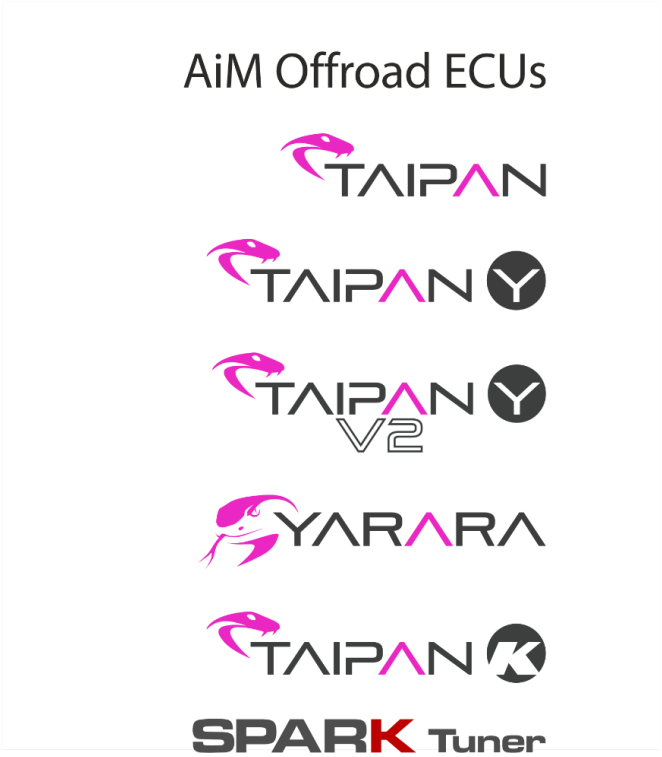
Tuner Manual
AiM ECUs and Spark software

Release 1.13



INDEX

1 – Introduction

Taipan/Taipan Y, Taipan K and Yarara are the AiM ECUs designed for off-road bikes.

Their **part numbers** are:

- Taipan **XE1ECUCBO**
- Taipan Y **XE1ECUCB1**
- Taipan Y v2* **XE1ECUTYV2**
- Taipan K **XE1ECUTK0**
- Yarara **XE1ECUYA0**

* For Yamaha cross YZ 250 F 2024 and Yamaha cross YZ 450 F 2023-2024

Each ECU can have **optional accessories** as follows:

- Handle Bar switch **XE1HBS000**
- CAN UC Bridge Tuner version **XE1UCBT00**

Additional cables or harnesses are also available

- All ECUs 2m extension cable **V02596020**
- All ECUs 4m extension cable **V02596030**
- 50cm extension cable for connection with Solo 2 DL **V02589120**
- Analog channels and second injection harness **V02596060**
- Analog channels harness **V02596070**
- Second Innjection harness **V02596080**
- Yarara additional harness **V02596090**

Please refer to "Appendix "C for further information about ECUs accessories, cables and harnesses.

All ECUs are easily installable on most of the off-road bikes, as described in Chapter 3.

2 – AiM off road ECUs connectors

AiM ECUs ECU have four connectors:

- the main connector, compatible with most of the off-road bikes
- a CAN connector, to be connected to the Handlebar Switch and to an external datalogger.
- a second CAN connector, to be connected to the UC Bridge in order to communicate with the PC.
- a fourth connector, to be connected to spare sensors and eventually to a second injector.

Yarara ECU has two connectors:

- the main connector, compatible with most of the off-road bikes
- a CAN connector, for Yarara optional harness that allows connection with
    - UC Bridge
    - Handlebar Switch (HBS)
    - an external datalogger
    - other expansions

Please note: AiM off road ECUs and accessories dimensions and pinout are described in Appendix B.

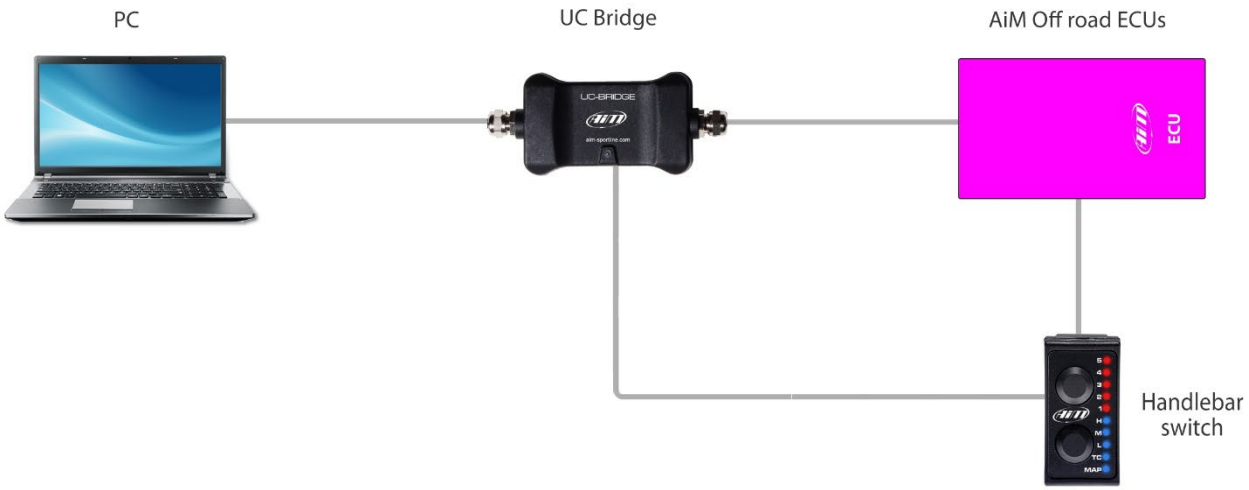
3 – Compatibilities

AiM off road ECUs, Spark tuning software and accessories, are compatible with many model brands and types; please refer to Taipan page, compatible models of AiM website at www.aim-sportline.com. This list is constantly updated.

4 – Accessories: Handlebar Switch and UC Bridge

AiM off roads ECU have these accessories:

- Handlebar switch: the fastest way to apply strategies while riding.
- UC Bridge: an USB to CAN dongle used for Aim off road ECUs-Spark tuning software communication.



4.1 – Handlebar switch

The Handlebar Switch is the best way to change the behavior of your motorcycle; it features 2 pushbuttons and 10 LEDs and manages the following settings:

- Running map change
- Fuel corrections
- Traction control activation
- Launch control activation.

The lower pushbutton is used to select a feature while the upper pushbutton is used to choose one of the available options in the selected feature.

Finally, as described in section 4.1.5, you may use the LEDs on the handlebar switch as a Shift Light Module: in this case, at the desired RPM value the LEDs will start blinking, helping you changing gear.

When the ECU is powered ON Handlebar Switch will display the running map. The example to the right shows that map 2 is the running one.

4.1.1 – How to change Maps:

To change the running map:

- push the lower button until when the MAP Led is enlightened in blue
- push the upper button for changing the running map
- if the selected map is valid the respective LED will remain lit; else it will return to the previously selected valid map.

4.1.2 – How to apply corrections:

Correction is the possibility to get a richer/leaner fuel mixture at different RPM ranges: low, mid, high. The RPM thresholds as well as the percentage to apply along with the default value, are defined in a proper chapter in this manual (configuration-parameters- map switch – injector trims 8.2.5). To apply a correction:

- push the lower pushbutton to select at which RPM range (lower, mid, or high) you want to set the correction.
- use the upper button to set it:
    - Select Level 3 for No Correction
    - Select Level 4 and 5 for a fatter mixture.
    - Select Level 1 and 2 for a leaner mixture.

4.1.3 – How to use Traction Control:

Traction control is a system that aids in preventing driven wheel spin when excess power is applied. To activate it:

- keep pushed the lower button until the green LED beside the TC turns ON; if you want to de-activate it, press and hold the lower pushbutton again until the green LED turns OFF.
- With the TC enabled, use the upper pushbutton to select the strength of the Traction Control strategy with 1 being the minimum and 5 being the maximum.

Please note that Traction Control must be enabled for the selected Map: this will be done during the ECU Map configuration.

4.1.4 – How to activate Launch Control:

Launch control is an electronic aid to assist riders to accelerate from a standing start.
To activate it press and hold both upper and lower pushbuttons until the LEDs blink red, indicating that the strategy is engaged.

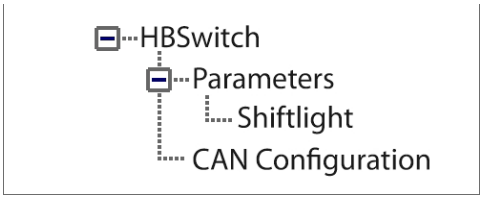
Please note: Launch Control must be enabled in the selected map.

4.1.5 – Configure the Handlebar Switch as a Shift Light Module:

A Shift light module is an array of LEDs that will begin flashing at a defined RPM value, aiding the rider to choose the optimal shift points. You may use the Handlebar Switch LEDs as a Shift Light after configuring as shown here. Please, connect and link the HBS to the UC Bridge through the CAN Connection.

- Open a new project and select the HBS image from Create blank project menu as shown below.

After the selection you will see this project tree:



Please, do not forget to click "Connect" Icon.

Shift light:
Shift lights Enabled: true or false, to set up if you want to have the shift lights on your HBS or not.
Shift lights RPM threshold: to set up the RPM value at which the LEDs will flash.

After configuring the Handlebar Switch connect it to the ECU expansion connector.

4.2 – UC Bridge

The **UC Bridge** is the connection between the CAN bus of the ECU and the USB port of your PC and is available with 2 different licenses:

- **User license**: an AiM ECU ECU comes with some basic maps that already give you performances better than the stock ones. All over the world some highly professional tuners offer specific maps that may better fit your requirements managing, for example, different exhaust systems, two injector kits, etc. You need UC Bridge to:
    - transfer new and different maps to your ECU through the User License UC Bridge
    - receive diagnostic information from AiM ECU

- **Tuner license**: with this license tuners can create maps, configurations and strategies designed for the riders motorcycle. The tuner can flash the ECU directly or send the file by email to allow the rider downloading and flashing their own ECU. All while preserving the tuners proprietary work with three layers of protection and security. The tuner can flash the files directly to the ECU or send them by e-mail to allow the rider downloading and installing all Maps in the ECU. This manual covers the use of the tuner license.

5 – ECU Available Configurations

AiM ECUs ECU is available in two different configuration statuses:

- **Configured ECU**: an already configured ECU is dedicated to the desired brand and model motorcycle. You may change maps and configurations but cannot change motorcycle brand or model.
- **ECU**: an ECU can be configured for the brand/model motorcycle you desire, simplifying the stock management of the tuners.

6 – Spark Software

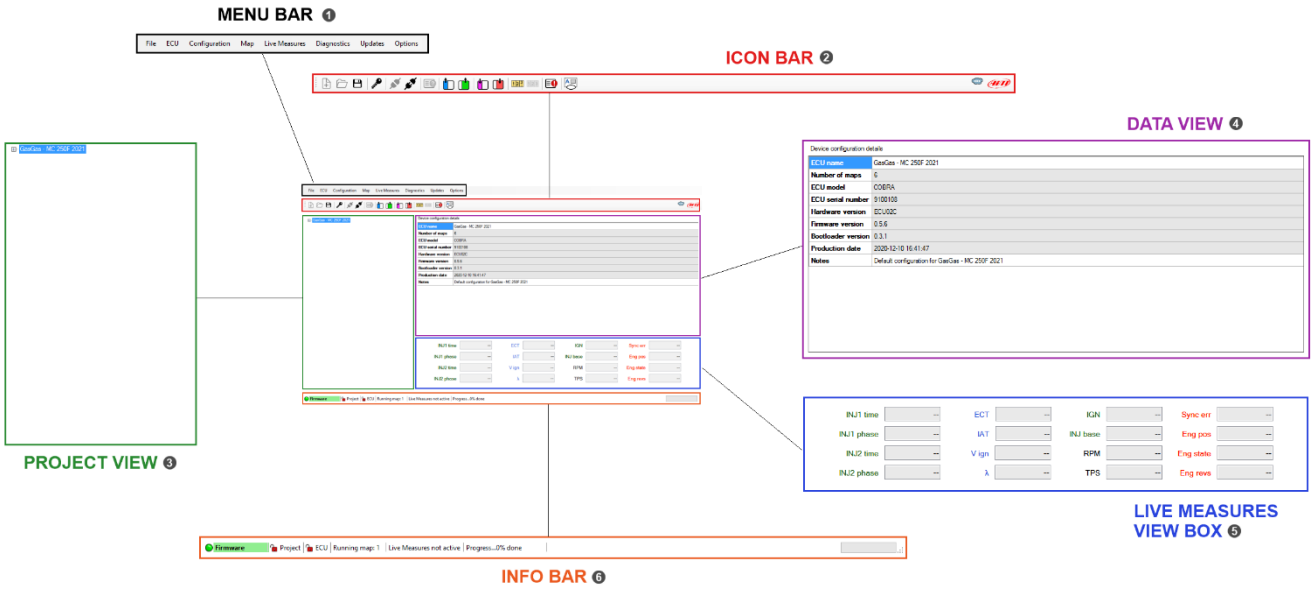
Spark is the AIM software used to configure and calibrate AiM ECUs. This document explains in detail each available function you can use with this software with a "tuner" license. To use the software, you must connect at least UC Bridge, otherwise you cannot create projects nor use all the functionalities of Spark.

Connecting UC Bridge tuner licence and the ECU to the PC you can create, read projects, write, and flash the ECU.

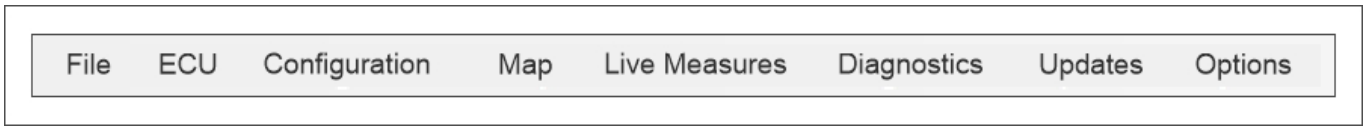
6.1 – Software overview

When you open the Spark software with UC Bridge connected, the first window appears as in the following picture. The six macro-areas here highlighted will be referred to as indicated here on the right. The following chapters describe each area in detail.

- Black Menu bar (1)
- Red Icon bar (2)
- Green Project view (3)
- Violet Data view (4)
- Blue Live Measures view box (5)
- Orange Info bar (6)



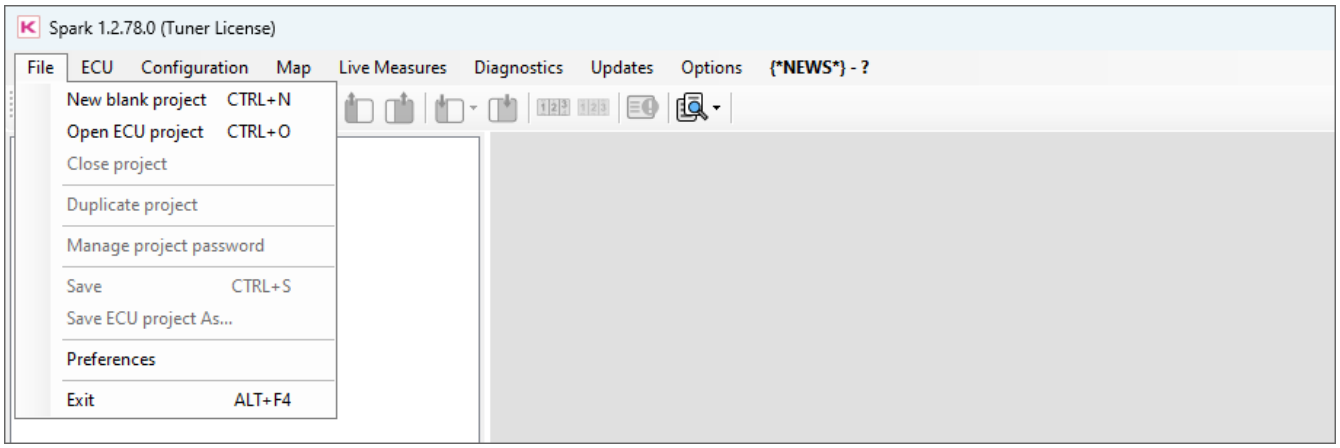
6.2 – Menu bar



This bar features all the available items that allow to manage the project, setup the ECU, monitor data.
Each item includes several functions here below listed. **Please note that**:

- **Connected** is intended to mean "physically connected": an ECU is "connected" to the PC when is connected to the UC Bridge and this last is connected to your PC.
- **Linked** means that the communication between PC and device is activated: this is done clicking  icon on the icons bar.

6.2.1 – File



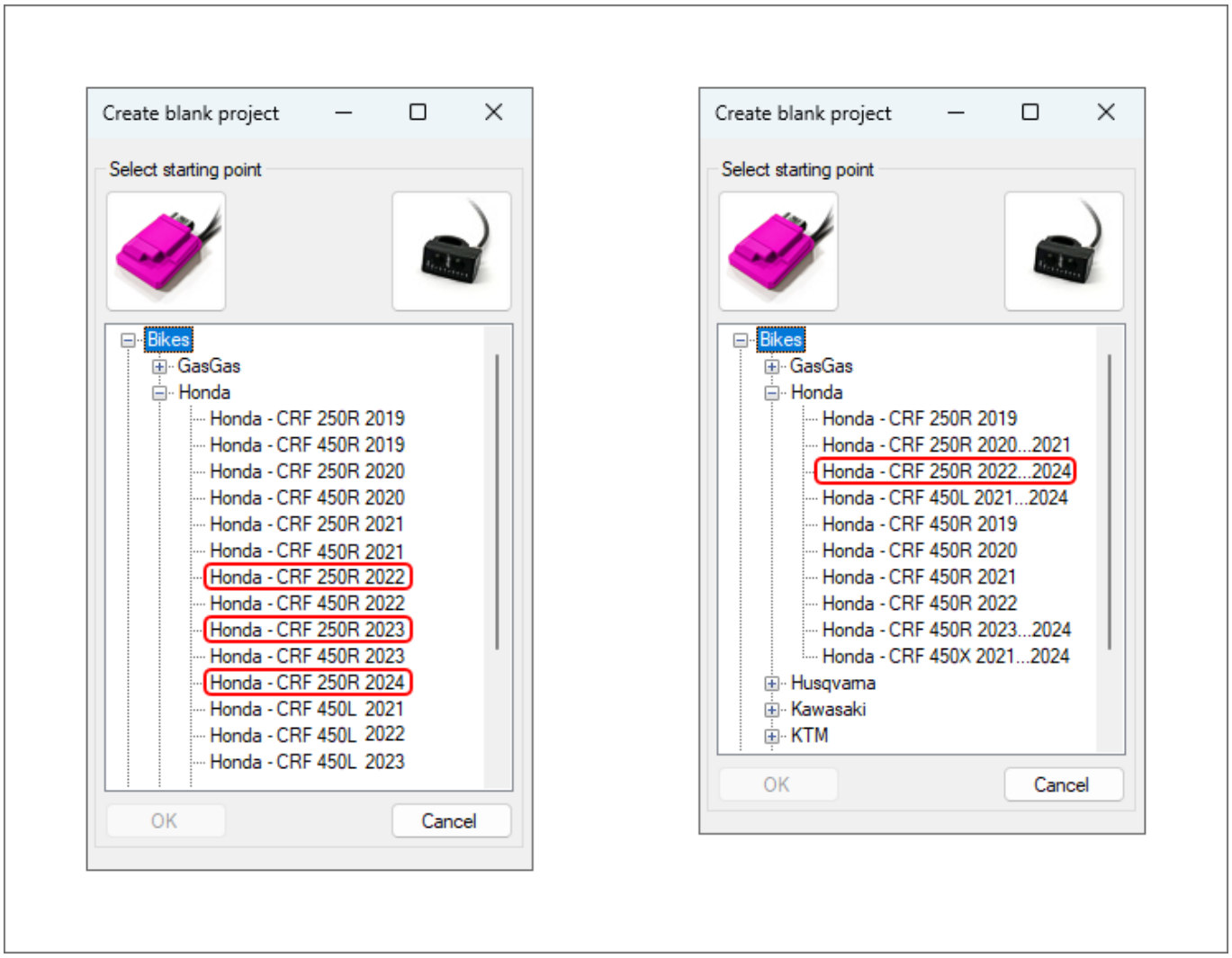
New Empty project: using this command you can create a new project, that is the sum of configuration, maps, strategies and other parameters. A list of available motorcycles will appear after the selection and selecting one of them you will be able to start.

Please note: you can create a project without connecting the ECU but UC Bridge must be connected to the PC.
This is the menu that will appear after the selection of starting a new project, then you can select the motorcycle type or the Handlebar Switch configuration.

- **Open ECU project:** opens a previously saved project
- **Close project:** closes the open project
- **Duplicate project:** duplicates a project into another compatible motorbike.

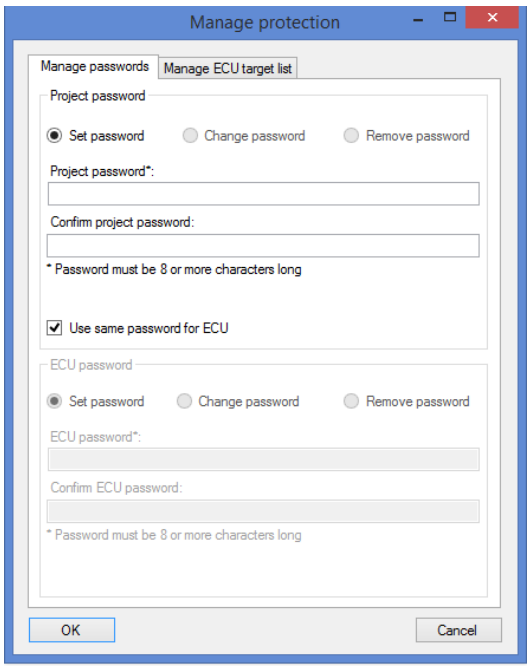
Please note: You need to make sure that the two motorbike/ATV models for which you are duplicating the project are compatible in terms of configuration and maps! AiM does not take any responsibility for failure due to this feature.

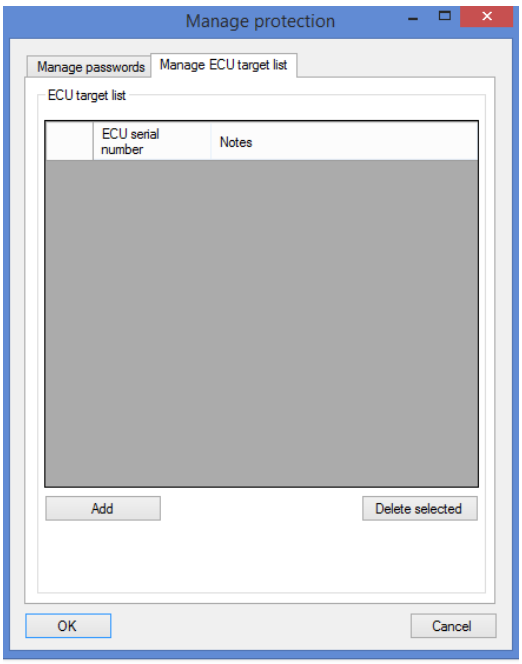
Bikes models with the same project have been grouped thereby reducing the number of items in the list and making the research easier. In the image below Honda CRF 250R from 2022 to 2023 where three items (left image) and now are grouped in one item only (right image).



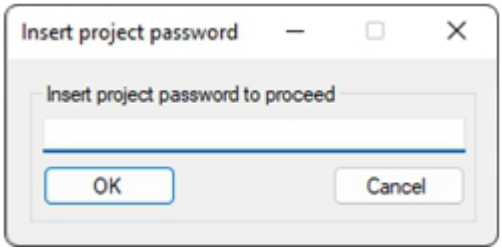
- **Manage project password (shortcut icon).** The tuner that has developed a project may protect it with a password: when a protected project is sent to a customer, only who has the password may open and eventually modify it.

  The tuner that develops a project may decide to give the possibility to send it to one ECU only or to some ECU(s): in this case, he needs to create a crypted version of the project, depending upon the SERIAL NUMBER of the ECUs that may receive it.
  In "Manage ECU target list "area you can add or delete a target ECU using its serial number.

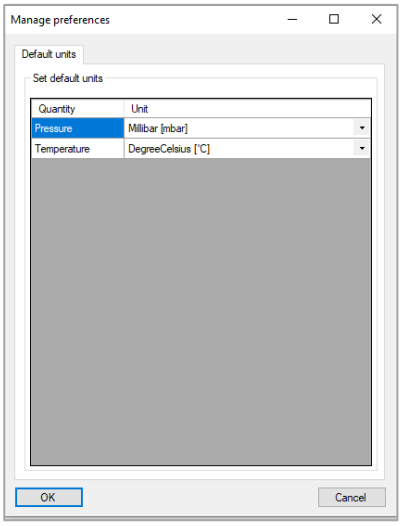




If a password is set when the project is reopened the password will be requested.

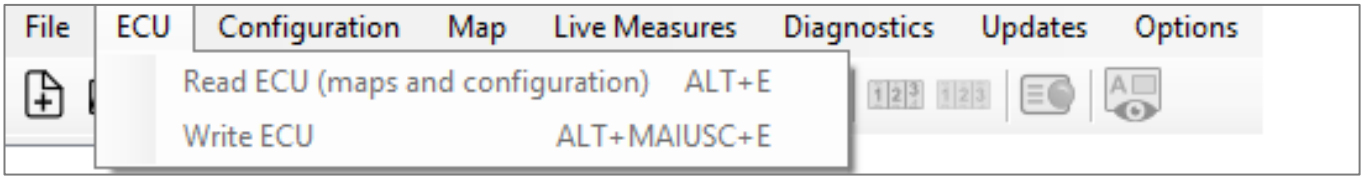


- **Save:** to save the current project
- **Save ECU project As...:** to save a copy of the current project with a new name.
- **Preferences:** To set up your country measurement units.



- **Exit:** to close Spark.

6.2.2 – ECU



Read ECU (maps and configuration): this command is used to read from the ECU all the maps and the configurations flashed in. To do so follow these steps:

- open a project selecting the proper motorcycle
- connect and link the ECU
- read the ECU.

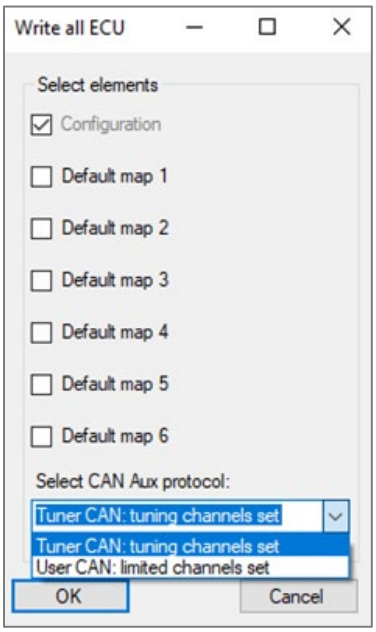
Please note: the ECU comes with the base map OPEN. If you have a Tuner UC Bridge you may read and modify the ECU as you wish. If the ECU stores maps produced by professional tuners and reasonably protected by a password you are required to set the proper password to read them.

Write ECU: This command is used to flash the configuration and maps selected into the ECU with the dedicated menu shown here below on the right; it appears executing this command.

Two different CAN protocols are available:

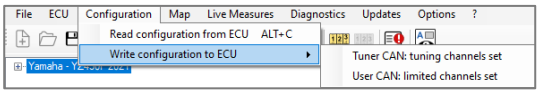
- Tuner CAN Protocol
- User CAN Protocol

Both are fully described in Appendix J.
The first one, **Tuner CAN Protocol**, is used when you need to send all the possible information managed by the ECU (66 channels) to the logger and is useful when you are tuning a motorcycle. The second one, **User CAN Protocol**, only transmits the most important channels (28 channels) and is to be chosen when you flash a configuration into the ECU of the customer.

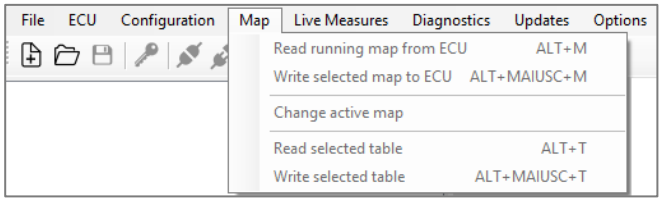


6.2.3 – Configuration

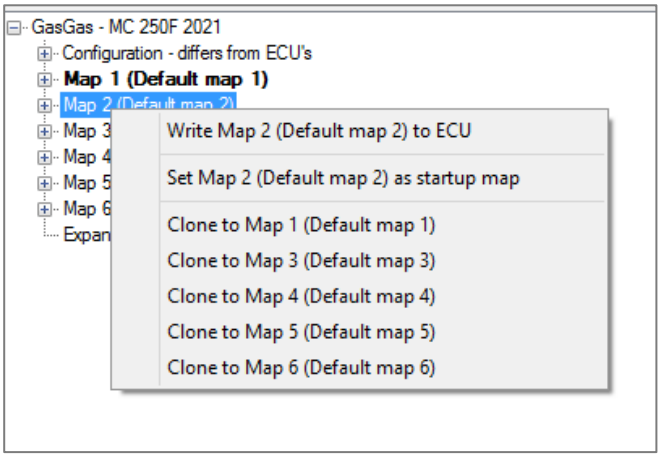
Read configuration from ECU: this command is used to read the configuration from the ECU.
Write configuration to ECU: this command is used to flash the configuration in the ECU.



6.2.4 – Map

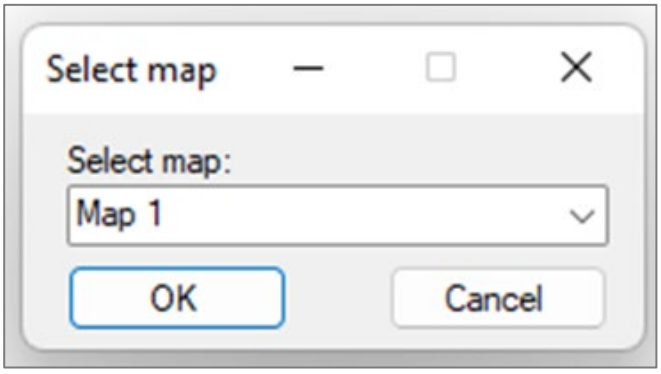


Read running map from ECU: this command is used to read the running map only.
Write selected map to ECU: this command is used to flash the desired map into the ECU. After having selected this feature, the following image appears.



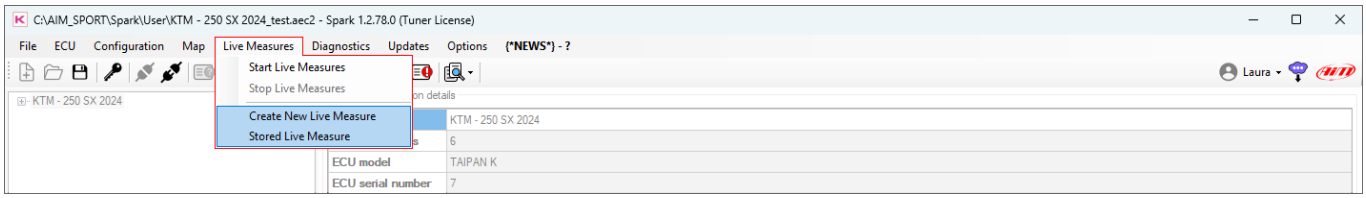
- select the desired map through the right click of your mouse.
- select the menu voice “Write Map”.

Finally, you can **clone the map** on other maps, for future developments.
Change active map: the active map (the map that is currently running) can be changed choosing from a proper selection menu.

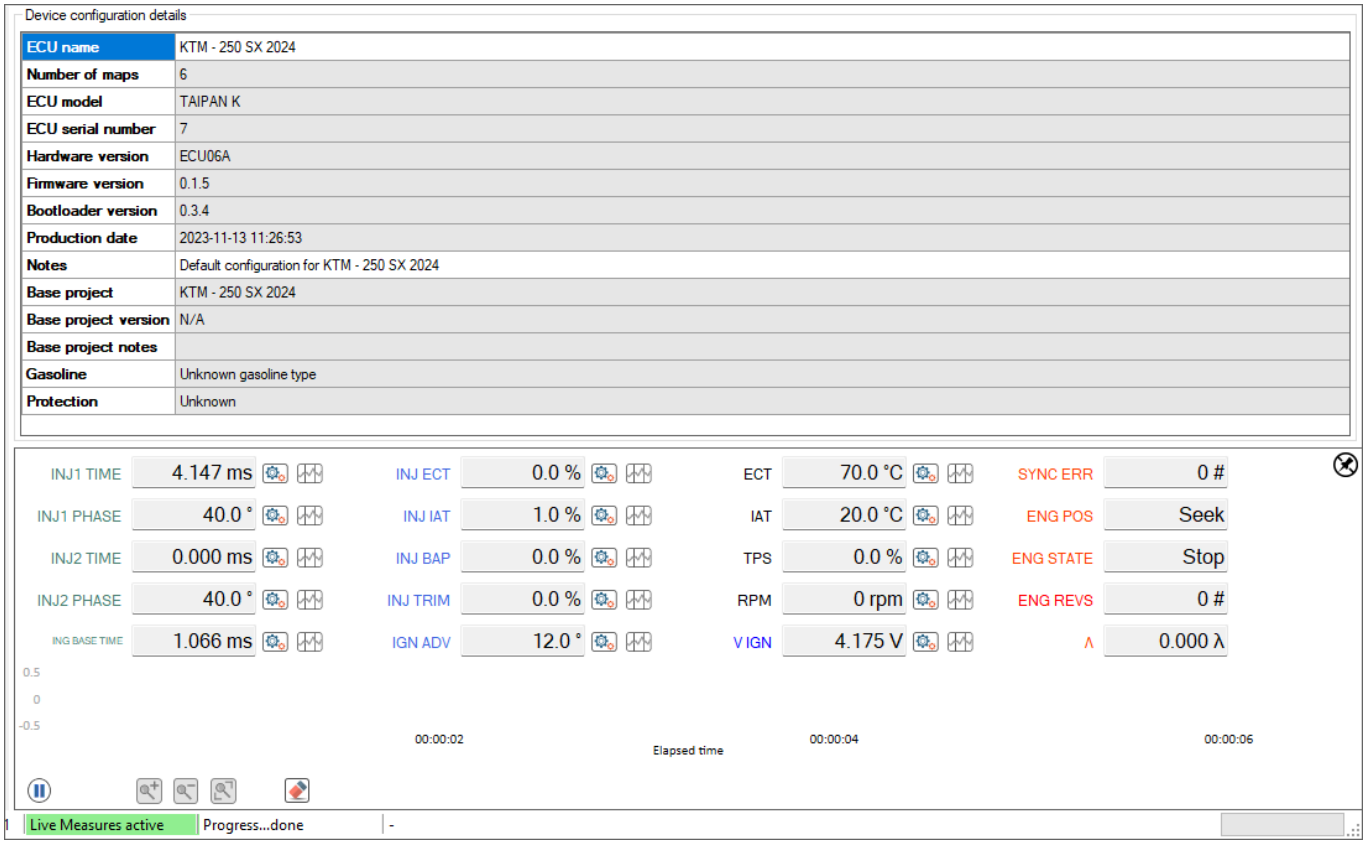


Read selected table: a selected table can be read from the running map.
Write selected table: the selected table can be written to the running map.

6.2.5 – Live Measures



Start Live Measures: this option is used to start Live Measures in Live Measures view box, once the project is opened and the ECU connected.



Stop Live Measures: stops live measures in Live Measures view box.
Hide Live Measures panel: hides Live Measures view box and expands the data view area just above.
Show Live Measures panel: Shows Live Measures view box.

Please note: All tables can be pinned/unpinned in the software view using these icons  you find top right of the software panels that allows this function (bottom panel in the image above). The panels hook/unhook from spark main window allowing the user to displace and resize it as desired, saving all functions. Once the window unhooked the icon switches to “Pin” icon indicating that if pressed the panel re-hooks to the main one.

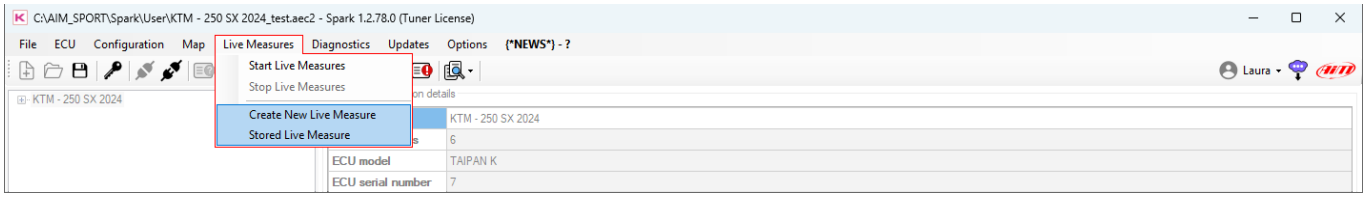
Live Measures view can be customized as preferred. Th image below shows Live measures default view on top and customized view bottom. To customize the view:

- enable the graph of the channel through the proper icon (**1**)
- press setting button (**2**)
- fill in min and max values (**3**)
- activate colours panel (**4**), select the desired colour and press "OK"
- both the name of the measure and the related graph are shown bold (**5**)

6.2.6 – Configurable live measures view

"Live Measures" menu shows two additional items:

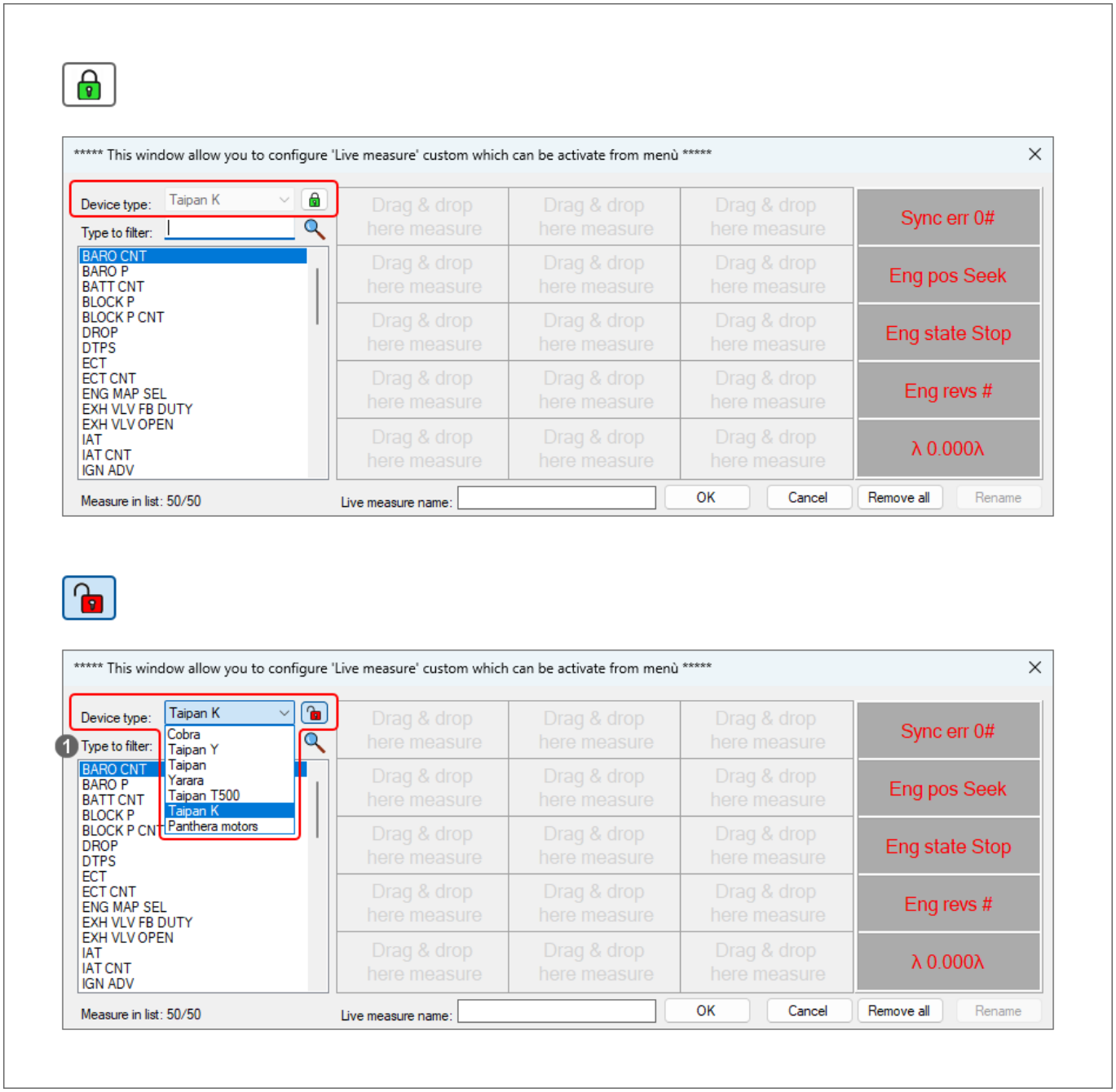
- "Create new live measures" and
- "Stored live measures"



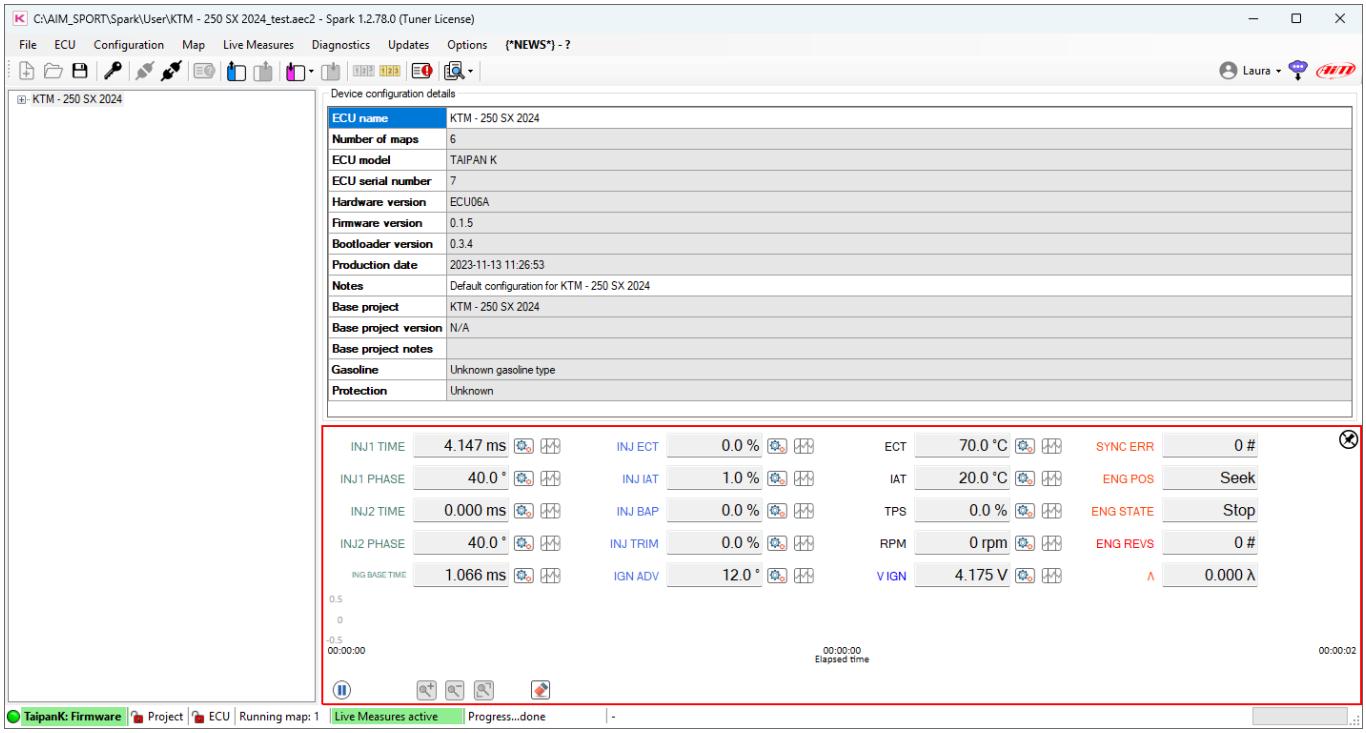
Please note: "Tuner default" template cannot be modified.

"**Create new Live Measures**" allows the user to create templates of measures that can be saved and recalled from "Stored live measures" option; this way it is possible to create different templates that fits different situations. Selecting this option the related panel is prompted. It shows "Device Type" option locked (top image); pressing the icon green it unlocks (not available in modify mode – bottom image) and it will be possible to change it. Opening the drop down menu the current ECU is highlighted. Changing the ECU the measures currently in the grid are deleted and replaced by those of the selected ECU. The far right column stays fixed for conformity with live measures window. Measures can be placed in the grid double clicking them; in this case they are placed sequentially by row starting from the first free cell.

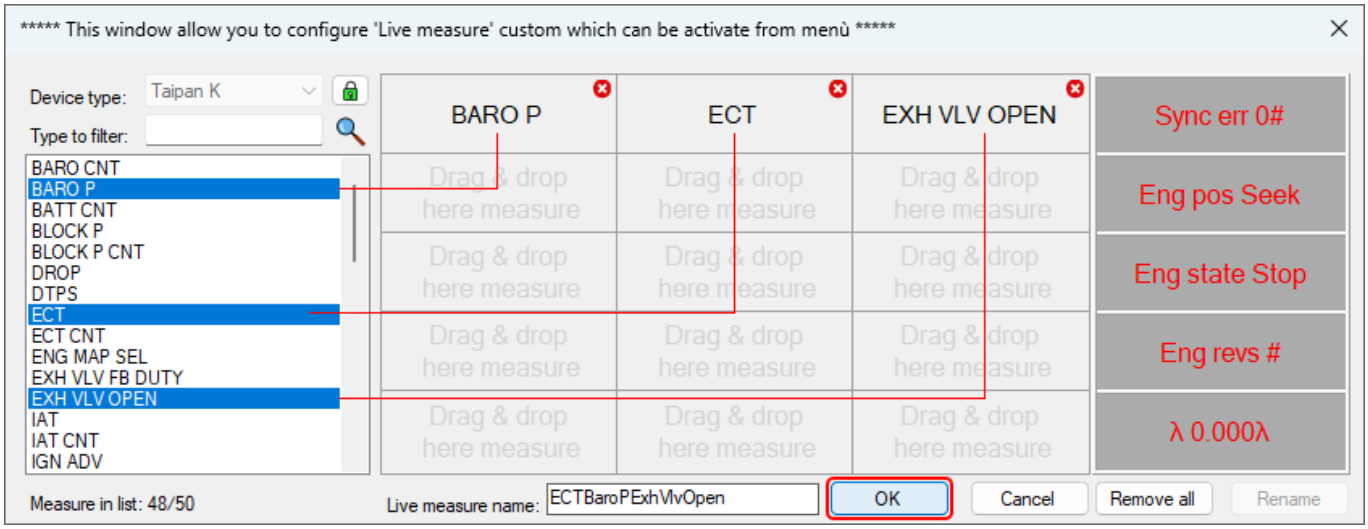
"Type to filter" box (**1** – bottom image) filters the measures according to the text you type in the box.



Starting from the default setting, here follows explanation of how to create, modify and activate a “Live Measures” setting. The image below shows user default live view setting highlighted by a red box.

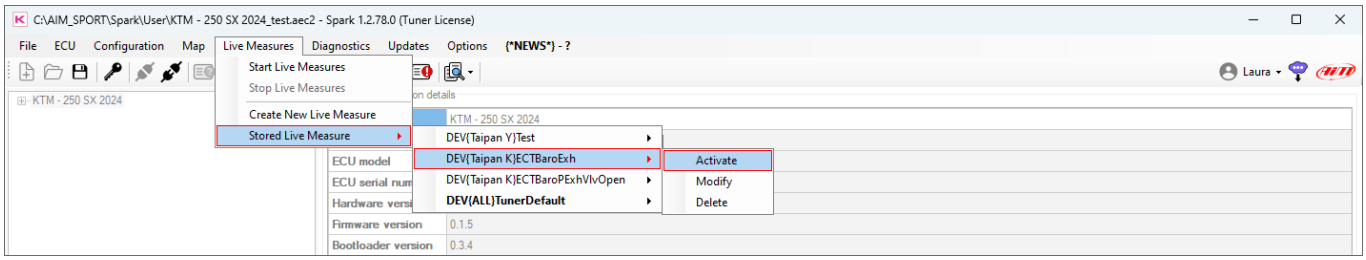


Following the path “Live Measure –> Create Live Measure” in the top menu bar the panel shown below is prompted. If you need to create a live measure setting for a different ECU unlock “Device Type” and select the ECU you need to create the setting for; to create a new live measure setting for the current ECU just double click on the measures you want to see or drag and drop them in the right part of the panel and press “OK”. The setting is saved.

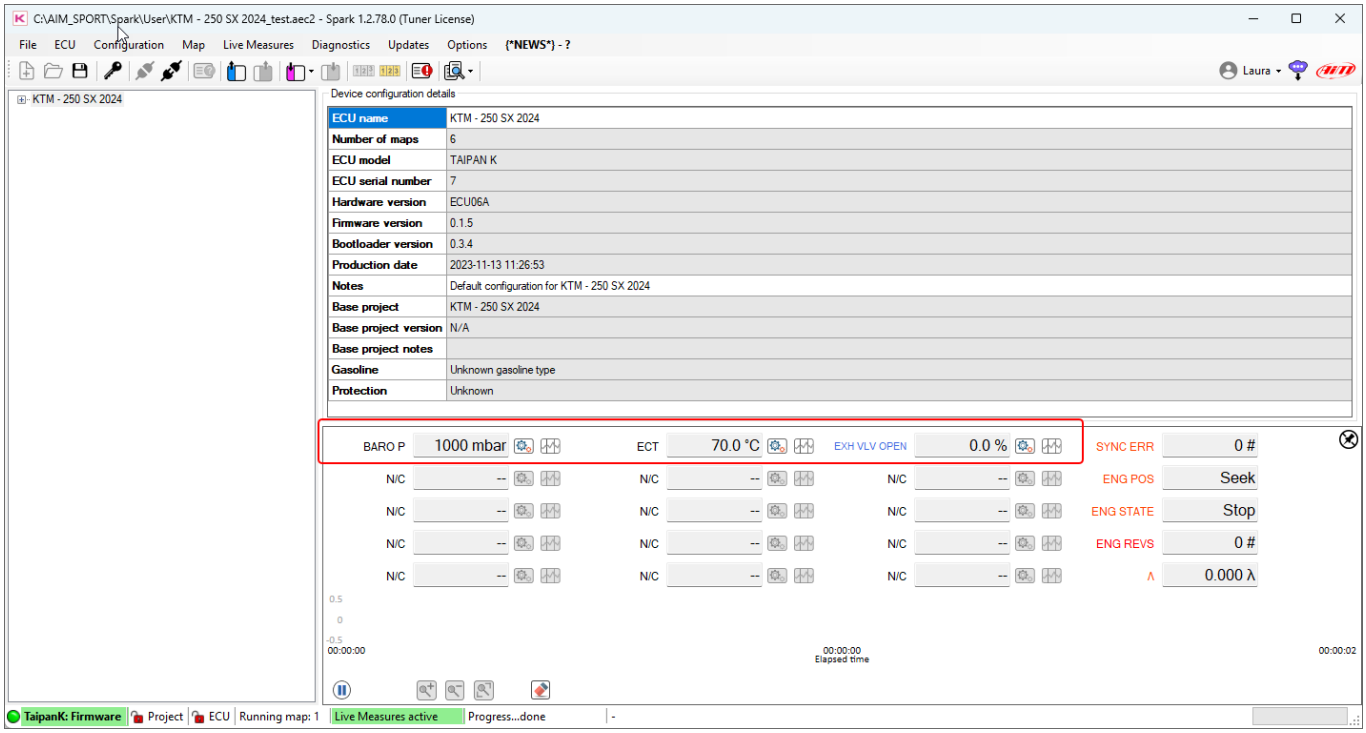


Once Live Measures created it is possible to:

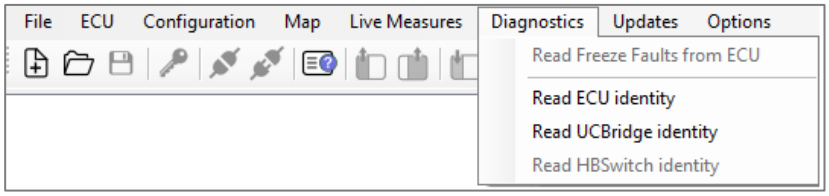
- Activate
- Modify or
- Delete it



Following the path shown here below. Selecting "Activate" live measures bottom of the software view shows the new setting as shown here below.

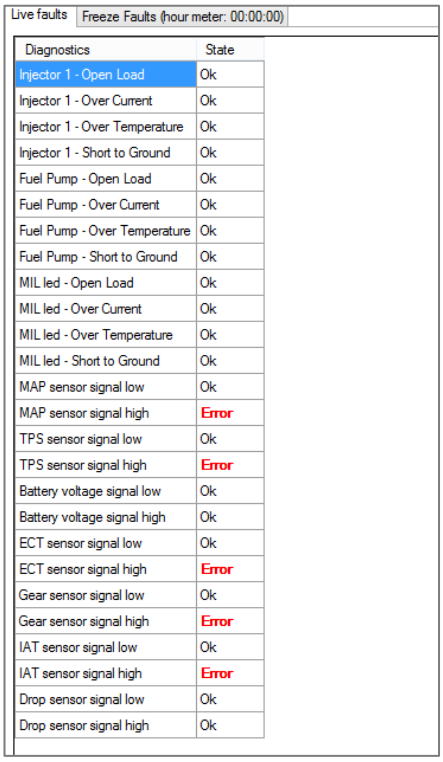


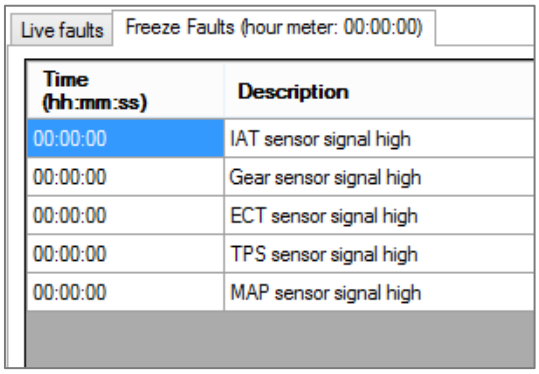
6.2.7 – Diagnostics



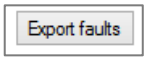
Read Freeze Fault from ECU:
Once the project is open and the ECU linked, it is possible to read the diagnostic data in real time or after a session and check the faults of engine and sensors. Saved faults can be exported in a ".csv" report file or deleted.

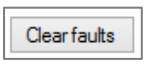
Clicking the command, two tabs appear. The Live faults tab (real time data) and Freeze faults tab (errors saved). Each fault is reported associated to the hour meter in which it occurred.





If Live Measures view box is activated, you can visualize the faults in real time. To activate Live Measures, press Start Live Measure icon 

To save the faults in a CSV file press the bottom-right button 

To clear the faults list, press the bottom-left button 

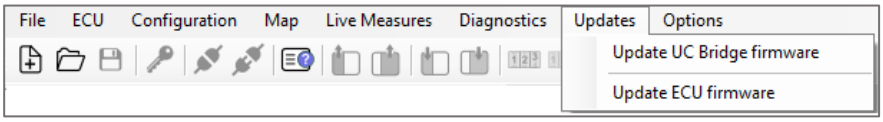
Read ECU/UC bridge identity: reads serial number, firmware version and hardware versions of both ECU and UC bridge. This is an important info to maintain software and devices aligned.

Read Handlebar Switch identity: read serial number, firmware, and configuration from Handlebar Switch (if HB connected).
Here is the list of the possible sensor errors, coming from the ECU, that can be recognized by Spark (Injector 2 errors are present if injector 2 is available and enabled):

- Injector 1 – Open Load

- Injector 1 – Over Current
- Injector 1 – Over Temperature
- Injector 1 – Short to Ground
- Fuel Pump – Open Load
- Fuel Pump – Over Current
- Fuel Pump – Over temperature
- Fuel Pump – Short to ground
- MIL led – Open load
- Mil led – Over current
- Mil led – Over Temperature
- Mil led – Short to ground
- MAP sensor signal low
- MAP sensor signal high
- TPS sensor signal low
- TPS sensor signal high.
- Battery voltage signal low.
- Battery voltage signal high.
- ECT sensor signal low.
- ECT sensor signal high.
- Gear sensor signal low.
- Gear sensor signal high.
- IAT sensor signal low.
- IAT sensor signal high.
- Drop sensor signal low.
- Drop sensor signal high.

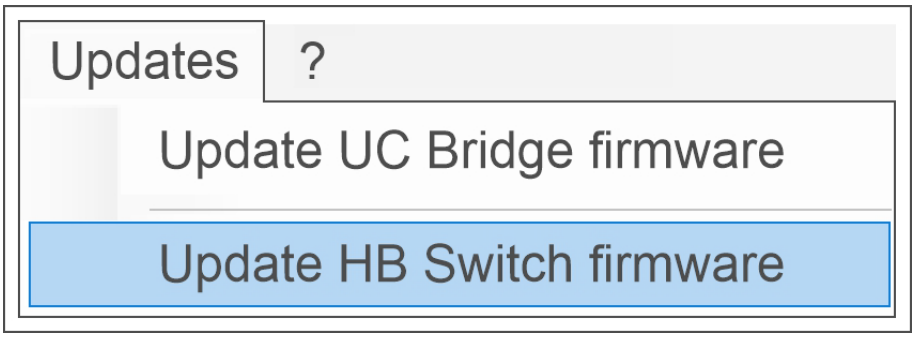
6.2.8 – Updates



Update UC Bridge firmware: with **the project closed and the UC Bridge connected** you can update the firmware. First check if an update is available (icon on the right – icon section ). If it is you can download and install it in this section.

Update ECU Firmware: with **the project closed and ECU the connected** you can update the firmware. First check if an update is available (icon on the right – icon section). If it is you can download and install it in this section.

Update Handlebar Switch Firmware: This section appears only if HB Switch is connected to the UC Bridge. With **the project closed and HBS connected** you can update the firmware. First check if an update is available (icon on the right – icon section). If it is you can download and install it.



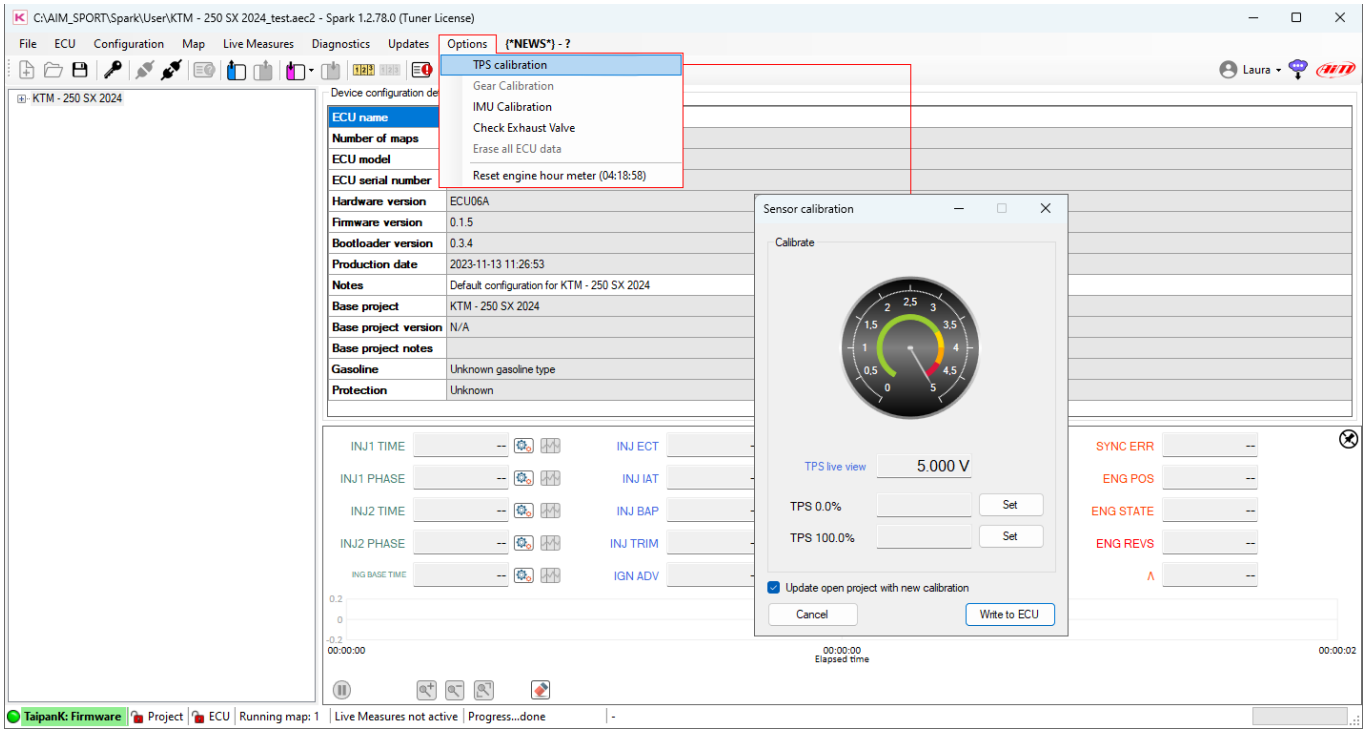
6.2.9 – Options

TPS Calibration: this command is used to calibrate the Throttle position sensor.
First of all, **please note that this command is only available if you are connected to the ECU and you have an open ECU project**.

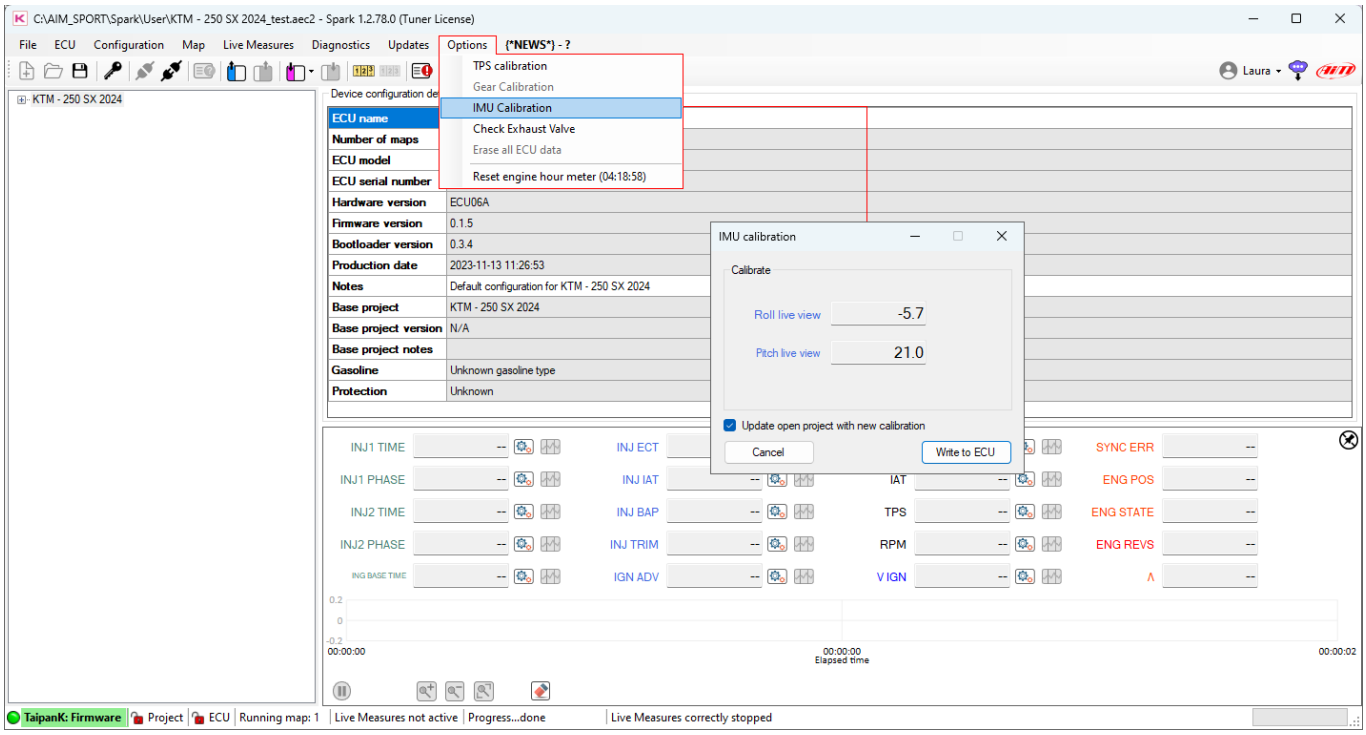
To perform the calibration follow these steps:

- keep the throttle in its zero position (completely closed) and click “Set” in correspondence of TPS 0.0%: the value in volts, corresponding to throttle zero position, will appear
- subsequently maintain the throttle in its 100% position (fully open)and click “Set” in correspondence of TPS 100%: the value in Volts, corresponding to the throttle fully open position, will appear
- click “Write to ECU” and the TPS calibration is flashed to the ECU.

Please note: if “Update open project with new calibration” (bottom left of the panel) checkbox is enabled , the TPS calibration will be updated to the open project too.

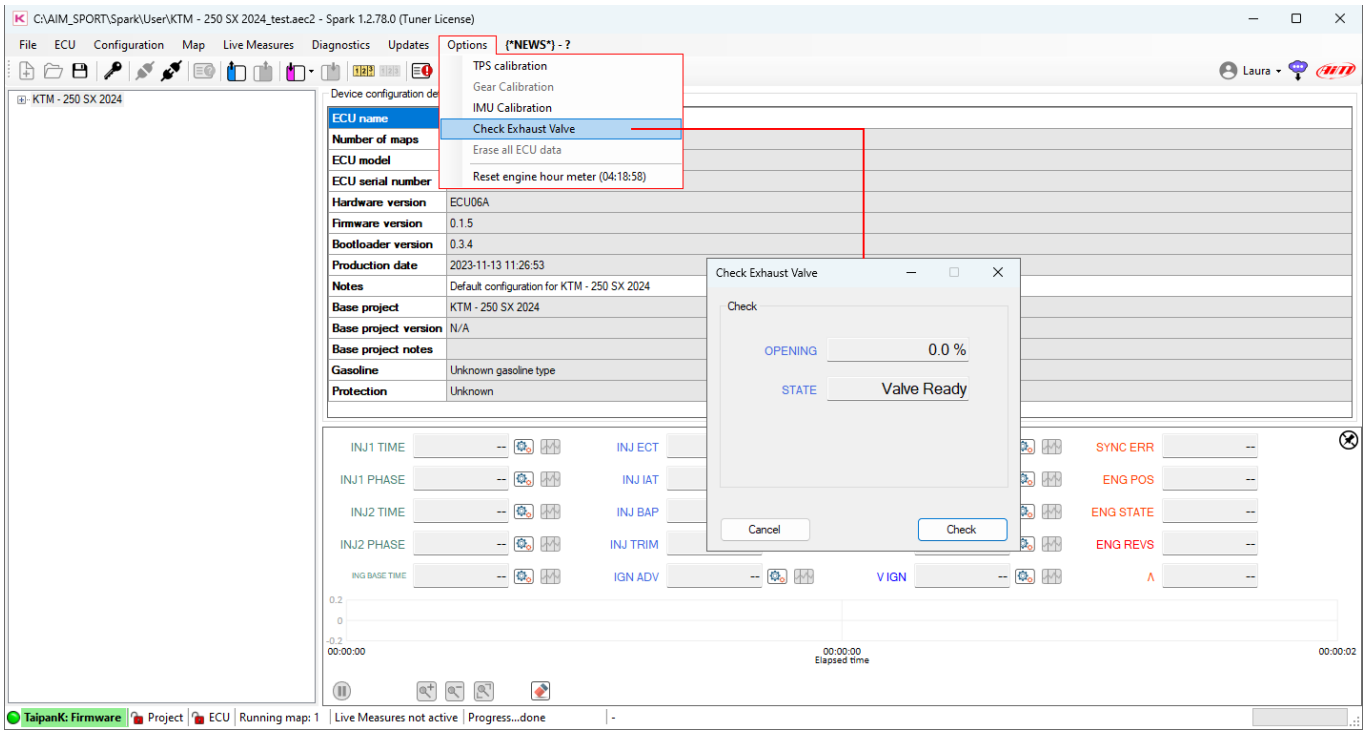


IMU Calibration (Taipan K only). IMU Calibrations is to calibrate the bike roll and pitch angle. To perform the calibration follow this path: "Options –> IMU Calibration" as shown here below. The panel here below is prompted. To perform IMU calibration place the bike in its "Zero" position and press "Write to ECU". The software stores this situation as "Zero position" for both angles. Once the calibration performed the software notifies it in the Status bar.

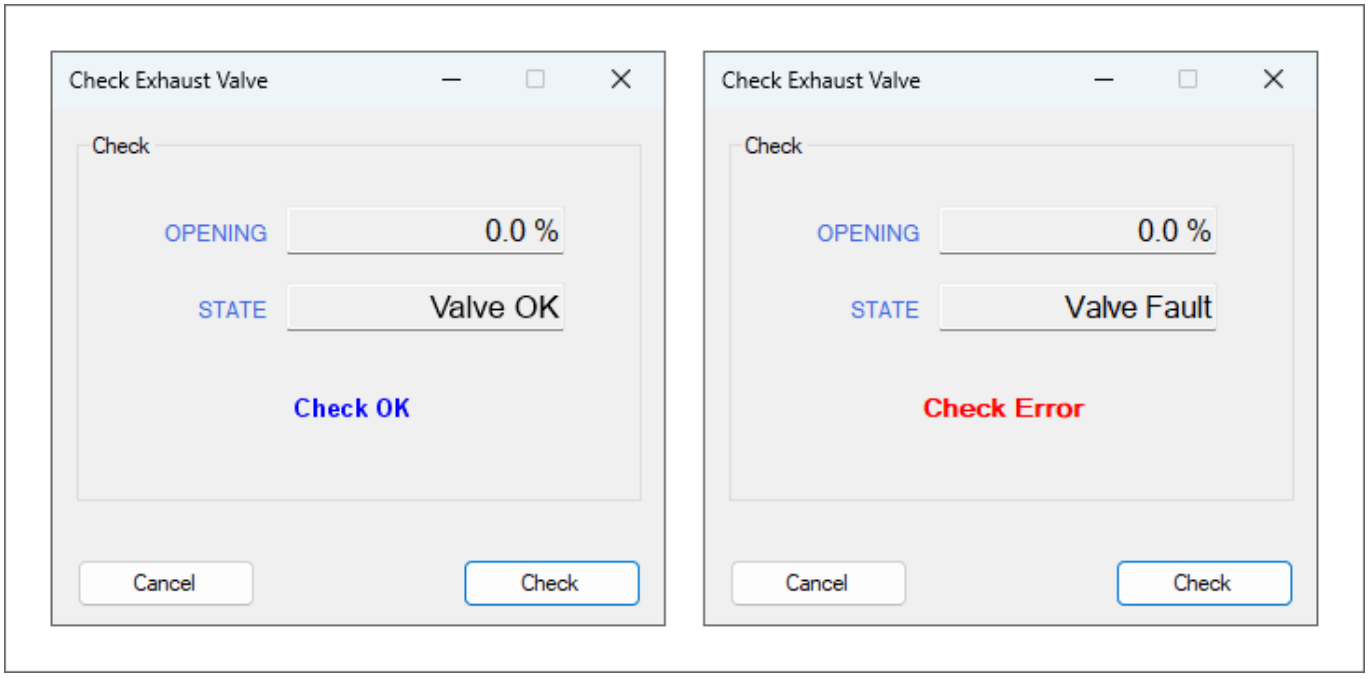


Check Exhaust Value (Taipan K only). This option is to calibrate the exhaust valve opening. To perform the calibration follow this path: "Options –> Check Exhaust value" as shown here below. The related panel below is prompted. To check the exhaust valve press "Check" and the ECU moves the valve in the three checking positions:

- 100% opening
- 50% opening
- 0% opening

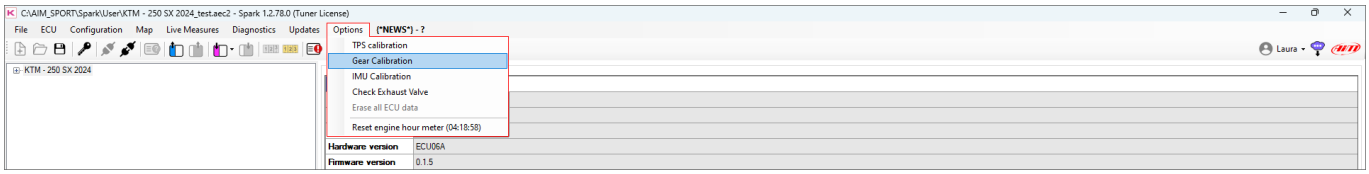


Once all three positions tested the result is shown in the panel. If everything is ok it writes "Check ok" in blue; otherwise it writes "Check error" in red as shown here below.

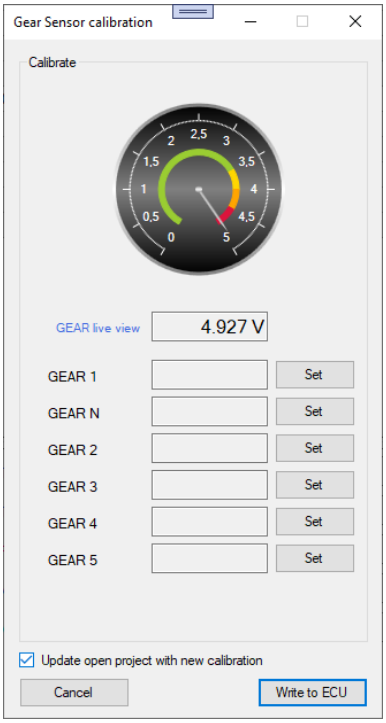


Gear Calibration gauge. In gear calibration window a gauge has been added to give the user an easier feedback about gear value (volt). To perform gear calibration follow these steps:

- Press "Option" on the top menu bar
- Select "Gear calibration" option
- A setting panel is prompted: fill the gear number and press "OK"

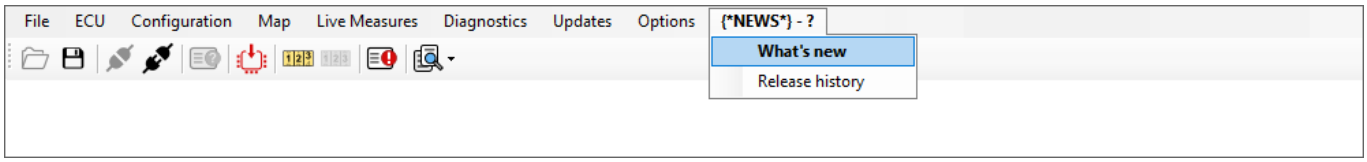


The panel with gauge shown here below gives the user a more user friendly feedback.



6.2.10 – What's new?

Far right on the top menu bar the additional "What's new" menu has been introduced. It connects to an internal document that is installed with Spark and gives the user an overview of the last improvement of the software. This menu remains bold until is clicked for the first time. Once clicked, when restarting the software it disappears.



7 – Icon bar

This bar features some shortcut icons for the most common commands. Some of these icons are activated only if the project is open, others when the project is open and the ECU linked.

The icons are to:


Create a New Project


Open Project


Save Project


Manage Project Password


Link to ECU (in order to work on that specific connected ECU)


Unlink from ECU


ECU configuration info: tells the user for the bike model the ECU is configured for.


Read configuration from ECU


Read running Map from ECU


Flash configuration to ECU


Flash running map to ECU


Start Live Measures


Stop Live Measure


View diagnostic fault: no fault is detected


View diagnostic fault: one or more faults are detected


Show Live Measures panel


Hide Live Measures panel


Web update available, web connection detected


Web update ready for installation and web connection detected


No web update, web connection detected


Downloading web update, web connection detected


No web update, web connection not detected


Web update available, web connection not detected


Link to AiM web site

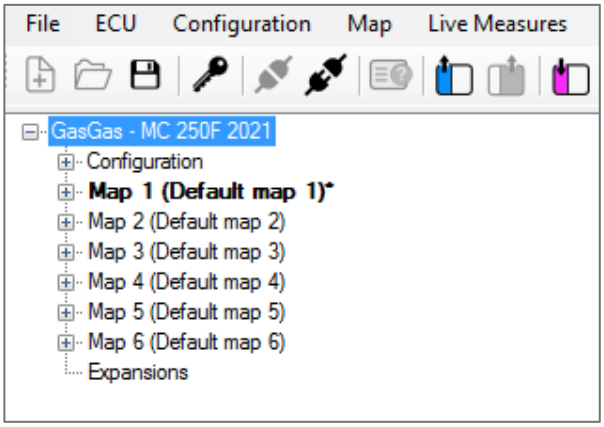
8 – Project view

The **Project** is the sum of all the 6 maps and the configuration that describe the behaviour of a bike. In this chapter we explain how to develop and modify a project.

Once an existing project has been opened or a new one created, the software shows the image below. In the Project tree view the software shows:

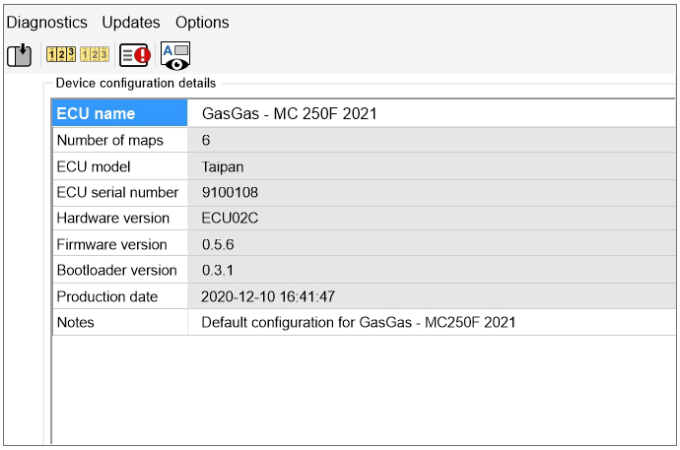
- Motorcycle model (GasGas – MC 250F 2021 in the image below on the right).
- Configuration.
- The six Maps.
- Expansion: the Handlebar Switch and related parameters.

The Project tree can be expanded pressing the plus symbol; each part includes several submenus that will be explored in the following chapters.



After having connected your ECU, you can find the ECU Info section:

- Motorcycle model
- Number of maps
- ECU model
- ECU Serial number
- Hardware version
- Firmware version
- Bootloader version
- Production date
- Notes
- Base project version and notes
- Type of Gasoline
- Password protection of the project



8.1 – Configuration

The configuration section lets you manage all the parameters that are not directly related to the engine performance:

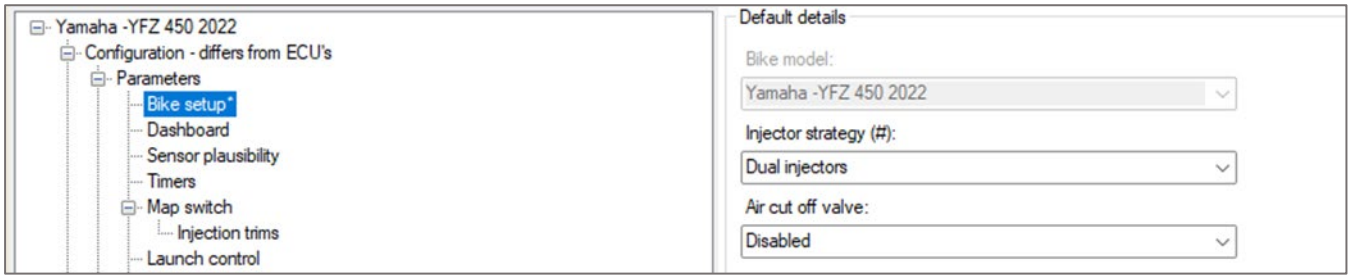
- second injector.
- sensors plausibility.
- kill switch and MIL lamp timers.
- map switch.
- parameters for launch control strategy.
- pre injection.
- RPM limiters.
- drop sensor.
- strategies for injection, injection phase, neutral and quick shift
- Vb out

These features are collected in the following three groups:

- Parameters, strategies and Vb out
- CAN configuration
- Sensors

8.1.1 – Parameters

8.1.1.1 – Motorcycle Setup

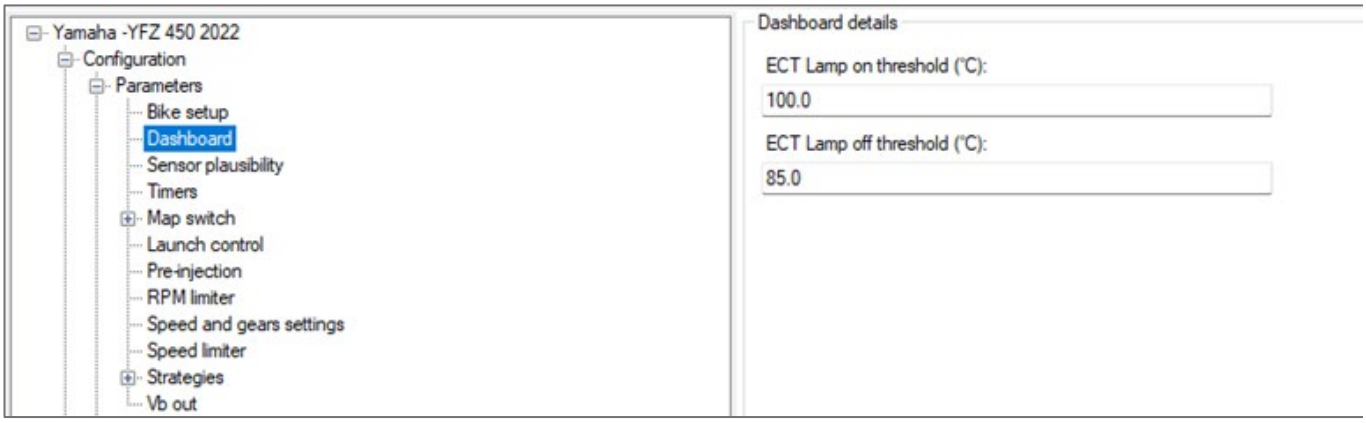


In this section it is possible to enable the second injector if present; moreover, if you are configuring Yarara ECU you can configure the Air cut off valve to be closed if you select "Disabled" or open if you want a passage of air to exhaust. The default is closed position (Air cut off valve Disabled).

Please note: after having enabled the second injector, you must define the strategy for activating it, filling the proper injector tables located in the Map section -> Fuel -> Injector (1 and 2).

8.1.1.2 – Dashboard (Yarara only)

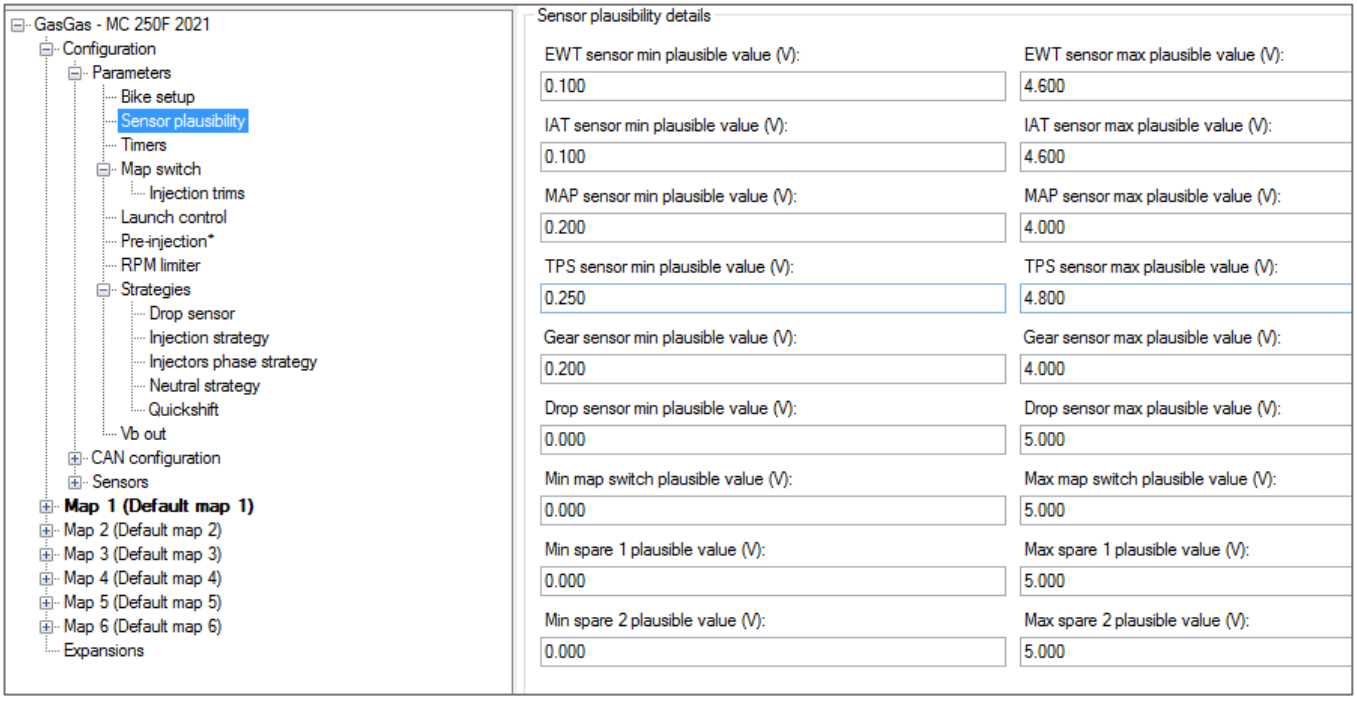
Configuring Yarara ECU you can choose at which temperature threshold value that turns on7off the ECT warning light on the ATV dashboard.



8.1.1.3 – Sensor Plausibility

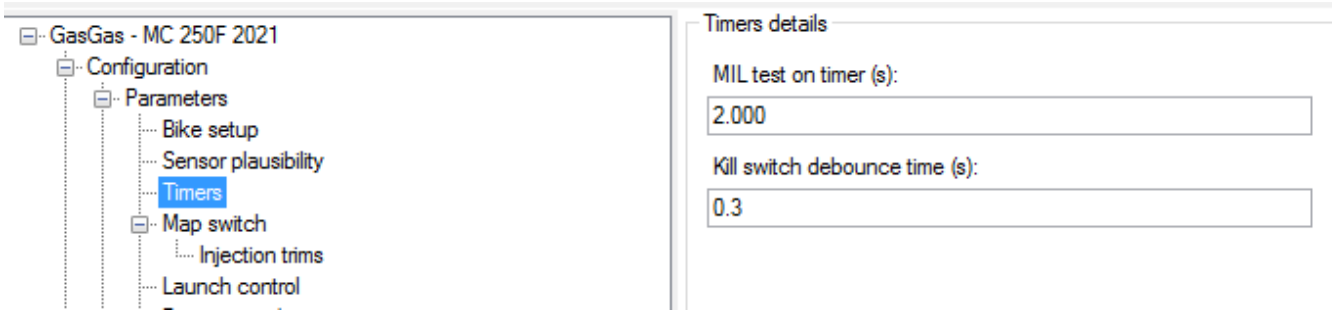
Here you can set the acceptability output range of each sensor connected to the ECU. When a sensor gives an output out of range, the default value is associated to the sensor:

- TPS default value: 0.
- ECT default value: 70°C.
- IAT default value: 20°C.
- MAP default value: 1.000 bar
- BARO default value: 1.013 bar



Just a few words about the **Min Map Switch range sensor: t**his field is intended to define the range of the Min Map Switch and appears in the KTM/Husqvarna project only because these models only have the analogue switch input.

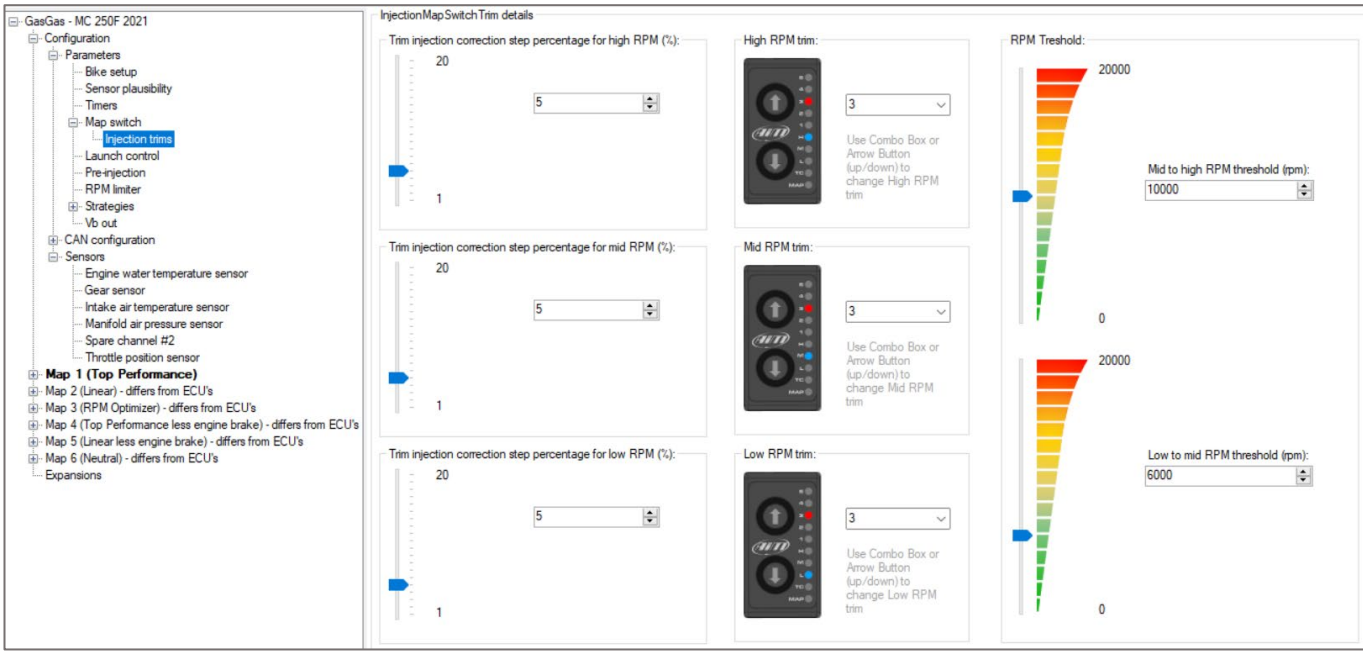
8.1.1.4 – Timers



Here you can set timers for MIL lamp and kill switch.

- MIL test on timer(s): time that MIL (Malfunction Indicator Lamp) is on for initial check.
- Kill switch debounce time(s): minimum time the kill switch is pressed to activate the motorcycle stop.

8.1.1.5 – Map switch



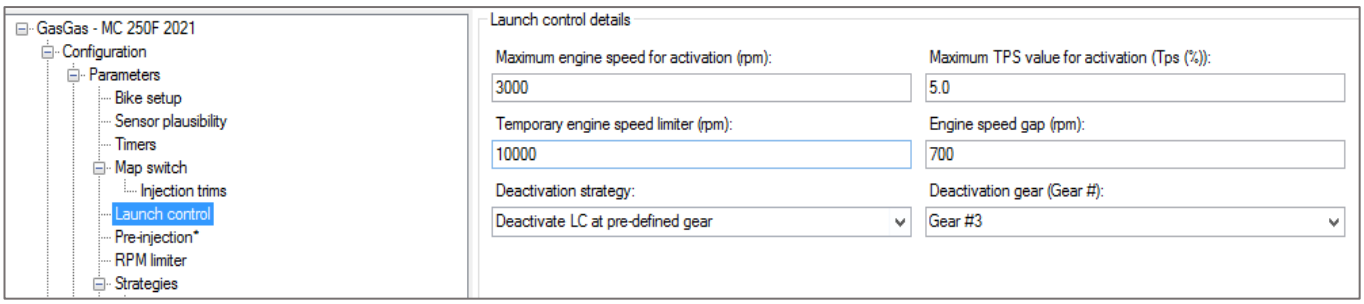
In this section you can set the configuration parameters of the Handlebar switch.

Injectors trims: in this section you can set the percentage steps, the level and the ranges of the fuel corrections that will be set by the Handlebar Switch. Setting for example all the step percentages to 5%:

- at Trim injector correction 3, there will be no correction
- at Trim injector correction 4 and 5, there will be a fuel correction of + 5% or +10%
- at Trim injector correction 2 and 1 there will be a fuel correction of -5% or -10%

Finally, the thresholds between Low and Mid RPM and between Mid and High RPM are set in the dedicated fields.

8.1.1.6 – Launch Control



Launch control is an electronic aid to assist riders to accelerate from a standing start.

This strategy has three different states: **ENGAGED**, **ON** and **OFF**.

ENGAGED (motorcycle ready to go but still stationary): the motorcycle needs to be in these conditions:

- launch control enabled in the running map.
- launch control requested pushing launch control button on the Handlebar Switch.
- RPM less than maximum RPM value set for launch control activation.
- bike TPS value less than the maximum TPS threshold value for launch control activation (%)
- be in neutral or first gear

Only if these conditions are true the strategy will be engaged.

When Launch control is engaged you may limit RPM value at a configurable RPM value set in the field.

Temporary RPM limiter. RPM limiter is disabled at the motorcycle starting when the RPM has a drop that you may define in the field: Engine speed gap (Rpm)

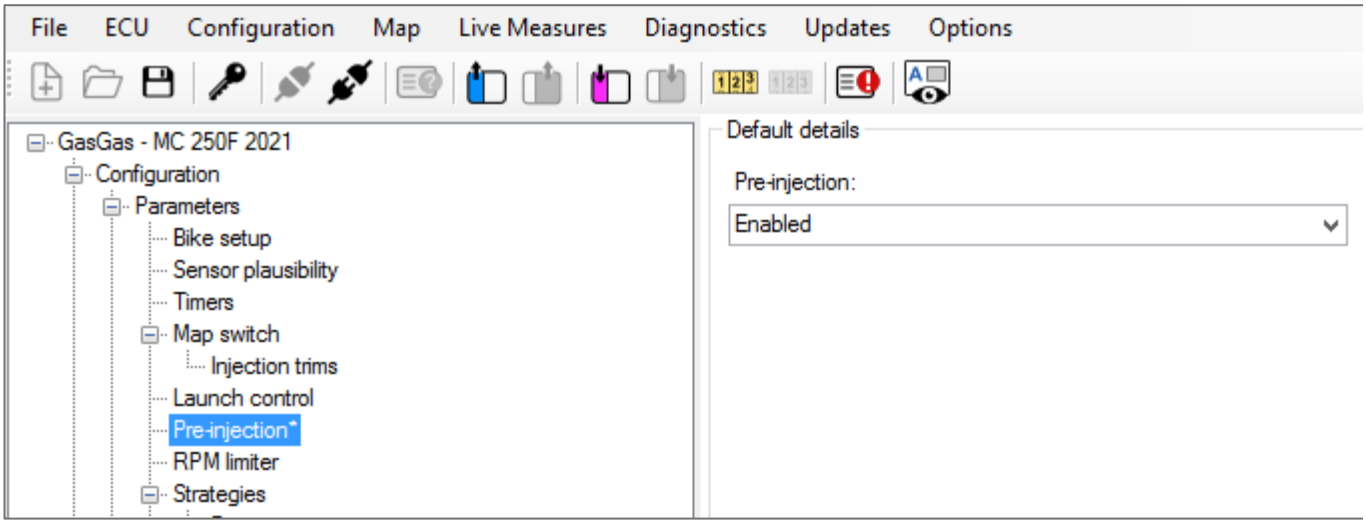
When the motorcycle starts moving Launch Control strategy turns **ON** and temporary launch control RPM limiter is activated till when an RPM drop is detected. At this point temporary launch control RPM limiter is deactivated, the normal RPM limiter comes back and the Launch Control table is used.

The Launch Control is **deactivated** in two different ways:

- Deactivate LC after a pre-defined time period – launch control deactivation time. It sets the seconds after which LC turns off
- Deactivate LC at a pre-defined gear – Launch control deactivation gear. It sets the gear that turns launch control off.

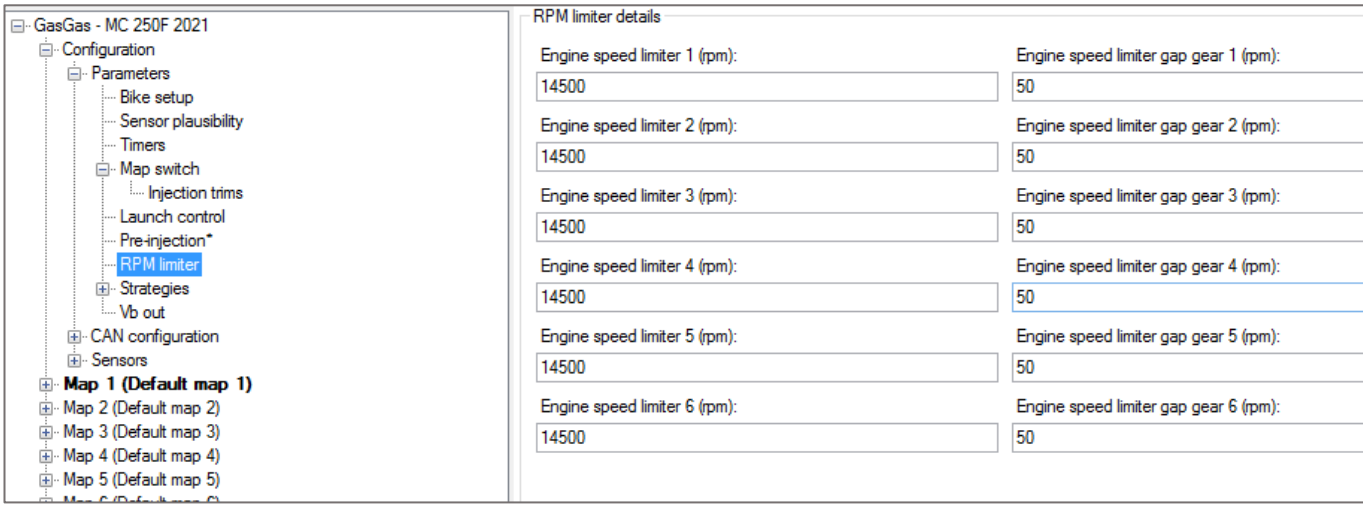
You can find the launch control tables in Map –> Launch control (injection launch control main table – ignition launch control main table).

8.1.1.7 – Pre-injection



The **pre-injection** is an amount of fuel injected early at the very first crankshaft instants to clean the tubes and improving the fuel passage.
It is possible to enable the pre-injection, while you may set the quantity of injected fuel, in dependence of the water temperature, in the table at: Map chosen – > Fuel – > Pre-injection.

8.1.1.8 – RPM Limiter

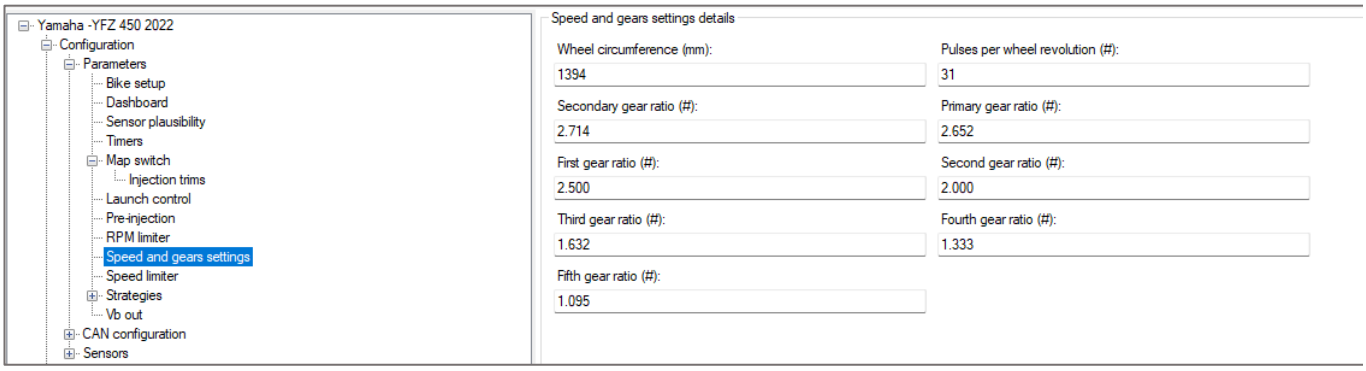


Here you may set a different RPM threshold per each map.
Beside the limiter values, you may define the RPM gap in order to define for each map the RPM value that exits limiter strategy.

8.1.1.9 – Speed and gears settings (Yarara only)

For a proper speed and gear calculation strategies working you need to add correctly the following parameters:

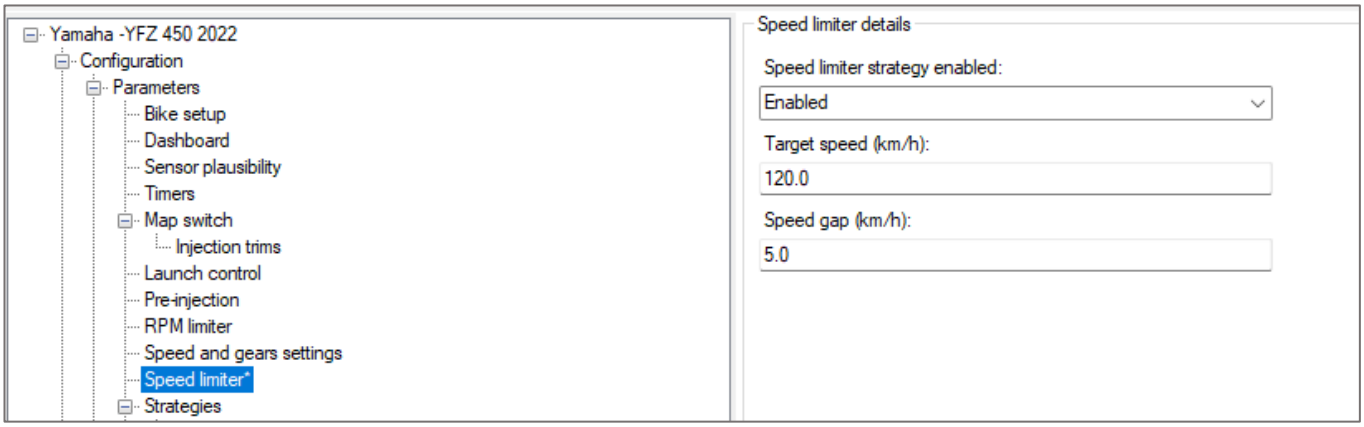
- Wheel circumference in mm
- Pulse per wheel revolution (number of gear teeth where the speed sensor is fitted)
- Gear ratios of all five gears



8.1.1.10 – Speed limiter

Here it is possible to configure the speed limiter parameters:

- target speed: the target speed that the motorbike must maintain till the strategy remain engaged
- speed gap: defines the range of the speed target where the pit limiter cutting strategy takes place



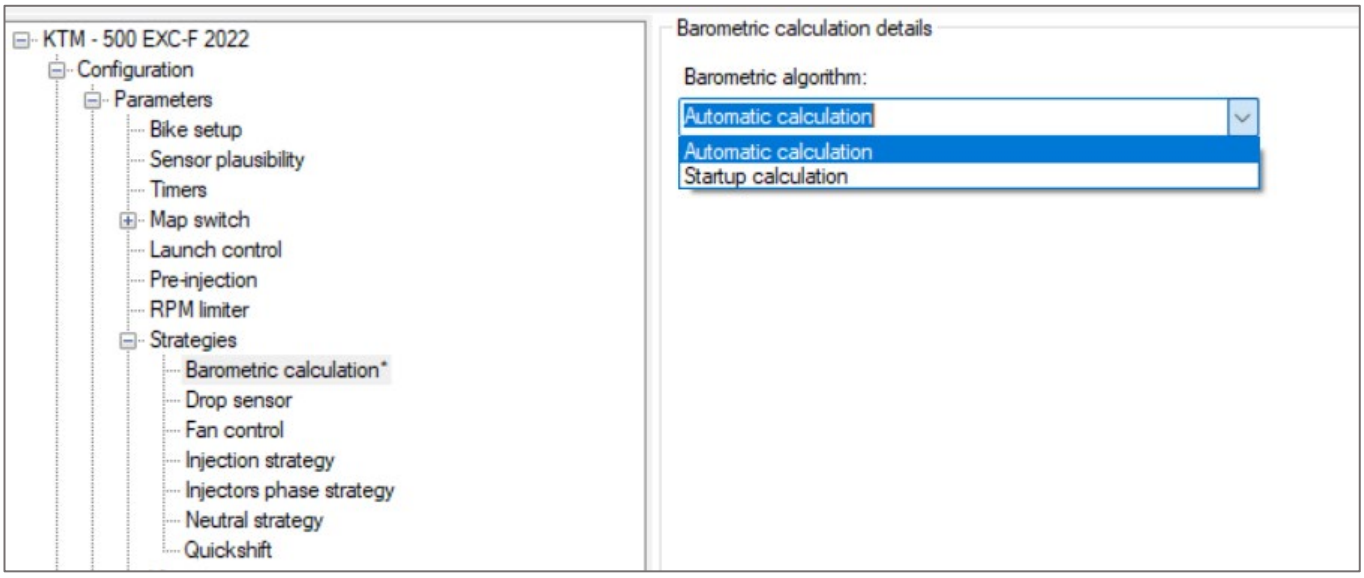
8.1.1.11 – Strategies

Here you can manage:

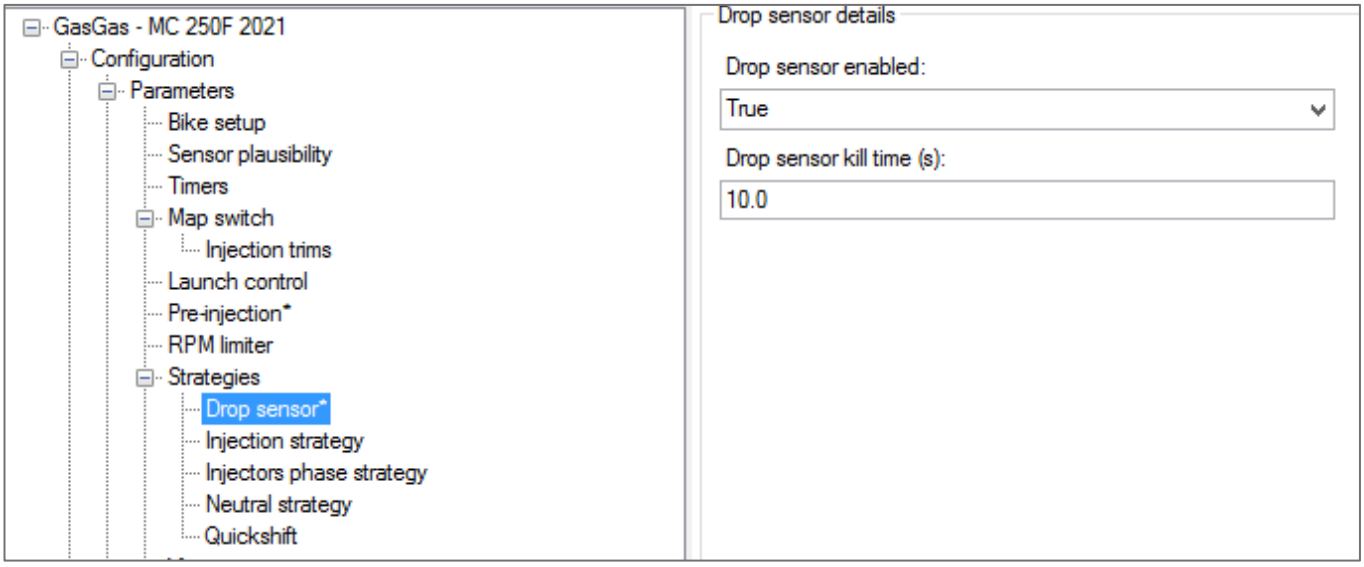
- barometric calculation
- Drop sensor
- Fan control
- Injection strategy
- Idle motor (Yarara only)
- Injection phase strategy
- Lean angle sensor (ATV only)
- neutral strategy
- Quickshaft

Barometric calculation

Here you can set an Automatic calculation of the barometric pressure or a Start-up calculation.
Using the first option the ECU will continue to update the barometric pressure value while choosing the second option the ECU will compute the Barometric Pressure only at the vehicle start-up.



Drop sensor



You can set the parameters for the Drop sensor, the sensor used for evaluating the bike inclination.

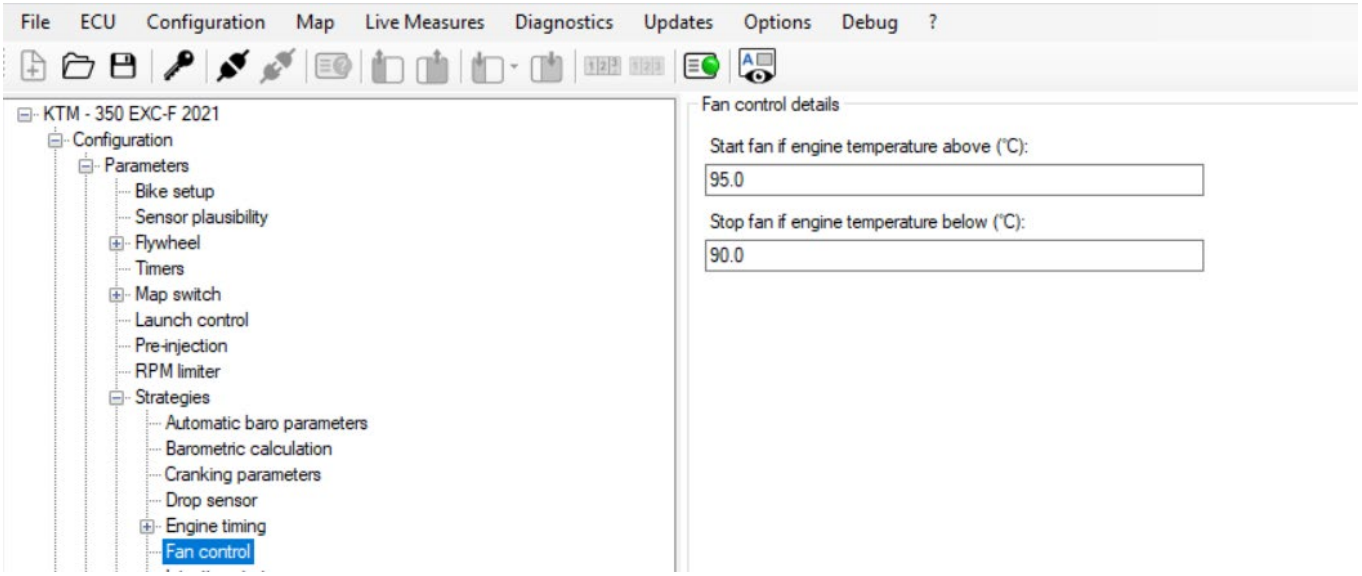
- Drop sensor enabled: False/True – to enable the drop sensor signal.
- Drop sensor kill time – if the drop sensor is enabled, select the time to wait before the engine is killed after the drop sensor signal has been triggered.

Please note: this sensor is not present on Honda bikes and all ATV models so in that case this section is not available.

Fan control (Enduro bikes and ATV only)

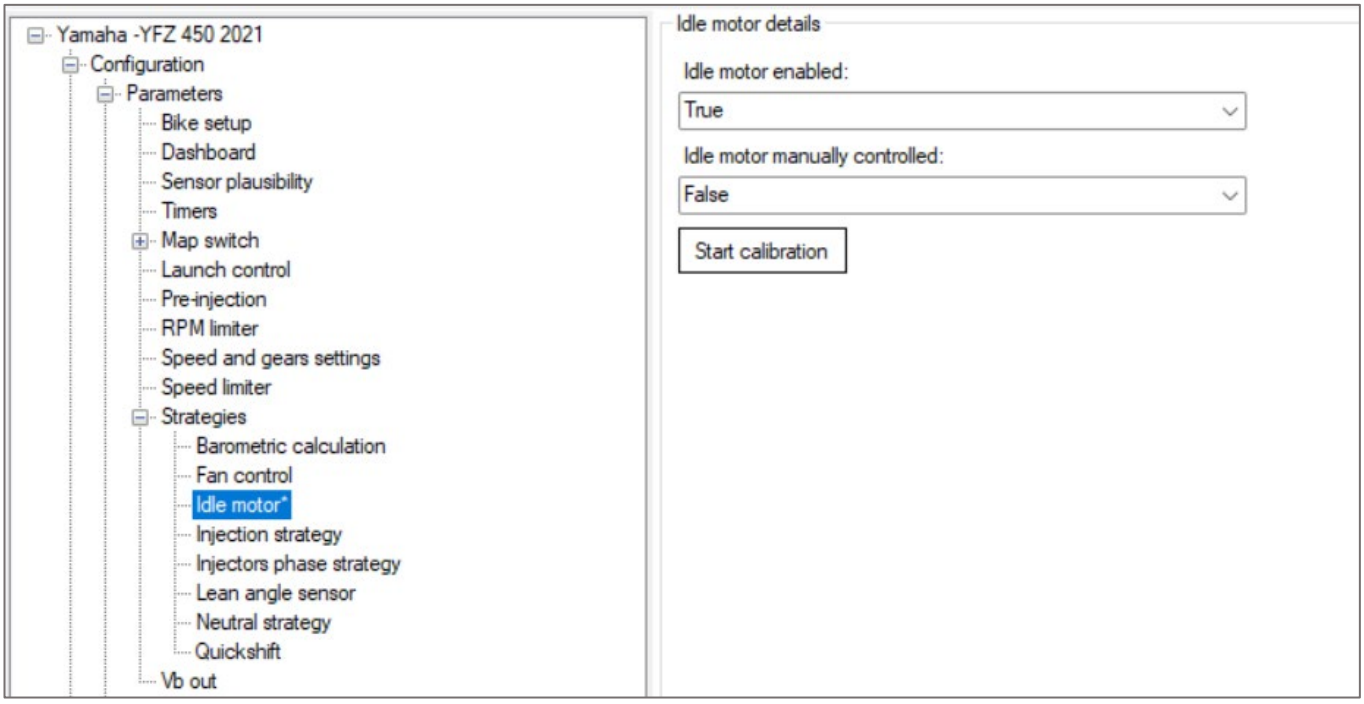
Fan control parameters are to set FAN control intervention temperature; this option is only available on Enduro bikes and ATVs.

- Start fan if engine temperature above (°C): if engine temperature exceeds this threshold the cooling fan switches on.
- Stop fan if engine temperature below(°C): with FAN control active, if and only if engine temperature drops below the fixed threshold, cooling fan switches off

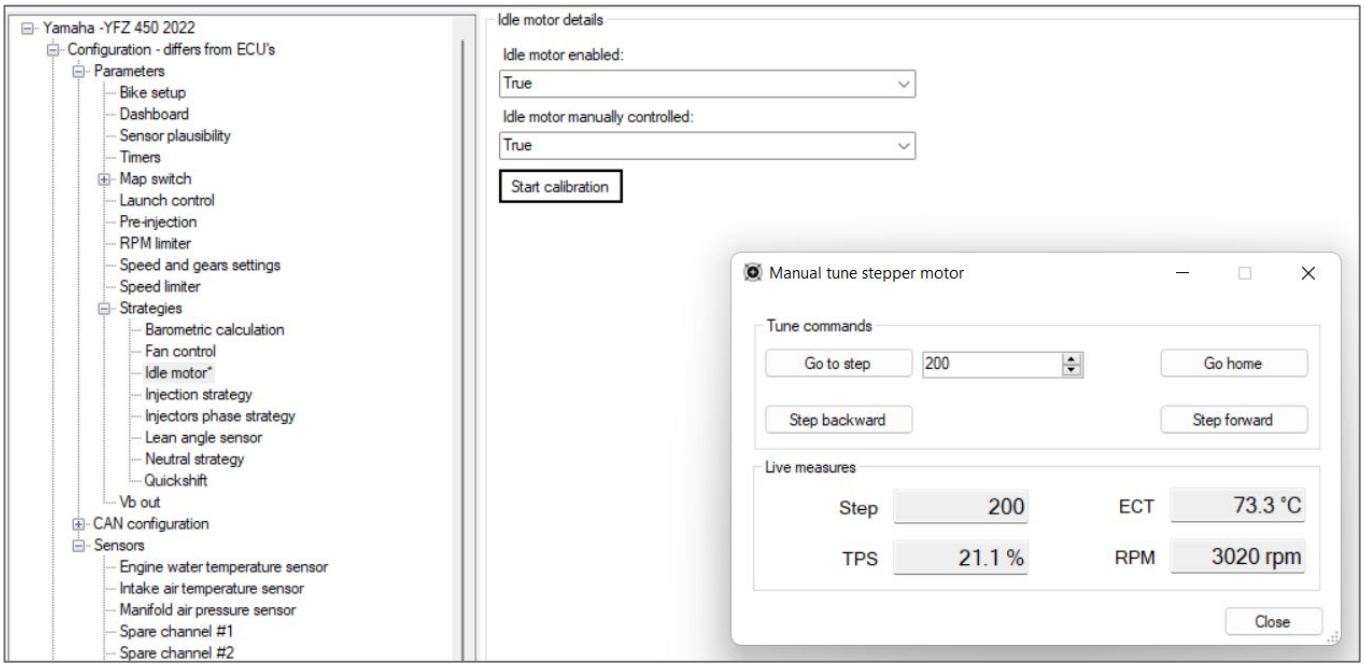


Idle motor (Yarara only)

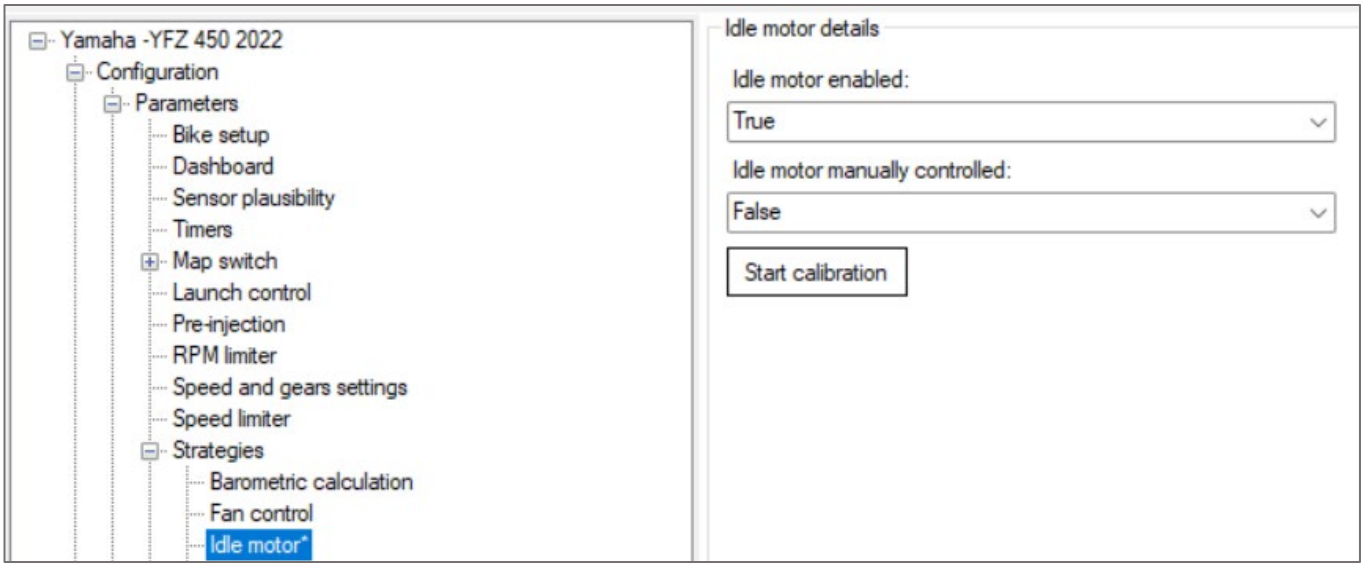
In this section it is possible to test both manually or automatically the idle motor as shown below:



In particular, if you select to control the idle motor manually, as shown below, the following table will be available:

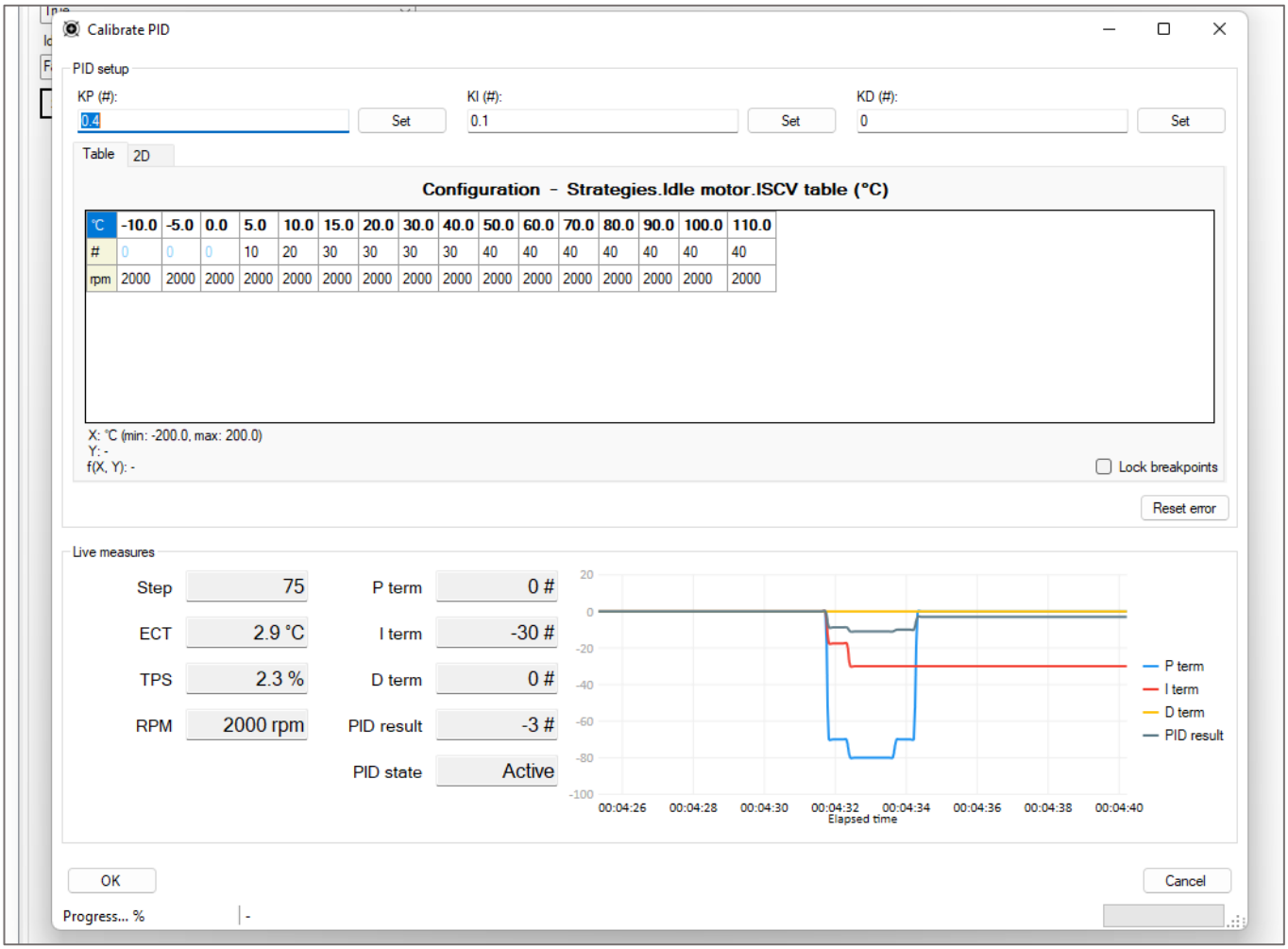


Here it is possible to select in a range between 0 and 200 steps depending on how much you want to close or open the air passage at the idle condition of the engine. Consider that if the idle motor is at step 200 it means that engine at idling is letting pass the minimum air level, instead the 0 position means that the passage of air is at the maximum position.
Control manually the idle motor could be useful if you want to find how many steps are needed in function of the cooling temperature to achieve a target engine speed.
Instead, if you want to change and test the parameters of the automatic strategy of the idle motor, first you have to select “True” in the “Idle motor Enabled” menu and “False” in the “Idle motor –> manually controlled” menu, as shown below.



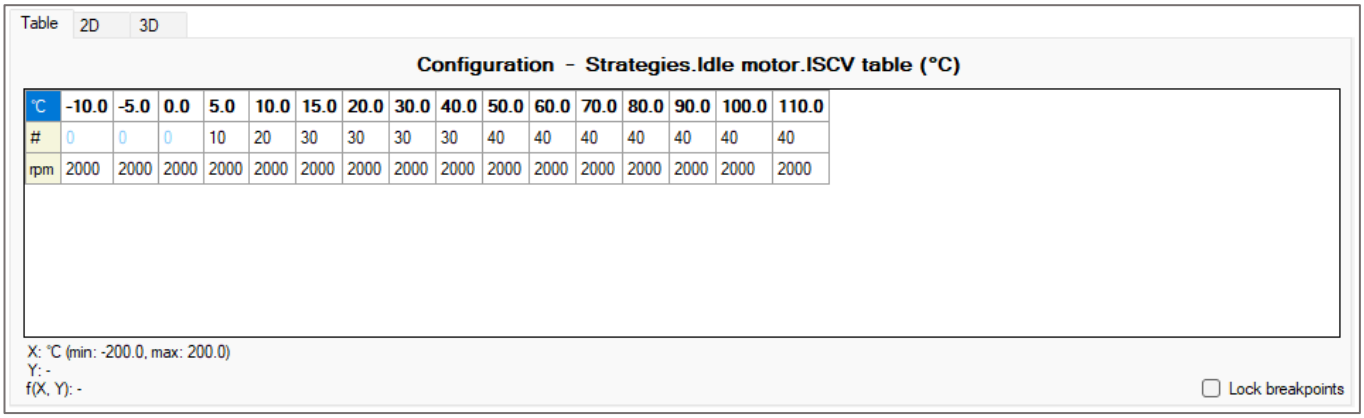
Please keep in mind that to pass from manual to automatic control it is necessary to change those settings, write the configuration back to the ECU and update the strategy change.

Then, if you press on “Start calibration” the calibration menu of this strategy will appear, as shown below:



Please remember that the automatic strategy consists in two stages of operation; one being an open loop strategy and the other being a PID closed loop strategy.

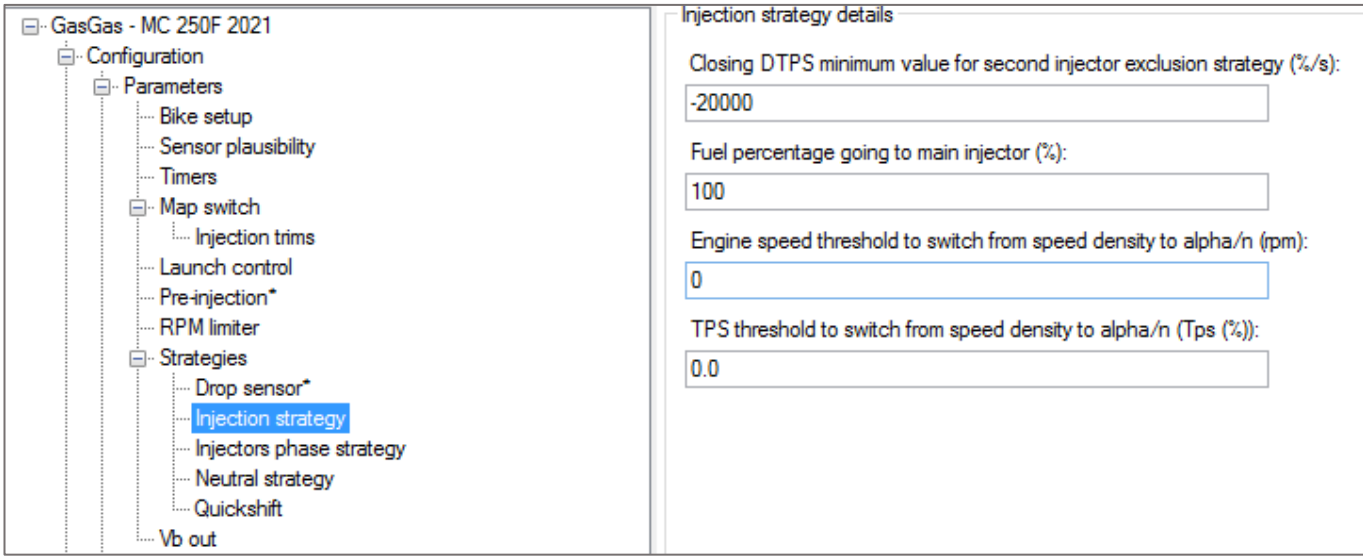
There is a table with 16 breakpoints and 3 rows where it is possible to set a target engine idle level, a cooling temperature and a number of steps of the idle motor.
The first consists of a table where you can configure the target engine RPM at idling, the water temperature ECT and the steps that the idle motor does according to the water temperature.
The strategy is designed to make sure that the correct amount of air passes at each engine temperature, the default parameters that we recommend for the Yamaha YFZ 450 2022 are the following:



°C	-10.0	-5.0	0.0	5.0	10.0	15.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0
#	0	0	0	10	20	30	30	30	30	40	40	40	40	40	40	40
rpm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000

Moreover, when the TPS is under 3% and the engine speed is comprised in a certain range, the engine is considered idling and so the closed loop strategy is applied, outside this ranges (engine speed outside the range and/or TPS higher than 3%), the open loop strategy is applied.
At this point the PID automatically adjusts the steps of the idle motor in order to bring the engine revolutions to the idle target (in this case 2000 rpm). It is possible to adapt the PID control to your needs by tune up the 3 PID constants KP, KI, KD.
You can change the PID constants and flash them to the ECU using the set button next to the parameters, then in live measure you can see how the PID controller behaves.
Please note that, at cranking time, the idle motor is letting pass the maximum amount of air and then after the engine is running, the idle motor is managed by the two strategies. Remember also that when the ATV key switch is turned off (even if the engine is not running) or when the engine is turned off unintentionally (not switched off by key switch), the ECU will perform the idle motor calibration (coming home strategies) opening the passage of air for the next cranking time.

Injection strategy



In this section is explained how to manage the second injector during a rapid throttle closure. The second injector is generally positioned above the throttle in order to have a better air/fuel mixture at high RPM /throttle range. After a rapid throttle closure, a quantity of fuel may remain nearby the throttle valve and, at the next throttle rapid opening, may produce a very fat mixture inside the cylinder. To avoid this problem with AiM ECUs you can set the fuel percentage that passes through the main injector after a fast TPS closing, helping to keep the fuel/air ratio optimal even in this situation.
The parameters to be set are:

- **Closing DTPS** (TPS closing speed) injector exclusion strategy (%/s): TPS closing speed per second over which to start the strategy.
- **Fuel percentage going to main injector** (%) when the previous condition related to the closure of the DTPS is respected.

To set up **injector 1** fuel values go to: map –> fuel –> injector 1 (injector 1 battery corrections – injector 1 phase) To set up **injector 2** fuel values go to: map –> fuel –> injector 2 (injector 2 battery corrections – injector 2 percentage – injector 2 phase).

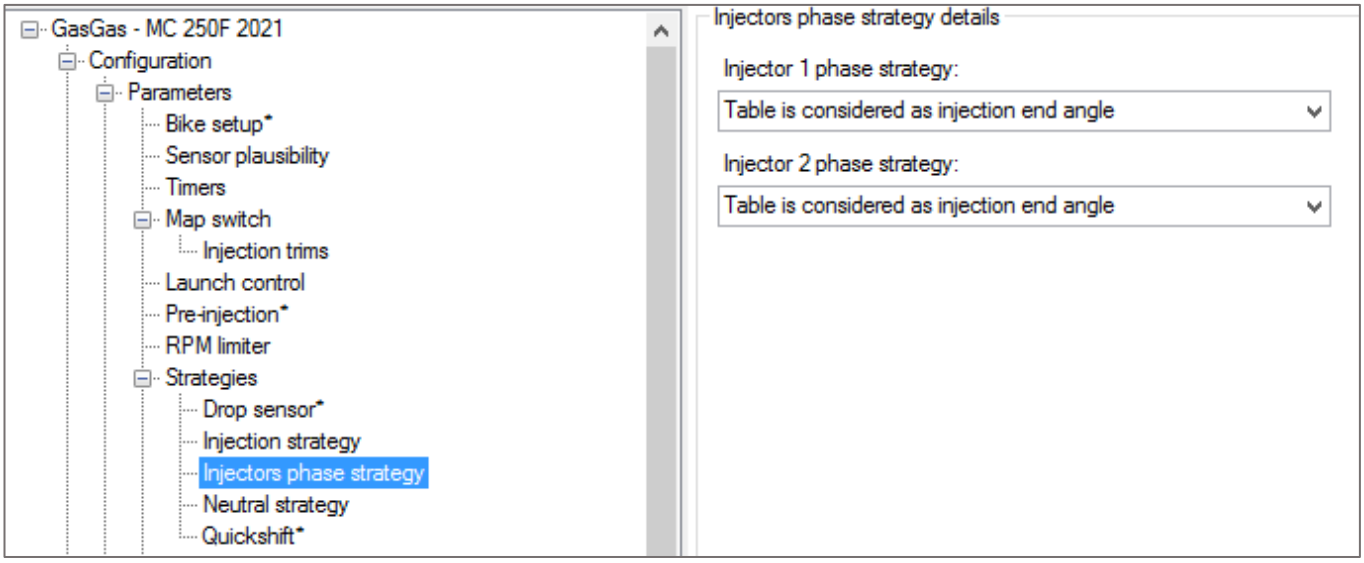
The next two parameters that define the Injection Strategy are intended to decide which table is to be used for establishing the amount of gasoline to be injected. There are two different ways for calculating the amount of gasoline used in each active phase:

- In dependence upon the amount of aspired air, Speed – density, calculated from MAP sensor and RPM.
- In dependence upon the throttle angle (alpha) and RPM.

The first method gives a more precise idea of the oxygen available for the combustion, so let us calculate the amount of gasoline necessary to get the desired lambda value but may be used only when RPM value is low and TPS is partially open. Over an RPM threshold and a TPS threshold, that you may define here, it is better to use the second method; so, when RPM and TPS are under the set thresholds, the Speed Density/RPM map is used, else the Throttle angle (alpha) / RPM map is used. The parameters to be set here are:

- RPM threshold to switch from speed density to alpha/n table (RPM)
- TPS threshold to switch from speed density to alpha/n table (%)

Injectors phase strategy



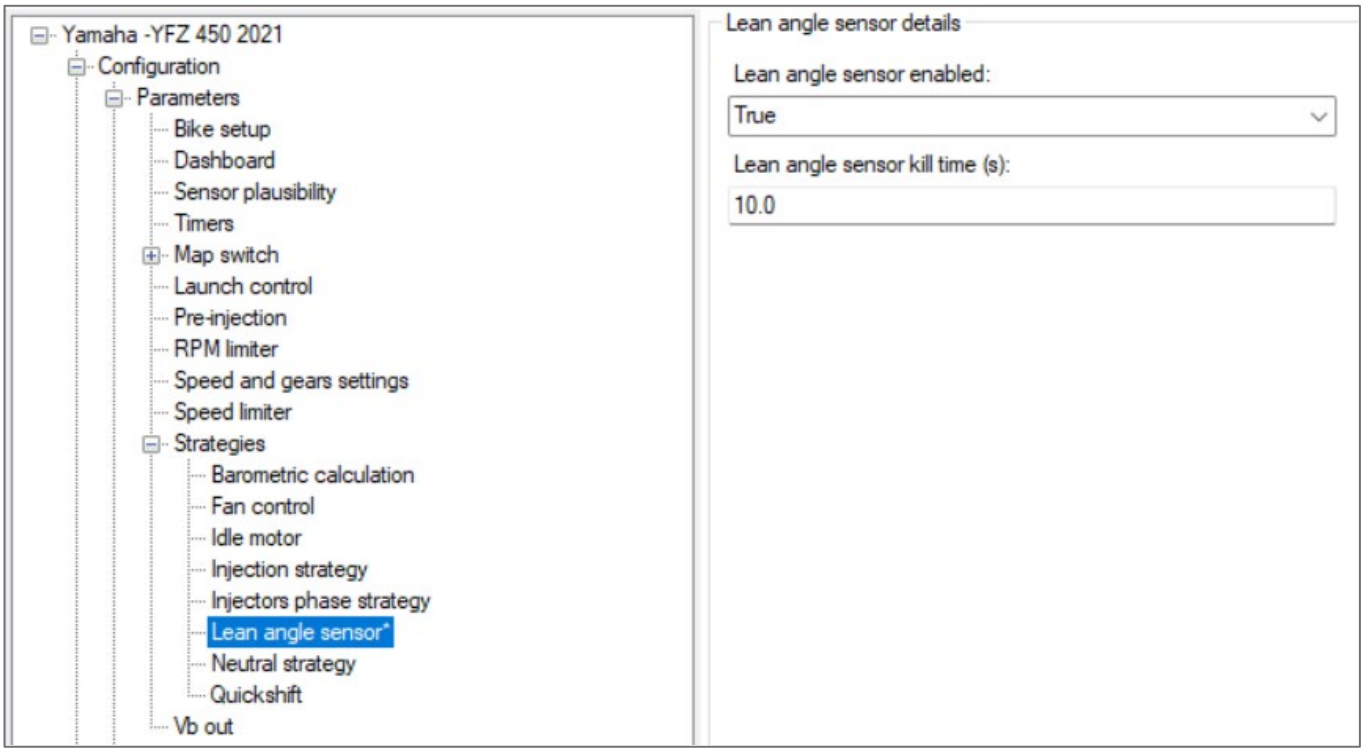
For each injector is possible to set the injection phase as:

- the start of injection or
- the end of injection.

Lean angle sensor (ATV only)

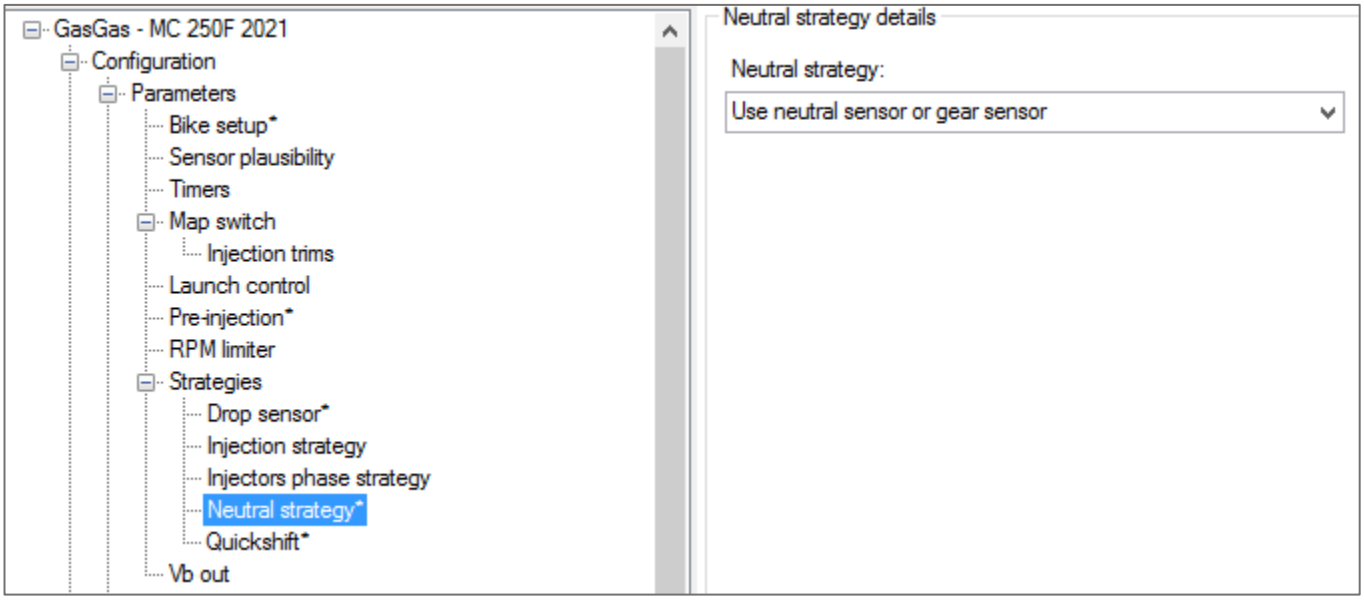
You can set the parameters for the lean angle sensor, the sensor used for evaluating the ATV inclination.

- lean angle sensor enabled: False/True – to enable the lean angle signal.
- lean angle sensor kill time – If the lean angle sensor is enabled, select the time to wait before the engine is killed after the lean angle sensor signal has been triggered.



Please note: at present this sensor can only be configured on Yarara ECU.

Neutral strategy



By default Map number 6 is dedicated to neutral strategy. You can choose how to engage this map in different ways:

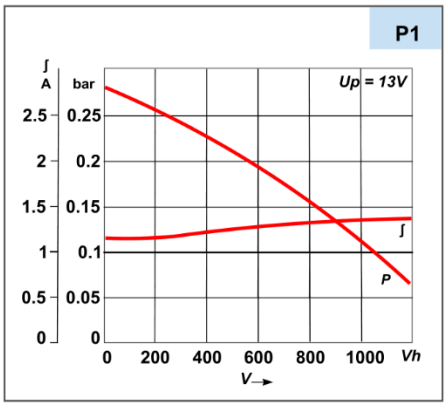
- Strategy OFF: the strategy is disabled
- Use neutral sensor or gear sensor: if the motorcycle has a neutral or gear sensor and the neutral is detectable, once neutral is engaged the map is automatically changed to map 6, otherwise is changed to the previous default map.
- Use external switch: in this case a bi-stable switch can be plugged in, only once the switch is active the map is changed to map 6.

Electric Water Pump control strategy

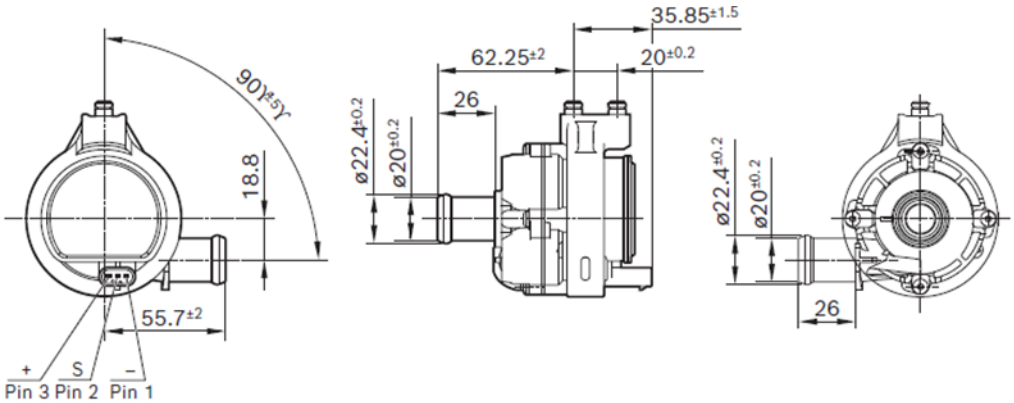
The Electric Water Pump (EWP) strategy has been designed in order to control the flow rate of a water pump that can be connected to the cooling system of the motorbike replacing the mechanical water pump. The main advantage of using this AiM ECUs strategy and an EWP is that the cooling flow rate of the bike will be controlled by a feedback loop based on the engine coolant temp (ECT) sensor and no longer based on the engine revolutions of the vehicle. This allows to always have an optimum cooling of the engine even in low rpm conditions and very low temperature thus maximizing the performance of the vehicle.
For this type of PWM control strategy we have validated the following two BOSCH electric pumps:

- BOSCH electric water pump (flow rate 500 l/h) - part number 0392023232
- BOSCH electric water pump (flow rate 500 l/h) - part number 0392023454

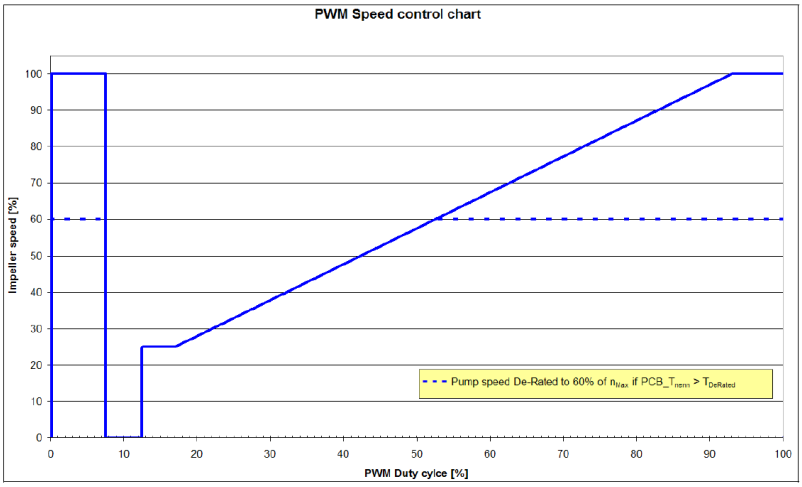
Both pumps have the following flow rate chart:



As shown in the dimensional drawing below, the EWP has a 3-pin connector where the "S" pin is dedicated to the low side PWM command. The power supply voltage range is 8-16 V.



Keep in mind that, for a proper operation of the cooling system using an EWP, the impeller of the mechanical pump must be removed from its engine seat. This will also allow to have less engine drag due to the mechanical impeller.
It is also recommended to pay attention to the following steps during the installation of the electric water pump; First, we suggest mounting the EWP between the cooling ducts coming out of the engine and the inlet ducts of the radiators. Second, it is advisable to check properly the cooling system to avoid the formation of air bubbles and therefore the phenomenon of cavitation. A good procedure at the first installation of the EWP is to check the correct movement of water in all the cooling ducts by making the EWP turn at full power for a few seconds. This can be done by only giving the power supply and no low side control to the EWP, instead if you connect the low side command to the ECU, it will modulate its flow rate based on the ECT. The PWM speed control chart of the EWP is shown below:

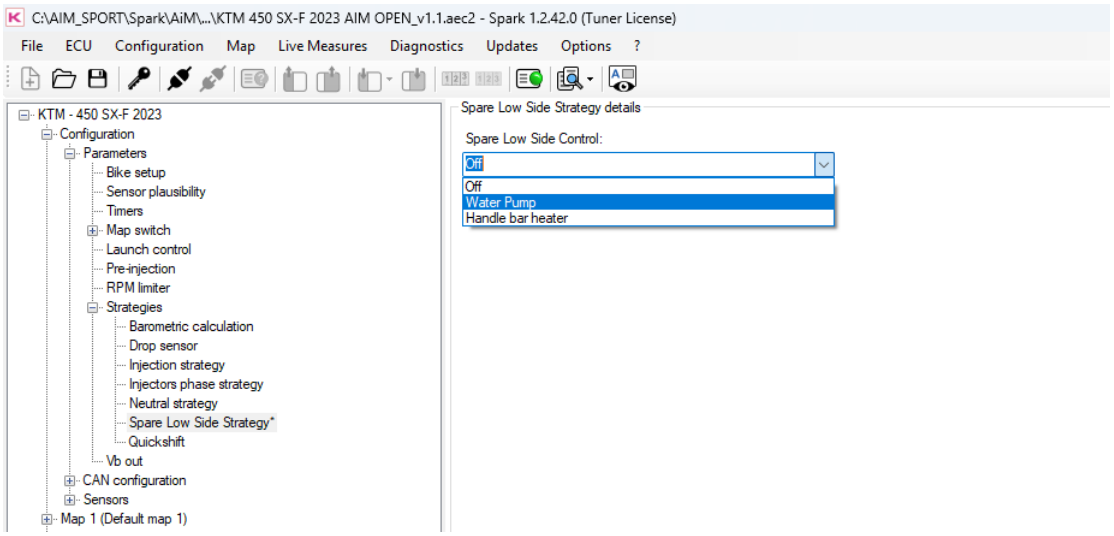


The control strategy of our ECU consists in three operational regions; in the first two regions the EWP operates slowly at two different speeds, instead in the last region the flow rate of the EWP is managed by a PID control used to maintain the target temperature set by the tuner.

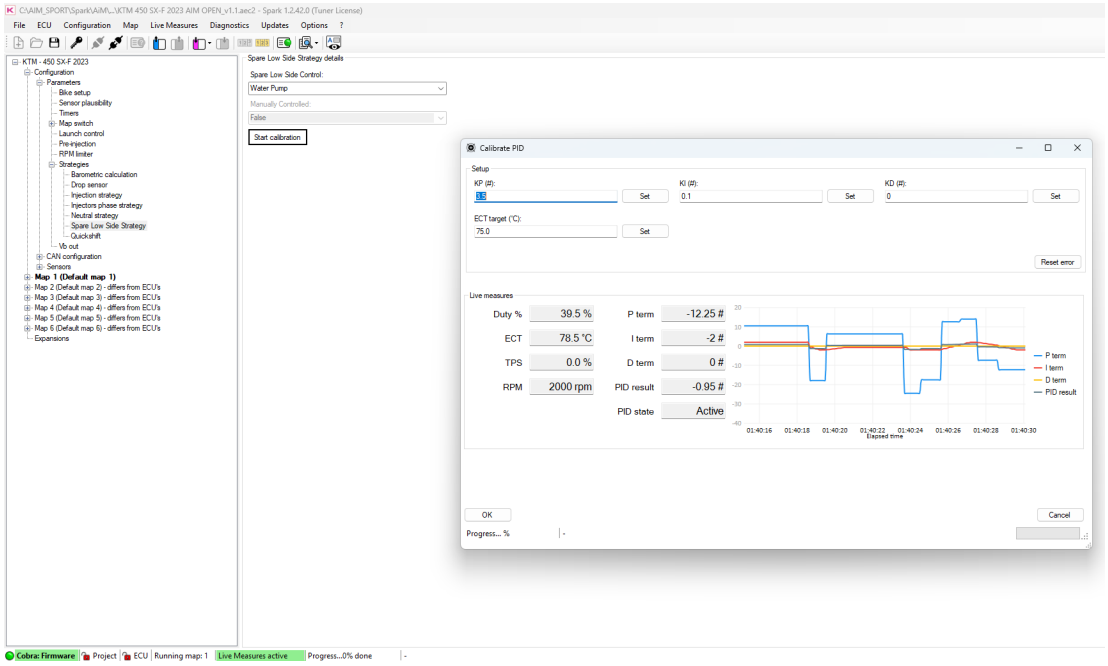
With the tuner licence it is possible to change the target temperature (target ECT) and the three parameters (KP, KI, KD) that regulate the PID control in the last region. The three operational regions are divided as follows:

- Zone A; (Target ECT - actual ECT) > 25 °C, constant minimum speed of the EWP
- Zone B; (Target ECT - actual ECT) < 25 °C, constant slow speed of the EWP
- Zone C; (Target ECT - actual ECT) < 7 °C, PID control of the EWP flow rate

In order to calibrate the PID controller or change the ECT target you have to select “Spare low Side Strategy” in the configuration menu as shown below.



Then, clicking on “Start calibration” the following pop-up menu will appear, and it will be possible to change the setup values shown below.



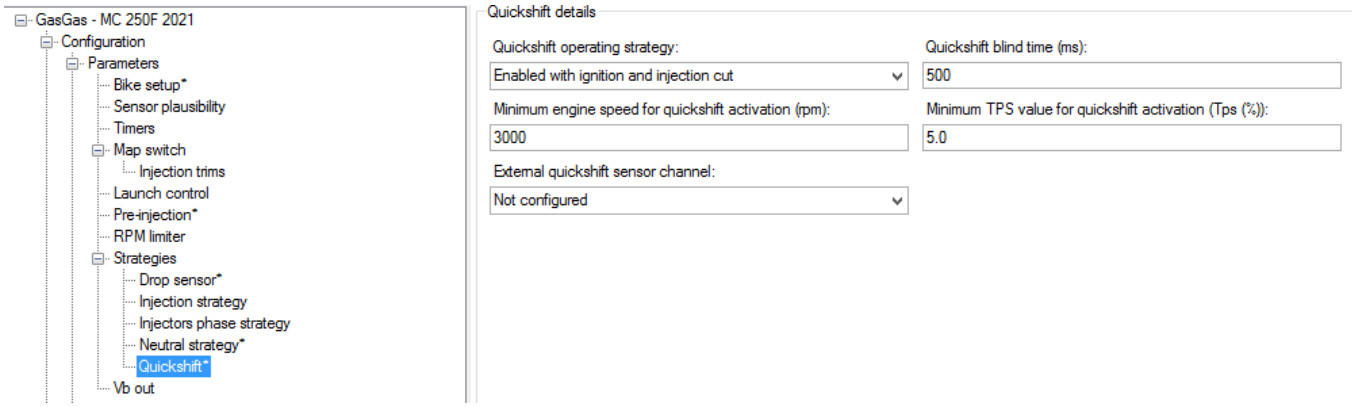
AiM default values for the EWP control strategy are:

- KP = 3.5
- KI = 0.1
- KD = 0
- ECT target (°C) = 75.0

These values have been widely tested on the two compatible Bosch water pump; therefore, we recommend using these values where possible.
Keep in mind that, in order to write a new value of these parameters to the ECU you have to press the button “Set” near the value you are changing. It is also possible to check in live measure the correct functioning of the strategy in that pop-up menu.

In the calibration pop-up the word “Duty %” is the PWM Duty cycle percentage with which the ECU powers the pump using a low-side command and it is directly connected to the flow rate of the EWP.

Quick shift



It is possible to set-up the quick shift strategy, in order to reduce the time of power loss between gear changes. This setting works in combination with a proper quick shift table, to be defined in every map (map -> quick shift)

The Quick Shift may be:

- Quick shift DISABLED
- Quick shift ENABLED with ignition cut only
- Quick shift ENABLED with injection cut only
- Quick shift ENABLED with ignition and injection cut

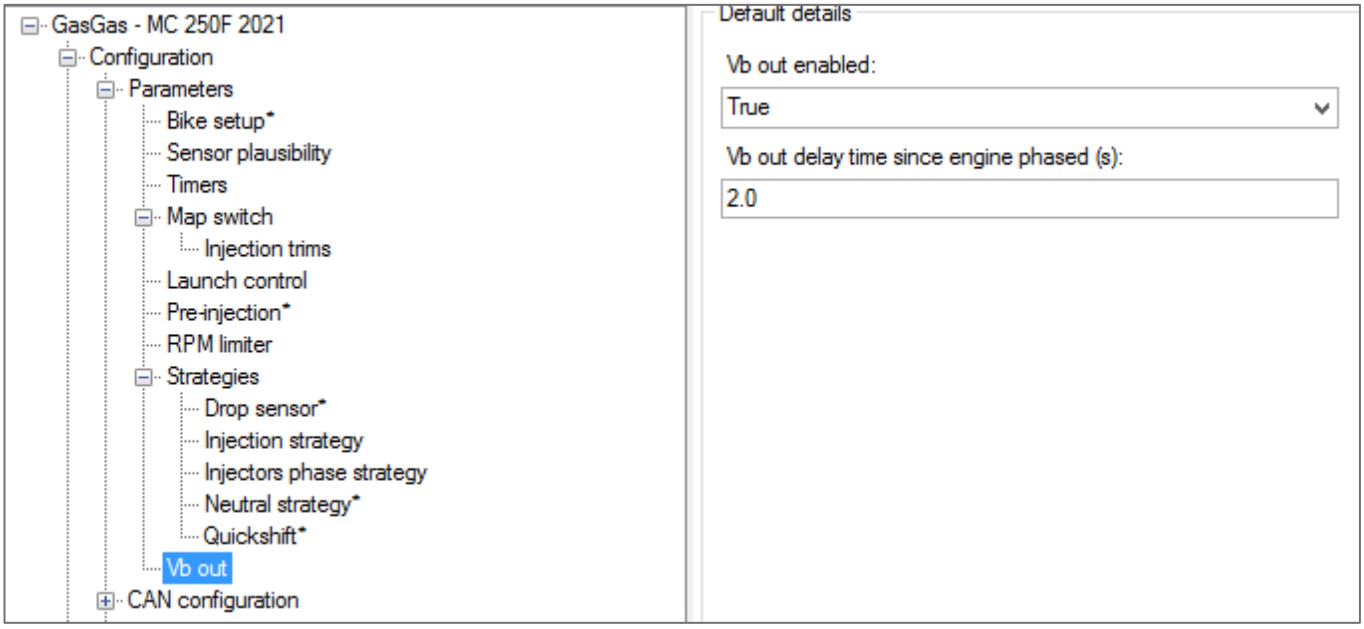
If Quick Shift strategy is ENABLED, you must set these parameters:

- Minimum RPM for quick shift activation.
- Minimum TPS value for quick shift activation (%)

Only if TPS and RPM are greater than the thresholds this strategy is active.

- Quick shift blind time (msec): Once the strategy is active for the calculated time from the dedicated table, another shift activation is inhibited for this blind time.
- External quick shift sensor channel: in case your bike must have an external switch, used to read the shift status, connected to one of the two spare inputs of the AiM ECUs ECU.

8.1.1.12 – Vb out

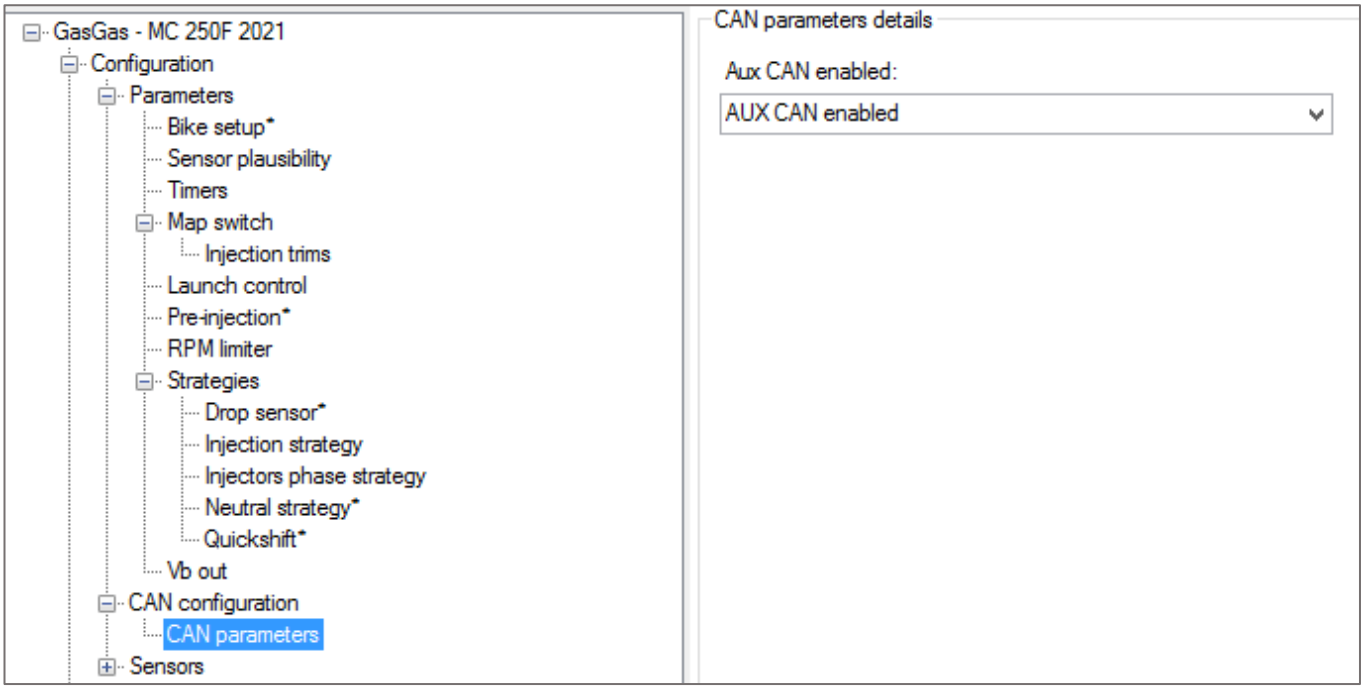


AiM ECUs ECU can be enabled to generate the Vb (12V power supply) in order to power an external device (i.e., datalogger).

- Vb out enabled: False/True.
- Vb out delay time(s) - the Vb out is generated only if the engine is running and is phased. If these conditions are met, once the delay time expires the ECU starts supplying power externally.

8.1.2 – CAN Configuration

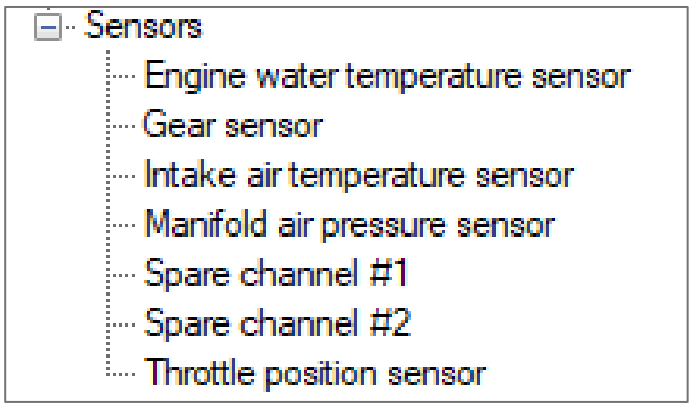
8.1.2.1 – CAN parameters



This section is activated when the Expansions section (the last section of the project tree) is set to true. If the section is set to false, you can choose to have a CAN output or not (aux Can enabled / disabled)

8.1.3 – Sensors

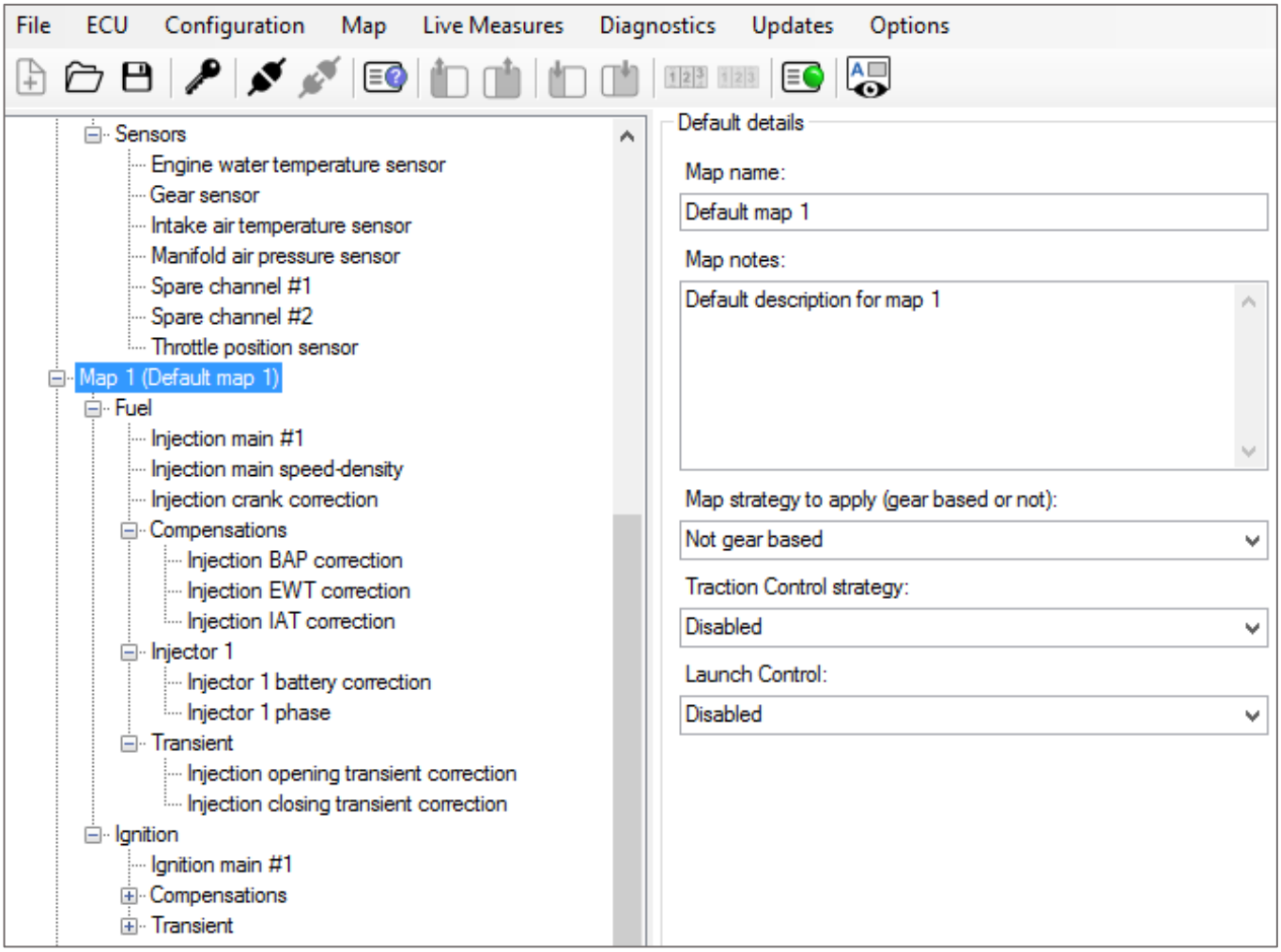
In this section it is possible to define the linearisation of the analog sensors shown below or configure the spare channels to possibly connect, for instance, a quick shift sensor, a Pit limiter, an electric water pump.



8.1.3.1 – Spare channel #1 and #2

AiM ECUs ECU offer the possibility to manage two spare sensors. Each of them may be enabled and configured, thanks to a dedicated table with 16 breakpoints. For each entry, the voltage and the corresponding sensor's measure must be defined.

8.2 – Maps



This is the section where the six ECU maps and strategies are defined. Please select a map from the Tree View and look at its details and strategies in the Data View window.

Please note: in this chapter the maps and their meanings are introduced. In Chapter 9 how to manage the entry points will be explained.

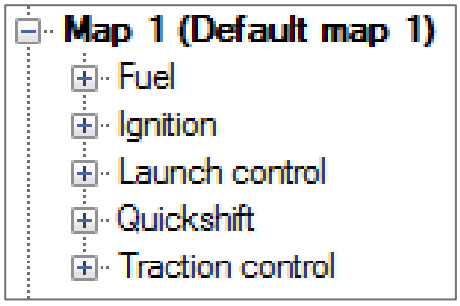
Map strategy to apply; the Map Strategy may be:

- Gear based
- Not Gear based.

In the first case, there is a different main table for injection and ignition for each gear.

Traction Control Strategy: in case Traction Control is ENABLED for each map and ECU has dedicated parameters that will be described later in this manual.

Launch Control: if Launch Control is ENABLED, for every map, the ECU has a dedicated launch control main table.

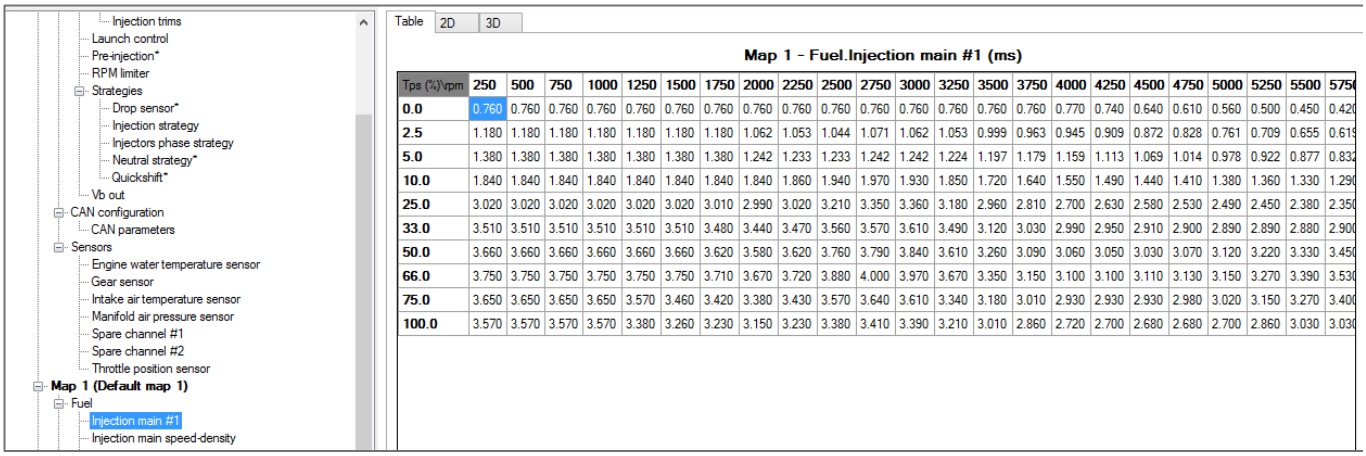


For each map you need to set the following tables:

- Fuel
- Ignition
- Launch control (if enabled)
- Quick shift (if enabled)
- Traction control (if enabled)

8.2.1 – Fuel

8.2.1.1 – Injection main #1



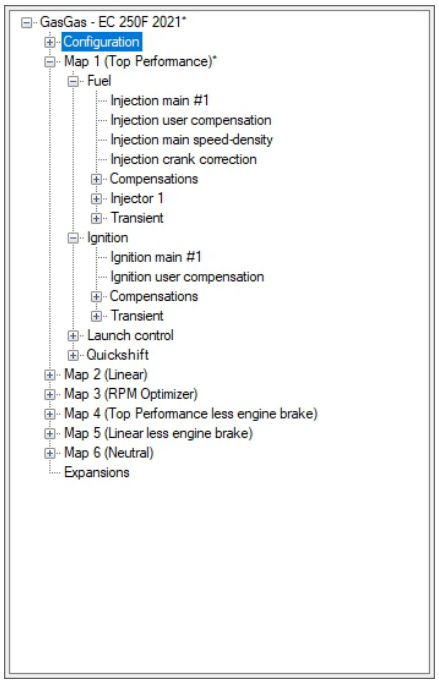
Tps (%)\rpm	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	575
0.0	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.770	0.740	0.640	0.610	0.560	0.500	0.450	0.42
2.5	1.180	1.180	1.180	1.180	1.180	1.180	1.180	1.062	1.053	1.044	1.071	1.062	1.053	0.999	0.963	0.945	0.909	0.872	0.828	0.761	0.709	0.655	0.61
5.0	1.380	1.380	1.380	1.380	1.380	1.380	1.380	1.242	1.233	1.233	1.242	1.242	1.224	1.197	1.179	1.159	1.113	1.069	1.014	0.978	0.922	0.877	0.83
10.0	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.860	1.940	1.970	1.930	1.850	1.720	1.640	1.550	1.490	1.440	1.410	1.380	1.360	1.330	1.29
25.0	3.020	3.020	3.020	3.020	3.020	3.020	3.010	2.990	3.020	3.210	3.350	3.360	3.180	2.960	2.810	2.700	2.630	2.580	2.530	2.490	2.450	2.380	2.35
33.0	3.510	3.510	3.510	3.510	3.510	3.510	3.480	3.440	3.470	3.560	3.570	3.610	3.490	3.120	3.030	2.990	2.950	2.910	2.900	2.890	2.890	2.880	2.90
50.0	3.660	3.660	3.660	3.660	3.660	3.660	3.620	3.580	3.620	3.760	3.790	3.840	3.610	3.260	3.090	3.060	3.050	3.030	3.070	3.120	3.220	3.330	3.45
66.0	3.750	3.750	3.750	3.750	3.750	3.750	3.710	3.670	3.720	3.880	4.000	3.970	3.670	3.350	3.150	3.100	3.100	3.110	3.130	3.150	3.270	3.390	3.53
75.0	3.650	3.650	3.650	3.650	3.570	3.460	3.420	3.380	3.430	3.570	3.640	3.610	3.340	3.180	3.010	2.930	2.930	2.930	2.980	3.020	3.150	3.270	3.40
100.0	3.570	3.570	3.570	3.570	3.380	3.260	3.230	3.150	3.230	3.380	3.410	3.390	3.210	3.010	2.860	2.720	2.700	2.680	2.680	2.700	2.860	3.030	3.03

- X axis: RPM – 64 breakpoints
- Y axis: TPS (%) – 10 breakpoints
- Entry points: Injection Time (ms)

This map defines the injection time, in ms, in dependence upon the RPM and Throttle position.
In case of gear dependant setting, this table is applied only to the first gear otherwise is applied to all gears.
The map can also be managed with a 2D view providing a quicker overview of the calibration.
In case the Map Strategy is Gear based, you may also fill the same maps for the other gears.

8.2.1.2 – Fuel injection user compensation table

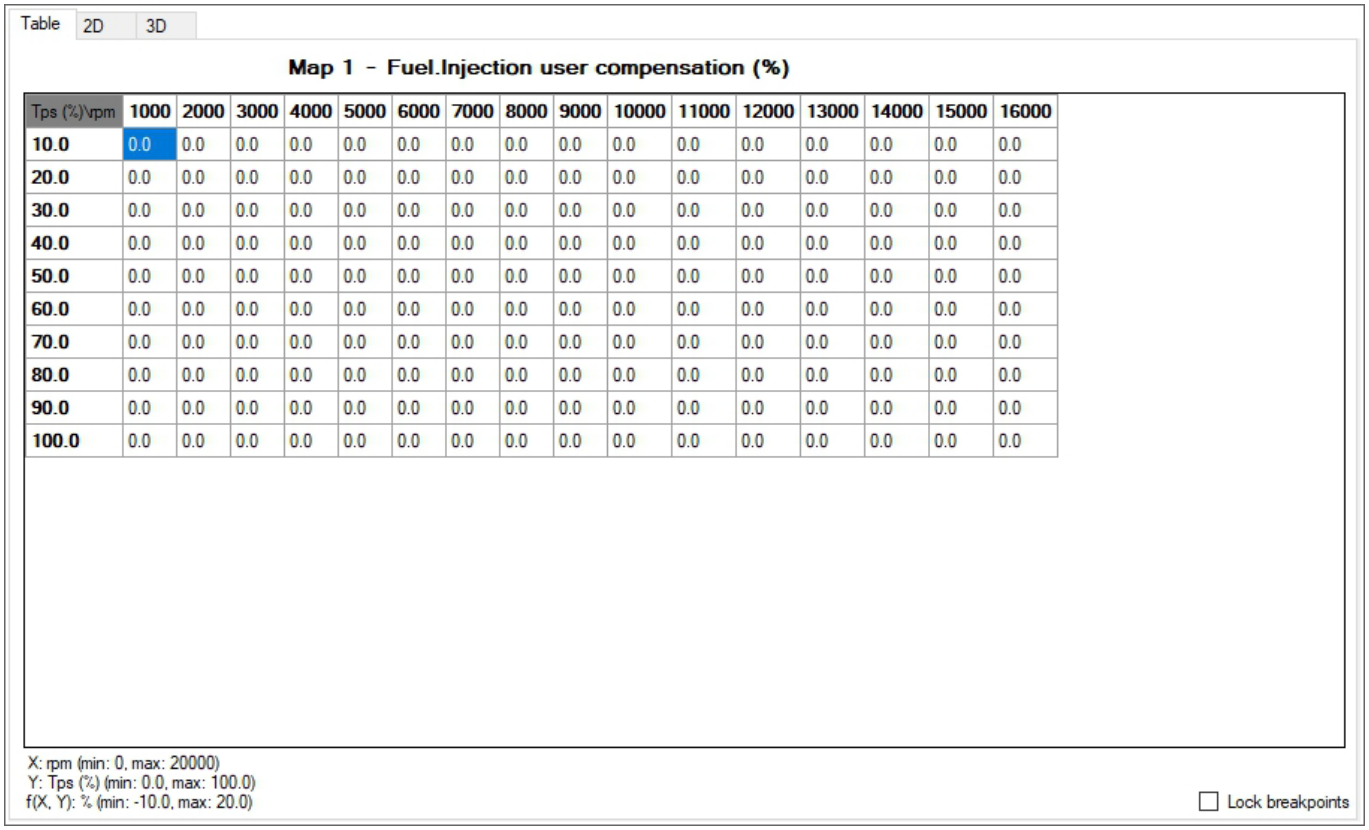
From Spark 1.1.8 onwards there is also the possibility with both user and tuner license to correct the injection/ignition base maps.
More into details, below each map there are two user compensation tables as shown in the figure below:



- **Injection user compensation:**

The fuel injection user compensation is a correction table where you can correct the injection time in percentage for each map, an example of an empty table is shown below. The correction range available is between +20% and -10%.

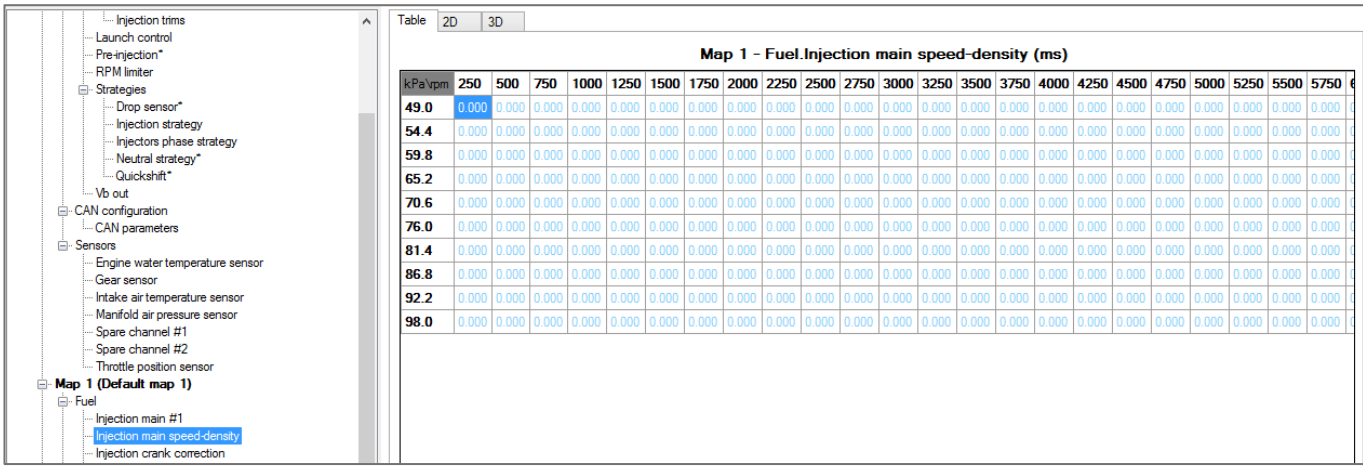
This means that if you are adding a + 10% in a point of this table the main injection map is corrected in that exact point by a 10% more of injection time.



Tps (%)\rpm	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Please remember that, to apply the changes made to the user compensation tables you need to connect the UC-bridge between the PC and the ECU and write the previously modified map using the command “Write ECU” or using the shortcut ALT+MAIUSC+E.

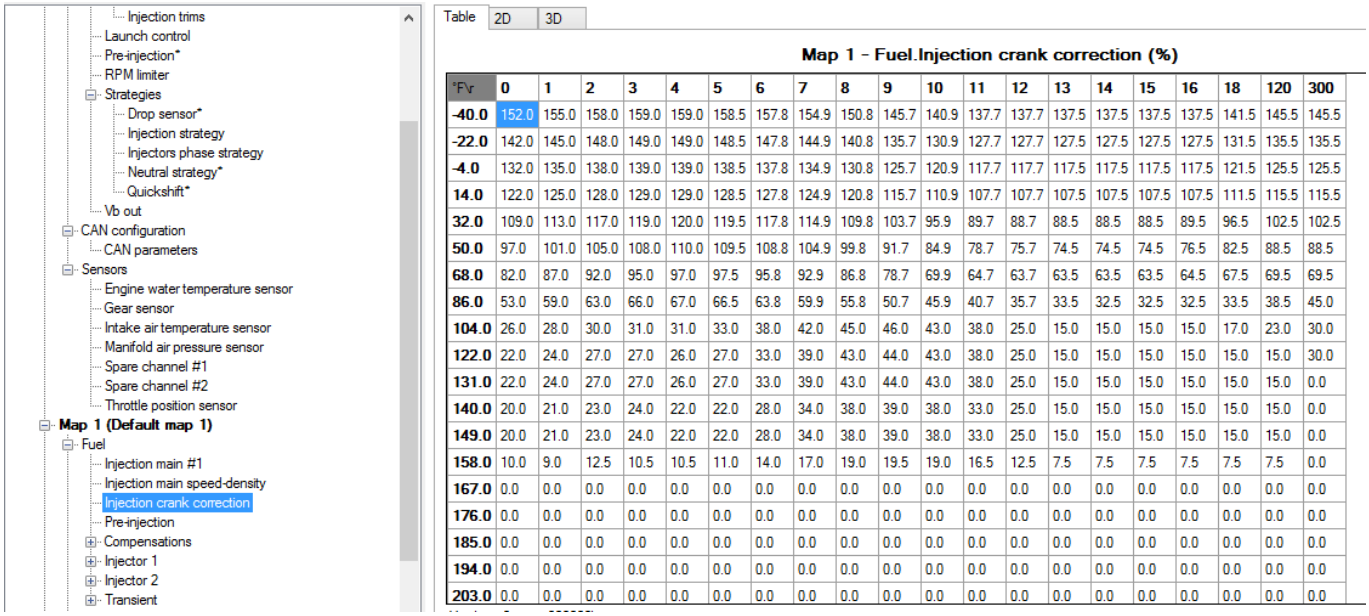
8.2.1.3 – Injection main speed-density (ms)



- X-Axis: RPM
- Y-Axis: MAP (Manifold Air Pressure)
- Entry Point: Injection Time in ms

This map represents an alternative way to calibrate the ECU: depending on manifold air pressure (MAP) sensor, guarantees a better tuning at low RPM and TPS opening. it is applied when the conditions under the Speed density strategy (Configuration -> Parameters -> Strategies -> Injection strategy) are met, so when RPM and TPS are under the set thresholds.

8.2.1.4 – Injection crank correction (%)



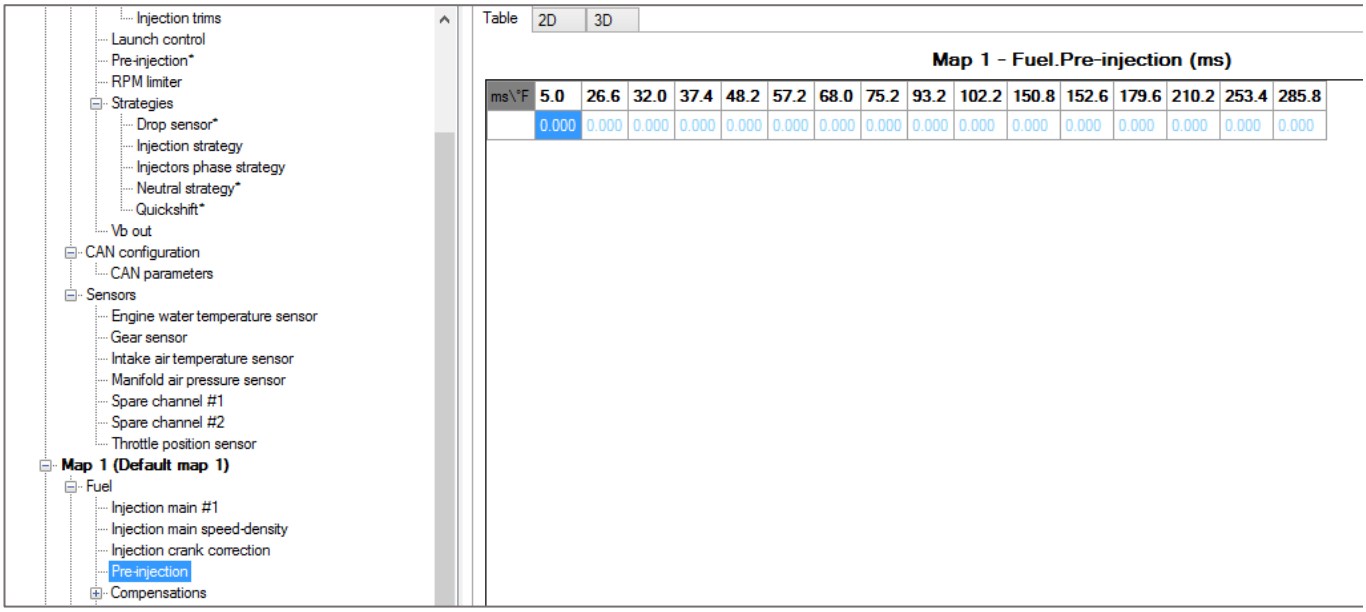
°F\r	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	120	300
-40.0	152.0	155.0	158.0	159.0	159.0	158.5	157.8	154.9	150.8	145.7	140.9	137.7	137.7	137.5	137.5	137.5	137.5	141.5	145.5	145.5
-22.0	142.0	145.0	148.0	149.0	149.0	148.5	147.8	144.9	140.8	135.7	130.9	127.7	127.7	127.5	127.5	127.5	127.5	131.5	135.5	135.5
-4.0	132.0	135.0	138.0	139.0	139.0	138.5	137.8	134.9	130.8	125.7	120.9	117.7	117.7	117.5	117.5	117.5	117.5	121.5	125.5	125.5
14.0	122.0	125.0	128.0	129.0	129.0	128.5	127.8	124.9	120.8	115.7	110.9	107.7	107.7	107.5	107.5	107.5	107.5	111.5	115.5	115.5
32.0	109.0	113.0	117.0	119.0	120.0	119.5	117.8	114.9	109.8	103.7	95.9	89.7	88.7	88.5	88.5	88.5	89.5	96.5	102.5	102.5
50.0	97.0	101.0	105.0	108.0	110.0	109.5	108.8	104.9	99.8	91.7	84.9	78.7	75.7	74.5	74.5	74.5	76.5	82.5	88.5	88.5
68.0	82.0	87.0	92.0	95.0	97.0	97.5	95.8	92.9	86.8	78.7	69.9	64.7	63.7	63.5	63.5	63.5	64.5	67.5	69.5	69.5
86.0	53.0	59.0	63.0	66.0	67.0	66.5	63.8	59.9	55.8	50.7	45.9	40.7	35.7	33.5	32.5	32.5	32.5	33.5	38.5	45.0
104.0	26.0	28.0	30.0	31.0	31.0	33.0	38.0	42.0	45.0	46.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	17.0	23.0	30.0
122.0	22.0	24.0	27.0	27.0	26.0	27.0	33.0	39.0	43.0	44.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	30.0
131.0	22.0	24.0	27.0	27.0	26.0	27.0	33.0	39.0	43.0	44.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
140.0	20.0	21.0	23.0	24.0	22.0	22.0	28.0	34.0	38.0	39.0	38.0	33.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
149.0	20.0	21.0	23.0	24.0	22.0	22.0	28.0	34.0	38.0	39.0	38.0	33.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
158.0	10.0	9.0	12.5	10.5	10.5	11.0	14.0	17.0	19.0	19.5	19.0	16.5	12.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0
167.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
176.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
185.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
194.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
203.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

- X-axis: Number of Revolutions (REV)
- Y-axis Engine Coolant Temperature ECT.
- Entry Point: injection percentual correction to apply at the main injection table.

This table is only applied at the engine crank for the maximum number of revolutions (end point of Revolution X-axis).

This strategy is deeply explained in Appendix F.

8.2.1.5 – Pre-injection (ms)



- X-axis: Engine Coolant Temperature ECT
- Entry Point: pre-injection durations in ms.

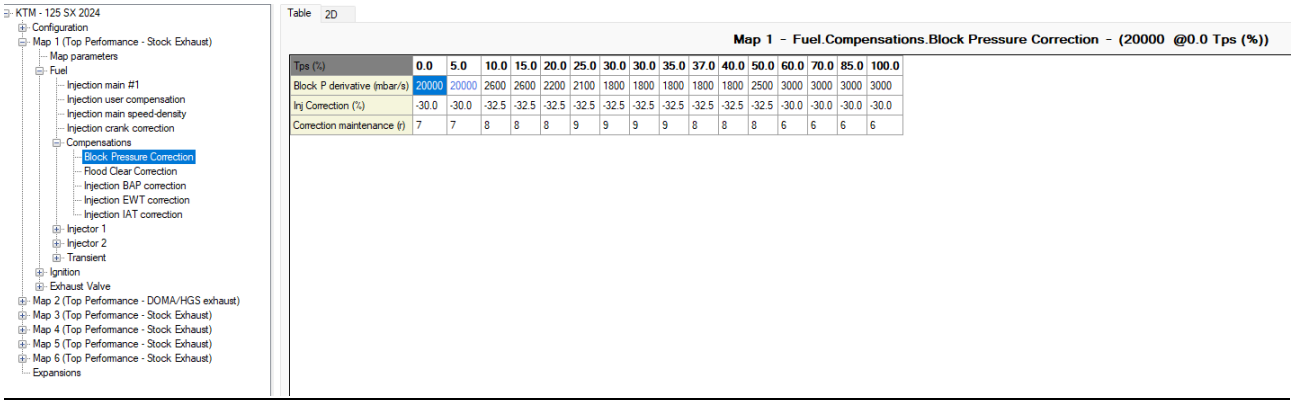
If Pre-injection strategy is enabled, this table is activated by the very first movement of the crankshaft and is applied just before the intervention of all the other tables (injection main / injection crank corrections).

This strategy is deeply explained in Appendix E.

8.2.1.6 – Compensations

Block pressure correction strategy

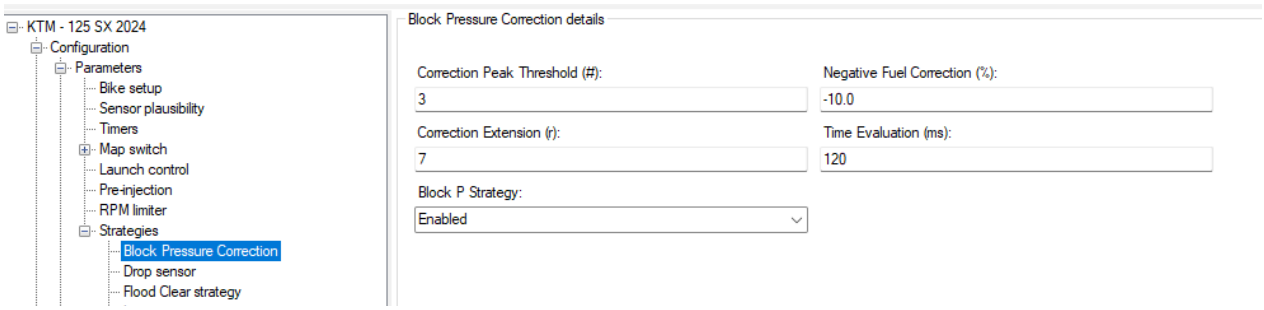
The correction strategy based on the block pressure sensor, also known as the crankcase pressure sensor, is a strategy that corrects the air/fuel ratio by reducing fuel when there is not a good distribution of pressure near the transfer where the sensor is mounted. Taipan K applies corrections that can be configured from the table below:



Tps (%)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	30.0	35.0	37.0	40.0	50.0	60.0	70.0	85.0	100.0
Block P derivative (mbar/s)	20000	20000	2600	2600	2200	2100	1800	1800	1800	1800	1800	2500	3000	3000	3000	3000
Inj Correction (%)	-30.0	-30.0	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5	-30.0	-30.0	-30.0	-30.0
Correction maintenance (r)	7	7	8	8	8	9	9	9	9	8	8	8	6	6	6	6

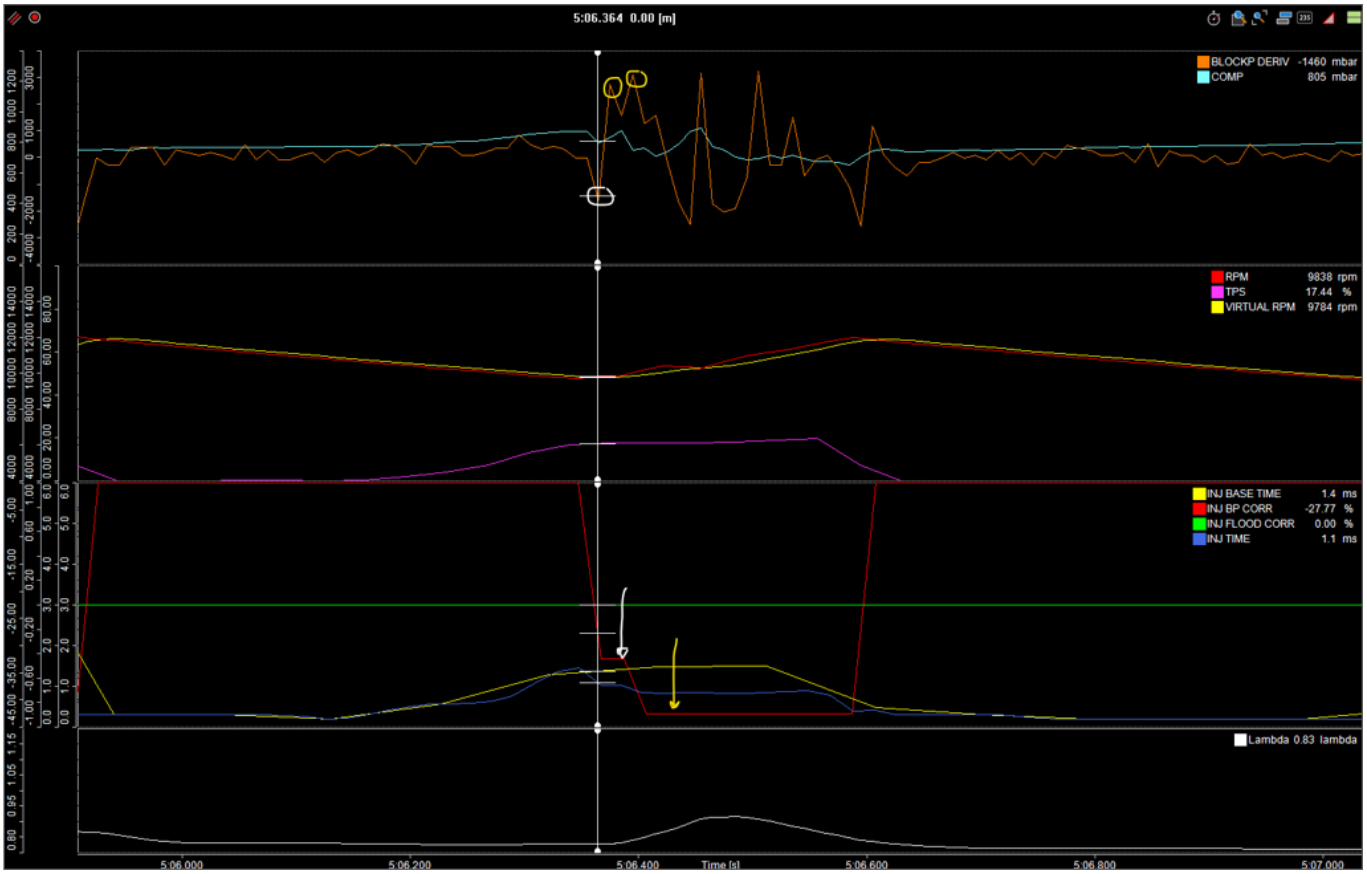
So, for example, using this table, if at 20% of TPS I have a value of the derivative of the Block Pressure Sensor higher than the value written in the table the ECU will correct the fuel injection by –32.5% for 8 revolutions of the engine.

Additionally, since small 2 stroke engines often has a rich fuel mixture condition when not under load, we have added an extension to this strategy which can be configured under "Block Pressure Correction Details" as shown below:



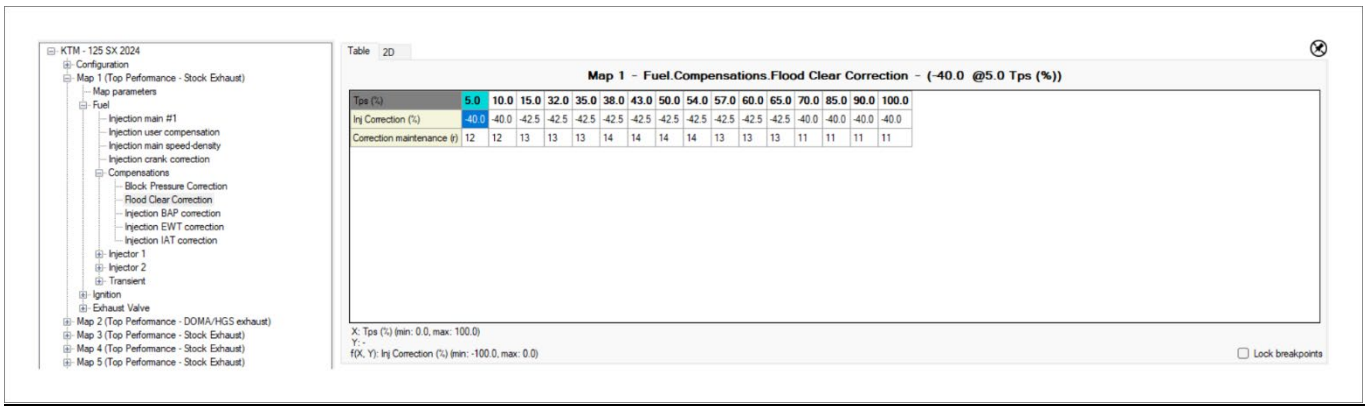
As shown in the table above the “Correction Peak threshold” is the number of derivative peaks of the BlockP during a period defined in “Time Evaluation(ms)” beyond which the ECU will increase the negative correction by a value defined in “Negative fuel Correction” and a number of revolution defined in “Correction extension”.

The image below shows an example.

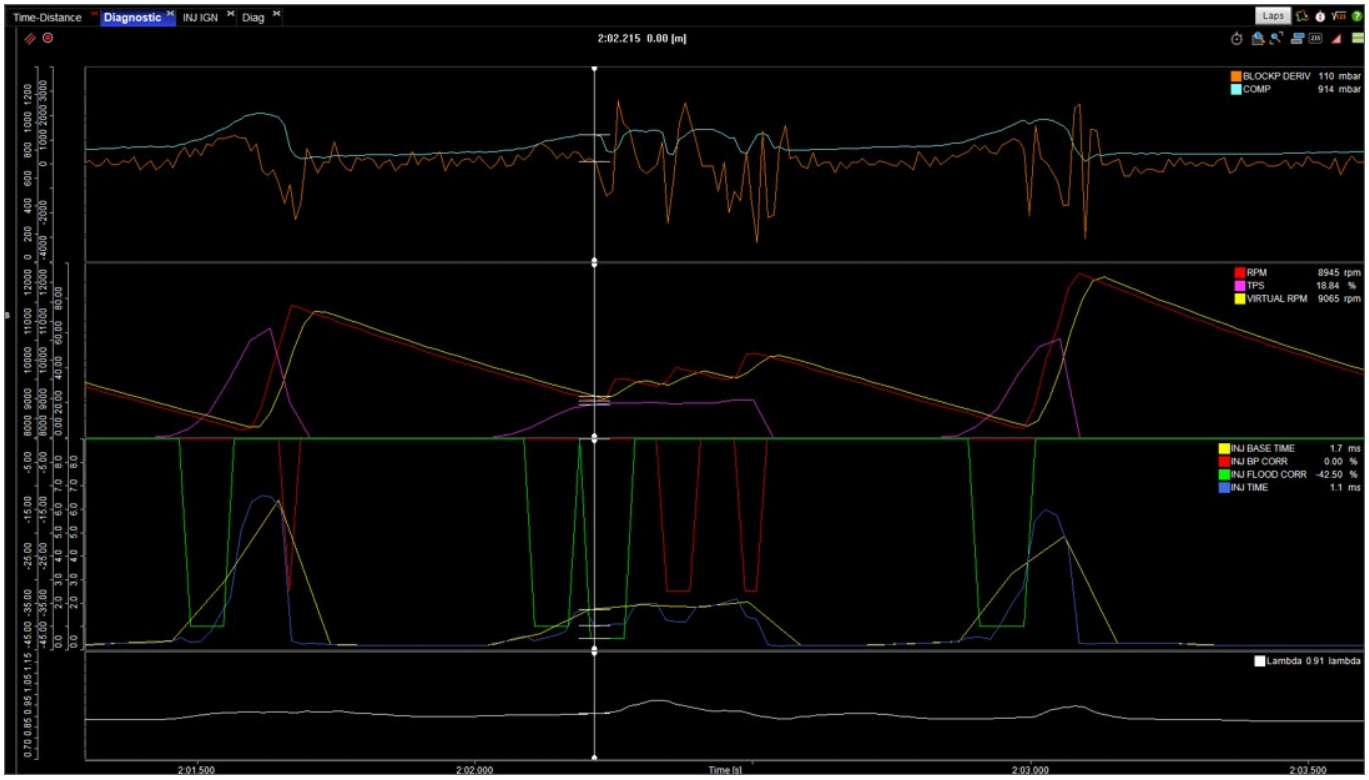


Flood Clear Correction strategy

The Flood Clear correction is a strategy used by the ECU to clear the engine when it is in a state of light flooding. For example, it happens when the motorcycle remains under load with the throttle closed for a few seconds (e.g., while descending) and an excess of fuel accumulates in the combustion chamber, making the motorcycle unresponsive when the throttle is reopened.
To address this issue, the ECU checks and applies a negative fuel correction as described in the table below, of course if the strategy is set as enabled in the configuration panel.

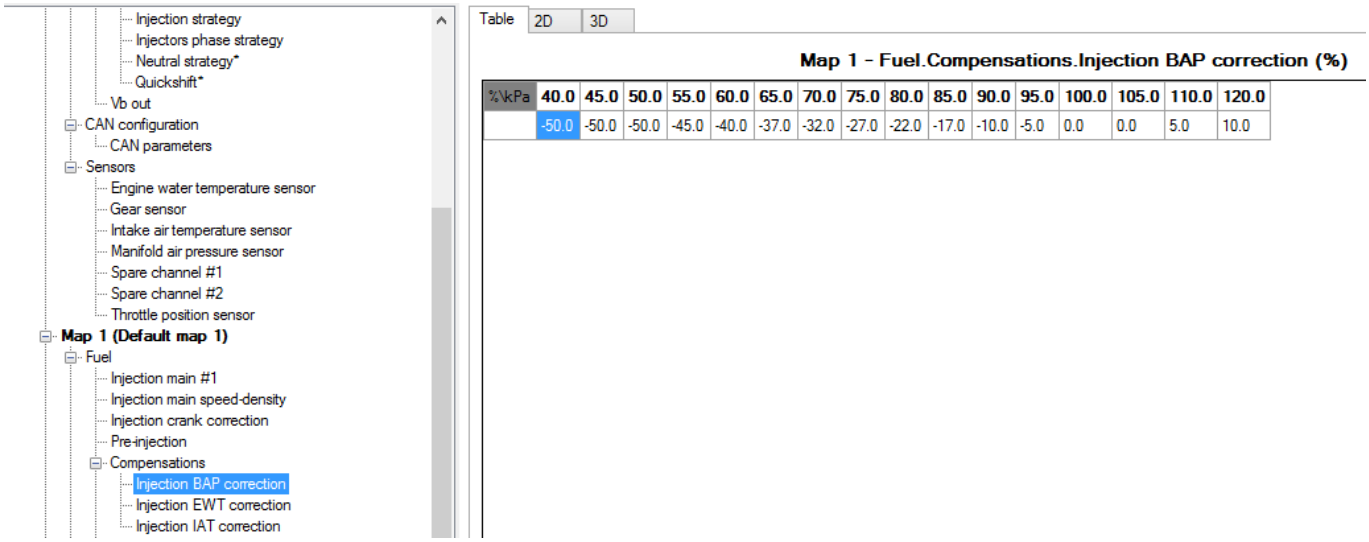


Fuel correction stops if the fuel mixture has cleared or if the revolutions expressed in the table have expired.
In the data below an example of test session with the KTM 125 cc is shown; it highlighting the points where the flood clear correction strategy intervenes in green. This strategy is currently used only above 2800 RPM (not at idle) and below 10000 RPM.



Injection BAP correction (%)

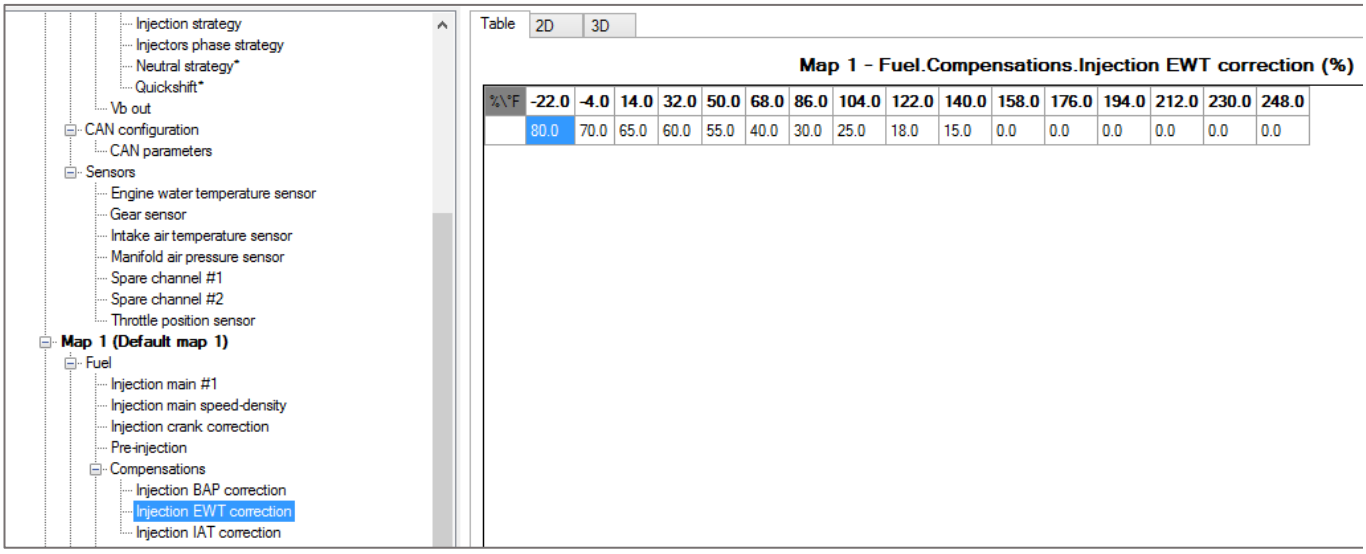
All these tables are referred as corrections as to the main injection table.



%\kPa	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0	105.0	110.0	120.0
	-50.0	-50.0	-50.0	-45.0	-40.0	-37.0	-32.0	-27.0	-22.0	-17.0	-10.0	-5.0	0.0	0.0	5.0	10.0

- X-axis: Barometric pressure
- Entry Point: percentage of fuel correction.

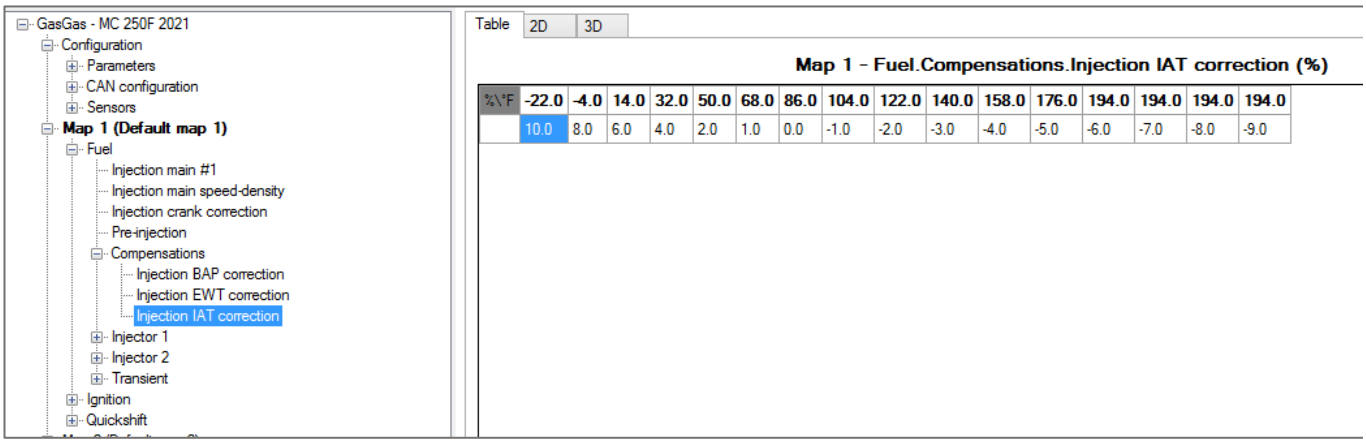
Injection EWT correction (%)



%\°F	-22.0	-4.0	14.0	32.0	50.0	68.0	86.0	104.0	122.0	140.0	158.0	176.0	194.0	212.0	230.0	248.0
	80.0	70.0	65.0	60.0	55.0	40.0	30.0	25.0	18.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0

- X-axis: Engine Water Temperature
- Entry Point: percentage of fuel correction.

Injection IAT correction (%)

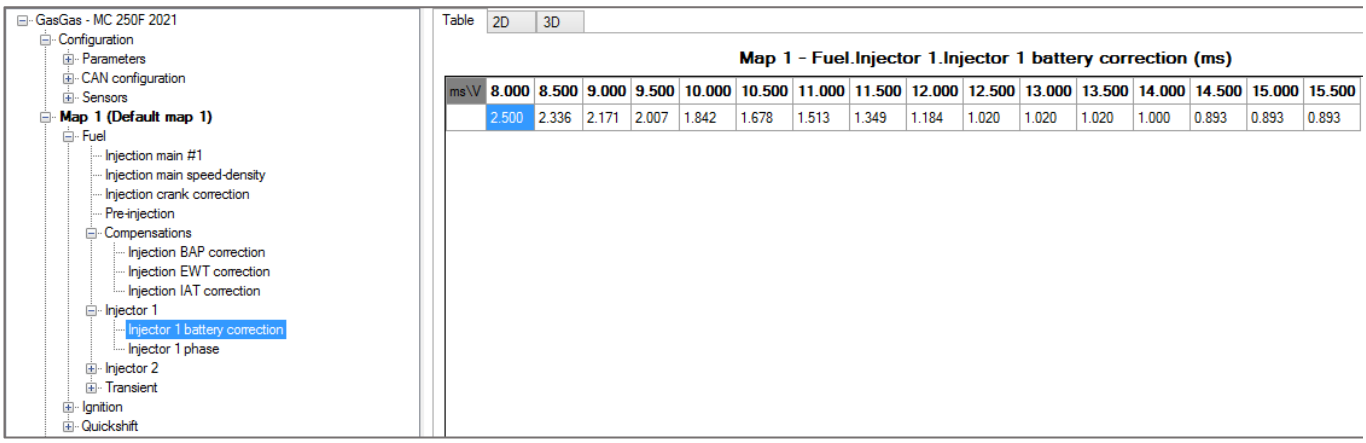


%\°F	-22.0	-4.0	14.0	32.0	50.0	68.0	86.0	104.0	122.0	140.0	158.0	176.0	194.0	194.0	194.0	194.0
	10.0	8.0	6.0	4.0	2.0	1.0	0.0	-1.0	-2.0	-3.0	-4.0	-5.0	-6.0	-7.0	-8.0	-9.0

- X-axis: Intake Air temperature
- Entry Point: percentage of fuel correction.

8.2.1.7 – Injector 1

Injector 1 battery correction (ms)

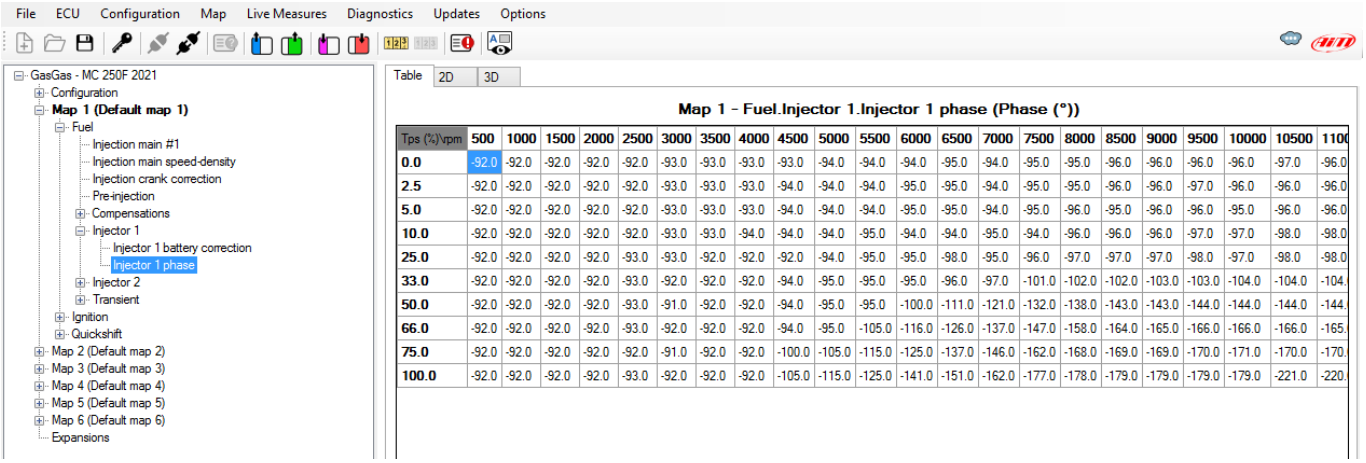


ms\V	8.000	8.500	9.000	9.500	10.000	10.500	11.000	11.500	12.000	12.500	13.000	13.500	14.000	14.500	15.000	15.500
	2.500	2.336	2.171	2.007	1.842	1.678	1.513	1.349	1.184	1.020	1.020	1.020	1.000	0.893	0.893	0.893

- X-axis: battery voltage
- Entry Point: injection time offset in ms.

This strategy is deeply explained in Appendix G.

Injector 1 phase (phase°)



Tps (%)\rpm	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	10500	110
0.0	-92.0	-92.0	-92.0	-92.0	-92.0	-93.0	-93.0	-93.0	-93.0	-94.0	-94.0	-94.0	-95.0	-94.0	-95.0	-95.0	-96.0	-96.0	-96.0	-96.0	-97.0	-96.0
2.5	-92.0	-92.0	-92.0	-92.0	-92.0	-93.0	-93.0	-93.0	-94.0	-94.0	-94.0	-95.0	-95.0	-94.0	-95.0	-95.0	-96.0	-96.0	-97.0	-96.0	-96.0	-96.0
5.0	-92.0	-92.0	-92.0	-92.0	-92.0	-93.0	-93.0	-93.0	-94.0	-94.0	-94.0	-95.0	-95.0	-94.0	-95.0	-96.0	-95.0	-96.0	-96.0	-95.0	-96.0	-96.0
10.0	-92.0	-92.0	-92.0	-92.0	-92.0	-93.0	-93.0	-94.0	-94.0	-94.0	-95.0	-94.0	-94.0	-95.0	-94.0	-96.0	-96.0	-96.0	-97.0	-97.0	-98.0	-98.0
25.0	-92.0	-92.0	-92.0	-92.0	-93.0	-93.0	-92.0	-92.0	-92.0	-94.0	-95.0	-95.0	-98.0	-95.0	-96.0	-97.0	-97.0	-97.0	-98.0	-97.0	-98.0	-98.0
33.0	-92.0	-92.0	-92.0	-92.0	-93.0	-92.0	-92.0	-92.0	-94.0	-95.0	-95.0	-95.0	-96.0	-97.0	-101.0	-102.0	-102.0	-103.0	-103.0	-104.0	-104.0	-104.
50.0	-92.0	-92.0	-92.0	-92.0	-93.0	-91.0	-92.0	-92.0	-94.0	-95.0	-95.0	-100.0	-111.0	-121.0	-132.0	-138.0	-143.0	-143.0	-144.0	-144.0	-144.0	-144.
66.0	-92.0	-92.0	-92.0	-92.0	-93.0	-92.0	-92.0	-92.0	-94.0	-95.0	-105.0	-116.0	-126.0	-137.0	-147.0	-158.0	-164.0	-165.0	-166.0	-166.0	-166.0	-165.
75.0	-92.0	-92.0	-92.0	-92.0	-92.0	-91.0	-92.0	-92.0	-100.0	-105.0	-115.0	-125.0	-137.0	-146.0	-162.0	-168.0	-169.0	-169.0	-170.0	-171.0	-170.0	-170.
100.0	-92.0	-92.0	-92.0	-92.0	-93.0	-92.0	-92.0	-92.0	-105.0	-115.0	-125.0	-141.0	-151.0	-162.0	-177.0	-178.0	-179.0	-179.0	-179.0	-179.0	-221.0	-220.

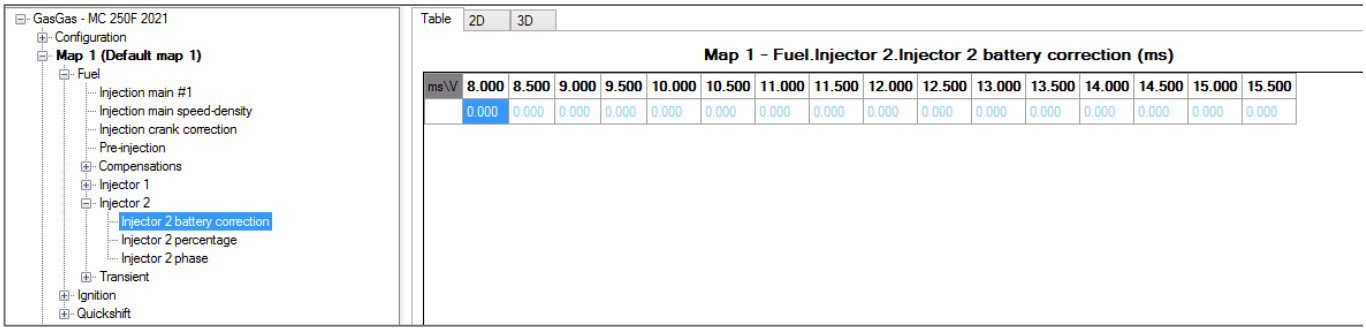
This table is based on X-axis with RPM and Y-axis with TPS. Depending on the injector operating strategy selected (Configuration –> Parameters –> Strategies) the entry value in this table is the end or the start angle of the injection phase.

- X-axis = RPM.
- Y-axis = TPS.
- Entry Point = end or the start angle of the injection phase.

8.2.1.8 – Injector 2

This section appears only if you have an OEM 2nd injector or if you have selected the proper option in Configuration –>Strategies-> Motorcycle setup

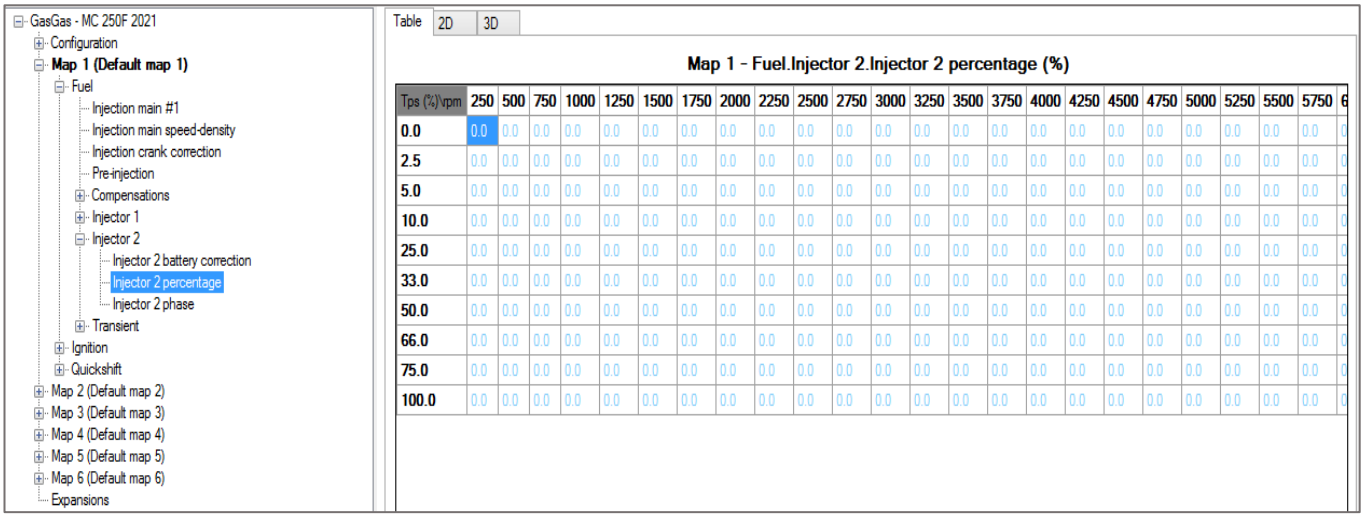
Injector 2 battery correction (ms)



- X-axis: battery voltage
- Entry Point: injection time offset in ms.

This strategy is deeply explained in Appendix G.

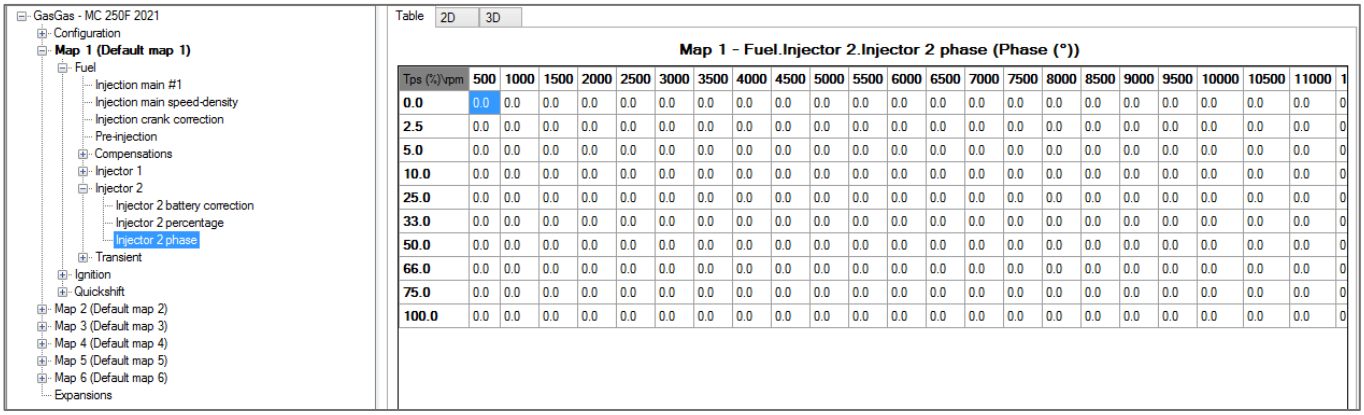
Injector 2 percentage (%)



This table defines the percentual repartition between the two injectors.

- X-axis = RPM.
- Y-axis = TPS.
- Entry Point = percentage of the fuel to the second injector

Injector 2 phase (phase°)



Tps (%)\rpm	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	10500	11000
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Depending on the injector operating strategy selected (Configuration -> Parameters -> Strategies -> Injector phase strategy) the entry value in this table is the end or the start angle of the injection phase. This table is made of an X-axis with RPM and Y-axis with TPS.

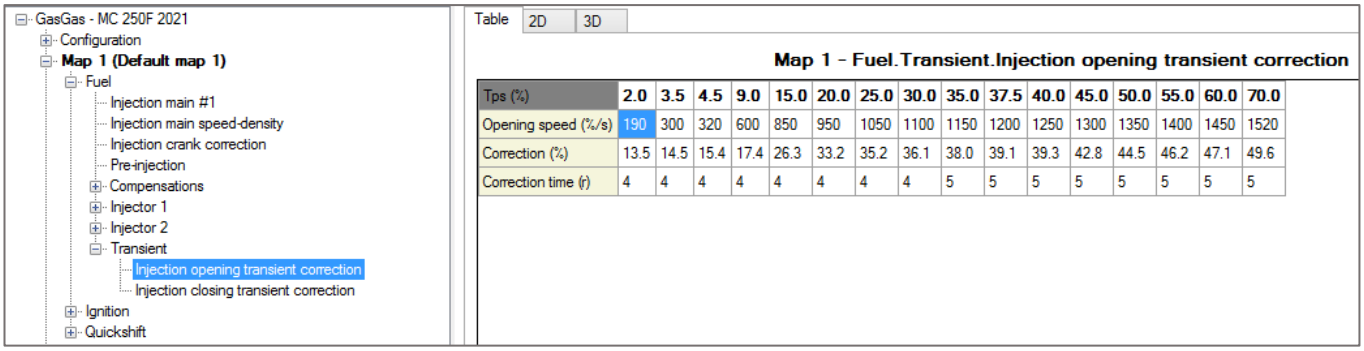
- X-axis = RPM.
- Y-axis = TPS.
- Entry Point = end or the start angle of the injection phase.

8.2.1.9 – Transient

This function is the one relevant to transient injection mapping tables (transient corrections applied under conditions), these are separated for opening and closing throttle.

This strategy is deeply explained in Appendix I.

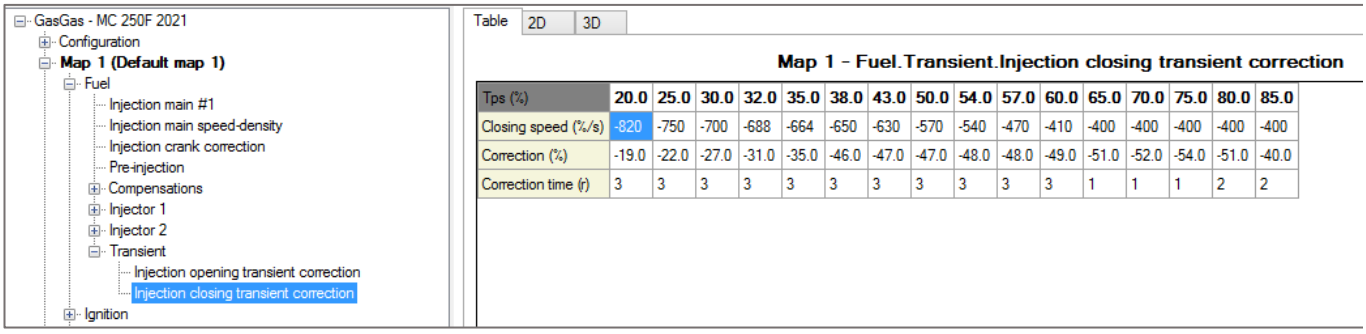
Injection opening transient correction.



Tps (%)	2.0	3.5	4.5	9.0	15.0	20.0	25.0	30.0	35.0	37.5	40.0	45.0	50.0	55.0	60.0	70.0
Opening speed (%/s)	190	300	320	600	850	950	1050	1100	1150	1200	1250	1300	1350	1400	1450	1520
Correction (%)	13.5	14.5	15.4	17.4	26.3	33.2	35.2	36.1	38.0	39.1	39.3	42.8	44.5	46.2	47.1	49.6
Correction time (r)	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5

The table is composed by one X-axis with TPS and three rows of entries: **Opening speed (%/s)**, **Correction (%)** and **Correction period (Rev)**. The strategy works as follows: in dependence upon the throttle position (TPS), if its opening speed (dTPS) is over the corresponding value (in the second-row cell), a correction (in the third-row cell) is applied for a number of revolutions (in the fourth row cell).

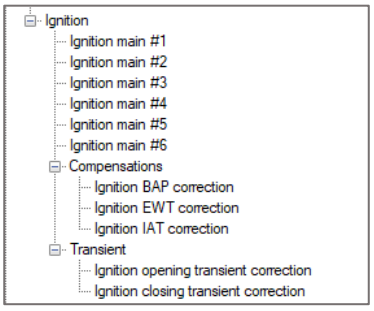
Injection closing transient correction



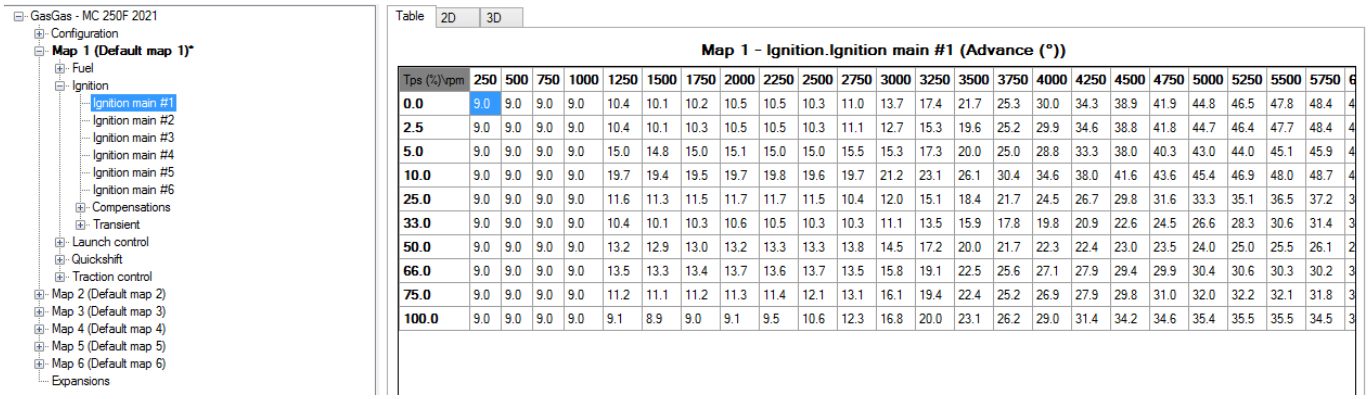
Tps (%)	20.0	25.0	30.0	32.0	35.0	38.0	43.0	50.0	54.0	57.0	60.0	65.0	70.0	75.0	80.0	85.0
Closing speed (%/s)	-820	-750	-700	-688	-664	-650	-630	-570	-540	-470	-410	-400	-400	-400	-400	-400
Correction (%)	-19.0	-22.0	-27.0	-31.0	-35.0	-46.0	-47.0	-47.0	-48.0	-48.0	-49.0	-51.0	-52.0	-54.0	-51.0	-40.0
Correction time (r)	3	3	3	3	3	3	3	3	3	3	3	1	1	1	2	2

The table is composed by one X-axis with TPS and three rows of entries: **Closing speed (%/s)**, **Correction (%)** and **Correction period (Rev)**. The strategy works as follows: in dependence upon the throttle position (TPS), if its closing speed (dTPS) is below the corresponding value (in the second-row cell), a correction (in the third-row cell) is applied for a number of revolutions (in the fourth row cell).

8.2.2 – Ignition



8.2.2.1 – Ignition main #1 alpha-n (Advance)



Tps (%)\rpm	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6
0.0	9.0	9.0	9.0	9.0	10.4	10.1	10.2	10.5	10.5	10.3	11.0	13.7	17.4	21.7	25.3	30.0	34.3	38.9	41.9	44.8	46.5	47.8	48.4	4
2.5	9.0	9.0	9.0	9.0	10.4	10.1	10.3	10.5	10.5	10.3	11.1	12.7	15.3	19.6	25.2	29.9	34.6	38.8	41.8	44.7	46.4	47.7	48.4	4
5.0	9.0	9.0	9.0	9.0	15.0	14.8	15.0	15.1	15.0	15.0	15.5	15.3	17.3	20.0	25.0	28.8	33.3	38.0	40.3	43.0	44.0	45.1	45.9	4
10.0	9.0	9.0	9.0	9.0	19.7	19.4	19.5	19.7	19.8	19.6	19.7	21.2	23.1	26.1	30.4	34.6	38.0	41.6	43.6	45.4	46.9	48.0	48.7	4
25.0	9.0	9.0	9.0	9.0	11.6	11.3	11.5	11.7	11.7	11.5	10.4	12.0	15.1	18.4	21.7	24.5	26.7	29.8	31.6	33.3	35.1	36.5	37.2	3
33.0	9.0	9.0	9.0	9.0	10.4	10.1	10.3	10.6	10.5	10.3	10.3	11.1	13.5	15.9	17.8	19.8	20.9	22.6	24.5	26.6	28.3	30.6	31.4	3
50.0	9.0	9.0	9.0	9.0	13.2	12.9	13.0	13.2	13.3	13.3	13.8	14.5	17.2	20.0	21.7	22.3	22.4	23.0	23.5	24.0	25.0	25.5	26.1	2
66.0	9.0	9.0	9.0	9.0	13.5	13.3	13.4	13.7	13.6	13.7	13.5	15.8	19.1	22.5	25.6	27.1	27.9	29.4	29.9	30.4	30.6	30.3	30.2	3
75.0	9.0	9.0	9.0	9.0	11.2	11.1	11.2	11.3	11.4	12.1	13.1	16.1	19.4	22.4	25.2	26.9	27.9	29.8	31.0	32.0	32.2	32.1	31.8	3
100.0	9.0	9.0	9.0	9.0	9.1	8.9	9.0	9.1	9.5	10.6	12.3	16.8	20.0	23.1	26.2	29.0	31.4	34.2	34.6	35.4	35.5	35.5	34.5	3

This table is based on RPM (X-axis) and TPS (Y-axis), the entry is the ignition advance in degrees (°). In case of gear dependant setting, this table is used only for the first gear, otherwise is applied for all gears.

Ignition main #2 alpha-n (Advance°)

Ignition main #3 alpha-n (Advance°)

Ignition main #4 alpha-n (Advance°)

Ignition main #5 alpha-n (Advance°)

Ignition main #6 alpha-n (Advance°)

These tables are applied to the corresponding gear (2 to 6), only if the Map strategy to apply is Gear based.

8.2.2.2 – Ignition user compensation

The ignition user compensation table is a correction table where you can correct the advance in degrees for each map. The thresholds to be respected are between 3.0 ° and -5.0° in term of advance. In other words, if you are adding in a point a -2° of advance the main ignition map is corrected by a -2° of advance in that exact point resulting in a delay in terms of ignition advance degrees. An example of an empty ignition user compensation table is shown below:

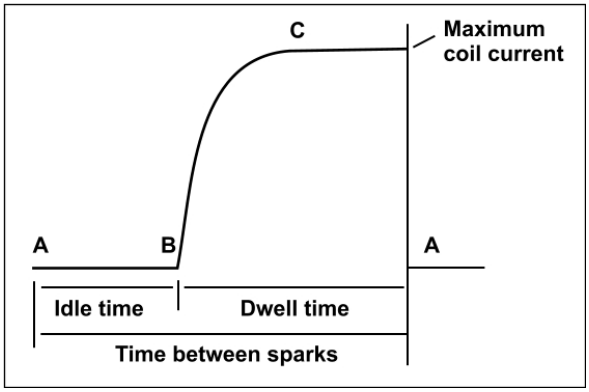
Table 2D 3D

Map 1 - Ignition.Ignition user compensation (Advance (°))

Tps (%)\rpm	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

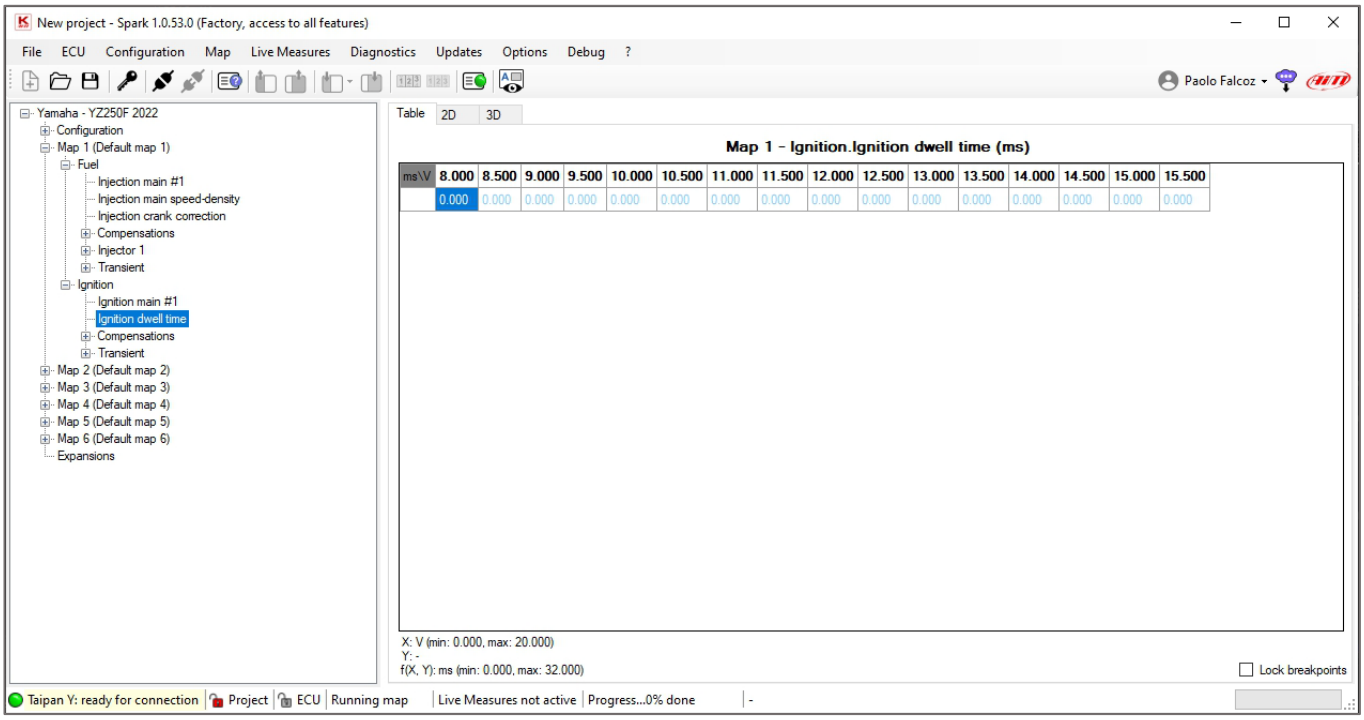
8.2.2.3 – Ignition dwell time (Taipan Y/Yarara only)

In inductive systems, such as the Yamaha engines, the Ignition Dwell Time is the time needed to charge the coil as shown in the following image. More into detail, it is the length of time that current flows through the primary winding of the coil.



- 'A': the electronic switch opens, and the spark occurs.
- 'B': the electronic switch closes, and the current grows.
- 'C': the current reaches its peak.

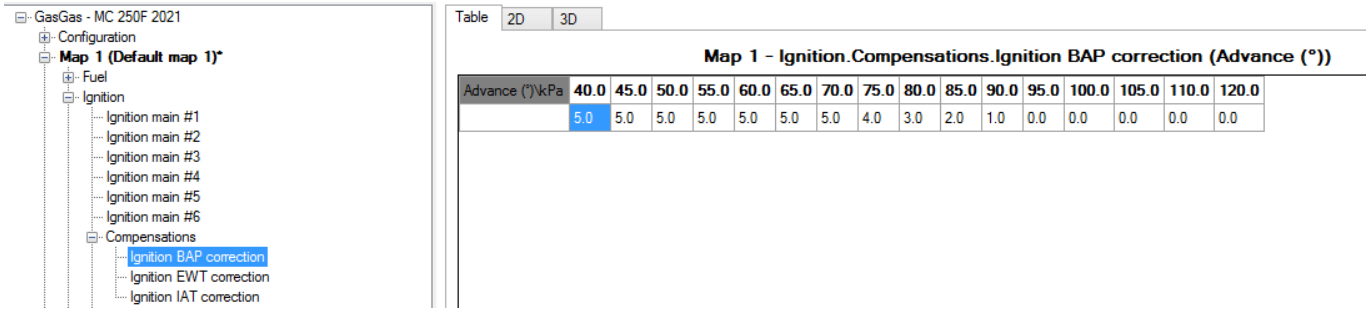
The period B-A is the “Ignition Dwell Time” to be set in the following table.



As shown in the previous table, it is a compensation strategy that changes the time of charge of the coil in order to have the same condition of ignition even with low battery.
Please note that this battery compensation is available for Taipan Y and Yarara only since they have an inductive discharge ignition system as opposed to the Taipan that uses a capacitor discharge ignition system.

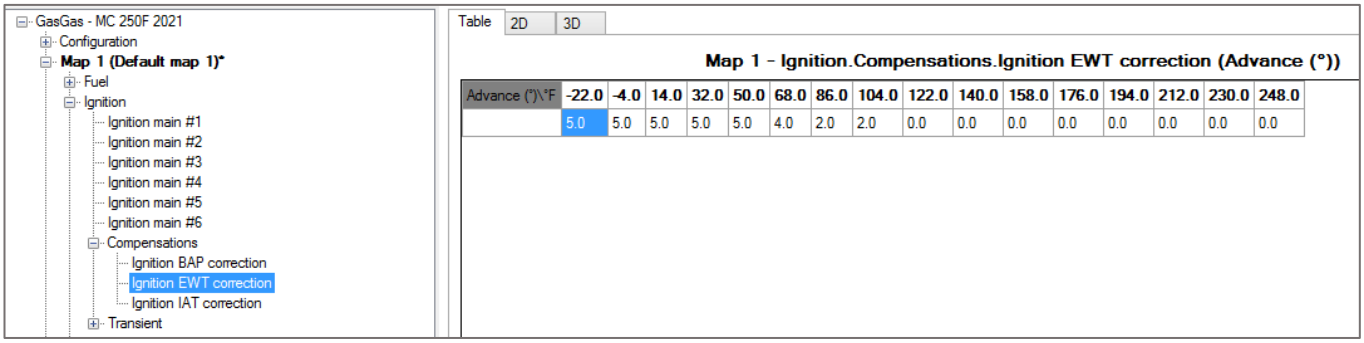
8.2.2.4 – Compensations

Ignition BAP correction (Advance°):



This table represents the Barometric Air Pressure contribution to ignition. This table is based on one X-axis with Barometric pressure and the entries are the angle degrees corrections to apply to the main ignition table.
This strategy is deeply explained in Appendix H.

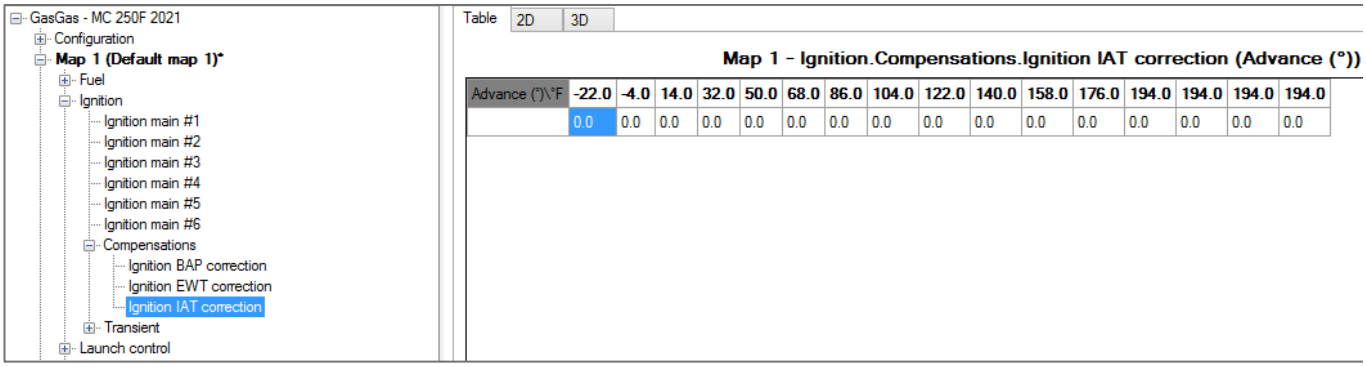
Ignition EWT correction (Advance°)



Advance (°)\°F	-22.0	-4.0	14.0	32.0	50.0	68.0	86.0	104.0	122.0	140.0	158.0	176.0	194.0	212.0	230.0	248.0
	5.0	5.0	5.0	5.0	5.0	4.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

This table represents the Engine Water Temperature (EWT) contribution to ignition. This table is based on one X-axis with EWT and the entries are the offset correction of angle degrees to apply to the main ignition table.

Ignition IAT correction (Advance °)

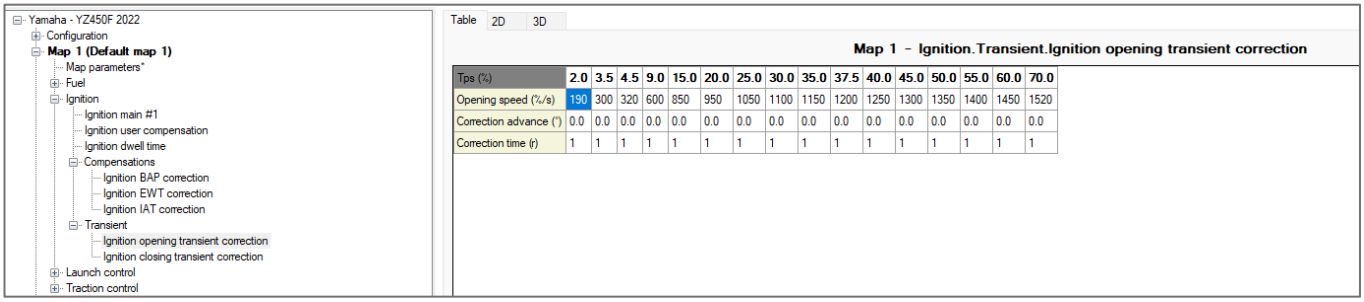


Advance (°)\°F	-22.0	-4.0	14.0	32.0	50.0	68.0	86.0	104.0	122.0	140.0	158.0	176.0	194.0	194.0	194.0	194.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

This table represents the Intake Air Temperature (IAT)contribution to ignition.
X-axis = IAT
Entry Points = angle degrees corrections to apply to the main ignition table.

8.2.2.5 – Transient

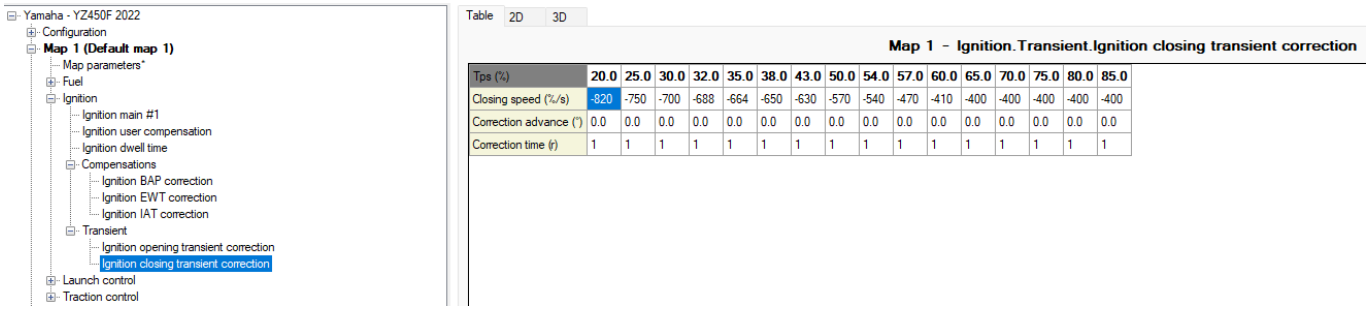
Ignition opening transient correction



Tps (%)	2.0	3.5	4.5	9.0	15.0	20.0	25.0	30.0	35.0	37.5	40.0	45.0	50.0	55.0	60.0	70.0
Opening speed (%/s)	190	300	320	600	850	950	1050	1100	1150	1200	1250	1300	1350	1400	1450	1520
Correction advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction time (r)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The table is composed by one X-axis with TPS and three rows of entries: **Opening speed (%/s)**, **Correction Advance (°)** and **Correction time (Rev)**. The strategy works as follows: in dependence upon the throttle position (TPS), if its opening speed (dTPS) is over the corresponding value (in the second-row cell), a correction (in the third-row cell) is applied for a number of revolutions written in the fourth-row cell.

Ignition closing transient correction

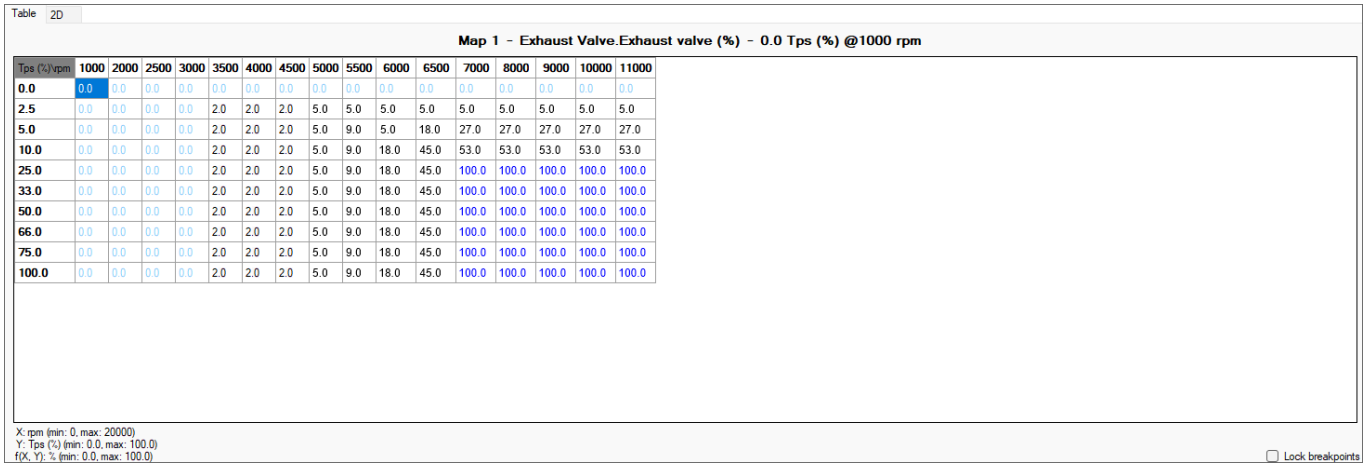


Tps (%)	20.0	25.0	30.0	32.0	35.0	38.0	43.0	50.0	54.0	57.0	60.0	65.0	70.0	75.0	80.0	85.0
Closing speed (°/s)	-820	-750	-700	-688	-664	-650	-630	-570	-540	-470	-410	-400	-400	-400	-400	-400
Correction advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction time (r)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The table is composed by one X-axis with TPS and three rows of entries: **Closing speed (%/s)**, **Correction Advance (°)** and **Correction time (Rev)**. The strategy works as follows: in dependence upon the throttle position (TPS), if its closing speed (dTPS) is below the corresponding value (in the second-row cell), a correction in terms of ignition advance (in the third-row cell) is applied for the number of revolutions written in the fourth row.

8.2.3 – Exhaust Valve (Taipan K only)

Exhaust valve map is based upon RPM and TPS and is used to define the valve opening percentage. A model table (shown below) is available for the user and the entry is the exhaust percentage opening valve.

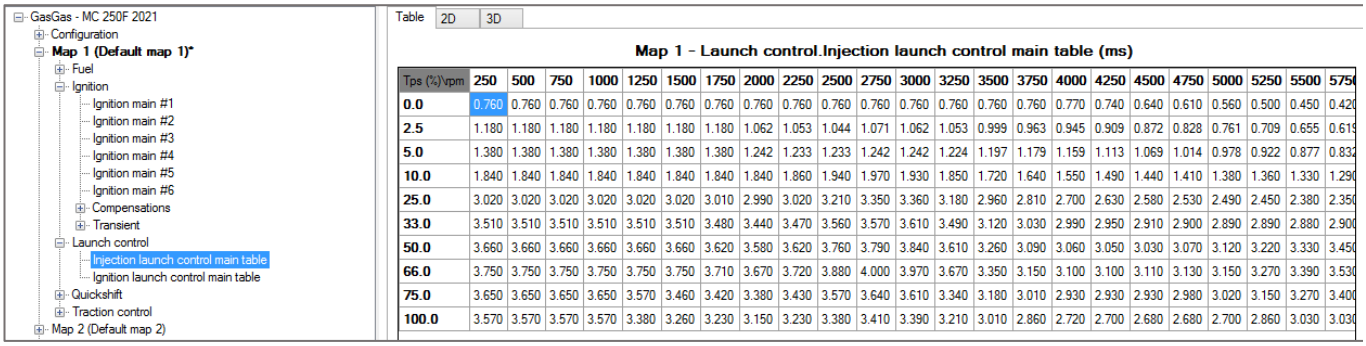


Tps (%)\rpm	1000	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	8000	9000	10000	11000
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.5	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	5.0	18.0	27.0	27.0	27.0	27.0	27.0
10.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	53.0	53.0	53.0	53.0	53.0
25.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0
33.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0
50.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0
66.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0
75.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0
100.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	5.0	9.0	18.0	45.0	100.0	100.0	100.0	100.0	100.0

8.2.4 – Launch control

Launch control is an electronic aid to assist riders to accelerate from a standing start.
This section is viewable only if enabled (click on the map chosen—launch control —enable). You can find the parameters to set the launch control strategy in Configuration –> Parameters –> Launch control.

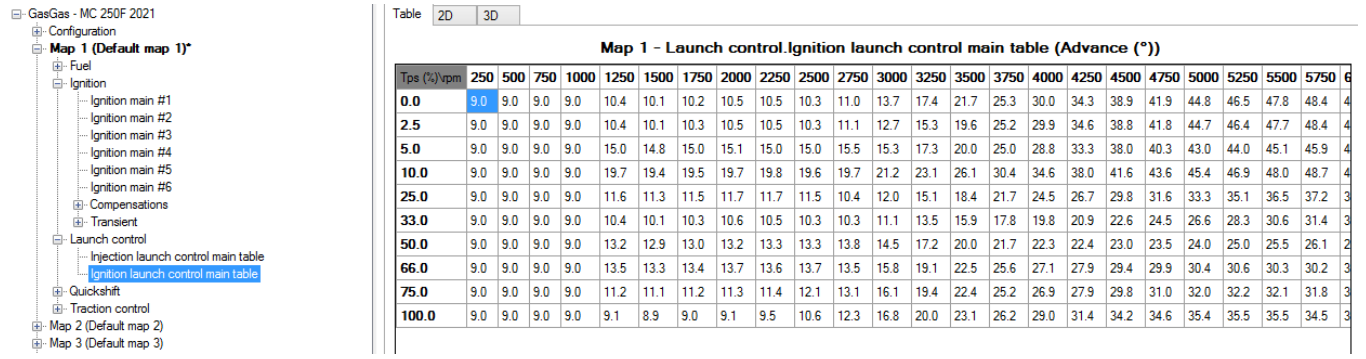
8.2.4.1 – Injection launch control main table (ms)



Tps (%)\rpm	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	575
0.0	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.770	0.740	0.640	0.610	0.560	0.500	0.450	0.42
2.5	1.180	1.180	1.180	1.180	1.180	1.180	1.180	1.062	1.053	1.044	1.071	1.062	1.053	0.999	0.963	0.945	0.909	0.872	0.828	0.761	0.709	0.655	0.61
5.0	1.380	1.380	1.380	1.380	1.380	1.380	1.380	1.242	1.233	1.233	1.242	1.242	1.224	1.197	1.179	1.159	1.113	1.069	1.014	0.978	0.922	0.877	0.83
10.0	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.860	1.940	1.970	1.930	1.850	1.720	1.640	1.550	1.490	1.440	1.410	1.380	1.360	1.330	1.29
25.0	3.020	3.020	3.020	3.020	3.020	3.020	3.010	2.990	3.020	3.210	3.350	3.360	3.180	2.960	2.810	2.700	2.630	2.580	2.530	2.490	2.450	2.380	2.35
33.0	3.510	3.510	3.510	3.510	3.510	3.510	3.480	3.440	3.470	3.560	3.570	3.610	3.490	3.120	3.030	2.990	2.950	2.910	2.900	2.890	2.890	2.880	2.90
50.0	3.660	3.660	3.660	3.660	3.660	3.660	3.620	3.580	3.620	3.760	3.790	3.840	3.610	3.260	3.090	3.060	3.050	3.030	3.070	3.120	3.220	3.330	3.45
66.0	3.750	3.750	3.750	3.750	3.750	3.750	3.710	3.670	3.720	3.880	4.000	3.970	3.670	3.350	3.150	3.100	3.100	3.110	3.130	3.150	3.270	3.390	3.53
75.0	3.650	3.650	3.650	3.650	3.570	3.460	3.420	3.380	3.430	3.570	3.640	3.610	3.340	3.180	3.010	2.930	2.930	2.930	2.980	3.020	3.150	3.270	3.40
100.0	3.570	3.570	3.570	3.570	3.380	3.260	3.230	3.150	3.230	3.380	3.410	3.390	3.210	3.010	2.860	2.720	2.700	2.680	2.680	2.700	2.860	3.030	3.03

If the Launch control strategy is enabled (Map n -> Launch control -> Enabled) and the corresponding conditions (in Configuration-> Parameters->Launch control) met and a proper switch (like the AiM Handlebar switch or the stock launch control switch if is present on the bike) is present on the motorbike (and the activation button is pressed) this table is applied. This is based on TPS (Y axis) and Rpm (X axis), the entry is the injection time in ms.

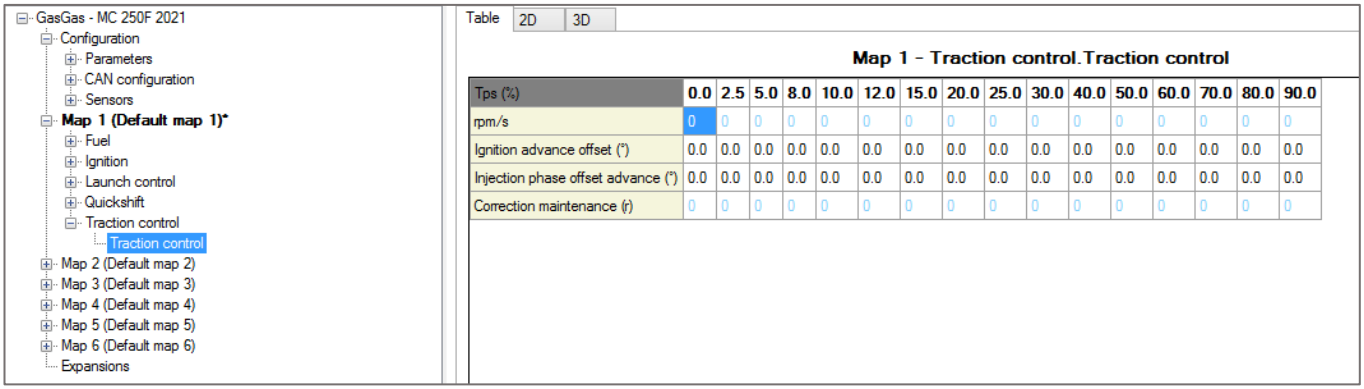
8.2.4.2 – Ignition launch control main table (Advance (°))



Tps (%)\rpm	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6
0.0	9.0	9.0	9.0	9.0	10.4	10.1	10.2	10.5	10.5	10.3	11.0	13.7	17.4	21.7	25.3	30.0	34.3	38.9	41.9	44.8	46.5	47.8	48.4	4
2.5	9.0	9.0	9.0	9.0	10.4	10.1	10.3	10.5	10.5	10.3	11.1	12.7	15.3	19.6	25.2	29.9	34.6	38.8	41.8	44.7	46.4	47.7	48.4	4
5.0	9.0	9.0	9.0	9.0	15.0	14.8	15.0	15.1	15.0	15.0	15.5	15.3	17.3	20.0	25.0	28.8	33.3	38.0	40.3	43.0	44.0	45.1	45.9	4
10.0	9.0	9.0	9.0	9.0	19.7	19.4	19.5	19.7	19.8	19.6	19.7	21.2	23.1	26.1	30.4	34.6	38.0	41.6	43.6	45.4	46.9	48.0	48.7	4
25.0	9.0	9.0	9.0	9.0	11.6	11.3	11.5	11.7	11.7	11.5	10.4	12.0	15.1	18.4	21.7	24.5	26.7	29.8	31.6	33.3	35.1	36.5	37.2	3
33.0	9.0	9.0	9.0	9.0	10.4	10.1	10.3	10.6	10.5	10.3	10.3	11.1	13.5	15.9	17.8	19.8	20.9	22.6	24.5	26.6	28.3	30.6	31.4	3
50.0	9.0	9.0	9.0	9.0	13.2	12.9	13.0	13.2	13.3	13.3	13.8	14.5	17.2	20.0	21.7	22.3	22.4	23.0	23.5	24.0	25.0	25.5	26.1	2
66.0	9.0	9.0	9.0	9.0	13.5	13.3	13.4	13.7	13.6	13.7	13.5	15.8	19.1	22.5	25.6	27.1	27.9	29.4	29.9	30.4	30.6	30.3	30.2	3
75.0	9.0	9.0	9.0	9.0	11.2	11.1	11.2	11.3	11.4	12.1	13.1	16.1	19.4	22.4	25.2	26.9	27.9	29.8	31.0	32.0	32.2	32.1	31.8	3
100.0	9.0	9.0	9.0	9.0	9.1	8.9	9.0	9.1	9.5	10.6	12.3	16.8	20.0	23.1	26.2	29.0	31.4	34.2	34.6	35.4	35.5	35.5	34.5	3

If the Launch control strategy is enabled (Map n -> Launch control -> Enabled), the corresponding conditions (in Configuration -> Parameters -> Launch control) are met and a proper switch (like the AiM Handlebar switch or the stock launch control switch if is present on the bike) is present on the motorcycle this table is applied. This table is based on TPS (Y axis) and Rpm (X axis) and the entry is the offset correction of angle degrees.

8.2.5 – Traction control



Traction control is a system that stops the wheels of a vehicle from spinning when excess power is applied.

If the traction control strategy is enabled (Map -> Traction control -> Enable) and the corresponding conditions are met, this table is applied.
This is based on TPS (X axis) and four rows of entries:

- **Traction Control Factor (Rpm/s)**
- **Ignition advance offset (Advance (°)),**
- **Injection phase offset (Advance (°))**
- **Correction maintenance (Rev).**

8.2.5.1 – Traction control strategy

The traction control strategy has been designed in order to control the slipping of the rear wheel of the vehicle. A slipping wheel condition is necessarily transmitted to a sudden increase of the engine Rpm and therefore to a peak of engine acceleration. Therefore, our control strategy is based on monitoring the engine acceleration through a constant that from now on we will call "Traction Control factor" expressed in Rpm/s.
The TC factor has been used as threshold to activate or not the corrections of the traction control. In other words, it means that, if the ECU detects a Tc factor higher than the one set in the Traction control table, the corrections are activated. An example of an empty Traction control table is shown below:

Map 1 - Traction control.Traction control

Tps (%)	0.0	2.5	5.0	8.0	10.0	12.0	15.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
rpm/s	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ignition advance offset (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Injection phase offset advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction maintenance (r)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Afterwards, since the traction corrections should provide less power to the vehicle, the rear wheel of the vehicle should regain grip and the engine acceleration should decrease as the Tc factor. By doing so, the ECU will continue to use the traction corrections until the Tc factor computed goes below the Tc factor threshold set in the Traction control table (first raw of the table).
At this point the previous corrections are maintained for a number of engine revolutions as set in the last raw of the Traction control table called "Correction maintenance(r)" (figure below).

Map 1 - Traction control.Traction control

Tps (%)	0.0	2.5	5.0	8.0	10.0	12.0	15.0	20.0	25.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
rpm/s	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ignition advance offset (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Injection phase offset advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction maintenance (r)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Keep in mind that, a part of the engine revolutions set in the correction maintenance is used by the strategy to return linearly to the 0-correction condition. This has been used in order to have a transition between active and non-active correction condition as smooth as possible.
The Traction control corrections editable in Spark software are:

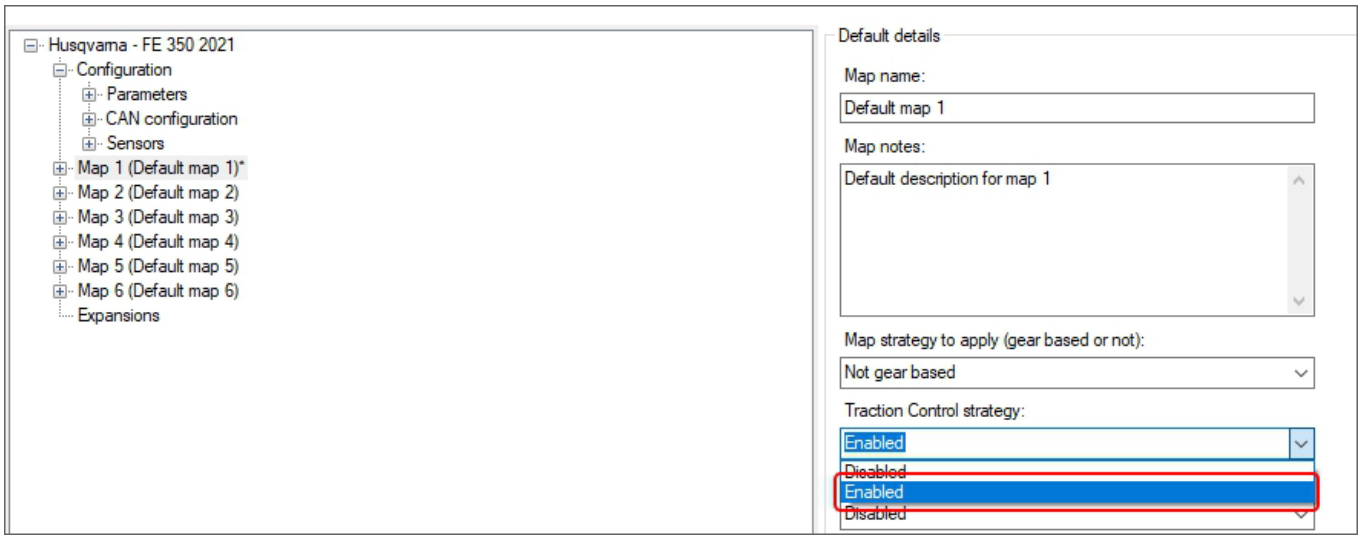
- The "Ignition advance offset (°)" that is an offset correction expressed in degrees for the Ignition advance, more into detail, for instance, if the value of this correction is -5° it means that the ECU is shifting forward the value of the main ignition advance table by a value of 5°, thus having a delay in the ignition advance.
- The "Injection phase offset advance (°)" that is an offset correction expressed in degrees for the injection phase advance, so, for instance, if the value of this correction is -35° it means that the ECU is shifting forward the value of the injector 1 phase table, thus having a delay in the injector phase.

Keep in mind that, if the vehicle has a second injector the traction control injection phase correction is acting on the main injector (Injector 1).

8.2.5.2 – Activate the traction control strategy

In order to activate the Traction control strategy, it is necessary to do a few mandatory things:

- Select "enabled" on the traction control strategy flag, corresponding to the map desired as shown below



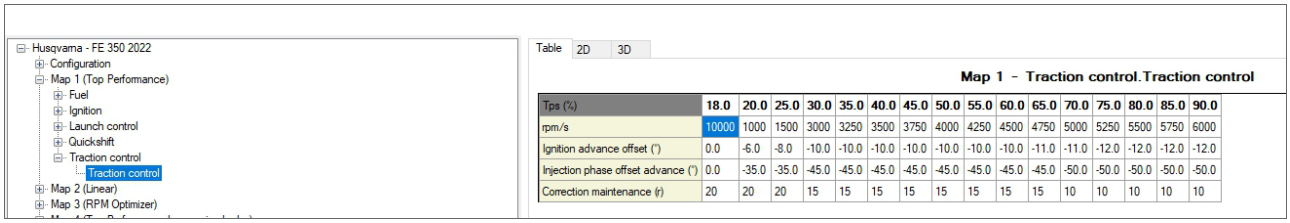
- Write to the ECU a map with a non-empty traction control table
- Activate the Traction control using the AiM HBS switch or using the standard button of the motorbike if provided by the manufacturer

Consider that if you are using the AiM HBS there are 5 levels of traction control selectable: with 1 being the minimum and 5 being the maximum. It means that level 5 of Traction control corresponds to the corrections set in the Traction control table of the corresponding map. Therefore, the other TC levels are a percentage of the Traction correction table that corresponds to the maximum, more into details:

- Level 5 – 100% Tc corrections

- Level 4 – 80% Tc corrections
- Level 3 – 60% Tc corrections
- Level 2 – 40% Tc corrections
- Level 1 – 20% Tc corrections

Please note that the Traction Control must be enabled for the selected Map: this will be done during the ECU Map configuration. To give a reference, it is shown below the Traction control table we provide for the motorcycle model Husqvarna – FE 350 2022.



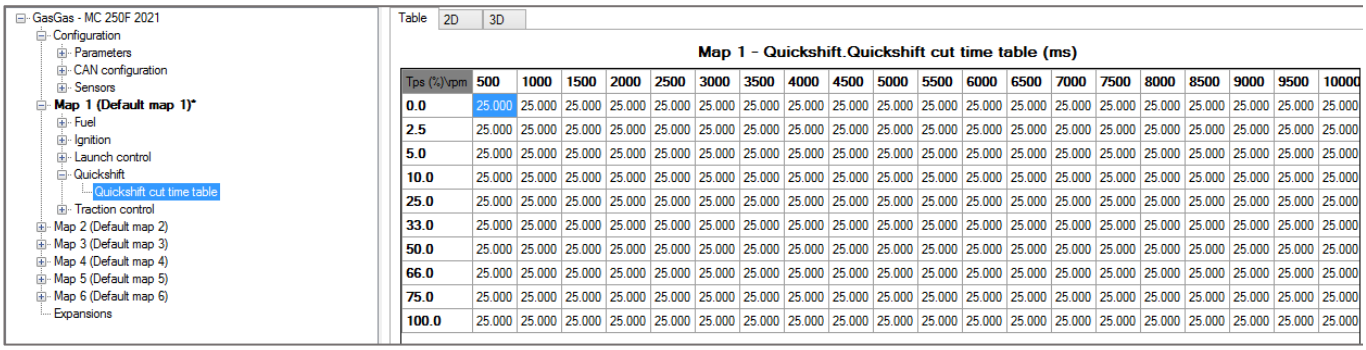
Tps (%)	18.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0
rpm/s	10000	1000	1500	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
Ignition advance offset (°)	0.0	-6.0	-8.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-11.0	-11.0	-12.0	-12.0	-12.0	-12.0
Injection phase offset advance (°)	0.0	-35.0	-35.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-50.0	-50.0	-50.0	-50.0	-50.0
Correction maintenance (r)	20	20	20	15	15	15	15	15	15	15	15	10	10	10	10	10

Before using the traction control strategy, make sure to have updated the firmware of the Taipan ECU.

8.2.6 – Quick shift

Quick shift is a strategy that works by reducing time of power loss between gear changes.
This section is viewable only if enabled (click on Configuration –> Strategies –> Quick shift –> Enable). You can find the parameters to set the Quick shift strategy in Configuration –> Parameters –> Strategies –> Quick shift.

8.2.6.1 – Quick shift cut timetable (ms)

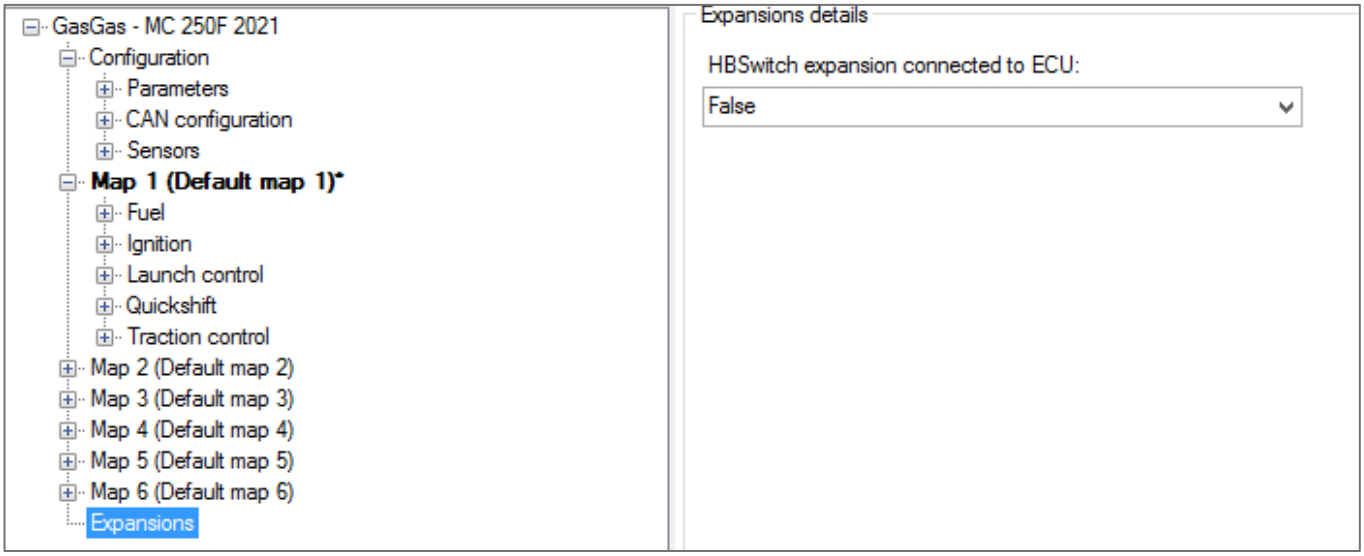


Tps (%)\rpm	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000
0.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
2.5	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
5.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
10.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
25.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
33.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
50.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
66.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
75.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000
100.0	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000	25.000

If the Quick shift strategy is enabled (Configuration –> Parameters –> Strategies –> Quick shift) and the corresponding conditions are met, this table is applied.

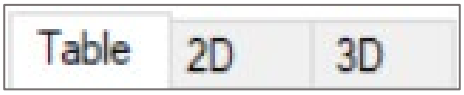
- X Axis = RPM
- Y Axis = TPS
- Entry points = cut times in ms, used during gear shifts.

8.3 – Expansions



This section is made to enable the Handlebar switch.

9 – Data view – special key and visualization



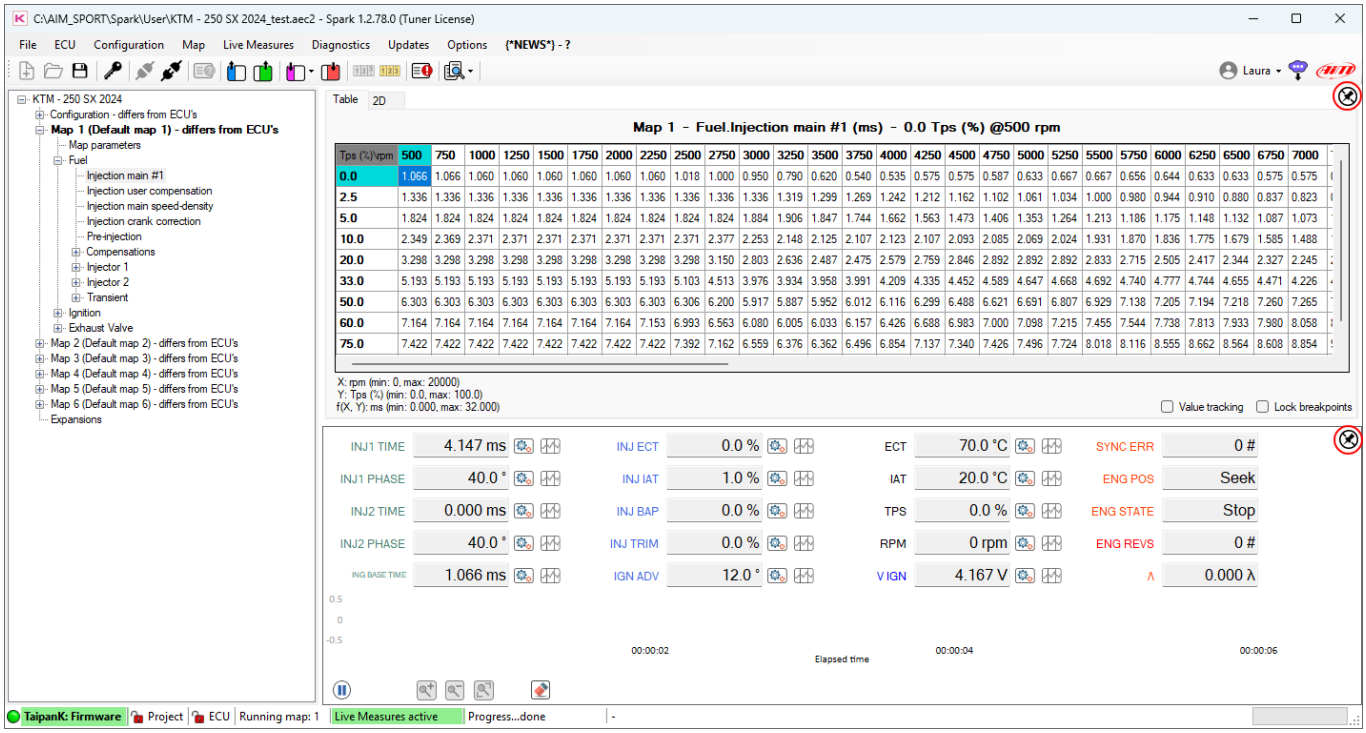
The data view area can show the mapping tables in three different ways:

- Table Format
- 2D Format
- 3D Format (will be available soon)

It is possible to switch this view by pushing the tab placed on top of the data view area or using the shortcut: Ctrl button plus 1, 2 or 3 (1 for table view, 2 for 2D view and 3 for the 3D view).

9.1 - Table Format

All tables can be pinned/unpinned in the software view using these icons  you find top right of the software panels that allows this function (red circled in the image above). The panels hook/unhook from spark main window allowing the user to displace and resize it as desired, saving all functions. Once the window unhooked the icon switches to "Pin" icon indicating that if pressed the panel re-hooks to the main one.



Selecting a single cell and pressing CTRL+L all cells of the row will be selected.

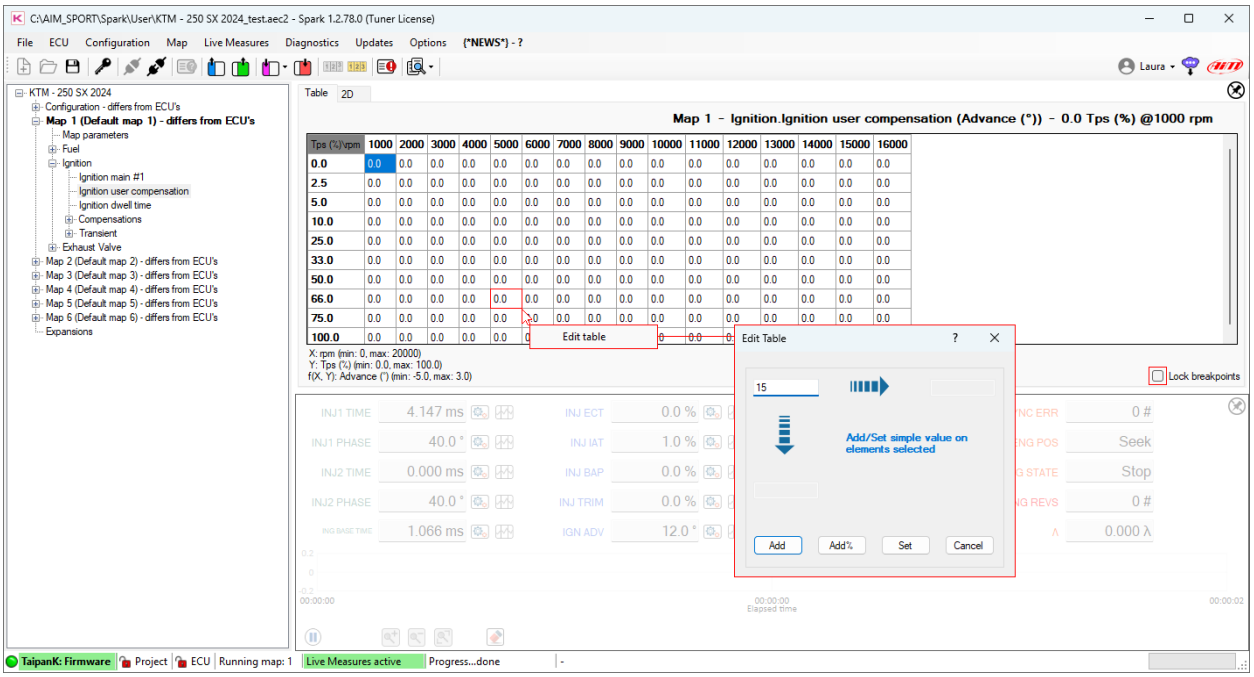
This mode allows to type in the entry values in the cells, modify them and the breakpoints. The entries can be modified one by one or grouped together. The selection on the table can be done with **shift + arrow** keys or using a mouse. To select a group of entries:

- Left click and press for desired table zone (mouse)
- Shift + Arrows move for desired zone (keyboard)

Once elements (entries) are selected, it is possible to change their value in the following ways:

Mouse

- Doble click on the cell you want to modify and it becomes editable: fill in the desired value
- Right click on the cell you want to modify, “Edit table” tooltip is prompted, select it. Available options are:
    - entering a value in the top left cell the software allows the user to perform addition, addition percentage or setting the single value across all selected items in the table
    - entering a value in either the horizontal or the vertical cell respectively enables the user to choose if performing addition, addition percentage or setting linearized values of the selected items horizontally or vertically
    - entering values in all three cells allows the user to perform a bi-directional addition, addition percentage or setting operations

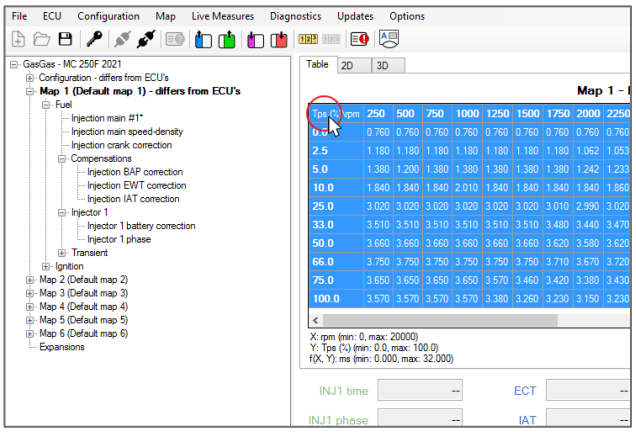


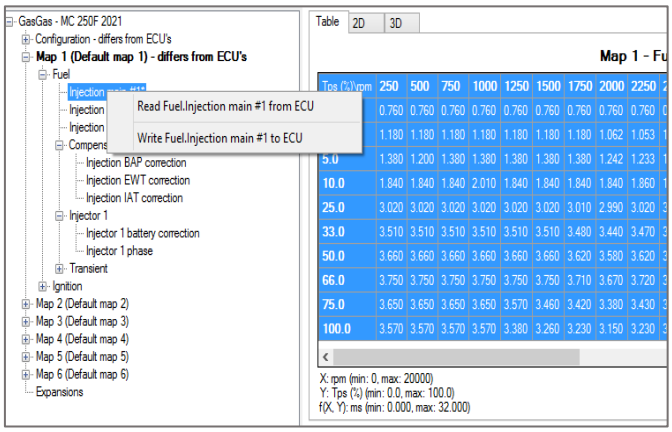
Keyboard

- Ctrl+Up -> Increment the selected entries for entry resolution x 10.
- Ctrl+Down -> Decrement the selected entries for entry resolution x 10.
- Alt+Up -> Increment the selected entries for entry resolution.
- Alt+Down -> Decrement the selected entries for entry resolution.
- Type in the value -> Force all entries to the desired number.
- **Breakpoints can be locked** to avoid unintentional changes. This is done enabling the checkbox right bottom of Data view area.

Once data have been changed, modified cells are highlighted in orange to show that the data is changed but not yet sent to the ECU. To send it to the ECU push enter on the keyboard, and the cells transmitted to the ECU are highlighted in green, to show that they have been written in temporary way. They have not been flashed into the ECU for permanent use.

To write the whole table directly into the ECU it is possible to select it clicking on the top left section. Then (with ECU connected and project opened) clicking the right button of the mouse on the map selected (left menu) you can directly write the whole table into the ECU.



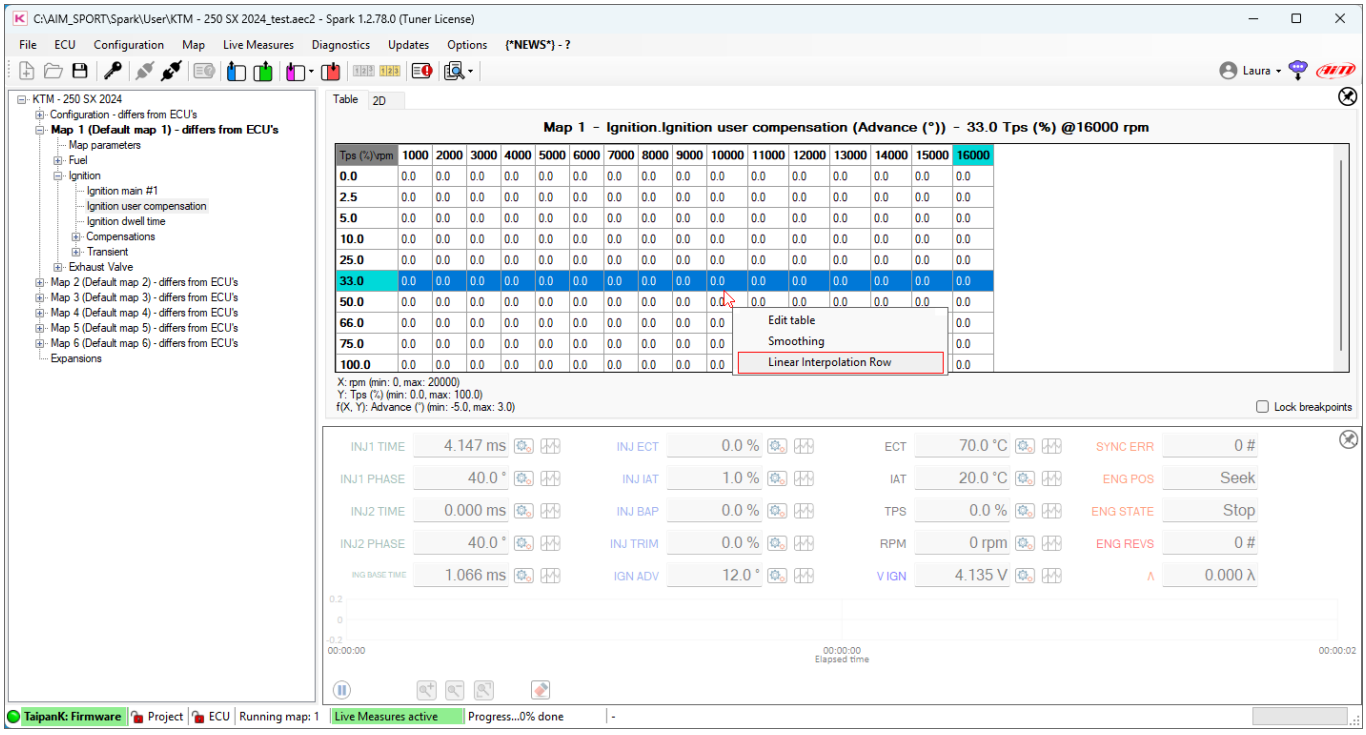


Shortcuts for these tasks are available:

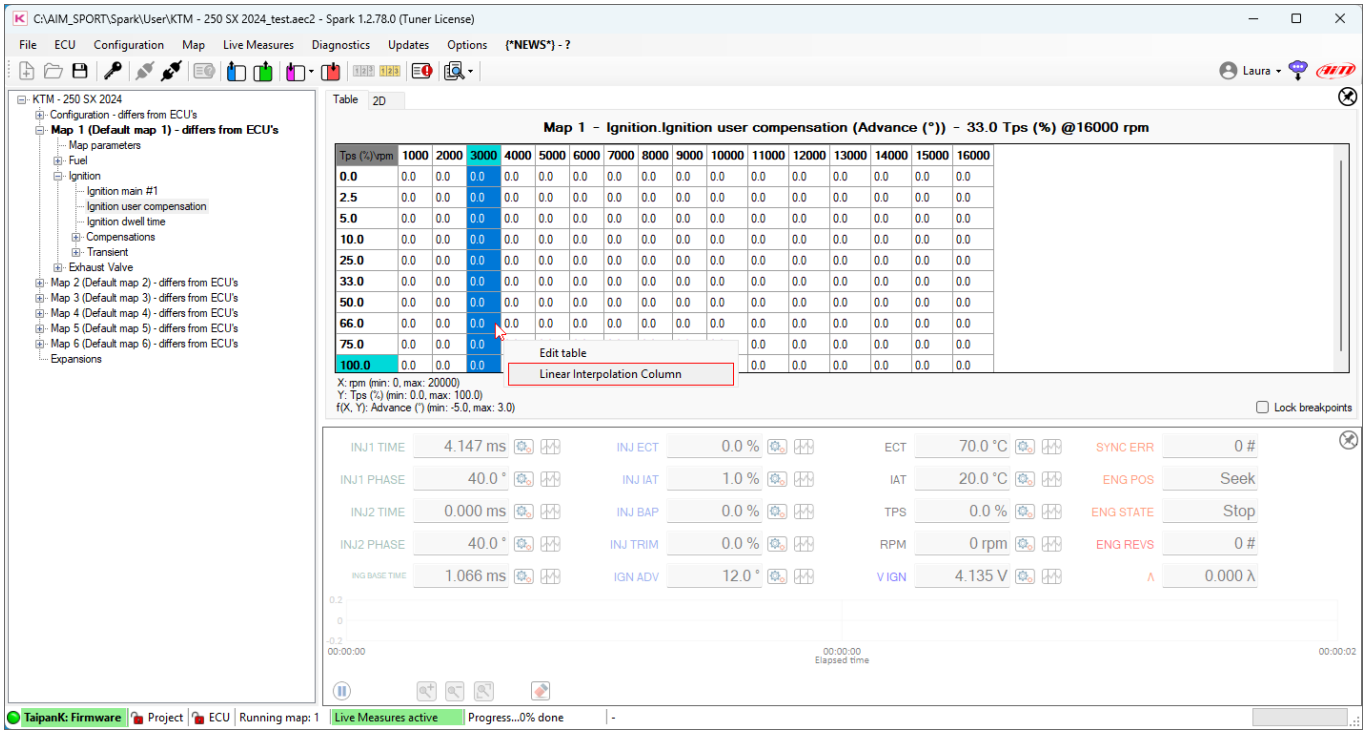
- Alt-Shift-T, to write the whole table.
- Alt-T, to read the whole table.

9.2 – Interpolation on row, column and bilinear

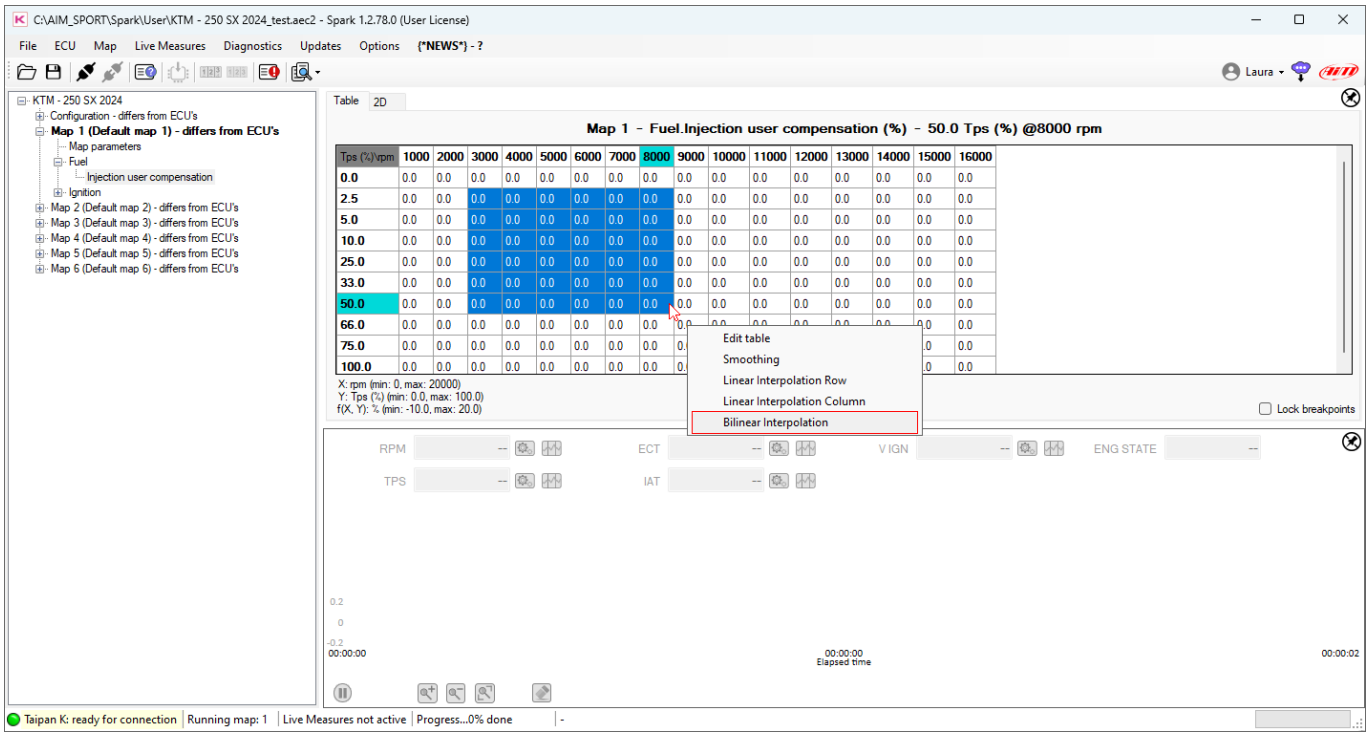
Selecting one or more **rows** of values and right clicking on the selection "Linear interpolation row" menu is enabled and values are interpolated according to horizontal breakpoints and selected columns.



Selecting one or more **columns** of values and right clicking on the selection "Linear interpolation column" menu is enabled and values are interpolated according to horizontal breakpoints and selected columns.



Selecting a range that includes **rows and columns** of values you can decide the desired interpolation to be made: for rows, for columns or **bilinear**. Choosing bilinear option the software performs first an interpolation for rows, that for columns always taking into accounts the values of horizontal and vertical breakpoints.



9.3 – Cell Track

In main and cranck tables a pointer that combines the value from DAQ in coordinates values on the table has been added. In the main table, for example, it combines TPS and RPM and places the red pointer on the table to identify the zone you want to modify as shown in the animated gif images you find clicking "What's new" button in "Download SW/FW" section of aim-sportline.com.

9.4 – Smoothing

Selecting at least three contiguous cells and right clicking on them "Smoothing" menu is enabled: selecting it the smoothing algorithm is applied. The images below show:

- graph with starting data top
- selection of snooting functionality central
- graphic effect on the data bottom

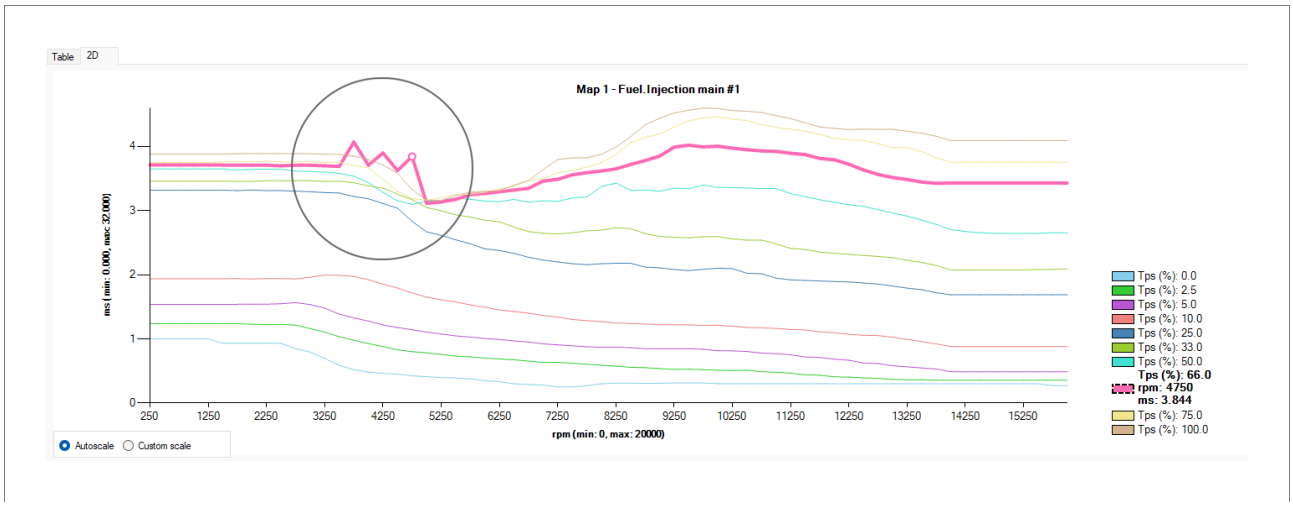
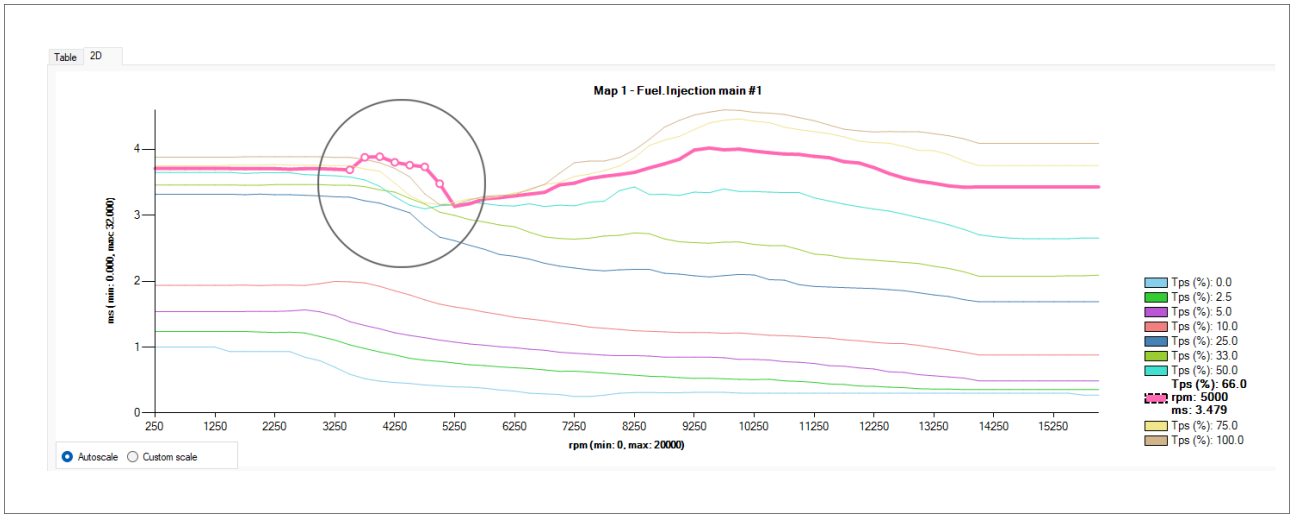


Table 2D

Map 3 - Fuel.Injection main #1 (ms) - 100.0 Tps (%) @7500 rpm

Tps (%)\rpm	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9000	9250	9500	9750	10
0.0	1.187	1.001	0.846	0.736	0.657	0.615	0.593	0.600	0.600	0.600	0.600	0.601	0.600	0.600	0.600	0.600	0.600	0.600	0.590	0.571	0.551	0.528	0.510	0.479	0.457	0.431	0.401	0.381	0.3
2.5	2.002	1.860	1.707	1.510	1.378	1.253	1.160	1.060	0.990	0.930	0.910	0.900	0.870	0.850	0.820	0.810	0.780	0.780	0.726	0.686	0.667	0.647	0.639	0.620	0.602	0.602	0.583	0.564	0.5
5.0	2.857	2.640	2.461	2.287	2.129	2.027	1.916	1.833	1.745	1.663	1.572	1.537	1.502	1.444	1.398	1.352	1.306	1.243	1.176	1.118	1.095	1.062	1.051	1.017	1.007	0.976	0.967	0.956	0.9
10.0	3.661	3.365	2.951	2.732	2.625	2.491	2.403	2.397	2.383	2.451	2.503	2.503	2.447	2.336	2.243	2.168	2.100	2.046	2.005	1.931	1.867	1.792	1.771	1.716	1.686	1.607	1.505	1.451	1.3
25.0	6.366	6.073	5.498	5.000	4.592	4.298	3.904	3.813	3.774	3.772	3.777	3.778	4.225	4.193	3.704	3.644	3.596	3.153	3.048	3.297	3.235	3.154	3.102	3.018	2.936	2.848	2.777	2.685	2.6
38.0	7.997	7.516	7.217	6.345	5.944	5.764	5.659	5.593	5.604	5.628	5.671	5.688	6.112	6.030	5.483	5.396	5.299	4.824	4.731	4.914	4.784	4.633	4.503	4.330	4.164	4.009	3.831	3.738	3.6
50.0	8.549	8.035	7.772	6.847	6.328	6.204	6.255	6.420	6.586	6.612	6.581	6.496	6.898	6.815	6.309	6.276	6.1	5.691	5.552	5.681	5.496	5.348	5.184	5.054	4.961	4.758	4.641	4.555	4.4
60.0	8.848	8.417	7.726	6.434	6.072	6.175	6.471	6.639	6.834	7.019	7.266	7.415	8.052	8.254	7.921	7.926	7.85							.440	6.358	6.233	6.113	5.957	5.854	5.7
75.0	8.786	8.357	7.791	6.373	6.152	6.298	6.362	6.703	7.028	7.175	7.477	7.716	8.269	8.442	8.214	8.202	8.13							.058	7.007	6.844	6.714	6.507	6.409	6.3
100.0	8.876	8.403	8.051	7.594	7.413	7.390	7.247	7.331	7.660	7.849	8.249	8.477	8.739	9.170	9.438	9.523	9.45							.157	8.762	8.752	8.677	8.430	8.124	7.8



9.5 – 2D Format

To select the 2D graphs is possible:
Direct mouse selection (mouse). Once the mouse focus is on this window (click) move among graphs with the arrow keys (keyboard). Graphs can be modified point-by-point, after having selected the desired point:

Mouse

- Holding pressed the right button and dragging the line.

Keyboard

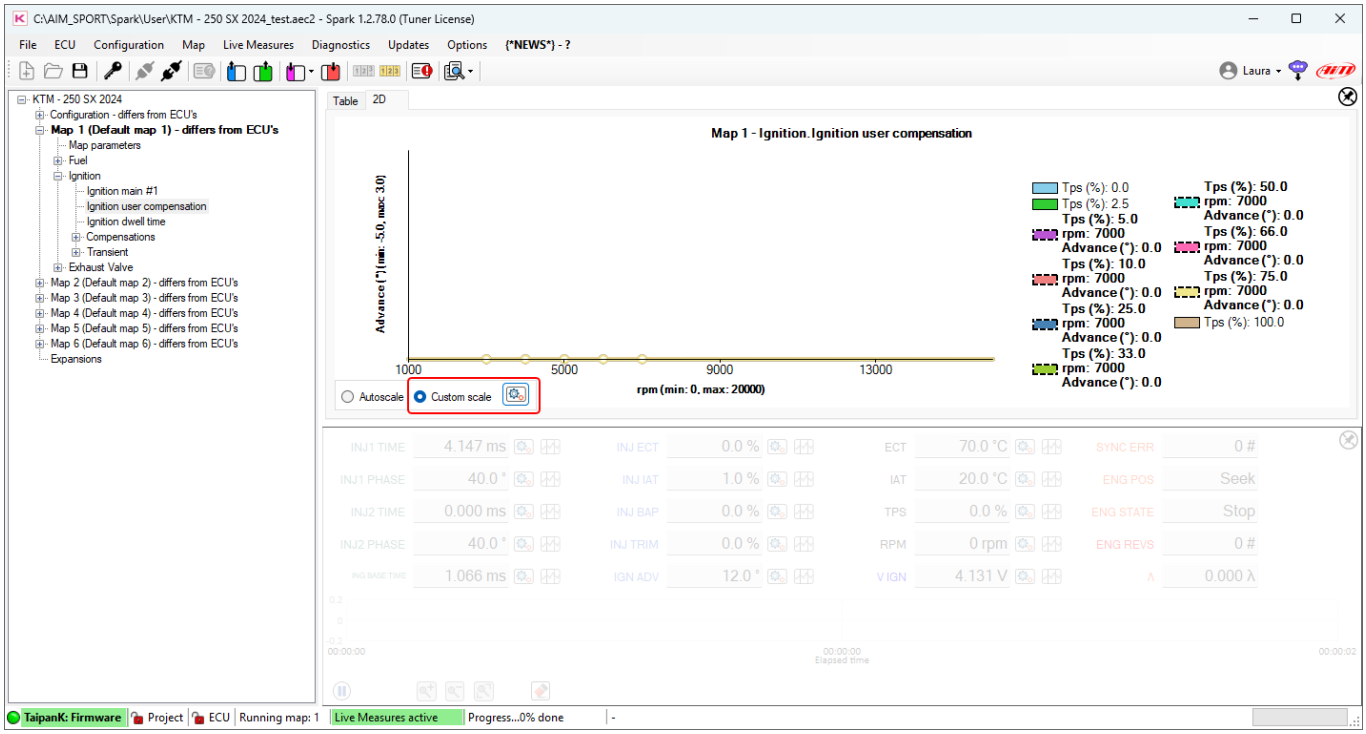
- Ctrl+Up -> Increment the selected entries for entry resolution (+ 0,1 per pressure)
- Ctrl+Down -> Decrement the selected entries for entry resolution (+ 0,1 per pressure)
- Alt+Up -> Increment the selected entries for entry resolution.
- Alt+Down -> Decrement the selected entries for entry resolution.

Once data have been changed in the 2D graph, to write them into the ECU return in the Table view and press the Enter Key.

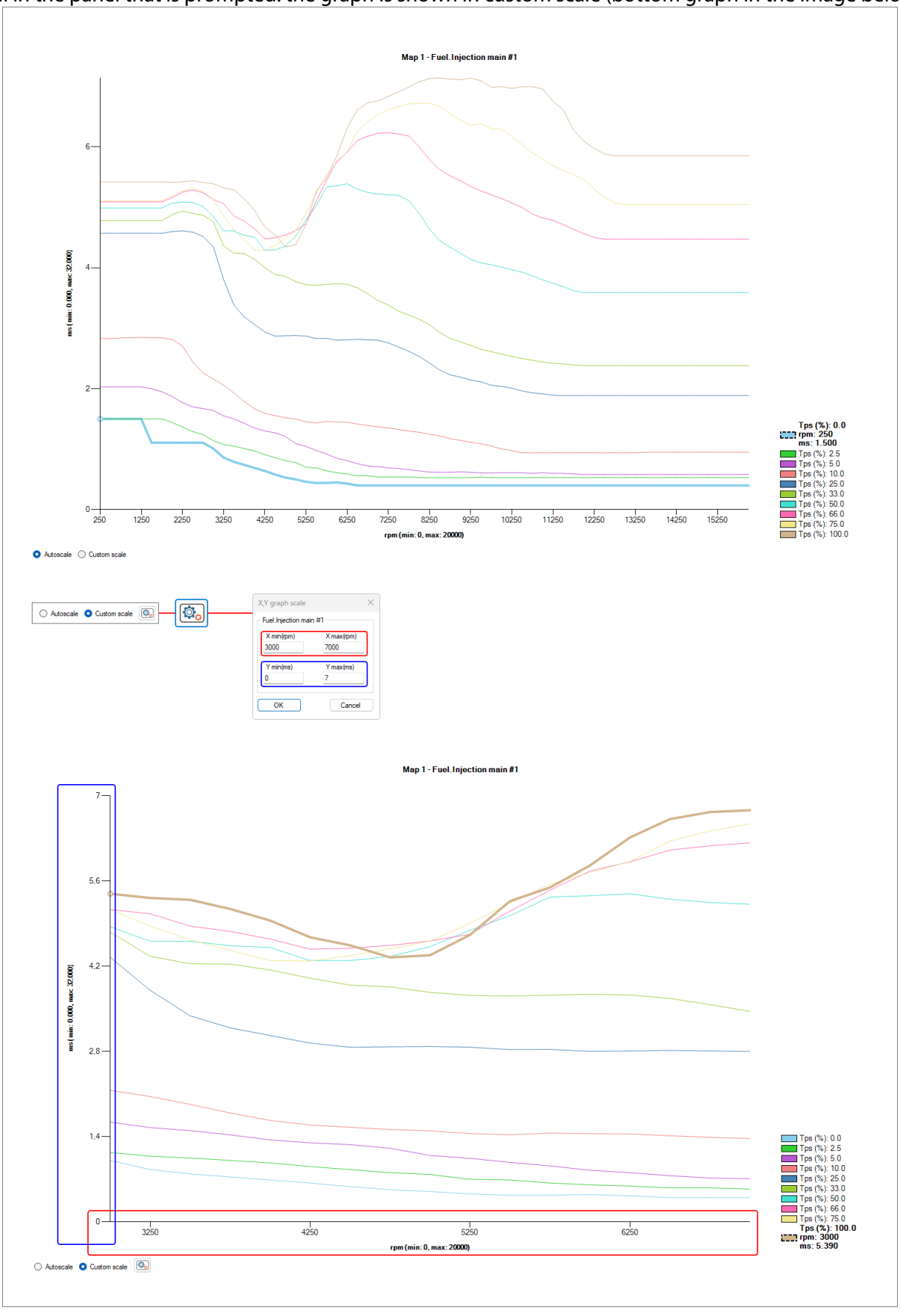
In the Table view, breakpoints can be locked not to change them unintentionally. This is done ticking the flag at the right bottom corner of the Data view area.

To focus on a particular line, you can click on the line and press the shortcut Ctrl-Q. This hides the other lines. Use Ctrl-W to make them reappear.

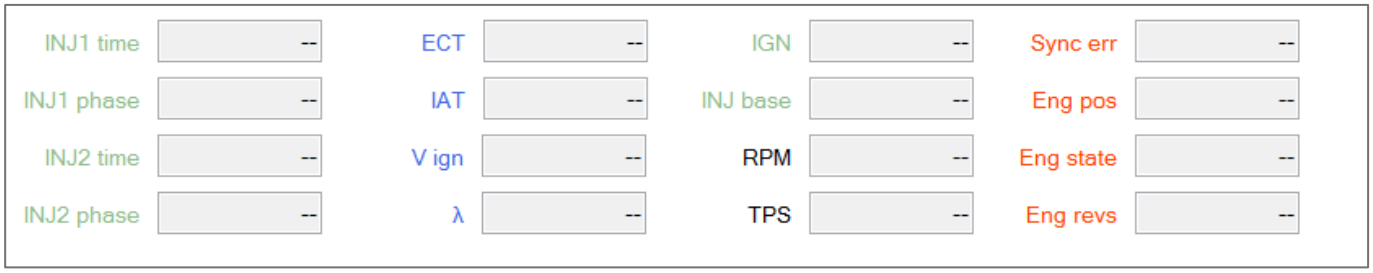
It is also possible to set **custom scale on the graph** through the proper button bottom left under the graph. As shown below


C:\AIM_SPORT\Spark\User\KTM - 250 SX 2024_test.aec2 - Spark 1.2.78.0 (Tuner License)
File ECU Configuration Map Live Measures Diagnostics Updates Options {*NEWS*} - ?
Laura
KTM - 250 SX 2024
Configuration - differs from ECU's
Map 1 (Default map 1) - differs from ECU's
Map parameters
Fuel
Ignition
Ignition main #1
Ignition user compensation
Ignition dwell time
Compensations
Transient
Exhaust Valve
Map 2 (Default map 2) - differs from ECU's
Map 3 (Default map 3) - differs from ECU's
Map 4 (Default map 4) - differs from ECU's
Map 5 (Default map 5) - differs from ECU's
Map 6 (Default map 6) - differs from ECU's
Expansions
Table 2D
Map 1 - Ignition. Ignition user compensation
Advance (°) (min: -5.0, max: 3.0)
1000
5000
9000
13000
rpm (min: 0, max: 20000)
Tps (%): 0.0
Tps (%): 2.5
Tps (%): 5.0 rpm: 7000 Advance (°): 0.0
Tps (%): 10.0 rpm: 7000 Advance (°): 0.0
Tps (%): 25.0 rpm: 7000 Advance (°): 0.0
Tps (%): 33.0 rpm: 7000 Advance (°): 0.0
Tps (%): 50.0 rpm: 7000 Advance (°): 0.0
Tps (%): 66.0 rpm: 7000 Advance (°): 0.0
Tps (%): 75.0 rpm: 7000 Advance (°): 0.0
Tps (%): 100.0
Autoscale
Custom scale
INJ1 TIME 4.147 ms
INJ1 PHASE 40.0 °
INJ2 TIME 0.000 ms
INJ2 PHASE 40.0 °
INJ BASE TIME 1.066 ms
INJ ECT 0.0 %
INJ IAT 1.0 %
INJ BAP 0.0 %
INJ TRIM 0.0 %
IGN ADV 12.0 °
ECT 70.0 °C
IAT 20.0 °C
TPS 0.0 %
RPM 0 rpm
V IGN 4.131 V
SYNC ERR 0 #
ENG POS Seek
ENG STATE Stop
ENG REVS 0 #
λ 0.000 λ
00:00:00
Elapsed time
TaipanK: Firmware
Project
ECU
Running map: 1
Live Measures active
Progress...0% done

Default setting is Auto scale. To have a custom scale graph enable the related checkbox, click the setting icon and fill in the panel that is prompted: the graph is shown in custom scale (bottom graph in the image below).



10 – Live Measures view box

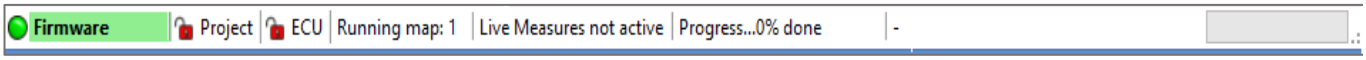


This area is used to monitor live data. Available parameters change according to the licence in use. This is activated only when the ECU is connected. Can be hidden/shown pressing the hide/show Live Measures panel button in the icon bar. Hiding this panel is recommended when the Data view area must be maximized.
Only if Live Measures is activated, live faults can be shown by the diagnostics section.

Live Measures parameters:

- INJ1 time: Total injector1 time of injection
- INJ1 phase: Injector 1 phase of injection
- INJ2 time: Total injector2 time of injection
- INJ2 phase: Injector 2 phase of injection
- ECT: Engine coolant temperature
- IAT: Intake air temperature
- V ign: Motorcycle ignition voltage
- λ: Lambda values (if ECU connected to an AiM logger that has LCU1 controller)
- IGN: Ignition advance
- INJ base: Injection base time from main table
- RPM: RPM at the moment
- TPS: Throttle position percentage at the moment
- Sync err: Synchronism errors
- Eng pos: Engine position, divided in Seek, Semi phased and Phased
- Eng state: Engine state divided in stop, cranking and running.
- Eng revs: Engine revolutions number

11 – Info bar



The bottom Info bar is a quick monitor for the ECU and software communication state. There are the following fields.

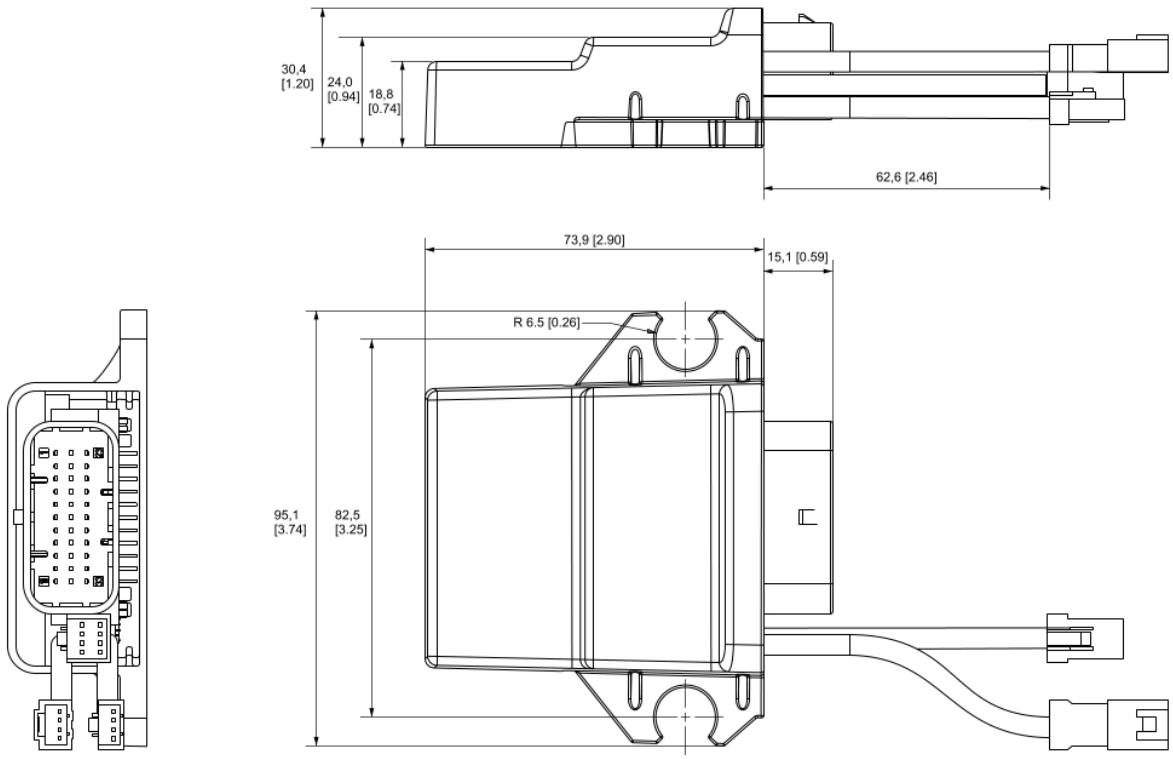
- Semaphore
  - red light: the ECU is not recognized.
  - orange blinking light: ECU is being recognized.
  - green: the ECU is recognized.
- Ecu status (not connected or firmware, it depends on whether the control unit is connected. If the ecu is not connected you cannot write or flash anything in the ECU).
- Project (project locked by password or not).
- ECU (ECU target locked by password or not).
- Running map number
- Live Measures status (active – not active).
- Operation progress percentage
- Status bar showing the operation progress of a process (opposite corner in the bottom Info bar)

Appendix A – AiM ECUs ECU Part Numbers

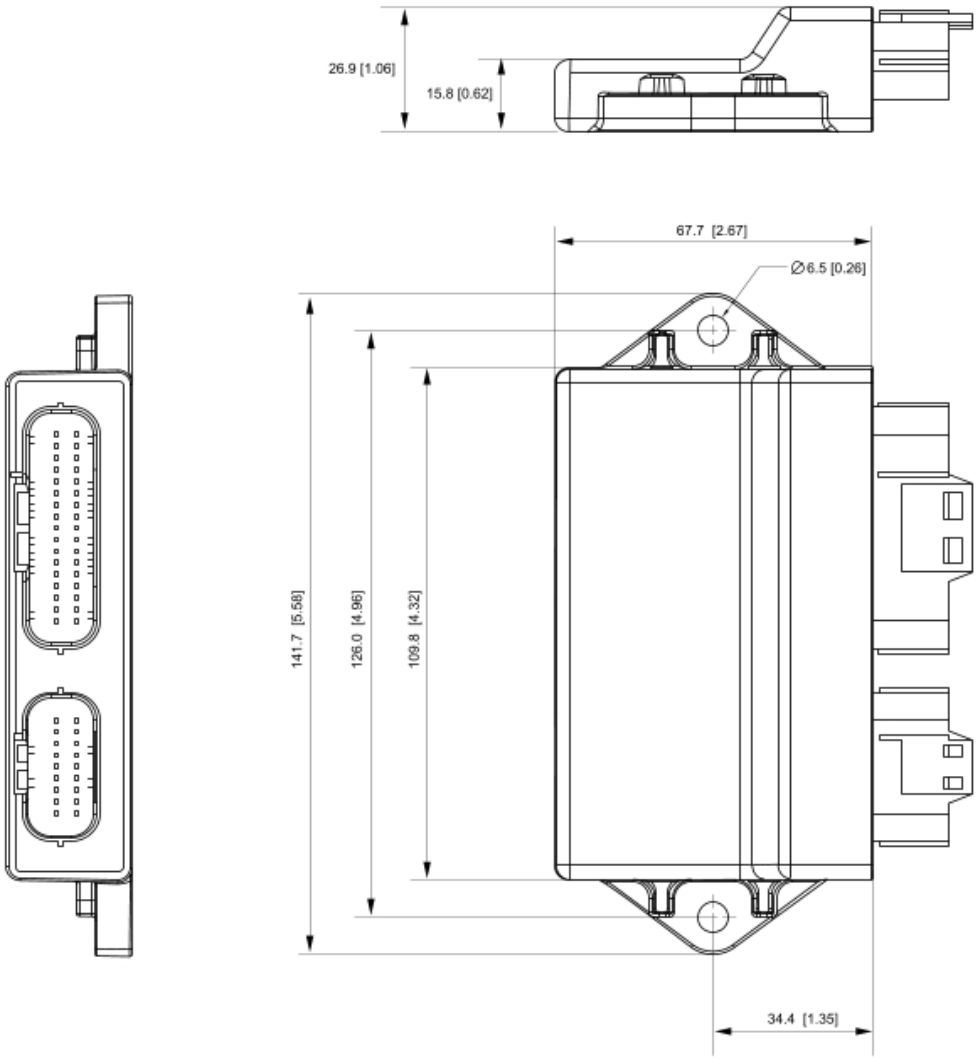
XE1ECUCB0	ECU TAIPAN
XE1ECUCB1	ECU TAIPAN Y
XE1ECYYA0	ECU YARARA
XE1UCBT00	UC BRIDGE TUNER
XE1UCB000	UC BRIDGE
XE1HBS000	HANDLEBAR SWITCH
V02596090	ECU YARARA ADDITIONAL HARNESS

Appendix B – AiM ECUs and accessories dimensions and pinout

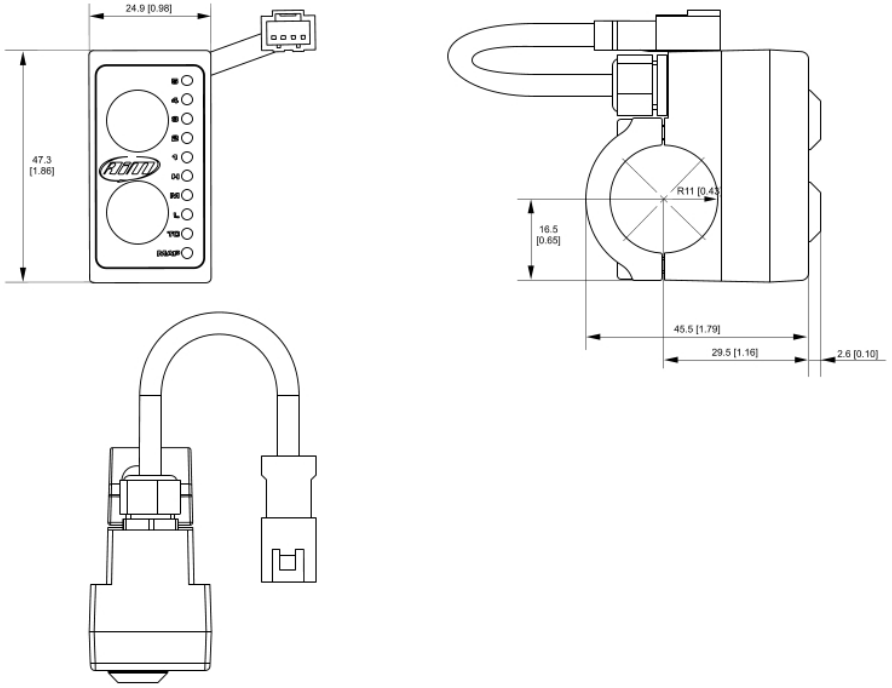
Taipan and Taipan Y dimensions in mm [inches]



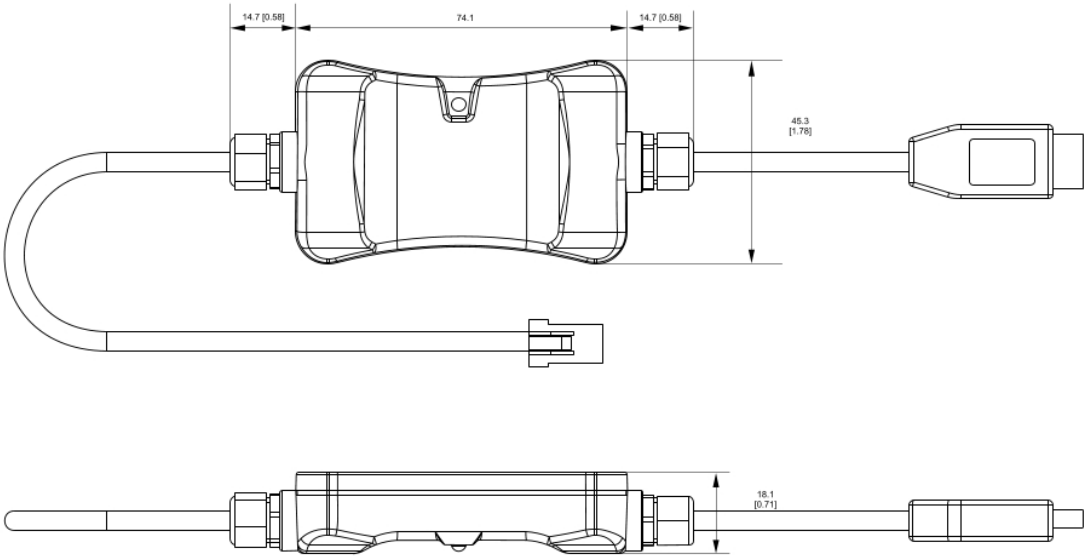
Yarara dimensions in mm [inches]



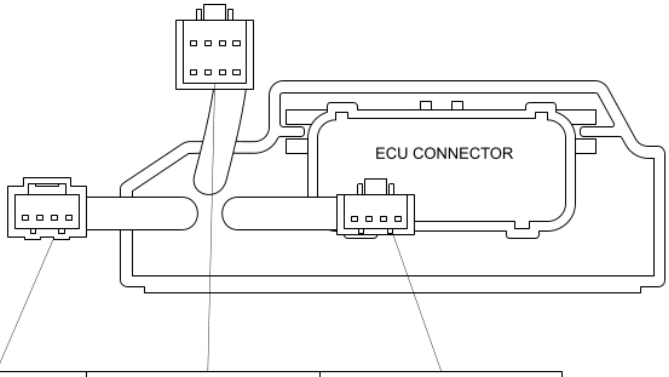
Handlebar Switch dimensions in mm [inches]



UC Bridge dimensions in mm [inches]

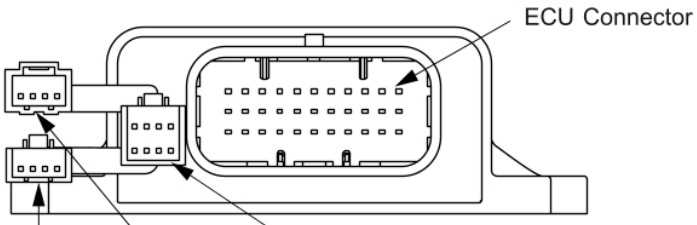


Taipan pinout



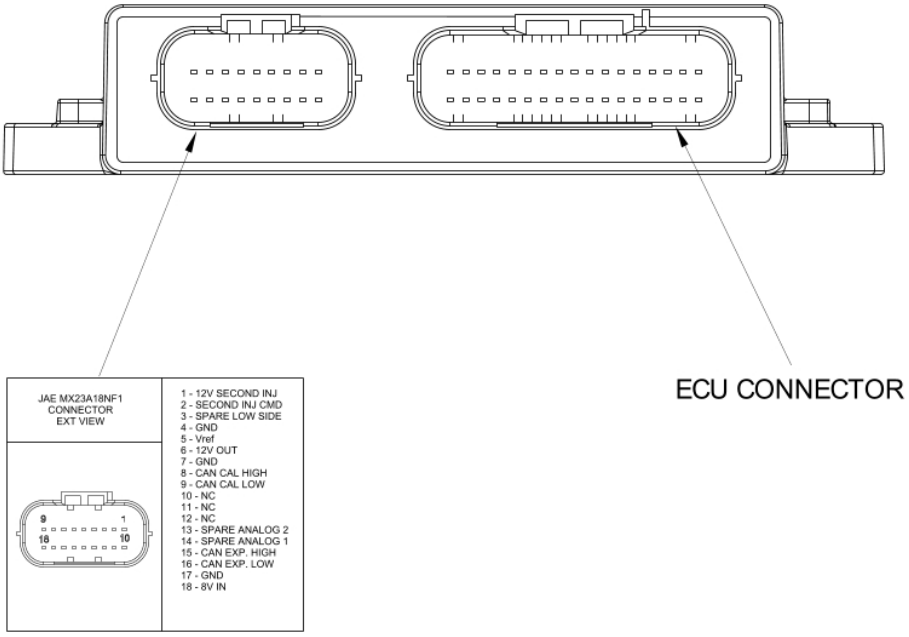
JST 04T-JWPF-VSLE-S CONNECTOR EXT VIEW	JST 08R-JWPF-VSLE-D CONNECTOR EXT VIEW	JST 04R-JWPF-VSLE-S CONNECTOR EXT VIEW
		
1 - GND 2 - CAN CAL HIGH 3 - CAN CAL LOW 4 - 12V IN	1 - 12V SECOND INJ 2 - LOW SIDE SECOND INJ 3 - LOW SIDE 4 - GND 5 - ANALOG INPUT 1 6 - ANALOG INPUT 2 7 - DNC 8 - DNC	1 - GND 2 - CAN EXP HIGH 3 - CAN EXP LOW 4 - 12V OUT (switched)

Taipan Y pinout

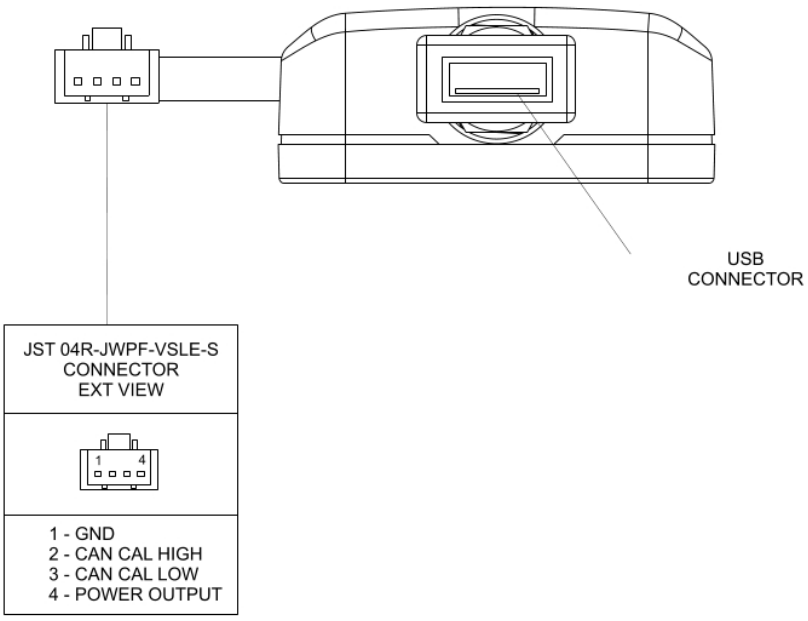


JST 04R-JWPF-VSLE-S CONNECTOR EXTERNAL VIEW	JST 04T-JWPF-VSLE-S CONNECTOR EXTERNAL VIEW	JST 08R-JWPF-VSLE-D CONNECTOR EXTERNAL VIEW
		
1 - GND 2 - CAN EXP. HIGH 3 - CAN EXP. LOW 4 - 12V OUT (switched)	1 - GND 2 - CAN CAL HIGH 3 - CAN CAL LOW 4 - 12V IN	1 - 12V SECOND INJ 2 - LOW SIDE SECOND INJ 3 - LOW SIDE 4 - GND 5 - ANALOG INPUT 1 6 - ANALOG INPUT 2 7 - VREF 8 - DNC

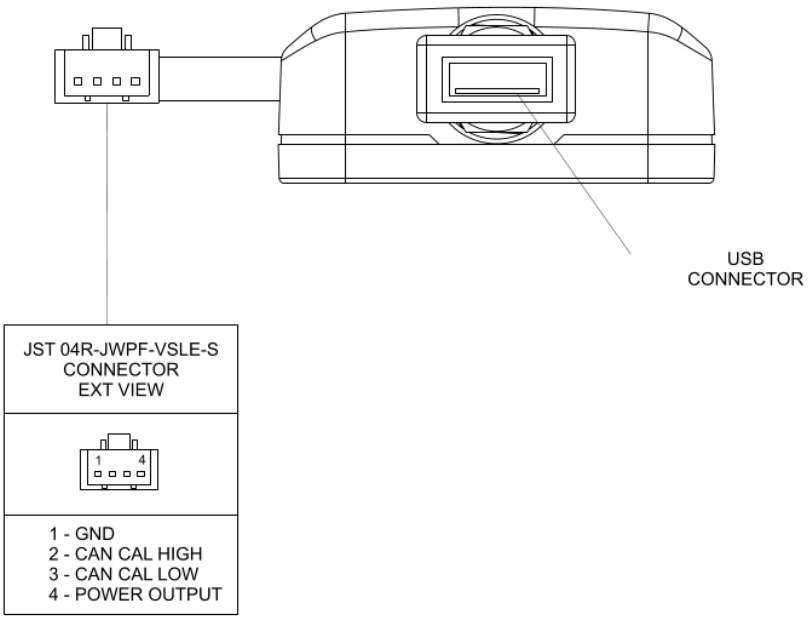
Yarara pinout



Handelbar Switch pinout



UC Bridge pinout

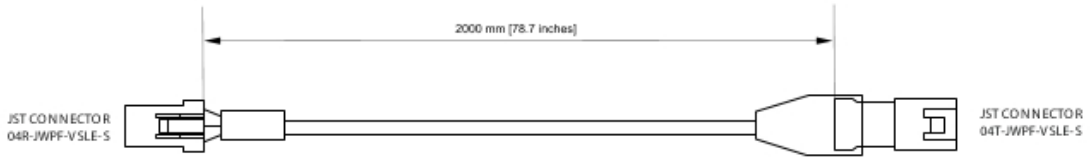


Appendix C – Taipan, Taipan Y and Yarara harnesses

Taipan and Taipan Y optional cables dimensions and pinout

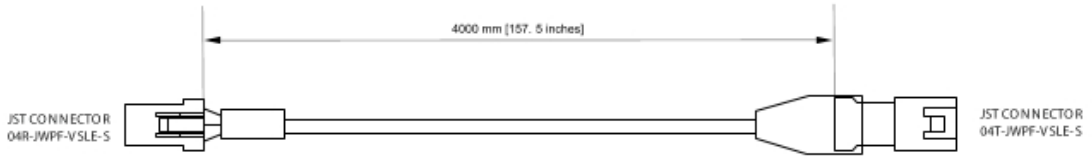
1 UC Bridge extension cable 2 m

Part number V02596020



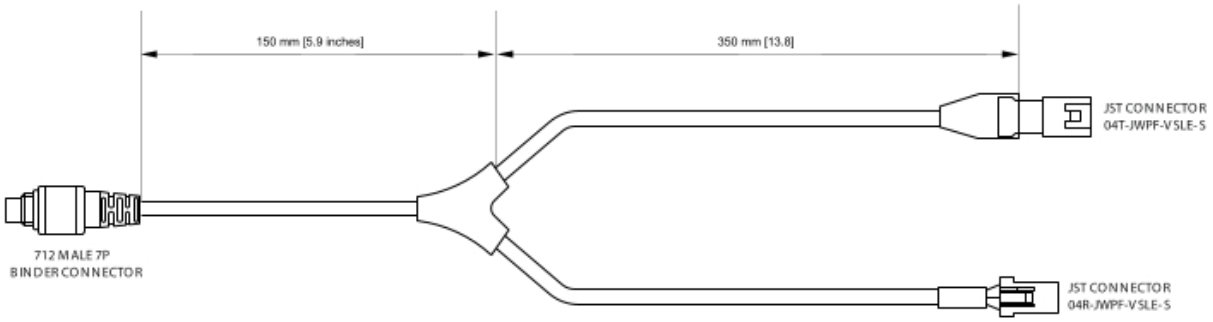
2 UC Bridge extension cable 4 m

Part number V02596030



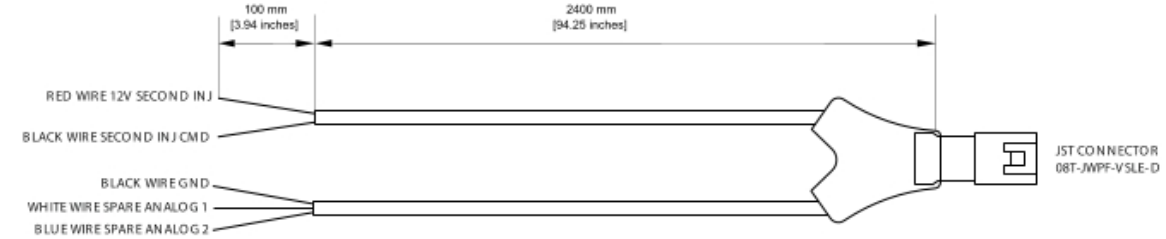
3 Solo 2 DL extension cable 50 cm

Part number V02589120



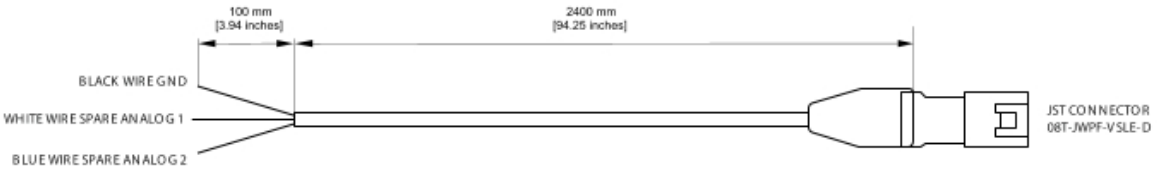
❹ Analog channels and second injection harness

Part number V02596060



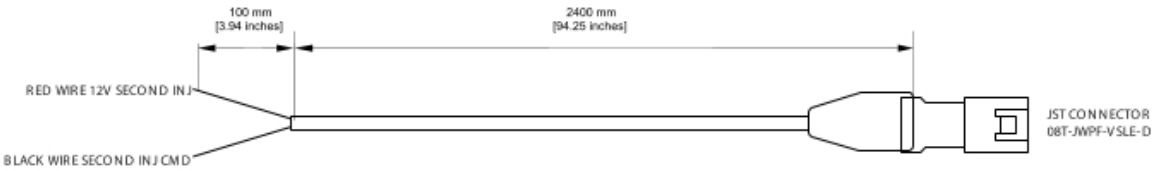
❺ Analog channels harness

Part number V02596070

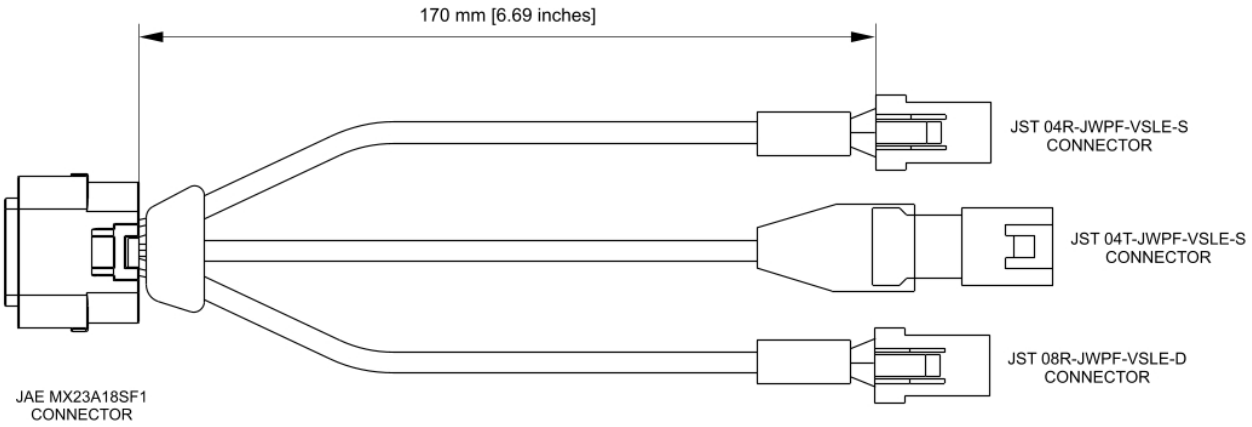


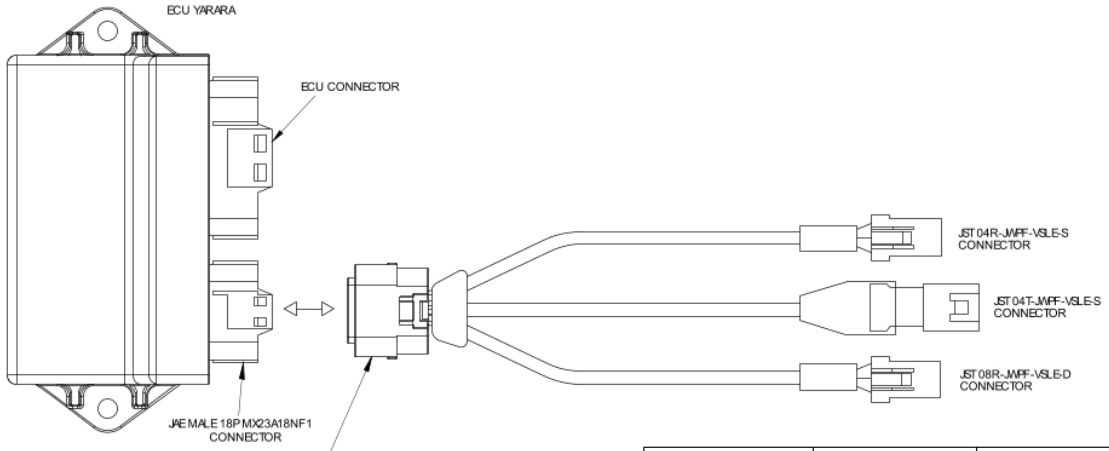
❻ Second injection harness

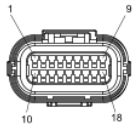
Part number V02596080



Yarara optional cable dimensions and pinout

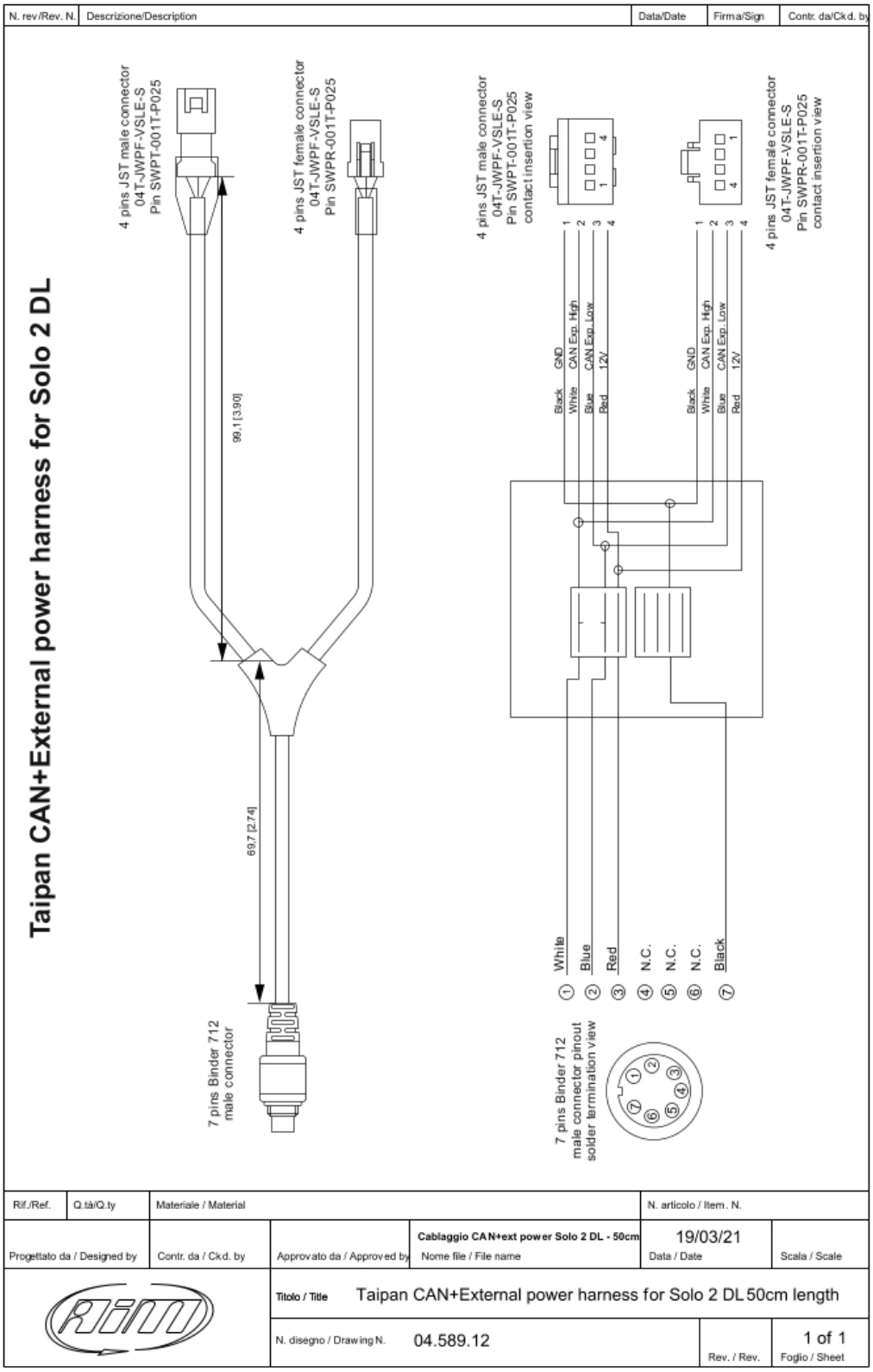




JAE MX23A18SF1 CONNECTOR EXT VIEW	
	1 - 12V SECOND INJ 2 - SECOND INJ CMD 3 - SPARE LOW SIDE 4 - GND 5 - Vref 6 - 12V OUT 7 - GND 8 - CAN CAL HIGH 9 - CAN CAL LOW 10 - NC 11 - NC 12 - NC 13 - SPARE ANALOG 2 14 - SPARE ANALOG 1 15 - CAN EXP HIGH 16 - CAN EXP LOW 17 - GND 18 - 8V IN

JST 04R-JWPF-VSLE-S CONNECTOR EXT VIEW	JST 04T-JWPF-VSLE-S CONNECTOR EXT VIEW	JST 08R-JWPF-VSLE-D CONNECTOR EXT VIEW
		
1 - GND 2 - CAN EXP HIGH 3 - CAN EXP LOW 4 - 12V OUT	1 - GND 2 - CAN CAL HIGH 3 - CAN CAL LOW 4 - 8V OUT	1 - 12V SECOND INJ 2 - SECOND INJ CMD 3 - SPARE LOW SIDE 4 - GND 5 - SPARE ANALOG 1 6 - SPARE ANALOG 2 7 - Vref 8 - NC

AiM ECUs CAN+External power cable for Solo 2 DL dimensions pinout



Appendix D – Main terms

Here, a list of terms used in this document and relevant to the Spark software.
Configuration: A Configuration includes the base parameters not directly related to the engine performance. i.e.:

- Set up the second injector if present.
- Set up range of sensor plausibility.
- Set up parameters for the map switch like fuel correction, threshold of RPM to activate the correction chosen.
- Enable/disable launch control.
- Enable/disable pre injection.
- Set up the RPM limiters.
- Set up strategies (The drop sensor, injection, injector phase strategy, neutral strategy, quick shift).
- Set up the VB out (Voltage Battery Output).
- Set up the Can configuration.
- Set up sensors.

Table: The main feature of a table is the presences of one or two breakpoint axis dependent from the type of table (2D: One breakpoint axis, 3D: two breakpoint axis). The table is composed by cells that are a correlation between variables. Here below an example of table.

Map 1 - Fuel.Injection main #1 (ms)

Tps (%)\rpm	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000	6250	6500	6750	7000	7250	7500	7750	8000	8250	8500	8750	9000
0.0	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.760	0.770	0.740	0.640	0.610	0.560	0.500	0.450	0.420	0.380	0.333	0.314	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.271
2.5	1.180	1.180	1.180	1.180	1.180	1.180	1.180	1.062	1.053	1.044	1.071	1.062	1.053	0.999	0.963	0.945	0.909	0.872	0.828	0.761	0.709	0.655	0.619	0.573	0.546	0.513	0.496	0.453	0.445	0.419	0.403	0.385	0.368	0.343	0.350	0.340
5.0	1.380	1.380	1.380	1.380	1.380	1.380	1.380	1.242	1.233	1.233	1.242	1.242	1.224	1.197	1.179	1.159	1.113	1.069	1.014	0.978	0.922	0.877	0.832	0.795	0.778	0.752	0.718	0.674	0.648	0.638	0.614	0.599	0.571	0.555	0.550	0.550
10.0	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.840	1.860	1.940	1.970	1.930	1.850	1.720	1.640	1.550	1.490	1.440	1.410	1.380	1.360	1.330	1.290	1.250	1.231	1.202	1.173	1.144	1.116	1.080	1.063	1.036	1.018	1.014	1.000	0.990
25.0	3.020	3.020	3.020	3.020	3.020	3.020	3.010	2.990	3.020	3.210	3.350	3.360	3.180	2.960	2.810	2.700	2.630	2.580	2.530	2.490	2.450	2.380	2.350	2.296	2.247	2.228	2.218	2.209	2.200	2.162	2.143	2.124	2.106	2.087	2.080	2.060
33.0	3.510	3.510	3.510	3.510	3.510	3.510	3.480	3.440	3.470	3.560	3.570	3.610	3.490	3.120	3.030	2.990	2.950	2.910	2.900	2.890	2.890	2.880	2.900	2.910	2.920	2.920	2.910	2.900	2.880	2.840	2.760	2.679	2.632	2.594	2.537	2.480
50.0	3.660	3.660	3.660	3.660	3.660	3.660	3.620	3.580	3.620	3.760	3.790	3.840	3.610	3.260	3.090	3.060	3.050	3.030	3.070	3.120	3.220	3.330	3.450	3.580	3.680	3.780	3.830	3.880	3.890	3.900	3.880	3.850	3.800	3.740	3.640	3.540
66.0	3.750	3.750	3.750	3.750	3.750	3.750	3.710	3.670	3.720	3.880	4.000	3.970	3.670	3.350	3.150	3.100	3.100	3.110	3.130	3.150	3.270	3.390	3.530	3.670	3.810	3.960	4.060	4.000	4.220	4.280	4.320	4.340	4.330	4.320	4.250	4.190
75.0	3.650	3.650	3.650	3.650	3.570	3.460	3.420	3.380	3.430	3.570	3.640	3.610	3.340	3.180	3.010	2.930	2.930	2.930	2.980	3.020	3.150	3.270	3.400	3.530	3.620	3.770	3.880	4.000	4.050	4.170	4.220	4.270	4.270	4.270	4.250	4.240
100.0	3.570	3.570	3.570	3.570	3.380	3.260	3.230	3.150	3.230	3.380	3.410	3.390	3.210	3.010	2.860	2.720	2.700	2.680	2.680	2.700	2.860	3.030	3.030	3.180	3.260	3.400	3.540	3.680	3.780	3.890	4.060	4.150	4.200	4.250	4.260	4.280

Map: A Map is the combination of all the parameters governed by the ECU directly related to engine performance and consist of different tables. The main maps are the fuel and ignition, but you can also set up the tables of various strategies and sensors, as we see in the next chapters.

Project: A project is the union of ECU configuration and ECU Maps.

Breakpoint: A breakpoint is the segmentation of the axis. Breakpoints can be equally distributed or increased in specific areas where more accuracy is desired. The trend of breakpoints is monotone.

Entry: An entry is the desired value that the user wants to set in a specific cell in the table.

Engine hour meter: The engine hour meter is the time the engine has been used with this ECU.

Write: means that the data is sent real time to the ECU, but it is not stored in the ECU. As soon as this is turned off, data "written" are cleared. Generally used to tune some entries live.

Flash: means that the data is sent real time to the ECU and it is stored in a permanent memory. Generally used to write a complete map.

TPS: Throttle Position Sensor in %.

ECT: Engine Coolant Temperature.

MAP: Manifold Air Pressure.

Baro: Barometric Air Pressure.

EWT: Engine Water Temperature.

IAT: Intake Air Temperature.

VIGN: Ignition Voltage in V.

Project File: It is the combination of configuration and all the maps.

Valid Map: A map may be not valid in these situations:

- if it is not completely transmitted to the ECU.
- it is not compatible with the firmware version of the ECU.

Running Map: A Running Map is the map actually used by the ECU.

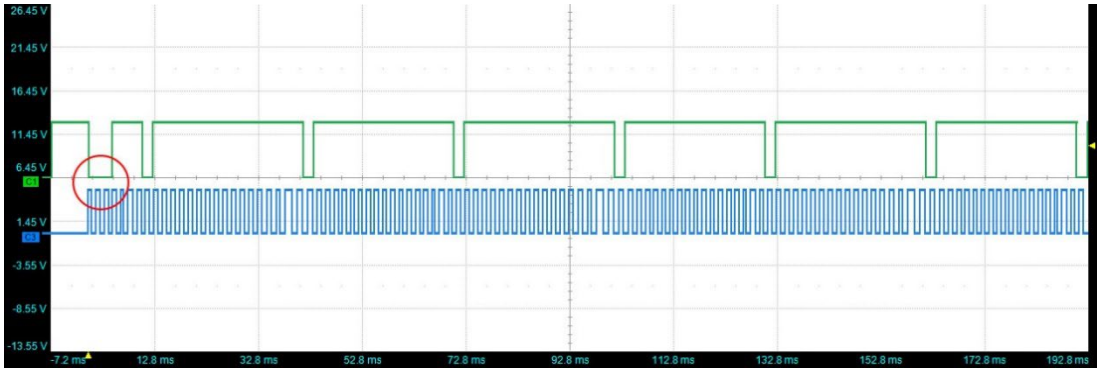
Appendix E – Pre-injection

Pre-injection is intended to avoid starting problems, which could happen in some situations:

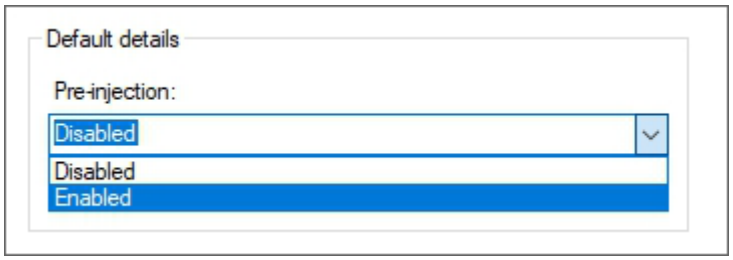
• When the water or coolant temperature is low.
• When the geometry of the ducts is not very straight in the direction of the intake valve.
• When the position of the injector is not in line with the intake valve.

The basic purpose of this strategy is to activate, at the beginning of the crank phase, a disposable injection, which goes to wet the intake duct. This allows the subsequent injections not to settle on the ducts, to facilitate starting the motorcycle.

Looking at the image here down:
• Light blue: flywheel signal
• Green: injector command (injects when piloted low)
As can be seen, this strategy, if enabled, intervenes when the ECU is powered at the first rotation of the flywheel to the first tooth detected, regardless of the position of the piston.



In the red circle, the pre-injection time is highlighted.
This strategy is enabled within the configuration of the project file, in:
Configurations->Parameters->Pre-Injection



For every map, a pre-injection table is available:

Ms\°C	-15	-3	0	9	14	20	24	34	39	66	82	99
	22	13	9	7	5	4	4	4	3	2	2	2

where the X-axis shows the water temperature, and the entry points are the pre-injection times in msec.
The table above, to be considered as an example, was obtained on an experimental basis, verifying, at the different temperatures at the start-up, how the pre-injection affects the start-up itself. It is easy to see how the pre-injection is more important at low temperatures.

Appendix F – Injection crank correction (%)

The crank injection correction intervenes to facilitate engine starting, when an extra amount of fuel is required than is necessary to keep the engine running in normal conditions. To define this correction, the following table is available:

Table 2D 3D

Map 1 - Fuel.Injection crank correction (%)

°C\r	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	120	300
-40.0	152.0	155.0	158.0	159.0	159.0	158.5	157.8	154.9	150.8	145.7	140.9	137.7	137.7	137.5	137.5	137.5	137.5	141.5	145.5	145.5
-30.0	142.0	145.0	148.0	149.0	149.0	148.5	147.8	144.9	140.8	135.7	130.9	127.7	127.7	127.5	127.5	127.5	127.5	131.5	135.5	135.5
-20.0	132.0	135.0	138.0	139.0	139.0	138.5	137.8	134.9	130.8	125.7	120.9	117.7	117.7	117.5	117.5	117.5	117.5	121.5	125.5	125.5
-10.0	122.0	125.0	128.0	129.0	129.0	128.5	127.8	124.9	120.8	115.7	110.9	107.7	107.7	107.5	107.5	107.5	107.5	111.5	115.5	115.5
0.0	109.0	113.0	117.0	119.0	120.0	119.5	117.8	114.9	109.8	103.7	95.9	89.7	88.7	88.5	88.5	88.5	89.5	96.5	102.5	102.5
10.0	97.0	101.0	105.0	108.0	110.0	109.5	108.8	104.9	99.8	91.7	84.9	78.7	75.7	74.5	74.5	74.5	76.5	82.5	88.5	88.5
20.0	82.0	87.0	92.0	95.0	97.0	97.5	95.8	92.9	86.8	78.7	69.9	64.7	63.7	63.5	63.5	63.5	64.5	67.5	69.5	69.5
30.0	53.0	59.0	63.0	66.0	67.0	66.5	63.8	59.9	55.8	50.7	45.9	40.7	35.7	33.5	32.5	32.5	32.5	33.5	38.5	45.0
40.0	26.0	28.0	30.0	31.0	31.0	33.0	38.0	42.0	45.0	46.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	17.0	23.0	30.0
50.0	22.0	24.0	27.0	27.0	26.0	27.0	33.0	39.0	43.0	44.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	30.0
55.0	22.0	24.0	27.0	27.0	26.0	27.0	33.0	39.0	43.0	44.0	43.0	38.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
60.0	20.0	21.0	23.0	24.0	22.0	22.0	28.0	34.0	38.0	39.0	38.0	33.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
65.0	20.0	21.0	23.0	24.0	22.0	22.0	28.0	34.0	38.0	39.0	38.0	33.0	25.0	15.0	15.0	15.0	15.0	15.0	15.0	0.0
70.0	10.0	9.0	12.5	10.5	10.5	11.0	14.0	17.0	19.0	19.5	19.0	16.5	12.5	7.5	7.5	7.5	7.5	7.5	7.5	0.0
75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

This table is defined by:

- X axis: number of motor revolutions
- Y axis: engine coolant temperature
- Entry Points: injection time correction percentage

As stated, this strategy works for a limited number of revolutions, as defined in the last value of the X-Axis.

So, once the Start Button is pushed, the injection time will be calculated considering all the following tables:

• the main table "Main table" indicating the injection time,
• the injector battery compensation,
• compensation of the air temperature
• compensation of the barometric pressure
• **the contribution deriving from the crank injection time correction table.**

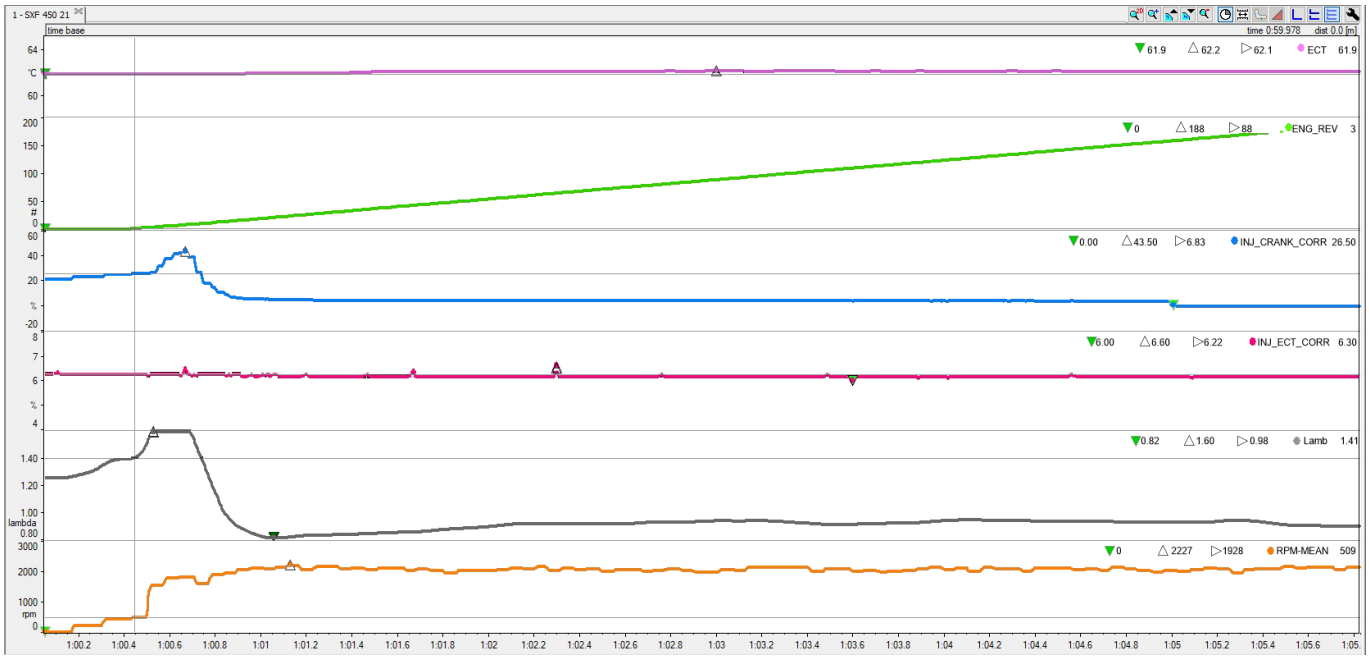
Let us imagine scrolling this table from left to right at start-up: once the revolutions indicated as the last point on the X axis are finished, the crank phase can be considered finished, and the crank injection correction is interrupted. At this point, the Injection Time Compensation Table will intervene based on the temperature of the coolant.

So, in the example of the table above, once the 300 revolutions of the engine have been exceeded, the following contributions will intervene:

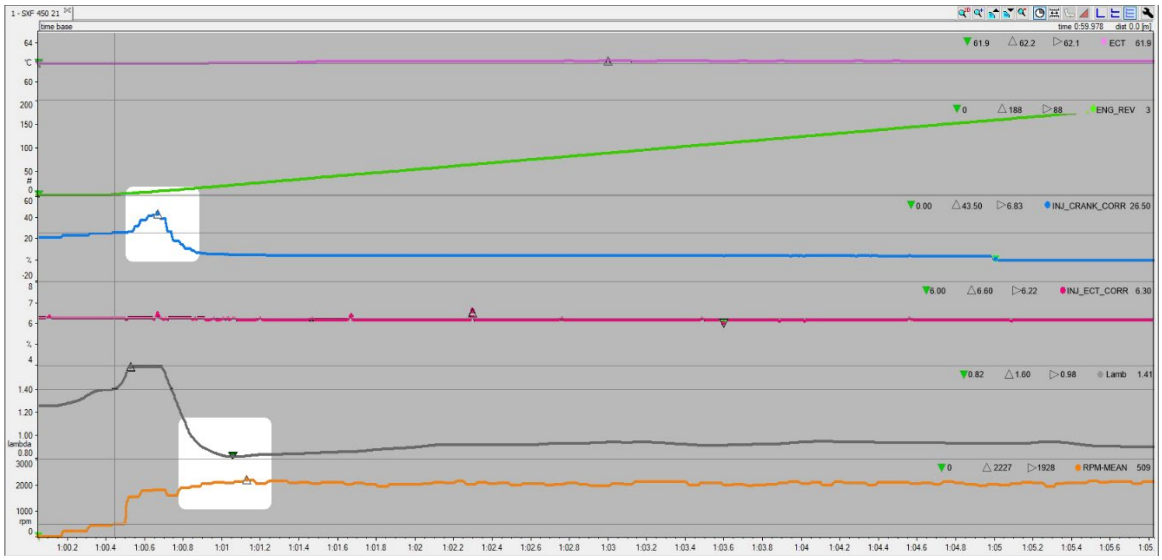
• the “main” table indicating the injection time
• the injector battery compensation
• compensation of the air temperature
• compensation of the barometric pressure
• the contribution deriving from the interpolation of the injection time compensation table as a function of the temperature of the coolant.

The graph below shows an example of strategy intervention and management:

pink: water temperature
green: number of motor revolutions
blue: correction contribution to the crank
red: water temperature correction contribution
white: lambda probe value
orange: RPM



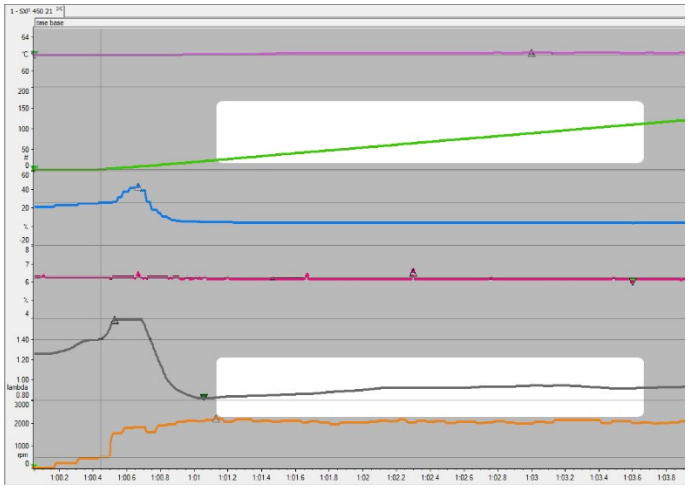
In this example, in the very first revolutions managed by the starter, there is a correction contribution to the crank of 20%. The lambda value will show the effect of the crank - correction a few revolutions after the implementation as shown below.



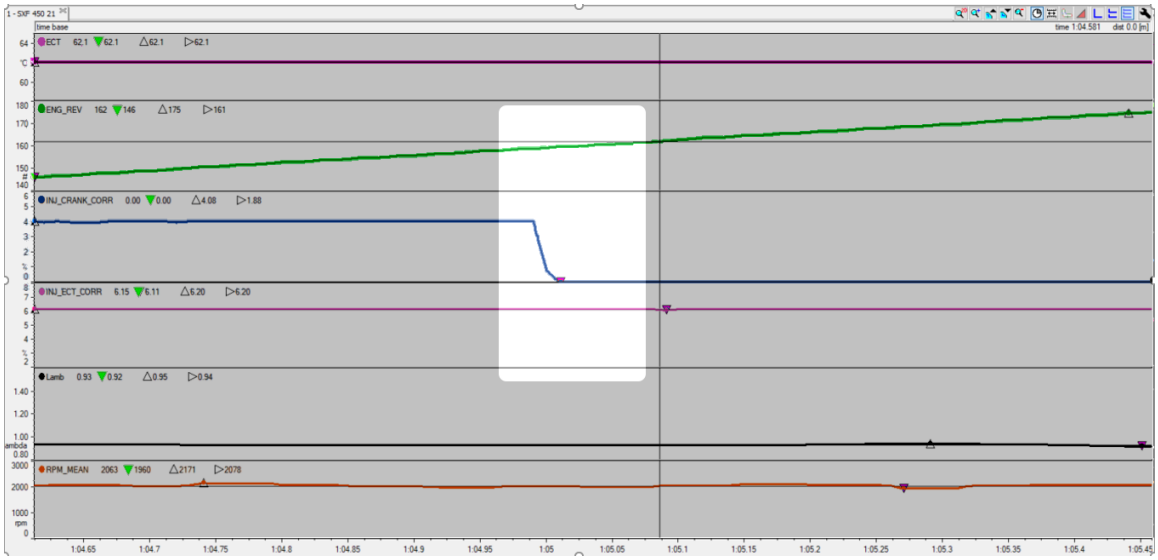
In the picture here above, you may note the crank injection correction peak and the effect of this correction on the lambda level.

The lambda value at this stage is very important:
• if too low "the engine drowns" (too much gasoline) and it will not start, with the risk of wetting the spark plug
• if it is too high, the gasoline will not be enough to start the engine.

After the crank, the engine is at idle, and the lambda value will stabilize at the desired target value, as shown in the image below.



The last image shows exactly when the correction of the injection to the crank stops, and the correction is managed in accordance with the coolant temperature.


1 - SXF 450 21
time base
time 1.04.581
dist 0.0 [m]
ECT 62.1 62.1 62.1 62.1
ENG_REV 162 146 175 161
INJ_CRANK_CORR 0.00 0.00 4.08 1.88
INJ_ECT_CORR 6.15 6.11 6.20 6.20
Lamb 0.93 0.92 0.95 0.94
RPM_MEAN 2063 1960 2171 2078
1:04.65
1:04.7
1:04.75
1:04.8
1:04.85
1:04.9
1:04.95
1:05
1:05.05
1:05.1
1:05.15
1:05.2
1:05.25
1:05.3
1:05.35
1:05.4
1:05.45

Appendix G – Injection N battery correction

One of the most important parameters for the engine control is the injection time, i.e., the duration of the injector command pulse so that the desired amount of petrol enters the combustion chamber of the engine. The injection time is calculated based on parameters, some of which depend on the characteristics of the injector, while others depend on other factors, such as water temperature, air, barometric pressure, etc.
Here we see how the injector power supply voltage affects the opening time of the injector during the injection.
The injector can be schematized as in this image:

This is a very simple circuit consisting of an inductor and a resistor. The inductive component, depending on the applied voltage, will make the injector open more or less quickly.
Injector manufacturers always provide a table such as this one below, which represents the characterization of the injector itself. The table is very simple:

G2-99-0123

350 CC/MIN - 32 LBS/HR

EV6/EV14/USCAR electrical connector

Fuel Pressure		Voltage Offset					Flow Rate	
PSID	BAR	8 Volts	10 Volts	12 Volts	14 Volts	16 Volts	cc/min	lbs/hr
43.5	3.00	1.890	1.530	1.120	0.750	0.490	309	29
45	3.10	1.935	1.518	1.095	0.733	0.485	321	31
50	3.44	1.980	1.505	1.070	0.715	0.480	334	32
55	3.79	2.025	1.492	1.045	0.697	0.475	346	33
60	4.13	2.070	1.480	1.020	0.680	0.470	358	34
65	4.48	2.190	1.555	1.060	0.710	0.500	371	35
70	4.82	2.310	1.630	1.110	0.740	0.530	383	36
75	5.17	2.370	1.675	1.135	0.765	0.550	396	38
80	5.51	2.430	1.720	1.170	0.790	0.570	408	39
85	5.86	2.485	1.765	1.210	0.820	0.595	420	40
90	6.20	2.540	1.810	1.250	0.850	0.620	433	41
95	6.55	2.600	1.855	1.280	0.875	0.635	449	43
100	6.89	2.660	1.900	1.310	0.900	0.650	464	44

STANDARD

Voltage offset values are in milliseconds ms - 1ms = 1000us

At a certain fuel pressure (column 1/2) to obtain the desired amount of fuel (column 8/9), the injector must remain open for the time in msec depending on the power supply voltage indicated in the various “Voltage Offset” columns (columns 3/7).
The overall injection time driven by the ECU will therefore be given by considering, in addition to the set of contributions on the main table, also from this "offset" strictly dependent on the intrinsic characteristics of the injector.

Appendix H – Injection BAP correction

- BAP means Barometric Air Pressure, the weight exerted on the Earth by the air present in the atmosphere. The barometric pressure is therefore the pressure exerted at a certain point by the column of air that goes from the highest point of the atmosphere to the ground. It is obvious that the higher you move, the lower is the barometric pressure value.
- AFR means Air Fuel Ratio, that is the ratio between the intake air and the injected gasoline.

On a beautiful day at sea level the barometric pressure is 1020mBar, and a motorcycle at idle speed will have an AFR of 0.89. If you go up to 2500 m (8000 ft), where the air pressure is 780mBar, how will the lambda change? Given the premises described above, and knowing that as the height increases, the weight of the air column decreases, there is less air at altitude and therefore the AFR ratio decreases. If in these conditions we left the injected petrol unchanged, our engine would get greased, with even the risk of being shut down due to too much injected petrol.

Injection BAP correction serves to avoid this effect and acts by decreasing the percentage of petrol injected as the barometric pressure decreases in order to maintain the target lambda value.

This compensation table is very simple and is shown below:

%\mbar	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1200
	-50.0	-50.0	-50.0	-45.0	-40.0	-37.0	-32.0	-27.0	-22.0	-17.0	-5.0	0.0	0.0	0.0	5.0	10.0

The pressure value in mBar is shown on the X axis, and the percentage correction on injected petrol as an entry point value.

Appendix I – Transient management

Managing transient throttle enrichment of an off-road motorcycle is one of the most critical calculations the ECU performs and represents the core of all its strategies. The effectiveness and speed of implementation are vital in providing a reliable response to the rapid transient throttle opening and closing.

In motocross applications, the transient opening and closing of the throttle represents 80-85% of the time on track; the throttle is closed for the remaining 15-20%.

Closed-loop tuning with Lambda or AFR is not a practical strategy in motocross because of the amount of transient throttle. However, using a Lambda sensor is useful for validating the effectiveness of transient throttle enrichment strategies.

Transient corrections are unique to every map in the Spark tuning software. Four transient correction tables are available for each map; a throttle opening and closing table for both injection and ignition.

- Injection corrections are a percentage of injector pulse duration.
- Ignition corrections are an offset in degrees of spark timing.

Please review the sample transient throttle correction tables below.

Injection correction table for transient throttle opening.

Injection correction for opening throttle transients

Tps (%)	2.0	3.5	4.5	9.0	15.0	20.0	25.0	30.0	35.0	37.5	40.0	45.0	50.0	60.0	70.0	80.0
Opening speed (%/s)	190	300	320	360	360	650	650	650	650	650	650	650	650	650	650	650
Correction (%)	5.0	5.0	8.0	10.0	15.0	15.0	20.0	25.0	30.0	30.0	30.0	30.0	30.0	20.0	20.0	20.0
Correction time (r)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4

Injection correction for closing throttle transients

Tps (%)	15.0	25.0	30.0	32.0	35.0	38.0	43.0	50.0	54.0	57.0	60.0	65.0	70.0	75.0	80.0	85.0
Closing speed (%/s)	-820	-750	-700	-688	-664	-650	-450	-450	-450	-450	-410	-400	-400	-400	-400	-400
Correction (%)	-40.0	-40.0	-40.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0	-45.0
Correction time (r)	6	6	6	6	5	5	5	5	5	4	4	4	4	3	3	3

Ignition correction for opening throttle transient

Tps (%)	2.0	3.5	4.5	9.0	15.0	20.0	25.0	30.0	35.0	37.5	40.0	45.0	50.0	55.0	60.0	70.0
Opening speed (%/s)	190	300	320	600	850	950	1050	1100	1150	1200	1250	1300	1350	1400	1450	1520
Correction advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction time (r)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Ignition correction for closing throttle transient

Tps (%)	20.0	25.0	30.0	32.0	35.0	38.0	43.0	50.0	54.0	57.0	60.0	65.0	70.0	75.0	80.0	85.0
Closing speed (%/s)	-820	-750	-700	-688	-664	-650	-630	-570	-540	-470	-410	-400	-400	-400	-400	-400
Correction advance (°)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Correction time (r)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table Details:

The first column is the same structure across all tables:

- **TPS (%)** is the position of the throttle.
- **Opening/Closing Speed (% / s)** is the derivative of throttle position speed (**DTPS**), or how fast the throttle is opened or closed. It's important to note that the value is a minimum threshold for the correction to be applied.
- DTPS is calculated as $v = (x2-x1) / t$ where:
    - v = speed
    - x2 = final throttle position
    - x1 = initial throttle position
    - t = time interval

During throttle opening, x2 will be greater than x1; therefore, the speed will be a positive value.

During throttle closing, x2 will be less than x1; therefore, the speed will be a negative value.

A DTPS value of 100%/s means that the throttle position moves from 0 to 100% in ONE second.

If the rider opens the throttle faster, the DTPS value grows. A DTPS of 200%/s means that the rider opens the throttle from 0 to 100% in half a second (100 / 0.5). Similarly, a throttle twist from 20 to 70% in half a second, a 50% change, is 100%/s (50 / 0.5)

A negative value means that the rider is closing the throttle. For example, a value of -500%/s means that the rider has closed the throttle, from 100% to 0% in 0.2 secs (-100 / 0.2).

Important! The DTPS is the qualifying threshold that must be met to apply the correction.

A data logger is required to record the value of the DTPS while the rider is on track. Analysis of the data will allow recursive fine-tuning of the transient enrichment strategy. AiM offers several data loggers, and for motocross, the Solo2 DL is the most suitable choice.

• **Correction** indicates the type of correction:
On the injection table, it indicates the percentage of correction to the injector pulse duration.
On the ignition table, it indicates the offset in degrees of spark timing.

• **Correction time (r)** is the number of engine revolutions for which the corrections are applied. For example, at 12,000 RPM, the engine rotates 200 times per second, so every revolution is five (5) milliseconds (1000 / 200). To continue with the example, if the 'correction time (r)' is set to 5 revolutions, the correction will apply for a total of 25 milliseconds (5 revs x 5 msec).

Purpose:
The purpose of the transient throttle strategy is to avoid:

1) **The engine stalling during the rapid opening of the throttle.**
A rapid opening of the throttle will result in a large volume of air rushing into the intake with insufficient fuel to burn. Not having enough fuel to burn, the air pressure will rapidly increase in the intake duct, the lambda value will reach a lean peak, and the engine will hesitate and possibly stall. This effect is more evident at low RPM.

2) Engine hesitation after the rapid closing of the throttle.

When the rider quickly closes the throttle, a quantity of scheduled fuel is still delivered into the intake. The extra fuel delivered during the closing of the throttle may result in a puddle of fuel in the intake. This extra fuel can create a rich condition when the throttle is again opened, making for a hesitant engine that lacks a good throttle response.

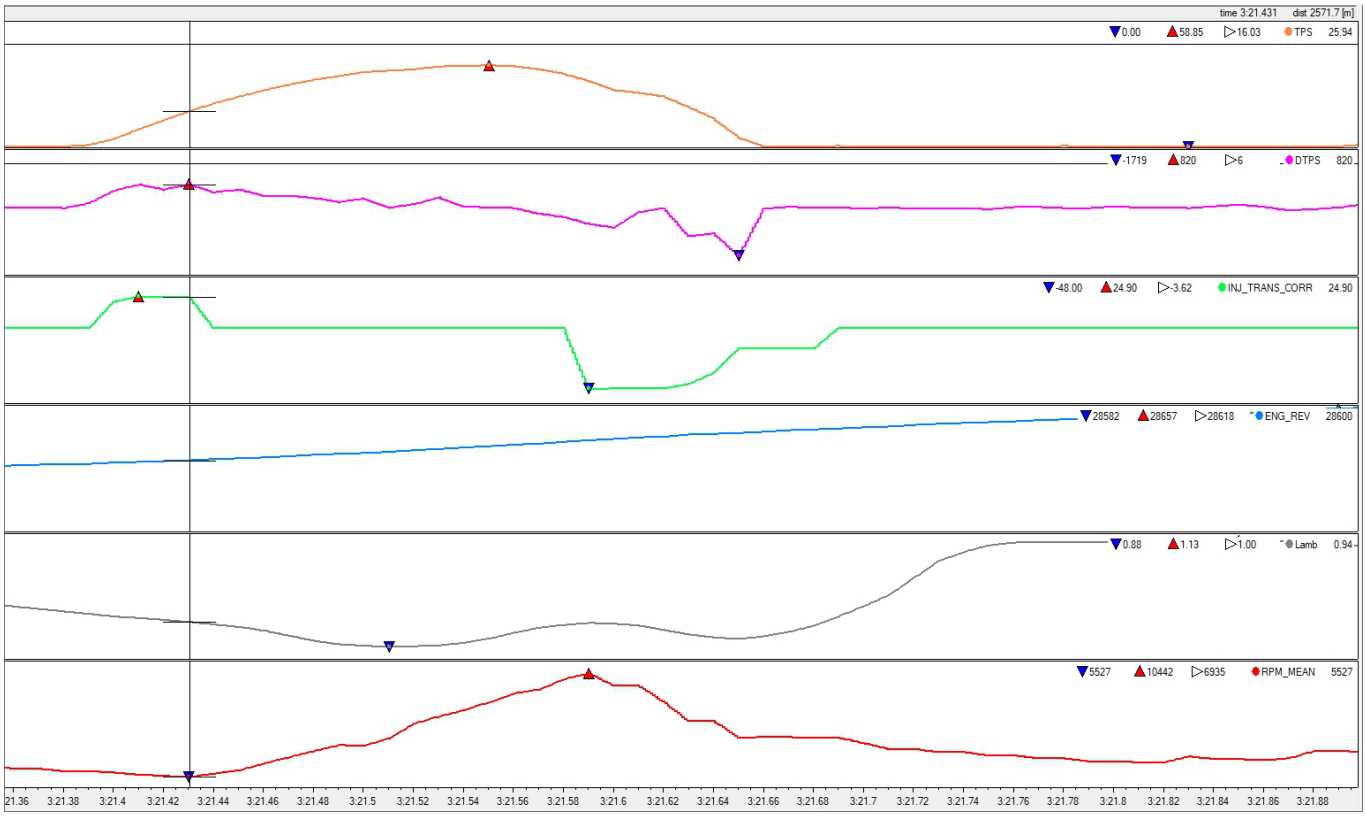
Minimizing these two conditions will result in a predictable, ready, and consistently snappy motorcycle.
Please review the injector transient correction table and corresponding data below to see this strategy at work

Tps (%)	2.0		4.5	9.0	15.0	20.0	25.0	30.0	35.0	37.5	40.0	45.0	50.0	55.0	60.0	70.0
Opening speed (%/s)	190		320	360	360	650	650	650	650	650	650	650	650	650	650	650
Correction (%)	5.0		8.0	10.0	15.0	15.0	20.0	25.0	30.0	30.0	30.0	30.0	30.0	20.0	20.0	20.0
Correction time (r)	5		5	5	5	5	5	5	5	5	5	5	5	5	4	4

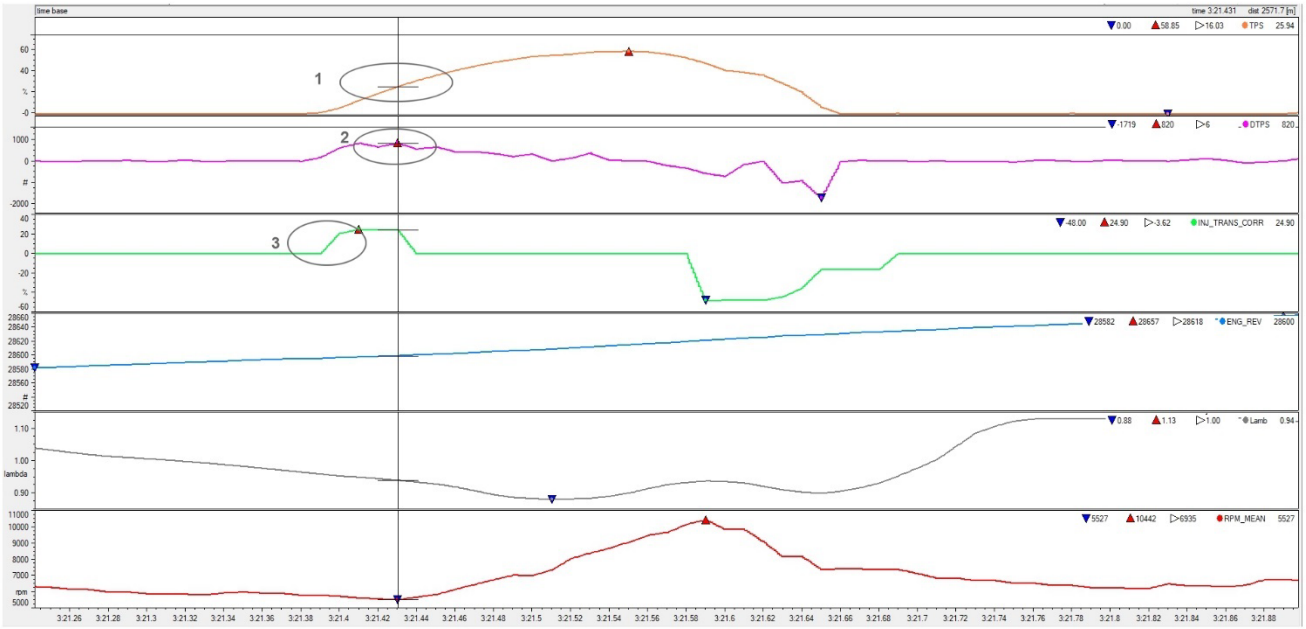
Reading this table from top to bottom, looking at the area circled, we see:

1) An assumed value of 10% throttle opening, falling between 9 and 15% in the first row.
2) A throttle opening speed threshold of 360% per second in the second row.
3) A fuel correction between 10-15%, to be linearly interpolated, in the third row.
4) A correction time of 5 engine revolutions in the final row.

These screen captures of logged data give visual details of the transient throttle enrichment strategy at work.



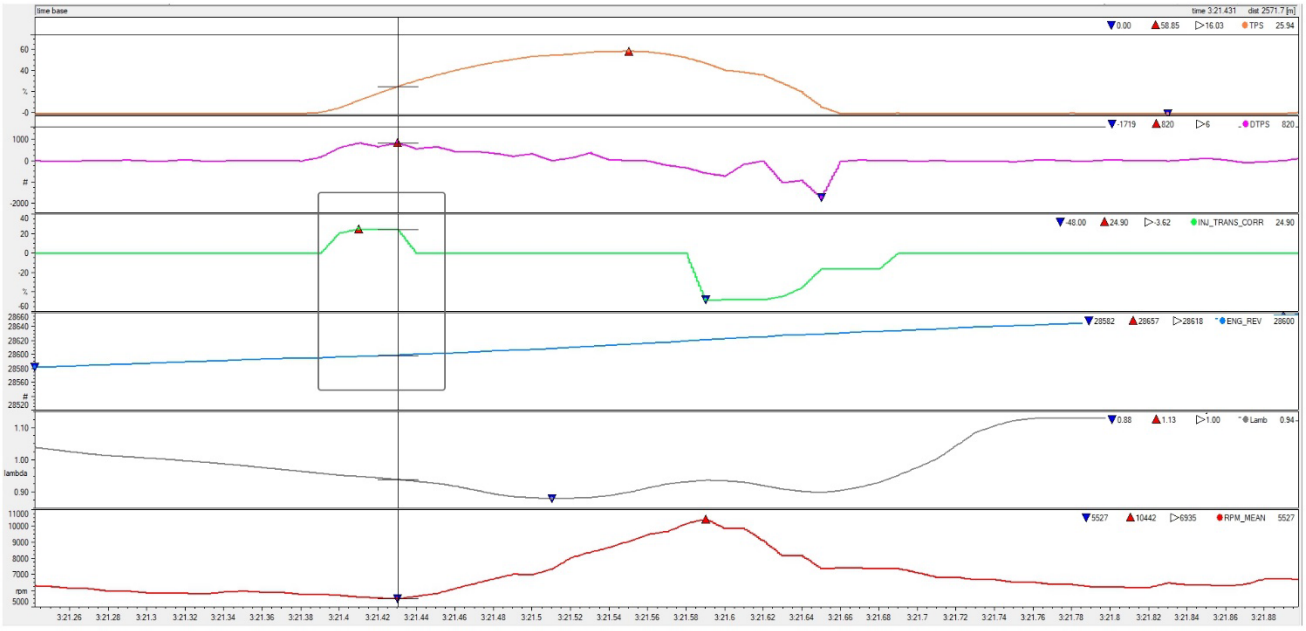
- Orange curve: TPS
- Purple curve: DTPS (throttle opening speed)
- Green curve: INJ_TRANS_CORR (% injection correction of transients)
- Blue curve: ENG_REV (motor revolution counter)
- Grey curve: lambda value
- Red curve: RPM



Above we see the data plotted over time, zoomed full screen to about 0.5 seconds.

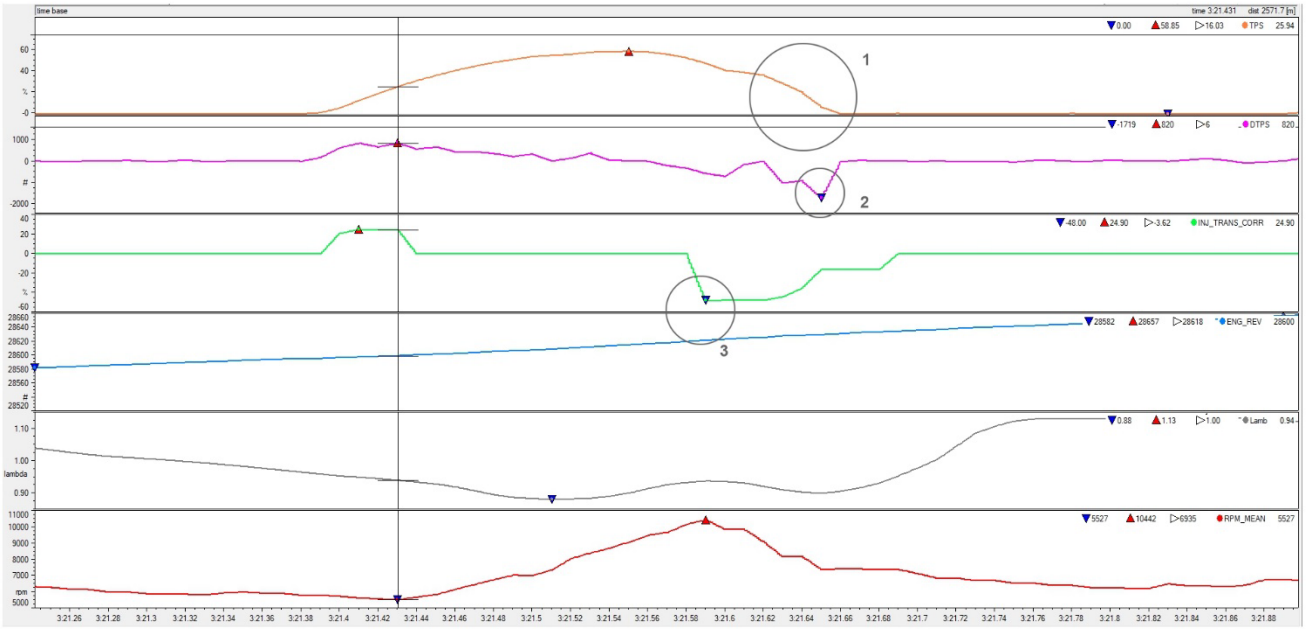
- Circle 1 is the throttle opening.
- Circle 2 shows an increased throttle opening speed (DTPS) that exceeds the threshold value of the opening speed value expressed in the table to apply a transient injector correction.
- Circle 3 shows the percentage of injector pulse width correction applied.

The correction is recalculated 200 times per second: when, during an opening, the DTPS value is no longer higher than the value interpolated from the table, the correction remains for the number of revolutions set in the same table. The graph below shows this effect.



The rectangle in this graph highlights how the contribution of the injector correction (green curve) at a certain point remains constant for the number of motor revolutions set in the correction time (blue graph).

The moment the throttle is released, the throttle lock injection transient correction table will be used.
You can check the result by observing the lambda value, highlighted in the rectangle in the image above.



When the rider closes the throttle and the DTPS closing speed exceeds the threshold value from the injection correction table for transient throttle closing in the negative direction, the fuel percentage correction is applied for the number of engine revolutions expressed in the table. The above image shows the throttle closure process (orange graph) with the effects of DTPS (purple) and injection percentage correction (green).

It is easy to see that it is necessary to add fuel during the throttle opening to prevent the engine from stalling, while during the closing, it is essential to remove fuel.

Here we can also observe that:
- The throttle went from 0 to 58% in 0.16 sec
- The RPM value went from 5527 to 10442 in the same period
- The Lambda value remained between 0.88 and 0.96λ without rich or lean peaks during the transient conditions.

Similar transient throttle corrections can be made for ignition timing; increasing the advance by adding a positive offset assists in increasing engine RPM to avoid a stall. However, the ignition offset is generally absent, and only in some rare cases is it appropriate to introduce a negative offset.

Appendix J – CAN Protocols

User CAN Protocol

Can Bus Speed: 1 Mbit Endianless: Big Endian

CAN ID	B0	B1	B2	B3	B4	B5	B6	B7
0x402			TPS		Gear			
0x403	Battery Voltage							
0x404	ECT		IAC		ECU T			
0x405	RPM							
0x40B	Usage Time Sec		Usage Time Min					
0x40C	DTPS		Inj Trans Corr		Ign Trans Corr		Eng Flag	
0x40D							Eng State	
0x40E					Map Sel		Launch State	
0x40F	Eng Diag HH	Eng Diag HL	Eng Diag LH	Eng Diag LL	Analog Diag HH	Analog Diag HL	Analog Diag LH	Analog Diag LL
0x410	Eng Rev							
0x411	Drop V		Spare CH 1		Spare CH 2			

Channel name	Gain	Offset	Sign	Measure unit
TPS	0,1	0	unsigned	%
GEAR	1	0	unsigned	#
Battery Voltage	1	0	unsigned	mV
ECT	0,1	0	signed	C
IAT	0,1	0	signed	C
ECU T	1	0	signed	C
RPM	1	0	unsigned	rpm
USAGE TIME SEC	1	0	unsigned	s
USAGE TIME MIN	1	0	unsigned	min
DTPS	1	0	signed	#
INJ TRANS CORR	0.1	-100	signed	%
IGN TRANS CORR	0.1	0	signed	deg
ENG FLAG	1	0	unsigned	#
MAP SEL	1	0	unsigned	#
LAUNCH STATE	1	0	unsigned	#
ENG DIAG HH	1	0	unsigned	#
TPS	0,1	0	unsigned	%
GEAR	1	0	unsigned	#
DTPS	1	0	signed	#
ENG DIAG HL	1	0	unsigned	#
ENG DIAG LH	1	0	unsigned	#
ENG DIAG LL	1	0	unsigned	#
ANALOG DIAG HH	1	0	unsigned	#
ANALOG DIAG HL	1	0	unsigned	#
ANALOG DIAG LH	1	0	unsigned	#
ANALOG DIAG LL	1	0	unsigned	#
ENG REV	1	0	unsigned	#
DROP V	1	0	unsigned	mV
SPARE CH 1	1	0	unsigned	mV
SPARE CH 2	1	0	unsigned	mV

Tuner CAN Protocol

Can Bus Speed: 1 Mbit Endianless: Big Endian

CAN ID	B0	B1	B2	B3	B4	B5	B6	B7
0x400	**MAP CNT**		**TPS CNT**		**BATTERY CNT**		**ECT CNT**	
0x401	**GEAR CNT**		**IAT CNT**					
0x402	**MAP**		**TPS**		**GEAR**		**RPM 360**	
0x403	**BATTERY**						**VREF**	
0x404	**ECT**		**IAT**		**ECU T**		**BAROMETRIC P**	
0x405	**RPM**		**IGN ADV**		**IGN BASE ADV**		**INJ TIME**	
0x406	**IGN ECT CORR**		**IGN IAT CORR**		**INJ ECT CORR**		**INJ IAT CORR**	
0x407	**INJ1 BASE PHASE**		**INJ BASE TIME**		**INJ1 PHASE**		**INJ1 TIME**	
0x408	**SMOT ERR CNT**		**INJ CRANK CORR**		**INJ1 BATT CORR**		**TRIM CORR**	
0x409	**IGN BAP CORR**		**INJ BAP CORR**					
0x40A	**INJ1 PERC**		**INJ2 PERC**				**INJ2 PHASE**	
0x40B	**INJ2 TIME**		**INJ2 BATT CORR**		**USAGE TIME SEC**		**USAGE TIME MIN**	
0x40C	**DTPS**		**INJ TRANS CORR**		**IGN TRANS CORR**		**ENG FLAG**	
0x40D	**IGN TC CORR**		**INJ TC CORR**		**ENG POS**		**ENG STATE**	
0x40E	**REF TIME**				**MAP SEL**		**LAUNCH STATE**	
0x40F	**ENG DIAG HH**	**ENG DIAG HL**	**ENG DIAG LH**	**ENG DIAG LL**	**ANALOG DIAG HH**	**ANALOG DIAG HL**	**ANALOG DIAG LH**	**ANALOG DIAG LL**
0x410	**ENG REV**				**RPM MEAN ACC**			
0x411	**DROP V**		**SPARE CH 1**		**SPARE CH 2**			
0x412	**LAMBDA**							

Channel name	Gain	Offset	Sign	Measure unit
MAP CNT	1	0	unsigned	#
TPS CNT	1	0	unsigned	#
BATTERY CNT	1	0	unsigned	#
ECT CNT	1	0	unsigned	#
GEAR CNT	1	0	unsigned	#
IAT CNT	1	0	unsigned	#
MAP	1	0	unsigned	mBar
TPS	0,1	0	unsigned	%
GEAR	1	0	unsigned	#
RPM 360	1	0	unsigned	rpm
BATTERY	1	0	unsigned	mV
VREF	1	0	unsigned	mV
ECT	0,1	0	signed	C
IAT	0,1	0	signed	C
ECU T	1	0	signed	C
BAROMETRIC P	1	0	unsigned	mBar
RPM	1	0	unsigned	rpm
IGN ADV	0,1	0	signed	deg
IGN BASE ADV	0,1	0	signed	deg
INJ TIME	1	0	unsigned	us
IGN ECT CORR	0,1	0	signed	deg
IGN IAT CORR	0,1	0	signed	deg
INJ ECT CORR	0,1	-100	signed	%

INJ1 BASE PHASE	0,1	-360	signed	deg
INJ BASE TIME	1	0	unsigned	ms
INJ1 PHASE	0,1	-360	signed	deg
INJ1 TIME	1	0	unsigned	ms
SMOT ERR CNT	1	0	unsigned	#
INJ CRANK CORR	0,1	-100	signed	%
INJ1 BATT CORR	1	0	unsigned	ms
TRIM CORR	0,1	-100	signed	%
IGN BAP CORR	0.1	0	signed	deg
INJ BAP CORR	0,1	-100	signed	%
INJ1 PERC	0.1	0	unsigned	%
INJ2 PERC	0,1	0	unsigned	%
INJ2 PHASE	0,1	-360	signed	deg
INJ2 TIME	1	0	unsigned	us
INJ2 BATT CORR	1	0	unsigned	us
USAGE TIME SEC	1	0	unsigned	s
USAGE TIME MIN	1	0	unsigned	min
DTPS	1	0	signed	#
INJ TRANS CORR	0.1	-100	signed	%
IGN TRANS CORR	0.1	0	signed	deg
ENG FLAG	1	0	unsigned	#
IGN TC CORR	0.1	0	signed	deg
INJ TC CORR	0.1	0	signed	deg
ENG POS	1	0	unsigned	#
ENG STATE	1	0	unsigned	#
REF TIME	1	0	unsigned	us
MAP SEL	1	0	unsigned	#
LAUNCH STATE	1	0	unsigned	#
ENG DIAG HH	1	0	unsigned	#
ENG DIAG HL	1	0	unsigned	#
ENG DIAG LH	1	0	unsigned	#
ENG DIAG LL	1	0	unsigned	#
ANALOG DIAG ...	1	0	unsigned	#
ANALOG DIAG ...	1	0	unsigned	#
ANALOG DIAG ...	1	0	unsigned	#
ANALOG DIAG LL	1	0	unsigned	#
ENG REV	1	0	unsigned	#
RPM MEAN ACC	1	0	signed	#
DROP V	1	0	unsigned	mV
SPARE CH 1	1	0	unsigned	mV
SPARE CH 2	1	0	unsigned	mV
LAMBDA	0.001	0	Unsigned	lambda

Appendix K – Malfunctioning Indicator Lamp (MIL) – Taipan only

From Taipan firmware version 0.5.19 all bikes equipped with a MIL (Malfunction indicator Lamp) a visual indicator of malfunctions is available. According to the settings here below explained the type of error will be identified:

- 1 Flash –> Primary Injector Failure
- 2 Flashes –> Secondary Injector Failure (stock on the bikes that feature it)
- 3 Flashes –> MAP (manifold air pressure) sensor failure
- 4 Flashes –> TPS (throttle position sensor) sensor failure
- 5 Flashes –> ECT (engine coolant temperature) sensor failure
- 6 Flashes –> IAT (Intake air temperature) sensor failure
- 7 Flashes –>GEAR sensor (where available) failure