logger configuration

This section allows the **logger** to be configured to the project requirements

Select the **Logger config** icon





Channels

Channels can be selected individually or you can **Select All**

6.7 Logger configuration contd...

Sampling rate

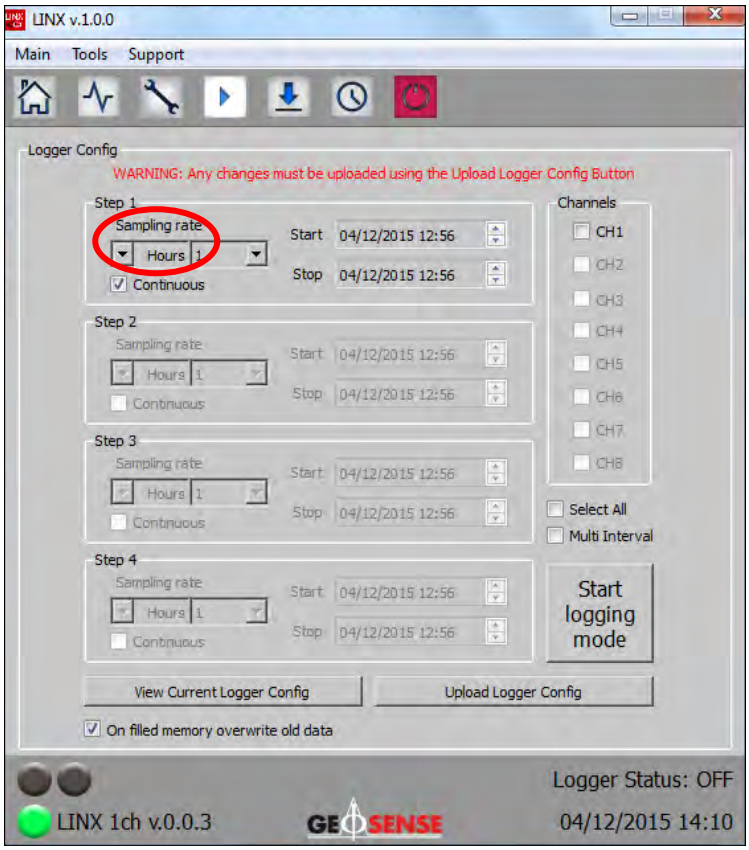
The sampling rate (interval) can be selected in

Seconds

Minutes

Hours

Days



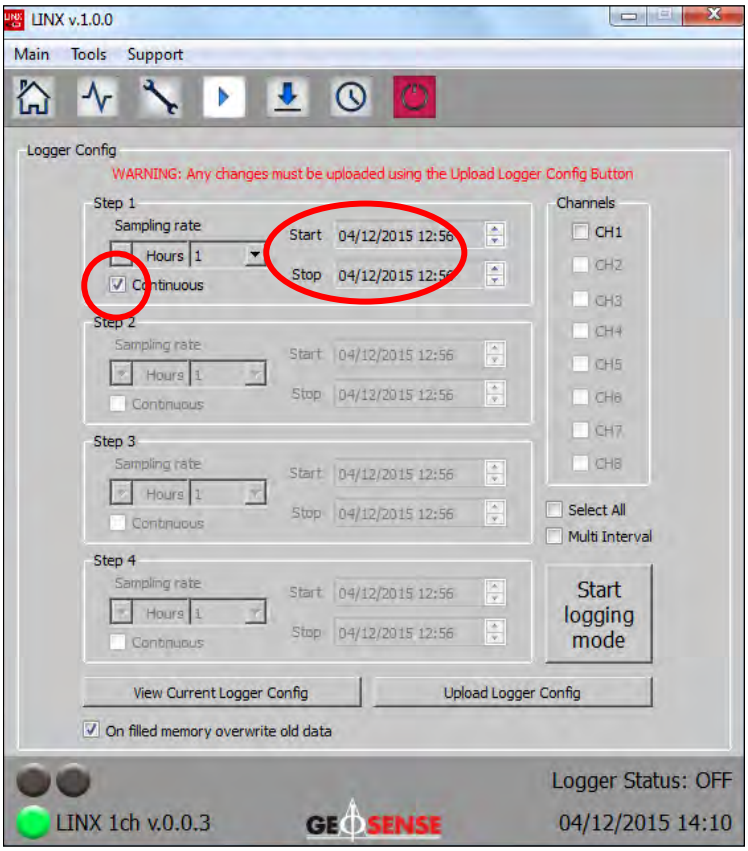
Date

Can be set from **Start** to **Stop** using the calendar.

It can also be set for **Continuous** (no end date)

NOTE

To change each **day/month/year hour/minute** place the cursor over each unit and use the up or down arrows to select the required value or use the central wheel to scroll



6.7 Logger configuration contd...

Sampling rate contd...

The sampling rate (interval) can also have four different steps by selecting **Multi Interval**

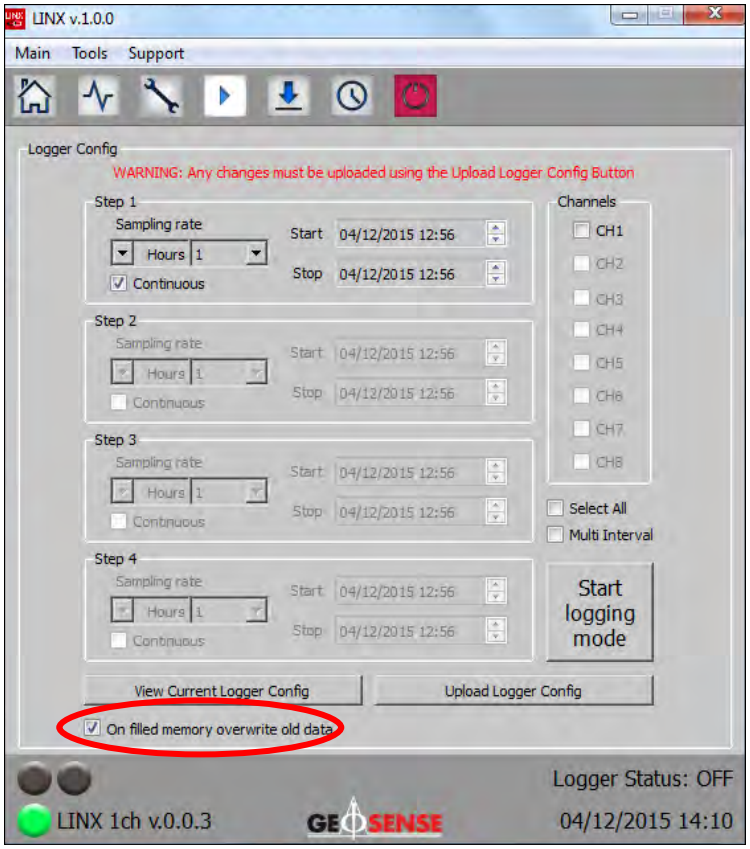
Individual **Start** & **Stop** times can be set to suit the project requirements

Data storage

Two types of data storage are available:-

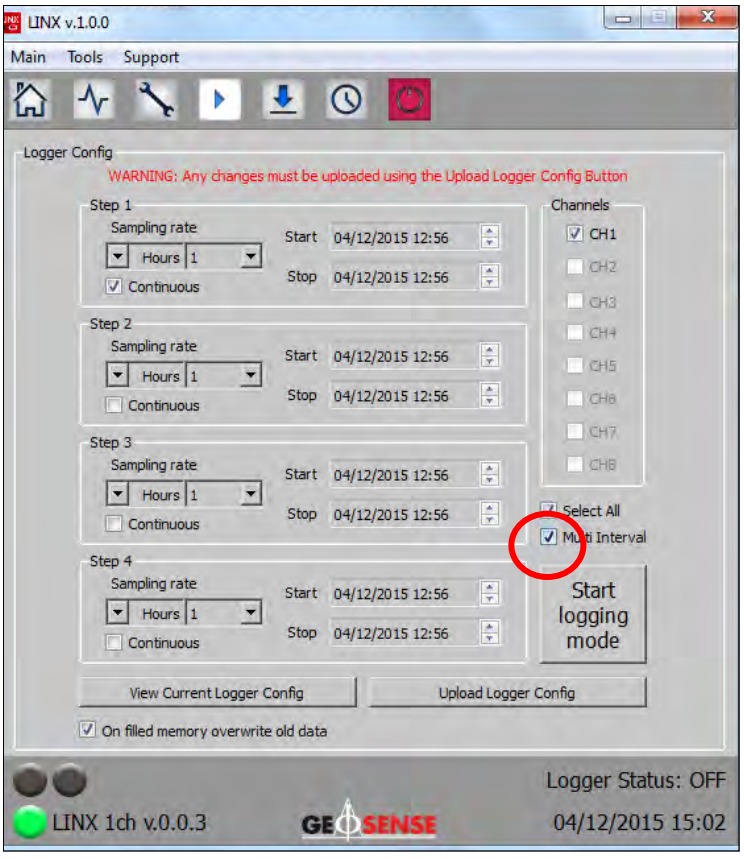
On filled memory overwrite old data is the **default** setting

Fill and stop - if this option is required de-select the above option



Multi-interval sampling rates are also available.

Select **Multi Interval** to activate this option



6.7 Logger configuration contd...

Configuration of logger

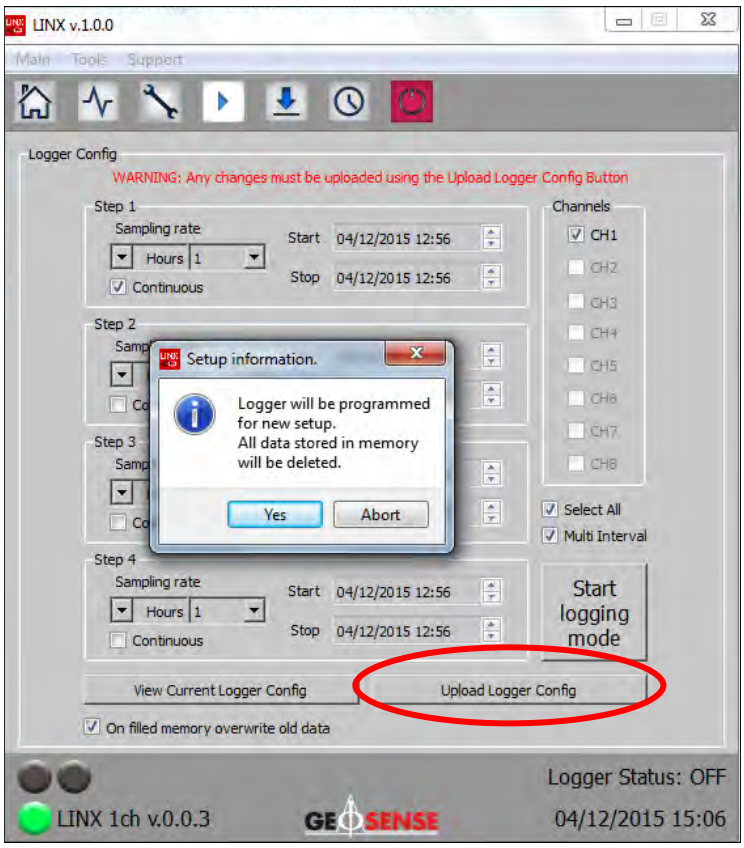
Once all the settings have been selected they need to be uploaded to the data logger

Select Upload Logger Config

At this stage you have the option to confirm or to cancel

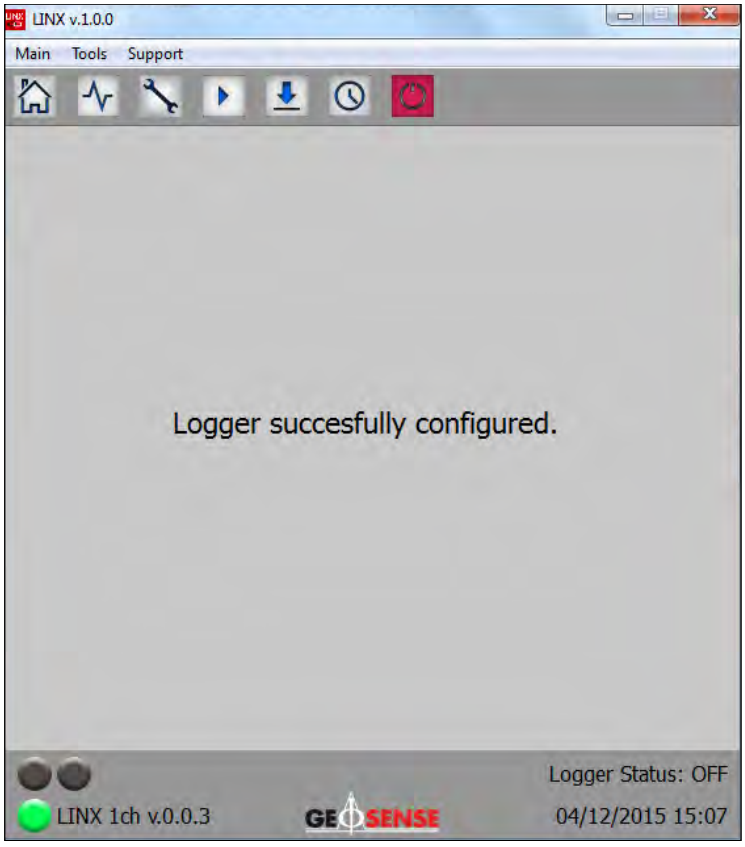
To confirm select **YES.** All the entered data will then be uploaded to the logger

To cancel select **Abort.** This will take you back to the previous screen



Configuration confirmed

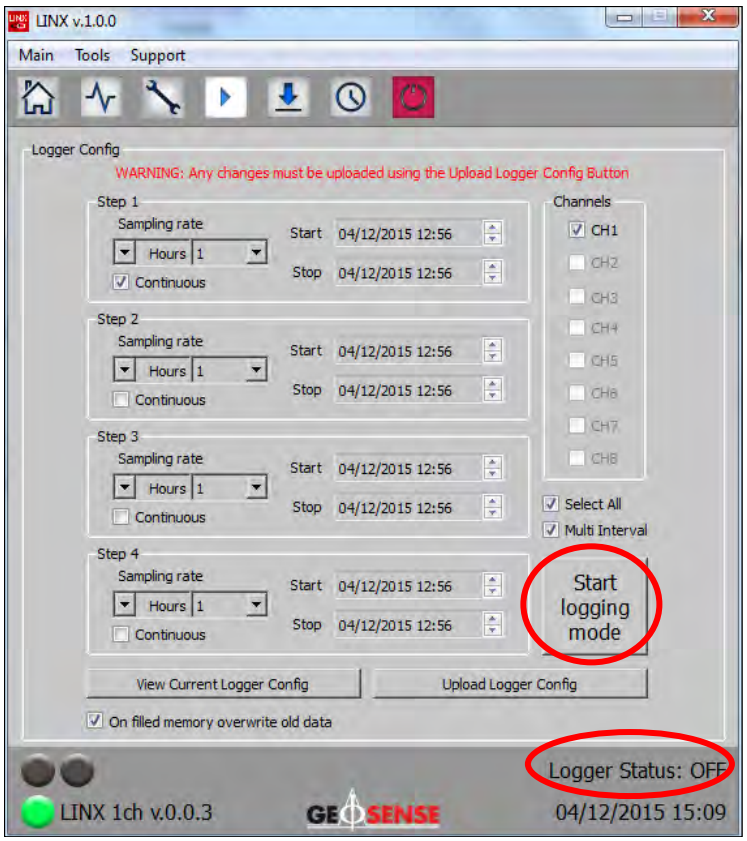
If all fields are filled in correctly then the **Logger successfully configured** message will be displayed



6.8 Start & stop logging status

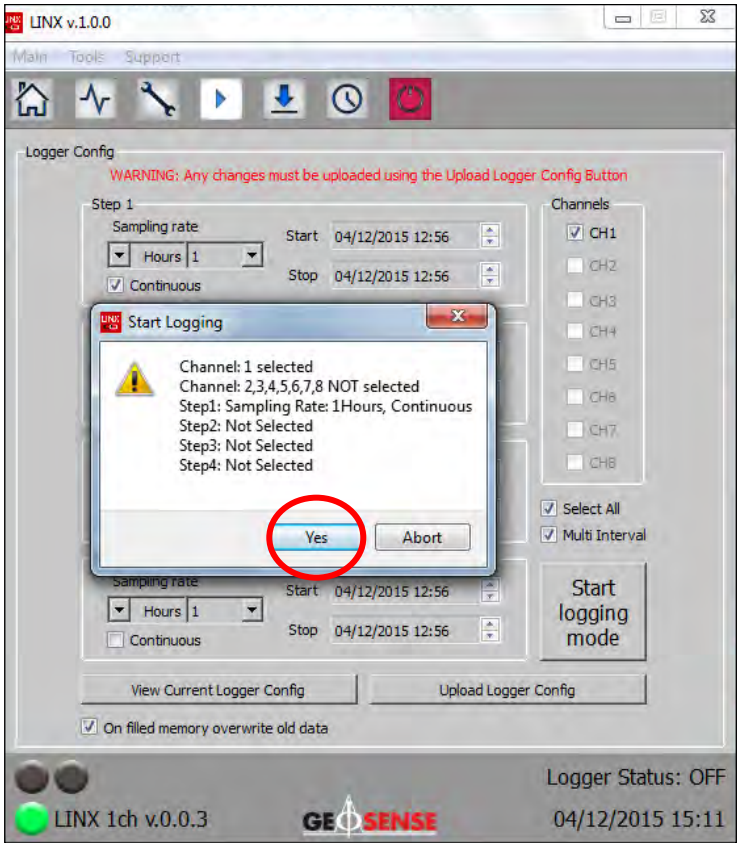
If the Logger Status is **OFF** it is necessary to select

“**start logging mode”**



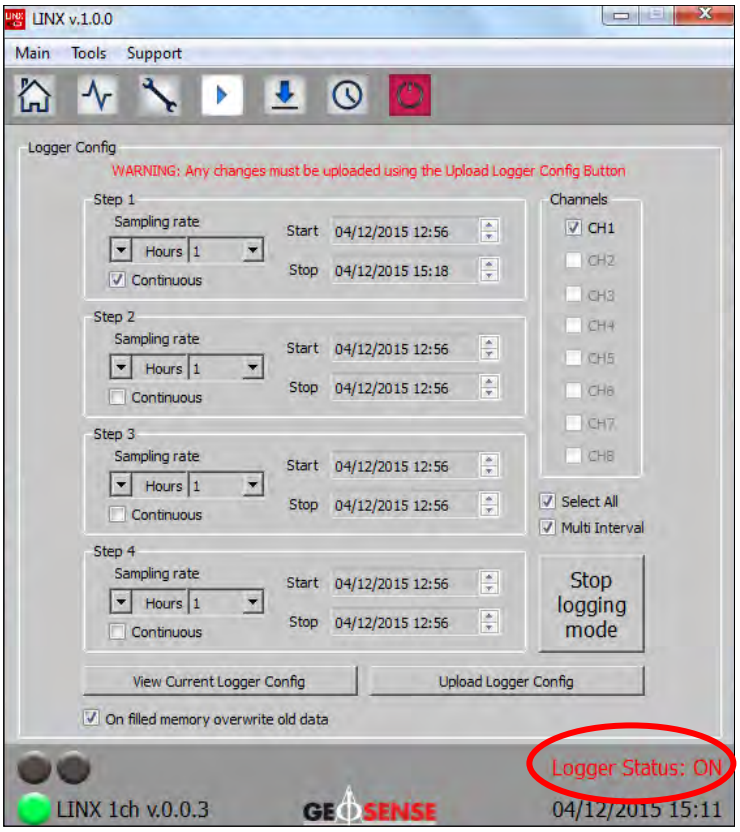
Before the logging mode starts confirmation of the logging configuration is displayed

If all is correct select **YES** to set to logging mode



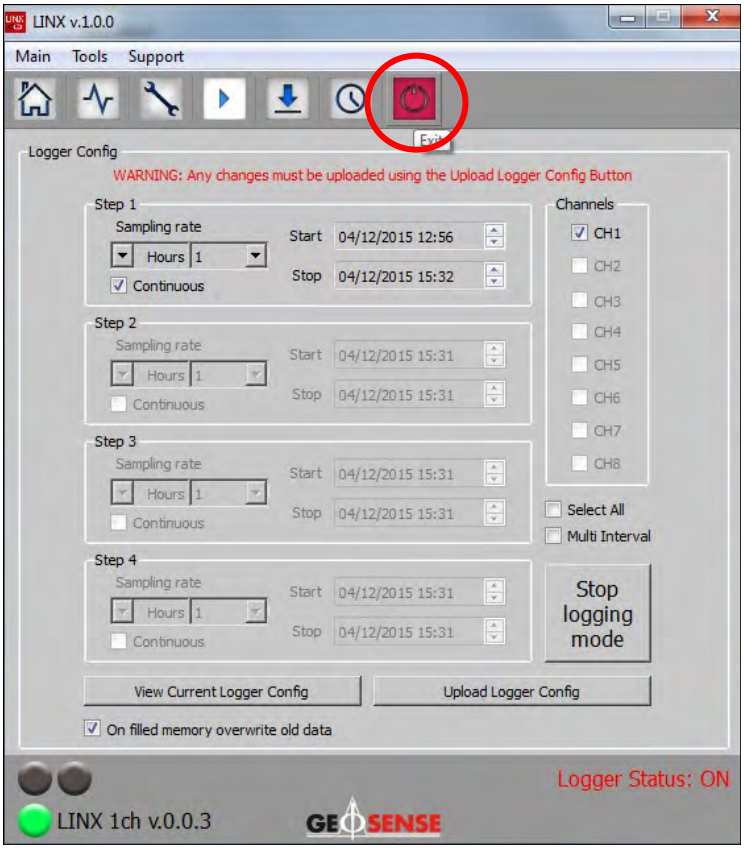
6.8 Start & stop logging status contd...

Confirmation that the **Logger Status** is **ON** is confirmed in the bottom right pane



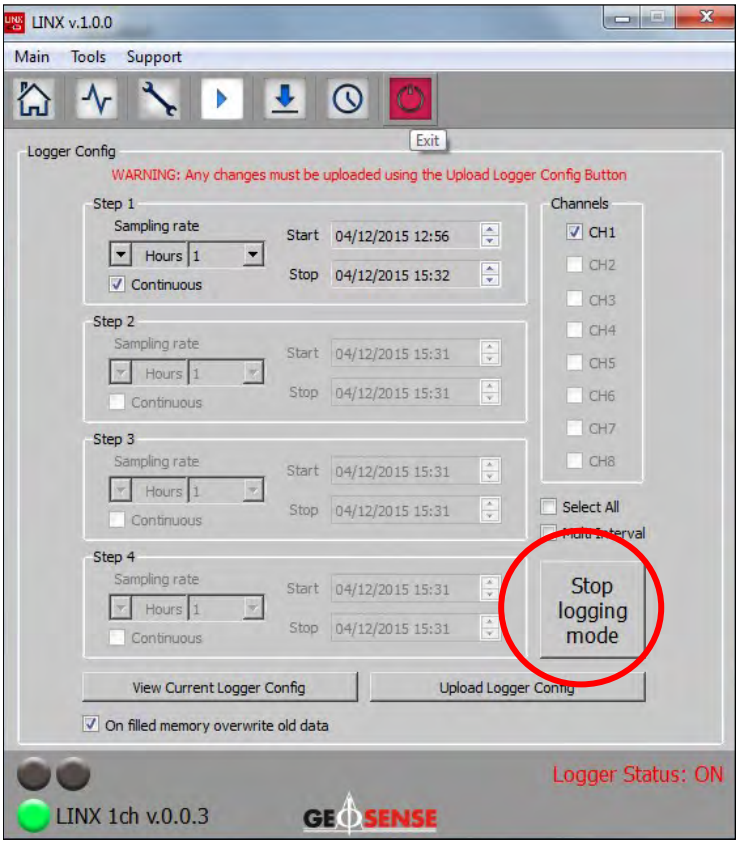
Logging mode can be started with the USB still inserted into the logger. Batteries provided with the logger will need to be placed inside the battery cradle to allow logger to be powered once USB cable is removed

Select **Exit** to close the software



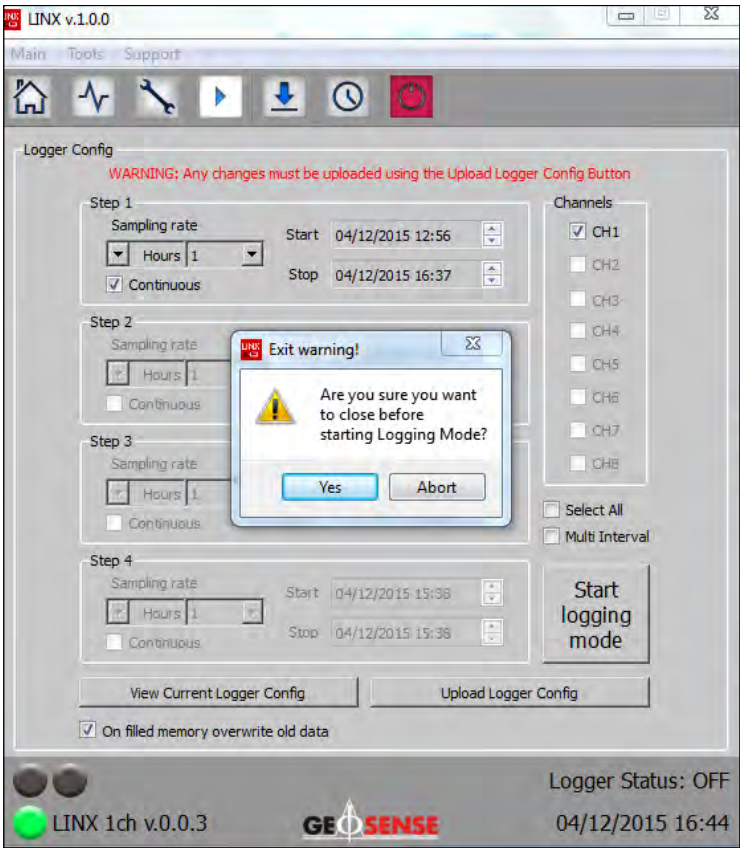
6.8 Start & stop logging status contd...

Once data collection is complete and the logger is to be left unused and in order to safeguard battery life and memory it is necessary to select “**stop logging mode”**



6.8 Start & stop logging status contd...

If you forget to set the logger to **Start Logging Mode** on pressing the Exit button you will be prompted to confirm if you want to exit before starting the Logging Mode



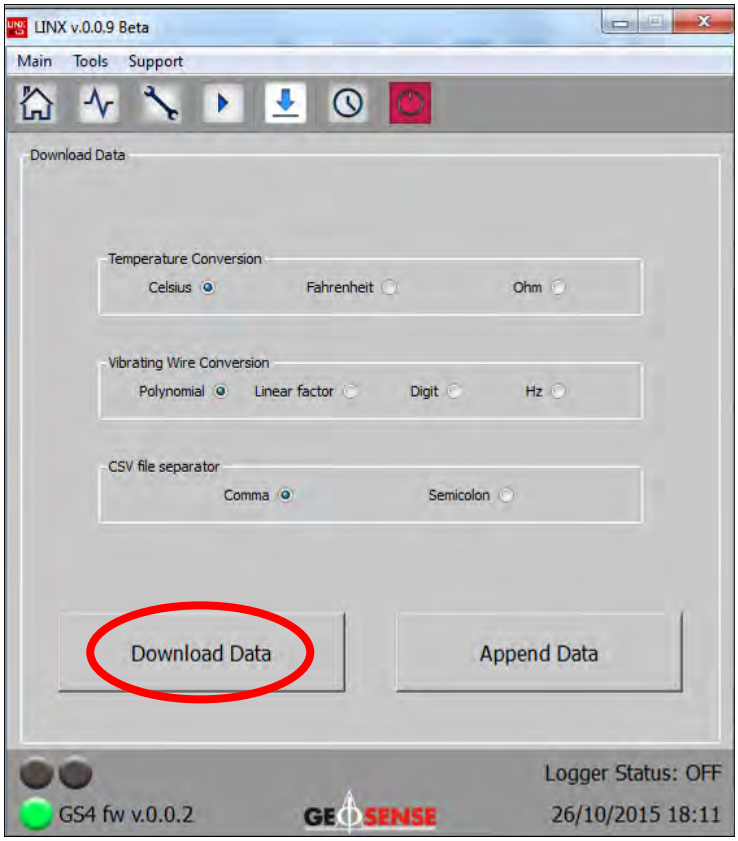
6.9 Download & append data

It is not necessary to select the **Stop Logging Mode** in order to download data.

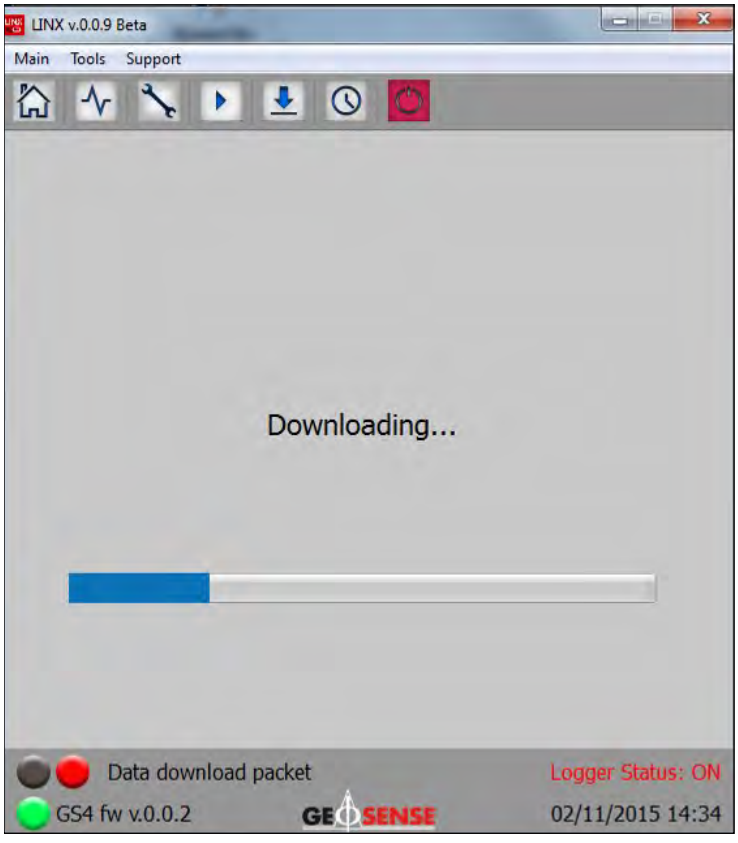
Downloading or appending can therefore by carried out in any mode.

The data can also be downloaded in different units by selecting the relevant ones

Select **Download Data**

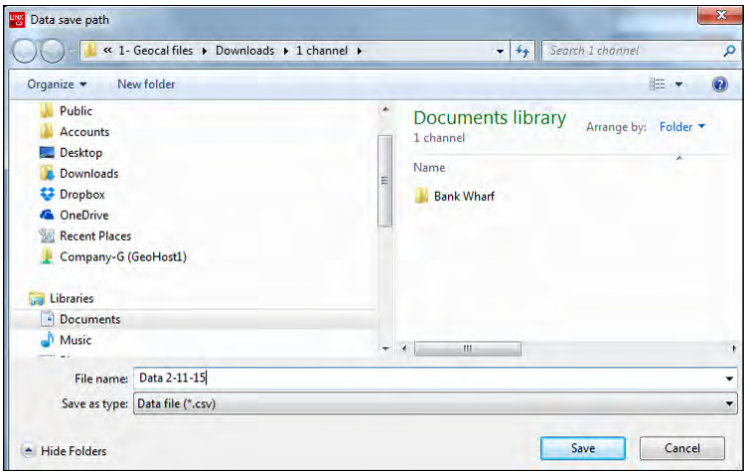


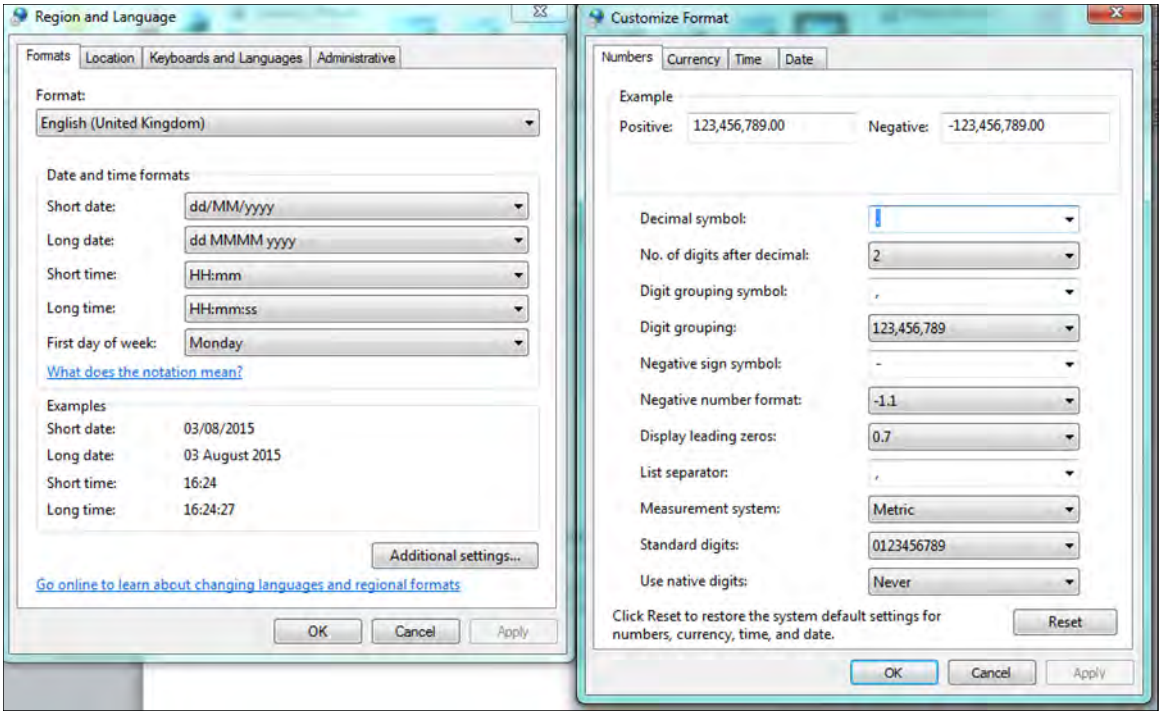
The downloading is confirmed by the horizontal blue bar filling from left to right, the red buttons flashing and the message **Data download packet**



6.9 Download & append data contd….

On completion of downloading the browser will open to allow you to select the location to save the data

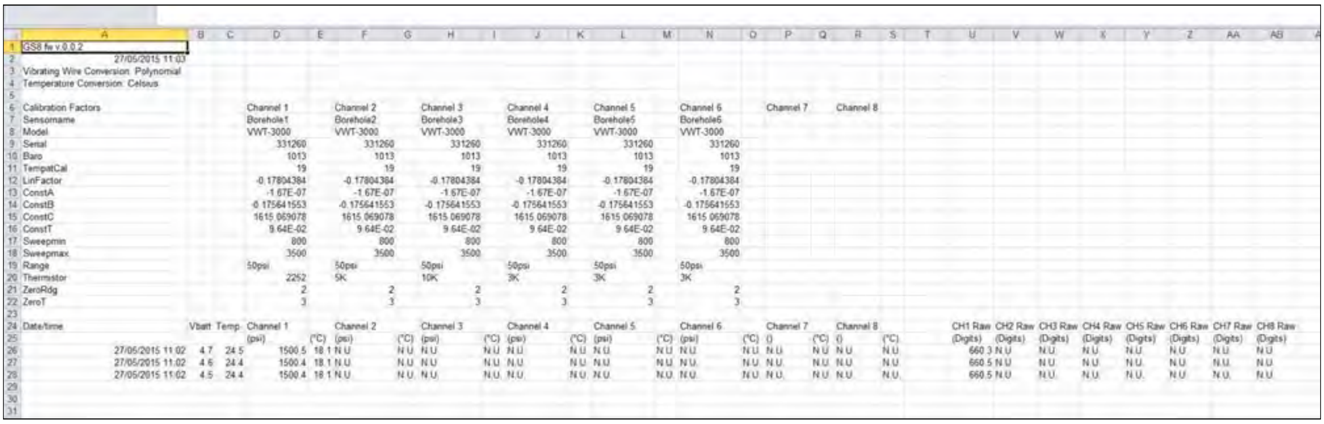




The software creates CSV files. Both Engineering unit values or raw data units are available in the output CSV file if the VW Sensor conversion factors are set in the "Temperature Conversion" or in the "Vibrating Wire Conversion" group boxes of the "Sensor Config" tab. These factors can be imported from text files, read from the logger or manually filled in. See chapter 3 for more details. If the "Vibrating Wire Conversion" is set differently to "Digit", a "Digit" column will also be present in the CSV file.

The CSV file separator can be set in the dedicated group box. Comma or semicolon separators are available. Check in Control Panel, Regional and language options, for your operating system default settings. If the software and the Operating system settings match, the correct CSV file preview is shown while opening the file with Excel.

6.9 Download & append data contd….



GS8 fw v.0.0.2
27/05/2015 11:03
Vibrating Wire Conversion: Polynomial
Temperature Conversion: Celsius

Calibration Factors	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Sensorname	Borehole1	Borehole2	Borehole3	Borehole4	Borehole5	Borehole6		
Model	VWT-3000	VWT-3000	VWT-3000	VWT-3000	VWT-3000	VWT-3000		
Serial	331260	331260	331260	331260	331260	331260		
Baro	1013	1013	1013	1013	1013	1013		
TempatCal	19	19	19	19	19	19		
LinFactor	-0.17804384	-0.17804384	-0.17804384	-0.17804384	-0.17804384	-0.17804384		
ConstA	-1.67E-07	-1.67E-07	-1.67E-07	-1.67E-07	-1.67E-07	-1.67E-07		
ConstB	-0.175641553	-0.175641553	-0.175641553	-0.175641553	-0.175641553	-0.175641553		
ConstC	1615.069078	1615.069078	1615.069078	1615.069078	1615.069078	1615.069078		
ConstT	9.64E-02	9.64E-02	9.64E-02	9.64E-02	9.64E-02	9.64E-02		
Sweepmin	800	800	800	800	800	800		
Sweepmax	3500	3500	3500	3500	3500	3500		
Range	50psi	50psi	50psi	50psi	50psi	50psi		
Thermistor	2252	5K	10K	3K	3K	3K		
ZeroRdg	2	2	2	2	2	2		
ZeroT	3	3	3	3	3	3		

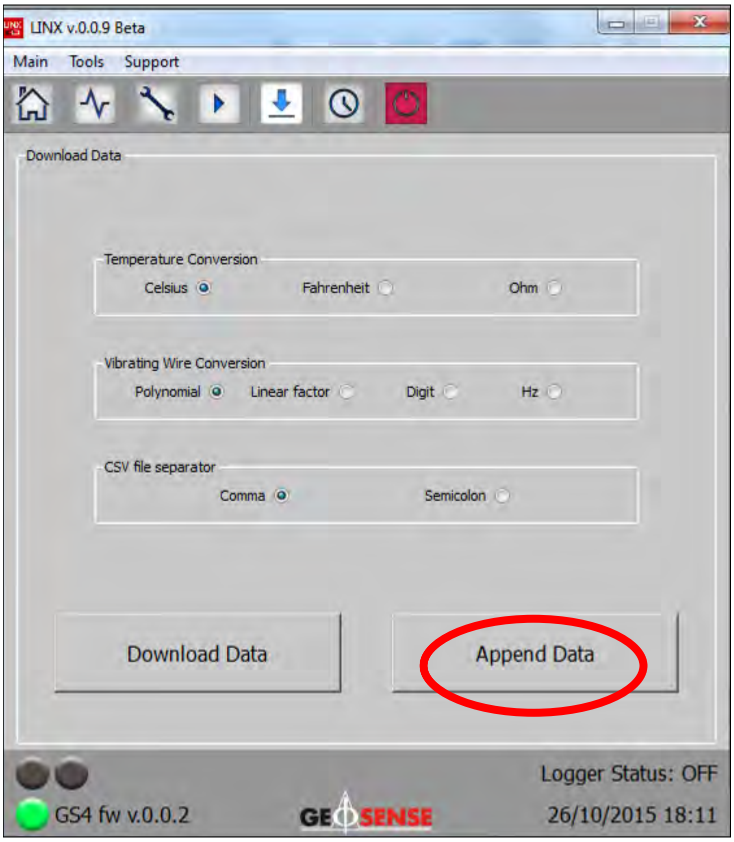
Date/time	Vbatt	Temp	Channel 1 (psi)	(°C)	Channel 2 (psi)	(°C)	Channel 3 (psi)	(°C)	Channel 4 (psi)	(°C)	Channel 5 (psi)	(°C)	Channel 6 (psi)	(°C)	Channel 7 ()	(°C)	Channel 8 ()	(°C)
27/05/2015 11:02	4.7	24.5	1500.5	18.1	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U
27/05/2015 11:02	4.6	24.4	1500.4	18.1	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U
27/05/2015 11:02	4.5	24.4	1500.4	18.1	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U	N.U

Date/time	CH1 Raw (Digits)	CH2 Raw (Digits)	CH3 Raw (Digits)	CH4 Raw (Digits)	CH5 Raw (Digits)	CH6 Raw (Digits)	CH7 Raw (Digits)	CH8 Raw (Digits)
27/05/2015 11:02	660.3	N.U	N.U	N.U	N.U	N.U	N.U	N.U
27/05/2015 11:02	660.5	N.U	N.U	N.U	N.U	N.U	N.U	N.U
27/05/2015 11:02	660.5	N.U	N.U	N.U	N.U	N.U	N.U	N.U

The data is presented as above

There is also a facility to Append all downloaded data to an existing file.

This can be useful if the memory has to be cleared.



Select **Append Data**

On completion the browser will open to allow you to select the location to append the data as shown previously

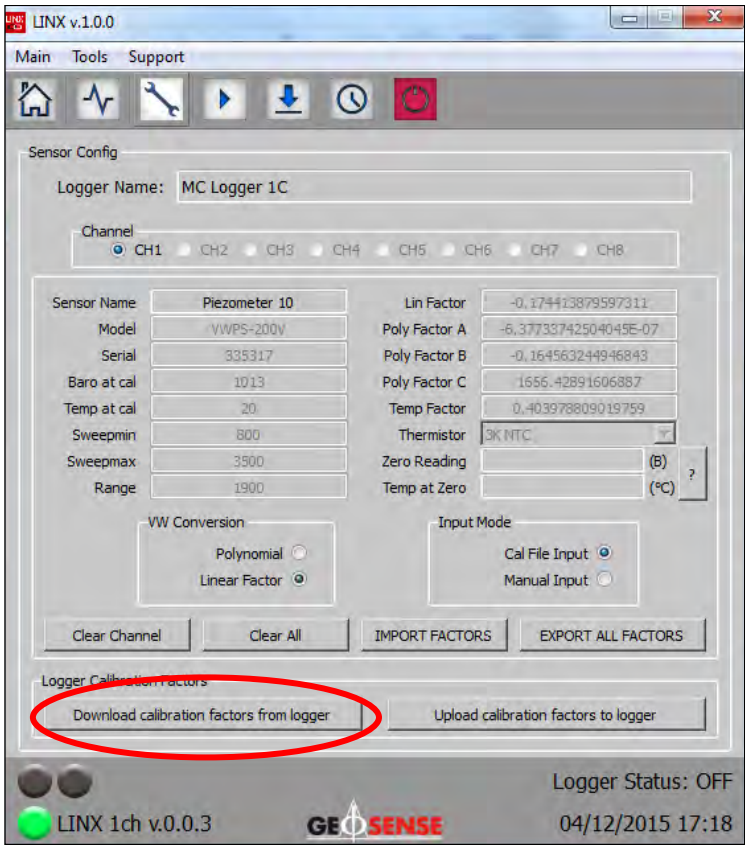
EXISTING DATA WILL BE APPENDED AT THE END OF EXISTING DATA

MULTIPLE APPENDS WILL RESULT IN DUPLICATE DATA

6.9.1 Download calibration factors from logger

Please note the calibration factors are automatically downloaded from the logger however as a backup feature there is a facility to download all the calibration factors from the logger to the software on your PC.

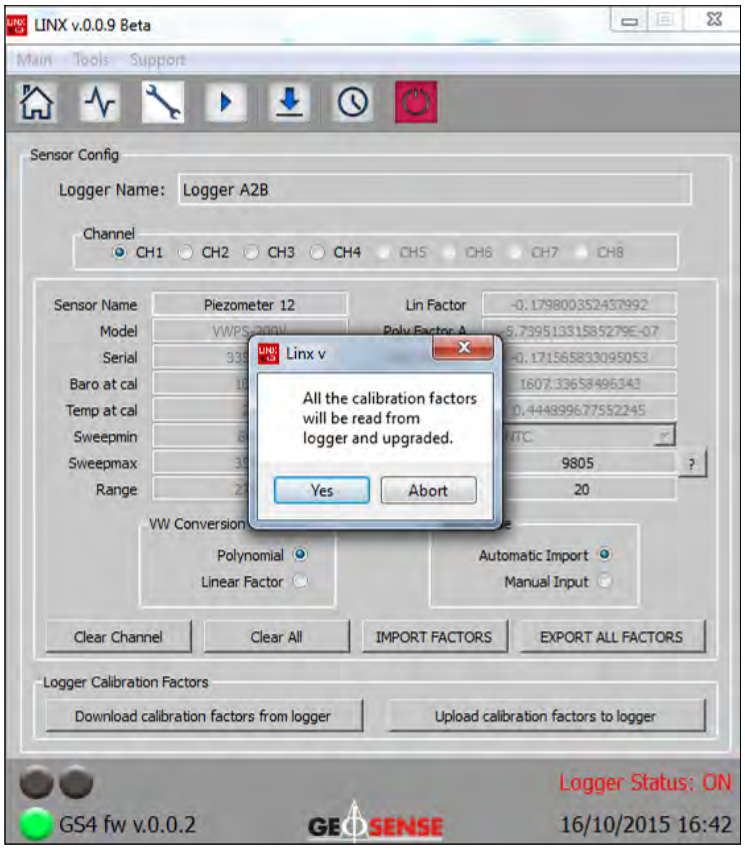
This can be useful where calibration factors are accidently cleared.



At this stage you have the option to confirm or to cancel

To confirm select **YES.** All the entered data will then be uploaded to the logger

To cancel select **Abort.** This will take you back to the previous screen



7.0 MAINTENANCE

The maintenance for Linx Loggers is minimal for most applications but the following should be checked periodically:-

ITEM	ACTION
Enclosure	Check for damage, water ingress
Connections	Check tightness
Internal cables	Check for loose connections
Battery	Check voltage (replace if necessary)
Firmware	Check for latest version & upload if necessary

7.1 Replacing the batteries

The following batteries can be used:-

- 4 x 1.5V C Alkaline cells which are rated for operating temperatures of -18 degrees to +55 degrees Celsius.
- 4 x 1.5V C Lithium cells which are rated for operating temperatures of –60 to +85 degrees Celsius.

The standard battery fitted is Alkaline which is suitable for most applications but in extreme cold conditions Lithium may be required for extended use.

Loosen the four screws in the lid and remove and replace all the batteries

DO NOT OVERSTRETCH THE CONNECTING CABLE

WHEN FITTING BATTERIES ENSURE THE CORRECT POLARITY

DISPOSE OF ALL SPENT BATTERIES RESPONSIBLY

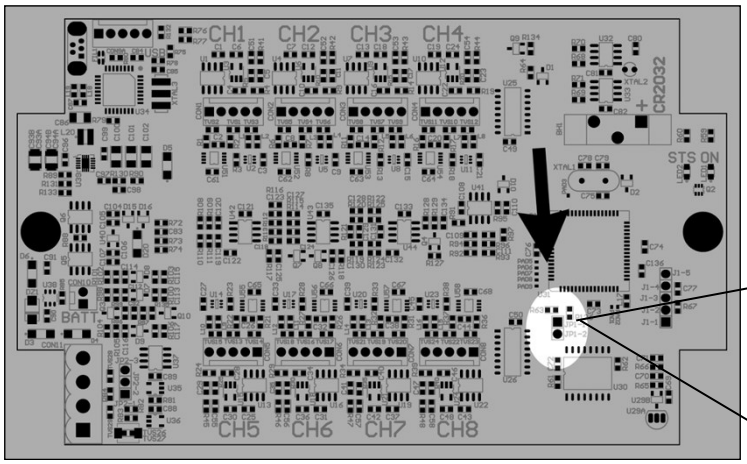
7.2 Updating firmware

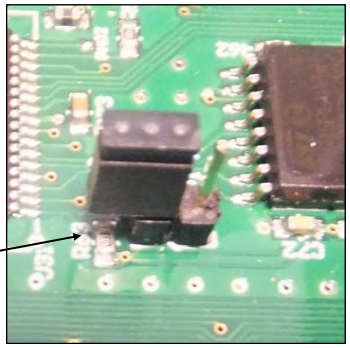
As part of continual improvement updates to firmware may occur. Updates will be available from the website. We recommend you check periodically to see if you have the latest firmware installed. The version is shown on the **home page**.

In order to install new firmware:-

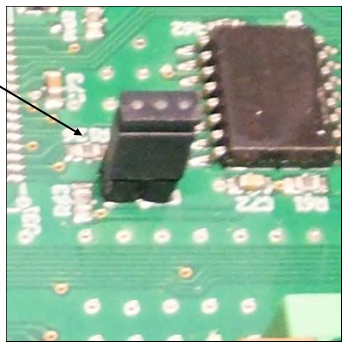
- Verify that you have installed the logger's drivers correctly
- Disconnect the USB cable if currently connected and/or Set logger status to OFF
- If you are using a laptop, make sure you have enough battery life for at least half an hour otherwise plug in the laptop into mains

A jumper plug is stored on the PCB (see below)





- Remove it from the single peg that it is normally stored on



- Replace it onto the two pegs

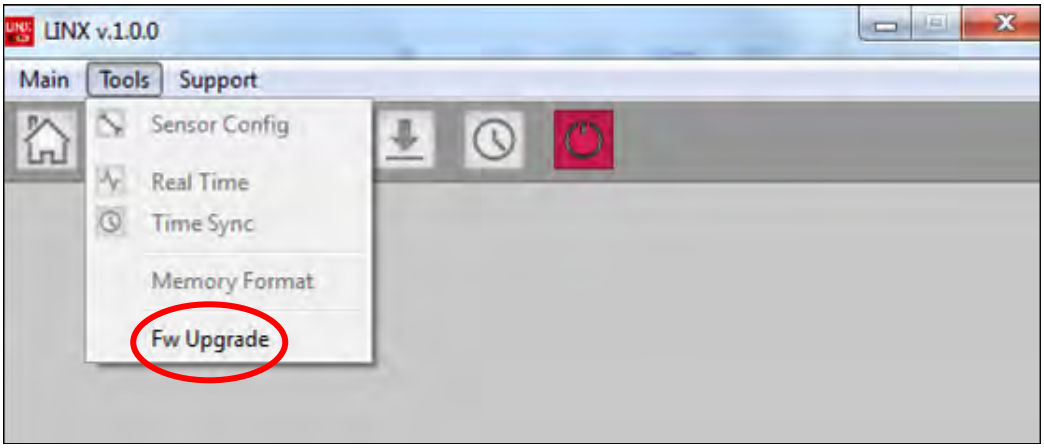
- Connect the logger to the PC using the USB cable. Ensure both the red and green LED's are ON
- Open the software

DO NOT REMOVE THE JUMPER PLUG

7.0 7.2 Updating firmware contd...

- The program will connect to the logger automatically. Once connected, confirmation will be given by the message **GS Bootloader** and the green light will illuminate. It is now safe to remove the jumper plug.

In the “Tools” menu, select “**Fw upgrade**” and then select the .hex file path of the desired upgrade supplied from Geosense.



Wait for the progress bar to finish. During this process the red and green LED’s flash alternately, the red very fast and the green much slower.

DO NOT DISCONNECT THE USB CABLE DURING THE PROCESS AND DO NOT USE THE SOFTWARE OR COMPUTER WHILE THE LIGHTS ARE FLASHING

7.2 Updating firmware contd...

Once the progress bar has reached the end, the program will reconnect to the logger in standard working mode.

Once connected, check the Logger name and the version of updated firmware at the bottom-left hand corner.

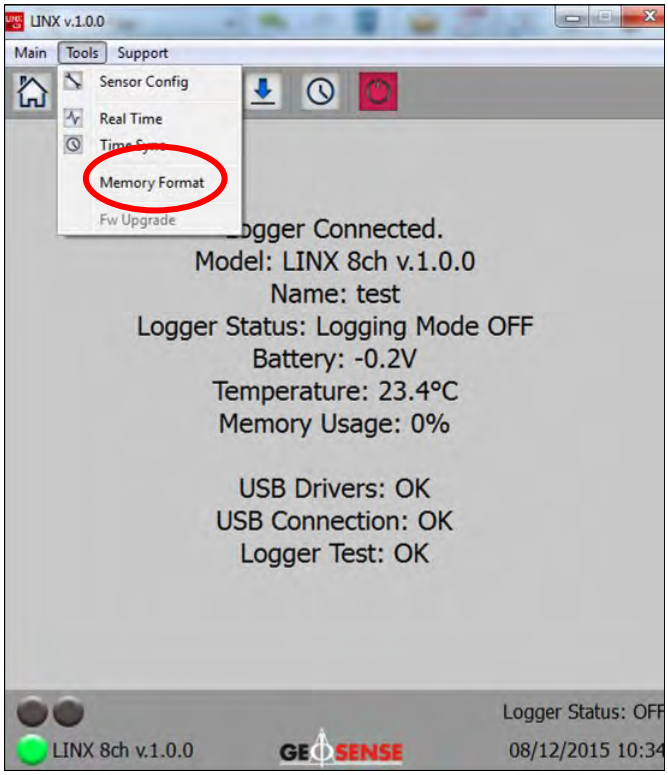
7.3 Memory format

Once the firmware has been updated it is necessary to carry out a **Memory Format**

IT IS RECOMMENDED TO DOWNLOAD ALL DATA BEFORE UPGRADING THE FIRMWARE AS THIS WILL DELETE ALL OLD AQUISITIONS

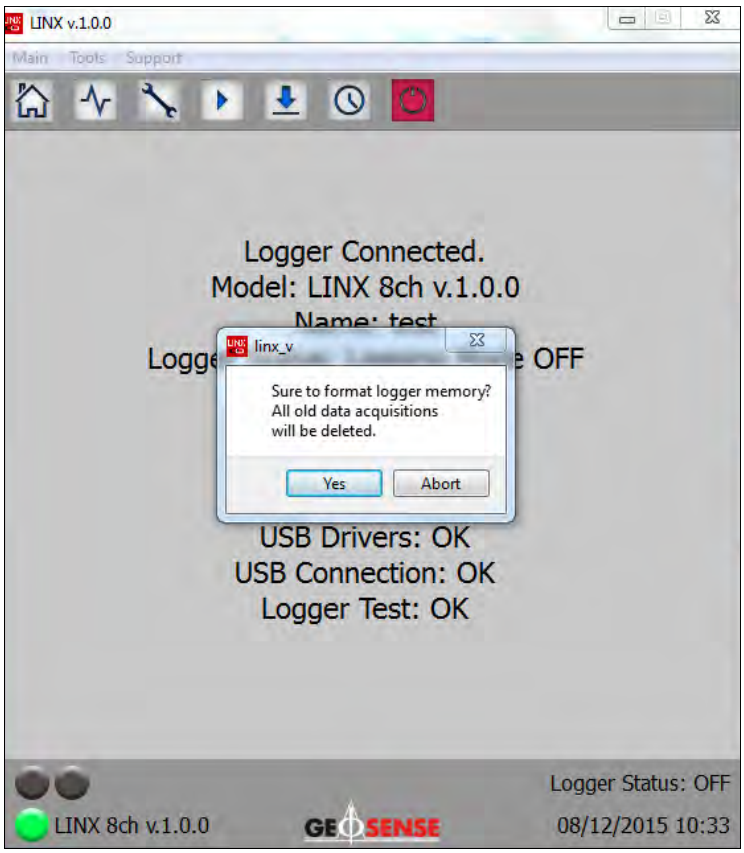
Remove the programming jumper plug from the two pegs and replace back onto one of the pegs.

Select **Memory Format** cycle



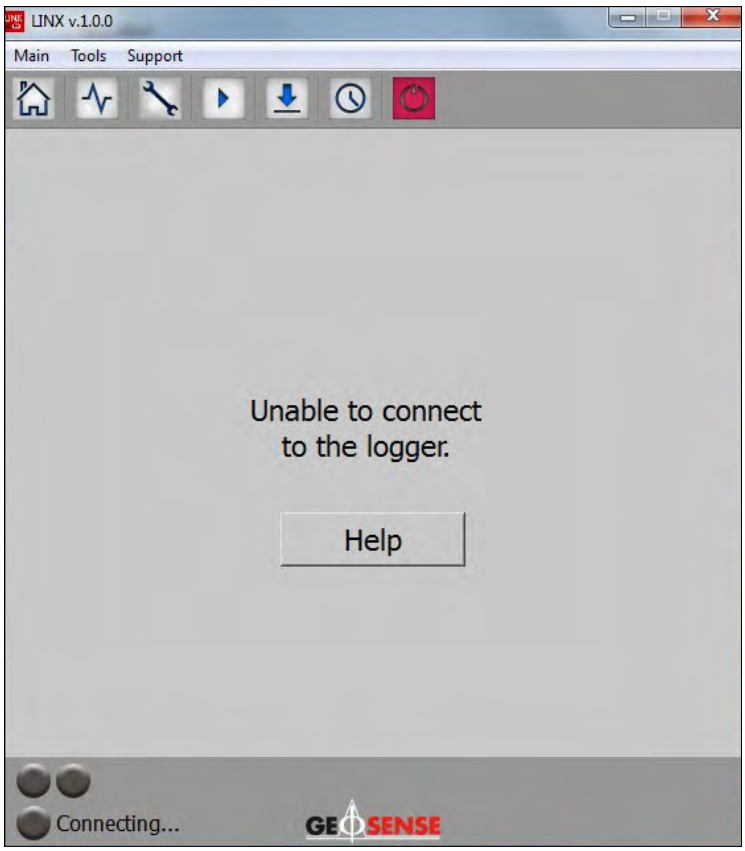
7.3 Memory format contd...

To upgrade the firmware select **Yes**

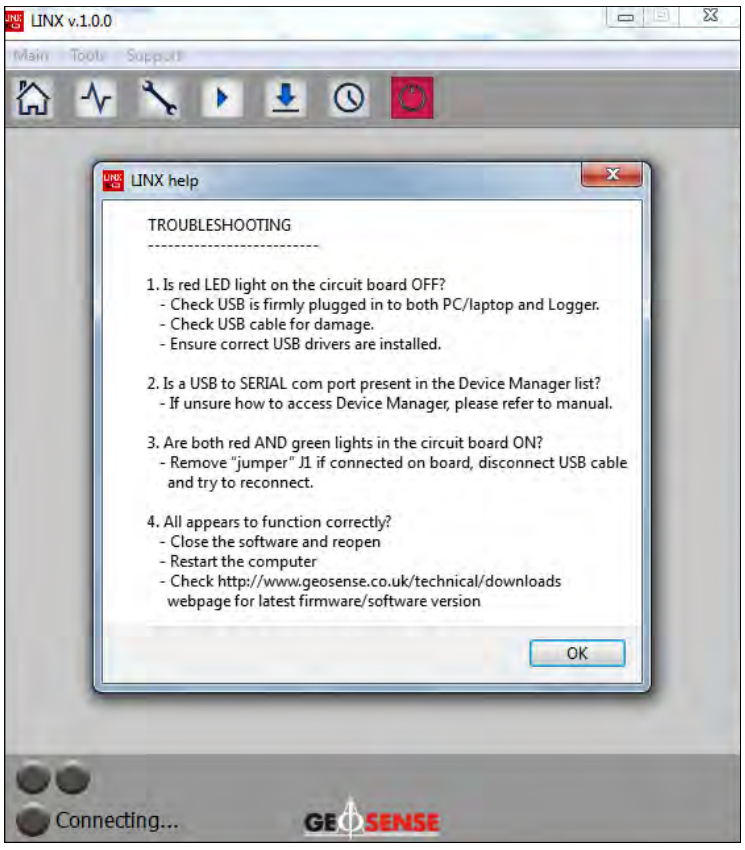


8.0 TROUBLESHOOTING

The Linx software contains a large amount of self help and Therefore the user should follow any help found within the software itself.



For any communication problems select the **Help** button which will offer various solutions to the problem.



If problems still arise please contact Geosense for further assistance.

9.0 SPECIFICATION

MODEL	LINX-1C	LINX-4C	LINX-8C
Channels	1VW + 1NTC	4 VW + 4 NTC	8VW + 8 NTC
Vibrating wire			
Excitation	0 - 5 V	0 - 5 V	0 - 5 V
Range	260 to 4800 Hz	260 to 4800 Hz	260 to 4800 Hz
Resolution	0.10 Hz	0.10 Hz	0.10 Hz
Accuracy*	0.01% Full Scale	0.01% Full Scale	0.01% Full Scale
Thermistor			
Range	1000 to 64000 Ohm	1000 to 64000 Ohm	1000 to 64000 Ohm
Resolution	<4 ohm	<4 ohm	<4 ohm
Accuracy (25 ºC)**	0.3 ºC	0.3 ºC	0.3 ºC
Communication			
Port	Mini B USB	Mini B USB	Mini B USB
Software	Linx	Linx	Linx
Readout	Windows XP onwards	Windows XP onwards	Windows XP onwards
Data storage			
Memory	8MB	8MB	8MB
Readings	up to 279,000	up to 135,000	up to 83,000
On memory full	Overwrite old data or stop	Overwrite old data or stop	Overwrite old data or stop
Reading interval***	sec/min/hr/day/month/year	sec/min/hr/day/month/year	sec/min/hr/day/month/year
Time format	Day/month/year; hr/min/sec	Day/month/year; hr/min/sec	Day/month/year; hr/min/sec
Power			
Voltage	3-7Vdc	3-7Vdc	3-7Vdc
Standard battery	4 x AA Alkaline	4 x Alkaline C	4 x Alkaline C
(Lithium battery available on request)			
Battery life****	>8 years / 8 memory fill	>5 years /4 memory fills	>5 years / 3 memory fills
Enclosure			
Material	Cast aluminium	Cast aluminium	Cast aluminium
Dimensions (L x W x H)	160 x 100 x 80mm	160 x 100 x 80mm	160 x 100 x 80mm
Rating	IP66	IP66	IP66
Weight (with battery)	1032g	1280g	1368g
Weight (without battery)	932g	998g	1086g

* Sensor dependent

** Sensor & temperature dependent

*** Scheduled reading available

****Depending on temperature and sampling interval

10.0 SPARE PARTS

The following components are available:-

Part number	Description
Q22-011BP	Battery - AA Alkaline 4 pack
Q22-012BP	Battery - C Alkaline 4 pack
Q35-507	USB cable
Q12-087	Dust cap

11.0 RETURN OF GOODS

11.1 Returns procedure

If goods are to be returned for either service/repair or warranty, the customer should contact **Geosense®** for a **Returns Authorisation Number,** request a **Returned Equipment Report Form QF034** prior to shipment. Numbers must be clearly marked on the outside of the shipment.

Complete the **Returned Equipment Report Form QF034**, including as much detail as possible, and enclose it with the returned goods and a copy of the form should be faxed or emailed in advance to the factory.

11.2 Chargeable Service or Repairs

Inspection & estimate

It is the policy of **Geosense®** that an estimate is provided to the customer prior to any repair being carried out. A set charge for inspecting the equipment and providing an estimate is also chargeable.

11.3 Warranty Claim

(See Limited Warranty Conditions)

This covers defects which arise as a result of a failure in design or manufacturing. It is a condition of the warranty that the **Geosense® GeoLogger Linx** must be installed and used in accordance with the manufacturer's instructions and has not been subject to misuse.

In order to make a warranty claim, contact **Geosense®** and request a **Returned Equipment Report Form QF034.** Tick the warranty claim box and return the form with the goods as above. You will then be contacted and informed whether your warranty claim is valid.

11.4 Packaging and Carriage

All used goods shipped to the factory **must** be sealed inside a clean plastic bag and packed in a suitable carton. If the original packaging is not available, **Geosense®** should be contacted for advice. **Geosense®** will not be responsible for damage resulting from inadequate returns packaging or contamination under any circumstances.

11.5 Transport & Storage

All goods should be adequately packaged to prevent damage in transit or intermediate storage.

12.0 LIMITED WARRANTY

The manufacturer, Geosense Ltd, warrants the **Geosense® GeoLogger Linx** manufactured by it, under normal use and service, to be free from defects in material and workmanship under the following terms and conditions:-

Sufficient site data has been provided to **Geosense®** by the purchaser as regards the nature of the installation to allow **Geosense** confirm its suitability for use and that it shall be installed in accordance with the manufacturer's recommendations.

The equipment is warranted for 1 year from the date of shipment from the manufacturer to the purchaser.

The warranty is limited to replacement of part or parts which, are determined to be defective upon inspection at the factory. Shipment of defective part or parts to the factory shall be at the expense of the Purchaser. Return shipment of repaired/replaced part or parts covered by this warranty shall be at the expense of the Manufacturer.

Unauthorised alteration and/or repair by anyone which, causes failure of the unit or associated components will void this **LIMITED WARRANTY** in its entirety.

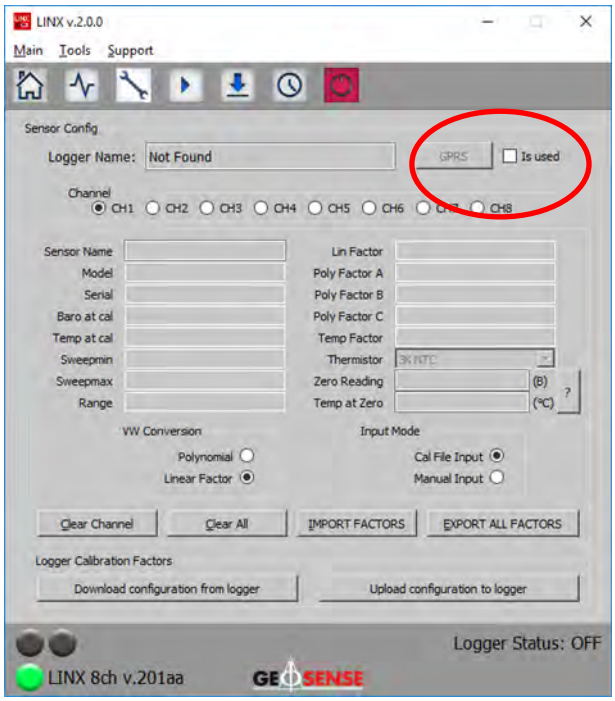
The Purchaser warrants through the purchase of the Geosense® GeoLogger Linx equipment that he is familiar with the equipment and its proper use. In no event shall the manufacturer be liable for any injury, loss or damage, direct or consequential, special, incidental, indirect or punitive, arising out of the use of or inability to use the equipment sold to the Purchaser by the Manufacturer.

The Purchaser assumes all risks and liability whatsoever in connection with the **Geosense® GeoLogger Linx** equipment from the time of delivery to Purchaser.

13.0 ADDENDUM

13.1 Selecting GPRS mode

1. Go to Sensor Setup screen.
2. Click the '**Is Used'** Box so the GPRS settings menu is displayed



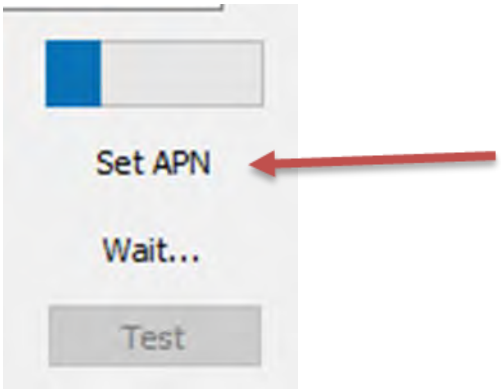
Enter the following information:

- **SIM PIN** - Obtain from SIM provider (Geosense Sims do not have a pin)
- **PROVIDER APN** - Obtain from SIM provider ('internet' is default for Geosense Sims, if this does not work and logger gets stuck at 'set APN' please try 'wlapn.com')
- **SERVER IP ADDRESS** - IP Address of FTP server
- **USER ID** - Username for FTP server
- **PASSWORD** - Password for FTP server
- **FILE NAME** - Name of file that will be sent
- **SUBFOLDER PATH** - File path for file to be sent to (This is relative from the user path; folders need to be separated with \)
- **DATA RATE** – Rate of FTP
- **STARTING FROM** – Select date/time to FTP from
- Press '**Upload Settings to Logger'**
- Press **TEST** to send a test file, check the file is sent to correct location
- Press **OK**

13.1 Selecting GPRS contd….

When a test file has been successful, the file will be visible on the virtual server. Please login to check that file has arrived correctly.

If the logger fails to send FTP, please try test again and carefully watch the text that is being shown on the screen:



This displays what the logger is currently trying to do, the message before it fails the FTP will be why it failed, common causes are:

1. Incorrect User, Password or Subfolder path. If the subfolder path is longer than one file, the files will need to be separated with a '\' e.g. Geosense\Test\Linx
2. Incorrect APN, this will be internet for Geosense sim cards, other providers will have their own.
3. SIM pin incorrect, this is only if the user knows that there is a pin.
4. The 'upload settings to logger' button has not been pressed before testing.
5. The logger loses connection, this will be due to the logger drawing too much current from the computer (this could cause the computer to crash, the software will likely need to be restarted). In order to prevent this the gold-plated connector cable must be used as it allows more current to pass. A large current draw is due to very low signal, this can also be resolved by moving to a new location with better signal.

Please be aware that this extra current draw will affect battery life if kept in a low signal area

13.2 Data output from FTP

The data format from FTP differs from the standard Linx in that it is only raw data and therefore VW readings are in Hertz and Thermistor readings are in Ohms and will need to be converted

Date/Time	Linx Battery Voltage	Linx Tempera-ture	Barometric pressure	VW Reading (Hz)	Thermistor Resistance (Ohms)	Conversion Hz to Digits	Conversion Resistance to Temp (°C)
05/01/2020 09:18	6.1	6.4	1028	2757.4	6380	7603.3	8.56

Resistance versus temperature table

Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp
201.1K	-50	16.60K	-10	2417	30	525.4	70	153.2	110
187.3K	-49	15.72K	-9	2317	31	507.8	71	149.0	111
174.5K	-48	14.90K	-8	2221	32	490.9	72	145.0	112
162.7K	-47	14.12K	-7	2130	33	474.7	73	141.1	113
151.7K	-46	13.39K	-6	2042	34	459.0	74	137.2	114
141.6K	-45	12.70K	-5	1959	35	444.0	75	133.6	115
132.2K	-44	12.05K	-4	1880	36	429.5	76	130.0	116
123.5K	-43	11.44K	-3	1805	37	415.6	77	126.5	117
115.4K	-42	10.86K	-2	1733	38	402.2	78	123.2	118
107.9K	-41	10.31K	-1	1664	39	389.3	79	119.9	119
101.0K	-40	9796	0	1598	40	376.9	80	116.8	120
94.48K	-39	9310	1	1535	41	364.9	81	113.8	121
88.46K	-38	8851	2	1475	42	353.4	82	110.8	122
82.87K	-37	8417	3	1418	43	342.2	83	107.9	123
77.66K	-36	8006	4	1363	44	331.5	84	105.2	124
72.81K	-35	7618	5	1310	45	321.2	85	102.5	125
68.30K	-34	7252	6	1260	46	311.3	86	99.9	126
64.09K	-33	6905	7	1212	47	301.7	87	97.3	127
60.17K	-32	6576	8	1167	48	292.4	88	94.9	128
56.51K	-31	6265	9	1123	49	283.5	89	92.5	129
53.10K	-30	5971	10	1081	50	274.9	90	90.2	130
49.91K	-29	5692	11	1040	51	266.6	91	87.9	131
46.94K	-28	5427	12	1002	52	258.6	92	85.7	132
44.16K	-27	5177	13	965.0	53	250.9	93	83.6	133
41.56K	-26	4939	14	929.6	54	243.4	94	81.6	134
39.13K	-25	4714	15	895.8	55	236.2	95	79.6	135
36.86K	-24	4500	16	863.3	56	229.3	96	77.6	136
34.73K	-23	4297	17	832.2	57	222.6	97	75.8	137
32.74K	-22	4105	18	802.3	58	216.1	98	73.9	138
30.87K	-21	3922	19	773.7	59	209.8	99	72.2	139
29.13K	-20	3748	20	746.3	60	203.8	100	70.4	140
27.49K	-19	3583	21	719.9	61	197.9	101	68.8	141
25.95K	-18	3426	22	694.7	62	192.2	102	67.1	142
24.51K	-17	3277	23	670.4	63	186.8	103	65.5	143
23.16K	-16	3135	24	647.1	64	181.5	104	64.0	144
21.89K	-15	3000	25	624.7	65	176.4	105	62.5	145
20.70K	-14	2872	26	603.3	66	171.4	106	61.1	146
19.58K	-13	2750	27	582.6	67	166.7	107	59.6	147
18.52K	-12	2633	28	562.8	68	162.0	108	58.3	148
17.53K	-11	2523	29	543.7	69	157.6	109	56.8	149

Conversion Hz to Digits

Please refer to the individual sensor manual for conversion of frequency to digits and engineering units.

Nova House . Rougham Industrial Estate . Rougham . Bury St Edmunds . Suffolk . IP30 9ND . England .

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