MXm

USER GUIDE 1.00

MXm

1. MXm in a few words

■ **What is MXm?**
MXm is the new AiM mini logger that combines small dimensions, usability and logging capability.

Why MXm?
Because it features:

■ ECU connection
■ 2 speed inputs
■ 4 analog inputs
■ 2 digital high side output
■ up to 8 configurable display pages
■ integrated GPS + Glonass receiver
■ a huge tracks database to automatically select the track you are racing on
■ a powerful and comfortable Wi-Fi connection
■ 10 RGB LEDs that clearly show if you are improving or not
■ a huge amount of internal memory (four gigabytes) capable of recording a lot of tests

What about ECU connection?
MXm manages all the hardware ECU connections as well as all the communication lines: CAN, K-Line, RS232. Its huge database includes more than 1500 protocols you can load in your MXm.

If the vehicle does not have an ECU?
In case your vehicle does not have an ECU, you can anyway connect MXm to an RPM wave to synchronize RPM to the position on the track thanks to the cable labelled RPM of 37 pins connector harness you find in the kit.

Is MXm an expandable logger?
Yes. MXm can be connected to AiM LCU-One CAN to maximize your engine performances and AiM SmartyCam to see your track performances on your PC with all the values you need in overlay.

Anything else?
Of course yes.
An app for iPhone is coming! In a few weeks you will be able to analyse essential data on your iPhone; furthermore, you will be able to see in real time all the values MXm samples, upgrade its firmware, create new tracks as well as update your database and modify Wi-Fi settings.
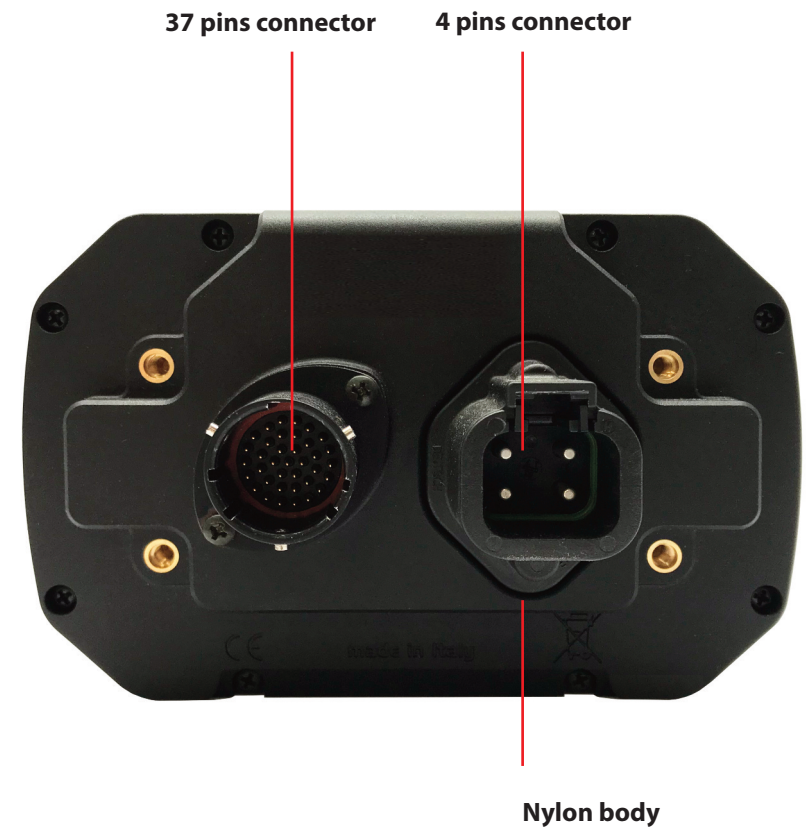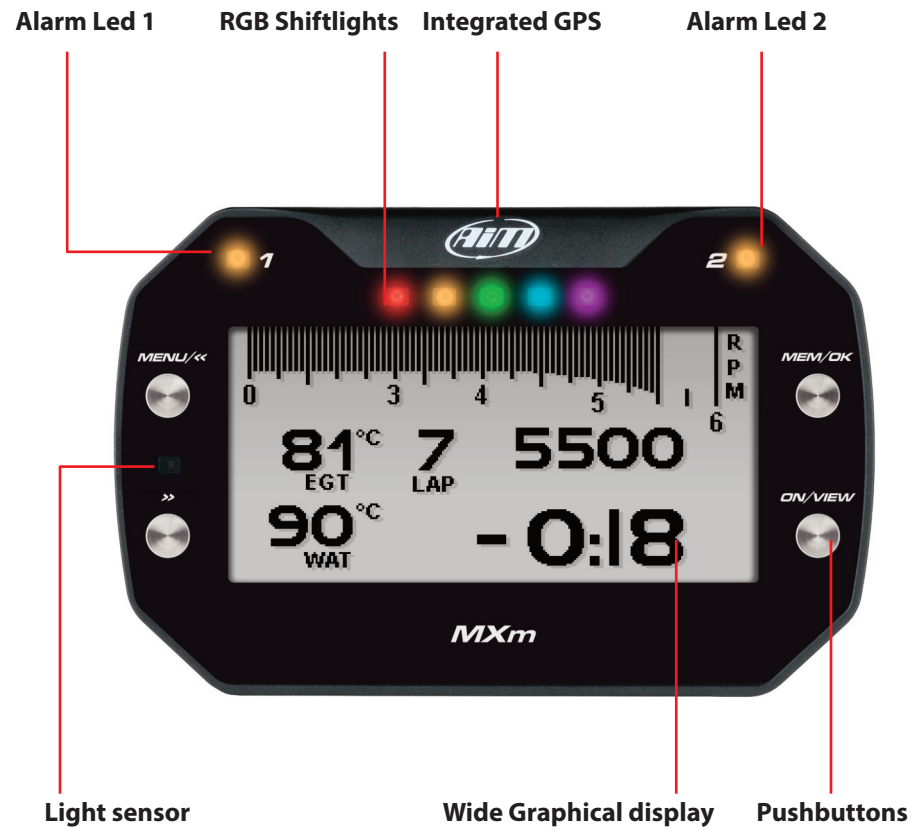
2. What is in the kit?

MXm kit includes:
1 MXm
2 37 pin connector harness
3 4 pins connector kit
4 CD for software installation

MXm

Alarm Led 1   **RGB Shiftlights**   **Integrated GPS**   **Alarm Led 2**

37 pins connector   **4 pins connector**

Light sensor   **Wide Graphical display**   **Pushbuttons**

**Nylon body**

3. Installation, powering and accessories

MXm is powered connecting the 37 pins connection harness you find in the kit to the vehicle master switch. This way MXm will switch on/off with the vehicle engine.
37 pins connection harness wires to be used are labelled "9-15 VDC" and "GND".

A said before, AiM MXm features two digital outputs you can turn ON/OFF according to pre-defined conditions you can set using Race Studio 3 software.

They need the connection of the 4 pins connector included in the kit. Please refer to MXm pinout you find at the end of this user manual for further information.

4. At power on

When switched on MXm shows satellite page.
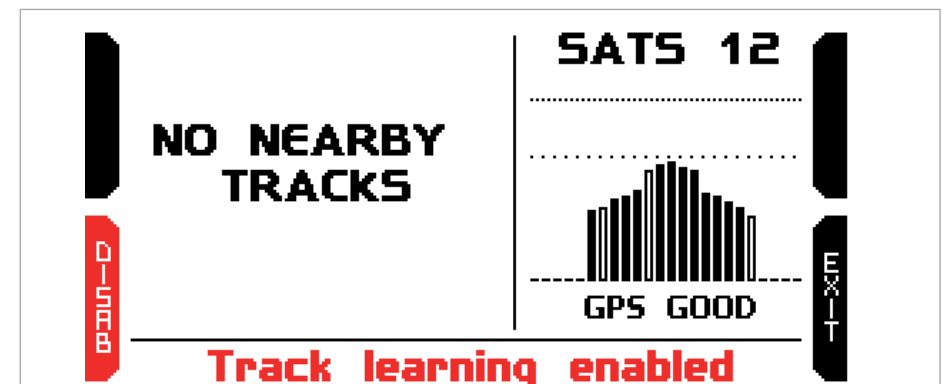
Here you can see the number of connected satellite (SATS 12 in the image above) as well as the quality of the signal.
If you are on a track not included in MXm database the system shows the message "NO NEARBY TRACKS and "Track learning" enables automatically. You can disable it pressing the related button, that switches to "ENABLE" and you only need to press it again to enable track learning mode. In this second case the system asks for confirmation.
Please refer to "Tracks Management" chapter for further information.

5. What you can do via keyboard

MXm is mainly configurable using Race Studio 3 software but some functions are settable via keyboard as explained here below. Press "MENU" and this page shows up.

The icons are to manage:

 Backlight

 Unit of measure

 Wi-Fi

 Tracks

 Counters

 Date Time

 Language

 System info
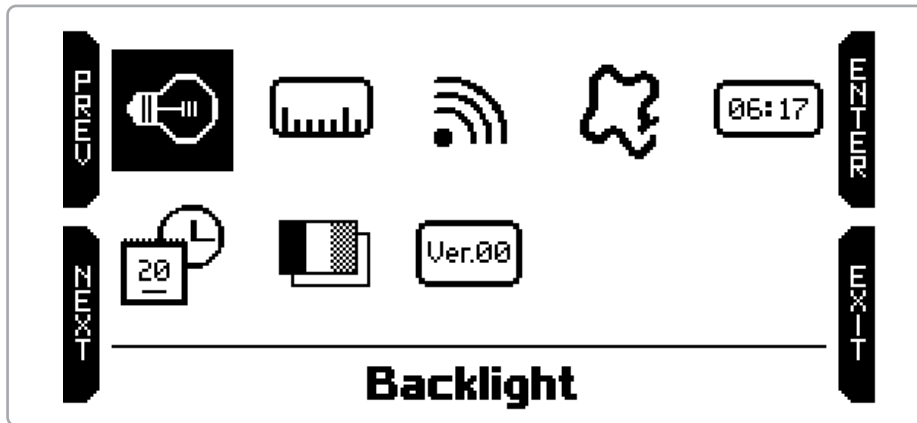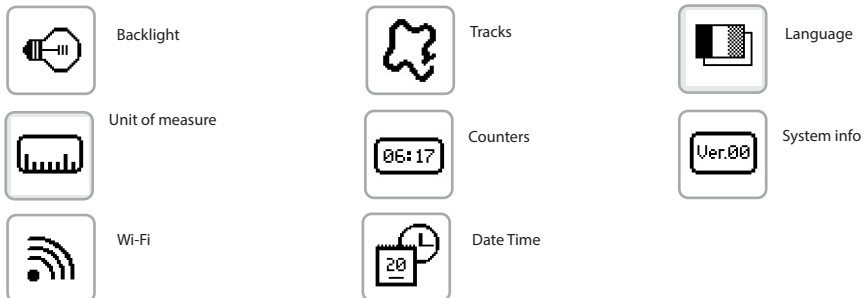
5.1 Backlight

You can set MXm backlight as "AUTO"(Default setting), "ON" or "OFF".
Thanks to the light sensor, placed left front of MXm, "AUTO" setting switches the backlight on/off according to the ambient light conditions.

MXm back light can be: white, purple, red, green, yellow blue, magenta and cyan.

5.2 Unit of measure

Here you can manage speed, temperature and pressure unit of measure. Use:
■ "PREV"/"NEXT" buttons to scroll the measure to set
■ "CHANGE" button to change the measure unit

```
              Unit  of  Measure
 P
 R   Speed:                        km/h    C
 E   Temperature:              Celsius     H
 V   Pressure:                      psi    A
                                           N
                                           G
 N                                         E
 E
 X                                         E
 T                                         X
                                           I
                                           T
```
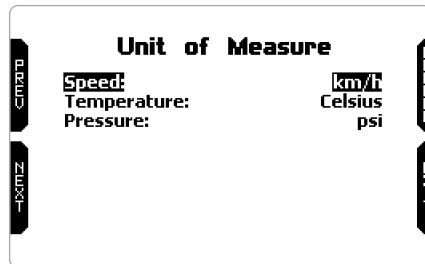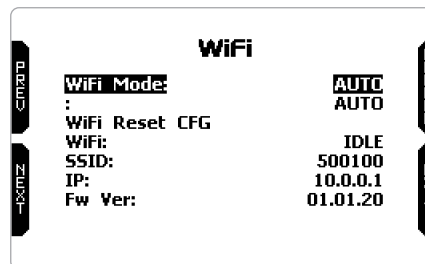
5.3 Wi-Fi

Here you can manage Wi-Fi as well as reset its configuration. Wi-Fi modes are:
■ ON
■ Auto: switches Wi-Fi on when the vehicle is stopped and automatically switches
 it off when MXm starts recording, according to the setting you performed in
 "Parameters" page of Race Studio 3 software (see paragraph 6.2.6 for further
 information)
■ OFF

"Wi-Fi reset CFG" allows you to reset Wi-Fi configuration and is very useful if you do
not remember Wi-Fi password.

```
                     WiFi
 P                                         C
 R   WiFi Mode:               AUTO         H
 E   :                        AUTO         A
 V   WiFi Reset CFG                        N
     WiFi:                     IDLE        G
     SSID:                   500100        E
 N   IP:                    10.0.0.1
 E   Fw Ver:                01.01.20       E
 X                                         X
 T                                         I
                                           T
```

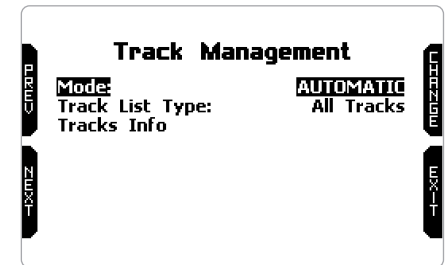## 5.4 Tracks Management

MXm built in GPS receiver is used for:
■ Lap time calculation
■ Speed calculation
■ Predictive lap time calculation
■ Position on the track in analysis

To calculate these data the system needs to know the start/finish line coordinates.
MXm comes with a long list of the world main tracks. The list is constantly updated
by our technicians and it updates on your PC when you run Race Studio 3 software
and a connection to the internet is available. Available track selection modes are: au-
tomatic and manual

Automatic:
the system automatically recognizes
the track you are running on, loads
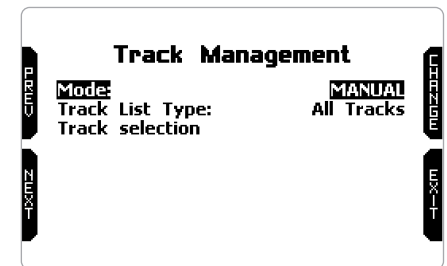start/finish line and calculates lap
times.
This is the best mode in most cases.

```
              Track  Management
 P                                         C
 R   Mode:                AUTOMATIC        H
 E   Track List Type:     All Tracks       A
 V   Tracks Info                           N
                                           G
                                           E
 N
 E                                         E
 X                                         X
 T                                         I
                                           T
```

Manual:
allows you to manually select the track
from the internal database.
This mode is to be preferred when mul-
tiple track configurations are available
nearby. In this case MXm would any-
way recognize the track but would
need at least one complete track lap.
To be ready from the first lap manual
mode would be helpful.

```
              Track  Management
 P                                         C
 R   Mode:                   MANUAL        H
 E   Track List Type:     All Tracks       A
 V   Track selection                       N
                                           G
                                           E
 N
 E                                         E
 X                                         X
 T                                         I
                                           T
```

Both track modes provide three track list type:
■ nearest: shows only tracks in a 10 km distance with max 50 tracks shown
■ all tracks: shows all tracks stored in the system in alphabetical order
■ custom: shows only the tracks you have previously created (learning mode)

5.4.1 Creating a track with MXm

If you are running in a track NOT included in MXm database the device switches to "learning" mode and behave this way:
■ it starts sampling all track points
■ when detects that it is crossing the same points for the second time it realizes that the track is closed and sets a temporary start/finish line showing lap time each time it crosses that point;
■ at the end of the session the system shows the track map with start/finish line: you can move start/finish line using MXm side buttons;
■ you can add this new map to MXm database, modify start/finish line coordinates, name the track and transmit it to the PC at first PC-MXm connection

You find a deeper explanation of track management with Race Studio 3 in the related chapter and a "Track manager" user manual is available in documentation area, firmware/ software of www.aim-sportline.com.

■ scroll to Status and press "CHANGE" to switch from "Active" to "Stop" and vice-versa
■ scroll to clear and press "CHANGE" to reset an odometer (left image below)
■ pressing "EXIT" you come back to odometer page and the odometer you stopped/reset will not show the asterisk and will show "0" km (in the example below both operations have been performed on odometer 1 (right image below).

5.5 Counters

This page manages the 4 resettable odometers of MXm.
The system odometer is not resettable. All odometers are shown on Race Studio 3 too (see chapter about MXm and the PC).

Each odometer can be activated/deactivated and/or reset. To select the odometer you want to manage press "CHANGE".
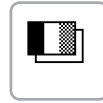
5.6 Date and Time

Here you can set the time zone of your MXm as well as enable/disable Daylight Saving Time" option. Time zone is always set manually. Date and time can be shown in different format.

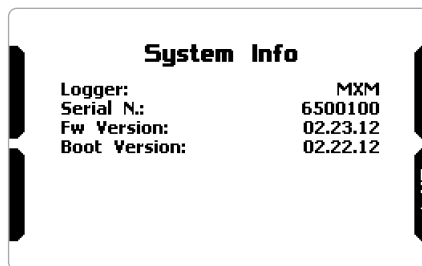Time is automatically synchronized as MXm receives the GPS signal.

5.7 Language

You can set MXm language. Default setting is English. Press "CHANGE" to set the language you prefer. At present available languages are (in this order):

■ English
■ Italian
■ German
■ Spanish
■ French
■ Dutch
■ Danish
■ Portuguese
■ Japanese
■ Czech

5.8 System Info

This page shows serial number as well as firmware and boot version of your MXm.

```
           System Info
Logger:                MXM
Serial N.:          6500100
Fw Version:          02.23.12
Boot Version:        02.22.12
                              EXIT
```

6 MXm and the PC

Using AiM Race Studio 3 software you can configure MXm, manage its tracks database as well as check other device functions using the device window.

6.1 Connection to the PC

MXm can be connected to the PC via Wi-Fi or via USB.

To connect MXm to the PC **via USB** use the USB cable you find in the kit: plug it in the cable labelled "USB" of MXm 37 pins connector harness and in the PC USB port.
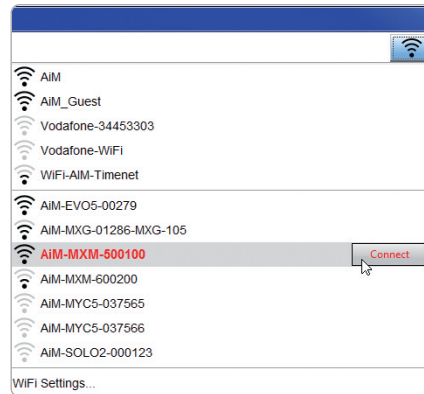
To connect MXm to the PC **via Wi-Fi**

■ check that MXm is set on "AUTO" or on "ON"

■ read your MXm name – mid of MXm home page bottom line – or look for it in system information page

```
0      25%        50%      75%       S o C
                                    100%
              °C
              BTL              1 km/h
T
R       °C
K       BTR
GPS GOOD        500100        11:56PM
```
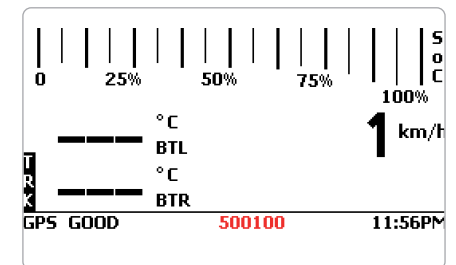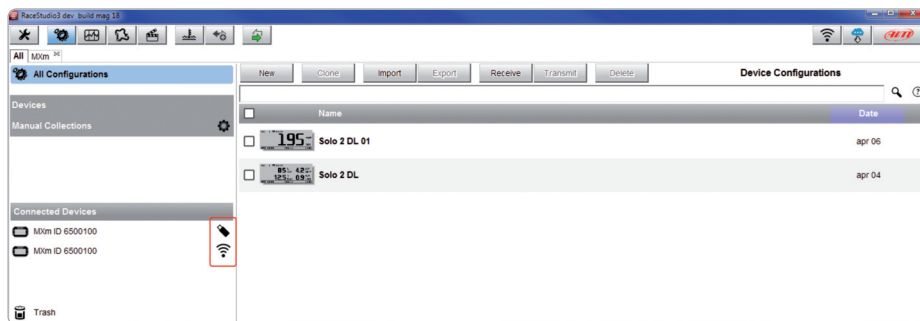
■ click Race Studio 3 Wi-Fi icon and se-lect your MXm

■ press "Connect" and wait just a few moments

Once the system is connected to the PC the software shows it bottom left of the software home page showing also the way it is connected: an USB icon for USB connection and a Wi-Fi icon if connected via Wi-Fi as shown here below.

6.1.1 Wi-Fi configuration

As far as Wi-Fi connection is concerned two possible Wi-Fi modes are available.

1 – As an access point (AP – default)
This is the ideal configuration if you have one only device and one only computer. In this situation your MXm creates a Wi-Fi network and works as an Access Point you can connect your PC to.

2 – Existing network (to connect to an existing Wi-Fi network – WLAN)

This mode is complex and implies an external access point (AP) but it is also more flexible and powerful because al-lows you to communicate with more than one device and with more than one computer in the same network. MXm and the PC must connect to an existing Wi-Fi network made by a de-vice that works as an external access point.
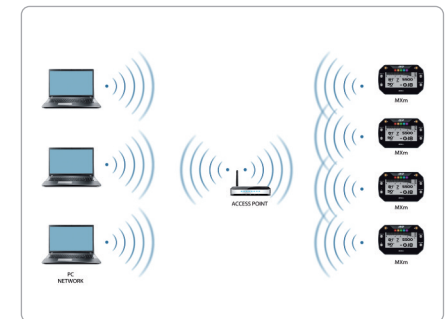
When working in WLAN mode MXm has two available security levels:
■ network authentication: network password
■ device authentication: MXm password
Both levels allow you to use different strategies. A PC in WLAN, for example, can see several AiM devices but can communicate only with those he knows the password of. If you forget the password you can reset Wi-Fi configuration from MXm menu as explained before.

## 6.1.2 Configuring MXm as an access point (AP)

This is MXm default configuration and is the easiest and most direct connection mode, ideal if you want to communicate with one MXm using one PC. It is free and so completely accessible by anyone. Please set an access password as soon as possible.
To establish a Wi-Fi connection:
■ ensure that the Wi-Fi is enabled
■ read your MXm Name
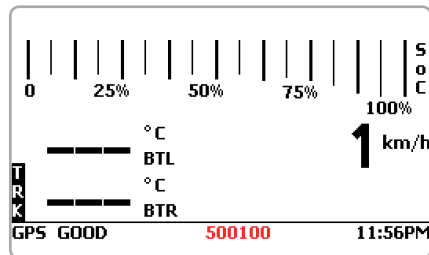
■ run Race Studio 3
■ click Wi-Fi icon and select your device
■ in a few seconds the connection is established
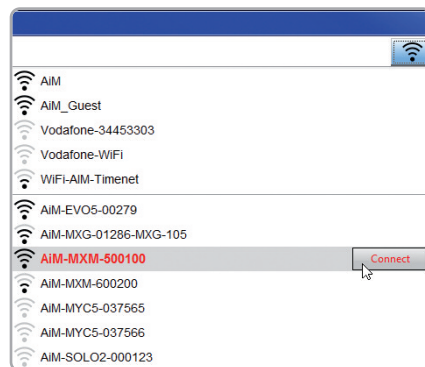
To set other parameters create a unique password to protect your device/your network. With a password the communication is safe and encrypted using WPA2-PSK standard.
Characters allowed in the password are all letters, also capital, all digits and these characters: '+–_()[]{}$£!?^#@*\\\"=~.:;/%"
"Space" type can be used if it is not the first one because this could cause incomprehension in some Windows™ versions.
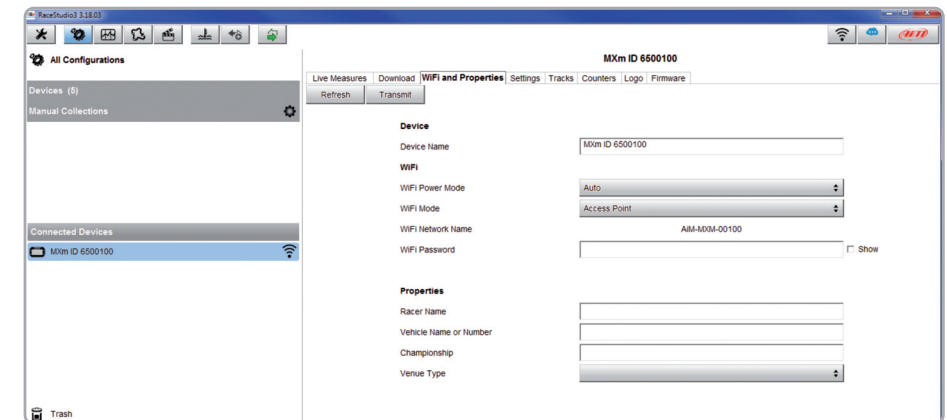
This AP or SSID name is unique for your device.
An example of name is:" AiM-MXm-00100" where:
■ "AiM" is the prefix of all AiM devices
■ "MXm" is the device identifier
■ "00100" is your device serial number assigned by the factory.

To make your device more recognizable you can add a name to the SSID. The limit is of eight characters. Allowed characters are all letters, capital too, all digits and these characters: '+ - _ () [] {}!.

"Space" type can be used provided that it is not the first one because it can cause in-comprehension in some WindowsTM versions.
If, for example, you add the driver's name, Tom Wolf, the network name (SSID) beco-mes:
"AiM-MXM-00100-TomWolf"

Once all parameters set click "Transmit". MXm reboots and is configured with the new parameters. If MXm is protected by a password, as recommended, Race Studio 3 will ask that password to authenticate.
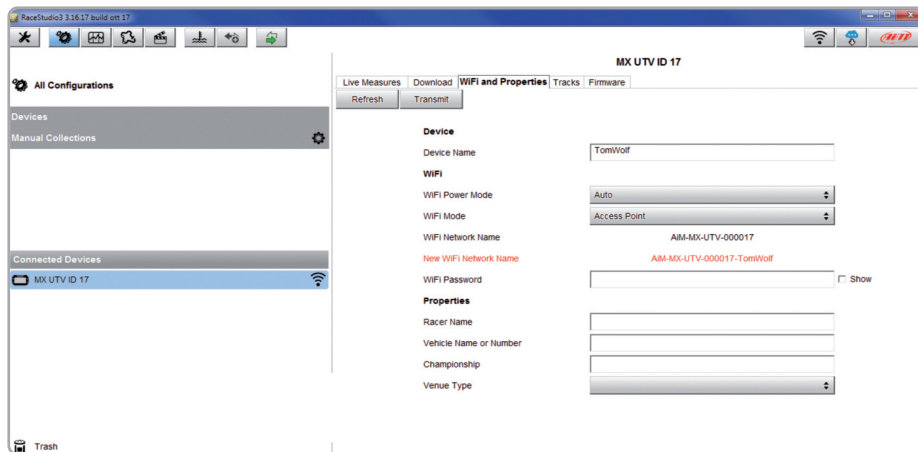
Please Note the same Wi-Fi connection can be created with the operative system tool. Once the device has been authenticated in the Wi-Fi network you can communicate with it using Race Studio 3.

6.1.3 Adding MXm to an existing network

This situation is ideal for a team with multiple drivers and staff members and is desired to communicate with one or more AiM devices using the same PC network. Each MXm can have its password that adds another security and privacy level to the net-work.

Race Studio 3 will show all MXm connected to the same network under "Connected devices" label, bottom left of the software page: click your device.

Enter "Wi-Fi and properties" tab and set it on "Existing Network"; fill in network name, network password and device password.

Transmit the network settings to your device clicking "Transmit": your device reboots and joins that network.

Please note: the only admitted password are those following WPA2-PSK standard.
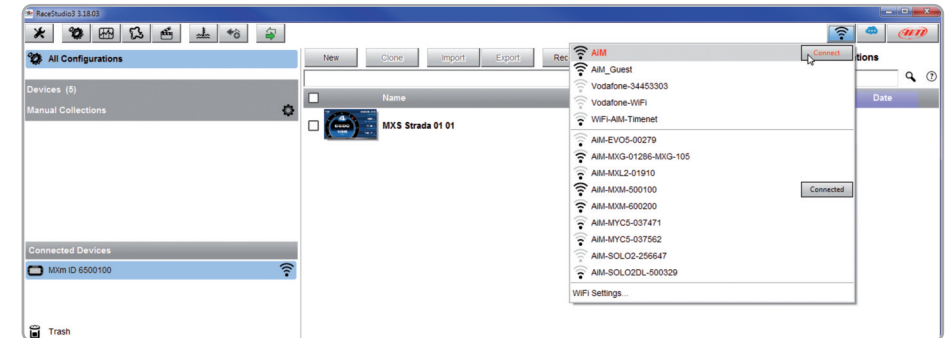
To complete this procedure use Race Studio 3 software as here explained.
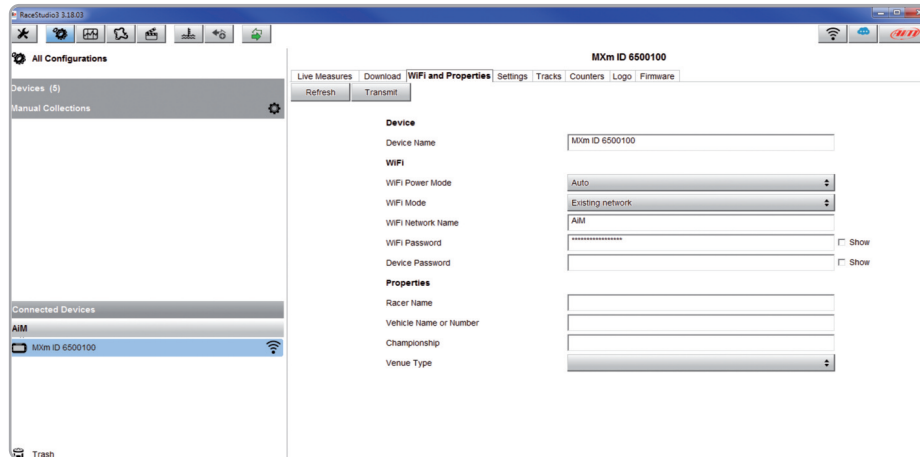
Here above you see a device "MXm ID 6500100" that switched from AP to WLAN mode (Existing Network).

Network name is "AiM" and does not work with free access because is protected by a password

To obtain connectivity on the device the PC has to be authenticated to the same network as shown here below.

When the PC is authenticated to the network called "AiM" it can see all devices you configured to access the same network. In the image below two AiM devices are connected to the same "AiM" WLAN.
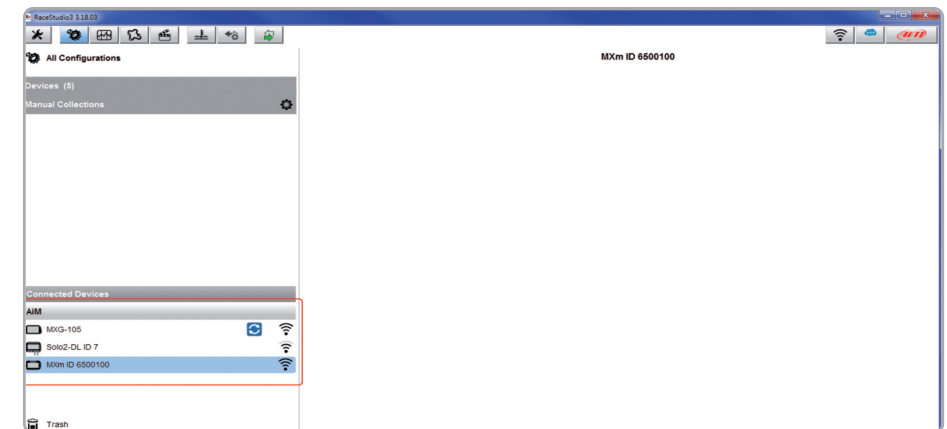
6.1.4 Wi-Fi network settings

In this chapter, you find a short description of how to configure a WLAN including AiM devices and a PC.

Here below is an example of configuration.

For better network performances, we suggest the use of a network device equipped with a DHCP server and using 3x3 MIMO technology like, for example a Linksys AS3200.

To maximize the bandwidth, you should not allow the Internet on this WLAN; this means the DHCP server should be configured without any DNS address nor gateway by default.

The parameters for the device network configuration in this example are:

■ **Wireless network name: Network_1**
   It means that the WLAN network name is "Network_1." A PC has to be authenticated in this network to interact with any AiM device of this network.

■ **Gateway address: 192.168.0.1**
   primary DNS server: 0.0.0.0
   secondary DNS server: 0.0.0.0
   (These settings prevent Internet connectivity on this WLAN)

■ **Subnet mask: 255.255.255.248**
   Enable DHCP server: yes
   DHCP IP address range: 192.168.0.2 to 192.168.0.6

These settings enable a DHCP server running on this WLAN and provide an IP address in a 2-6 range. This means that this network allows 5 network hosts.

The number of devices on a WLAN network depends on the subnet mask. Here below you see typical examples of network masks and IP addresses range.

The configuration in bold is the one we suggest (if a greater number of devices is not needed), being the one that makes it easier and quicker for Race Studio 3 the identification of the devices in the network.

Subnet mask:	IP address range:	Number of devices:
255.255.255.0	192.168.0.1 – 254	254
255.255.255.128	192.168.0.1 – 126	126
255.255.255.192	192.168.0.1 – 62	62
255.255.255.224	192.168.0.1 – 30	30
255.255.255.240	192.168.0.1 – 14	14
255.255.255.248	**192.168.0.1 – 6**	**6**

6.1.5 The Internet connectivity

For an optimal speed of your AiM device(s) we recommend not to allow the Internet on the same network and to set the WLAN in the same way.

You can of course allow the Internet access on your network but this would degrade the communication.

This slightly slower speed can be suitable for your needs but you can also have a second Wi-Fi connection using an additional hardware (NIC).

This configuration would provide an optimal speed of the data network of your AiM device(s) and at the same time would provide an internet connectivity with the second NIC.

6.1.6 Connection issues

It can occur that MXm is correctly connected to Race Studio 3 via Wi-Fi but the user interface does not show it. This may be because Wi-Fi port setting is set with a static IP. To switch it to dynamic (DHCP):

■ open "Network and sharing centre" in the Windows™ research engine
■ right click on the Wi-Fi connection and a panel shows up
■ select "Properties" option
■ double click on "Internet Protocol version 4 (TCP/IPv4)"
■ verify that option "Obtain an IP address" is active

For further information refer to FAQ section, Wi-Fi of www.aim-sportline.com.

## 6.1.7 Working on Mac™ with virtualized Windows™

Race Studio 3 only works on Windows™ operative systems; Mac users can use a virtualized Windows™ machine.

The main problem is that the host OS (Mac) must share its Wi-Fi interface with the virtualized operative system (Windows) as Ethernet interface and not as Wi-Fi interface.
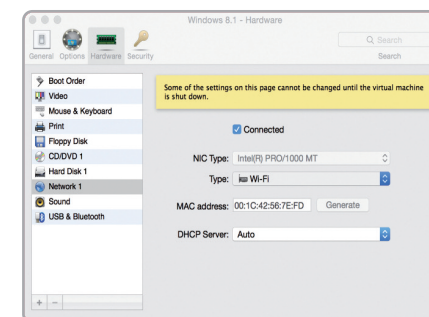
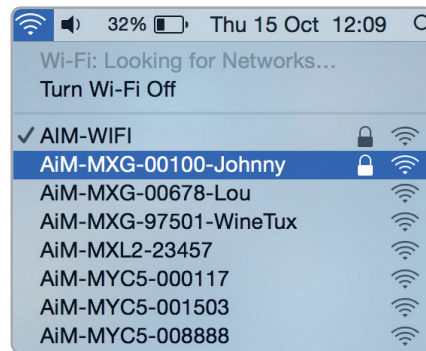**Configuring Parallels(™)**

Select "Menu -> Configure…" in Parallels.
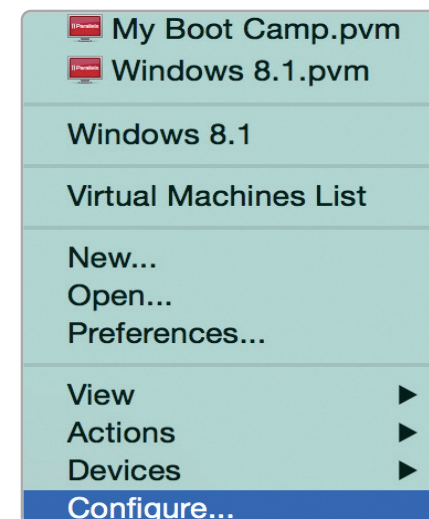
Press "Hardware" – top on the page that shows up – and select "Network" in the drop-down menu on the left.

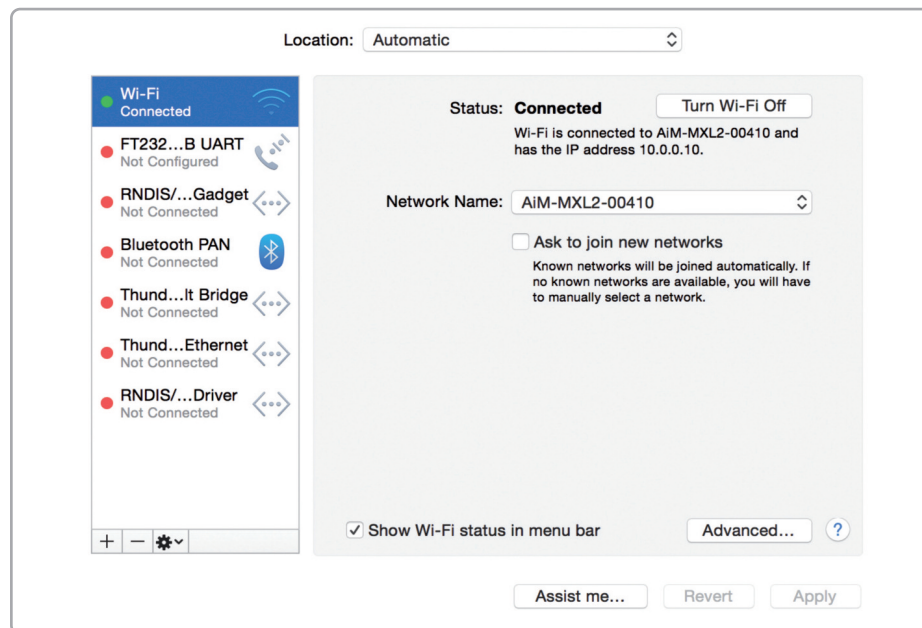Right on the configuration panel set "Type" field on "Wi-Fi".

Then select the device you want to communicate with.

To ensure that the communication works select
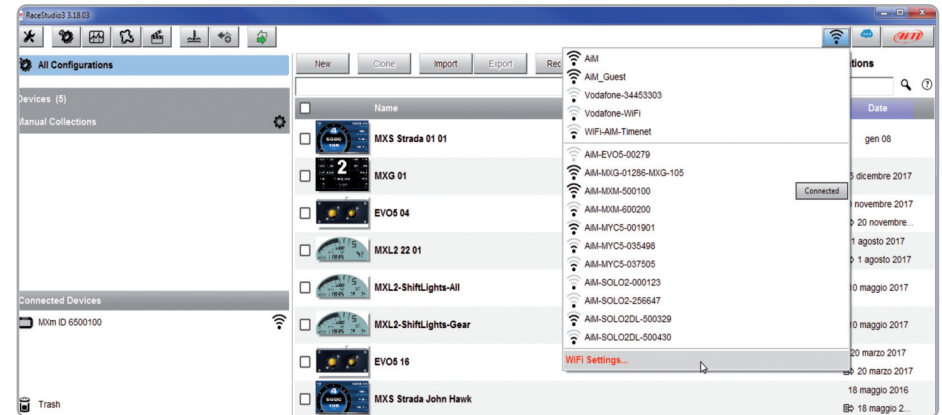"Open Network preferences…" menu.

Verify that the status in the window that shows up is "Connected" and that the IP address associated is, for example, 10.0.0.10 (could be 10.0.0.11, 10.0.0.12, or generically 10.0.0.x).
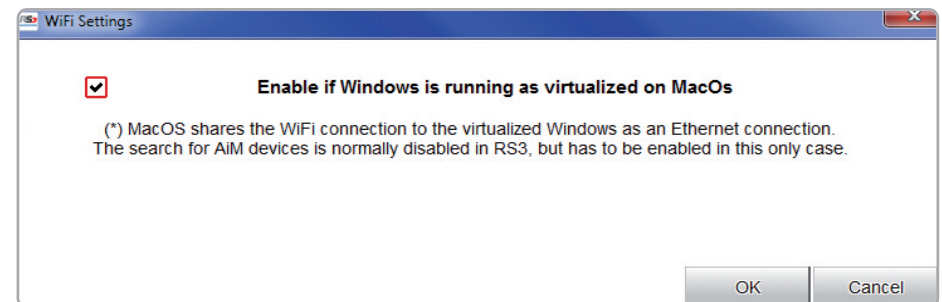

To enable Race Studio 3 correctly working on a Mac with virtualized Windows™:

■ press Wi-Fi icon
■ select "Wi-Fi Settings…" icon

■ enable the checkbox shown here below.

6.1.8 Connected device visualization issues

It may occur that using Race Studio 3 on an iMac with virtualized Windows the device connected via Wi-Fi takes some time to be shown in the network or is not shown at all. This is why we always suggest using an Wi-Fi (WLAN) router.

This router work as an Access Point allowing more external devices to connect to its network. MXm Wi-Fi configuration is to be set on Existing Network as explained before.
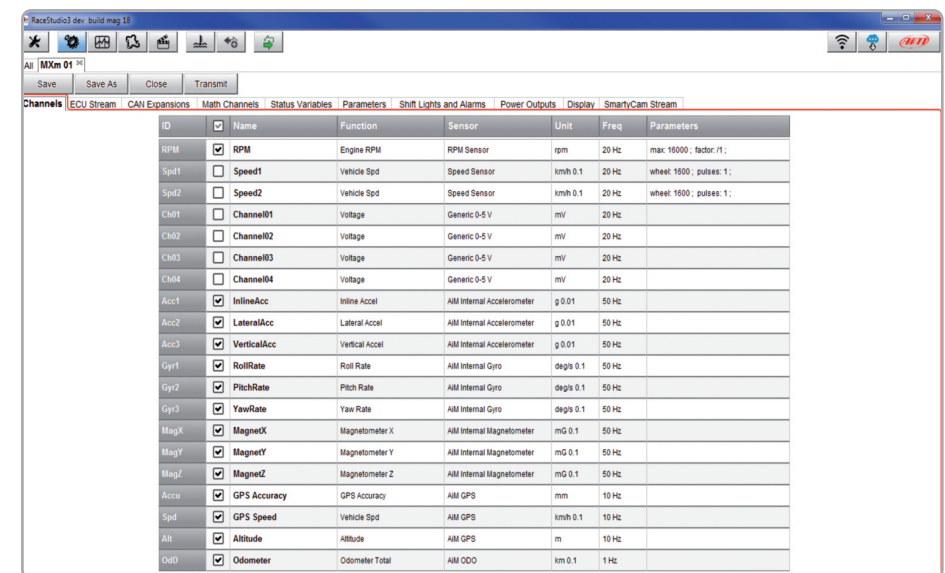
6.2 Configuration of MXm

Once MXm connected to the PC
■ click "Configurations" icon 🔧 and configurations page appears
■ click "New" and new configuration panel appears: select "MXm" and press "OK".
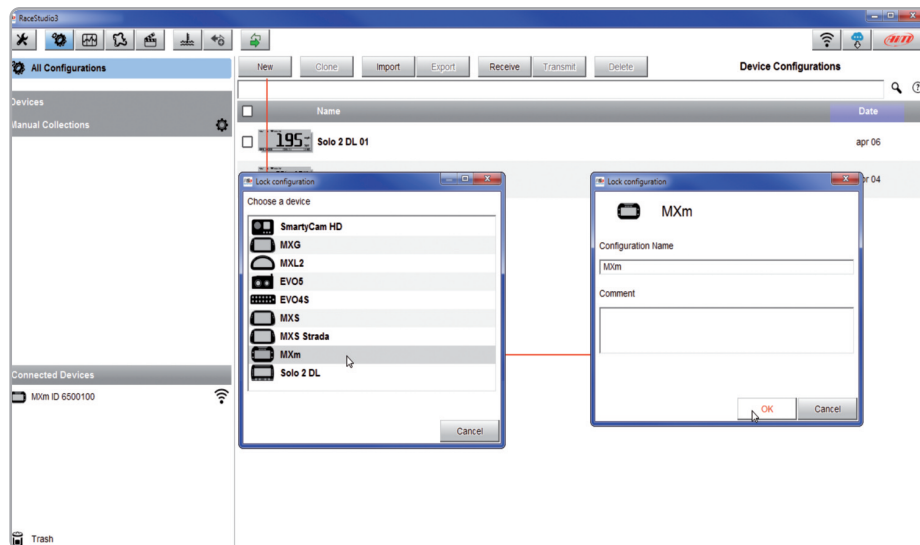
6.2.1 – Channels configuration

"Channels" layer opens; all channels are disabled by default. Here you can set all MXm channels.

To set a channel just click on its line and the related panel shows up. Speed 1 and 2 and the four Analog channels are disabled by default. First thing to do is enabling them.

To set **Speed** channels click on the row and a setting panel appears. In addition to sampling frequency, unit of measure and display parameters, you can choose:

- Function: Vehicle speed, Angular velocity, Speed, Turbo RPM
- Sensor: Speed sensor or ABS speed
- Speed parameters in the proper bottom box

Please note: if you set one speed as ABS Speed the second will switch to ABS speed too as shown here below.
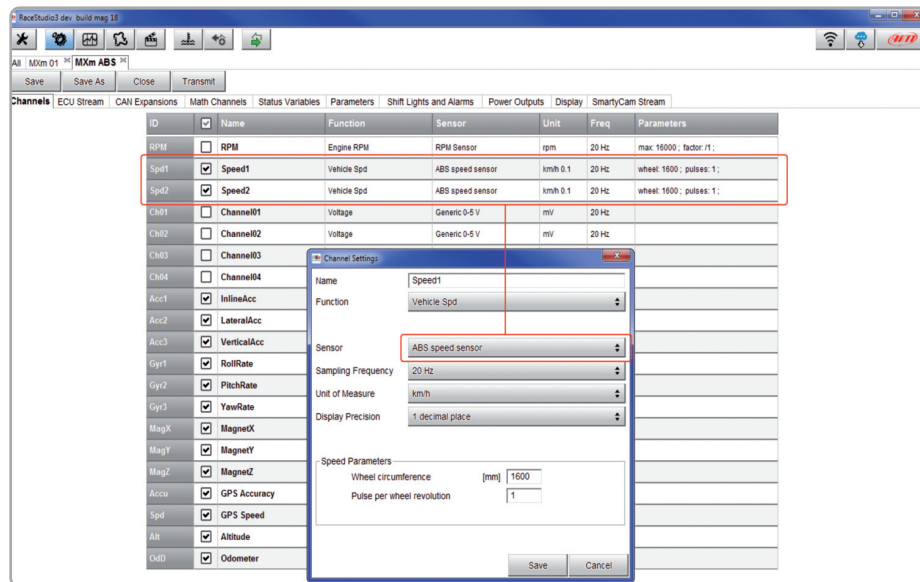

To set the four **Analog channels** click on the related row, a setting panel appears and you can choose function, sensor type, measure units, display precision or specific parameters.

6.2.2 ECU Connection and configuration

MXm can be connected to your vehicle ECU. When possible documents explaining how to connect your MXm to your vehicle ECU are published on our website www.aim-sportline.com. As explained, MXm can communicate using all currently available communication lines: CAN, RS232, K-Line.
To load the ECU protocol in MXm configuration:
- enter "ECU Stream" tab
- press "Change ECU" button
- elect ECU Manufacturer and ECU Model (in the example FORD/ MUSTANG 2010)
- press OK
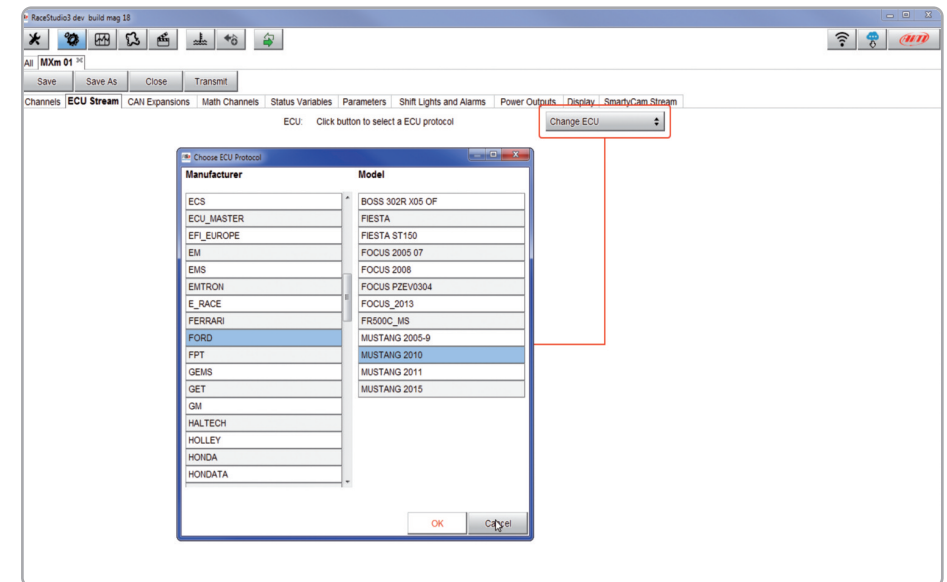
6.2.3 LCU-One CAN setting

MXm can be connected to AiM LCU One CAN lambda controller plugging the 5 pins male Binder connector of LCU one in the female one of MXm 37 pins harness cable labelled "EXP".
Once the expansion connected you need to set it:
■ enter "LCU-One CAN" tab
■ press "ADD" button; it switches to "Remove"
■ name your LCU One and fill in its serial number or press "Get SN from a connected expansion" to receive the serial number from the connected LCU-One
■ select the multiplier to calculate AFR from lambda
  (in the example "14.57 Gasoline") or add a custom value pressing
   "Add Custom Value" (the related panel shows up)
■ set the LCU One channels double clicking on each channel and setting the panel that shows up.
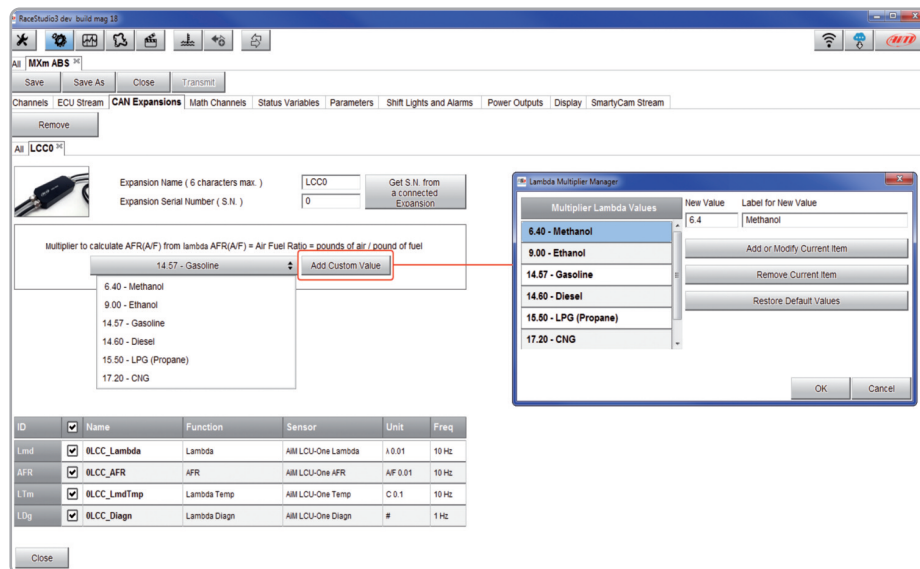

6.2.4 Math channels

Here you can create math channels; available options are:
■ Bias: considering a relation between two mutually compatible channels it computes which one is prevailing (typically used for suspensions or brakes);
■ Bias with threshold: it needs the user to set a threshold value for the considered channels; once these threshold values are both exceeded the system makes the calculation;
■ Calculated gear: it calculates the gear position using engine RPM and vehicle speed
■ Precalculated gear: it calculates the gear position using Load/Shaft ratio for each gear and for the vehicle axle too
■ Linear correction: typically used when a channel is not available in the desired format or if it is wrongly tuned and cannot be tuned again.

Each option asks the user to fill in a proper panel.
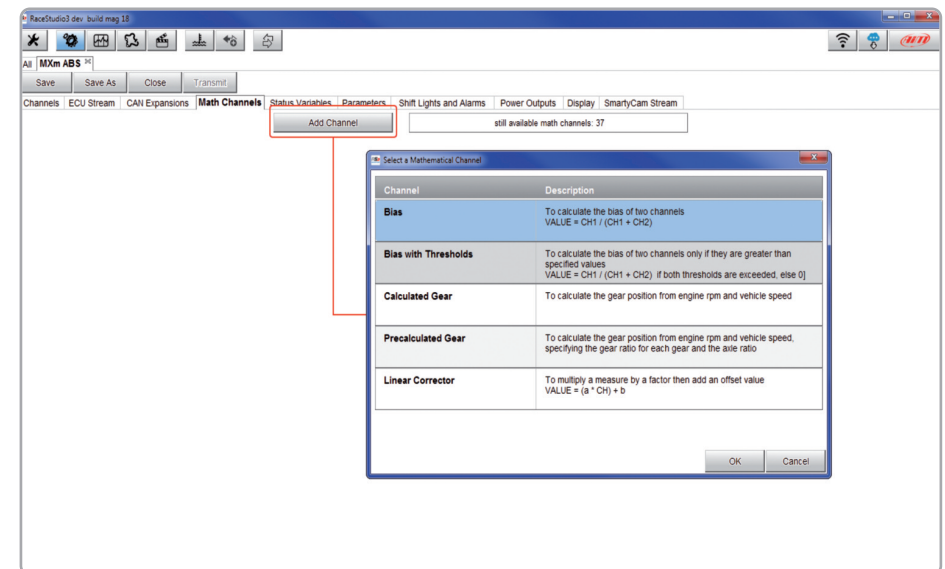
6.2.5 Status variables setting

Here you can set Status variables.
Status variables are user defined conditions that can be used in different situations. This means that when setting an alarm in "Shift lights and Alarm page" you can set different alarm including each the same condition (status variable) simply recalling it from the list.

Pressing "Add New Variable" the related panel appears.
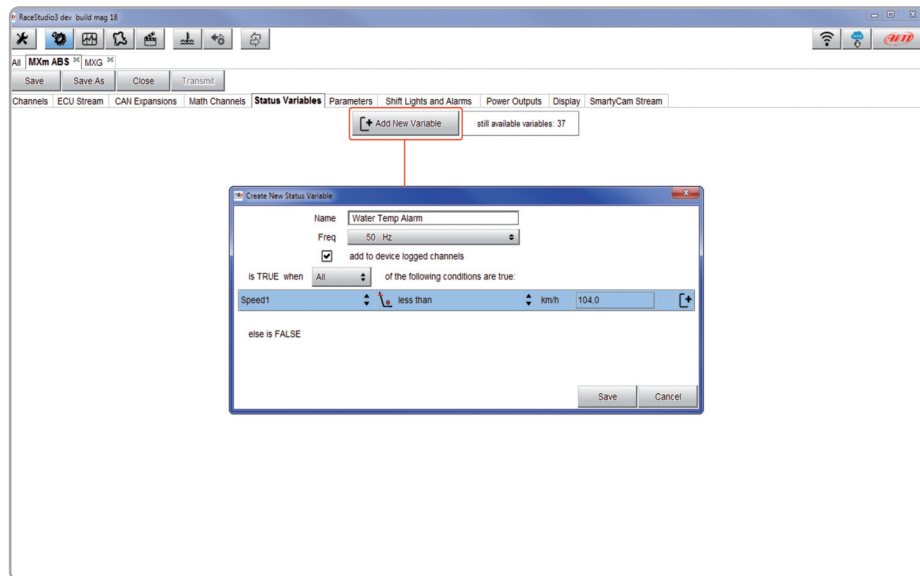
In the example below the user created a Status variable called "Water Temp Alarm". The status variable can also be logged checking "add to the device logged channels" checkbox thereby working as an analog channel. Mousing over the status variable a summary panel appears on the right.
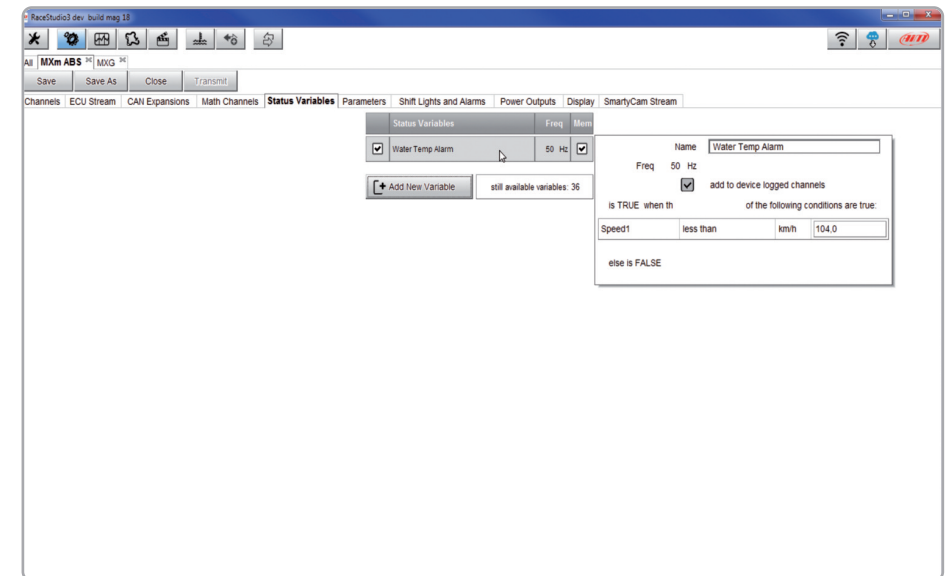
6.2.6 Parameters settings

Parameters page is divided in two parts.
■ on top **GPS Lap detection** parameters; mousing over the question marks a pop up message will explain you the working mode of:
   ■ hold lap time for: the time period for which lap time is shown on your MXm display
   ■ the track width: width that will be considered for any GPS point you set

■ bottom **Start data recording** conditions;
   ■ standard conditions (default setting) make MXm start recording when RPM is higher than 500 or speed is higher than 10 km/h and switches MXm Wi-Fi off
   ■ custom conditions: you can set two conditions and decide if making MXm start recording when only one of them is reached ("ANY") or when both are satisfied ("ALL"); pressing the button it sets the condition as shown here below.
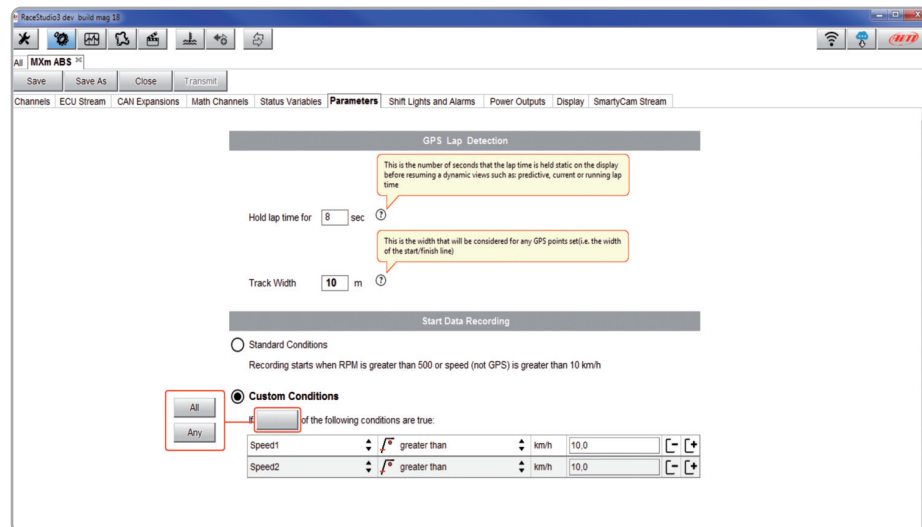
6.2.7 Shift Lights and Alarms

In this page you can set shift lights (on top) and set the alarm led (bottom) of your MXm.
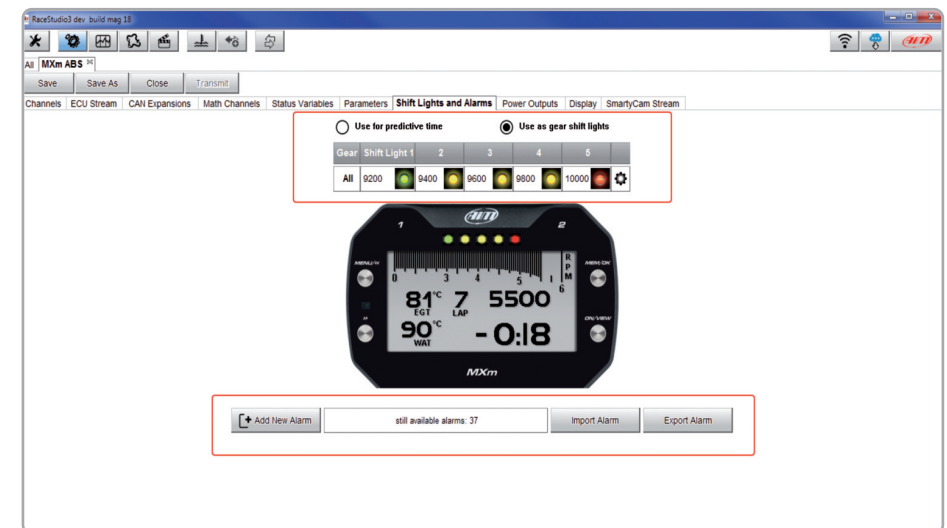
On top you can set your MXm shift lights working mode. Available options are shift lights (default) and predictive time.
Use as gear Shift Lights. To use the led bar as shift lights click the setting icon (⚙) and the related panel shows up.
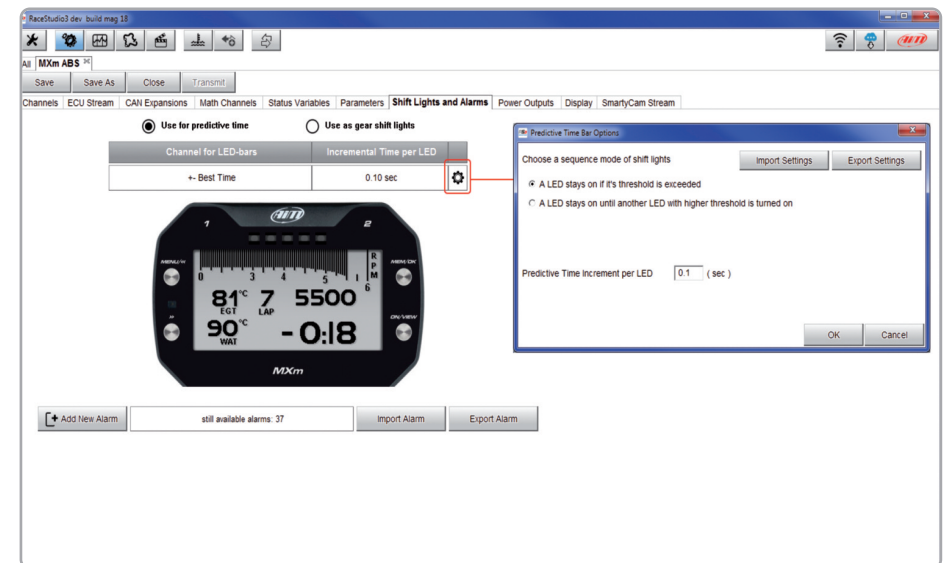You can
■ import/export shift lights setting using the proper buttons
■ decide the sequence mode of the LEDs enabling the desired option:
　■ a LED stays on if its threshold is exceeded
　■ a LED stays on until another LED with higher threshold turns on or
■ link the shift lights to the engaged gear enabling the related checkbox; in this last case you need to fill in max gear number and set LEDs colours and threshold values for each gear.
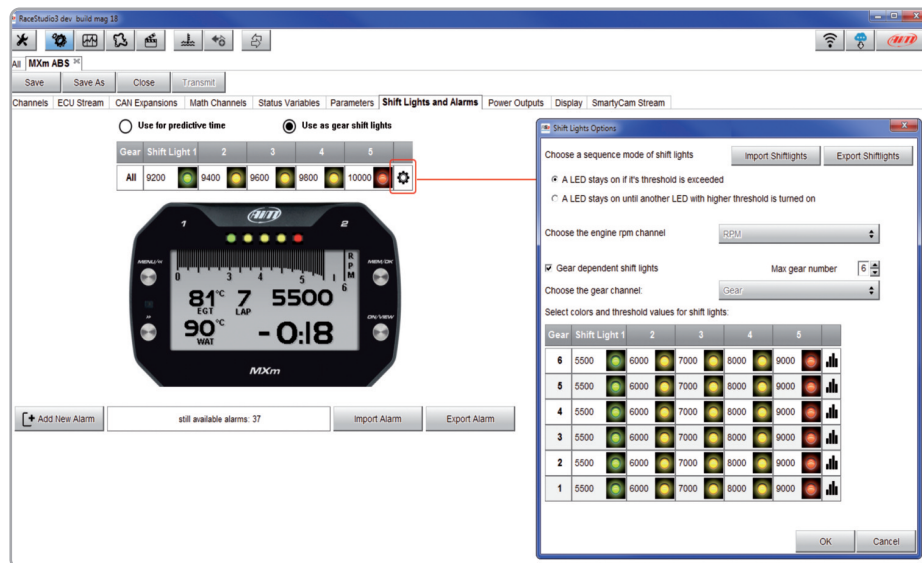
Use for predictive time. To use the LED bar for predictive lap time enable the related option and press the setting icon (⚙).
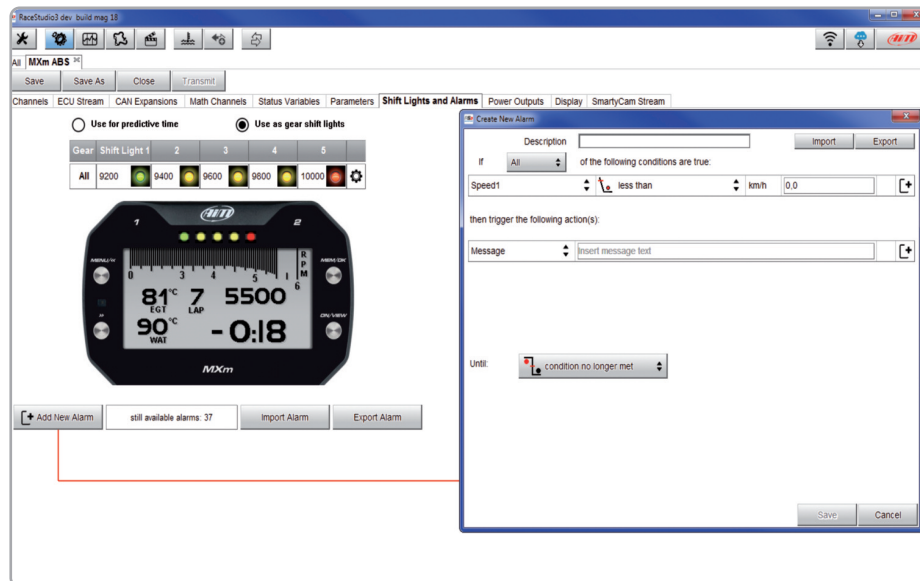You can
■ import/export shift lights setting using the proper buttons
■ decide the sequence mode of the LEDs enabling the desired option:
　■ a LED stays on if its threshold is exceeded
　■ a LED stays on until another LED with higher threshold turns on or
■ fill in the predictive time increment of each LED. The LED value indicates the time gap to be assigned to each LED. Assuming you fill in "0.1" and your lap time is improving of 0.3 sec toward the reference lap, your MXm will switch on 3 LEDs green; if, on the contrary, your lap time is worsening the LEDs will switch on red.
The lap considered as reference is the best one of the current session.

Create and set MXm alarm
As for any AiM logger you can import/export alarms using the related buttons but you can also create new ones.
To create a new alarm press "+ Add new Alarm"

To set the new alarm:
■ fill in description box on top of "Create New Alarm Panel" (1)
■ press the arrows you find on the left of "Create new alarm " panel (2)
■ "Select Channel" panel shows up on the right
■ as you can see in the image below if you set a status variable (Water Temp Alarm in the example) you find it in the available channels list: select the channel you prefer (3) and press "OK"
■ decide which action is to be triggered (4) among displaying a message or a timed popup message, display a measure, switch a LED on or activate an output signal (Power output page, see the related paragraph)
■ decide the alarm ending condition ("Until" – 5) among condition no longer met, the device is turned off, a button is pushed or data are downloaded
■ "+" buttons you find right of the panel are to add new alarms (the top one) or to add new actions to an alarm (bottom one)
■ when all operations have been performed press "Save" in "Create New Alarm Panel" and you will come back to "Shift Lights and Alarm" page
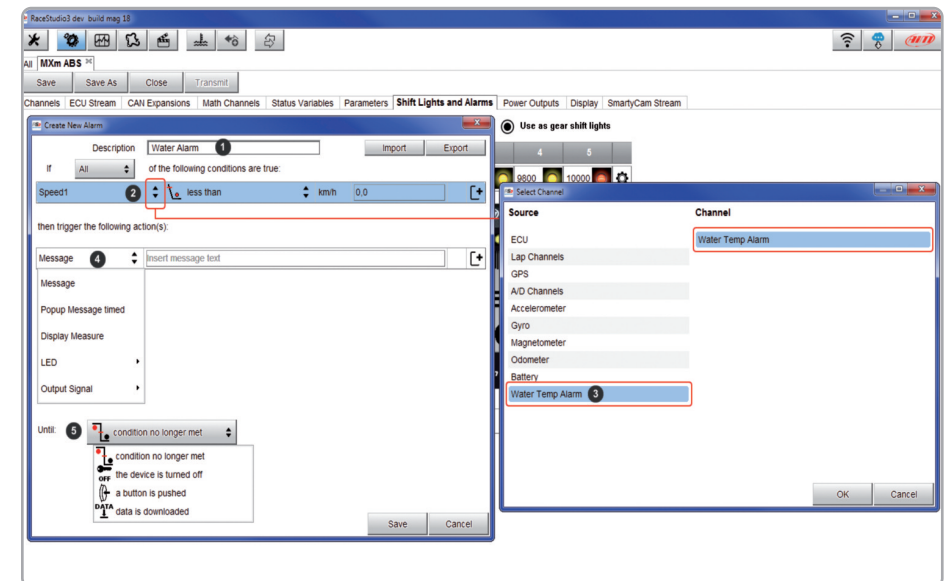
Bottom of the page an Alarm summary is shown. Right clicking on the setting icon, right of the alarm row you can edit to modify or delete the alarm.
Editing the alarm its "Modify Alarm" panel shows up on the right as in the image below.
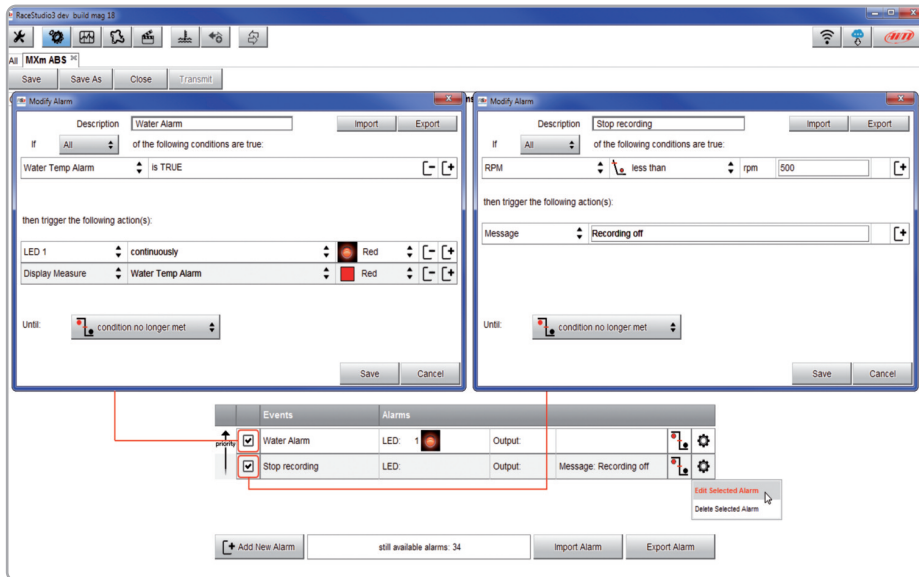
6.2.8 Power Outputs setting

MXm features 2 Power outputs, that can drain up to 15 Amp each. The power outputs connector, highlighted here below, is a four pin connector.


| Pin	Function
1	High side output2
2	9-15V power input
3	9-15V power input
4	High side Output1
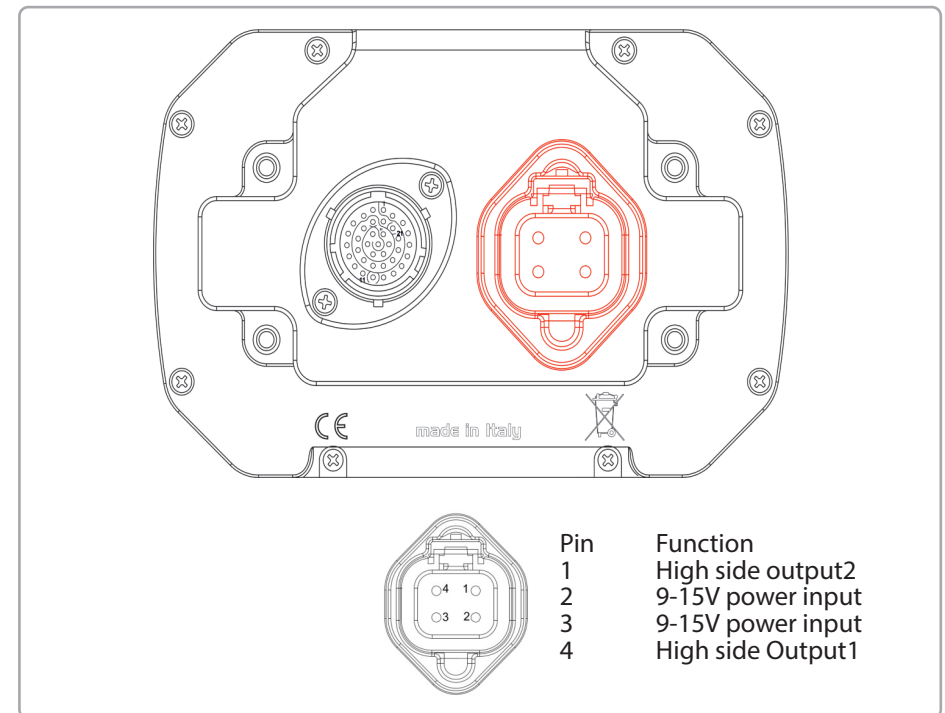
Each Power output is managed by three channels:
■ the output (ON or OFF)
■ the drained current
■ the Status (OK, Shortcut, Overcurrent, Open Circuit)

To set the two power outputs:
■ enter Power output page
■ mouse over the power output you want to set
■ setting icon appears on the right of the power output row: click it
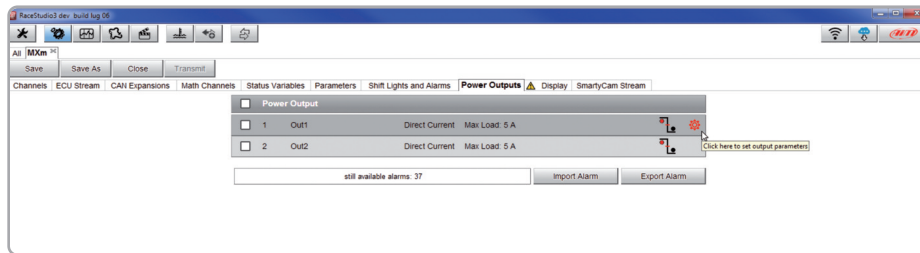

The setting panel appears: fill it in. In the example Power output 1 has been configu-
red to manage a fan: it turns ON when Water temperature is greater than 90°C: Max
accepted current (Maximum value of requested Loan) is 8 Amp: over this value the
output circuit opens and the read status becomes "Overcurrent".
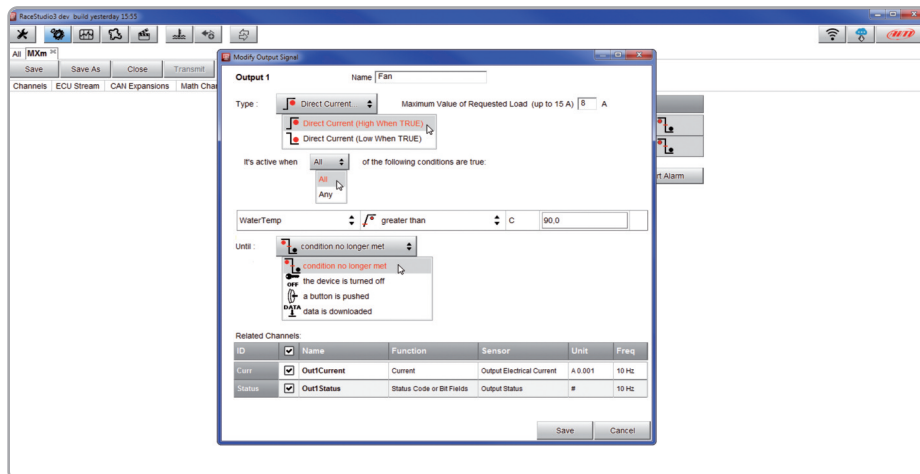

6.2.9 Display settings

MXm can have up to eight pages to be set via software. Each page can have from 1
to 4 fields and can be set as you prefer.
■ enter "Display" tab
■ a panel shows up where you can select the display page you prefer
  (in the example a four fields page with bar graph has been chosen)
■ select the page and press "OK"
■ repeat the operation for the number of pages you want to set
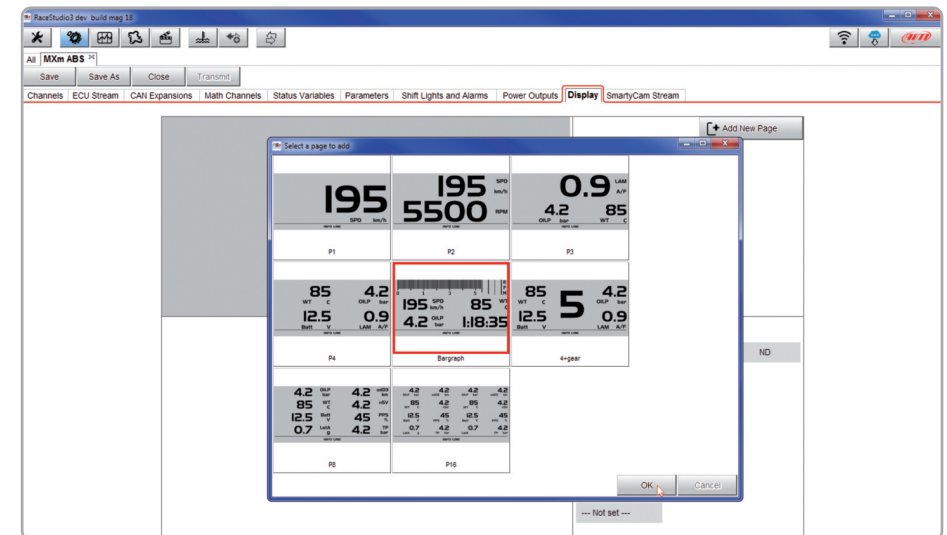
When the page has been selected two setting panels appears bottom of the page:
■ on the left a panel that shows as many rows as the fields to be set
  (in the example 5 fields)
■ on the right a panel shows the channels group you can set in that field and all the
  channels in it included; you can drag and drop the channel you want to set in the
  desired field or double click on it
■ if you added more display pages the one you are setting is indicated top of the tab
  as highlighted here below.
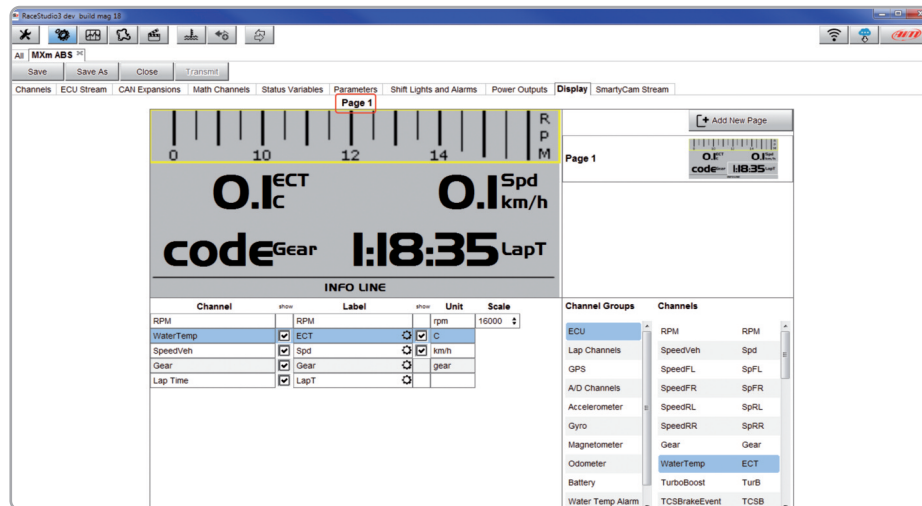
6.2.10 SmartyCam stream setting

MXm can be connected to AiM SmartyCam to show the data you wish on SmartyCam
video. To set each channel:
■ click on it and a setting panel shows up
■ it shows all channels and/or sensors that fits the selected function
■ in case you do not find the channel or the sensor in the list enable "Enable all
  channels for functions" checkbox and all channels/sensors will be shown
■ once all channels set your configuration is finished: press "Transmit" on the page
  top keyboard
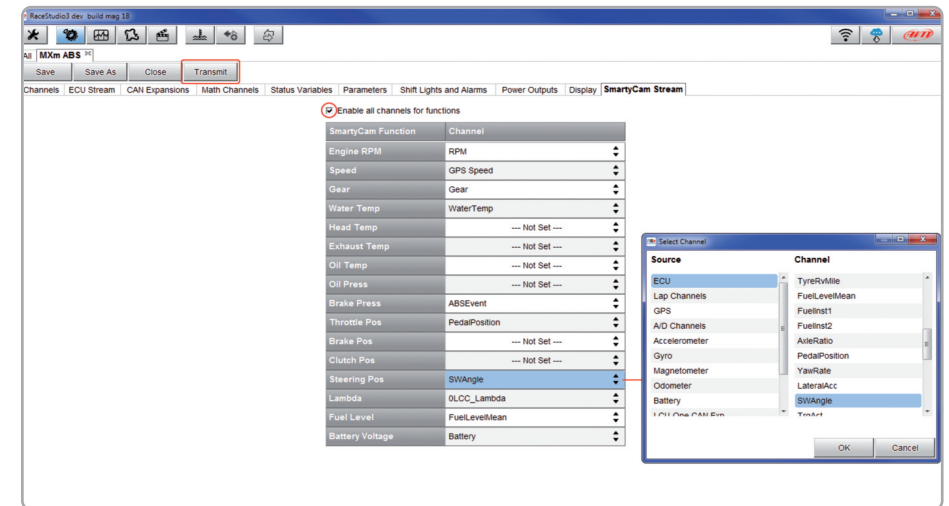
6.3 Managing a track on MXm with Race Studio 3

With Track Manager function of Race Studio 3 you can create, delete and modify tracks, transmit and receive them to/from your MXm. Press "Tracks" icon.

The main page is divided in three columns; on the **left:**
■ on top, the filters that allow to collect many tracks following customized criteria; by default, all tracks are shown (light blue "All Tracks" filter in the image below).
■ bottom left, the connected devices (in the image, "MXm ID 6500100")

The column in the **middle** shows:
■ on top a fast search bar, that allows to select the tracks which satisfy your personal research criteria; by pressing "?"a pop-up window explains research criteria (highlighted in red below), where:
   ■ long name is the name you see in bold in each track box
   ■ short name is the track name shown on the display of your MXm and is the name you find top right of each track box
   ■ track city is the name of the city the track is located in
■ all the tracks listed in Race Studio 3 database. It automatically updates at start up if a connection to the Internet is available.

The column on the **Right** shows:
■ the data sheet of the track you are mousing over.
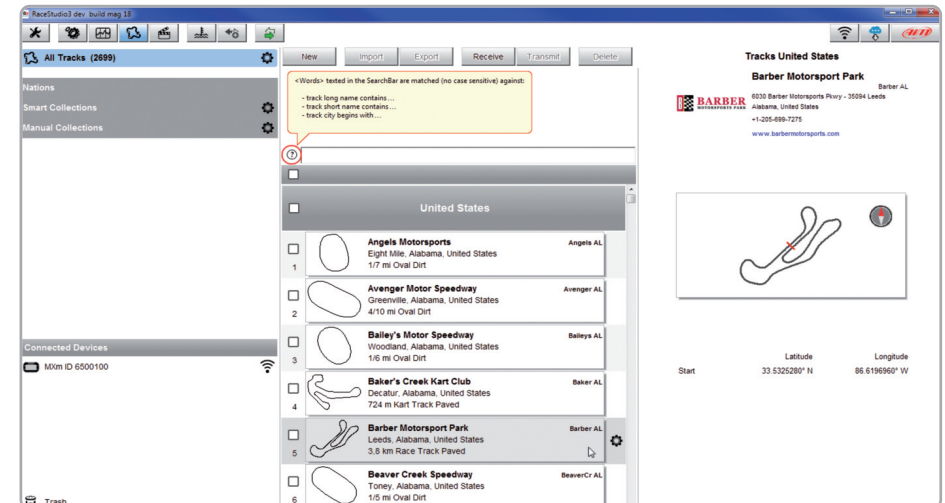
When your MXm is connected it is shown on the left bottom part of the page as said before. Clicking on it all the tracks it contains are shown in the right column of the page. The tracks you created are labelled "user" in red.
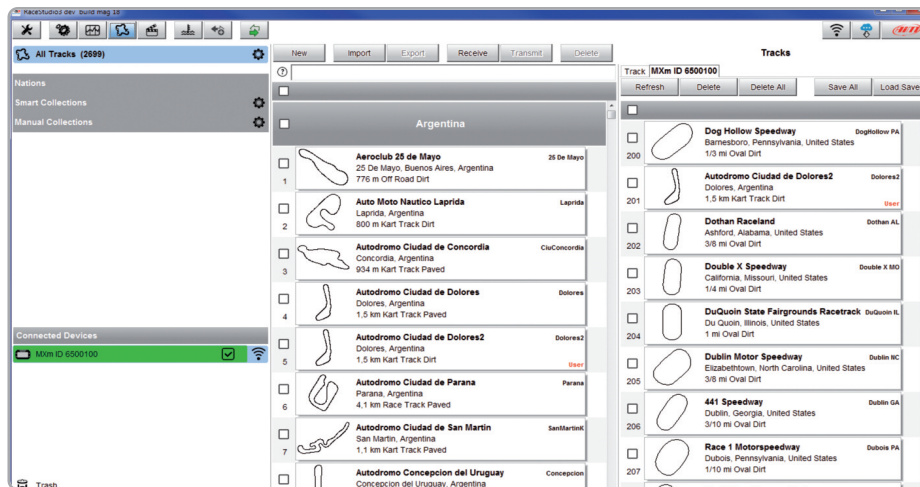
The page keyboards are used to manage the tracks.

The keyboard you find above the central column allows you to:

■ **New:** create a new track
■ Import: import one or more tracks you stored in your MXm or in another external device
■ **Export:** export one or more tracks to a specific PC folder or to another peripheral device
■ **Receive:** receive from your connected MXm the tracks you created (if no device is connected the button is disabled)
■ **Transmit:** transmit one or more tracks form the PC to your connected MXm (if no device is connected the button is disabled)
■ **Delete:** delete one or more tracks from Race Studio 3 Database

The keyboard you find above the right column allows you to:

■ **Refresh:** refresh the track list stored in your connected MXm
■ **Delete:** delete one or more tracks from your MXm memory
■ **Delete All:** delete all tracks stored in your MXm memory
■ **Save all:** save all the tracks stored in your connected MXm; it creates a zip file you can load to another AiM device
■ **Load Saved:** load the tracks you previously saved in your connected MXm memory

As said before, your MXm detects if the track it is racing on is not included in its database and it starts recording in "learning" mode. At the end of the session you can connect the logger to the PC to add the track map to your PC database.

■ click the device name bottom left of Race Studio 3 page
■ select the track map and press "Receive": the track map appears in the central column list
■ right click on the map and select "Edit option"
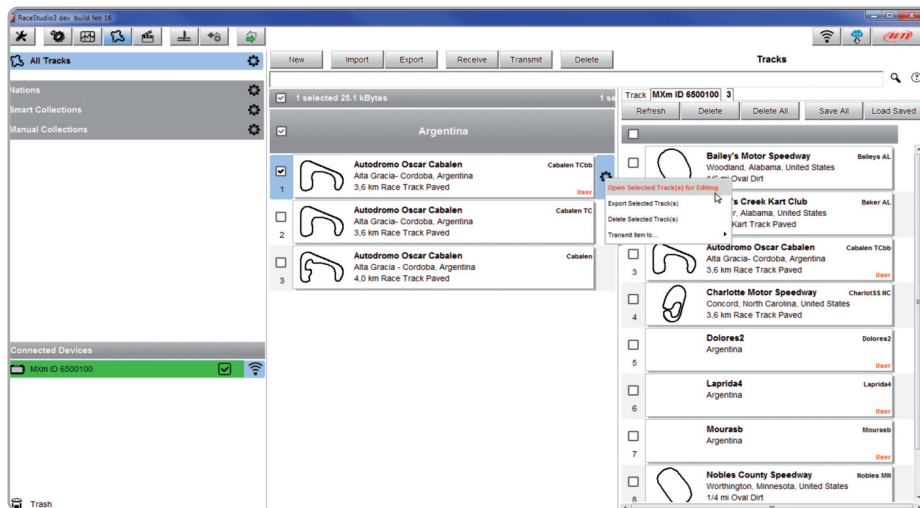
A page for adding some useful information appears. It may be useful to know that:
■ "Track name short" is the name you will see on your device
■ "Circuit type" and "Road surface", even if not necessary to set the track, are used by the research filters.
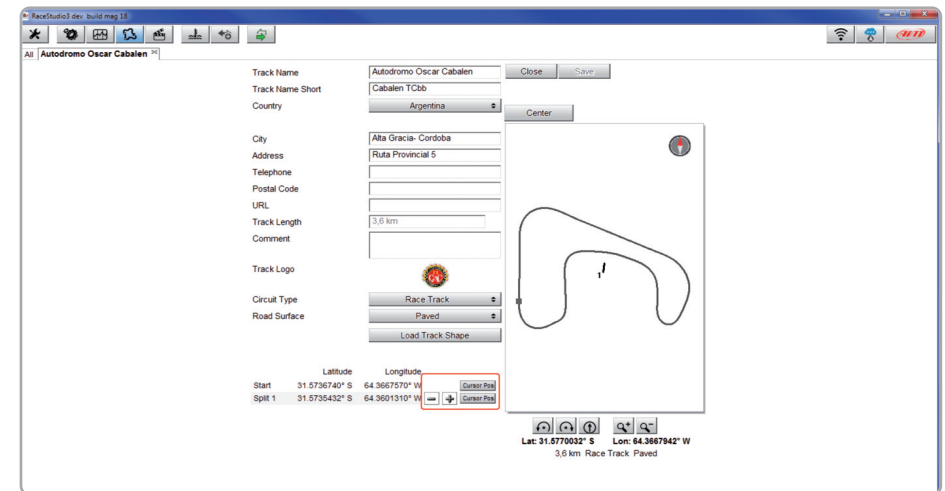
It is possible to change the start line position (move the cursor and set "Cursor Position") and to add split points in order to organize the track in different segments. This will be used in Data Analysis.
Press "Save" and the new track will appear in the list labelled "User".
Since the software is constantly updated, may be other information or features will be available soon. Please check our website www.aim-sportline.com documentation area software section "Track Manager" manual.

6.4 ECU Driver builder

If your vehicle ECU is not included in Race Studio 3 software you can use CAN Driver builder to create your own CAN protocol. Press CAN Protocols button shown here above and then "New". The panel shown below appears.

You can add a new ECU Manufacturer and/or a new ECU model.

Please note: this Race Studio function is for expert users only and a CAN Driver builder user manual can be freely downloaded from AiM website at www.aim-sportline.com, documentation area software/firmware section.
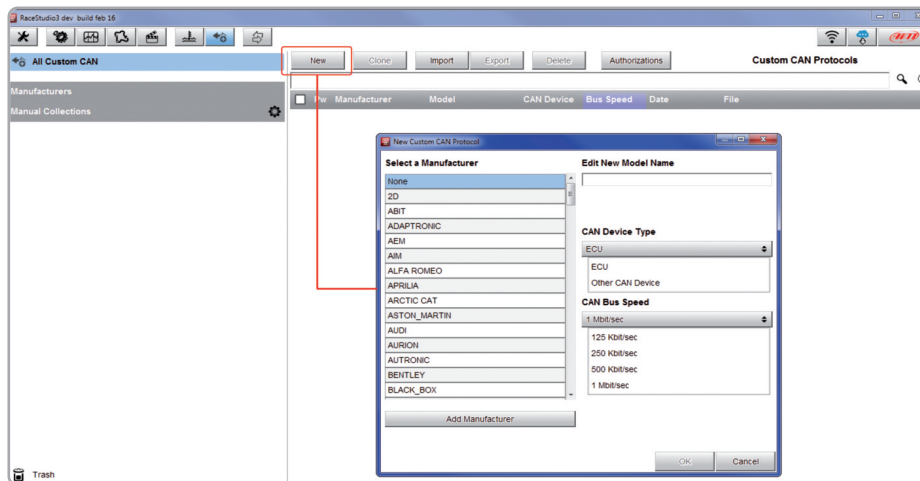
6.5 The device window
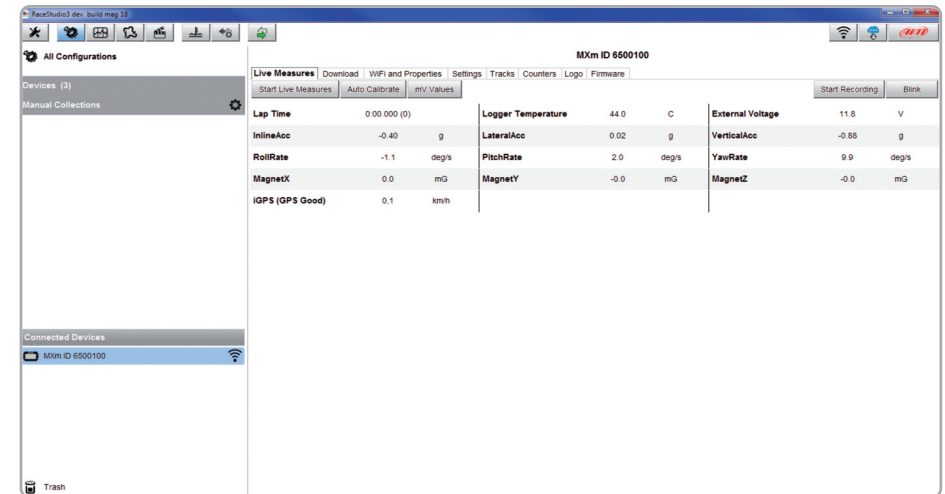
Clicking your MXm bottom left of the software page you enter the device window and have these options:

■ **Live Measures:** to check all MXm channels;
■ **Download:** to download data, see the related chapter;
■ **Wi-Fi and Properties:** to manage the Wi-Fi configuration – see the related paragraph;
■ **Settings** to:
   ■ set date format
   ■ enable/disable daylight time
   ■ set time format and time zone
   ■ set backlight colour
   ■ enable/disable night vision
■ **Tracks:** to manage the tracks stored in the device memory
■ **Counters:** to set each user odometer decimal places as well as reset it
■ **Logo:** transmit/receive the logo that shows up when switching MXm on; supported image format are JPEG or BMP; always use the most recent Windows™ versions (Windows8 or Windows10) whose graphic libraries are more updated
■ **Firmware:** to check or update your MXm firmware version.

7 On the track

Some MXm pages are available for online visualization. To scroll them press "NEXT. Pages can change according to the device configuration.

7.1 Track page

This is the first page that appears when you switch MXm on and can be recalled pressing "TRACK" button that appears on the left of the logger home page. When you start the engine of your car it goes away automatically. It shows:
• on the left the selected track; you can select a new one manually or automatically ("MENU"/ Track Management); in case of "Automatic" selection the track is selected according to the coordinates of your vehicle; in case the track you are running on is not included in your MXm database the laptimer switches to "learning mode" as shown in the bottom image here on the right
• on the right the satellite bar (visible satellites and signal level of each one) useful to evaluate the status of GPS signal.
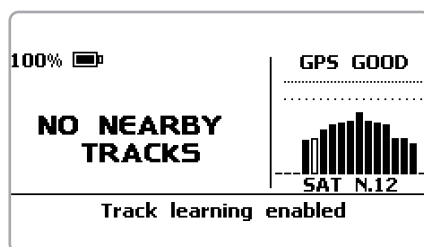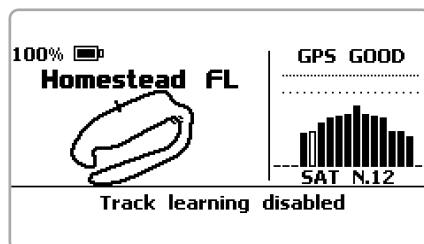
7.2 Other pages

At very first switch on, when you quit track page MXm shows by default Laptime Page; afterwards it will show the last page you displayed.
As said before, MXm can show up to eight custom pages to be configured using Race Studio 3 software; use ">>" button to scroll among them.

8 Data recall

At the end of the test you can recall sampled data pressing "MEM".

First is "Summary" page.
Select the session you want to see and press "ENTER"

Once the session selected you see all tests in a box showing time of the test and best lap of the test.
Select the test you want to see and press "ENTER".

Here you see the three best lap of the test with max speed value of each lap.
Press "PAGE".

This page is a histogram test summary. Moving the cursor left and right you can see all laps and the difference versus the best lap of that test.
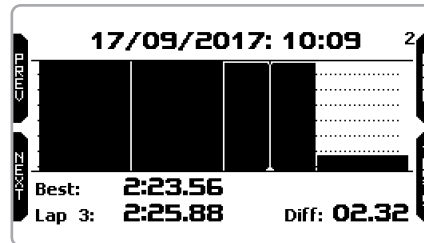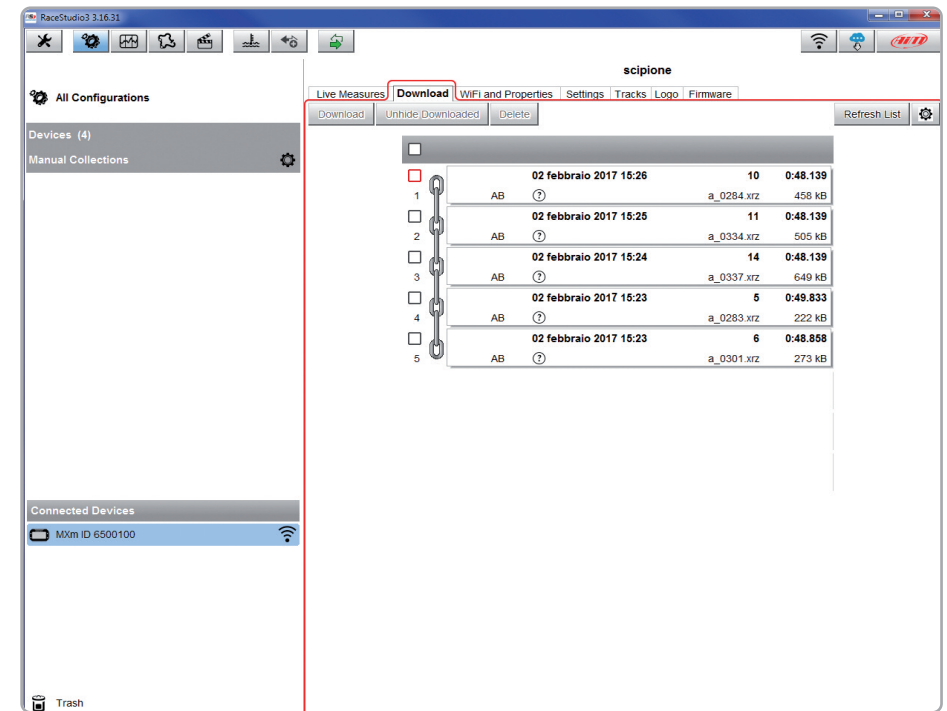

Lap page shows lap time with speed max/min values.

9 Data download

Once MXm-PC connection is established activate "Download" tab to download sampled data

This page shows all information about the files stored in the system: number of laps, best lap, date/time and file dimensions.
Select one or more files and press "Download" to download and analyse them.
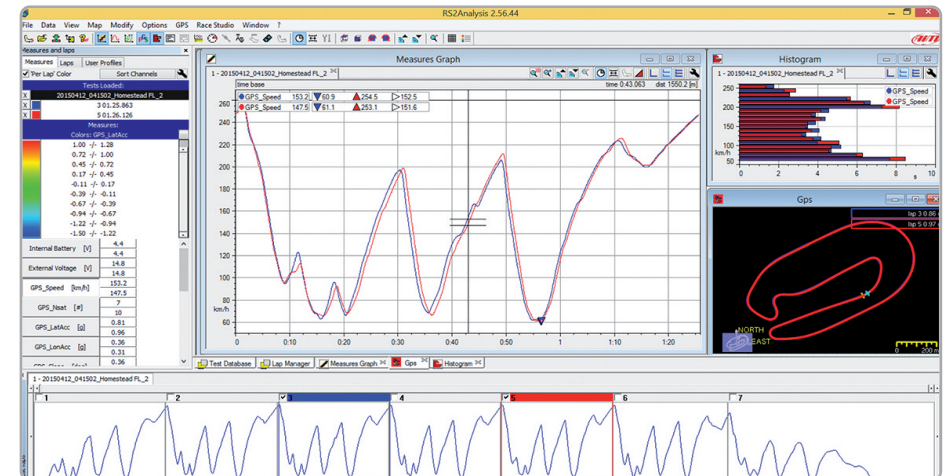
10 Data Analysis

When data have been downloaded press Analysis icon and Race Studio Analysis software will open showing this page.

Select your file double clicking on it and start analysing it. A lot of pages, graphs and images will help you analysing your data in the best way.

11 New firmware upgrade

Our technicians and engineers are constantly working to improve both the firmware (the application that manages your device) and the software (the application you install on your PC).

Each time a new firmware and/or software version is available the icon here above appears with an arrow indicating that something is available for download (otherwise the icon only shows the cloud).

Click it and freely download the new applications.
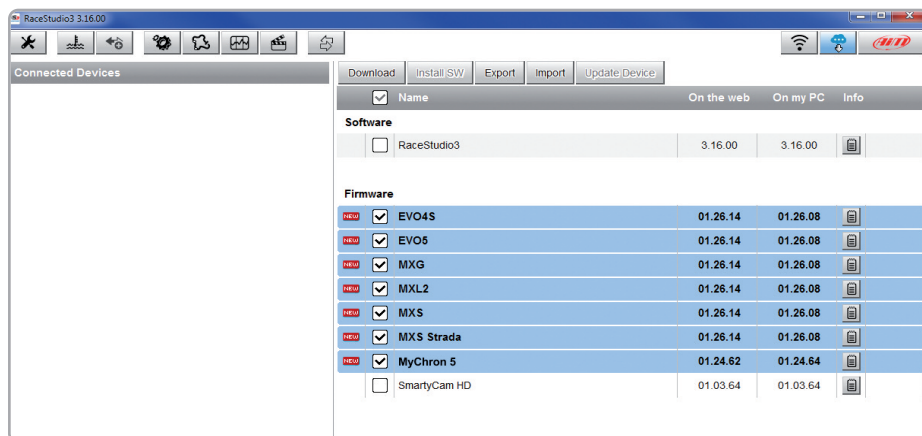
Once the new firmware has been downloaded connect your device to the PC via Wi-Fi to perform a firmware upgrade. In a few seconds the device is ready.

12 RPM

MXm can receive RPM value from the ECU. If on the contrary your vehicle does not have an ECU you can sample RPM using the wire labelled "RPM" of 37 pins connector harness you find in the kit.

12.1 RPM from ECU

To get the RPM from the ECU you only need to connect your MXm to the ECU and it will automatically sample that value.

12.2 RPM via a 5-50V square wave or coil (150-400V)

If your vehicle has no ECU you need to connect the wire labelled " RPM" of 37 pins connector harness to the ignition system. This way MXm can read the signal form the low voltage of the coil (whose peak can be from 150 to 400 V) or from a possible square wave (the peak can be from 5 to 50 V).
The image below shows an example of wiring of the ignition system.
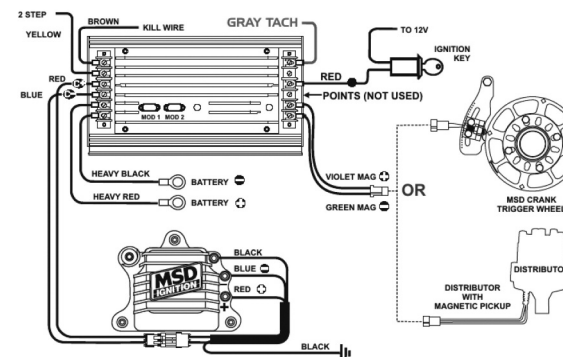
The output labelled "GRAY TACH" gives a 5-50V output that can be directly sampled by MXm.

In case the vehicle ignition system has no output you need to connect MXm to the low voltage of the coil as shown in the following images.

Point 1: low voltage of the coil
Point 2: connected to the spark plug
Point 3: connected to the +12V of the battery
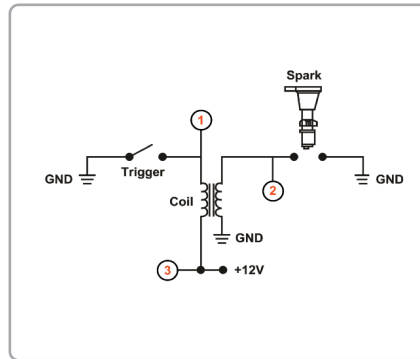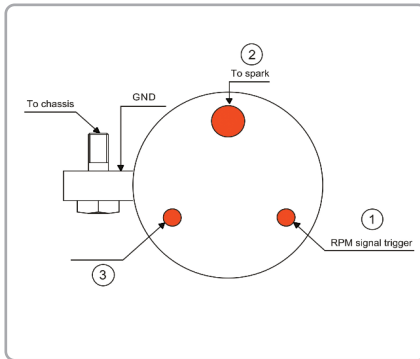
Once MXm connected to RPM signal you can set its parameters in channels page of Race Studio 3 as explained in "Channels configuration" paragraph.
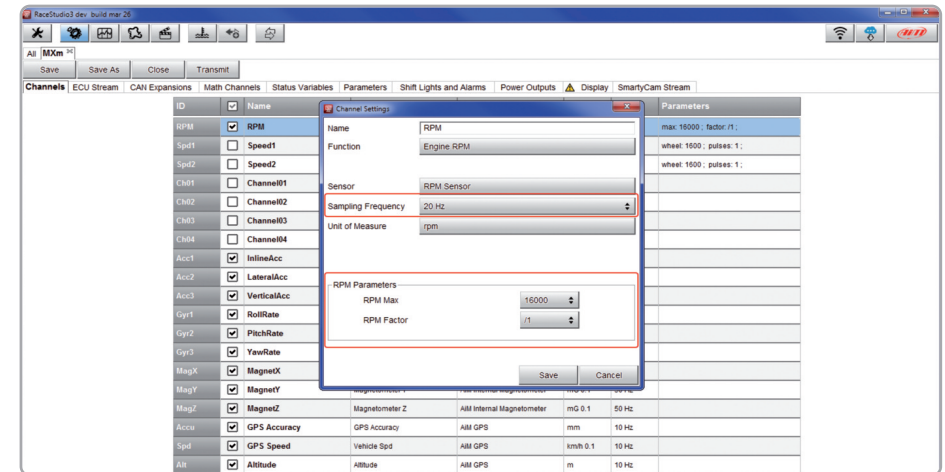
13 Connection with SmartyCam and LCU-One

Your MXm can be connected to AiM SmartyCam HD, SmartyCam GP HD and LCU-One CAN as shown in the images below.

Please remember that all channels transmitted by these AiM expansions have to be set in Race Studio 3 software as already explained in the related paragraphs ("LCU-One CAN setting" and "SmartyCam stream setting").

Moreover for further information concerning SmartCam HD, SmartyCam GP HD and LCU One refer to the related manuals you can download from "Documentation" area of AiM website www.aim-sportline.com.

To connect MXm to SmartyCam HD connect SmartyCam CAN cable to the cable labelled "EXP" of MXm 37 pins connection harness and 7 pins Binder connector of SmartyCam CAN cable to 7 pins Binder connector placed rear left of SmartyCam HD as shown here below.

To connect MXm to SmartyCam GP HD connect SmartyCam CAN cable to the cable labelled "EXP" of MXm 37 pins connector harness and 7 pins Binder connector of SmartyCam HD CAN cable to the recorder central connector as shown here below.

To connect MXm to LCU-One CAN connect cable labelled "EXP" of MXm 37 pins connector harness to 5 pins Binder connector of LCU-One as shown here below.

14 Technical specifications and drawings

- ◼ Display resolution — 268x128 pixel
- ◼ Display pages — Up to 8 freely configurable
- ◼ Backlight — 7 configurable RGB colours
- ◼ Ambient Light sensor — Yes
- ◼ Shift Lights — 5 freely configurable RGB LEDs
- ◼ Alarm LEDs — 2 freely configurable RGB LEDs
- ◼ CAN connections — 2
- ◼ Analog Inputs — 4 fully configurable max 1.000Hz each
- ◼ Digital Inputs — 2 speed inputs, coil RPM input
- ◼ Digital outputs — 2 hight side
- ◼ Integrated track database — Yes
- ◼ Inertial platform — 9 axis internal platform
- ◼ Wi-Fi connection — Yes
- ◼ Integrated GPS — 10Hz GPS+Glonass
- ◼ ECU connection — CAN, RS232, K-Line
- ◼ External power — 12V
- ◼ Internal memory — 4Gb
- ◼ Pushbuttons — Metallic
- ◼ Connectors — 37 pins motorsport connector + 4 pins power connector

- ◼ Body — Glass fiber reinforced Nylon
- ◼ Weight — 330g
- ◼ Dimensions — 137x88,4x31,9 mm
- ◼ Waterproof — IP65
- ◼ Analysis software — Race studio analisys freely downloadable from www.aim-sportline.com

MXm Pinout

37 pins Motorsport
male connector
front view

4 pins power
male connector
front view
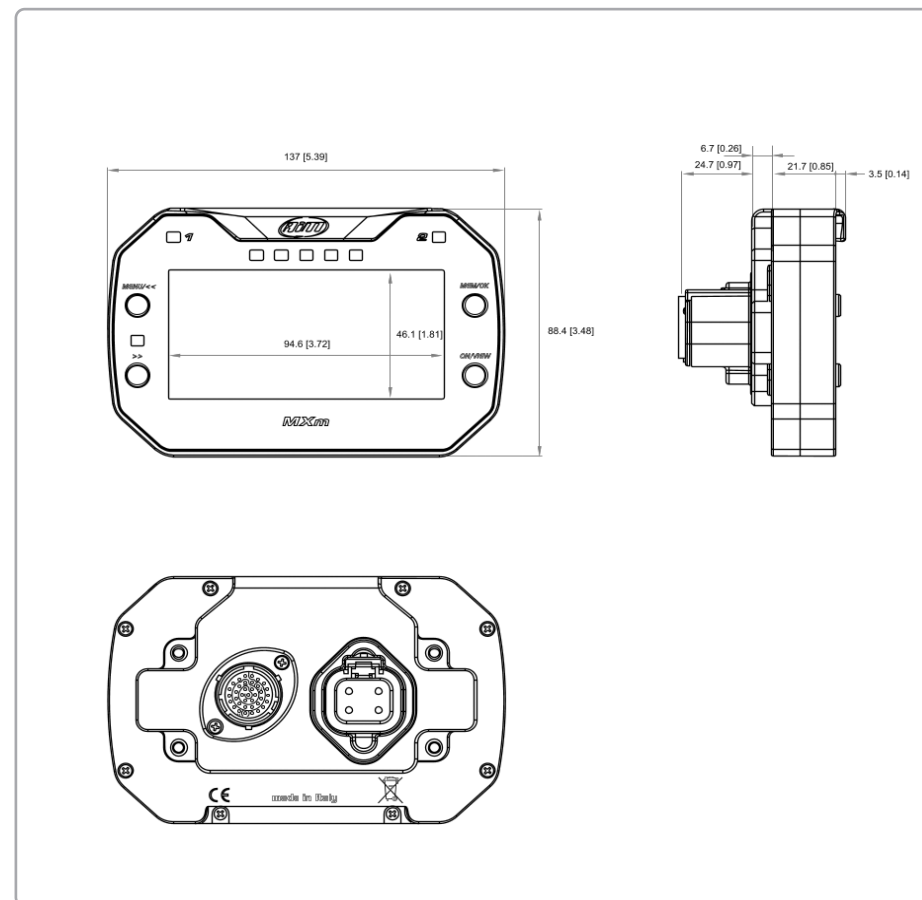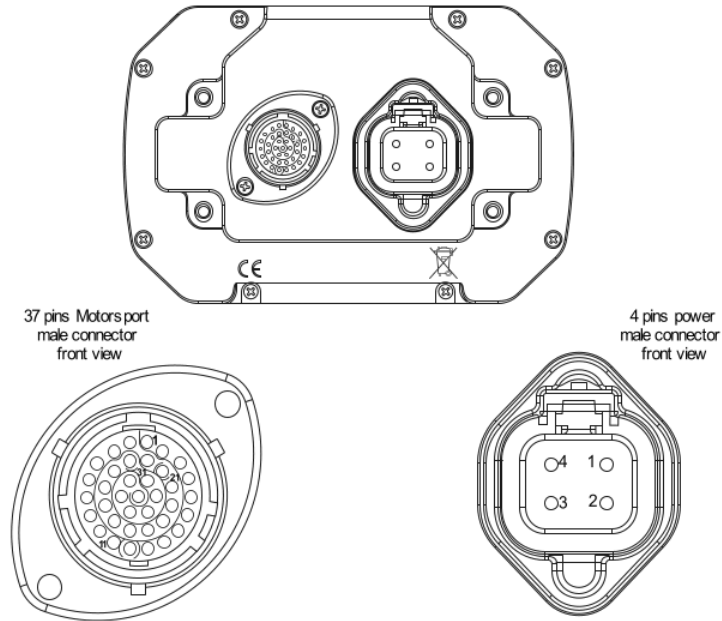
Pin	Pin function	Pin	Pin function	Pin	Pin function
1	9-15V Power input	20	Ground	1	High side output 2
2	Battery Ground	21	+Vbattery	2	9-15V power input
3	CAN+ Exp	22	Analog Input 1	3	9-15V power input
4	Ground	23	Analog GND	4	High side output1
5	+Vbattery CAN	24	+Vbattery		
6	CAN- exp	25	+Vreference		
7	+Vbext	26	Analog Input 2		
8	CAN1+ ECU/RS232TX	27	Analog GND		
9	CAN1- ECU/RS232RX	28	+Vbattery		
10	Ground	29	+Vreference		
11	ECU K-Line	30	Analog Input 3		
12	USB D+	31	Analog GND		
13	USB D-	32	+Vbattery		
14	Ground	33	+Vreference		
15	RPM	34	Analog Input 4		
16	Ground	35	Analog GND		
17	+Vbattery	36	+Vbattery		
18	Speed2	37	+Vreference		
19	Speed1				

MXm 37 pins Deutsch connector harness

N.6 - 4 pins Binder 719
female connectors

N.1 - 5 pins Binder 712
female connector

N.1 - 4 pins Binder 719
female connector

5 pins Binder 712
female connector pinout
solder termination view

4 pins Binder 719
female connector pinout
solder termination view

N. 4 - 4 x 0.25 cables +
N. 2 - 3 x 0.25 cables

N. 1 - 5 x 0.25 cable

N.1 twisted cable
2 x 0.35+1 x 0.35

N.7- 1 x 0.5 cables

37 pins Deutsch connector pinout
contact insertion view

SEZA-A

37 pins Deutsch
flying female
connector

A

A

Harness front view

Pin 1

37 pins Deutsch connector
front view

76

77

Table of cables ending with 4 pins Binder 719 female connectors

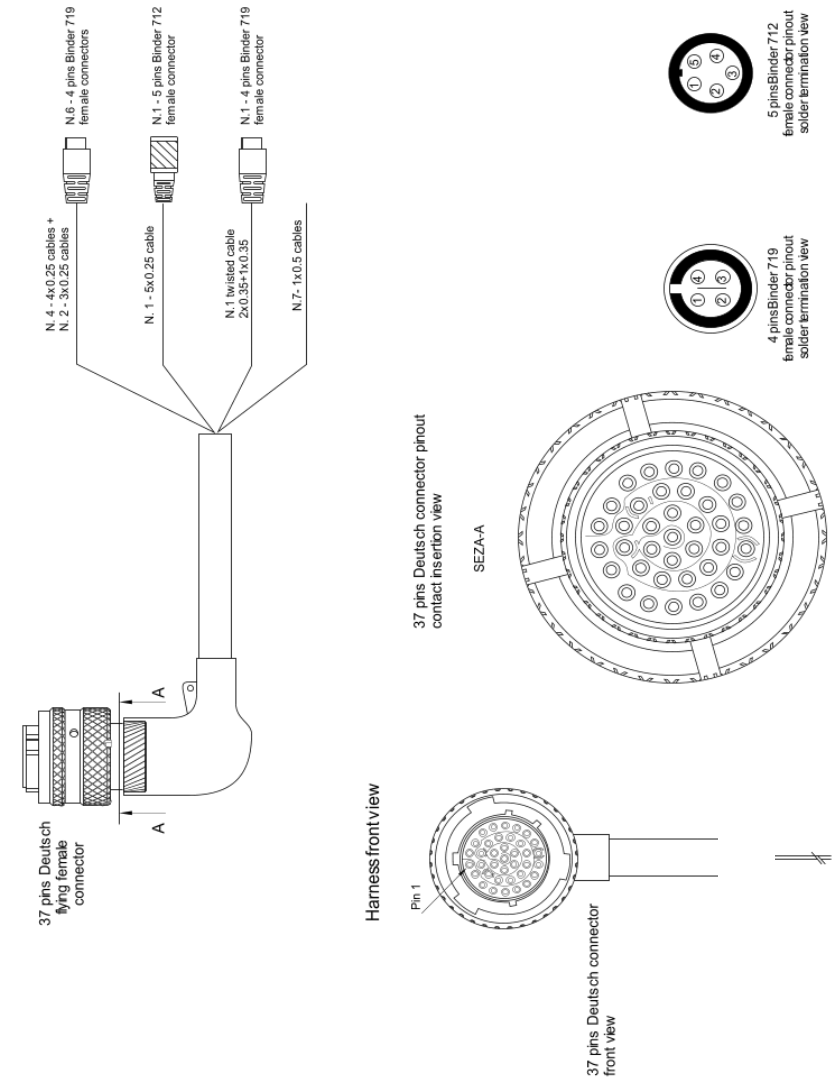| 37 pins Deutsch connector pin	Cable colour	Destination connector pin	Cable type	Length	Channel	Label
22 23 24 25	White Black Red Blue	1 2 3 4	4x0.25mm²	340mm	+Analog Input Channel1 GND V Battery V Reference	Channel 1
26 27 28 29	White Black Red Blue	1 2 3 4	4x0.25mm²	340mm	+Analog Input Channel 2 GND V Battery V Reference	Channel 2
30 31 32 33	White Black Red Blue	1 2 3 4	4x0.25mm²	360mm	+Analog Input Channel 3 GND V Battery V Reference	Channel 3
34 35 36 37	White Black Red Blue	1 2 3 4	4x0.25mm²	360mm	+Analog Input Channel 4 GND V Battery V Reference	Channel 4
19 20 21	White Black Blue n.c.	1 2 3 4	3x0.25mm²	320mm	Speed 1 GND V Battery n.c.	Speed 1
18 16 17	White Black Blue n.c.	1 2 3 4	3x0.25mm²	320mm	Speed 2 GND V Battery n.c.	Speed 2
12 14 13	White TW Black Blue TW n.c.	1 2 3 4	Twisted 2x0.35+1x0.35	1100mm	USB D+ GND USB D- n.c.	USB

Table of cables ending with 5 pins Binder 712 female connectors

37 pins Deutsch connector pin	Cable colour	Destination connector pin	Cable type	Length	Channel	Label
3 4 5 6 7	White Black Red Blue Orange	1 2 3 4 5	5x0.25mm²	350mm	CAN+ Exp GND V Battery CAN- Exp Vb ext	Exp

Table of not cabled cables

37 pins Deutsch connector pin	Cable colour	Length	Cable type	Label
15	White	1x0.5mm²	550mm	RPM
2 1	Black Red	1x0.5mm² 1x0.5mm²	550mm	GND 9-15V Power in
8 9 10 11	White Blue Black Blue	1x0.5mm² 1x0.5mm² 1x0.5mm² 1x0.5mm²	550mm	CAN1+ RS232TX CAN1- RS232RX Kline GND Kline

Our web site, www.aim-sportline.com is constantly updated.

Please, refer to it for downloading the last release of our documentation.