

Fuel Tank Calibrator

**Fuel Tank Calibration Software
for
GuardMagic VB, GuardMagic mTF, GuardMagic FSM
modules**

Contents:

- 1. INTRODUCTION 3
- 2. REQUIREMENTS TO WORKING PLACE 3
- 3. REQUIREMENTS TO PC 4
- 4. GuardMagic VB, GuardMagic mTF MODULE CONNECTION 5
 - 4.1. CONNECTION DIAGRAM 5
 - 4.2. CONNECTION ORDER 5
- 5. GuardMagic FSM MODULE CONNECTION 6
 - 5.1. CONNECTION DIAGRAM 6
 - 5.2. CONNECTION ORDER 6
- 6. START PROGRAM 7
 - 6.1. BEFORE STARTING 7
 - 6.2. START PROGRAM 7
- 7. OVERVIEW OF BASIC FORM 8
 - 7.1. MODULE MAIN DATA 8
 - 7.2. CONTROLS ELEMENTS 8
 - 7.3. FUEL TANK SELECTION 9
 - 7.4. CALLIBRATION TABLE 9
 - 7.5. CALLIBRATION GRAPH 9
- 8. CALLIBRATION PROCEDURE 10
 - 8.1. PRINCIPAL PROVISIONS 10
 - 8.2. SAMPLE OF CALIBRATION DATA 10
 - 8.3. ACTION ORDER OF CALLIBRATION PROCEDURE 11
 - 8.4. FORM OF CALIBRATION LEAFLET 12
- 9. APPENDIX: DIGITAL FUEL LEVEL SENSOR ADDRESS IN FUEL BUS 13
 - 9.1. GUARDMAGIC VB MODELE SERIES 13
 - 9.2. GUARDMAGIC mTF MODELE SERIES 13
 - 9.3. GUARDMAGIC FSM MODELE SERIES 13

1. INTRODUCTION

“**GuardMagic Fuel Tank Calibrator**” is the universal technological utility for fuel tank calibration procedure of **GuardMagic VB, GuardMagic mTF and GuardMagic FSM** series modules.

GuardMagic VB2, GuardMagic mTF1, GuardMagic mTF2 modules have analog “fuel interface”

GuardMagic VB3, GuardMagic VB4, GuardMagic VB5, GuardMagic mTF3, GuardMagic FSM2, GuardMagic FSM3 have EIA-485 communication interface.

“**GuardMagic Fuel Tank Calibrator**” utility allows calibrate vehicle main fuel tanks and cargo tanks.

Fuel tank calibration procedure is carried by Notebook (Personal Computer) in vehicle or in object.

2. REQUIREMENTS TO WORKING PLACE

- PC based computer (notebook, portable computer);
- Connection cable GuardMagic VB module – Personal Computer*;
- Program “**GuardMagic Fuel Tank Calibrator**” (TankCib.exe);
- GuardMagic system installed on vehicle.

* - RS-232 cable from GuardMagic VB programming tool set, GuardMagic mTF programming tool set.

If notebook has only USB port will be need in additional standard USB-Com converter (and installed on PC utility for such converter from USB-Com converter set).
This USB-Com converter is acquired independently.

Main Note:

- Before calibration procedure the system based on GuardMagic VB, GuardMagic mTF modules had be mounted on vehicle and made all necessary electrical connection.
See GuardMagic VB or GuardMagic mTF and fuel level sensors installation manual (GuardMagic FLPa, or GuardMagic DLLS1, or GuardMagic DLLS2, or GuardMagic DLLE1, or GuardMagic DLLE2 or GuardMagic DFLS3, or GuardMagic DFLS3CT).
- Before calibration procedure the system based on GuardMagic FSM modules had to be mounted on stationary object and made all necessary electrical connection.
See GuardMagic FSM and fuel level sensor installation manuals (GuardMagic DLLS1, or GuardMagic DLLS2, or GuardMagic DLLE1, or GuardMagic DLLE2 or GuardMagic DFLS3, or GuardMagic DFLS3CT).
- Fuel level sensors (GuardMagic DLLS1, or GuardMagic DLLS2, or GuardMagic DLLE1, or GuardMagic DLLE2, or GuardMagic DFLS3, or GuardMagic DFLS3CT) before calibration procedure have to be programming (entered network address and fixing “dry” and “maximum” level – see DFLS installation manual);
- Fuel level sensor must be connected to GuardMagic module;
- Electrical power be supplied to fuel level sensors.

3. REQUIREMENTS TO PC

Minimum requirements to the PC (notebook):

- MS Windows XP, MS Windows Vista;
- Intel Pentium IV 600 or above (or AMD analogue);
- Main memory 256MB or above;
- 500 free space on a hard disk;
- Mouse and keyboard;
- Free serial port (RS-232);
- Video adapter and color monitor with the resolution not less than 800 x 600.

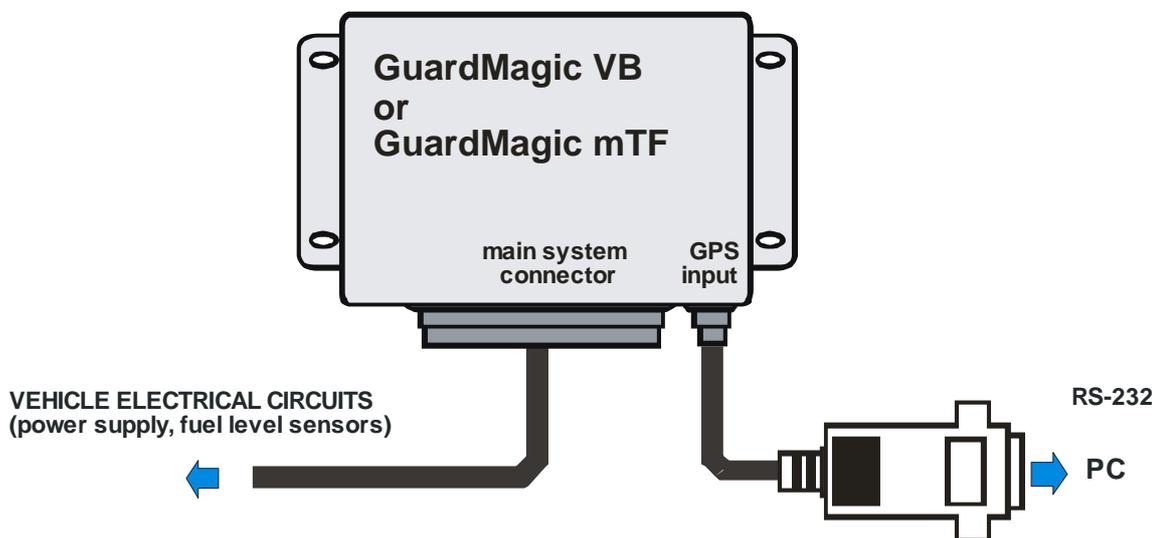
4. GuardMagic VB, GuardMagic mTF MODULE CONNECTION

Before calibration procedure module have be mounted and installed on object (vehicle) and made all necessary electrical connections.

See GuardMagic VB, GuardMagic mTF and fuel level sensors installation manuals ((GuardMagic DLLS1, or GuardMagic DLLS2, or GuardMagic DLLE1, or GuardMagic DLLE2 or GuardMagic DFLS3, or GuardMagic DFLS3CT).



4.1. CONNECTION DIAGRAM



4.2. CONNECTION ORDER

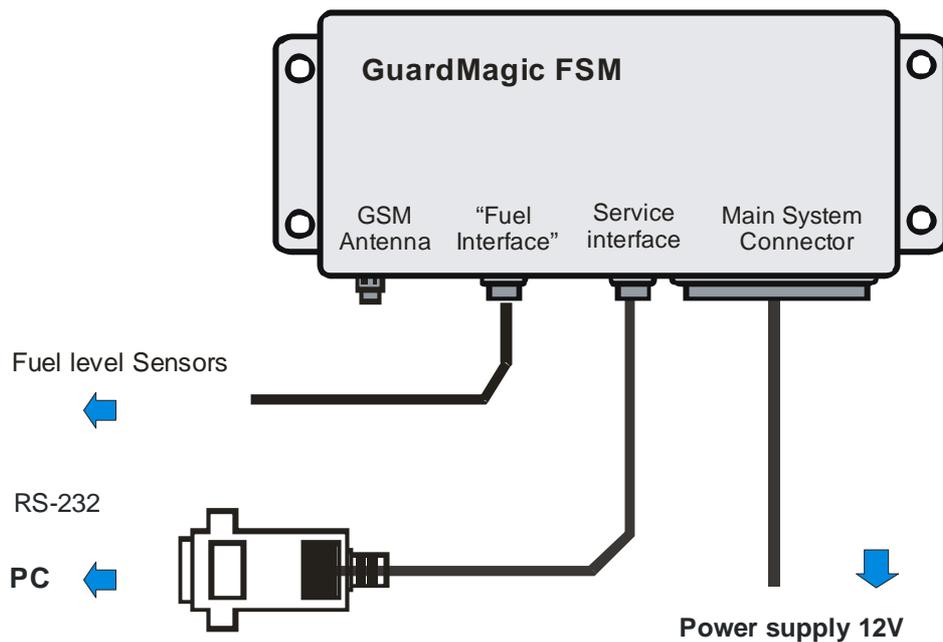
- Disconnect from **GuardMagic VB, GuardMagic mTF** module GPS antenna receiver,
- Connect to **GuardMagic VB, GuardMagic mTF** module connection cable “GuardMagic module – Personal Computer”;
- Connect connection cable “GuardMagic module – Personal Computer” to personal computer. (If need use USB-Com converter to connect module to notebook).

5. GuardMagic FSM MODULE CONNECTION

Before calibration procedure module have be mounted and installed on object and made all necessary electrical connections.

See GuardMagic FSM and fuel level sensors installation manuals ((GuardMagic DLLS1, or GuardMagic DLLS2, or GuardMagic DLLE1, or GuardMagic DLLE2 or GuardMagic DFLS3, or GuardMagic DFLS3CT).

5.1. CONNECTION DIAGRAM



5.2. CONNECTION ORDER

- Connect module **GuardMagic FSM** to serial port of personal computer by the special connection cable (Connection cable PC-GuardMagic FSM);
- Connect the cable of AC/DC power adapter (from complete set) to main system connector on GuardMagic FSM;
- Connect power supply.

6. START PROGRAM

6.1. BEFORE STARTING

Copy program "FUEL TANK CALIBRATOR" (TankClb.exe) to hard disk of your PC (notebook).

6.2. START PROGRAM

Start the program "FUEL TANK CALIBRATOR" (VBTankClb.exe).

After start the program on the screen will open the basic form, shown on figure.

The screenshot shows the 'Fuel Tank Calibrator' application window. The title bar reads 'Fuel Tank Calibrator - 15.12.2009'. The interface is divided into several sections:

- Vehicle Data:** Fields for 'Unit Type:', 'Factory Num:', and 'Firmware Num:'.
- Graph:** A plot area with 'Litres' on the vertical axis and 'Code' on the horizontal axis. Both axes have a '0' mark. A dashed horizontal line is at 0 Litres and a dashed vertical line is at 0 Code.
- Fuel Tanks:** A list of radio buttons for selecting tanks: 'Main Tank 1', 'Main Tank 2', 'Main Tank 3', 'Cargo Tank 1', 'Cargo Tank 2', 'Cargo Tank 3', 'Cargo Tank 4', 'Cargo Tank 5', 'Cargo Tank 6', 'Cargo Tank 7', 'Cargo Tank 8', 'Cargo Tank 9', 'Cargo Tank 10', and 'Cargo Tank 11'.
- Right Panel:** A 'No Data' status box, a 'Unit Type:' dropdown menu, a 'COM Port:' dropdown menu (set to 'COM1'), a 'Start Calibration' button, a 'Code:' display showing '0', a 'Litres:' display showing '0', an 'Add Value' button, a 'Delete Row' button, and an 'Exit' button at the bottom.

At the bottom of the window, the text reads: 'Fuel Tank Calibrator for GuardMagic mTF, GuardMagic VB', 'GuardMagic, Riga, Latvia (EU)', and 'www.guardmagic.com, www.guardmagic.lv'.

All further operation with the program is carried out by this form.

7. OVERVIEW OF BASIC FORM

7.1. MODULE MAIN DATA

Vehicle Data

Unit Type: GuardMagic VB2

Factory Num: 8000006

Firmware Num: 1.0 (1.0)

Service area located on the left top corner of the form is intended to give main information about GuardMagic VB, GuardMagic mTF module (Read Only):

- Unit Type - type of module;
- Unit Factory Number – factory number of module;
- Unit Firmware Version –module firmware.

7.2. CONTROLS ELEMENTS

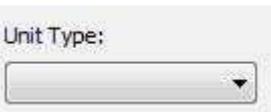
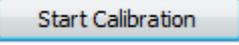
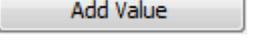
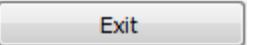
Unit Type:

COM Port:

Code:

Litres:

Controls elements located on the right side of the form and are intended for calibration operations and exit from the program

Image	Name	Description
	Unit type	Type of vehicle module (GuardMagic VB or GuardMagic mTF or Guardmagic FSM)
	Serial Port (com1)	Serial port selection (on the PC)
	Start Calibration	Start calibration procedure of the fuel tanks
	Code	Digital code of fuel volume ("fuel code") in fuel tank.
	Litres	Fuel value in liters (in fuel tank) corresponding for the value showed in the window "Code"
	Add Value	Fix value of "fuel code" and "Litres" to the calibration table
	Delete Row	Delete selected row from the calibration table
	Exit	Exit from the program

7.3. FUEL TANK SELECTION

Fuel Tanks (Analog)

Main Tank 1 Main Tank 2 Main Tank 3

Cargo Tank 1 Cargo Tank 5 Cargo Tank 9

Cargo Tank 2 Cargo Tank 6 Cargo Tank 10

Cargo Tank 3 Cargo Tank 7 Cargo Tank 11

Cargo Tank 4 Cargo Tank 8

Controls elements located on the bottom side of form are intended for selection fuel tank for calibration.

Program in automatic mode select the necessary type of fuel level sensor (analog or digital) and display the sensor type.

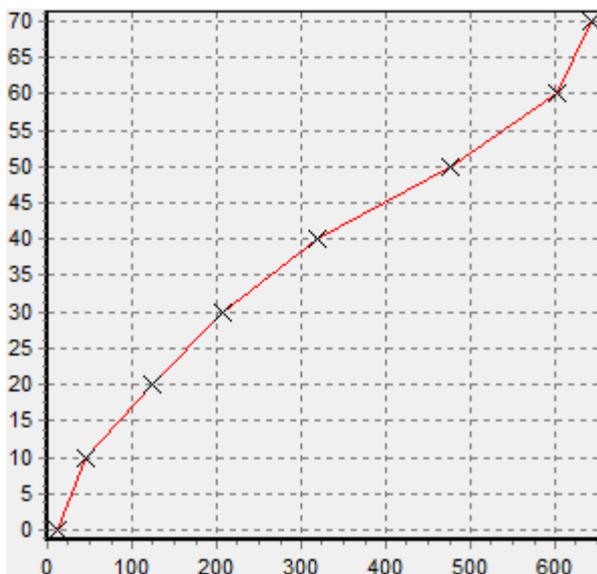
7.4. CALLIBRATION TABLE

No.	Code	Litres
1	11	0
2	45	10
3	123	20
4	207	30
5	319	40
6	476	50
7	604	60
8	644	70

Table located on the center of the form are intended for showing fuel tank calibration data.

Maximal calibration points: 30 points.

7.5. CALLIBRATION GRAPH



Calibration graph located on the left middle side of the form and are intended for calibration graph showing.

8. CALLIBRATION PROCEDURE

8.1. PRINCIPAL PROVISIONS

Fuel tank calibration is consecutive fixing values of a level of fuel, which is filled in vehicle tank or tank trailer (regular or cargo), with the subsequent entering these data in the working program.

At carrying out of calibration operation it is convenient to take advantage of the form offered a calibration leaf p.7.4

As a measure of filled fuel is used the indicator of a filling station. Filling stations, as a rule, provide accuracy not worse 0,3 %.

Code of filled fuel will be shown in calibration software.

At calibration procedure fuel is filled in with portions approximately on 1/10 - 1/20 volumes of a fuel tank.

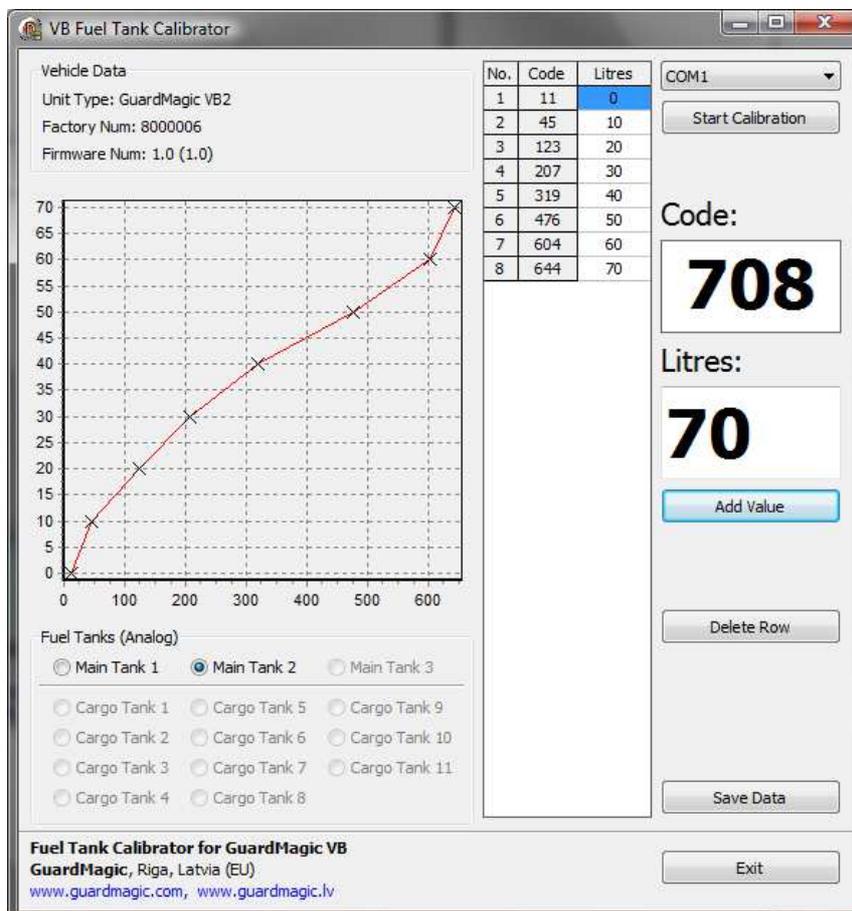
As a rule, carrying out of calibration need to be spent on 5 ... to 15 control points.

It is necessary to consider, that in the majority of vehicles when the ignition is switched in OFF, the electrical circuit of fuel level measurement is disconnected (does not work).

Hence, it is necessary to record the control information when the ignition key is in "ON" position.

Calibration procedure is carried out independently for each fuel tank.

8.2. SAMPLE OF CALIBRATION DATA



8.3. ACTION ORDER OF CALIBRATION PROCEDURE

Before calibration:

- For modules GuardMagic VB, GuardMagic mTF disconnect GPS cable from the module and connect calibration cable to module;
- For module GuardMagic FSM connect calibration cable to module;
- Run the program "FUEL TANK CALIBRATOR";
- Select the necessary type of module in "Unit Type" field;
- Select communication port on your PC in "Com Port" field.

Note:

Be sure, that the physical tank you will start to calibrate will be the same that the tank number in calibration program. If necessary make marking the physical tank number.
(for digital fuel level sensor see address table in appendix)

Carrying out the operation of the calibration procedure is carried out in following order:

1. In a fuel tank of vehicle leave the minimal possible fuel level. This fuel level will be considered as **MINIMAL** level (like 1 liter); no more than 1%... 2 % of a tank volume;
2. Turn ON ignition key, but the engine do not start;
3. Select in program necessary fuel tank for calibration (mark necessary tank for calibration);
4. Fix minimal value of the fuel by pressing "Add Value" button in program ("minimal fuel level" will be fix);
5. Insert a pistol of a fuel hose into a tank;
6. Add some control fuel to the fuel tank;
7. Wait till the value of the fuel level indicator in program will stop changes (field code). About 40 – 60 sec;
8. Enter the fuel level value in liters (field "Litres"). Press "Add Value" button;
9. Execute the indications of the previous paragraph till filling the fuel tank full with fuel.
10. Write down the table "fuel code" and "fuel volume" in paper table.

If vehicle has more than one fuel tank calibration procedure is carried out independently **for each fuel tanks** (others tanks also must have minimal fuel volume).

For calibration other tanks: select necessary fuel tank and make calibration procedure for it (**starting from point 3**).

In the future the values obtained for the calibration data table must be entered in the operation program.

8.4. FORM OF CALIBRATION LEAFLET

Recommended form of calibration leaf

Calibration leaf

Vehicle:

Model _____ Number _____ Tank _____

Date ____ _____ 201_ year

Number of record	Digital code of fuel volume ("fuel code")	Filled fuel (liters)
1	0	0
2	<i>(write code from software)</i>	1
3		
N		

Additional comments for line

first record in table fix "0" in system. Write in table Fix minimal fuel level in tank. (point 4 in 7.3 paragraph)

Where:

- **Digital code of fuel volume ("fuel code")** – code of fuel volume in tank;
- **Filled fuel (liters)** – total amount of fuel in tank (filled fuel).

9. APPENDIX: DIGITAL FUEL LEVEL SENSOR ADDRESS IN FUEL BUS

9.1. GUARDMAGIC VB MODELE SERIES

Sensor Number (Tank Name)	Sensor Address in Bus (decimal)	Modules name
Main Tank 1	01	VB3; VB4; VB5
Main Tank 2	02	VB3; VB4; VB5
Main Tank 3	03	VB3; VB4; VB5
Cargo Tank1	04	VB4; VB5
Cargo Tank2	05	VB4; VB5
Cargo Tank3	06	VB4; VB5
Cargo Tank4	07	VB4; VB5
Cargo Tank5	08	VB5
Cargo Tank6	09	VB5
Cargo Tank7	10	VB5
Cargo Tank8	11	VB5
Cargo Tank9	12	VB5
Cargo Tank10	13	VB5
Cargo Tank11	14	VB5

9.2. GUARDMAGIC mTF MODELE SERIES

Sensor Number (Tank Name)	Sensor Address in Bus (decimal)	Modules name
Main Tank 1	01	mTF3
Main Tank 2	02	mTF3
Main Tank 3	03	mTF3
Cargo Tank1	04	mTF3
Cargo Tank2	05	mTF3
Cargo Tank3	06	mTF3

9.3. GUARDMAGIC FSM MODELE SERIES

Sensor Number (Tank Name)	Sensor Address in Bus (decimal)	Modules name
Tank 1	08	FSM2 ; FSM3
Tank 2	09	FSM2 ; FSM3
Tank 3	10	FSM2 ; FSM3
Tank4	11	FSM3
Tank5	12	FSM3
Tank6	13	FSM3
Tank7	14	FSM3