



# **Modle Eco-Drive Advisor EDA01**

## **OPERATING MANUAL**

- Description
- Functionality
- Configuration software



**QUASAR ELECTRONICS**  
**Cieslewskich 25K Street**  
**03-017 Warsaw, Poland**  
**phone +48 22 4273141÷43**

**[www.quasarelectronics.pl](http://www.quasarelectronics.pl)**  
**[biuro@quasarelectronics.pl](mailto:biuro@quasarelectronics.pl)**

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## Device description

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Eco-Drive Advisor (in brief: EDA) is a device that supports Driver in applying best practices, ecological and economical driving. Module continuously analyse a momentary operating parameters read from CAN-Bus vehicle and using display (which is available three versions: [basic](#), [standard](#) and [extended](#)) and sound signal communicates current "eco-status" with suggestions/warnings for Driver.

The following operating parameters are used by device:

- speed of vehicle;
- engine speed;
- usage of acceleration pedal;
- usage of break pedal;
- torque;
- fuel consumption;
- overloading (built-in accelerometer).

Module is available in two versions:

- „[EDA01](#)” – full functionality (analysis of all parameters, active all signal outputs, possible calibration for each ratio of gear box);
- „[EDA01-Basic](#)” – limited/budget version (analysis of selected parameters, active one signal output, without calibration each ratio of gear box - only general settings of the engine speed).

This device also can to [cooperate with GPS transmitter](#) (eg. QRT02 Quasar Electronics - as well as third party after implementation of the protocol) for recording and transmitting specific parameters driving style to the monitoring system for further detailed analysis and periodic reports.

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## Assembly kit content

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The complete set of EDA01 module includes:

- Main module – available versions:
  - „[EDA01-Basic](#)” (with basic functionality);
  - „[EDA01](#)” (with full functionality);
- Cable harness with 8-pin connector (power supply, CAN-Bus, input/outputs);
- Display (according to choosen version):
  - "EDA01-Basic" - [basic](#) version;
  - "EDA01" - version [standard](#) or [expanded](#).

Optionally for [configuration/programinng module](#) is needed (this is optionally equipment):

- Bootloader USB;
- Dedicated cable harness bootloader's for module EDA01.

## Basic characteristics

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### Interfaces/connections:

- Power supply of device (from installation of vehicle);
- CAN-Bus – support the FMS standard and proprietary protocols vehicle manufacturers;
- 1 analog input (ignition);
- 2 analog outputs (type: OC);
- 1 analog output (type:  $V_{level}$ );
- Display connector RJ45;
- UART – device configuration and also communication with GPS transmitter;
- Power supply for mode „Configuration off-line”;

### Special functions:

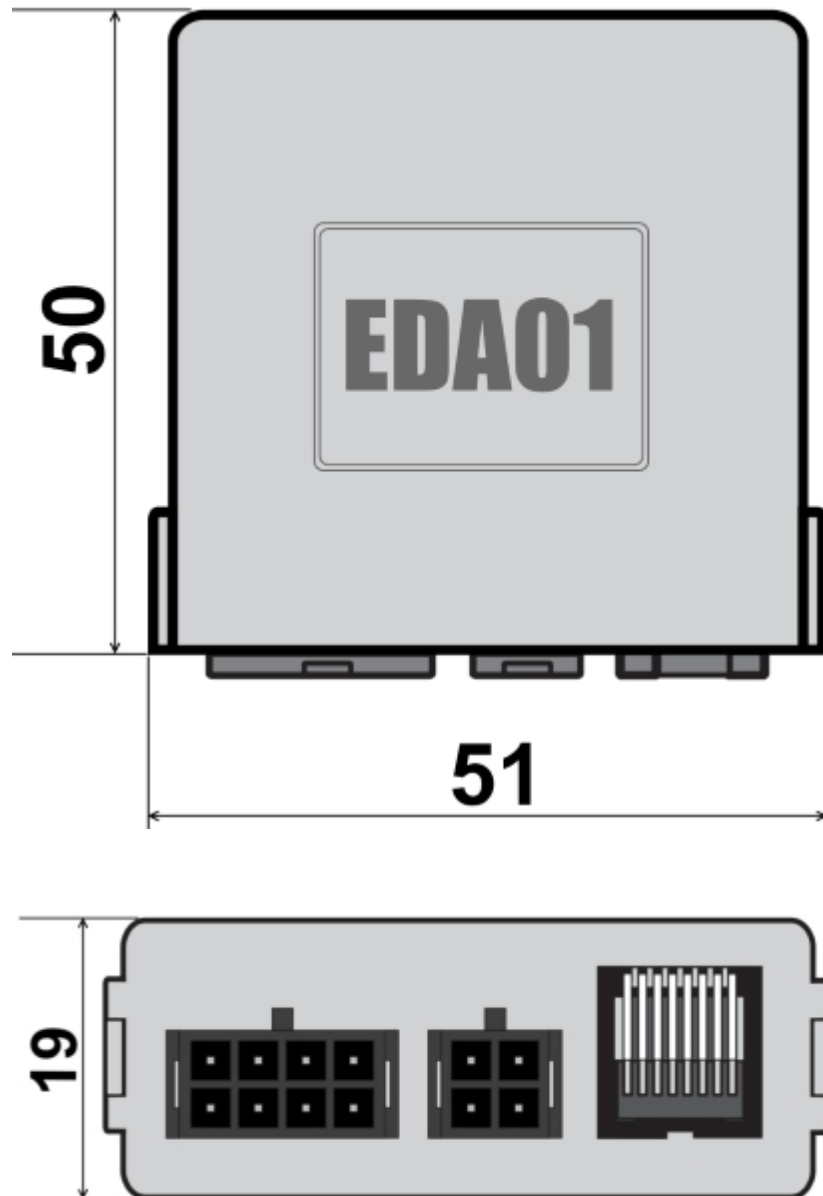
- Configuring parameters (*required MCB-Bootloader with dedicated cable harness*);
- Possible cooperation with systems of GPS monitoring (external companies);
- Ability to complete configuration without connecting to the vehicle installation;
- Light sensor built into display (display version: standard or expanded);
- Beeper built into display (display version: standard or expanded);
- Reading data from CAN-Bus of various vehicle manufacturers;

### Technical parameters:

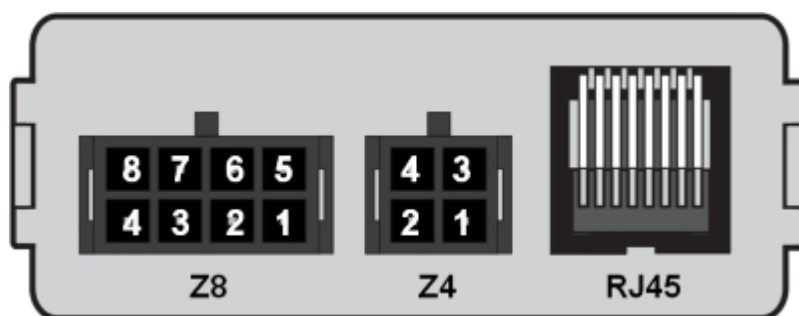
- Nominal supply voltage 12/24V;
- Allowed range of supply voltage: 8-36V;
- Ambient humidity during operation: <90%;
- Max. current for outputs type OC: 100mA;
- Max. current for output type  $V_{level}$ : 10mA;
- Power consumption in standby mode (when engine off): <2mA;
- Power consumption in operation mode (average – display version: simple): 10mA;
- Operating temperature range: from -30°C to 80 °C;
- International Protection Rating: IP40;
- Device weight (without harness nor display): 40g;
- Dimensions: 51 x 50 x 19 mm;

## Construction and equipment

### Dimensions of main unit



## Sockets and connections

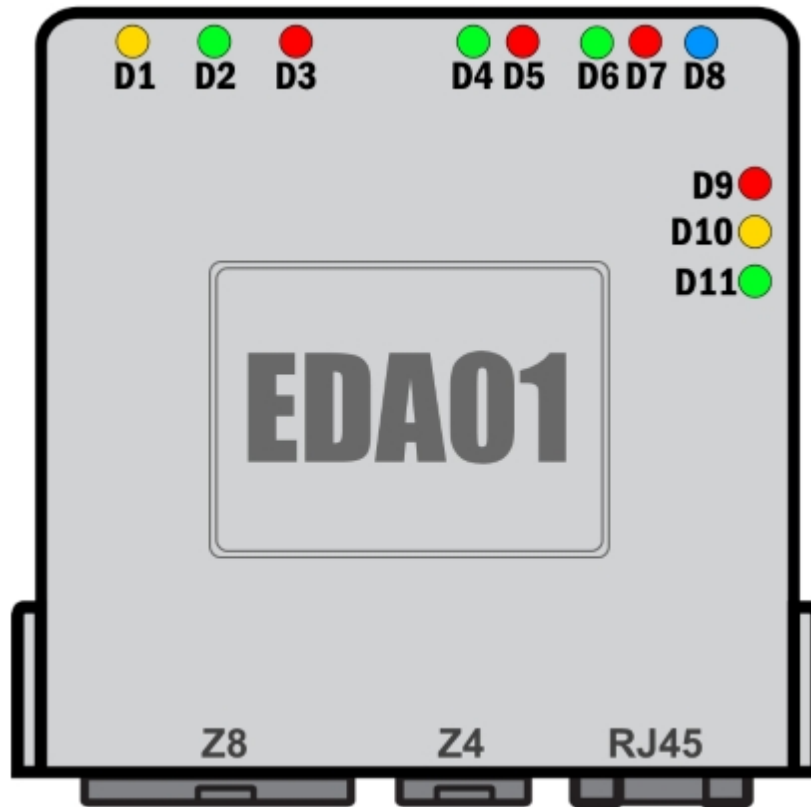


Connector	Name	Description
Z8-1	CAN-H	Differential input of CAN-Bus - High
Z8-2	CAN-L	Differential input of CAN-Bus - Low
Z8-3	IGNITION	Input: indication to connect the vehicle ignition
Z8-4	GND	Power supply ground
Z8-5	OUT_SPEED_LIMIT	Output: Exceeding the speed limit MAX (OC type, ground active)
Z8-6	OUT_ECO_ALARM	Output: ECO alarm (OC type, ground active)
Z8-7	OUT_ECO_LEVEL	Output (voltage level): ECO level (5V=ECO OK.; 0V=ECO Alarm; step of 0,5V)
Z8-8	+Vcc	Permanent power supply with the vehicle installation
Z4-1	+Vcc_BOOTLOADER	Power supply by Bootloader (programming „off-line”); Reboot module
Z4-2	GND	Power supply ground
Z4-3	UART_TX_EXT	Output for communication UART (TX)
Z4-4	UART_RX_EXT	Output for communication UART (RX)
RJ45	DISPLAY	Output (8-pin): display connection

## LED in main unit

Main unit EDA01 is equipped with LEDs which are mounted on the base plate of the module and are visible through semitransparent housing. It is intended to facilitate the verification of the main functions of the module during installation as well as visualization of the actual operating status, eg. on the failure of the main display.

Below is schematically illustrated unit EDA01 in top view with the description all LED indicators and a table with descriptions of the status of each of the LEDs.



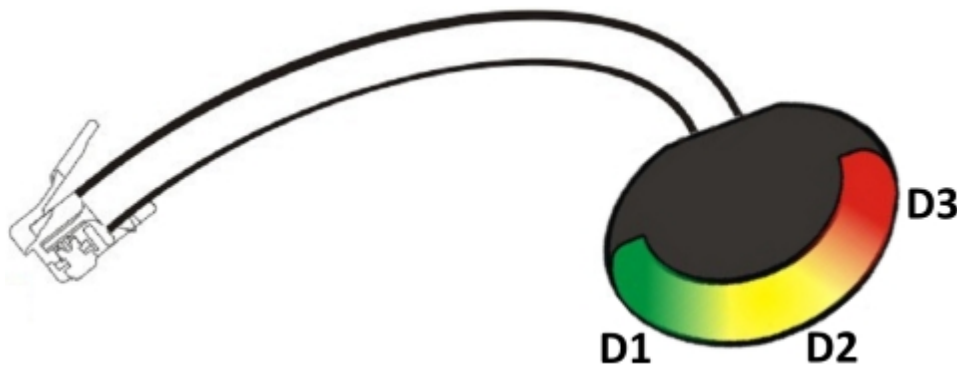
LED	Colour - state	Description
D1	Yellow - light	Status: Ignition of the vehicle - ON;
D2	Green - light	Status: Properly connection to the CAN-Bus of the vehicle;
D3	Red - blink	Indication transmission data from the CAN-Bus of the vehicle;
D4	Green - blink	Indication transmission (D4 – RX / D5 – TX) of data by UART (communication with Bootloader or with transmitter QRT02);
D5	Red - blink	
D6	Green - blink	Indication transmission (D6 – RX / D7 – TX) data with display;
D7	Red - blink	
D8	Blue - light	Work of module EDA01;
D9	Red	Emulation of basic display - displays the status of the ECO in accordance with the current configuration, it works regardless of the type of connected display;
D10	Yellow	
D11	Green	

## Display versions

Are available three versions of displays according to device version:

- for version "EDA01-Basic" - display: [basic version](#);
- for version "EDA01" - displays: [standard version](#) or [expanded version](#) (with detailed descriptions of [alarms codes](#)).

## Display for basic version



The LEDs on this display light up in sequence: green - yellow - red. The LEDs lights up "incrementally", ie. the next LED lights up after the previous. This means that eg. lighting up of the red LED is only when both other LEDs are lights.

Signaling of information by the display elements:

LED	Status	Description
All	Don't light	Device is switched off;
D1 green	Light	Device operates and the measured parameters are within the ECO;
D2 yellow	Blink ( <i>increasing frequency</i> )	Means the occurrence of at least one from the factors: <ul style="list-style-type: none"> <li>• It exceeded the threshold of ECO MAX for at least one of the parameters ECO (*);</li> <li>• It started the countdown for the minimum one of the parameters "delay" (*);</li> </ul> <i>The higher frequency of flashing this LED mean that the threshold value (or time) is the more exceeded and is approaching to the ALARM - up to continuous lighting.</i>
D3 red	Lights up	At least one of the parameters exceeded the threshold of ALARM; <i>Note: exceeding the parameter "dynamics of pressing the accelerator pedal" immediately indicates ALARM and lights all LEDs (*).</i>

(\*) description of [parameters](#) and [programming/configuring](#)



## Display for standard version



The LEDs on this display light up in sequence: from left to right. This means that eg. lighting up of the red LED D5 is only when all other LEDs from left are lights.

Display is equipped with buzzer, which generates:

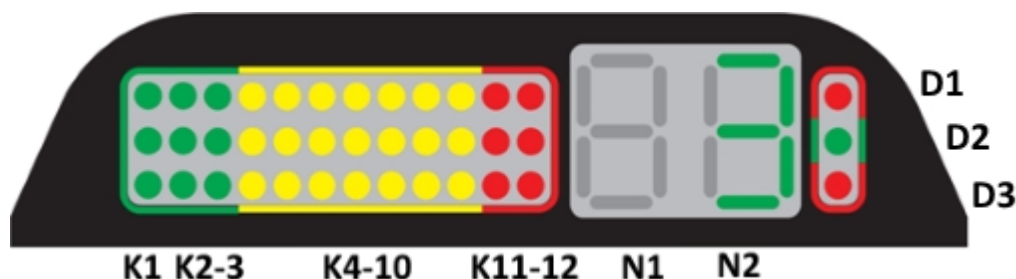
- continuous signal – Alarm – at the same time with LED D5 (red);
- pulse signals – proportionally to the counting of the parameter "delay". (\*)

Signaling of information by the display elements:

LED	Status	Description
All	Don't light	Device is switched off;
D1 green	Light	Device operates and the measured parameters are within the ECO;
D2 green	Light up	Means the occurrence of at least one from the factors: <ul style="list-style-type: none"> <li>• It exceeded the threshold of ECO MAX for at least one of the parameters ECO (*);</li> <li>• It started the countdown for the minimum one of the parameters "delay" (*);</li> </ul>
D3 i D4 yellow	Light up sequentially	Means "continuation/increase" described above conditions and thereby "the approach" of parameter(s) to the ALARM value (*);
D5 red	Light up	At least one of the parameters exceeded the threshold of ALARM; <i>Note: exceeding the parameter "dynamics of pressing the accelerator pedal" immediately indicates ALARM and lights all LEDs (*).</i>

(\*) description of [parameters](#) and [programming/configuring](#)

## Display for expanded version



Display for extended version is composed of three separate sections presenting individual information:

- 1) left part – line of LED consists of 12 columns (marked K1 – K12) in the three colors presents an "ECO-level";
- 2) numeric field (two character) in the central part (marked N1 - N2) - presents (alternatively) two info:
  - without ECO alarm [N1 don't light] N2 means the calculated number of the currently used gear box ratio;
  - when is ECO alarm [N1="A"] N2 means code of ECO alarm (according to [the table](#)).
- 3) right part – three LEDs (marked D1 – D3) – presents suggestions to change the gear box ratio.

Display is equipped with buzzer, which generates:












- continuous signal – Alarm – at the same time with a LED D5 (red);
- pulse signals – proportionally to the counting of the parameter "delay". (\*)

Signaling of information by the display elements:

LED	Status	Description
All	Don't light	Device is switched off;
K1 green	Light	Device operates and the measured parameters are within the ECO;
K2-3 green	Light up sequentially	Means the occurrence of at least one from the factors: <ul style="list-style-type: none"> <li>• It exceeded the threshold of ECO MAX for at least one of the parameters ECO (*);</li> <li>• It started the countdown for the minimum one of the parameters "delay" (*);</li> </ul>
K4-10 yellow	Light up sequentially	Means "continuation/increase" described above conditions and thereby "the approach" of parameter(s) to the ALARM value (*)
K11-12 red	Light up	At least one of the parameters exceeded the threshold of ALARM; <i>Note: exceeding the parameter "dynamics of pressing the accelerator pedal" immediately indicates ALARM and lights all LEDs (*).</i>
N1-N2 green	Two digit	Detailed description of displayed informations in numeric field is in <a href="#">separate table</a> ; <i>Note: alternatively display can be orange or red.</i>
D1 red	Light up	Lighting up this LED (then LED D2-green turns off) means „suggest” to <u>upshift</u> [according to performed calibration of rotations (*)]; <i>More over, when gear ratio wasn't changed after finishing half-time (and later whole time) „Δ time” (*) is generated by buzzer signal („pik”);</i>
D2 green	Light	In time of driving informs about optimal [ie. according to performed calibration of rotations (*)] ratio of gear box; <i>This LED turns off, when D1 or D3 lights up;</i>
D3 red	Light up	Lighting up this LED (then LED D2-green turns off) means „suggest” to <u>downshift</u> [according to performed calibration of rotations (*)]; <i>More over, when gear ratio wasn't changed after finishing half-time (and later whole time) „Δ time” (*) is generated by buzzer signal („pik”);</i>

(\*) description [parameters](#) and [programming/configuring](#)

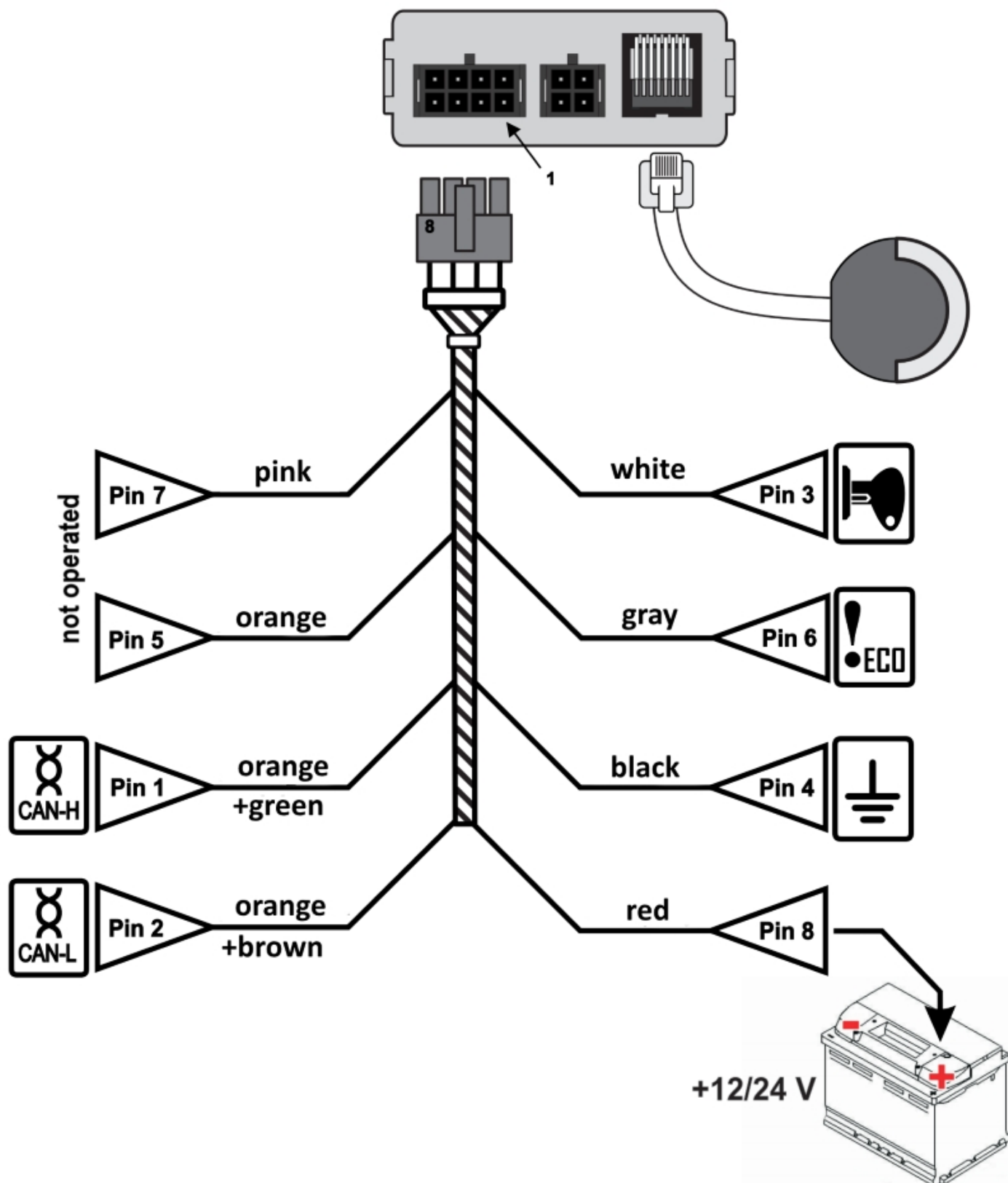
Detailed description of displayed information in numeric fields by expanded display:

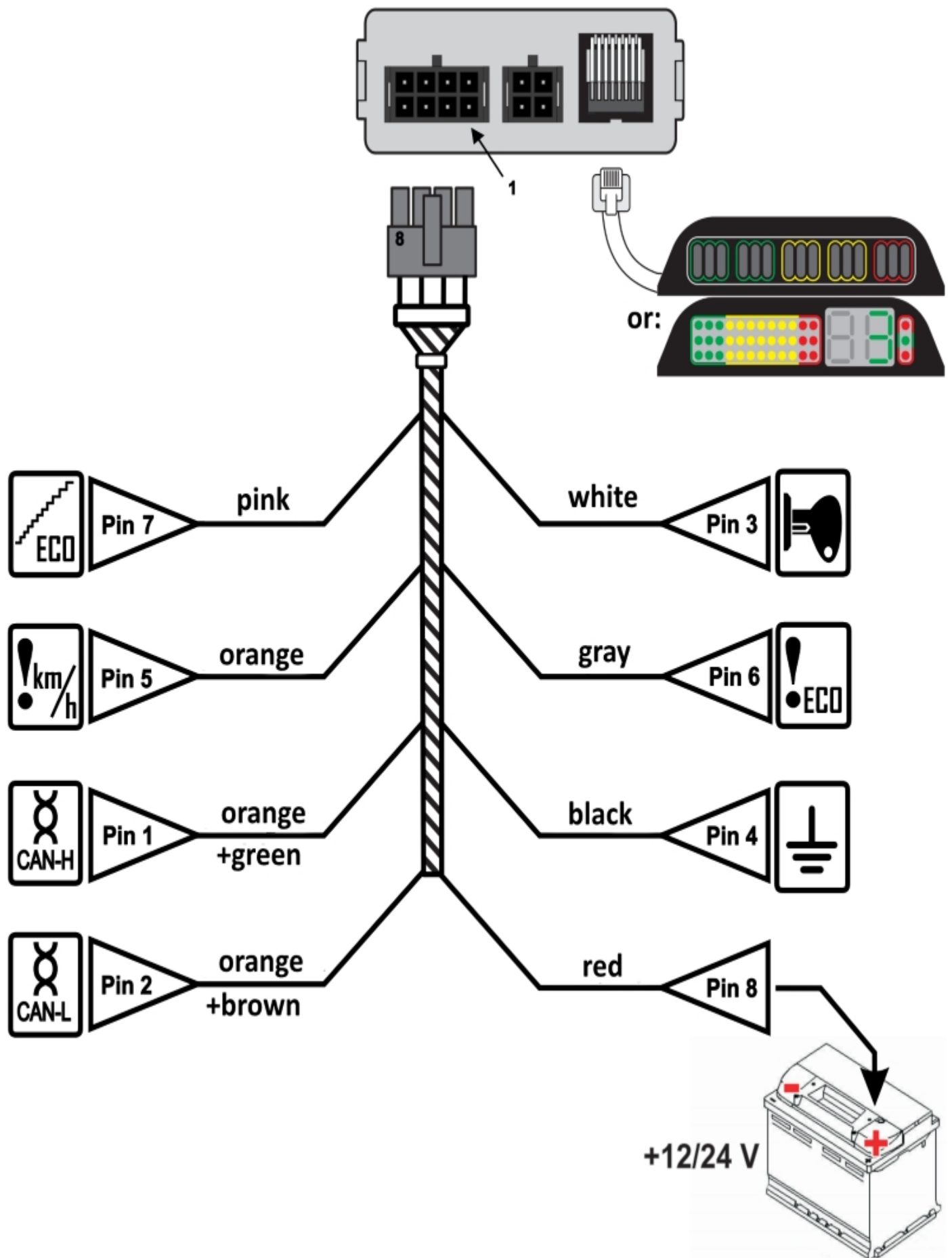
Fields N1-N2	Description
	While driving without ECO alarm signaling → displays the currently calculated gear box ratio (gear: from <b>1</b> up to <b>5/6</b> according to the configuration); <i>Note: gear box ratio is calculated on the basis of the performed calibration of rotations; in time of driving "in neutral" is displayed the recently used ratio of gear box (gear).</i>
	During stopping without ECO alarm signaling → detection of stop of the vehicle always displays „0”;
	At moment ECO alarm signalling → code <b>A1</b> : Exceeding the threshold "Alarm" by parameter <b>SPEED</b>
	At moment ECO alarm signalling → code <b>A2</b> : Exceeding the threshold "Alarm" by parameter <b>ENGINE BRAKING</b>
	At moment ECO alarm signalling → code <b>A3</b> : Exceeding the threshold "Alarm" by parameter <b>ENGINE RPM</b>
	At moment ECO alarm signalling → code <b>A4</b> : Exceeding the threshold "Alarm" by parameter <b>ENGINE TORQUE</b>
	At moment ECO alarm signalling → code <b>A5</b> : Exceeding the threshold "Alarm" by parameter <b>FUEL RATE</b>
	At moment ECO alarm signalling → code <b>A6</b> : Exceeding the threshold "Alarm" by parameter <b>ACCELERATION PEDAL</b>
	At moment ECO alarm signalling → code <b>A7</b> : Exceeding the threshold "Alarm" by parameter <b>Δ ACC PEDAL</b>
	At moment ECO alarm signalling → code <b>A8</b> : Exceeding the threshold "Alarm" by (one of) parameter <b>ACCELEROMETER</b>
	At moment ECO alarm signalling → code <b>A9</b> : Exceeding the threshold "Alarm" by parameter <b>PARKING RPM</b>

## Installation - Wiring diagram

### Installation of module inside a vehicle

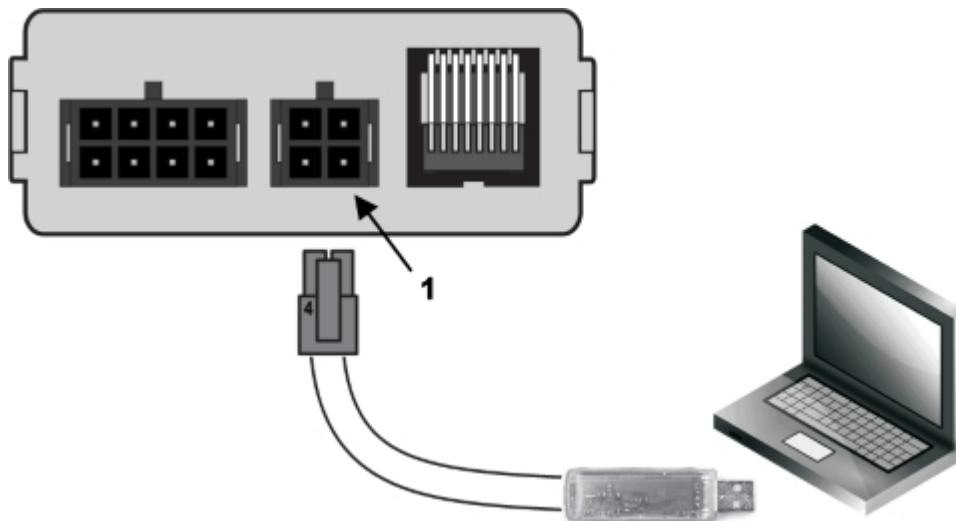
#### Variant [1] - Module "EDA01-Basic" (with "Basic" display)



**Variant [2] – Module „EDA01” (with „Standard” or „Expanded” display):**

## Connection to PC

For configuration work is needed a dedicated device: Bootloader-EDA (isn't supplied with module EDA01) with the correct cable. Bootloader-EDA must be connected to a laptop (or PC) using an USB cable and to the central EDA01 using a dedicated cable according to the following diagram:



### Notes:

- 1) Connecting an alone module EDA01 for configuration (ie. without/before installing in vehicle - exactly as in the diagram above), do not connect the display (because of the limited current capacity output of Bootloader-EDA);
- 2) Is possible connection of Bootloader-EDA to the module mounted In vehicle – in this case (when module is powered from vehicle) display needn't disconnected;
- 3) Drivers to Bootloader-EDA are available on website [www.quasarelectronics.pl](http://www.quasarelectronics.pl).

## Installation - Software

Operating the EDA01 is only possible by using a dedicated configuration software "Configurator EDA". It contains the functions of the configuration and monitoring of the system. It is designed to run under Windows operating system (Windows XP and later) and is available to download from [www.quasarelectronics.pl](http://www.quasarelectronics.pl).

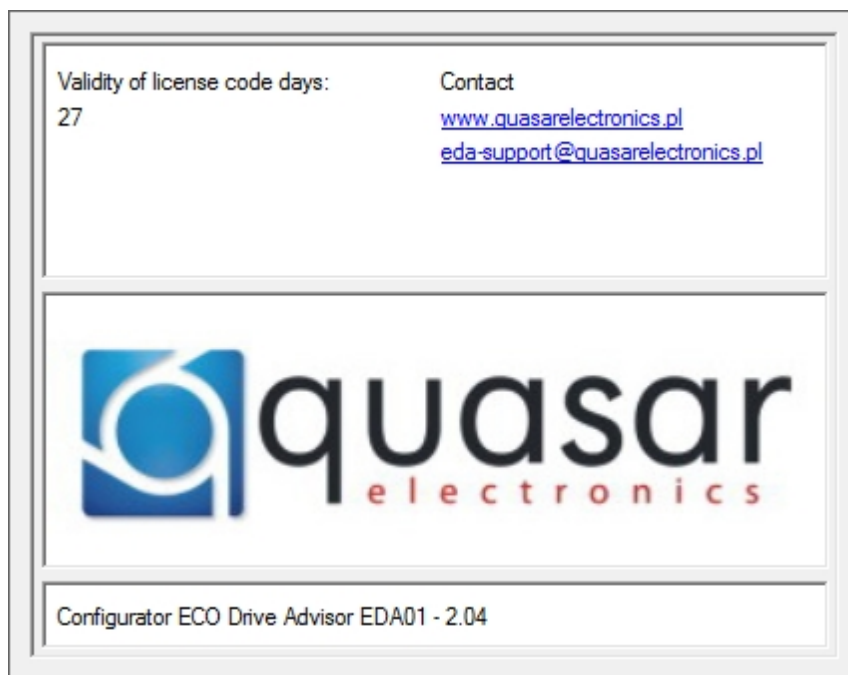
### Note:

- Software is licensed without additional costs for installers and distributors;
- For first run is needed activation code (or file);
- Activation code is time limited (max up to 365 days);
- License is granted for firm/person cooperating with Quasar Electronics;
- Description applies to version 2.04. *The manufacturer reserves the right to change the program for the functionality and/or interface in future versions.*

## Welcome screen

At first run the program shows the welcome screen, with requirement of giving the path to the license file (received from Quasar Electronics). After reading the license, the changes will be saved. Later this window will be to display the number of days to expire of the license and dissapear after few seconds.

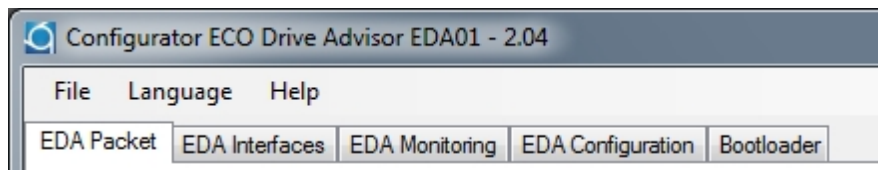
For prolongation of license it should be [to contact](#) again with Quasar Electronics.



## Header of program

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After start program are visible on tabs all main functions, which will be detailed described in next sections..



Options available by menu:

- Menu „File” allows:
  - Exit program;
- Menu „Language” allow to choose a interface language – available options:
  - Polish (default);
  - English;
- Menu „Help”:
  - Displays Help file;
  - „Technical support” – opens new email (using default mail software on this PC) addressed to Quasar Electronics;
  - Displays information "About program" - includes number of days to end of license.



## Tab "EDA Packet"

In this tab are displayed current value received parameters (from bus: J1939, CAN or UART). This functionality allows to fast verification read parameters from bus of vehicle and thereby to verify correct of installation and settings of module. Is suggested to use for contactless reading specialized module [MCB-CLICK-CAN](#) produced by Quasar Electronics.

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring EDA Configuration Bootloader

Table of monitored parameters

PARAMETER [a]	VALUE [b]	DEC [c]	HEX [d]
Vehicle Speed [km/h]	0	0	00
Accelerator Pedal Position [%]	0	0	00
Total Fuel Used [l]	0	0	00000000
Averaged Fuel Level [%]	0	0	00
Engine RPM [RPM]	0	0	0000
Engine Hours [h]	0	0	00000000
Vehicle Distance [km]	0	0	00000000
Engine Temperature [C]	-40	0	00
Wheel Angle	0	0	0000
Actual Retarder/Torque [%]	-125	0	00
Current Gear	0	0	00
Fuel Level [%]	0	0	00
Boost Pressure [kPa]	0	0	00
DD - Driver Door	<input type="checkbox"/>	Close	Close
OD - Other Doors	<input type="checkbox"/>	Close	Close
TD - Trunk	<input type="checkbox"/>	Close	Close
IGN - Ignition	<input type="checkbox"/>	Off	Off
AD - Am	<input type="checkbox"/>	Off	Off
RPM - RPM Status	<input type="checkbox"/>	Off	Off
WS - Work Status	<input type="checkbox"/>	Off	Off
CAN Status	<input type="checkbox"/>	Sleep	Sleep
Program Number	00	00	00
Truck Weight [kg]	0	0	0000
Trailer Weight [kg]	0	0	0000
Fuel Rate [l/h]	0	0	0000
Brake	<input type="checkbox"/>	Off	Off
Parking Brake	<input type="checkbox"/>	Off	Off
Clutch	<input type="checkbox"/>	Off	Off
-	<input type="checkbox"/>	-	-
-	<input type="checkbox"/>	-	-
TFU Resolution	<input type="checkbox"/>	0.5l	0.5l
Cruise Control	<input type="checkbox"/>	Off	Off
Hardware Version	<input type="checkbox"/>	5011	5011
EcoDrive Index	0	0	00
Firmware Version	00	00	00

Port: COM13 [e]

Start [f]

Data - Packet EDA

Rx [g] Tx [h]

EDA Type: EDA01 [h]

Log EDA packet to CSV file

Start [i] Stop

[k]

- [a]** - Name of the read parameter;
- [b]** - Real (recalculated) value read parameter (decimal notation);
- [c]** - Value of parameter read from bus (decimal notation);
- [d]** - Value of parameter read from bus (hexadecimal notation);
- [e]** - COM port of PC where is connected Bootloader;
- [f]** - Start/Stop transmission and current data presentation from EDA01 module;
- [g]** - Signaling receiving and transmitting data from EDA01;
- [h]** - Selection of mode program for the type of EDA01 module;
- [i]** - Firmware version of EDA01 module;
- [j]** - Option for saving of monitored data to CSV file;
- [k]** - View window (of terminal), when transmission is by UART port;

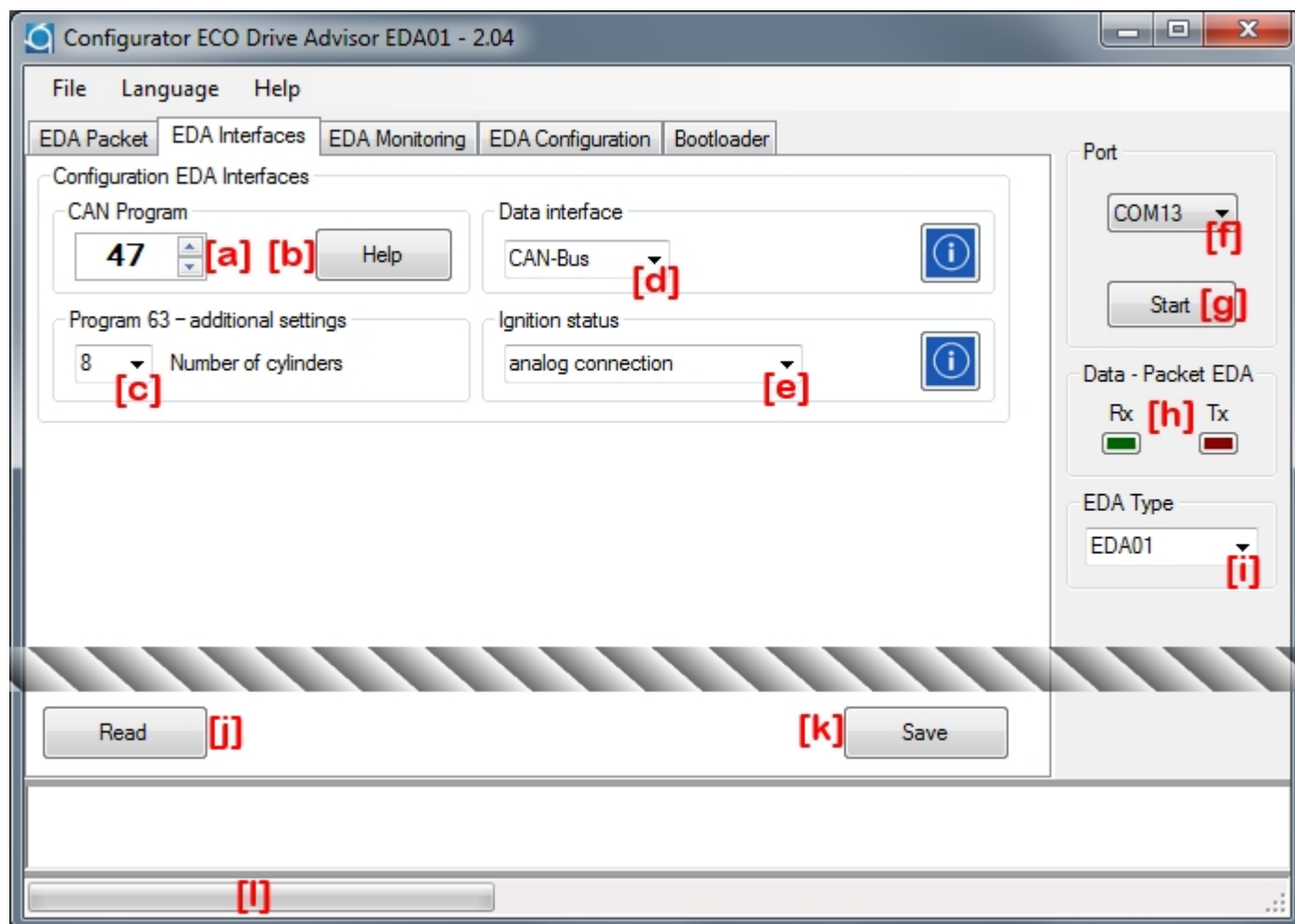
## Tab "EDA Interfeces"

Tab „EDA Interfaces” defines parameters related with device configuration for working with data-bus of vehicle and some factors used for calculation by module.

Content of this tab doesn't depend on „EDA Type” of module EDA01.

Important (even critical) on this tab is right choice of „Data interface” and when this is CAN right choice of program adequate for vehicle.

Buttons  displays detailed description of the item (functionality).



[a] - Selection of program when was selected CAN-Bus interface;

[b] - Shows the list of supported vehicles;

[c] - Additional settings available only for program: 63;

[d] - Selection of interface of data-bus of vehicle;

[e] - Read status of ignition by EDA01 module (*for "CAN-Bus interface" is recommended analog connection*);

[f] - COM port of PC where is connected Bootloader;

[g] - Start/Stop transmission and current data presentation from EDA01 module;

[h] - Signaling receiving and transmitting data from EDA01;

[i] - Selection of mode program for the type of EDA01 module;

[j] - Read configuration parameters from module into this tab;

[k] - Save to module current configuration from this tab;

[l] - Progres bar for operations Read/Save;

## Tab "EDA Monitoring"

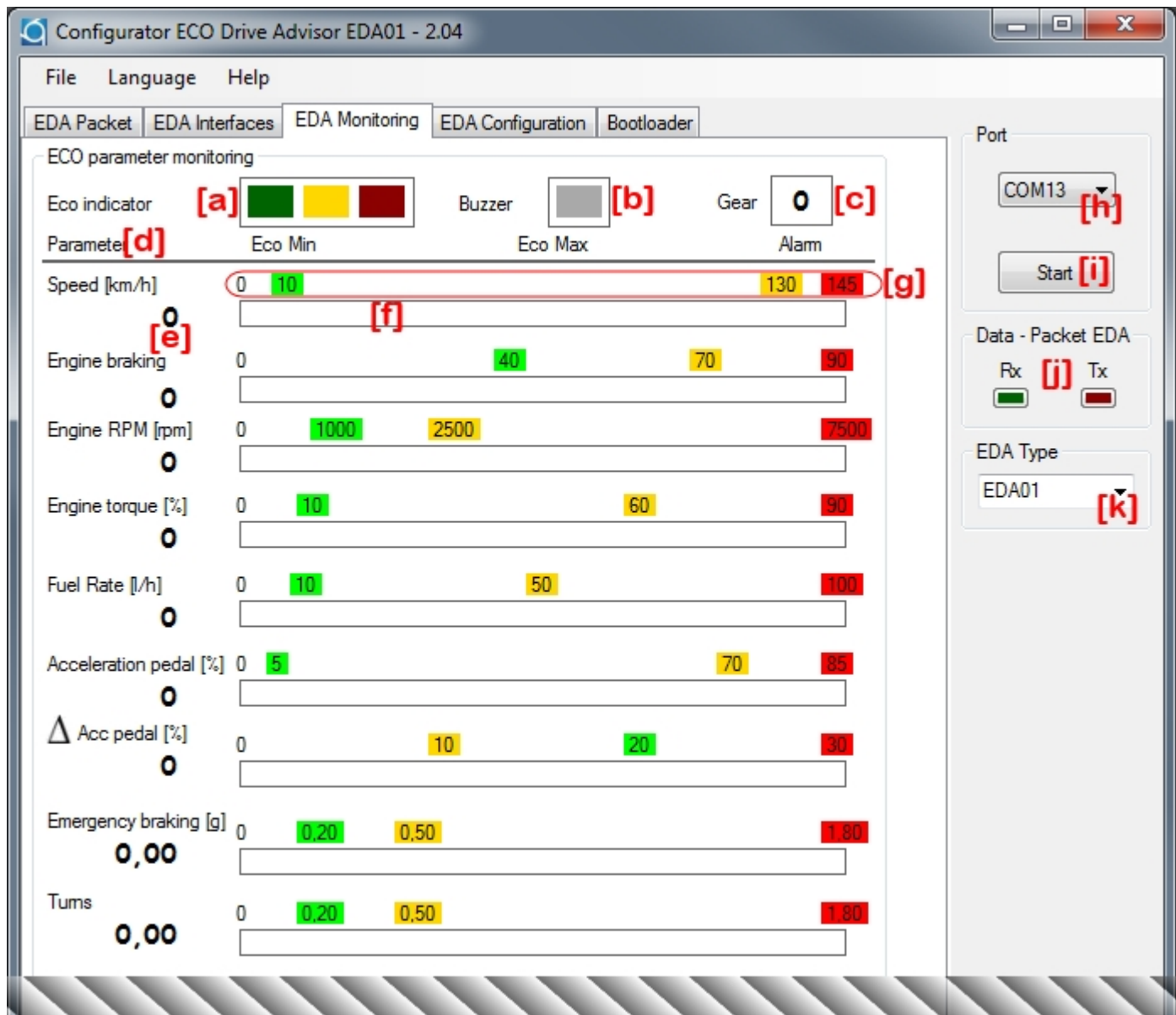
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Tab „EDA Monitoring” is used to visualize the current values of the parameters read from the CAN bus on a background configured of threshold values of each parameter. Directly after starting the program, all parameters have default values as shown below. However, after change any of the parameters on tab „[EDA Configuration](#)” or after loading the entire (previously saved) configuration (tab „[Bootloader](#)”) limit values are also changed on this tab.

Content on tab „EDA Monitoring” depends on selected mode „EDA type” and:

- for mode „[EDA01](#)” are visible all parameters;
- for mode „[EDA01-Basic](#)” are shown only these parameters which are used (and configured) for working of module in this (budget/limited) version.

## Tab „EDA Monitoring” for mode „EDA Type = EDA01”



[a] - Software emulation of basic display;

[b] - Software (visual) emulation of sound signal;

[c] - Number of gear ratio currently used of gear (this is calculated value) and is only presented when "RPM calibration" is activated;

[d] (column) - Names of measured parameters;

[e] (column) - Numerical values of measured parameters;

[f] - Linear indicators of values measured parameters (*lines of indicators are filled adequate to their values [e]*);

[g] - Threshold values of each parameters [d] (visualized by line of indicator [f]):

- **ECO min** - minimum value of ECO range;
- **ECO max** - maximum value of ECO range;
- **Alarm** - value that trigger an immediate alarm;

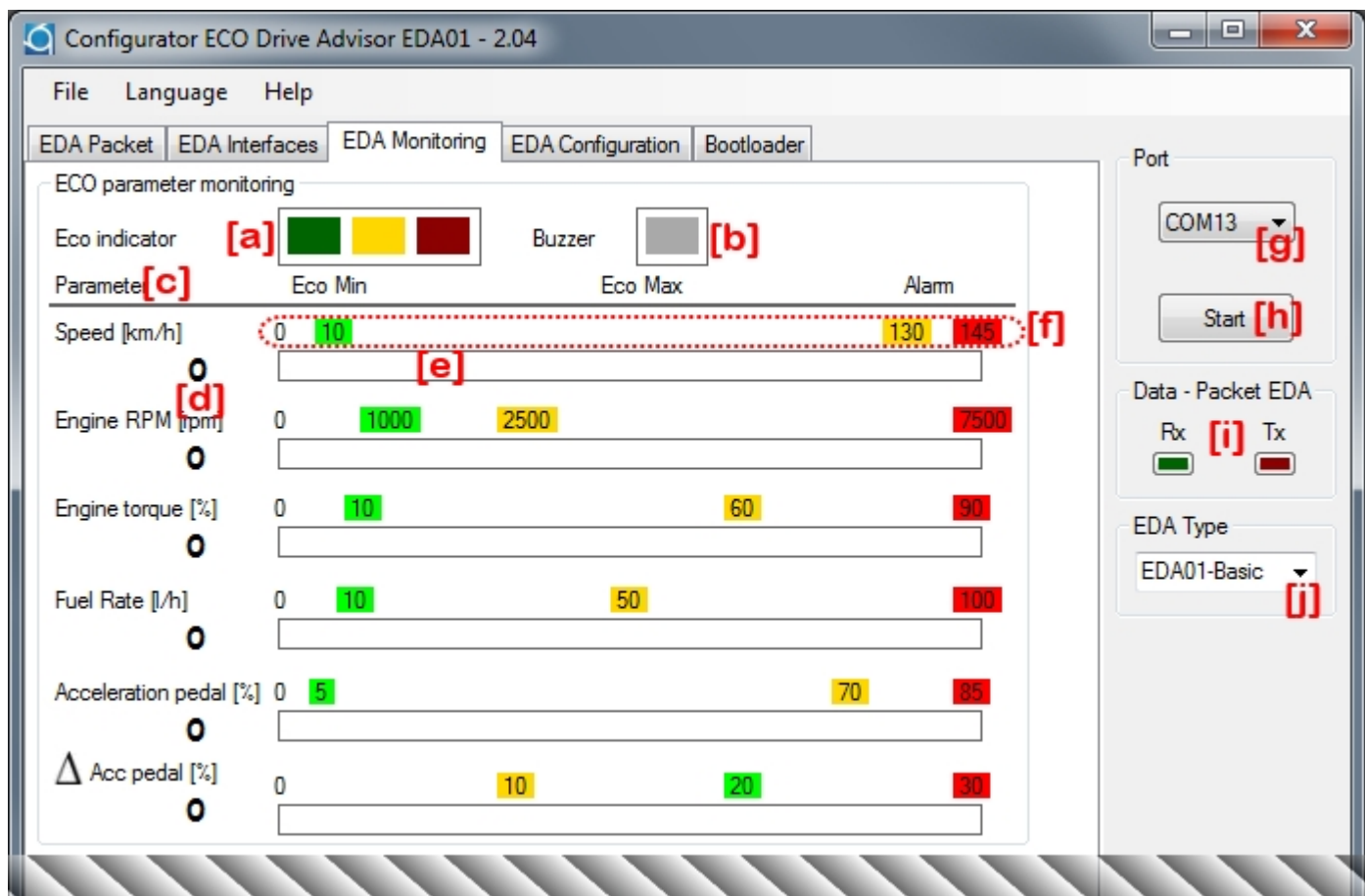
[h] - COM port of PC where is connected Bootloader;

[i] - Start/Stop transmission and current data presentation from EDA01 module;

[j] - Signaling receiving and transmitting data from EDA01;

[k] - Selection of mode program for the type of EDA01 module;

## Tab „EDA Monitoring” for mode „EDA Type = EDA01-Basic”



[a] - Software emulation of basic display;

[b] - Software (visual) emulation of sound signal;

[c] (column) - Names of measured parameters;

[d] (column) - Numerical values of measured parameters;

[e] - Linear indicators of values measured parameters (*lines of indicators are filled adequate to their values [d]*);

[f] - Threshold values of each parameters [c] (visualized by line of indicator [e]):

- **ECO min** - minimum value of ECO range;
- **ECO max** - maximum value of ECO range;
- **Alarm** - value that trigger an immediate alarm;

[g] - COM port of PC where is connected Bootloader;

[h] - Start/Stop transmission and current data presentation from EDA01 module;

[i] - Signaling receiving and transmitting data from EDA01;

[j] - Selection of mode program for the type of EDA01 module

## Tab "EDA Configuration"

Tab „EDA Configuration” contains all configuration function of EDA01 module. Proper configuration of all these parameters is a key to the success. Here are determined thresholds for each parameter (minimum, recommended and alarm) like also accepted of the dynamics of their changes. Also here gear box ratios are set. Keep in mind that for each (model) of the vehicle, some of the following parameters may not be available in the data bus, and then they should not be taken into consideration (and marked) in the settings.

Available options on this tab are different depending on the "EDA Type":

- ["EDA01"](#) (include ["RPM calibration"](#));
- ["EDA01-Basic"](#);

### Tab „ECO Parameters" for mode "EDA Type = EDA01"

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring **EDA Configuration** Bootloader

ECO parameters

Setting the parameter values

Parameter	Eco Min	Eco Max	Alarm	Delay [s]	Function [f]
<input checked="" type="checkbox"/> Speed [km/h]	10 [b]	130 [c]	145 [d]	20 [e]	
<input checked="" type="checkbox"/> Engine braking	40 [km/h]	Activation threshold		5	
Detection: Pressing the clutch					
<input checked="" type="checkbox"/> Engine RPM [rpm]	1000	2500	7500	20	Global [g]
<input type="checkbox"/> Engine torque [%]	10	60	90	20	or [h]
<input type="checkbox"/> Fuel Rate [l/h]	10	50	100	20	
<input checked="" type="checkbox"/> Acceleration pedal [%]	5	70	85	5	
<input checked="" type="checkbox"/> Acc pedal	20 [%]	Active above	30 [%/s]		
<input checked="" type="checkbox"/> Parking RPM [rpm]	900			120	
<input type="checkbox"/> Emergency braking [g]			1,80		
<input type="checkbox"/> Turns [g]	20		1,80		

Port: COM13 [i]

Start [j]

Data - Packet EDA

Rx [k] Tx [l]

EDA Type: EDA01 [i]

Read [m] [n] Save

[o]



- [a]** (column) - Marker, should be this parameter active (and computed)?
- [b]** (column) - Threshold „Minimum” of parameter for ECO mode;
- [c]** (column) - Threshold „Maximum” of parameter for ECO mode;
- [d]** (column) - Threshold „Alarm” of parameter, when alarm is triggered directly;
- [e]** (column) - Time after which the parameter exceeding the "Maximum" value triggers alarm;
- [f]** - Additional function (according to adequate description);
- [g]** - The choice of method of analyzing engine speed ("Global" as above or ["Gear RPM"](#));
- [h]** - Logical function binding parameters (and=„for each from...”; or=„for one from...”);
- [i]** - COM port of PC where is connected Bootloader;
- [j]** - Start/Stop transmission and current data presentation from EDA01 module;
- [k]** - Signaling receiving and transmitting data from EDA01;
- [l]** - Selection of mode program for the type of EDA01 module;
- [m]** - Read configuration parameters from module into this tab;
- [n]** - Save to module current configuration from this tab;
- [o]** - Progress bar for operations Read/Save;

#### Detail description of some parameters:

- Speed [km/h] – speed values entered here are recalculated only when the function "Global" is chosen; otherwise (i.e. for function "Gear RPM") values of speeds results from table "RPM calibration" for each gear box ratios;
- Engine braking – aims to mobilize Driver to using (for speeds above "[km / h] Activation threshold") of engine braking; this function is implemented in one of two modes:
  - 1) "Detection = Pressing the clutch" – after pressing the clutch starts counting the time "Delay" for triggering an alarm (this is time to change gear); each press of the brake while the clutch is also pressed causes an immediate alarm; this option significantly reduces the "ride in neutral";
  - 2) "Detection = Pressing the break" – after pressing the brake (when clutch is pressed or vehicle "ride in neutral") starts counting the time "Delay" for triggering an alarm (this is the time to change gear); this option allows to "ride in neutral";

Of course is possible to use brake pedal (for speed above "Activation threshold") in time "engine braking" and this doesn't trigger an alarm;
- Engine RPM [rpm] - for function "Global" are set here (recommended for automatic transmission); for function "Gear RPM" are set on separate subtab "RPM calibration";
- Acceleration pedal [%] – means "depth" of depressing the accelerator pedal ("to the end" = 100%);
- Δ Acc pedal – parameter monitoring the dynamics of the use of the accelerator pedal; exceeding this parameter immediately triggers alarm; specifies a value:
  - 1) [% Active above] - percent on start of range, where this factor isn't active (*picture above =15%*);
  - 2) [%/s] - maximum value up to what part of the whole range, is possible to press the accelerator pedal in one second when will be not triggered immediate alarm (*picture above =20%*);
- Parking RPM [rpm] – entered here the value, is used by the system to identify a vehicle stop (threshold value); the delay for this parameter is the time after which the system will to start counting of 120 seconds; these 120s will be showed (proportionally) on yellow progress bar; when this time (120s) elapse then will be triggered an alarm: "turn off an engine when vehicle stop";
- Emergency braking [g] and Turns [g] – parameters of operation of the built-in acceleration sensor.



## Tab "RPM calibration"

**Exclusively** for „EDA type=EDA01” is possible to set the gear box ratios and to configure the optimum engine speed range for each gear.

To enable this feature, parameter "Engine RPM [rpm]" must be checked; then should be chosen function "Gear RPM" and will be displayed subtab "RPM calibration" (as shown below - with default values).

The procedure of calibration RPM (determining the gear ratios) for each gear is described in ["Programming procedure"](#).

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring EDA Configuration Bootloader

ECO parameters RPM calibration

Engine speed calibration

Calibration Gear number Time Rpm Rpm Speed Ratio

Start 6 15 150 0 0 0

Gear number	Rpm Min	Rpm Max	Alarm	Delay [s]	Ratio
1	500	2500	3000	5	111
2	900	2500	3000	5	59
3	1200	2300	2800	7	36
4	1300	2300	2700	10	26
5	1350	2300	2650	25	21
6	1400	2450	2600	25	18

Visualization of speed for calibrated gears

Parameter	Speed Min	Speed Max	Alarm
Gear 1	0 4	22 27	145
Gear 2	0 15	42 50	145
Gear 3	0 33	63 77	145
Gear 4	0 50	88 103	145
Gear 5	0 64	109 126	145
Gear 6	0 77	136 144	145

Read Save

Port: COM13

Start

Data - Packet EDA

Rx Tx

EDA Type: EDA01

Read Save

Status bar

- [a]** - Start the process of determining the gear box ratio;
- [b]** - Number of gear in vehicle gear box (exlude Reverse);
- [c]** - Time signaling suggestion for upshift or downshift;
- [d]** - The overrun of the engine rotation (minimum for higher gear) when should be suggested upshifting;
- [e]** - Read current RPM from data bus of vehicle;
- [f]** - Read current speed from data bus of vehicle;
- [g]** - Calculated ratio for current gear of gear box;
- [h]** - Buttons for transfer the value of current calculated gear box ratio to the column [m] "Ratio";
- [i]** - Engine RPMs which defines minimum ECO range for each gear (ratio) of gear box;
- [j]** - Engine RPMs which defines maximum ECO range for each gear (ratio) of gear box;
- [k]** - Engine RPMs which immediately triggers an alarm (for this gear of gearbox);
- [l]** - Time after which Engine RPMs still exceeds "Rpm Max" triggers an alarm;
- [m]** - Value of ratio (copied after click on button in column [h] "Gear number") with possibility of correction;
- [n]** - Visualisation (based on current value of ratio of gearbox) speed ECO range (green bar) for each ratio of gearbox;
- [o]** - COM port of PC where is connected Bootloader;
- [p]** - Start/Stop transmission and current data presentation from EDA01 module;
- [q]** - Signaling receiving and transmitting data from EDA01;
- [r]** - Selection of mode program for the type of EDA01 module;
- [s]** - Read configuration parameters from module into this tab;
- [t]** - Save to module current configuration from this tab;
- [u]** - Progres bar for operations Read/Save;

#### Detail description of some parameters:

- Δ Time – when EDA01 displays suggestion of upshifting/downshifting - after half of that time will be a single beep from buzzer and LED (high/low) will blink; after whole of that time will be longer beep from buzzer and the LED will light continuously;
- Δ Rpm – this value is important for maintaining smooth drive and for properly suggestions of upshifting; this is value which define "deep of hysteresis" to protect against continuous switching up/down of gear box; the value of this is the same for each gear; recommends are 100-150-200;

## Tab „ECO Parameters” for mode "EDA Type = EDA01-Basic"

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring EDA Configuration Bootloader

ECO parameters

Setting the parameter values

Parameter	Eco Min	Eco Max	Alarm	Delay [s]	Function
<input checked="" type="checkbox"/> Speed [km/h]	10	130	145	20	
<input checked="" type="checkbox"/> Engine RPM [rpm]	1000	2500	7500	20	
<input type="checkbox"/> Engine torque [%]	10	60	90	20	or
<input type="checkbox"/> Fuel Rate [l/h]	10	50	100	20	
<input checked="" type="checkbox"/> Acceleration pedal [%]	5	70	85	5	
<input checked="" type="checkbox"/> Acc pedal	20	[%] Active above	30	[%/s]	

Port: COM13

Start

Data - Packet EDA

Rx Tx

EDA Type: EDA01-Basic

Read Save

Progress bar

**[a]** (column) - Marker, should be this parameter active (and computed)?

**[b]** (column) - Threshold „Minimum” of parameter for ECO mode;

**[c]** (column) - Threshold „Maximum” of parameter for ECO mode;

**[d]** (column) - Threshold „Alarm” of parameter, when alarm is triggered directly;

**[e]** (column) - Time after which the parameter exceeding the "Maximum" value triggers alarm;

**[f]** - Additional function (according to adequate description);

**[g]** - Logical function binding parameters of this group:

- i = „complied of each from active factors...”
- lub = „complied of one from active factors...”

**[h]** - COM port of PC where is connected Bootloader;

**[i]** - Start/Stop transmission and current data presentation from EDA01 module;

**[j]** - Signaling receiving and transmitting data from EDA01;

**[k]** - Selection of mode program for the type of EDA01 module;

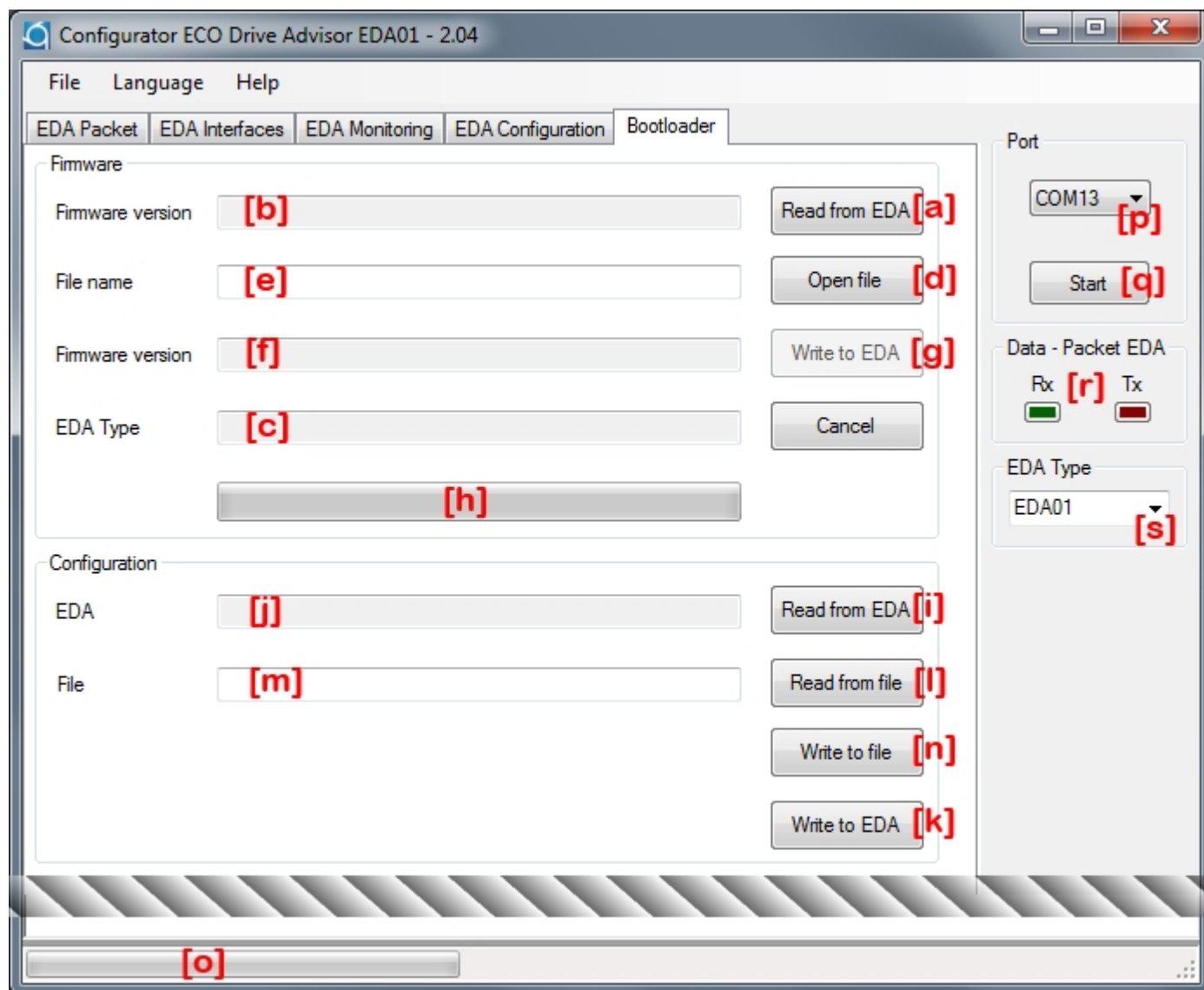
**[l]** - Read configuration parameters from module into this tab;

**[m]** - Save to module current configuration from this tab;

**[n]** - Progres bar for operations Read/Save;

## Tab "Bootloader"

Tab "Bootloader" groups the functions of communication with the module EDA01 through Bootloader. Options of this tab are the same for both "EDA type".



- [a]** - Reading from connected module EDA01 info about firmware;
- [b]** - Current version of the firmware read from the EDA01 after clicking [a];
- [c]** - Module type read from the EDA01 after clicking [a];
- [d]** - Open file with firmware (for update EDA01);
- [e]** - Name of file with firmware (selected in [d]);
- [f]** - Read firmware version from file (selected in [d]) (for upload to connected EDA01);
- [g]** - Write to EDA01 new firmware (version [f]) from selected file (name of file [e]) to connected EDA01;
- [h]** - Progress bar dedicated only for update firmware process;
- [i]** - Reading from EDA01 whole configuration and setting as the current settings (to all tabs);
- [j]** - Name of configuration read from EDA01 in [i];
- [k]** - Write to EDA01 the current configuration (include all tabs) with name [m] into connected EDA01 module;
- [l]** - Reading from file the configuration of EDA01 (saved to file earlier) and setting as the current settings (to all tabs);
- [m]** - Name of file with configuration (selected in [l]);
- [n]** - Writing to file the whole (from all tabs) current configuration of EDA01 (with a choice of filename);
- [o]** - Progress bar for operations Read/Save configuration of device;
- [p]** - COM port of PC where is connected Bootloader;
- [q]** - Start/Stop transmission and current data presentation from EDA01 module;
- [r]** - Signaling receiving and transmitting data from EDA01;
- [s]** - Selection of mode program for the type of EDA01 module;

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## Installation - Programming of module

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As was earlier described in this manual – objective of using the module EDA01 is "...to support the application of good practices, economic and ecological driving...". For this reason the correct configuration, (the proper selection of individual parameters) is fundamental to the effectiveness and efficiency of its use. After the setup is complete it should be able "good and convenient" driving taking account the "suggestions" EDA01.. Possible may also be necessary to change certain habits of the vehicle driver. For this reason important may be that the driver should to have the best knowledge of "how it works?".

EDA01 module for property operation ie. according to specifications (and assumptions design) must to have configured the following parameters:

a) for [ EDA Type = EDA01-Basic ] :

- Speed of vehicle;
- RPM of engine;
- Position and dynamics of use of the accelerator pedal;

b) for [ EDA Type = EDA01 ] :

- Speed of vehicle;
- RPM of engine;
- Position and dynamics of use of the accelerator pedal;
- Engine breaking;
- Parking RPM;
- Optimization of engine rpm by calibration for each gear box ratio.

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## Programming procedure

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- 1) After installation and connection module to PC should be [make a connection](#) with EDA01 module;
- 2) If EDA01 module was previously configured in/for this vehicle then is required to read his [firmware version and current configuration](#). This is important for:
  - a) verification the hardware version of the connected device with the program settings;
  - b) the introduction in the current EDA settings expected values;
- 3) The program prevents [Save] configuration to the hardware version other than set in the program - so you should make sure about the compatibility "EDA Type" of the program with an attached EDA01 module. This isn't blocked automatically for two reason:
  - a) for improvements "series" configuration more devices using data from a file;
  - b) for the practical verification the differences between versions of devices;
- 4) Select tab "EDA Configuration" and on subtab "EDA Parameters" fill (or change predefined) values (at least) to [required fields](#) based on your own experience and the following suggestions:
  - a) Speed [km/h] – for „Alarm” value: Besides the technical aspects to be considered, eg. Law regulations for the type of vehicle;
  - b) Engine braking – suggested are default values (include: "Detection = Pressing the clutch");
  - c) Engine RPM [rpm] – default values are good point of start but each model of engine and gearbox will be to need less or more adjusting/corrections for optimal settings; see on [sample configuration](#) ("[Basic](#)" or "[Standard](#)" with "[RPM calibration](#)");

- d) Acceleration pedal [%] – suggested (and default) values are:
- Eco Min: 5
  - Eco Max: 70
  - Alarm: 85
  - Delay: 5
- e)  $\Delta$  Acc pedal – suggested (and default) values are:
- „Active above” suggested is ca.10% (and no more than default 20%); is possible to set on 0% then can be a little increase the range [%/sek];
  - value [%/s] suggested is (up to) 40%/s when „Active above” is 10%; sum of both parameters shouldn't be higher than 50%;
- f) Parking RPM [rpm] – it should to put the value of RPM of approx. 10%-20% above the "idle/free rpm"; the time should be "balanced" between "real" stop (in this case is enough 45 seconds) and short-term stoppage resulting from eg. traffic; suggestion is to start from 2-3 minutes (120-180 seconds), and depending on the "usual" conditions of driving the vehicle eventually to change this parameter;
- 5) For [EDA Type=EDA01] is possible and „strongly recommended” to make „RPM calibration”. This involves the necessity to perform a test drive with a PC connecting to the EDA01 module and settings each gear ratios for gear box. Practically this mean the necessity of driving two persons (the driver and installer). It is required that on each gear to drive through the measurement period (about 10 seconds) with constant speed and ca.2100 +/- 100 RPM. So be sure to plan the route of the journey, where you will be able to drive with a low speeds (for gear 1 and 2) and high ie. above 90 km/h. Of course RPM callibration can be made in few steps – separately for low gears (and low speed) and (later) for high gears (and speed) on completely other route.

During driving – reading (current values) and registration (to configuration table) various ratios should be carried out as follows:

- stabilize on selected gear RPM engine (2100 +/- 100 rpm) and thus speed – for about 5 seconds – then the box "Ratio" will turn on green ...
- ... next click on "Gear number", which is currently used by the vehicle – which will rewrite the value of the calculated ratio from green field to the desired position in configuration table.

Engine speed calibration

Calibration	Gear number	$\Delta$ Time	$\Delta$ Rpm	Rpm	Speed	Ratio
Stop	6	15	150	2100	54	39 (a)

Gear number	Rpm Min	Rpm Max	Alarm	Delay [s]	Ratio
1	750	3000	3200	10	120
2	800	2700	3200	10	65
3 (b)	1200	2300	3200	10	39
4	1350	2200	3200	10	28
5	1400	2200	3100	20	24
6	1400	2500	3050	20	21

This procedure should be made for each gear (ratio) of gear box.

- 6) In addition, it should to verify "experimental" value of RPM "Eco Max" and – in particular – "Eco Min" for each gear, at which the engine is working "still normal". This can't be automated (without special measurements). The selected values have a significant impact on the efficiency of the module EDA01. RPM value of "Alarm" shouldn't be "red from console" of the vehicle – but can't be too low eg. it was possible "quite dynamic" overtaken on the road (eg. driving on highest gear).



## Sample configuration

Below are showed illustrations of sample configurations (Kia Ceed 1.6 CRDi 120KM; gear box with 6 ratios). Of course this is only proposition – as a reference point – absolutely not as a standard configuration for all engines..

### Sample configuration for „EDAType = EDA-Basic”

The screenshot shows the 'Configurator ECO Drive Advisor EDA01 - 2.04' window. The 'EDA Configuration' tab is active, displaying a table for setting parameter values. The table has columns for Parameter, Eco Min, Eco Max, Alarm, Delay [s], and Function. The parameters are Speed [km/h], Engine RPM [rpm], Engine torque [%], Fuel Rate [l/h], Acceleration pedal [%], and Acc pedal. The 'Acc pedal' parameter is set to 20 [%] and 30 [%/s]. The 'EDA Type' is set to 'EDA01-Basic'.

Parameter	Eco Min	Eco Max	Alarm	Delay [s]	Function
<input checked="" type="checkbox"/> Speed [km/h]	10	130	145	20	
<input checked="" type="checkbox"/> Engine RPM [rpm]	1000	2500	7500	20	
<input type="checkbox"/> Engine torque [%]	10	60	90	20	or
<input type="checkbox"/> Fuel Rate [l/h]	10	50	100	20	
<input checked="" type="checkbox"/> Acceleration pedal [%]	5	70	85	5	
<input checked="" type="checkbox"/> Acc pedal	20	30			[%] Active above [%/s]

Buttons: Read, Save

Port: COM13

Data - Packet EDA: Rx (green), Tx (red)

EDA Type: EDA01-Basic



## Sample configuration for „EDAType= EDA01”

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring EDA Configuration Bootloader

ECO parameters RPM calibration

Setting the parameter values

Parameter	Eco Min	Eco Max	Alarm	Delay [s]	Function
<input checked="" type="checkbox"/> Speed [km/h]	10	130	145	20	
<input checked="" type="checkbox"/> Engine braking	40	[km/h] Activation threshold		5	
Detection	Pressing the clutch				
<input checked="" type="checkbox"/> Engine RPM [rpm]					Gear Rpm
<input type="checkbox"/> Engine torque [%]	10	60	90	20	or
<input type="checkbox"/> Fuel Rate [l/h]	10	50	100	20	
<input checked="" type="checkbox"/> Acceleration pedal [%]	5	70	85	5	
<input checked="" type="checkbox"/> Acc pedal	20	[%] Active above		30	[%/s]
<input checked="" type="checkbox"/> Parking RPM [rpm]	900			120	
<input type="checkbox"/> Emergency braking [g]			1.80		
<input type="checkbox"/> Turns [g]	20		1.80		

Read Save

Port: COM13

Start

Data - Packet EDA

Rx Tx

EDA Type: EDA01

## Sample "RPM calibration"

Configurator ECO Drive Advisor EDA01 - 2.04

File Language Help

EDA Packet EDA Interfaces EDA Monitoring EDA Configuration Bootloader

ECO parameters RPM calibration

Engine speed calibration

Calibration Gear number  $\Delta$  Time  $\Delta$  Rpm Rpm Speed Ratio

Start 6 15 150 0 0 0

Gear number	Rpm Min	Rpm Max	Alarm	Delay [s]	Ratio
1	500	2500	3000	5	111
2	900	2500	3000	5	59
3	1200	2300	2800	7	36
4	1300	2300	2700	10	26
5	1350	2300	2650	25	21
6	1400	2450	2600	25	18

Visualization of speed for calibrated gears

Parameter	Speed Min	Speed Max	Alarm
Gear 1	0 4 2,27		145
Gear 2	0 15 42 50		145
Gear 3	0 33 63 77		145
Gear 4	0 50 88 103		145
Gear 5	0 64 109 126		145
Gear 6	0 77 136 144		

Read Save

Port: COM13

Start

Data - Packet EDA

Rx Tx

EDA Type: EDA01

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## Cooperation with external systems

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Eco-Drive Advisor EDA01 was designed to work standalone with possibility communicating with solutions/system location/alarms (GPS) third parties/companies. This may be done in three different ways.

### 1. Analogue outputs

EDA01 module has 3 analogue outputs, which can be used to communicate data/levels as follows::

a) Active for [ EDA Type = EDA01-Basic ]

- Output 1: ECO-ALARM – output type „OC” where active signal is „GND” (0V); this is „logically equivalent” to lighting up of red LED (alarm) on the display;

b) Active for [ EDA Type = EDA01 ]:

- Output 1: ECO-ALARM – output type „OC” where active signal is „GND” (0V); this is „logically equivalent” to lighting up of red LED (alarm) on the display;
- Output 2: ECO-LEVEL – output of voltage (level); assumes the values between +5V - 0V with 0.5V increments; "logically" corresponds to yellow bar on the display; where:
  - +5V is equal to yellow bar is off – ECO level is 100%;
  - 0V is equal “ECO Alarm” – ECO level is 0%;
- Output 3: SPEED-LIMIT – output type „OC” where active signal is „GND” (0V); this is „logically equivalent” to “Speed Alarm” – defined in: EDA Configuration ⇄ ECO Parameters ⇄ Speed [km/h] ⇄ Alarm.

Transmission of these signals/levels to the IT system allows to visualise of the current "ECO status" and – in consequence – to prepare reports (on basic level) about style of driving (vehicle/driver – depending on the possibilities of the IT system)..

### 2. UART Port

For module EDA01 was defined data protocol contains all ECO information and parametrs needed for advanced analysis of driving style of monitored vehicle. These data can be transmitted through UART port to the transmitter of external companies and further processed in any way by the IT system (after implementation of "ECO protocol").

For further information and documentation of „ECO protocol” please contact with Quasar Electronics.

### 3. Nadajnik QRT02 Quasar Electronics.

EDA01 module cooperates with transmitter QRT02 (by connections both UART ports). In this case EDA01 module no need „own” connection to CAN bus of the vehicle, because it receive all data from QRT02 by UART. QRT02 by UART also receives “ECO protocol” and forward it to IT system.

For further information and documentation of „ECO protocol” please contact with Quasar Electronics.