Sensors

1 – Street Icon LEDs: connection and setup

Question:
I have an MXS1.2 Strada / MXG 1.2 Strada / MXP Strada with the optional Street Icon LEDs.
How can I activate my Street Icon alarm LEDs according to my car/bike signals?

Answer:
Street Icon warning LEDs are not strictly connected to a specific analog input: these LEDs can be freely linked to any analog/digital input of the AiM dash or also to channels received through a data bus available on your vehicle (CAN, RS232, K-line).
Street Icons featured by each AiM dash are listed here below:

LED n	MXG 1.2 Strada	MXS 1.2 Strada	MXP Strada
1	left turn light	turn lights	fuel reserve
2	high beam	high beam	high beam
3	low beam	low beam	MIL
4	MIL	fuel reserve	oil pressure/oil level
5	right turn light	oil pressure/oil level	water temperature
6	oil pressure/oil level	water temperature	
7	water temperature		
8	fuel reserve		

In the next pages the physical connection, with related wiring diagrams, and the software configuration are explained for all the available alarm icons.

On newer vehicles these parameters might be supplied by a data bus.
Check on AiM website (www.aim-sportline.com) – Documentation Area - ECU Connections – Stock ECUs, which parameters are available for your vehicle's ECU driver. If they are included in the list, jump directly to Chapter 3 for the configuration, otherwise refer to the following Chapter 2.

2 – Physical connection

Here follows explanation for the physical connection to the vehicle signals, when they are not coming from data streams broadcast by the vehicle.

2.1 – Turn lights and high/low beam signals

Head lights and turn lights are generally signals that raise to 12V when activated, otherwise they sit at 0V. These signals are used to feed the original instrumentation unit.

Turn lights
- pick the turn lights signal from the original instrumentation connector
- connect it to one of the analog channels of your AiM dash (23 pins optional wiring harness), using Pin1 of the Binder connector.

If signals for right and left directions are separated and are going to be used with an MXS1.2 Strada, with one LED dedicated to turn lights, it is recommended to join the two channels together. To do this use two diodes (1N4148) as in the diagram below:
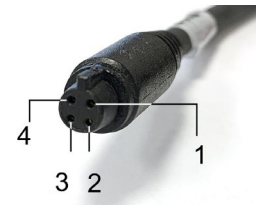
High beam/Low beam
- pick the high or low beam signal from the original instrumentation connector
- connect it to one of the analog channels of your AiM dash (23 pins optional wiring harness), using Pin1 of the Binder connector.

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2.2 – Fuel level/reserve signals

Fuel reserve warning lamp can be associated to an analog signal coming from the fuel level sender or from a reserve switch; this last is very common on bikes without fuel level indication.
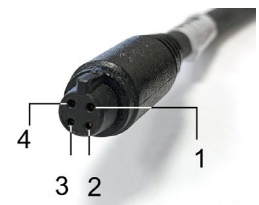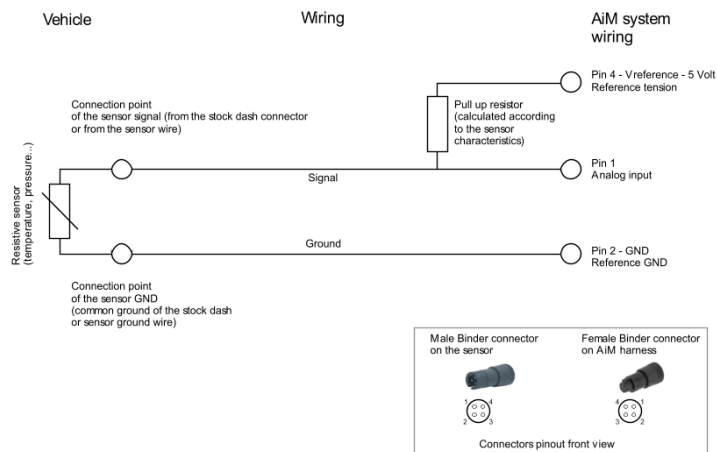
Fuel
- pick the fuel level/reserve signal from the original instrumentation connector, or from the fuel pump connector, where the sensor pins are available.
- connect it to one of the analog channels of your AiM dash (23 pins optional wiring harness), using Pin1 of the Binder connector.

Fuel level – connection notes

Fuel level senders generally output a variable resistance signal, thus an additional pull up resistor has to be added. The value of this pull up resistor, shall be 9 times greater than the maximum value the fuel sender shows when measuring its resistance (Ohm) at full and empty levels, with ignition key off. Should this value not correspond to an available resistor, select a value rounded off by excess.

The pull-up resistor is to be bridged between Vref (Pin4) and the Analog Input (Pin1) of the Channel's Binder connector (23 pins optional wiring harness).

Picking this signal from the original instrumentation connector, the sensor ground wire (GND) may not be available: in this case use the common ground and link it to Pin 2 of the Binder connector.

Sensors

Fuel reserve – connection notes

Fuel reserve signals generally output a variable resistance signal generated by an NTC thermistor. This specific sensor requires a current loop to work, thus an additional pull up resistor has to be added.

The value of this pull up resistor, shall be in the range of 40-80 Ohm and this must feature a maximum power of 3W due to the high current flowing through it.

The pull-up resistor is to be bridged between the vehicle switched power (12V) and the Analog Input (Pin1) of the Channel's Binder connector (23 pins optional wiring harness).

Picking this signal from the original instrumentation connector, the sensor ground wire (GND) may not be available: in this case use the common ground and link it to Pin 2 of the Binder connector.
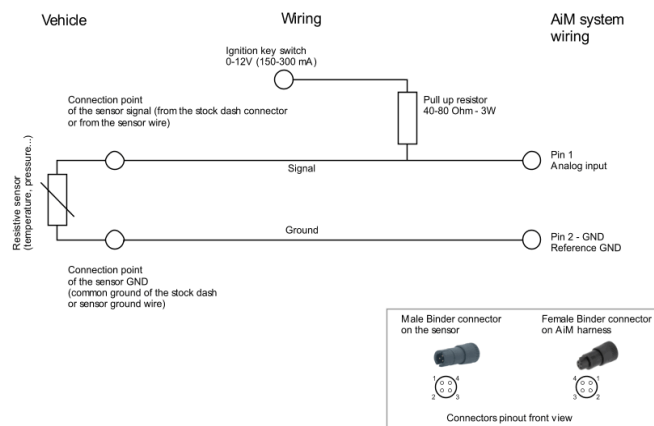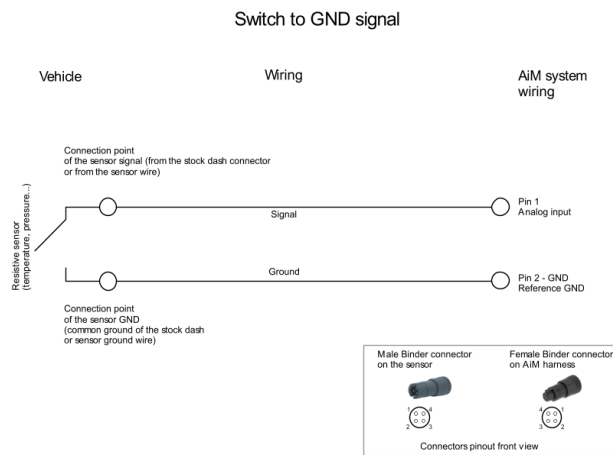
Sensors

2.3 – Oil pressure/level signals

Oil alarm warning lights are generally driven by switched to ground signals when activated; when released they are pulled up at a voltage of 5V or 12V. So they act as digital ON/OFF status signals.

This warning lamp can also be linked to an AiM oil pressure sensor, to be chosen among those available in the AiM catalogue. Check them out on AiM website (www.aim-sportline.com) – Products – Sensors.

Oil pressure/level switch
- pick the low oil pressure/level signal from the original instrumentation connector, or directly on the sensor/switch pins
- connect it to one of the analog channels of your AiM dash (23 pins optional wiring harness), using Pin1 of the Binder connector.

AiM oil pressure sensor
- Connect the sensor to one of the analog channels of your AiM dash (23 pins optional wiring harness). If using a customized harness, be sure to connect signal, ground and Vref (5V) or Vbat (12V) power – according to the sensor used.

On-board analog sensors
- In this case be sure to know their connection diagram, for correct connection, and their characteristic curve, to fill the custom sensor table in Race Studio 3 - Custom Sensors.

Sensors

2.4 – Water temperature signals

This warning lamp can be linked to an AiM water temperature sensor to be chosen among those available in the AiM catalogue, check it out on AiM website (www.aim-sportline.com) – Products – Sensors.

AiM water temperature sensor
- Connect the sensor to one of the analog channels of your AiM dash (23 pins optional wiring harness). If using a customized harness, be sure to connect signal, ground and Vref (5V).

On-board analog sensors
- In this case be sure to know their connection diagram, for correct connection, and their characteristic curve, to fill the custom sensor table in Race Studio 3 - Custom Sensors.

3 – Race Studio 3 configuration

To setup the signals received by AiM dashes using RS3, proceed as explained below:

- run Race Studio 3
- select "Configurations" [⚙] : the section main page appears
- to create a new configuration, select "New", then the device you are setting up, fill in a name and a comment for the configuration and click "OK"
- to modify an existing configuration, double click on it.
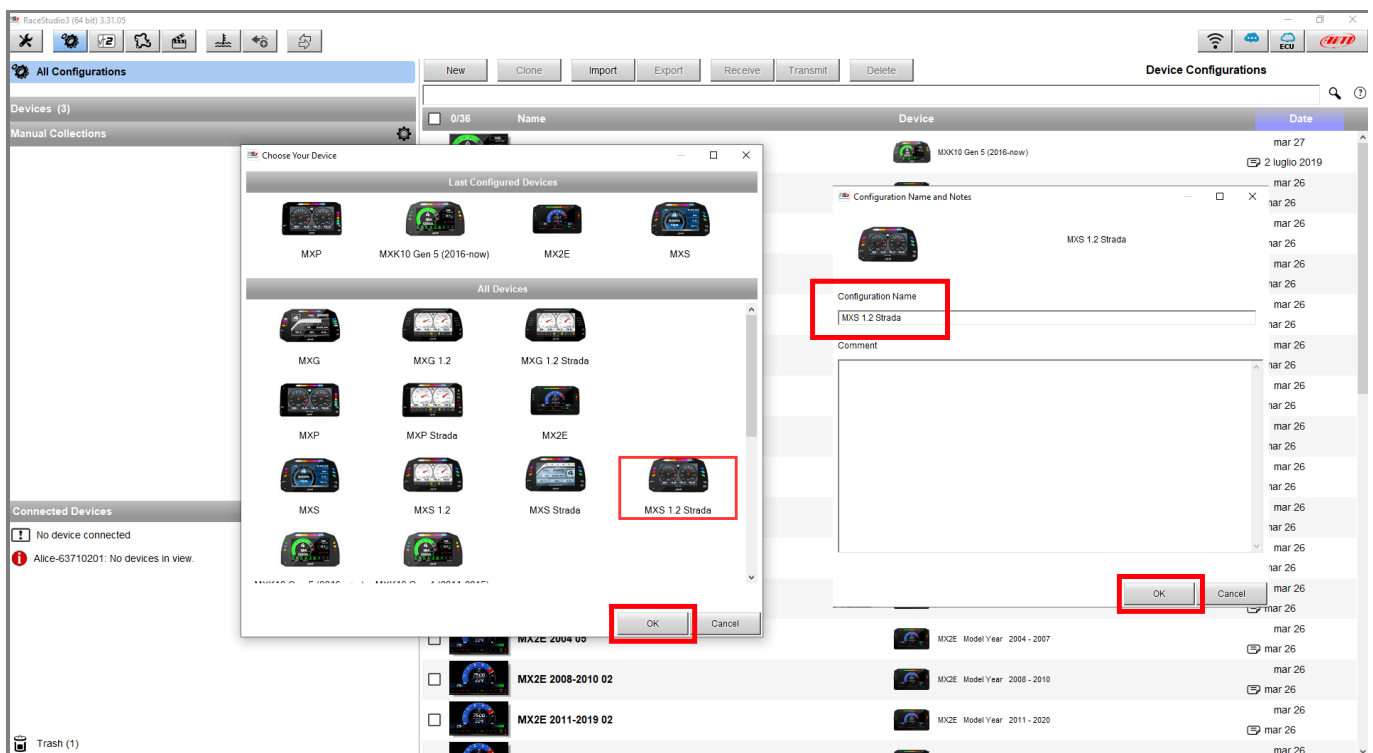

By default, the software enters the "Channels" tab of the selected configuration, this shows the device analog/digital channels with their corresponding functions.

To transmit the configuration:
- Connect the AiM device to the PC with the supplied USB cable
- Select "Transmit" from the top bar to transfer the configuration to the unit

Sensors

3.1 – Turn lights and high/low beam
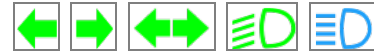
To configure turn lights and high/low beam warning LEDs you need to:
- setup one of the analog/digital inputs in the "Channels" tab
- configure the specific LED in the "Shift Lights and Alarms" tab

Setup the analog/digital input
- in the "Channels" tab select the channel you want to set
- after having set the "Name", select "Digital" and "close to "VBatt". No need to activate the internal pull down. Make sure the type of signal is "Monostable" and make your choice on the labels and if the channel needs to be logged

Proceed the same way for high/low beams and turn lights.

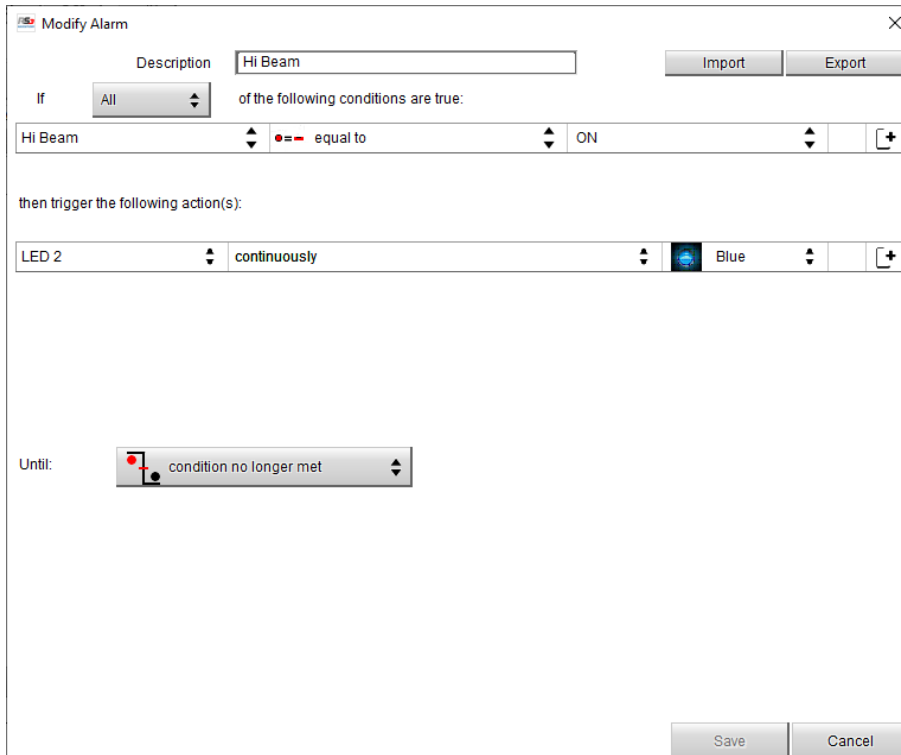**Sensors**

Configurate the alarm LED in "Shift Lights and Alarms" tab

- in the "Shift Lights and Alarm" tab press "add New Alarm" to set a new alarm
- fill in its name, the channel to set it on and the active LED condition (equal to: ON)
- choose the appropriate LED and its working mode (colour, blinking frequency etc) and "Save"
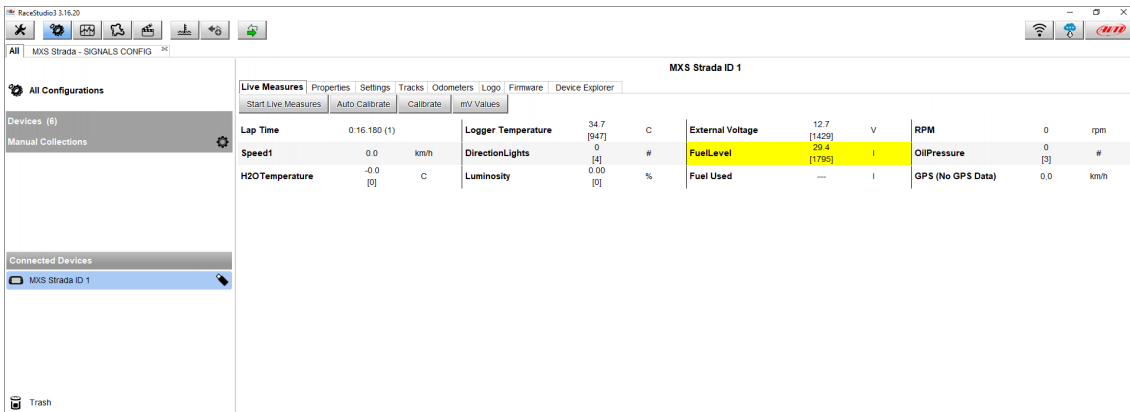
Sensors

3.2 – Fuel level warning lamp

To configure the low fuel level lamp, you need to:
- find, with RS3 Live Measures, the corresponding voltage read by AiM device to fuel levels
- create a custom sensor in RaceStudio3
- setup one of the analog/digital inputs in the "Channels" tab
- configure the specific LED in the "Shift Lights and Alarms" tab

Find the corresponding voltage
- with the AiM dash switched on and connected, press "Device" ( ) on Race Studio 3 top bar
- select the connected device
- press "Live Measures" and take note of the voltage values of the **fuel level sensor,** with the fuel tank empty and then full (press "mV" to read the voltage). For a more accurate reading perform the procedure adding the fuel step by step and taking note of mV values.
- if using a **fuel reserve sensor switch**, with no level indication, to have a more accurate reading take note of the values read by the AiM dash, with the fuel tank full and then with the tank empty. Read these two values after waiting for 5 minutes with the ignition switched on. It is suggested to read the values with the battery fully charged or the engine running.
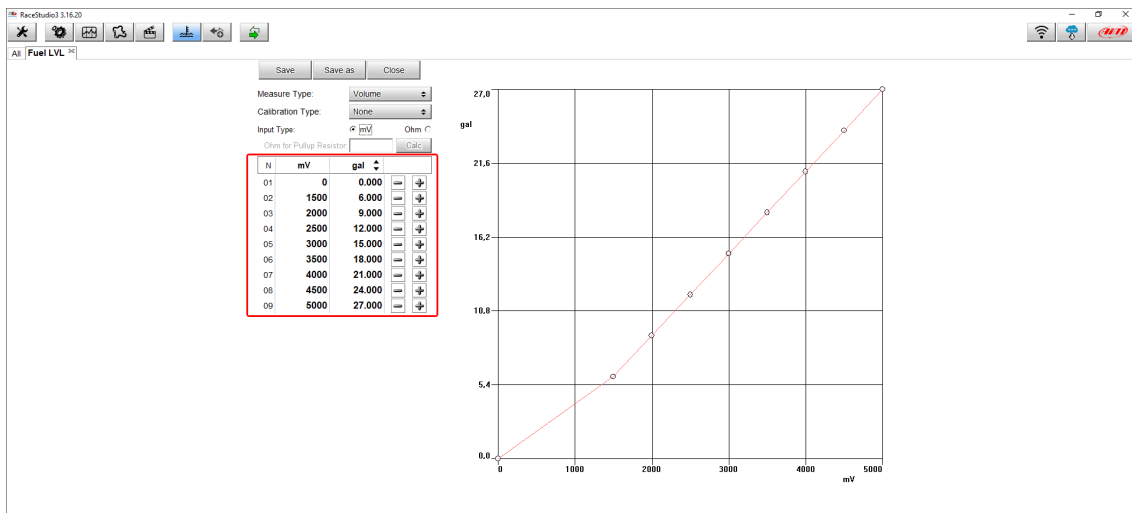
Sensors

Create a custom sensor
- click "Custom sensor" (⚓) on Race Studio 3 top bar
- in the page that appears click "New" to create a new sensor
- fill in the panel that appears with a name (i.e. "Fuel LVL") and a comment and click "OK"

If using a **fuel level sensor**:
- the window here below appears, then set:
    - Measure Type: Volume
    - Calibration Type: None
    - Input Type: mV
- fill in the table with the values in mV and the corresponding fuel volume (litres or gallons)
- click "Save" and the sensor just created is added to the list under the sensor function "Volume". Note that the "Fuel level" can also be expressed in percentage ("Pct Fuel Level"), in this case choose the voltage corresponding to the different filling percentages

Sensors

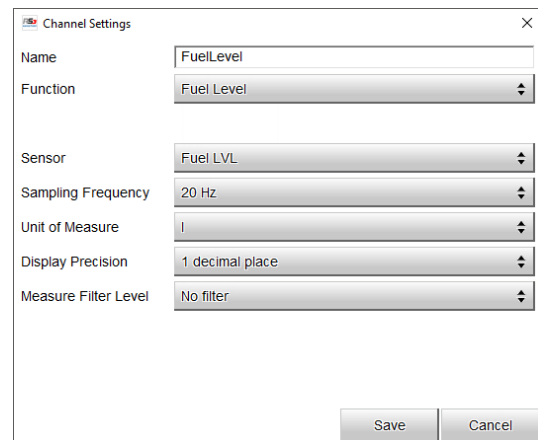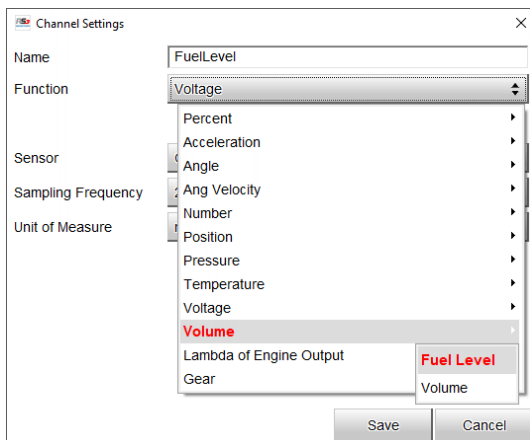If using a **fuel reserve sensor**:
- in the window, shown here above, set:
  - o Measure Type: Number
  - o Calibration Type: None
  - o Input type: mV
- fill in the table with the values in mV corresponding to empty tank (1.0) and full tank (0.0)
- click "Save" and the sensor just created is added to the list under the sensor function "Number"

Setup the analog/digital input
- in the "Channels" tab select the channel you want to set
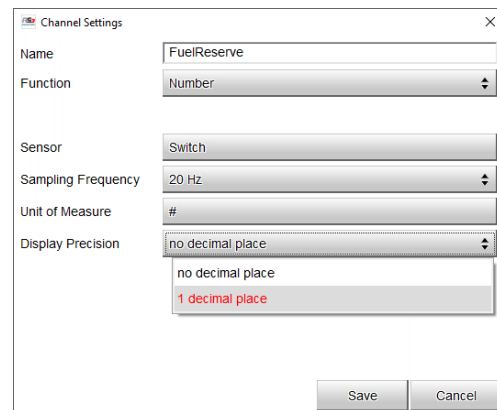
If using a **fuel level sensor**:
- After having set the "Name", select "Analog", the function "Volume", sub-function "Fuel Level" and the sensor just created, as in the example below, and press "Save".
  Or set the function "Percent", sub-function "Pct Fuel Level", the sensor just created and "Save"
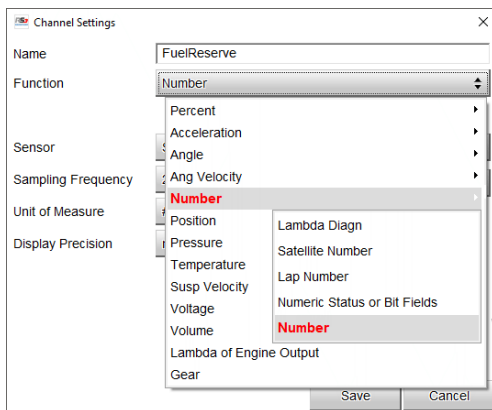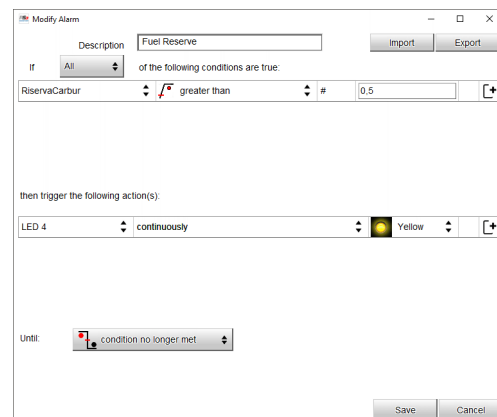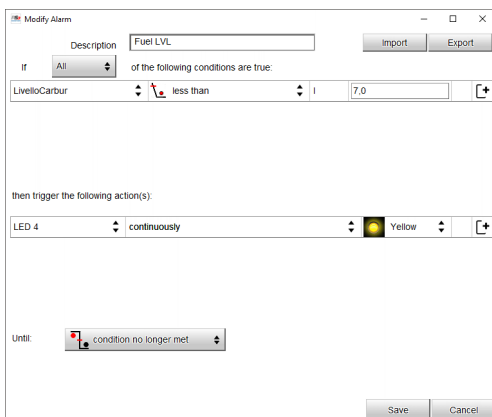
Sensors

If using a **fuel reserve sensor**:
- after having set the "Name", select "Analog", the function "Number", sub-function "Fuel Level" and the sensor just created, as in the example below
- also set "**Display precision**" to "**1 decimal place**" (right image below) and press "Save"

Configure the alarm LED in "Shift Lights and Alarms" tab
- in the "Shift Lights and Alarm" tab press "add New Alarm" to set a new alarm
- fill in its name, the channel to set it on and the active LED condition.
- With a **fuel level sensor** set a threshold value under which the lamp switches on. The threshold value refers to fuel litres/gallons or to the percentage, according to the function set.
- With a **fuel reserve sensor** set a threshold value higher than 0.5: be sure that the channel has been configured with one decimal.
- choose the appropriate LED and its working mode (colour, blinking frequency etc) and "Save"

3.3 – Low oil pressure/level warning lamp

If using the **oil pressure/level switch**, to configure the low oil pressure/level lamp you need to:
- setup one of the analog/digital inputs in the "Channels" tab
- configure the specific LED in the "Shift Lights and Alarms" tab

Setup the analog/digital input
- in the "Channels" tab select the channel you want to set
- after having set the "Name", select "Digital" and "close to ground", also tick the box to activate the internal pull up. Make sure the type of signal is "Monostable" and make your choice on the labels and if the channel needs to be logged

Configurate the alarm LED in "Shift Lights and Alarms" tab
- in the "Shift Lights and Alarm" tab press "add New Alarm" to set a new alarm
- fill in its name, the channel to set it on and the active LED condition (equal to: ON)
- choose the appropriate LED and its working mode (colour, blinking frequency etc) and "Save"

If using an **oil pressure sensor** (AiM or OEM), to configure the low oil pressure/level lamp you need to:

14

Sensors

- create a custom sensor in Race Studio 3 (only for OEM sensors)
- setup one of the analog/digital inputs in the "Channels" tab
- configure the specific LED in the "Shift Lights and Alarms" tab

Create a custom sensor (only for OEM sensors, not for AiM sensors)
- click "Custom sensor" ( ) on Race Studio 3 top bar
- in the page that appears click "New" to create a new sensor
- fill in the panel that appears with a name (i.e. "Oil Press") and a comment and click "OK"
- in the window that appears, set:
- Measure Type: Pressure
- Calibration Type: None
- Input type: mV
- Fill the table with the pressure and the corresponding voltage values supplied by the manufacturer.

Setup the analog/digital input
- in the "Channels" tab select the channel you want to set
- after having set the "Name", select "Analog", the function "Pressure", sub-function "Oil Pressure" and the AiM sensor you are using, or the custom sensor created, and press "Save".
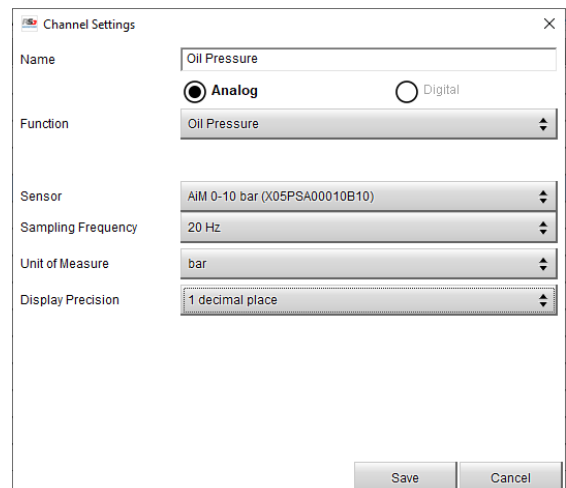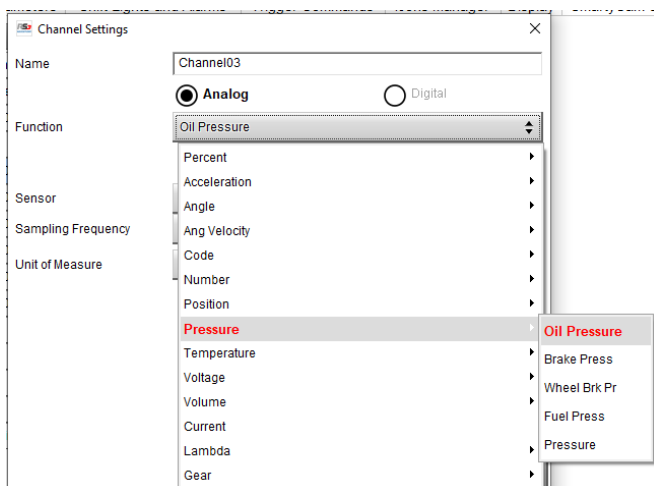
Sensors

Configurate the alarm LED in "Shift Lights and Alarms" tab
- in the "Shift Lights and Alarm" tab press "add New Alarm" to set a new alarm
- fill in its name, the channel to set it on and the active LED condition, setting the threshold value under which the lamp switches on. There can be more conditions, like in the example below
- choose the appropriate LED and its working mode (colour, blinking frequency etc) and "Save"

Sensors

3.4 – Water temperature warning lamp

It is suggested to use one of AiM temperature sensors (PT100 thermoresistor) or, if available, the information coming from the ECU data or diagnosis line (CAN bus, RS232, K-Line).

If using OEM sensors, you additionally need to:
- find, with RS3 Live Measures, the corresponding voltage to water temperature
- create a custom sensor in RaceStudio3

The following steps are common for AiM sensors and OEM ones
- setup one of the analog/digital inputs in the "Channels" tab
- configure the specific LED in the "Shift Lights and Alarms" tab

Find the corresponding voltage (only for OEM sensors, not for AiM sensors)
- with the AiM dash switched on and connected, press "Device" (⇧) on Race Studio 3 top bar
- select the connected device
- press "Live Measures" and take note of the voltage values corresponding to measured temperatures (press "mV" to read voltages); for a more accurate measurement perform the procedure when the circuit is cooling down, noting these values step by step (i.e 5-10 degrees at a time).
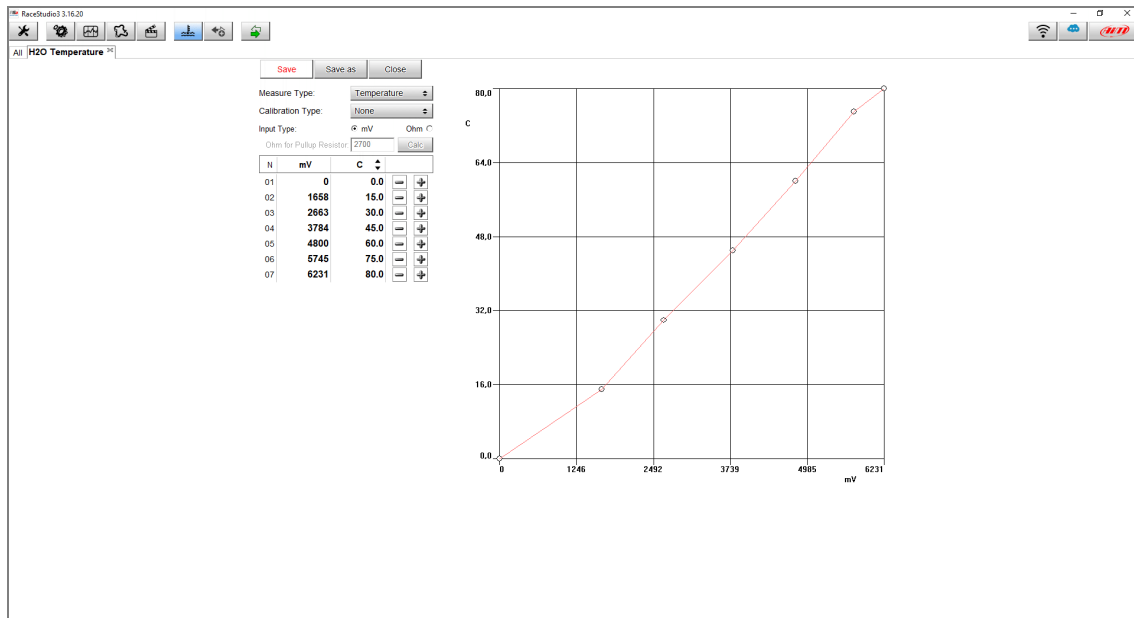
Sensors

Create a custom sensor (only for OEM sensors, not for AiM sensors)
- click "Custom sensor" ( ) on Race Studio 3 top bar
- in the page that appears click "New" to create a new sensor
- fill in the panel that appears with a name (i.e. "H2O Temp") and a comment and click "OK"
In the window that appears, set:
  - o Measure Type: Temperature
  - o Calibration Type: None
  - o Input Type: mV
- fill in the table with the values in mV and the corresponding temperature (°C or °F)
- press "Save" and the sensor just created is added to the list under the function "Temperature".

Sensors

Setup the analog/digital input
- in "Channels" tab select the channel you want to set
- after having set the "Name", select "Analog", the function "Temperature", sub-function "Water Temp" and the AiM sensor you are using, or the custom sensor created, and press "Save".
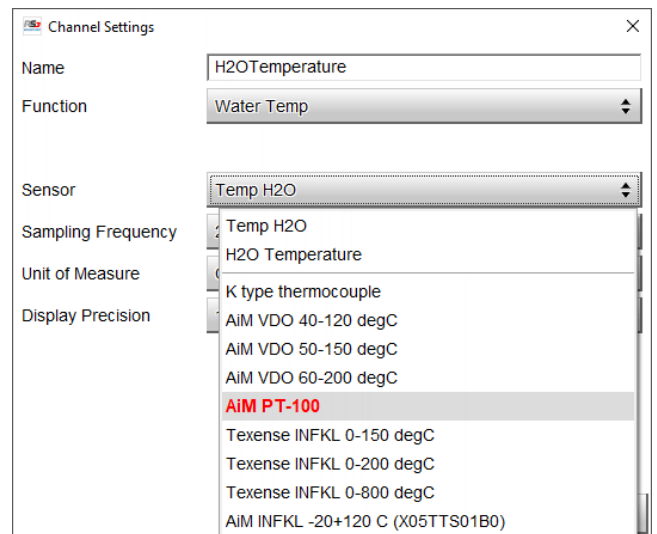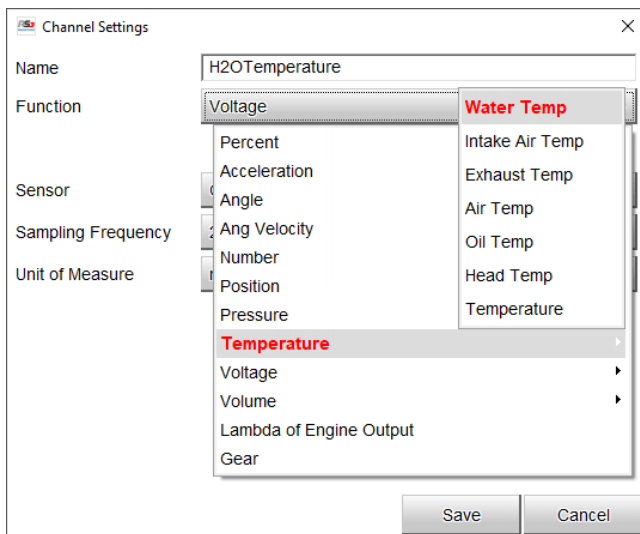
Sensors

Configurate the alarm LED in "Shift Lights and Alarms" tab

- in the "Shift Lights and Alarm" tab press "add New Alarm" to set a new alarm
- fill in its name, the channel to set it on and the active LED condition, setting the threshold value over which the lamp switches on.
- choose the appropriate LED and its working mode (colour, blinking frequency etc) and "Save"