GENERAL INFORMATION

The system EGS -DI is intended to convert diesel engine onto gas-diesel blend. It could be used for engines with or without turbocharge, both. As a gas, Liquefied Petroleum Gas (LPG) or Compressed Natural Gas (CNG) could be used. The dosing is made by supply of extra fuel (gas) into inlet manifold. The dosing is carried out only within certain range of engine loading and RPM. The system does not supply gas on high RPM, idling and at slow-downing by engine. Adding gas portion increases drive torque at current engine mode what allows to decrease pressing acceleration pedal and, therefore, decreases diesel fuel supply. By this fuel expenses are becoming less. The economy is calculated according to the formula:

% savings = 0.3*diesel fuel cost -0,4*gas cost / diesel fuel cost.

In practice, the economy depends on gas and diesel fuel costs and varies from 10 to 30%. Emission becomes less by 8 %. Solid waste pollution (soot) becomes less, too.

The advantage of this system is simple installation and tuning. The system does not require diesel engine modification and in case of gas system failure the car could be used on Diesel fuel.

The principle of operation is supplying gas portions through gas injectors into main line. The portion is calculated by ECU. The data of calculation are:

- throttle position sensor (common rail) - TPS
- engine RPM
- gas temperature
- exhaust gas temperature
- knock sensor indication
- gas pressure
- pressure in inlet manifold

Electronic Control Unit:

- switches the car to gas or to diesel
- permanently analyzes all input signals and calculates optimal gas portion
- checks operability of sensors and injectors

- checks exhaust gas temperature and knock sensor indication. In case they exceed normal range it switches car to diesel fuel. It prevents failure of diesel engine.
- indicates gas level in tank on remote control.

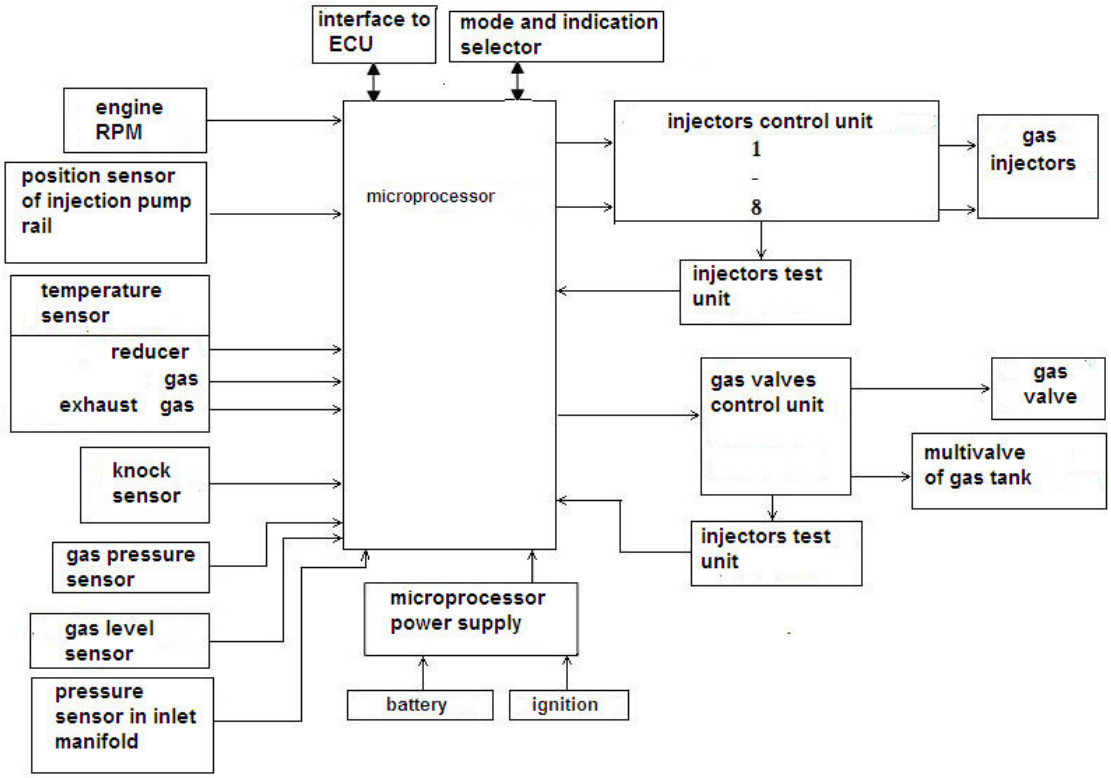
The system is controlled by EGS-DI software. Software allows to program the system in automatic mode with minimal intervention of the installer. It allows to shorten the time of tuning and exclude possible mistakes of installation.

Software allows:

- to detect mistakes of installation
- with minimal intervention of the installer, to tune all necessary parameters.
- to check gas escape.
- to tune the system automatically
- if necessary, to change times of gas injection depending on gas temperature, TPS, RPM, pressure in inlet manifold
- read Errors codes of ECU EGS-DI

The set consists of:

- Electronic Control Unit EGS-DI
- remote control (change-over switch)
- wire harness with connectors
- Manifold Absolute Pressure (MAP) sensor
- reducer, gas and exhaust temperature sensors
- knock sensor(s)
- CD ROM with software EGS-DI
- Installation Manual



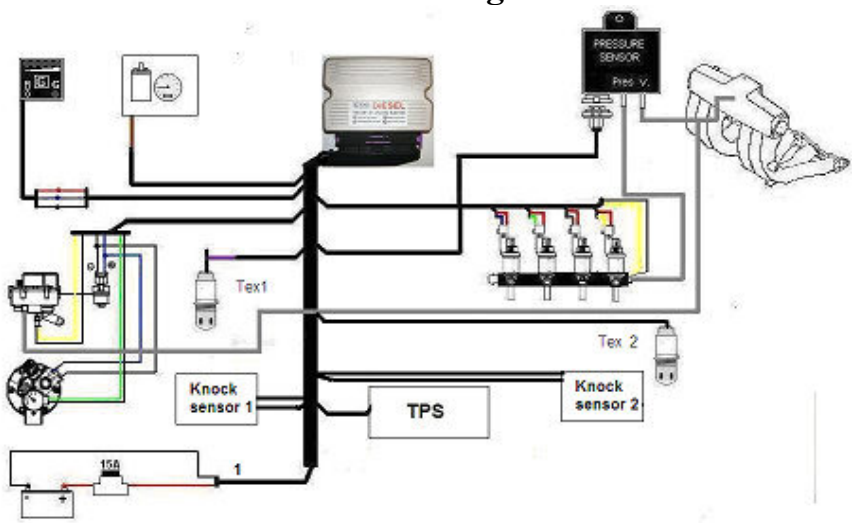
Block schematic diagram of EGS-DI

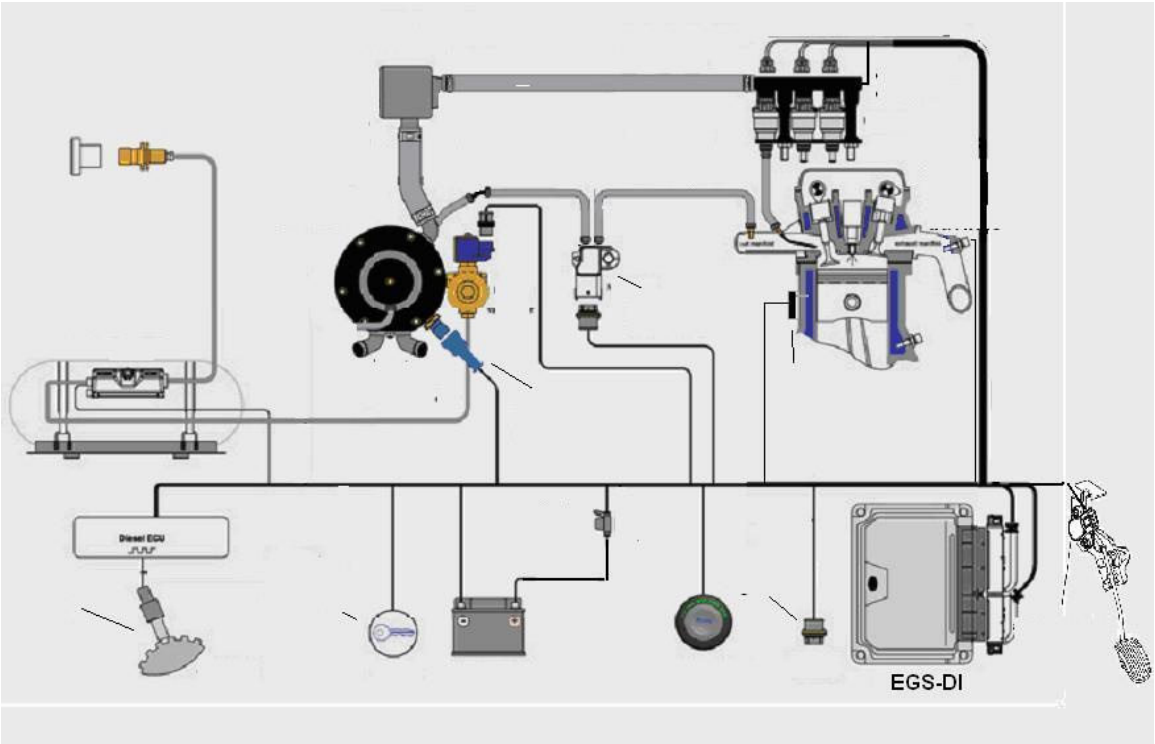
Safety requirements during installation

Make sure that CD or tape recorder in car is not encoded. Disconnect battery terminals. Battery terminals must be re-connected only after full checking that installation of hardware was done properly.

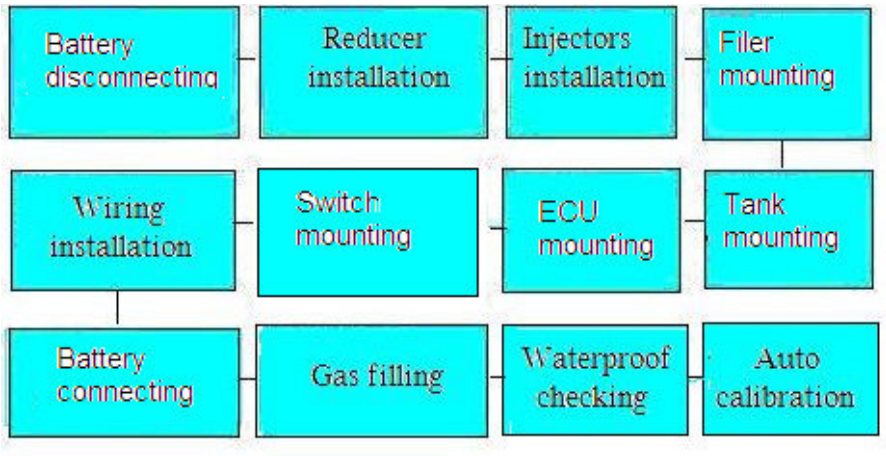
- Do not left tools (screwdrivers, spanners, etc.) in engine compartment.
- Do not turn on reducer heating until engine becomes cold.
- Use only fuses of proper value, after full hardware installation mount them in reachable places.
- Do not drill holes until you are sure that this place do not harm car's unit and wiring.
- Do not look for proper wires with car's control lamp. Use multimeter, oscilloscope and car's electric diagrams.
- During wiring within passenger compartment use available blind-end caps. Make sure that you did not spoil car's unit and wiring.
- After hardware installation fill up coolant, leave car to work on idling until electric fan starts and shuts down. Drive some distance (some kilometers) on petrol before calibration.
- After hardware installation check gas escape with special spray or soap solution.

Connection diagram

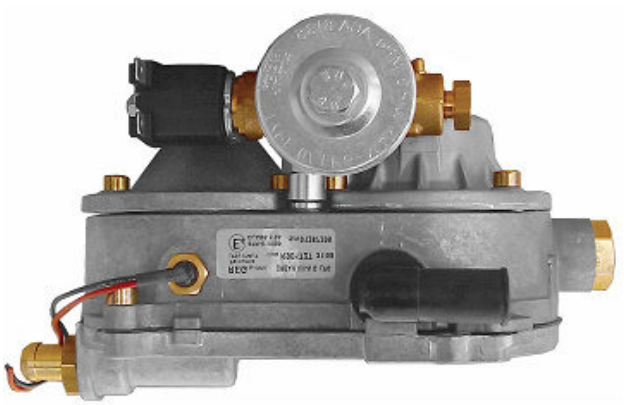




Simplified procedure of LPG kit installation

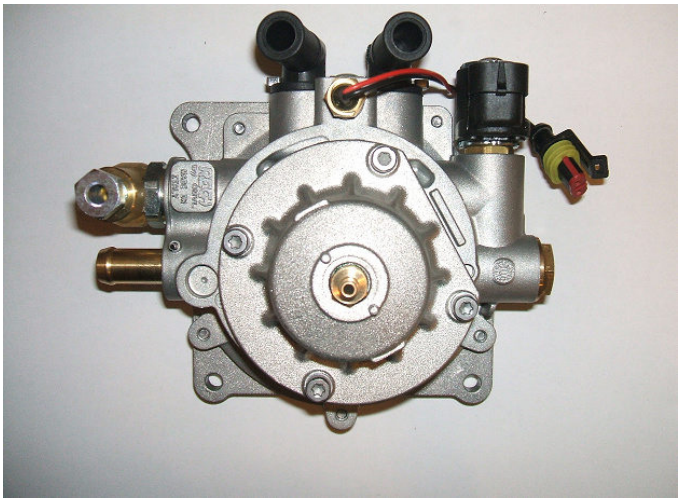


Reducers



Reducer with gas valve and temperature sensor

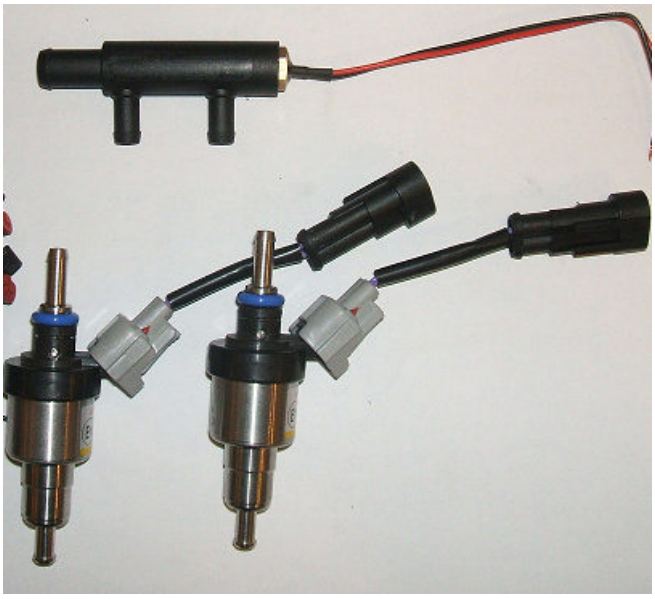
Pressure adjusting



Reducer (vaporizer) is meant to convert liquid phase onto gaseous one and to maintain constant pressure in the system about 1…2 atmosphere. For that purpose, reducer is connected to vacuum hose from inlet manifold.

Reducer has to be installed according to installation diagram. If possible, it has to be installed in achievable place but not less 10 cm from exhaust manifold. If it has electromagnetic valve with liquid phase filter, assure easy replacement of the filter. Electric valve could be installed separately from reducer. All connected hoses must be installed far from (at least 10 cm) exhaust manifold. If it is impossible , install thermal shield. Do not connect compensation of pressure control and protect its fitting from mud and chocking. Reducer temperature sensor is screwed to reducer .

Injectors

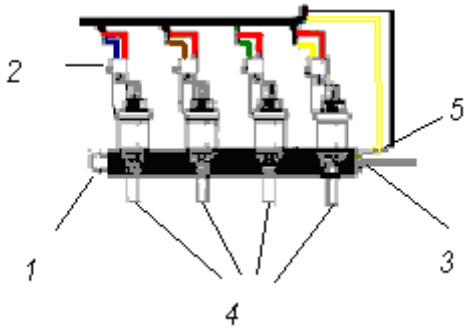


The unit that is controlled by ECU which is meant for supply of necessary quantity of fuel to inlet manifold before turborcharger.

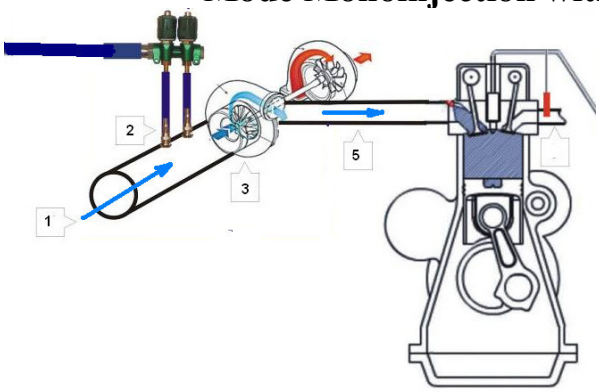
1) Gas inlet
2) Electric connectors
3) Nipple for gas pressure measuring
4) Calibrated nipples for gas supply towards manifold
5) Gas temperature sensor

Holes in intake manifold to be drilled to main line. At installation onto engine with turborharger holes to be between air filter and turbocharger as close as possible to turborcharger. Drill holes in the middle of manifold perpendicularly to air flow. Make sure that chips have not drop to manifold. If possible, remove inlet manifold.

Attention ! Mount injectors in the place where gas will not get in other equipment (compressor of brake system in cars with pneumatic brake system, etc.).



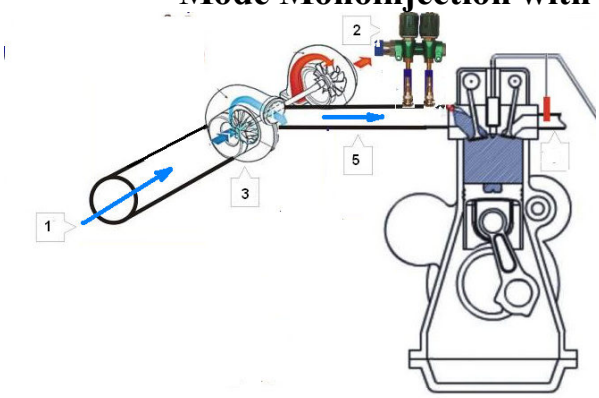
Mode Monoinjection without compensation



The injectors to be drilled in main line, with installation onto engine with turbocharger to be mounted between air filter and turbocharger (as close to turbocharger as possible). Drill the holes in the middle of the manifold perpendicularly to air flow. Check that chips have not dropped into manifold. If possible, remove inlet manifold.

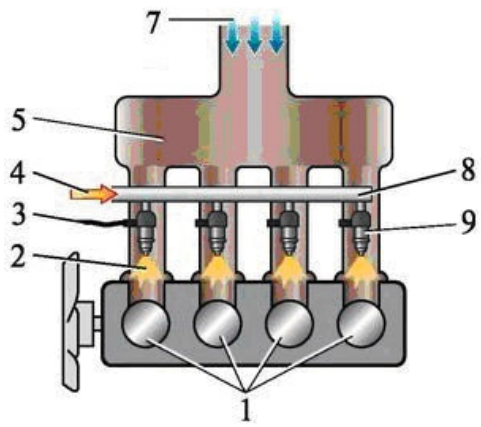
Attention! Fix the injectors where gas cannot get into the other equipment (brake system compressor, etc.).

Mode Monoinjection with compensation

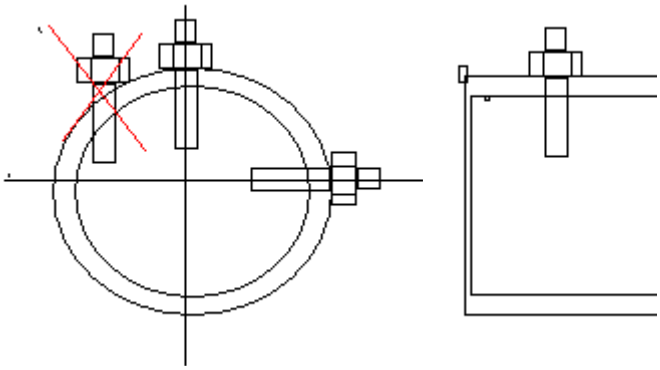


The injectors to inlet manifold to be drilled in main line, with installation onto engine with turborcharger they to be mounted after intercooler, where manifold begins to channel off to each cylinder.

Modes Semi-sequent and Sequent



Injectors to inlet manifold to be drilled to each cylinder, close to inlet valves.



If injectors are installed improperly, gas will be mixed with air improperly and the blend will not burn.
Nozzles have cross-section that corresponds to engine power.

Nozzle diameter (mm)	Power in 1 cyl. (kW)
1,8-2	12 – 17
2,1-2,3	18 – 24
2,4-2,6	25 – 32
2,7-2,9	33 – 40
3,0	41 – 48

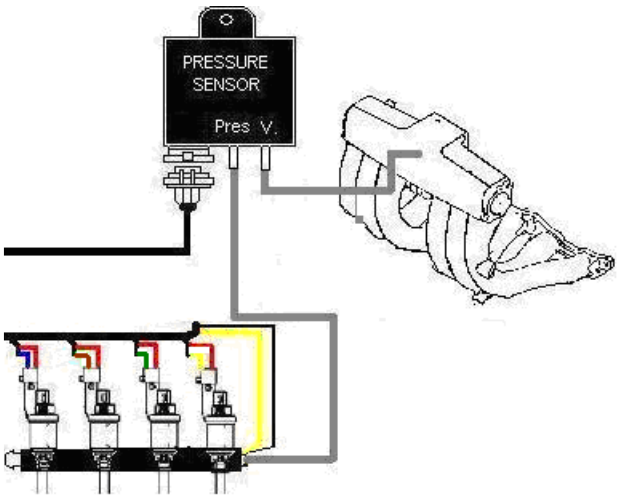
Data in the table are approximate and could sometimes differ.

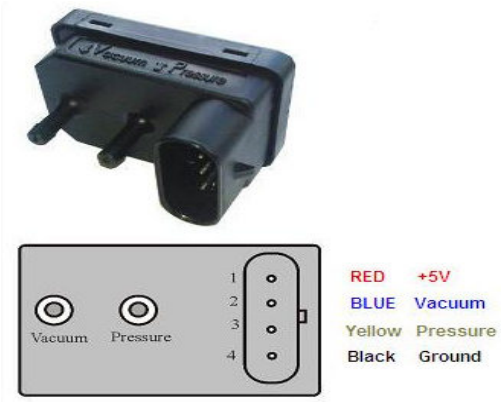
Injectors to be connected to injectors rail with gas hoses. Hoses have to be of the same length as short as possible (if possible, 10…15 cm). Cross section is not less 3 mm. All connections to be tighten with hose clamps.
Temperature sensor is fixed to injectors rail. Injectors rail is fastened to engine on the bracket through rubber shock absorbers**.**

Fine cleaning filter

In order to keep injectors line pure, install fine cleaning filter . Keep proper direction by use of arrow on the filter. Replace it any 10, 000…15, 000 km.

Manifold Absolute Pressure (MAP) sensor



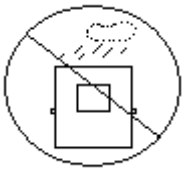


MAP sensor informs gas ECU of pressure value in gas injectors line and vacuum in inlet manifold. Lower part of MAP has two pipe nipples which are marked with "Pres" and "V".
It is recommended to mount pipe nipple separately instead of connecting through T-joint to other parts because connecting to them requires deep knowledge of engine theory and practice.
Mount the nipple after turbocharger. All connections to be tighten with hose clamps.

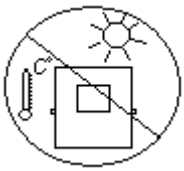
Take pressure directly from gas injectors line. Use special gas hose and fasten it with metallic clamps. In order to keep fast response of the system, use hoses as short as possible. Mount MAP sensor far from heat and high voltage sources.

ECU installation

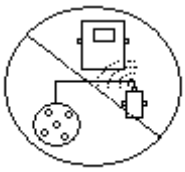
Where to install ECU ?



Avoid moisture infiltration



Avoid overheating (more 85 °C)



Avoid high voltage !

Assure good electric contact and connection isolations

S.O.S.

Inform the customer that if the GAS system fuse blows, the Control Unit restores the System onto Diesel mode..

Do not open ECU ! The factory's warranty is void

Gas Electronic Control Unit

Electronic control unit (ECU) is meant for car operation on Diesel-Gas fuel. It consists of:

- aluminium water-proof main unit
- wire harness with connectors
- manifold absolute pressure (MAP) sensor
- reducer temperature sensor
- gas temperature sensor
- fuel type switch
- exhaust gas temperature sensor (optional)
- knock sensor (optional)
- mounting set
- Owner's Manual
- Installation Manual

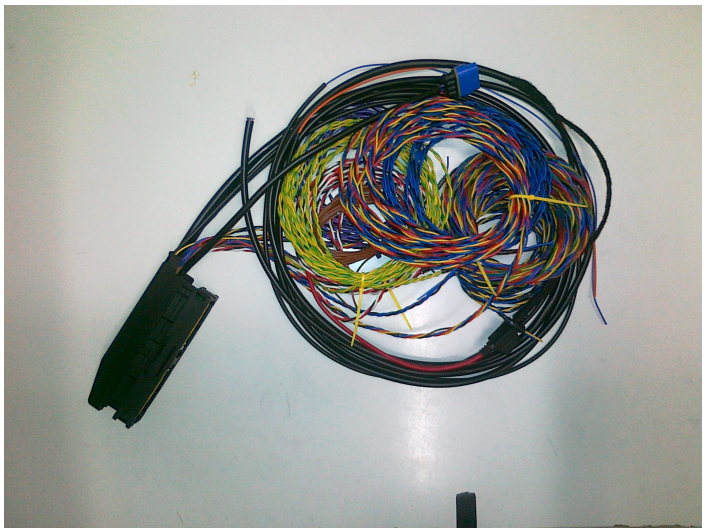
Install ECU far from electromagnetic emission sources (glow plugs, generator, high voltage wires, ABS unit, commutator, etc.) and high temperature sources. Fasten ECU connector to car body downwards in the place where moisture cannot get within ECU. Mount ECU on metallic bracket or with screws, assure good electrical contact between ECU case and car ground. Programming connector has to be in achievable place.

Changeover switch

Mount changeover switch on center console or dashboard in achievable and observable place. Use double-sided tape or self-tapping screws of the kit.

Electric wiring connection

Wire harness with connectors.



Wire harness for trucks, without connectors.

Before installation, think how to mount wires from ECU in engine compartment Mount them far from sources of heat and electromagnetic emission. Mount wires without loops.
All connections must be soldered and isolated with thermo shrinking PVC hoses. Connect minus terminals to minus of battery or directly to car body. **Never connect terminals to the components of gas line!**
Insert the fuse into the holder only after full check of installation.

Connection cables layout (56-Pins Connector) for 4 cyl.

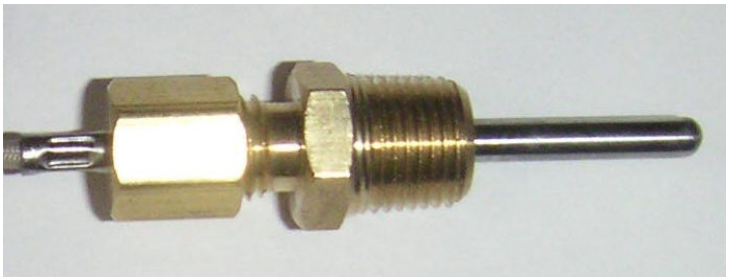
1 RS232TX
2 RS232RX
3 Knock input 1
4 Analog GND
5 Knock input 1
6 Exhaust temper input
7 Exhaust temper input
8 Gas level input
9 CAN -
10 CAN +
11 Switch LED out
12 Switch input
13 DIG inp TPS
14 RPM input -

15 +12 OUT (for multivalve)
16 Battery GND
17 Battery GND
18 Gas injector OUT 1
19 Gas injector OUT 2
20 Gas injector OUT 3
21 Gas injector OUT 4
22 +12 V Out injectors
23 +12 V IGNITION
24 +12 V Battery
25 +12 V Battery
26 Analog inp TPS
27 Analog inp Vacuum
28 Analog inp Pressure

29 +12 V RS232
30 Analog GND
31 Knock input 2
32 Analog GND
33 Knock input 2
34
35
36 Analog GND
37 +5V out (for level sensor)
38 Analog GND
39 Analog GND
40 +5V out (for switch)
41 +5V out
42 RPM input +

43 +12V out (for reducer)
44 +12V out (for reducer)
45 +12V ext.
46 Emulator Activation +12V
47 Digital input dies injector
48 +12 V Out injectors
49 Analog GND
50 Analog inp Temp (Gas)
51 Analog inp Temp (Reducer)
52 Analog GND
53 Battery Analog GND
54 +5V out (for TPS (option))
55 +5V out (for MAP)
56 Analog GND

Exhaust gas temperature sensor

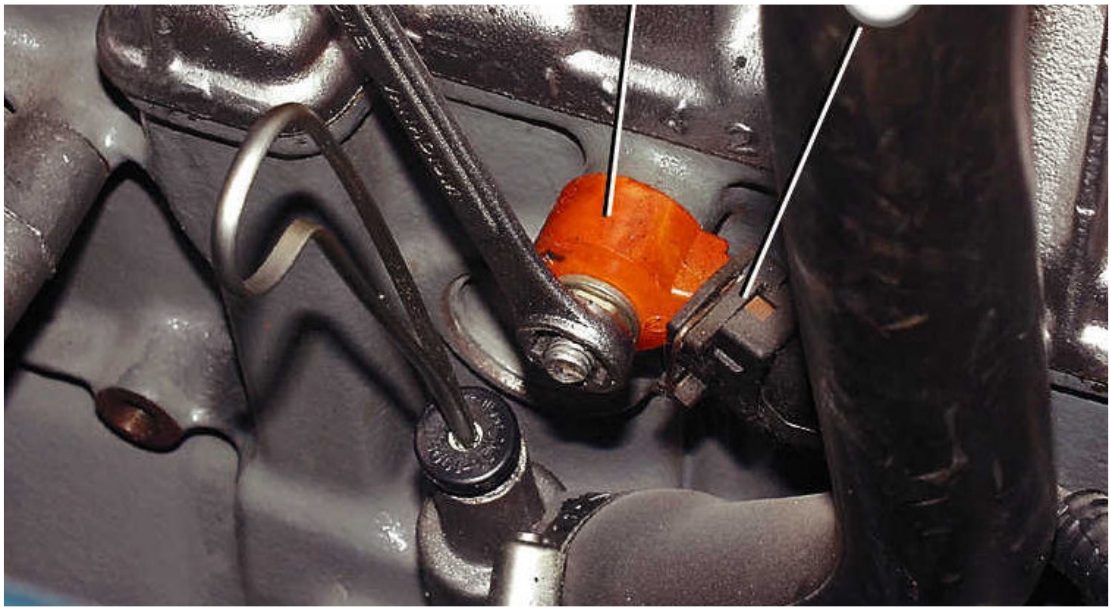


Exhaust gas temperature sensor is intended to measure temperature of exhaust gas. It is a thermocouple in the case. In order to install it, drill the hole in common for all cylinders line of exhaust manifold. Mount its case in the hole and weld it hermetical seam. The sensor to be fasten within case by thread.

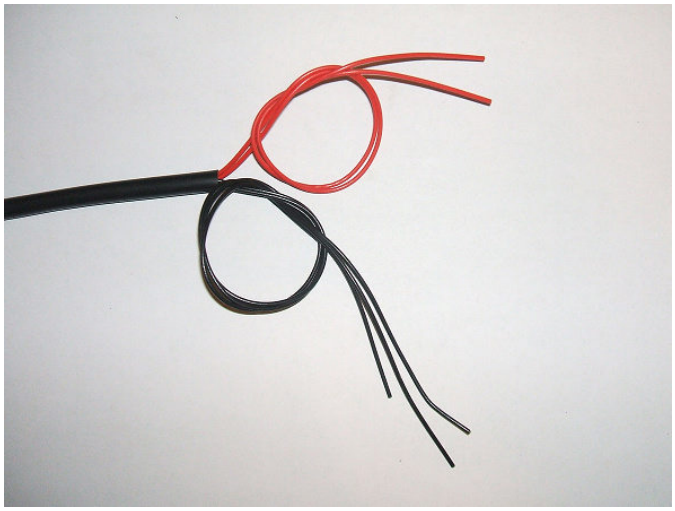
There are two sensors for V-engine, one for each bank.

Knock-sensor

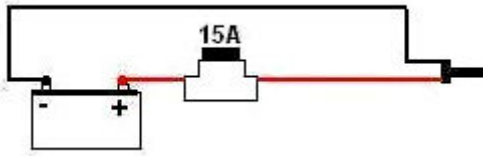
Knock sensor is intended to measure detonation of engine. Mount it on engine in the medium height and length of cylinders block and fasten with threaded bolt .
There are two sensors for V-engine, one for each bank.



Electric wiring connection is carried out according to the following scheme.

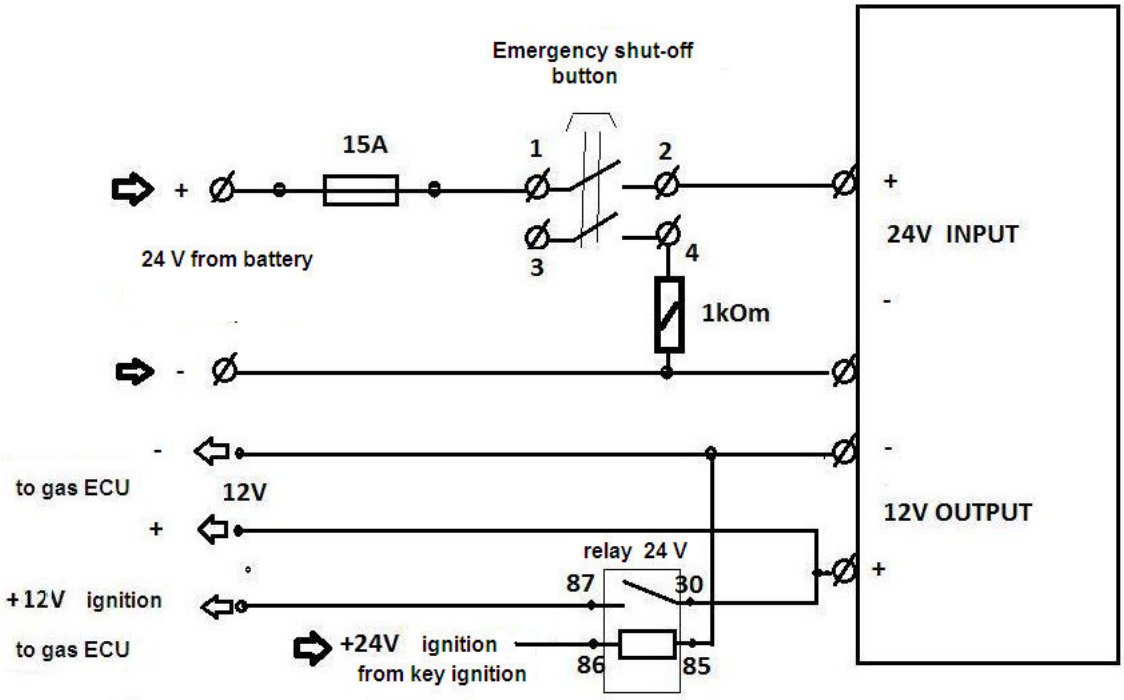


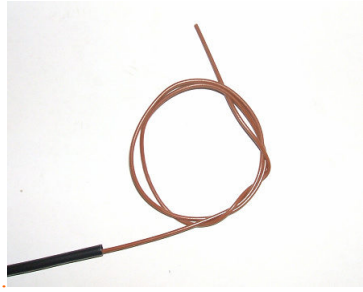
Double black wire must be connected directly to negative of battery.

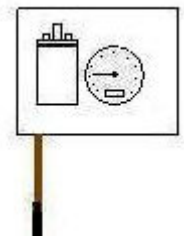


Double red wire is for plus of 12 V battery and must be connected directly to positive of the battery via fuse 15 A.
Triple black wire must be connected directly to negative of battery.
In case of 24 V car supply, install converter to 12 V, as shown below. Connect positive of converter to the wire from ignition lock. It has to have supply on Ignition and Starter positions.

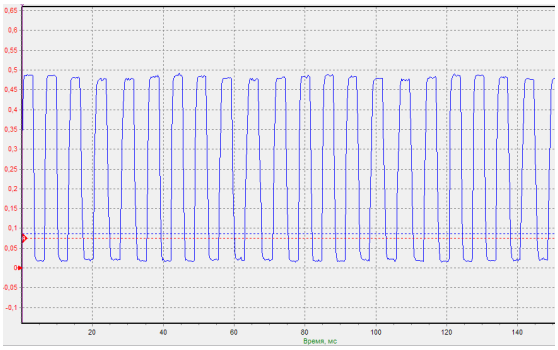
Connection of Converter 24 V DC -12 V DC



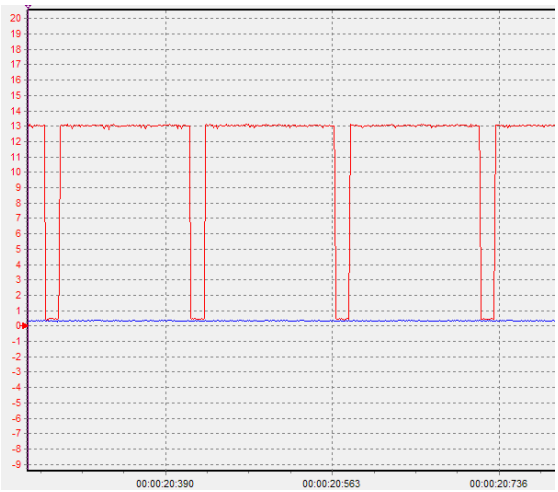




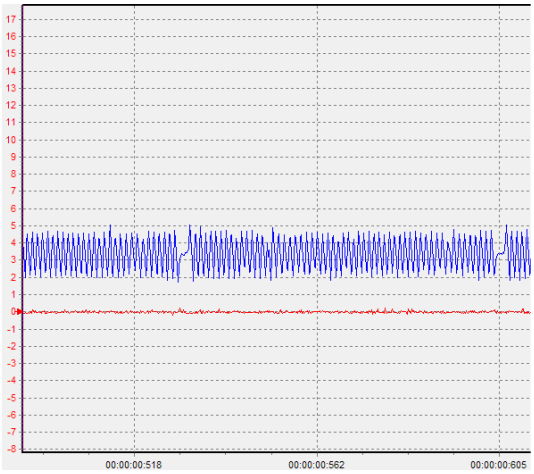
Brown wire (pin 14) is used to read the engine RPM . To be connected to wire of tachometer, Hall sensor or induction sensor (one wire of which is connected to car ground).
Grey wire (pin 42) not to be connected. Wave forms have to be as follows:



Pulses from generator.



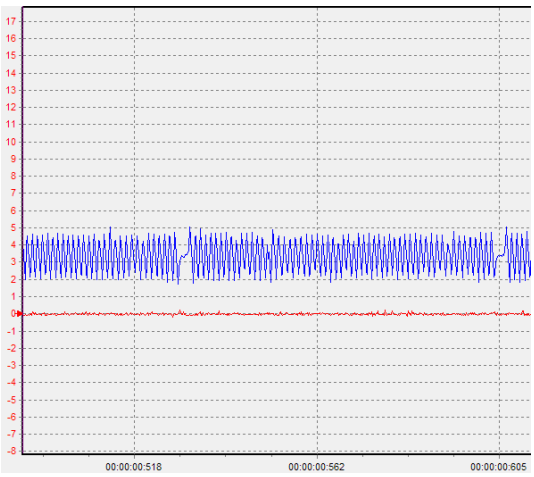
Pulses from Hall sensor.



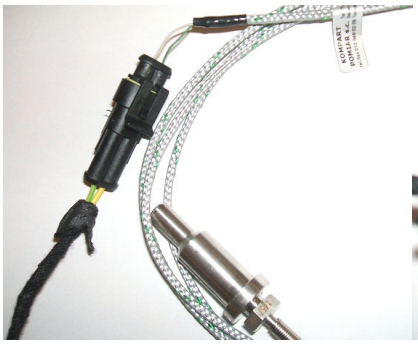
Pulses from induction sensor of crankshaft or camshaft.

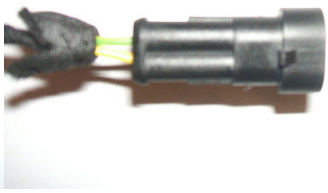
Connection to induction sensor, no wire of which is connected to car ground

Brown wire (pin 14) reads RPM. To be connected to first wire of induction sensor.
Grey wire (pin 42) to be connected to second wire of induction sensor. It processes pulses with voltage more 0.4 V. Wave forms have to be as follows::

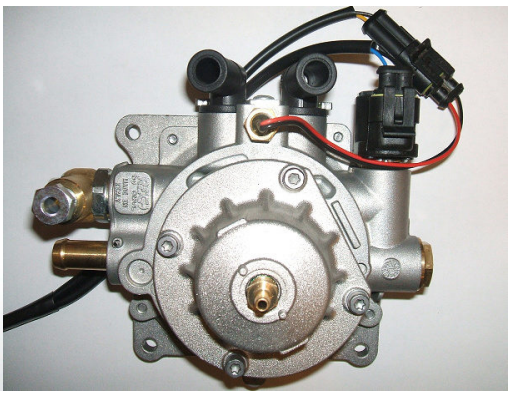


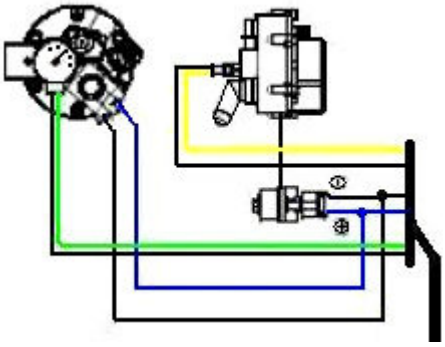
Pulses from induction sensor of crankshaft or camshaft.



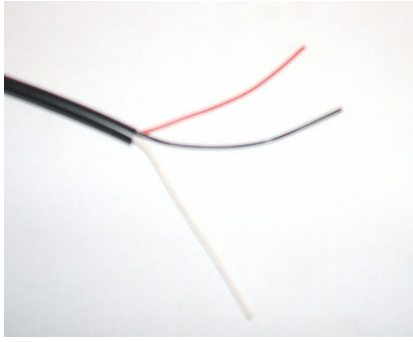


Double connector with green and green-striped wires is the signal of exhaust gas temperature sensor. If separate tuning is carrried out , connect two exhaust gas temperature sensors to this connector in parallel.





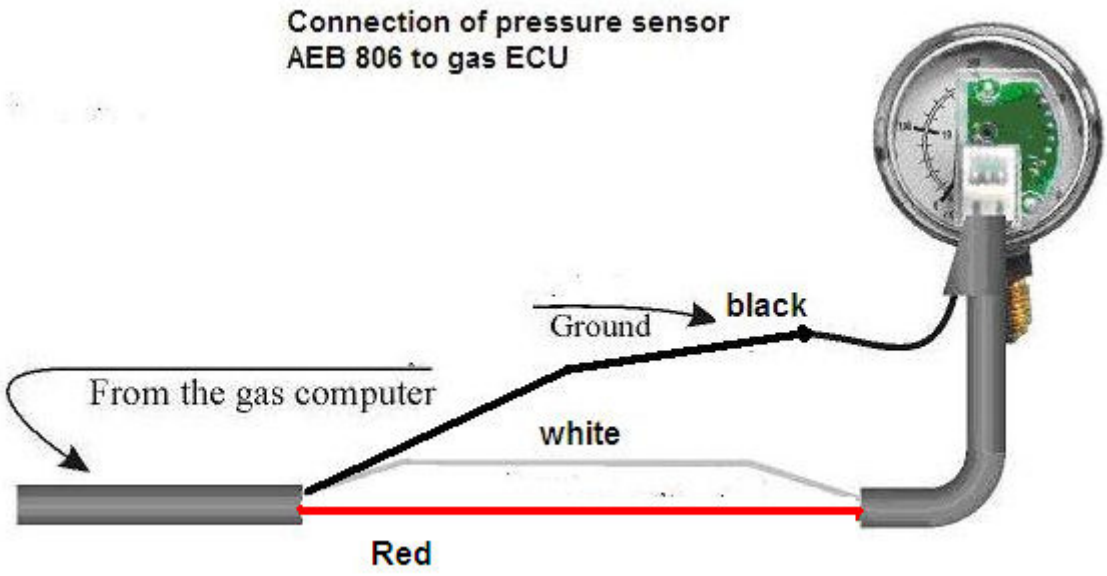
Double connector for two wires (female) . **Blue wire** connects +12 V to gas valve, **black wire** connects negative terminal to gas valve.
Double connector for two wires (male). **Yellow wire** is connected to reducer temperature sensor. **Black wire** is connected to negative of reducer temperature sensor.
Violet wire is connected to +12 V to multivalve . **Black wire** connects negative to multivalve.



White wire is connected to gas level sensor (0..90, 90...0, 0...50 K, 50... 0 K)

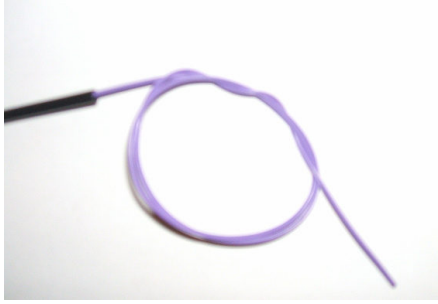
Red wire connects +12 V to level gas sensor (AEB806 for CNG).
Black wire is connected to negative of level gas sensor.

Operation on CNG

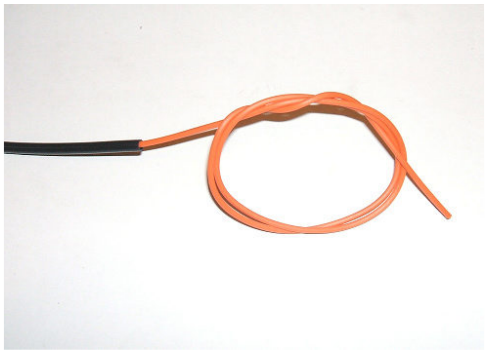


Connector with three wires (female). **Two blue wires** are knock sensor of bank 1, **black wire** is ground.

Connector with three wires (female). **Two green wires** are knock sensor of bank 2**, black wire** is ground. It is used only for V-engines.



Violet wire (pin 26) is analogue signal of acceleration pedal (TPS, PPS, APP). Usually the sensor is situated in passenger‘s compartement directly on acceleration pedal. At changing pedal position, the signal has to be changed within 0... 2.5 V or 0... 5 V.
White wire (pin13) is signal (digital) of acceleration pedal position sensor.
At changing acceleration position pulses frequency has to increase or decrease.

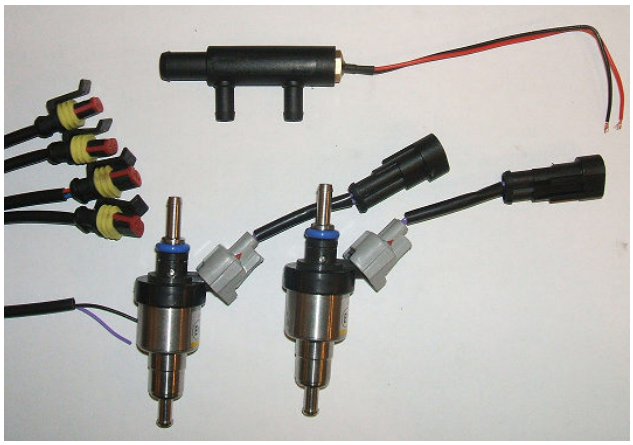


Orange wire is ignition plus. This wire supplies coils of gas valve and gas injectors. As well it is used for switching ECU on and off.

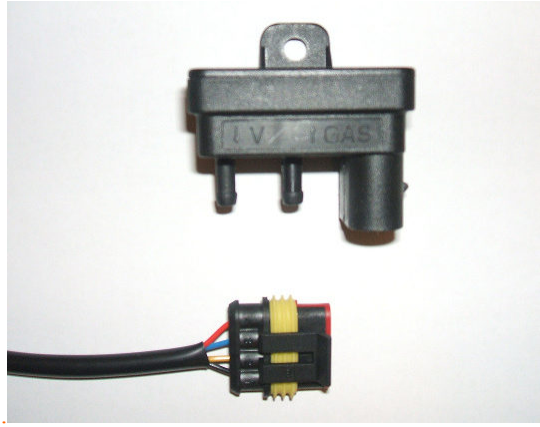
Connection of gas injectors for in-line engine

Harness of gas injectors is connected to gas injectors.

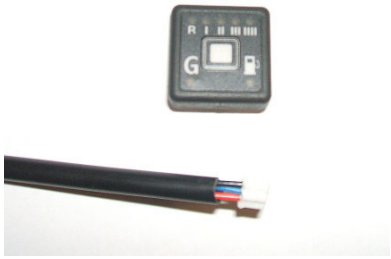
Harness with colored PVC hose is connected to Bank 2, if there is a separate tuning. If no, connect it to Bank 1.

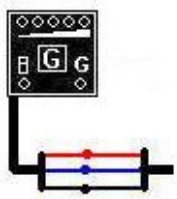


Double connector (male). Violet wire is connected to sensor of gas temperature. Black wire is connected to negative of sensor of gas temperature.



Wire harness of pressure sensor (with 4 -pins connector) is connected to pressure sensor.





Wire harness of control unit (with 3-pins connector) is connected to remote control according to color rainbow or with connector . Remote control to be installed in achievable place place of dashboard of the car. Avoid direct sunlight.

Diagnostic connector is connected to PC via interface cable. Do not forget to put protection cap after disconnection.

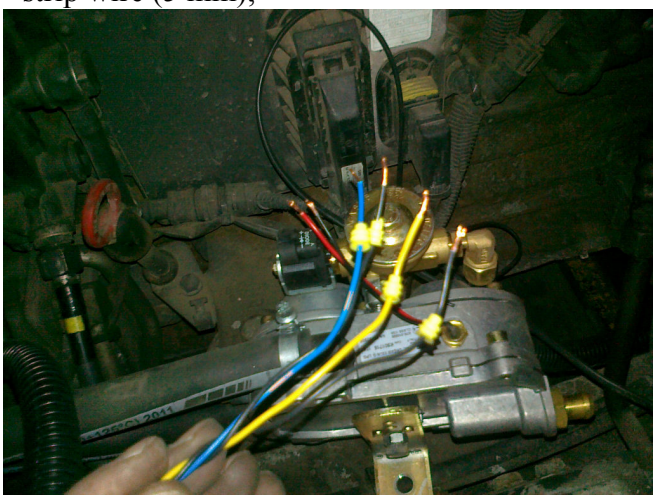
After installation ends all the plaits have to be fixed by means of plastic collars so that they do not touch strongly heated or moving details of the car. Insert the fuse.

Some specificities for trucks

Due to long wires and difficulties to lead them in trucks, wire harness is supplied without connectors. Crimping to be done after their setting.

The way of crimping:

- put yellow sealing onto wire;
- strip wire (5 mm);

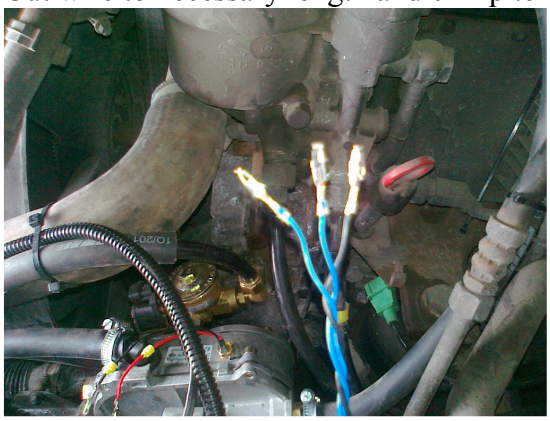


-insert terminal into crimping tool, put the terminal and crimp it.

-insert the terminal into connector till fixation.

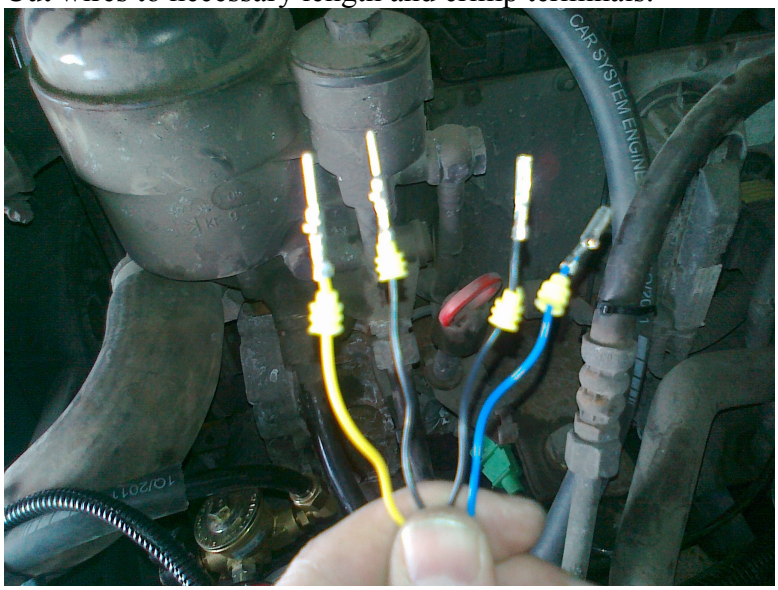
- put yellow sealing into connector.

Knock sensor connector
Take twisted triple wire (two blue ones and black).
Cut wire to necessary length and crimp terminals.

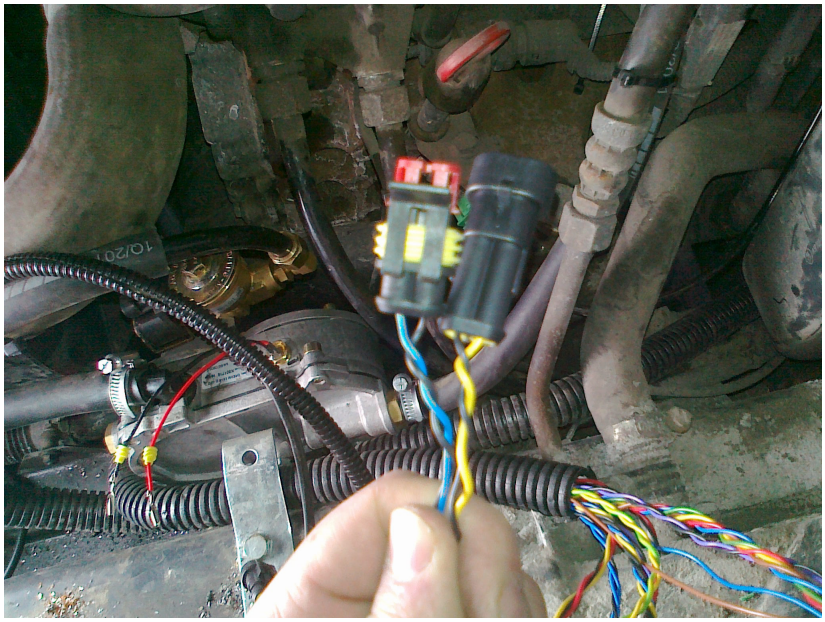


Insert wires into connector, as shown on photo.

Connector of reducer temperature sensor.
Take quadruple twisted wire (one yellow, one blue and two black ones).
Cut wires to necessary length and crimp terminals.



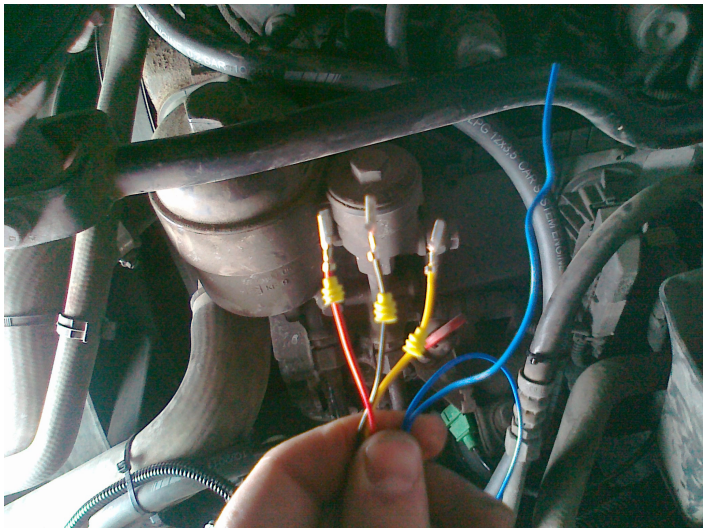
Insert wires into connector, as shown on photo.



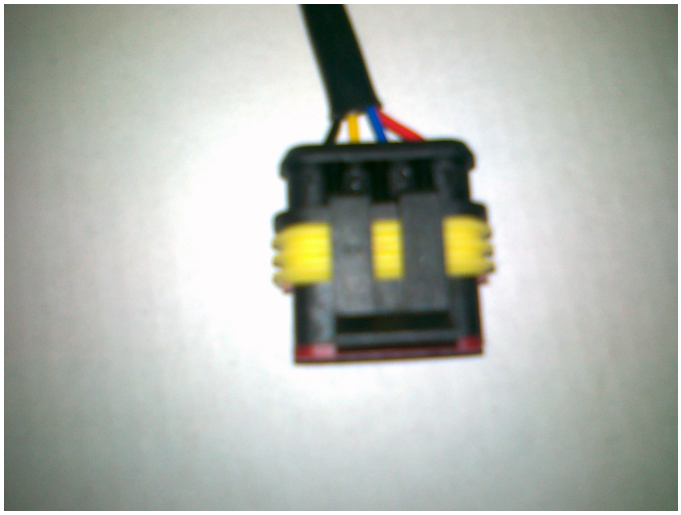
1- black wire (ground)
2- yellow wire (signal from reducer temperature sensor)

Connector of reducer gas valve
1- black wire (ground)
2- blue wire (+12 V **reducer gas valve**)
Insert wires into connector, as shown on photo.

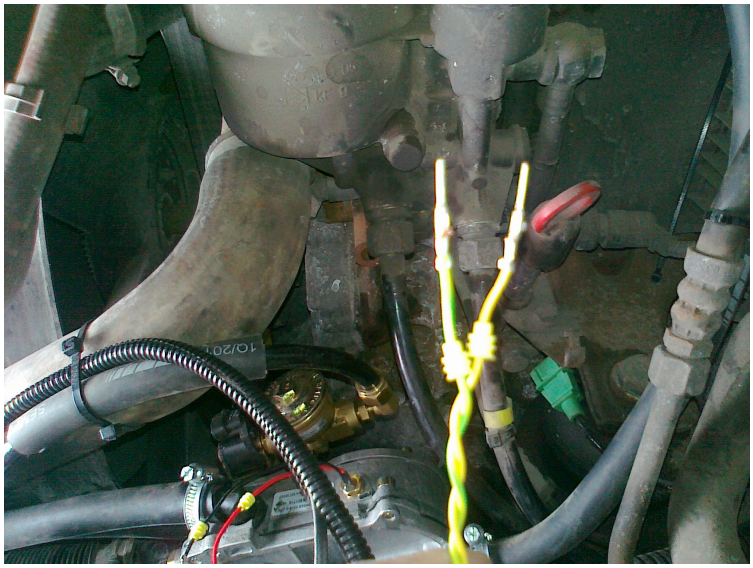
MAP sensor connector
Take quadruple twisted wire (one yellow, one blue, one red and one black).
Cut wires to necessary length and crimp terminals.



1- black wire (ground)
2- yellow wire (gas pressure line)
3- blue wire (line pressure in turbocharger)
4- MAP sensor supply (+ 5 V)
Insert wires into connector, as shown on photo.



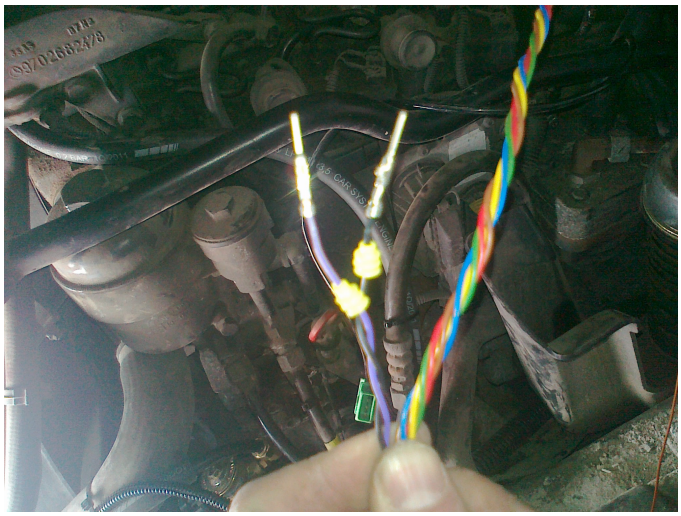
Connector of exhaust temperature sensor
Take double twisted wire (one yellow and one yellow/green).
Cut wires to necessary length and crimp terminals.



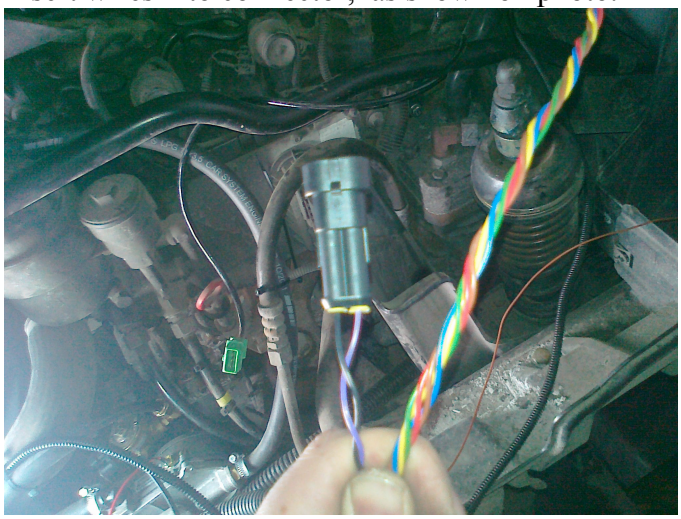
1- yellow/green wire

2- yellow wire
Insert wires into connector, as shown on photo.

Connector of gas temperature sensor
Take twisted seven wires (select one violet and one black)
Cut wires to necessary length and crimp terminals.



1- black wire
2- violet wire
Insert wires into connector, as shown on photo.

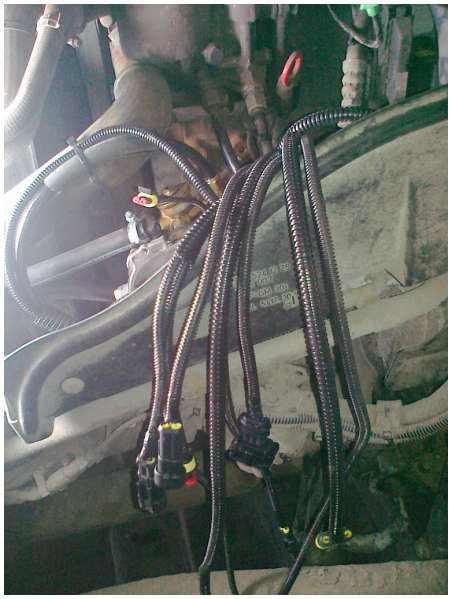


Gas injectors connectors

Take twisted seven wires (do not take one violet and one black).
Cut wires to necessary length and crimp terminals.

1. Blue wire (output 1), brown (output 2), green (output 3), yellow (output 4)
2. Red wire

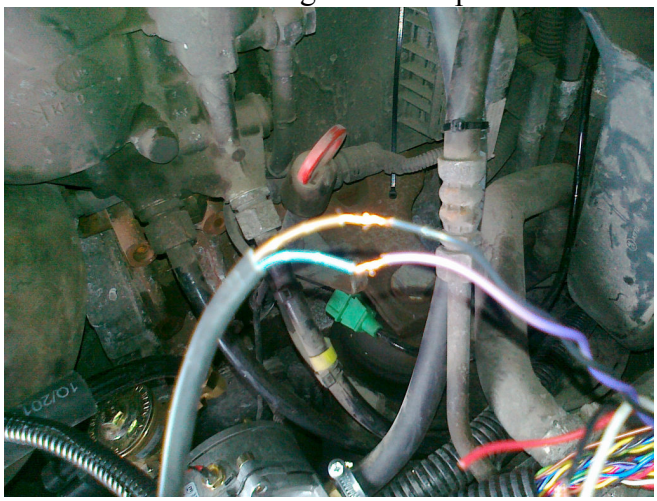
Insert wires into connector, insert all wire harnesses into plastic goffer.



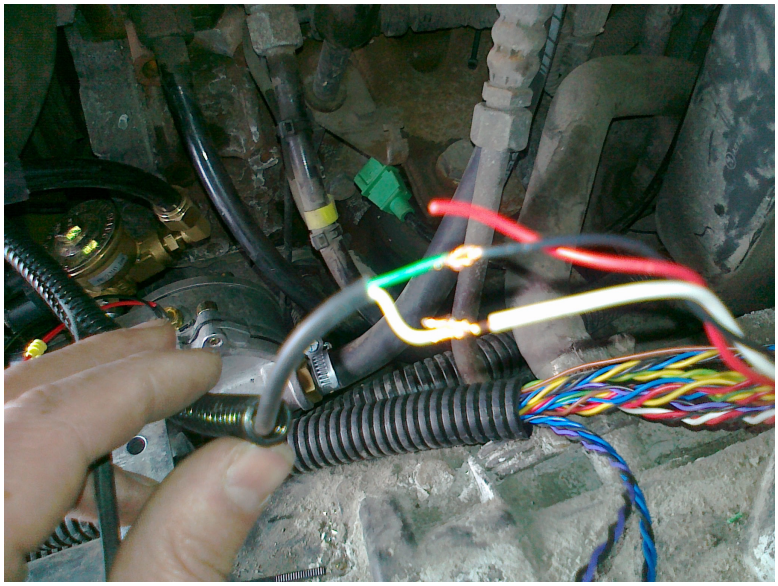
The way of wires connecting:

Put thermo-shrinking PVC hose onto one wire
- strip two wires which to be connected together (10 mm)
- twist them
- solder them
- put thermo-shrinking PVC hose onto solder place and heat with hair-dryer.

Connection of wires of gas valve of tank multivalve.
Connect black wire from gas ECU to negative terminal of gas valve.
Connect violet wire of gas ECU to positive terminal of gas valve.



Connection of wires of gas level sensor in tank.
Connect black wire of gas ECU to the first wire (eg., to green one) of level sensor.
Connect white wire of gas ECU to the second wire (eg., to white one) of level sensor.



Drill the whole in the inlet manifold after turbocharger, to make thread 5 mm and to screw the nozzle hermetically in, put rubber hose on the nozzle, press hose clamp around and connect the hose to channel VAC. of MAP sensor. Crimp the terminal on blue wire and insert it into the connector of MAP sensor.

Typical mistakes and troubleshooting

1. Double black wire is connected not to minus of the battery but to another place where there is no ground of the car. For example, it is to the bolt linked up with the car through the rubber shock-absorber or is connected to the plastic part of the car.
2. Brown wire is connected not to the signal wire. Signs: on the computer engine speed does not change with time or at the moment of sudden increase in speed the computer shows wrong values.

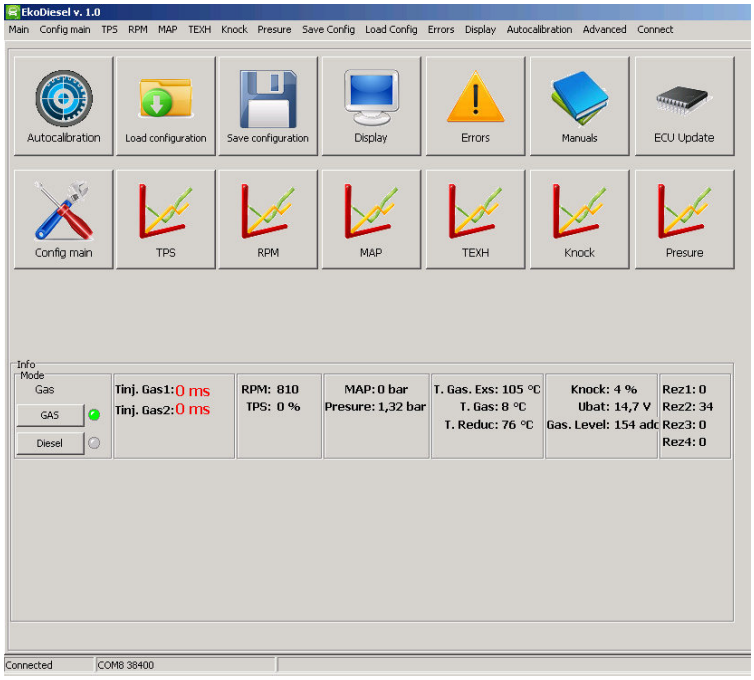
Program installation

The program has automatic installation function. So:
1. Insert CD ROM into CD drive.
2. Select language and disc where you want to place the program.
3. Press button INSTALL
4. After successful installation press button EXIT.
5. An icon EGS appears on the desktop.

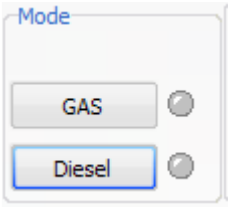
Program description

Minimal requirements to PC:
Windows 98 and later versions,
Processor: 500 MHz
memory 256 MB RAM
hard disc 25 MD
CD ROM driver availability
COM or USB port.

Window MAIN



Main window where main program windows are placed. They are doubled with buttons on top of the program. Bottom part of main window at right has the buttons (with indication) of switching car to Diesel or Diesel-Gas .



Tinj. Gas1: - duration of gas pulse of BANK 1 (msec.)\

RPM: - current RPM

TPS: - current position of acceleration pedal, in per cents. (0 % pedal is released, 100% means fully pressed)

MAP: - current pressure value in inlet manifold (in bars)

Presure: - current pressure value of gas in gas injectors line (in bars)

T. Gas. Exs: - current value of exhaust gas temperature (in °C)

T. Gas: - current value of gas temperature (in °C)

T. Reduc: - current value of reducer temperature (in °C)

Knock: - current value of knock sensor (in ADC units)

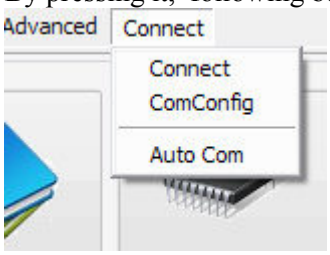
Ubat: - current voltage value of in Gas ECU input (V).

Gas. Level: - current value of level sensor (in ADC units)

Info- - bottom part of this window indicates text information of Gas ECU operation.
Left bottom part of this window indicates: there is or no connection, number of com. port and speed of interconnection. If connection available - Connect, if no – Disconnect .

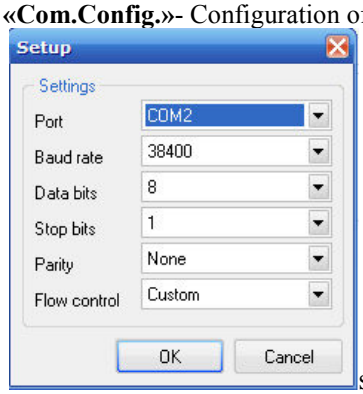
Button Connect

By pressing it, following buttons appear:



Connect - by pressing it, you may connect or disconnect gas ECU .

«Com.Config.»- Configuration of COM port.



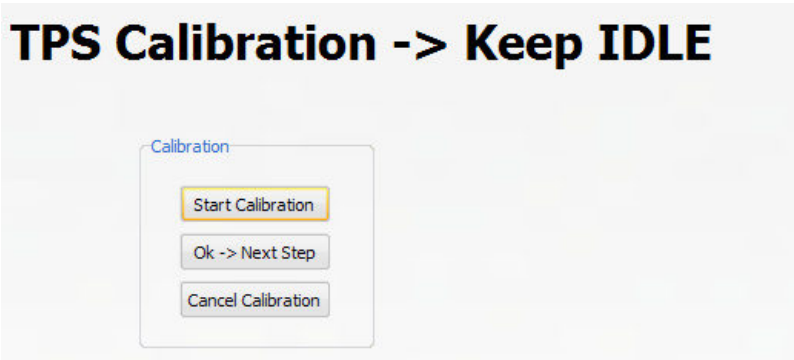
selection of Com.port number. Leave all other parameters without changing (as in window).

"Auto Com" - the mode of automatic search of Com.port.

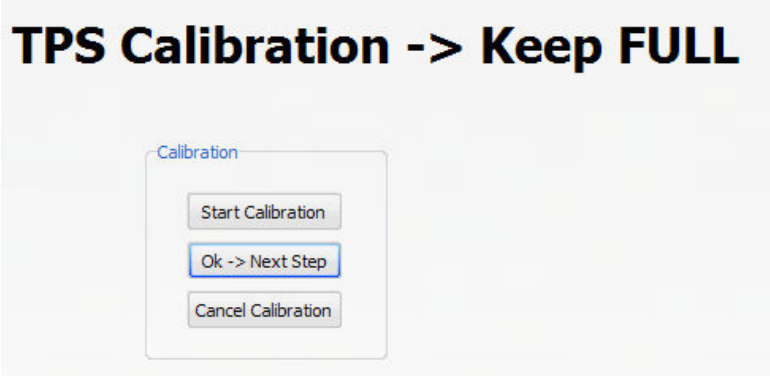
Car Autocalibration

After installation finish and gas refueling do the following:

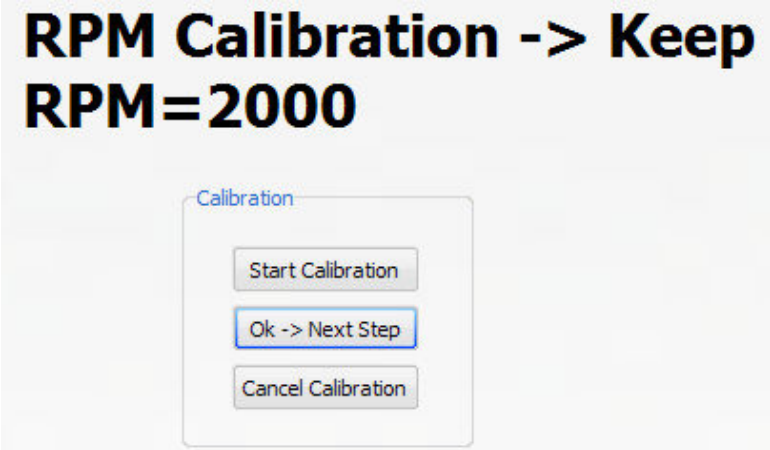
1. Start the car on Diesel and leave it to work on idling, switching off all extra equipment (headlights, heater, windows heating, etc.)
2. Connect diagnostic connector to PC and Gas ECU
3. Start diagnostic program EGS-DI by double clicking on the desktop
4. After automatic connection search, click the Icon Config by mouse or arrows DOWN and UP. Input the number of cylinders and press ENTER.
5. Enter the window Autocalibration. The temperature of the reducer has to be more than 60 °C . If no, the system waits for temperature increasing.
6. Release acceleration pedal fully. Press acceleration pedal. When RPM start to increase, press the button OK.



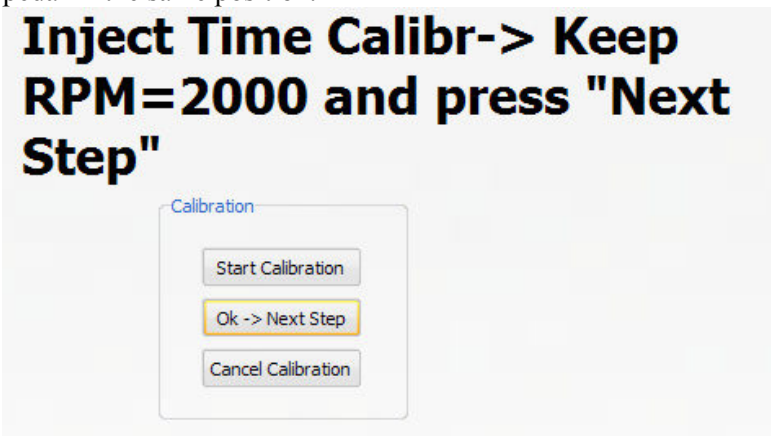
Press acceleration to end some times and press the button OK.



Rise RPM to 2000 and keep it. Press the button OK.

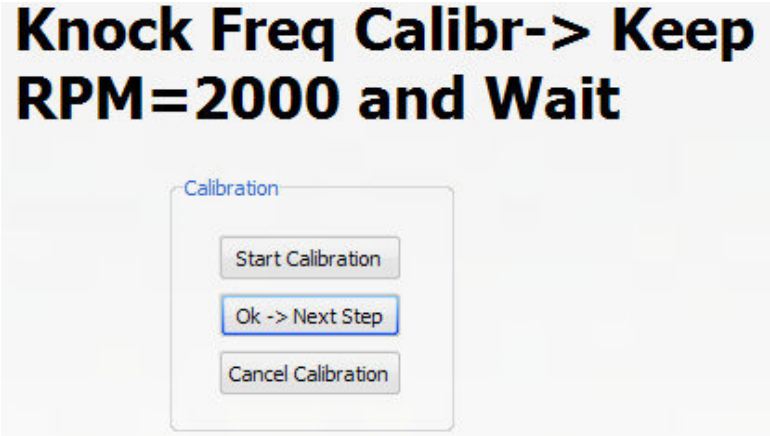


Fix acceleration pedal on 2000 RPM and keeping it, press OK. RPM will rise but keep acceleration pedal in the same position.



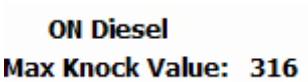
Rise and hold RPM on 2000. Press the button OK.

Keep RPM at 2000 until the system goes to the next step.



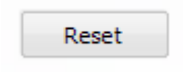
Press acceleration pedal some times abruptly. Press the button OK.

After automatic calibration the system gives the message that parameters are memorized and goes to Diesel mode.

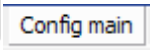


- maximal value of knock sensor on performance on Diesel.

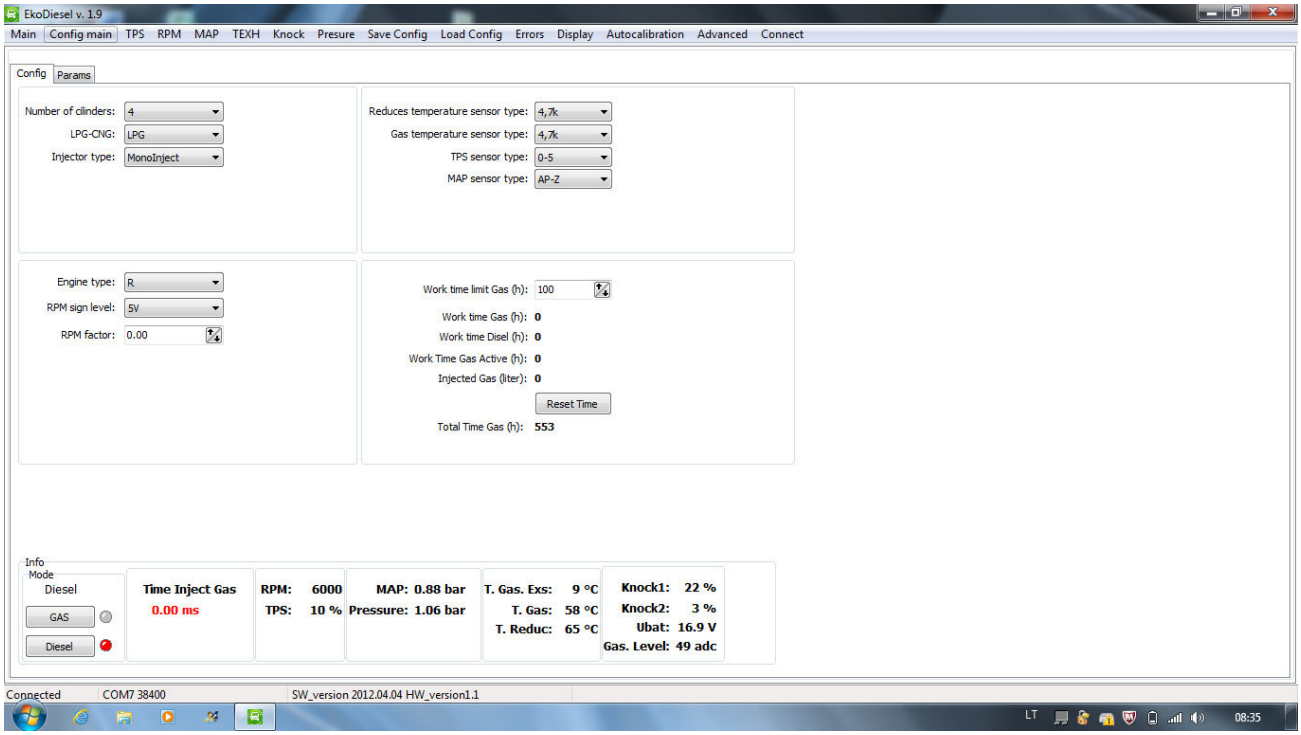
- maximal value of exhaust temperature sensor on performance on Diesel.



- delete values.



Main configuration «Config»- main parameters of engine and gad equipment.



In order to change parameter value in the program, select its value and press ENTER. It does not concern work with curves: at dragging point its new position is fixed automatically (you may do not press button ENTER).

Number of cilinders: 4 - the number of cylinders in engine.

LPG-CNG: LPG - type of gas in use (propane- LPG or methane - CNG)

Engine type: R - engine type (in-line - R or V-type).

RPM sign level: 1,5V - RPM signal level , (1.5 V or 5 V)

RPM factor: 1,00 - the factor of RPM. Is set automatically at auto calibration

Reduces temperature sensor type: 4,7k - type of reducer temperature sensor

Gas temperature sensor type: 4,7k - type of gas temperature sensor

TPS sensor type: T1 - type of acceleration pedal position sensor

MAP sensor type: AP-Z - type of MAP sensor

Work time limit Gas: 1000 limit between technical inspections - running time on Diesel (hrs.)

Work time Gas (h): **0** - running time on Gas-Diesel (hrs.).

Work time Disel (h): **0** - running time on Diesel and Gas-Diesel (hrs.).

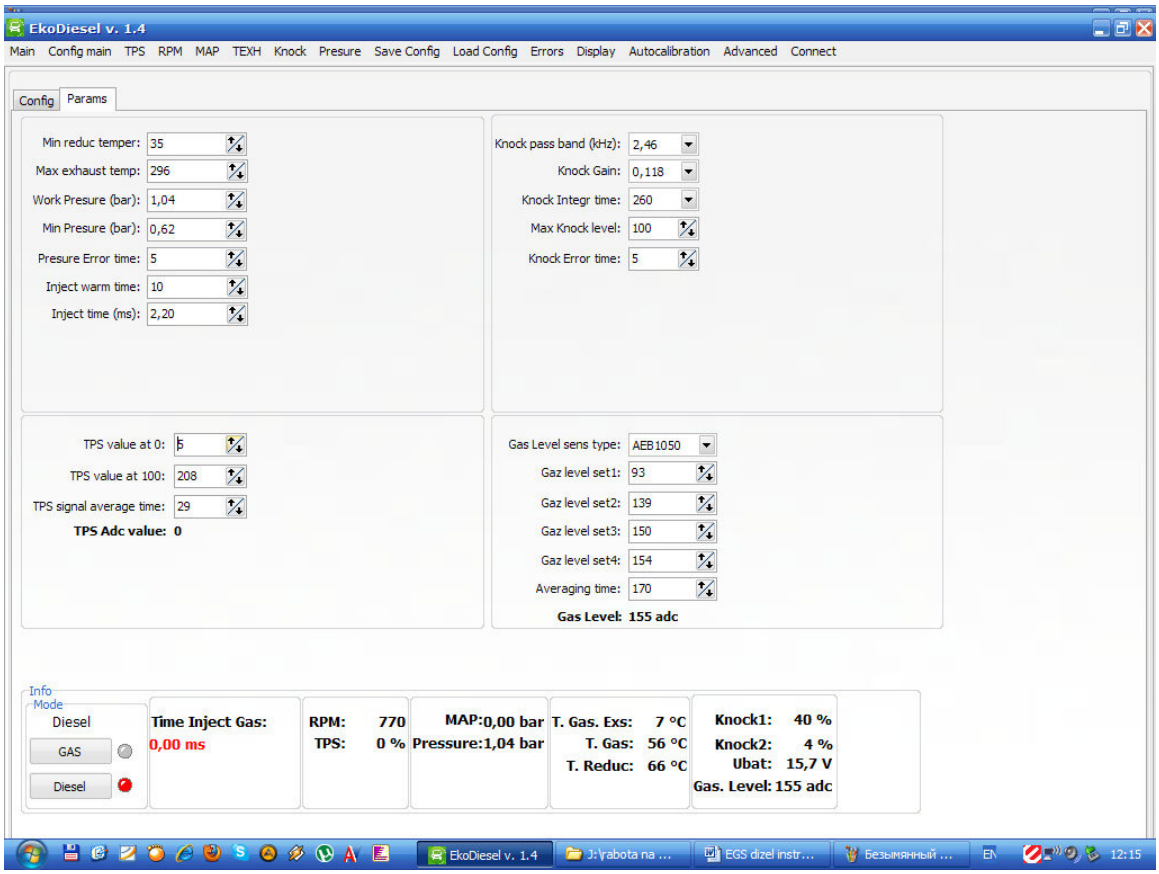
Work Time Gas Active (h): **0** - running time on Gas-Diesel (hrs.) when Gas was in use.

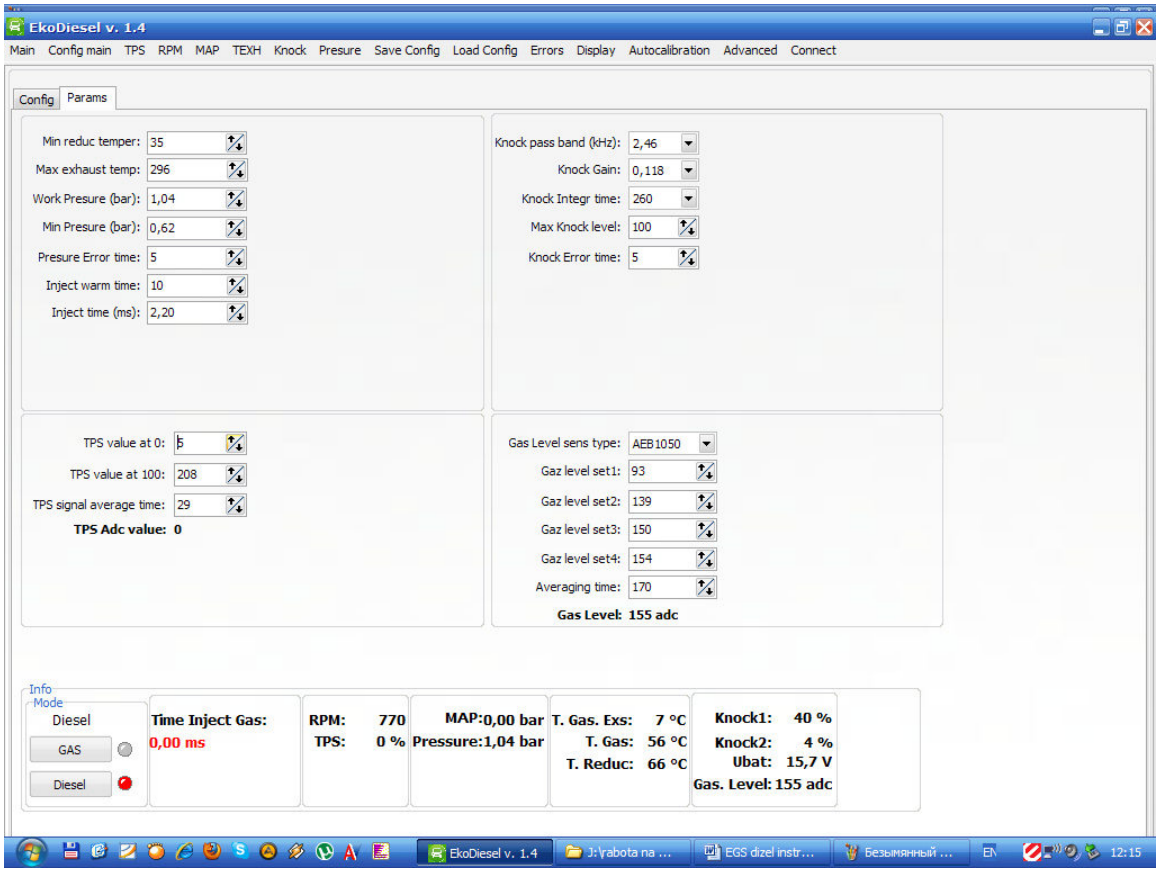
Injected Gas (liter): **0** -quantity of used Gas (option).

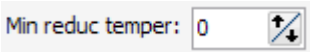
Reset Time - Button RESET - clears all times.

Total Time Gas (h): **Label41** The whole operation time on Gas-Diesel (hours). It will be reset at autocalibtarion.

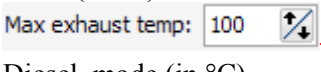
Parameters: main parameters of gas equipment tuning







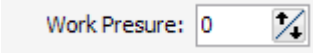
-- reducer temperature, at reaching which the system switches to Gas- Diesel mode (in °C)



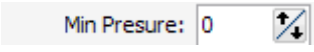
-- maximal exhaust gas temperature, at reaching which the system switches to Diesel mode (in °C)

Critical exhaust temperature is temperature at which gas supply is stopped. We recommend to set it by 50 °C more than maximal temperature at is fixed on loaded car performance. Do not set it too high in order to prevent engine runaway.

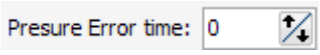
.



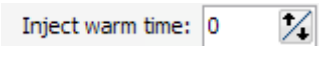
- gas pressure in injectors line. Is set up automatically at auto calibration (in bars)



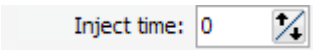
- minimal pressure in injectors line, at reaching which the system switches to Diesel mode (in bars)



- response time to minimal pressure (sec.).



- response time to injectors breakage (sec.)



gas injection time (To in msec.) (it is recorded automatically at autocalibration) relatively which injection time (T) is calculated, with different re-calculation factors T=To*Krps*Krpm*…….

Manual tuning of acceleration pedal position sensor (TPS)

TPS value at 0: 0 - value (in ADC units) of signal of fully released acceleration pedal + 5…10 units, at which the system is working in Diesel-Gas mode (it is recorded automatically at autocalibration).

TPS value at 100: 0 - value (in ADC units) of signal of fully pressed acceleration pedal - 5…10 units, at which the system is working in Diesel-Gas mode (it is recorded automatically at autocalibration).

TPS signal average time: 0 - time of averaging of signal of acceleration pedal position.

Tuning of knock sensor

Knock pass band: 1,22 - frequency of band pass filter (in KHz), it is recorded automatically at autocalibration.

Knock Gain: 2,000 - gain of knock sensor signal, it is recorded automatically at autocalibration.

Knock Integr time: 40 - integration time of knock sensor signal.

Max Knock level: 0 - maximal value of knock sensor signal, at which the system switches to Diesel mode.

Knock Error time: 0 - response time at reaching maximal value of knock sensor signal.

Tuning of gas level sensor in tank

Gas Level sens type: Type 0-90 -type of gas level sensor in tank

Gaz level set1: 0 - value of gas level sensor signal (in ADC), lower which gas level understood as reserve on the button (one red LED)

Gaz level set2: 0 - value of gas level sensor signal (in ADC), lower which gas level understood as ¼ of tank on the button (one green LED)

Gaz level set3: 0 -- value of gas level sensor signal (in ADC), lower which gas level understood as ½ of tank on the button (two green LEDs)

Gaz level set4: 0 - value of gas level sensor signal (in ADC), lower which gas level understood as ¾ of tank on the button (three green LEDs). If the signal is higher it is understood as full tank (four green LEDs)

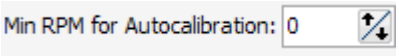
Averaging time: 0 - averaging time of gas level sensor signal

Gas Level: - value of gas level sensor signal (in ADC)

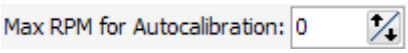
Advanced

Max RPM Limiting Gas: 0 -maximal engine RPM at which the system does not give gas pulses on Diesel-Gas mode (in RPM)

Max RPM Switch to Diesel: 0 - maximal engine RPM at which the system switches to Diesel mode



- minimal engine RPM at which software gathers loading chart in window Display (in RPM)



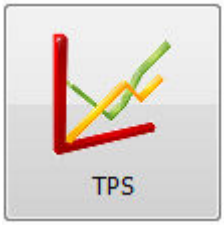
- maximal engine RPM at which software gathers loading chart in window Display (in RPM).

Charts tuning windows

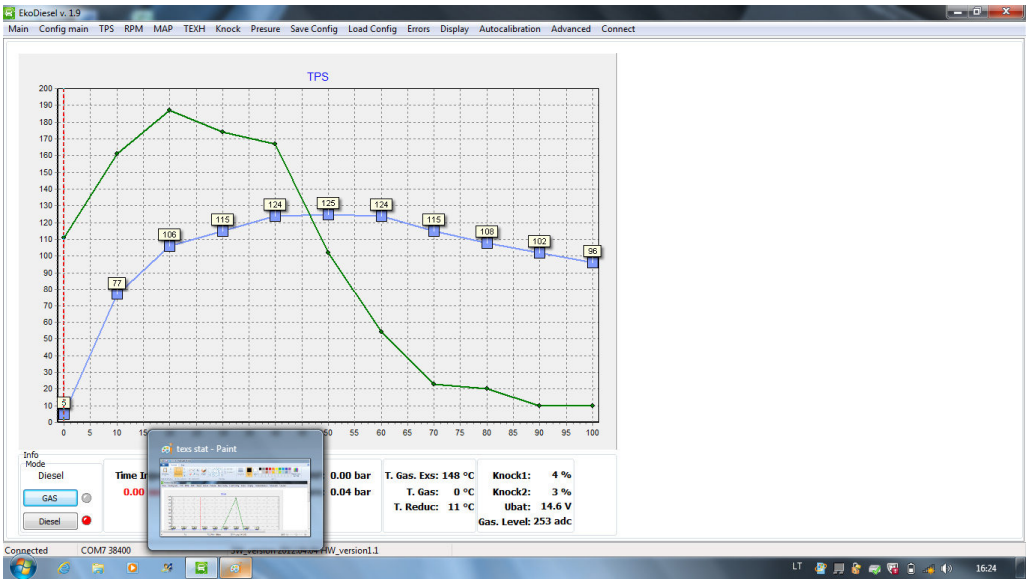
The duration of gas pulse is calculated as initial one which was obtained after autocalibration and multiplied to different influence factors that are set in charts tuning windows (**TPS, RPM, MAP, Knock, TECH).**

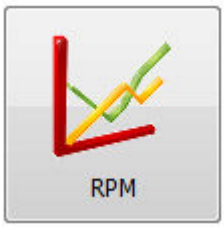
T=To*Ktps*Krpm*Kmap*K….

All windows have the same performance principle. Select necessary chart window and drag with mouse and left button on it point to the other value of factor. Its value is indicated on left axis, eg. 200 corresponds to factor 2. Bottom axis shows signal values of current window. Red dotted stripe shows its current value.



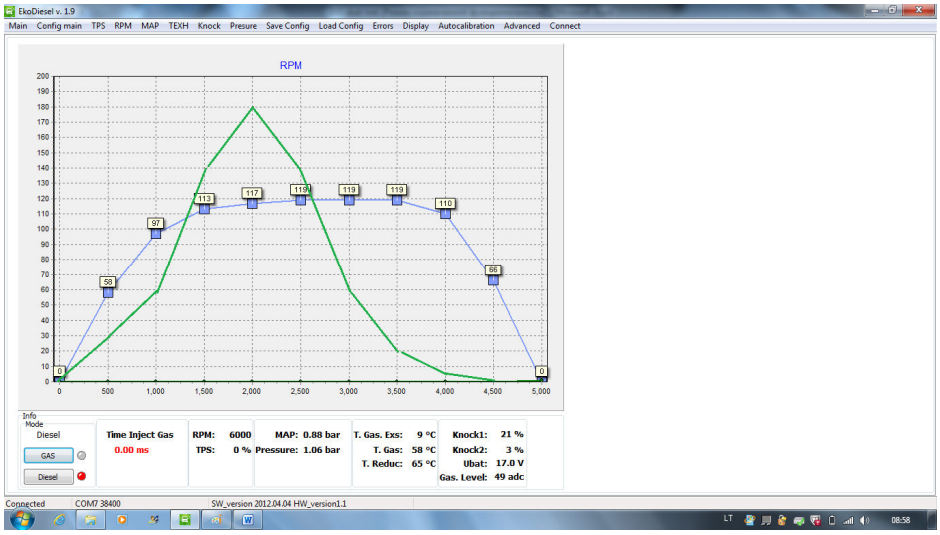
TPS (APP) chart tuning window





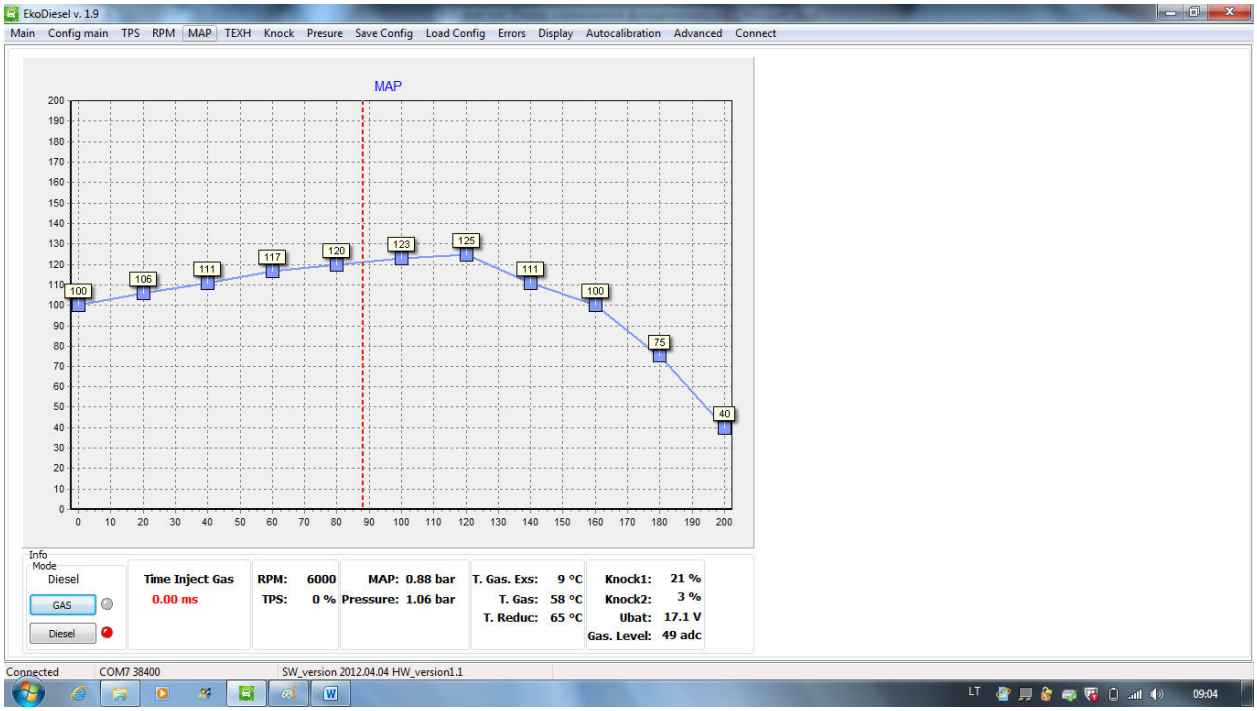
RPM chart tuning window

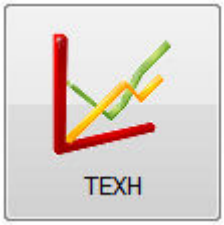
This chart is used for correction of gas supply, depending on engine RPM and supply limitation at maximal RPM in order to prevent engine destroy (runaway). Green curve shows statistical data on RPM, within which values RPM were within certain time period.



MAP chart tuning window (pressure in turbocharger)

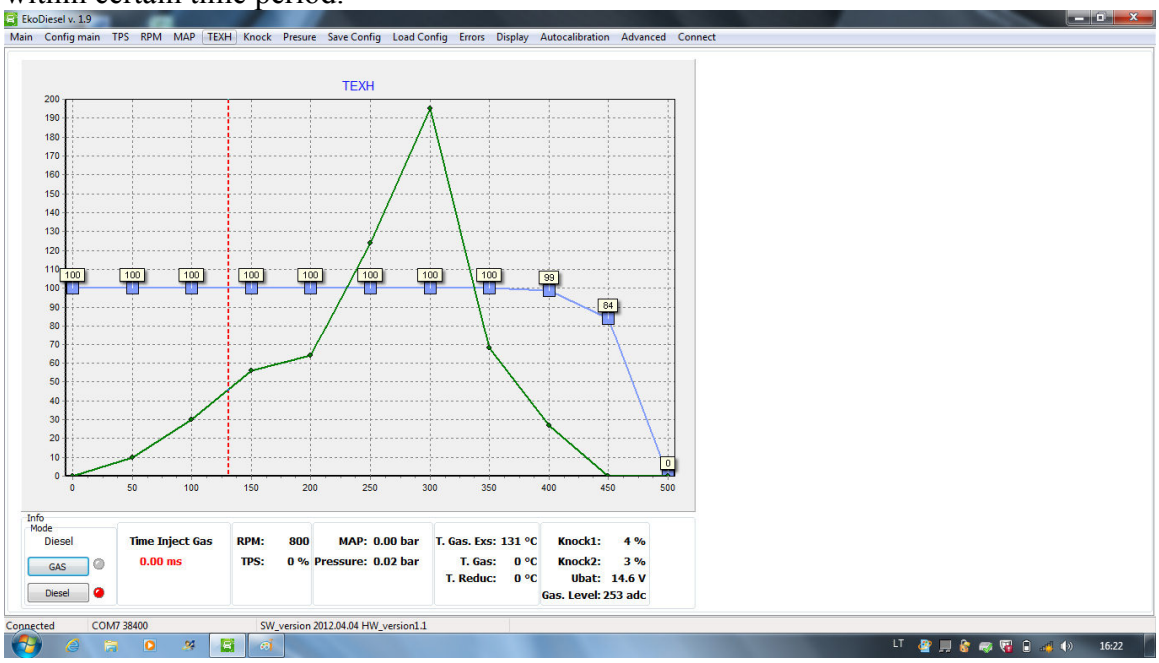
This chart is used for correction and limitation of gas supply depending on pressure in turbocharger.

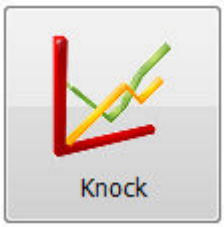




TECH chart tuning window (exhaust temperature)

At tuning this chart, taking into account that temperature on Gas-Diesel mode will not exceed maximal temperature on diesel. Exceeding maximal temperature of exhaust gas may come to destroy turbocharger or glow-plugs. In order to tune exactly for drive on diesel fuel on maximal loads, set maximal temperature of exhaust gas in software. Afterwards, move to 50 °C and decrease abruptly gas supply after this value. For example, maximal temperature is 450 °C. Deduct 50 °C , so from 400 °C decrease gas supply by factors diminution, as shown below.
Green curve shows statistical data of exhaust gas temperature, within which values temperature was within certain time period.



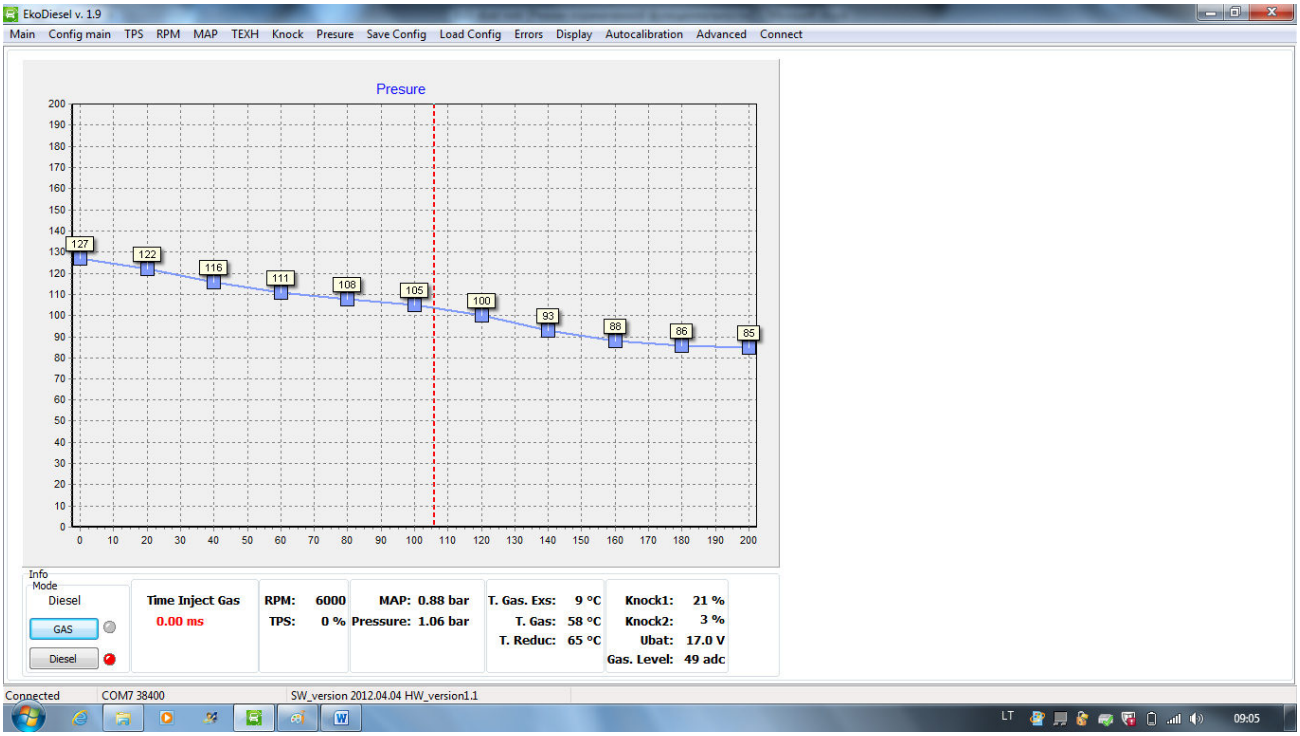


Knock sensor chart tuning window

This chart is used for limitation of engine knocking at operation on gas-diesel fuel. Knock sensor is automatically tuned during autocalibration. But if it is not enough, make the same procedure as for exhaust gas temperature. Draw attention to maximal value of knock sensor. Deduct 10 % if this value and limit gas supply with factors.

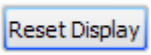
Pressure chart tuning window

This chart is used for gas portion changing depending on gas pressure in the system.

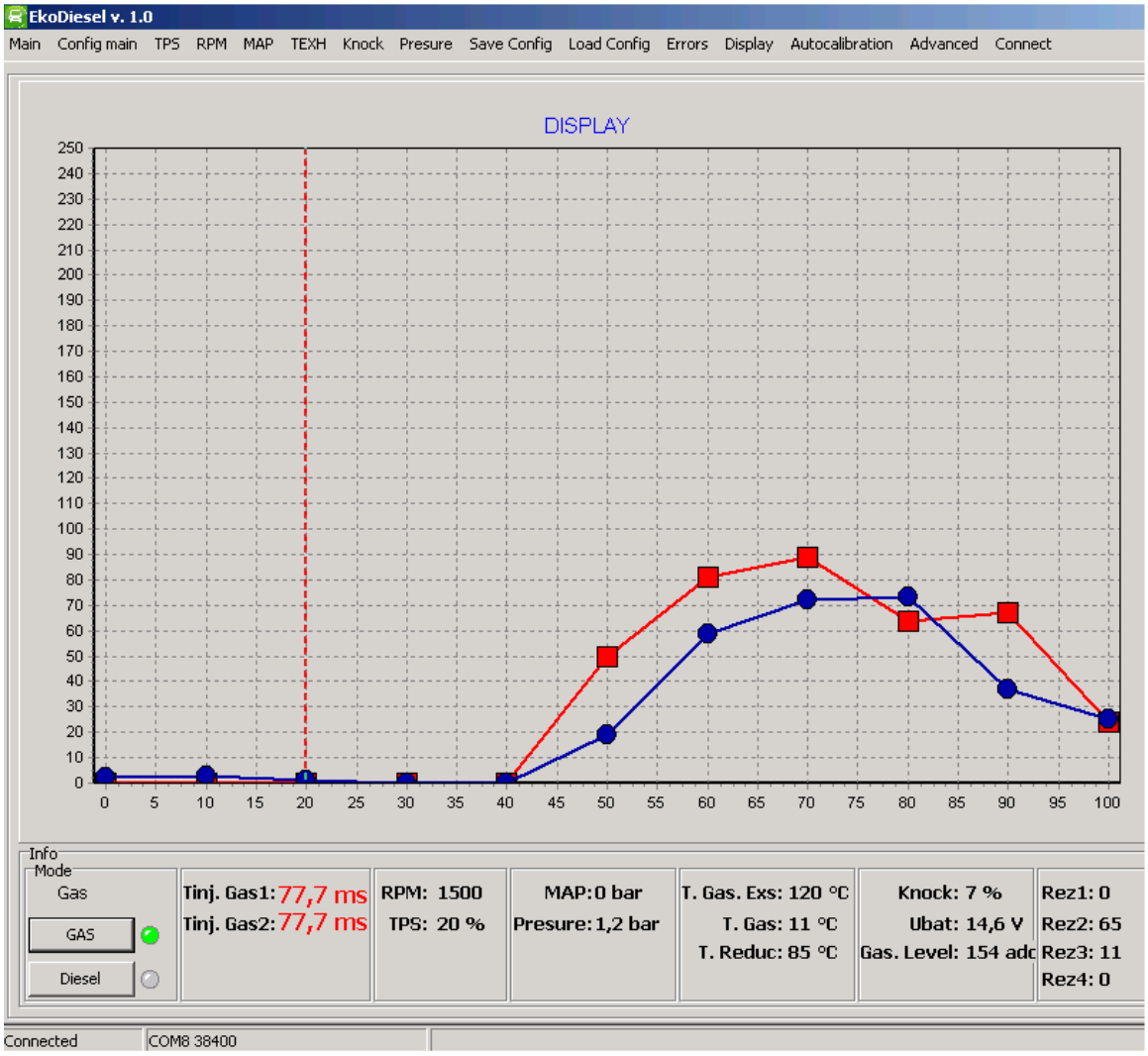


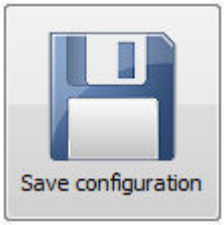
Display window

This window is used for comparison of load characteristics on operation on diesel and gas – diesel. At normal tuning, curves differ by 10-20 % on TPS axis. The chart is gathered at drive on diesel, firstly (red curve), at different TPS values. The parameters, lower and upper RPM values are set in window Advanced. Afterwards, gather chart on gas-diesel in the same modes (blue curve).



- to clear all statistical and loading parameters.



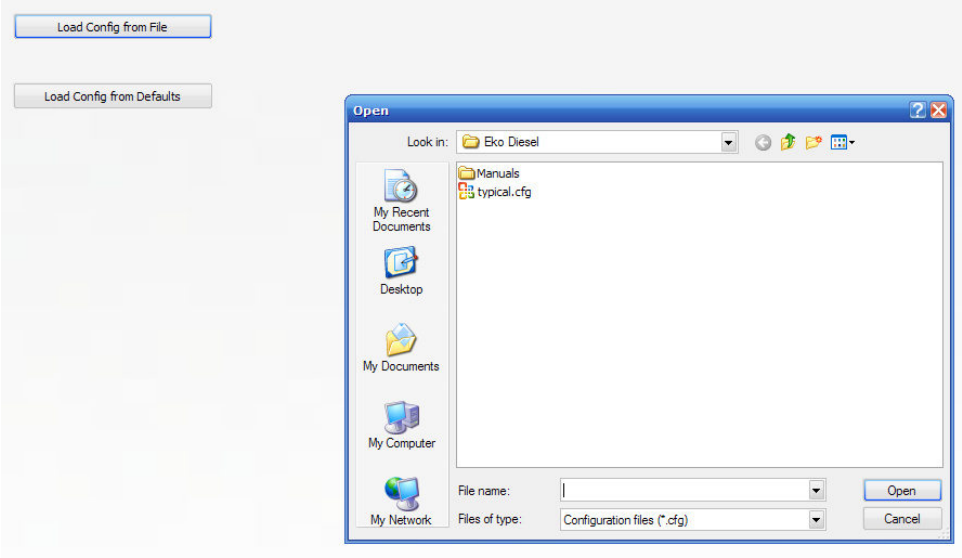


Save Config. window

This window is used for saving all tuning parameters of the car in the system memory.
In order to save, enter this window (Save Config). Click the button Save Config to File, the window Save As will open. Save car data there, do not delete extension .cfg, and click the button Save.

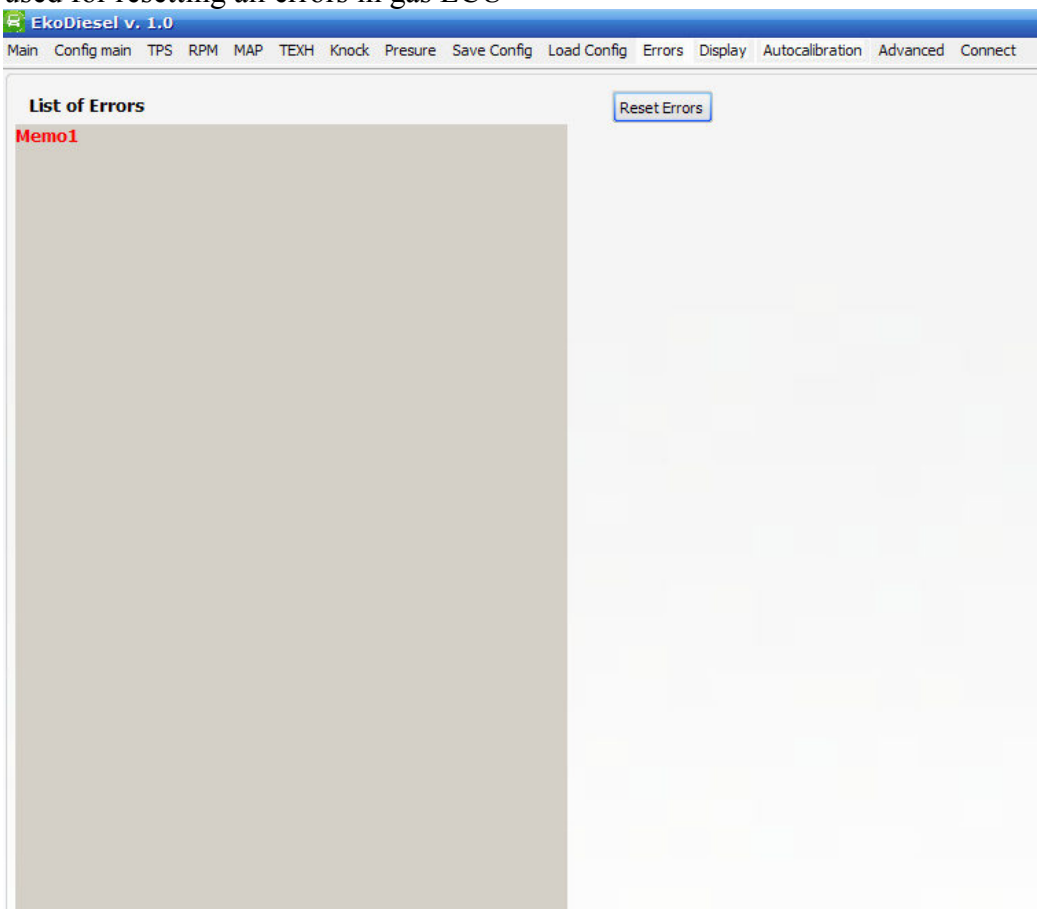
Load Config. window

This window is used for saving all parameters of the car from program memory to gas ECU memory. In order to save, enter this window **Load Config**., click the button **Load Config from File** , the window **Open** will open. Select necessary data of the car and click button **Open**.
In order to load factory's settings click the button **Load Config from Default**.

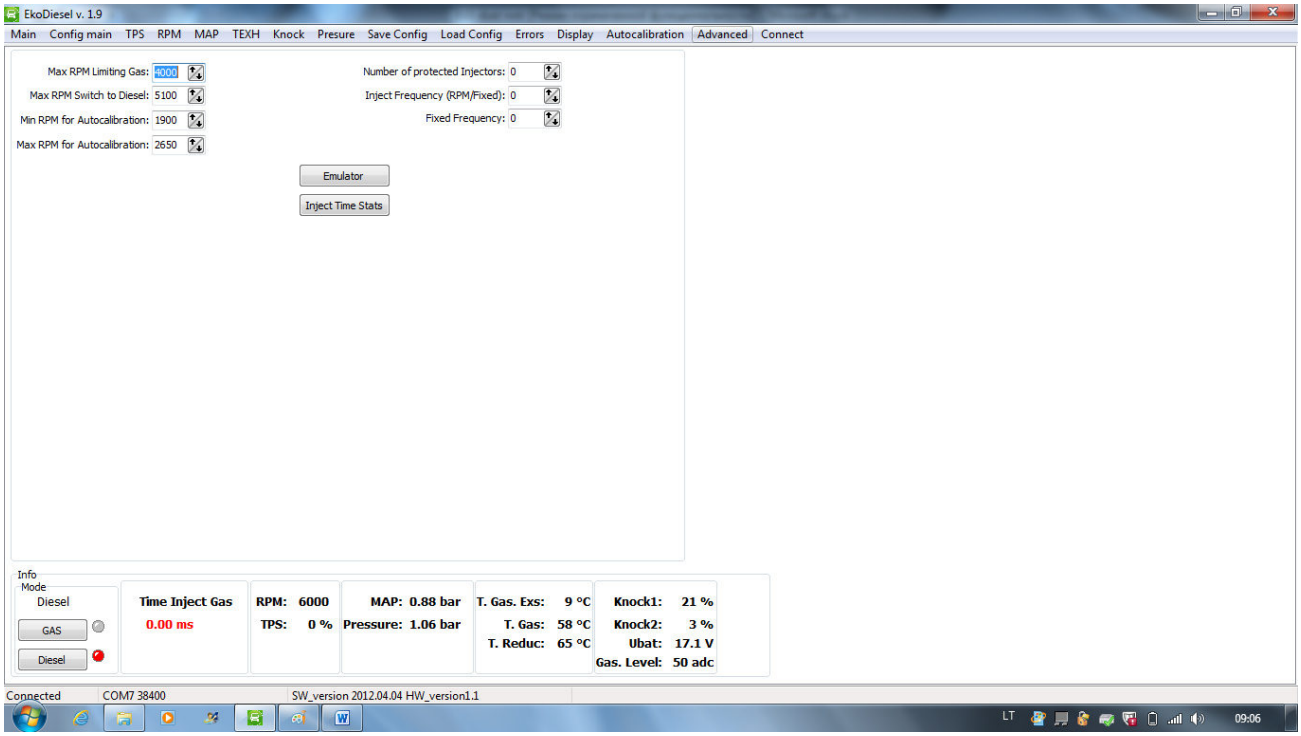


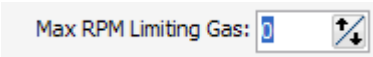
Window Errors

This window is used for indication of all errors in Gas-diesel system that are registered in gas ECU. There will be indicated all errors and the number of recurrence. The butten Reset Errors is used for resetting all errors in gas ECU

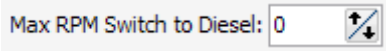


Window Advanced

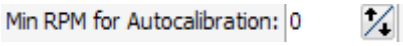




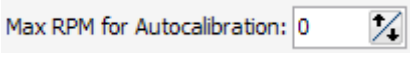
- RPM on operation in gas-diesel mode. At exceeding set RPM value gas supply is stopped but the system stays in Gas-Diesel mode. At decreasing RPM the system comes back to gas supply.



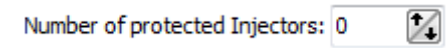
- RPM on gas-diesel operation by exceeding which the system goes to diesel mode.



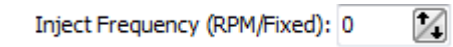
- minimal RPM at which the window DISPLAY gathers load chart.



- maximal RPM at which the window DISPLAY gathers load chart.

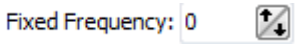


- the number of injectors which are checked for break or short circuit . 0 – no checking.

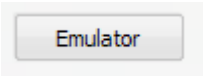


- type of system working algorithm

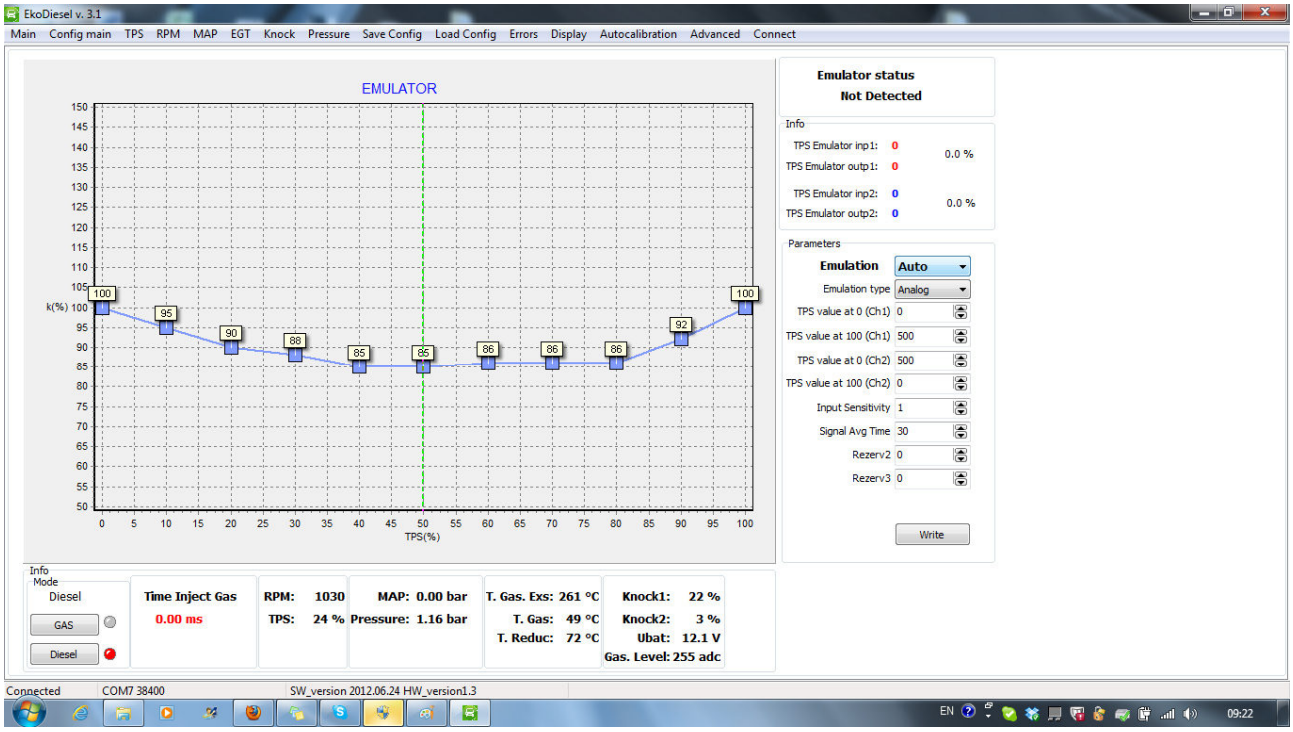
0- frequency of gas pulses depends on RPM
1- frequency of gas pulses is fixed



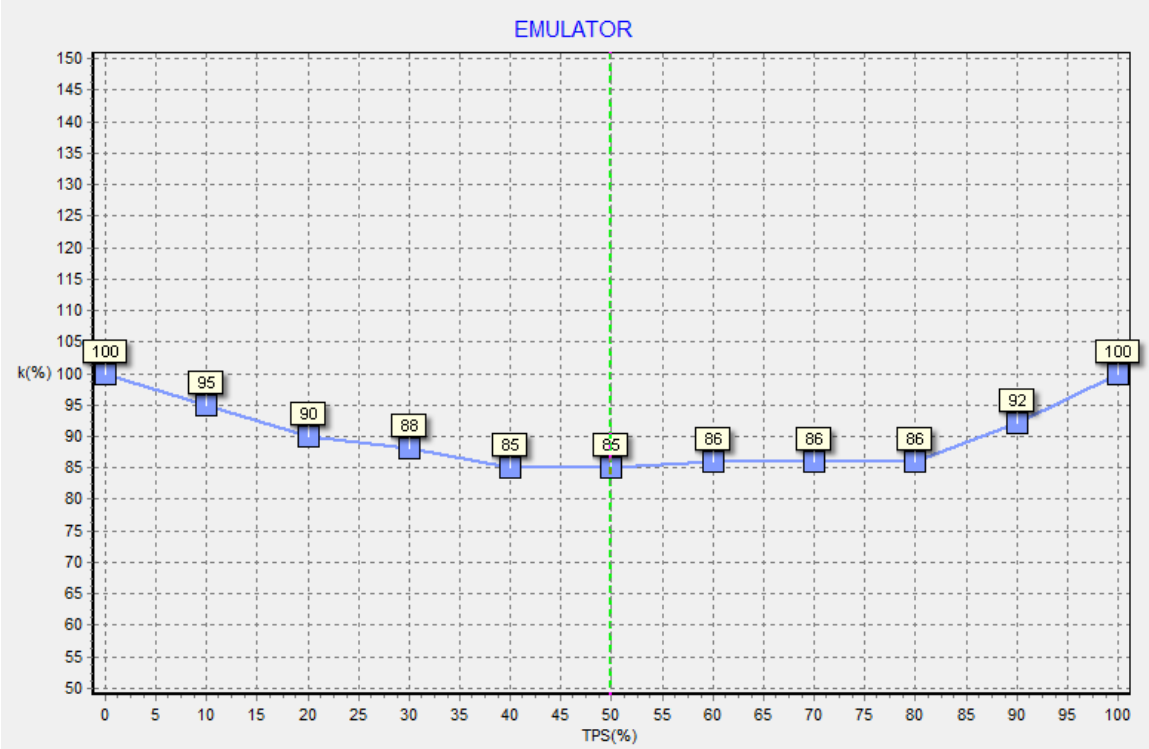
frequency of gas pulses is fixed mode.



- entrance to window of emulation channel tuning (option).



This window is used to tune emulation module (optional) of signals of acceleration pedal sensor.



Emulator performance diagram. Changing of curve is the same as for other curves in program (dragging the point to proper place). By this diagram we can change value of output TPS signal, depending on input signal (in %) by set value , in %. For example: Value of input TPS signal is 50 %, re-calculation factor is 85 %, than value of output TPS signal is 42.5 %, i.e. we decrease value of TPS signal by 7.5 %.

Emulator status

Not Detected - emulator status (On, Off, Not Detected)

Info

TPS Emulator inp1: 0 0.0 %

TPS Emulator outp1: 0

TPS Emulator inp2: 0 0.0 %

TPS Emulator outp2: 0

display of output of emulator performance.

TPS Emulator inp1: 0 value of input signal of TPS, Channel 1 (in ADC units)

TPS Emulator outp1: 0 value of ourput signal of TPS, Channel 1 (in ADC units)

0.0 % value of emulation rate in %, Channel 1.

Channel 2 is displayed in the same way as Channel 1.
The windows to be filled in for proper emulator performance.

Emulation Auto

Emulation type OFF / ON / Auto

value at 0 (Ch1) -emulator performance modes.

AUTO-automatic mode. Emulator switches on at switching system to Gas-Diesel mode.
OFF- Emulator is always OFF.
ON- Emulator is always ON.

Emulation type Analog

value at 0 (Ch1) PWM / Analog - Type of input signal of TPS.

PWM - Digital signal.
Analog- Analog signal.

TPS value at 0 (Ch1) 0 -value of TPS at released acceleration pedal. To be set the figure in the window TPS Emulator inp1: 0

TPS value at 100 (Ch1) 500 -value of TPS at fully pressed acceleration pedal. To be set the figure in the window TPS Emulator outp1: 0

TPS value at 0 (Ch2) 500

TPS value at 100 (Ch2) 0 -these values to be set in the same way as for Channel 2, see above.

Input Sensitivity 1 -sensitivity by input signal

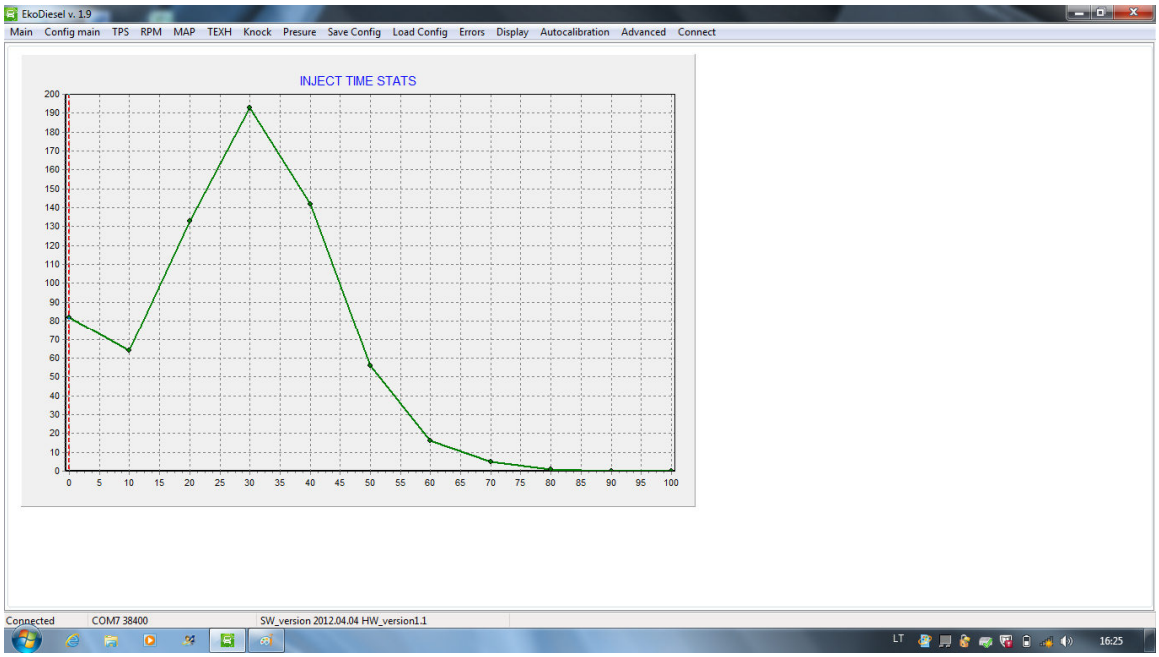
Signal Avg Time 30 -avaraging time of output signal

Rezerv2 0

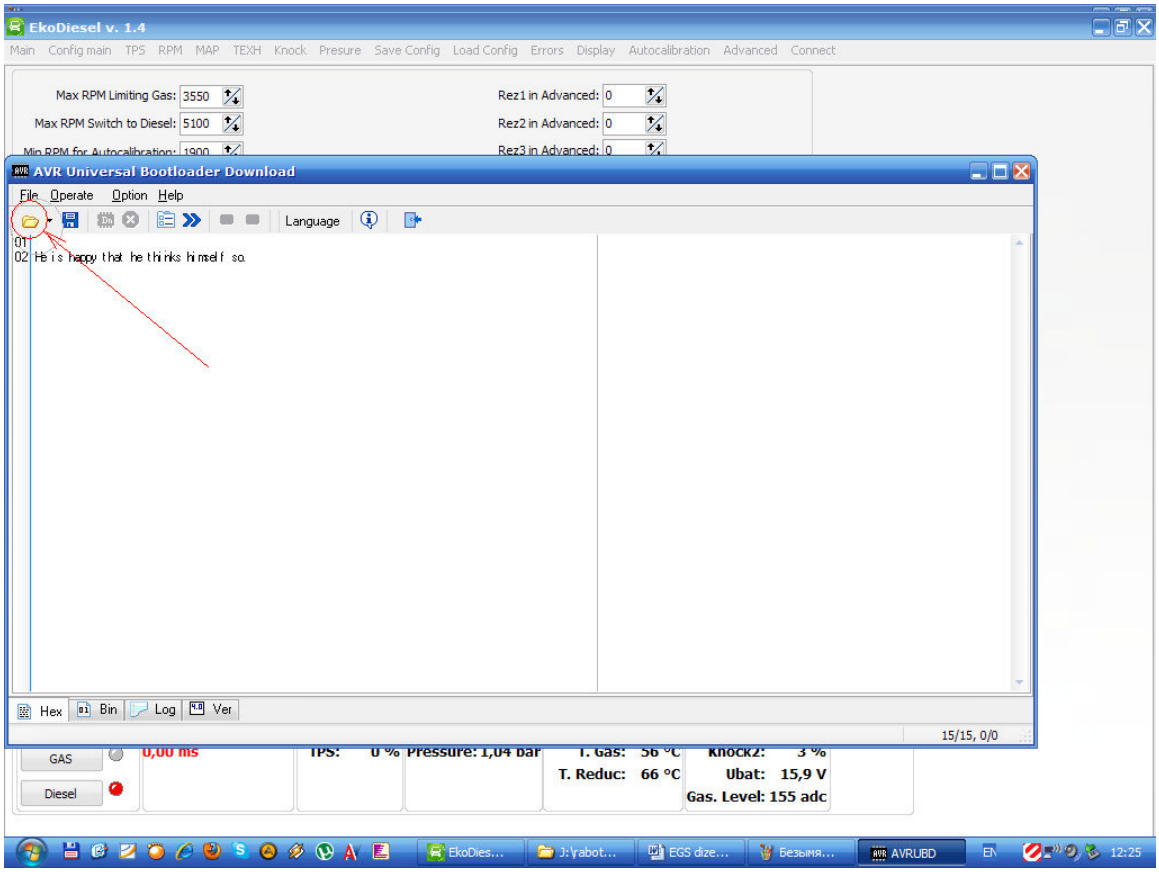
Rezerv3 0 - reserved data (not used)

Write **-After data changing click this button !**

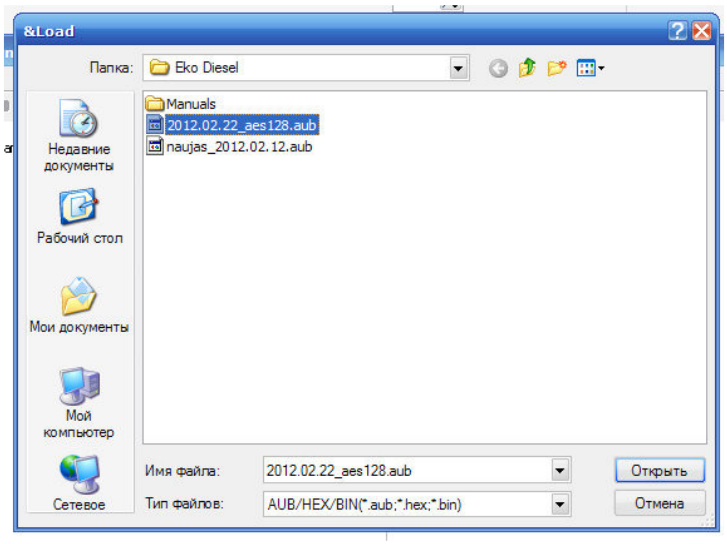
- distribution of gas pulses duty ratio in time. It allows to estimate correctness of injectors selection and approximate gas consumption.



new software updating to gas ECU.

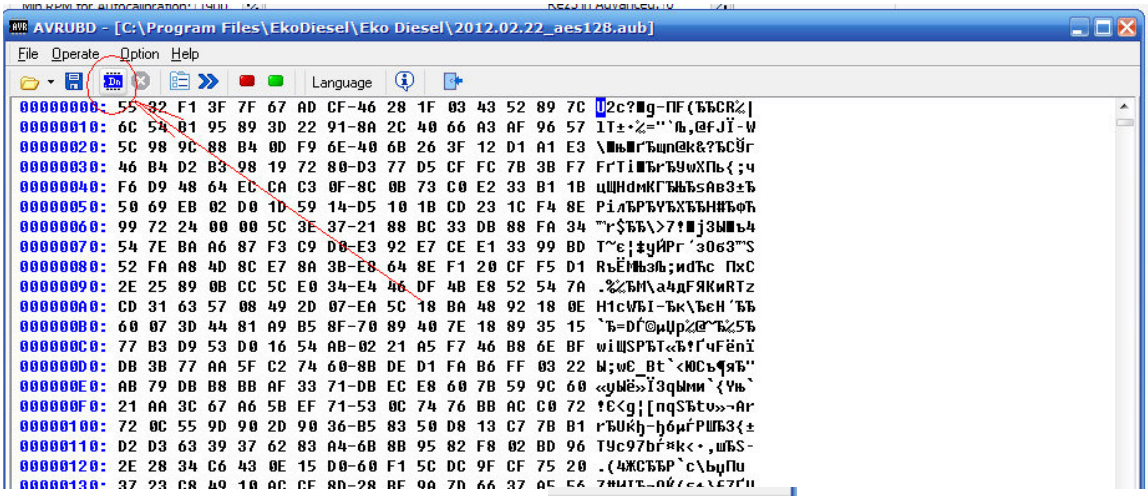


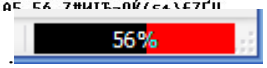
Press the button OPEN FOLDER.



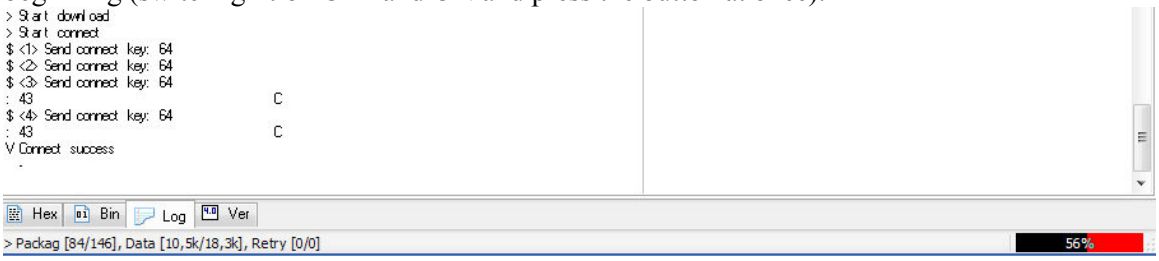
Select the file to load and press OPEN.

Switch ignition OFF, switch it back to ON and at once press the button 



After pressing the button loading is starting. 

If no, repeat the procedure from the beginning (switch ignition OFF and ON and press the button at once).

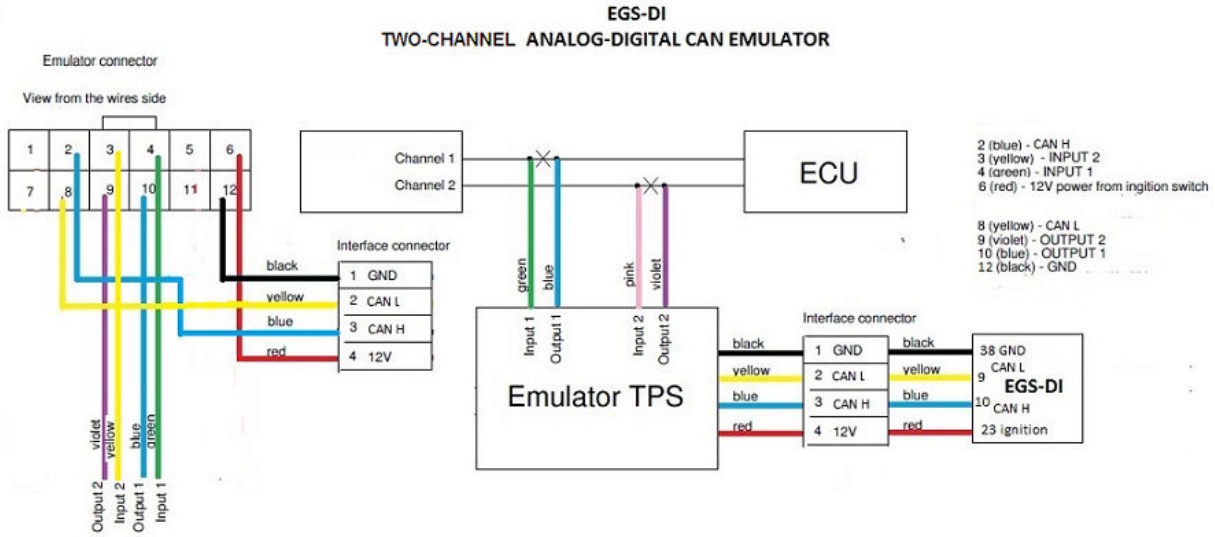


If loading completed successfully, the program gives following message:

> Packag [146/146], Data [18,3k/18,3k], Retry [0/0]
√ Update success: time elapsed [12,3s], speed 1,5k/s.

After programming complete exit loader program. After exit press the button AUTOCOM to restore interconnection with Gas ECU.

Attention: ECU memorizes all changes only after switching ignition off. **Never remove fuse or ECU from socket until ignition is off and LEDs on remote control are OFF !**

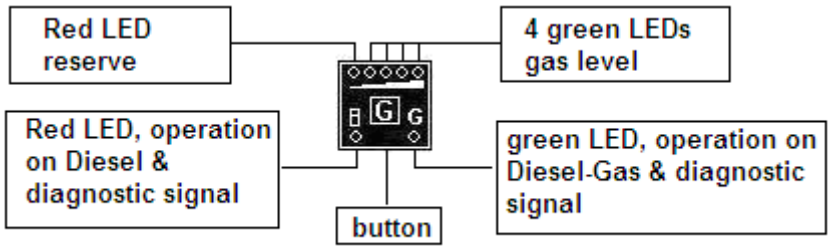


Changeover switch performance

The fuel mode switch is for switching between Diesel and Diesel-Gas modes.

It consists of 7 luminous LEDs, the button and the embedded buzzer. It also carries out memory function which means that it can remember the **mode** which was in use before turning off ignition and returns to it after ignition is on again.

The button in the center of switch is used to select Diesel or Diesel-Gas mode. After holding it pressed for 1 sec. the system switches to the other mode (Diesel- Gas/Diesel). At the same time, the buzzer makes a short sound which means that Diesel mode is now in use or a two short sounds if it is in Diesel-Gas mode.



Red LED indicates the work on the **Diesel (LED burns)**. If it blinks - that the system works in emergency mode (eg. , due to broken fuse).

Green LED indicates the work on the Diesel-Gas mode (LED burns). If it blinks the system waits until terms of switching are satisfied (RPM and reducer temperature should achieve necessary values). If it blinks slowly, reducer temperature is low, yet. If it blinks rapidly , RPM is not enough, yet.

Red LED and 4 green ones indicate the level of the gas in tank. If only red burns it means that reserve is in use. Four **Green LEDs** indicate the GAS level (¼, ½, ¾, 1).

If necessary to replace the filter, the system emits not two but 10 short signals at switching to Diesel-Gas.

Automatic switching to Diesel at low Gas pressure

At working on Diesel-Gas, when pressure drops to value that was set in the program, the system automatically switches to Diesel. At the same time buzzer emits constant signal for 4 sec. and level blinks with all LEDs. It indicates that no gas left in tank or it is necessary to replace filter of fine cleaning.

When reducer is cool at working on Diesel-Gas, the system switches to Diesel. At the same time lower red LED is on and green LED blinks slowly. If reducer temperature rises, the system switches to Diesel-Gas automatically.

If the system detects gas escape, the system switches to Diesel and all level LEDs blink. Buzzer emits constant sound which could be stopped by pressing the button. In this mode, switch does not respond to pressing button until ignition is switched OFF and back ON.

Emergency transition to Diesel at trouble in the system(option).

If fuse blows in the system or there are other fails, the system makes emergency transition to Diesel. At this time buzzer emits permanent signal and level LEDs blink . There are trouble codes as below 9break or short circuit):

 knock sensor

 gas valve

 multivalve

 pressure sensor

 vacuum sensor

 supply voltage

 gas injector

 common rail sensor

 temperature sensor of exhaust gases

 reducer temperature sensor

 gas temperature sensor

To stop constant signal and trouble codes indication is possible by pressing button. The switch does not respond to pressing button until ignition switched off and on back.
Transition to Diesel-Gas blend in case of failures of temperature sensors occurs with failures analyze. If only reducer temperature sensor is faulty, the system waits for 10 min. with trouble code indication and switches to Diesel-Gas.
If gas temperature sensor is faulty, the system indicates trouble code and switches to Diesel-Gas. Temperature value is taken from default, in this case. If both reducer and gas temperature sensors are faulty, the system does not switch to Diesel-Gas but to emergency mode.

Technical data

Supply Voltage	12 V with negative on car body
Minimal resistance of gas injector	1 Ohm
Maximal current	15 A
Current when ignition off	0 mA
Ambient temperature	-40 °C … +110 °C
Inner emulator resistance	100 Ohm
Protection class	IP54

Warranty

The manufacturer provides warranty terms 24 months from the date of installation.
The manufacturer bears no responsibility for damage due to incorrect installation or improper use of equipment.
If the case was open the warranty is void.