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Instruction Manual Rev 1.0

Speedometer is designed for DIY all-terrain vehicles (ATV). It has large bright 4-digit display (14 mm symbols) and indicates speed, distance, altitude, satellite time. May be used as specific speed signal source for automotive engines that uses ABS system sensors data (to compute vehicle speed).

Speedometer can transmit correct speed pulse to ABS block (replaces original ABS sensor). This fully tested with engine Volkswagen Touran TDI 2.0 AZV (2004).

If vehicle body shields GPS signal, you can connect active GPS antenna.

Technical characteristics

vksensor GPS Speedometer	G2.2
Power supply voltage	12-15V
Power supply current	0.15A
Dimensions	113x73x28 mm
GPS receiver	GNSS GG1802

Display Modes:

1. Speed (km/h)
2. Distance counter (in km)
3. Altitude, (m)
4. GPS time (backed up with internal real-time clock)
5. Satellites count

Speed Accuracy	0.1 km/h
Distance Accuracy	0.1 km
Time zone (selectable)	-13 … +12 UTC

Tunable optocoupled pulse output (able to set pulse frequency and duty cycle)

Cold start time < 3 min
Hot start time < 5 s

Mileage data stored in NVRAM, which is powered by a CR2032 battery, battery life > 3 years.

External GPS antenna connector: SMA

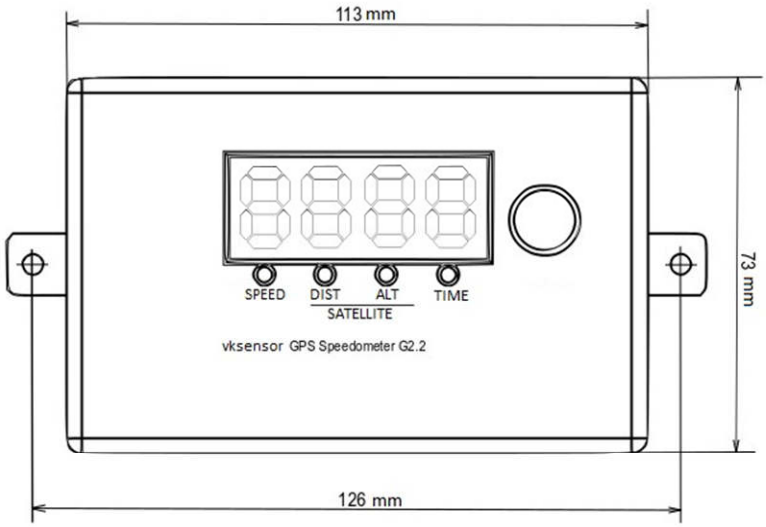
After connecting the GPS power, the GG1802 receiver downloads satellite navigation data.

Speedometer displays “----“ symbols.

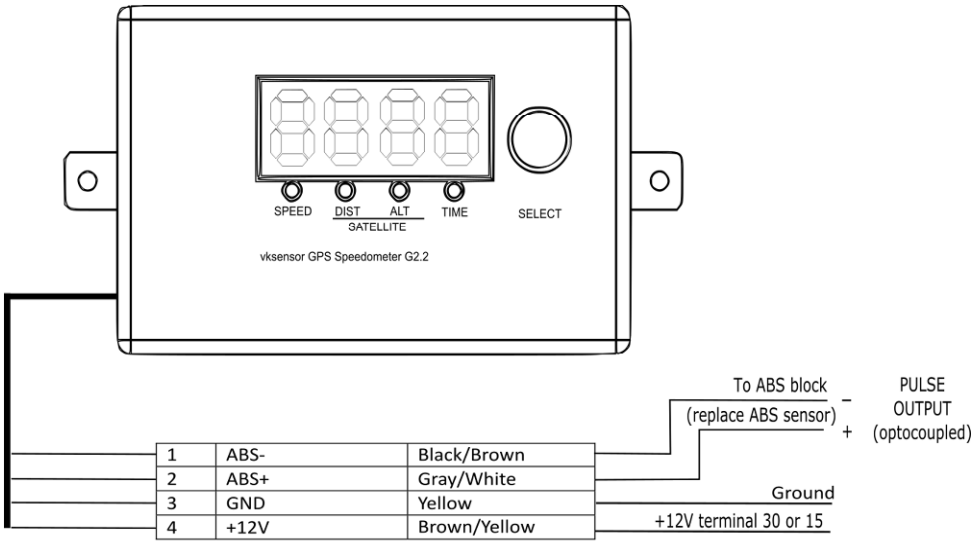
If the power off was more than 1 hour, the satellite search time is about 5 minutes. After a short power off (“hot start”), the search time is 3-30 s.

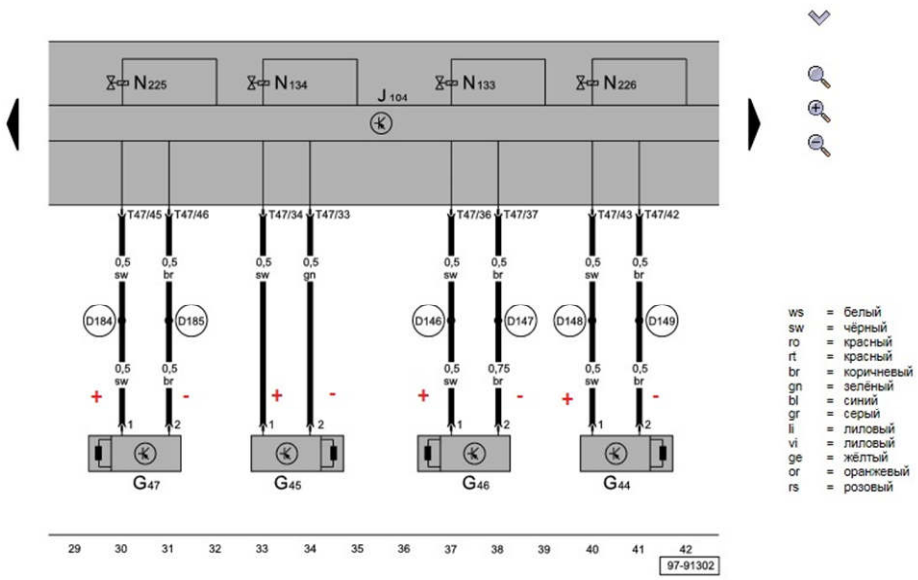
Navigation is possible if the number of visible satellites (menu "Satellites") is more than three.

Dimensions



Connection diagram





Example of automotive ABS sensors wiring (Volkswagen Touran TDI 2.0 AZV)

Speedometer replaces any one G4* sensor.

Setting the Speedometer

The transition between the five menus is carried out by briefly pressing the "Select" button.

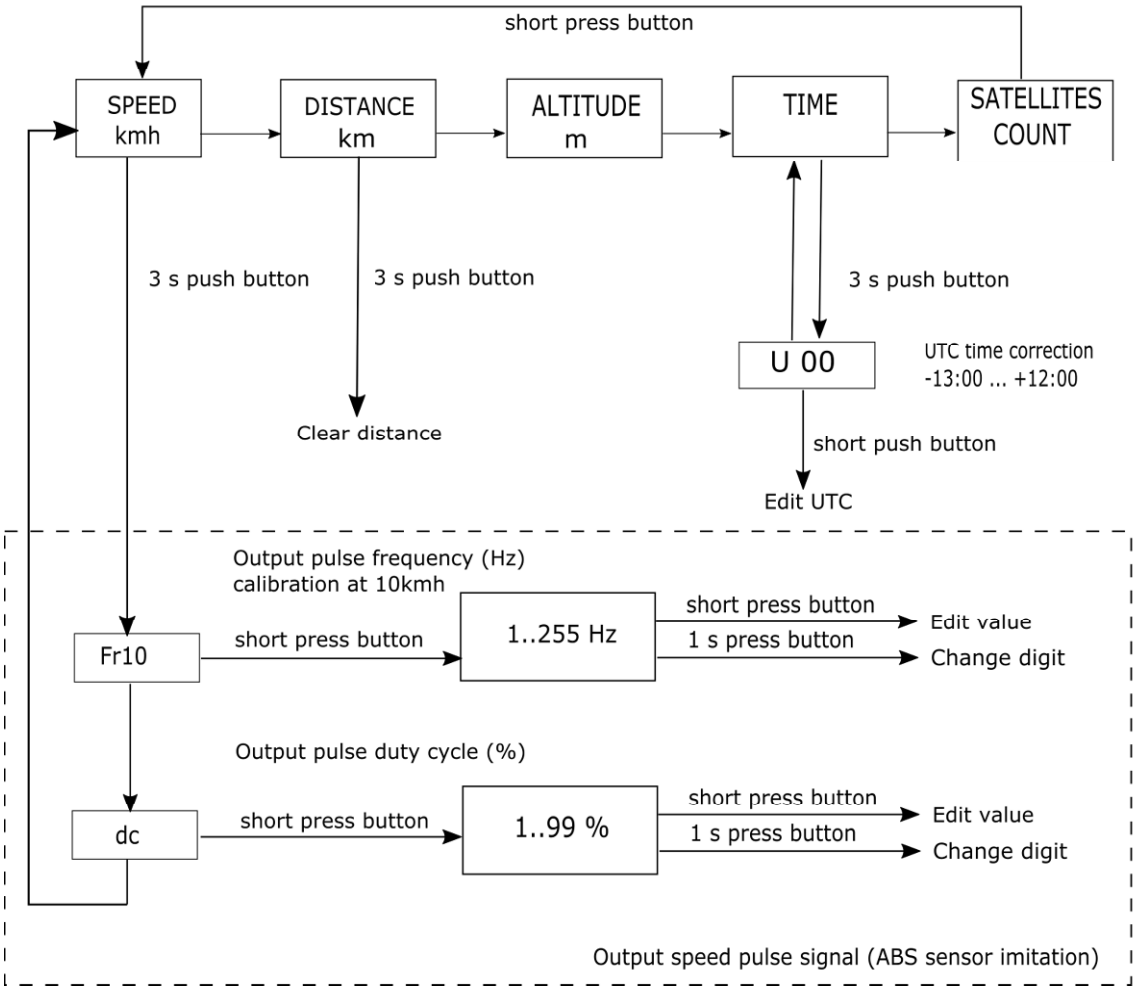
1. Reset the odometer. To reset the current distance, go to the "DIST" menu and press and hold the "Select" button for more than 3 s.
2. Setting the Time Zone. It is made in the "TIME" menu. Automatic adjustment of the internal clock is carried out after downloading the latest satellite data. In order to set the UTC time zone, it is necessary to hold the “Select” button for about 3 s. The display will show “U 00”. Briefly pressing the "Select" button sets the time zone. Exit the setup menu and save by pressing the "Select" button for about 3 s.
3. The pulse output is configured in the “SPEED” menu

Long presses of the “Select” button (more than 3 s) go to the submenu:

1. "Fr10" - the number of pulses per second at a speed of 10 km/h.
2. "dc" - pulse duty cycle in %
3. Exit setup menu

By briefly pressing the button, you can enter the submenu. The setting is increased by short presses.
You can transit between digits by pressing a button lasting about 1 s.
Saving and leaving the submenu is done by a long press of a button.

Menu structure



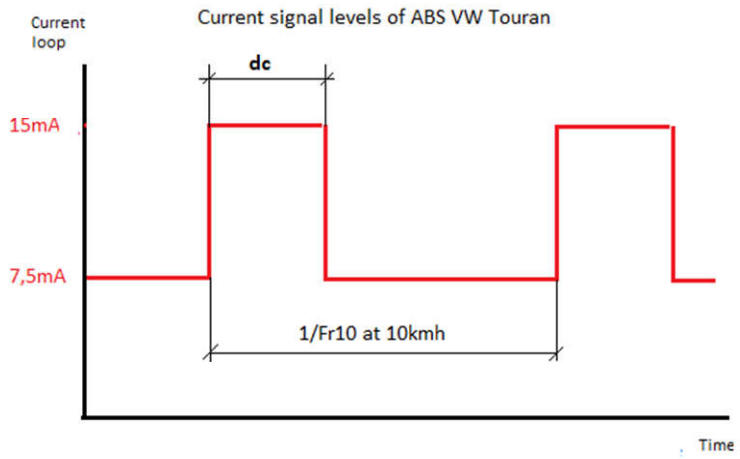
Parameter	Default setting (for VW Touran 1T1)	Minimal value	Maximal value
Pulse frequency Fr10, Hz	65	1	255
Duty cycle, dc, %	30	1	99

Pulse signal of ABS VAG

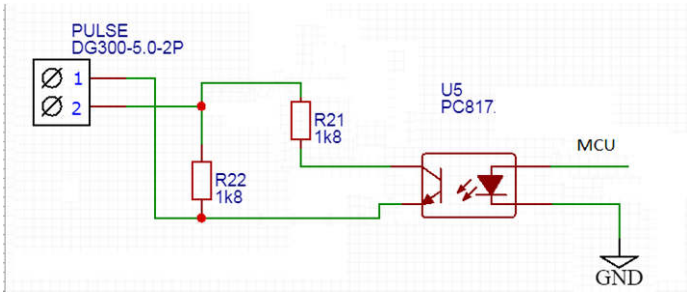
The speedometer can be used as a source of a pulse signal of speed for the ABS system of vehicle.

For cars of the VAG family, ABS sensors installed on the hubs are two-wire and have a current signal. The voltage on the ABS line is 12 V. The low level is 7.5 mA, high level is 15 mA. If other current levels are applied to the current loop, the ABS unit disconnects the sensor with the error “Invalid signal”. For the speed signal to work, it is enough to use any one (out of four) ABS sensor.

After connecting the sensor, it is necessary to reset the block errors in the ABS block with the diagnostic adapter (VAG COM, Vasya Diagnost, etc.). The ABS unit corresponds to the section "Electronics of the brake system"



Note. For other types of active sensors, you may need to change values of resistors R21 and R22 on Speedometer PCB.

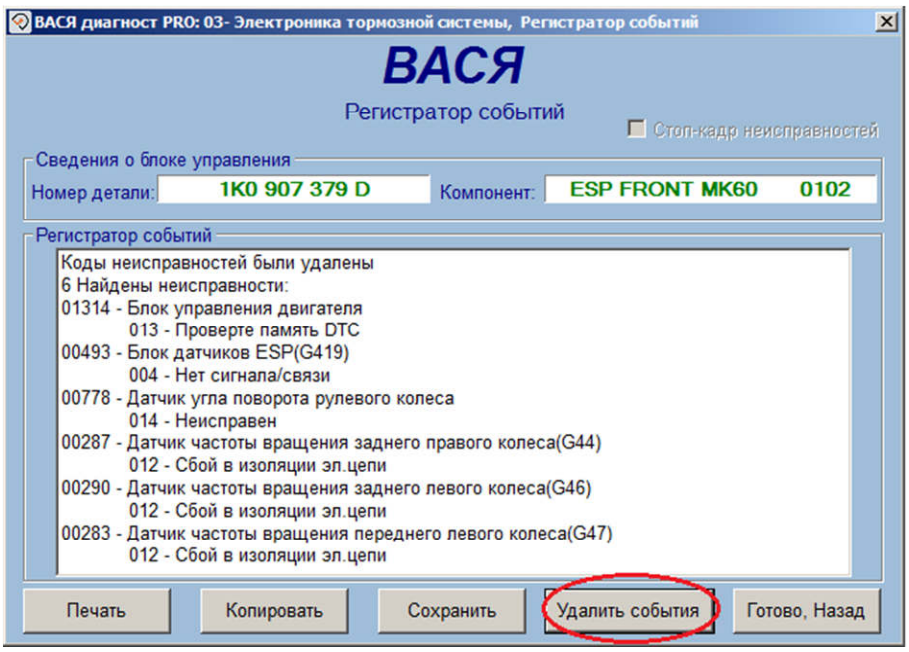


Speedometer Calibration

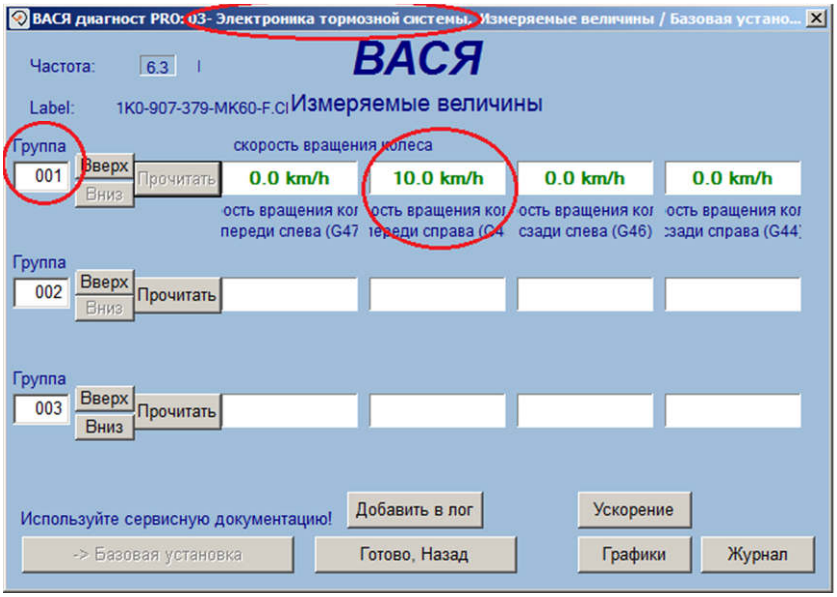
After entering the “Fr10” menu, pulses corresponding to a speed of 10 km/h appear on the pulse output.

Using the diagnostic adapter (for example, “Vasya Diagnostics” Russian analog VAG COM) go to the ABS block, section “Measured values”. Parameter group 001 will display speed data.

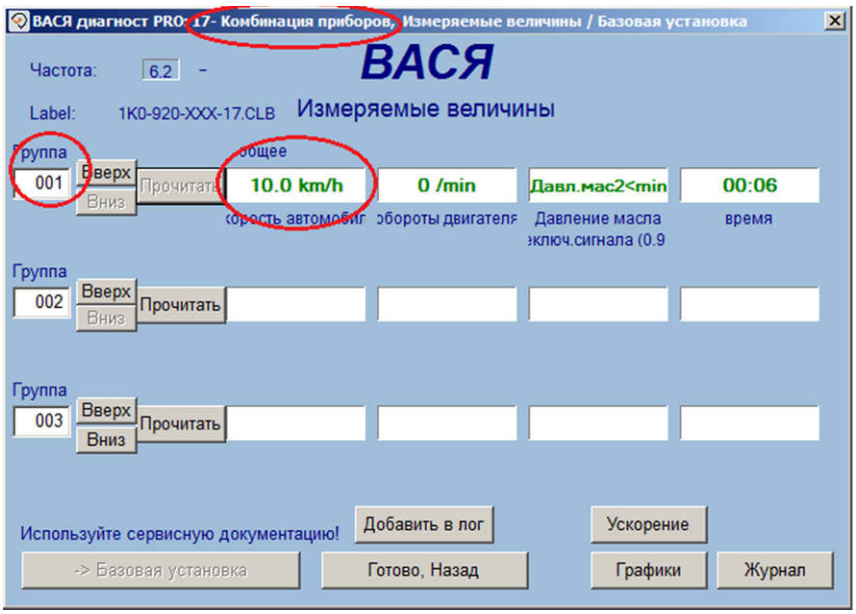
Select the speedometer parameter Fr10 so that the sensor readings correspond to 10 km / h. In this case, the speed reading on the dashboard should correspond to 10 km / h.



Erasing ABS error messages



Calibrating 10 km/h by tuning Fr10 parameter of Speedometer



Checking parameters of speed in Dashboard block

Source code

Source code of Speedometer G2.2 is open.

Download and modify MCU source code (under GPL license):

http://vksensor.ru/load/0-0-0-20-20

Download schematics and PCB:

http://vksensor.ru/load/1