ASMoto
Race Electronics

Freely Programmable Dashboard for Racing Purposes

Installation / user manual 1.5

General Characteristics:

- **Robust Design:** CNC-milled aluminum housing.

- **Customizable Pages:** 4 freely programmable pages.

- **Dual CAN Interfaces**

- **Integration with ASMoto ECU:** Display settings can be configured separately for four engine maps. Easy display of a vast amount of data available from the ECU.

- **Compatibility with Other ECUs:** Supports communication via AIM protocol (RS232 19200, n, 8, 1), compatible with VEMS, MoTeC M4-M48, DTA S.., LifeRacing, Syvecs, MaxxECU, and general EOBD.

- **12 Configurable Inputs:**
  Suitable for analog sensors, buttons, indicator lights, RPM sensors, and Vs signals.

- **Built-In Dashboard Indicators:** Includes the most essential dashboard lights.

- **Customizable and Acknowledgeable Warnings:** Monitors 12 channels simultaneously, independent of the displayed data (Warnings).

- **Programmable Brightness Control:** Integrated light sensor for adaptive brightness.

- **Gear Detection:** Recognizes gear positions.

- **Customizable Shift Light Control:** Shift light thresholds can be individually programmed for each gear.

- **User-Friendly Software:** Free firmware updates with continuous development and simplified electrical wiring.

The DashBoard TFT builds on its predecessor, the DashBoard LED, by introducing numerous new features. Thanks to TFT technology, it offers enhanced brightness and contrast, ensuring that critical information is easily perceivable under any circumstances, even without direct driver focus.

The display can be configured separately for four engine maps, while a large amount of data from the ECU can be displayed via the CAN bus without requiring additional wiring to the dashboard. For instance, it can display RPM, coolant temperature, fuel level graphically, as well as speed, gear position, and use shift light functionality. In addition to CAN and RS232 buses, the device has 12 additional inputs configurable for indicator lights, oil pressure, oil temperature, fuel level, or other analog signals.

With the ASMoto PowerModule, users can display additional parameters such as load, temperature, voltage, current draw, status, and error messages of the 18 HP output channel.

The 12-channel customizable warning system ensures that drivers are immediately informed of any vehicle-related issues.

In addition to these features, the DashBoard TFT includes general dashboard indicator lights, such as for battery charge, oil pressure, parking lights, low and high beams, turn signals, and brake fluid levels, which can also be repurposed for other uses if necessary.

2.   Technical Specifications:

Electrical:	Min.:	Typical:	Max.:	Unit:
Supply Voltage:	8	14	20	V
Standby Current (without sensors, at 12V, depends on brightness)	200	300	380	mA
Load Capacity of "+5V Sensor Output" ("11 pin")	-	-	250	mA
Input Voltage Range (for proper operation)	0	0,1-4,9	5	V
Input Voltage Range (without permanent damage)	-20	0,1-4,9	20	V
Mechanical:	**Min.:**	**Typical:**	**Max.:**	**Unit:**
Width:		177		mm
Depth (without connector)		29		mm
Height:		119.5		mm
Weight:		570		g
Operating Conditions:	**Min.:**	**Typical:**	**Max.:**	**Unit:**
Operating Temperature:	-30	-	70	°C
Storage Temperature:	-40	-	80	°C
Optical:	**Min.:**	**Typical:**	**Max.:**	**Unit:**
Pixel Resolution:		800 x 480		pixel
Brightness:		800	1000	Cd/m2
Contrast Ratio:	400	500		
Viewing Angle:	60	70		Degree

2.2.   Pinout of the 23-Pin Connector on the DashBoardTFT:

Pin:	Name/funion:	Description:
1	**Battery +30**	
2	**Ignition +15**	
3	**CH1 input**	**0-5V analog or digital input** **55 kOhm pull down internal resistors**
4	**CH2 input**	
5	**CH3 input**	
6	**CH4 input**	
7	**Config. CAN L**	**120 Ohm termination resistor**
8	**Config. CAN H**	
9	**GND**	
10	**CH5 input (33 Ohm PU)**	**0-5V analog or digital input** **2.2 kOhm pull up internal resistors**
11	**CH6 input**	
12	**CH7 input**	
13	**CH8 input (100 Ohm PU)**	
14	**ASMoto CAN L**	
15	**ASMoto CAN H**	
16	**ASMoto LIN**	
17	**Config. RX input**	
18	**CH9 input/output**	**0-5V analog or digital input,** **or low side output** **2.2 kOhm pull up internal resistors**
19	**CH10 input/output**	
20	**CH11 input/output**	
21	**CH12 input/output**	
22	**Sensor GND**	
23	**Sensor 5V**	**Max.: 250 mA load**

3.   Wiring Diagrams:

ASMoto
DashBoard TFT
Wiring diagram 1.2
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3.10 ábra (The wiring diagrams can be found in higher resolution and printable format on the ASMoto website under the Downloads section.)

4.   Operation:

4.1.   General:

The DashBoardTFT features four customizable pages, allowing users to select from various graphical and textual display formats. These pages can be individually configured in terms of color, brightness, and displayed data:
Page 1 - 4

There are global settings that apply to all four pages:
Input – Output
Sensor calibration
Global settings
Warning

All settings can be saved into a single configuration file with a .cfg extension and reloaded later.

Some settings (e.g., Input - Output, Configurable CAN and Rx) require a restart of the DashBoardTFT for proper functionality after modifications. To restart, turn off the ignition and wait approximately 3 seconds until the DashBoardTFT powers down.
For further details, see:
       https://asmoto.eu/online-help/?page=content/power-latch.html

4.2.   Input – Output:

The DashBoardTFT is equipped with 12 freely configurable inputs (CH1 – CH12).

- CH5 includes a software-switchable 33 Ohm pull-up resistor, which can be used if excitation for the alternator is required.
- CH8 includes a software-switchable 100 Ohm pull-up resistor for the fuel level sensor.

The first four inputs (CH1 – CH4) have 55 kOhm pull-down resistors, making them suitable for connecting devices such as pressure sensors or lighting indicators. Inputs CH5 – CH12 are equipped with 2.2 kOhm pull-up resistors, which simplify connections for temperature sensors, oil pressure lights, and buttons.

When using the ASMoto PowerModule, there is no need to wire lighting indicators (turn signals, parking lights, low beams, high beams) or the PageSelect button, as these can be controlled via the CAN bus directly from the PowerModule.

When connecting sensors that require calibration, select the ANx voltage input type for the respective channel.

4.3.   Sensor calibration:

Sensors connected to the 12 inputs can be calibrated so that the displayed values (e.g., temperature, pressure) are easy to read. It is recommended to connect sensors that are not already integrated into the ECU communicating with the DashBoardTFT.

At the top of the screen, in the Analog Channels section, select the analog input (sensor) to be calibrated. For each channel, you can specify what is connected to it: Variable.

Under This Sensor → Import Sensor, you will find predefined sensor calibrations, and under Export Sensor, you can create your own for frequently used sensors. This only applies to the sensor currently selected on the interface.

Set the two extreme values of the Analog Channel Voltage so that, under normal operation, the sensor will fall within these values. However, in the event of a short circuit or break, the values should fall outside the range. Fill in the upper row for all voltage values, and for the two extreme separate fields, enter the substitute values that you would like the Dash to use in case of a sensor break or short circuit.
Press the Processing button to display the table on the upper graph. Afterward, you can proceed to the next Analog Channel.

> **Note:**   For all two-dimensional tables and sensor calibrations, if any changes are made to the table, you must click the Process button to confirm the changes. Only after this can you save and send the data to the Dash.

For further details, see:
       https://asmoto.eu/online-help/?page=content/sensor-calibration.html

4.4.   Page 1 - 4:

The DashBoardTFT includes 4 pages (4 different screens), each of which can be configured in completely different ways. ([Active Page Dash] 1-4). Different data can be displayed, brightness can be adjusted, and the shift light can be configured differently.

To choose which of the 4 pages you want to edit, use the Page 1 - Page 4 buttons at the top. In the upper-right corner of the AREM screen, you can see (DashBoard active Page:) which page is currently displayed on the DashBoard.

Settings highlighted in green on this page are valid for all 4 pages and apply to the settings in other tabs as well (Input - Output, Sensor Calibration, Global Settings, Warning).

There are two options for selecting one of the 4 pages:

1.   By checking the "Active Page from Active MAP ECU" checkbox, the [Active Page Dash] automatically changes in sync with the current MAP selection from the ASMoto ECU [Active Map ECU] (this requires a CAN connection to the ECU)
2.   If the checkbox is unchecked, you can switch the [Active Page Dash] manually using the Page Select button, cycling through pages 1 to 4

In the Page Mode dropdown menu, you can choose the type of the currently edited page (Graphical, Text, or PowerModule).

Each selected variable can be displayed with a unique name (Name) on the screen. If you wish to leave the space for a variable empty, choose "0 Not selected" and clear the text in the Name field.

In the Style/Color section, you can assign different colors to the function. For example, you can hide the grid by setting its color to match the background.

From the Selected Variable dropdown menus, you can choose the variable to be displayed at the specific position on the selected page:
… Variables ending with **… ECU** come from the ASMoto ECU via CAN.
… Variables ending with **… Ext ECU** are received from other ECUs via RS232 (pin 7) or configurable CAN.
… Variables ending with **… calculated** are measured by the DashBoardTFT.
… Variables ending with **… TC** come from the ASMoto TractionControl via CAN.

Note!
In the Source dropdown menus (both for Page and Warning settings), make sure to select the correct origin of the variables, i.e., the data source from which you want to display the information. At the end of the setup, verify all displayed data!

4.4.2   Brightness Settings:

Above the DashBoardTFT display, in the center, there is a light sensor. For each of the 4 pages, it can be separately configured how the background brightness of the display will change depending on the external illumination (Brightness intensity):

The external illumination (on the Y-axis of the coordinate system) defines the minimum and maximum brightness levels, while the background brightness (on the X-axis) adjusts accordingly.
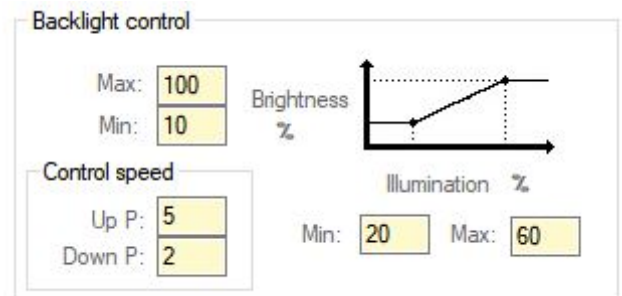
In the example on the right, if the illumination is 20% or below, the background brightness will be set to 10%, and if the illumination is 60% or above, the background brightness will reach 100%. The brightness will change linearly between 20% and 60% illumination.

4.5. Global settings:

4.5.1 **The Gear Detection setting matches the ECU Gear Detection setting. For more details, see:**
https://asmoto.eu/online-help/?page=content/gear-detection.html

4.5.2 **If the "Use power voltage controlled charge lamp" option is checked, the charging indicator light will not only activate when the 16-pin generator excitation input is triggered, but also when the supply voltage is below 12.7V for 1 second.**
If the Input – Output tab is set to Generator DF Analog, you can adjust the charge indicator light's on/off threshold here. (Measured on the selected pin, between 0-5000 mV).

4.5.3 **Trip and service:**
A service interval can be set between 1 and 30,000 km, which will count down (depending on the speed signal), with a minimum of -40 km. The variable named Service shows the remaining kilometers. The Trip and Odo counters can be reset.

4.6. Warning:

Two conditions (Condition 1 and Condition 2) can be assigned to each of the 12 channels. A warning will only appear for a channel if both conditions are met. When two conditions are assigned, both must be satisfied for the warning to be triggered. (This prevents, for example, a warning for low oil pressure when the engine is stationary.) Additionally, the Warning Channel 13 monitors the oil pressure switch, and a warning will also be triggered if it signals above the set RPM threshold.

The display of warnings is independent of the current page configuration and the selected variables on the page. Therefore, if the warning conditions are met, it will appear regardless of the settings or which page is currently active on the display. The only exception is when the page's brightness is completely turned down, in which case the warning will not be visible.

Source:

The selected variable can be assigned a condition, specifying the minimum (min) and maximum (max) values for when a warning should trigger.

Displayed name:

The text entered here will appear when the warning is triggered.

Min-max:

A warning will be triggered once the values exceed the specified minimum and maximum limits. (This happens if the assigned conditions are met and the Exceed. time has elapsed.)

Units:

Unit of measurement.

Exceed. time: [s]:

In seconds, this defines how long the minimum or maximum value (the conditions) must be exceeded for the warning to trigger.

Alarm time: [s]:

In seconds, this sets how long the warning should be displayed.

Alarm again: [s]:

In seconds, this defines the time interval before the warning is triggered again (only if the condition is still present).

All warning alerts can be acknowledged by pressing the Page Select button, after the warning has been displayed for 2 seconds. (This 2-second delay is necessary to avoid accidental acknowledgments.) After acknowledging, the warning will not appear again unless the condition is no longer met and is triggered again, or after the DashBoardTFT is turned off and back on.

4.7.   Shift lámpa:

When using graphical modes, once the RPM limits set in the Shift Light field are reached, the color of the RPM scale and gear position display will change to the color selected in the Gear Shift Color field. The RPM at which the color change occurs can be set separately for each gear, and it is also possible to configure which variable the DashBoardTFT will use to calculate the gear position and RPM for this function.

4.8   Gear Position Detection / Gear Sensor Calibration:

4.8.1   If the gear position is sent by another unit (e.g., ECU) via CAN or RS232, you can select here for the DashBoardTFT to use that signal.

4.8.2   If the gear position is indicated by a voltage corresponding to the gear, connect it to one of the analog inputs (CH1-CH12).
Select Use Analog CH Input and specify which AN CH x channel the sensor is connected to. The CHx: … mV value will be displayed at the bottom of the field by the AREM interface. Then, for each gear, determine and enter the minimum and maximum values.

4.8.3   If there is no gear position signal, the DashBoardTFT can calculate it based on the ratio of RPM and speed (Use RPM/Vs Rate).
In this case, you need to select which variables to use for RPM and speed information. Then, the RPM Vs Rate value will be displayed at the bottom of the field, and for each gear, determine and enter the minimum and maximum values.

Calibrating the gear is the same as the ECU gear calibration. For more information, see:

https://asmoto.eu/online-help/?page=content/gear-detection.html

4.9. Communication:

4.9.1 Using the ASMoto CAN Network:

When used with the ASMoto ECU, the ECU sends data via the CAN bus, so there is no need to wire these separately to the instrument cluster. The DashBoardTFT sends its measured quantities and warning statuses via the CAN bus, for example, to a DataLogger.
Here are three examples:
[In square brackets, the names as they appear in the AREM dropdown menu]
- RPM [RPM ECU]
- Coolant Temperature [CLT ECU]
- Coolant Temperature [ECT ECU]

Additionally, there is the option to use 12 inputs, where additional sensors can be connected, such as fuel level, oil pressure, etc. These sensors need to be calibrated so that real values can be displayed on the screen.

4.9.2 Connecting to Other ECUs via Serial Port or CAN Bus:

It is possible to connect a Configurable CAN or RS232 serial port (19200, n, 8, 1) capable ECU to the DashBoardTFT. In the case of RS232, the ECU's TX pin must be connected to pin 17 of the DashBoardTFT, and by selecting the variables ending in Ext ECU, the data sent by the ECU will be displayed.
The table below shows which variables can be displayed, provided the ECU sends them.

The list of displayable data from other ECUs communicating via serial port or CAN bus:

| Változónév:	AIM (VEMS)	MoTeC M4, M48	MoTeC M100 series		LifeRacing Syvecs	DTA S series	MaxxECU	EOBD
		Set 5 Data Protocol	Set 3 Data Protocol	MoTeC CRC32 Address:1520				ISO 15765
	DashBoard 7 pin (RS232) baud: 19200,n,8,1		CAN					
Aux Voltage1 Ext ECU	-	x	x	x	-	x	-	-
Aux Voltage2 Ext ECU	-	-	x	x	-	x	-	-
Baro press kPa Ext ECU	-	x	-	-	x	-	-	x
Calibration position Ext ECU	-	-	-	-	x	-	-	-
CLT Ext ECU	x	x	x	x	x	x	x	x
ECU temp Ext ECU	-	x	x	x	-	-	-	-
EGT Ext ECU	x	-	x	x	x	-	-	x
Errors Ext ECU	x	-	-	-	-	x	-	-
Fuel Consumption Ext ECU	-	-	-	-	x	x	x	-
Fuel duty cycle Ext ECU	-	x	x	x	-	-	-	-
Fuel press Bar Ext ECU	x	-	x	x	x	x	x	x
Fuel temp Ext ECU	x	-	x	x	x	-	-	x
Gear Ext ECU	x	x	x	x	x	x	x	x
IAT Ext ECU	x	x	x	x	x	x	x	x
Lambda Sensor Ext ECU	x	x	x	x	x	x	x	x
MAP kPa Ext ECU	-	x	x	x	-	x	x	x
MAP mBar Ext ECU	x	-	-	-	x	-	-	-
Oil press Bar Ext ECU	x	-	x	x	x	x	x	x
Oil temp Ext ECU	x	-	x	x	x	x	x	x
Power voltage Ext ECU	x	x	x	x	x	x	x	x
RPM Ext ECU	x	x	x	x	x	x	x	x
TPS Ext ECU	x	x	x	x	x	x	x	x
Vehicle speed Ext ECU	x	x	x	x	x	x	x	x
Wheel drive speed Ext ECU	-	x	x	x	x	-	-	-

Example for MaxxECU Data Stream Setup:

In the ASMoto DashBoardTFT, under Global Settings / Configurable CAN, set the following:
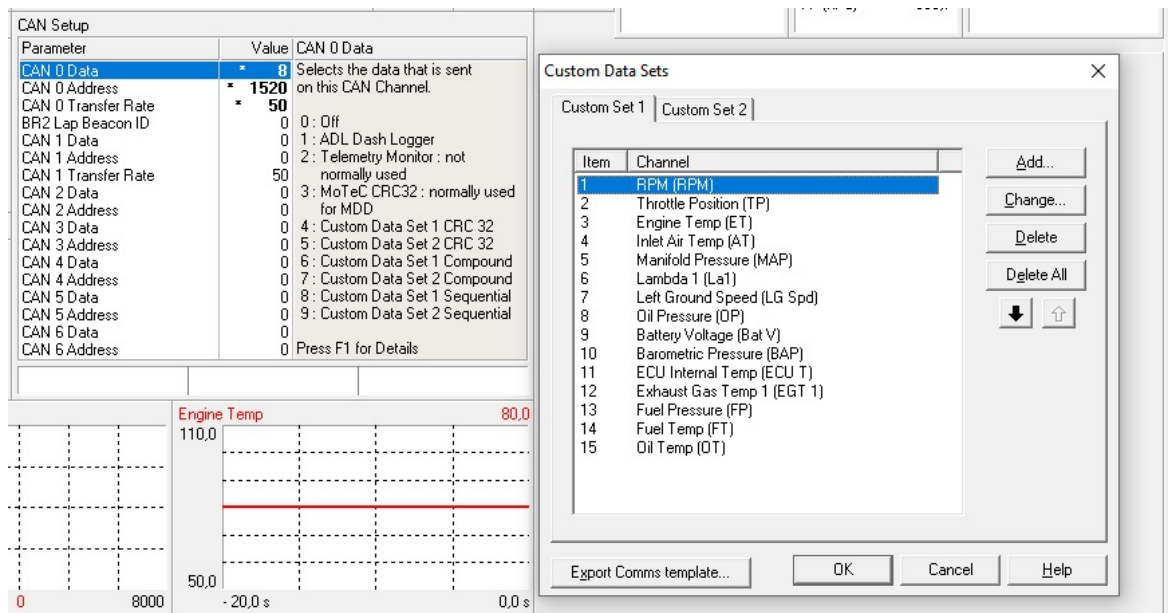- **Speed: 1 Mb/s**
- **Mode: DTA S series (CAN) (or MaxxECU(CAN) from firmware version 1.29 onwards)**

In the MaxxECU, go to CAN Bus / CAN Settings, and set the CAN bit rate to 1 Mbit. The data packets must be configured as shown in the images below:
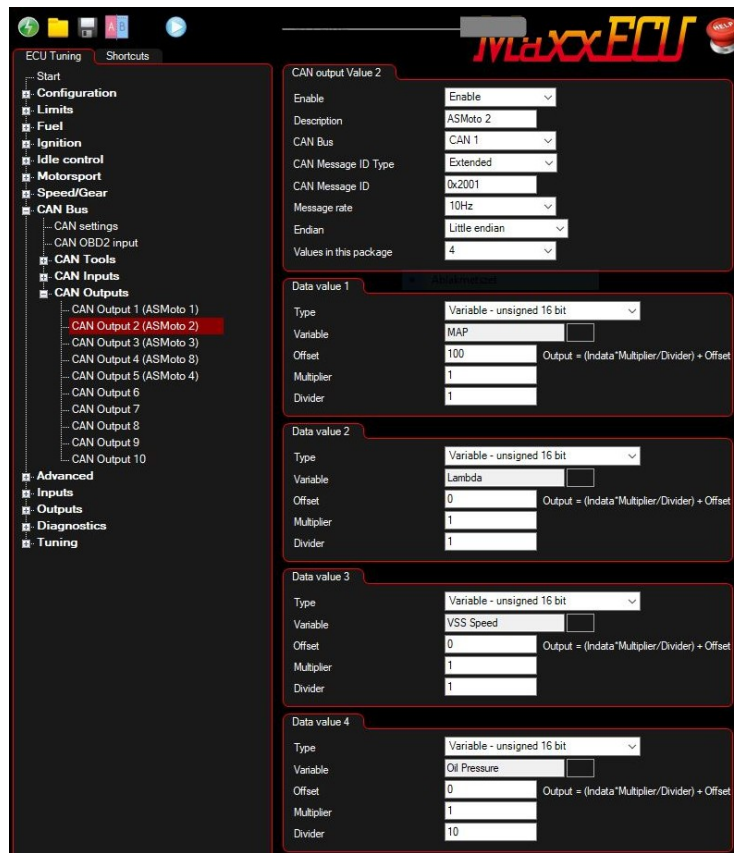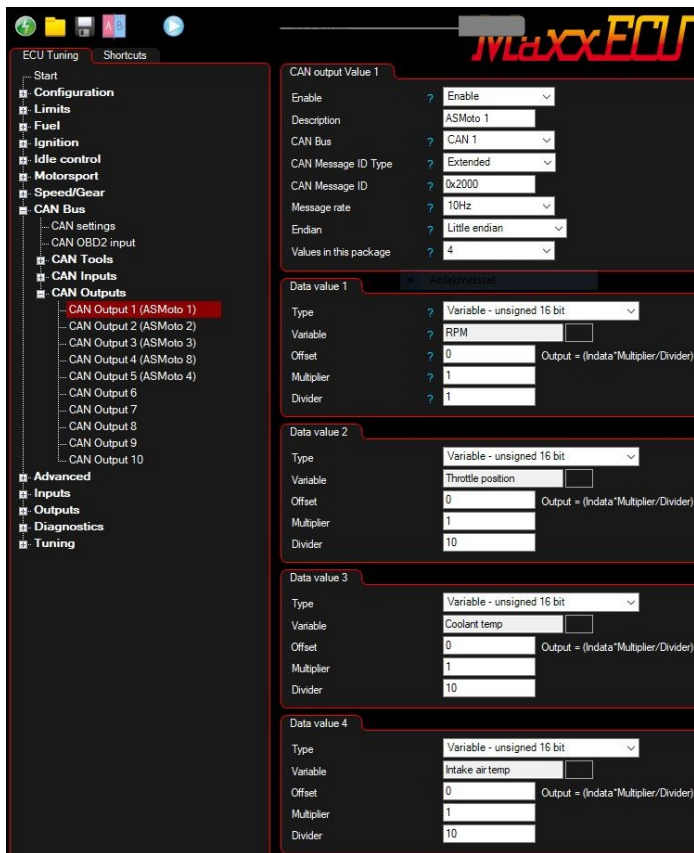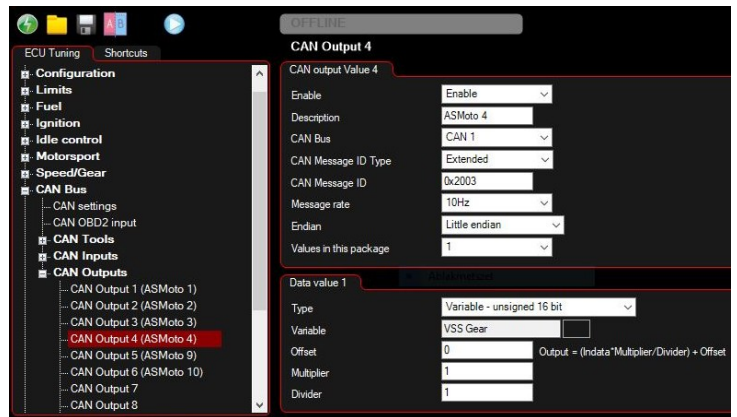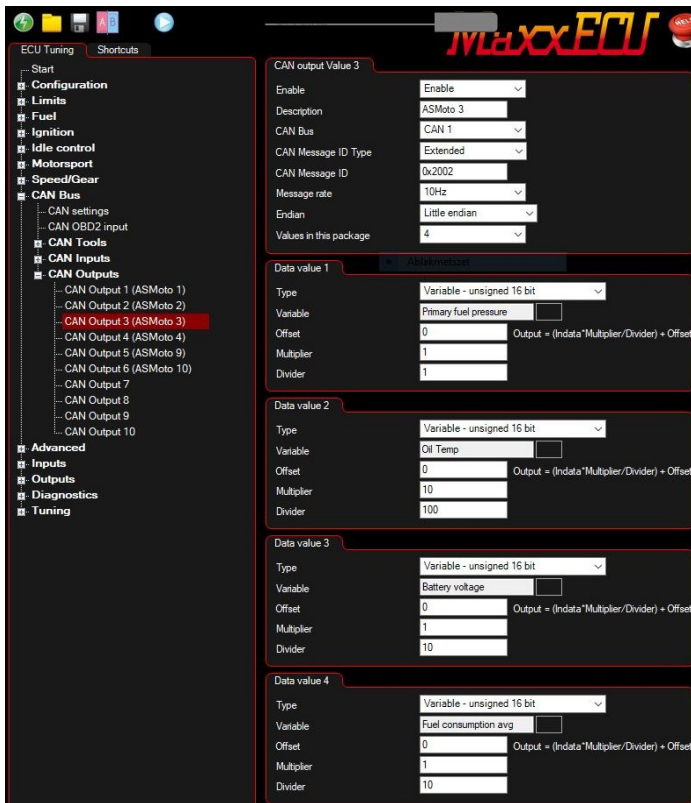
Example for MoTeC Custom Data Sets Setup:

5. Firmware Update:

5.1. Firmware Update:

The DashBoardTFT software is continuously being developed, with new features being added and bugs being fixed. Therefore, it is recommended to always update to the latest version. The update mode is activated when the display is completely dark. If the communication is interrupted for any reason, the process must be restarted. The update may take up to 15 minutes.

For more information, see:
https://asmoto.eu/online-help/?page=content/software-update.html

6. Installation:

6.1. When installing the DashBoardTFT, ensure that it is properly shaded from sunlight so that it remains easily readable under all conditions. Before installation, check the viewing angle to avoid issues with reflection and contrast. Use a dark, preferably matte black background.

The DashBoardTFT can be mounted at the back using three M5 screws.
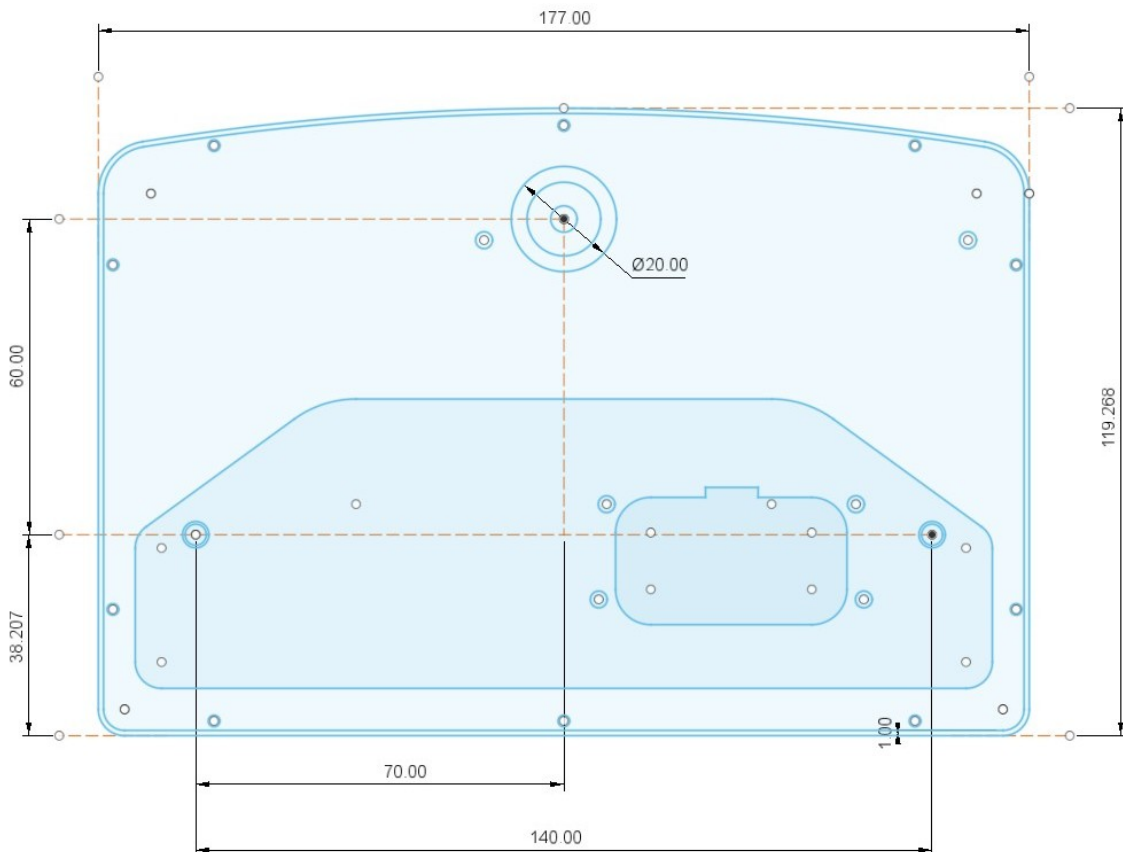
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If you find any grammatical, stylistic, technical, logical, or any other errors in the description, or if anything is unclear, please let us know by emailing us at info@asmoto.eu .

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