CAN DRIVER BUILDER

The CAN Driver Builder is a utility included in RaceStudio3, intended for developing a software driver capable to read a CAN datastream coming from an ECU or a different device. The driver produced can be used on one of the following devices:
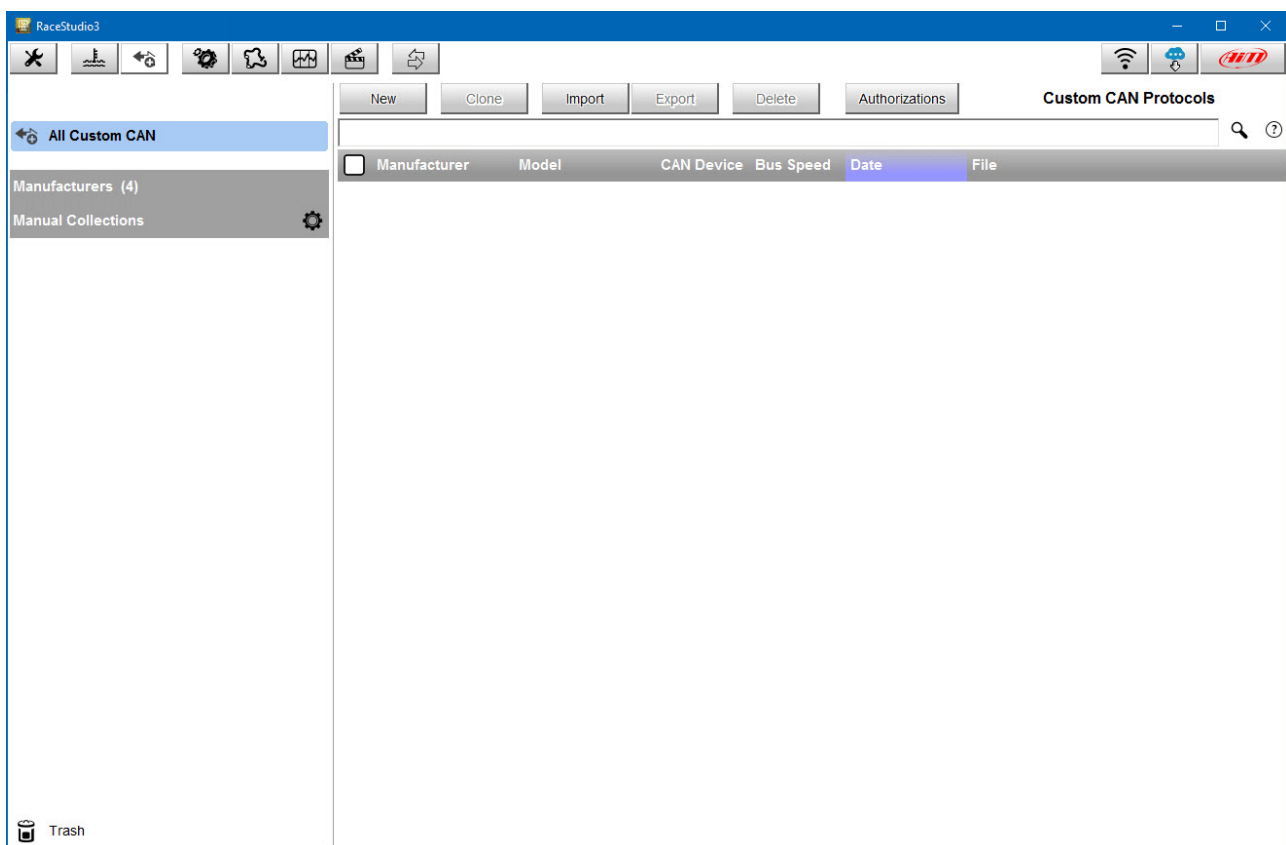MXG, MXS, MXL2, EVO4S, EVO5.

In case the device for which you are to develop the driver is an ECU, it can be used only on CAN1, else on both CAN 1 and CAN2.
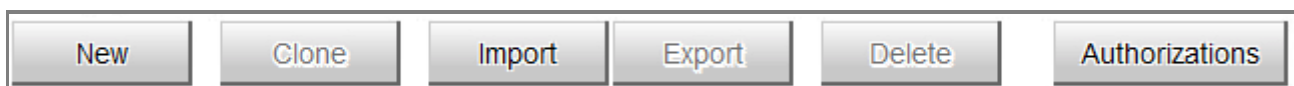
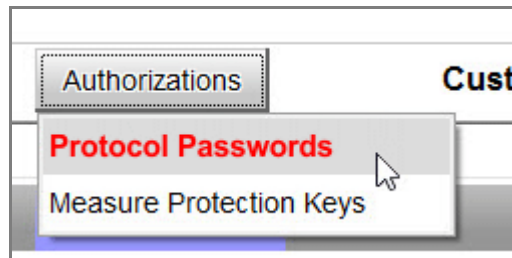In order to activate the DriverBuilder, press the following pushbutton:
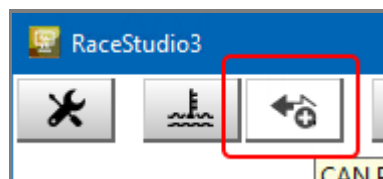
The main page is shown:

and the following pushbuttons are available:

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The last pushbutton is intended for managing the "Authorizations":

CAN Driver Builder offers TWO different Authorizations:

1. **Protocol Password**: the password that you are supposed to have in your PC for EDITING the protocol
2. **Measure Protection Key**: the key that you are supposed to have in your PC for using, seeing in online, downloading and seeing in Analysis the measures defined as "locked" in your protocol. The "locked" measures cannot be shown on the display, but are recorded like any other measure. If you download the data into a PC with the Measure Protection Key installed, the locked measures are completely visible, else they are hidden and crypted.
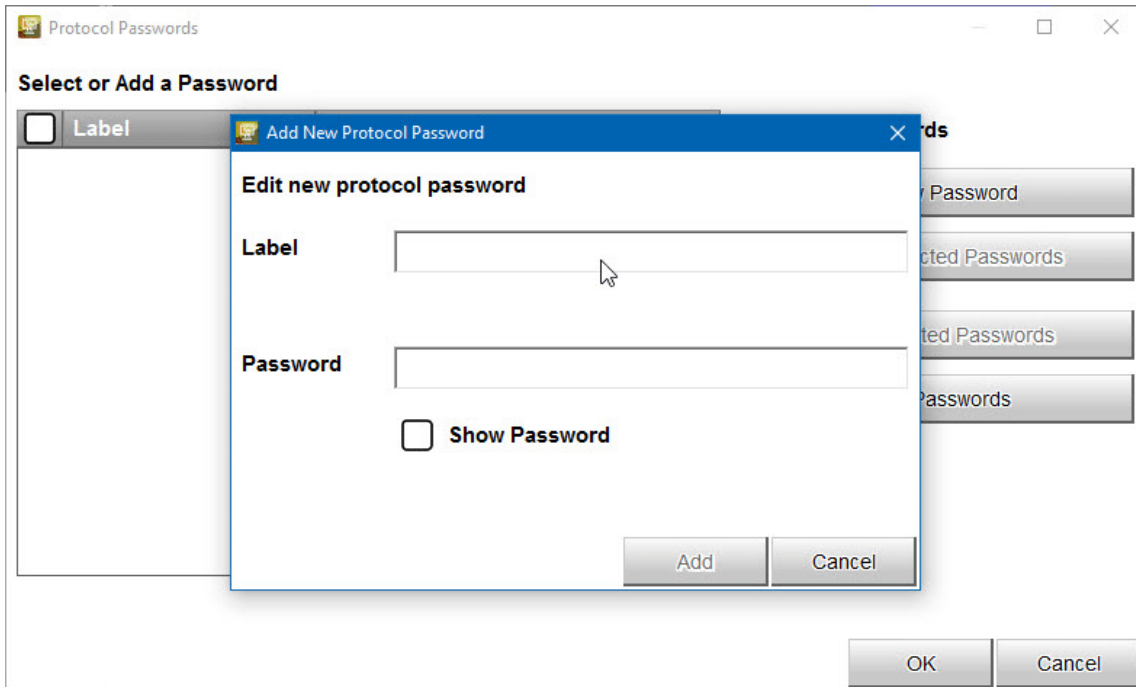
1. Selecting '**Protocol Password'**, this window appears:
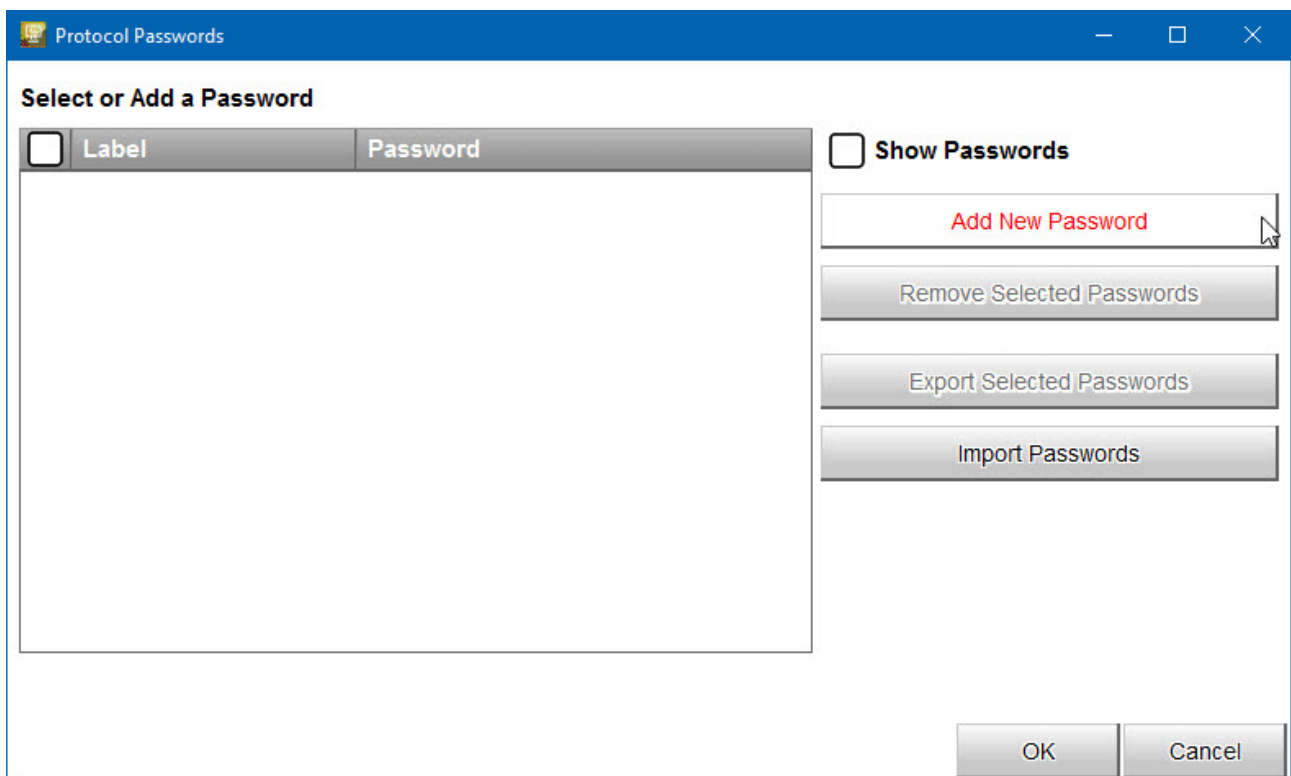
Here you can create and edit a list of passwords and associate each password to the protocols you are going to create.
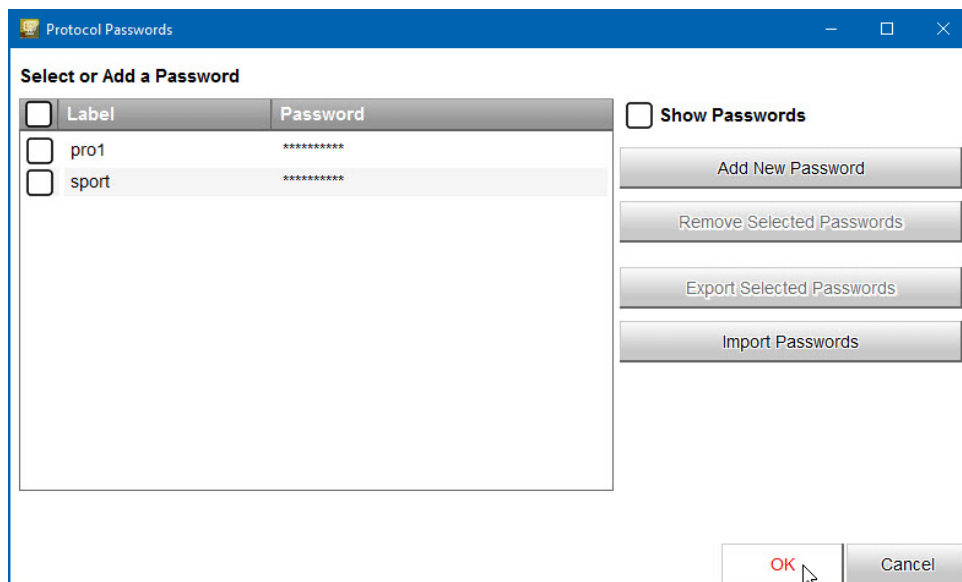
Click '**Add New Password'.**

This page is shown:

Here you have to choose a label for the password, and then the password itself.
If you flag '**Show Password'**, the password will be shown in clear text, else as a row of asterisks.
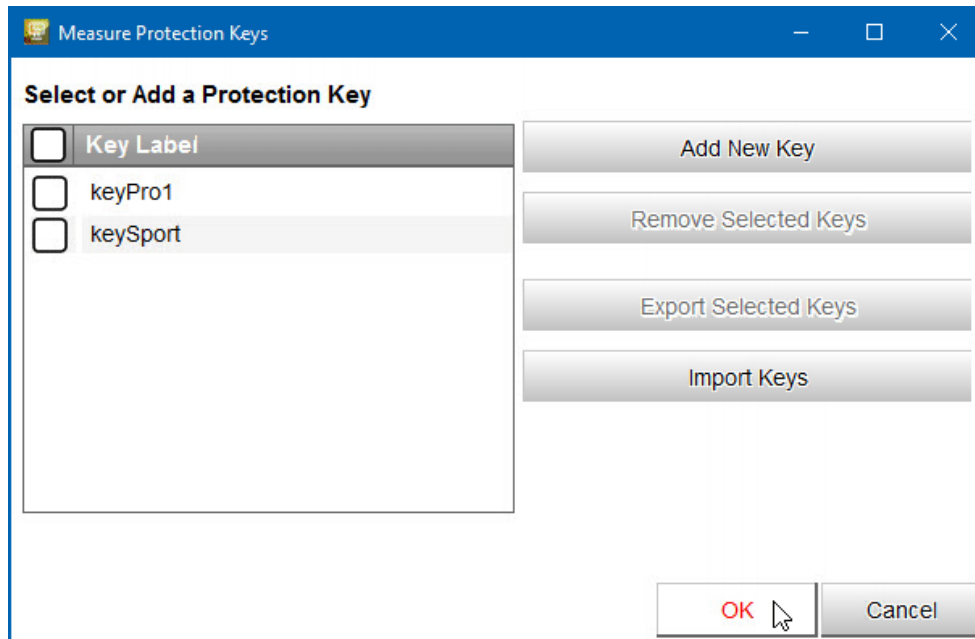
To add a password to the list, press **OK**.

You will at anytime be able to remove all the passwords you need from the list, or export/import them to/from a file.
Click **OK** to save the changes.

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2. Selecting '**Measure Protection Keys'**, this window appears:

Exactly like for passwords, here you can create/edit a list of keys and choose - for each protocol - which key will be used to hide/encrypt the measures you wish to be protected by keys.

For each new key you will just have to indicate a label, as the value will be software generated.

Click **OK** to save the changes.

In the main page, press "NEW" for creating a new protocol.

This window appears:
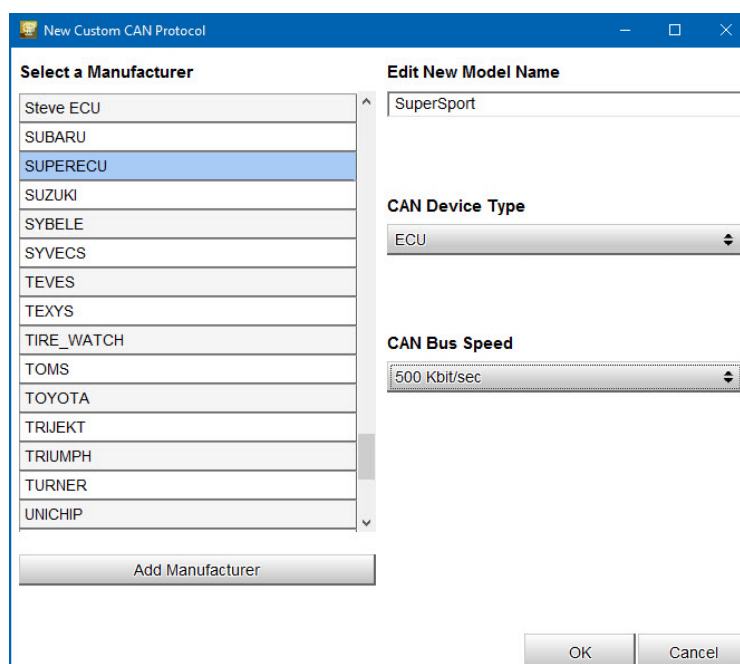
Here you can set:

- the Device manufacturer and the Model name, for then being able to select the new protocol, that you will find in the Protocols Database. In case the Device Manufacturer is not in the list, you can add it.
- the Device Type: it can be ECU (in this case it can be managed only in CAN1 of the Aim Loggers/dashes) or Another CAN device (in this case it can be managed both in CAN1 and in CAN2)
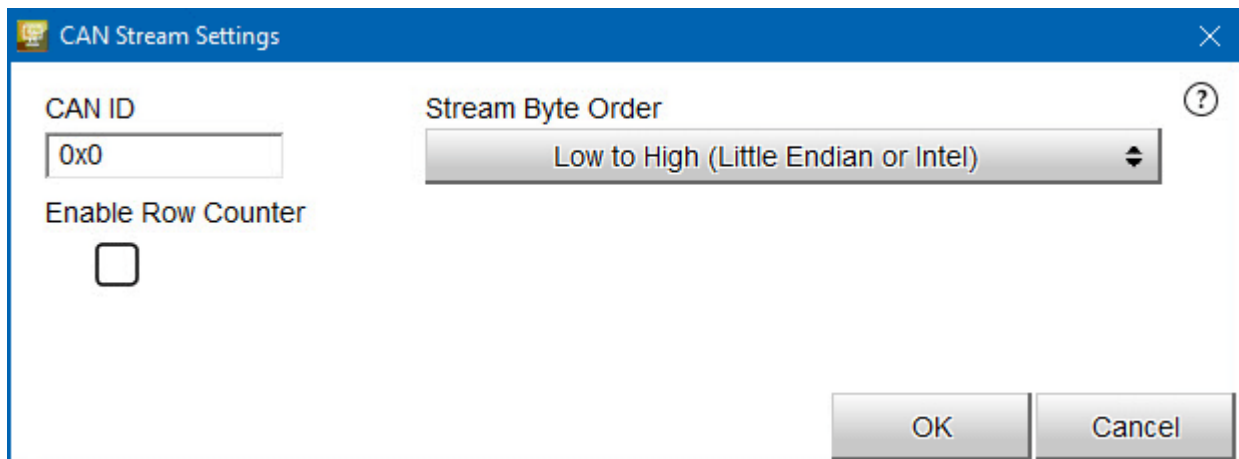- the CAN bus speed

After having set the proper fields, this page appears:
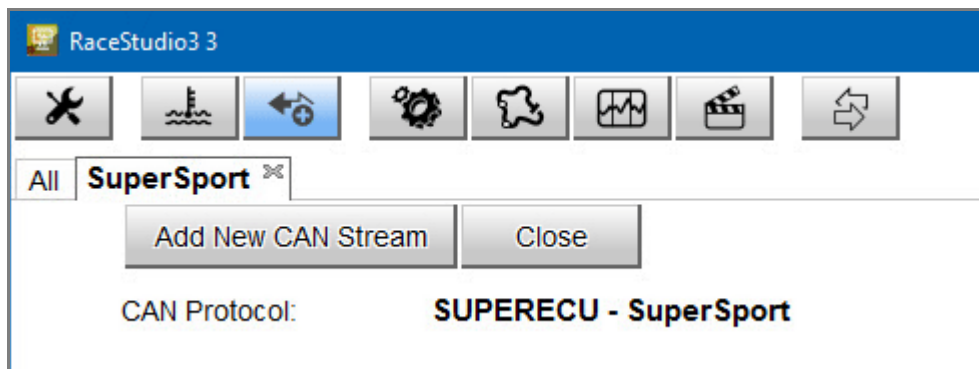
You have two pushbuttons:

1) Add New can Stream
2) CLOSE

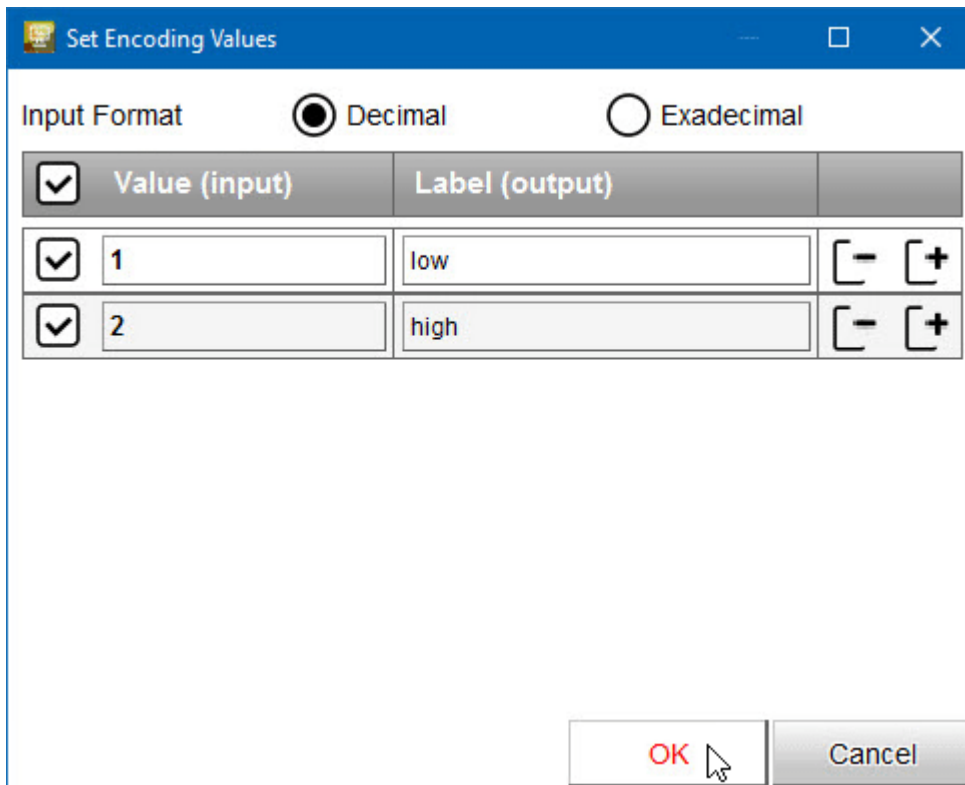Click on "ADD NEW CAN STREAM" and the new window appears:

The fields to be set are:

- CAN ID
- Stream Byte Order. This last can be Little or Big Endian, in dependence upon the processor of the device.

Here an example of the different formats:

Big-endian (POWER family)

89	AB	CD	EF

Address   0   1   2   3

Little-endian (x86 family)

EF	CD	AB	89

Address   0   1   2   3

- Enable Row Counter: this field is used when we have to define a multiplexed stream, that is to say a stream where the format depends upon a field, called Row Counter.

If you enable the Row Counter, you have to specify its Start Bit, its Number of bits and the Value for each single row to be defined.

After having set the different parameters, you click OK and a new window appears:

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This page is used for defining a single channel.

You have to define:
- Start Bit
- Number of Bits
- Name - to be used in Analysis
- Short Name - to be used on the display
- Function
- Max Acquisition Frequency
- Unit of Measure
- If protected by key (In this case the Measure Protection Key set for this protocol)
- Stepped Value - this field is used in Analysis: if a value is Stepped, it is not interpolated (for example, the Gear Number, that is to be shown at fixed values).
- Conversion : for every channel you can define a Gain and an Offset (Output = Input Value x Gain + Offset) or an Encoding. In this case, a conversion table is to be defined per every value of the field:

Set Encoding Values			
Input Format	● Decimal	○ Exadecimal	
✔ **Value (input)**	**Label (output)**		
✔ 1	low	[−	[+
✔ 2	high	[−	[+

OK   Cancel

The window CAN Measure Settings shows on the right the Bit Stream and - in yellow - the corresponding measure.

To set the Start Bit or the Number of Bits for each measure it is possible to drag&drop it into the stream, or even to move just its start/finish point.

After having set all the parameters, click on **OK** and the data stream is shown:

Five pushbuttons are available:

1) SAVE
2) CLOSE
3) Password: to set the password associated to the protocol
4) Protection Key : to set the protection key used for crypting and hiding some measures of the protocol
5) Sort Measures: used for changing the order in which you will see the channels in the final protocol, that will be available in the protocol database and used like any other protocol

To set the protocol editing password just click **'Set Protocol Password'**.
This window will appear:
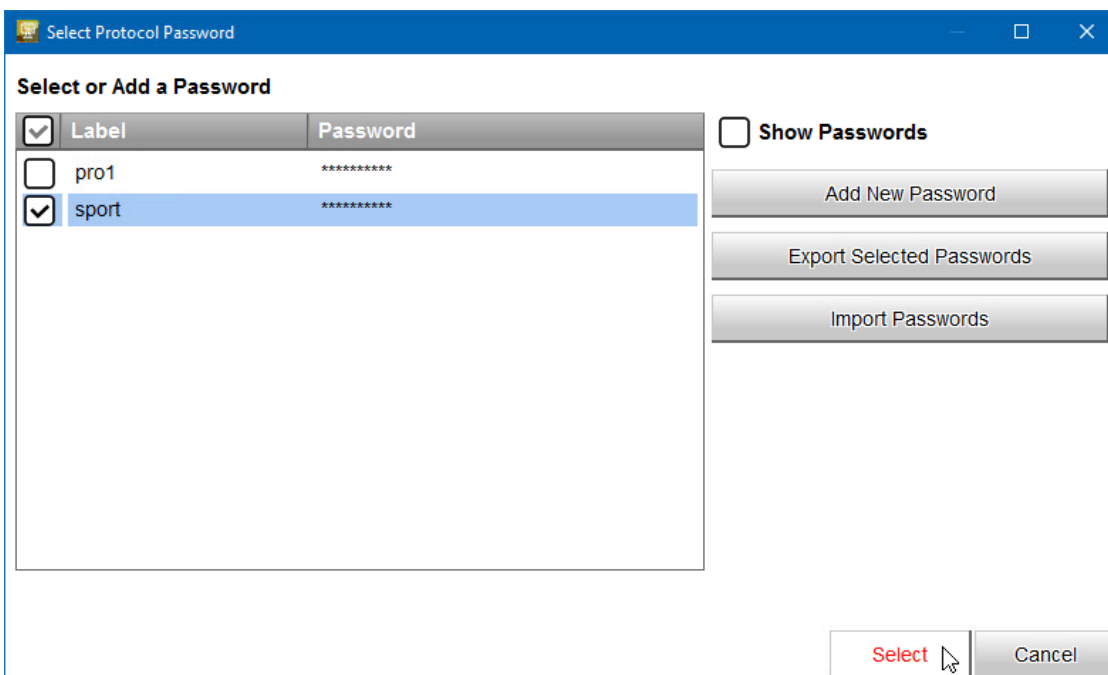
Just flag a password from the list and click **'Select'**

It is also possible to edit the password list, like:

1. Creating a new password.
2. Export/import passwords to/from a file.

Double-clicking a password, you will select that pw and de-select all the others included in the list.

Clicking 'Select' all changes to the list will be saved and the selected pw will be associated to the protocol and shown in the Password pushbutton.

To set the protection key of a measure, click **'Set Measures Protection Key'**
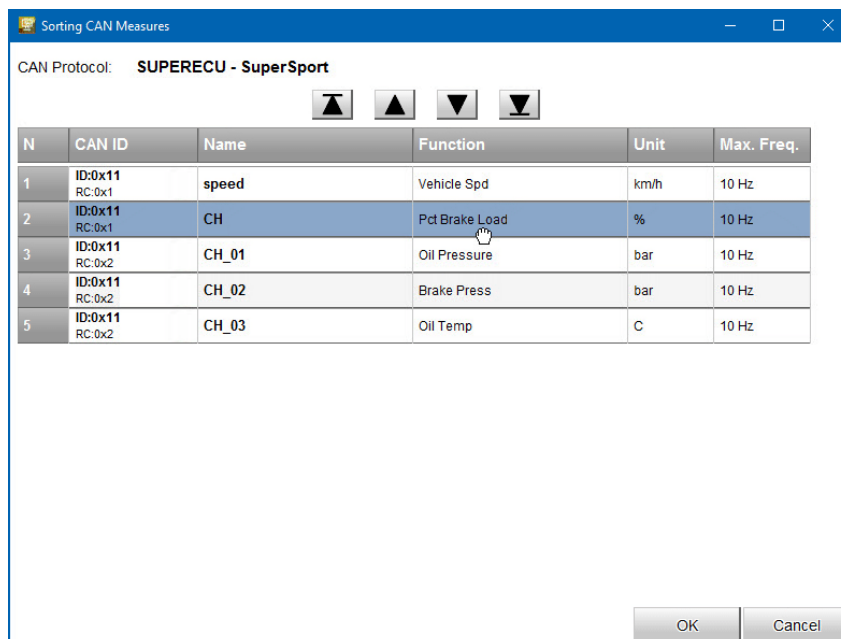This window will appear:
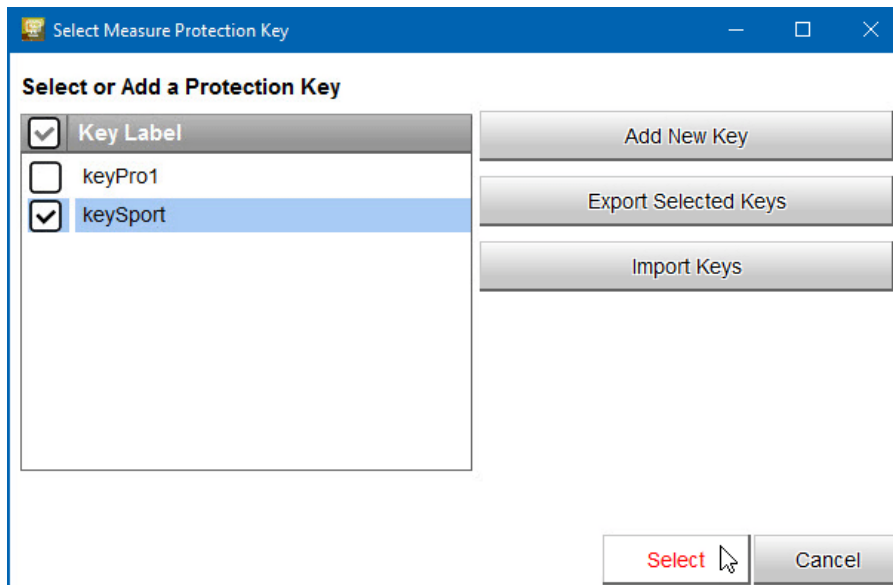
The procedure is exactly the same as for protocol passwords.

For adding a channel, please double click in the desired position of the stream.

For modifying a channel, click on it.

For adding another stream, click on the "+" at the right of the stream.

For Sorting the measures in the stream, please, push the pushbutton and the window will appear:

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To sort measures:

1. You can click on a field and move it up and down, dragging and dropping it.
2. You can also click the arrows on top of the list to move a measure up/down or in the first/last row
3. You can click the fields above the list to automatically sort measures in ascending/descending order.

At the end, "Save" and exit. You will find the new protocol among all the others in the database.

To edit a protocol on a different PC, just click Export - and Import on the destination PC.
The same operation has to be performed for Protocol Passwords and for Measure Protection Keys.

To simply use a protocol you need to import it from a file where it had previously been exported.

To import it use the key '**Import CAN Protocols**' in the drop down menu lying under this icon
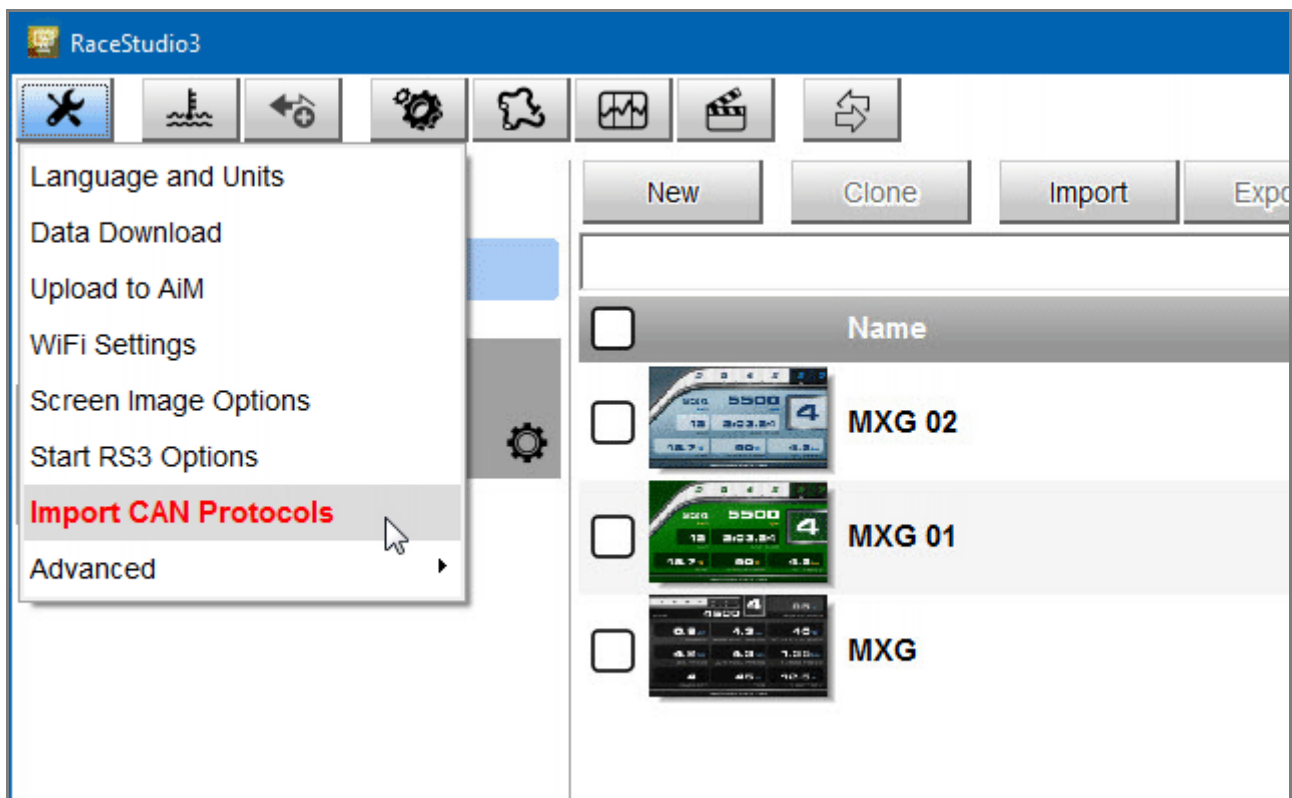
To use measures protected by key it is necessary to import the key from a file where it had been exported. To import it click '**Advanced**' and '**Import Protection Key**' in the same drop down menu.