ENGLISH

SL1

DATA LOGGER

User Manual

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INDEX

1 SL1 KIT 7
2 WHY BUY 8
3 GPS SYSTEM. 8
3.1 FIX GPS 8
4 NECESSARY REQUIREMENTS. 9
5 SL1: INSTALLATION. 10
5.1 INSTALLING THE GPS ANTENNA 10
5.2 PRECAUTIONS 11
6 SL1: FRONT VIEW 12
7 BEFORE STARTING. 13
7.1 INSTALL THE SOFTWARE 13
7.1.1 HOW TO ACTIVATE THE WINTAX4 JUNIOR LICENSE 17
7.1.2 UPDATE OF LynXLog AND / OR SL1 DATA LOGGER 17
7.1.3 UPDATE OF THE SL1 DATA LOGGER 18
8 SL1: OPERATING DIAGRAM 19
9 BEHAVIOUR OF THE LEDS. 20
10 SL1: POWER SUPPLY MANAGEMENT 21
11 LYNXLOG: SOFTWARE INTERFACE 22
11.1 LYNXLOG: NAVIGATION BAR 23
11.1.1 NAVIGATION BAR: FUNCTIONALITY 23
11.2 LYNXLOG STATUS BAR 24
12 HOW TO... 24
12.1 CONNECT THE SL1 DATA LOGGER TO THE PC 24
12.1.1 USB CONNECTION 25
12.1.2 WIFI CONNECTION 25
12.2 SETTING THE DATA ARCHIVE FOLDER 28
12.3 DOWNLOADING THE ACQUIRED DATA (RUN) 29
12.4 DELETING THE ACQUIRED DATA (RUN) 30
12.5 OPENING, SAVING AND MODIFYING THE SETUP 32
12.5.1 DOWNLOADING THE SETUP FROM SL1 33
12.5.2 OPEN THE SETUP FILE (.SET) 34
12.5.3 SEND SETUP TO SL1 35
12.5.4 CHANGING THE SETUP 36
12.5.5 SAVING THE SETUP TO A FILE (.SET) 37
12.5.6 CREATING AN EMPTY SETUP 37
12.6 USING THE REAL-TIME MONITOR 38
12.6.1 ADD / REMOVE A CHANNEL TO/FROM THE MONITOR DISPLAY LIST 39
12.6.2 DISPLAYING A CHANNEL IN REAL-TIME 39
12.6.3 CALIBRATING A CHANNEL FROM THE MONITOR 40
12.6.4 SETTING THE ZERO OF A CHANNEL FROM THE MONITOR 41
12.7 STARTING ACQUISITION MANUALLY 42
12.8 CHANGING THE SETTINGS DATA LOGGER SL1 HARDWARE 43
12.8.1 CHANGING THE AUTO POWER OFF TIME 44
12.8.2 CHANGING THE GPS DYNAMIC 45
12.8.3 CHANGING THE LED BRIGHTNESS 46
12.8.4 TURNING OFF THE DATA LOGGER SL1 MANUALLY 47
12.8.5 ADJUSTING THE CLOCK OF THE DATA LOGGER SL1 47
12.9 TRACK MANAGEMENT 48
12.9.1 CREATING A TRACK WITH GOOGLE MAPS ™ 49
12.9.2 CREATING A TRACK IN "OFFLINE" MODE 52
12.9.3 SENDING A TRACK TO THE SL1 DATA LOGGER 53

12.10 LYNXLOG OPTIONS....55
13 TECHNICAL CHARACTERISTICS OF THE DATA LOGGER SL1....57
ANNEX 1: FURTHER INFORMATION ON THE SETUP....58
1 SETTING THE SETUP INFORMATION (INFO)....59
2 SEARCHING FOR A CHANNEL....60
3 SETTING THE TRIGGERS....61
3.1 SETTING THE DATA LOG TRIGGER (START/STOP ACQUISITION)....61
3.2 SETTING THE LAP TRIGGER SOURCE (CUT LAPS)....62
3.3 SETTING THE DIGITAL OUT TRIGGER....63
3.3.1 NOTES ON THE DIGITAL OUTPUT....64
4 AN/FRQ PANEL (PHYSICAL INPUTS: AN1...AN3, IC1)....65
5 CAN PORT GET AND CAN PORT EXP PANELS....66
5.1 ADDING A NEW CAN CHANNEL....68
5.2 CHANGING A CAN CHANNEL....69
6 CONFIGURING A CHANNEL....70
6.1 CHANNEL PROPERTIES....71
6.2 CALIBRATING A CHANNEL....72
6.2.1 CALIBRATION NONE....72
6.2.2 LINEAR CALIBRATION....73
6.2.3 POLYLINE CALIBRATION....74
6.2.4 SUSPENSION CALIBRATION....76
6.2.5 OTHER CALIBRATIONS....77
7 GPS PANEL....78
8 IMU PANEL....79
9 OTHER FUNCTIONS....80
9.1 THE CONTEXTUAL MENUS OF THE SETUP TREE AND THE BUTTONS OF THE FUNCTIONS AREA....80
9.2 IMPORTING .dbc FILES....81
ANNEX 2 PINOUTS....84
1 "MAIN" CONNECTOR....84
2 "EXP" CONNECTOR....84
3 "USB" CONNECTOR....85
ANNEX 3 THE SL1 WIRING....86
1 MAIN POWER/IC WIRING CODE GL-0178-AA/AB....86
2 EXPANSION WIRING CODE GL-0179-AB....87
3 MULTILINK WIRING CODE GL-0167-AB....88
ANNEX 4 SL1 CONNECTION DIAGRAM....89
1 RX1/ GP1 ECUS - SL1 (BATTERY-LESS CONFIGURATION KIT COD. GK-SL1-0001 / GK-SL1-0002)....89
2 RX1/ GP1 ECUS - SL1 (KIT COD. GK-SL1-0003)....90
3 APPLICATION OF CAN BUS + EXT SENSORS: RX1/ GP1 ECUS - SL1 (BATTERY LESS CONF.)....91
4 APPLICATION SL1 + RX1/ ECULMB /GP1 ECUS + D30 DASH....92
5 APPLICATION SL1 + RX1/ ECULMB /GP1 ECUS+ S2A CAN EXPANSION....93
6 APPLICATION SL1 + S2A CAN EXPANSION - D30 DASH....94
7 GK-LC1-EVO MODULE ANALOG CONNECTION....95
8 GK-LC1-PRO MODULE ANALOG CONNECTION....96
9 CAN BUS CONNECTION TO THE GK-LC1-PRO MODULE....97
10 GET MAGNETOSTRICTIVE SENSOR CONNECTION....98
11 SL1 AND S2A EXPANSION MODULE CONNECTION....99
12 CLASSIFICATION OF THE SENSORS/ SIGNALS AND CONNECTION TO THE SL1....100

Dear Customer,

Thank you for selecting a product from the **GET** by **Athena** data acquisition line.
We are sure that our passion and experience will be able to successfully reach maximum performance in all the competitions in which you want to participate. Therefore please read this manual as we are sure that it can help you to properly use your new **GET** by **Athena** device.
Thanks to GPS technology, the devices in the **SL1 Data Logger** family are able to acquire not only signals from the sensors connected to them, but also vehicle trajectories and speed.

The data download and configuration of the **SL1 Data Logger** is managed using the **LynXLog** software.
The acquired data can be analysed using the **WinTAX4 Junior*** software.
The purpose of this manual is to illustrate the functions of the **SL1 Data Logger** to the end user.

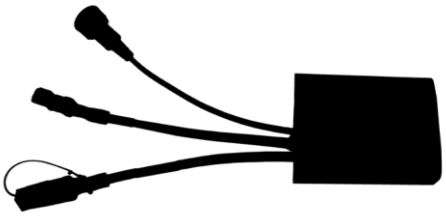
*WinTAX Junior requires an activation code, to obtain it contact us at tech@athena.eu.

Nomenclature

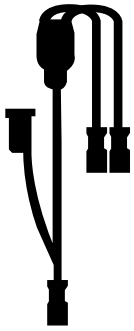
CAN – Communication protocol.
DYNO – Test bench.
GPS – Global Positioning System is a satellite positioning and navigation system
FS - Full scale
FIX-GPS – The FIX-GPS is the position that the GPS module obtained calculating the distance of the satellites
IMU – Inertial platform, system that permits monitoring a moving vehicle using inertial sensors
LED – Light Emitting Diode, the luminous lights on the SL1 Data Logger.
LOGGER / SL1 DATA LOGGER - Data acquisition system.
LynXLog – Software for managing the SL1 Data Logger.
OTA – Software update system.
PASSWORD- Access word.
RPM – Revolutions per minute.
RUN – Data acquisition that has a progressive number and a date.
SETUP – SL1 Data Logger configuration file.
SL1 – Commercial name of the Athena data acquisition device.
TPS – Accelerator position sensor.
USB – Communication port with wired communication.
Wifi – Wireless communication technology.
WinTAX4 – Data analysis software (Magneti Marelli).

1 SL1 KIT

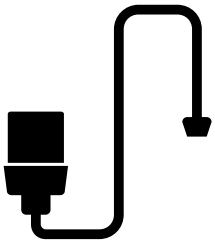
The **SL1** kit includes:



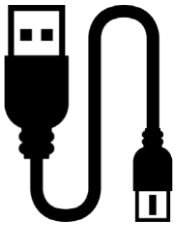
SL1 Data Logger



1 Connection wiring between SL1 and GET control units



1 GPS antenna



1 USB data cable (mini - USB) for connection to the PC

1 USB flash drive

NOTE: The content of the kit may vary depending on the version.

2 WHY BUY ...

Data acquisition during test sessions is becoming increasingly important because it permits:

- Reducing the vehicle configuration time.
- Correcting driving errors.
- Controlling vehicle behaviour, statically and dynamically.
- Viewing all the acquired parameters.
- Controlling engine and chassis performance continuously.
- Viewing the lap times of a session once downloaded.

3 GPS SYSTEM

The GPS system (Global Positioning System), on which your GET system is based, uses an algorithm in order to determine the position of the GPS module that receives the signal transmitted by the satellites. By measuring the time a radio signal needs to travel the distance between the satellite and receiver and knowing the precise position of at least 4 satellites, it is possible to identify the 3D position of the receiver.
24 GPS satellites in orbit, inclined 55 degrees with respect to the equator, are located between 18000 and 20000 km from the earth and rotate around it once every 12 hours.
The satellites transmit a signal between 1.2 and 1.5 GHZ (to avoid errors coming from the refraction of the atmosphere) generated by a single oscillator (atomic clock).
The transmitted data contain information about the orbit of the satellites and the time of the signal, which permit the receiver to define its position on the earth's surface.

The lap times are obtained via GPS: this solution eliminates the need to use inconvenient beacons on the track and helps provide a time reference during data analysis.
The GPS uses a stochastic algorithm and is strongly influenced by the quality of the received signal.
In the case of magnetic or environmental interference, data quality is not guaranteed. There must be a minimum number of 5 received satellites to guarantee the quality of the lap times.

3.1 FIX GPS

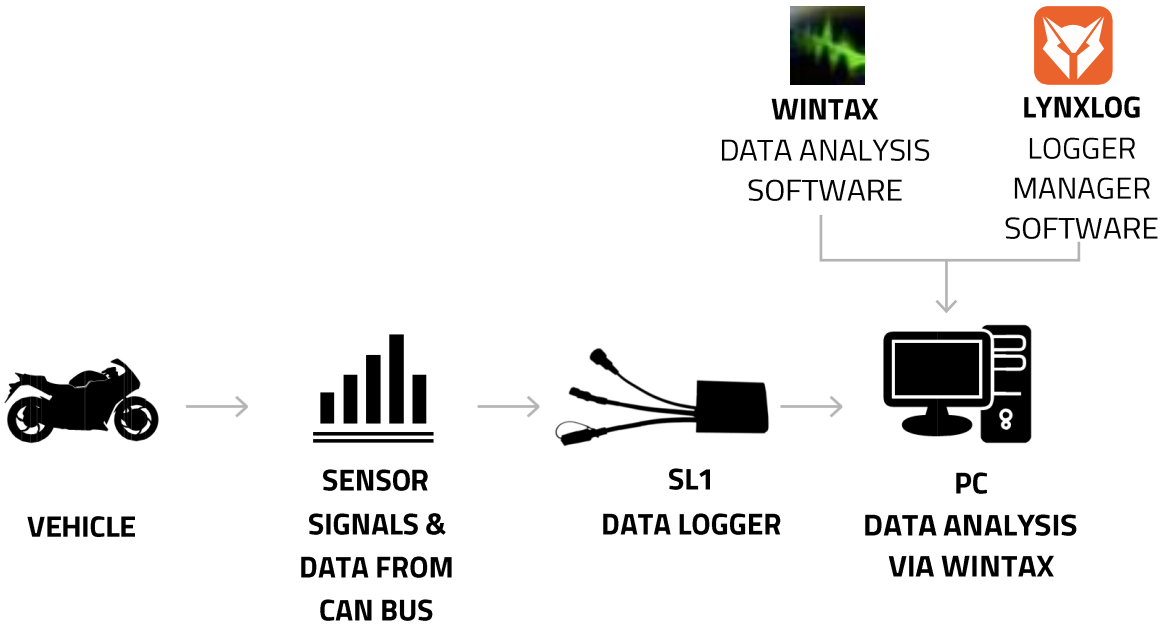
It is necessary to "fix" the satellites to obtain the trajectories and lap times in the acquisitions.
The minimum number of satellites for correct acquisition is 5.
In fixed applications (example sessions on the bench) GPS **is not** required.

NOTE: The SL1 Data Logger continues to search for satellites during acquisition, which permits starting acquisition also without GPS data.
In this case, it is probable that the trajectories, which are then displayed by the software, are compromised.
Evidence of this are quick changes in vehicle position (spikes), also in the order of Km!!!

4 NECESSARY REQUIREMENTS...

The following is required to acquire data:

- Analog signals or digital data (e.g. CAN bus) coming from the vehicle
- SL1 configured correctly to acquire the desired data
- Personal computer
- Software LynXLog (required to download data and configure SL1)
- Software WinTAX4 (required to analyse the downloaded data)



The **SL1 Data Logger** can be connected to the vehicle (or the sensors) using the specific cable (refer to Annex 3)

5 SL1: INSTALLATION

The SL1 Data Logger is designed to be easily installed in all vehicles.
With the dedicated cables, the Athena Evolution ECU (example RX1PRO) can be directly connected via CAN bus.
For electrical connections, see Annex 2 and Annex 3 of this manual.

5.1 INSTALLING THE GPS ANTENNA

Refer to the following instructions to install the GPS antenna properly:

- Pay particular attention when moving the GPS antenna: Avoid impacts and check that the cables are in perfect condition.
- Fix the antenna outside of the vehicle: obstacles near the antenna could reduce the sensor's reception ability.
- An incorrect position could cause an incorrect lap time, incorrect acquisitions and trajectories.
- Do not twist the antenna cable with other cables (especially around high voltage cables): this could cause inductive interference and therefore problems during operation.
- Do not pass the antenna cable around the cable of the spark plug or other electromagnetic fields.
- In motorcycles, it is preferable to pass the cable outside the chassis, but always in a protected area.
- Attach the GPS connector to the antenna input of the SL1 Data Logger without exerting excessive force.

Some suggestions for fastening the antenna:

- **Speed bikes**: fasten the antenna in the rear of the motorcycle, away from heat sources (exhaust) or in the instrument panel area (above).
- **Off-road motorcycle**: fasten the antenna on the handlebar.
- **Automobile**: fasten the antenna on the roof of the automobile.
- **Kart**: fasten the antenna on the top of the board, if necessary make a support to position the sensor in the appropriate direction.

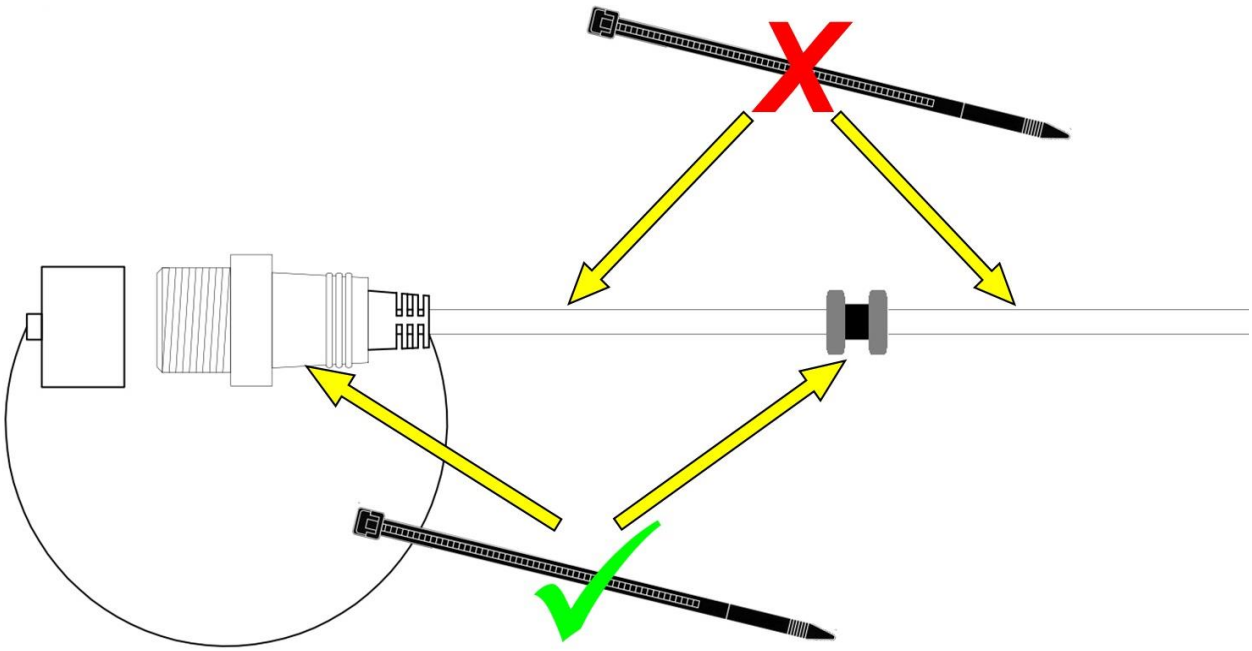
5.2 PRECAUTIONS

Observe the following rules to proceed with the installation of the SL1 Data Logger on the vehicle:

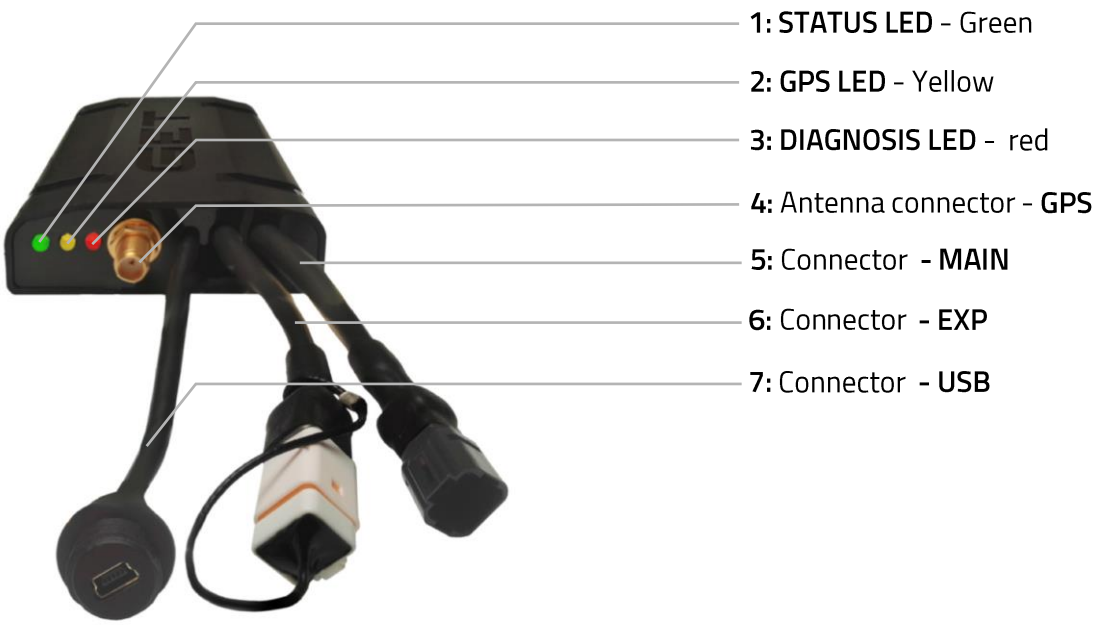
- Work in a comfortable environment (example: sufficient work space)
- Disconnect the battery
- Put all the parts removed from the vehicle in a safe place, making sure not to damage them
- Install the system when the engine is cold: during installation, it could come into contact with hot parts
- Carefully handle the connectors and wiring (avoid contact with sharp or hot surfaces)
- Keep the washers, nuts and bolts in a safe place during system installation
- Install the system so that it does not interfere with moving parts or with the pilot

ATTENTION: INCORRECT INSTALLATION COULD CAUSE PERSONAL INJURY OR PROPERTY DAMAGE

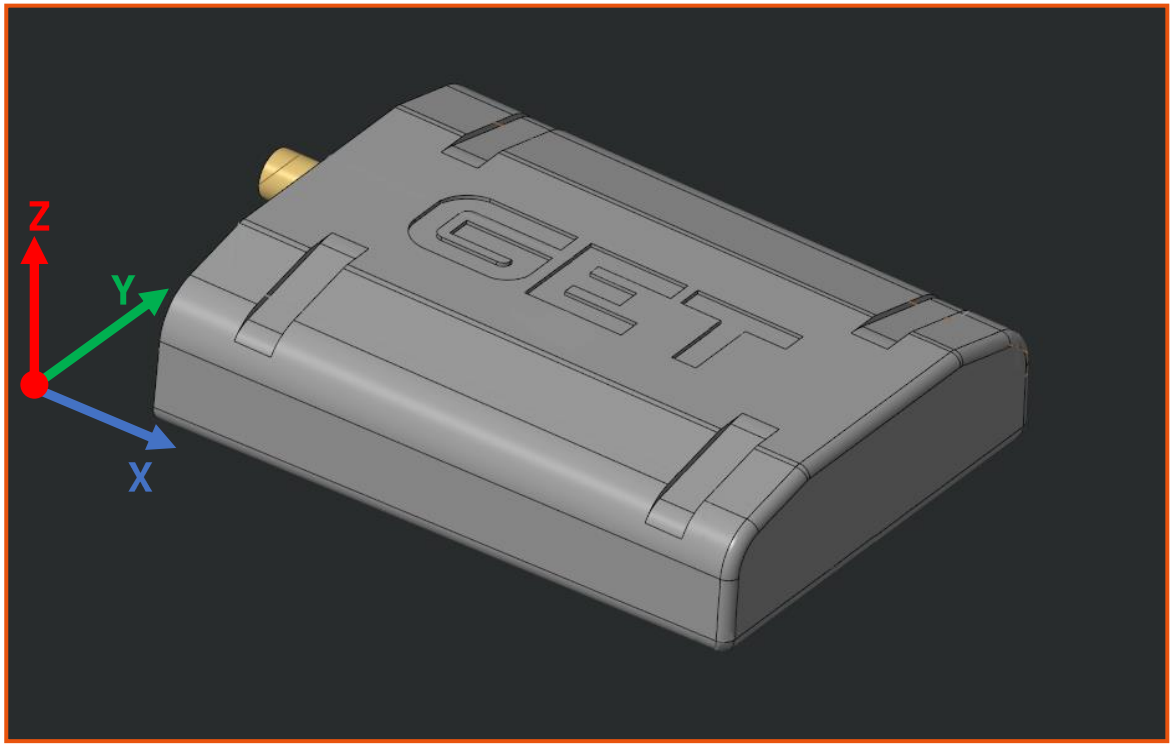
- Secure the USB connector for data download to prevent the cable from undergoing continuous movement (the cable may break).
- If you intend to fix the connector using clamps and not the appropriate ring nut, pay attention to:
- apply the clamps to the connector body and around the sliding grommet located on the data download cable.
- do not over tighten the clamp around the grommet (the cable must be able to slide)



6 SL1: FRONT VIEW



Inertial unit axis layout (factory calibration):



7 BEFORE STARTING....

The **SL1** Data Logger requires LynXLog and WinTAX4 software.
Follow these instructions:

7.1 INSTALL THE SOFTWARE

(LynXLog + WinTAX4 Junior version)

LynXLog is available for Microsoft Windows©. The officially supported versions are: Windows© 7 (32 – 64 bit), Windows© 8 (32 – 64 bit), Windows© 10 (32 – 64 bit).

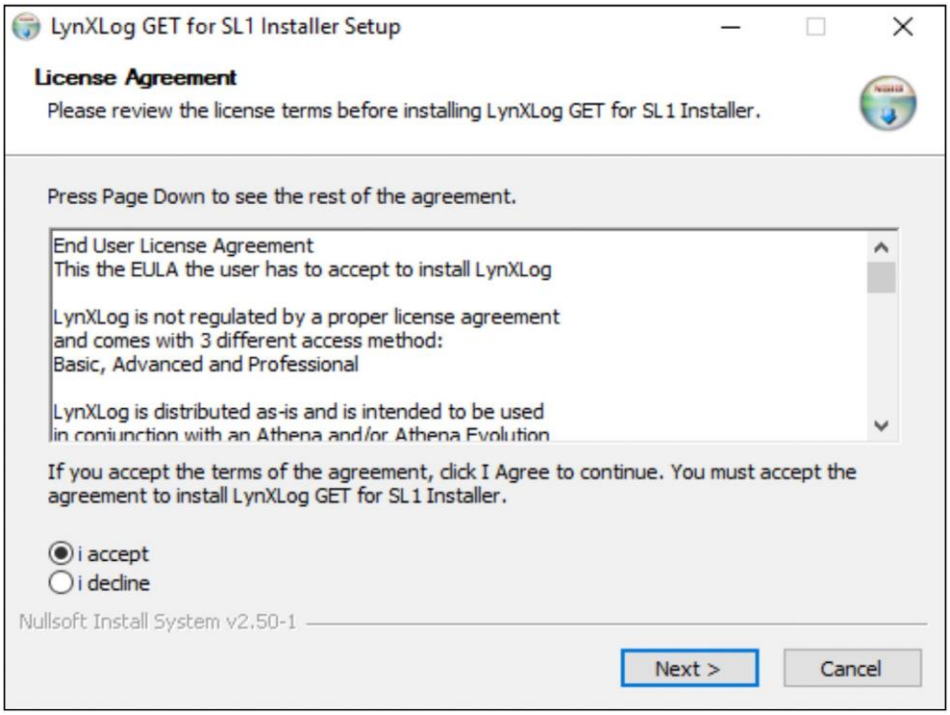
ATTENTION: Internet Explorer 11 is also required, make sure it is installed.

The SL1 kit includes one Get USB flash drive that contains a file called StartHere, double click the file and follow the instructions that appear on the screen.
If you want to install the software manually, follow these instructions:
Proceed as follows to install the LynXLog software:

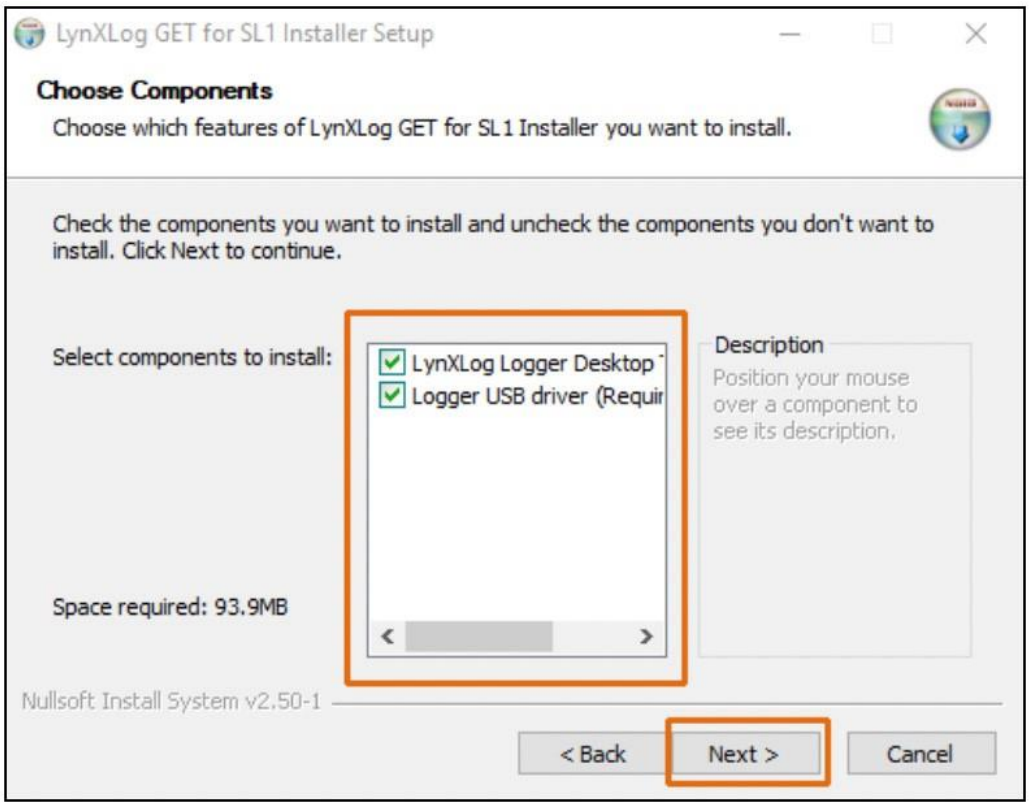
- Double click the software installer icon:

LynXLog_GET_Install_<Version>.exe

- Accept the terms of the license and then press **Next>**

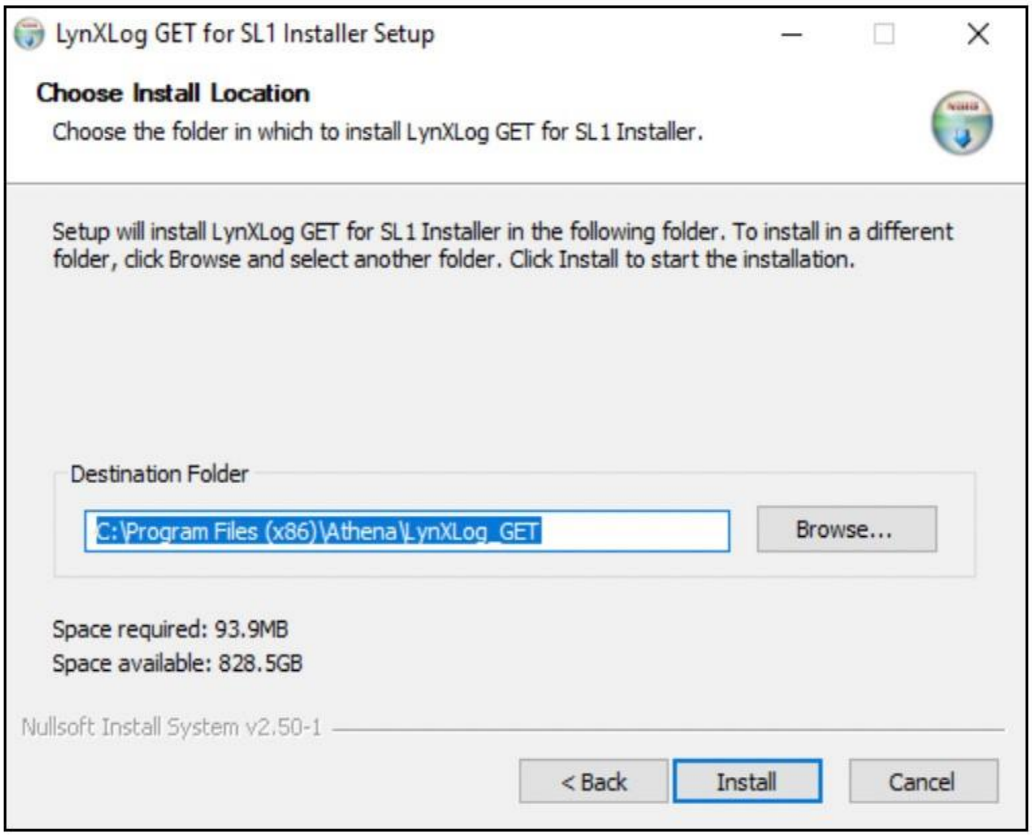


- Leave all the selected components and press Next>



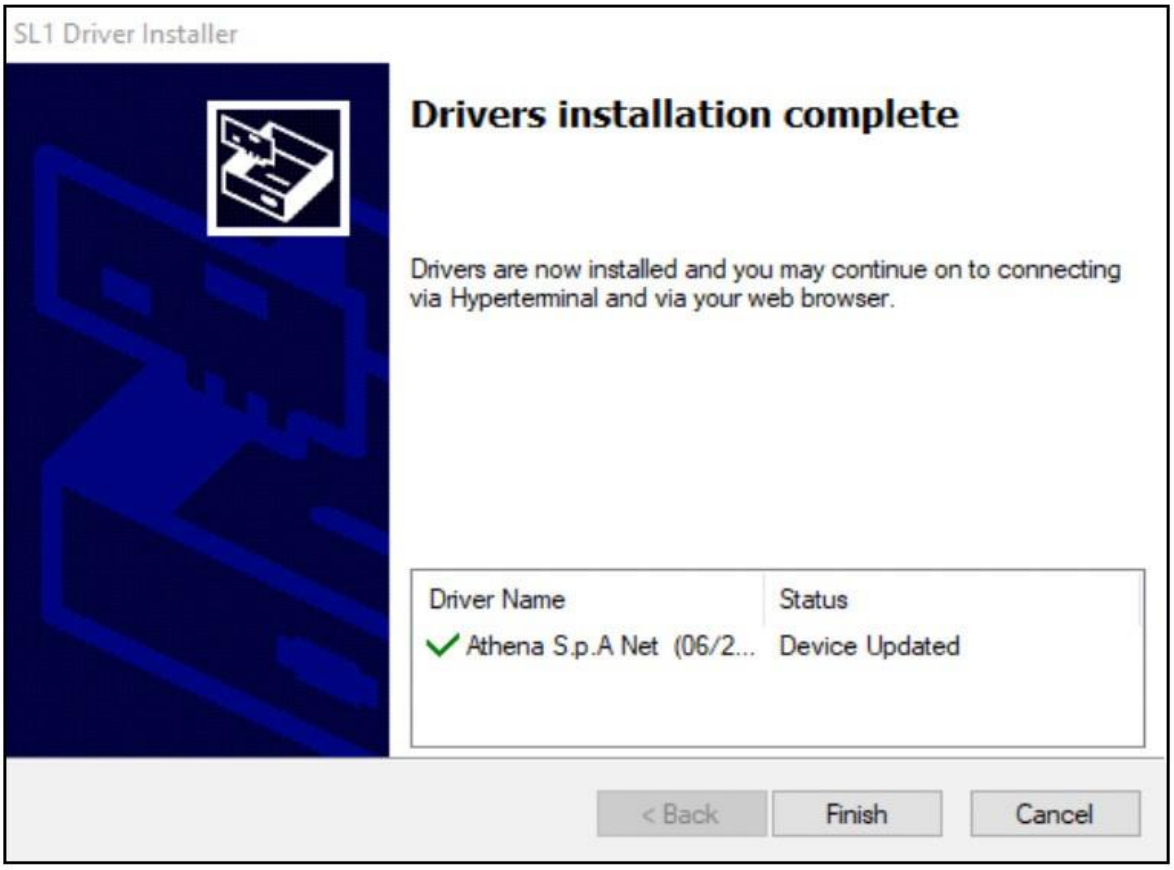
Proceed with the installation, following the instructions shown in the following windows:

1 LynXLog

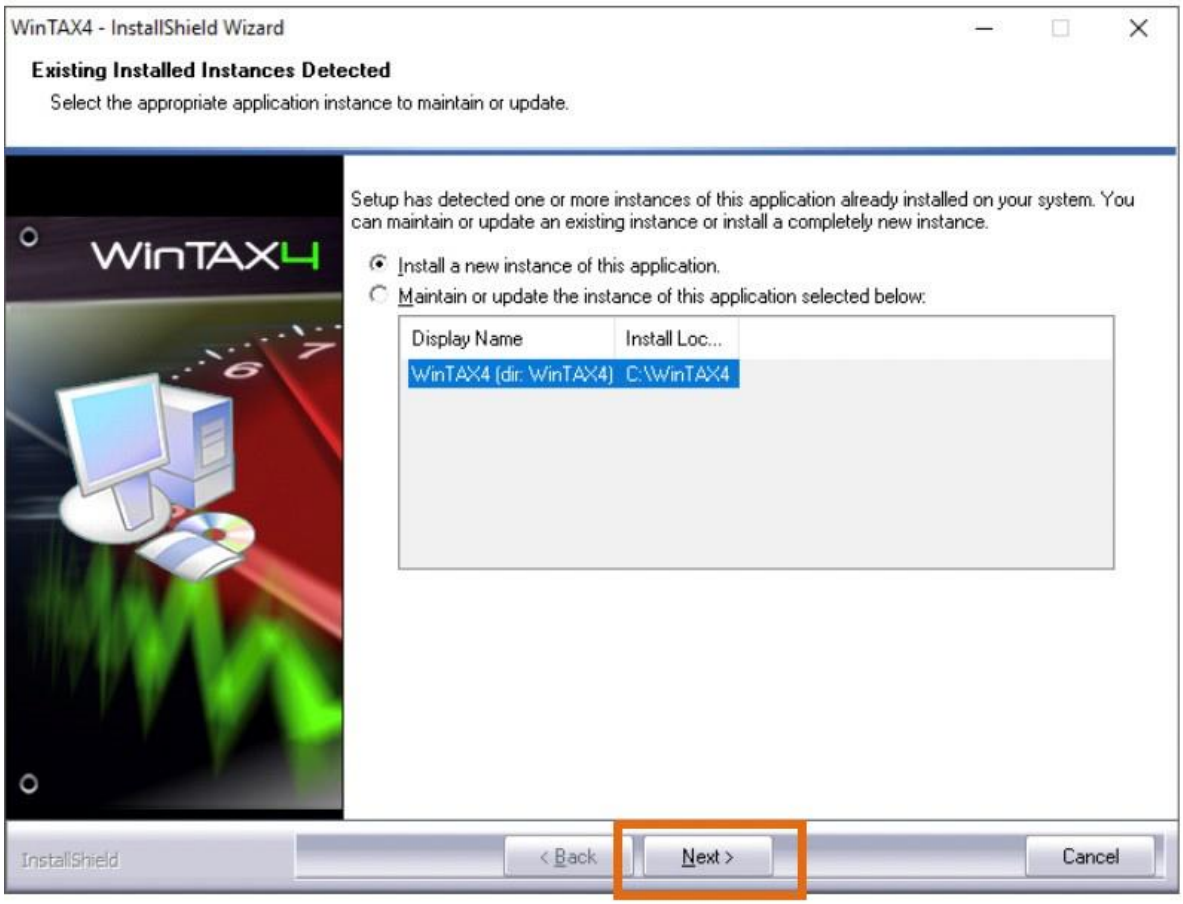


2 USB Driver

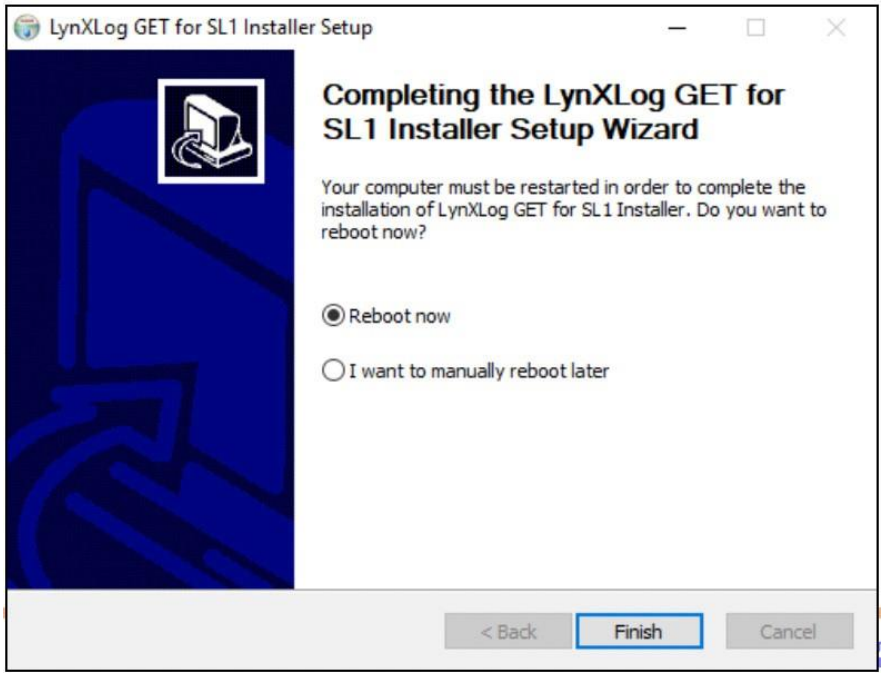
SL1 Driver Installer
Welcome to the SL1 Driver Installer!
This wizard will install drivers to help you connect to your SL1.
To continue, click Next.
< Back
Next >
Cancel


SL1 Driver Installer
Drivers installation complete
Drivers are now installed and you may continue on to connecting via Hyperterminal and via your web browser.
Driver Name
Status
Athena S.p.A Net (06/2...
Device Updated
< Back
Finish
Cancel

3 WinTAX



4 Finish



7.1.1 HOW TO ACTIVATE THE WINTAX4 JUNIOR LICENSE

WinTAX4 Junior requires a valid user license.

This license must be requested via e-mail to: tech@athena.eu

The e-mail must contain:

- WinTAX Registration ID (shown when WinTAX is executed)
- GETW Code (contained in the GETW_code.txt file in the supplied USB flash drive)

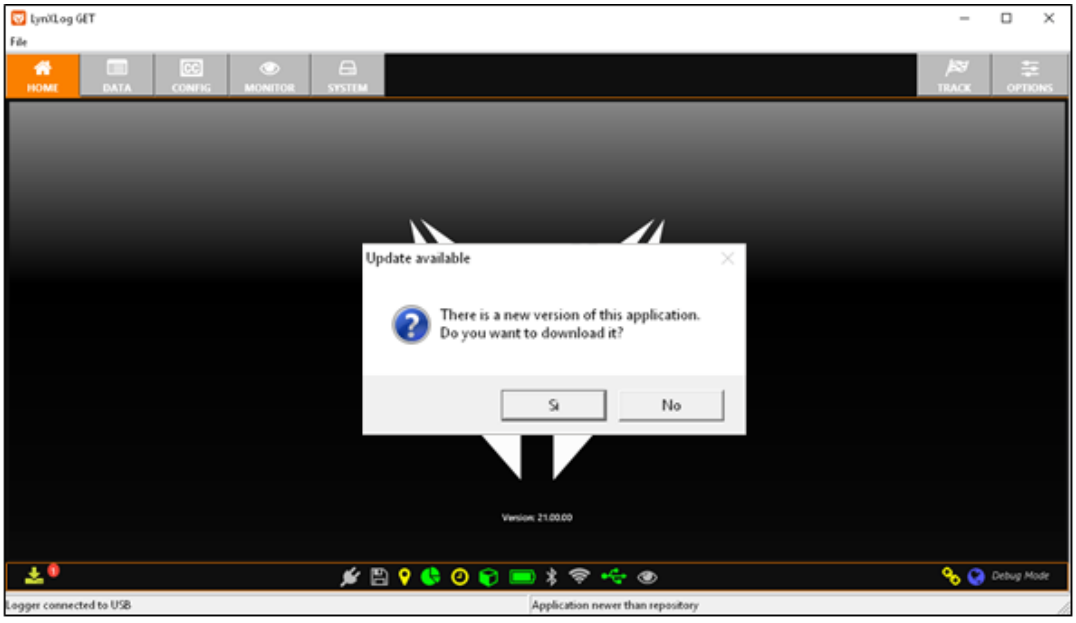
The SL1 kit includes one Get USB flash drive that contains a file called StartHere, double click the file and follow the instructions that appear on the screen.

7.1.2 UPDATE OF LynXLog AND / OR SL1 DATA LOGGER

The LynXLog software and the SL1 data logger are updated via the OTA (Over-the-air) system: every time the software is started, a check is made for the availability of new updates (NB: only in case of active internet connection).

The user will be notified by a message on the screen to confirm to proceed with the update (divided into two parts: data download and program installation). Following a software update, you may be asked to update the SL1 data loggers associated with it as well.

ATTENTION: the update process may take a long time, as it is related to the speed of the network connection



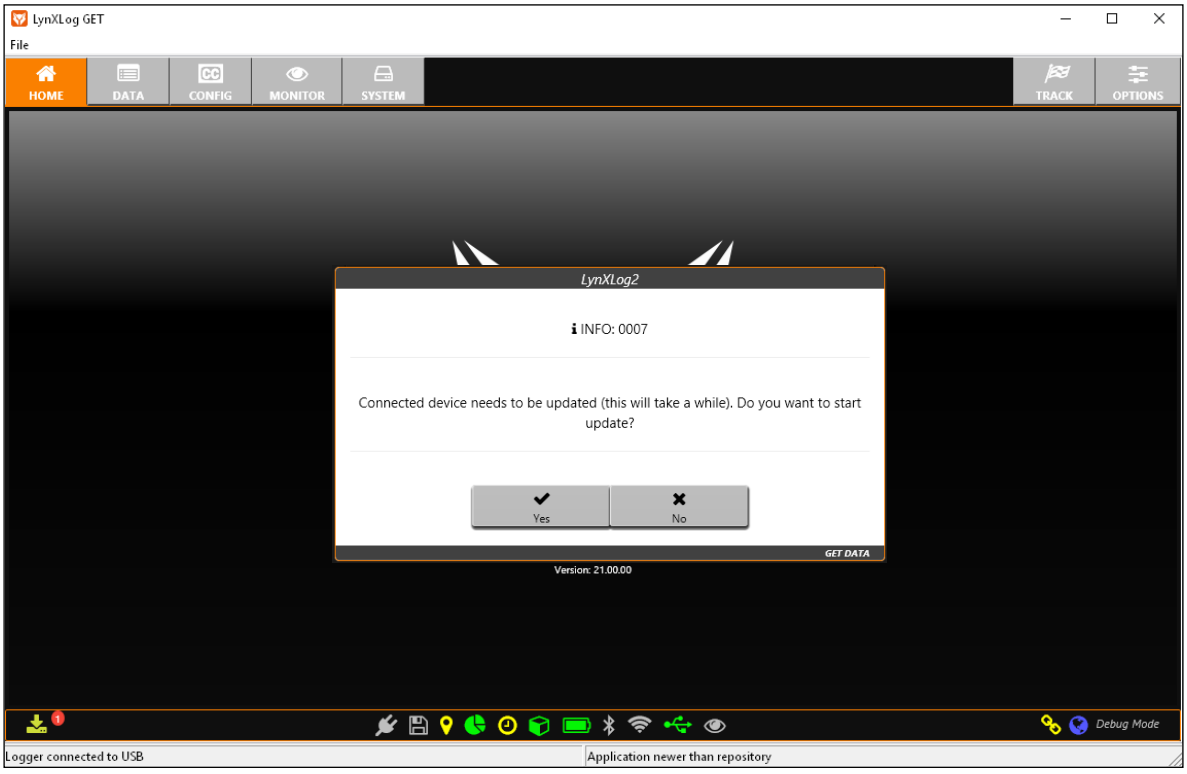
At the end of the download of the update you will be asked to install it: proceed as described in chap. 7.1 of this manual.

7.1.3 UPDATE OF THE SL1 DATA LOGGER

As anticipated, following an update of LynXLog, it will probably be required to update the devices connected to it via a notification (see figure below).

ATTENTION: CONNECT THE DEVICE WITH THE SUPPLIED USB CABLE
DO NOT DISCONNECT DURING THE UPDATE

As anticipated, following an update of LynXLog, it will probably be required to update the devices connected to it (see figure below



If you consent to the update (by pressing the **Yes** button) wait until the procedure is completed: do not use the data logger (the LynXLog software can instead be used, with the exception of the functions that interact with the device being updated).

ATTENTION: AT THE END OF THE UPDATE THE LOGGER WILL RESTART.
ON AVERAGE, THE UPDATE TAKES 7-8 minutes

If you decide to postpone the update (by pressing the **No** button in the update message) a notification badge will appear next to the OTA icon to the bottom left

8 SL1: OPERATING DIAGRAM

First use

INSTALL LynXLog & WinTAX4 → WinTAX4 JUNIOR ACTIVATION → SETUP DATA ARCHIVING FOLDER → LOGGER INSTALLATION IN THE VEHICLE → CONNECT THE SL1 DATA LOGGER TO → CONFIGURE ACQUISITION PARAMETERS (CHANNELS, TRIGGERS, INFO ETC.)

Normal use

CONNECT THE SL1 DATA LOGGER TO THE PC → CONFIGURE THE PARAMETERS OF ACQUISITION (IF NECESSARY) → DATA LOGGING → DATA DOWNLOAD WITH LynXLog → DATA ANALYSIS WITH WINTAX

9 BEHAVIOUR OF THE LEDS

The SL1 DATA LOGGER LEDs provide information concerning system status. See the following tables:

SYSTEM BOOT			
LED	**TYPE**	**STATUS**	**DESCRIPTION**
Green	GPS	ON - Blink	System check
Yellow	SYSTEM	ON - Fixed	System check
Red	DIAGNOSIS	ON - Fixed	System check

WORKING CONDITION			
LED	**TYPE**	**STATUS**	**DESCRIPTION**
Green	GPS	OFF	GPS link ok
Green	GPS	ON - Blink	Looking for GPS signal
Yellow	SYSTEM	ON	System ready
Yellow	SYSTEM	ON - Blink	Data logging condition
Red	DIAGNOSIS	OFF	System status ok
Red	DIAGNOSIS	ON – Blink	Alarm condition

SYSTEM SHUTDOWN			
Green	GPS	OFF	GPS link ok
Yellow	SYSTEM	ON - Blink	Data logging condition
Red	DIAGNOSIS	OFF	System status ok

WORKING CONDITION			
LED	**TYPE**	**STATUS**	**DESCRIPTION**
Green	GPS	ON	GPS signal OK
Yellow	SYSTEM	ON	Acquisition in progress
Red	DIAGNOSTICS	Flashing	System OK

10 SL1: POWER SUPPLY MANAGEMENT

The SL1 Data Logger can be turned on using the **MAIN** connector or via the USB port.
The second option makes it possible to download data without an auxiliary power supply (useful for battery-less applications).

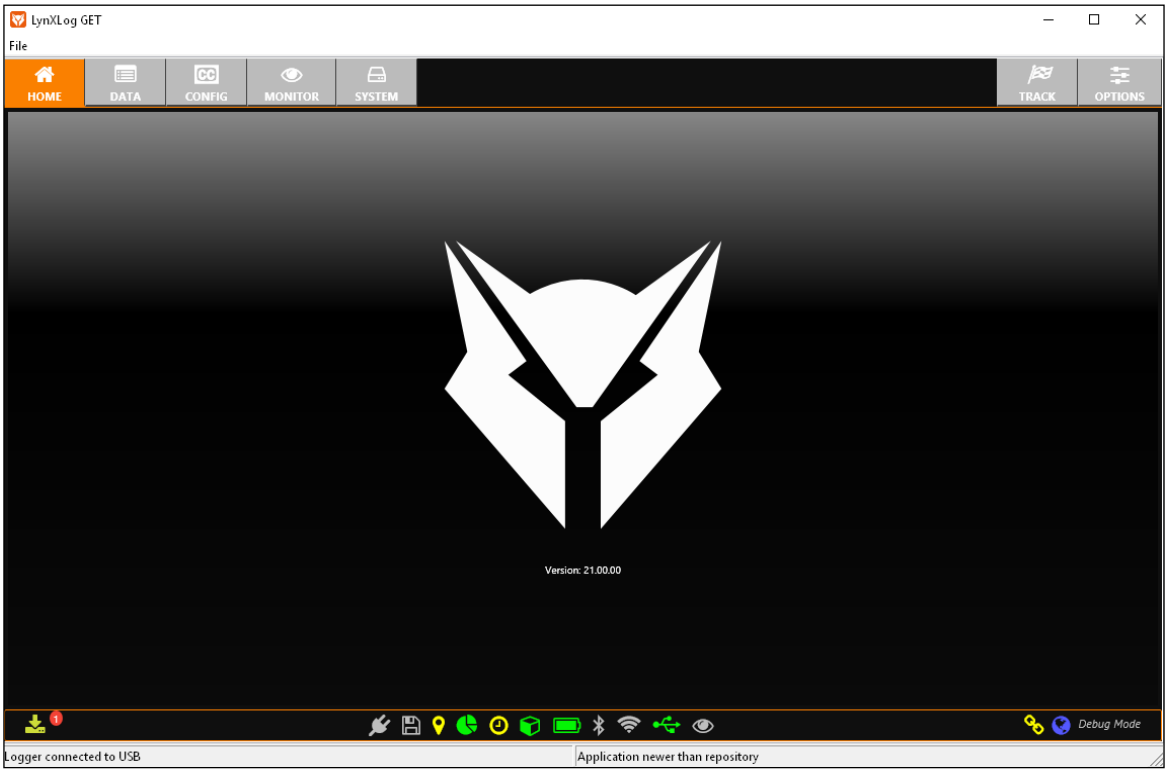
ATTENTION: **IF THE SYSTEM IS POWERED ONLY BY THE USB PORT, THE AUXILIARY VOLTAGE (5VREF) WILL NOT BE AVAILABLE: ANY ACTIVE SENSORS CONNECTED TO THE AN1, AN2 AND AN3 INPUTS MAY NOT WORK.**

11 LYNXLOG: SOFTWARE INTERFACE

The **SL1 Data Logger** requires the use of LynXLog, which is the interface between the SL1 data logger and the user, which makes it possible to:

- download and save the recorded data on a PC for analysis
- configure the data acquisition parameters (channel properties, log triggers, etc.)
- view the signals being acquired in real-time
- configure the system parameters (e.g. brightness of the LEDs or GPS dynamics)
- create circuits (tracks) to be inserted in the data logger (necessary to cut laps)
- configure the LynXLog software.

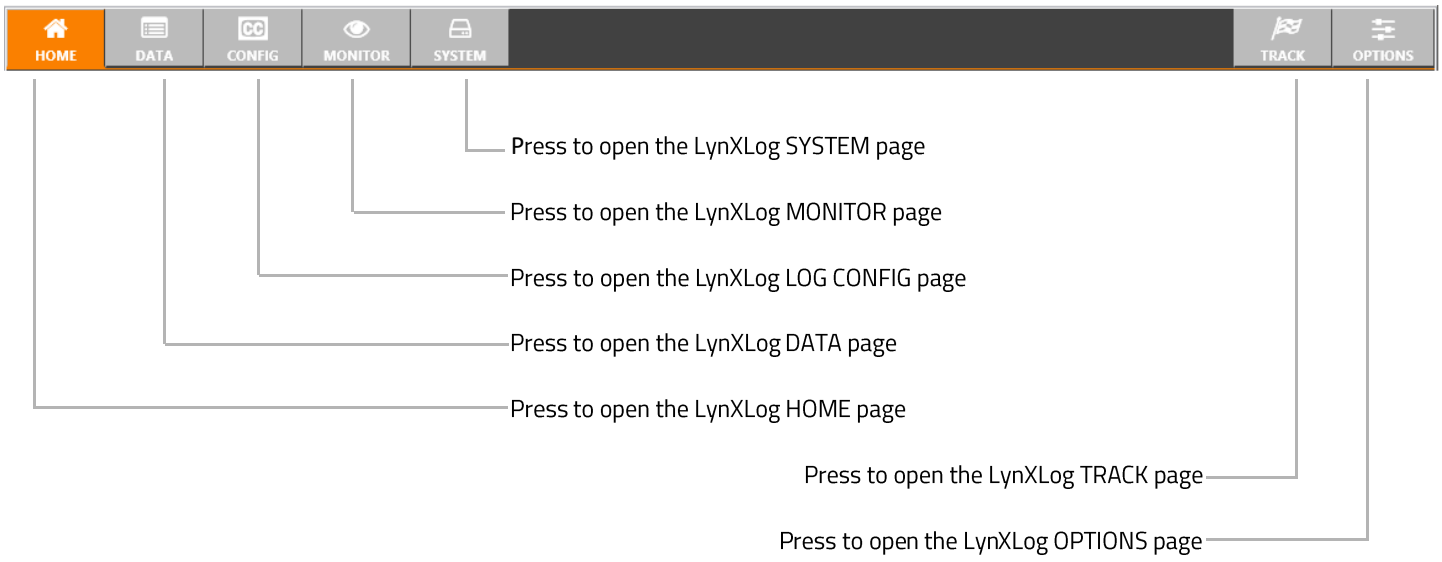
See the home page of LynXLog in the following image:



The LynXLog home page is divided into 2 areas:

LYNXLOG HOME PAGE	
AREA	**FUNCTION**
NAVIGATION BAR	Allows you to select LynXLog functions
STATUS BAR	Contains the icons that indicate the system status

11.1 LYNXLOG: NAVIGATION BAR



11.1.1 NAVIGATION BAR: FUNCTIONALITY

LYNXLOG FUNCTION BUTTONS	
BUTTON	**FUNCTION**
HOME	Shows the LynXLog home page
DATA	Opens the Procurement Management page: allows you to download, delete and set the destination folder of the acquired data.
CONFIG	Opens the setup page, here you can change the properties of the channels, the acquisition triggers etc.
MONITOR	Opens the real-time display page: allows you to calibrate and see in real time the values of the signals configured in the data logger.
SYSTEM	Opens the Hardware page of the SL1 data logger: allows you to change various Hardware settings and read the information of the connected SL1 device.
TRACK	Opens the track creation page: allows you to create, load and edit custom circuits.
OPTIONS	Opens the software's configuration page: allows you to customize some features of LynXLog.

11.2 LYNXLOG STATUS BAR

The status bar icons show the status of (from left to right) :

- : System update status
- : External power supply status
- : GPS status
- : Status of the internal memory
- : Status of the system clock
- : Status of the inertial platform (6)
- : Status of the internal battery (7)
- : Bluetooth status (8)
- : WiFi connection status (9)
- : USB connection status (10)
- : Channel Monitor Status (11)
- : System communication status (12)
- : Internet connection status (13)

12 HOW TO...

12.1 CONNECT THE SL1 DATA LOGGER TO THE PC

The **SL1 Data Logger** can be connected in two ways:

Via USB (code GK-SL1-0001 and GK-SL1-0002)

Via WiFi (only code GK-SL1-0001)

12.1.1 USB CONNECTION

Proceed as follows to connect the SL1 Data Logger via USB:

Connect the USB data cable to the USB port of the SL1 Data Logger.

Insert the USB cable into a USB port of the PC.

Run the LynXLog software

Wait for LynXLog to recognize the SL1 Data Logger – the USB icon in the status bar will turn green (it may take up to 30 seconds if the system was off).

NOTE: THE SL1 DATA LOGGER CAN BE POWERED VIA USB CABLE, THIS ALLOWS TO DOWNLOAD THE DATA WITHOUT THE NEED TO HAVE AN AUXILIARY POWER SUPPLY (THE PORT MUST DELIVER A CURRENT OF AT LEAST 500mA).

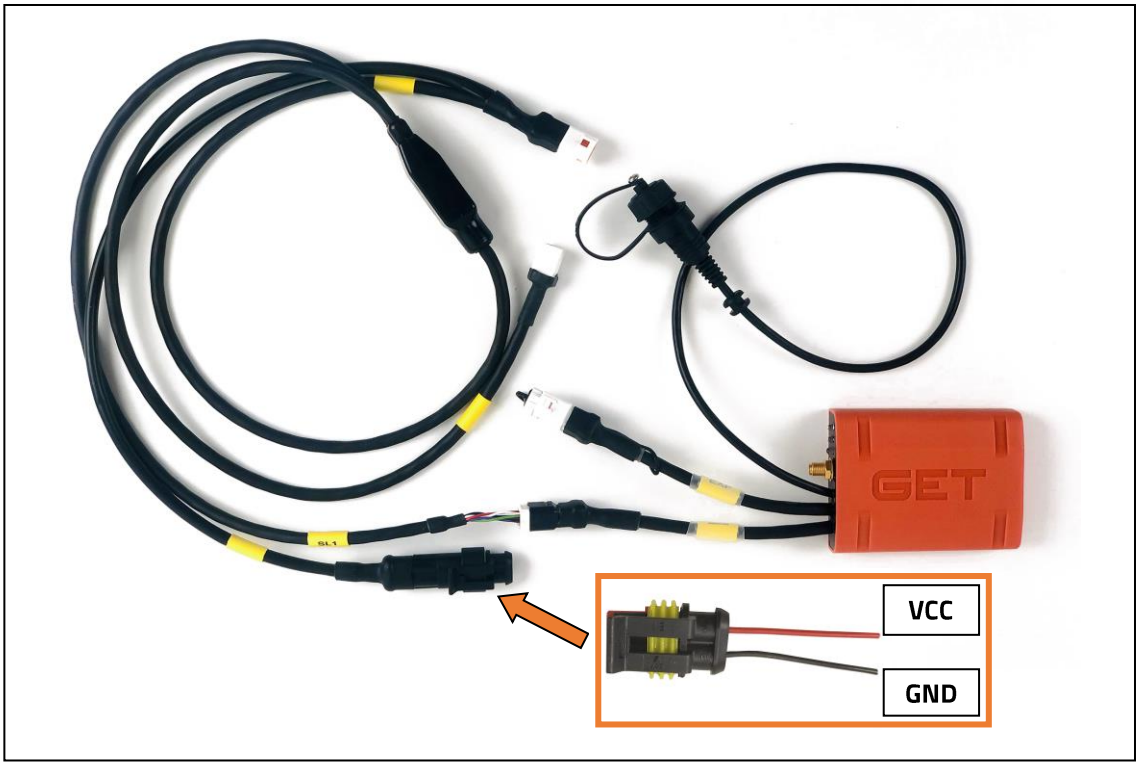
12.1.2 WIFI CONNECTION

There are 2 types of SL1 Data Loggers:

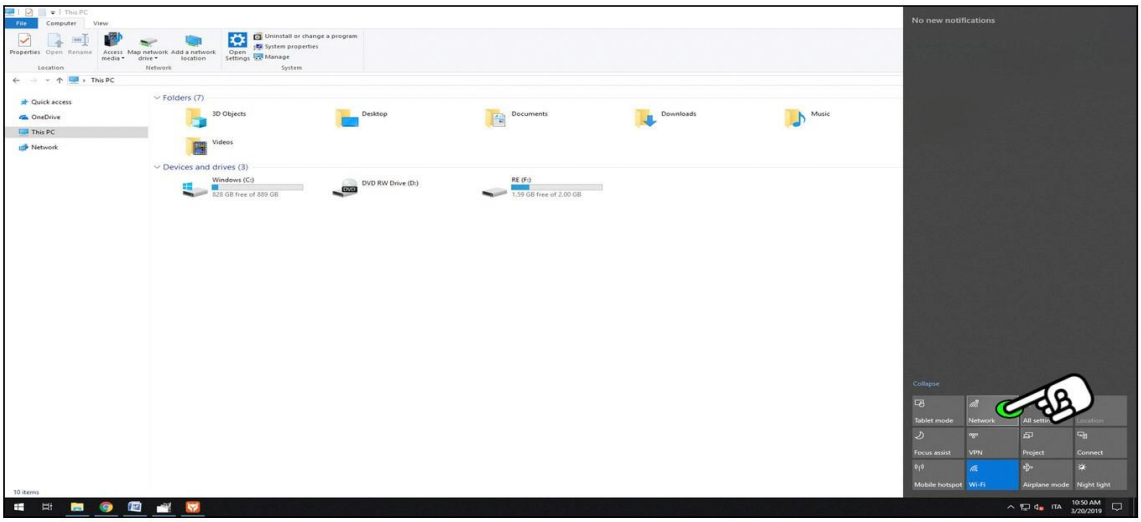
GK-SL1-0001, which has a USB and WiFi connection
GK-SL1-0002, which only has a USB connection

If you have purchased a GK-SL1-0002 you will not be able to connect to WiFi.

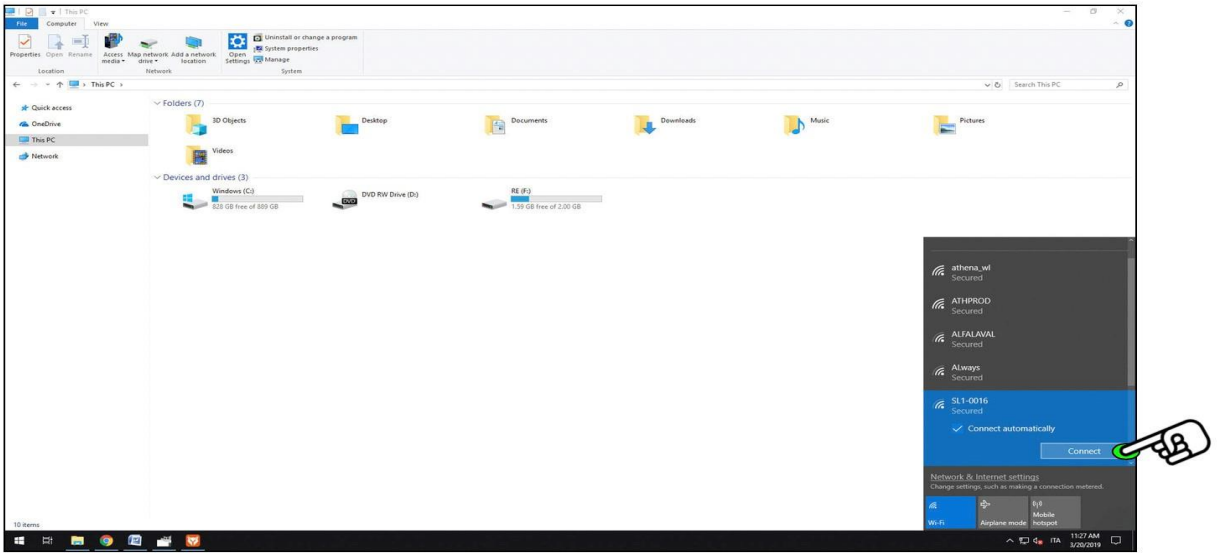
- Power the SL1 data logger via the MAIN connector (typically 12 VDC), however not exceeding the prescribed voltage range.
- Wait for the yellow LED to turn on



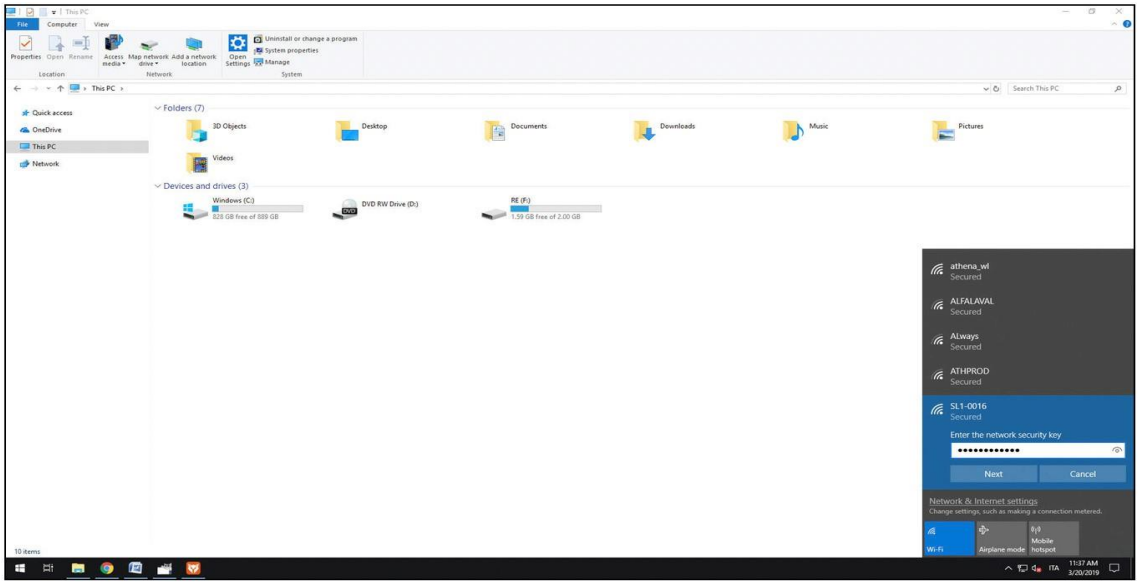
- Open the Windows network manager:



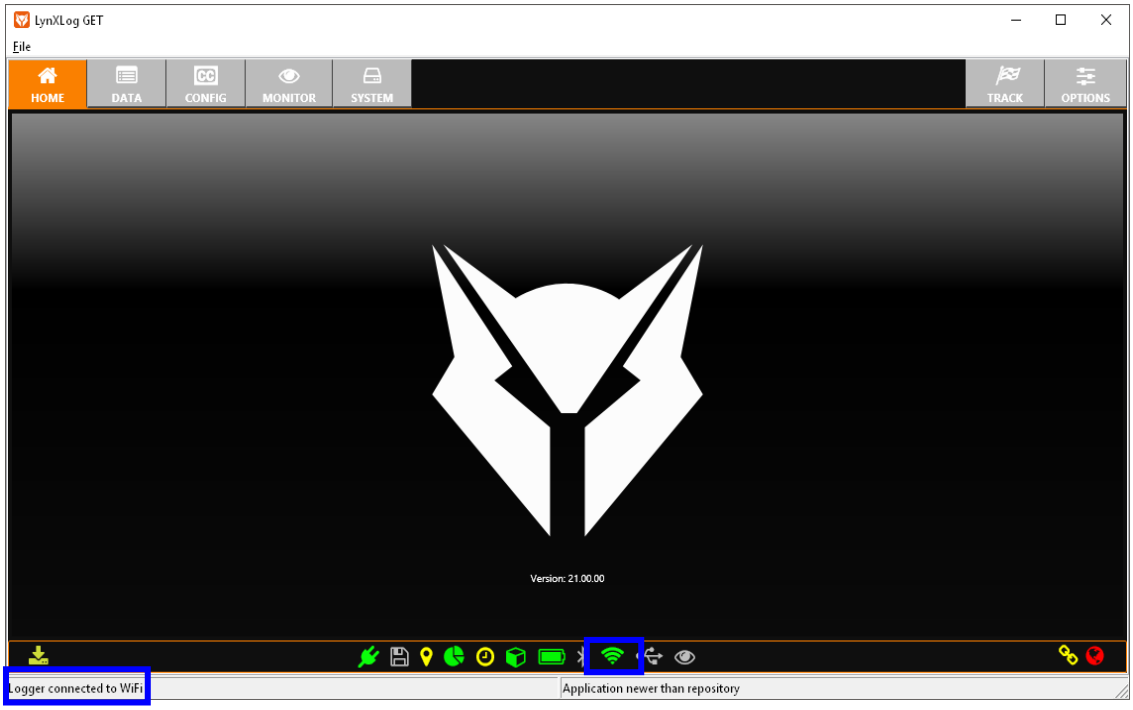
- Select the SSID of the SL1 Data Logger to which you want to connect:



- Enter the WIFI password, shown on the label applied to the SL1 Data Logger:



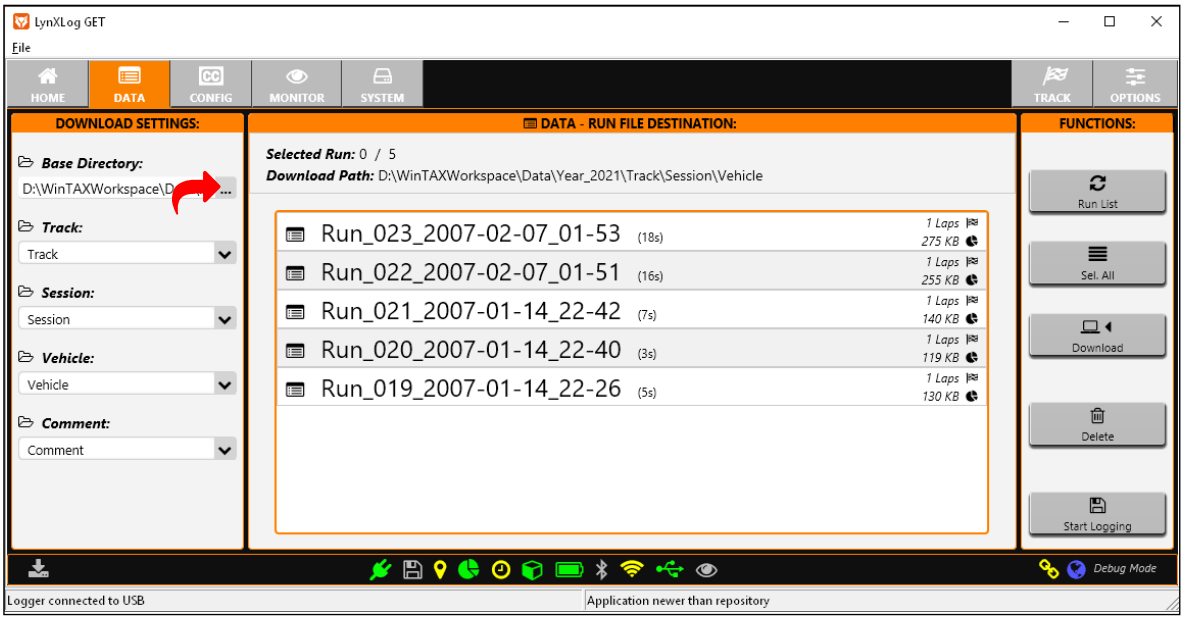
- Once connected, the WiFi status icon will turn green and the wording " **Logger connected to WiFi** " will appear at the bottom left.

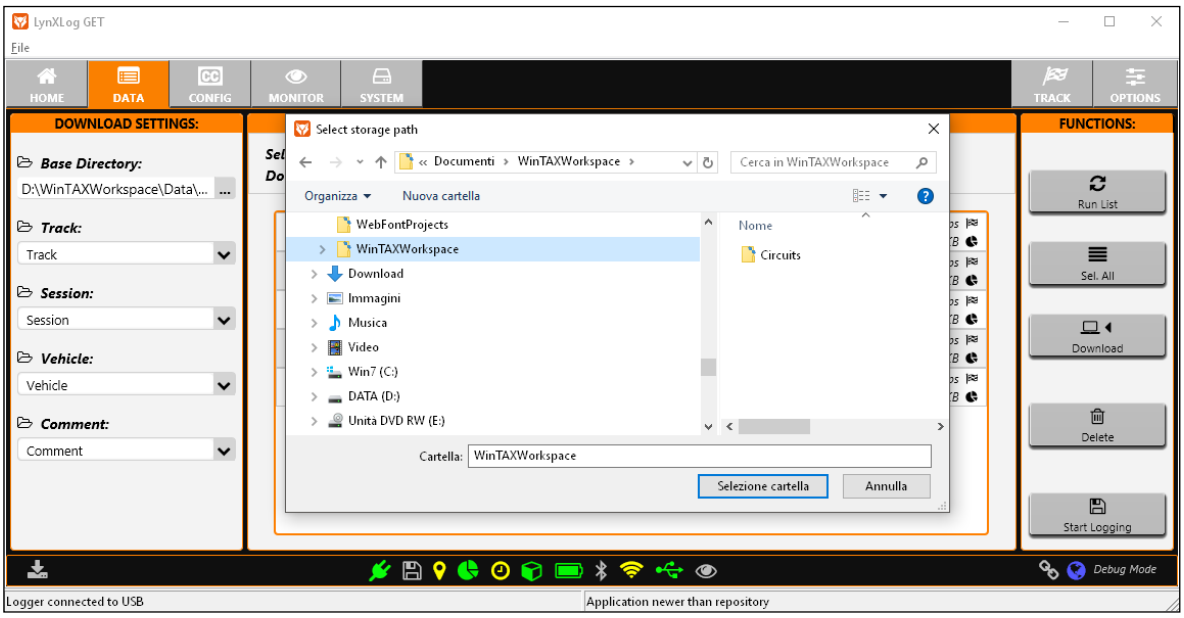


12.2 SETTING THE DATA ARCHIVE FOLDER

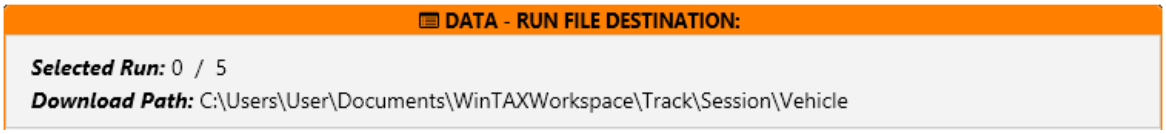
LynXLog will save all the downloaded data (sessions) in a specific Base Directory folder. The user can change the predefined folder (located in ...\Documents\WinTAXWorkspace) on the DATA page.
Proceed as follows:

- Start LynXLog
- Open the Date page by pressing the navigation bar icon .
- Press ••• next to the **Base Directory** control in the "**DOWNLOAD SETTINGS**" column and choose the desired path:





- The new archive folder will be shown in the upper central **"Download Path"** box:



For the archive path: **Track name, Session** and **Vehicle** will influence the path of the data storage folder as follows:

Base directory \ Track \ Session \ Vehicle Name \ Run_name\.file downloaded

Where:

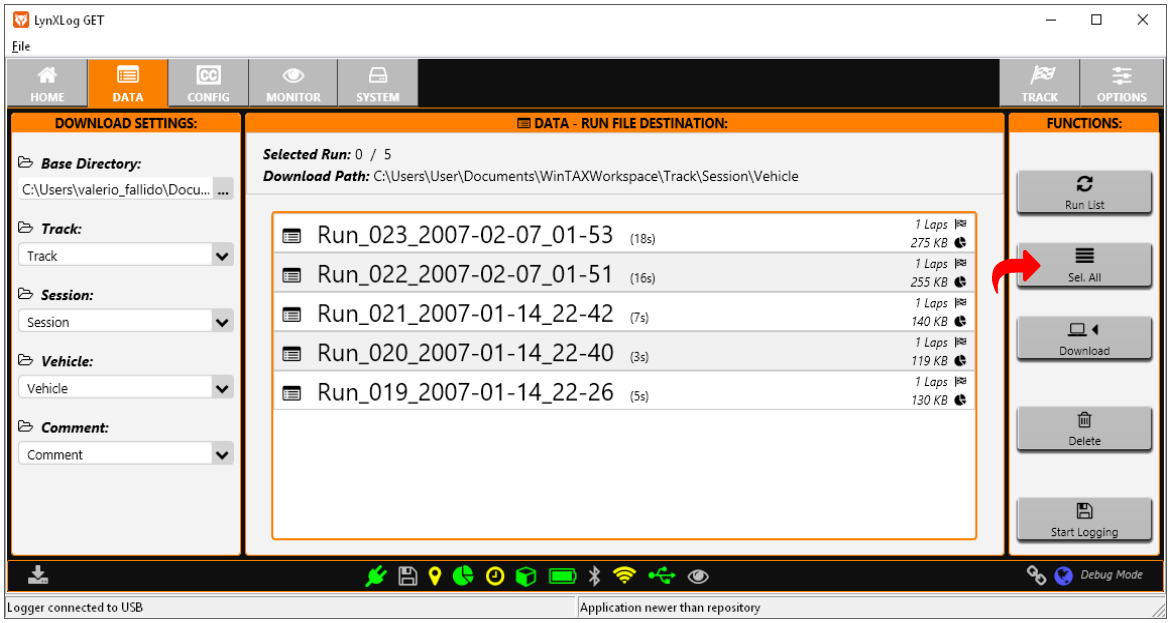
Base directory: this is the main folder for the storage path - set on the **DATA** page.
Track: this is the first subfolder of the storage path - the name is set by the **Track** control in the " **DOWNLOAD SETTINGS"** * column.
Session: is the second subfolder of the storage path - the name is set by the **Session** control in the " **DOWNLOAD SETTINGS"** * column.
Vehicle Name: is the third subfolder of the storage path - the name is set by the **Vehicle** control in the " **DOWNLOAD SETTINGS" *** column.
Run_name: this is the last subfolder of the storage path –– the name is composed of **"Run_"** followed by the progressive number of the session created by the SL1 data logger followed by what is set by the Comment control in the " **DOWNLOAD SETTINGS"** * column.

* If the control is set with the **Auto from Path** value, the data will be archived according to what is set in the configuration of the connected instrument (**INFO - DATA HEADERS panel**). For more information , refer to Annex 1 - chap 1

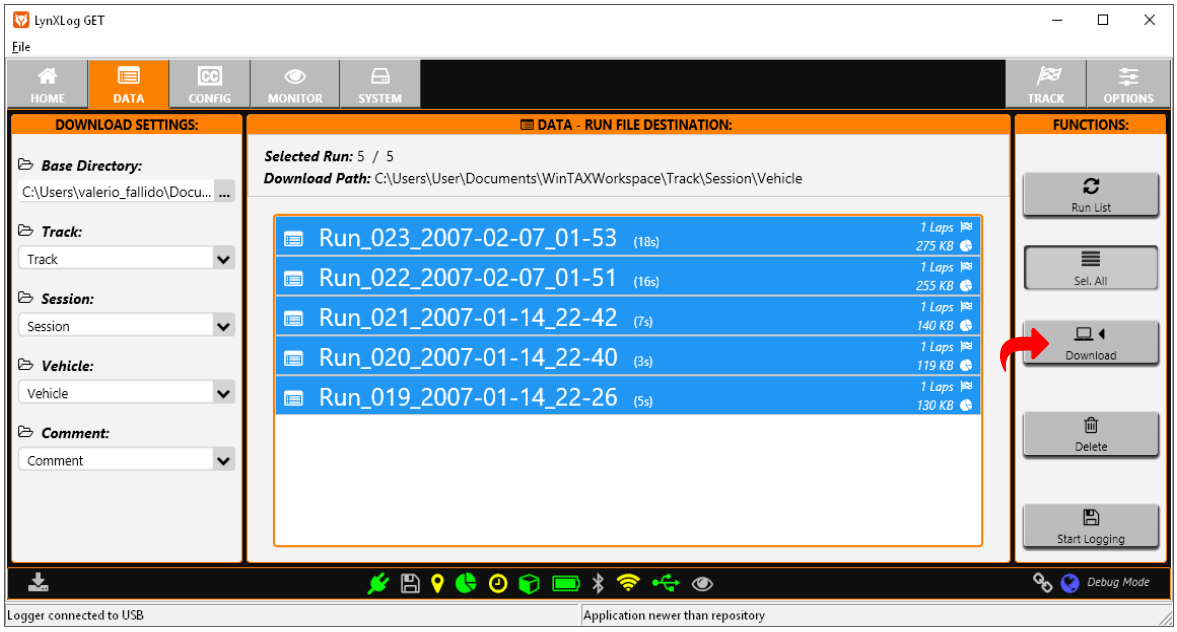
12.3 DOWNLOADING THE ACQUIRED DATA (RUN)

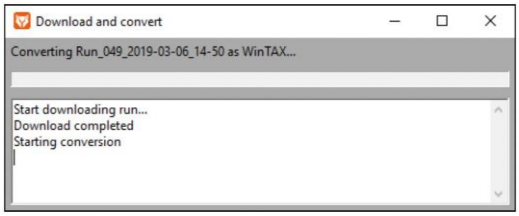
The acquired data can be downloaded from the SL1 Data Logger with the following instructions:

- Connect the SL1 Data Logger to the PC (see chapter 12.1).
- Open the DATA page by pressing the navigation bar icon .
- Press single Run or press the **Sel. All** button to select all sessions (Runs) saved in the SL1 Data Logger memory.



- Press the **Download** button to start downloading the sessions

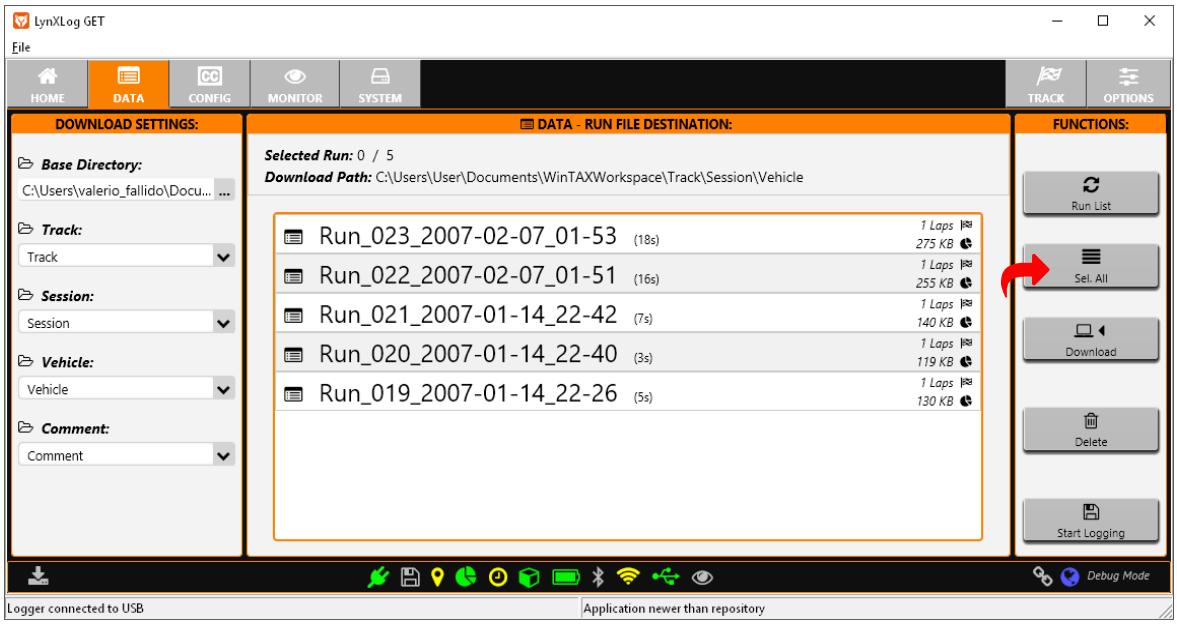




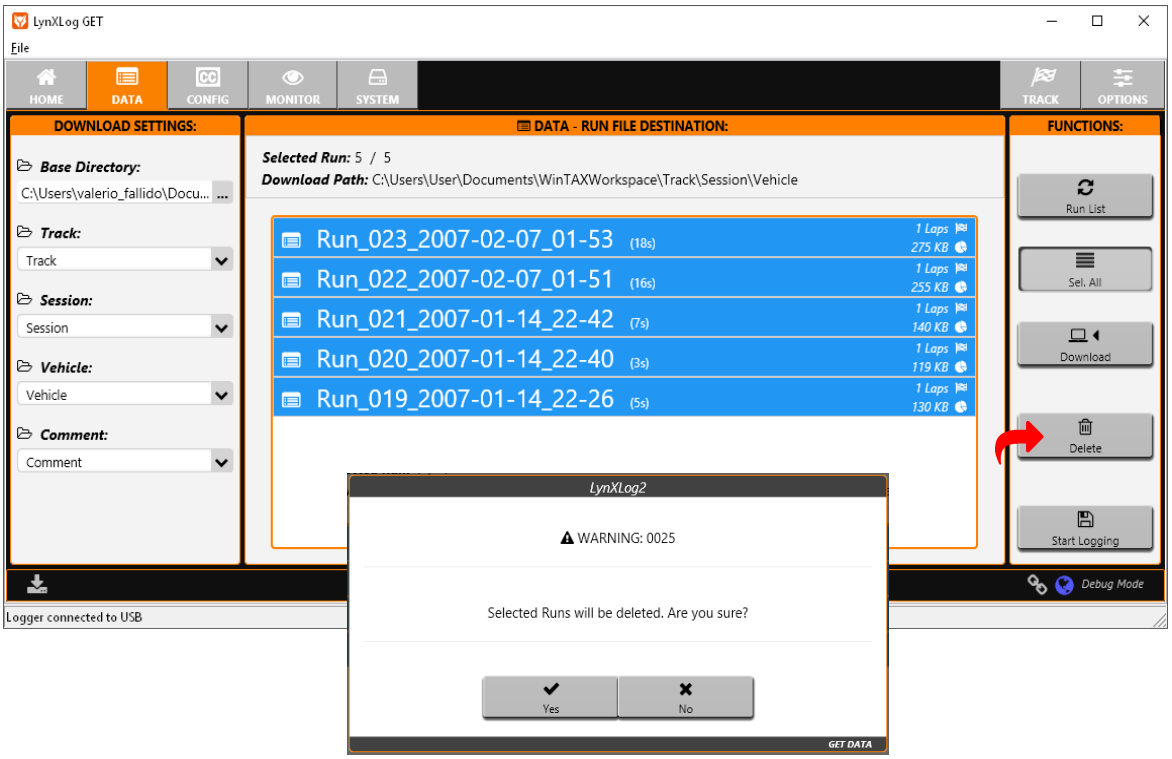
12.4 DELETING THE ACQUIRED DATA (RUN)

To remove the acquisitions and free the memory of the SL1 Data Logger, proceed as follows:

- Connect the SL1 Data Logger to the Pc (see chapter 12.1)
- Open the DATA page by pressing the navigation bar icon
- Use the left button to click a single Run or press the Sel. All button to select all the data saved in the SL1 Data Logger memory



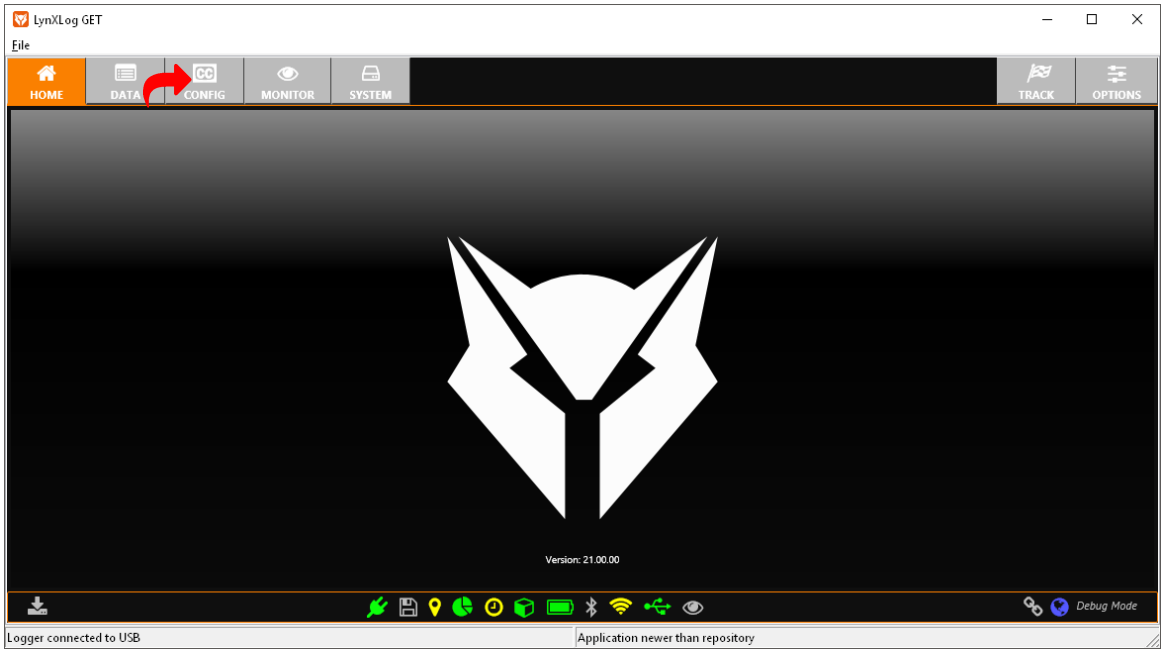
- Press Delete and then continue the operation by pressing Yes.



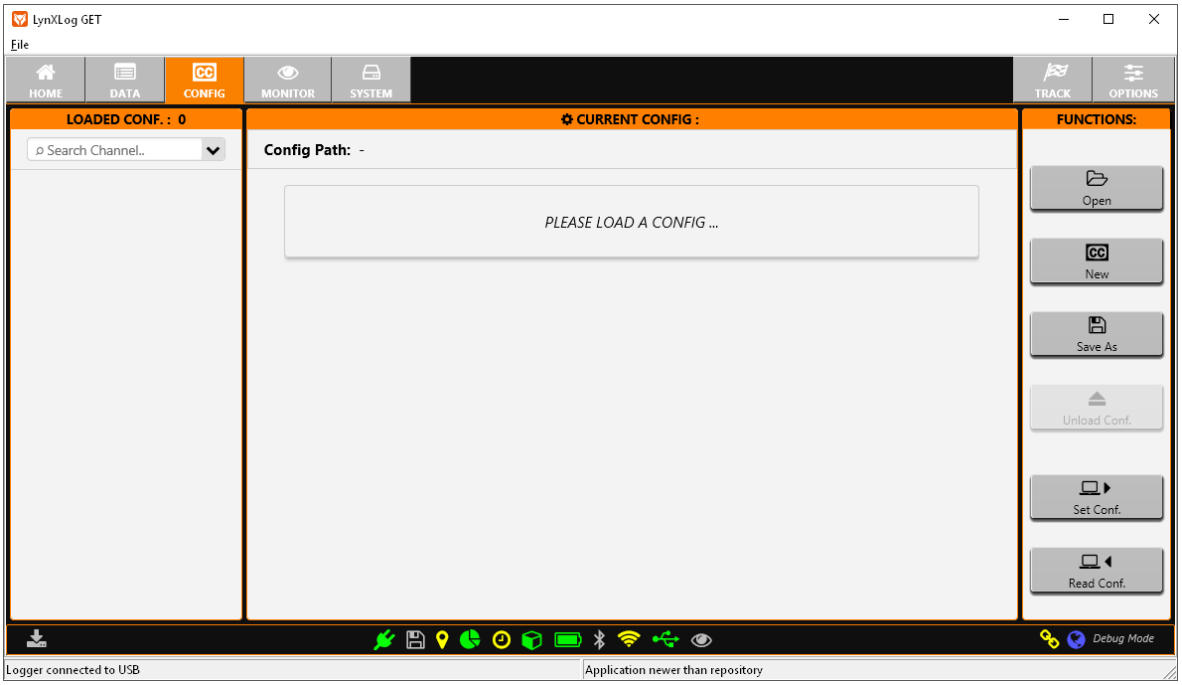
12.5 OPENING, SAVING AND MODIFYING THE SETUP

Modifying the setup makes it possible to change the following options:

- The information (such as name of the vehicle, driver, etc. ...) useful to identify the Run after downloading.
- The method for starting acquisition.
- Which of the signals connected to the physical inputs of the SL1 Data Logger to acquire and how to acquire them. All of the options can be found on the **CONFIG.** page



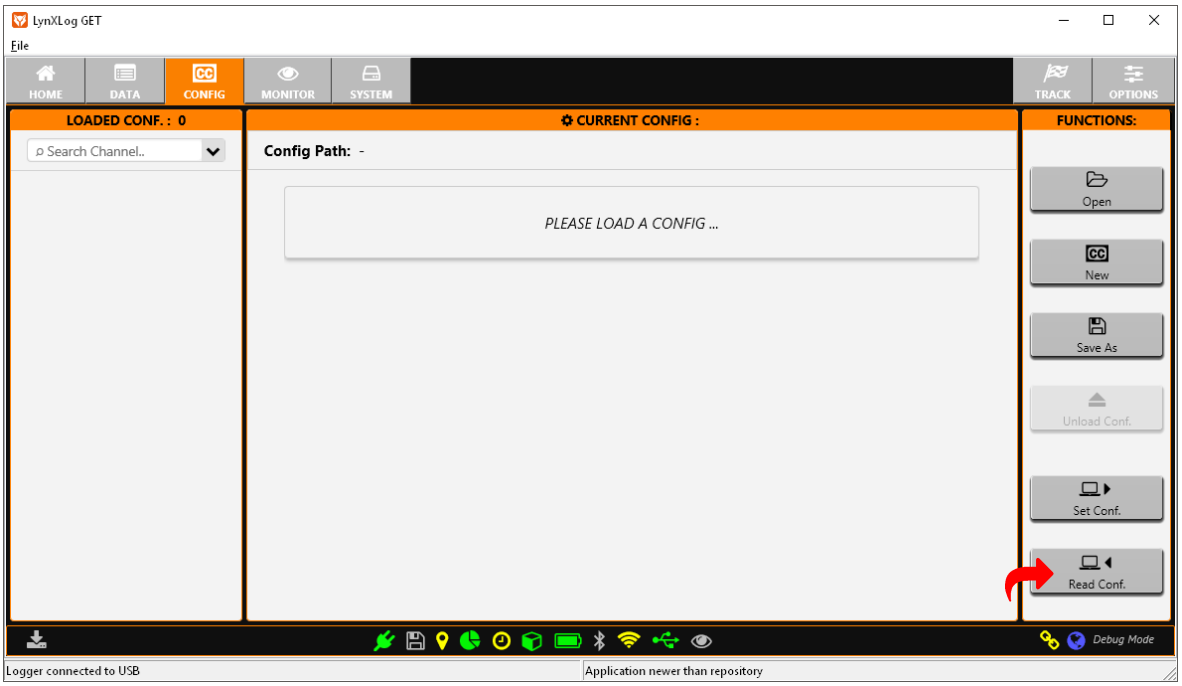
For more information about setup configuration, see Annex 1



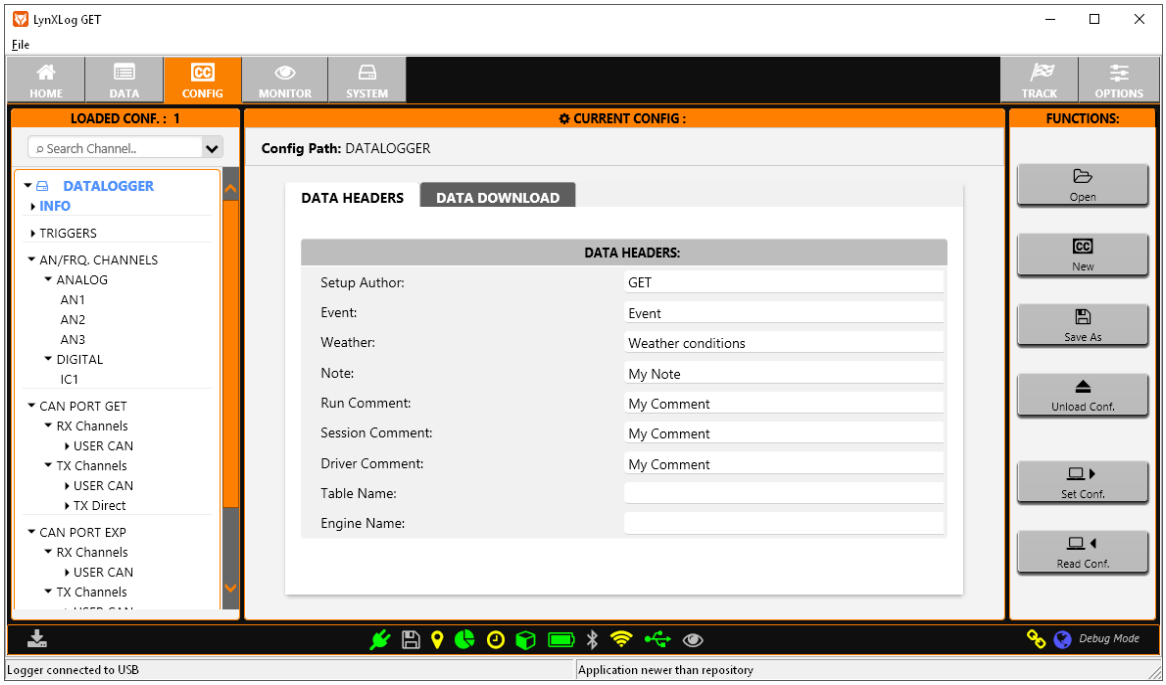
12.5.1 DOWNLOADING THE SETUP FROM SL1

The setup saved in the SL1 Data Logger can be downloaded as follows:

- Connect the SL1 Data Logger to the PC (see chapter 12.1)
- Open the setup editor page by pressing the CC icon on the navigation bar
- Press the **Read Conf.** button to import the SL1 Data Logger setup:



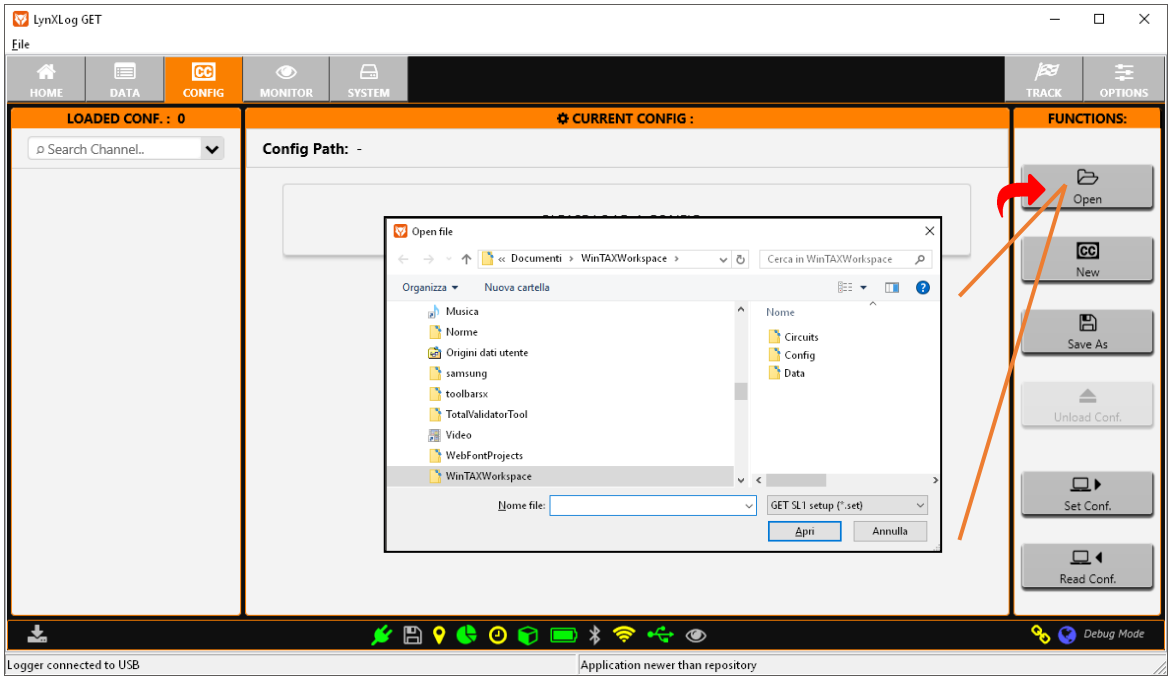
- The setup components will appear in the **LOADED CONFIG** column, press on an element to open its configuration panel in the **CURRENT CONFIG** area.

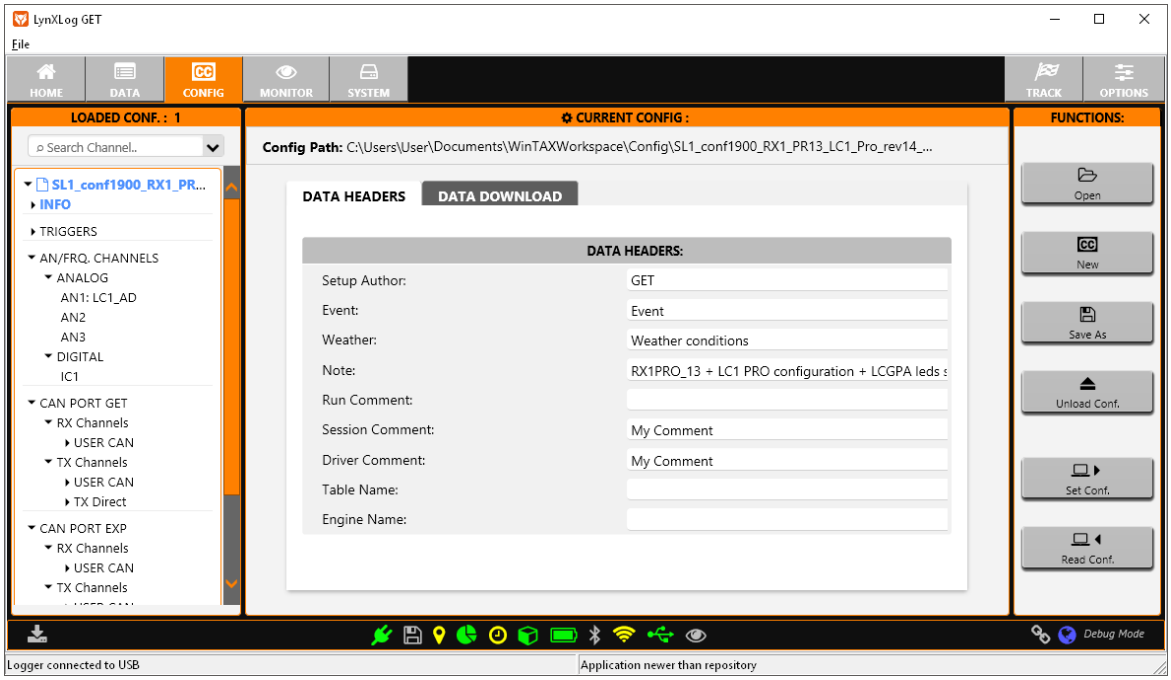


12.5.2 OPEN THE SETUP FILE (.SET)

The setup files saved on the PC can be loaded or modified or sent to the SL1 Data Logger with the following procedure:

- Run LynXLog
- Open the setup configuration page by pressing the **Log Config** button or pressing the icon CC on the navigation bar
- Press the **Open** button 🗁 to open the import window
- Select the setup file to open and press enter



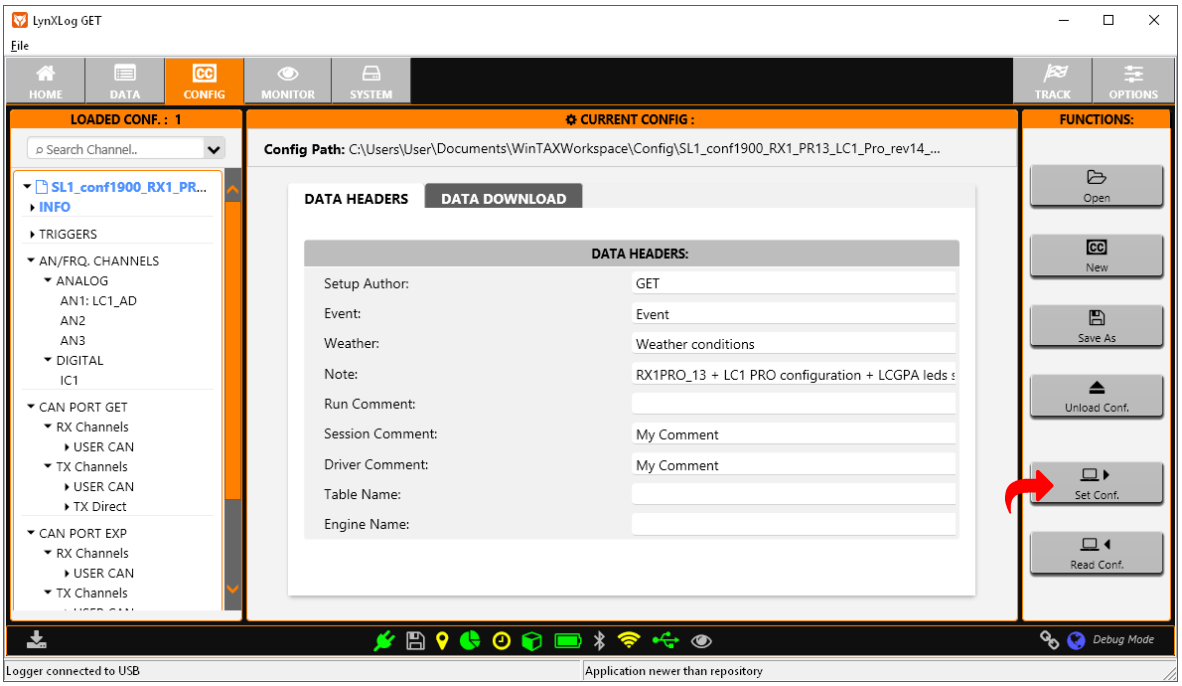


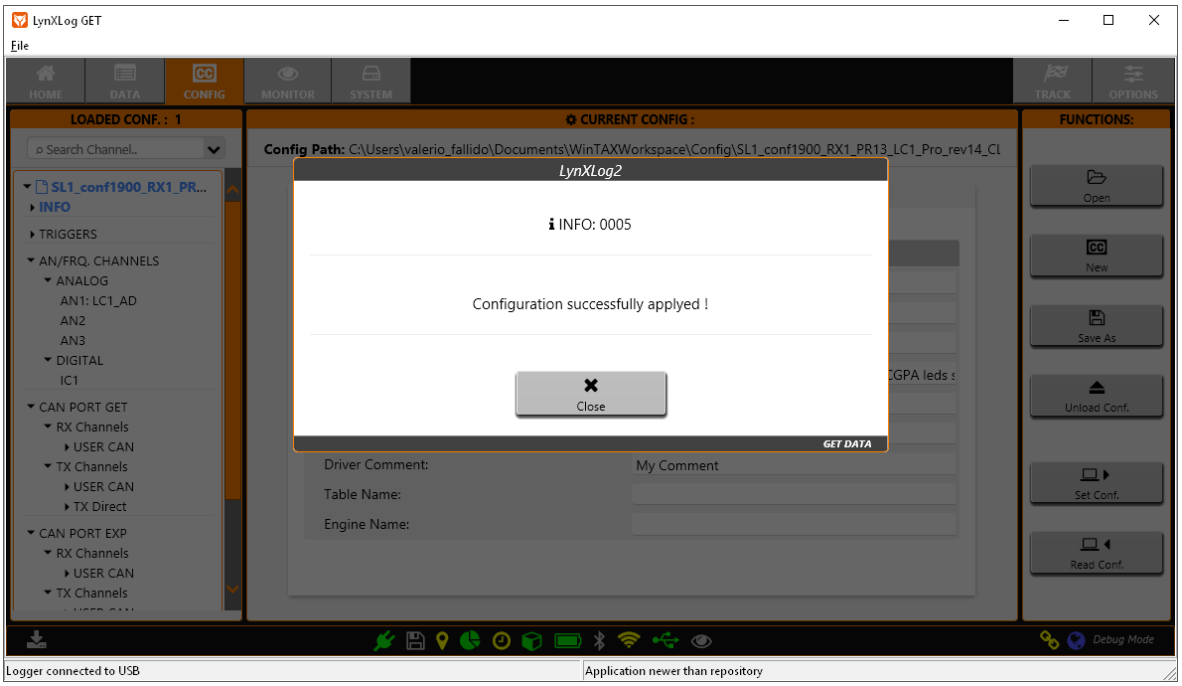
- Once the setup is open its components will be listed in the **LOADED CONFIG** column, press an element to open its panel.

12.5.3 SEND SETUP TO SL1

When the setup is modified, it is important to remember to send it to the SL1 Data Logger to apply the new settings. Proceed as follows:

- Connect the SL1 Data Logger to the PC (see chapter 12.1)
- Make sure that the correct setup was loaded (see chapter 12.5.1 and 12.5.2)
- Press ▸ **Set Conf.** to send the setup to the SL1 Data Logger:

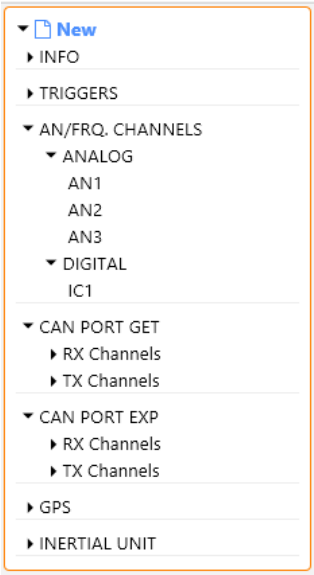




- During the procedure for sending the configuration, the red LED flashes a few times which indicates that the SL1 Data Logger is applying the configuration.
- At the end of the operation, a message is displayed to indicate that the procedure is complete.

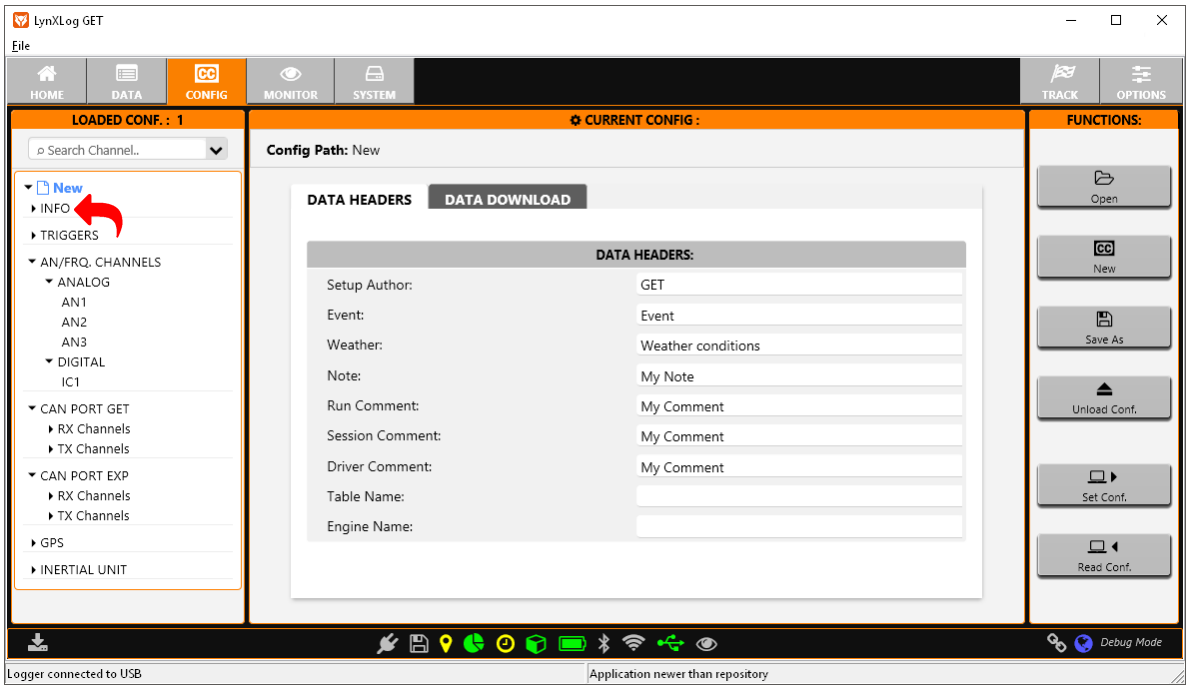
12.5.4 CHANGING THE SETUP

See the structure of the setup options:



INFO	All the information used to identify the Run, vehicle, pilot, etc...
TRIGGERS	They define the start and stop of the acquisition , the lap cutting mode and the management of the digital output (if present).
AN/FRQ	Configurations of the physical input channels, ordered by function: ANALOG (AN1,AN2,AN3 – EXP connector) DIGITAL (IC1 on the MAIN connector)
CAN PORT GET	CAN Bus port 1 (MAIN connector)
CAN PORT AUX	CAN Bus port EXP (EXP connector)
GPS	GPS channels (latitude, longitude, number of received satellites, GPS speed, etc.)
IMU	Accelerometers, gyroscopes

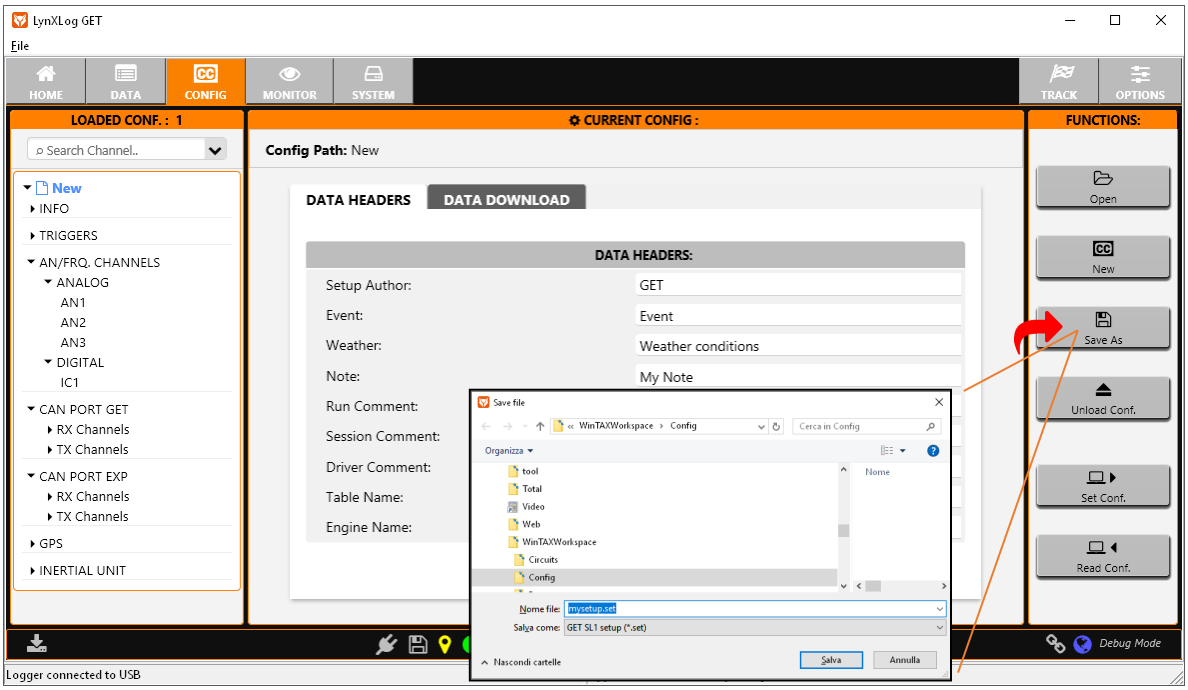
- Pressing one of the options opens the relative table, edit the desired parameters (see Annex 1).



12.5.5 SAVING THE SETUP TO A FILE (.SET)

To save the modifications to the SL1 Data Logger setup to the file proceed as follows:

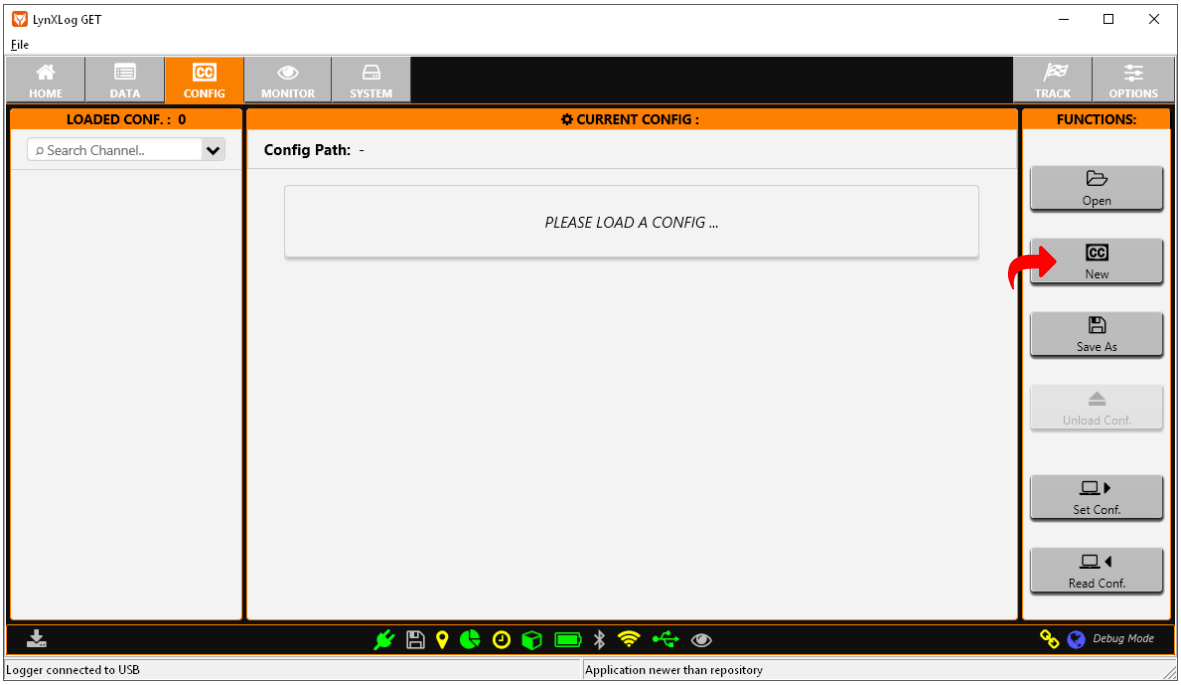
- Press the **Save As** button in the **FUNCTIONS column**



- Select the folder where the setup file should be saved, selecting the name and then press enter.

12.5.6 CREATING AN EMPTY SETUP

To create a completely empty setup, simply press the **New** button in the **FUNCTIONS** column.



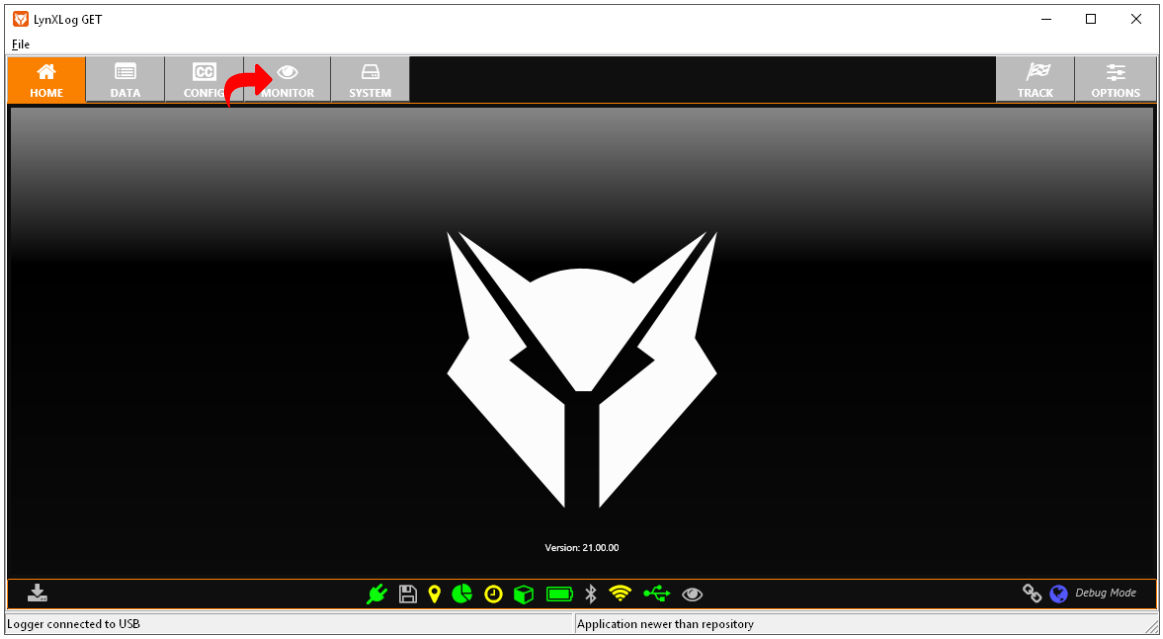
12.6 USING THE REAL-TIME MONITOR

The **Channel Real-Time Monitor page** allows you to view in real time the channels configured in the data logger setup, this option simplifies the calibration of the sensors and allows you to have a preview of what will be recorded once the acquisition has started.

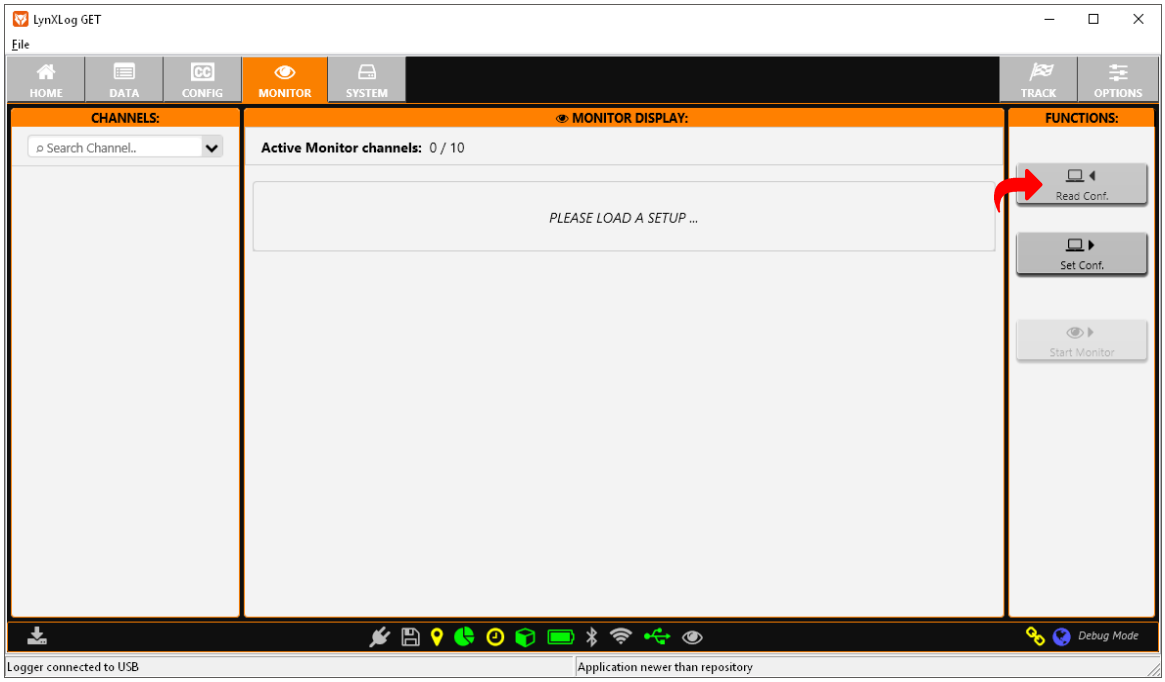
NOTE: the function requires that the data logger is connected and that the setup stored inside has been downloaded.

Proceed as follows to access the **Channel Real-Time Monitor page**:

- Connect the SL1 Data Logger to the Pc (see chapter 12.1)
- Open the **MONITOR** page by pressing the navigation bar icon 👁

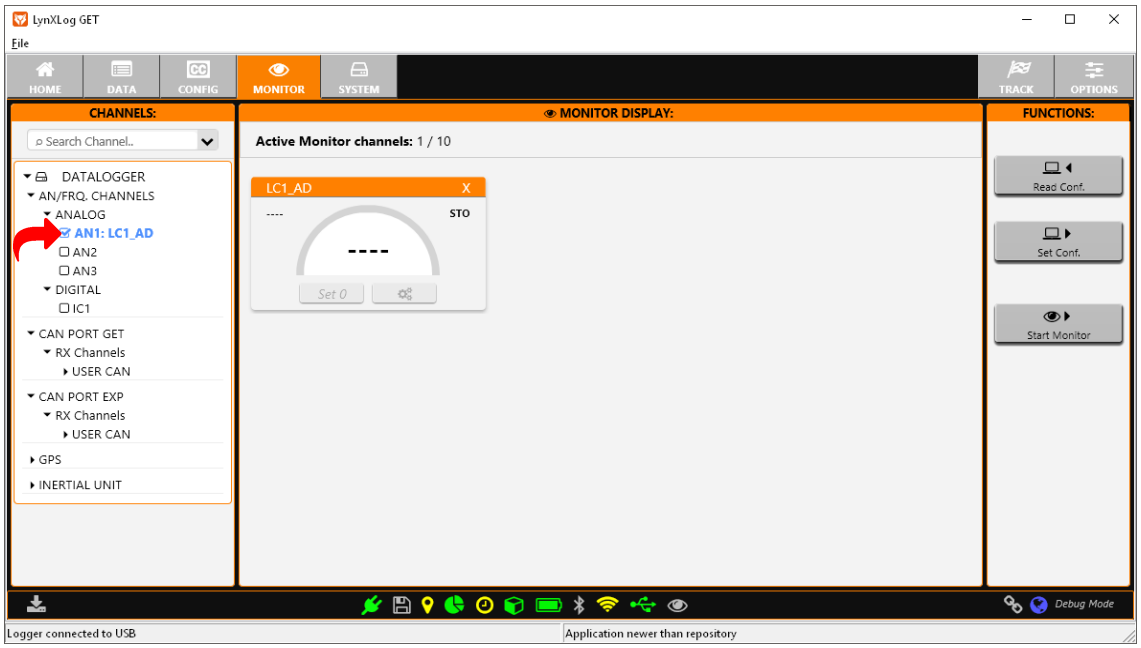


- If not present, download a setup from the Data Logger by pressing the **Read Conf.** button located in the **FUNCTIONS** area



12.6.1 ADD / REMOVE A CHANNEL TO/FROM THE MONITOR DISPLAY LIST

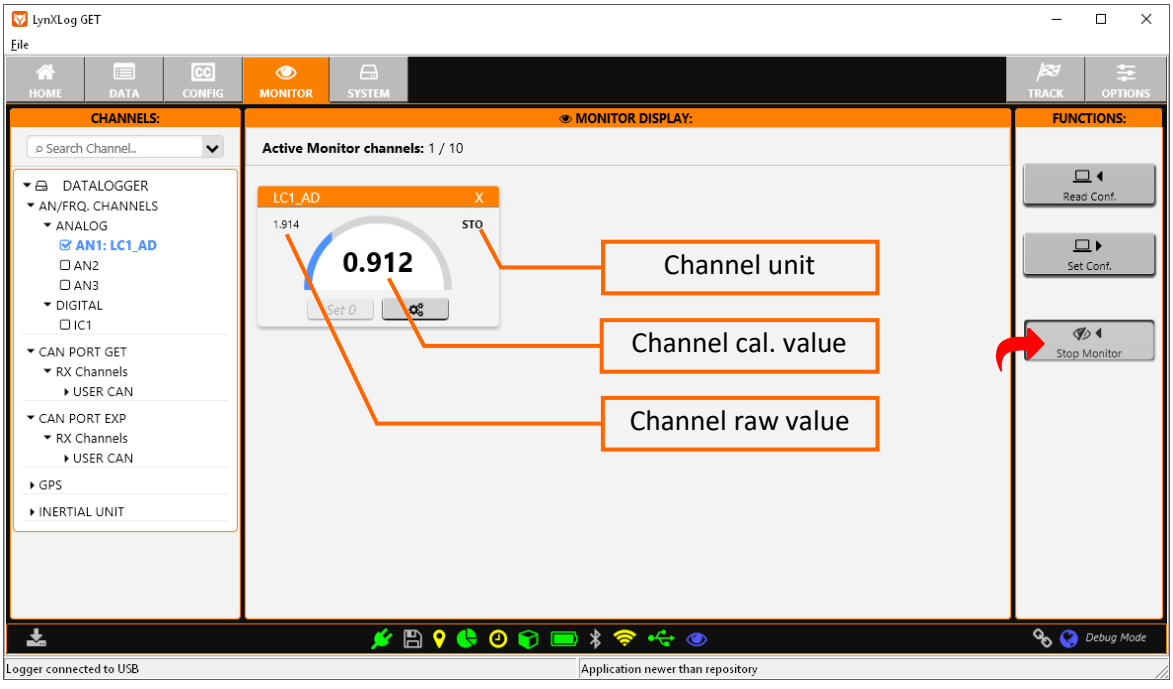
- Click on the box relating to the channel you want to see in real time, in the **Channels** column. ATTENTION: clicking on an already selected channel will remove it from the display.



- Repeat the procedure to add / remove other channels until the maximum allowed by the software is reached.

12.6.2 DISPLAYING A CHANNEL IN REAL-TIME

- Press the **Start Monitor** button in the **FUNCTIONS** column to start / stop the real-time display of the channel (s) values in the **MONITOR DISPLAY** area.

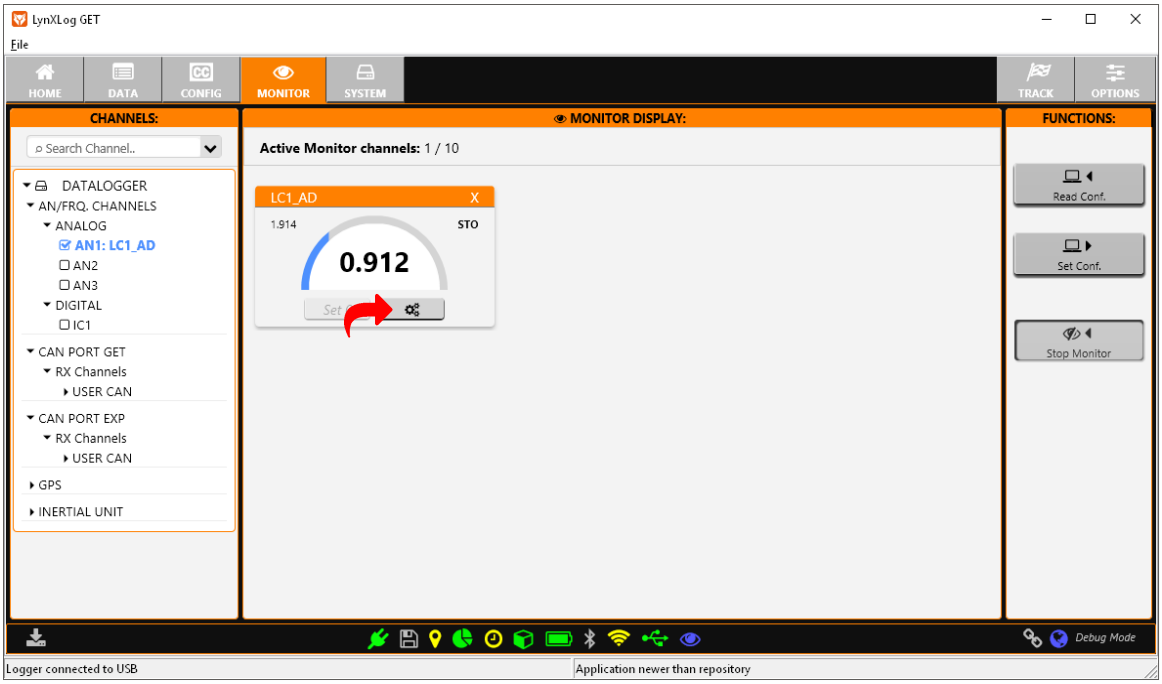


The graphic control associated with the channel being displayed contains:

- **Channel unit:** unit of measure for the channel (if set in the channel configuration)
- **Channel cal. value:** calibrated value of the channel (according to the calibration set in the channel configuration)
- **Channel raw value:** uncalibrated value of the channel
- **Set 0 button:** reset function of the current channel value (only for some calibrations)
- **Button :** opens the channel configuration panel (some parameters may not be available).

12.6.3 CALIBRATING A CHANNEL FROM THE MONITOR

To calibrate a channel directly from the **Monitor** press the button located in the respective control of the **MONITOR DISPLAY**,.



More information about calibration is available in chapter 6 of Annex 1.

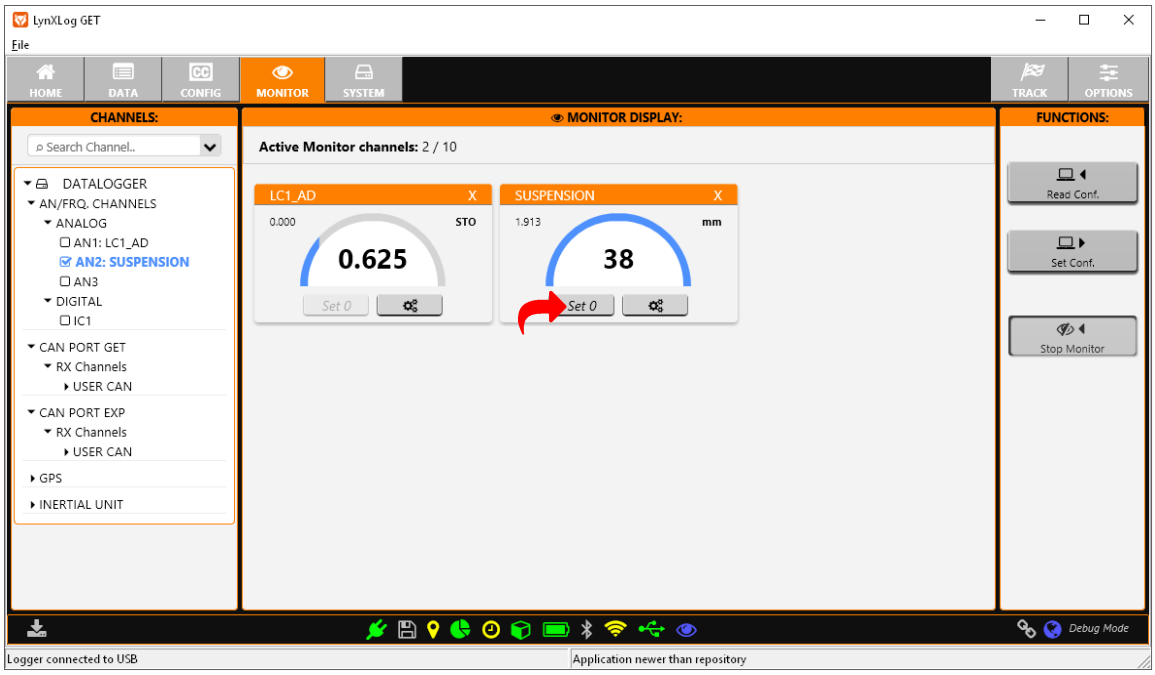
12.6.4 SETTING THE ZERO OF A CHANNEL FROM THE MONITOR

If the data channel you want to calibrate is a position sensor (e.g. suspension) you will probably need to set a **zero position**.

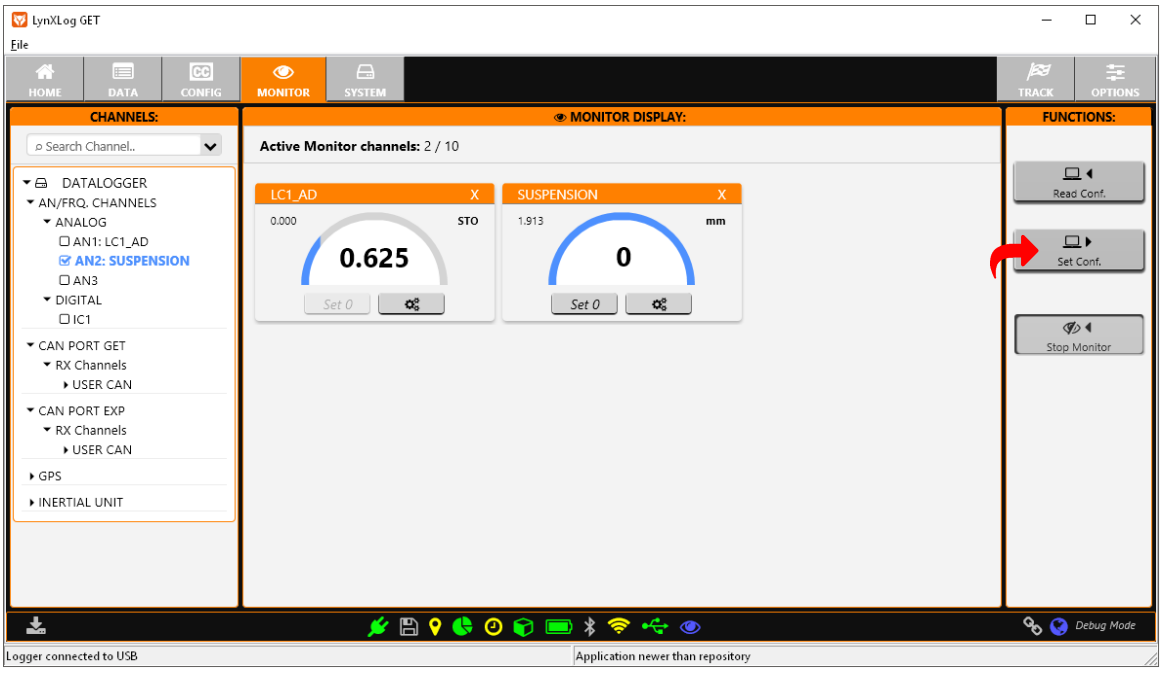
ATTENTION: THE SET 0 OPTION IS ONLY AVAILABLE FOR CHANNELS WITH SUSPENSION CALIBRATION.

Proceed as follows:

- Add the channel to the MONITOR DISPLAY list (see chapter 12.6.1).
- Set the type of channel as suspension and select the length of the sensor stroke (see Annex 1chap. 6.4).
- Make sure that the suspension is mechanically in the zero position.
- View the channel in real time (see chapter 12.6.2).
- Press the Set 0 button: the channel value will go to zero.



- Send the new setup to the SL1 Data Logger by pressing ▸ **Set. Conf.** In the **FUNCTIONS**column to confirm the new setting.

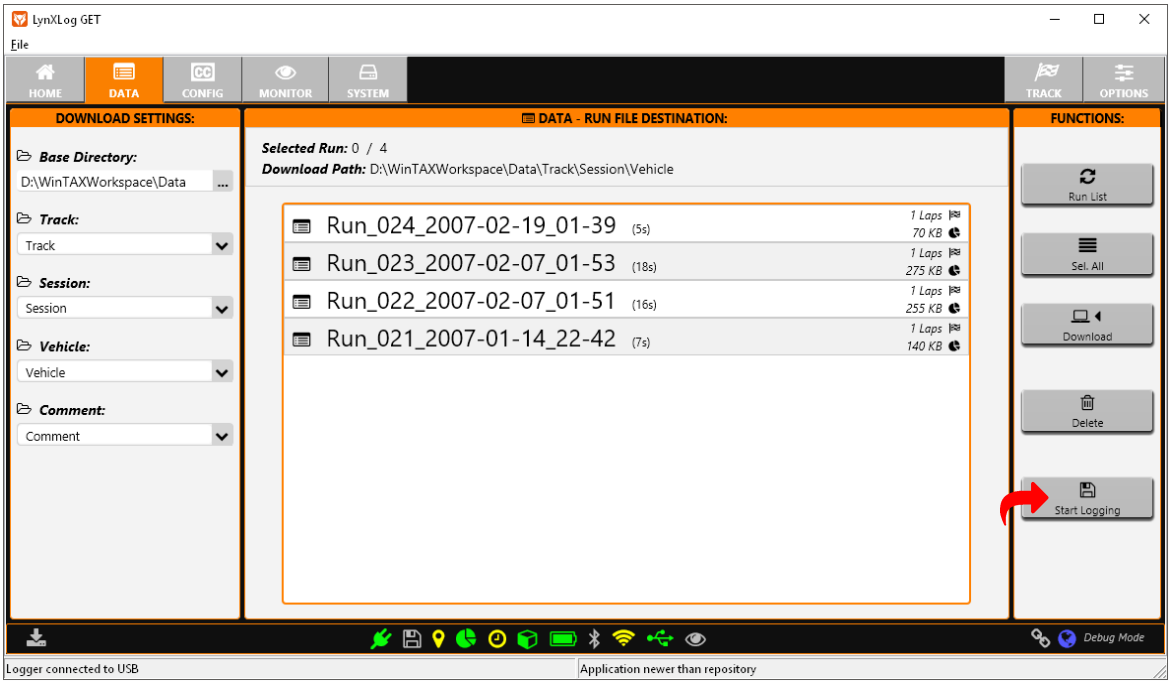


12.7 STARTING ACQUISITION MANUALLY

The most simple method for starting acquisition is to use the manual start option.
To start the acquisition manually proceed as follows:

- Connect the SL1 Data Logger to the Pc (see chapter 12.1)
- Open the **DATA** page by pressing the navigation bar icon

- Press the **Start Logging** button in the **FUNCTIONS** column to start acquisition.

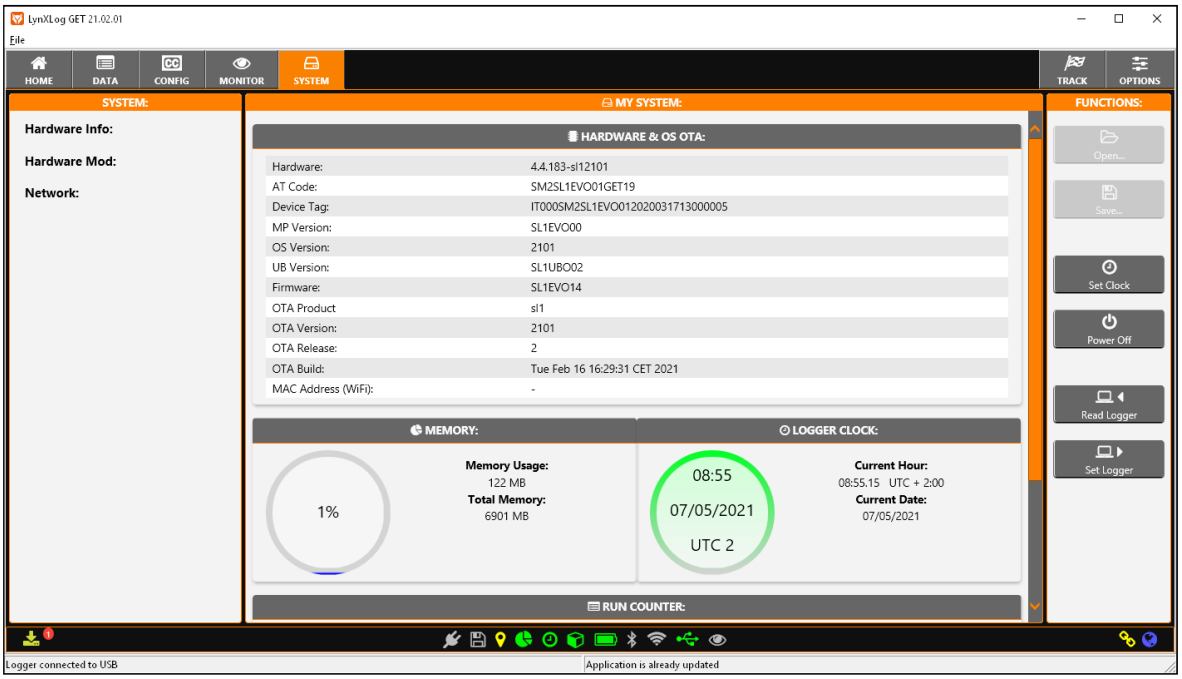


- The yellow SL1 Data Logger LED will start to flash, indicating that acquisition is in progress.
- To stop acquisition, press the **Stop Logging** button again.
- The new acquisition will be displayed at the beginning of the list of Runs stored in the device: refer to chapter 12.3 to download it to your PC.

12.8 CHANGING THE SETTINGS DATA LOGGER SL1 HARDWARE

LynXLog can modify some hardware settings of the Data Logger SL1 (such as the dynamics of the GPS or the brightness of the LEDs) when the latter is connected to the PC.
Proceed as follows to access the page:

- Connect the SL1 Data Logger to the Pc (see chapter 12.1).
- Open the DATA page by pressing the navigation bar icon .



This page is used to:

- Synchronise the system clock of the SL1 Data Logger by pressing the **Set Clock** button in the **FUNCTIONS** column.
- Turn off the SL1 Data Logger by pressing the **Power Off** button in the **FUNCTIONS** column.
- Read the current system settings by pressing the **Read Logger** button
- View information about the SL1 Data Logger (**Hardware Info**).
- Reset the session counter by pressing the **Reset Run** button (**Hardware Info**).

ATTENTION: THIS OPERATION WILL DELETE ALL SESSIONS STORED IN THE DEVICE.

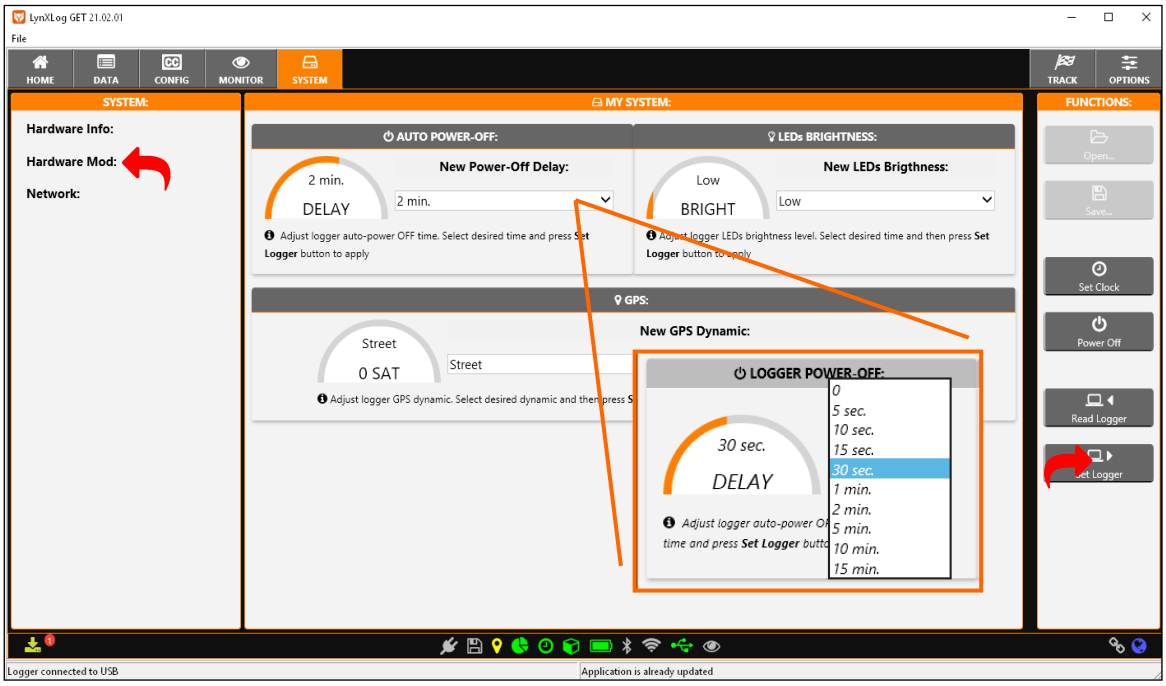
- Set the dynamics of the **GPS** module (**Hardware Mod**).
- Set the auto power off time – **AUTO POWER-OFF** (**Hardware Mod**).
- Set the brightness of the LEDs of the Data Logger SL1 (**Hardware Mod**). .

12.8.1 CHANGING THE AUTO POWER OFF TIME

If the SL1 Data Logger is not in acquisition mode, is not connected to a PC and is not powered by an external power supply, it will turn off automatically after the time specified by the Auto Power Off value.
The option is available on the **SYSTEM – Hardware Mod** page with system connected (see chapter 12.1).

Proceed as follows:

- Select the desired time from those proposed in the drop-down menu of the ⏻ **AUTO POWER-OFF** card.
  NOTE: the value set in the connected device is shown inside the semicircular indicator



- To apply the setting press the **Set Logger** button located in the **FUNCTIONS** column.

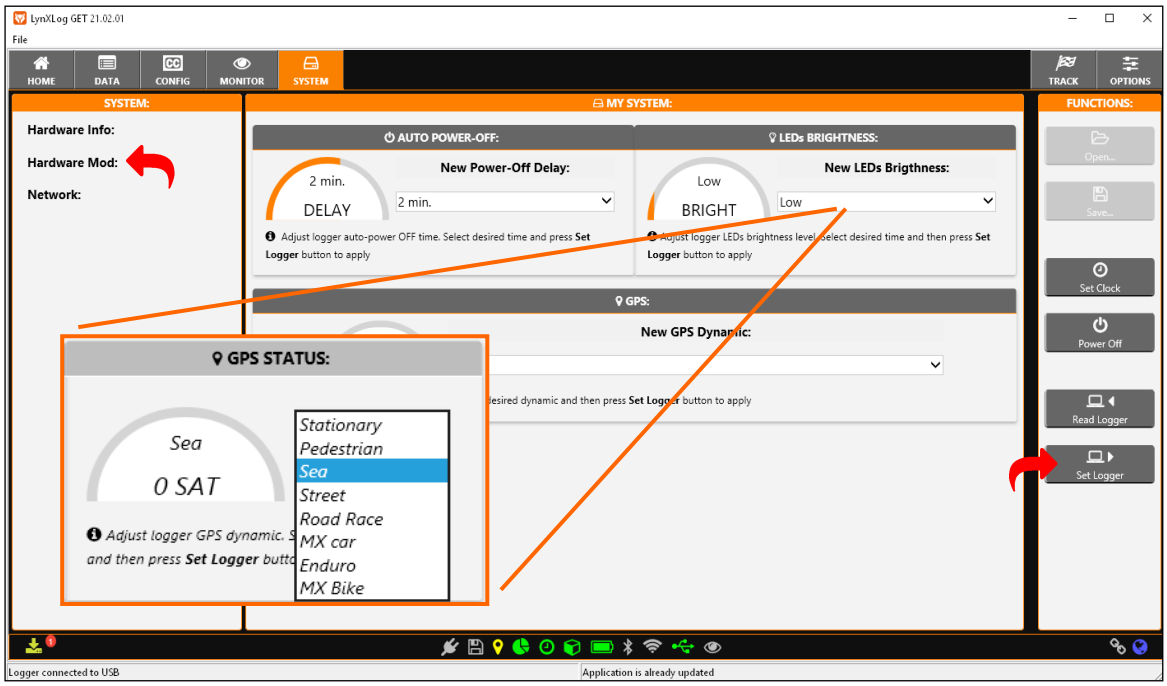
ATTENTION: IF THE INTERNAL BATTERY IS NOT SUFFICIENTLY CHARGED, THE POWER-OFF TIME MAY NOT BE RESPECTED.

12.8.2 CHANGING THE GPS DYNAMIC

To improve the quality of the acquired GPS trajectories, it is possible to select the GPS dynamics best suited to the type of use being made of the Data Logger SL1.
The option is available on the **SYSTEM – Hardware Mod** page with system connected (see chapter 12.1).

Proceed as follows:

- Select an option from those proposed in the drop-down menu of the **GPS STATUS** tab.
  NOTE: the current dynamics set in the connected device and the number of satellites received at that time are shown inside the semicircular indicator.



The options are:
- **Stationary**: suitable for stationary applications.
- **Pedestrian**: suitable for pedestrian use or with extremely low movement dynamics.
- **Sea:** suitable for marine use.
- **Street:** suitable for standard road use
- **Road Race:** suitable for dynamic road use with high movement (e.g. track competitions).
- **MX car:** suitable for dynamic off-road use with slow motion (e.g. car cross).
- **Enduro:** suitable for dynamic off-road use with medium movement (e.g. enduro).
- **MX Bike:** suitable for off-road use with high movement dynamics (e.g. motocross).

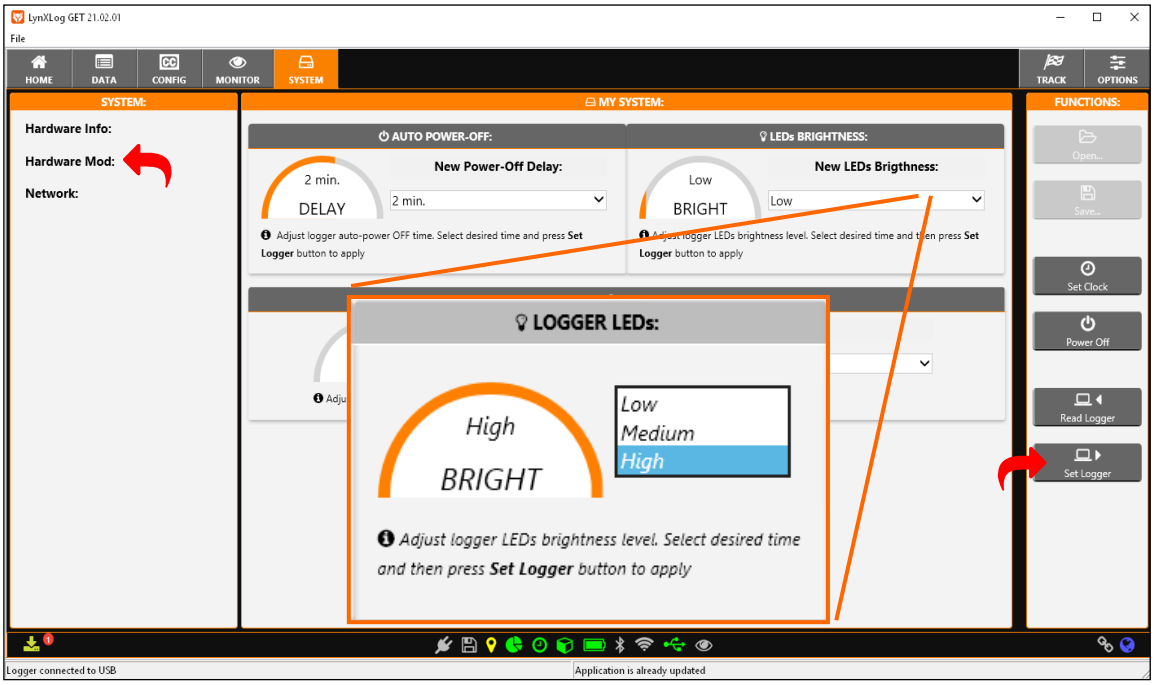
- To apply the setting press the **Set Logger** button located in the **FUNCTIONS** column.

12.8.3 CHANGING THE LED BRIGHTNESS

It is possible to adjust the brightness intensity of the LEDs of the Data Logger SL1.
The option is available on the **SYSTEM – Hardware Mod** page with system connected (see chapter 12.1).

Proceed as follows:

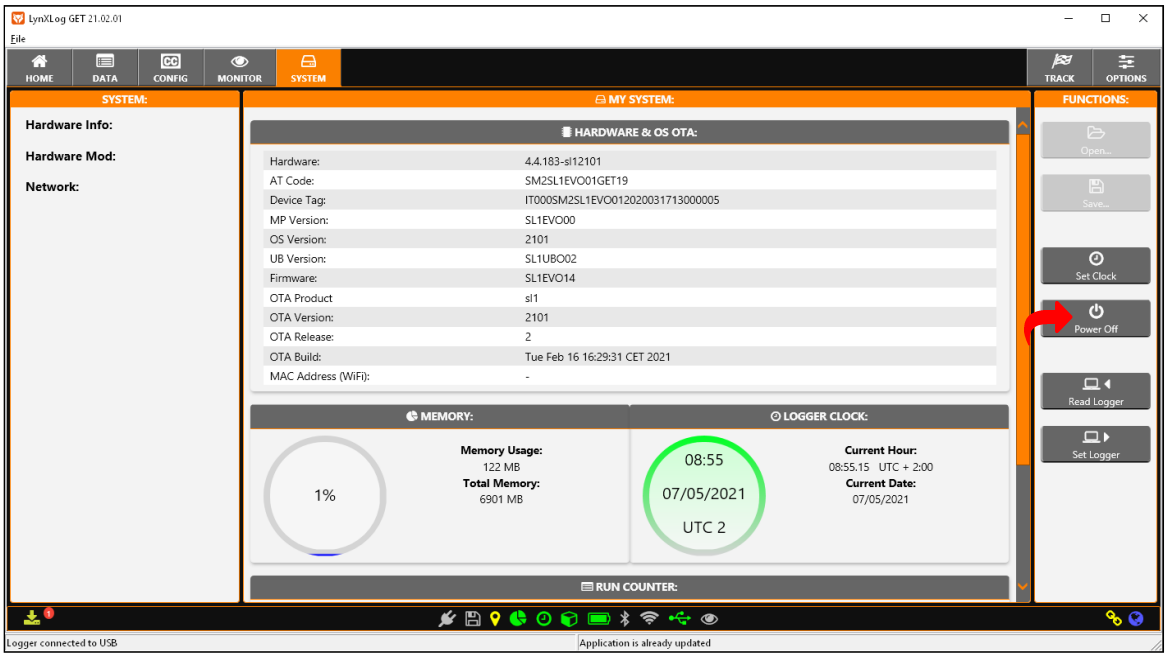
- Select the desired intensity from those available in the drop-down menu of the **LOGGER LEDs** tab.
  NOTE: the value set in the connected device is shown inside the semicircular indicator.



- To apply the setting press the **Set Logger** button located in the **FUNCTIONS** column.

12.8.4 TURNING OFF THE DATA LOGGER SL1 MANUALLY

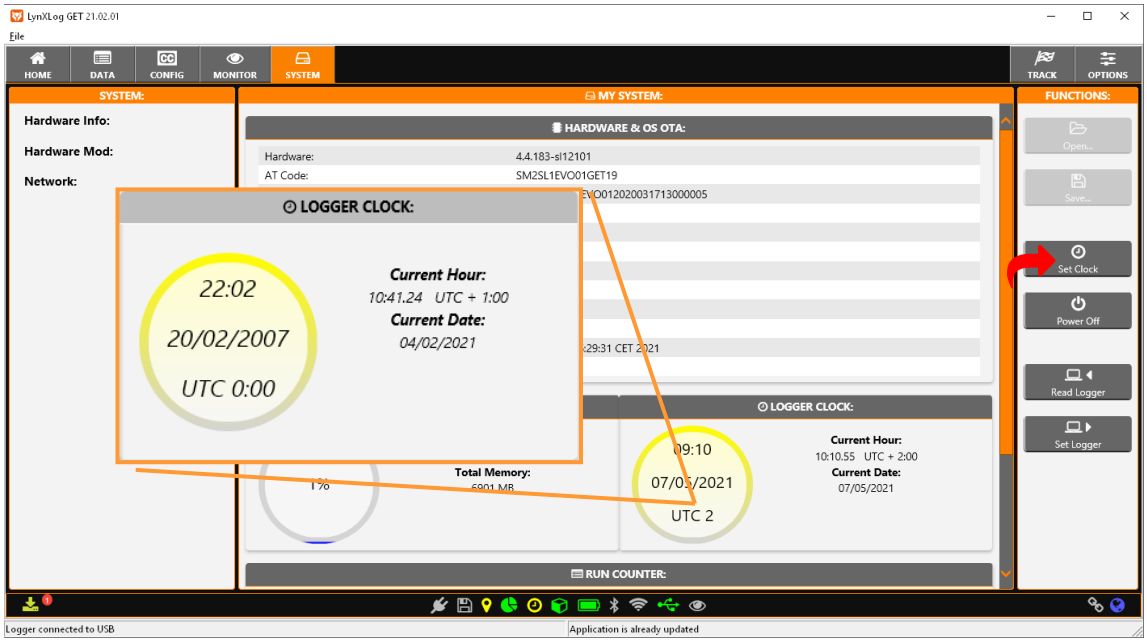
The SL1 Data Logger can be turned off manually without necessarily waiting for the **Power-Off** time.
The option is available on the SYSTEM page with system connected (seechapter 12.1).
Power off is performed by pressing the Power Off button in the FUNCTIONS area.



ATTENTION: MANUAL SHUTDOWN IS NOT PERFORMED IF THE DEVICE IS CONNECTED TO A POWER SOURCE

12.8.5 ADJUSTING THE CLOCK OF THE DATA LOGGER SL1

The SL1 Data Logger is equipped with an internal clock with a rechargeable buffer battery. In some cases the time may not be synchronized with that of the PC (e.g. due to a time zone or due to a low battery due to prolonged inactivity).
The clock status is visible on the **SYSTEM** page and in the status icons (icon).
If adjustment is required (useful for plotting data) press the **Set Clock button** in the **FUNCTIONS** area on the **SYSTEM** page.
The option is available when the system is connected (see chapter 12.1).

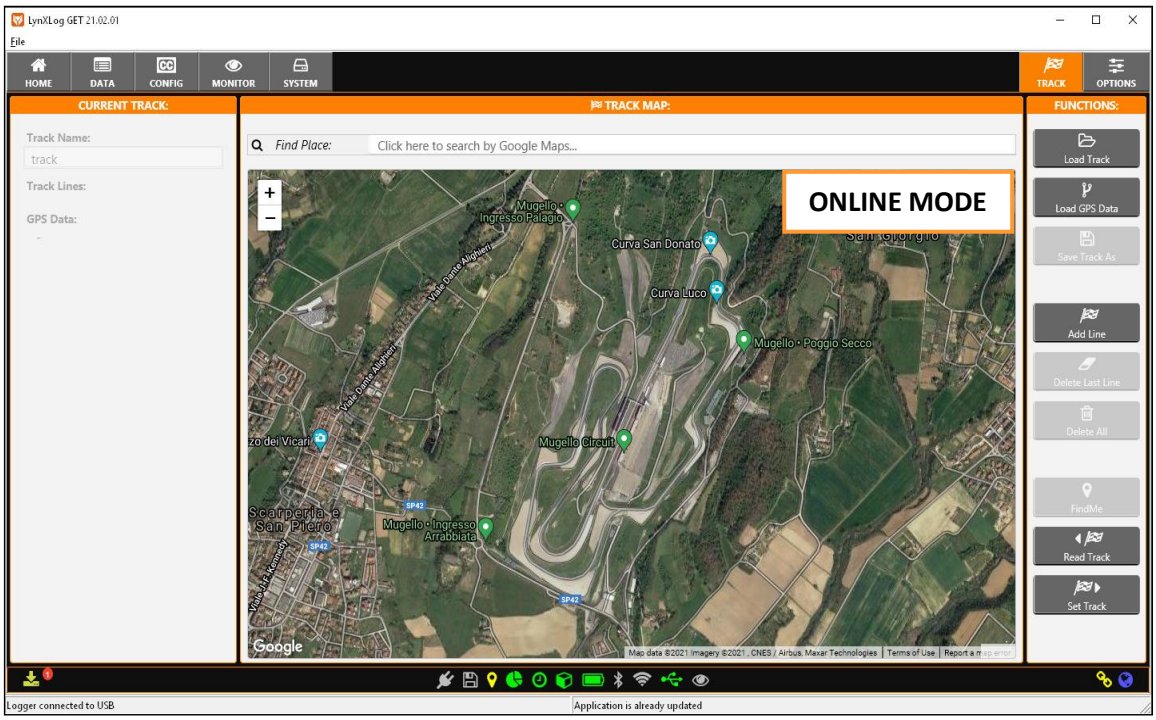


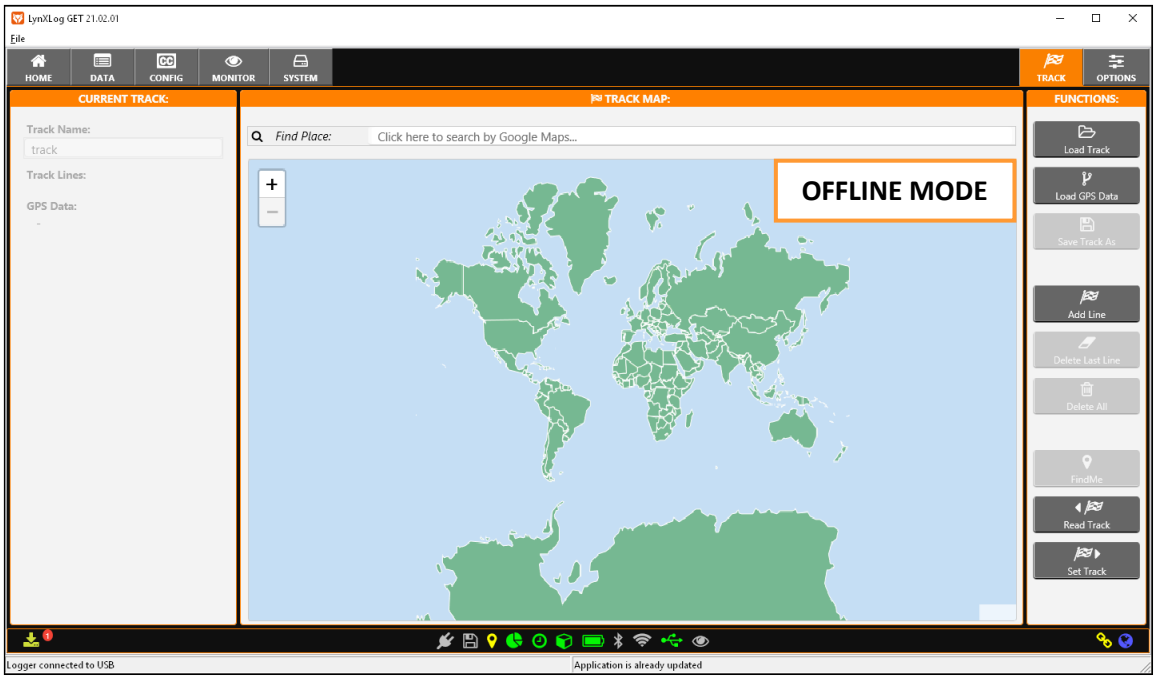
12.9 TRACK MANAGEMENT

The Track section of the LynXLog software allows the creation / modification of the tracks to be sent to the logger.
The SL1 data logger requires the setting of a track to:

- Divide the acquired data based on the laps travelled on the track and facilitate data analysis.
- Activate the digital output DIGITAL OUT (if it has been set in Beacon Mode).

LynXLog allows the creation of "online" tracks using Google Maps ™ support (an active Internet connection is required) or in completely "offline" mode (requires acquisition - Run - with valid GPS data exported in geojson format - functionality integrated in LynXLog and performed at each download of the sessions from the logger).
ATTENTION: IF THERE IS NO INTERNET CONNECTION, THE LynXLog SOFTWARE WILL AUTOMATICALLY GO TO OFFLINE MODE.



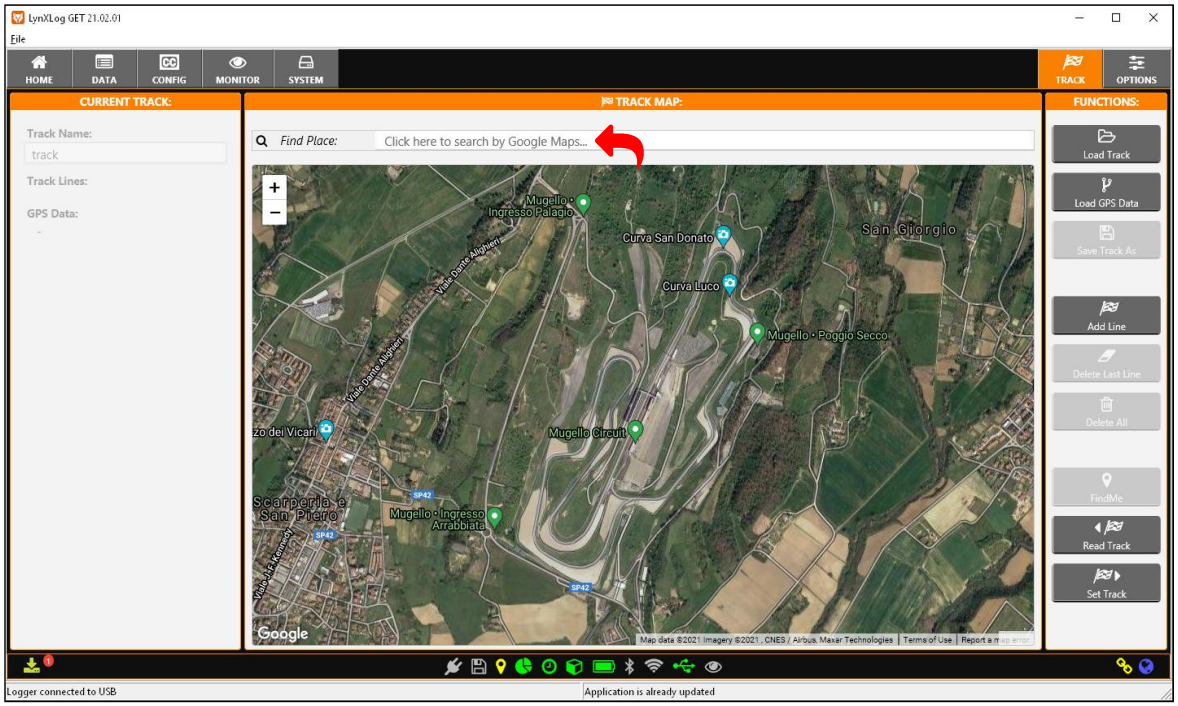


12.9.1 CREATING A TRACK WITH GOOGLE MAPS ™

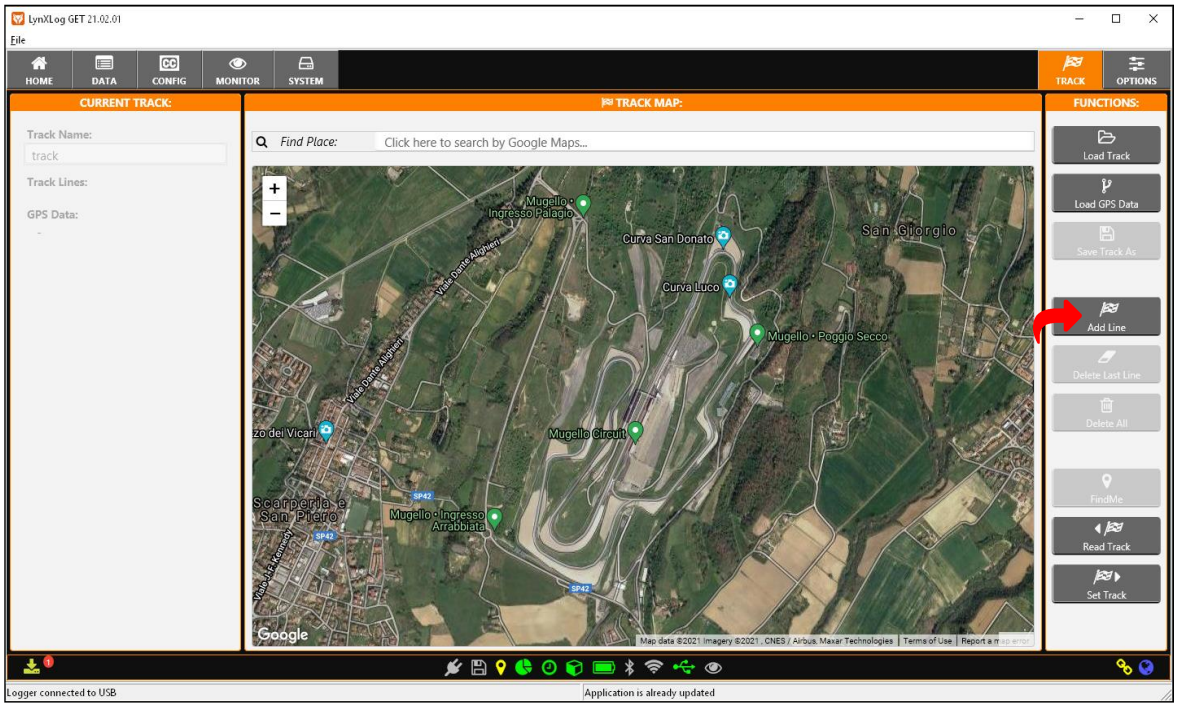
Proceed as described below:

- Make sure you have an internet connection on your PC (first icon in the status bar at the bottom left).
- Run LynXLog and press the TRACK key on the navigation bar.

- Drag the map to move to the desired area, or use the search function **Find Place** to find a particular location and centre the map in the desired location.

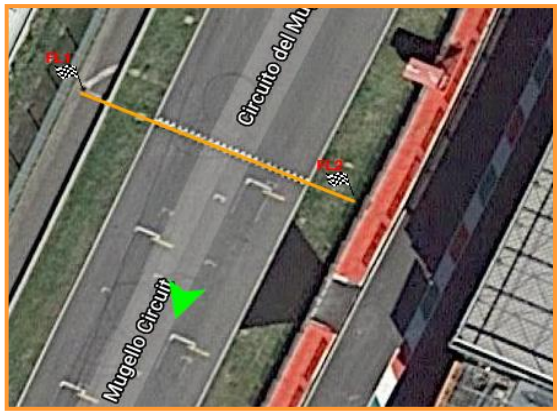


- Activate the finish line creation function using the **Add Line** button in the **FUNCTIONS** area.

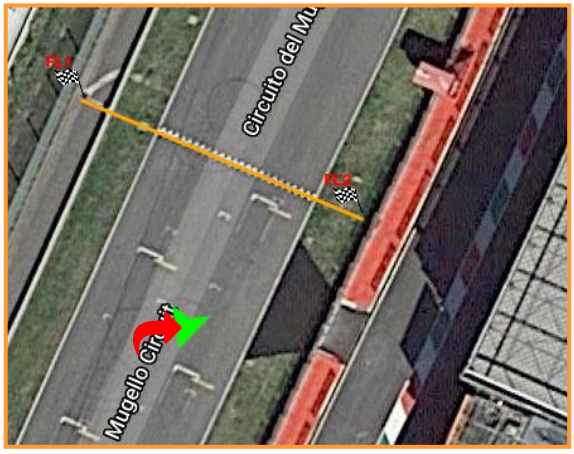


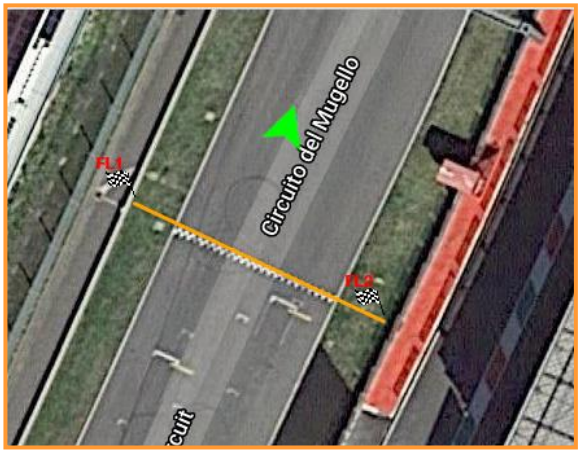
- Drag and / or zoom (using the zoom buttons at the top left of the map or with the mouse scroll) the map near the finish line and click on it to position the first finish line point.

- Press the map to create the second finish line point. A finish line will appear with a green arrow indicating the direction of the race.

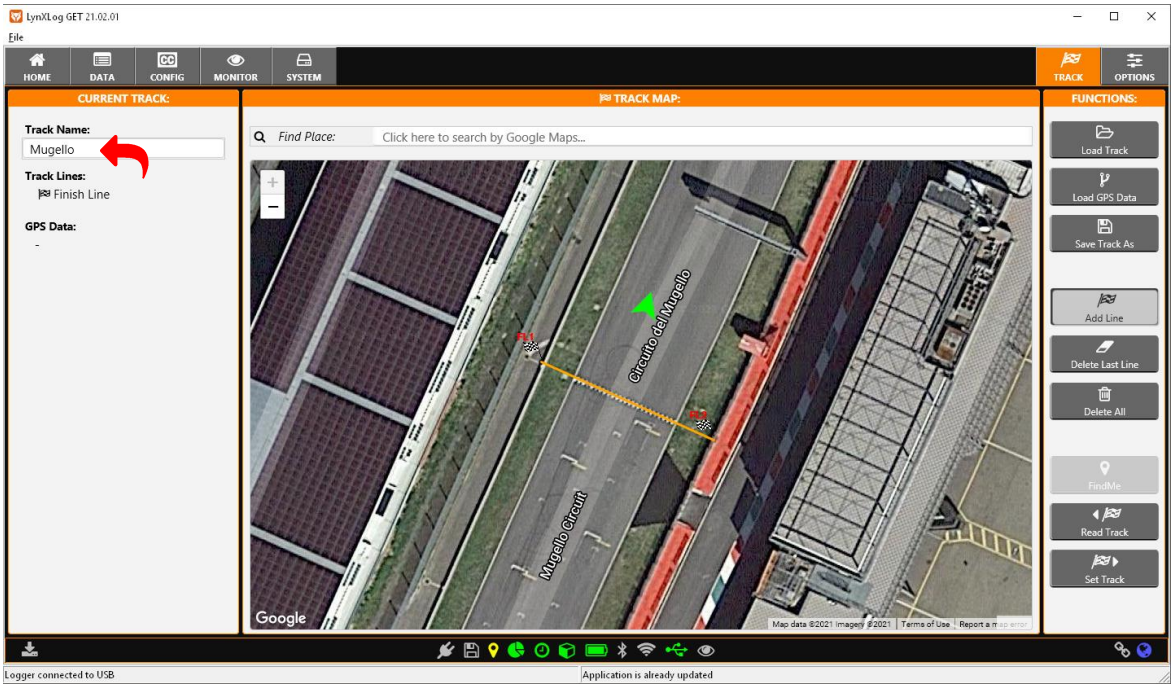


- If the direction is incorrect, it can be changed by pressing the green arrow:

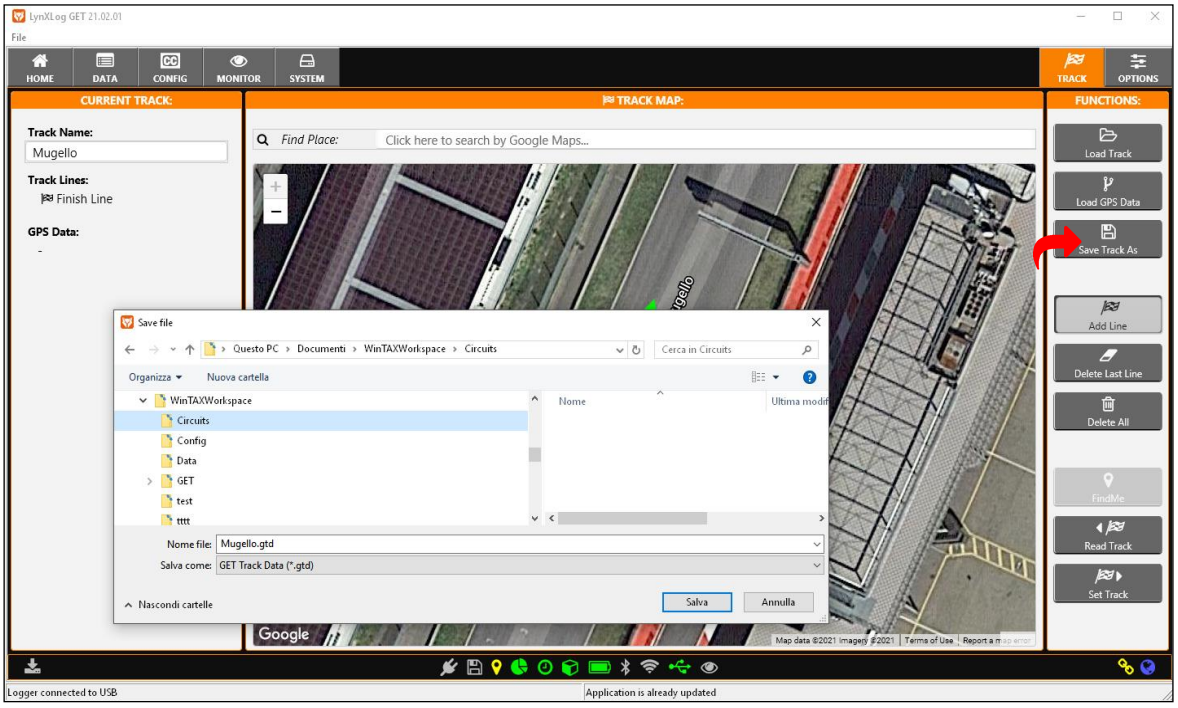




- Enter the name for the track in the Track Name field:



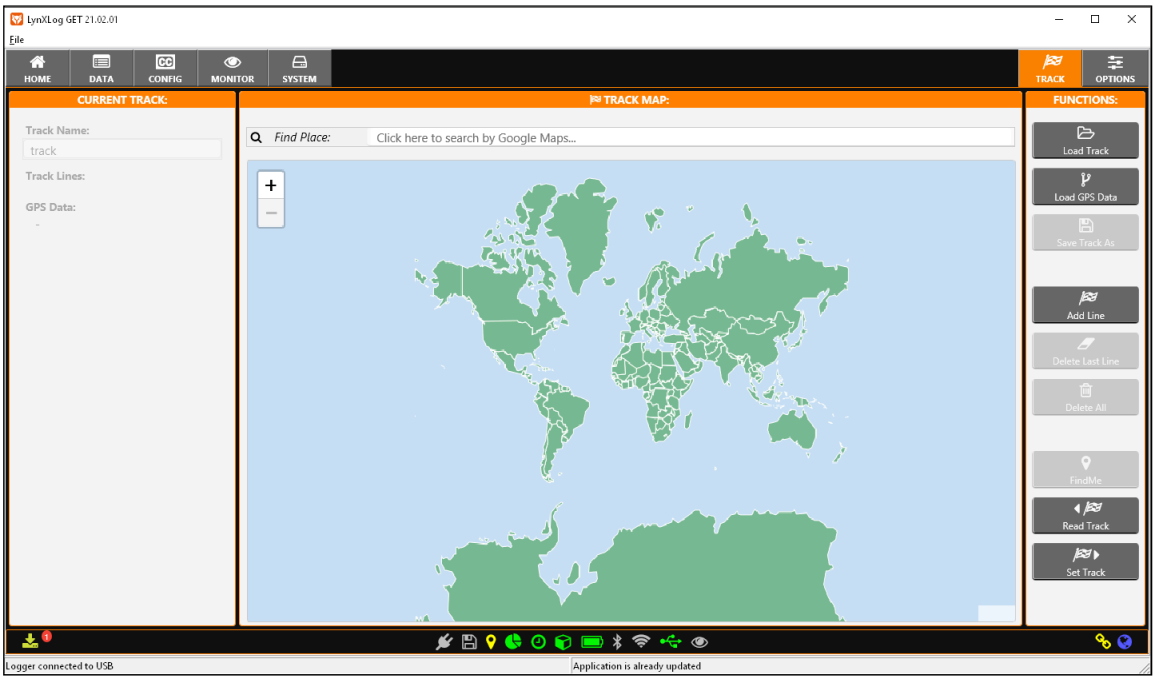
- Press **Save Track As** in the **FUNCTIONS** column to save the track:



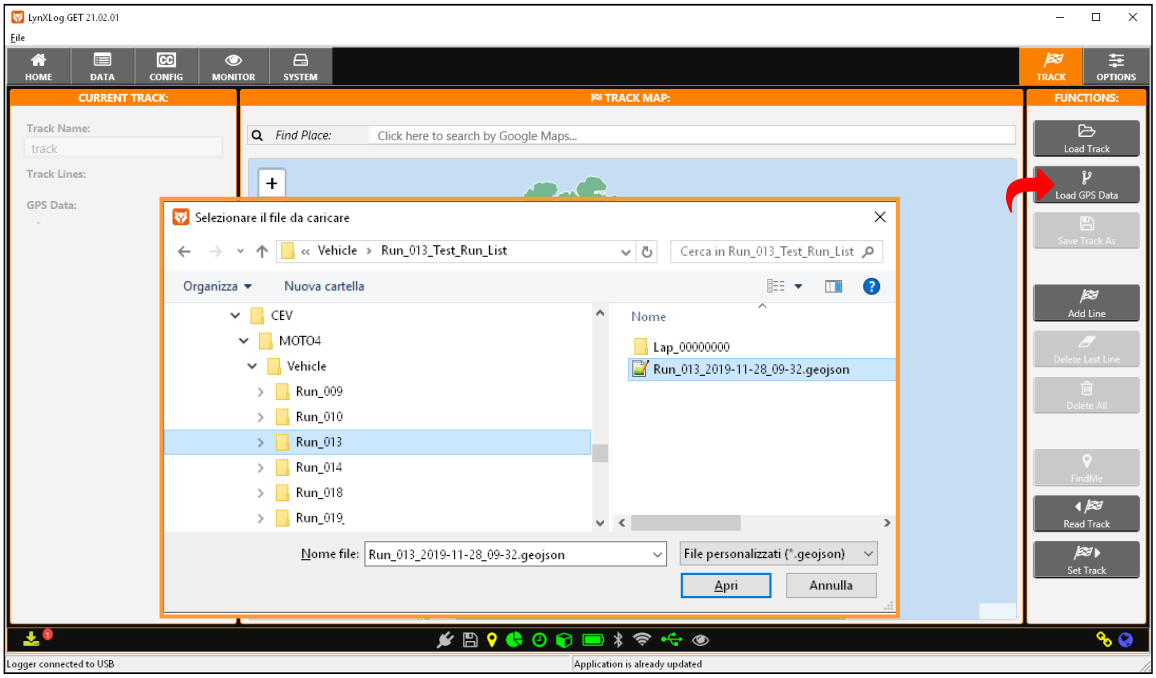
12.9.2 CREATING A TRACK IN "OFFLINE" MODE

Proceed as described below:

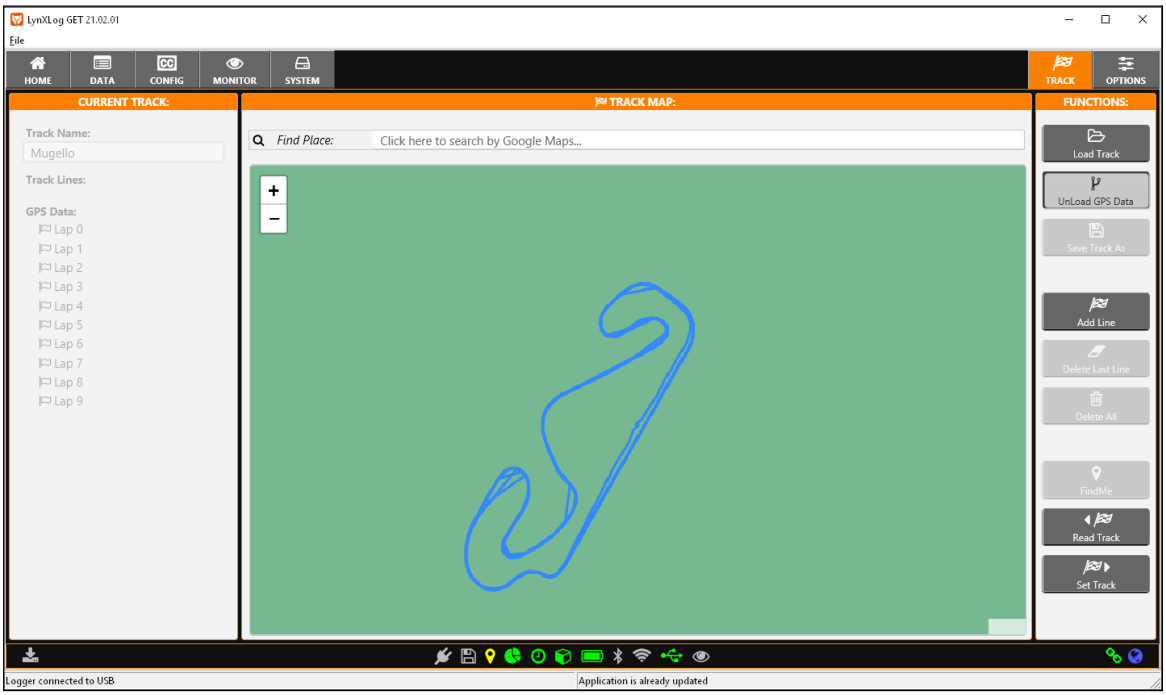
- Run LynXLog and press the Track function button.



- Press **Load GPS Data** and select the desired GPS data file (.geojson file) within the desired Run folder.



- The file with the GPS data (.geojson) will be imported and displayed as in the example below:

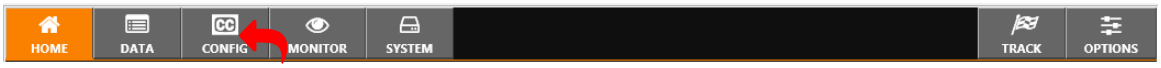


- Define the finish line, the direction and save the track file as described in the previous chapter.

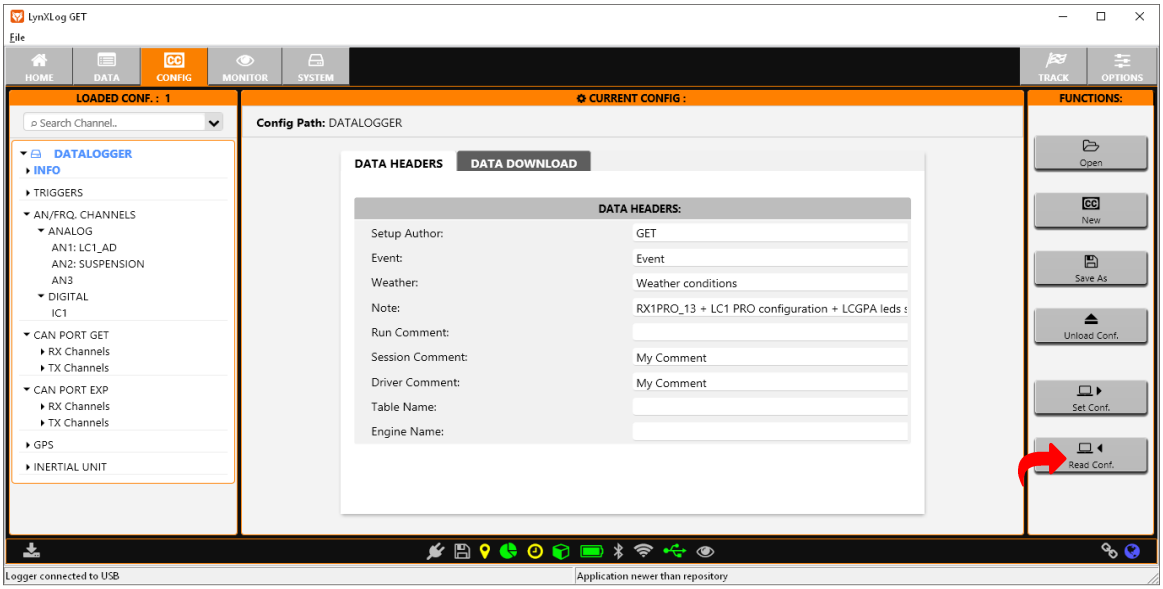
12.9.3 SENDING A TRACK TO THE SL1 DATA LOGGER

To allow the division of laps in the files acquired by the Data Logger SL1 it is necessary (as already stated above) that the correct trace is set in the instrument setup. This operation is not mandatory but it is still recommended to avoid having to manually cut the laps in WinTAX4.
You can load track file from LynXLog **TRACK** page and send it to connected logger by click on **Set Track** button.
Track can be sent to the logger also by update its configuration.
Proceed as follows:

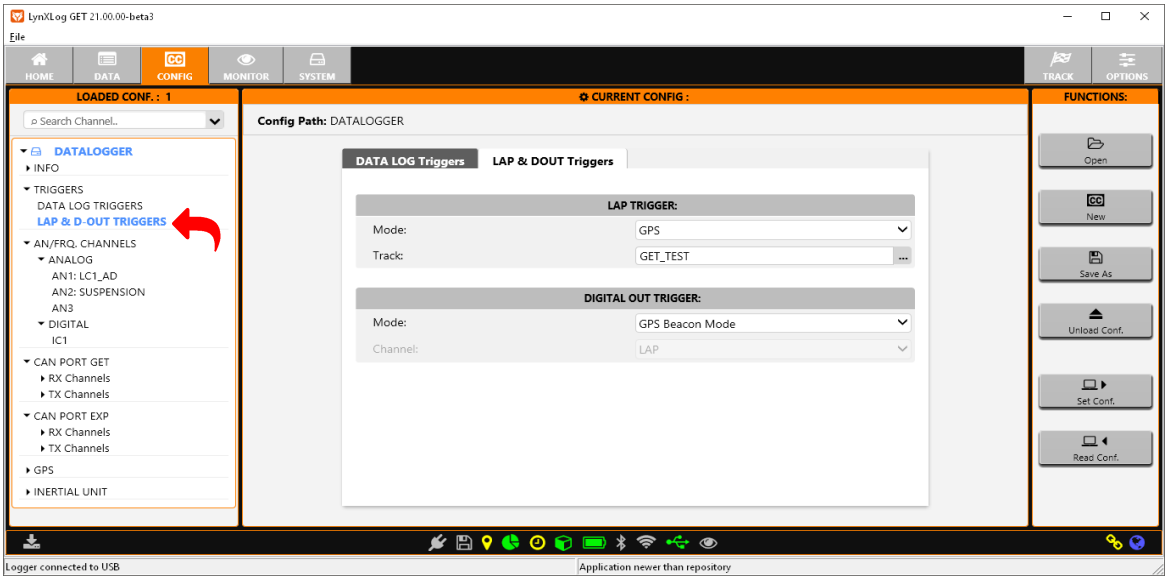
- Connect the SL1 Data Logger to the PC and wait for it to be recognized by LynXLog (see chapter 12.1).
- Press the **CONFIG** key on the navigation bar to open the setup editor.



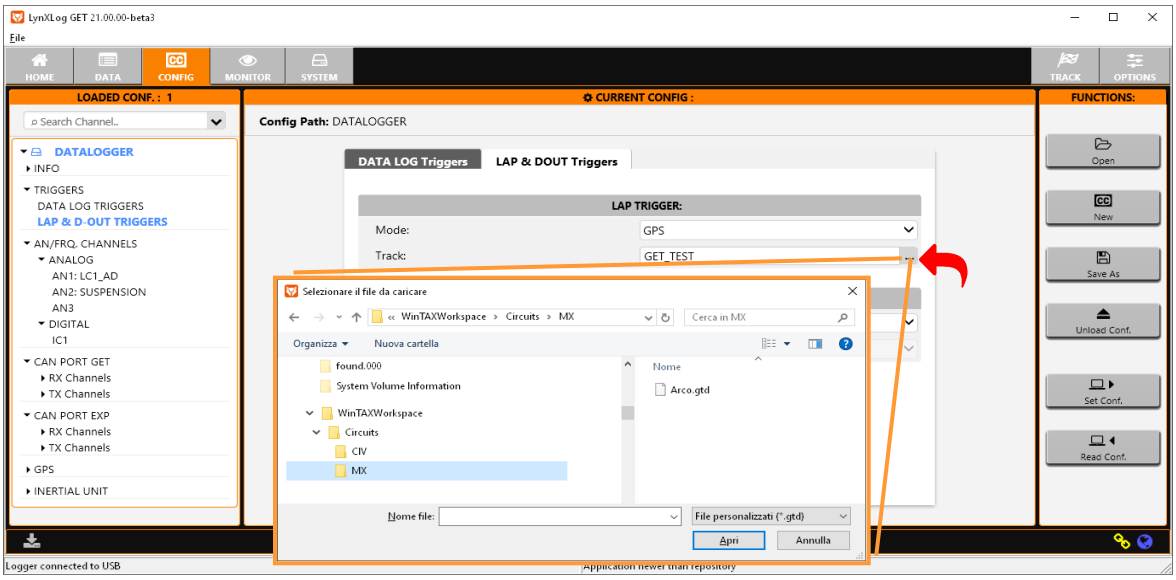
- Press the **Read Conf.** button or import the SL1 Data Logger setup:



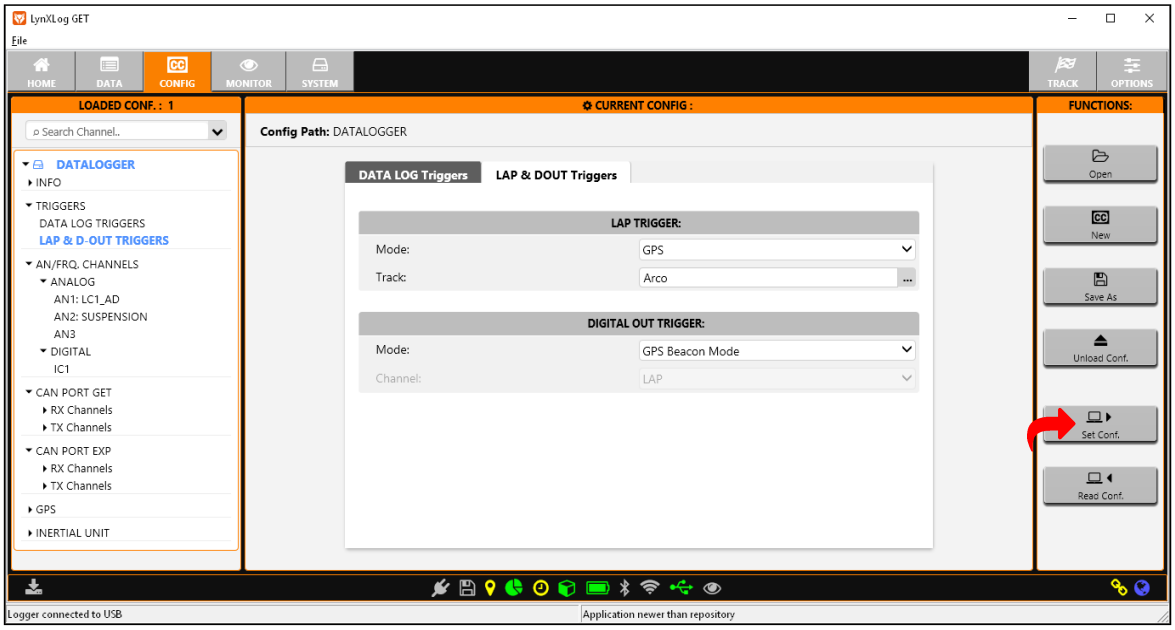
- Expand the **TRIGGER** entry in the setup tree on the left and select **LAP & D-OUT TRIGGERS**.



- Make sure that the **MODE** entry of the **LAP TRIGGER** table is set to **GPS**.
- Press ▪▪▪ next to the **Track** field value and select the .gtd file corresponding to the track where the data will be acquired.



- Send the configuration back to the Data Logger SL using the ▸ **Set Conf.** Button in the **FUNCTIONS** column



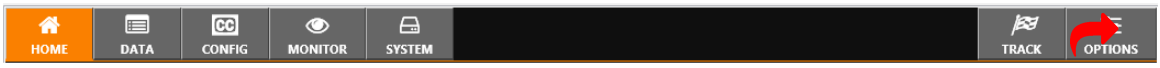
12.10 LYNXLOG OPTIONS

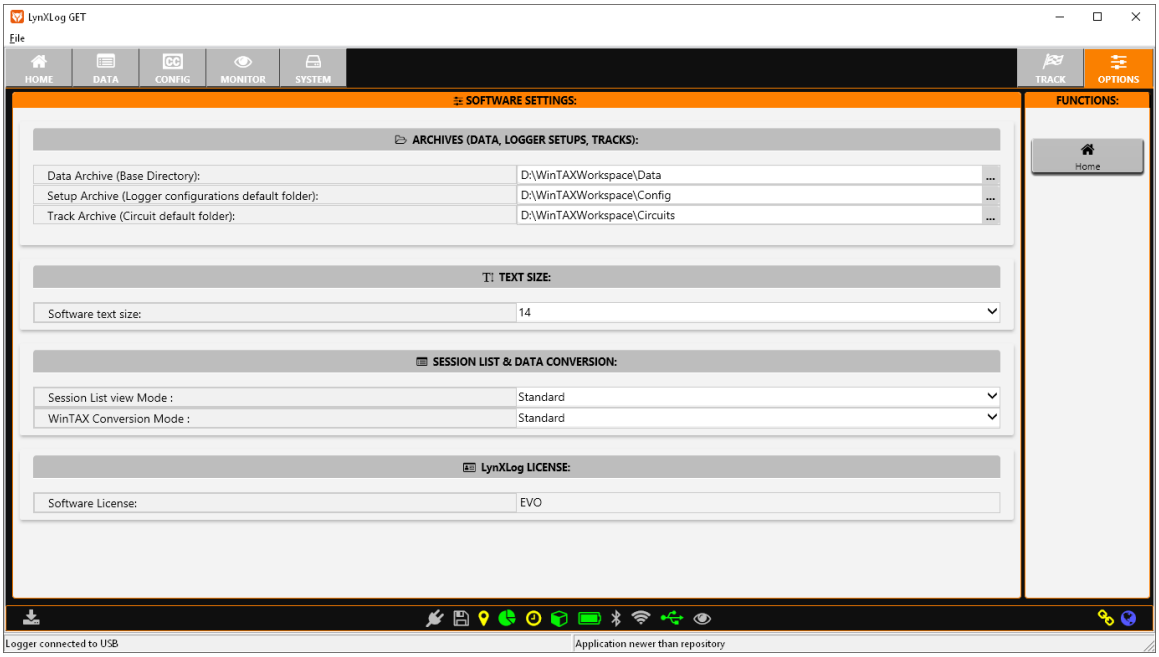
LynXLog offers the possibility to configure:

- The default path of the storage folders (sessions, track files and setups)
- The size of the text
- The display of the sessions (Run) on the **DATA** page
- The data conversion mode for WinTAX4

Proceed as follows:

- Press the **OPTIONS** button on the navigation bar to open the options window.





The displayed page contains the following sections:

- 🗁 ARCHIVES (DATA, LOGGER SETUPS, TRACKS):
  Data Archive: main folder for saving the acquired data.
  Setup Archive: default folder for saving the SL1 datalogger setups.
  Track Archive: default folder for saving tracks created in LynXLog.

- T↕ TEXT SIZE:
  Software text size: sets the font size of LynXLog texts.

- SESSION LIST & DATA CONVERSION:
  Session List view Mode: changes the view of the Runs on the DATA page.
  The selectable options are:
  - **Standard**: displays only valid Runs in the list of sessions recorded by the logger
  - **All:** displays all the Runs (valid and not - if present) on the DATA page.

- **WinTAX Conversion Mode:** modifies the data conversion strategy in WinTAX format in the absence of acquired samples (indicated as NoRx in the WinTAX software).
  The selectable options are:
  -**Standard:** keeps the last valid data of up to a maximum of 10 consecutive NoRx (default condition).
  -**Interpolate:** linear interpolation of valid samples in case of missing samples (NoRx) except the first and last sample of the session.
  -**Interpolate2:** linear interpolation of valid samples in case of missing samples (NoRx) of the session.
  -**NoRx:** convert all samples, even missing ones (NoRx) without interpolating the data

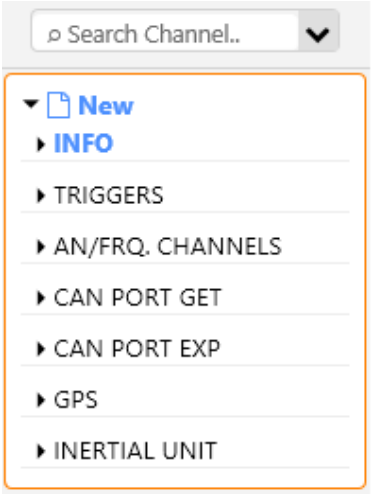
13 TECHNICAL CHARACTERISTICS OF THE DATA LOGGER SL1

Electrical Characteristic	
Main Power Supply:	9-18 VDC (typ. 12VDC)
Optional Power Supply:	5 VDC (mini-USB port)
Current Consumption	typ. 120mA@12V
Auxiliary Power Output:	5VDC - 70mA max.
Backup Battery:	Built-in 3.7VDC LiOn rechargeable battery
Mechanical Characteristic	
Dimensions:	21mm x 62mm x 79mm (without harness and GPS connector)
Weight:	Approximately 170g
Housing Materials:	PA6-GF30 (30% Glass Reinforced, Heat Stabilized, Flame Retardan)
International Protection Code:	IP 67
Operating Temperature:	-20°C/+70°C
System Characteristic	
Memory:	7 GB Flash
Logging Capacity:	35kB/s
Analog Inputs:	3x single ended inputs, input range 0-5V, res. 12 bit (SAR)
Frequency Inputs:	1x frequency input (frequency range: 0-20kHz)
Logic State Inputs:	1x logic state input
Digital Output:	1x low side power switch (3A max.)
GPS Characteristics:	GPS, Galileo, GLONASS, BeiDou enabled
	Sensitivity 167dB
	Update rate 10Hz – external antenna
IMU	9-axis Bosch BNO055
System Clock:	Built-in Real Time Clock (RTC)
System monitoring:	3 x device status LEDs
GPS Antenna Connector:	SMA
Communications ports:	
CAN Port:	2 x High Speed 2.0 CAN ports (125 – 250- 500 kb/s, 1Mb/s)
USB Port:	1 x Mini-Type connector USB 2.0
WiFi:	1 x EEE802.11b/g/n (cod. GK-SL1-0001 only)
Standard harness and connectors:	
SL1 Main Cable:	HRS 9 poles connector (DF62W-9EP-2.2C) – cable length: 150mm
SL1 Expansion cable:	JST 8 poles connector (08T-JWPF-VSLE-D) – cable length: 150mm
USB Cable:	Sealed Mini USB connector – cable length: 500mm
Software:	
Device Management Software	LynXLog
Analysis Software	WinTAX4 Junior license

ANNEX 1: FURTHER INFORMATION ON THE SETUP

Some examples are shown here that will help the user add new channels to the acquisition configuration (also called setup) and to change other parameters. The setup structure was already presented:

SL1 configuration			
GROUP	**CATEGORY**	**DESCRIPTION**	**RELATED TO:**
INFO	-	Information about the track, the pilot	Archiving
TRIGGERS	-	Acquisition start/stop rules	Acquisition
AN/FRQ	ANALOG (AN1…AN3)	Configuration of the analog inputs	Acquisition
	DIGITAL	Configuration of the frequency inputs	Acquisition
CAN Port GET	CAN	Configuring the CAN0 port (MAIN conn.)	Acquisition
CAN Port EXP	CAN	Configuration of the CAN1 port (EXP conn.)	Acquisition
IMU	IMU	Channels IMU (accelerometers and gyroscopes)	Acquisition
GPS	GPS	GPS channels	Acquisition

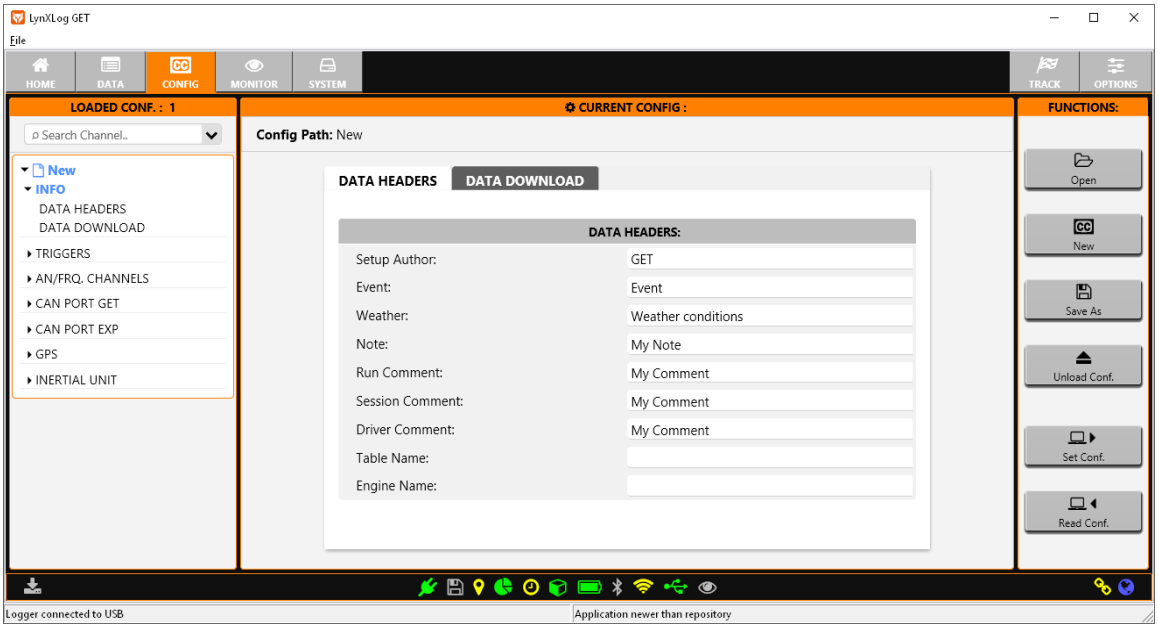


Each group of options is available by pressing the relative item in the **Config Channel Tree** column.

The following instructions assume that the reader has opened a valid setup (see chapters 12.5.1 and 12.5.2).

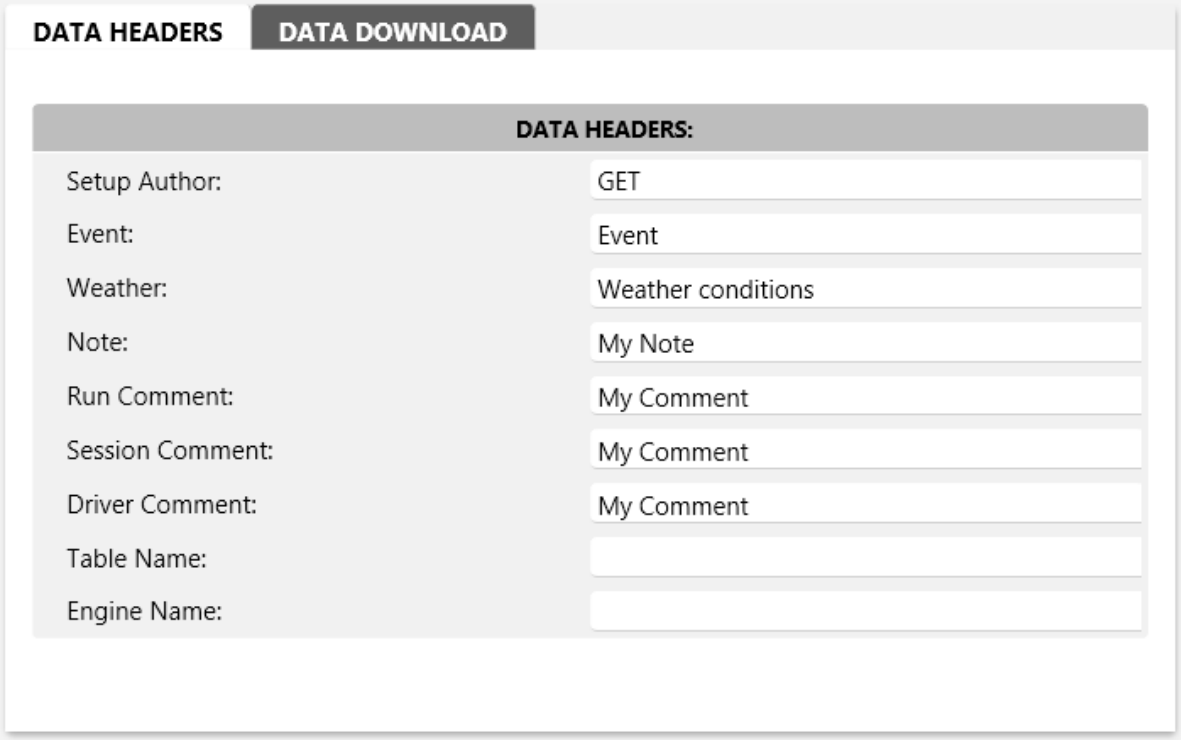
1 SETTING THE SETUP INFORMATION (INFO)

The **INFO** panel can be opened by pressing **INFO** in the **Config Channel Tree** column:

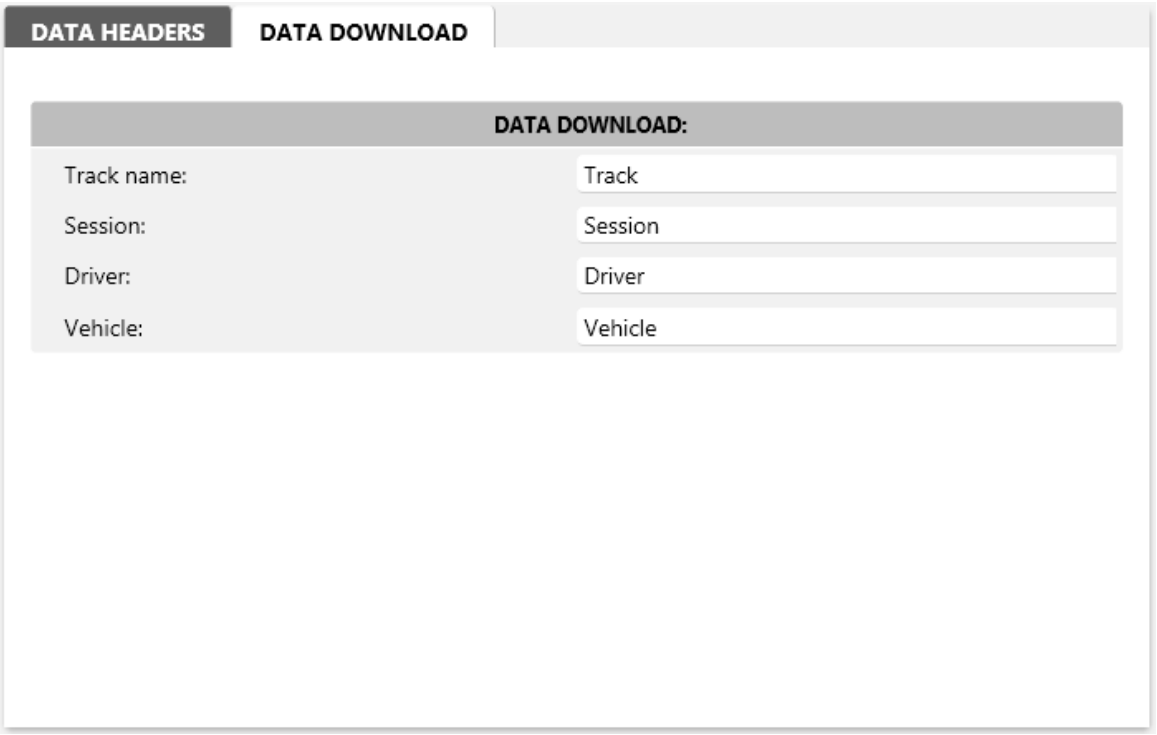


Inside the panel there are 2 tabs:

- **DATA HEADERS:** allows you to set configuration information. Some of these items can be displayed in the WinTAX4 Data Headers (for more information refer to the software manual). The following items are part of the WinTAX4 Data Headers: **Run Comment, Session Comment, Driver Comment,Table Name** and **Engine Name**.

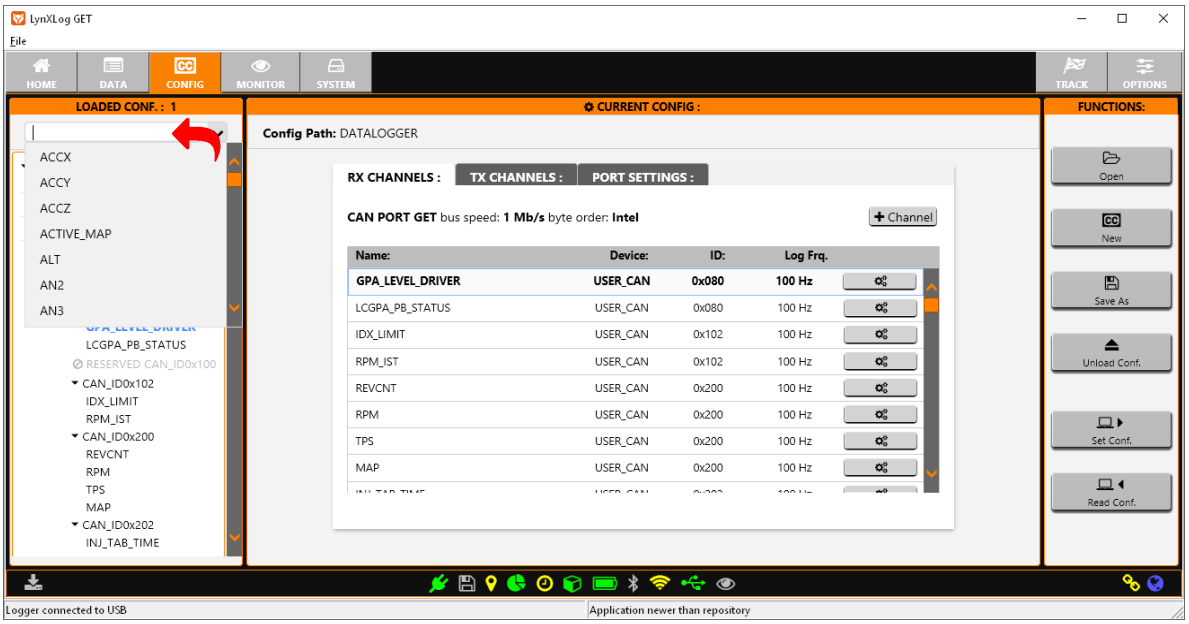


- **DATA DOWNLOAD:** allows you to set the default archive folders for data download. The values entered in the fields are considered only if the corresponding item in the **DATA** page is set as **"Auto - from config"** at the time of data download.



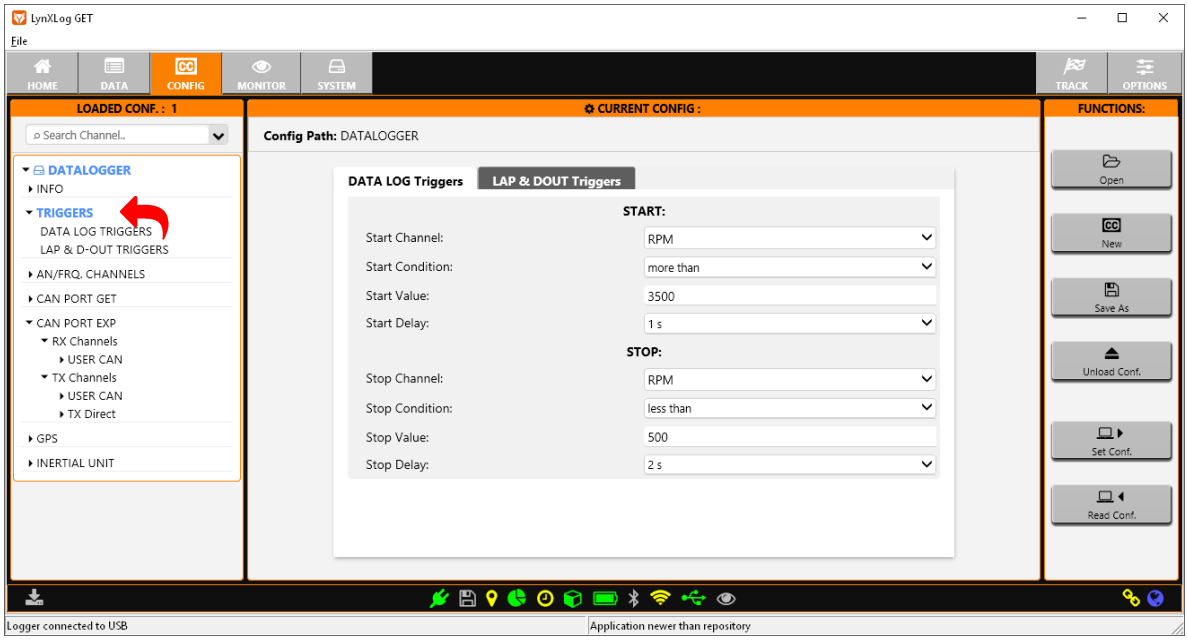
2 SEARCHING FOR A CHANNEL

There is a search function that makes it easier to search for a channel in the active setup.
Press the field **Search Channel** , scroll through the channel list and select one; alternatively you can start typing and the name to filter the channel list.



3 SETTING THE TRIGGERS

The **TRIGGER** panel can be opened by clicking once on **TRIGGERS** in the tree of the active setup.

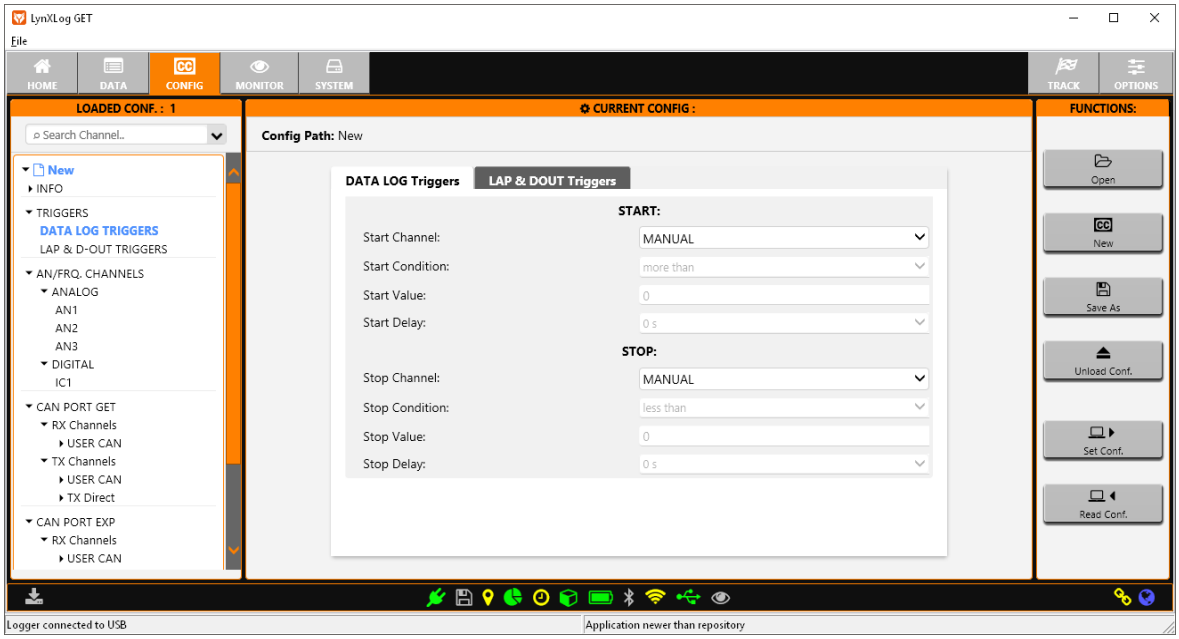


The available functions are:

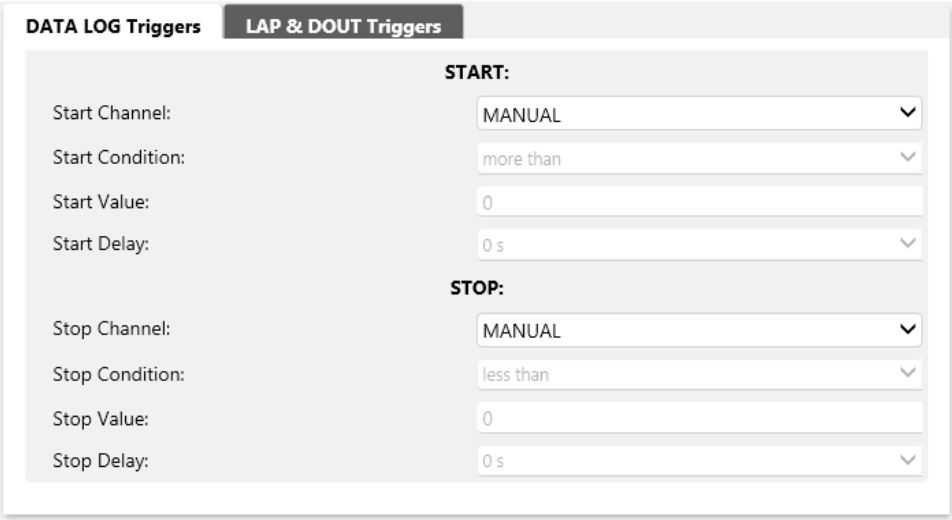
- **DATA LOG TRIGGERS**: sets the start and stop of data acquisition.
- **LAP & DOUT TRIGGER SOURCE:** sets the way in which the data logger divides the laps into the acquisitions (Runs) and sets the switching on and off of the digital output (if available in the connected SL1 Data Logger).

3.1 SETTING THE DATA LOG TRIGGER (START/STOP ACQUISITION)

The default start and stop of the acquisition is manual (MANUAL): to change the setting, select an item in the drop-down menus corresponding to the **Start Channel** and **Stop Channel** of the acquisition.
NOTE: the list of channels varies based on the configured channels in the active setup.



If the channel selected for starting acquisition is not **MANUAL**, all the options necessary for configuring automatic acquisition will be activated:



In case of automatic acquisition it is necessary to set correctly:

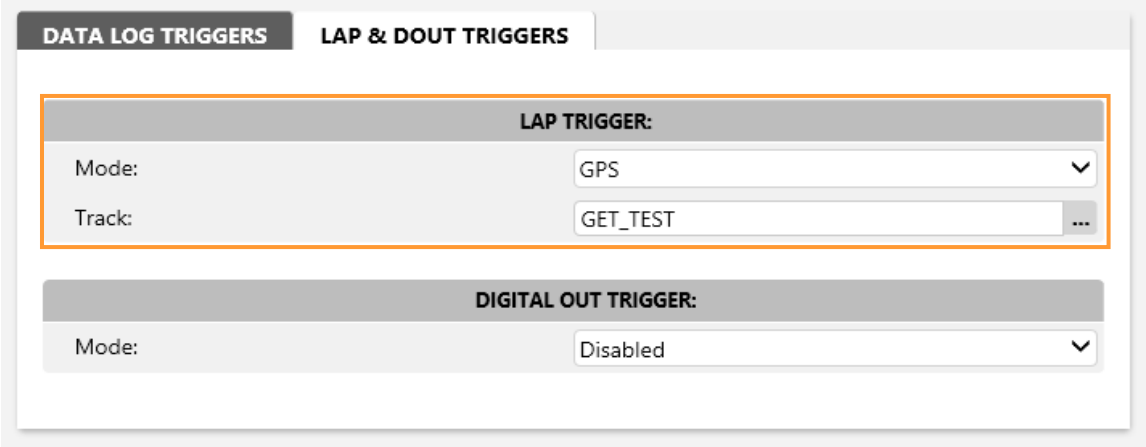
- **Start Condition:** acquisition start condition, i.e. if data recording must take place when the value of the channel set in the **Start Channel** field exceeds (option **more than**) or is below (option **less than**) the start threshold (**Start Value** parameter).
- **Start Value:** value of the channel that defines the acquisition start threshold.
- **Start delay:** acquisition start delay(useful to avoid unnecessary starts in case of channels with possible disturbances).

Obviously the same rules must be applied for the Stop channel.

Configure according to your needs, save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

3.2 SETTING THE LAP TRIGGER SOURCE (CUT LAPS)

The default lap cut mode (Mode option) is GPS: the lap is calculated based on the position on the track. In this condition it is NECESSARY to set the track correctly in the logger configuration (see chap. 12.9.3).

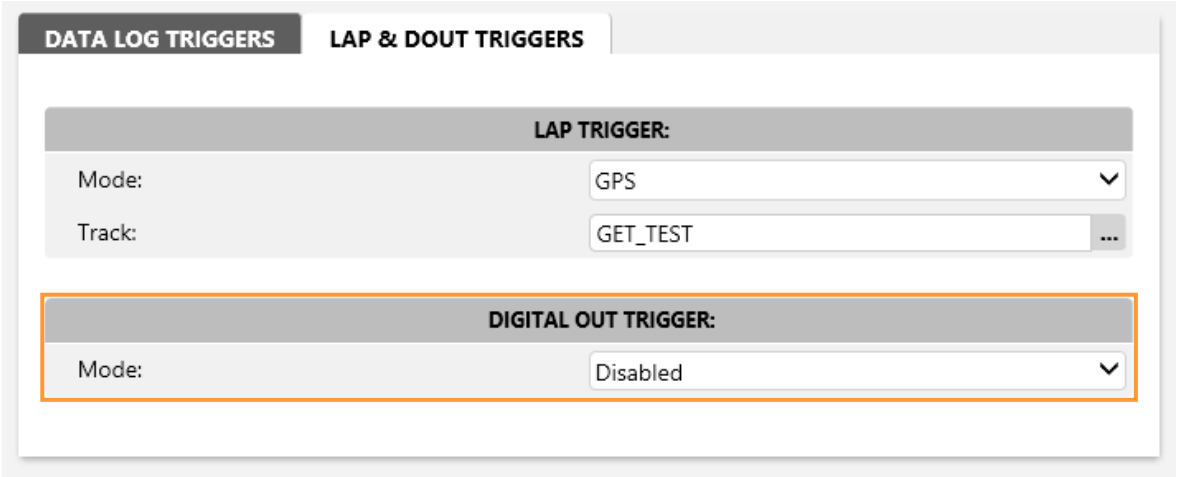


The failed and / or anomalous cut of the lap could be caused by:

- Mode option set to None.
- Error in the selection of the track or wrong direction set in it (see chap.12.9)
- Poor or no GPS signal

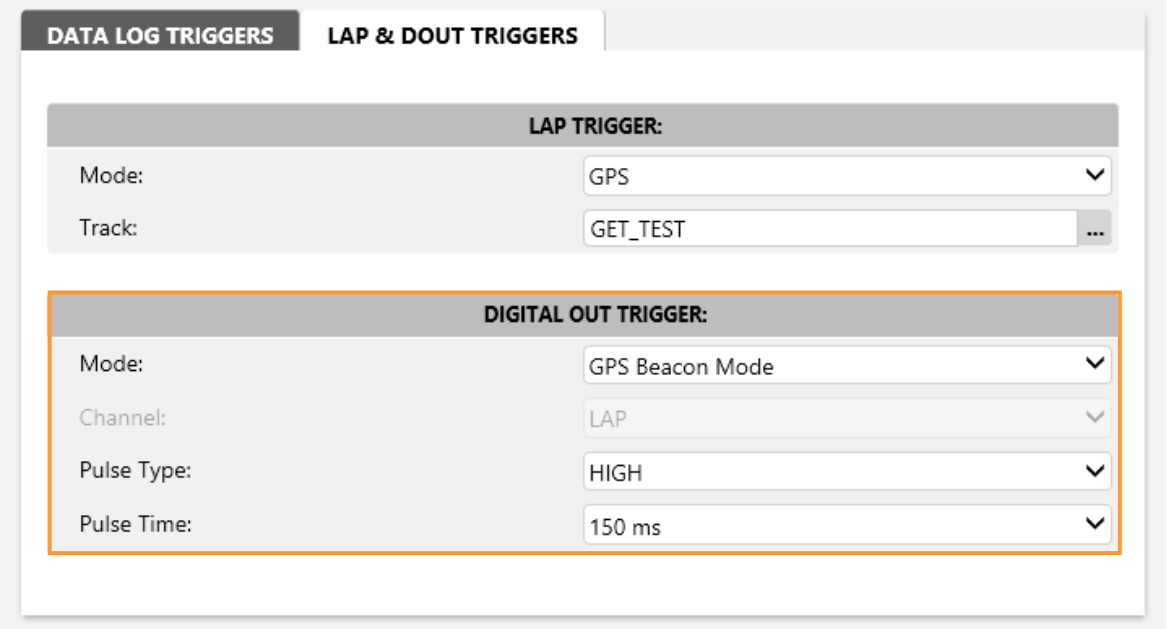
3.3 SETTING THE DIGITAL OUT TRIGGER

The configuration of the power output of the Data Logger SL1 (if available) is managed in the DIGITAL OUT TRIGGERS table.

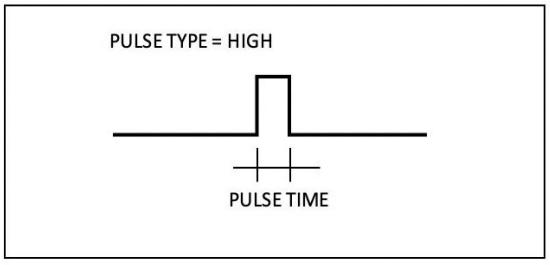


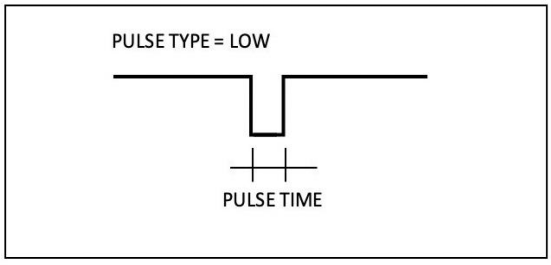
The **Mode** parameter defines the type of behaviour of the output:

- **Disabled**: the digital output is deactivated.
- **GPS Beacon Mode**: the digital output is activated when crossing the finish line defined by the track loaded in the device (see previous chapter).



NOTE: GPS Beacon mode allows you to define the type of pulse (**Pulse Type** parameter) and its duration (**Pulse Time** parameter).





3.3.1 NOTES ON THE DIGITAL OUTPUT

Physically the digital output consists of a MOS-FET in an open-drain configuration.
It is therefore necessary to insert the load to be controlled between the DOUT output and a positive power supply.

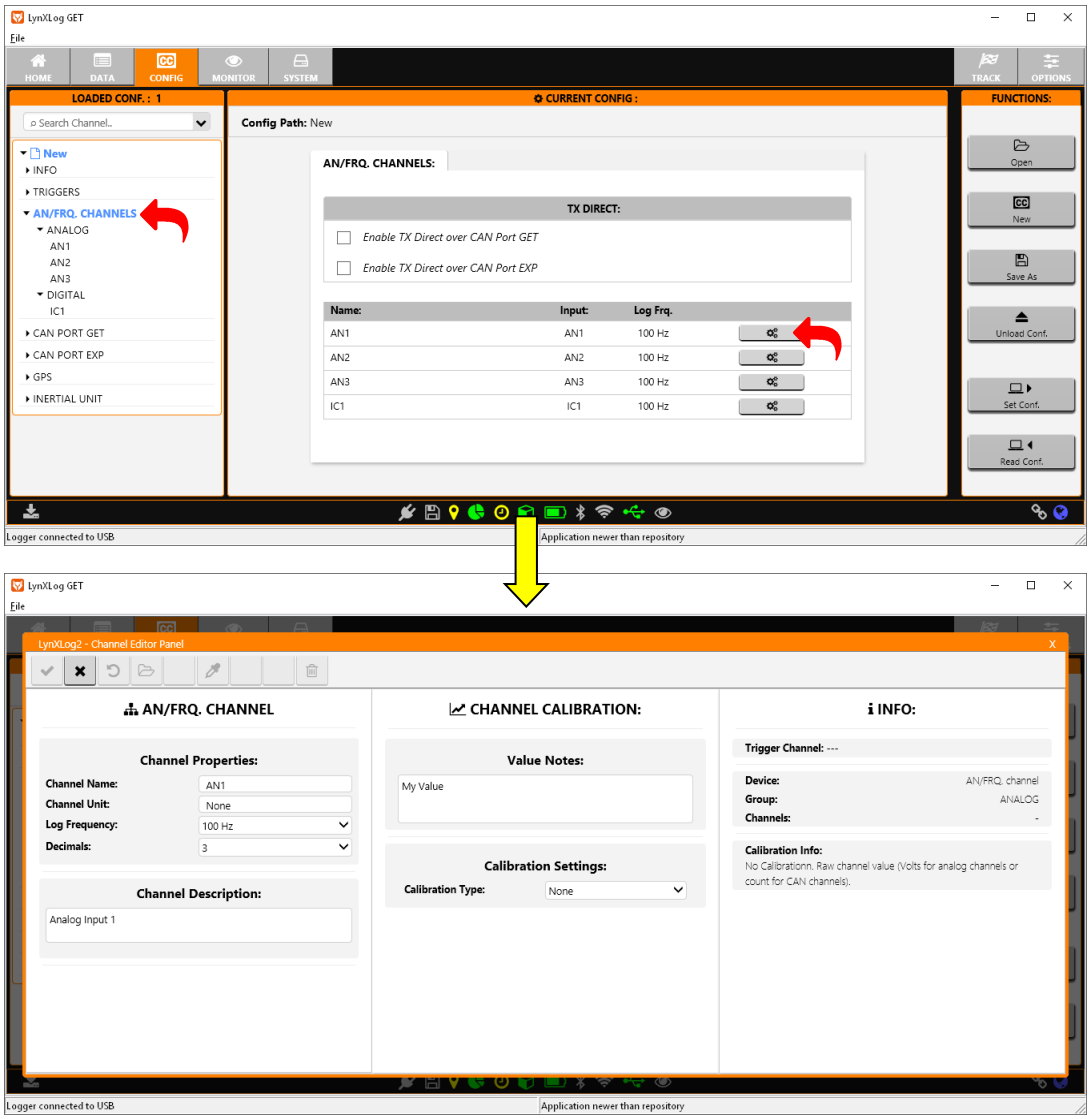
Pay attention to:

- potential reference (ground) of the logger and the positive of the power supply (must be the same)
- maximum voltage and current absorbed by the load (max.42VDC 1A)

Depending on the type of load to be controlled, if necessary, adopt appropriate digital output protection techniques (for example, recirculation diodes at the ends of the relay coil).

4 AN/FRQ PANEL (PHYSICAL INPUTS: AN1...AN3, IC1)

The **AN/FRQ CHANNELS** panel can be opened by clicking **AN/FRQ CHANNELS:** from here it is possible to configure the inputs AN1, AN2, AN3 and IC1.
To access the configuration panel of a channel, press the relative button in the channel table or double click on the element in the channel tree.



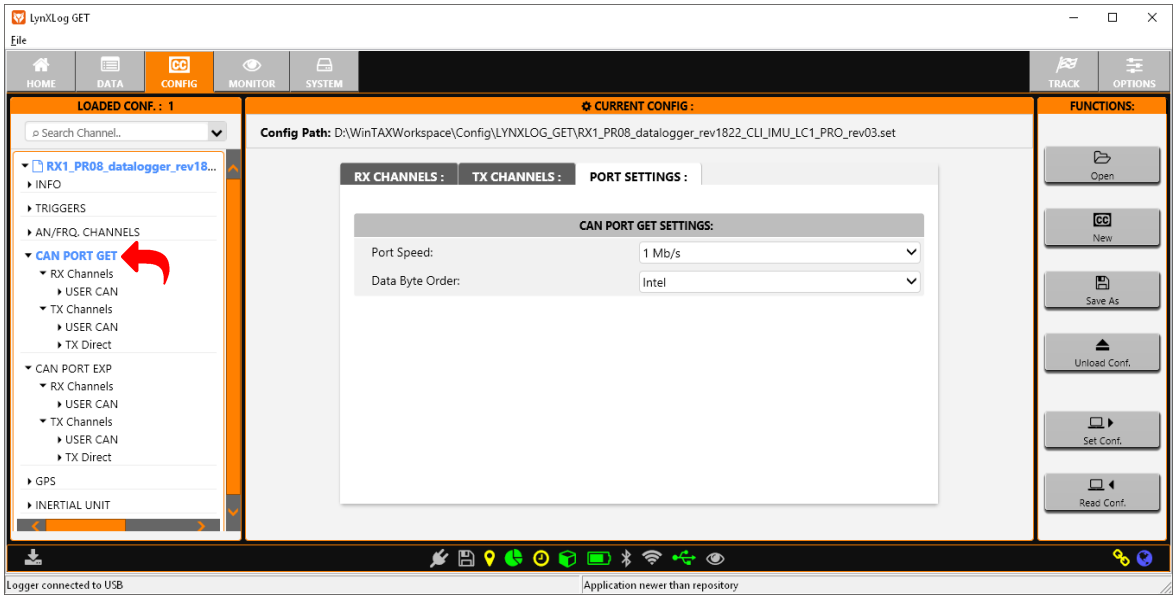
NOTE: the properties window can also be displayed by double clicking on the channel displayed in the **LOADED CONF** area tree. .
For more information on the channel properties window see Annex 1 chap. 6 of this manual.

The special feature of the panel is the **TX Direct** function: it allows to send the uncalibrated values of the physical inputs via CAN bus (in the specified port).
The following table contains the message specifications

CHANNEL	ID	TX RATE	TYPE	Bit Position	Data Length
AN1	0x1FFFFFFD	100 Hz	Unsigned	16	16
AN2	0x1FFFFFFD	100 Hz	Unsigned	32	16
AN3	0x1FFFFFFD	100 Hz	Unsigned	48	16
IC1	0x1FFFFFFE	100 Hz	Unsigned	0	32

5 CAN PORT GET AND CAN PORT EXP PANELS

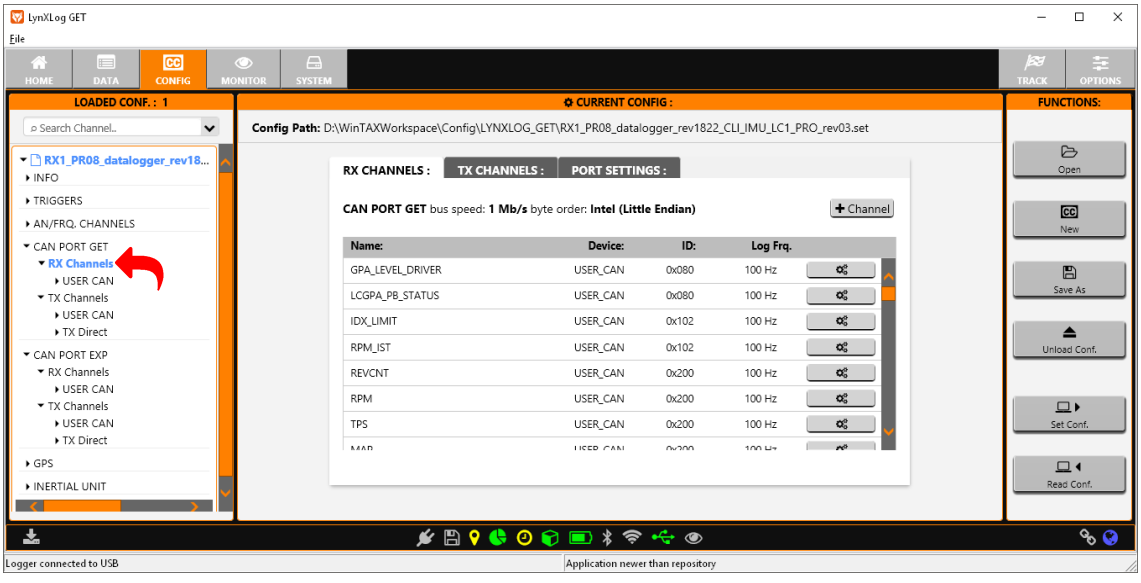
The **CAN Port GET** or **CAN Port EXP** panels can be viewed by clicking on the elements with the same name in the **LOADED CONF area. .**
Based on the selected tree point, one of the three tabs that make up the CAN port of the device will be shown first



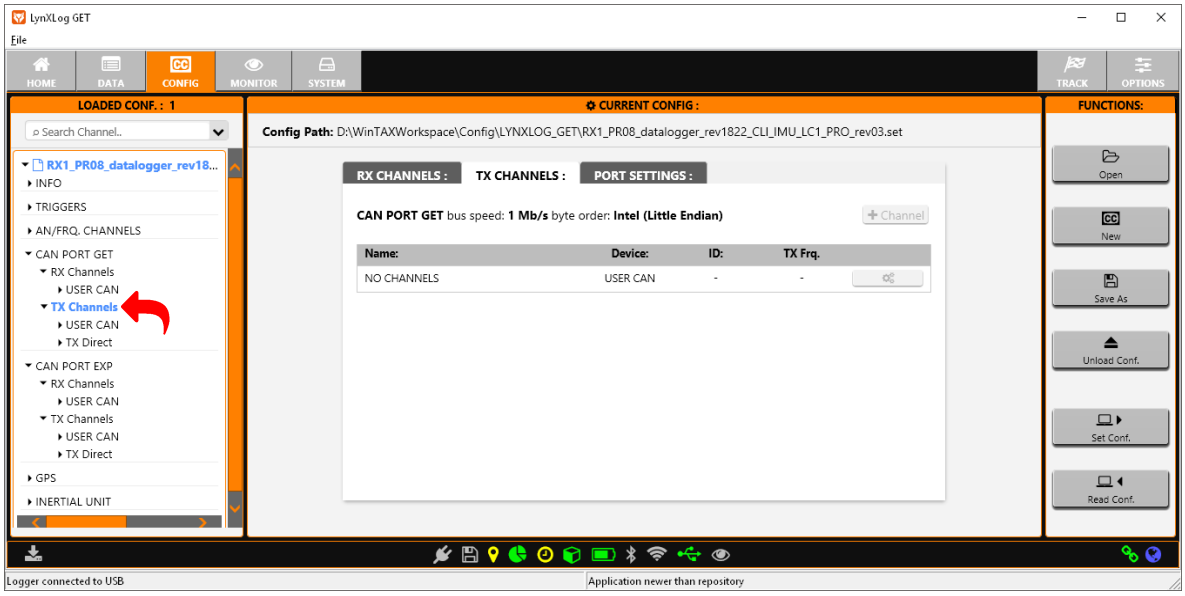
PORT SETTINGS: allows you to set the properties of the selected CAN port:

- **Port Speed:** allows you to set the speed of the CAN BUS by selecting an option from those available in the corresponding drop-down menu.
- **Data Byte Order:** allows you to set the order of the bytes making up the CAN bus messages. Supported formats are:
  Intel: Little Endian byte order
  Motorola: Big Endian byte order

RX CHANNELS: displays the CAN channels received by the instrument

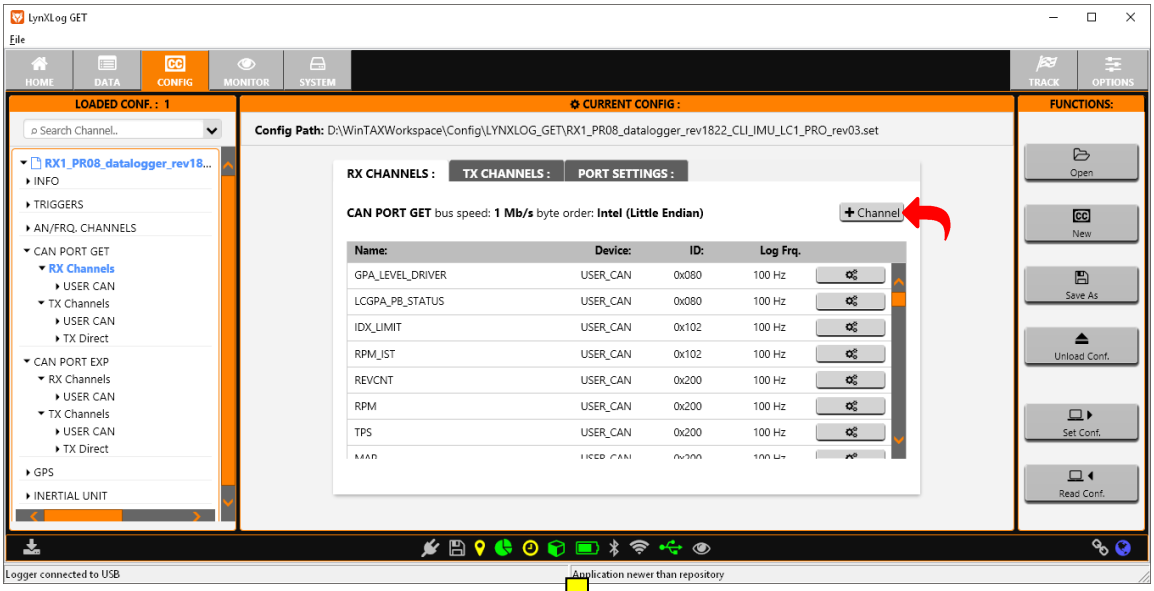


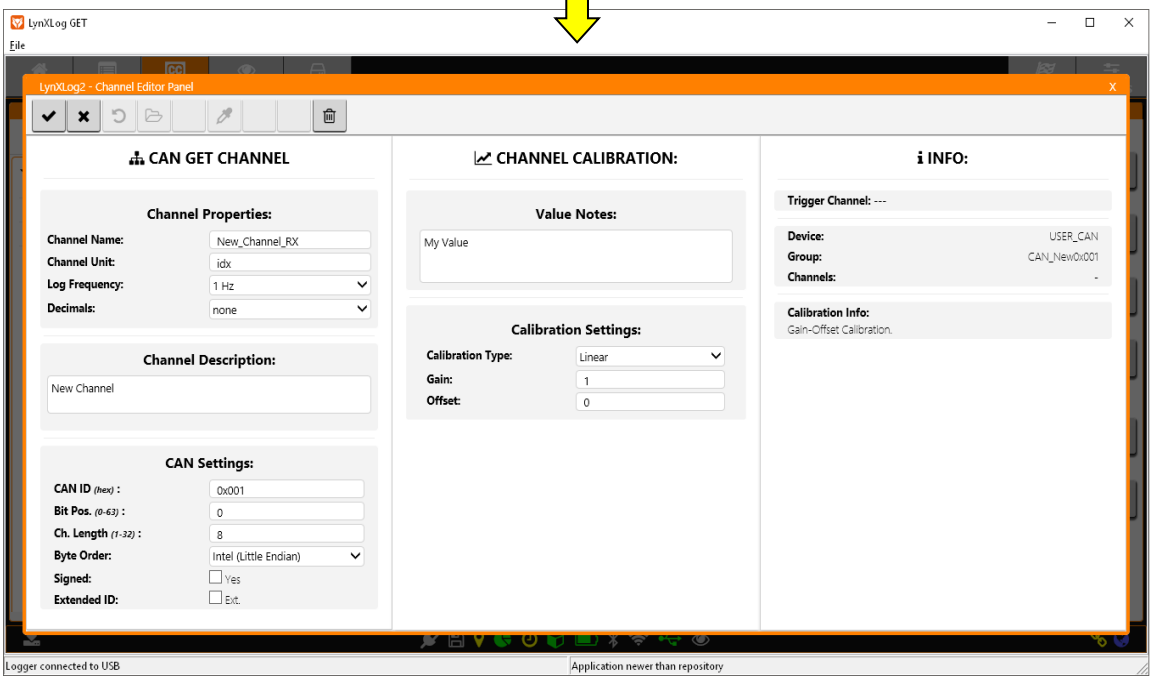
TX CHANNELS: displays the CAN channels transmitted by the instrument



5.1 ADDING A NEW CAN CHANNEL

Adding a CAN channel (receiving or transmitting) is done by pressing the **+ Channel** button (if enabled). The button is visible on the **RX CHANNELS** (receiving channels) and **TX CHANNELS** (transmitting channels) tabs: the channel added with this procedure is always added to the **USER CAN** sub-branch (user-defined channels).

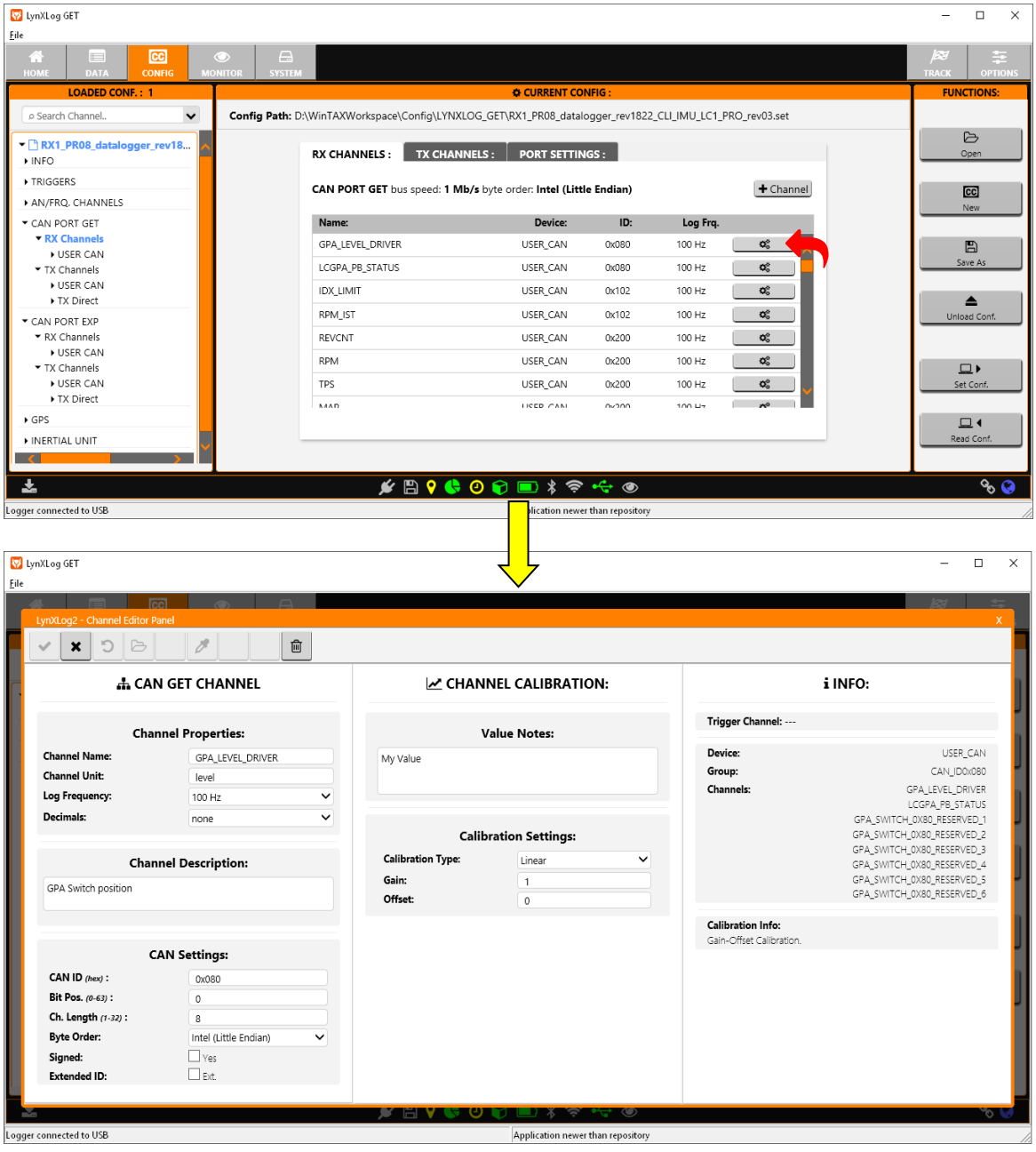




For more information on the channel properties window see Annex 1 chap. 6 of this manual.
Configure according to your needs, save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

5.2 CHANGING A CAN CHANNEL

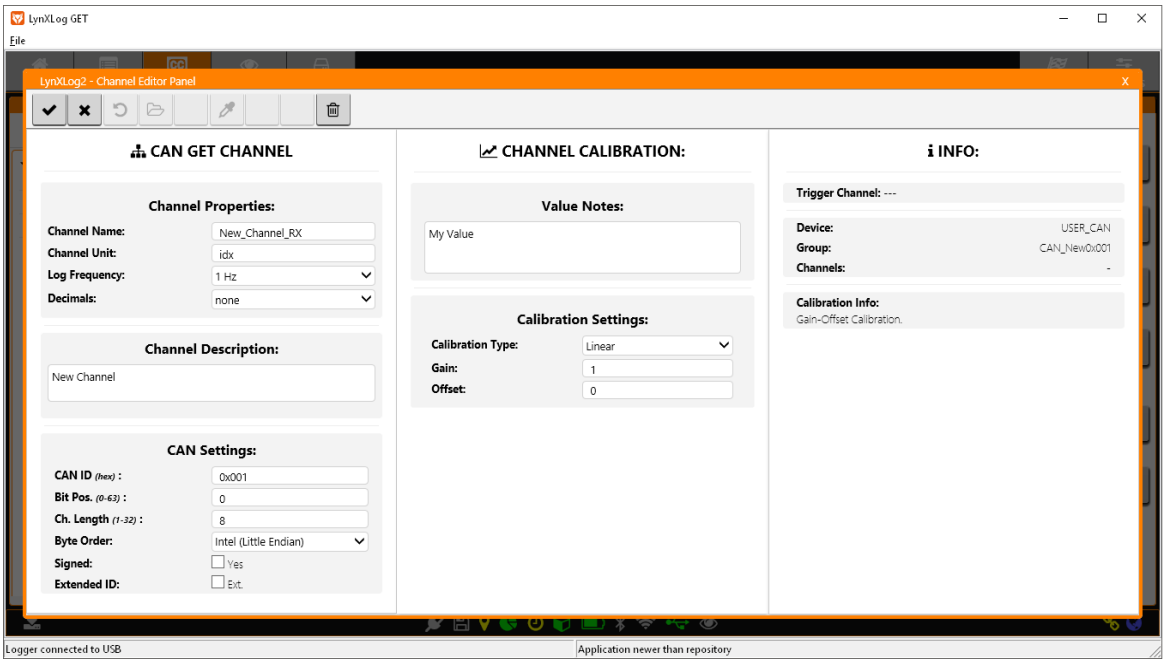
To access the configuration panel of a channel, press the relative button ⚙ in the channel table or double click on the element to be changed in the setup channel tree.



Configure according to your needs, save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

6 CONFIGURING A CHANNEL

The settings for configuring a channel are contained in the LynXLog **Channel Editor Panel.**
To access the configuration panel of a channel, press the relative button ⚙ in the channel table or double click on the element to be changed in the setup channel tree.



The **Channel Editor Panel** window has a toolbar at the top:

- ✔ : confirms all the changes made and closes the **Channel Editor Panel** window.
- ✖ : deletes all the changes made and closes the **Channel Editor Panel** window.
- ↺ : deletes all the changes made.
- 🗁 : opens the data source file selection.
- 💉 : imports the raw value of the channel.
- 🗑 : clears the channel and closes the Channel Editor Panel window.

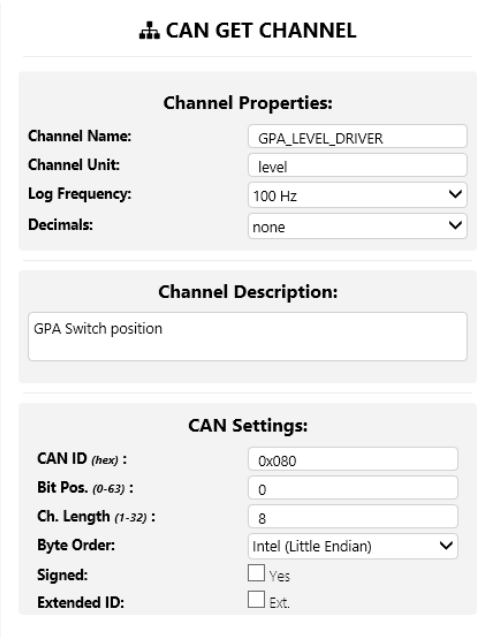
NOTE: THE TOOLBAR BUTTONS MAY BE ACTIVATED OR NOT ACCORDING TO THE TYPE OF CHANNEL YOU ARE EDITING.

The **Channel Editor Panel** is divided into three columns that allow you to:

- Change the channel properties.
- Change the channel calibration.
- View some summary information for the channel settings.

6.1 CHANNEL PROPERTIES

The properties column allows you to change:



- **Channel Name:** The name of the channel.
- **Channel Unit:** the unit of measurement of the channel (optional).
- **Log Frequency:** the acquisition frequency, if this parameter is set to None, the channel will not be acquired and will not be available for software analysis.
- **Decimals:** the number of decimals of the channel's calibrated value.
- **Channel Description**: channel description (optional) visible as a suggestion when the mouse pointer hovers over the channel name in the "Channel Table".
- **CAN ID:** defines the message identifier (ID) expressed in hexadecimal format. **NOTE**: you can enter the ID number using or not using the prefix 0x .
- **Bit Pos .:** defines the position of the LSB (in the case of a Little Endian channel) or MSB (in the case of a Big Endian channel) of a CAN channel.
- **Ch. Length:** defines the length of a CAN channel bit.
- **Byte Order**: defines the byte order of the CAN channel. The settings are: Intel (Little Endian), Motorola (Big Endian).
- **Signed**: if selected it indicates that the most significant bit of the channel represents the sign the order of the bytes of the CAN channel: Intel (Little Endian), Motorola (Big Endian).
- **Extended ID**: if selected it indicates that the channel ID is the extended type (length 29 bits), otherwise the ID is the standard type (length 11bit).

NOTE: THE CONFIGURATION PARAMETERS VARY ACCORDING TO THE TYPE OF CHANNEL YOU ARE MODIFYING.

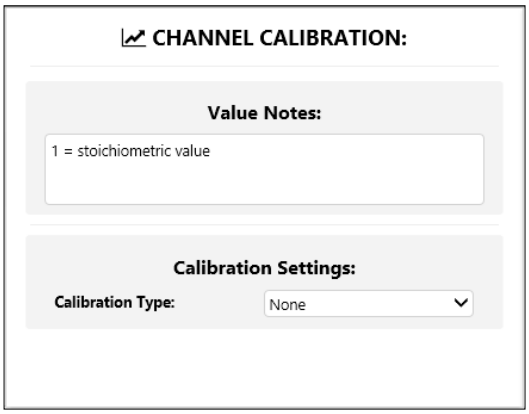
6.2 CALIBRATING A CHANNEL

In order to obtain correct data (to be analysed in WinTAX or displayed on the MONITOR page of LynXLog) it is almost always necessary to perform mathematical operations on the original values of the channel (raw data) defined by the calibration set in the channel.
In the **Channel Calibration** column of the **Channel Editor Panel** window you can see:

- **Value Notes**: allows you to enter notes on the calibration (e.g. what a certain value corresponds to).
- **Calibration Type**: indicates the type of channel calibration.

A channel can have different types of calibration:

- **None** : the channel values are not calibrated.
- **Linear:** the channel values are linearly calibrated using two coefficients (gain and offset).
- **Polyline:** the channel values are calibrated using a point-to-point association (linearly interpolating internal and external data to user-defined points).
- **Suspension:** use this type of calibration (if available) for linear position transducers (e.g. suspension potentiometers).
- **Other:** according to the type of channel, other types of calibration can be selected.



The following chapters will provide more details on the calibrations available in LynXLog.

ATTENTION: WHEN THE CALIBRATION OF A CHANNEL IS CHANGED, IT IS NECESSARY TO SEND THE CONFIGURATION TO THE LOGGER AGAIN (see chap. 12.5.3) TO APPLY IT TO THE NEW ACQUISITIONS.

6.2.1 CALIBRATION NONE

ATTENTION: **None** calibration does not apply any correction to the acquired data.
To apply a **None** calibration proceed as follows:

- Select the **None** item in the **Calibration Type** selector.
- If no other changes need to be made, press the ✔ button in the toolbar: the **Channel Editor Panel** will close.
- Save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

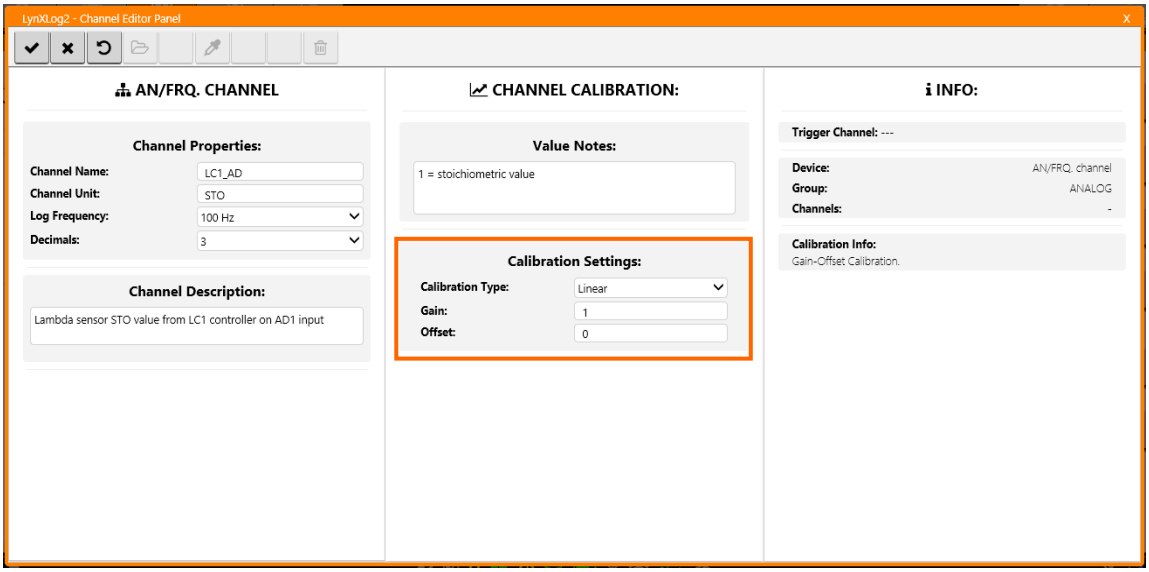
6.2.2 LINEAR CALIBRATION

Linear calibration calibrates the input data (raw value acquired by the logger) to obtain an intelligible value in the analysis/display phase (in the WinTAX software or on the LynXLog MONITOR screen). The calibrated data will be calculated according to the formula:

calibrated data = (raw data x **gain**) + **offset**

To apply a linear calibration proceed as follows:

- Select the Linear item in the **Calibration Type** selector.
- Select the **Gain** field and enter the multiplicative coefficient value of the input data .
- Select the **Offset** field and enter the value of the additional coefficient to the input data .

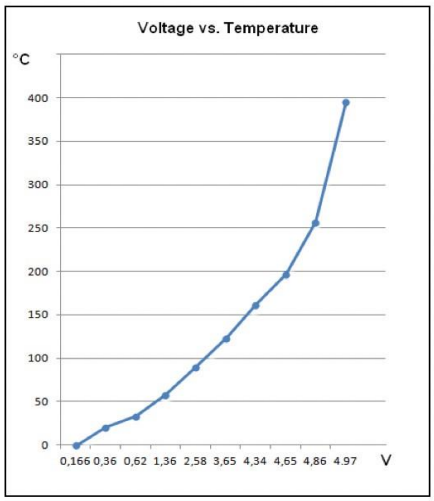


- If no other changes need to be made, press the ✔ button in the toolbar: the **Channel Editor Panel** will close.
- Save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

6.2.3 POLYLINE CALIBRATION

Polyline calibration calibrates the input data using a point-to-point association (linearly interpolating the internal and external data to the points defined in the calibration table). A concrete example of **Polyline** calibration is that of an NTC sensor (characterized by a non-linear relationship between the supplied voltage and the detected temperature).

Voltage (V)	Temperature (°C)
0,166	0
0,36	19,45
0,62	32,94
1,36	57,56
2,58	89,01
3,65	122,41
4,34	160,61
4,65	196,50
4,86	256,33
4.97	394,78



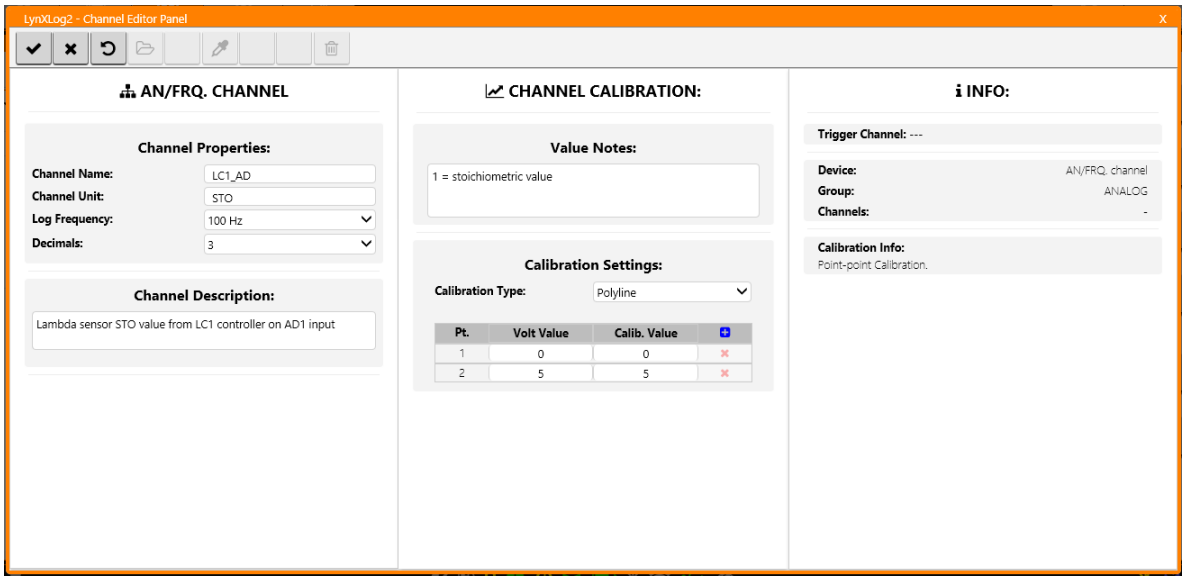
By entering the voltage values (raw data) in the **Raw Value** column and the temperature values (corresponding calibrated value) in the **Cal. Value** column it will be possible to reconstruct the temperature curve (it is clear that to obtain greater precision it will be necessary to define more points in the non-linear areas of the graph so that data interpolation is more accurate).

ATTENTION: THE VALUES ON THE CALIBRATION TABLE MUST PREFERABLY BE INSERTED IN ASCENDING ORDER IN THE Raw Value COLUMN.

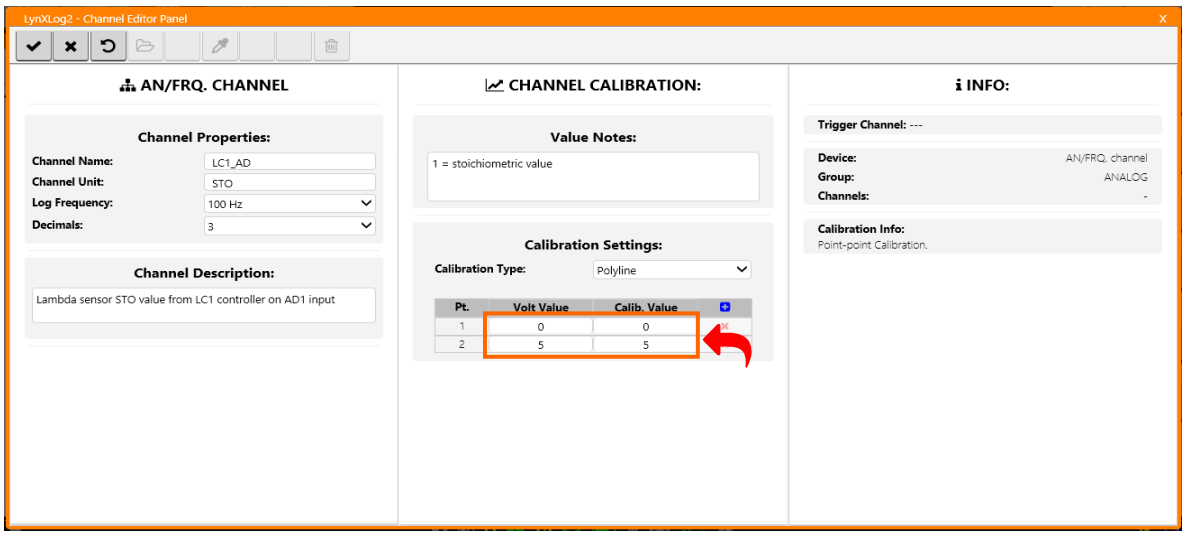
The Polyline calibration must contain at least two pairs of values.

To apply a Polyline calibration proceed as follows:

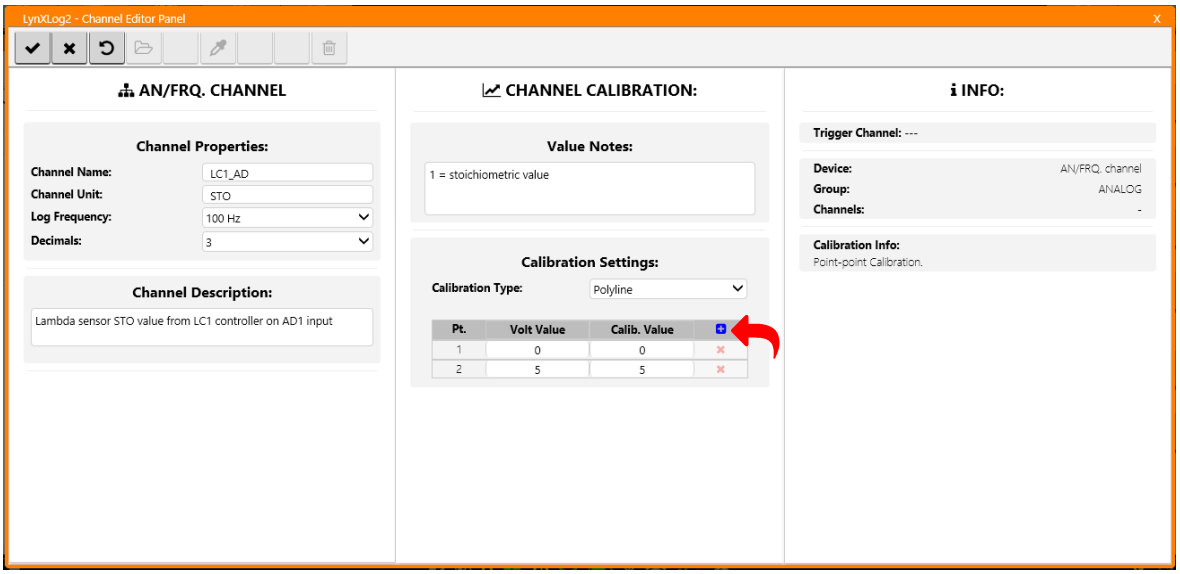
- Select the **Polyline** item in the **Calibration Type** selector



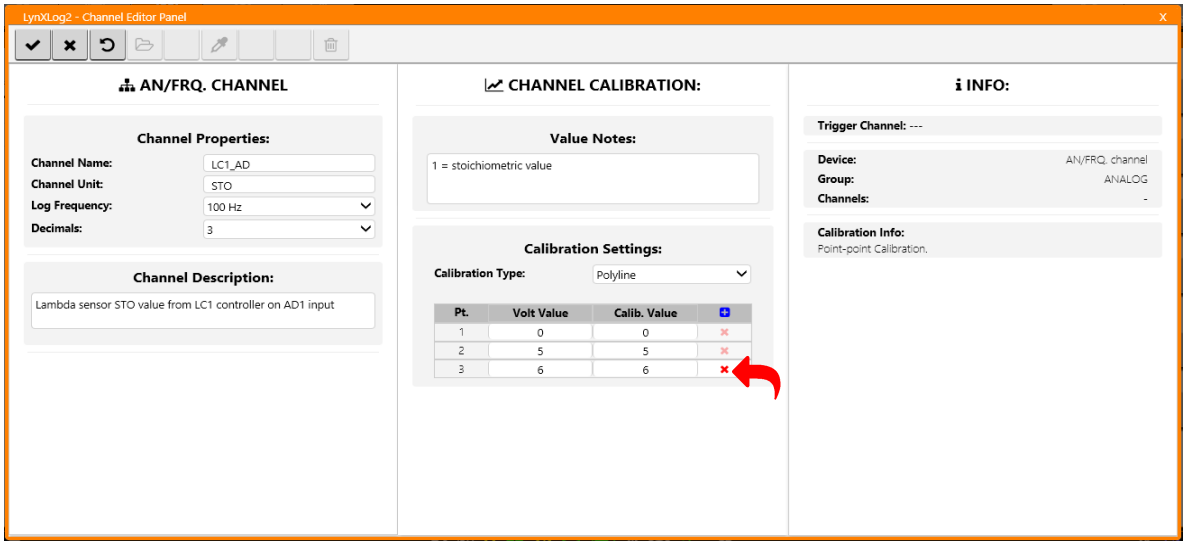
- Press on a cell of the calibration table to modify its value.



- To add a new line to the calibration table press the ⊞ button



- To remove a row from the calibration table, press the ✖ button

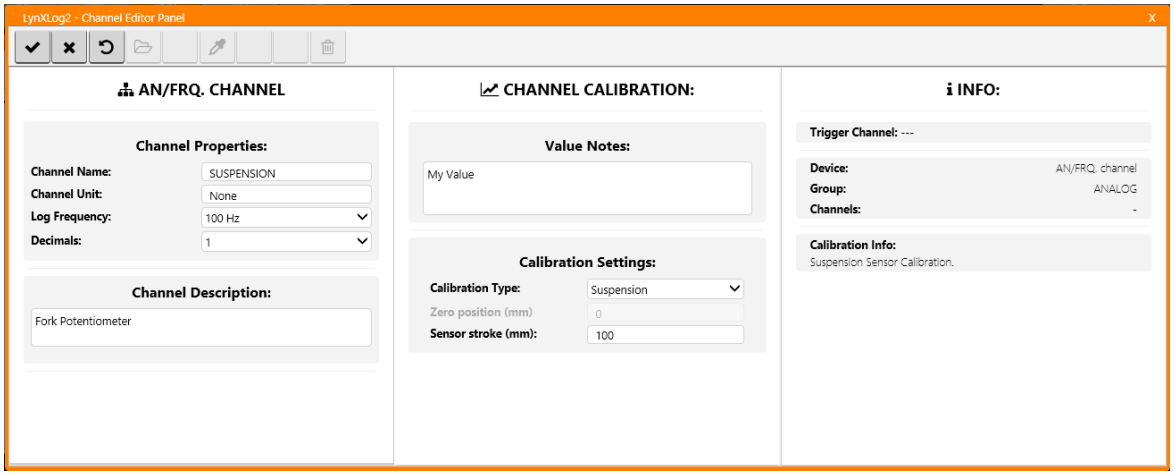


- If no other changes need to be made, press the ✔ button in the toolbar: the **Channel Editor Panel** will close.
- Save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

6.2.4 SUSPENSION CALIBRATION

Suspension calibration is generally used for transducers suitable for measuring linear travel (for example the potentiometers used in racing on car and motorcycle suspensions).
For a correct setting it is necessary to define the maximum stroke length of the potentiometer (Sensor Stroke parameter).
A special feature of the Suspension calibration is that it can define the "zero" position of the LynXLog Monitor screen (which is particularly useful in the case of sensors connected to suspensions).
To apply a Polyline calibration proceed as follows:

- Select the Polyline item in the Calibration Type selector
- Press Sensor stroke to enter the length of the useful working area of the sensor, expressed in mm.



- If no other changes need to be made, press the ✔ button in the toolbar: the **Channel Editor Panel** will close.
- Save the setup to a file or send it to the SL1 Data Logger (see chapters 12.5.5 and 12.5.3).

6.2.5 OTHER CALIBRATIONS

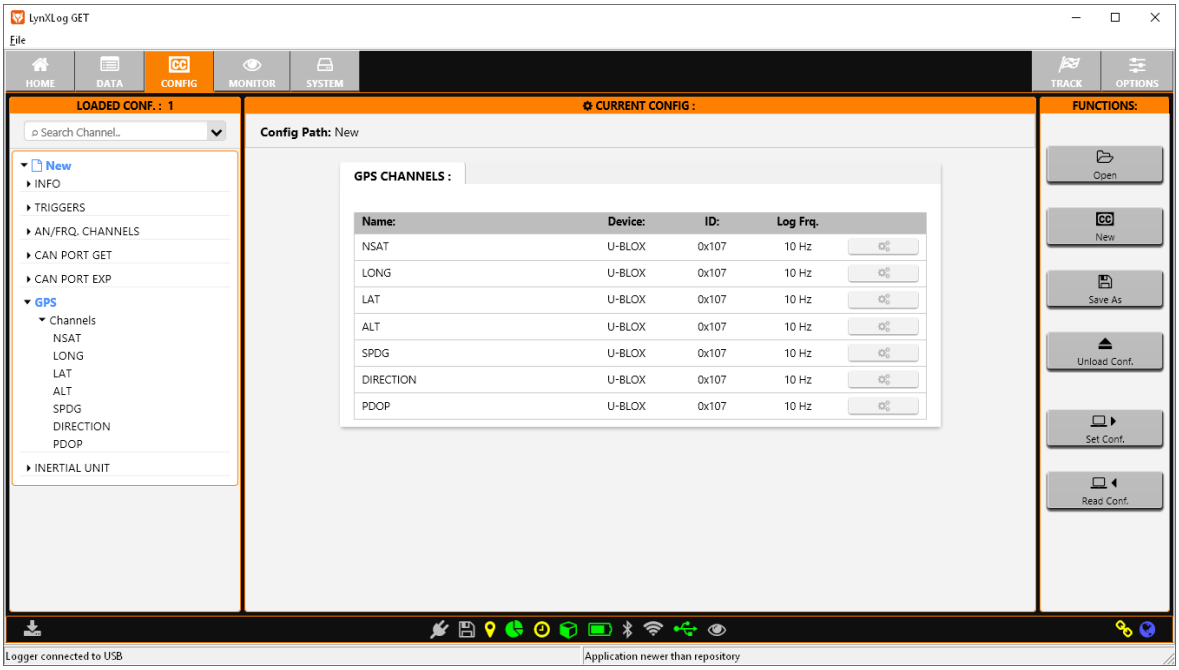
Depending on the type of input, particular calibrations may be available in addition to those described in the previous chapters. This is to facilitate the calibration and correct display of a channel on the Monitor screen and for data analysis on WinTAX4. A list of the other calibrations available in LynXLog is provided below:

INPUT	CALIBRATION NAME	DESCRIPTION
AN1-AN2-AN3	GK-LC1PRO-0001 AFR	calibration for Lambda sensor GET cod. GKLC1PRO-0001 (calibrated value expressed in Air Fuel Ratio).
	GK-LC1PRO-0001 STO	calibration for Lambda sensor GET cod. GK-LC1PRO-0001 (calibrated value expressed in STeichiOmetric)
	GK-LC1EVO-0001 AFR	calibration for Lambda sensor GET cod. GK-LC1EVO-0001 (calibrated value expressed in AFR)
	GK-LC1EVO-0001 STO	calibration for Lambda sensor GET cod. GK-LC1EVO-0001 (calibrated value expressed in STeichiOmetric)
	GS-TEM-0002 k-SENS	calibration for temperature sensor GET thermocouple k cod. GS-TEM-0002
	PRESS. SENS 10 bar	calibration for GET sensor cod. DS00080000 (FS 10 bar)
	PRESS. SENS 35 bar	calibration for GET sensor cod. DS00080001 (FS 35 bar)
	PRESS. SENS 100 bar	calibration for GET sensor cod. DS00080002 (FS 100 bar)
	NTC sensor	calibration for GET NTC temperature sensor cod. DS40050000
	TPS	Polyline calibration. The table is already pre-filled with the two values 0 and 100 in column Y. Insert the correct values provided by the TPS sensor in the fully closed (0) and fully open (100%) position
IC1	Frequency	Calibration for calculating the signal frequency in Hz.
	Rpm	calibration for the calculation of the revolutions per minute of the input signal (the Flywheel Teeth parameter defines the number of signal pulses supplied at each revolution)
	Speed	calibration for calculating the speed of a wheel (expressed in km/h) when using a sensor that provides an impulsive signal. The Pulse per Round parameter defines the number of signal pulses delivered at each revolution of the wheel, the Wheel Circumference parameter defines the circumference of the wheel

INPUT	CALIBRATION NAME	DESCRIPTION
CAN PORT GET CAN PORT EXP	Volt S2A	calibration that allows you to enter values in Volts in the X column when you calibrate a CAN channel coming from module S2A (AN inputs).
	Rpm S2A	calibration for the calculation of the revolutions per minute of the input signal (the Flywheel Teeth parameter defines the number of signal pulses supplied at each revolution) of a CAN channel coming from the S2A module (IC inputs).
	Speed S2A	calibration for calculating the speed of a wheel (expressed in km/h) when using a sensor that provides an impulsive signal connected to the S2A module (IC inputs). The Pulse per Round parameter defines the number of signal pulses delivered at each revolution of the wheel, the Wheel Circumference parameter defines the circumference of the wheel.

7 GPS PANEL

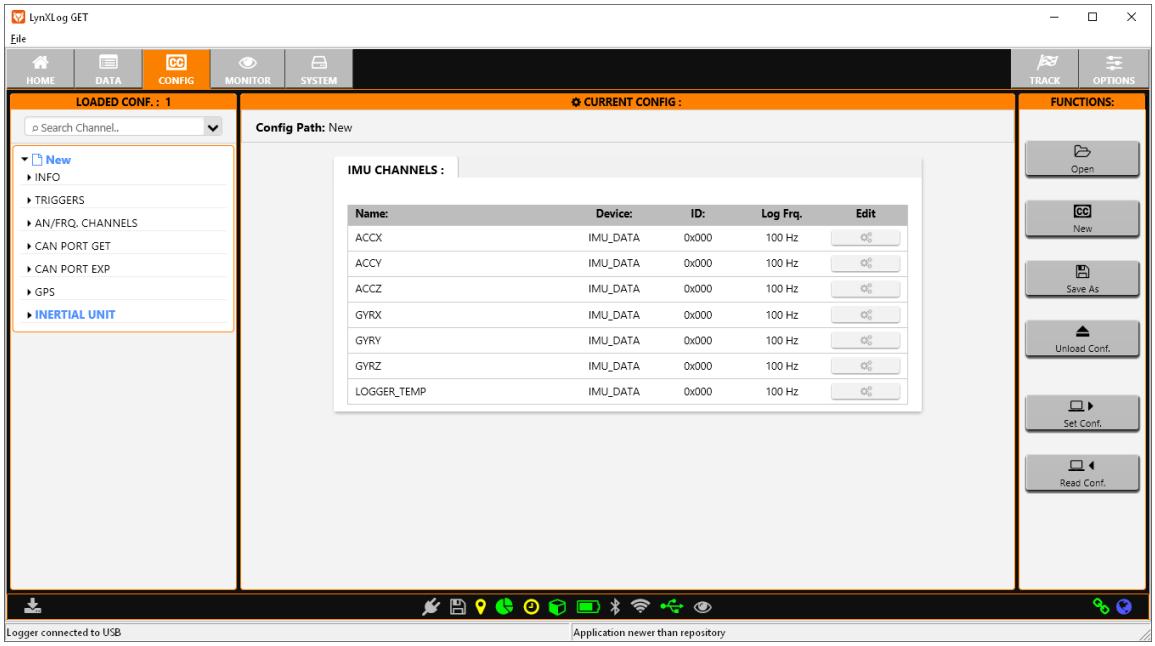
The **GPS** panel can be opened by clicking once on the **GPS** item of the active setup. This panel allows you to view the GPS channels acquired by the SL1 Data Logger.



The GPS channels cannot be edited.

8 IMU PANEL

The **IMU** panel can be opened by pressing on the **IMU** item of the active setup. This panel allows you to view the IMU channels acquired by the SL1 Data Logger.

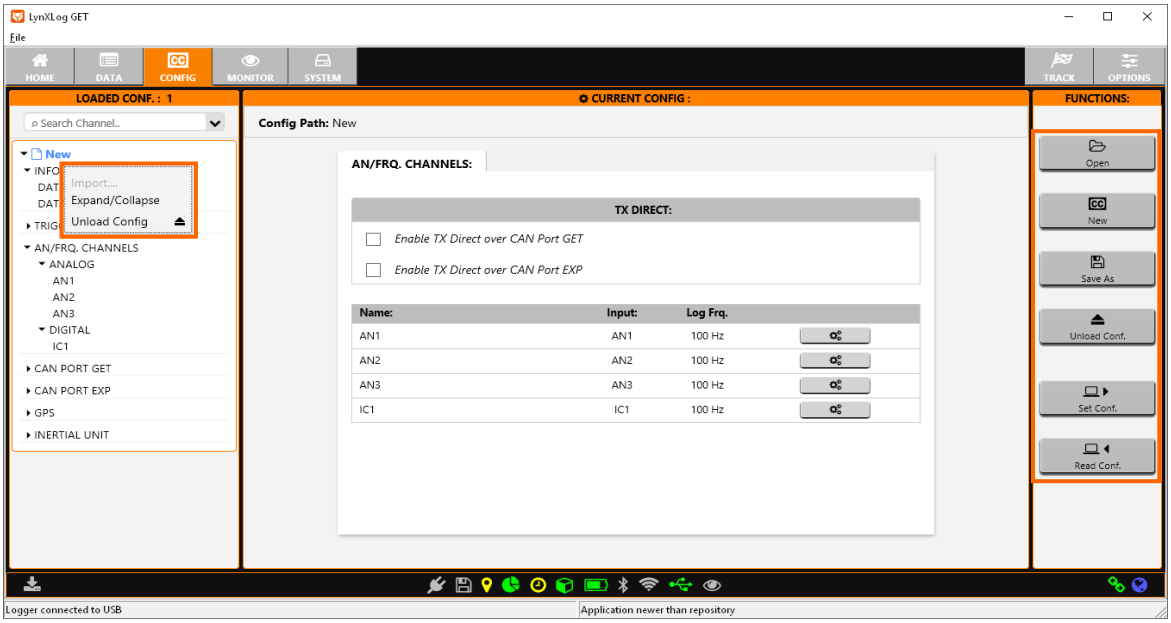


The **IMU** channels cannot be edited.

9 OTHER FUNCTIONS

9.1 THE CONTEXTUAL MENUS OF THE SETUP TREE AND THE BUTTONS OF THE FUNCTIONS AREA

The contextual menus appear by clicking the right mouse button over an element of the setup tree:



The functions available in the context menu are:

- **Import ...** : opens the panel for importing configurations from a file.
- **Expand / collapse** : expands or collapses the setup tree.
- **Unload Config** ⏏ : closes the setup without saving the data.

The **FUNCTIONS** area contains the following buttons:

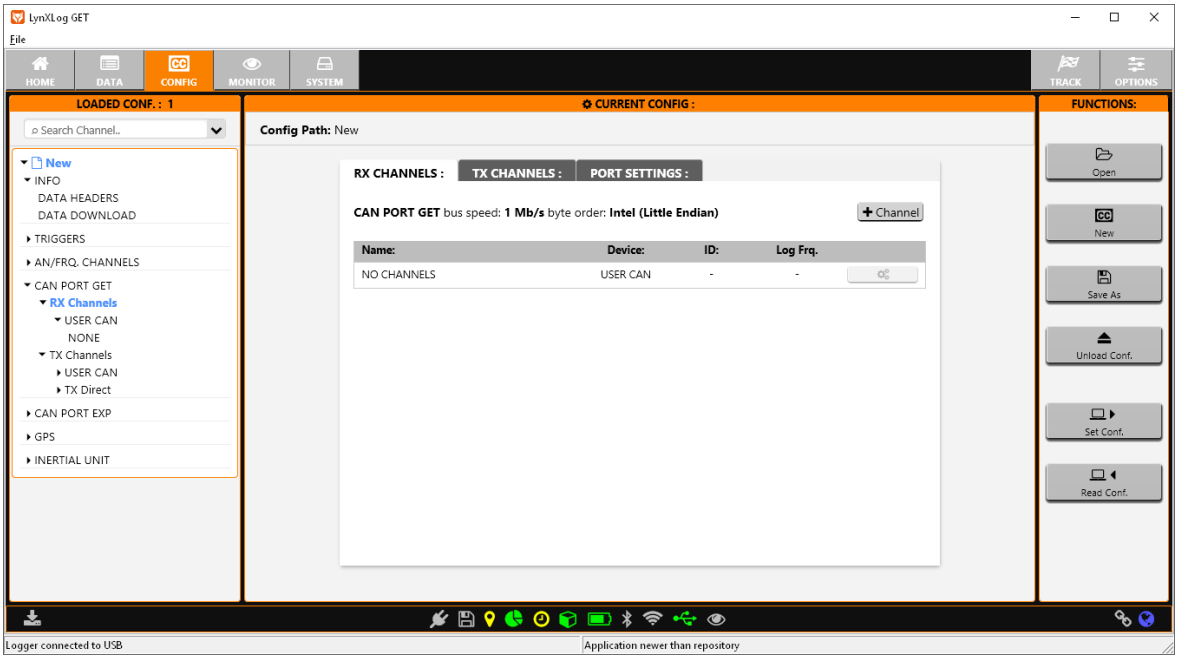
- **Open** : opens the dialog for loading a setup file (configuration).
- **New** : loads an empty setup (configuration).
- **Save as** : opens the window for saving the active setup (configuration).
- ⏏ **Unload Conf.** : closes the active setup (configuration).
- **Set Conf.** : sends the setup (configuration) to the connected device.
- **Read Conf.** : downloads the setup (configuration) from the connected device.

9.2 IMPORTING .dbc FILES

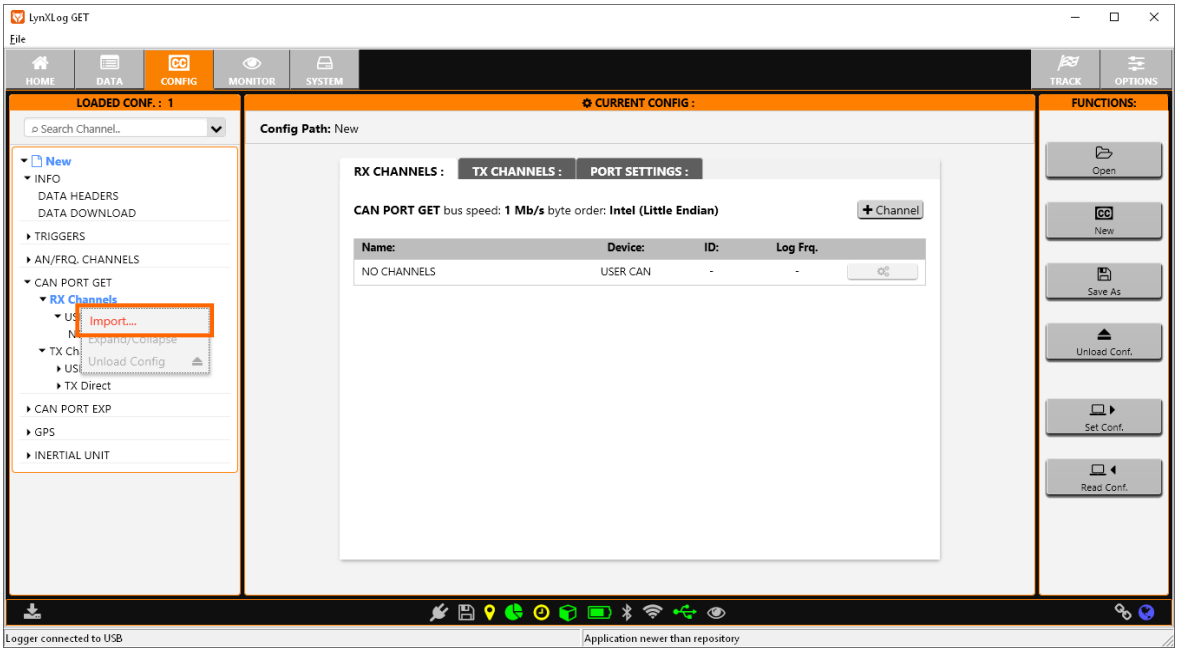
To speed up the creation of a setup it is possible to import files in .dbc format (descriptive of the CAN channels present in the bus to which the Data Logger SL1 will be connected).

To perform the import proceed as follows:

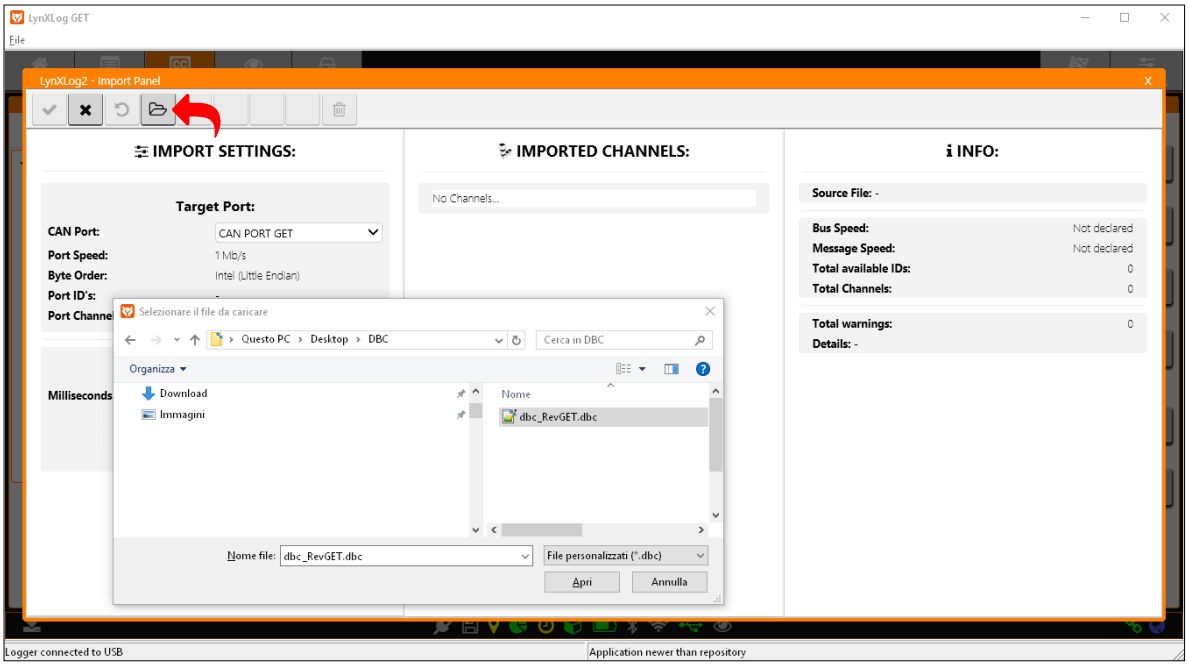
- Enter the LynXLog **CONFIG** page.
- Create a new SL1 setup (by pressing the **New** button) or load one from a file or download it directly from any connected device.



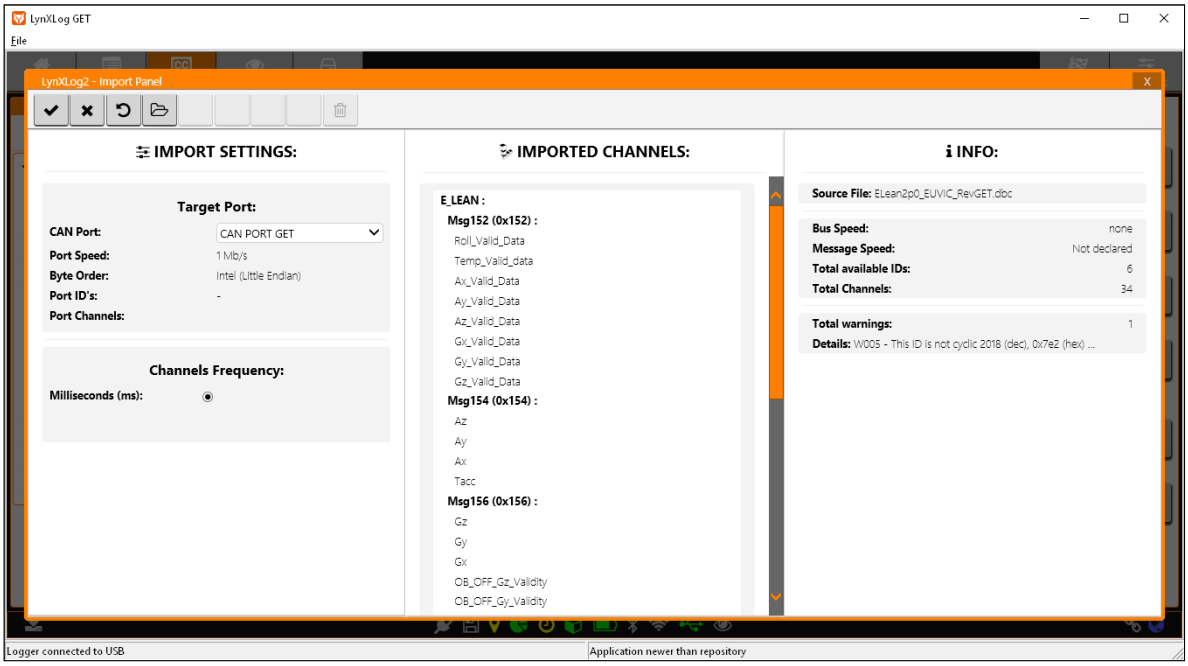
- Click the right mouse button on the CAN PORT GET or CAN PORT EXP item (depending on the CAN bus you want to use for importing the channels): click on **Import** (in the context menu) to display the **Import Panel**.



- Press the button in the toolbar and select the file you want to import.



- Once the import is complete, import statistics will be displayed (**INFO** column) and the list of imported channels (**IMPORTED CHANNELS** column).

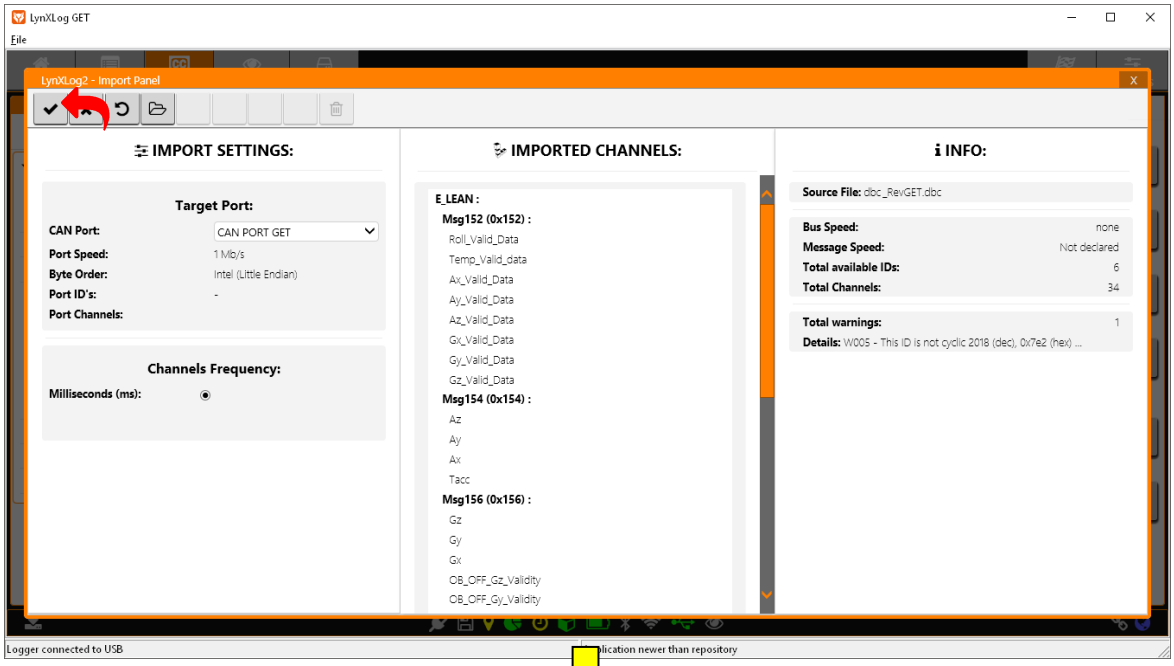


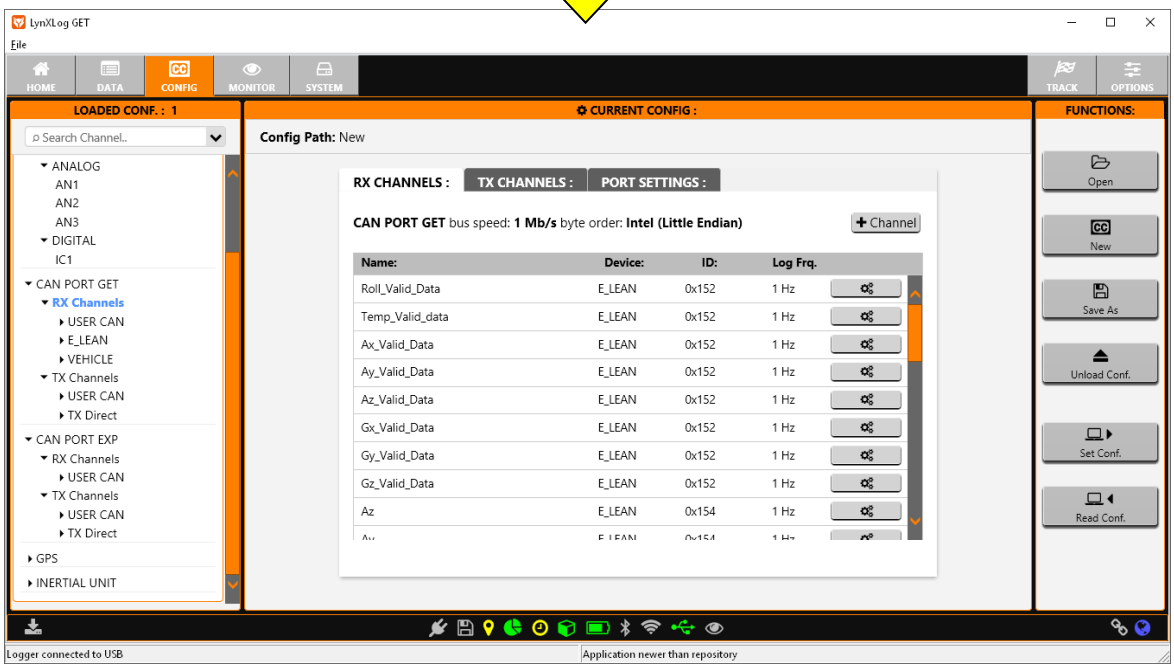
ATTENTION: DUE TO THE TYPE OF IMPORTED .DBC, WARNING MESSAGES MAY APPEAR (E.G. LACK OF CAN BUS SPEED DATA). THIS IS NOT TO BE CONSIDERED AN ERROR AS IT ORIGINATED FROM A LACK OF INFORMATION IN THE ORIGINAL FILE.

- If desired, it is possible to change the CAN port where the imported data will be sent (**CAN Port** selector in the **IMPORT SETTINGS** column).

- To continue, the buttons on the upper toolbar must be used:
  - ✔ : closes the panel and includes the channels imported into the active setup
  - ✖ : closes the panel without adding the imported channels to the active setup
  - ↺ : clears all imported channels

- To finish the import: press ✔.



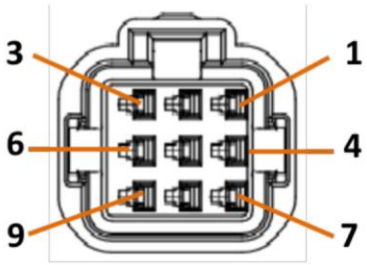


Note that the imported channels are included under the **RX Channels** branch of the selected CAN port, in a sub-branch different from the USER CAN (intended for user-defined channels).

ANNEX 2 PINOUTS

The following chapter shows the pinout for all connectors on the **SL1** Data Logger.

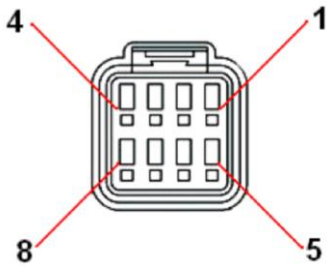
1 "MAIN" CONNECTOR



MAIN connector
Front view
(The wires exit from the rear)

MAIN CONNECTOR PINOUT		
PIN	**SIGNAL NAME**	**DESCRIPTION**
1	VPWR	Power supply positive
2	GNDPOW	Power supply negative
3	CANOL	CAN Port GET - CANL signal
4	CANOH	CAN Port GET - CANH signal
5	GNDSEN	Auxiliary power supply and analogue/frequency input negative
6	SL1TOEXT	Reserved
7	EXTTOSL1	Reserved
8	IC1	Frequency input (0-12V)
9	BEACON	Reserved

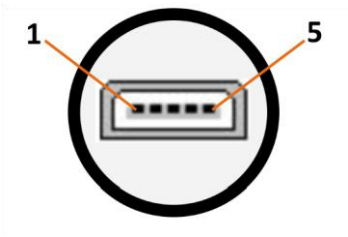
2 "EXP" CONNECTOR



EXP connector
Front view
(The wires exit from the rear)

EXP CONNECTOR PINOUT		
PIN	**SIGNAL NAME**	**DESCRIPTION**
1	DO	Digital output (only available for the new model)
2	GNDSEN	Auxiliary power supply and analogue/frequency input negative
3	CAN1L	CAN Port EXP - CANL signal
4	CAN1H	CAN Port EXP - CANH signal
5	AN1	Analogue input 1 (0-5V)
6	5VAUX	Auxiliary power supply output (5VDC)
7	AN2	Analogue input 2 (0-5V)
8	AN3	Analogue input 3 (0-5V)

3 "USB" CONNECTOR



USB connector
Front view
(The wires exit from the rear)

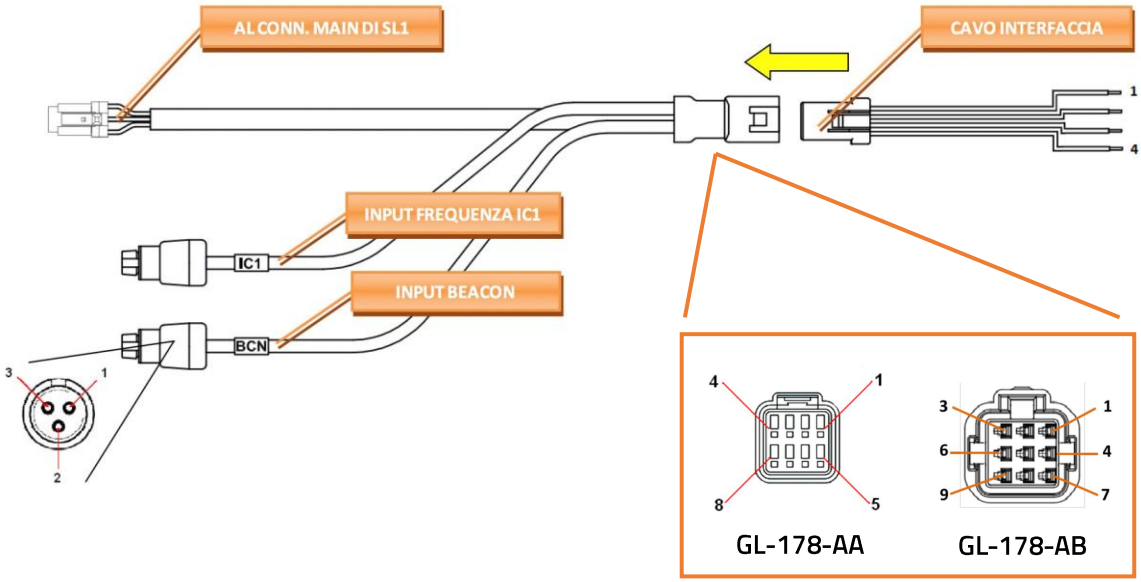
USB Connector Pinout		
PIN	**SIGNAL NAME**	**DESCRIPTION**
1	USB +	USB signal +5V
2	USB N	USB signal Data N
3	USB P	USB signal Data P
4	ID	USB signal ID
5	USB -	USB GND

ANNEX 3 THE SL1 WIRING

The following chapter describes the **SL1** wiring.

1 MAIN POWER/IC WIRING CODE GL-0178-AA/AB

MAIN/POWER wiring code GL-0178-AA/AB.
This wiring must be connected to the MAIN connector (SL1 Data Logger).

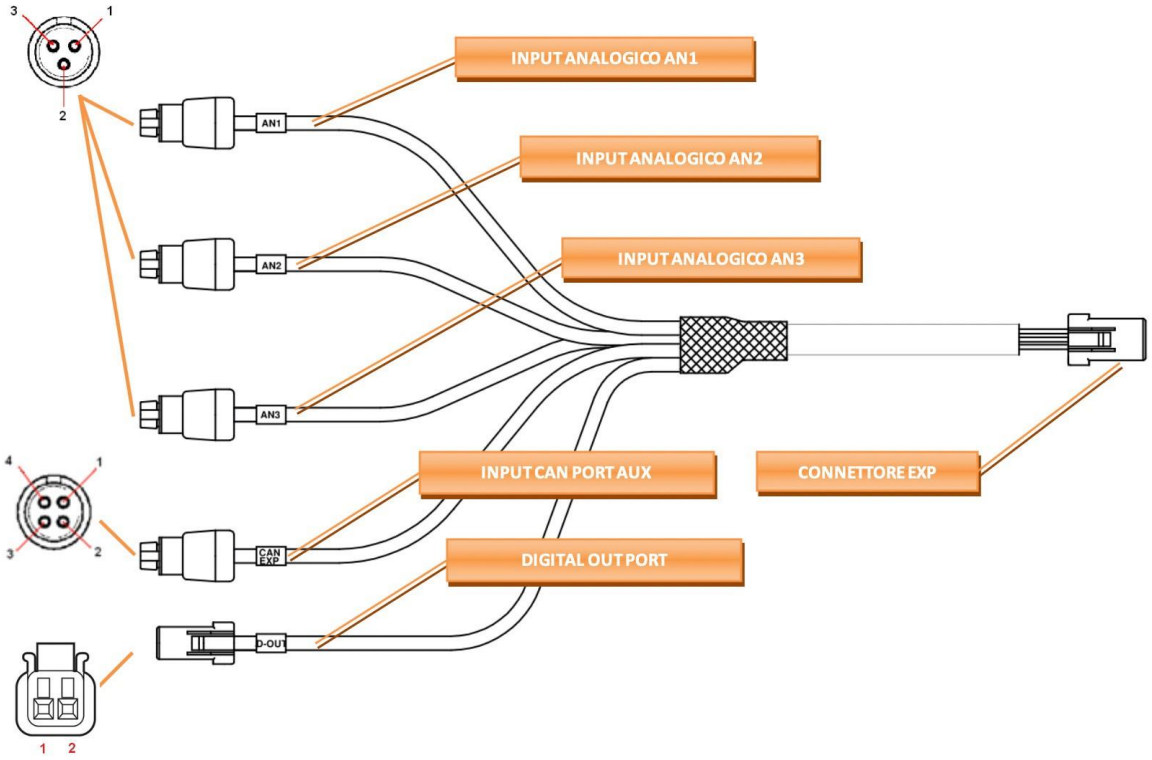


MAIN/POWER connector pinout		
CONNECTOR/CABLE	PIN	DESCRIPTION
IC1 BCN	1	+ Power supply positive
	2	Input signal
	3	Ground (GND SEN)
INTERFACE CABLE	1	+Power supply positive
	2	Power supply negative (GNDPWR)
	3	CAN Port GET - CANL signal
	4	CAN Port GET - CANH signal

Note: this wiring can be used in combination with code GL-167-AB to easily connect a Get ECU as well as a frequency input (e.g. RPM or speed sensor).

2 EXPANSION WIRING CODE GL-0179-AB

EXPANSION wiring code GL-0179-AB.
This wiring must be connected to the EXP connector SL1 Data Logger).

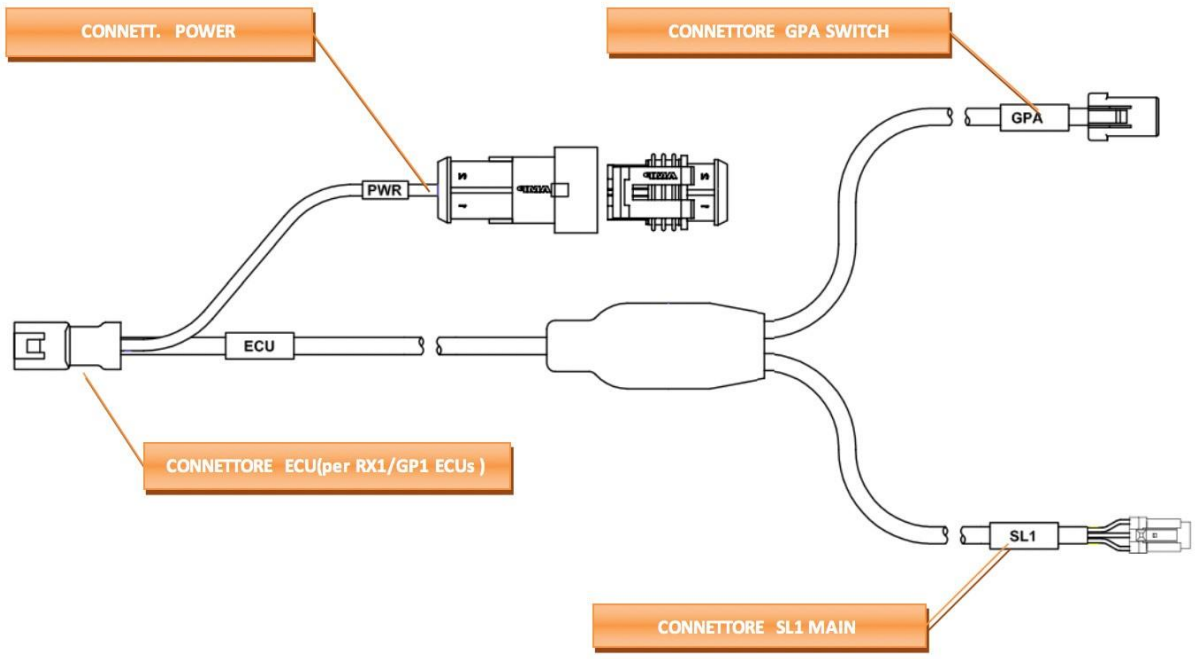


EXP Connector Pinout		
CONNECTOR	PIN	DESCRIPTION
AN1 AN2 AN3	1	+ 5 VDC (VREF)
	2	Input signal
	3	Ground (GND SEN)
CAN EXP	1	CAN Port EXP -CANL signal
	2	CAN Port EXP -CANH signal
	3	NC – not connected
	4	NC – not connected
DOUT	1	Digital output signal
	2	Ground (GND SEN)

- **EXP CONNECTOR:** must be connected to the **EXP** connector of the **SL1** Data Logger.
- **CONNECTOR AN1 ... AN3:** analogue inputs (example: potentiometer, thermocouple, etc.).
- **CAN EXP CONNECTOR:** second CAN port **(CAN Port EXP)**.
- **NECTOR DOUT:** Open-Drain digital output (**DIGITAL OUT**)

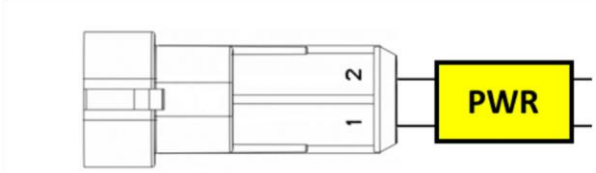
3 MULTILINK WIRING CODE GL-0167-AB

Position of the connectors in the **MULTILINK** wiring, code **GL-0167-AB**.



- **ECU CONNECTOR:** Input for the **GP1/RX1 ECUs** family or **LC1-EVO** lambda module (data via CAN Bus).
- **GPA CONNECTOR:** input for **GPA SWITCH** module.
- **MAIN SL1 CONNECTOR:** input for the **SL1** Data Logger connection (**MAIN** connector).
- **PWR CONNECTOR:** to be used to power the system.
  NOTE: all the connected devices will turn on (e.g ECU, SPA SW...).

PWR CONNECTOR PINOUT		
CONNECTOR/CABLE	**PIN**	**DESCRIPTION**
PWR	1	Power supply positive
	2	Power supply negative (GNDPWR)

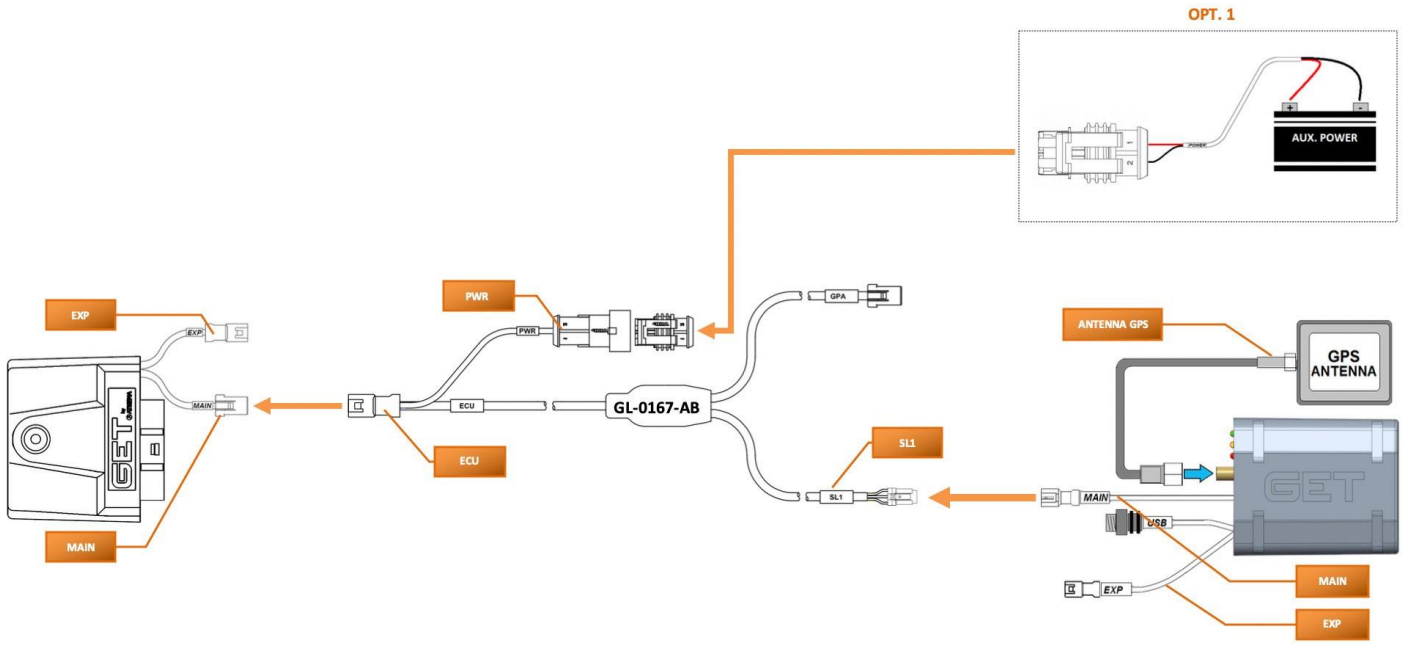


ANNEX 4 SL1 CONNECTION DIAGRAM

The following chapters show some connection examples:

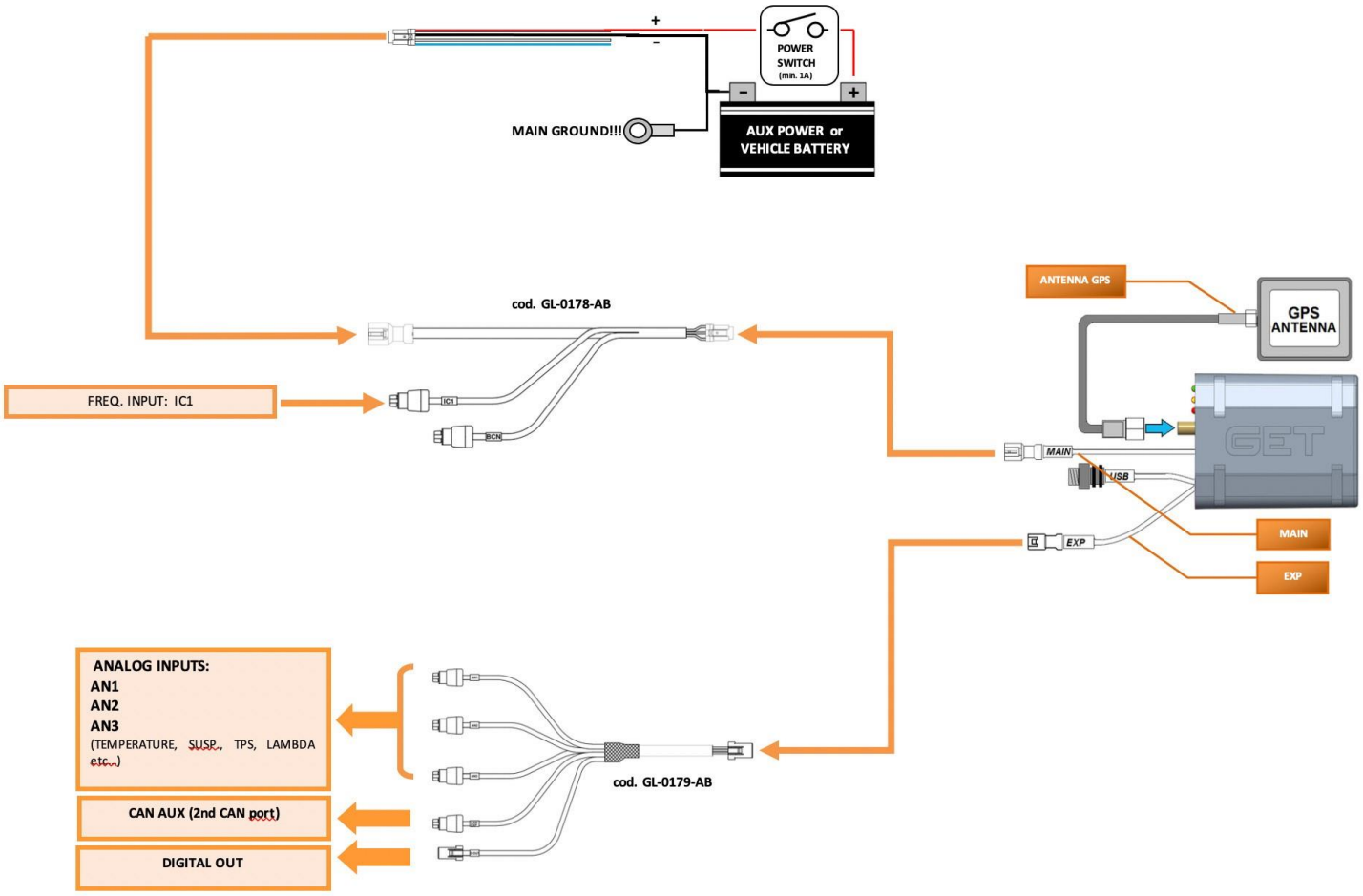
1 RX1/ GP1 ECUS - SL1 (BATTERY-LESS CONFIGURATION KIT COD. GK-SL1-0001 / GK-SL1-0002)

NOTE: IF OPT.1 IS USED, ALL CONNECTED DEVICES WILL BE POWERED WITHOUT THE NEED TO START THE ENGINE.

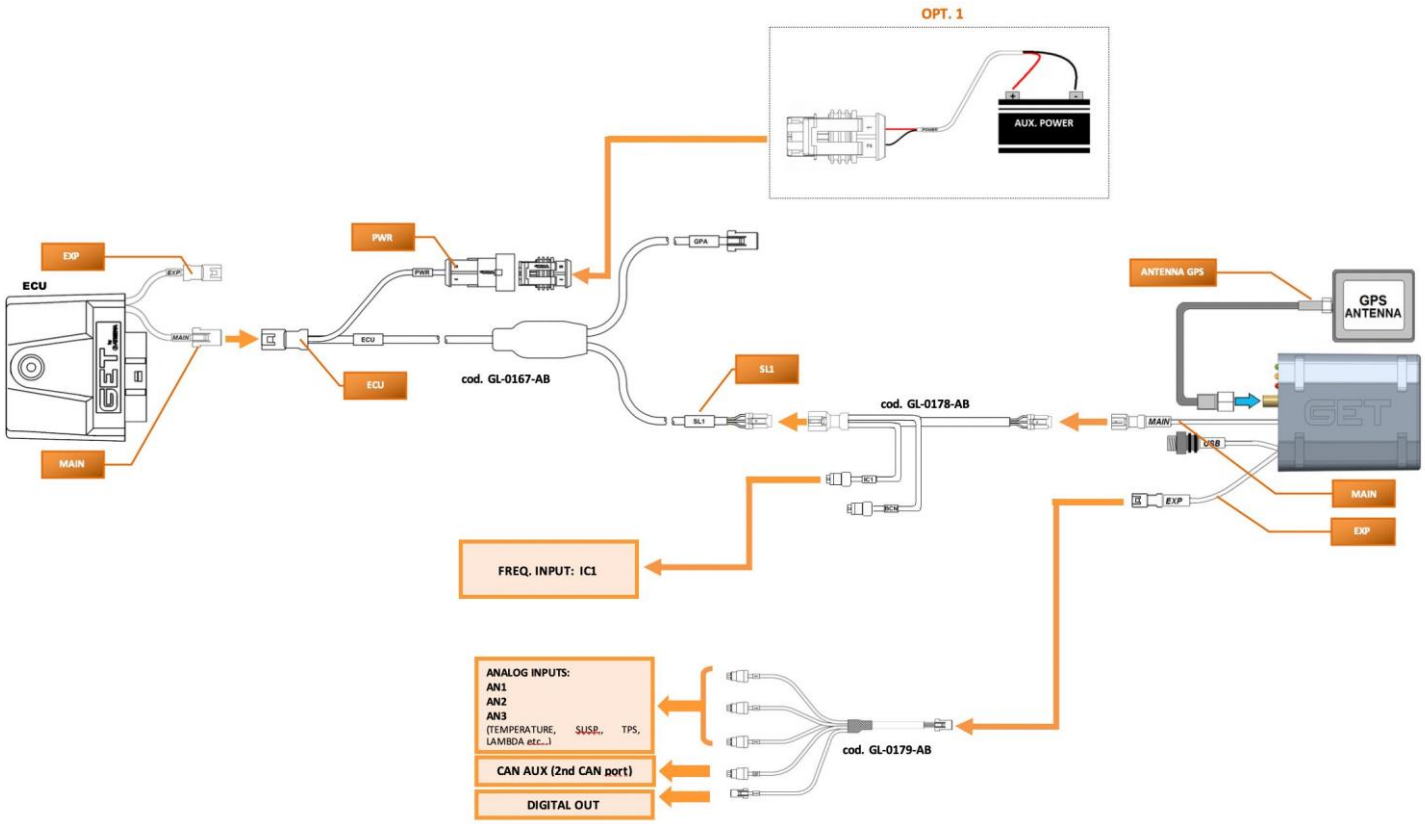


2 RX1/ GP1 ECUS - SL1 (KIT COD. GK-SL1-0003)

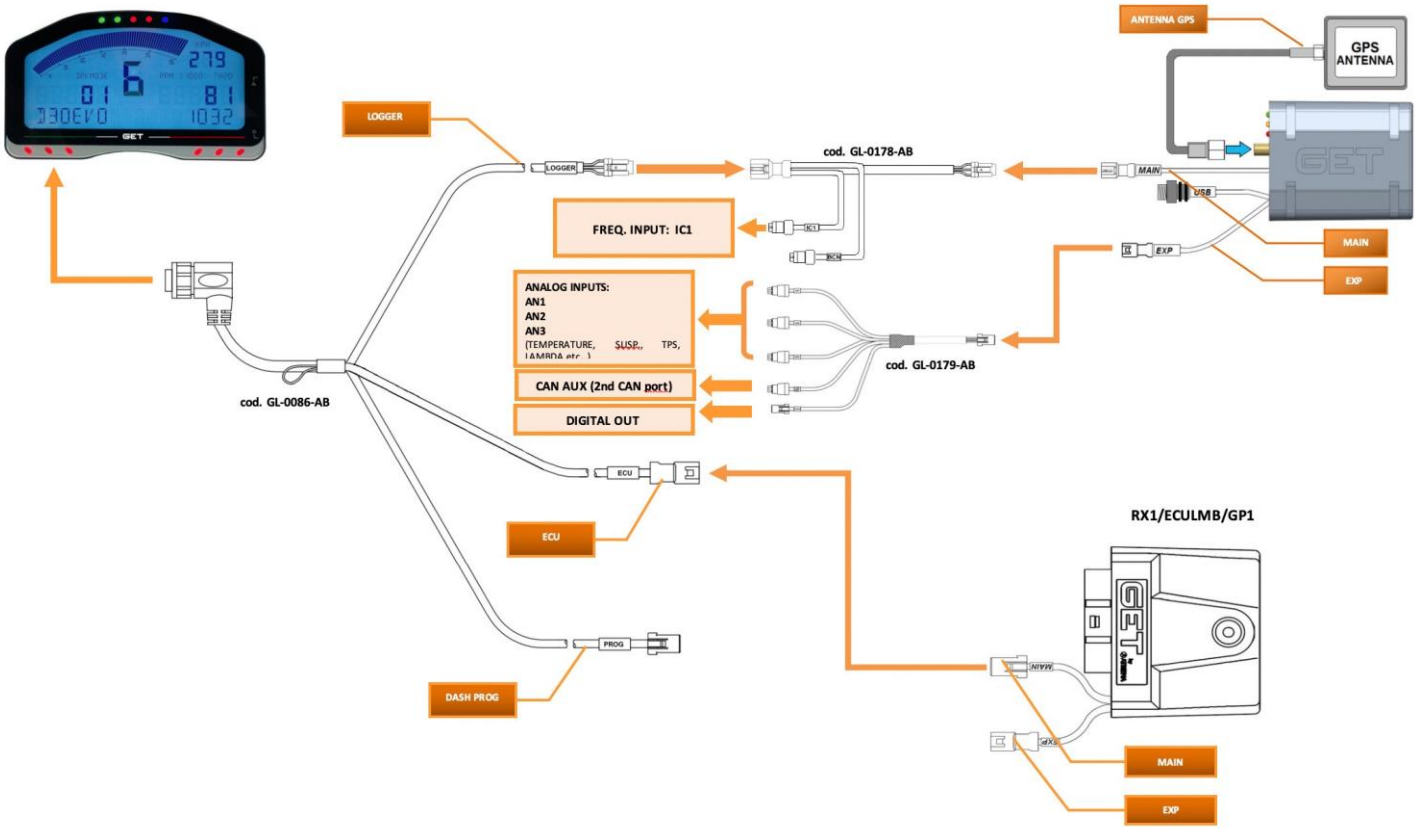
ATTENTION: IT IS RECOMMENDED TO INSERT A SWITCH ON THE SYSTEM POWER SUPPLY.



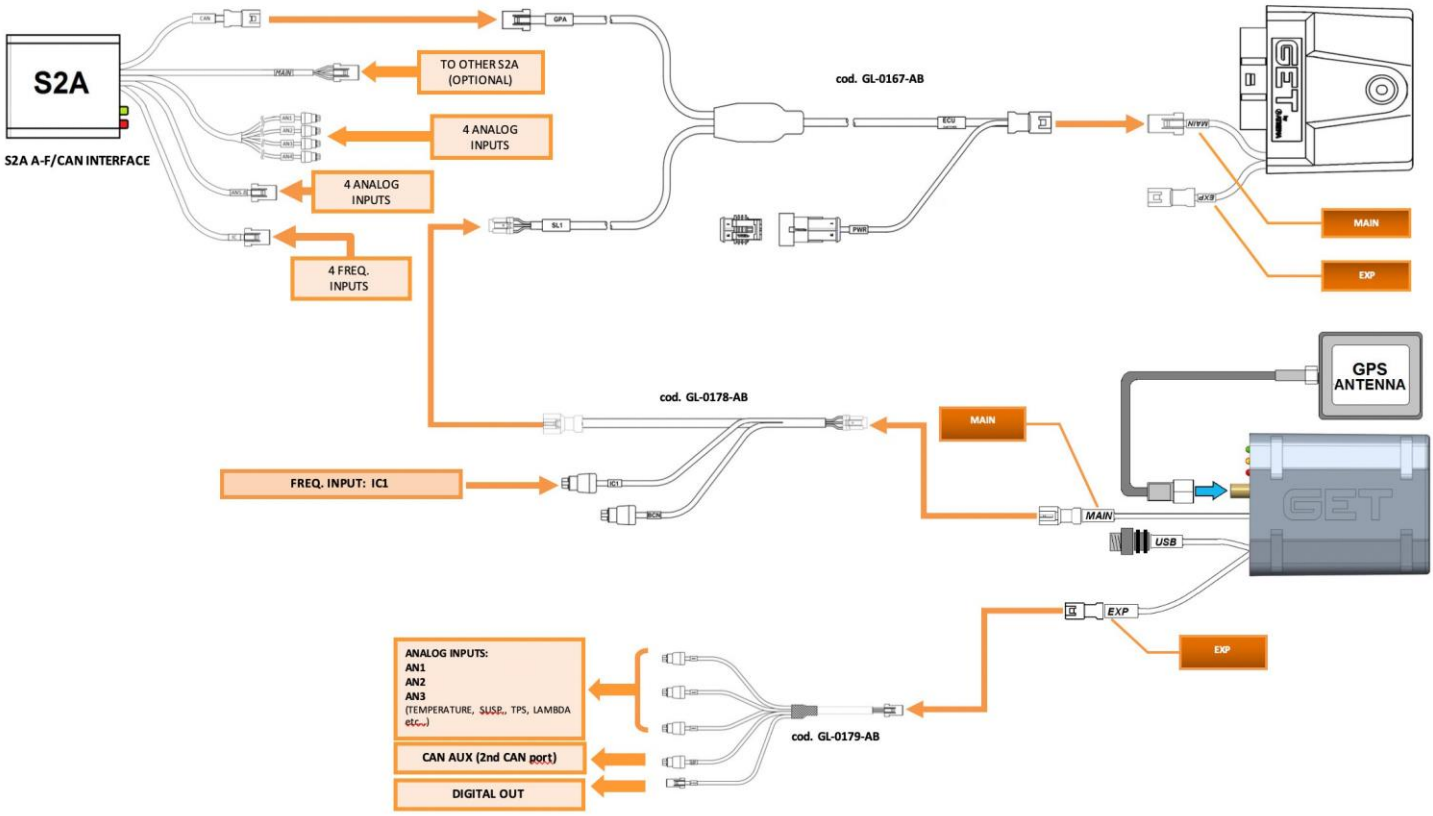
3 APPLICATION OF CAN BUS + EXT SENSORS: RX1/ GP1 ECUS - SL1 (BATTERY LESS CONF.)



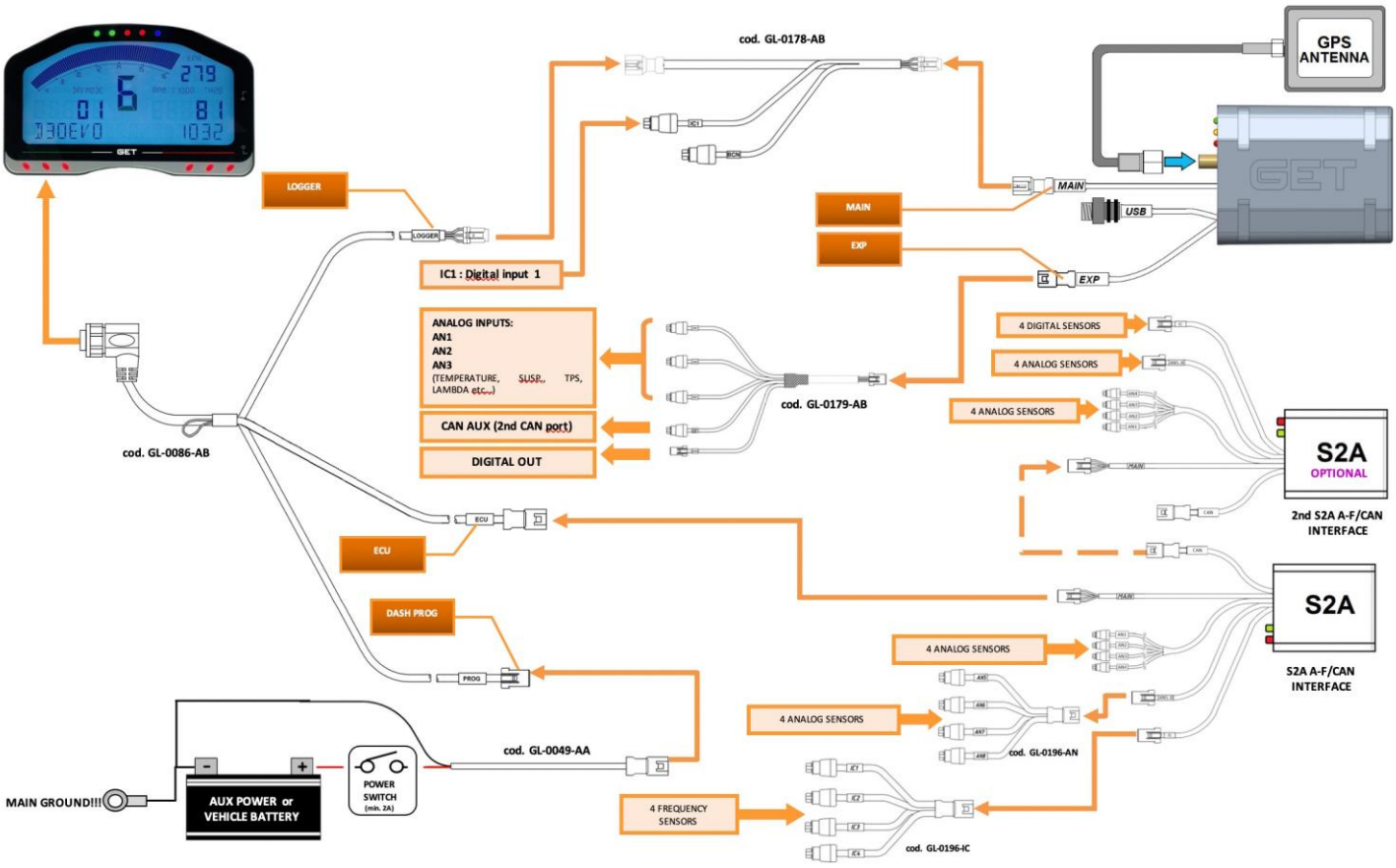
4 APPLICATION SL1 + RX1/ ECULMB /GP1 ECUS + D30 DASH



5 APPLICATION SL1 + RX1/ ECULMB /GP1 ECUS+ S2A CAN EXPANSION



6 APPLICATION SL1 + S2A CAN EXPANSION - D30 DASH



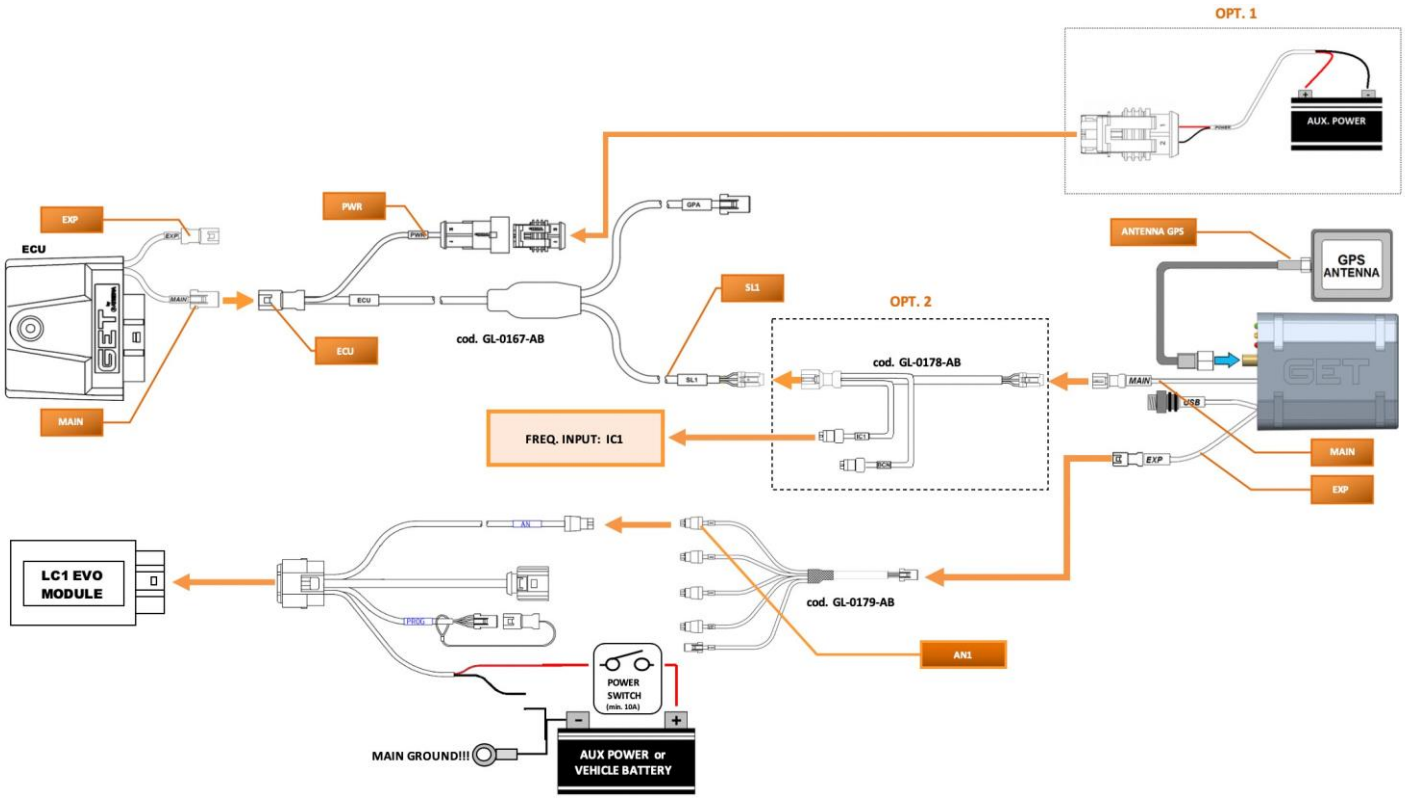
7 GK-LC1-EVO MODULE ANALOG CONNECTION

NOTES:

USING OPT.1 ALL THE CONNECTED DEVICES WILL BE POWERED WITHOUT THE NEED TO TURN ON THE ENGINE EXCEPT THE LC1-EVO MODULE

OPT.2 IS REQUIRED ONLY IF FREQUENCY SIGNALS MUST BE ACQUIRED (E.G. FREQUENCY OR WHEEL SPEED).

ATTENTION: IT IS RECOMMENDED TO INSERT A SWITCH (OR A RELAY COMMANDED BY THE START OF THE ENGINE) ON THE POSITIVE POWER SUPPLY OF THE LC1 MODULE (IF IT WAS CONNECTED BY THE VEHICLE BATTERY) TO AVOID DISCHARGING IT WHEN THE ENGINE IS OFF. USE A RELAY WITH CONTACTS ABLE TO SUPPORT 10A AT 12VDC



8 GK-LC1-PRO MODULE ANALOG CONNECTION

NOTES:

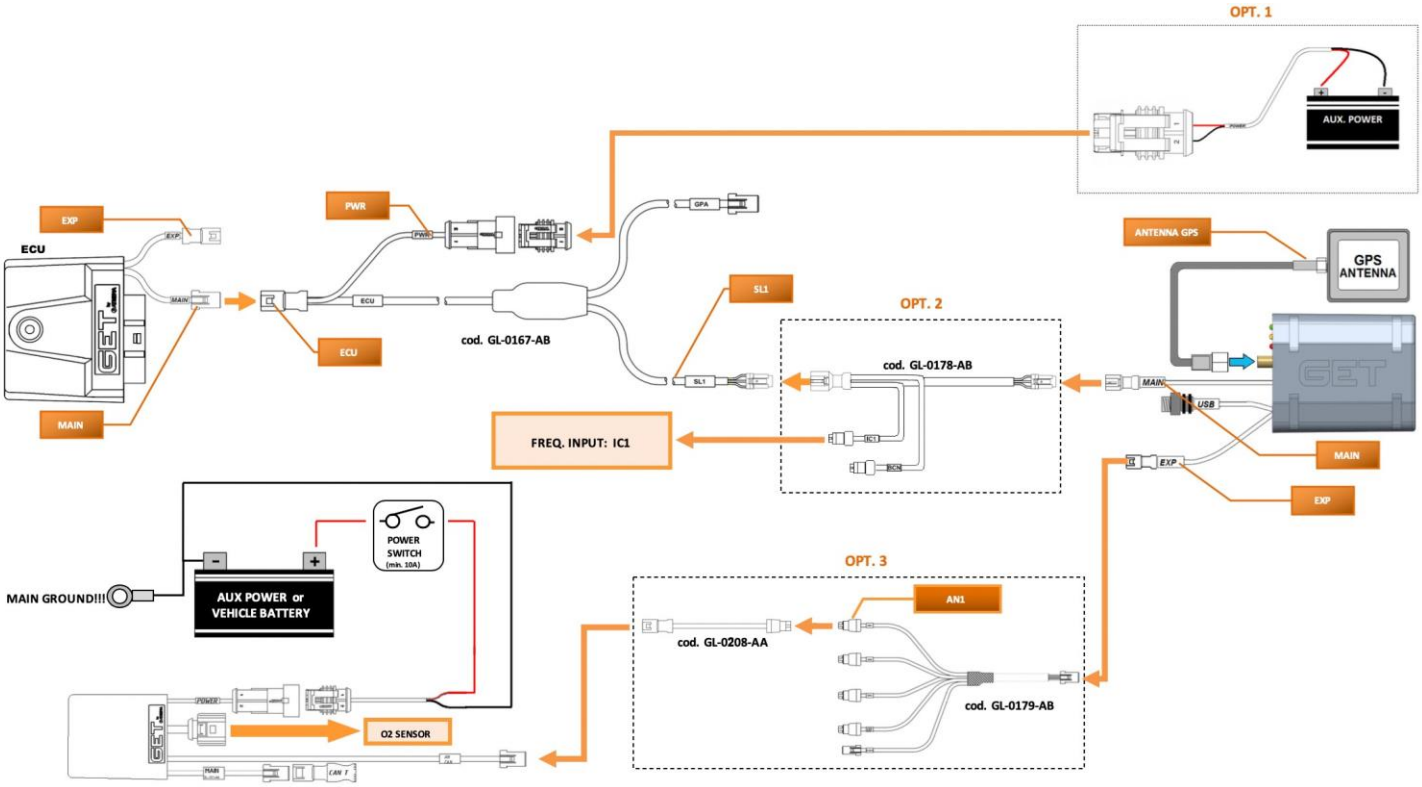
USING OPT.1 ALL THE CONNECTED DEVICES WILL BE POWERED WITHOUT THE NEED TO TURN ON THE ENGINE EXCEPT THE LC1-PRO MODULE

OPT.2 IS REQUIRED ONLY IF FREQUENCY SIGNALS MUST BE ACQUIRED (E.G. FREQUENCY OR WHEEL SPEED).

OPT.3 IS REQUIRED ONLY IF YOU WANT TO CONNECT OTHER ANALOG SENSORS (EX. TPS SIGNAL, POTENTIOMETERS, PRESSURE SENSORS ETC ...): AS AN ALTERNATIVE, CONNECT THE AN CAN CABLE OF THE LC1-PRO MODULE TO THE EXP CONNECTOR OF THE SL1 DATALOGGER.

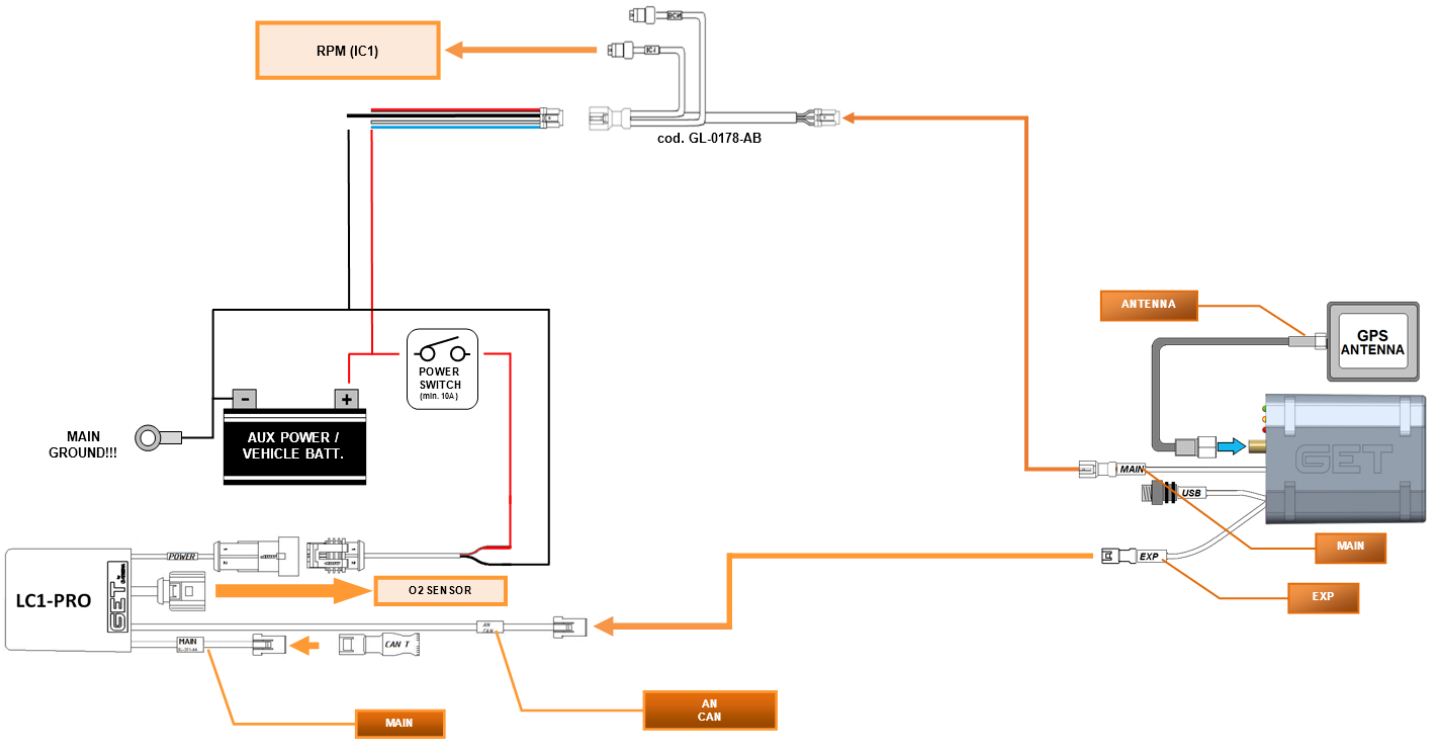
ATTENTION: WE RECOMMEND INSERTING A SWITCH (OR A RELAY COMMANDED BY THE START OF THE ENGINE) ON THE POSITIVE POWER SUPPLY OF THE LC1 MODULE (IF IT WAS CONNECTED BY THE VEHICLE BATTERY) TO AVOID DISCHARGING IT WHEN THE ENGINE IS OFF.

USE A RELAY WITH CONTACTS ABLE TO SUPPORT 10A AT 12VDC



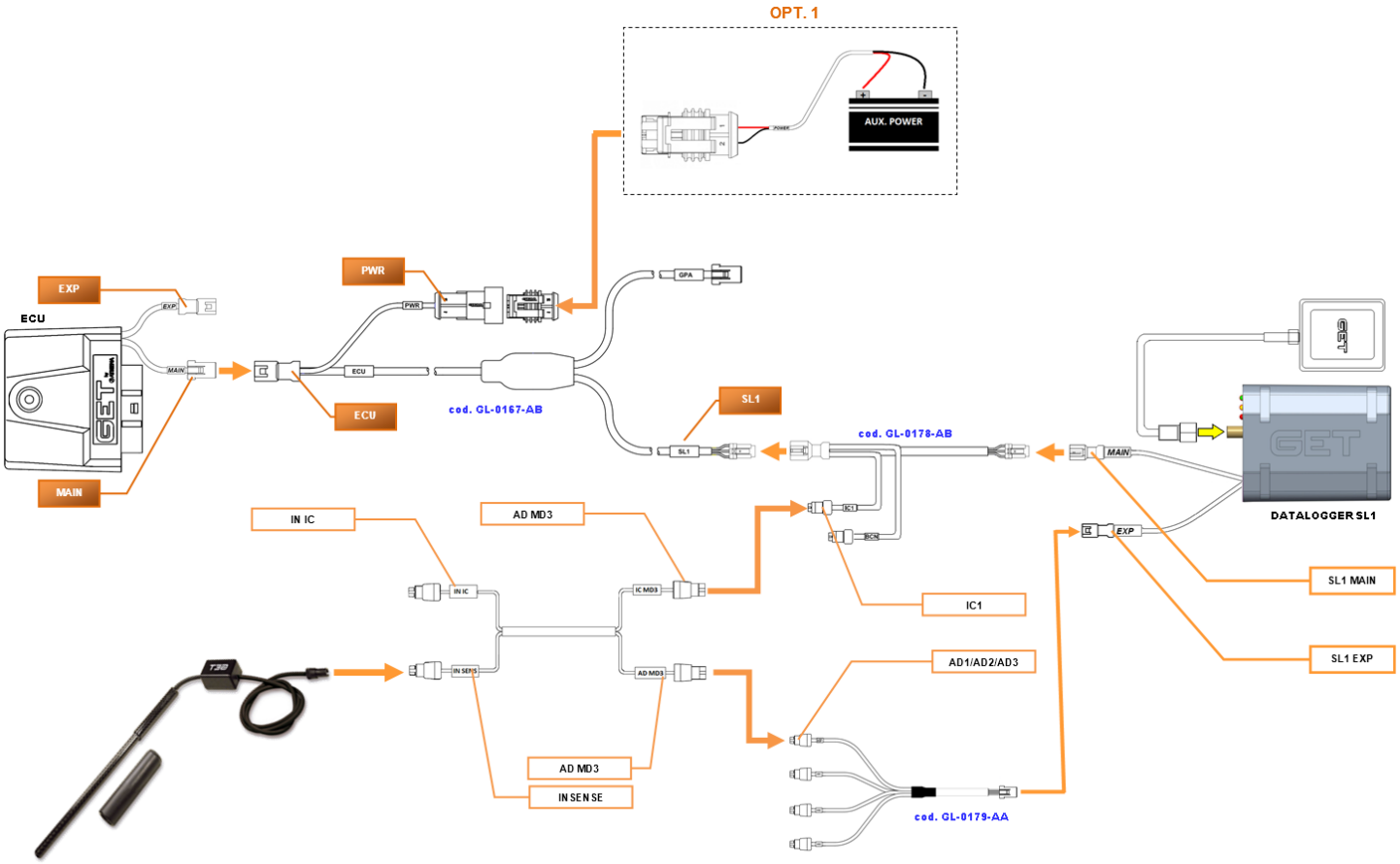
9 CAN BUS CONNECTION TO THE GK-LC1-PRO MODULE

NOTES:
THIS CONNECTION REQUIRES THE CAN PORT EXP CONFIGURATION OF THE SL1 DATA LOGGER.
IN THIS CONFIGURATION THE AN1 INPUT OF THE SL1 DATA LOGGER IS CONNECTED TO THE ANALOG SIGNAL OF THE LC1PRO MODULE

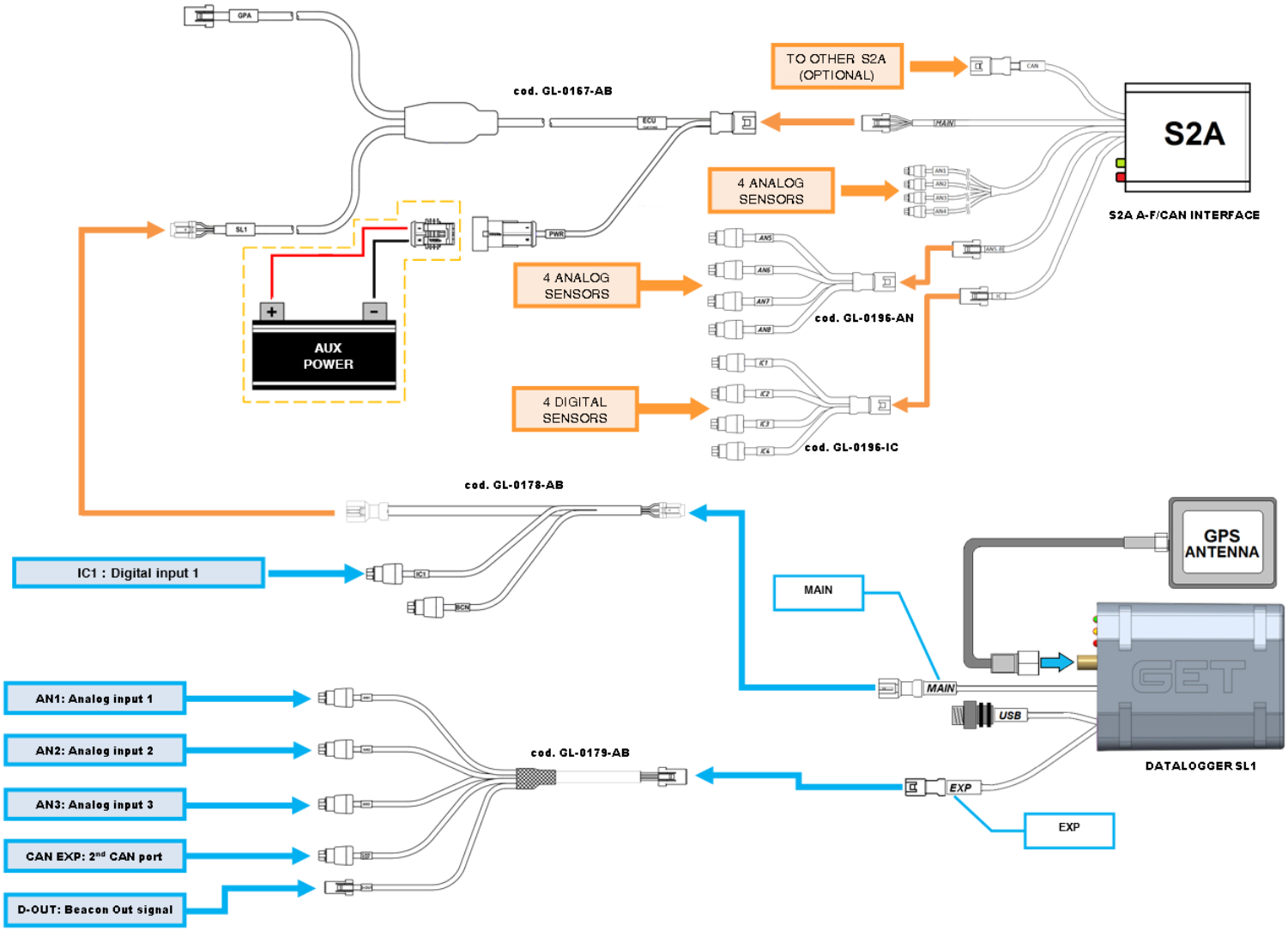


10 GET MAGNETOSTRICTIVE SENSOR CONNECTION

NOTES:
THIS CONNECTION REQUIRES THE USE OF THE ADAPTER CABLE SUPPLIED WITH THE MAGNETOSTRICTIVE SENSOR

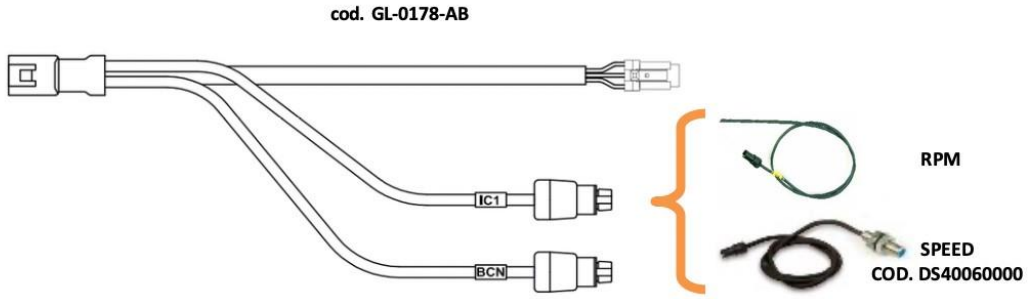


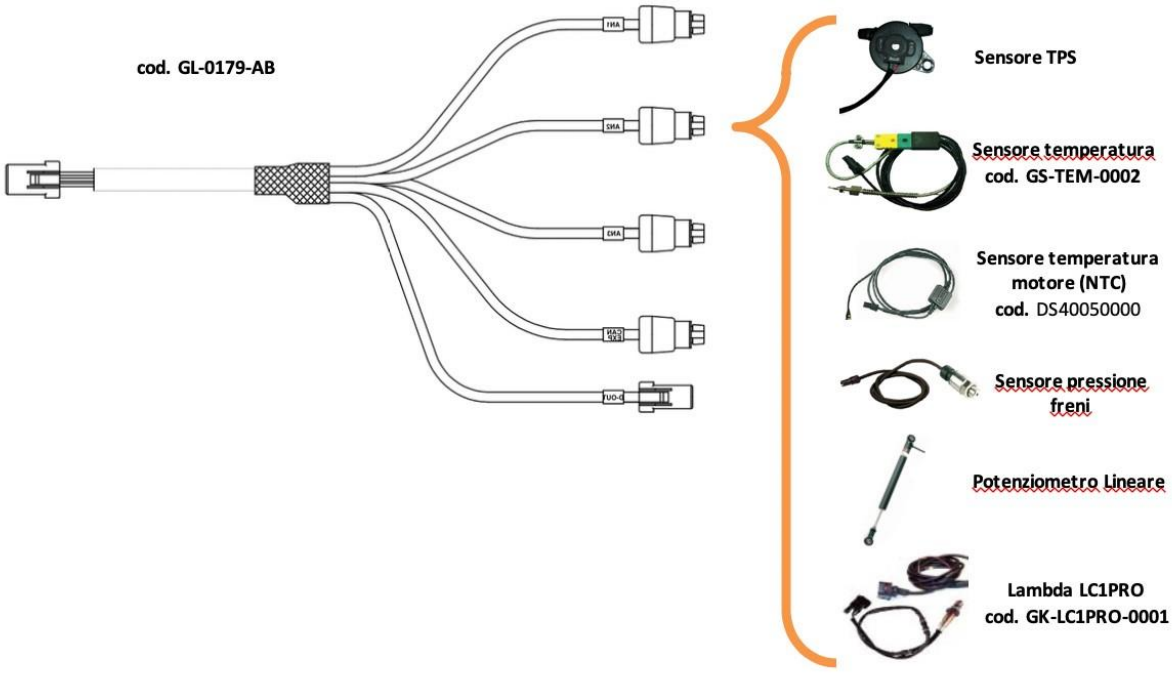
11 SL1 AND S2A EXPANSION MODULE CONNECTION



12 CLASSIFICATION OF THE SENSORS/ SIGNALS AND CONNECTION TO THE SL1

SENSOR / SIGNAL	TYPE	INPUT/WIRING
SPEED	frequency	IC1 (wiring code GL-178-AB)
ENGINE REVS (SPEED)	frequency	IC1 (wiring code GL-178-AB)
PRESSURE	analog	AN1-AN2-AN3 (wiring code GL-179-AB)
TEMPERATURE	analog	AN1-AN2-AN3 (wiring code GL-179-AB)
LAMBDA	analog	AN1-AN2-AN3 (wiring code GL-179-AB)
THROTTLE VALVE POTENTIOMETER (TPS)	analog	AN1-AN2-AN3 (wiring code GL-179-AB)
SUSPENSION POTENTIOMETER	analog	AN1-AN2-AN3 (wiring code GL-179-AB)





NOTES