Freely Programmable dashboard for Racing Purposes

Installation / User Manual 1.6

General Features:

- **Massive, CNC – milled aluminum chassis**
- **CAN interface**
- **Compatibility with ASMoto ECU:**
  Display is separately configurable for 4 engine maps. Simple display of numerous data available from the ECU
- **Compatibility with other ECUs that are capable of AIM (RS232 19200,n,8,1) protocol data transfer**
- **6 calibratable analog and 2 digital sensor input for RPM and Vs (Vehicle speed)**
- **Contains in-built the most important dashboard indicator lamps.**
- **Customizable and acknowledgeable warning with parallel monitoring of 12 channels, independently from the displayed data (Warning)**
- **Lap time measurement, 8 lap memory-recorded lap time register, displayable current lap, best lap, previous lap, average lap times**
- **Transmission gear recognition**
- **Customizable shift lamp control with default values programmable by each gearshift**
- **Flash memory. 100000 deletion/programming cycles**
- **Graphical User interface, with continuously developed free firmware, simple electric wiring**

The second generation DashBoard LED instrument cluster was expanded with a multitude of new features. Thanks to the LED technology the display has a higher level of contrast so the most important information among all conditions can be read even without direct glance. Brightness of each segment can be separately programmed or switched off.

The display is separately configurable for 4 different engine maps and numerous data available from the ECU can be displayed through CAN bus, without the need to install new wiring to the instrument panel. There is possibility for example for the graphic display of rev meter, water temperature, fuel level, speed and gear position and usage of shift lamp. Apart from the CAN bus a further 6+2 input is available, which are configurable, for example for oil pressure, oil temperature, fuel level or other analog signal.

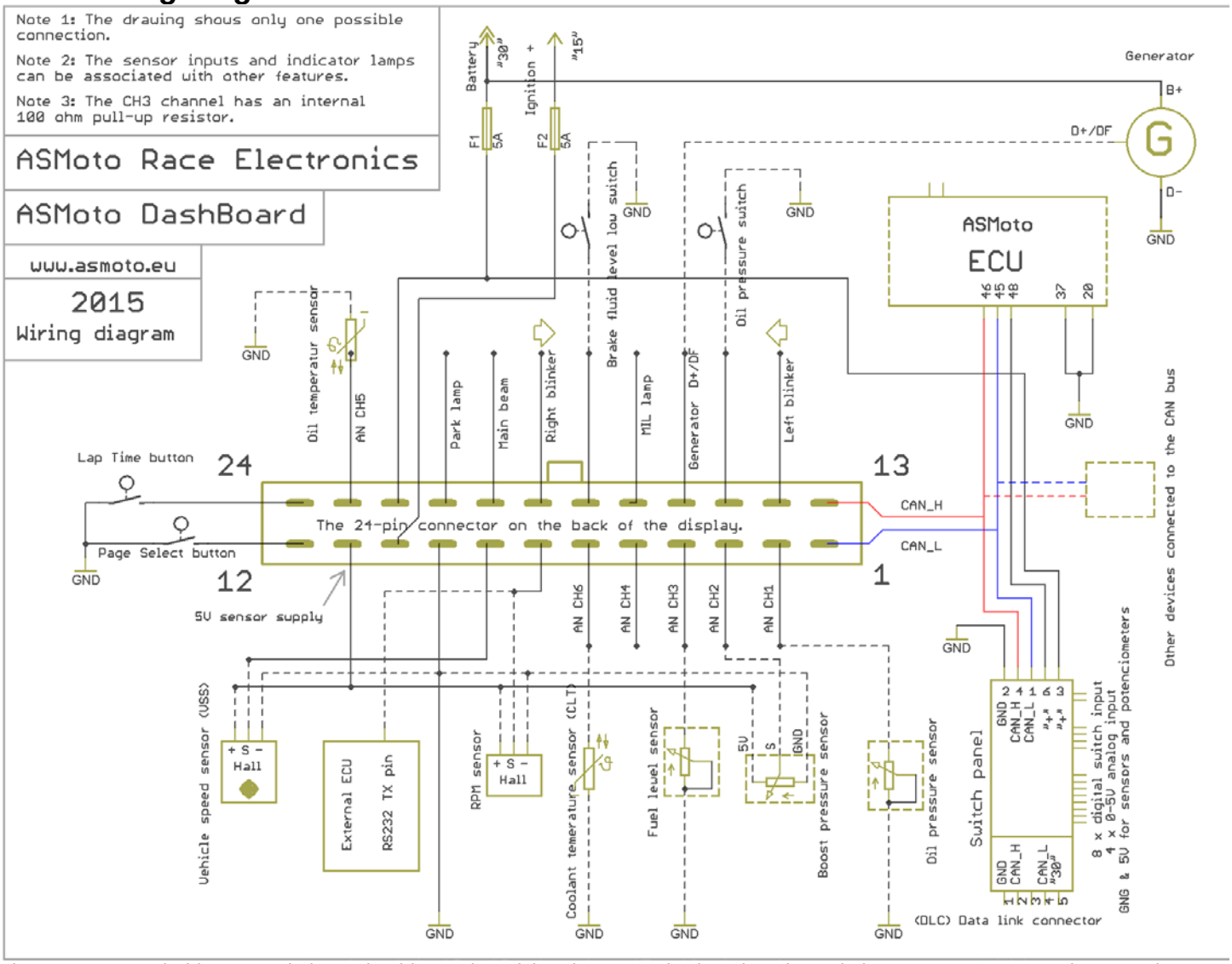
The driver can be instantly alerted on problems affecting the car through 12 channel configurable warnings.

On the top of these it contains the general dashboard indicators which can be used for other purposes, but by default it indicates: charge, oil pressure, position lights or dimmed headlights, high beam, direction indicators, brake fluid level indicator. Under the LED display can be found a two row LCD on which further configurable data (even 3data x 2page x 4MAP = 24 data) can be displayed. The LED displays can be ordered in unique colors.

2. Technical details:

Electrical:	Min.:	Norm.:	Max.:	Unit:
Supply voltage:	8	14	20	V
Standby power: (without sensors, in case of 12V)	200	300	400	mA
Load on output of „11 pin" sensors + 4,5V supply	-	-	100	mA
Voltage range of analog inputs: (for normal operation use)	0	0,1-4,9	5	V
Voltage range of analog inputs: (without permanent damage)	-20	0,1-4,9	20	V
Mechanical:	**Min.:**	**Norm.:**	**Max.:**	**Unit:**
Width:		175		mm
Length: (without connector)		37.5		mm
Height:		127.3		mm
Mass:		700		g
Usage conditions:	**Min.:**	**Norm.:**	**Max.:**	**Unit:**
Operational temperature:	-30	-	70	°C
Storage temperature:	-40	-	90	°C

3. Wiring diagram:



Picture no. 3.10. (A bigger resolution, printable version of the picture can be found on the website www.asmoto.eu under menu item titled Download)

3.2. Pin-out of the DashBoard 24 pin connector:

Pin:	Name/function:	Description:
1	CAN L	CAN Bus Low
2	AN1 CH1	Analog input with 4.7kΩ Pull-up to 5V
3	AN2 CH2	Analog input with 4.7kΩ Pull-up to 5V
4	AN3 CH3 fuel level	Analog input with 100Ω Pull-up to 5V
5	AN4 CH4	Analog input with 4.7kΩ Pull-up to 5V
6	AN6 CH6	Analog input with 4.7kΩ Pull-up to 5V
7	D IN RPM signal, or RS232 RX signal input for Ext. ECU	Digital input with 1kΩ / 4.7kΩ Pull-down to GND
8	D IN Speed	Digital input with 4.7kΩ Pull-up to 5V
9	GND	
10	Ignition + (15th pin)	
11	+5V output for power supply of the sensors (max: 80mA)	
12	Page Select button	Digital input with 10kΩ Pull-up to 5V
13	CAN H	CAN Bus High
14	Left direction indicator	
15	Oil pressure switch	
16	Generator indicator/ charge indicator	33ohm -> Ignition+ 10pin
17	MIL (Malfunction Indicator Lamp)	
18	Low brake fluid level indicator	
19	Left direction indicator	
20	High beam indicator	
21	Position lights or dimmed headlights indicator	
22	Permanent + power supply (30th pin)	-
23	AN5 CH5	Analog input with 4.7kΩ Pull-up to 5V
24	Lap Time button	Digital input with 10kΩ Pull-up to 5V

4. Operation:

4.1. MAP select, page select:

The DashBoard contains 4 MAPs through which it can be configured in completely different ways. ([A.Map:] 1-4) Different data can be displayed, different brightness can be set, also e.g. the shift-lamp can be configured differently.

The 4 MAPs are selectable in two different ways:

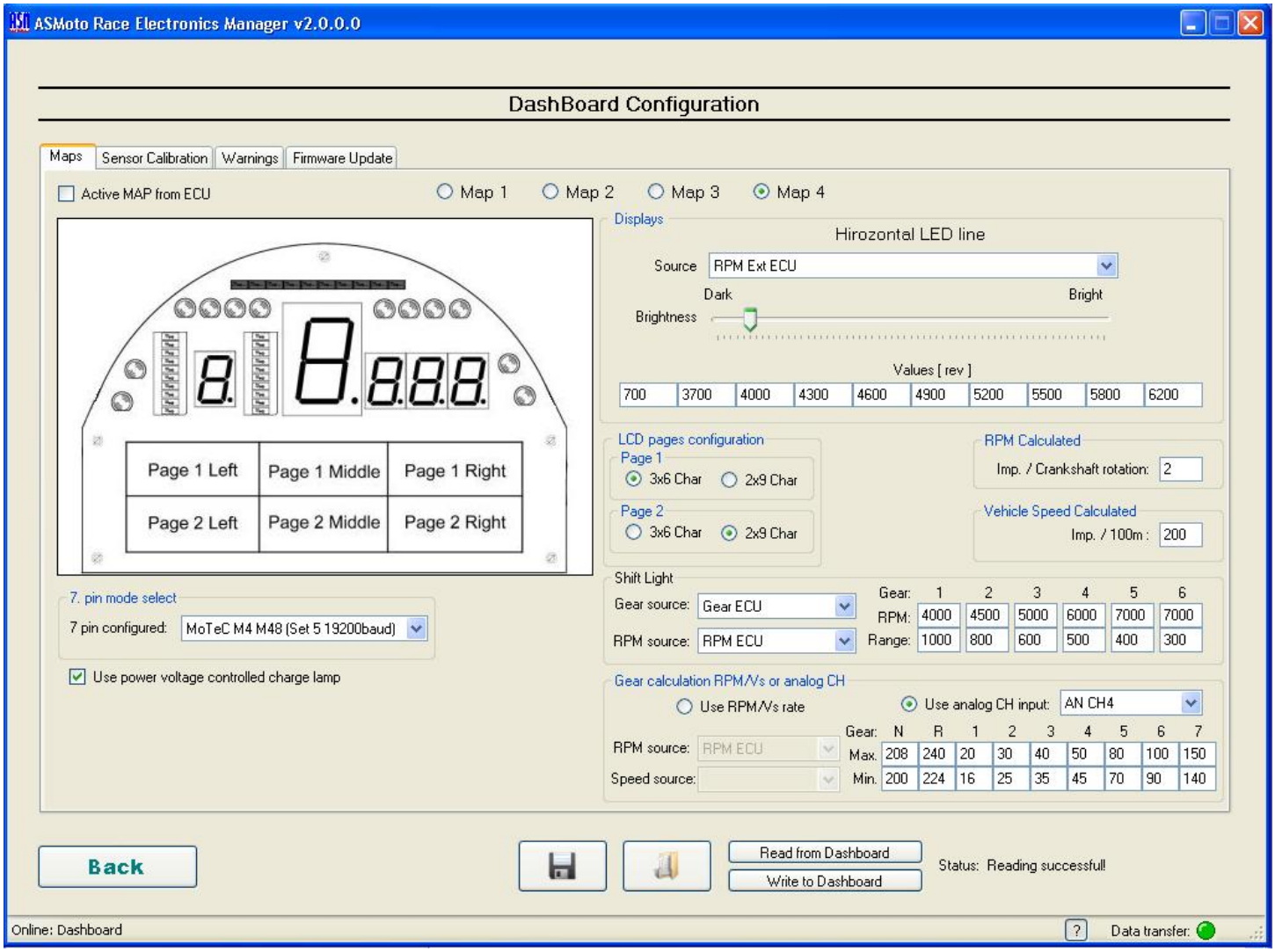
1. **Putting a tick mark in the tick box at 'Active MAP from ECU' the Active MAP [A.Map:] automatically changes together with the ECU's currently selected MAP [A.M:E:] (of course this feature requires CAN connection with the ECU)**
2. **In case the tick mark is removed, the [A.Map:] DashBoard MAP [A.M:D:] will be followed, which we can increment from 1 to 4 with the 3 second pushdown of the Page Select button.**

Besides of these we can step between two pages in the 4 MAPs on the LCD with the short pushdown of the Page Select button. This way only on the LCD up to 3data x 2page x 4MAP = 24 data can be made available.

In default mode, with the pressing and holding of the two buttons at the same time, the daily counter can be deleted (Trip).

From the dropdown menus the variable to be displayed on the given display in case of given MAP (in case of LCD even the given page) is selectable.
Variables ending with …_ECU are arriving through CAN from the ASMoto ECU.
Those ending with …_Ext_ECU are arriving from other manufacturers ECU on the RS232 –n (pin7).
Data ending with …_TC are arriving through CAN from the ASMoto TractionControl.

Attention!
In the „Source" dropdown menus (in case of Maps and Warning) we should pay attention to the origin of the chosen variables (where the to-be-displayed variables are arriving from). At the end of the setup check all displayed data!



After clicking on the display, on the picture's left side, we can select the variable to be displayed and in case of LED display the brightness. In case of 10 piece LED-line we can select the values where LEDs light up can be set. The two vertical LED lines upper two LEDs are always lit for the purpose of better readability.

The lower LCD display's both pages are optionally selectable, can be 3x6 or 2x9 grid. In case of 2x9 grid only 2 variables is displayed, but those can be longer (9 characters) like e.g.: lap-time.

If we put a tick mark to „Use power voltage controlled charge lamp" than the charge indicator lamp will not only light up because of the 16pin generator feedback input, but also when the supply power is under 13V for longer than 1 sec.

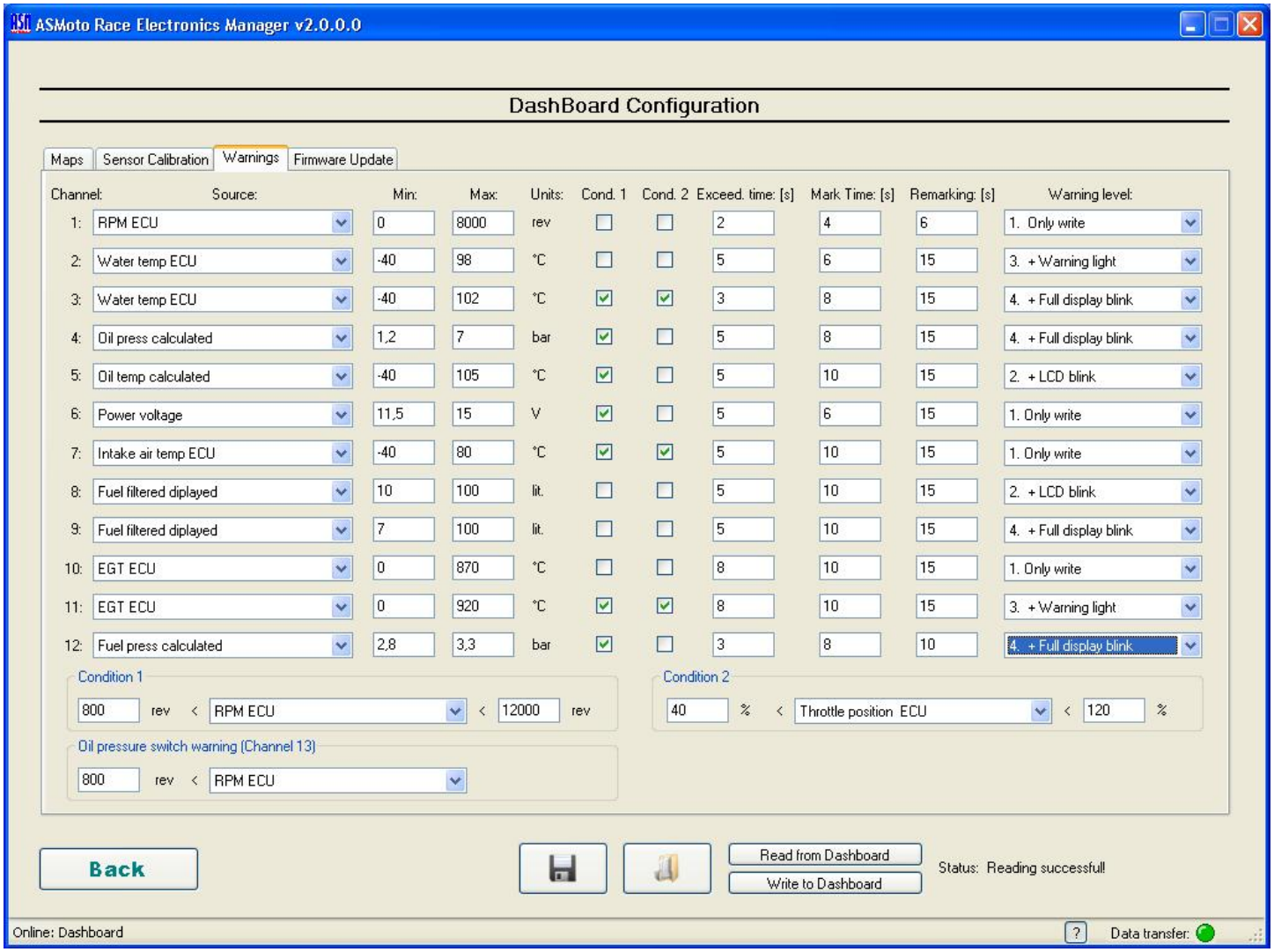
4.2. Warning:

The DashBoard 12, optional variables, can alert in different ways, in case of threshold crossing of upper- or lower limits set these variables.
We can choose from 4 warning levels:
1 level: only write Only displays text on threshold crossing
2 level: +backlight blink Text display with blinking background
3 level: +warning lamp Text display with blinking background and warning lamp
4 level: +full blink Text display with full display blinking and warning lamp

2 conditions can be tied to all 12 channels (Condition 1 - 2). In case we tie a condition to a channel then on that channel we only have warning if the condition is met. In case we tie two conditions both conditions have to be met.

This way it can be prevented that there is e.g. a warning because of low oil pressure at a standing engine.

The 13th warning channel monitors the oil pressure switch and if it would warn above the set RPM we can have the whole display blinking.



Source: A condition on the lower (min) and upper (max) limits can be set for the chosen variable for the warning.

Min-max: Crossing these thresholds triggers a warning. (In case set conditions are met and „Exceed. time" parameter was exceeded)

Units: measuring unit.

Exceed. time [s]:
Setting of the time duration in seconds for which the lower and upper values (conditions) will be exceeded to trigger a warning.

Mark time [s]:
Duration of the warning can be set, expressed in seconds.

Remarking [s]:
Can be set in seconds how long the system should wait to trigger a warning again (only in case the condition is still met)

All warning alert can be acknowledged with the Page select button, 2 seconds after the appearance of the warning on the display. (The 2 second delay is necessary to prevent accidental acknowledgement of warnings). In this case the given warning will not alert again until the condition that triggered the warning is not met anymore and then met again, or after the switching off and on of the Dashboard.

4.3. Lap time:

The DashBoard is equipped with an 8 lap memory-recorded lap time register. Every impulse arriving to the Lap time (24pin) input the ActLapNumber [ActLaN] variable is increased with one and this shows in which lap we are. The photocell or the transponder can be wired here. Time of the current lap can be seen at the [ActLap]. As a result of the impulse it is saved to the memory. After the 8th lap the 1st gets overwritten.

With pressing and holding the Lap time button for 3 seconds the previous 8 lap's time, best lap, average lap-time and total lap-time can be displayed on the LCD. In this case the ActLapNumber will not increase as a result of the impulses and page change is not possible, but we can switch between the lap times up and down with the two buttons. With the parallel 2 second holding of the two buttons we can delete the lap-time memory. With the holding of the Lap time button for 3 seconds we can exit the lap-time memory display.

4.4. Shift lamp:

The DashBoard offers several different opportunities for indication of gearshifts. With choosing the RPM... variable to the upper horizontal scale it is configurable for all the 10 segments at which RPM they each should light up and for every gearshift we can set a value that will be a threshold and when crossed we can have the whole scale blinking together with the gearshift display.
For every gearshift the RPM at which blinking should start can be separately set. Similarly it can be selected that from which variable the DashBoard should calculate for this the gear and RPM.

4.5. Using the ASMoto CAN network:

In case of using together with the ASMoto ECU, the ECU send 13 data through CAN bus, (details in the ASMoto CAN protocol documentation) so wiring these separately to the instrument panel is not necessary. The DashBoard will send the measured values and the warning statuses trough CAN bus for example, to the DataLogger
Here are 3 examples:
[in square brackets the name as we can find it in the dropdown menu of the AREM]

- **Round per minute [RPM_ECU]**
- **Water temperature [Water_temp_ECU]**
- **Exhaust gas temperature [ECT_ECU]**

Besides of this of course there is possibility to use analog and 2 digital input, where further sensors can be wired, such as fuel-level, oil pressure, etc. These sensors need to be calibrated so that real values are shown on the displays.

4.6. ASMoto without a CAN network:

The sensors wired to the 6 analog input can be calibrated so the displayed value (e.g.: temperature, pressure) becomes easily readable. The two digital inputs are set up for accepting RPM and wheel speed data. It is possible to show data on the display using other ECUs.

4.6.1 Connecting with other ECUs communicating over serial port or CAN bus.

There is possibility to connect to the DashBoard an ECU capable to communicate through the RS232 serial port according to the AIM protocol (19200,n,8,1). In this case the TX connector of the ECU has to be connected to the 7th pin of DashBoard and after selecting the variables ending with …Ext ECU we can already see the data sent by the ECU.

Attention!

In the case in which DashBoard is connected over CAN bus to other than ASMoto ECU (e.g. LifeRacing, Syvecs, DTA):

1.: None of ASMoto Products can be connected to the CAN bus, because of the difference in speed and protocol.
2.: Because the 120 Ohm CAN closing resistors are equipped only on the ECU and SwitchPanel, at least 1 closing resistor should be connected to the CAN bus.
3.: If ASMoto Interface is used to communicate with DashBoard, then first the ECU should be disconnected and then the ignition switch should be turned on, while Holding the Page Select button.
Then DashBoard will communicate through ASMoto Protocol, independently from the Communication settings, until the ignition switch is turned off.
(This disconnection is can be made with a two-way switch, which is connected to either the ECU or the Diagnostic connector.)

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

4.7. Calibration of Sensors:

1. **Select the ANx input where the sensor which is desired to be calibrated was wired. (Channels)**
2. **Choose the variable in which we would like to see the result (Source)**
3. **Generate the lowest and highest values which we would like to measure with the sensor (in case of temperature sensor heat it up and cool it down), and write these two A/D values to the two ends of the A/D value range. (The software interpolating between the two values fills in the upper table).**
4. **Create values again as possible, which are on the upper A/D range and write below all values the corresponding quantities (in case of temperature sensor, the temperature expressed in C°).**
5. **With the *Write to Dashboard* button we can write all set parameters (Maps, Sensor Calibration, Warnings) into the Dash.**

4.8. Transmission gear recognition / Gear sensor calibration:

4.8.1 In case we have power level proportionate to the gear position from the transmission wire it to any of the analog inputs (CH1-CH6) .
For this choose *„Use analog CH input:”*, and besides select the AN CH x channel which the sensor is wired to. Display this AN CH x value on any of the displays, then shifting the gear to each position one after another determine and write in the min and max values.

4.8.2 In case there is no signal available for the gearshift position the DashBoard can deduce it from the proportion of the RPM and the speed. (*Use RPM/Vs rate*)
For this we have to choose the source of RPM and speed information, namely, the variables to be used for the calculation, then write the *„RPM Vs Ratio”* value on any of the displays and driving with all gearshift positions determine and write in the min and max values.

5. Firmware update:

5.1. Firmware update:

The firmware of DashBoard is continuously updated, new functions are introduced, problems are debugged, therefore it is important to always update to the newest version. The update mode is shown by a black screen (only the LCD backlight is blinking). While updating the red warning is blinking showing that the update is being completed. In the case when the communication or the blinking ceases, the process should be restarted from the beginning. The update can take up to 15 minutes.

5.2. Service:

A service interval can be configured between the values of 1-30000km, which (dependent on speed signal) counts backwards to a maximum of 40km. The valuable named Sensor displays the remaining kilometers.

5.3. Demo Control:

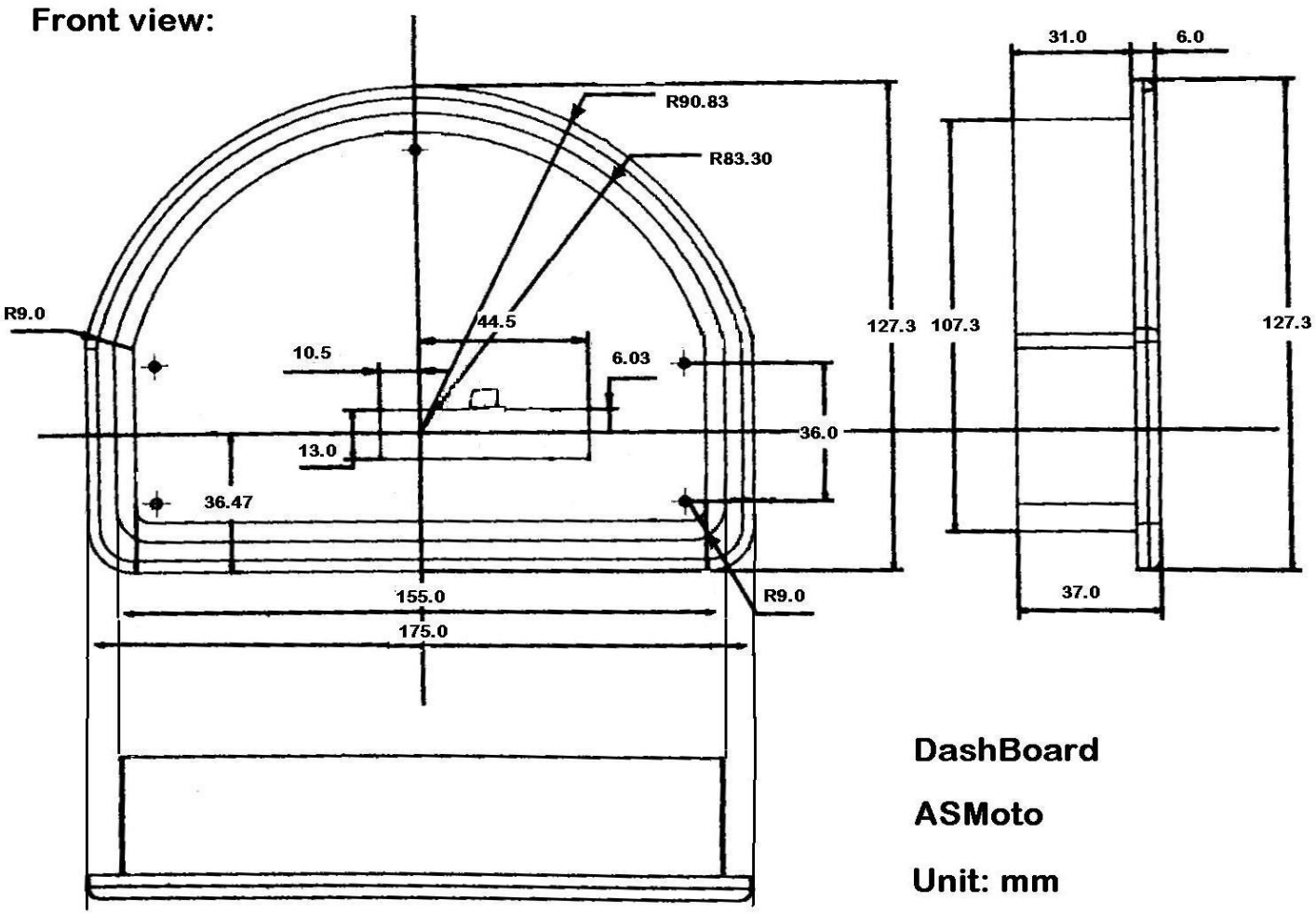
DashBoard can be password protected, which can prevent the writing of DashBoard, thus the changing of the settings.
The protection does not affect the reading of the values. The password has to be made out of 4 digits, if the password is “0000” then the protection is turned off, therefore DashBoard can be written.

5.4. LCD contrast:

From the hardware version 2.09 because of the variable color LCD, the LCD contrast can be adjusted. In the drop down menu the selected value (in case of online DashBoard) is immediately applied, and stored at the next ignition switch turn off in to the memory of DashBoard.

6. Installation:

6.1. **When installing the DashBoard make sure to properly shadow it from the sun so that among every condition it can be easily read. Check before installation the viewing angle to avoid reflection and contrast problems. Use dark or matte background if possible.**



Further information:	**www.asmoto.eu** / info@asmoto.eu
Author: ASMoto Team	

In case You find any grammatical, stylistically, professional, logical or other type of mistake in current manual or in case we did not phrase something unambiguously please notify us at the info@asmoto.eu e-mail address.