



# **M40 DATALOGGER User Manual**

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**By Athena Evolution**

M40 DATALOGGER User Manual Rev.05  
Release FW 1.42

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WARNING: M40 DATALOGGERS are not homologated for road circulation.

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Dear customer,

thank you for choosing a GET DATA ACQUISITION AND ANALYSIS SYSTEMS by **Athena Evolution**.

We are sure that our passion and experience will help you to express successfully in all competitions, we ask you to read carefully this user manual. We are confident that this will help you in the use of your new product **GET** by **Athena Evolution**.

**M40 STANDARD – M40 EXPANSION – M40 PLUS**, due to GPS technology, can log not only signal from connected sensors but also data concerning trajectories and vehicle speed.

Acquisition and configuration of **M40** datalogger (with firmware release less than 1.30) are done via **GATE** software, **MX2** (analysis), **Download Manager** (device synchronization) and **Setup Manager** (Setup management). The firmware release over than 1.30 are managed by **DATA MANAGER** software.

This manual is dedicated to illustrate to the end user information on **M40** datalogger functions.

Otherwise specified, functions described are in **Standard (M40 STD.)** **Expansion (M40 EXP.)** and **PLUS (M40 PLUS)**.

Different versions of **M40** are the followings:

| Characteristic/function                                | MODEL                                                                                     |         |          |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------|---------|----------|
|                                                        | M40 STD                                                                                   | M40 EXP | M40 PLUS |
| Integrated tri-axle accelerometer                      | ✓                                                                                         | ✓       | ✓        |
| Analogue input (0-5V)                                  | 3                                                                                         | 6       | 9        |
| Frequency input (open collector 0-5V, freq. 0 - 20kHz) | 2                                                                                         | 3       | 5        |
| External beacon input                                  | -                                                                                         | ✓       | ✓        |
| CAN connection                                         | 2.0 High Speed (bitrate 125 kb/s, 250 kb/s, 500 kb/s, 1Mb/s; Intel and Motorola protocol) |         |          |
| Maximum CAN channels                                   | 128                                                                                       |         |          |
| CAN channel transmission                               | ✓                                                                                         | ✓       | ✓        |
| CAN channel reception                                  | ✓                                                                                         | ✓       | ✓        |
| Logging rate (Hz) in each channel                      | 1 – 10 – 20 – 50 – 100 – 500                                                              |         |          |
| Auxiliary power output 5 VDC @ 1A                      | ✓                                                                                         | ✓       | ✓        |
| Auxiliary power output VBB                             | ✓                                                                                         | ✓       | ✓        |
| Logging trigger channel                                | User selectable (speed, RPM, manual, etc)                                                 |         |          |
| Switch on delay                                        | User selectable (via software)                                                            |         |          |
| Data recording switch on delay                         | User selectable (via software)                                                            |         |          |
| GPS logging frequency (Hz)                             | 5 – oversampled to 10                                                                     |         |          |
| Average precision GPS module (m)                       | 2.5                                                                                       |         |          |
| GPS antenna                                            | Active 5V, gain 28dB, SMA connector                                                       |         |          |
| Start/stop data logging signalling led                 | ✓                                                                                         | ✓       | ✓        |
| GPS status signalling led                              | ✓                                                                                         | ✓       | ✓        |
| Integrated Real Time Clock (RTC)                       | Yes, with backup battery                                                                  |         |          |
| Internal clock updating                                | Manual (via PC) or automatic (from GPS)                                                   |         |          |
| Time zone setting                                      | Via PC                                                                                    |         |          |
| Internal memory (GB)                                   | Up to 16                                                                                  |         |          |
| USB communication port                                 | ✓                                                                                         | ✓       | ✓        |
| Firmware update                                        | fw user updatable via PC                                                                  |         |          |
| Interface software                                     | DATA MANAGER (GATE for rel. fw <1.30)                                                     |         |          |
| Case material                                          | Anodized aluminium                                                                        |         |          |
| Protection grade                                       | IP68                                                                                      |         |          |
| Dimension length x width x height (mm)                 | 92 x 66 x 20                                                                              |         |          |
| Weight (g)                                             | 250                                                                                       | 260     | 270      |

Otherwise specified (**M40 STANDARD**, **M40 EXPANSION** or **M40 PLUS**) **M40** refers to instruction and/or function for all three data loggers.

**CAUTION: channels not available on M40 are locked from GATE software and the user can not modify this.**

# 1 M40 KIT

M40 kit is comprehensive of:

- box
- **M40** datalogger
- 1 GPS antenna
- 1 power cable, code GL-0038-AA
- 1 expansion cables JST-Binder for the connection of external sensors (only M40 EXPANSION)
- 2 expansion cables JST-Binder for the connection of external sensors (only M40 PLUS)
- 1 USB-JST cable for pc connection
- 1 CD with software and manuals electronic copy



**NOTE:** kit content can be different accordingly to the versions.

## 2 GPS WORKING PRINCIPLE

GPS (Global Positioning System) system, on which your GET system is based, uses a spherical positioning algorithm in order to identify the position of receiver the signal coming from satellites.

Measuring the time needed by a radio signal to cover the distance satellite-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, arranged in orbits inclined at 55 degrees to the equator, are between 18000 and 20000 km from the Earth and they rotate completely in 12 hours.

Satellites transmit signals of 1.2 and 1.5 GHz (to avoid errors coming from atmosphere refraction) originated by a single oscillator (atomic clock). Transmitted data contain information on satellite's orbit and time signal (messages of Ephemeris) that permit to the receiver to define position on earth surface.



**Time lapping is done via GPS: this solution avoid uncomfortable beacons side the track and help to have timing references during data analysis.**

**GPS is a stochastic algorithm and it is strictly linked to the correct signal receiving. In case of electromagnetic or ambient interferences the quality of data is not guaranteed. The minimum received number of satellites in order to guarantee a proper quality in time lapping is 5.**

## 3 SUGGESTIONS AND PRECAUTIONS DURING INSTALLATION

We recommend to read carefully following chapters in order to get the best during the installation of M40 in your vehicle.



**WARNING: A WRONG INSTALLATION COULD CAUSE SERIOUS TROUBLES TO PEOPLE AND/OR THINGS**

### 3.1 Precautions for M40 installation

Before proceeding with installation of **M40** onto a vehicle please observe the following rules:

- Work in a user friendly environment (example: enough working space)
- Disconnect battery wirings
- Put all removed vehicle parts in a safe place avoiding to damage them
- Installation in vehicle with internal combustion engine has to be done with the engine cold: during the installation you could be in contact with engine or chassis parts
- During the job be really careful to connectors and wirings
- Keep washers, bolts and nuts in a safe place during **M40** installation
- During installation avoid that any part installed interfere with driving parts or with the driver

### 3.2 GPS antenna installation

In order to install properly the GPS antenna please refer to the following instructions:

- be really careful during GPS antenna movement: Avoid shocks and verify that connector and cable are in a perfect shape



- fix the antenna outside the vehicle: obstacles near to the antenna could cause a reduction to the receiving capabilities of the sensor. A wrong position could cause an incorrect lap timing, wrong data acquisition and wrong trajectories
- do not twist the antenna cable around other cables (especially around high voltage plugs wiring): this could cause inductive interferences and cause problems during the functioning
- let pass the antenna cable as far as possible from spark plugs and other electromagnetic field. In motorbikes it is preferable to run the cable out of the chassis but in any case in a protected zone
- fix the GPS connector to the ANTENNA input in MD40 without use excessive torque: do not use tools

Some suggestions to fix the antenna:

- **Speed bikes:** fix the antenna in the far back part of the motorbike away from heat sources (exhaust) or in cockpit area (on top of it).
- **Off-road bike:** fix the antenna on handlebar handle pad.
- **Car:** fix the antenna on top of the roof.
- **Kart:** fix the antenna on the higher part of front number plate, if needed manufacture a support to address the sensor in the proper direction.

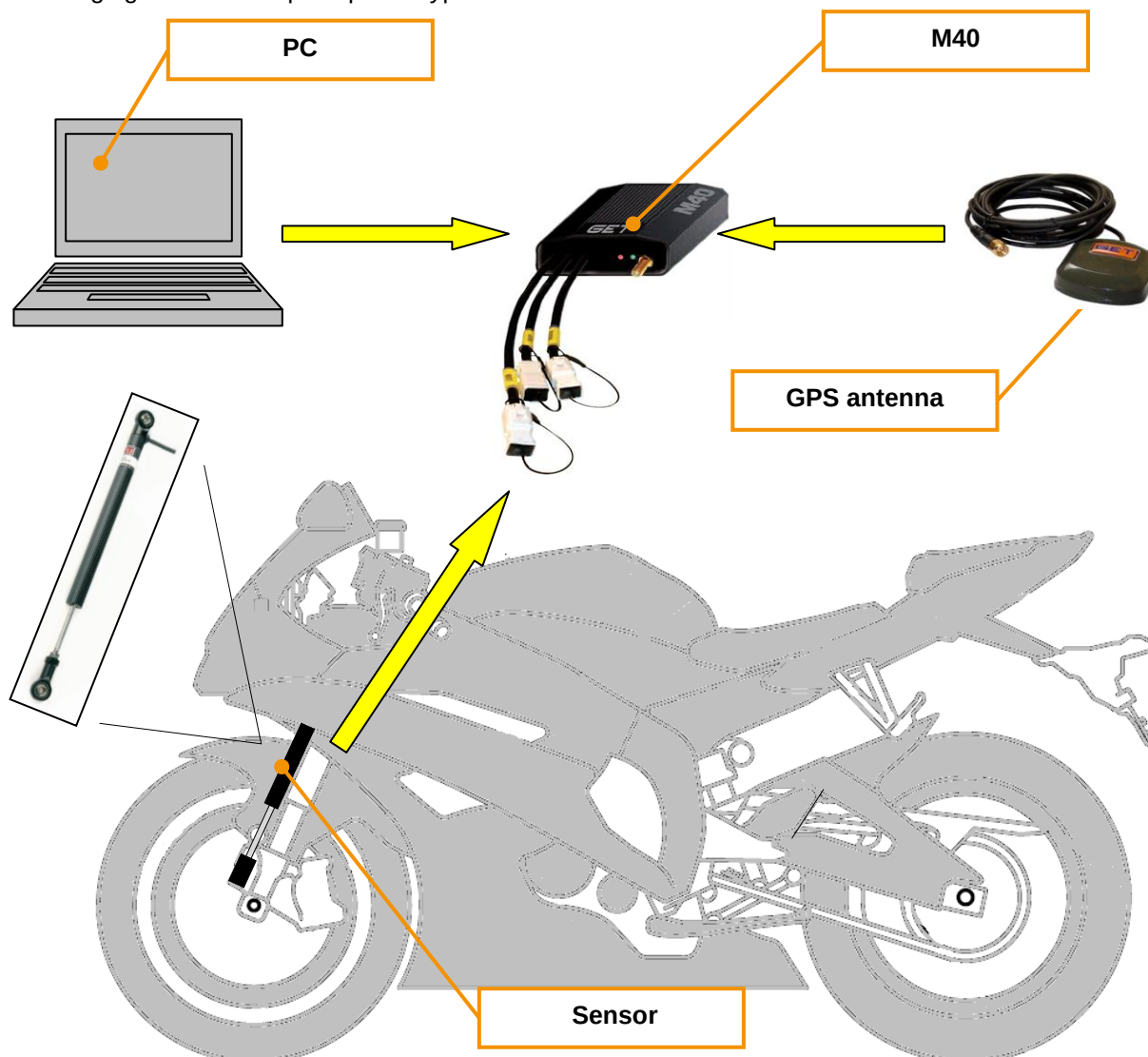
### 3.3 M40 system installation

**M40** data loggers are done in order to be fixed easily inside all vehicles.

For electrical connections please read [Appendix 2](#) and [Appendix 3](#) of this manual.

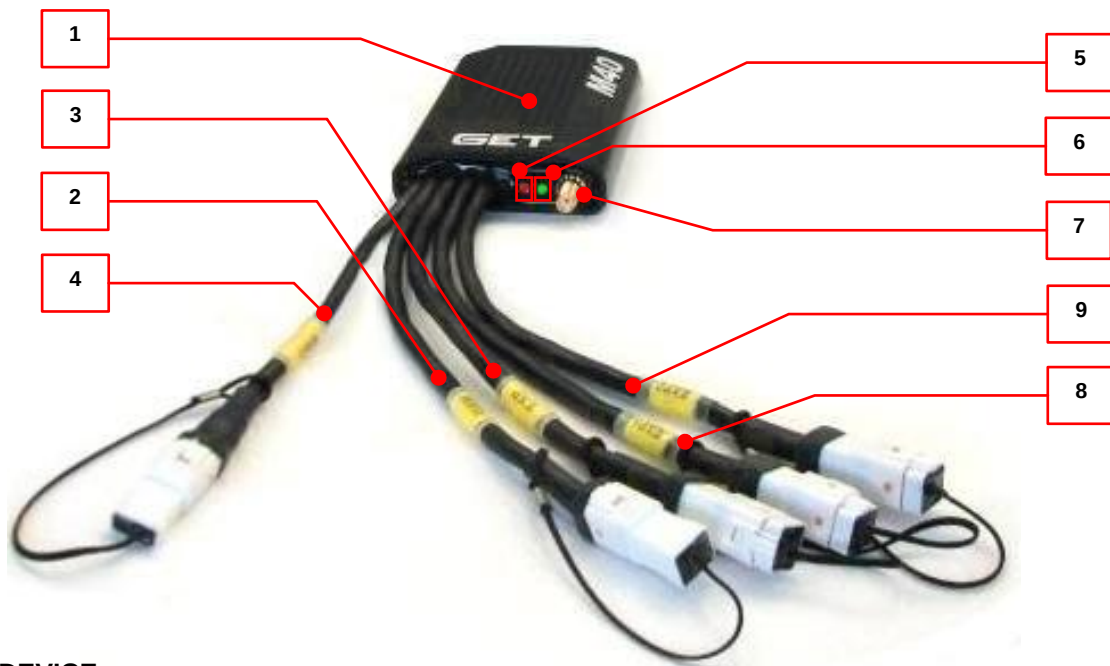
With dedicated cables it is possible to connect directly to ECU by **Athena Evolution** (example **GP1EVO**) via CAN bus.

The following figure shows in principles a typical installation of a **M40** into a motorbike.





## 4 M40: CONTROLS AND INDICATORS



### 1: M40 DEVICE

2: MAIN connection cable

3: EXP connection cable

4: USB connection cable

5: red diagnosis led

6: green diagnosis led

7: GPS antenna connector

8: EXP1 connection cable (only for M40 EXPANSION and M40 PLUS)

9: EXP2 connection cable (only for M40 PLUS)

### 4.1 Diagnosis LEDs

M40 data logger has got two LEDs. The following table shows their meaning:

| Cond. | Led         | Status                   | Meaning                         |
|-------|-------------|--------------------------|---------------------------------|
| 1     | Green       | Off                      | The device is off               |
| 2     | Green       | On fix                   | The device is on                |
| 3     | Green       | Blinking (frequency 1Hz) | Acquiring data                  |
| 4     | Green       | Blinking (frequency 2Hz) | The memory is full              |
| 5     | Red         | On fix                   | Not adequate satellites reading |
| 6     | Red         | Off                      | Adequate satellites reading     |
| 7     | Green + Red | Blinking (frequency 1Hz) | The device is connected to PC   |

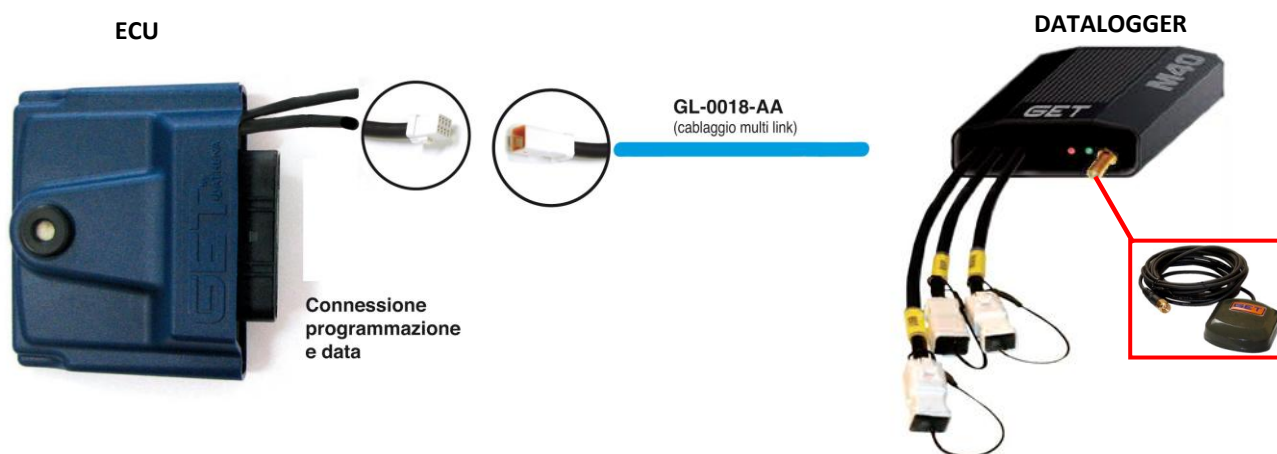
It is possible that some combinations occur. For example, both LEDs on fix: in this case the instrument is on (condition 2) but with a low satellite reading (condition 5).

Except for condition 7, status of **M40** will be defined by a combination of two LEDs conditions: 2 + 5, or 2 + 6, or 3 + 5, etc.

## 5 M40 WIRING LOOMS

M40 dataloggers could be linked to the vehicle (or sensors) with specific cables.

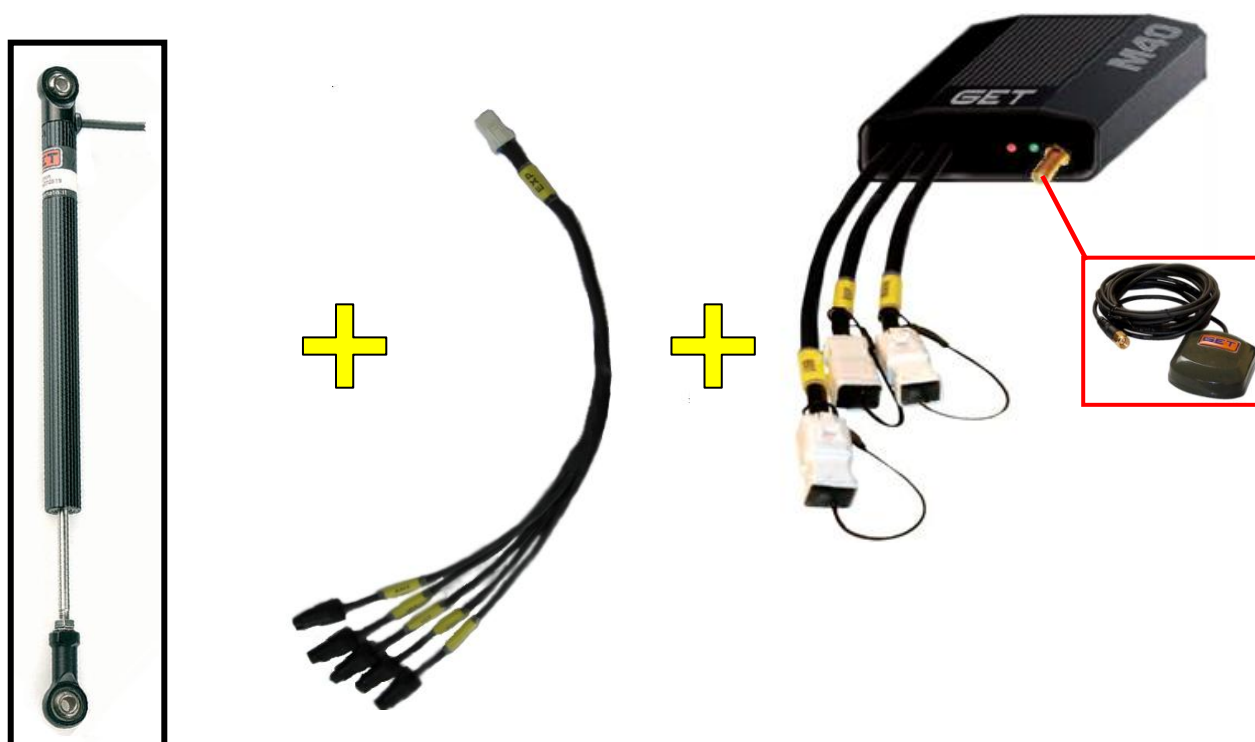
With “multilink” cable it is possible, for example, connect **M40** directly to ECU GP1 EVO (see following picture):



In this situation it is possible to give power to m40 directly from ECU and to log all CAN channels coming from ECU.

All data like rpm, throttle position, injection time, advance time, etc will be available through only one cable.

Interconnection cables are available for **EXP, EXP1, EXP2** connectors to connect **M40** to analogue sensors or frequency sensors with 3 wirings Binder connector.



If you need further information on **M40** wirings please refer to [Appendix 3](#).

## 6 FIRMWARE, CONFIGURATION, SETUP FOR M40 DATALOGGER

**M40** is based on three internal software:

- Firmware: this is necessary to guarantee the instrument functioning,
- Configuration: this is necessary for base setup of the instrument like serial number and identify number.
- Setup: this is needed by **M40** in order to get all information about sensors, calibrations, logging frequencies, etc.  
You can adjust **M40** setup with CONFIG DATALOGGER software (if you are using DATA MANAGER software) or Setup Manager (it'd included into the software suite GATE).  
Some channels cannot be modified by the user in order to avoid malfunctioning

## 7 USING M40 DATALOGGER

Following chapters are written to explain simple rules for the use of the instrument and information given by LEDs.

### 7.1 Importance of data logging

Logging data during test sessions or test bench is becoming more and more important because:

- You can reduce setup time on the vehicle
- You can solve driving mistakes
- You can evaluate vehicle behaviour statically and dynamically
- You can visualize all logged parameters
- You can check continuously engine and chassis performances
- You can see lap times once downloaded

### 7.2 Getting started

Please read carefully following chapters for an optimal use of **M40**.

#### 7.2.1 GPS fixing

You need to “fix” satellites in order to get trajectories and lap times with MX2 software.  
The minimum number of satellites to get a correct acquisition is 5.  
In fixed application (test bench) you do not need GPS.

**NOTE: M40 continue to search satellites during logging. This permit to start the acquisition also without GPS data. In this case it will be probable that trajectories visualization (done via software) could be compromise.**

**The evidence of this phenomena are fast variations on the position of vehicle (spike), up to some kilometres!!!!**

### 7.3 Data logging

Start and stop of data logging could take place with the following modes:

- Manual: starting the acquisition via software
- Automatic:
  - from vehicle speed (Speed) both with GPS or with wheel speed (only with installed sensor)
  - From engine speed (RPM)
  - defining a special threshold value from any given input/channel of **M40**

In standard configuration start/stop are **MANUAL**.

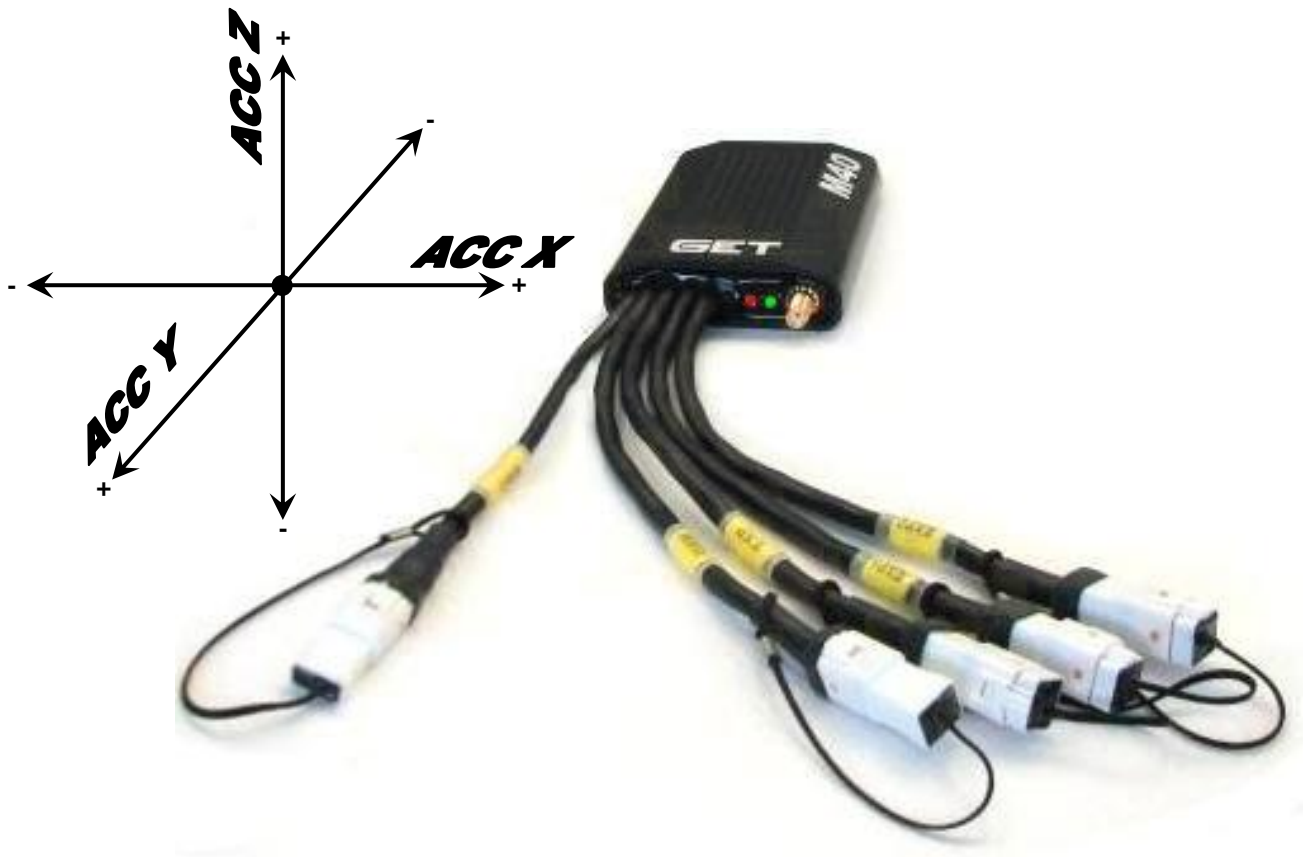
In this condition it is necessary to connect a pc with **DATA MANAGER** in order to record data.

For further information on data logging start/stop see chapter [8.7](#) and [8.9.3](#).

To modify logging start/stop mode use **Config Datalogger**.

## 7.4 Internal accelerometers

M40 has got three accelerometers as described in the picture:



Values are logged automatically by **M40** and therefore can be used with **MX2**.  
Internal accelerometers are **System Channels**, in **M40** setup.  
Logical names are:

- **ACCX**
- **ACCY**
- **ACCZ**

You can see these names in **Setup Manager** and in **Channel Bar** of **MX2**.

You can zero of these sensors with **WATCH** function in **Setup Manager** (read [Appendix 1 – cap. 5](#) of this manual).

## 8 USING M40 WITH A PC

Management of **M40** is done with a computer with **DATA MANAGER** software installed.

With the pc you can configure and calibrate channels (using **Config Datalogger**) and download data (using **Download Data**).

For further information on software read **DATA MANAGER** user manual (supplied in electronic format and downloadable in <http://www.getdata.it>). This manual describes also the operative instructions for **GATE** software (if the procedures are different)

### 8.1 Connection to a pc

In order to connect with a pc following the instructions below:

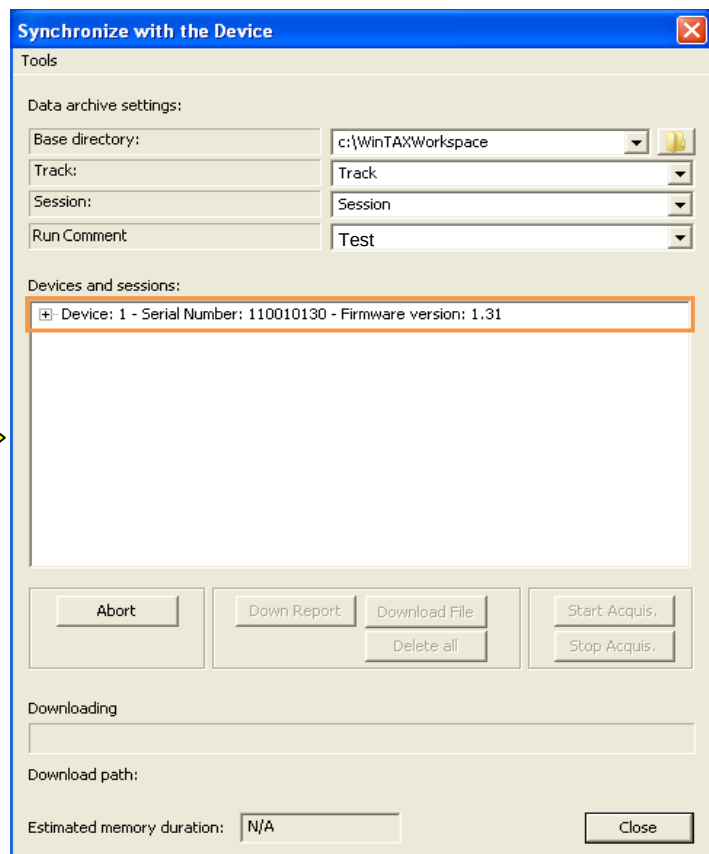
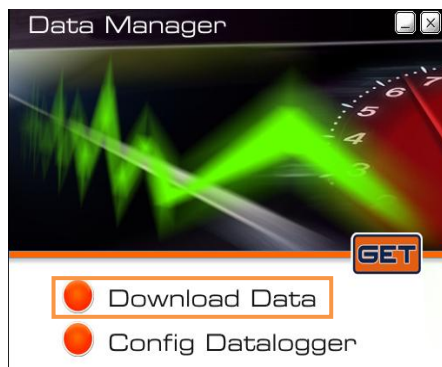
- Use a pc with an installed **GATE** software
- Connect the download cable to **M40**
- Plug the USB into the PC
- Start the **DATA MANAGER** software to manage the download, visualize logged data and manage the instrument setup.

### 8.2 Download of recorded sessions

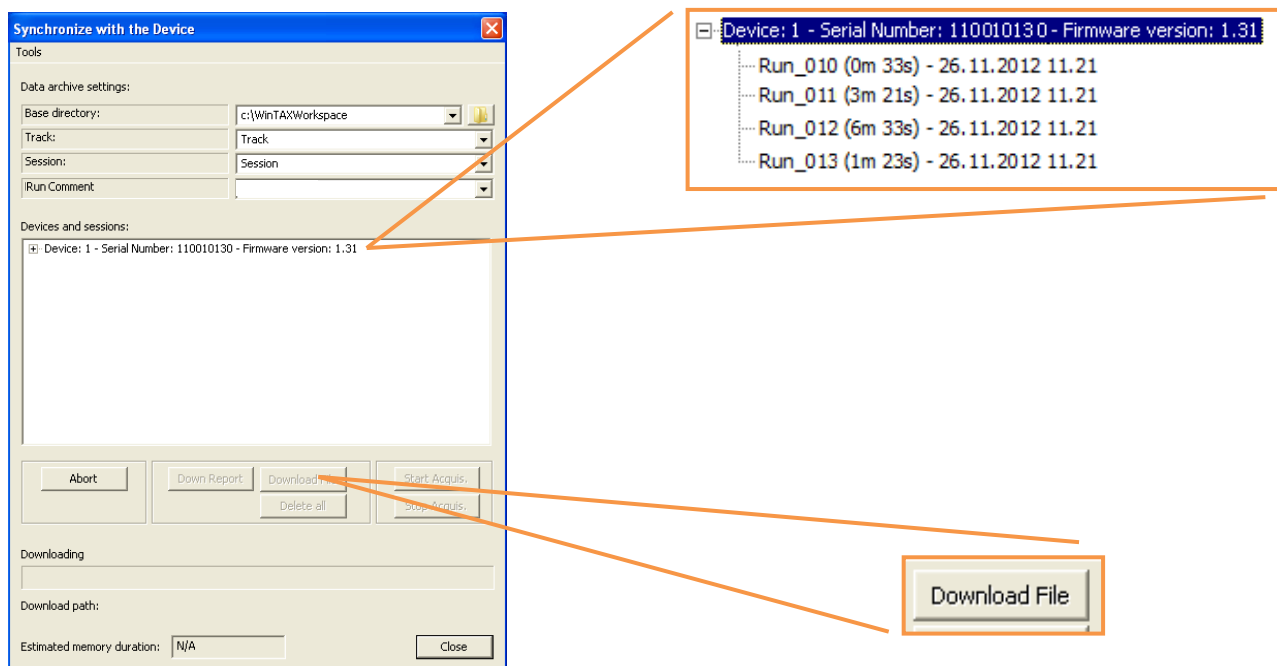
You need to download data before analyzing

Follow instructions below:

- Switch on the **M40** (green led on fix) and connect to the PC (both LEDs will blink together).
- Verify that all instruction in [8.1](#) are accomplished.
- Wait that Windows detect the instrument (the message will be likely in the right low part of the monitor, nearby the clock).
- Open **Download Data** and wait that instrument will be present in **Devices and Sessions**: select the device with a click



- If needed, you can stop acquisition pressing **Stop Acquis** in the right part of **Download Data** page.
- Click on to the cross at the left of the name in order to see stored sessions' list.



- Select the needed session with left click(blue background).
- Click on **Download File** and wait until the end of operation.
- Data are stored in the folder:

**“Base directory” \ “Track” \ “Session” \ “Vehicle Name” \ “Run\_name”**

Where:

**Base directory:** it is the main folder of storage path (the hard disk letter is also included). It is defined by **Base directory** field in **Download Data**. The default directory is **C:\WinTAXWorkspace**. A different path can be selected by click on **Base directory selection button**.

**Track:** it is the first sub directory of storage path. User can modify the **Track** field in **Download Data** in order to change the directory name. PLEASE NOTE: the directory is always create by the software, the default settings is **Track**.

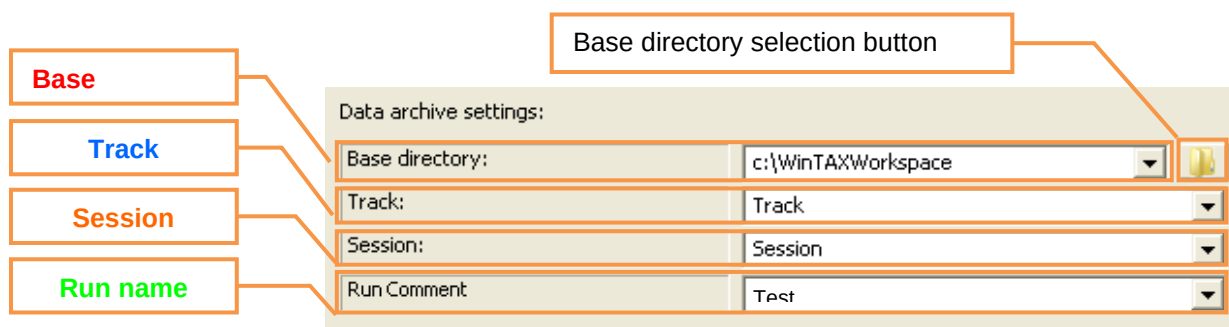
**Session:** it is the second sub directory of storage path. User can modify the **Session** field in **Download Data** in order to change the directory name. PLEASE NOTE: the directory is always create by the software, the default settings is **Session**.

**Vehicle Name:** it is the third sub directory of storage path. User can modify the **Vehicle Name** field in data logger configuration (see **Config Datalogger** section of this manual and the datalogger User Guide for more informations) to set a new folder name.

**Run\_name:** it is the last sub directory of storage path. Its name is **Run\_** followed to a progressive session index number created by the data logger (in our example it is represented with **XXX**). Also the **Run Comment**) text (if it is present) will be added to the folder name.



The picture below show the **Data Storage Settings Area**:



For example the storage path of picture above will be:

**c:\WinTAXWorkspace\** Track \ Session \ Car \ Run\_XXX\_Test

Where:

**Car** is set in **Vehicle Name** field of data logger setup

**Run\_XXX** is the progressive index of data

- **At the end of download a message will appear: the device has to be disconnect.**
- Confirm the operation pressing **OK**: the window of **Download Data** will disappear.

For further information on **Download Data** use read **DATA MANAGER** user manual.

## 8.3 Visualizing recorded sessions

In order to visualize downloaded sessions you need to use **MX2** (the analysis software of DATA MANAGER freeware) and/or **WINTAX** (require a payment license)  
Read following instructions:

- Start **MX2** by clicking on the desktop icon:

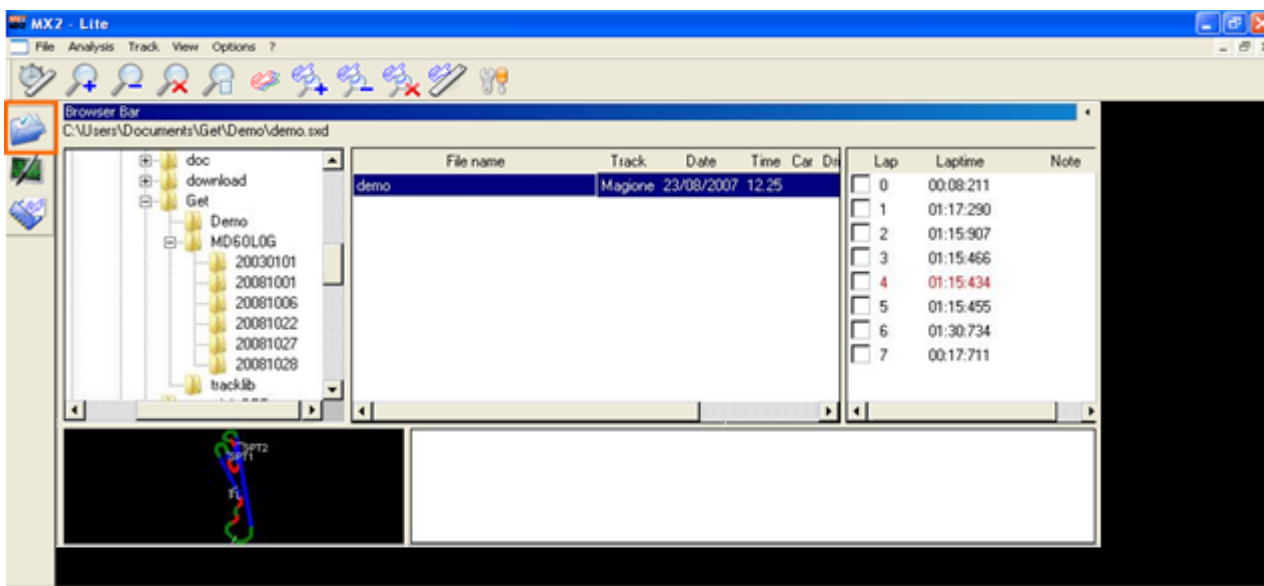


- Wait a few seconds: probably will appear demo project (if a new project has not been created).
- Create a new project by clicking **New Project** in **File** menu.  
NOTE: you can use an old project by selecting **Open Project** in **File** menu.

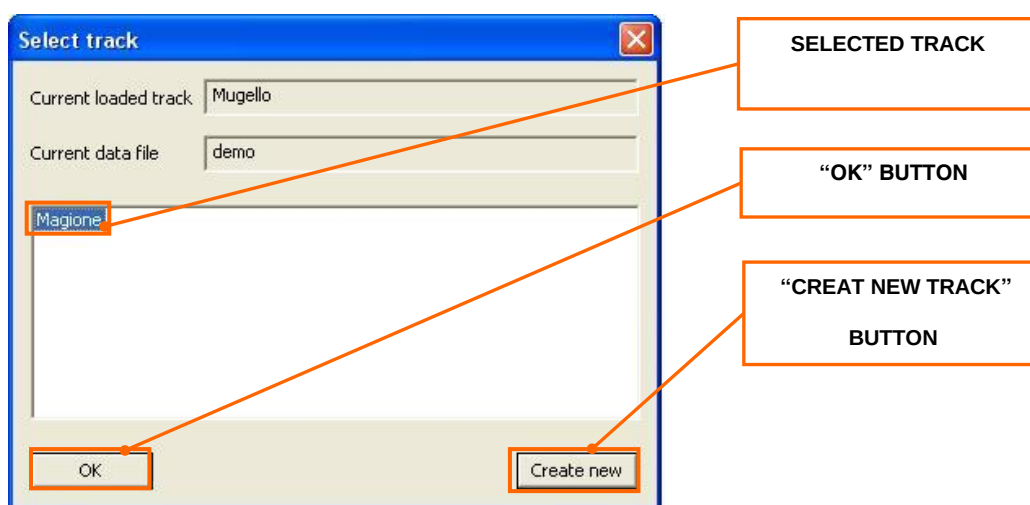


If you use the Demo project you cannot save changes (example: sessions and new channels). For this reason it is suggested to create a brand new project.

- Open **Browser Bar**  and search the needed session in the tree on the left.



- Select the session in the column **File name**
- Apply the track (or create a new one) to the selected session with the track selection window. This is needed to obtain laps' division (if needed):



**NOTE:** usually logged data contains information about the track used during the session. Sometimes could happen that this information is missing due to, for example, lack of synchronization of track library with the device. Until you do not associate a track to the session, you will see only lap 0. Once linked the session to the track you will see laps division: this division will be available in all accesses to the same session.

Lap times are linked to start-finish line: if you have official lap times and you need to compare directly to logged data it is needed to select a track with a start-finish line as close as possible to the real one.

**LAPS DIVISION IS UNAVAILABLE WITHOUT GPS INFORMATIONS (IF THE LAP TRIGGER PROPERTY IS SET AS GPS).**

- If the track is not in the library, or there are more tracks (usually with different start-finish line), for the needed session the window for the selection of the map could appear: you need to select the track between proposed or you need to create a new one with **Create New** – for the procedure refer to chapter [8.5](#) of this manual.

- Add channels by clicking  on the icon **Channel Bar** (under **Browser Bar**).
- You can now analyze data and lines.

## 8.4 Set the default track in the device

To set the default device's track follow the instructions:

- Switch on the device (green led fix) and connect to PC ( both led will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** by clicking on the button in starting window of **DATA MANAGER**.



- Click the icon **Send track** on main instrument bar, or select **Sync Track Library** from **Setup** menu.



- A message will appear at the end of the operation.

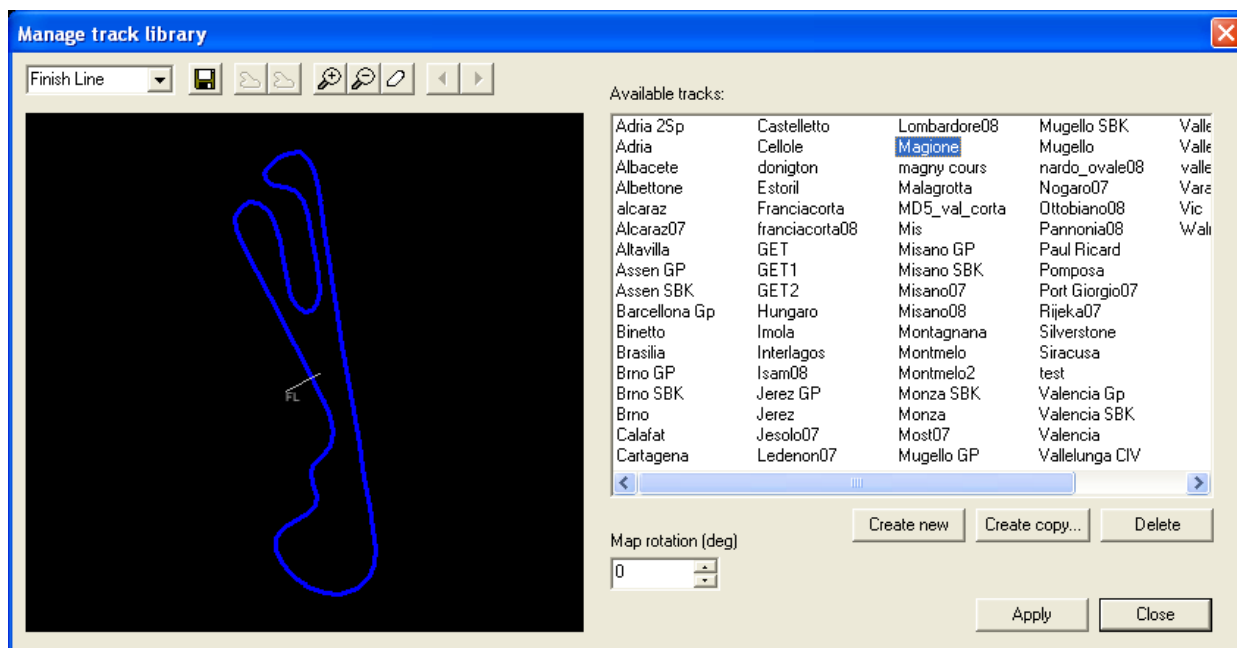
**PLEASE NOTE: BY SETTING THE DEFAULT TRACK THE LAPS DIVISION WILL BE ALREADY AVAILABLE ON WINTAX SOFTWARE (THIS OPERATION IS NOT NECESSARY FOR MX2 SOFTWARE).**

## 8.5 Track creation from a recorded session

The creation of new track it is possible by logging data as described in chapter [7.3](#).

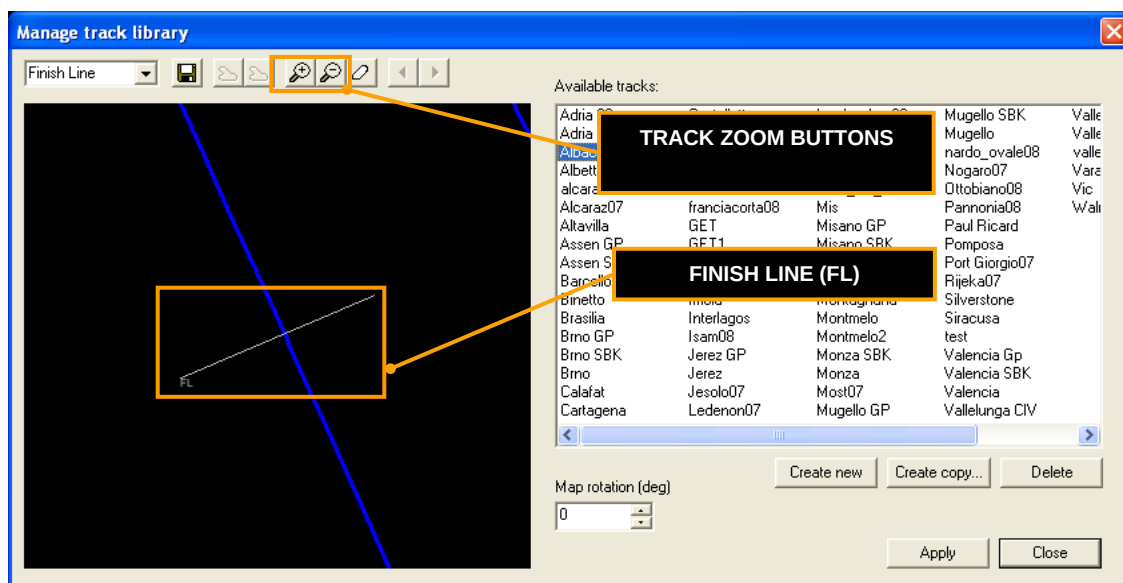
After the download of the session (read chapter [8.2](#)) proceed as follows:

- Open **MX2** and create a new project (read chapter [8.3](#)).
- Select the session: software will shows this window.



- Push **Create New** button: a new track will be created with the name **new\_track** in **Available Tracks** list. This track will be without start-finish line, split points and sectors.
- Define a new start-finish line: click on **Finish Line** in the left menu
- Define the line on the track (**FL**) by clicking on the track picture and drag the mouse (keeping left button pressed), and realize the line with needed dimensions.  
Release mouse button: the start-finish line will be set.  
The start-finish line must cross the map, otherwise laps won't be calculated.  
It is advised to create a perpendicular line to the trajectory with a proper length, not too long (avoiding crossing other parts of the track) not too short (otherwise you could not calculate some laps).
- If you need to modify a start-finish line, click on the FL and modify it.

- During this operation it is possible to use zoom buttons



- Define (if needed) intermediates.
- Save using the “save button”,  in order to save new settings: you need to rename the track.
- Push **Apply** to use the created track to the session.

Now it is possible to synchronize the track into the device as described [8.4](#) in this manual.

For further information on **MX2** functions read **DATA MANAGER** user manual.

## 8.6 Instrument setup download and updating

Device's setup contains all information relative to sensors calibrations. You should need to change some base parameters. Once done all modification you need to send the table to the device in order to get all modification working.



**WARNING: WRONG SETUPS CAN PRODUCE WRONG DATA LOGGING AND VISUALIZATION.**

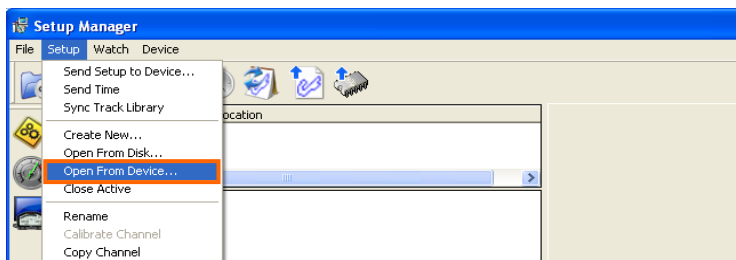
### 8.6.1 Instrument setup download and updating with DATA MANAGER software

Proceed as follows:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** clicking on the button in starting window of **DATA MANAGER**.



- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

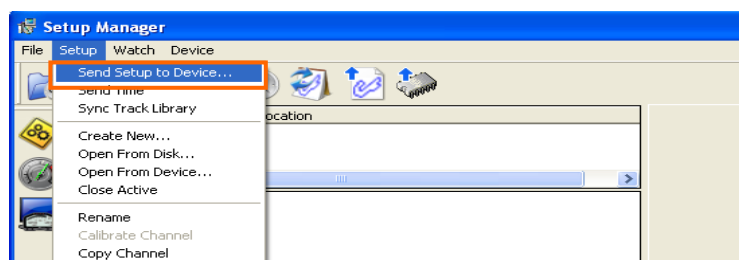


"Open from Device" ICON



- Once the job is done, a message will appear and you will see the setup in **Config Datalogger**.

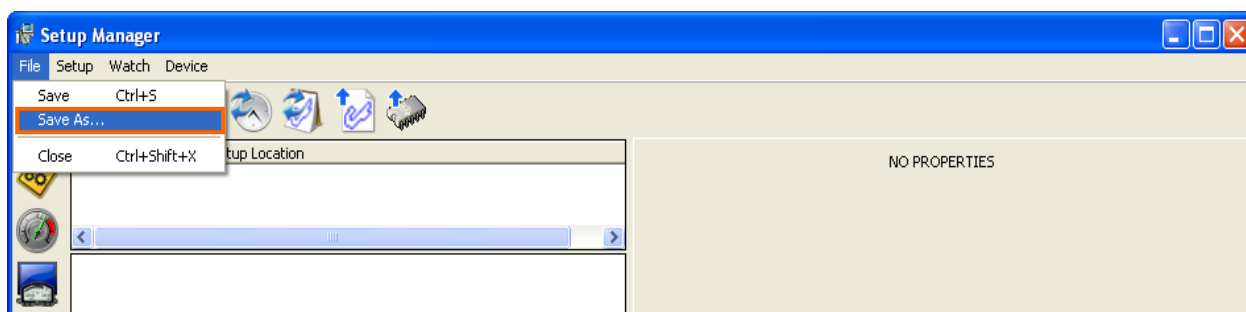
- You can now modify and transfer the new setup to the device: click the icon or click **Send Setup to Device** in **Setup** menu.



"Send Setup to Device"  
ICON

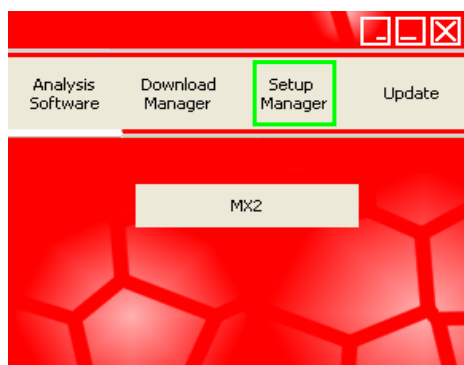


- You could save the modified setup on to the PC (suggested): select **Save as...** in **File** menu.

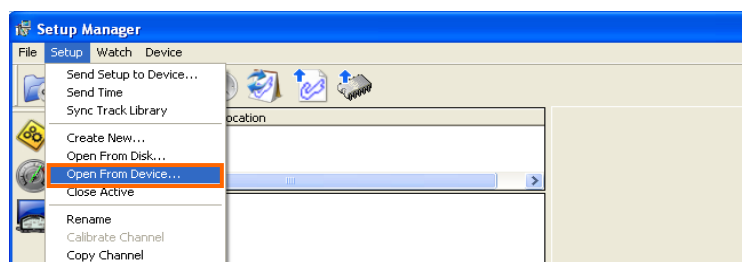


## 8.6.2 Instrument setup download and updating with GATE software

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start Setup Manager clicking on the button in starting window of GATE.



- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

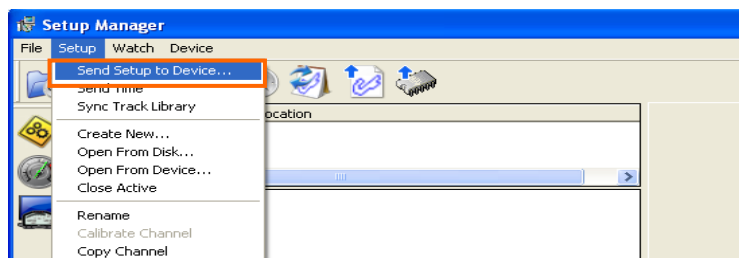


"Open from Device" ICON

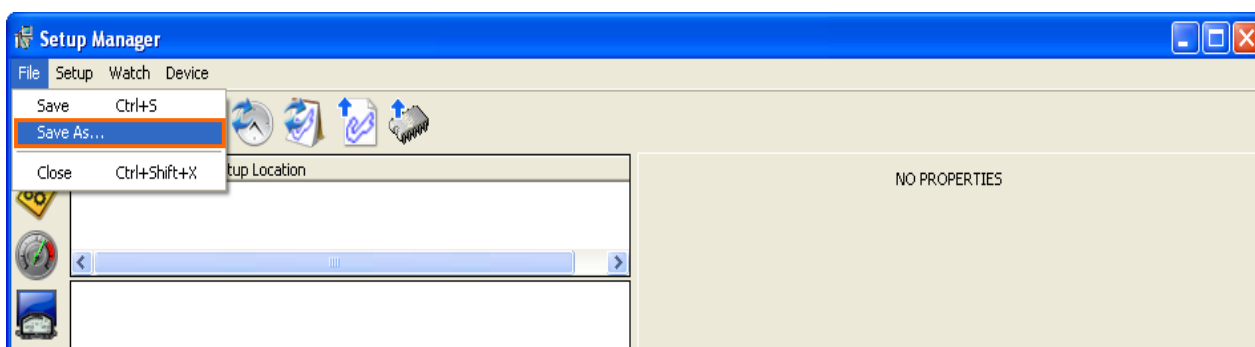




- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- You can now modify and transfer the new setup to the device: click the icon or click **Send Setup to Device** in **Setup** menu.



- You could save the modified setup on to the PC (suggested): select **Save as...** in **File** menu.



For further information on **Setup Manager** and modifications to calibrations read **GATE** user manual.

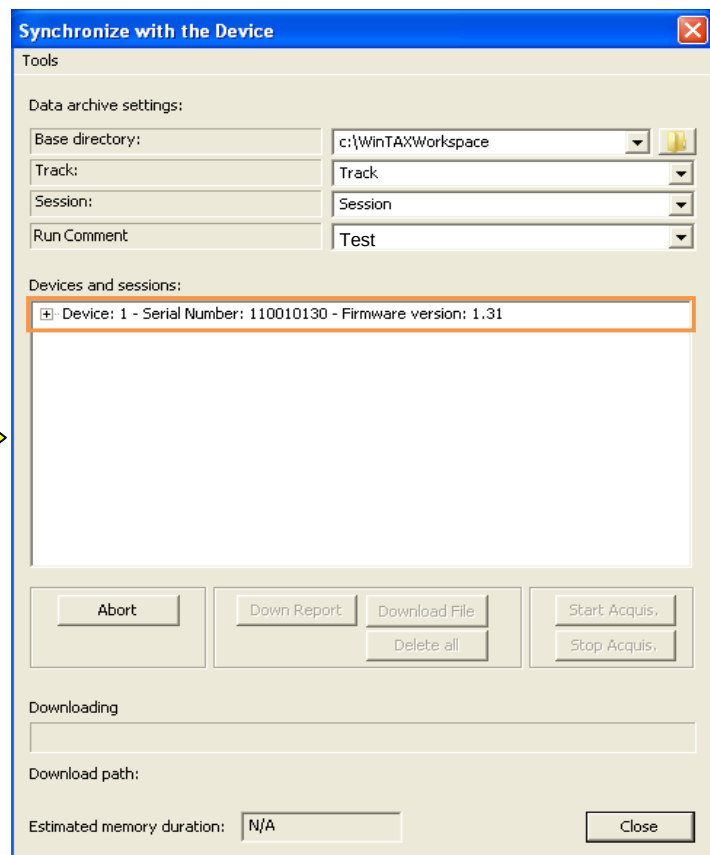
## 8.7 Starting and stopping logging (MANUAL)

If **M40** start and stop are set in manual (read chapter [8.9.3](#) of this manual) it is necessary to start/stop the device with the PC.

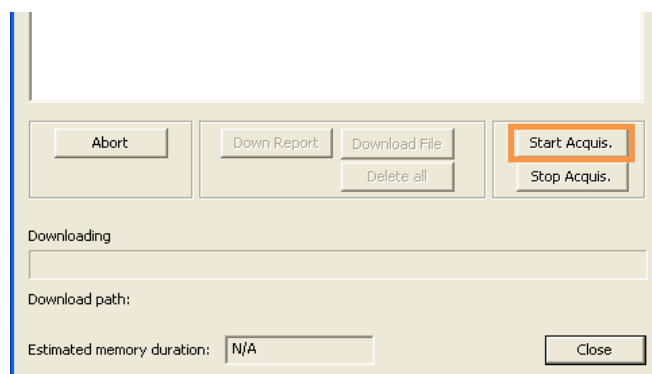
### 8.7.1 Starting and stopping logging (MANUAL) with DATA MANAGER

Follows these instructions:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Open **Download Data** and wait that instrument will be present in **Devices and Sessions**: select the device with a click

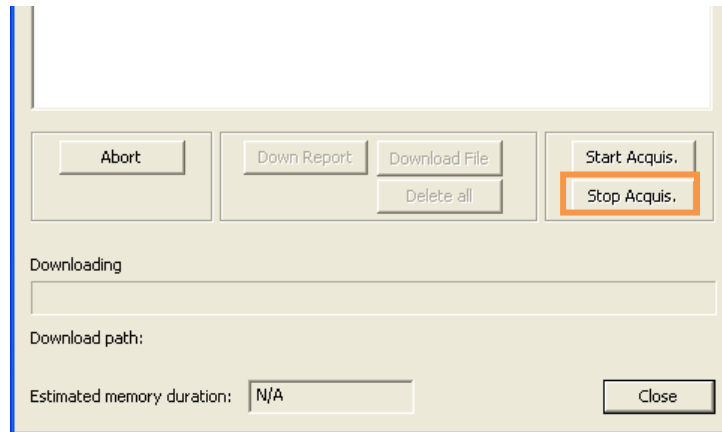


- Select the device as show in the picture above (one click over the device name).
- To start the logging press **Start Acquis.** in the right part of **Download Data**.



**NOTE: ONCE THE LOGGING HAS BEEN STARTED DISCONNECT THE LOGGER FROM THE PC.**

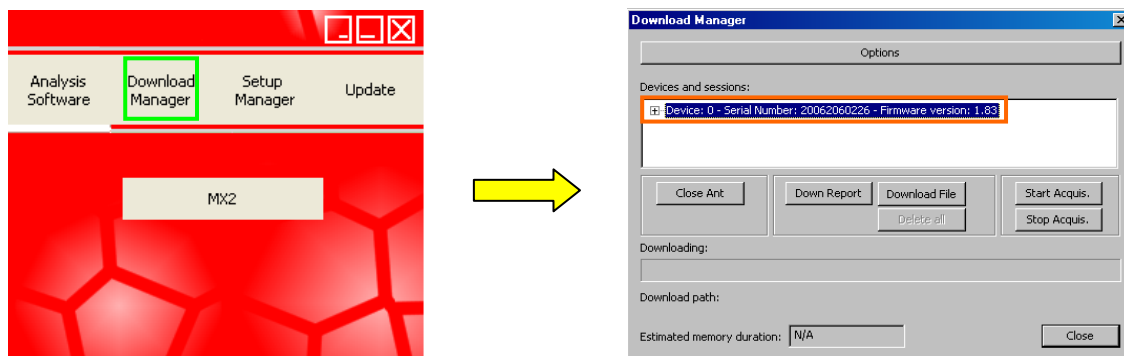
- To stop the logging press **Stop Acquis.** In the right part of **Download Data** (after selecting the device in the “Devices and sessions” window).



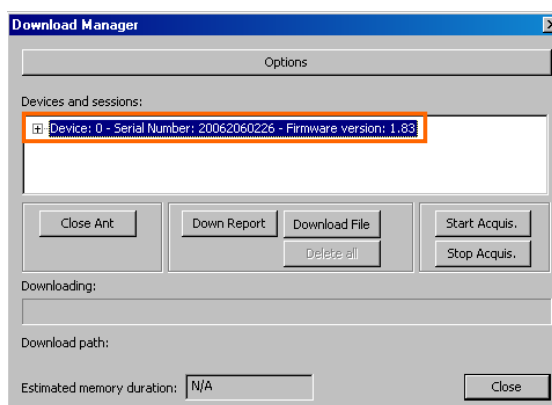
## 8.7.2 Starting and stopping logging (MANUAL) with GATE

Follows these instructions:

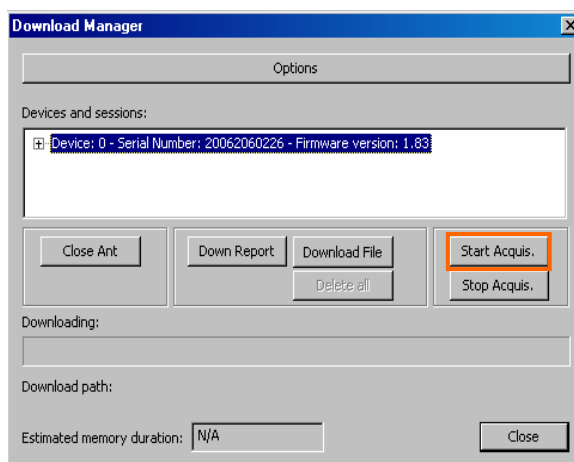
- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Open **Download Manager** and wait that the device appears in **Devices and Sessions**.



- Select the device as show in the picture.

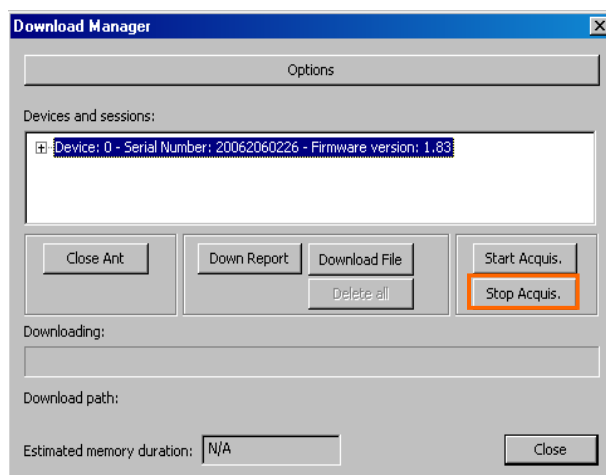


- To start the logging press **Start Acquis.** in the right part of **Download Manager**.



**NOTE: ONCE THE LOGGING HAS BEEN STARTED DISCONNECT THE LOGGER FROM THE PC.**

- To stop the logging press **Stop Acquis.** In the right part of **Download Manager** (after selecting the device in the “Devices and sessions” window).



## 8.8 Time synchronization (from pc)

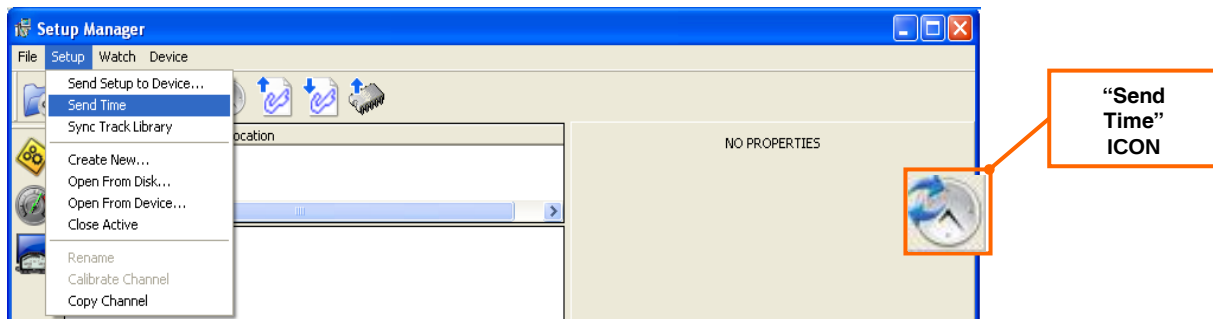
### 8.8.1 Time synchronization with DATA MANAGER

To synchronize **M40** clock with the PC, proceed as follow:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Open **Config Datalogger**.



- Click **“Send Time”** icon on main instrument bar, or select **“Send Time”** function in **Setup** menu.



By doing this the device and the PC will show the same time.

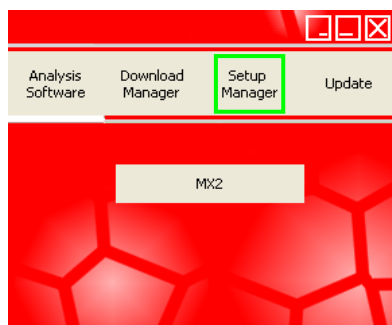
**NOTE :** you can do this only if **Time Mode** is in **MANUAL** (read chapter [8.9.4](#) of this manual).

### 8.8.2 Time synchronization with GATE

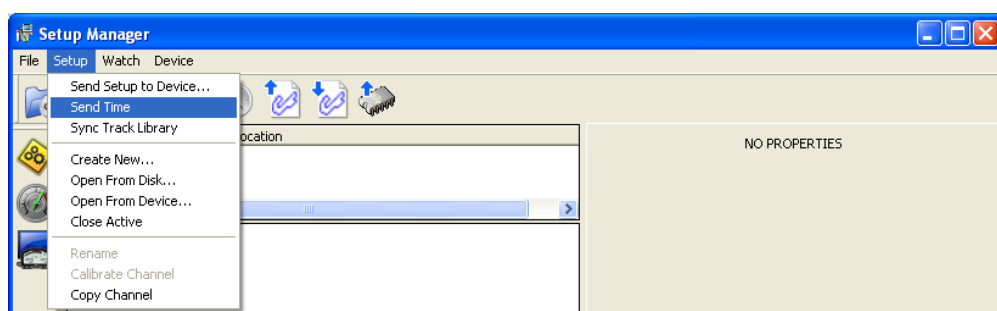
To synchronize **M40** clock with the PC, proceed as follow:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).

- Open **Setup Manager**.



- Click **“Send Time”** icon on main instrument bar, or select **“Send Time”** function in **Setup** menu.



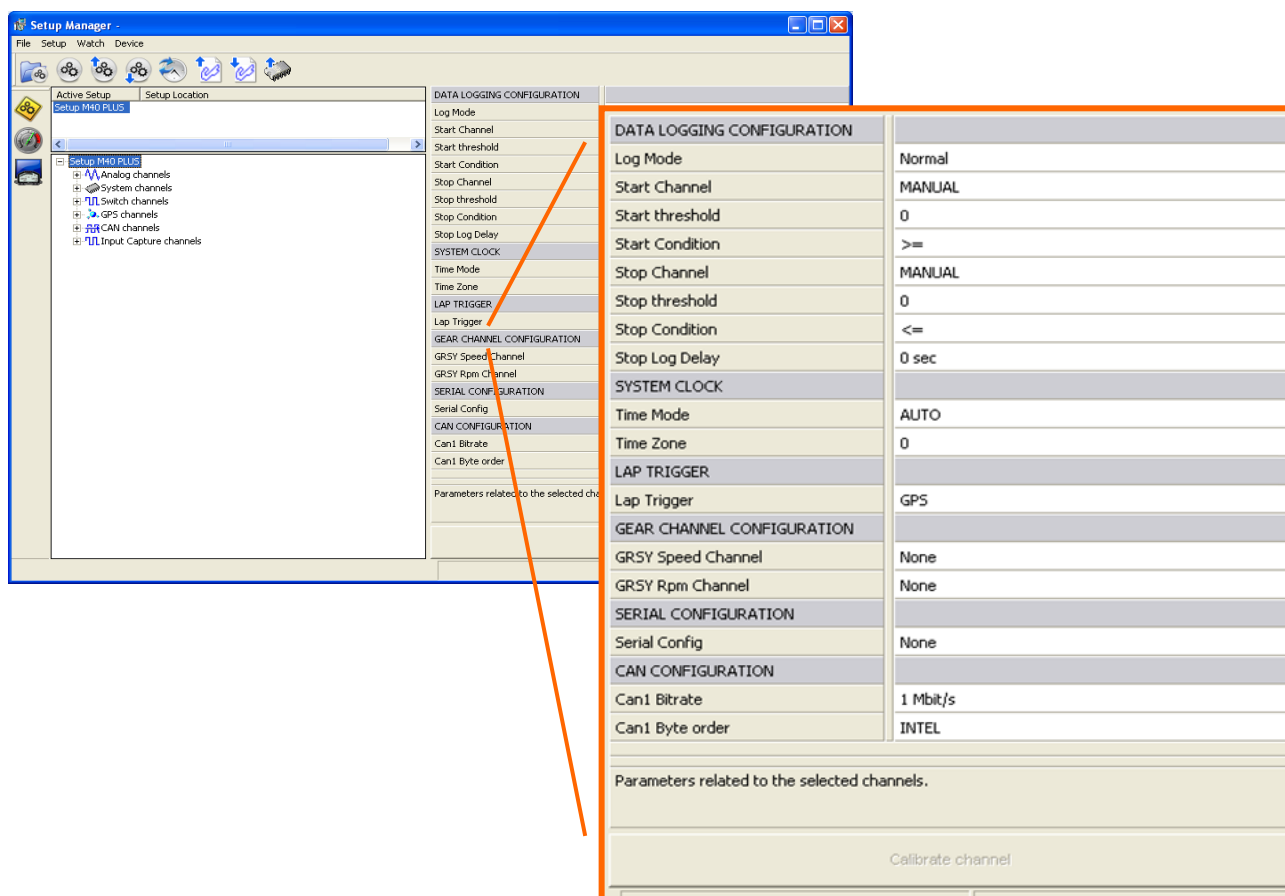
By doing this the device and the PC will show the same time.

**NOTE :** you can do this only if **Time Mode** is in **MANUAL** (read chapter [8.9.2](#) of this manual).

## 8.9 M40 configuration

M40 configuration panel permit to modify device parameters and it is the same both in DATA MANAGER and GATE.

Configuration panel is on the right part of setup window:



In the configuration panel you could set:

- Acquisition mode
- Acquisition start/stop (manual or automatic)
- Clock synchronization mode
- Lap time triggering mode
- Source channel of interpolated GEAR
- Serial protocol type
- Device CAN speed and protocol

**WARNING: WRONG SETUP COULD CAUSE MALFUNCTIONING (example DATA LOGGER NOT RECORDING).**

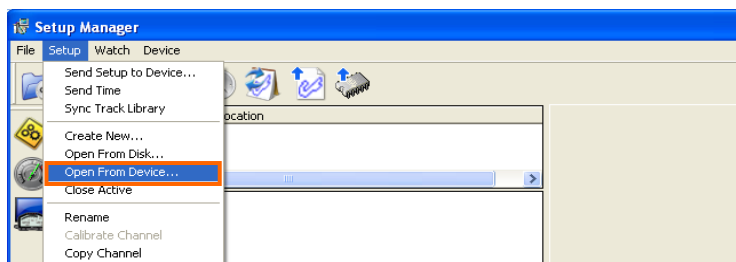
## 8.9.1 M40 configuration with DATA MANAGER

To get to the setup panel follow instruction below:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** clicking on the button in starting window of **DATA MANAGER**.



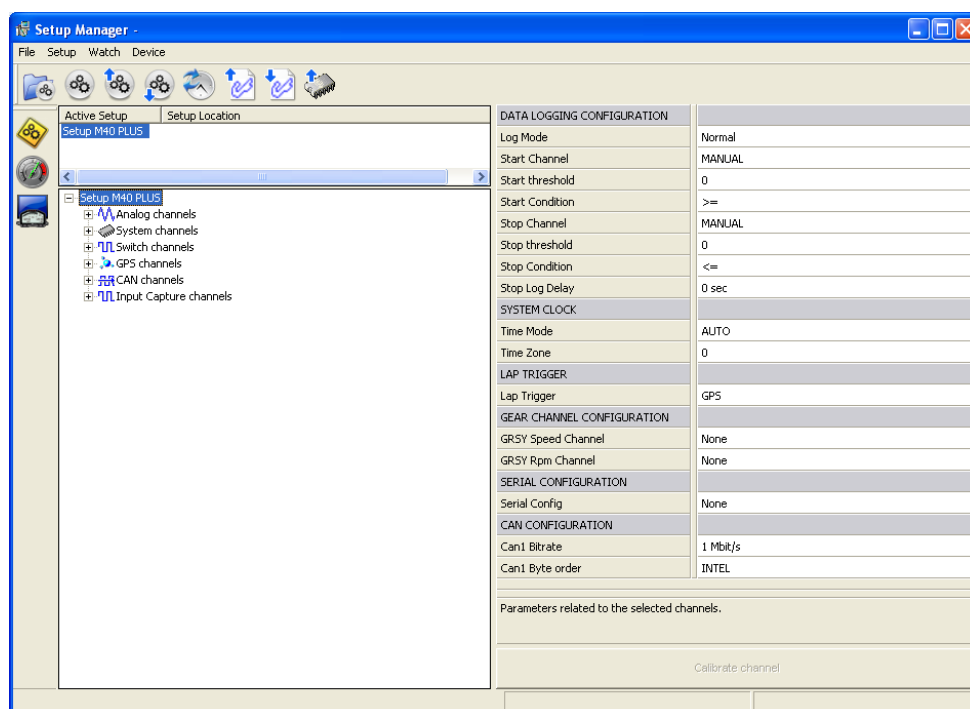
- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



"Open from Device" ICON

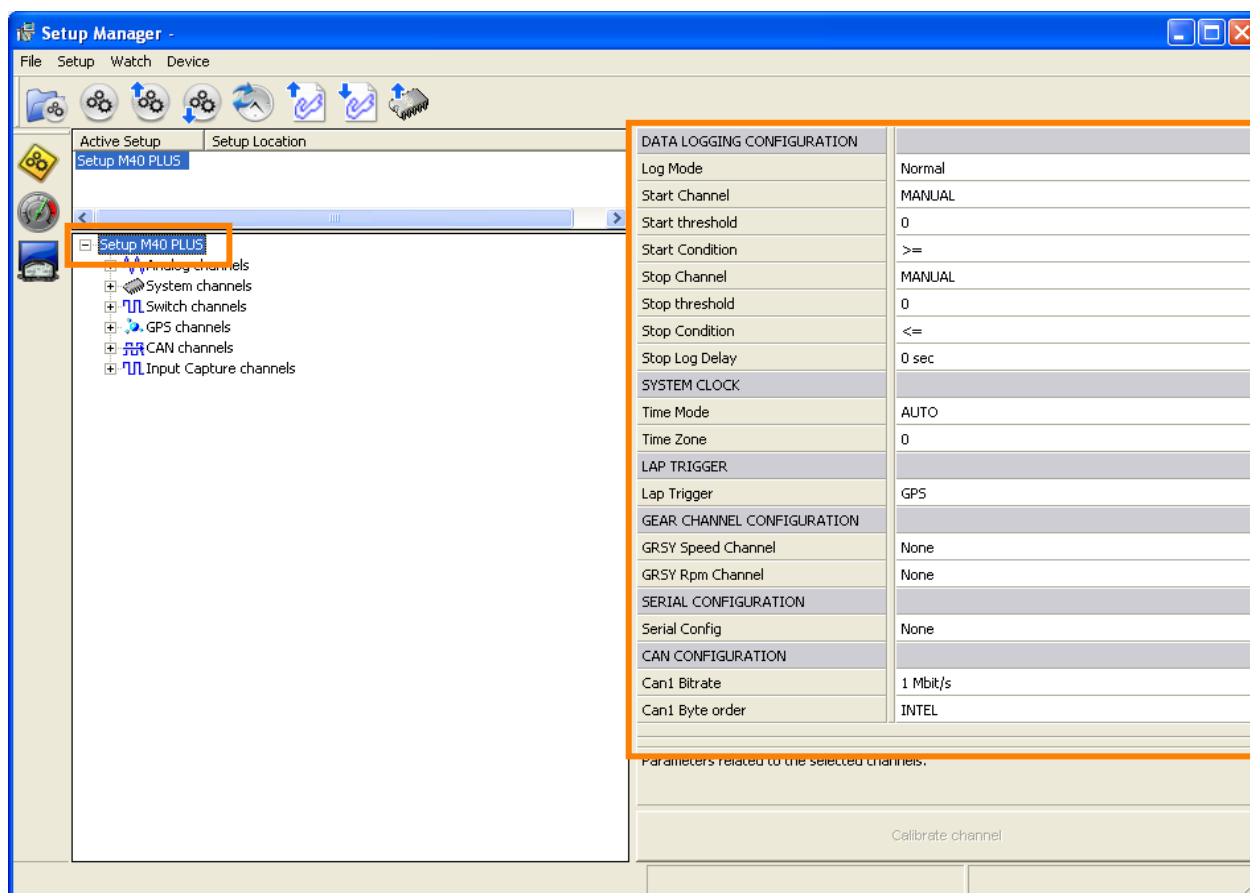


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger**.
- The picture below shows an example of a **M40 PLUS** base setup:





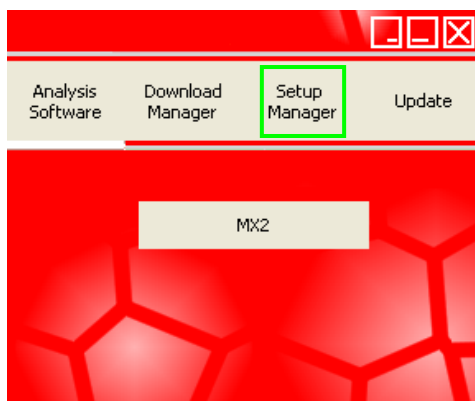
- Click on **Setup M40 PLUS** at the beginning of channels tree: on the right part of **Setup Manager** will appear a configuration page of the device (see picture below)



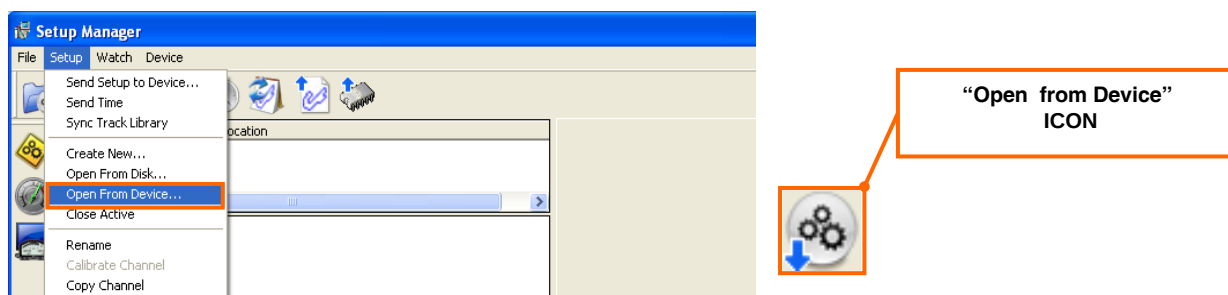
## 8.9.2 M40 configuration with GATE

To get to the setup panel follow instruction below:

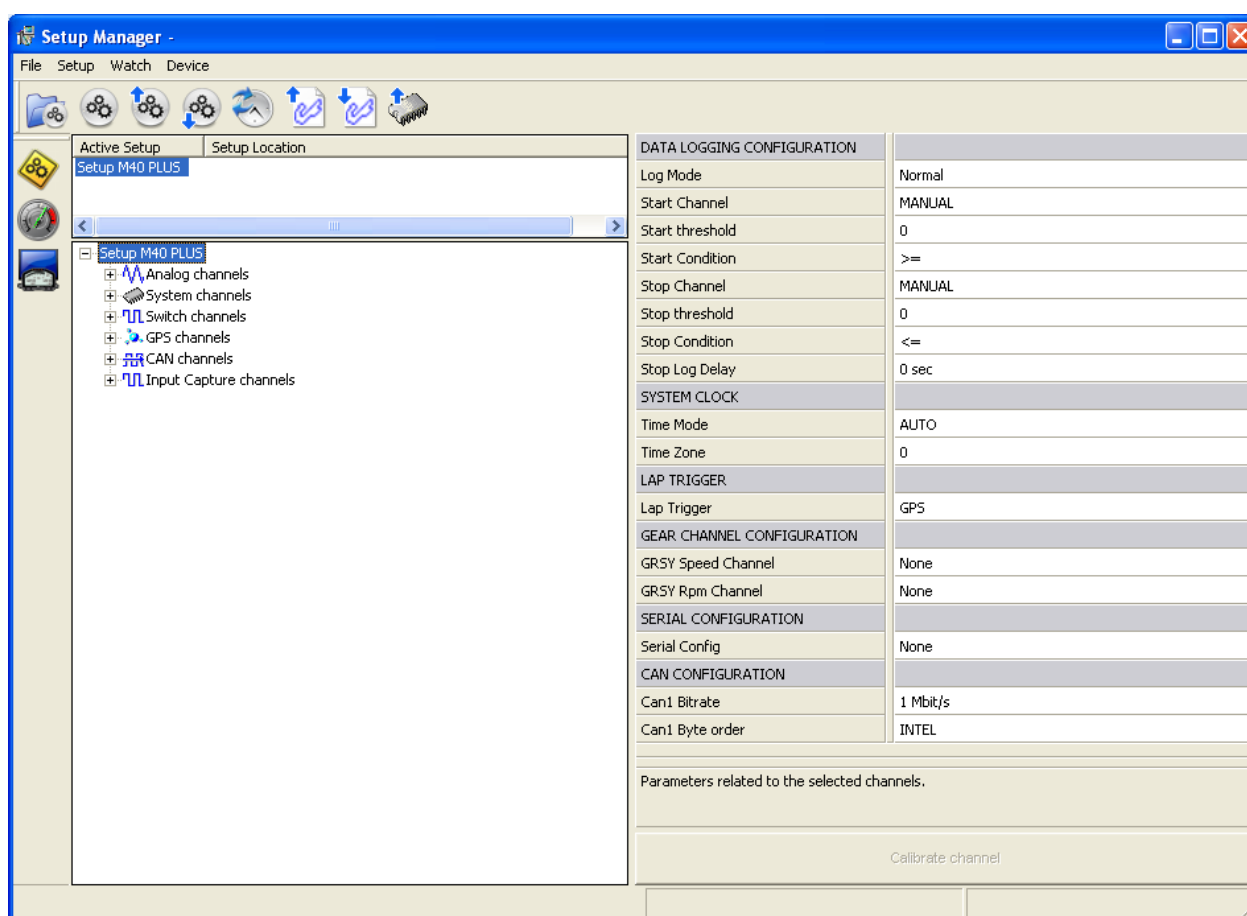
- Switch on the **M40** and connect to the PC.
- Start **Setup Manager** by clicking the button in **GATE**.



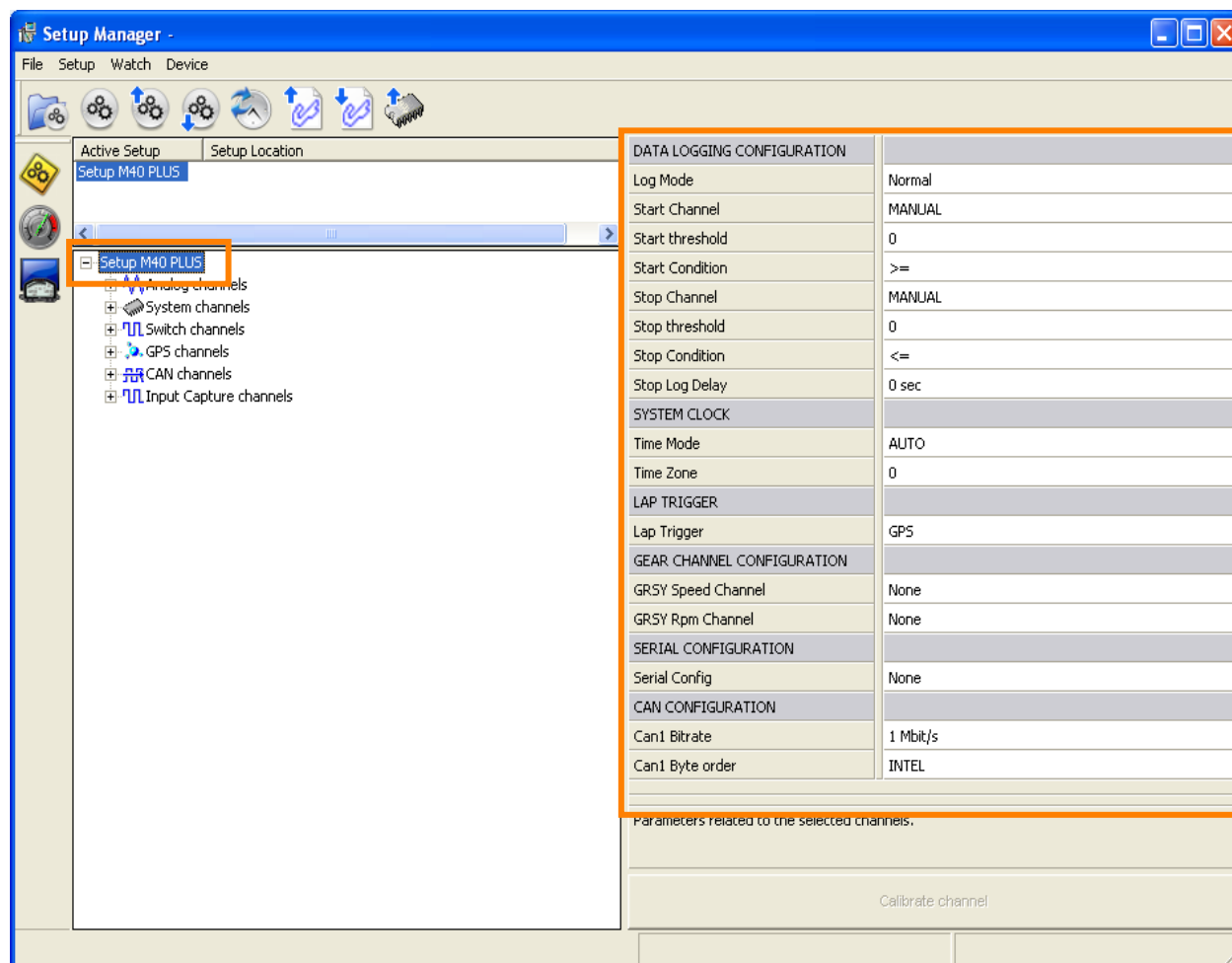
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- The picture below shows an example of a **M40 PLUS** base setup:



- Click on **Setup M40 PLUS** at the beginning of channels tree: on the right part of **Setup Manager** will appear a configuration page of the device (see picture below)



### 8.9.3 Data logging parameters modification

M40 logging parameters are in the upper part of configuration panel (see picture below):

| DATA LOGGING CONFIGURATION |        |
|----------------------------|--------|
| Log Mode                   | Normal |
| Start Channel              | MANUAL |
| Start threshold            | 0      |
| Start Condition            | >=     |
| Stop Channel               | MANUAL |
| Stop threshold             | 0      |
| Stop Condition             | <=     |
| Stop Log Delay             | 0 sec  |

Clicking the parameter you could change the configuration: you could change the value typing or with a dropdown menu (in this case the dropdown will appear after clicking the dots on the right).

The first screenshot shows the 'DATA LOGGING CONFIGURATION' window with 'Log Mode' set to 'Normal' and 'Start Channel' set to 'MANUAL'. An arrow points to the 'Log Mode' field.

The second screenshot shows the same window with a dropdown arrow icon highlighted on the right side of the 'Log Mode' field.

The third screenshot shows the dropdown menu open, displaying 'Normal' with a checkmark and 'Loop'. An arrow points to the 'Normal Loop' option.

Available options are:

- Log Mode:** define the logging mode of **M40**. Options are:  
**Normal** (predefined): data logging will stop only if “stop logging conditions” are satisfied or if the memory is full (green LEDs blinking). **It is suggested to leave this setting as it is.**  
**Loop:** data logging will stop each 40 minutes and it will start again erasing old data (“black box” mode).
- Start Channel:** define the triggering channel for starting of data logging. Standard setting is **MANUAL**: start/stop need to be done with PC (see chapter 8.7 of this manual). If you wish to modify the setting (**AUTOMATIC** start) you need to select a channel in the dropdown menu. **WARNING: CHANNELS AVAILABLE FOR START/STOP HAVE TO BE LOGGED INTO THE SYSTEM (“logging rate” different from “none”)**. The list visualizes the physical name of available channels.
- Start threshold:** define the threshold value of the channel to get the logging start. This setting will be effective only if the acquisition starts automatically.
- Start Condition:** define the condition that will start the logging. You could choose between:
  - > =** : by selecting this the logging will start when **Start Channel** will be greater or equal to the threshold defined in **Start threshold**
  - < =** : by selecting this the logging will start when **Start Channel** will be smaller or equal to the threshold defined in **Start threshold**
- Stop Channel:** define the channel that will stop the logging. The standard setting is **MANUAL**: start/stop controls need to be done via PC (read chapter 8.7 of this manual). If you modify **M40 (AUTOMATIC start)** the start channel will be stop channel. **WARNING: CHANNELS AVAILABLE FOR START/STOP HAVE TO BE LOGGED INTO THE SYSTEM (“logging rate” different from “none”)**. The Stop Channel may be different from the Start Channel.
- Stop threshold:** define the threshold value of the channel to get the logging stop. This setting will be effective only if the acquisition stops automatically.
- Stop Condition:** define the condition that will stop the logging. You could choose between:
  - > =** : by selecting this the logging will stop when **Stop Channel** will be greater or equal to the threshold defined in **Stop threshold**
  - < =** : by selecting this the logging will stop when **Stop Channel** will be smaller or equal to the threshold defined in **Stop threshold**
- Stop Log Delay:** you could set a delay stop time for the logging (this setting is really to avoid unwanted stops during automatic recording). Values are selectable from dropdown menu.

## 8.9.4 Change of system time

Parameters that configure **M40** clock are in the central part of setting panel (see picture below):

| SYSTEM CLOCK |      |
|--------------|------|
| Time Mode    | AUTO |
| Time Zone    | 0    |

The modification is done by clicking on the value of the parameter and selecting required value from dropdown menu.

Available options are:

- **Time Mode:** define the mode with **M40** update internal clock (date and hour). Available options are:  
**AUTO (preset):** clock update is automatic with GPS system.  
**MANUAL:** clock update is manual and comes from PC clock synchronization (read chapter [8.8](#) of this manual).
- **Time Zone:** define internal clock time zone for **M40**. Standard setting is **0** (Greenwich time zone). To have a precise hour it is essential to set properly the time zone. In Italy during DST this parameter need to be **+2**; during standard time this parameter will be **+1**.

## 8.9.5 Lap trigger modification

Parameters relative to source channel setup for lap triggering in **M40** are in the central configuration panel:

| LAP TRIGGER |     |
|-------------|-----|
| Lap Trigger | GPS |

**Lap Trigger** is used to cut laps in closed tracks in order to have lap times.

If **M40** is not linked to any display, this parameter is not really important: MX2 can cut lap times usin GPS signal only.

Usually **GPS** is used for **Lap Trigger**: other channels can be used only if configured as **beacon** (read [Appendix 1 chapter 2.2](#) of this manual).

## 8.9.6 GRSY channel setting

Parameters relative to GRSY for interpolated gear in **M40** are in the central configuration panel:

| GEAR CHANNEL CONFIGURATION |      |
|----------------------------|------|
| GRSY Speed Channel         | None |
| GRSY Rpm Channel           | None |

GRSY can be used only in M40 with a dedicated connected display.

## 8.9.7 Serial protocol setting

Parameters relative to serial protocol can start data logging through serial port RS232.

| SERIAL CONFIGURATION |      |
|----------------------|------|
| Serial Config        | None |

If it is not connected any device to RS232 port (or the needed protocol is not in the list of recognized protocols) set parameter to **None**.

## 8.9.8 CAN parameters setting

Parameters relative to CAN configuration permit to set data format and speed of the communication:

| CAN CONFIGURATION |          |
|-------------------|----------|
| Can1 Btrrate      | 1 Mbit/s |
| Can1 Byte order   | INTEL    |

Available options are:

**Can1 bitrate:** set speed (bitrate) of CAN1 bus, by choosing between proposed values

**Can1 Byte Order :** select data format of CAN1 bus, by choosing between proposed values

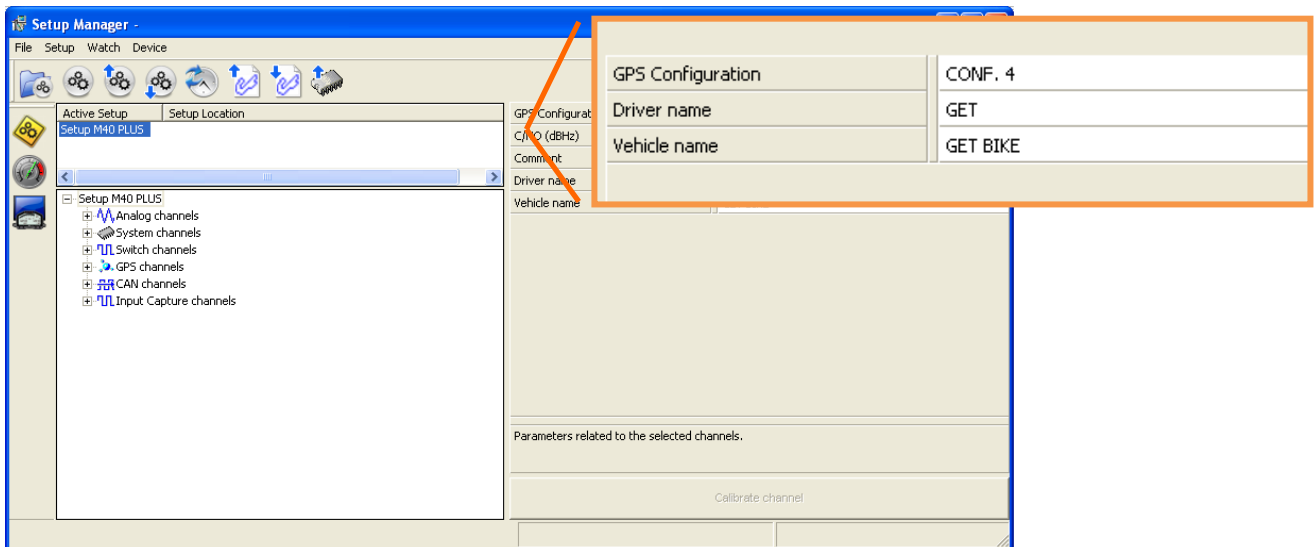
**WARNING: YOU NEED TO KNOW THE CAN PROTOCOL OF YOUR VEHICLE BEFORE MODIFY CAN PARAMETERS.**

## 8.10 M40 setup properties modification

In setup window you can modify following **M40** parameters:

- GPS configuration
- Adding comments (available only in GATE software)
- Adding driver's name
- Adding vehicle's name

Last three voices can change also the name of logging file downloaded by the PC with **Download Manager** (read chapter [8.2](#) of this manual)



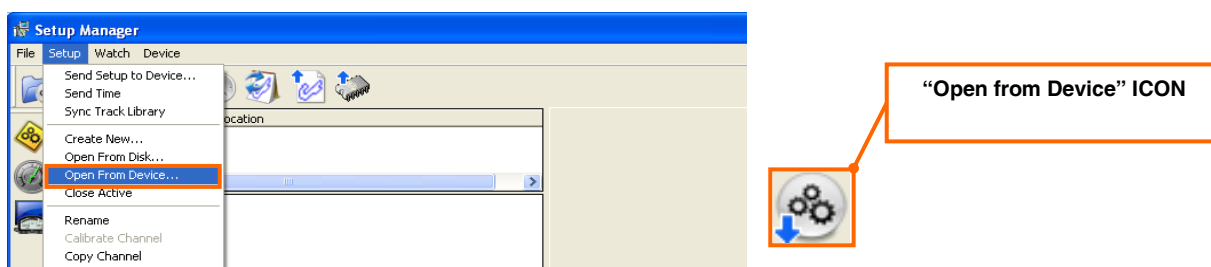
### 8.10.1 M40 setup properties modification with DATA MANAGER

To get to the setup panel follow instruction below:

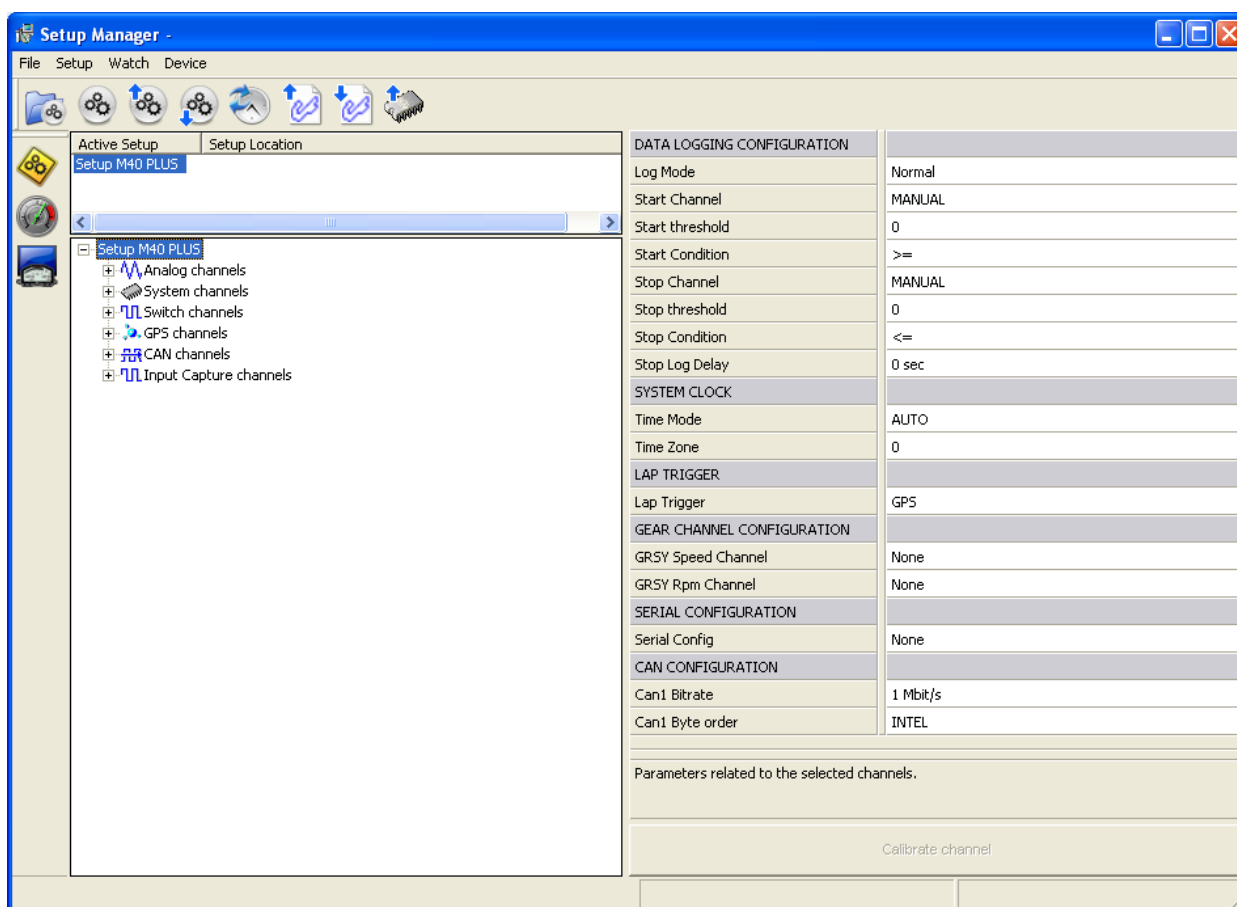
- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** clicking on the button in starting window of **DATA MANAGER**.



- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

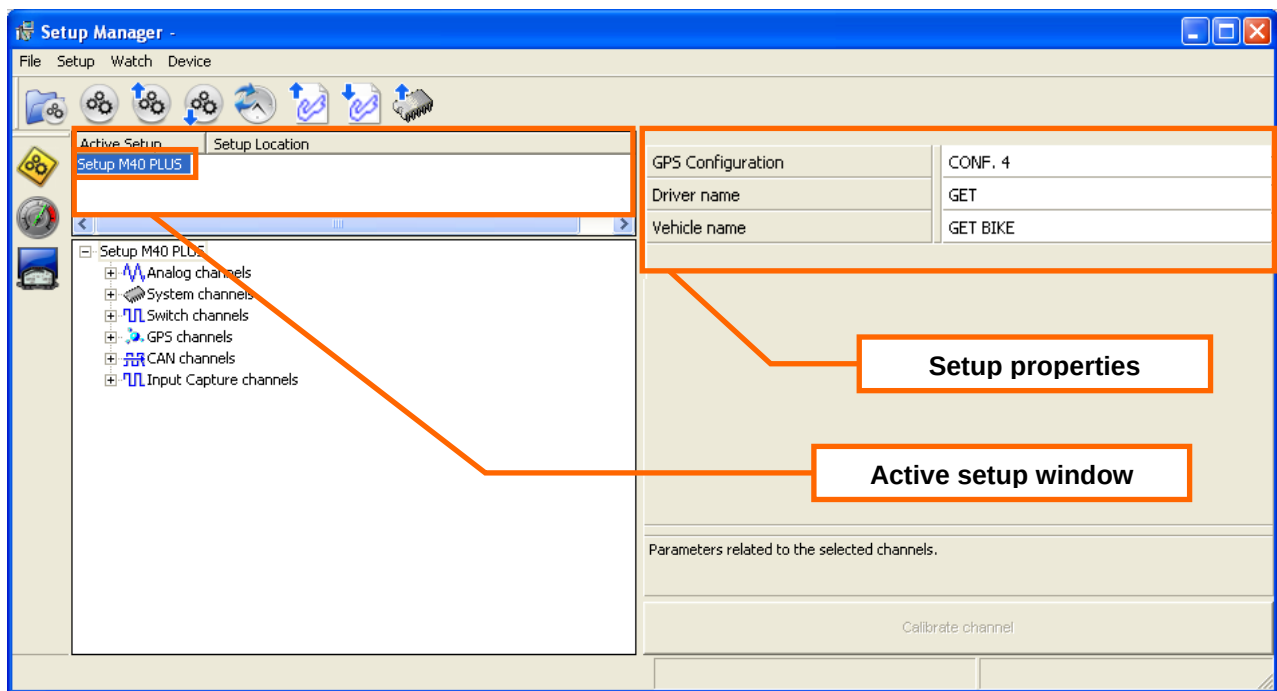


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger**.
- The picture below shows an example of a **M40 PLUS** base setup:





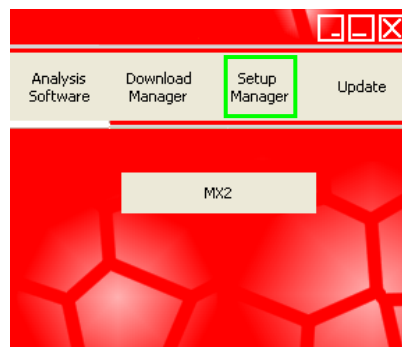
- Click on **Setup M40 PLUS** at the beginning of channels tree: on the right part of **Config Datalogger** will appear a configuration page of the device (see picture below)



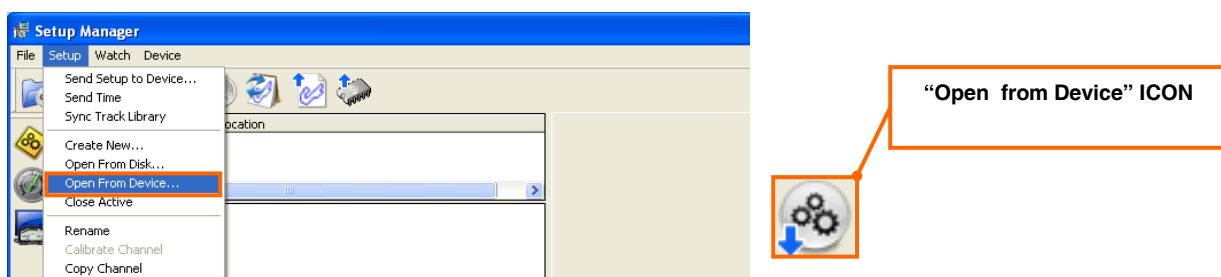
## 8.10.2 M40 setup properties modification with GATE

To get to the panel control follow the instruction below:

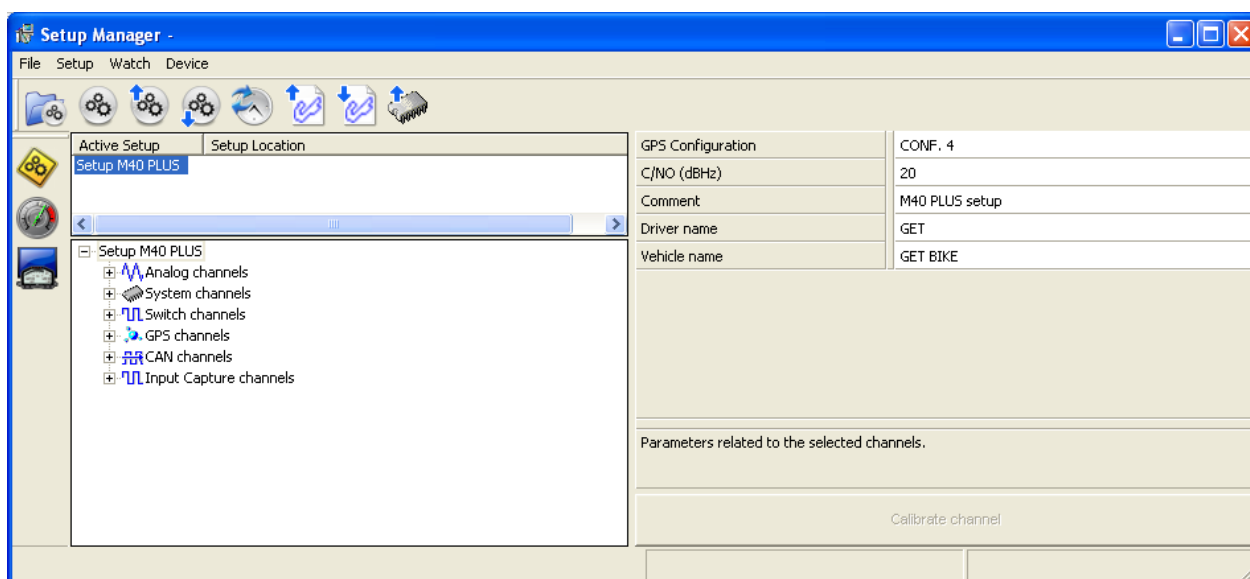
- Switch on **M40** and connect to a PC.
- Start **Setup Manager** by clicking the button on **GATE** main page.



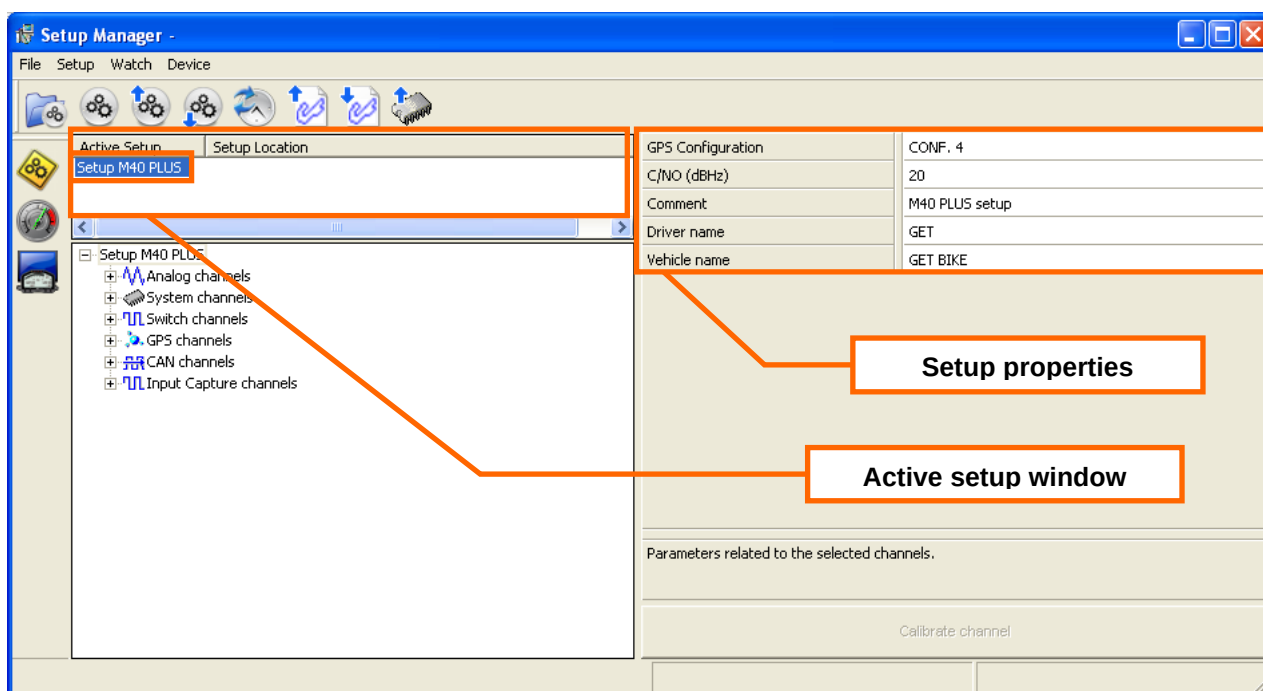
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- The picture below show an example of a **M40 PLUS** base setup:



- Click on **Setup M40 PLUS** at the beginning of channels tree: on the right part of **Setup Manager** will appear a configuration page of the device (see picture below)



### 8.10.3 GPS parameters setting

GPS parameters can change behaviour of **M40**: **PLEASE ACT CAREFULLY WHEN DOING THESE OPERATIONS.**

The following picture shows GPS configuration:

|                   |         |
|-------------------|---------|
| GPS Configuration | CONF. 4 |
|-------------------|---------|

**GPS Configuration:** this parameter change the dynamic of GPS module. Standard configuration is **CONF4**. We suggest **CONF6** in off-road applications

**WARNING: WRONG SETUP COULD CAUSE MALFUNCTIONING (example DATA LOGGER NOT RECORDING OR BAD GPS TRAJECTORIES).**

### 8.10.4 Comment, driver and vehicle setting

Comments, driver's name and vehicle's name can be changed in order to achieve a easier **M40** file management (this important when using more than one **M40**).

These are available configurations:

|              |                |
|--------------|----------------|
| Comment      | M40 PLUS setup |
| Driver name  | GET            |
| Vehicle name | GET BIKE       |

**Comment (only for GATE software):** you can add a comment

**Driver Name :** you can add a driver's name

**Vehicle name :** you can add vehicle's name

**All changes done in the previous parameters will affect file name downloaded with Download Manager.**

## 8.11 Firmware update

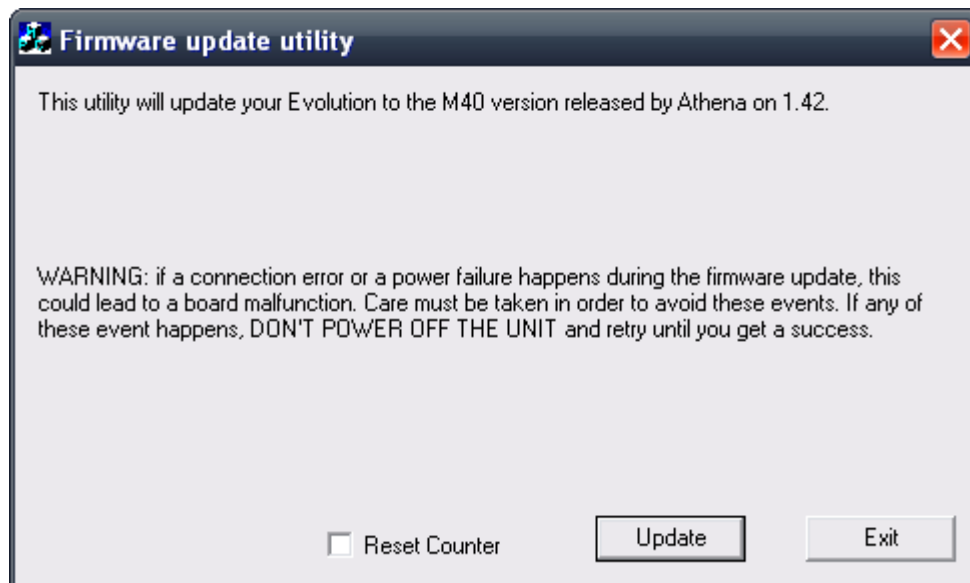
M40 firmware can be updated via the PC.  
To update firmware please act as follows:

- Switch on **M40** and connect to the PC with USB cable.
- Update the firmware by clicking on the firmware auto-executable icon.



- Push UPDATE and confirm: wait until the end of the procedure (a message will appear in the PC monitor).

**WARNING: DO NOT DECONNECT USB CABLE DURING UPDATING**



**NOTE: if RESET COUNTER option is present user can select it in order to reset the Run counter (only for fw rel. above 1.30)**

- Disconnect USB cable
- Switch off and switch on the device



**WARNING: A WRONG PROCEDURE DURING UPDATING COULD CAUSE MALFUNCTIONING**

## 9 M40 TECHNICAL CHARACTERISTICS

### **Power:**

- Power range: from 9 VDC to 24 VDC
- Consumption: 170mA @ 12VDC (device switched on, sensors not connected, alarms LEDs switched of, GPS aerial not connected)

### **System I/O:**

- Analogue inputs (range 0-5V)
- Frequency inputs (open collector 0-5V , freq. 0 - 20kHz)
- 1 input for button connection or external beacon (only in M40 EXP and PLUS) with internal 5V pull up
- 2 auxiliary power supplies (5V and 12V )
- Integrated tri-axial accelerometer

### **Communication ports:**

- 1 2.0 High Speed CAN port (bitrates 125 kb/s, 250 kb/s, 500 kb/s, 1Mb/s; Intel and Motorola protocols) transmitting or receiving configurable
- USB port for connection with PC

### **GPS module:**

- Integrated 5Hz GPS module (oversampled @ 10 Hz) with external antennal (supplied)
- SMA antenna connector

### **Miscellaneous:**

- Internal SD memory up to 16GB
- Integrated signalling LEDs
- Anodized aluminium machined case
- Protection grade: IP68
- Dimensions (mm) 92 x 66 x 20
- Weight: 250 g (circa)

## APPENDIX 1: M40 SETUP

Some examples here described will help the end user to add new channels into **M40 PLUS** setup and the use of **WATCH** window.

Each sensor physically connected to the datalogger need to be defined and calibrated into the setup, stored in the device.

Sensors have to be linked to specific “**channels**” that, for **M40**, can be resumed as follows:

- **Analogue Channels:** these channels can be used with analogue sensors that transform analogue signals (0 V - 5 V), as potentiometer, pressure transducers, thermocouples, etc.  
**M40** uses these connectors for analogue sensors connection: **AD1**, **AD2**, **AD3**, etc (inside **EXPANSION** cable)
- **System Channels:** system channel that should not be changed by the user.
- **Switch Channels:** these channels can be used to detect the pressure of buttons (map switch, for example).  
This channel is available only in **M40 PLUS** with **EXP2** connector.
- **GPS Channels:** GPS channel system that should not be changed by the user.
- **CAN Channels:** CAN BUS channels.
- **Input Capture Channels:** these channels can be linked to frequency channels as, for example, ignition pick up (rpm detection) or proximity sensors (wheel speed sensor).

For further information on GET sensors and calibration, read attached technical sheet and specification.

**Following chapters show software channel configuration; for hardware configuration please refer to appendix 2 of this manual.**

When writing/reading setups to/from the **M40** the device must be connected to the PC.  
Please make sure that the **M40** is not logging.



**NOTE:** the M40 setup types are reduced only to M40 PLUS one from firmware 1.30 and greater. The user can't send the different setups (M40STD or M40EXP types) to M40 if DATA MANAGER software is used, so pay attention when a new setup is being created.

# 1 ANALOGUE CHANNELS

Here you can find some instruction to create analogue channels.

## 1.1 Linear calibration example

This chapter will show how calibrate a generic linear sensor with an analogue output (0 - 5 Volt). This calibration is usually done with temperature sensors, pressure sensors, potentiometers, accelerometers. If the linear calibration has been used for a suspension potentiometer the user can run the **WATCH** function to set the “zero” of suspension sensor

The following table shows characteristic of a generic temperature sensors:

| Temperature (°C) | Output (V) |
|------------------|------------|
| 25               | 1.8        |
| 60               | 2          |
| 70               | 2.5        |
| 80               | 2.8        |
| 100              | 3.6        |
| 110              | 4          |
| 120              | 4.5        |

Let's suppose the this sensor is used to log the engine temperature.  
In order to set this sensor in the list of logged channels, refer to follows chapters.

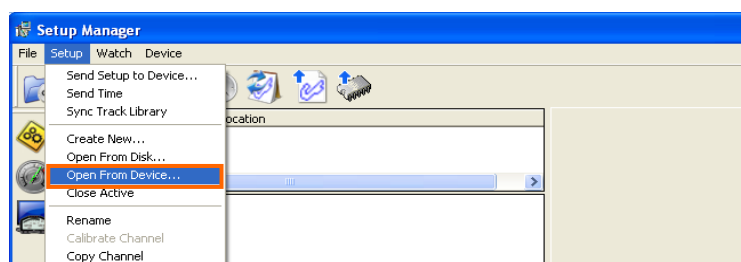
### 1.1.1 Linear calibration by using DATA MANAGER

To set the channel follow instruction below:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** clicking on the button in starting window of **DATA MANAGER**.



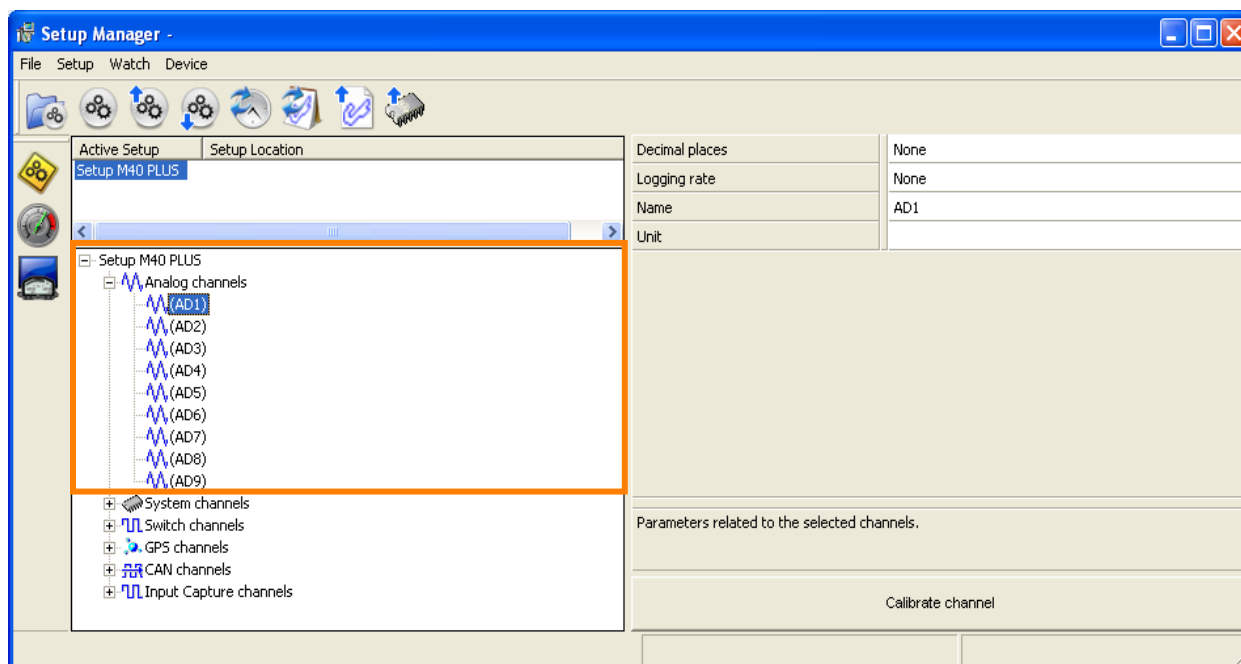
- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



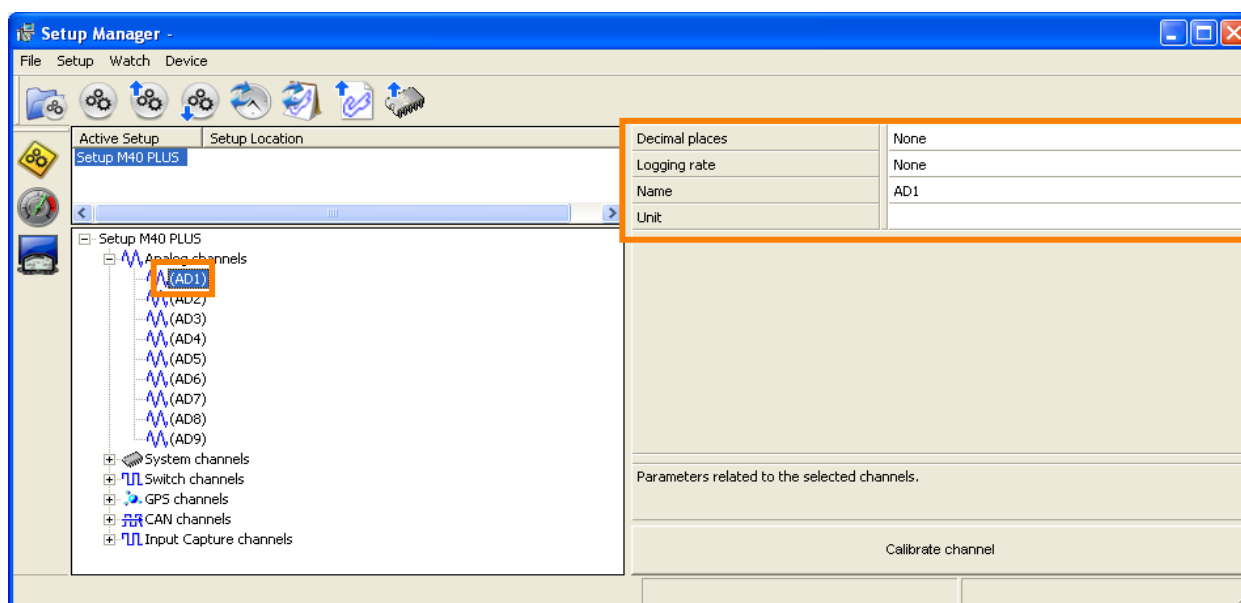
“Open from Device” ICON



- Once the job is done, a message will appear and you will see the setup in **Config Datalogger**.
- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the sensor is connected to **AD1**; click on **AD1** (in **Analogue Channels** list): channel's properties will appear.



- Now you can change all options:

**Decimal Places:** how many decimal places you wish to have

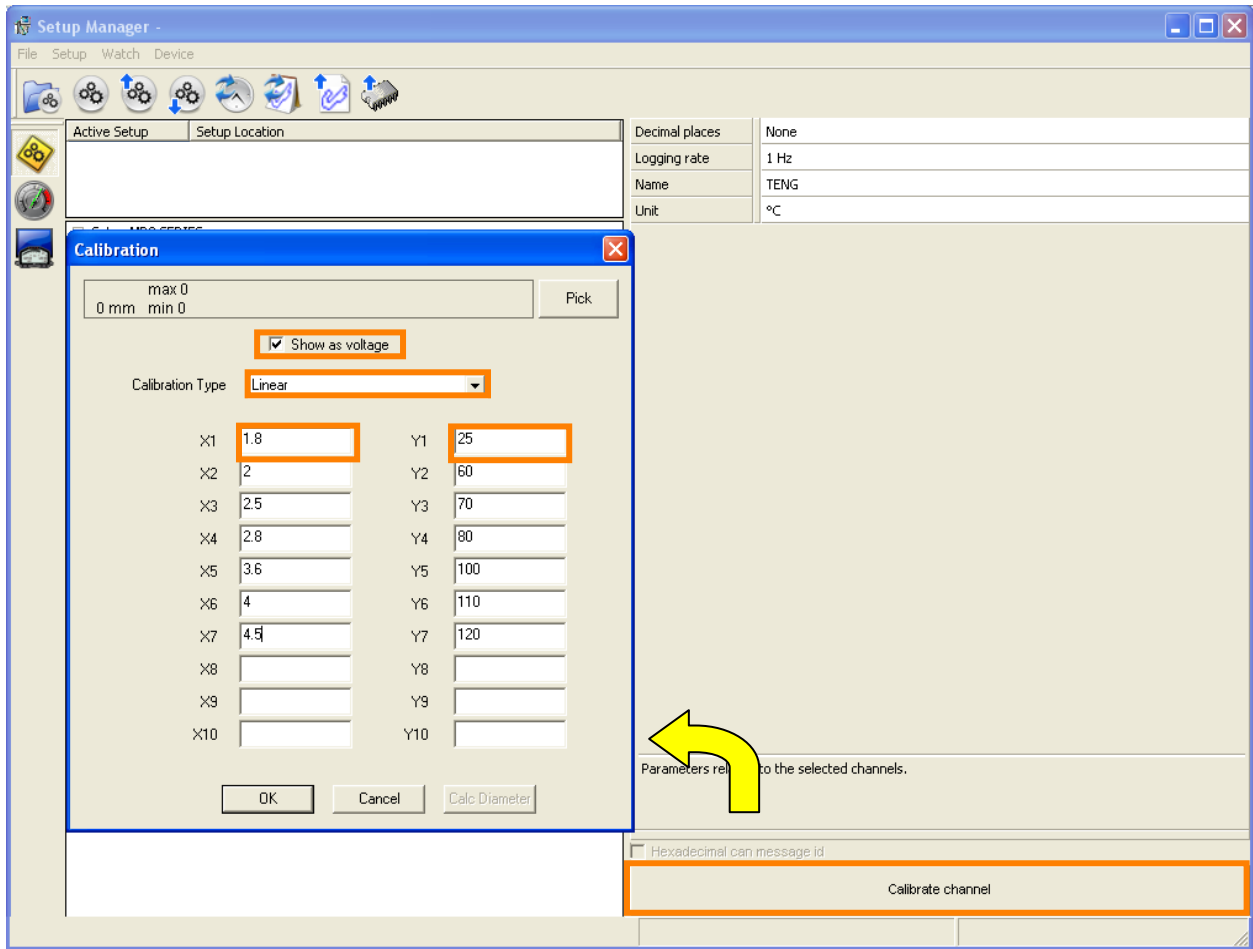
**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **TENG** – Engine Temperature).

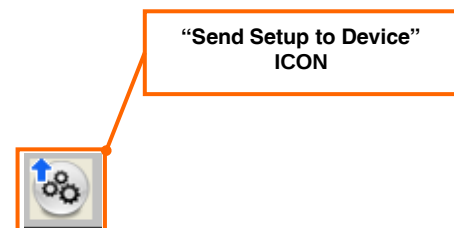
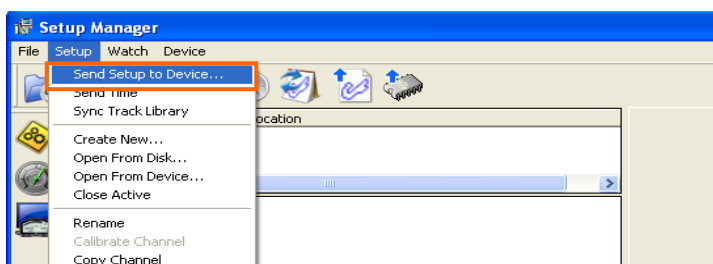
**Unit:** this parameter define measurement unit of the channel (°C for temperature sensor)



- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:

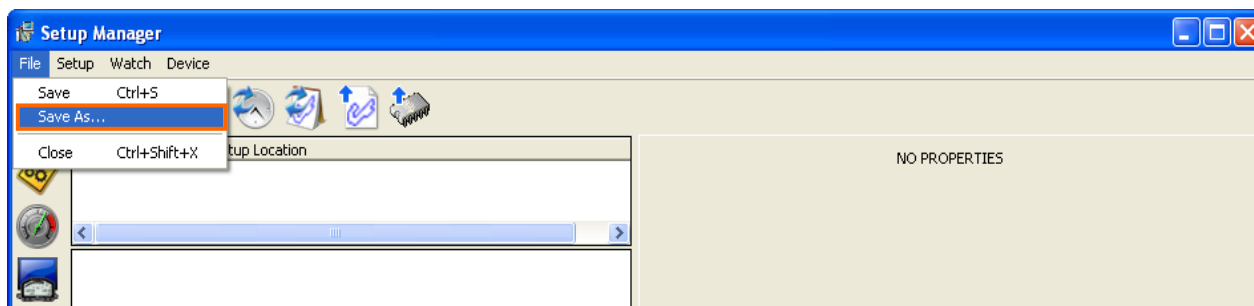


- Once you get in to the calibration window it is necessary to define:
  - Calibration Type** : you can chose the type of calibration (in this example use **Linear**)
  - X values**: values, **COUNT** or **VOLTAGE**, of the channel
  - Y values**: define calibrated values of the relative X values. In our example at 25°C (value **Y1**) we will read 1.8 V (value **X1**)
- Setup Manager permit to log **X** values, directly from the device using **Pick**<sup>2</sup>. **Y** values need to be known.
- NOTE**: values can be set in two different ways:
  - COUNT** : digital value associated to the channel
  - VOLT** : volt value associated to the channel.
- Volt visualization need to be activated by selecting “Show input as Voltage” box.**
- Once calibration values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



<sup>2</sup> This option is available on if **M40** is on and connected to PC via USB

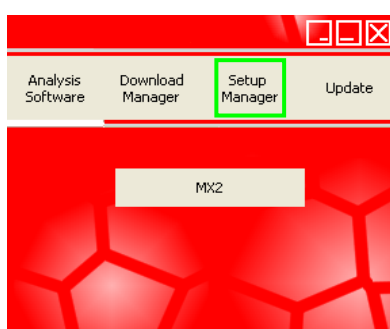
- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



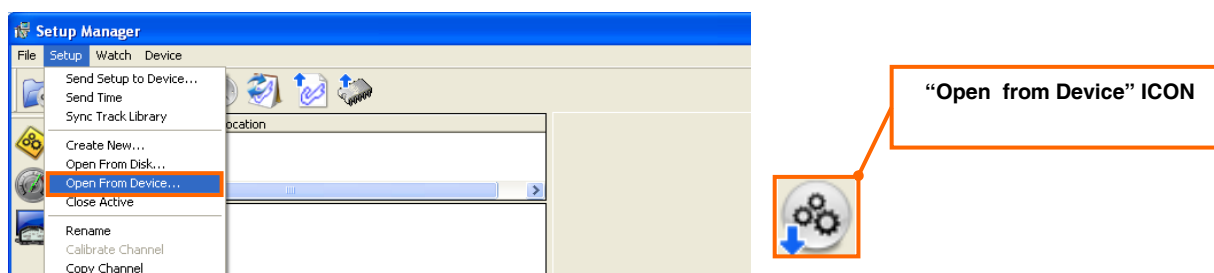
## 1.1.2 Linear calibration by using GATE

To set the channel follow instruction below:

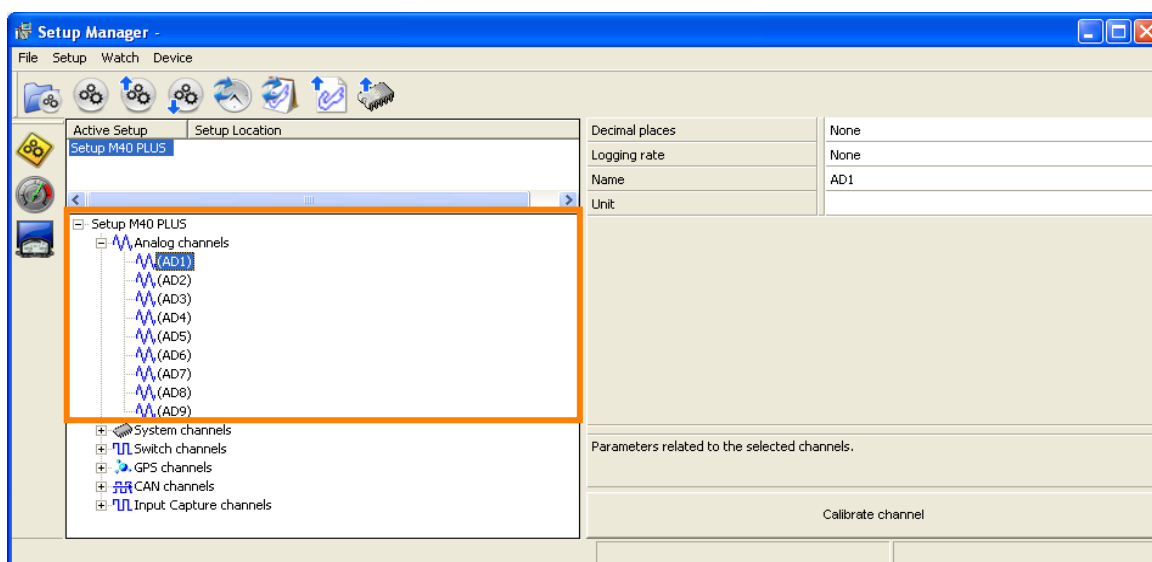
- Start **Setup Manager** by clicking the button in **GATE**.



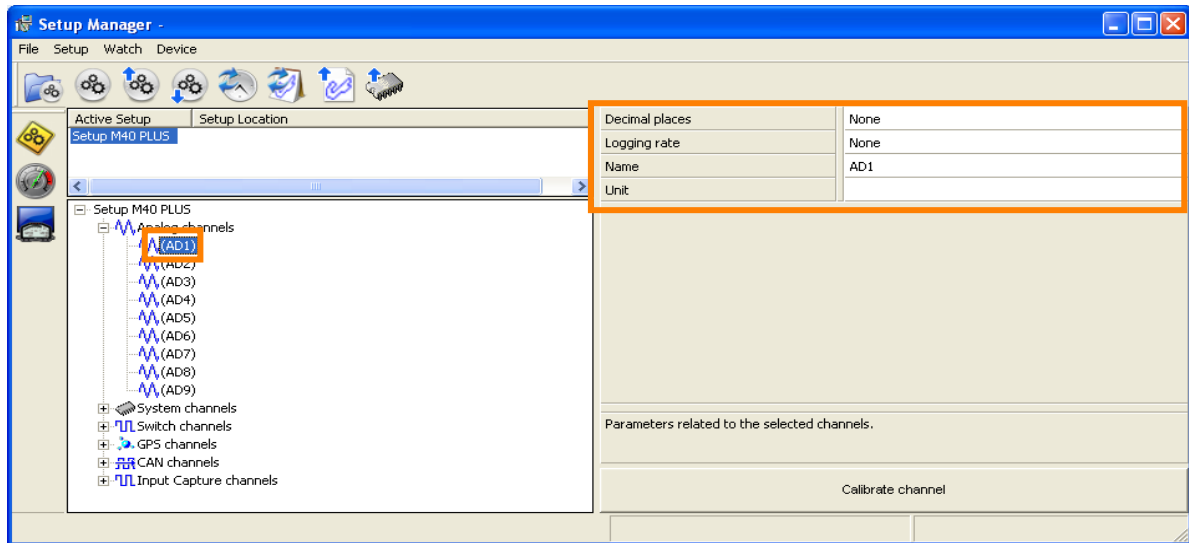
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the sensor is connected to **AD1**; click on **AD1** (in **Analogue Channels** list): channel's properties will appear.



- Now you can change all options:

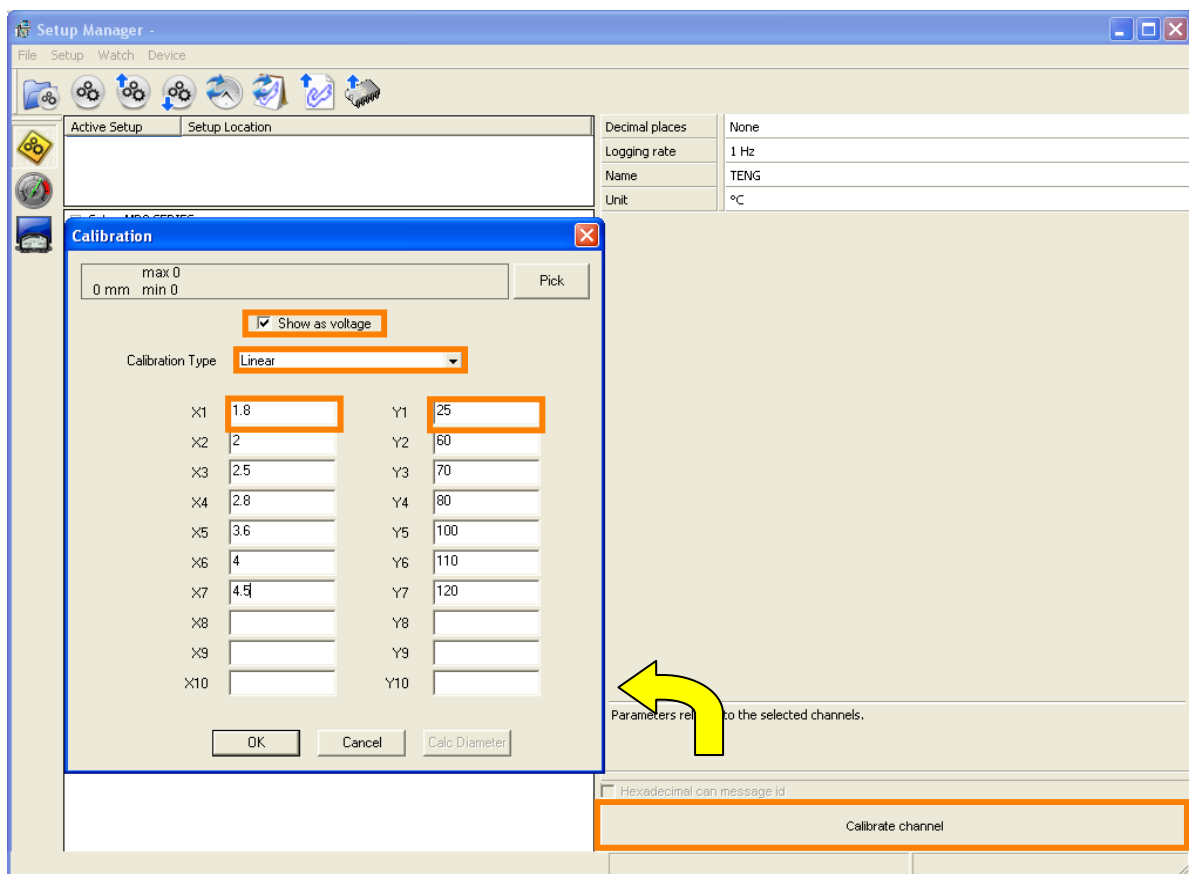
**Decimal Places:** how many decimal places you wish to have

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **Engine Temp**).

**Unit:** this parameter define measurement unit of the channel (°C for temperature sensor)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration (in this example use **Linear**)

**X values**: values, **COUNT** or **VOLTAGE**, of the channel

**Y values**: define calibrated values of the relative X values. In our example at 25°C (value **Y1**) we will read 1.8 V (value **X1**)

Setup Manager permit to log **X** values, directly from the device using **Pick**<sup>2</sup>. **Y** values need to be known.

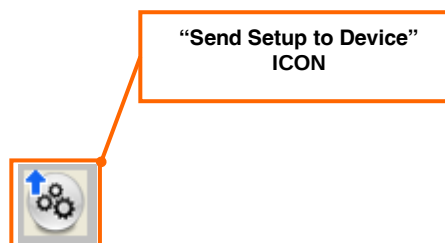
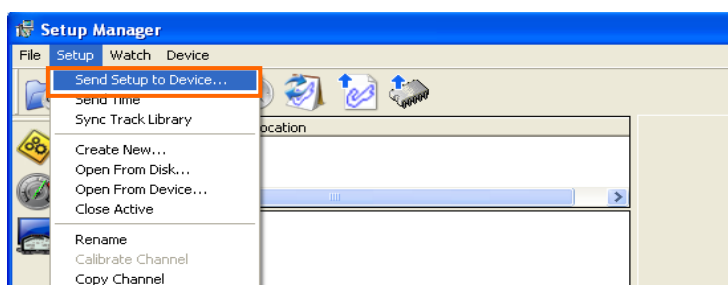
**NOTE**: values can be set in two different ways:

**COUNT** : digital value associated to the channel

**VOLT** : volt value associated to the channel.

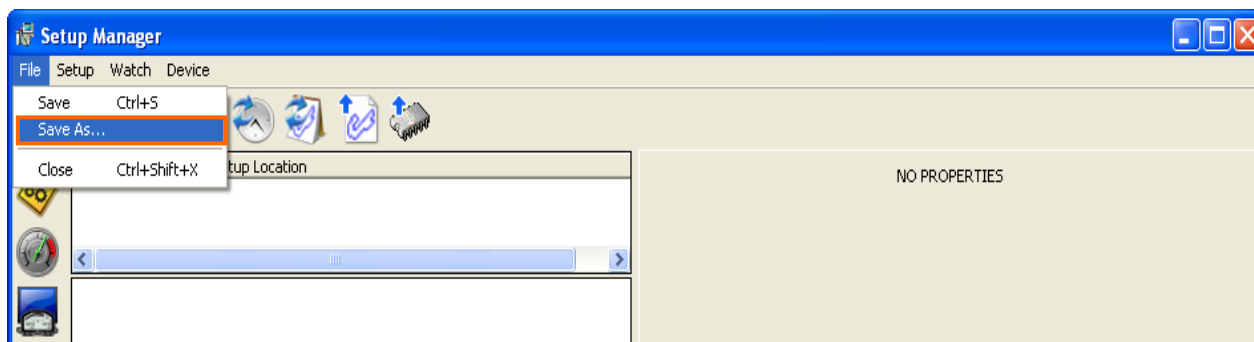
**Volt visualization need to be activated by selecting “Show as Voltage” box.**

- Once calibration values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



“Send Setup to Device”  
ICON

- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



For further information on **Setup Manager** read Gate user manual.

<sup>2</sup> This option is available on if **M40** is on and connected to PC via USB

## 1.2 GEAR on analogue input calibration

This chapter will help you to calibrate a “GEAR” sensor: this calibration is used when a 0-5 volt potentiometer is used to log the position of the gear barrel.  
Please refer to follows instructions.

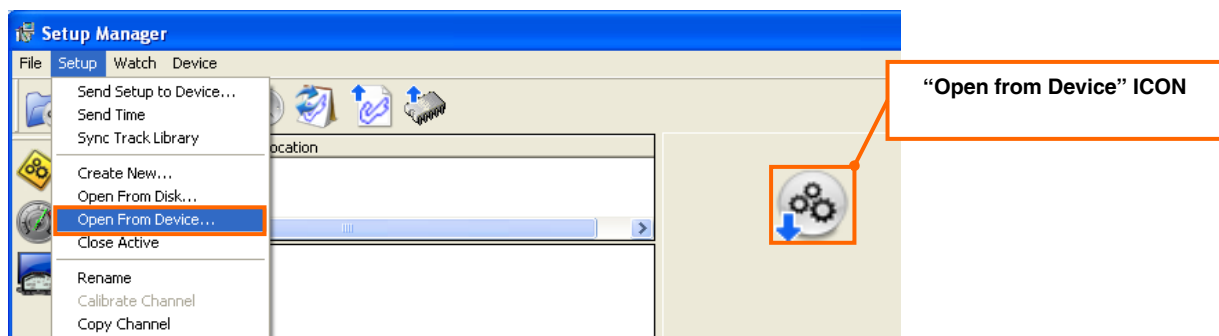
### 1.2.1 GEAR on analogue input calibration by using GATE

To set the channel follow instruction below:

- Switch on the device (green led on fix) and connect to the PC (both LEDs will blink).
- Verify that all condition of [8.1](#) are satisfied.
- Wait until the device is recognized by Windows (usually the message in the low right part of the screen).
- Start **Config Datalogger** clicking on the button in starting window of **DATA MANAGER**.

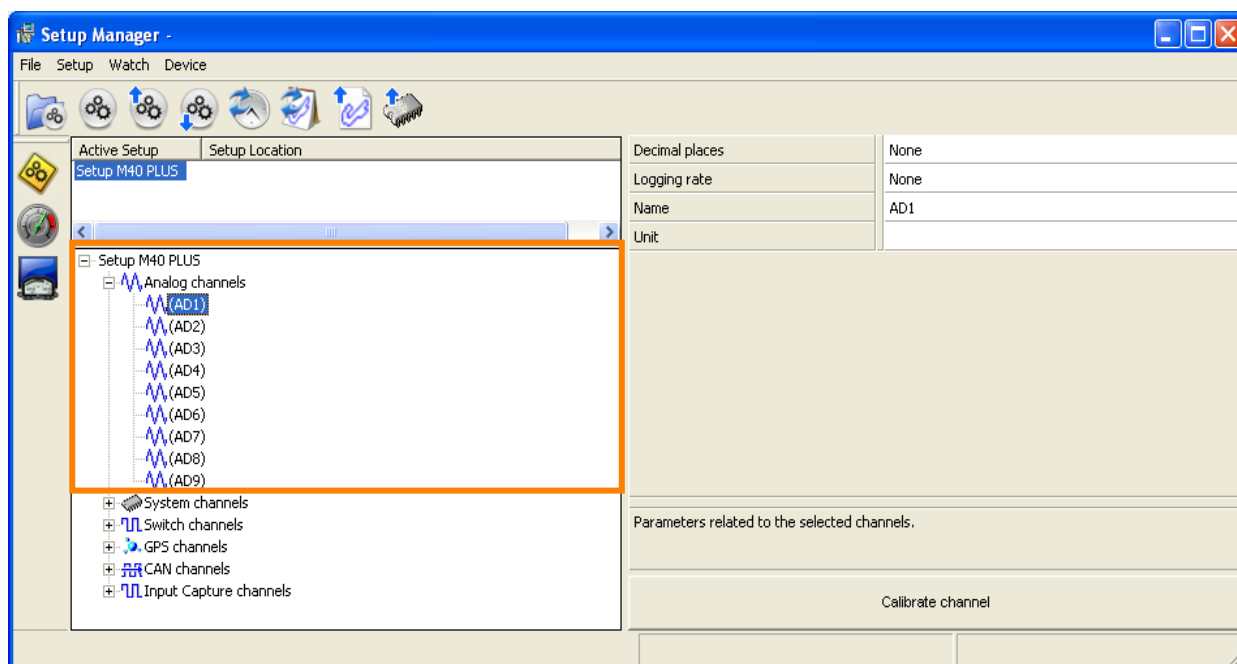


- Download device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

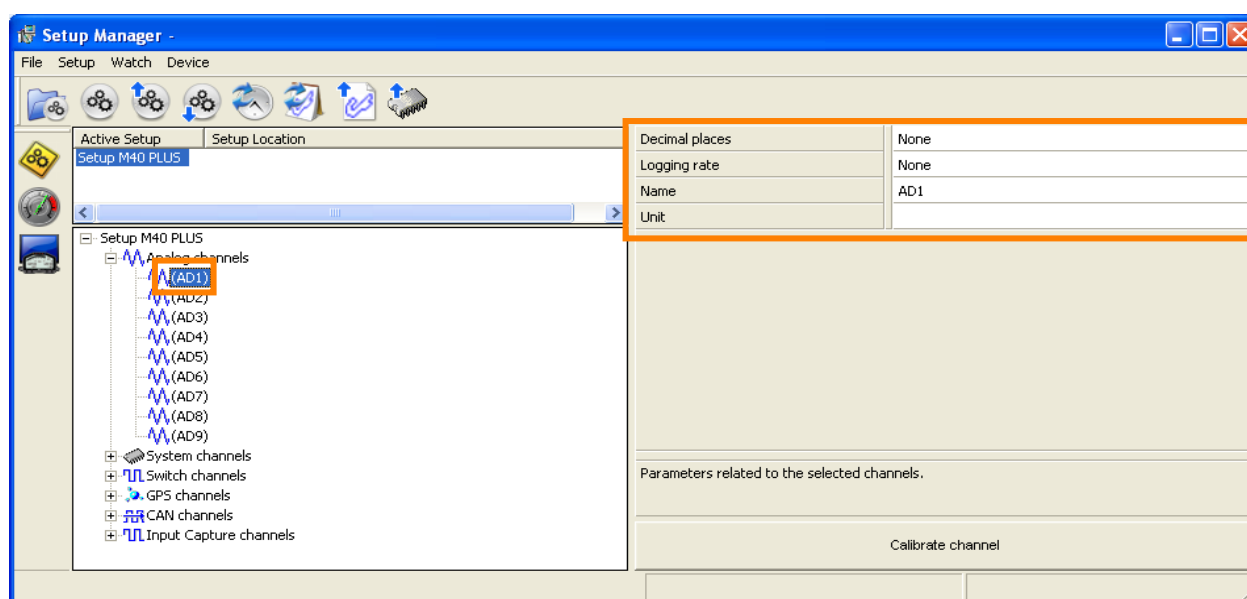


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger**.

- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the sensor is connected to **AD1**; click on **AD1** (in **Analog Channels** list): channel's properties will appear.



- Now you can change all options:

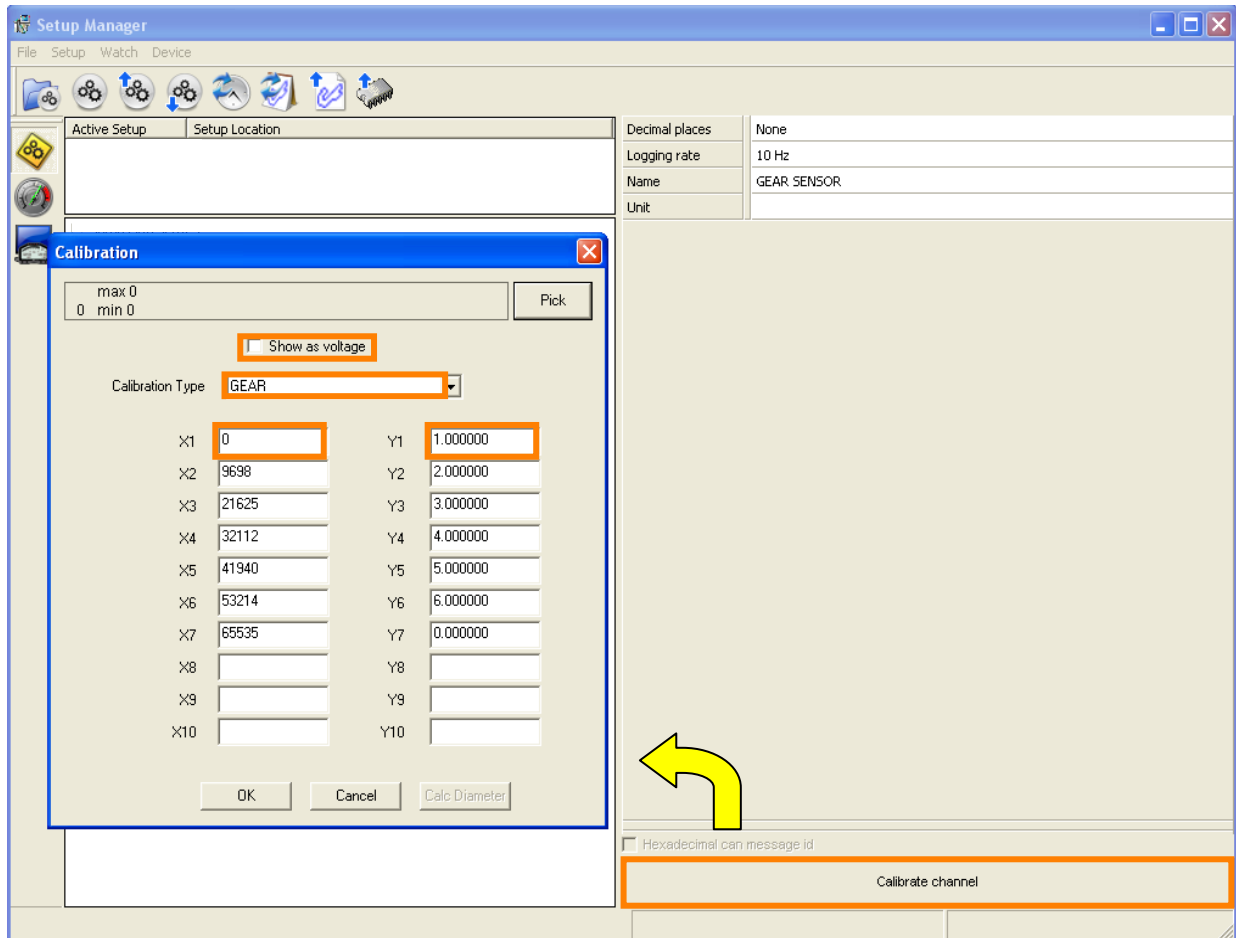
**Decimal Places:** how many decimal places you wish to have (set **None** for this case)

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

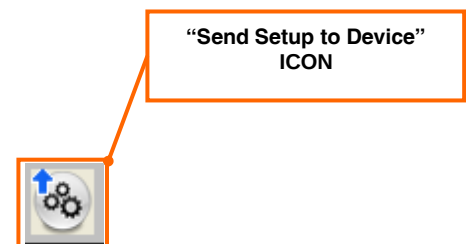
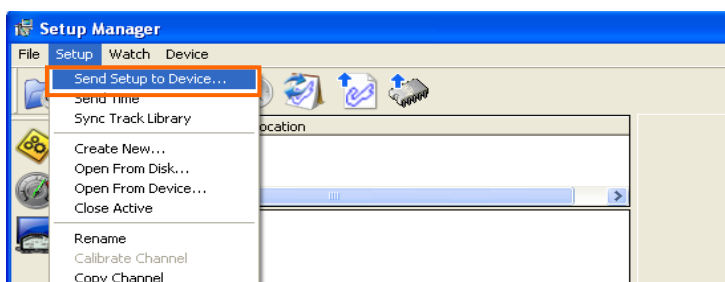
**Name:** channel's name (in this example is **GEAR SENSOR**).

**Unit:** this parameter define measurement unit of the channel (in this case there will be nothing)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:

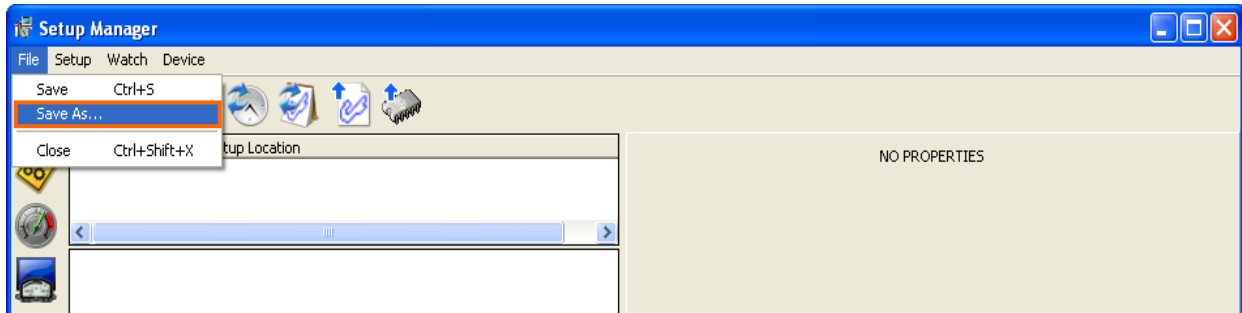


- Once you get in to the calibration window it is necessary to define:
  - Calibration Type** : you can chose the type of calibration (in this example use **GEAR**)
  - X values**: values, **COUNT** or **VOLTAGE**, of the channel
  - Y values**: define calibrated values of the relative X values. In our example 1<sup>st</sup> gear (value **Y1**) correspond to the analogue value of 0 V (value **X1**), neutral (value **Y7=0**) is 5V or 65535 COUNT (value **X7**)
  - Setup Manager permit to log **X** values, directly from the device using **Pick**<sup>3</sup>. **Y** values need to be known.
  - NOTE**: values can be set in two different ways:
    - COUNT** : digital value associated to the channel
    - VOLT** : volt value associated to the channel.
  - Volt visualization need to be activated by selecting “Show input as Voltage” box.**
- Once calibration values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



<sup>3</sup> This option is available on if **M40** is on and connected to PC via USB

- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.

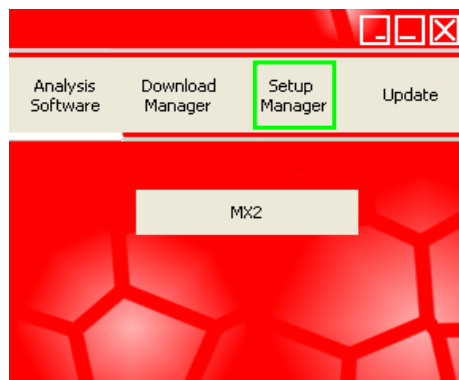


**WARNING:** values that will be set in Y fields are referred to number of gears of the gearbox. The value 0 in a Y field will be NEUTRAL, the value 10 will be the reverse (if present).

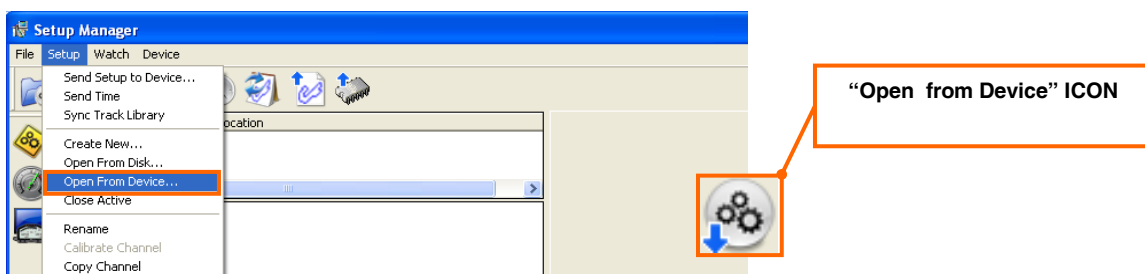
## 1.2.2 GEAR on analogue input calibration by using GATE

Proceed as follows:

- Start **Setup Manager** by clicking the button in **GATE**.



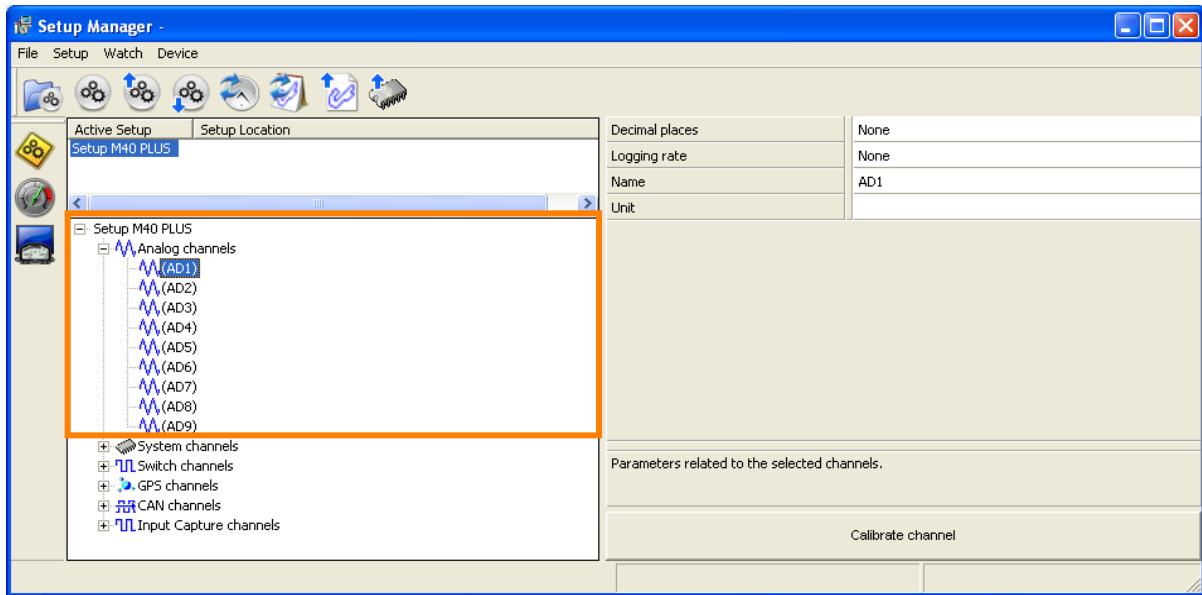
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



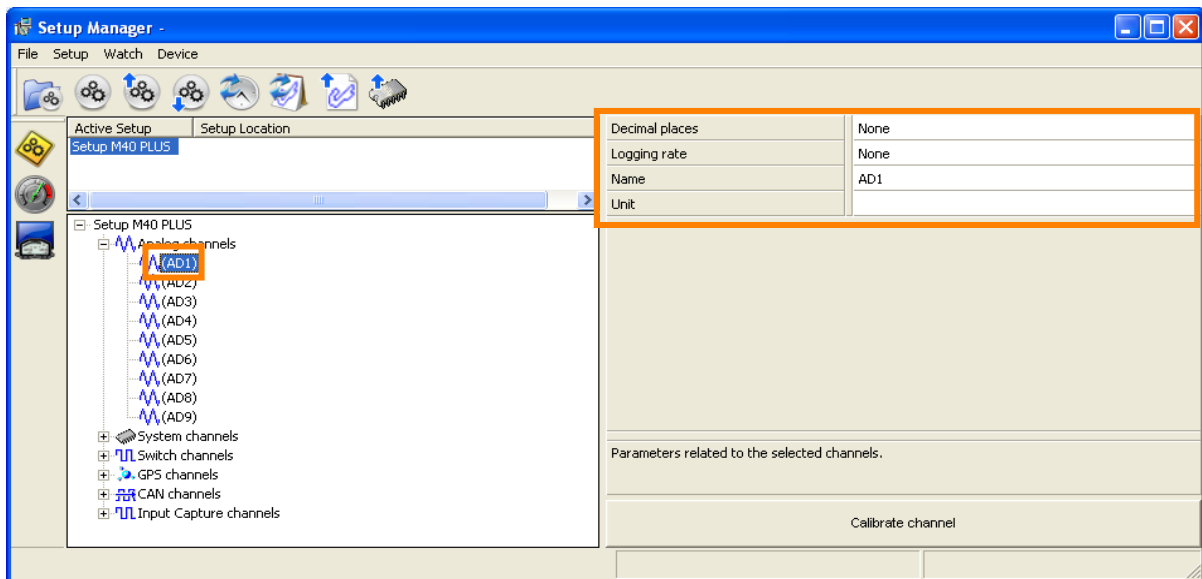
- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.



- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the sensor is connected to **AD1**; click on **AD1** (in **Analog Channels** list): channel's properties will appear.



- Now you can change all options:

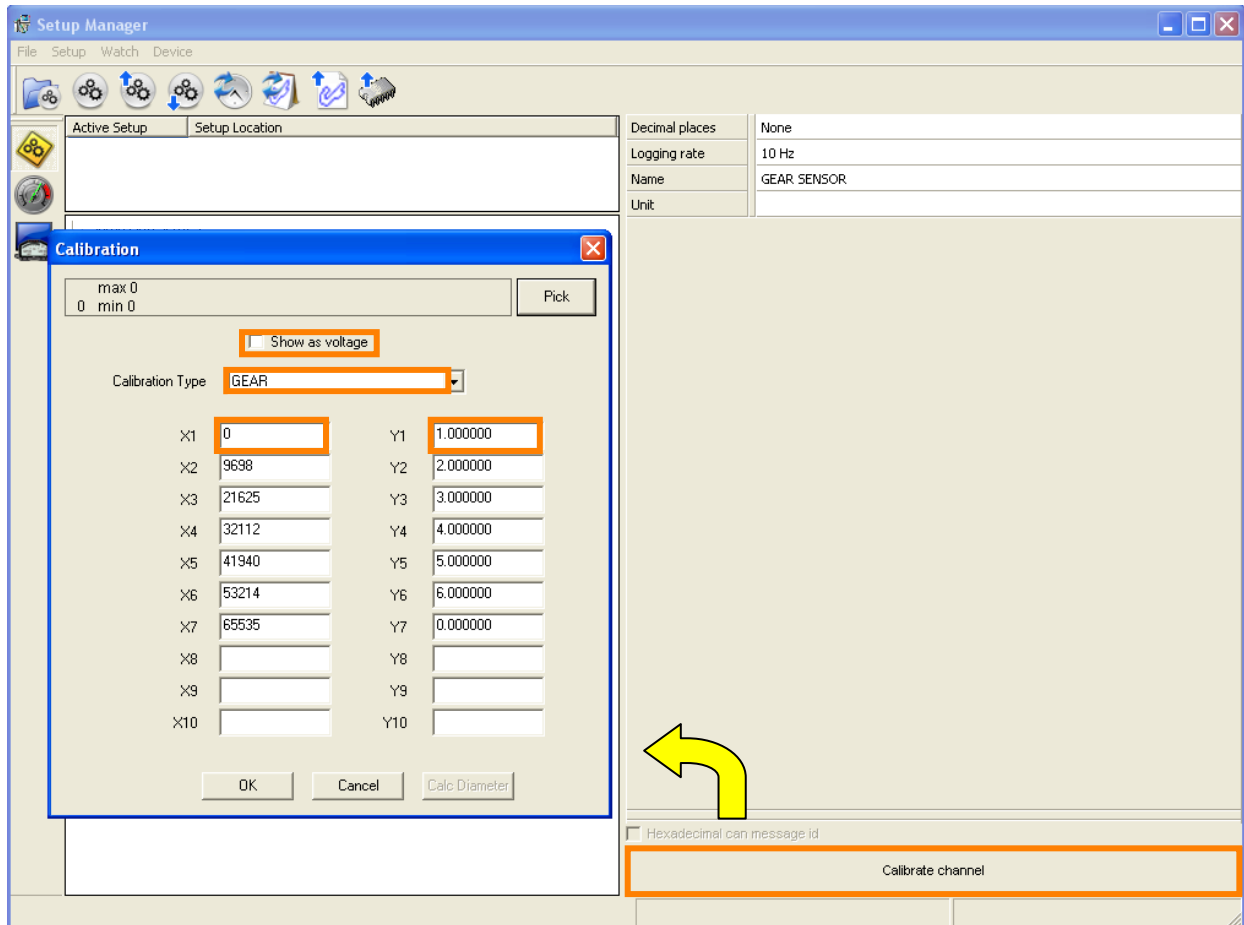
**Decimal Places:** how many decimal places you wish to have (set **None** for this case)

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **GEAR SENSOR**).

**Unit:** this parameter define measurement unit of the channel (in this case there will be nothing)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration (in this example use **GEAR**)

**X values**: values, **COUNT** or **VOLTAGE**, of the channel

**Y values**: define calibrated values of the relative X values. In our example 1<sup>st</sup> gear (value **Y1**) correspond to the analogue value of 0 V (value **X1**), neutral (value **Y7=0**) is 5V or 65535 COUNT (value **X7**)

Setup Manager permit to log **X** values, directly from the device using **Pick**<sup>3</sup>. **Y** values need to be known.

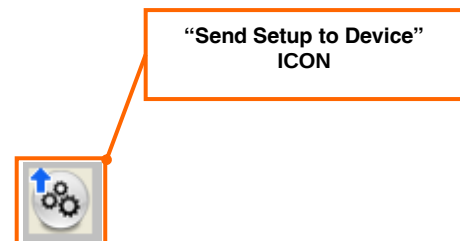
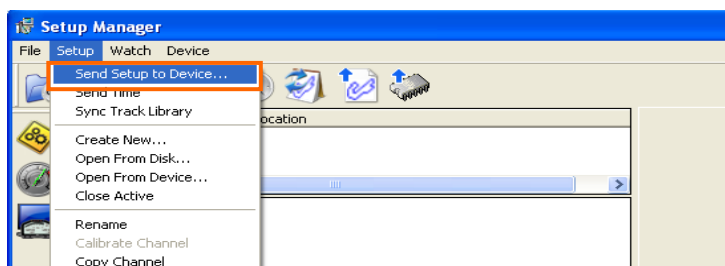
**NOTE**: values can be set in two different ways:

**COUNT** : digital value associated to the channel

**VOLT** : volt value associated to the channel.

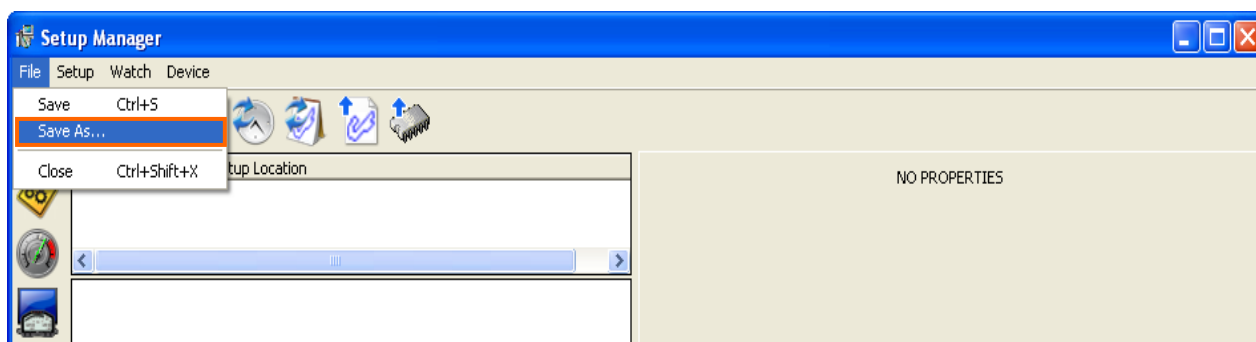
**Volt visualization need to be activated by selecting “Show as Voltage” box.**

- Once calibration values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



<sup>3</sup> This option is available on if **M40** is on and connected to PC via USB

- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



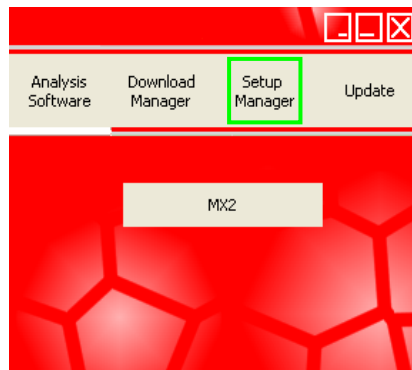
For further information on **Setup Manager** read Gate user manual.

**WARNING:** values that will be set in Y fields are referred to number of gears of the gearbox. The value 0 in a Y field will be NEUTRAL, the value 10 will be the reverse (if present).

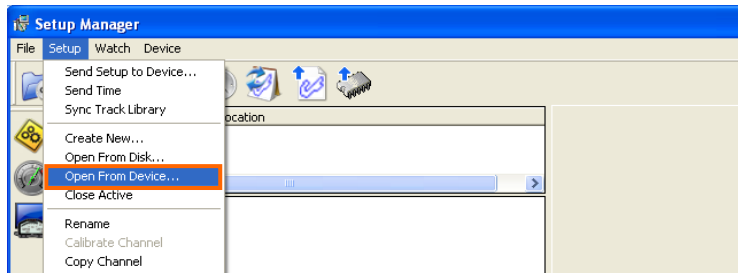
## 1.3 TPS setup (available only for GATE software)

To insert the TPS sensor inside **M40** setup we suggest to download the setup from the device:

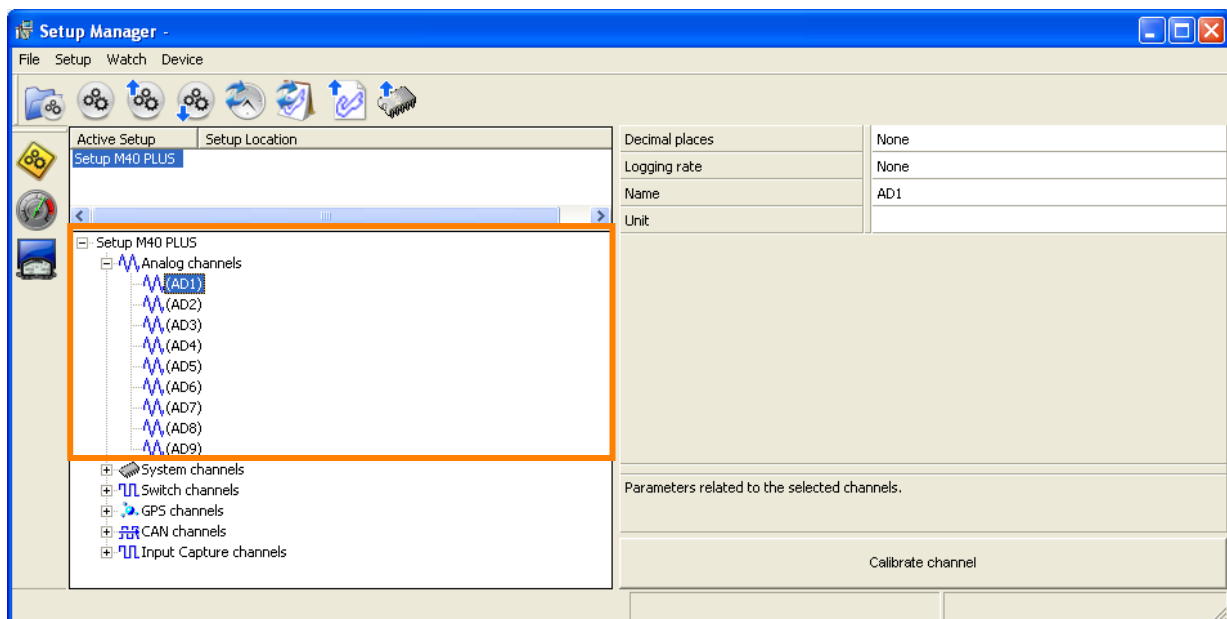
- Start **Setup Manager** by clicking the button in **GATE**.



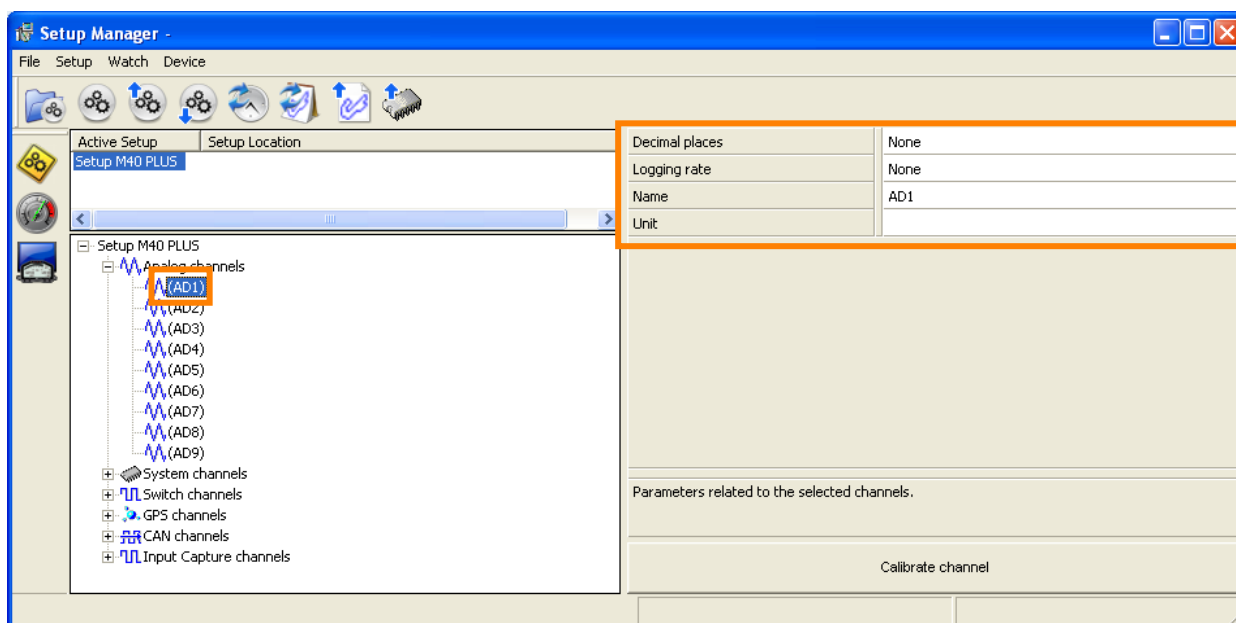
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, TPS is connected to **AD1**; click on **AD1** (in **Analogue Channels** list): channel's properties will appear.



- Now you can change all options:

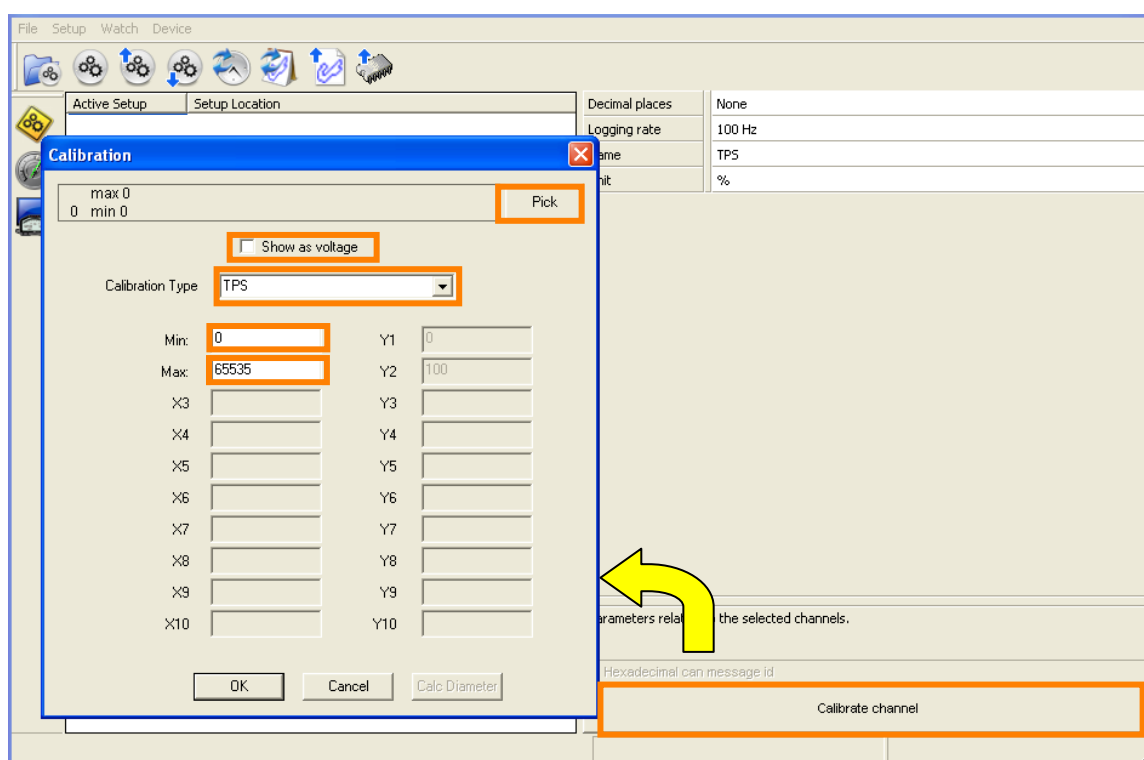
**Decimal Places:** how many decimal places you wish to have (usually **None** for TPS)

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **TPS**).

**Unit:** this parameter define measurement unit of the channel (usually **%** for TPS)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration (in this example use **TPS**)

**Min** : this parameter define the minimum value of the channel in order to get the zero in the acquisition

**Max** : this parameter define the maximum value of the channel in order to get 100

Setup Manager permit to log **Min** and **Max** , directly from the device, using **Pick**<sup>1</sup>.

In order to define **Min** and **Max** value you need to select the box and type the value manually, or by clicking **Pick**<sup>1</sup>.

In this example, while setting **Min** throttle need to be closed and while setting **Max** throttle need to be fully open.

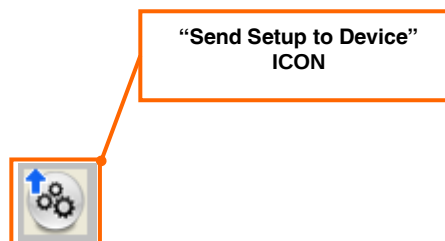
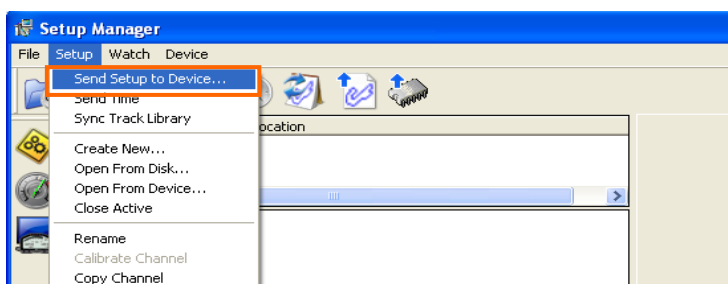
**NOTE:** values can be set in two different ways:

**COUNT** : digital value associated to the channel

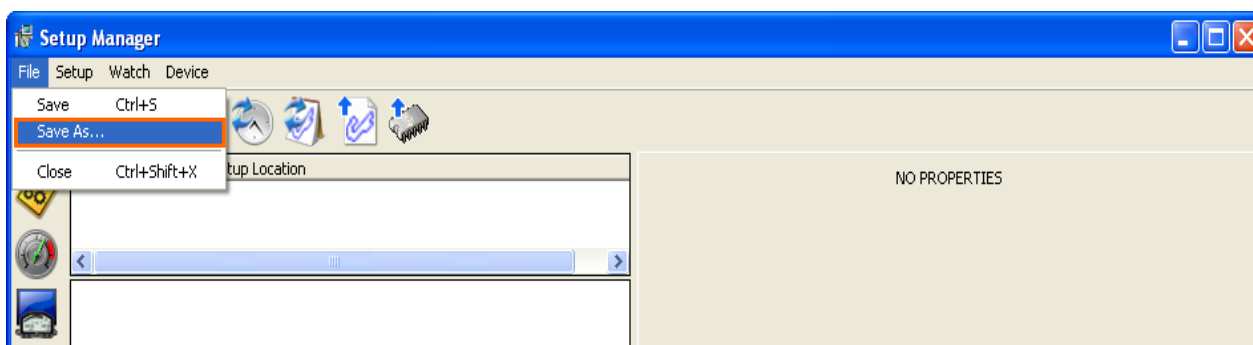
**VOLT** : volt value associated to the channel.

**Volt visualization need to be activated by selecting “Show as Voltage” box.**

- Once limit values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



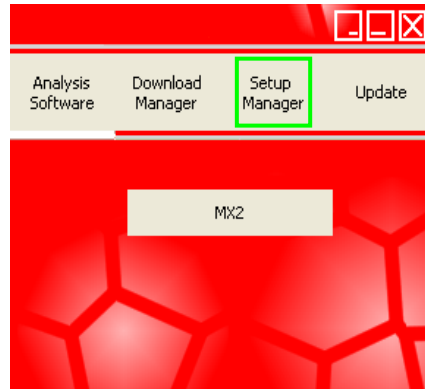
For further information on **Setup Manager** read Gate user manual.

<sup>1</sup> This option is available on if **M40** is on and connected to PC via USB

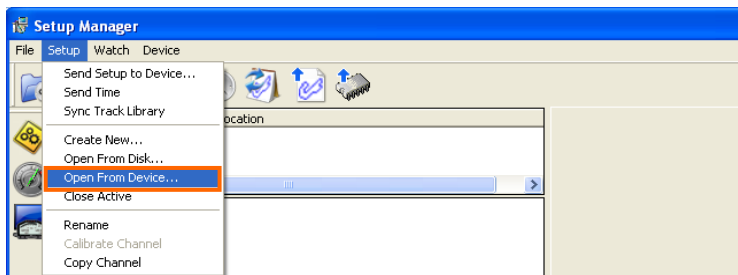
## 1.4 Suspension potentiometer setting (available only for GATE software)

Suspension movements are studied with a linear potentiometer. Before calibrate the channel, we suggest to download the setup from the device:

- Start **Setup Manager** by clicking the button in **GATE**.



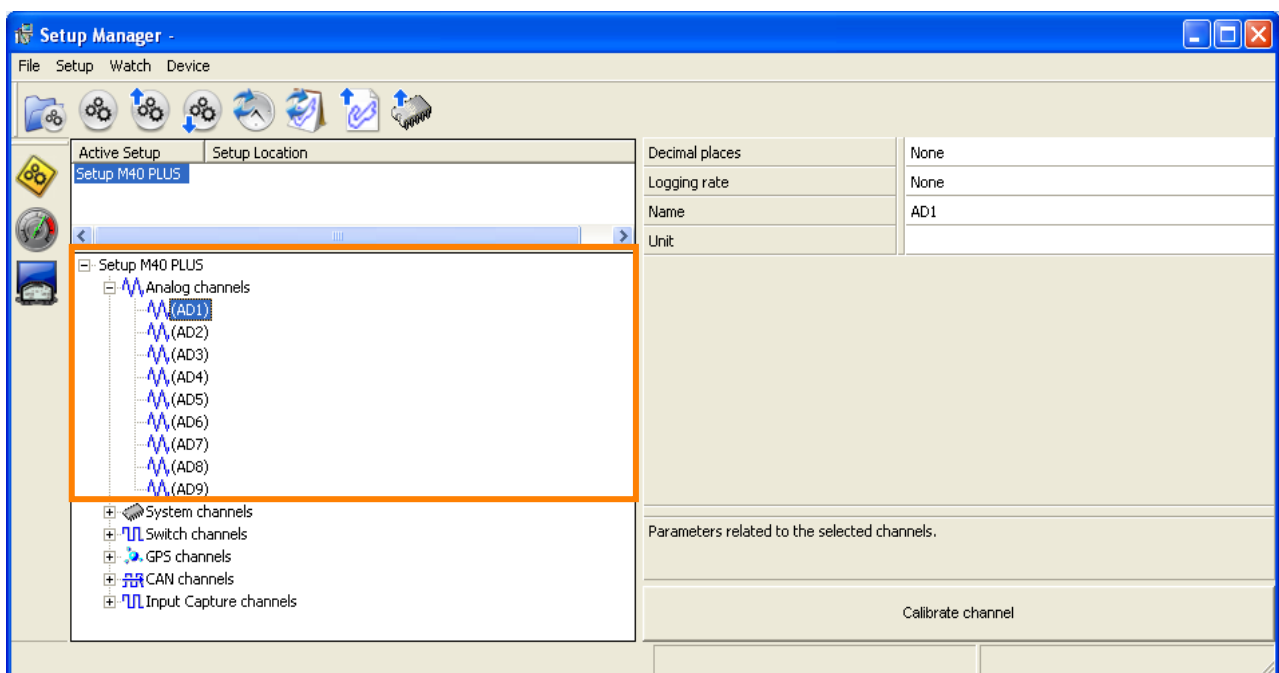
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



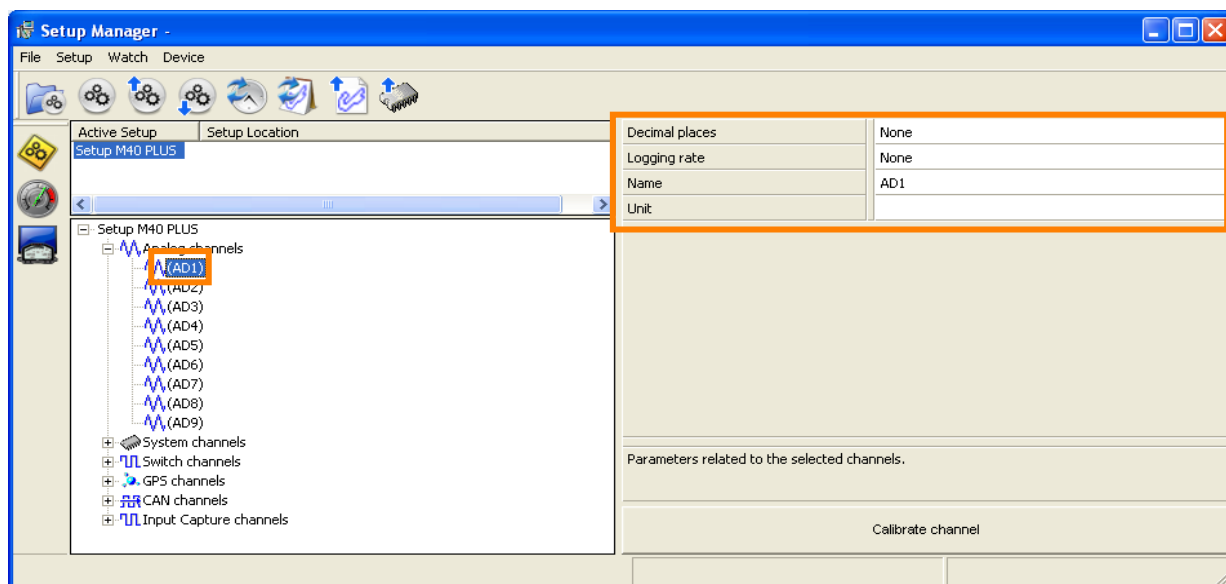
"Open from Device" ICON



- Once the job is done, a message will appear and you will see the setup in **Setup Manager**.
- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the linear potentiometer is connected to **AD1**; click on **AD1** (in **Analog Channels** list): channel's properties will appear.



- Now you can change all options:

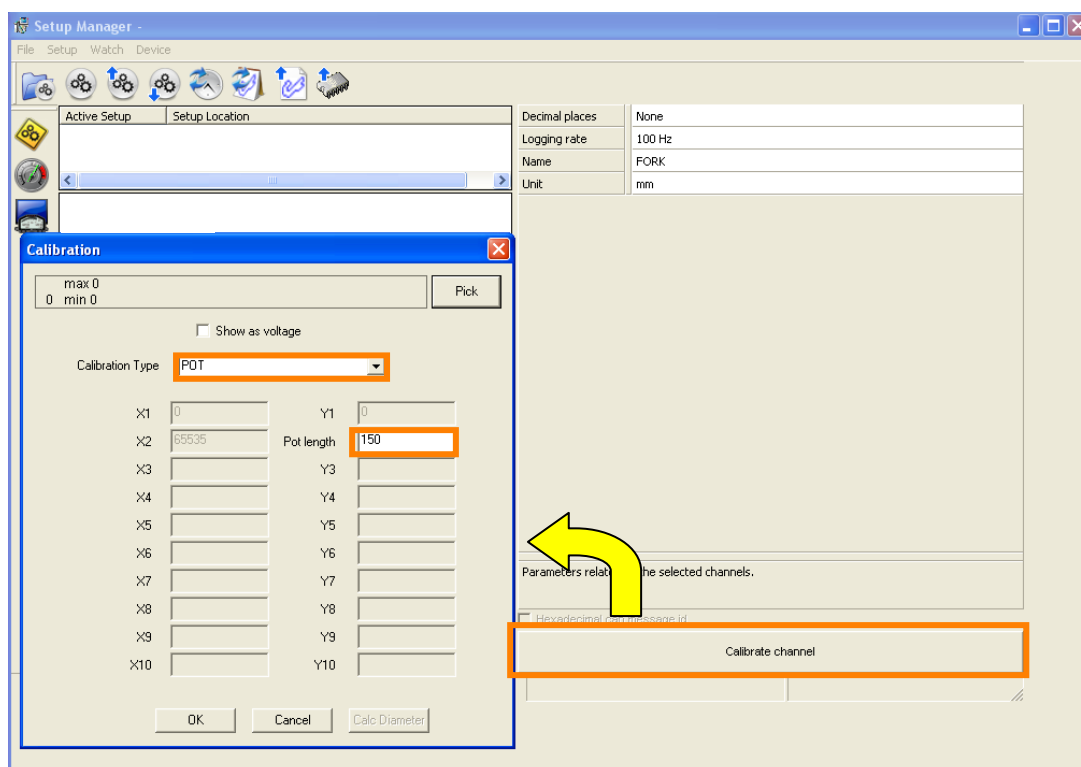
**Decimal Places:** how many decimal places you wish to have (usually **None** for suspension potentiometers)

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **FORK**).

**Unit:** this parameter define measurement unit of the channel (usually mm for this channel)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



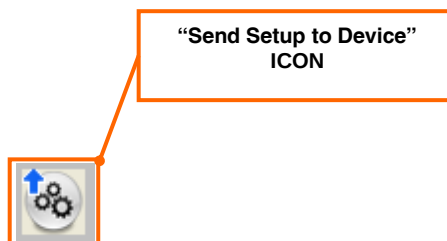
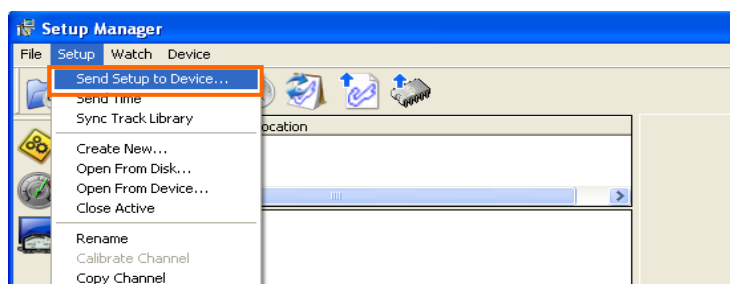


- Once you get in to the calibration window it is necessary to define:

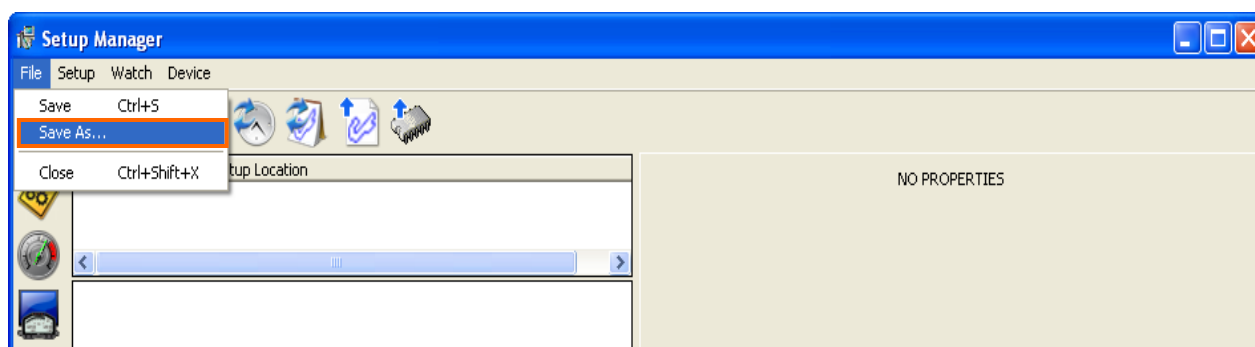
**Calibration Type** : you can chose the type of calibration (in this example use **POT**)

**Pot Length** : this parameter define the total length (in mm) of the installed sensor (in this example **150**)

- Once limit values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



For further information on **Setup Manager** read Gate user manual.

**WARNING:** for POT it is necessary to set zero point. This action could be done using WATCH in Setup Manager (for further information read [Appendix 1 chapter 5](#) of this manual and chapter 5.4 of GATE user manual).

## 2 SWITCH CHANNELS (ONLY M40 EXPANSION AND PLUS MODELS)

This chapter will guide the user to the functionalities of SWITCH channel.  
SWITCH channels could be used to log signals from:

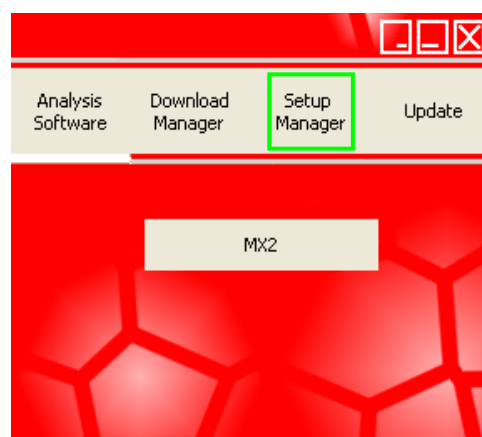
- buttons: the signal applied to the SW input is a pulse (voltage changes once the button is pressed and end once the button is released)
- switch: the signal has got two different status depending on switch position
- beacon: the signal applied to the SW input comes from an external IR receiver (beacon) for lap triggering.

From the electrical point of view, SWITCH input are 5 volt pull up.

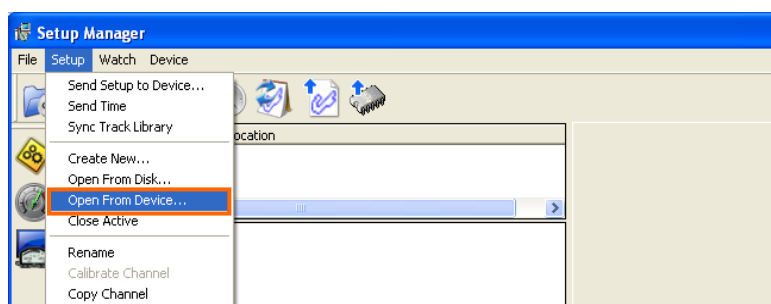
### 2.1 Adding a SWITCH MAP-SWITCH BUTTON channel

First of all we suggest to save device setup in to the PC:

- Start **Config Datalogger** (or **Setup Manager** you are using **GATE**) by click on software start panel .

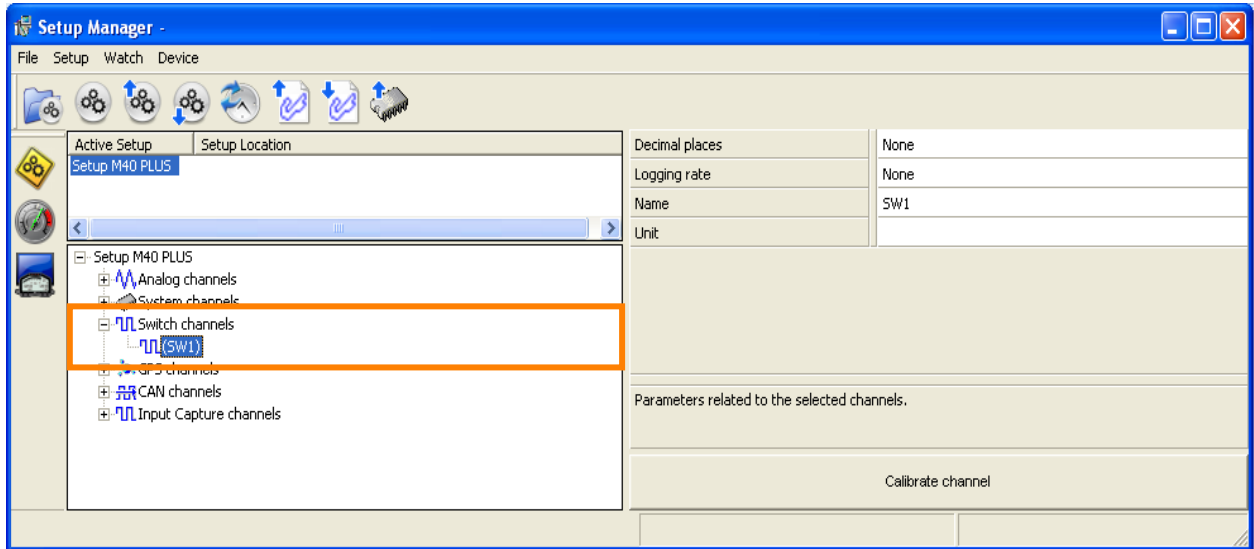


- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

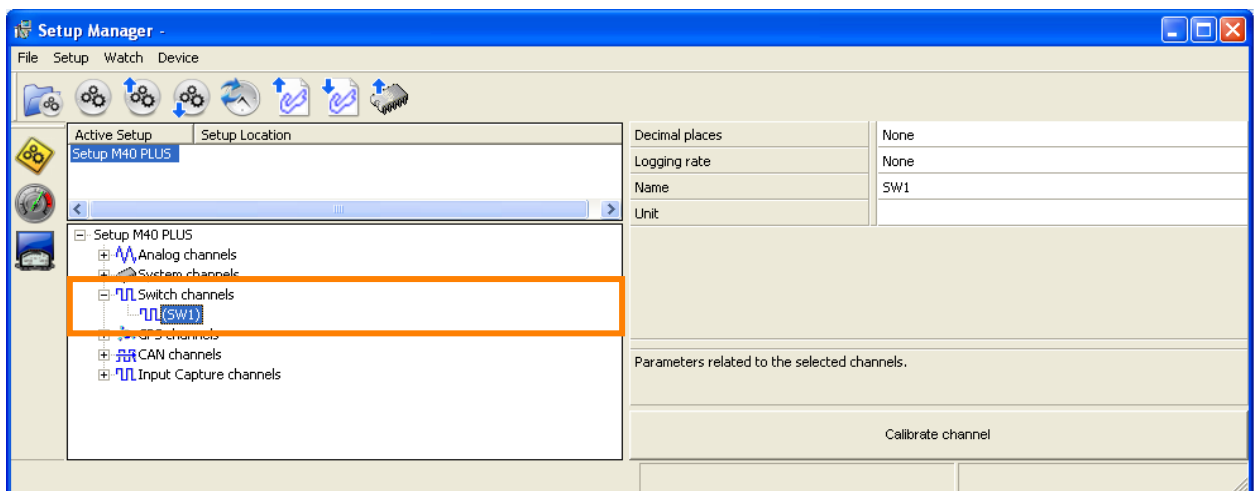


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger** (or **Setup Manager**).

- The picture below shows an example of a **M40 PLUS** base setup:



- Configure SW1 by clicking on SW1 in the **Switch Channels** list



- If, for example, the button is connected to **SW1** of **EXP1** wiring; click on **SW1** (in **Switch Channels** list): channel's properties will appear.
- Now you can change all options:

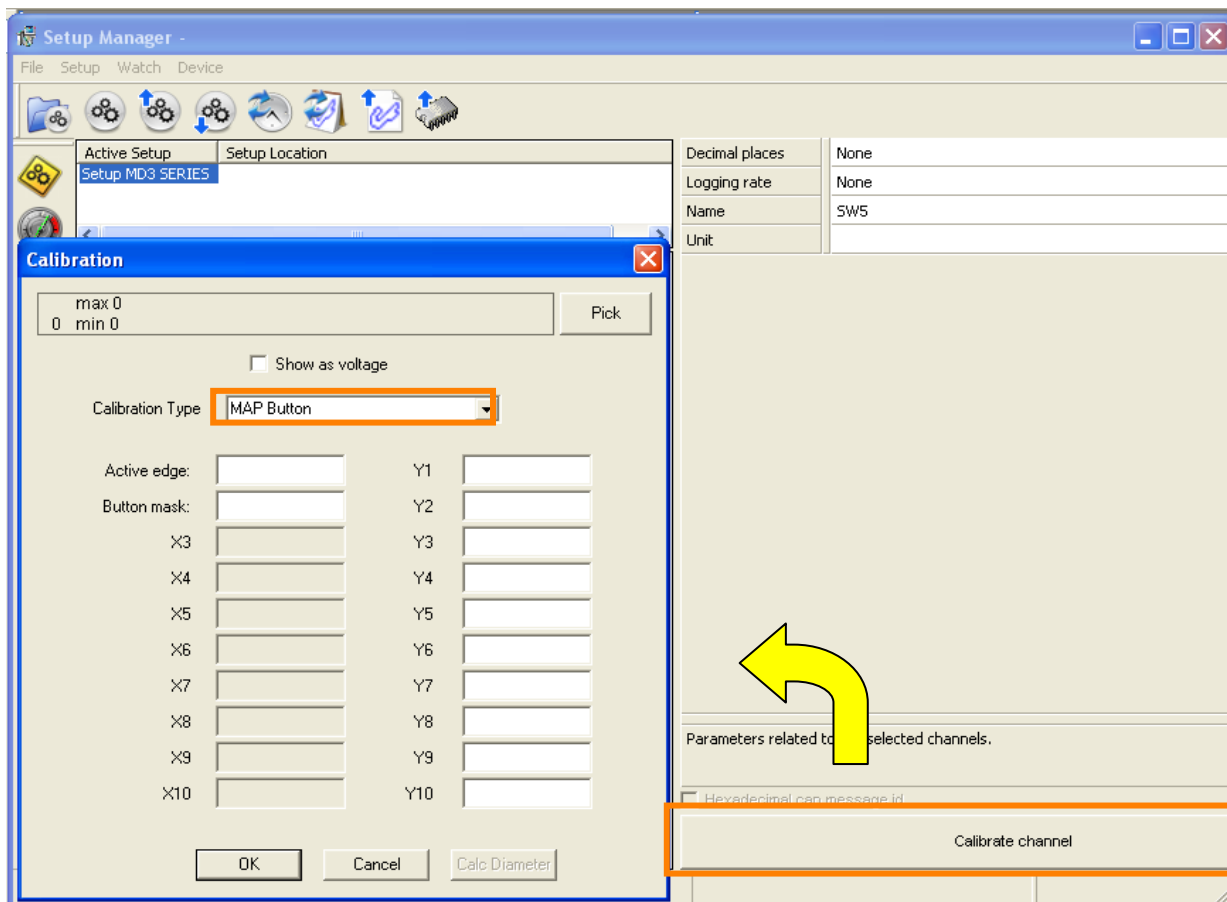
**Decimal Places:** how many decimal places you wish to have (set **None** for this case)

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Name:** channel's name (in this example is **SW**).

**Unit:** this parameter define measurement unit of the channel (in this case there will be nothing)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration. For **SWITCH** channel we can use:

**MAP SWITCH**: this setting need to be used with 2-position switches:

**X values**: switch status, the value could be **0** and **1**

**Y values**: define calibrated values of the relative X values. If we have, for example, a 2-positions map switch that could vary from 0 V( map 1) and 12 V (map 2): map 1 (value **Y1=2**) is the value 0 (value **X1**), map 2 (value **Y2=2**) is value 1 (value **X2**)

**NOTE**: in column **Y** you could add only numeric values.

**MAP BUTTON**: this setting need to be used with buttons.

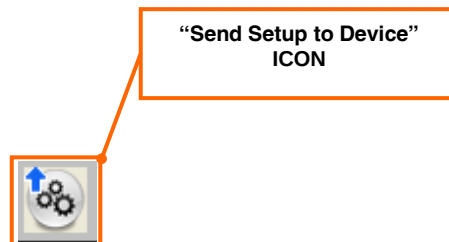
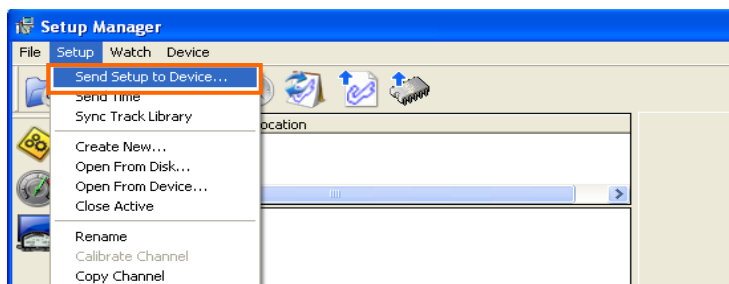
**Active Edge**: specify the activation edge for the button. Set value to 0 if button is connected to the ground when activated (0V); set value to 1 if button is positive when activated (example 12 V).

**Button Mask**: inhibition time (**milliseconds**) of the status control after the button is pressed.. this parameter is needed to avoid wrong readings and signals "jumps": a classical example is a button that need to be pressed some seconds to activate the function. If **Button Mask** is low **M40** could detect two or more activation instead of one. To avoid this you could set the parameter to 1000 (1 second).

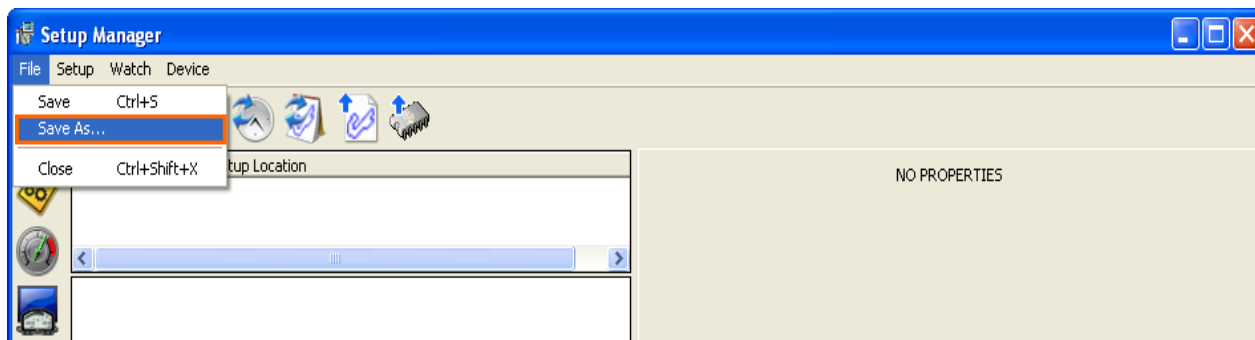
**Y values**: define calibrated values. If we connected a switch with three positions, in **Y1**, **Y2**, **Y3** we will add **1**, **2**, **3**

- Once calibration values are defined, click **OK** to get back to **M40** setup window

- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



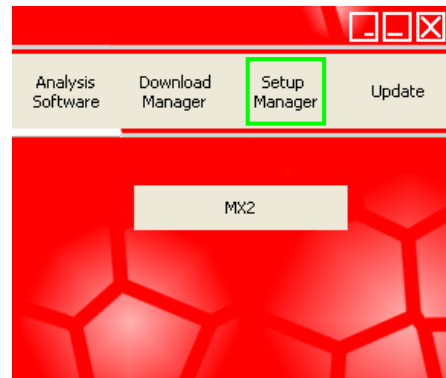
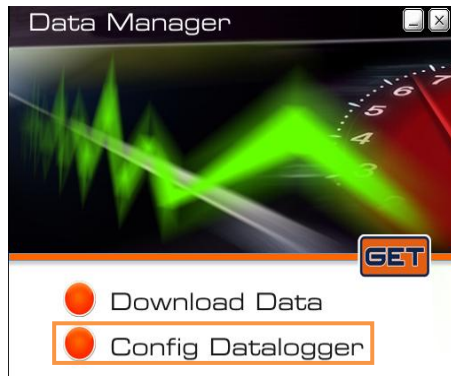
- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



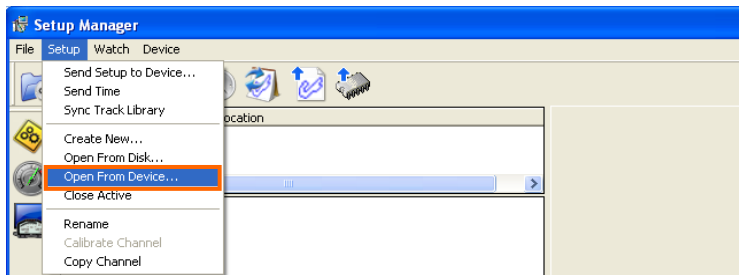
## 2.2 Adding a BEACON channel

Adding a **beacon** channel will permit to use a IR receiver for lap triggering.  
The use of this kind of sensor permit lap triggering also without GPS signal.  
In order to set a **beacon** channel follow instruction below:

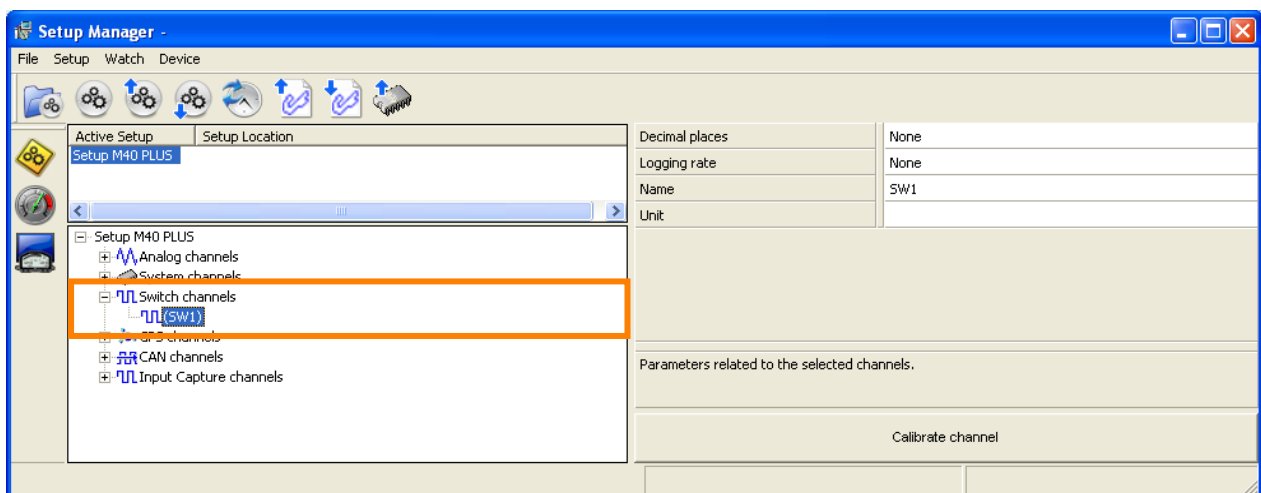
- Start **Config Datalogger** (or **Setup Manager** you are using **GATE**) by click on software start panel .



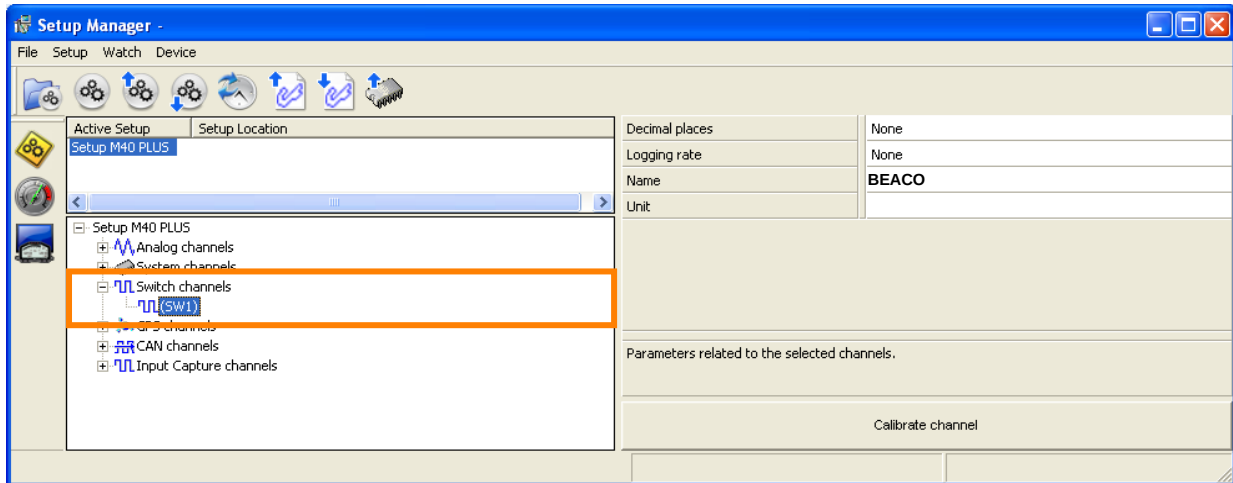
- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.



- Once the job is done, a message will appear and you will see the setup in **Config Datalogger** (or **Setup Manager**).
- The picture below shows an example of a **M40 PLUS** base setup:



- Configure SW1 channel by clicking on the **Switch Channels** list



- If, for example, the button is connected to **SW1** of **EXP1** wiring; click on **SW1** (in **Switch Channels** list): channel's properties will appear.

- Now you can change all options:

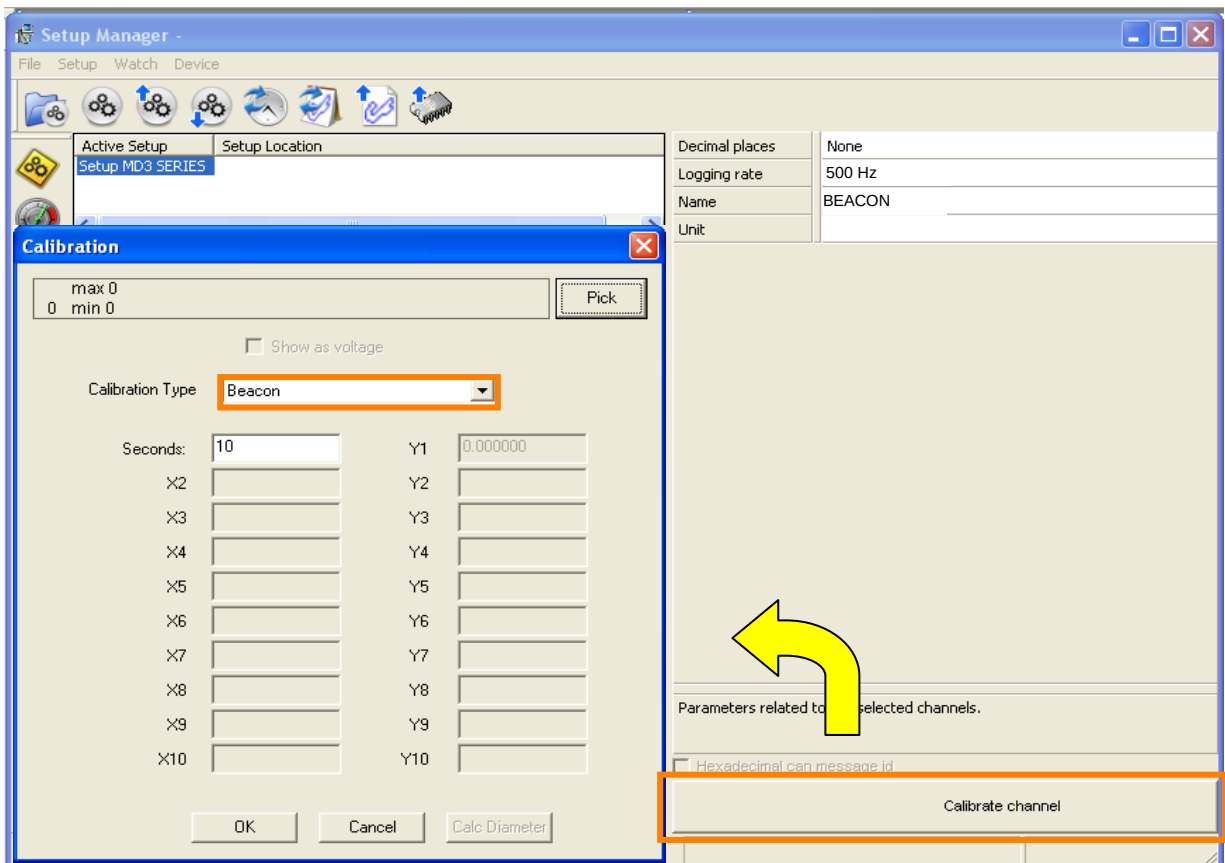
**Decimal Places:** how many decimal places you wish to have (set **None** for this case)

**Logging rate:** set **None**. The logging frequency will be updated automatically once the calibration is defined

**Name:** channel's name (in this example is **BEACON**).

**Unit:** this parameter define measurement unit of the channel (in this case there will be nothing)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:

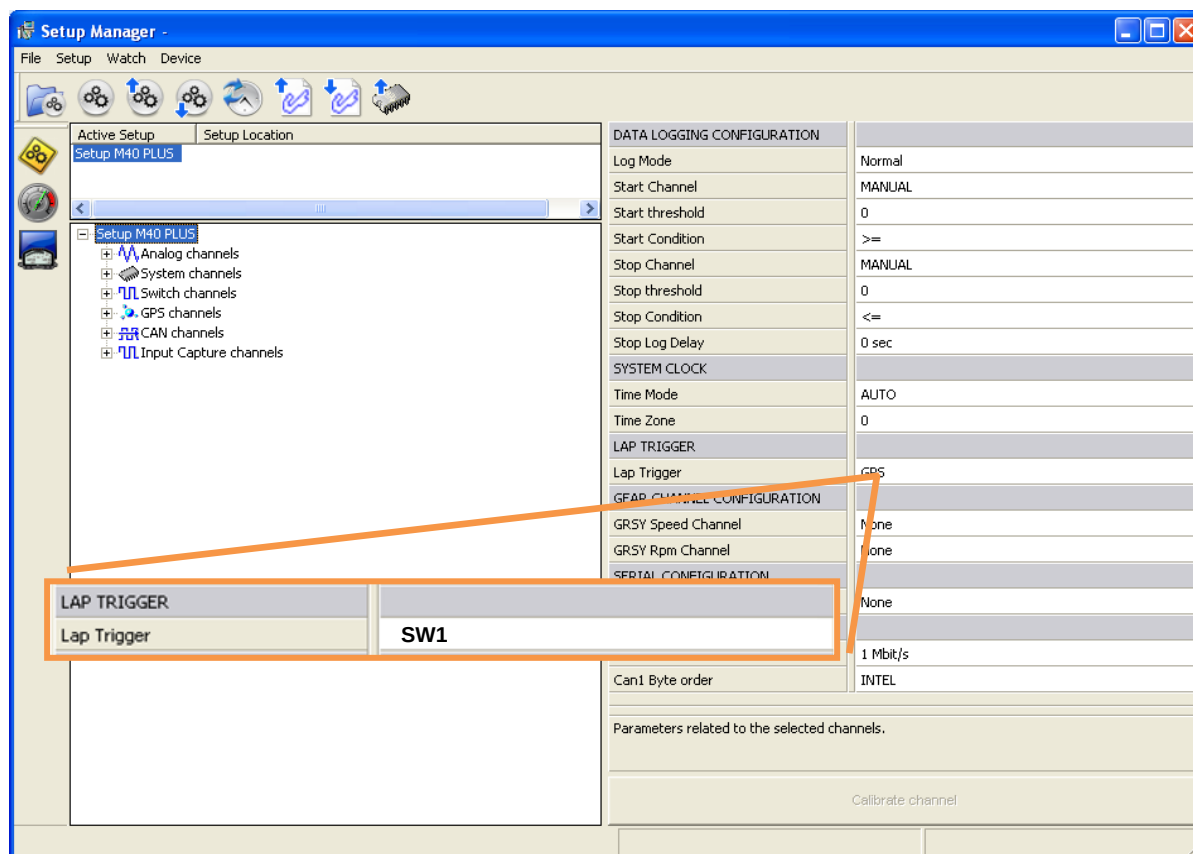


- Once you get in to the calibration window it is necessary to define:

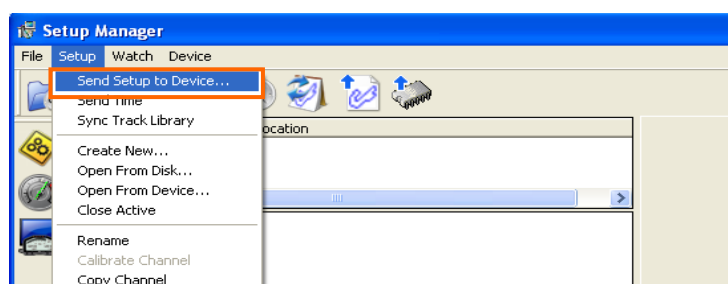
**Calibration Type** : you can chose the type of calibration. For **BEACON** channel use **beacon**.

**Seconds**: this is the “**blind time**” and it is used to avoid wrong lap triggering coming from more than one wall beacon transmitter.

- Once calibration values are defined, click **OK** to get back to **M40** setup window
- Set the lap trigger option as SW1:



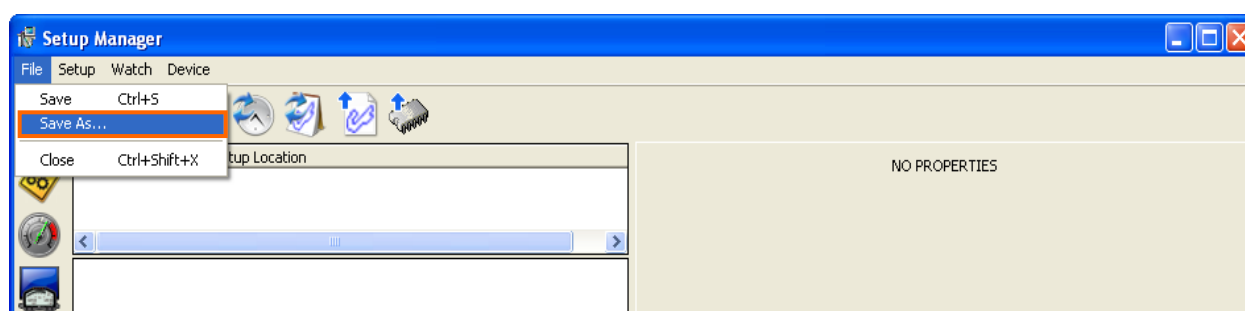
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



“Send Setup to Device”  
ICON



- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.





### 3 CAN CHANNELS

In this chapter you will have deep information on CAN channels setup.  
We need to:

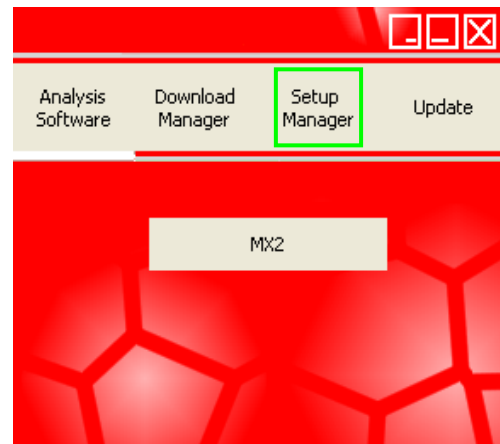
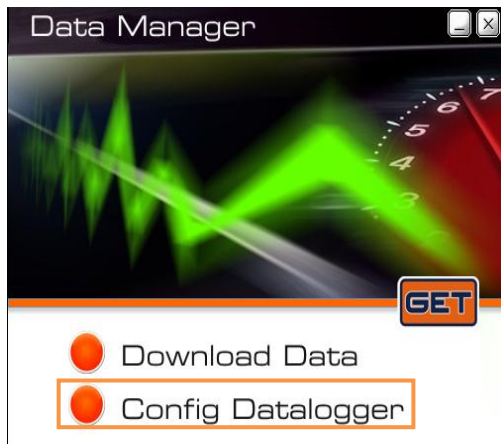
- Define protocol and bus speed
- Define channel properties

All operations depend on CAN bus used from all devices connected to **M40** datalogger: **it is necessary know data format prior to configure CAN channels.**  
CAN Bus connector is available in **MAIN** wiring of **M40**.

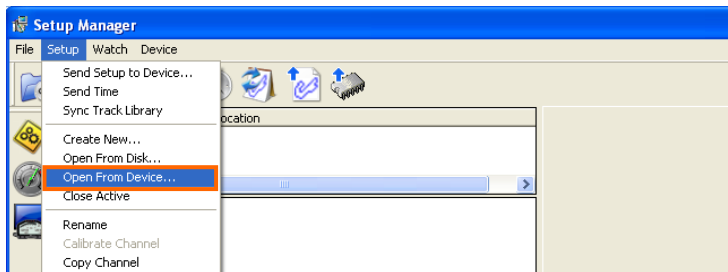
#### 3.1 Adding a CAN channel

First of all we suggest to save device setup in to the PC:

- Start **Config Datalogger** (or **Setup Manager** you are using **GATE**) by click on software start panel .

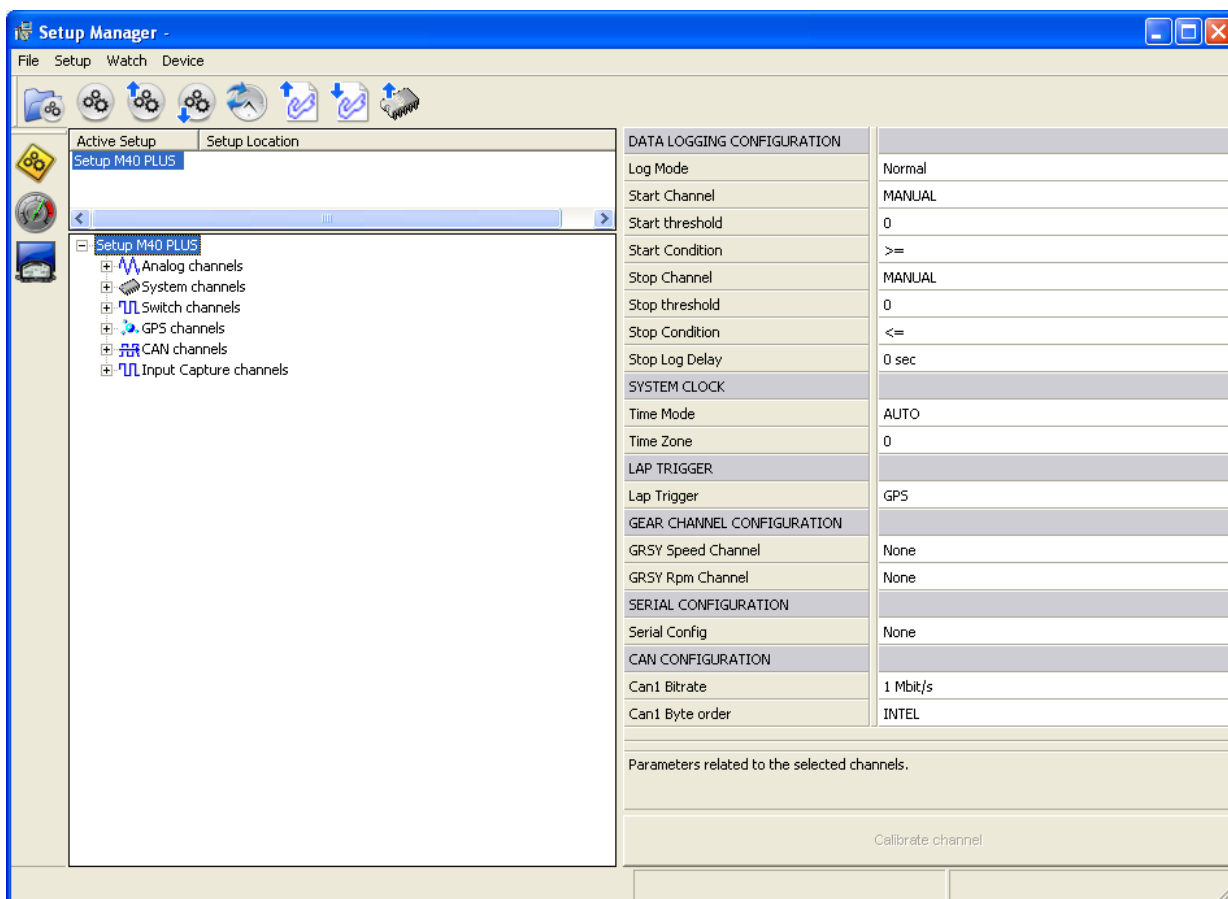


- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

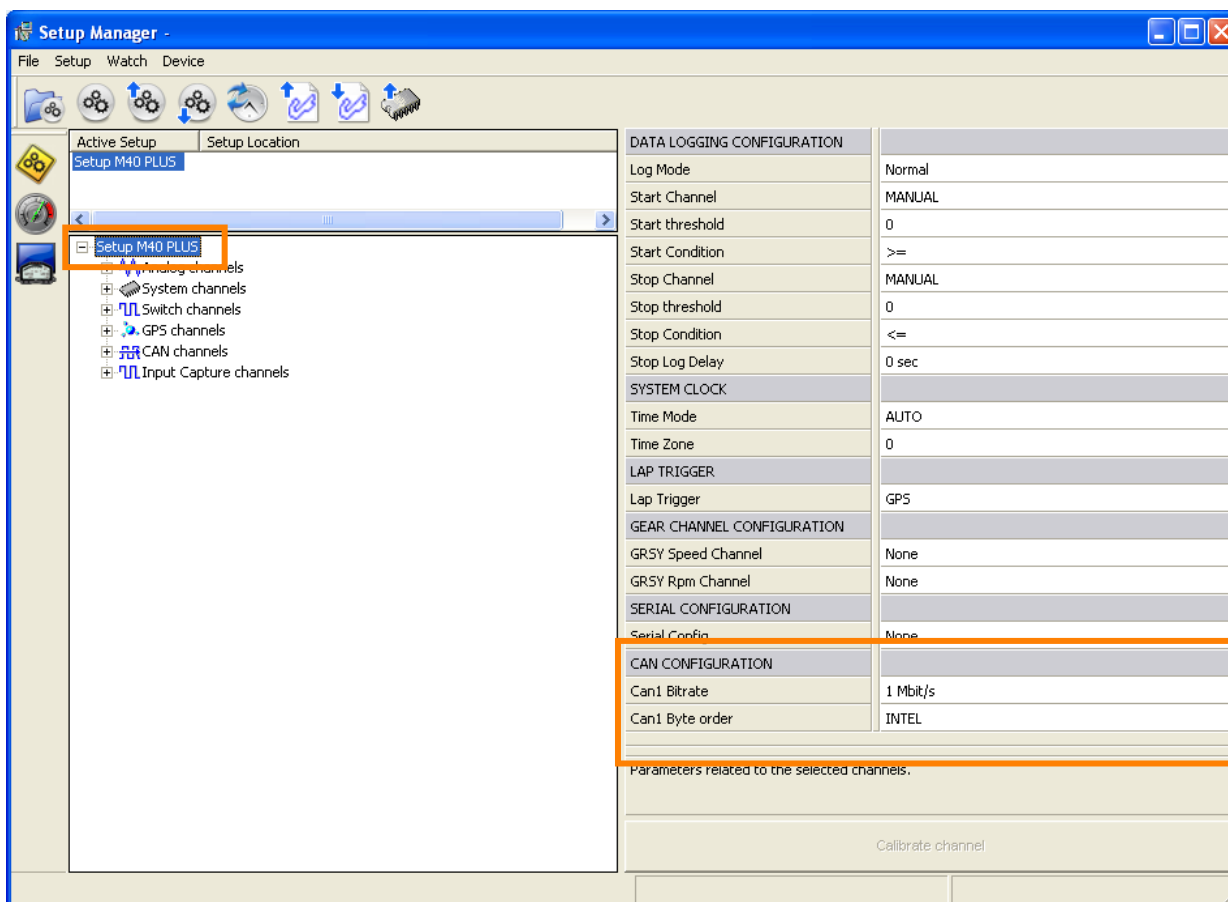


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger** (or **Setup Manager**).

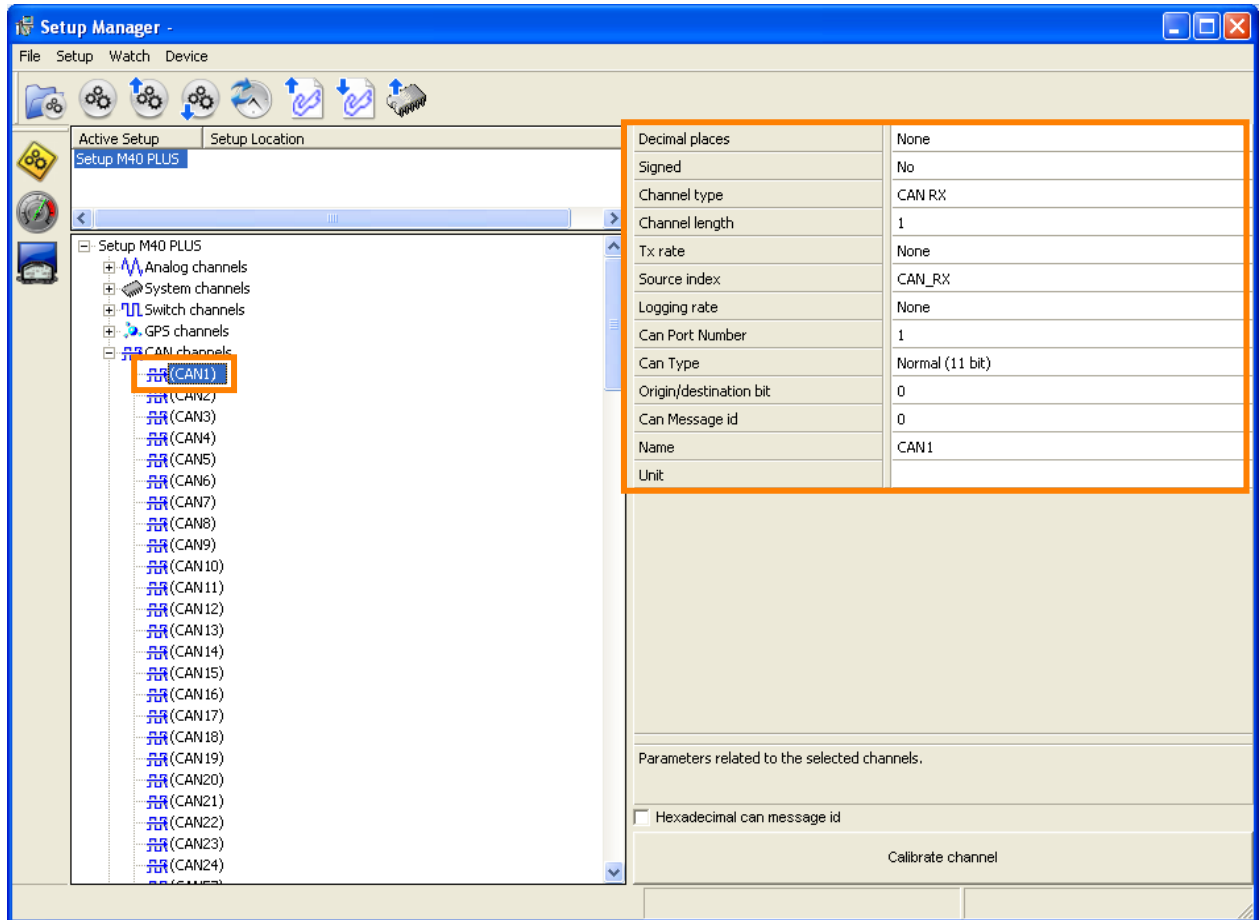
- The picture below shows an example of a **M40 PLUS** base setup:



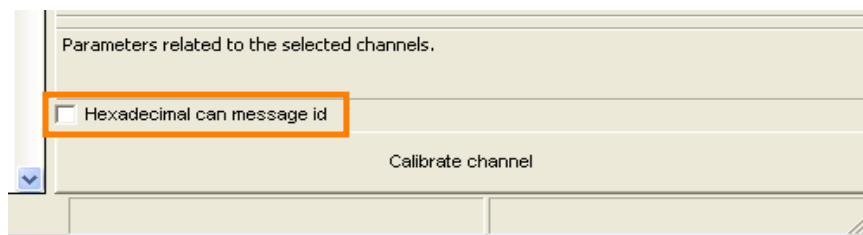
- Click **Setup M40 PLUS**: on right side of window will be available settings for protocol and bus speed (picture below):



- Now you can change all options:  
**Can1 bitrate:** with this parameter you could set bus CAN1 bitrate between available values  
**Can1 Byte Order :** with this parameter you could set CAN1 data format between available values
- You can now change properties by clicking the name of the channel needed, under **CAN Channels** list



- Now you can change all options:  
**Can Message ID:** define ID number of channel message. WARNING: ID number could be decimal base or hexadecimal!!!  
It is possible to change ID numerical base (decimal to hexadecimal) by selecting the box above **Calibrate Channel** button.



**Origin/Destination:** this parameter define the position (inside CAN message) that contains first data bit to be associated to the channel.

**Channel Length:** define bit length of CAN message

**Signed:** you can define if the channel has got a sign. This is essential when configuring signals that could be positive or negative. Available options are **Yes** or **No**.

**Name:** define channel name. In this case **CAN1**.

**Decimal Places:** how many decimal places you wish to have (set **None** for this case)

**Unit:** define channel measurement unit

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software.

**Channel Type :** this parameter define the type of used CAN channel. You could set **CAN RX** (to log and visualize the channel) or **CAN TX** (to transmit the channel onto the vehicle CAN bus).

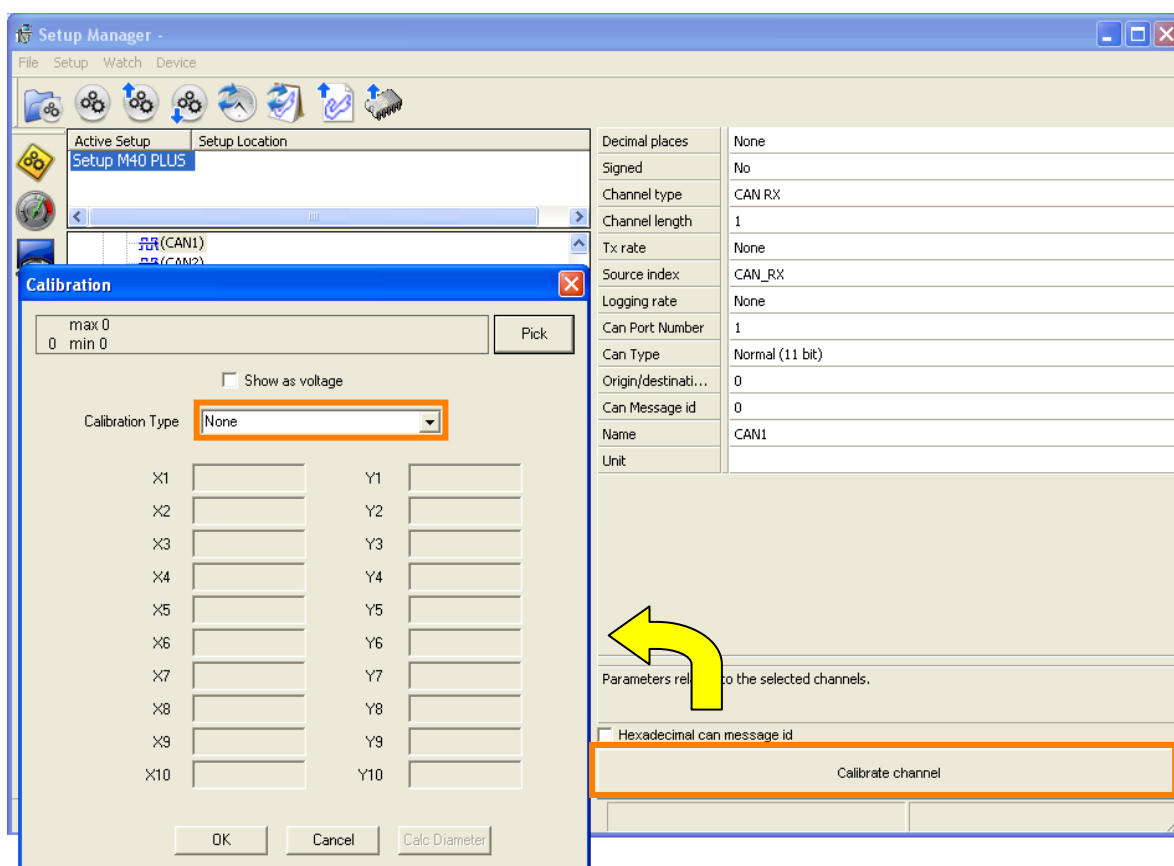
**Source Index:** this parameter defines the source of the channel. If the channel comes from the vehicle CAN bus (from the ECU, for example) you need to set **CAN\_RX**. If you set an other source (list on the right of white box), values will be sent also on CAN channel that you are setting. This is really useful if you wish to send through CAN bus an analogue value. In this case you need to set **Channel Type** as **CAN TX**.

**TX Rate:** define channel transmitting frequency. This option need to be **None** if **Channel Type** is **CAN RX**.

**Can Port Number:** this parameter define the port number in which the CAN bus is connected (typically 1).

**Can Type:** this parameter define CAN data format. You have two options: **Normal (11 bit)** and **Extended (29 bit)**.

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



- Once you get in to the calibration window it is necessary to define:

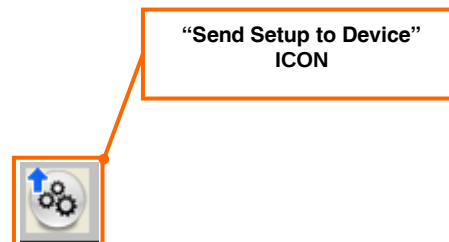
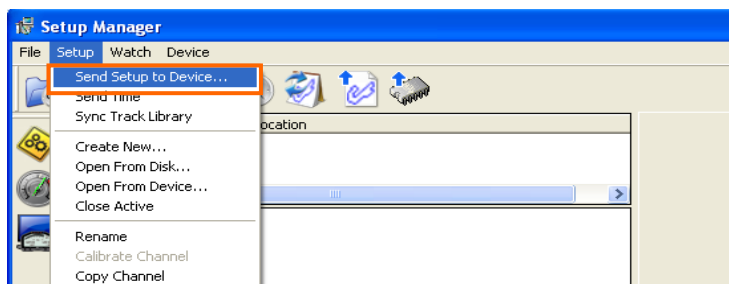
**Calibration Type :** you can chose the type of calibration. For CAN channels you could chose between:

**None:** no calibration, the value is visualized/logged as it comes from the CAN bus.

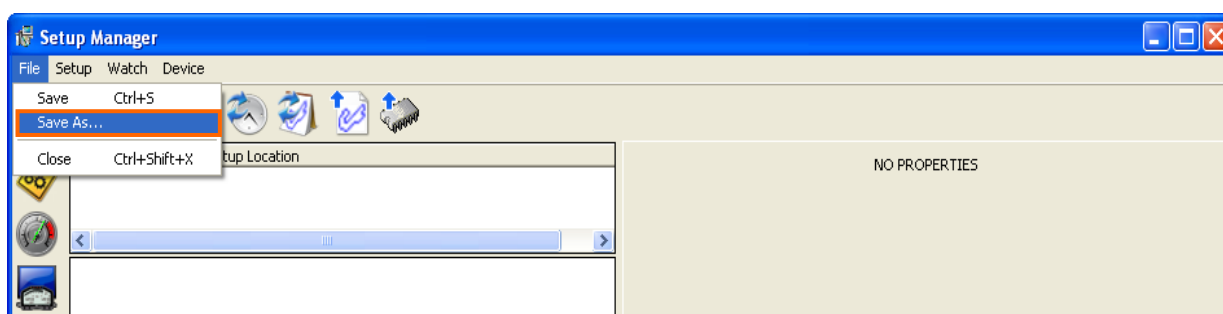
**Linear :** channel value is visualized/logged with the calibration curve defined by X and Y values (for further information read chapter [1.1 Appendix 1](#) of this manual)

**GEAR :** channel value is visualized/logged with the calibration “GEAR” (for further information read chapter [1.2 Appendix 1](#) of this manual).

- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



## 4 INPUT CAPTURE CHANNELS (IC CHANNELS)

This chapter will show how to set an IC channel in **M40**. IC channels are, for examples:

- Proximity sensors, as wheel speed sensors
- Engine speed (RPM)

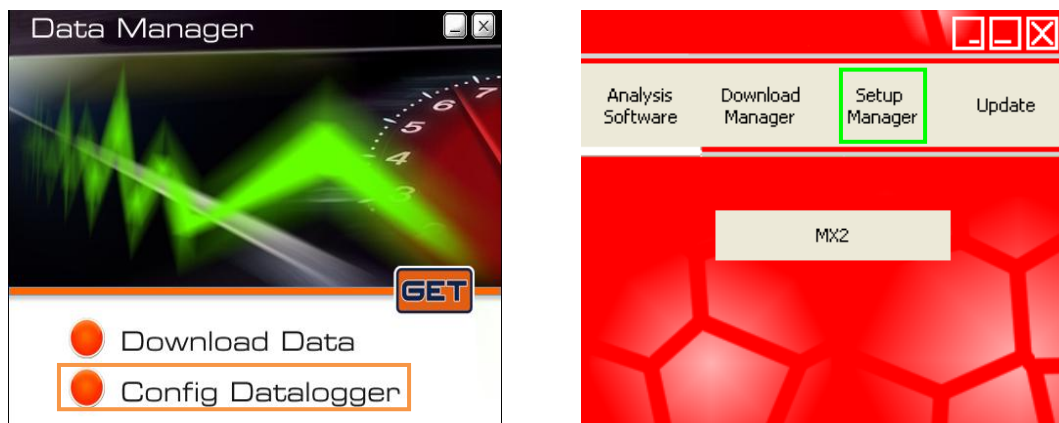
IC channels have frequency domain signals and an minimum amplitude between 0 and 5 V.

### 4.1 IC channel calibration (connected to a wheel speed sensor)

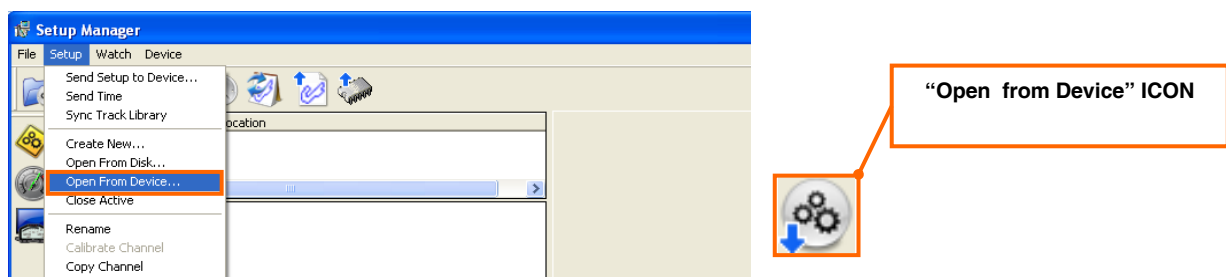
Instruction below are for M40 PLUS setup. The same procedure could be used in M40 STANDARD and EXPANSION.

In order to put this sensor in IC channel list, follow steps below:

- Start **Config Datalogger** (or **Setup Manager** you are using **GATE**) by click on software start panel .

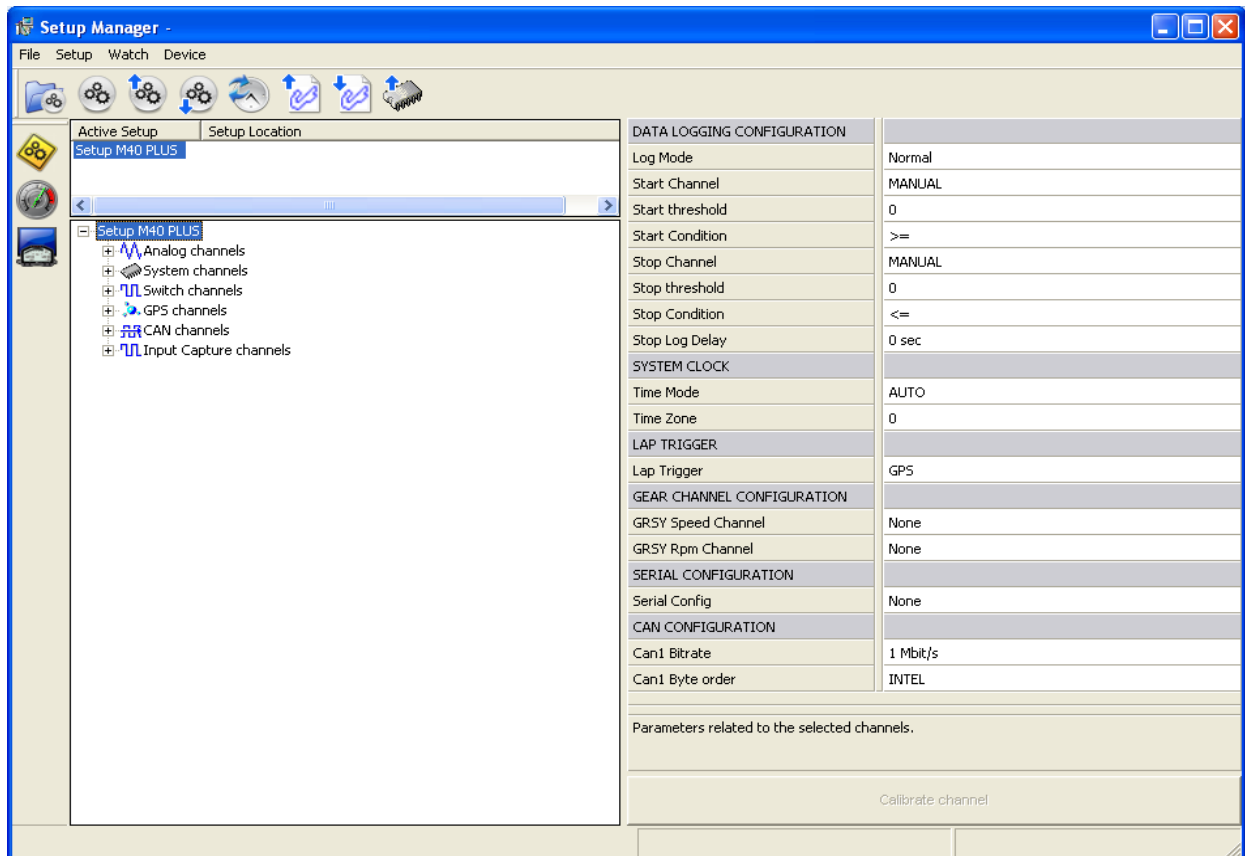


- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

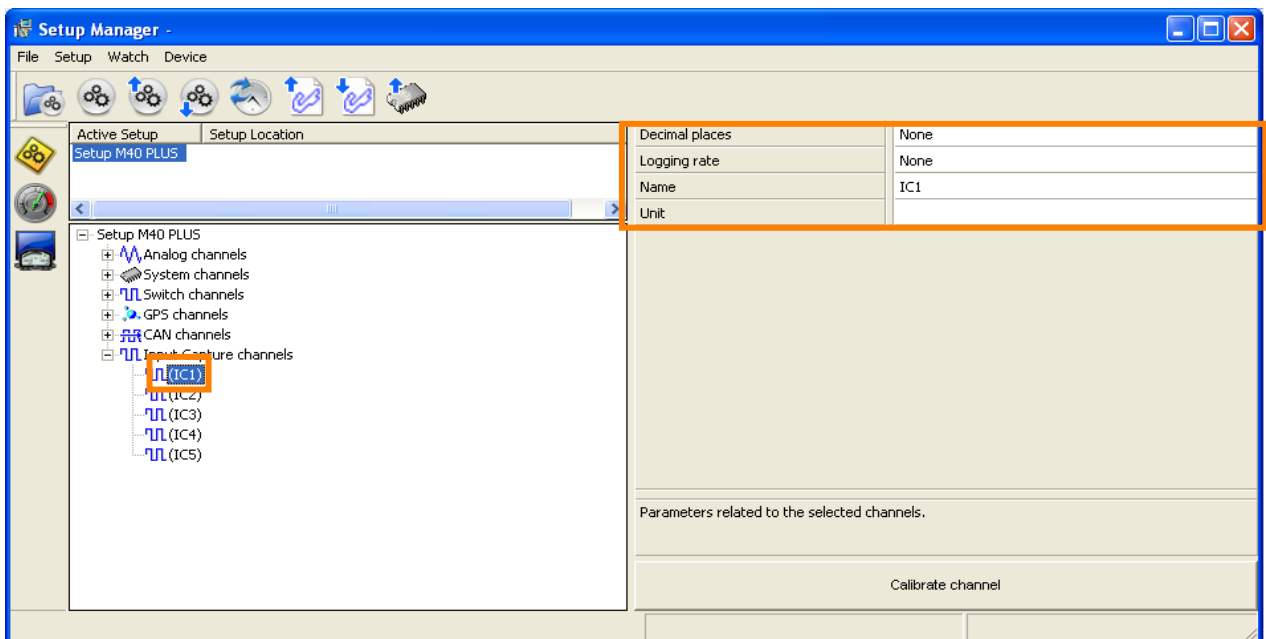


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger** (or **Setup Manager**).

- The picture below shows an example of a **M40 PLUS** base setup:



- If, for example, the sensor is connected to **IC1** (in **EXP** wiring loom); click on **IC1** (in **Input Capture Channels** list): channel's properties will appear.



- Now you can change all options:

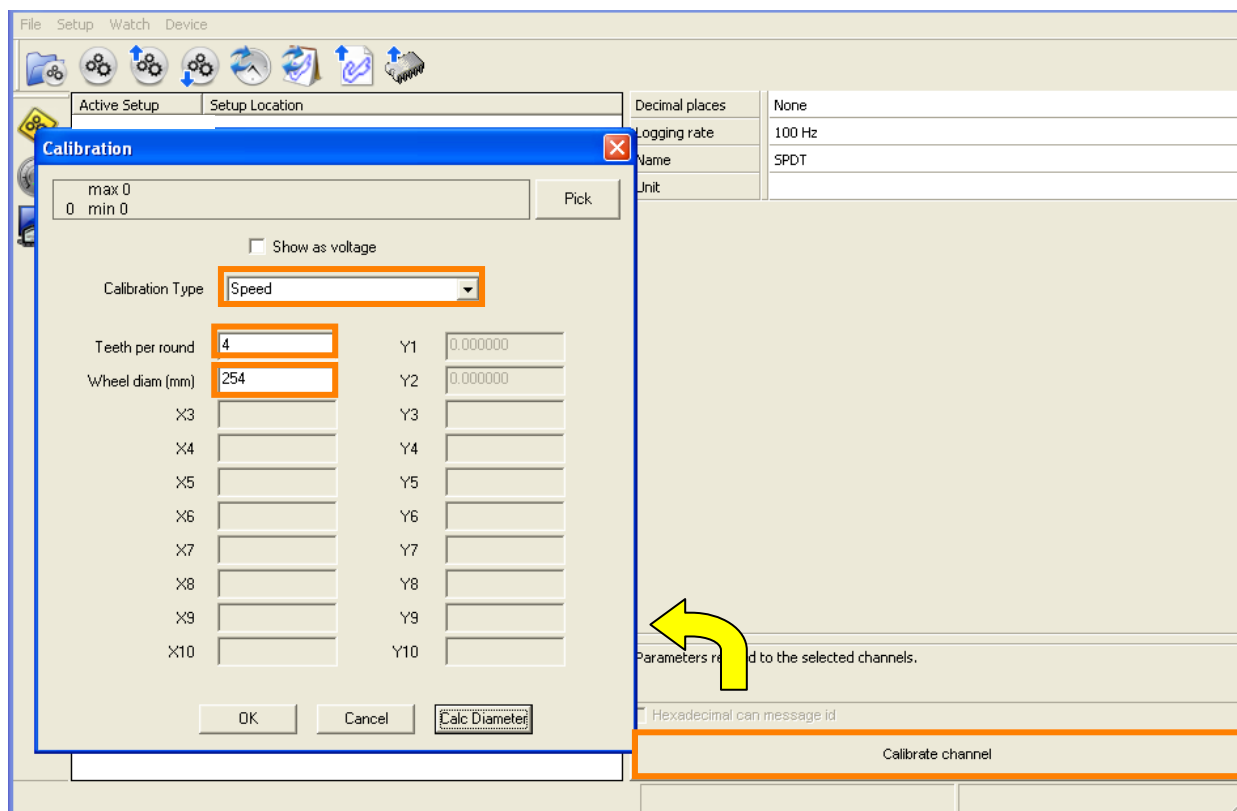
**Decimal Places:** how many decimal places you wish to have. In this example set **None**.

**Logging rate:** logging frequency. If this parameters is **None**, the channel will not be logged and it will not be available in analysis software. Set 100 Hz for this example.

**Name:** channel's name (in this example is **SPDR – Speed Rear**).

**Unit:** this parameter define measurement unit of the channel (kph for speed)

- We need now to proceed with the channel calibration. This operation is needed in order to have a proper logging signal. Click on **Calibrate Channel** (low right part of the screen), a calibration window will appear:



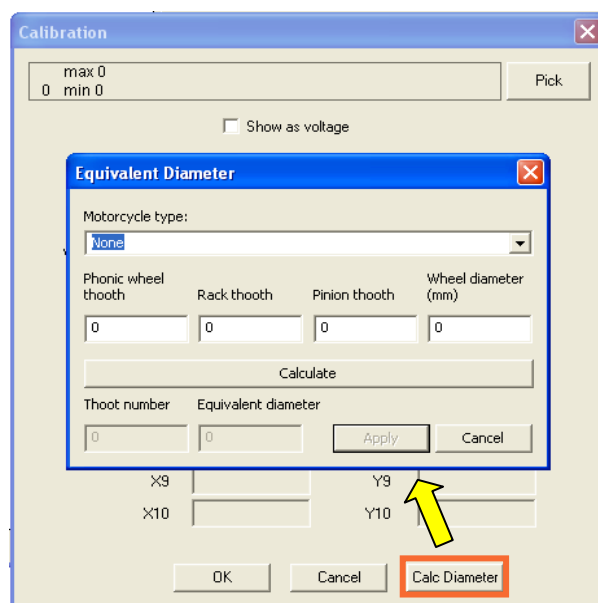
- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration (in this example use **SPEED**)

**Teeth per round** : this is the number of electrical pulses given by the sensor each wheel revolution. Usually the sensor reads brake disk fixing bolts: in this case you need only to type the correct number in the dedicated box

**Wheel diam mm** : this is the wheel diameter, in mm. You could calculate this dividing the circumference by 3,14.

**NOTE:** if the sensor is inside the gearbox (usual for motorbikes) you could use **Calc Diameter** (low right part of the screen). By clicking the button you will see this figure:





Clicking ▼ in **Motorcycle Type** box some “default” parameters will appear: if you motorbike is not in the list you need to type manually all parameters.

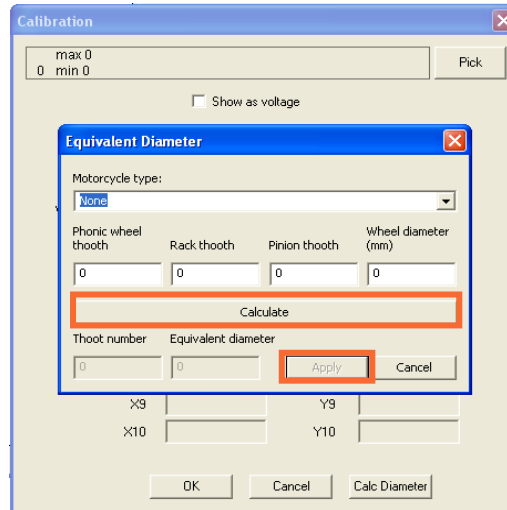
**Phonic wheel tooth** : teeth number of target wheel

**Rack tooth** : crown teeth number

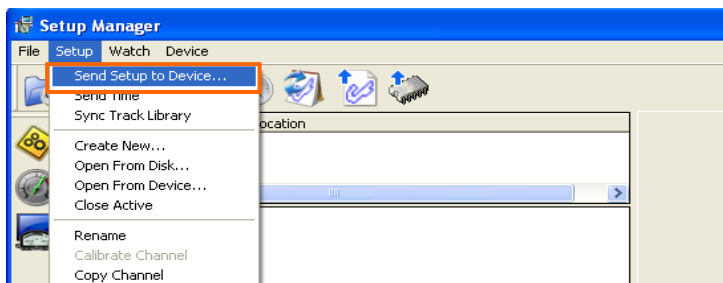
**Pinion tooth** : pinion teeth number

**Wheel diam mm** : this is the wheel diameter, in mm. You could calculate this dividing the circumference by 3,14.

Once the operation are completed, press **Calculate** (in **Tooth number** and **Equivalent diameter** appears calibration values). After this, press **Apply** to confirm data and get back to the configuration window.



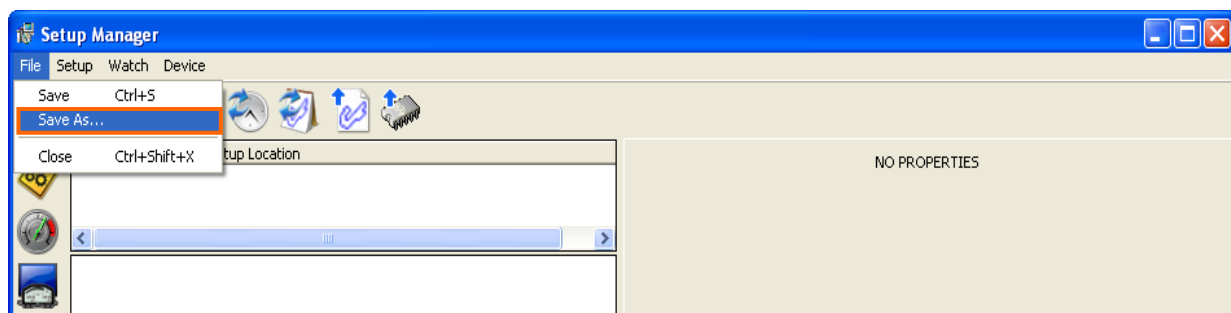
- Once calibration values are defined, click **OK** to get back to **M40** setup window
- You need to write the new modified setup to the device: click the icon or **Send Setup to Device** in **Setup** menu.



“Send Setup to Device”  
ICON



- We suggest to save the new modified setup in to the pc: select **Save as...** in **File** menu.



## 4.2 IC channel calibration (connected to a RPM sensor)

If a RPM signal is connected to the IC input, repeat all steps already seen regarding download and opening of setup.

- Once you get in to the calibration window it is necessary to define:

**Calibration Type** : you can chose the type of calibration (in this example use **RPM**)

**Teeth for two**: this is the number of electrical pulses given by the sensor each two flywheel revolutions. If you do not know this parameter, you need to try until you get the correct RPM reading

## 5 “WATCH” function

With **WATCH**, in **Setup Manager** you can:

- Read live sensors values
- Calibrate sensors
- Set **0** (really useful in cases, as suspension potentiometer, when the value can be positive or negative)
- Set offset

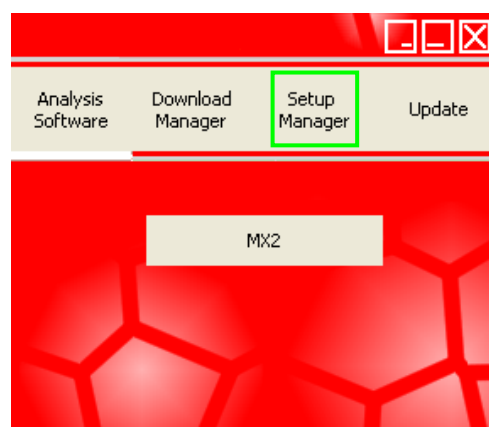
Using **WATCH** it is compulsory to switch on and connect M40 to PC (read chapter 8.1 of this manual).

### 5.1 Start and stop “WATCH”: real time channel visualization

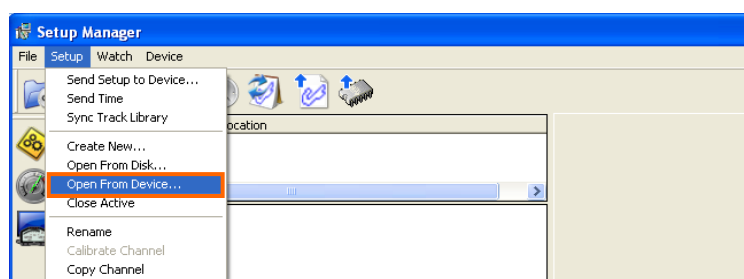
This procedure shows visualization of two analogue channels: operations are the same for all of **M40** parameters.

Start **WATCH** as described:

- Start **Config Datalogger** (or **Setup Manager** you are using **GATE**) by click on software start panel .

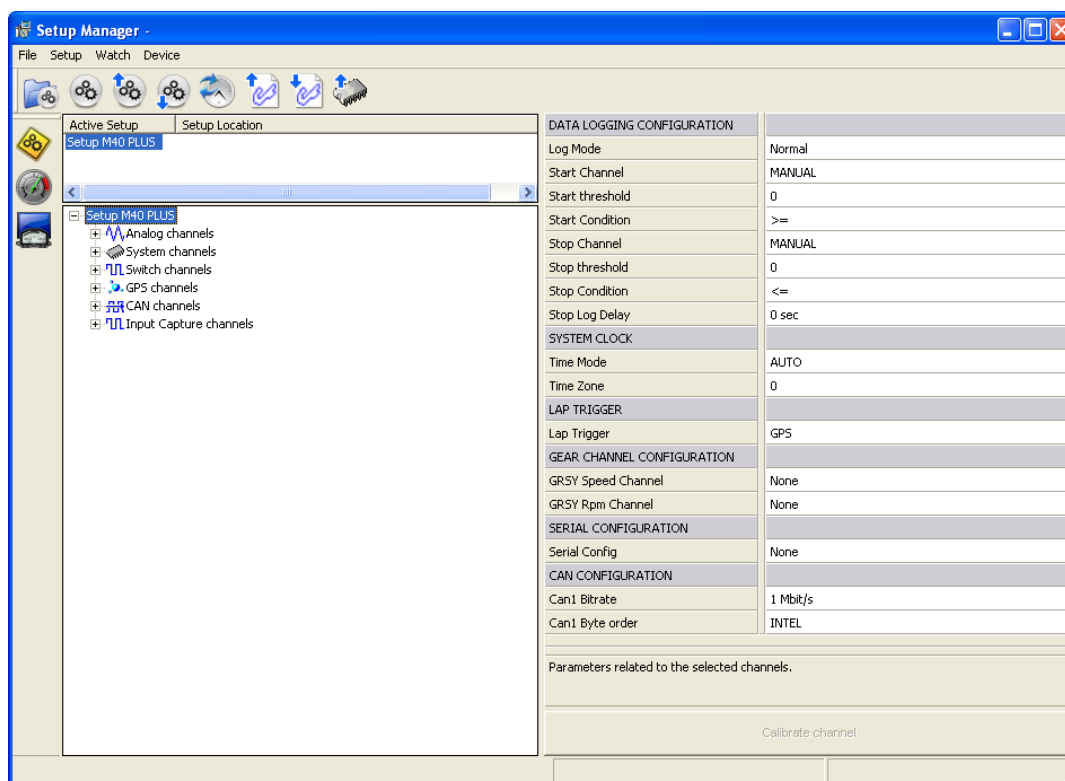


- Save device's setup in to the PC by clicking the icon or clicking **Open from Device** in **Setup** menu.

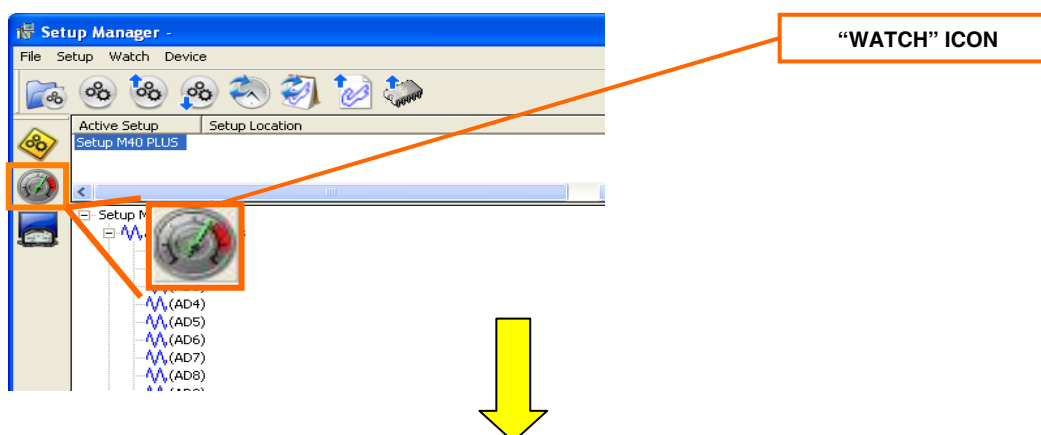


- Once the job is done, a message will appear and you will see the setup in **Config Datalogger** (or **Setup Manager**).

- The picture below shows an example of a **M40 PLUS** base setup:



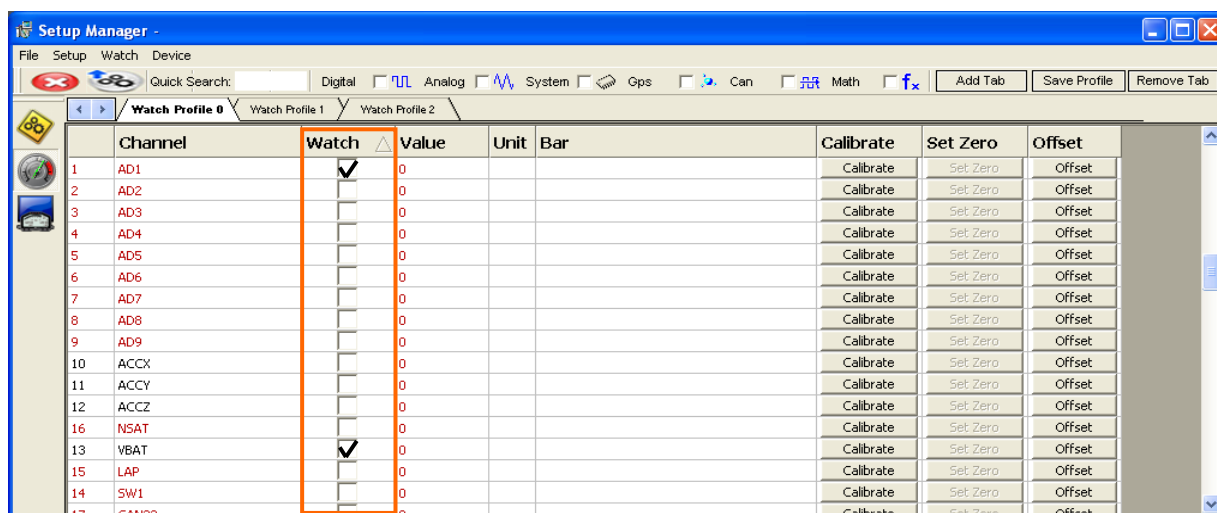
- Click on **WATCH** icon to see channels list visualization



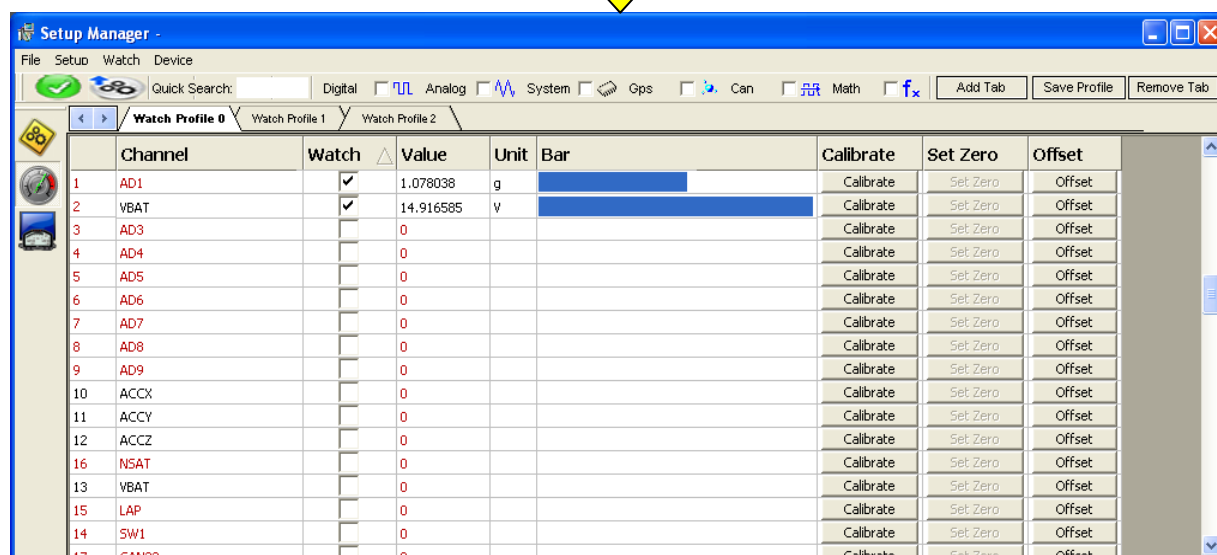
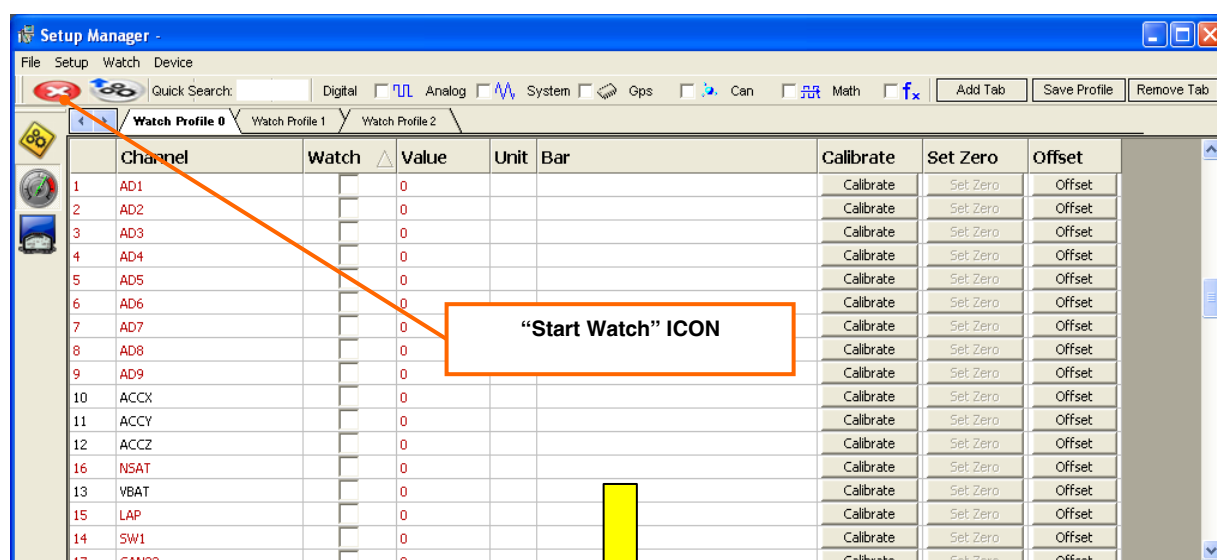
The screenshot shows the 'Watch' tab with 'Watch Profile 0' selected. The interface displays a table of channels with columns for Channel, Watch, Value, Unit, Bar, Calibrate, Set Zero, and Offset.

| Channel  | Watch                    | Value | Unit | Bar | Calibrate | Set Zero | Offset |
|----------|--------------------------|-------|------|-----|-----------|----------|--------|
| 49 CAN65 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 50 CAN66 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 51 CAN67 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 52 CAN68 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 53 CAN69 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 54 CAN70 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 55 CAN71 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 56 CAN72 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 57 CAN73 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 58 CAN74 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 59 CAN75 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 60 CAN76 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 61 CAN77 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 62 CAN78 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 63 CAN79 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |
| 64 CAN80 | <input type="checkbox"/> | 0     |      |     | Calibrate | Set Zero | Offset |

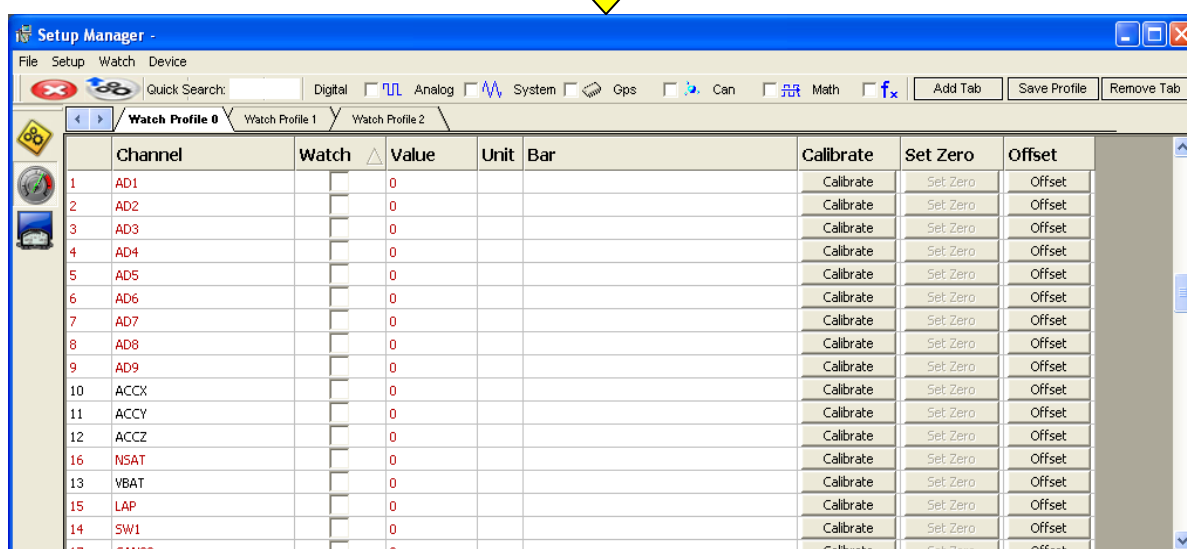
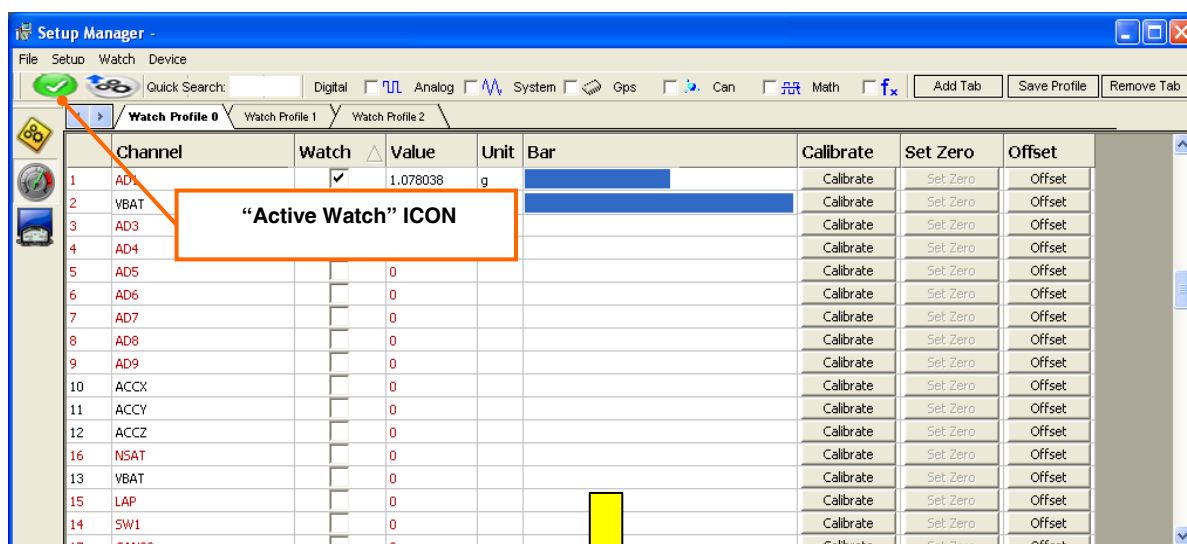
- If we wish to read live AD1 and VBAT channels, we select boxes in **Watch** column



- Click on **Start Watch** in “instrument bar” or select **Start Watch** in **Watch** menu: the software will show selected values.

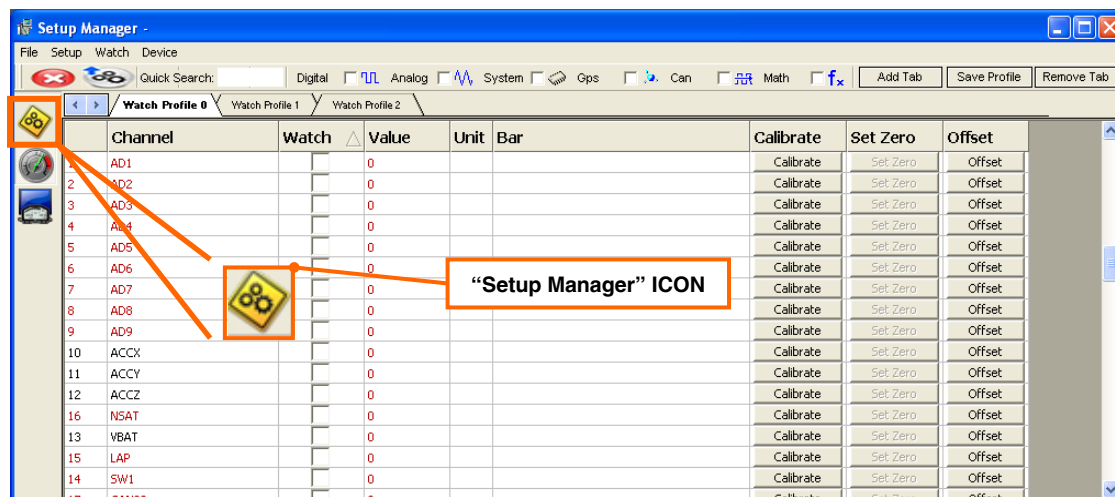


- In order to freeze **WATCH**, click again **Active Watch**, or select **Stop Watch** in **Watch** menu



**NOTE:** the value, visualized in **WATCH**, is given by channel calibration.

**WARNING:** to get back to Setup Manager window, click on the icon on the left of the **WATCH** window

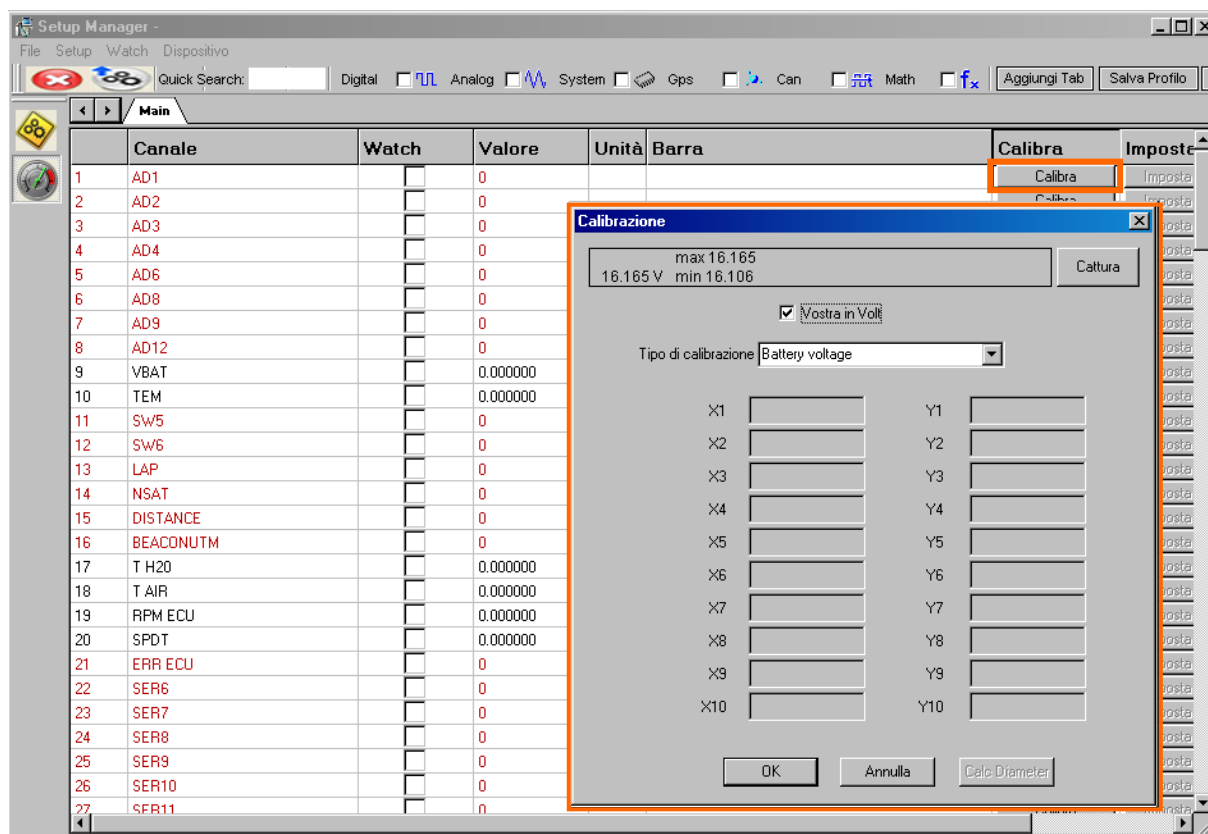


## 5.2 “WATCH” channel calibration

Calibration is necessary to convert signals from sensors to comprehensible data.

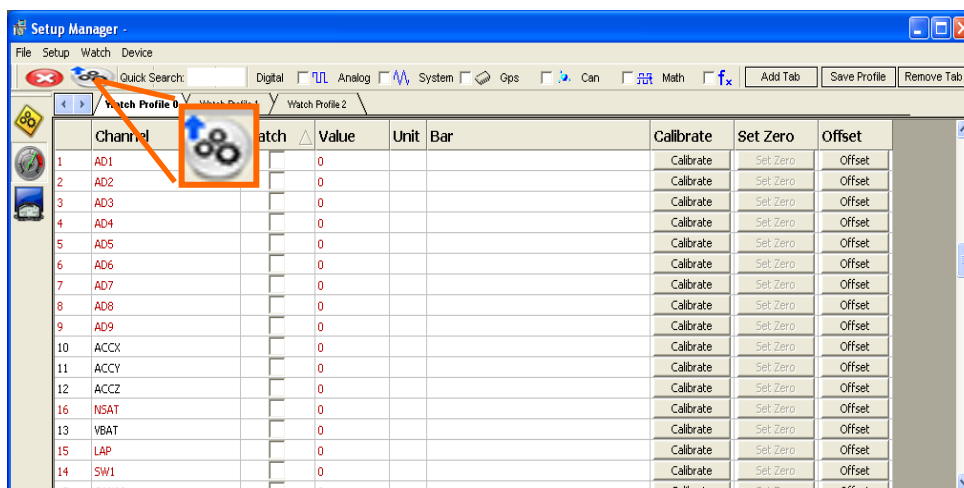
This operation can be done during the channel creation (read previous chapters) or in **WATCH** window, clicking on **Calibrate** button (corresponding to the required channel) without starting **WATCH**.

**We suggest to use this function only after the channel is configured in M40 setup.**



Once the button **Calibrate** is pressed, you will see the calibration window. The procedures are the same of previous chapters.

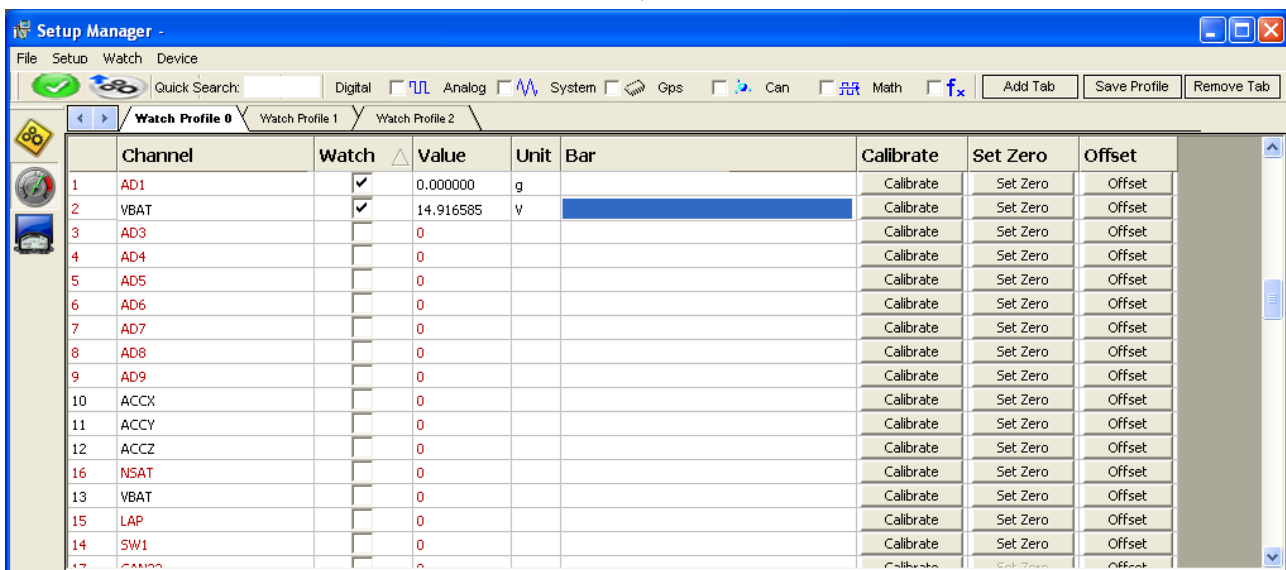
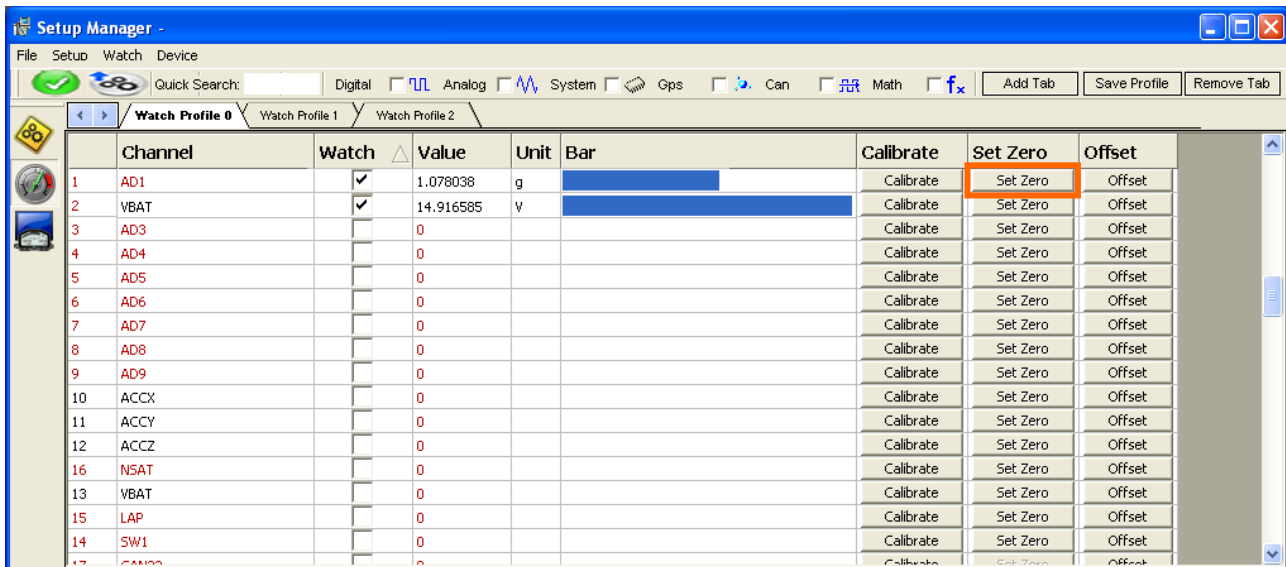
**Once the channel is calibrated, you need to send again the setup to the device. You can do this directly from WATCH selecting “Send Setup to Device” in File menu or by clicking the icon (second from the left in instrument bar).**



## 5.3 Setting channel zero in “WATCH”

Zero set is useful when using some kind of sensor (for example suspension potentiometer or internal accelerometer). **To use this function WATCH need to be activated (read chapter 5.1 of this Appendix) and the sensor need to be in “zero” position.**

To set the zero, press “Set Zero” of the required channel



We suggest to send back the setup once “zero” operation are finished.

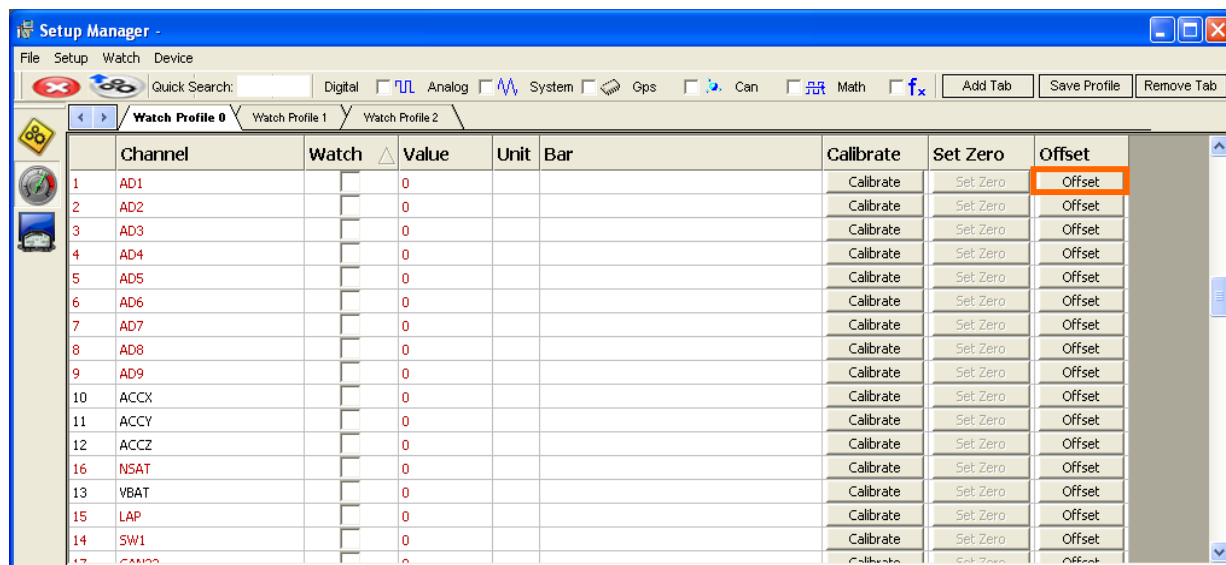
**We suggest to use this function only after the channel is configured in M40 setup.**



## 5.4 Setting channel offset in “WATCH”

Sometimes it is needed to add or remove a defined value from a sensor reading (wrong “zero” of a suspension potentiometer).

To set this we will use the **Offset** button:



Set the value in dialogue box:



Use negative values to add the offset to the channel value and use positive values to subtract; press OK to confirm.

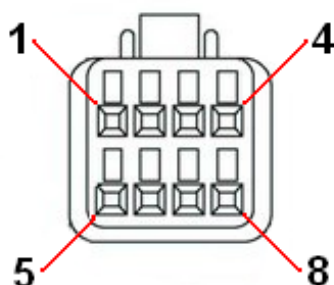
## APPENDIX 2: CONNECTORS M40 STD. – EXP. - PLUS

Following chapters will show pinout of all connector in M40.

### 1 “MAIN” CONNECTOR (M40 STD. - EXP. - PLUS)

MAIN pinout of M40 :

**MAIN connector**  
**Front view**  
(wiring get out from rear part)



| Pin | Signal name | Description          | Setup Manager name |
|-----|-------------|----------------------|--------------------|
| 1   | VBAT        | Positive power       | VBAT               |
| 2   | GND POW     | Negative power       | -                  |
| 3   | CANL        | CANL input           | -                  |
| 4   | CANH        | CANH input           | -                  |
| 5   | GND SEN     | Sensor reference     | -                  |
| 6   | RX          | M40 RS232 serial RX  | -                  |
| 7   | TX          | M40 RS232 serial TX  | -                  |
| 8   | EN-BLES     | “battery less” input | -                  |



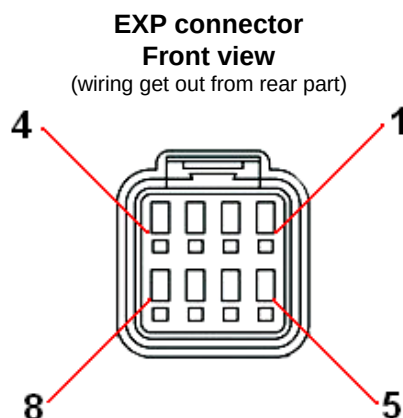
**NOTE:** if EN-BLESS is connected to ground (as in MULTILINK code GL-0018-AA) the switch on of the device will be delayed about 10 seconds. This function has been implemented for all battery less application (as, for example, in offroad motorbikes) when the power is present only with the engine on.



**NOTE:** CAN port is not closed into the device. If you problems occur, use a 120  $\Omega$  resistor between CAN H and CANL inputs. MULTILINK wiring loom code GL-0018-AA is supplied with CAN termination in the connector lid (“VT1-PC”)

## 2 “EXP” CONNECTOR (M40 STD. - EXP. - PLUS)

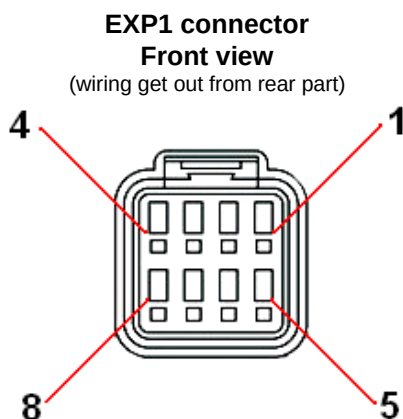
EXP pinout of **M40** :



| Pin | Signal name | Description                             | Setup Manager name |
|-----|-------------|-----------------------------------------|--------------------|
| 1   | VBB1        | Auxiliary power (same as power voltage) | -                  |
| 2   | GND SEN     | GND sensors                             | -                  |
| 3   | AN1         | Analogue input 1                        | AD1                |
| 4   | AN2         | Analogue input 2                        | AD2                |
| 5   | AN3         | Analogue input 3                        | AD3                |
| 6   | IC1         | Frequency input 1                       | IC1                |
| 7   | IC2         | Frequency input 2                       | IC2                |
| 8   | VREF        | Auxiliary power (5 VDC)                 | -                  |

## 3 “EXP1” CONNECTOR (ONLY M40 EXP. - PLUS)

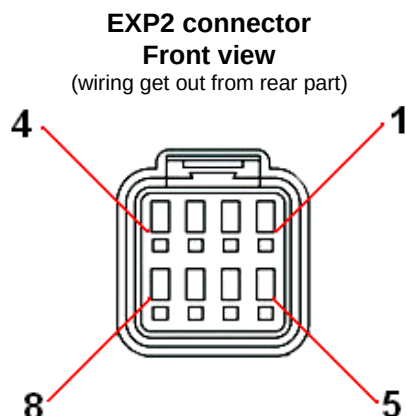
EXP1 pinout of **M40 EXPANSION** and **PLUS** :



| Pin | Signal name | Description                             | Setup Manager name |
|-----|-------------|-----------------------------------------|--------------------|
| 1   | VBB1        | Auxiliary power (same as power voltage) | -                  |
| 2   | GND SEN     | GND sensors                             | -                  |
| 3   | AN4         | Analogue input 4                        | AD4                |
| 4   | AN5         | Analogue input 5                        | AD5                |
| 5   | AN6         | Analogue input 6                        | AD6                |
| 6   | IC3         | Frequency input 3                       | IC3                |
| 7   | SW1         | Switch input                            | SW1                |
| 8   | VREF        | Auxiliary power (5 VDC)                 | -                  |

## 4 “EXP2” CONNECTOR (ONLY M40 PLUS)

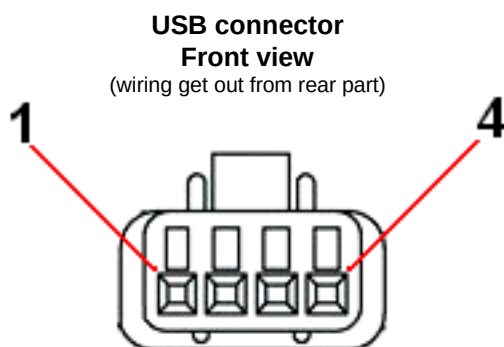
EXP2 pinout of **M40 PLUS** :



| Pin | Signal name | Description                             | Setup Manager name |
|-----|-------------|-----------------------------------------|--------------------|
| 1   | VBB1        | Auxiliary power (same as power voltage) | -                  |
| 2   | GND SEN     | GND sensors                             | -                  |
| 3   | AN7         | Analogue input 7                        | AD7                |
| 4   | AN8         | Analogue input 8                        | AD8                |
| 5   | AN9         | Analogue input 9                        | AD9                |
| 6   | IC4         | Frequency input 4                       | IC4                |
| 7   | IC5         | Frequency input 5                       | IC5                |
| 8   | VREF        | Auxiliary power (5 VDC)                 | -                  |

## 5 “USB” CONNECTOR (M40 STD. - EXP. - PLUS)

USB pinout of **M40**:



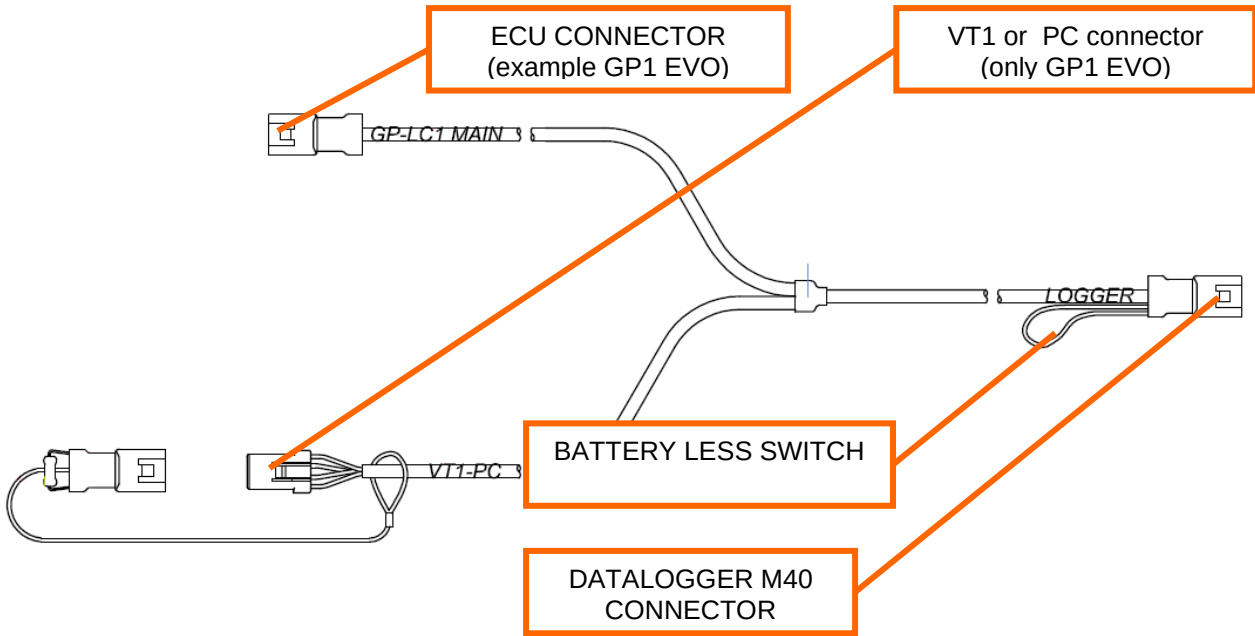
| Pin | Signal name | Description        |
|-----|-------------|--------------------|
| 1   | USB +       | USB +5V connection |
| 2   | USB P       | USB N connection   |
| 3   | USB N       | USB P connection   |
| 4   | USB -       | USB GND connection |

## APPENDIX 3: WIRING LOOMS FOR M40 CONNECTION

Following chapter illustrate optional **M40** wiring

### 1 MULTILINK WIRING code GL-0018-AA

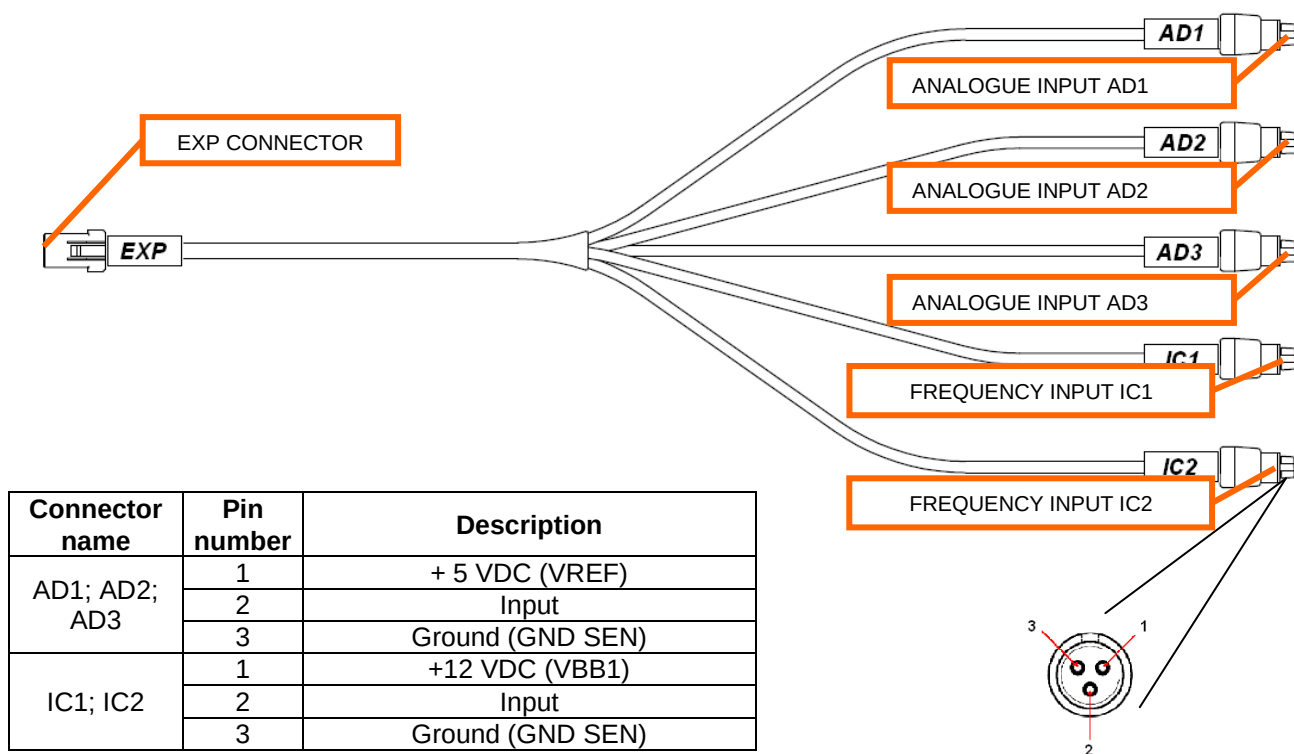
Connectors position in **MULTILINK** wiring loom code **GL-0018-AA**



- **GP-LC1 MAIN CONNECTOR:** input for the connection of ECU **GP1 EVO** or lambda module **LC1-EVO**
- **VT1-PC CONNECTOR:** input for the connection of **VT1** configurator or ECU setting cable **GP1 EVO**
- **LOGGER CONNECTOR:** input for the connection of **M40** datalogger (**MAIN** connector).
- **BATTERY LESS SWITCH:** this switch is a cable that connect EN-BLES to the ground: the datalogger switch on is delayed about 10 seconds in order to get the system ready (offroad motorbikes). A wrong power of the devices could cause a malfunctioning of the system.  
If you do not need the delay, cut the cable.

## 2 EXPANSION WIRING code GL-0041-AA

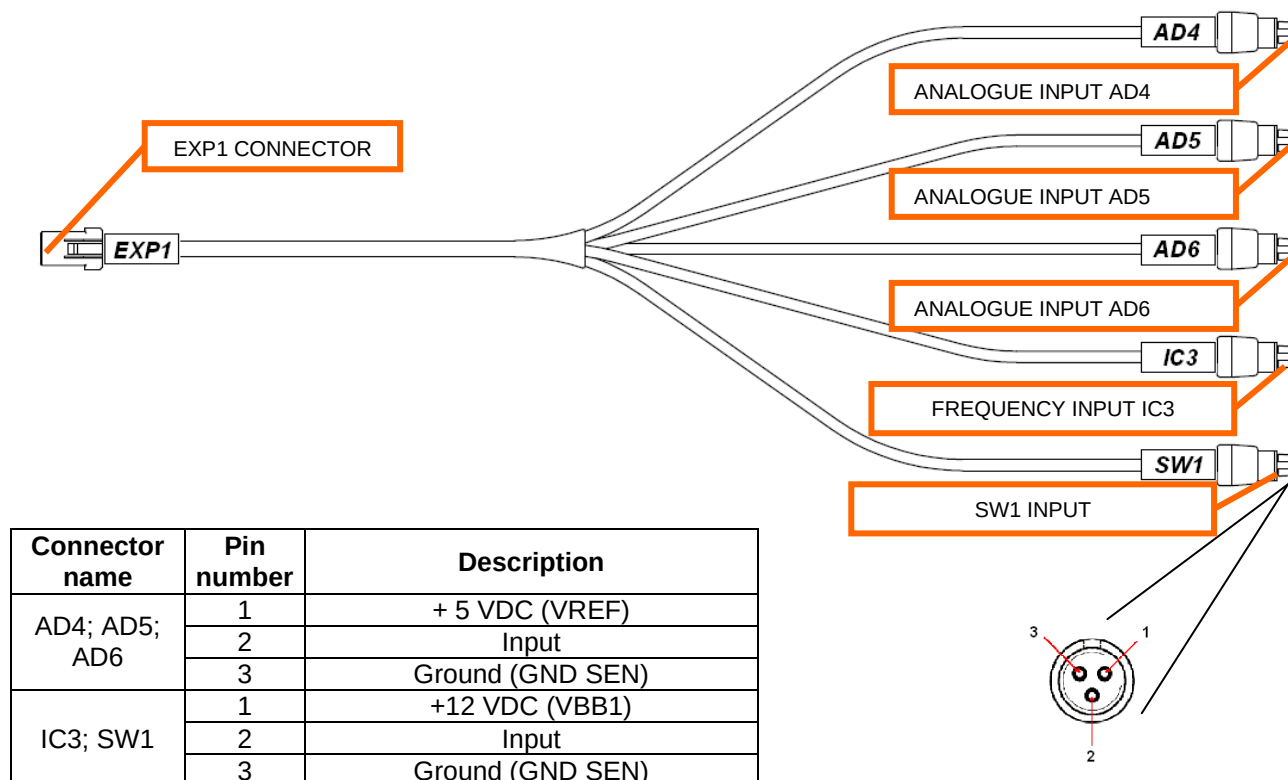
Connector position in **EXPANSION** wiring loom code **GL-0041-AA**. This wiring loom has to be connected to **EXP** (M40 datalogger).



- **CONNECTOR EXP:** you need to connect this to **EXP** connector of **M40**
- **CONNECTORS AD1...AD3:** analogue inputs (example: potentiometer, thermocouples, etc)
- **CONNECTORS IC1- IC2:** frequency input (example: wheel speed sensors, rpm, etc)

### 3 EXPANSION WIRING code GL-0042-AA

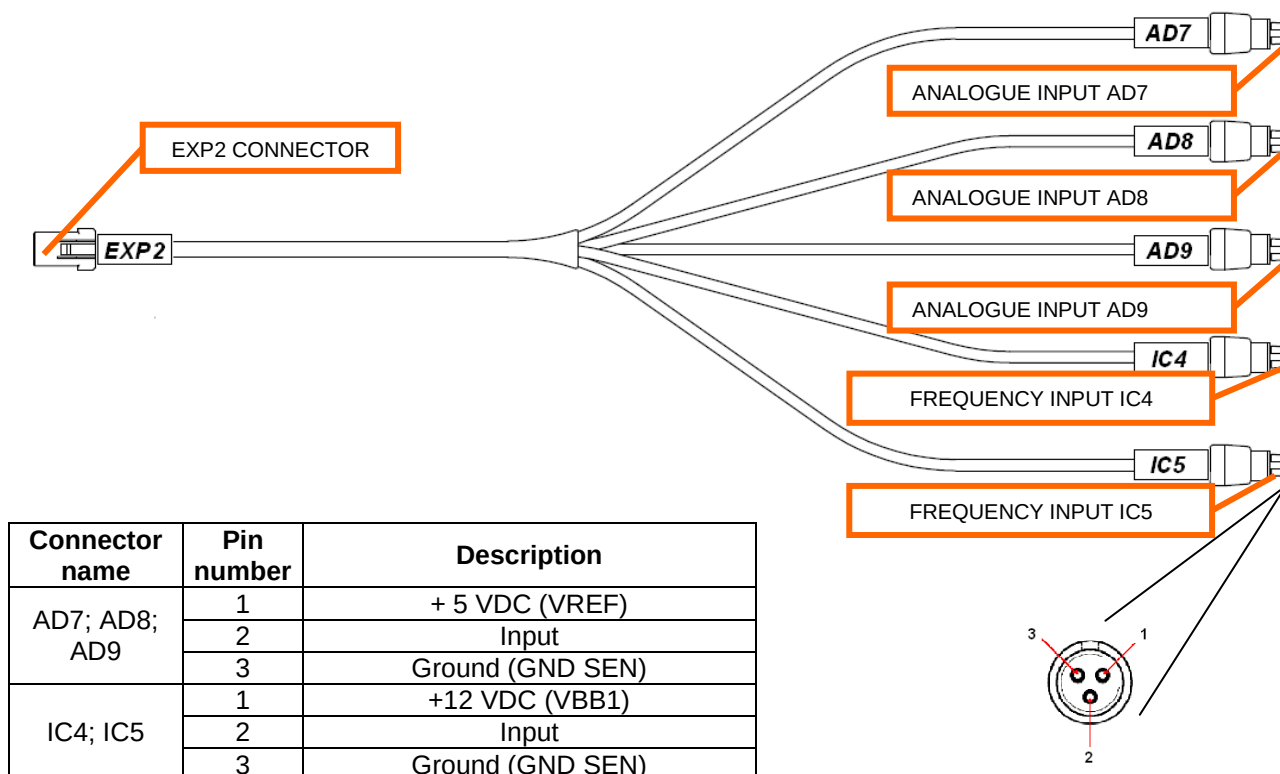
Connectors position in **EXPANSION** wiring loom code **GL-0042-AA**. This wiring loom has to be connected to **EXP1** (M40 datalogger)



- **CONNECTOR EXP1:** you need to connect this to **EXP1** connector of **M40**
- **CONNECTORS AD4...AD6:** analogue inputs (example: potentiometer, thermocouples, etc)
- **CONNECTOR IC3:** frequency input (example: wheel speed sensors, rpm, etc)
- **CONNECTOR SW1:** switch input, button input, IR receiver input (example: map switch, beacon, etc)

## 4 EXPANSION WIRING code GL-0043-AA

Connector position in **EXPANSION** wiring loom code **GL-0043-AA**. This wiring loom has to be connected to the cable labelled **EXP2 (M40 datalogger)**

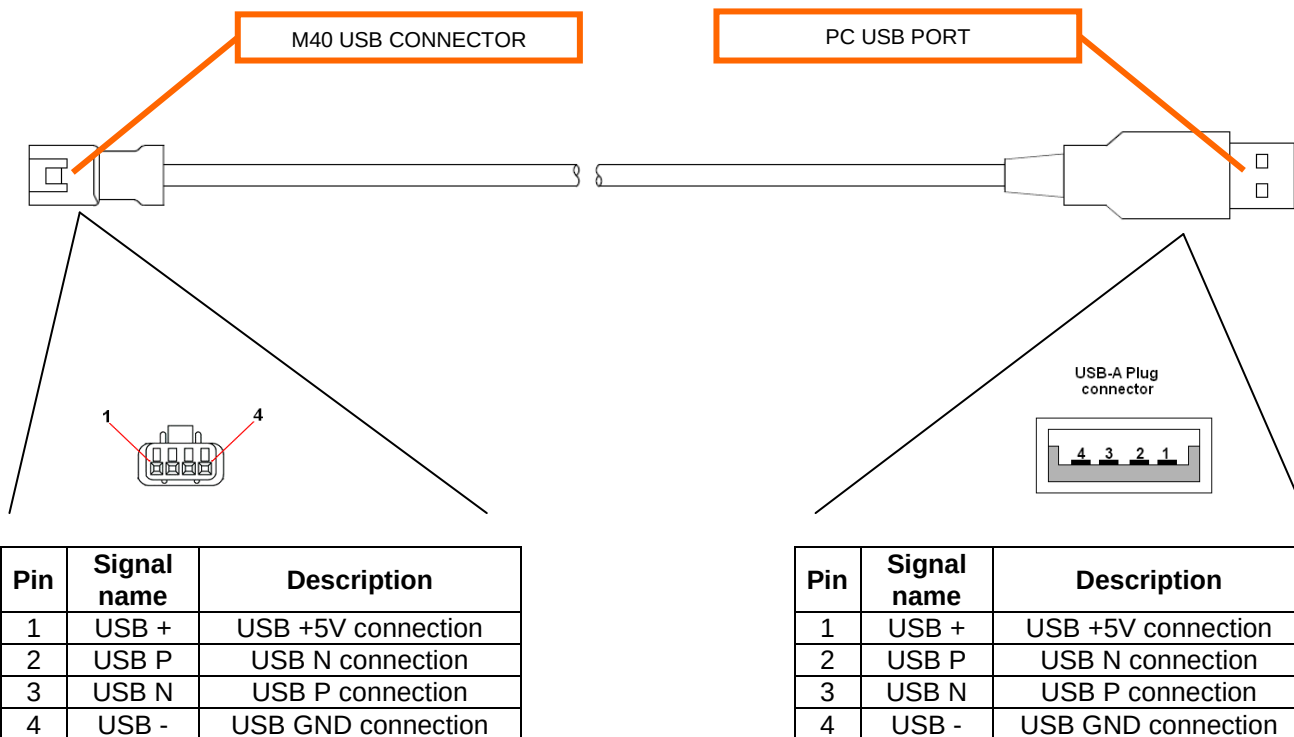


- **CONNECTOR EXP2:** you need to connect this to **EXP2** connector of **M40**
- **CONNECTORS AD7...AD9:** analogue inputs (example: potentiometer, thermocouples, etc)
- **CONNECTORS IC4- IC5:** frequency input (example: wheel speed sensors, rpm, etc)



## 5 DATA DOWNLOAD WIRING code GL-0019-AA

**DATA DOWNLOADING** wiring loom code **GL-0019-AA**. This wiring loom has to be connected to **USB (M40 datalogger)**

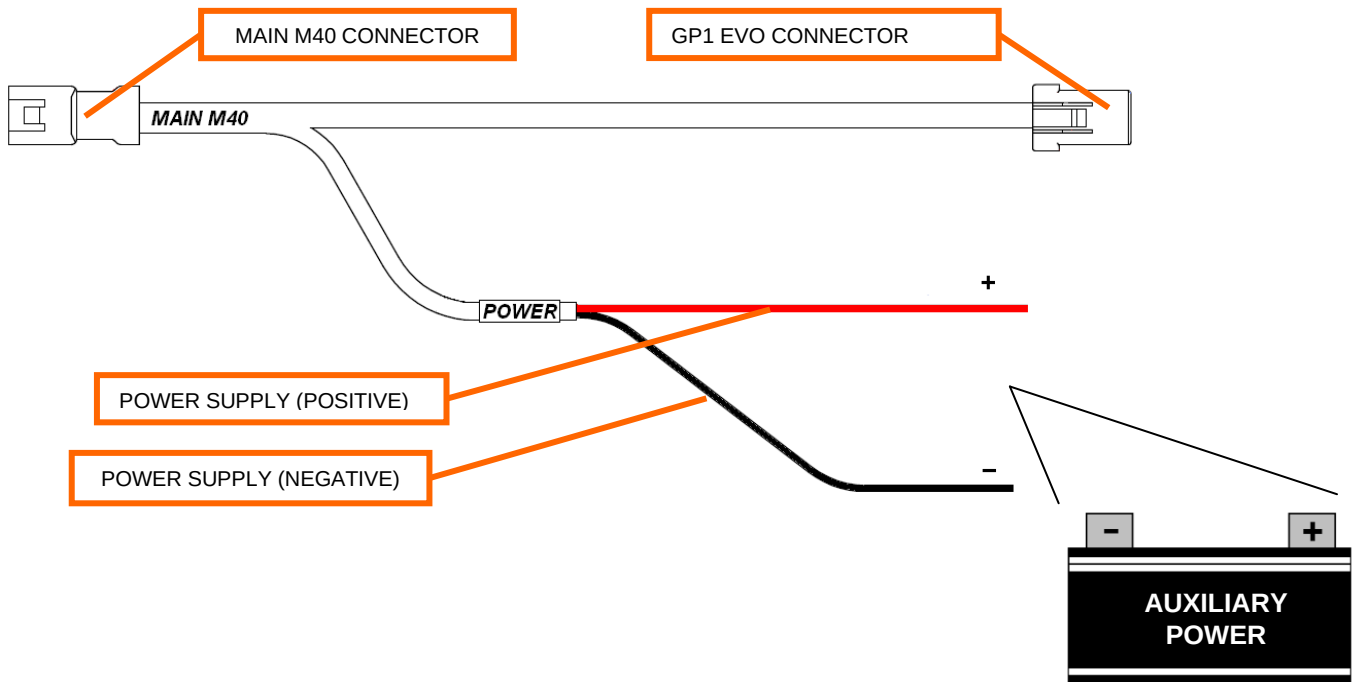


## 6 POWER WIRING code GL-0036-AA

This picture shows all connectors of **POWER** wiring loom code **GL-0036-AA**. This loom has to be connected to **MAIN** of **M40**.

Power wiring loom code **GL-0036-AA** could power the **M40** also with an external power supply (example battery) without the use of the engine. This is interesting especially in vehicles that power the system only with the engine switched on (offroad motorbikes).

Interconnection connector to **GP1 EVO** ECU permit to supply power and log CAN parameters directly from ECU.



- **MAIN M40 CONNECTOR:** to be connected to **MAIN** of **M40**
- **GP1 EVO CONNECTOR:** to be connected to **MAIN** of **GP1 EVO** ECU
- **RED WIRING “+”:** connect this to positive of auxiliary power supply (if needed)
- **BLACK WIRING “-”:** connect this to negative of auxiliary power supply (if needed)



**WARNING: THE DEVICE NEED TO BE POWERED WITHIN THE CORRECT VOLTAGE RANGE**

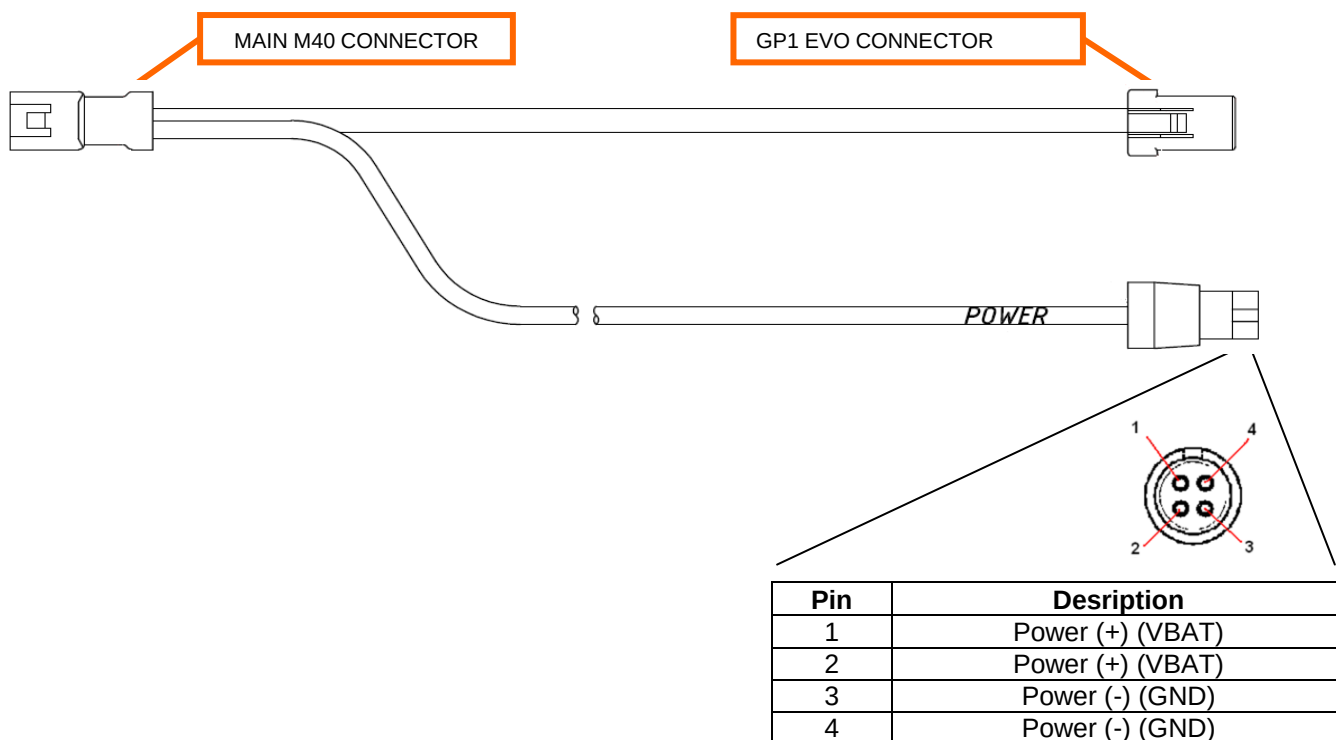


**WARNING: AVOID SHORTCIRCUITS USING AUXILIARY POWER SUPPLY**

## 7 POWER WIRING code GL-0037-AA

The following picture shows all connectors of **POWER** wiring loom code **GL-0037-AA**. This cable has to be connected to **MAIN** of **M40**.

Power cable code **GL-0037-AA** could power the **M40** also with the battery code **DA00010000** without the use of the engine. This is interesting especially in vehicles that power the system only with the engine switched on (offroad motorbikes). Interconnection connector to **GP1 EVO** ECU permit to power and log CAN parameters from ECU.

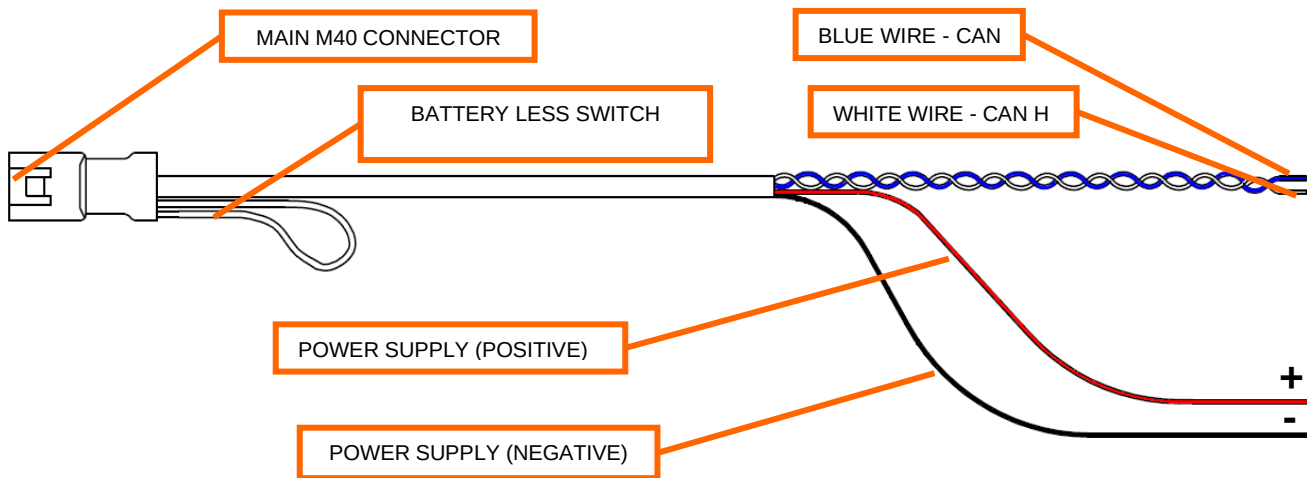


- **MAIN M40 CONNECTOR:** to be connected to **MAIN** of **M40**
- **GP1 EVO CONNECTOR:** to be connected to **MAIN** of **GP1 EVO** ECU
- **BATTERY CONNECTOR:** Binder 4 pins to be connected to battery, code **DA00010000** (if needed)

## 8 POWER – DATA WIRING code GL-0038-AA

This picture shows all connectors of **POWER-DATA** code **GL-0038-AA**. This loom has to be connected to **MAIN** of **M40**.

This loom could power **M40** with an external battery and could connect **M40** to CAN bus.



- **MAIN M40 CONNECTOR:** to be connected to **MAIN** of **M40**
- **BATTERY LESS SWITCH:** this switch is a cable that connect EN-BLES to the ground: the datalogger switch on is delayed about 10 seconds in order to get the system ready (offroad motorbikes). A wrong power of the devices could cause a malfunctioning of the system. If you do not need the delay, cut the cable.
- **BLUE WIRE “CAN L”:** connect to the cable “CAN L” of vehicle CAN bus
- **WHITE WIRE “CAN H”:** connect to the cable “CAN H” of vehicle CAN bus
- **RED WIRE “+”:** connect to the positive of auxiliary power supply
- **BLACK WIRE “-”:** connect to the negative of auxiliary power supply



**WARNING: THE DEVICE NEED TO BE POWERED WITHIN THE CORRECT VOLTAGE RANGE**



**WARNING: AVOID SHORTCIRCUITS USING AUXILIARY POWER SUPPLY**



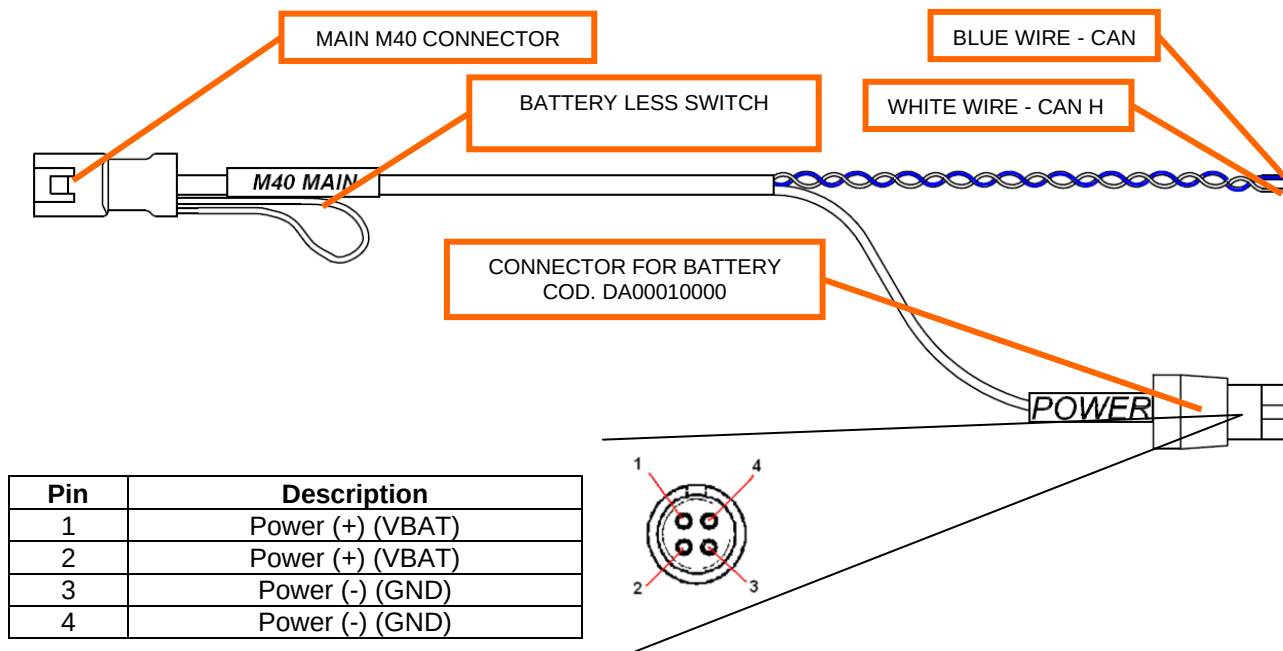
**NOTE: CAN port is not closed into the device. If you problems occur, use a 120  $\Omega$  resistor between CAN H and CANL inputs.**

## 9 POWER – DATA WIRING code GL-0039-AA

This picture shows all connectors of **POWER-DATA** code **GL-0039-AA**. This wiring loom has to be connected to **MAIN** of **M40**.

This cable could power **M40** also with battery code **DA00010000** avoiding the connection of the device with vehicle power loom.

There are also two wires to connect the vehicle CAN line.



- **MAIN M40 CONNECTOR:** to be connected to **MAIN** of **M40**
- **BATTERY LESS SWITCH:** this switch is a cable that connect EN-BLES to the ground: the datalogger switch on is delayed about 10 seconds in order to get the system ready (offroad motorbikes). A wrong power of the devices could cause a malfunctioning of the system.  
If you do not need the delay, cut the cable.
- **BLUE WIRE “CAN L”:** connect to the cable “CAN L” of vehicle CAN bus
- **WHITE WIRE “CAN H”:** connect to the cable “CAN H” of vehicle CAN bus
- **BATTERY CONNECTOR:** Binder 4 pins to be connected to battery, code **DA00010000** (if needed)



**NOTE:** CAN port is not closed into the device. If you problems occur, use a 120  $\Omega$  resistor between CAN H and CANL inputs.

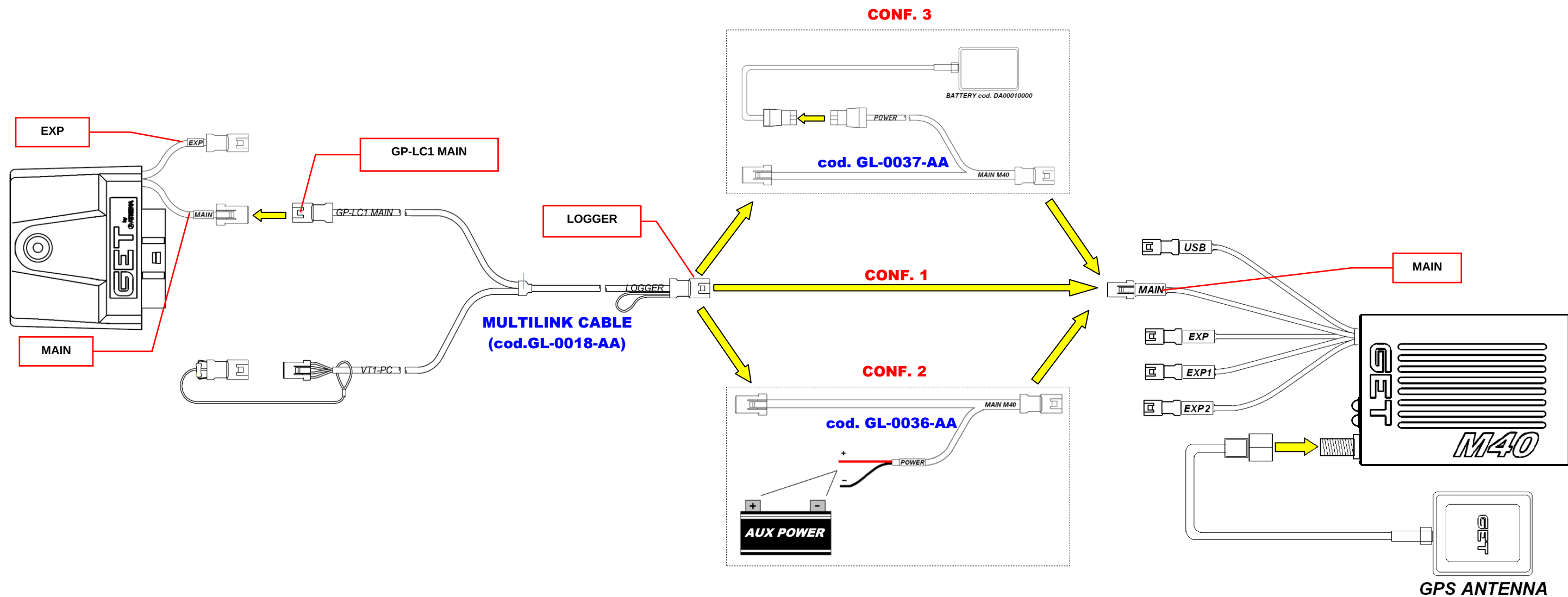
Some examples of M40 connections are showed in follows chapters:

1 GP1 EVO - M40 (BATTERY LESS CONFIGURATION)

PLEASE NOTE:

- If **CONF. 1** is used, the M40 is powered from GP1EVO
- If **CONF. 2** or **CONF. 3** are used, the M40 is powered separately without the need of the bike running

| Configuration            | Parts needed |                                                                 |
|--------------------------|--------------|-----------------------------------------------------------------|
|                          | Code:        | Description                                                     |
| CONF.1 – CONF.2 - CONF 3 | GL-0018-AA   | Multilink Cable                                                 |
| CONF.1 – CONF.2 - CONF 3 | -            | Datalogger M40 with GPS antenna                                 |
| CONF.1 – CONF.2 - CONF 3 | -            | GP1EVO (ECU)                                                    |
| CONF.2                   | GL-0036-AA   | Power cable                                                     |
| CONF 3                   | GL-0037-AA   | Power cable                                                     |
| CONF 3                   | DA00010000   | Battery with binder connector (only if cod. GL-0037-AA is used) |

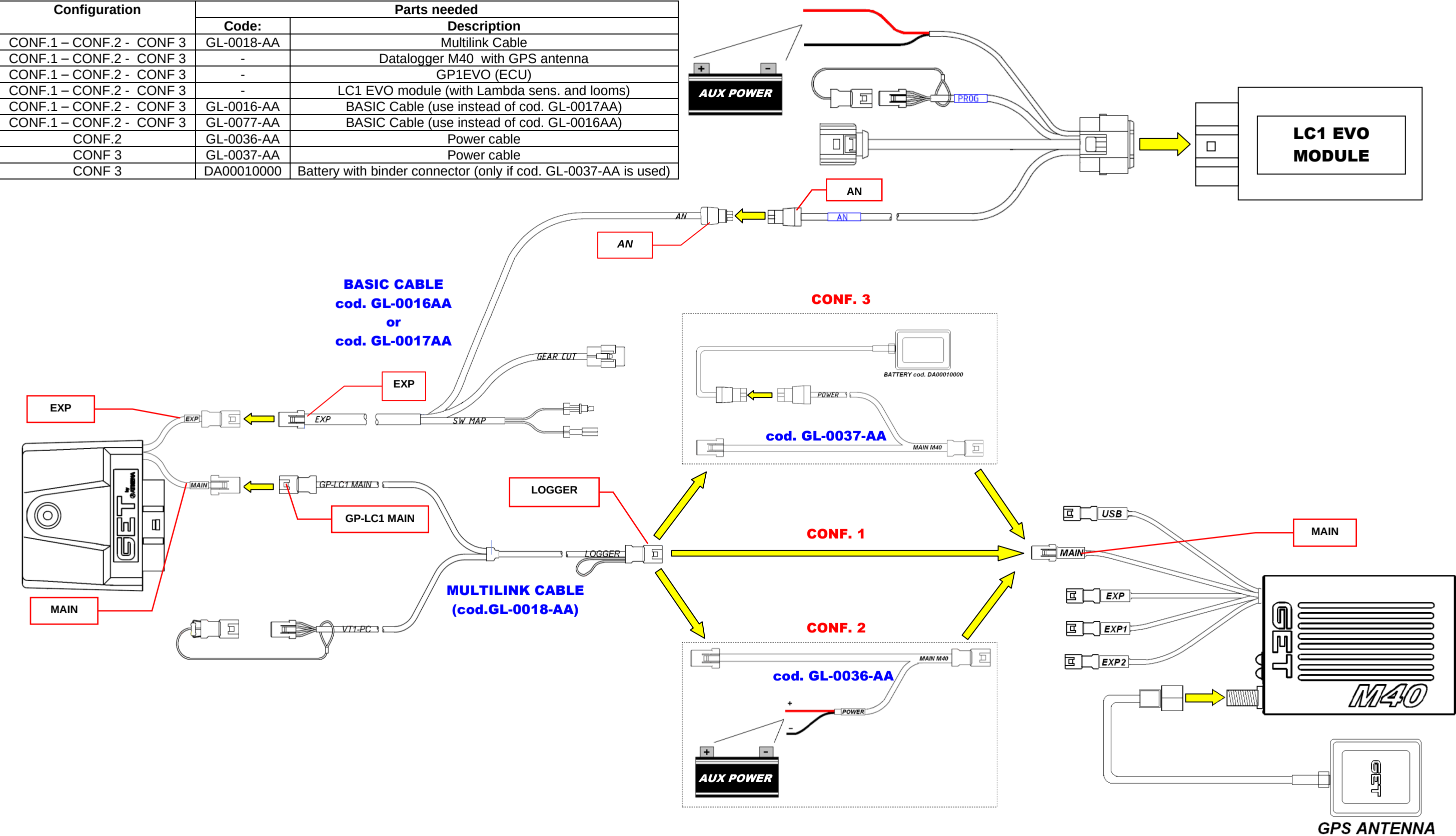


2 GP1 EVO - LC1 EVO - M40

PLEASE NOTE:

- If **CONF. 1** is used, the M40 is powered from GP1EVO
- If **CONF. 2** or **CONF. 3** are used, the M40 is powered separately without the need of the bike running

| Configuration            | Parts needed |                                                                 |
|--------------------------|--------------|-----------------------------------------------------------------|
|                          | Code:        | Description                                                     |
| CONF.1 – CONF.2 - CONF 3 | GL-0018-AA   | Multilink Cable                                                 |
| CONF.1 – CONF.2 - CONF 3 | -            | Datalogger M40 with GPS antenna                                 |
| CONF.1 – CONF.2 - CONF 3 | -            | GP1EVO (ECU)                                                    |
| CONF.1 – CONF.2 - CONF 3 | -            | LC1 EVO module (with Lambda sens. and looms)                    |
| CONF.1 – CONF.2 - CONF 3 | GL-0016-AA   | BASIC Cable (use instead of cod. GL-0017AA)                     |
| CONF.1 – CONF.2 - CONF 3 | GL-0077-AA   | BASIC Cable (use instead of cod. GL-0016AA)                     |
| CONF.2                   | GL-0036-AA   | Power cable                                                     |
| CONF 3                   | GL-0037-AA   | Power cable                                                     |
| CONF 3                   | DA00010000   | Battery with binder connector (only if cod. GL-0037-AA is used) |

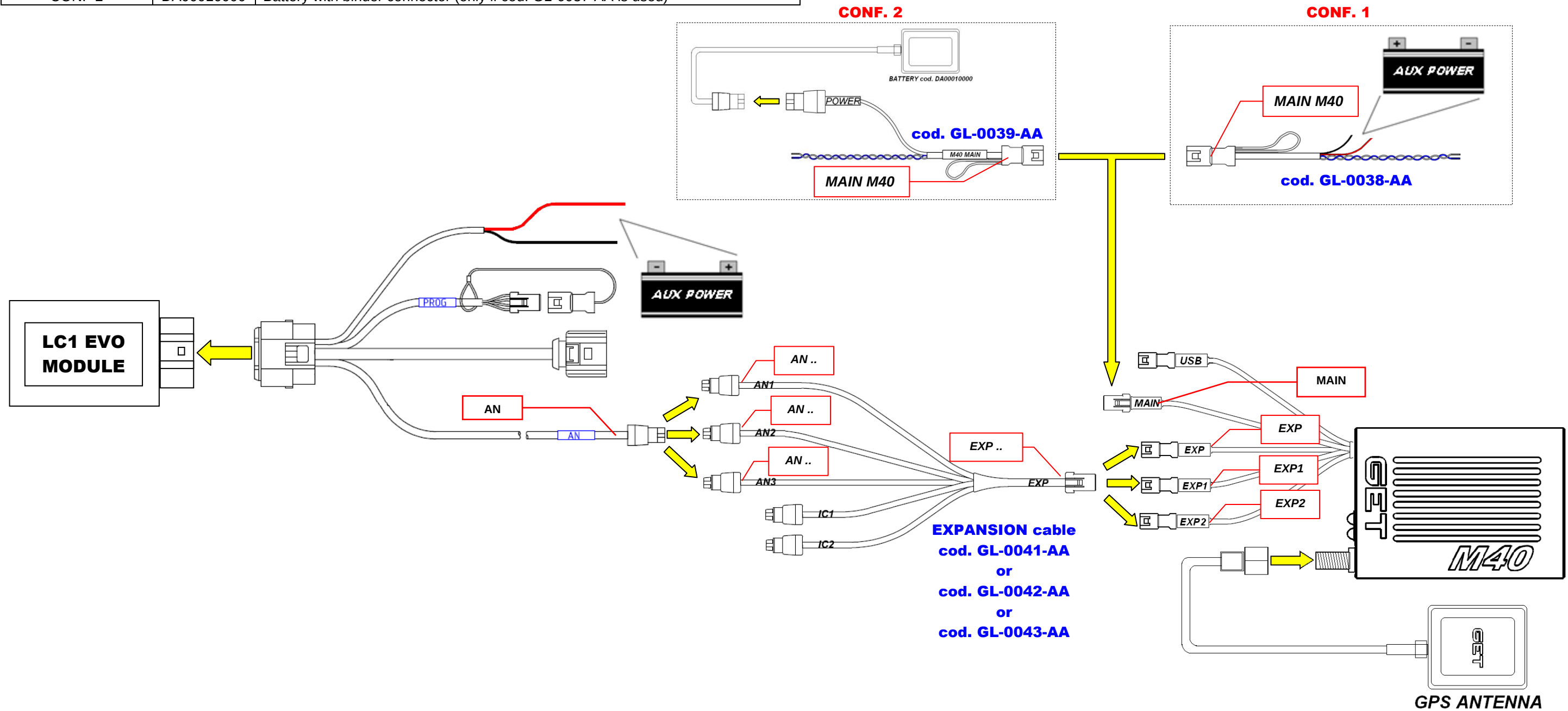


3 LC1 EVO - M40 (ANALOG CONNECTION)

NOTE:

- **LC1 EVO** module have to be powered separately
- **M40** have to be powered separately
- **After connecting LC1 module to M40, user have to set the channel in datalogger setup**

| Configuration   | Code:      | Parts needed                                                    |
|-----------------|------------|-----------------------------------------------------------------|
|                 |            | Description                                                     |
| CONF.1 – CONF.2 | -          | Datalogger M40 with GPS antenna                                 |
| CONF.1 – CONF.2 | -          | LC1 EVO module (with Lambda sens. and looms)                    |
| CONF.1 – CONF.2 | GL-0041-AA | EXPANSION Cable (use instead of GL-0042-AA or GL-0043-AA)       |
| CONF.1 – CONF.2 | GL-0042-AA | EXPANSION Cable ( use instead of GL-0041-AA or GL-0043-AA)      |
| CONF.1 – CONF.2 | GL-0043-AA | EXPANSION Cable ( use instead of GL-0041-AA o GL-0042-AA)       |
| CONF.1          | GL-0038-AA | Power cable                                                     |
| CONF 2          | GL-0039-AA | Power cable                                                     |
| CONF 2          | DA00010000 | Battery with binder connector (only if cod. GL-0037-AA is used) |



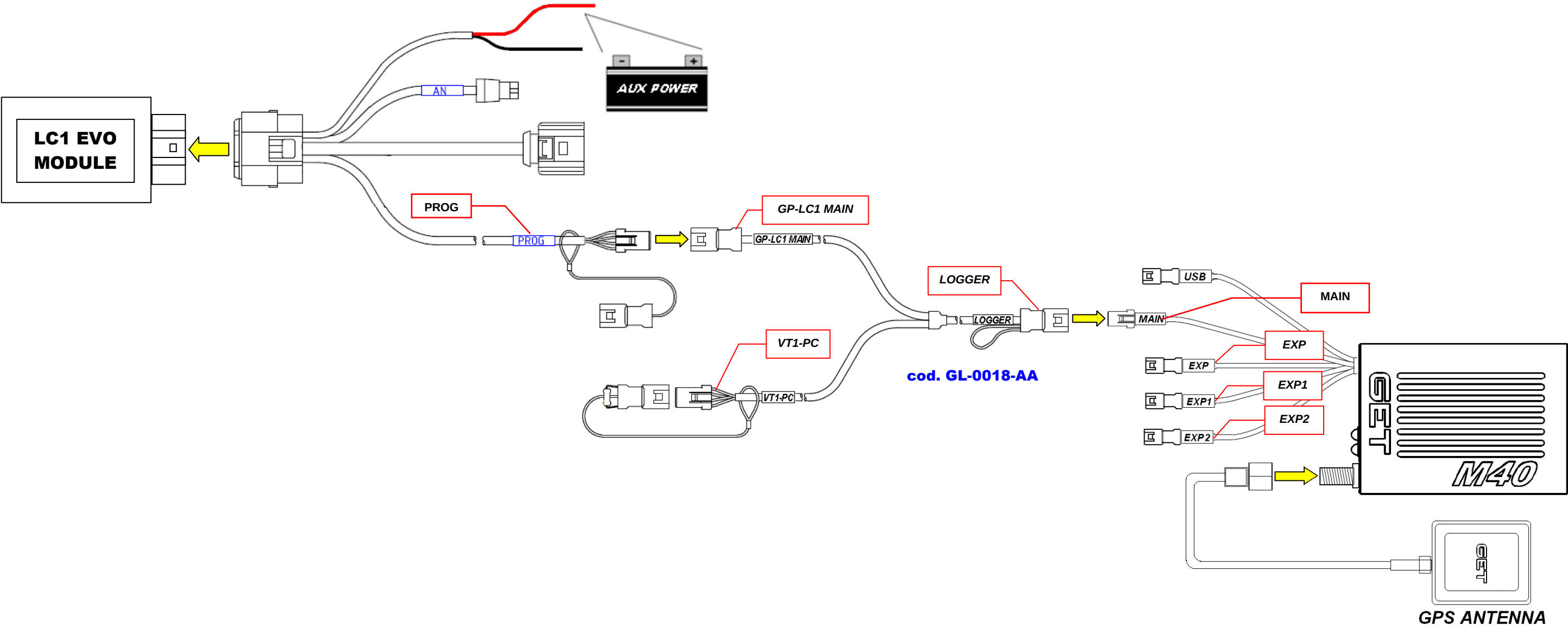


4 LC1 EVO - M40 (CAN BUS CONNECTION)

PLEASE NOTE:

- **LC1 EVO** module have to be powered separately
- **M40** have to be powered separately
- **After connecting LC1 module to M40, user have to set the channel in datalogger setup**

| Configuration | Parts needed |                                              |
|---------------|--------------|----------------------------------------------|
|               | Code:        | Description                                  |
| CONF.1        | -            | Datalogger M40 with GPS antenna              |
| CONF.1        | -            | LC1 EVO module (with Lambda sens. and looms) |
| CONF.1        | GL-0018-AA   | Multilink Cable                              |



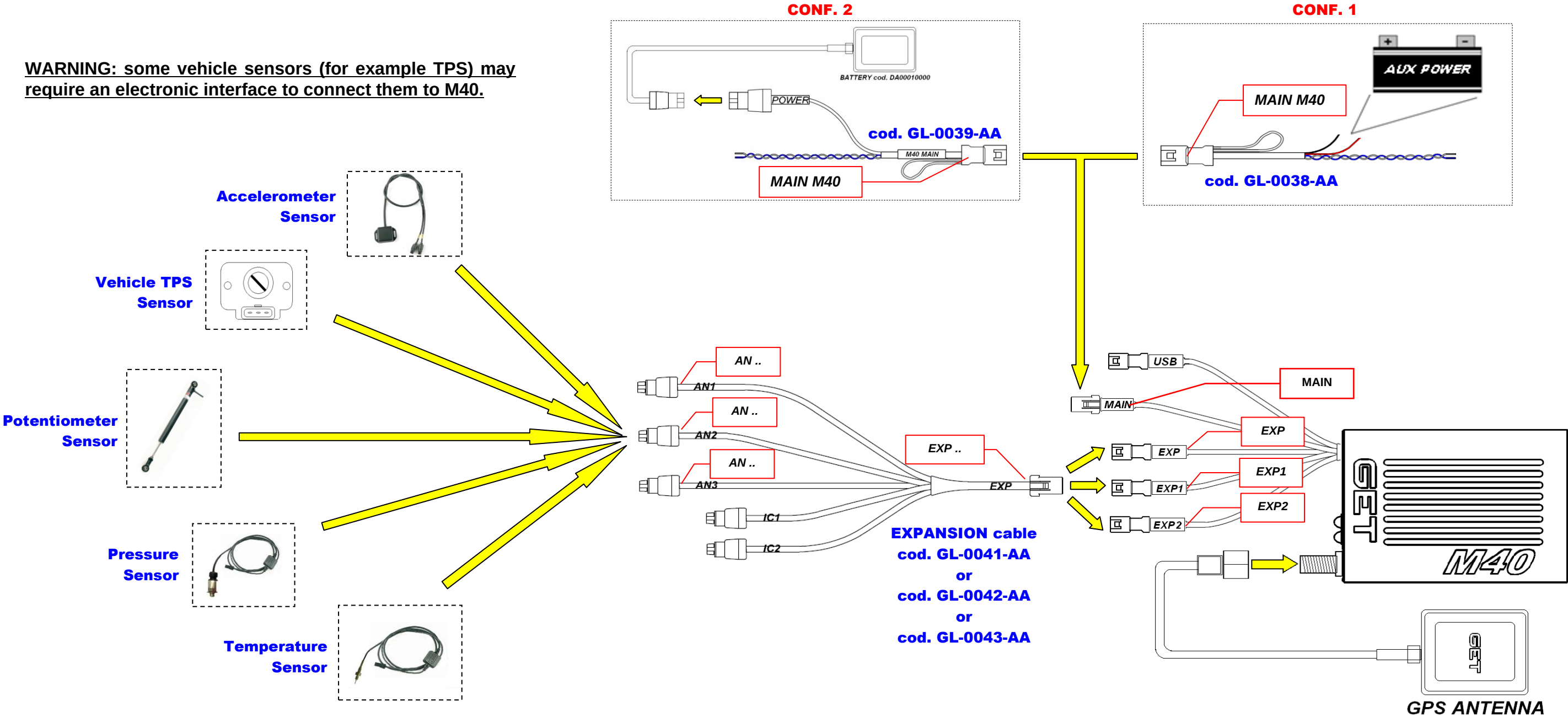
5 M40 - ANALOG SENSORS SUPPLIED AT 5VDC

PLEASE NOTE:

- M40 have to be powered separately
- After connecting sensors to M40, user have to set the channel in datalogger setup

| Configuration   | Parts needed |                                                                 |
|-----------------|--------------|-----------------------------------------------------------------|
|                 | Code:        | Description                                                     |
| CONF.1 – CONF.2 | -            | Datalogger M40 completo di antenna GPS                          |
| CONF.1 – CONF.2 | -            | GET analog sensor                                               |
| CONF.1 – CONF.2 | GL-0041-AA   | EXPANSION Cable (use instead of GL-0042-AA or GL-0043-AA)       |
| CONF.1 – CONF.2 | GL-0042-AA   | EXPANSION Cable ( use instead of GL-0041-AA or GL-0043-AA)      |
| CONF.1 – CONF.2 | GL-0043-AA   | EXPANSION Cable ( use instead of GL-0041-AA o GL-0042-AA)       |
| CONF.1          | GL-0038-AA   | Power cable                                                     |
| CONF 2          | GL-0039-AA   | Power cable                                                     |
| CONF 2          | DA00010000   | Battery with binder connector (only if cod. GL-0037-AA is used) |

**WARNING:** some vehicle sensors (for example TPS) may require an electronic interface to connect them to M40.

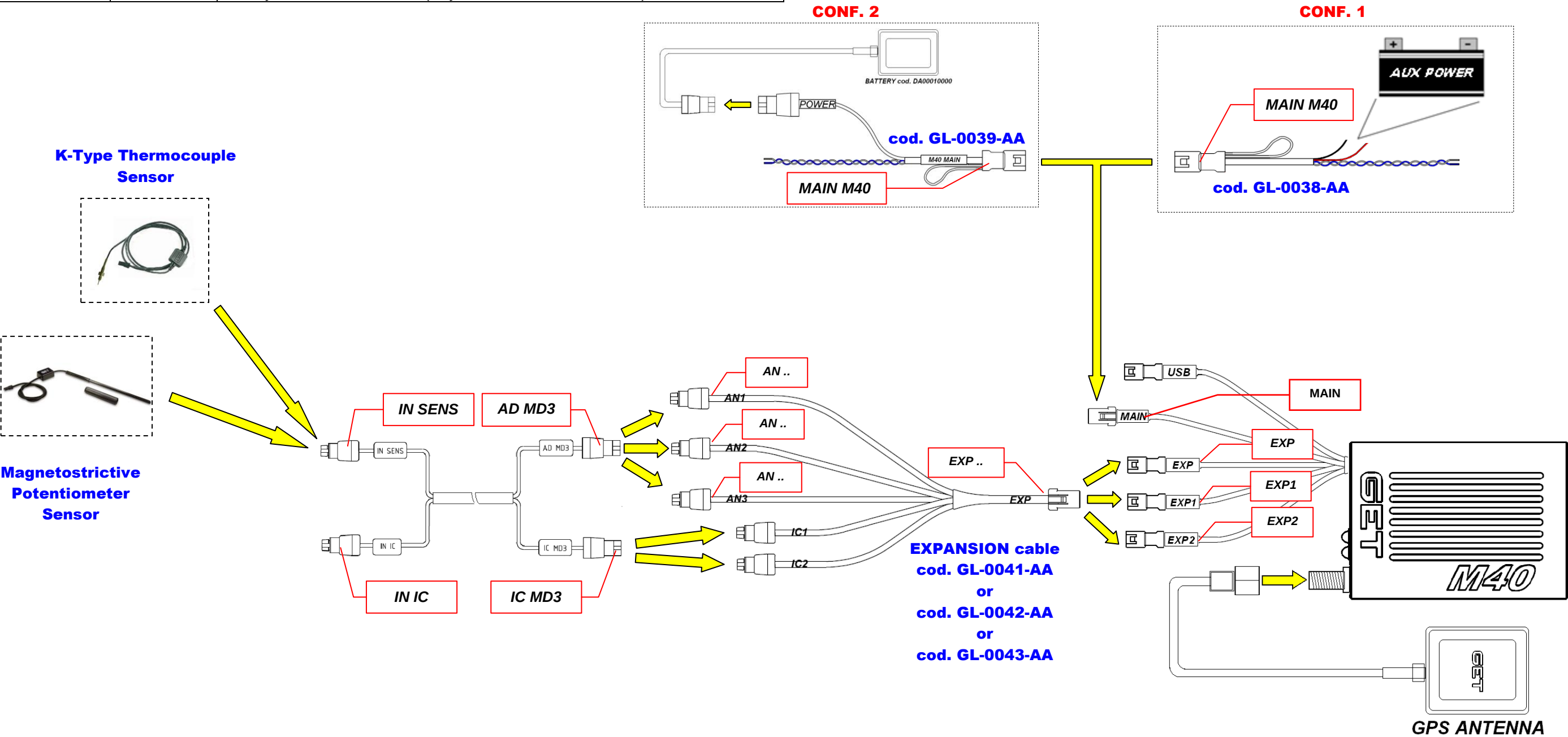


6 M40 - ANALOG SENSORS SUPPLIED AT 12VDC

PLEASE NOTE:

- M40 have to be powered separately
- After connecting sensors to M40, user have to set the channel in datalogger setup

| Configuration   | Parts needed |                                                                 |
|-----------------|--------------|-----------------------------------------------------------------|
|                 | Code:        | Description                                                     |
| CONF.1 – CONF.2 | -            | Datalogger M40 completo di antenna GPS                          |
| CONF.1 – CONF.2 | -            | GET analog sensor                                               |
| CONF.1 – CONF.2 | -            | 12 VDC sensor interface cable                                   |
| CONF.1 – CONF.2 | GL-0041-AA   | EXPANSION Cable (use instead of GL-0042-AA or GL-0043-AA)       |
| CONF.1 – CONF.2 | GL-0042-AA   | EXPANSION Cable ( use instead of GL-0041-AA or GL-0043-AA)      |
| CONF.1 – CONF.2 | GL-0043-AA   | EXPANSION Cable ( use instead of GL-0041-AA o GL-0042-AA)       |
| CONF.1          | GL-0038-AA   | Power cable                                                     |
| CONF 2          | GL-0039-AA   | Power cable                                                     |
| CONF 2          | DA00010000   | Battery with binder connector (only if cod. GL-0037-AA is used) |



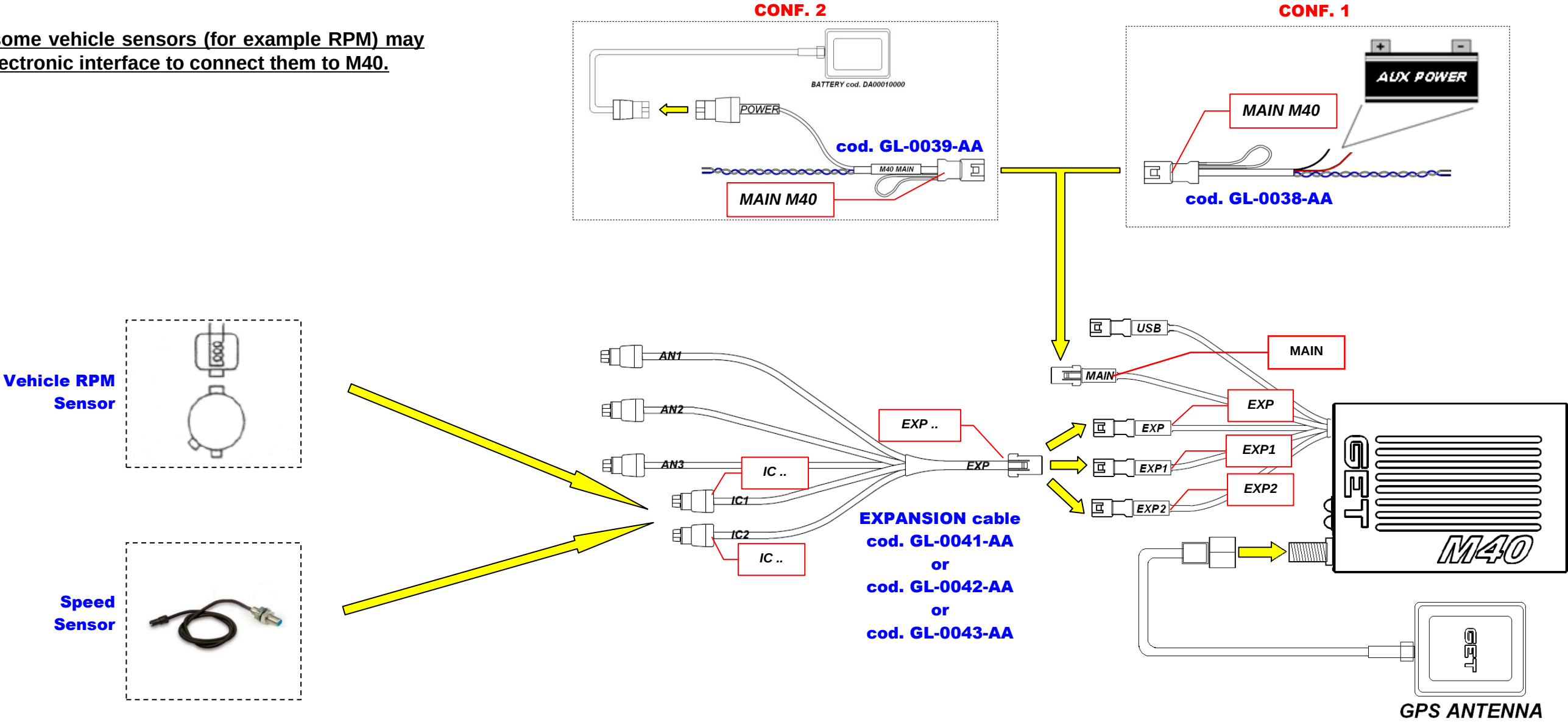
7 M40 - FREQUENCY SENSORS SUPPLIED AT 12VDC

PLEASE NOTE:

- M40 have to be powered by an external battery
- After connecting sensors to M40, user have to set the channel in datalogger setup

| Configuration   | Parts needed |                                                                 |
|-----------------|--------------|-----------------------------------------------------------------|
|                 | Code:        | Description                                                     |
| CONF.1 – CONF.2 | -            | Datalogger M40 completo di antenna GPS                          |
| CONF.1 – CONF.2 | -            | Frequency Sensor                                                |
| CONF.1 – CONF.2 | GL-0041-AA   | EXPANSION Cable (use instead of GL-0042-AA or GL-0043-AA)       |
| CONF.1 – CONF.2 | GL-0042-AA   | EXPANSION Cable ( use instead of GL-0041-AA or GL-0043-AA)      |
| CONF.1 – CONF.2 | GL-0043-AA   | EXPANSION Cable ( use instead of GL-0041-AA o GL-0042-AA)       |
| CONF.1          | GL-0038-AA   | Power cable                                                     |
| CONF 2          | GL-0039-AA   | Power cable                                                     |
| CONF 2          | DA00010000   | Battery with binder connector (only if cod. GL-0037-AA is used) |

**WARNING:** some vehicle sensors (for example RPM) may require an electronic interface to connect them to M40.





[illegible]

[illegible]



[illegible]





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