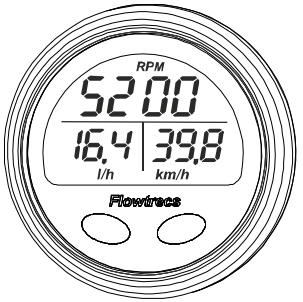
MULTIFUNCTIONAL FUEL CONSUMPTION METER

Flowtrecs INOX



v.4.2.5

FlowTrecs USER'S MANUAL

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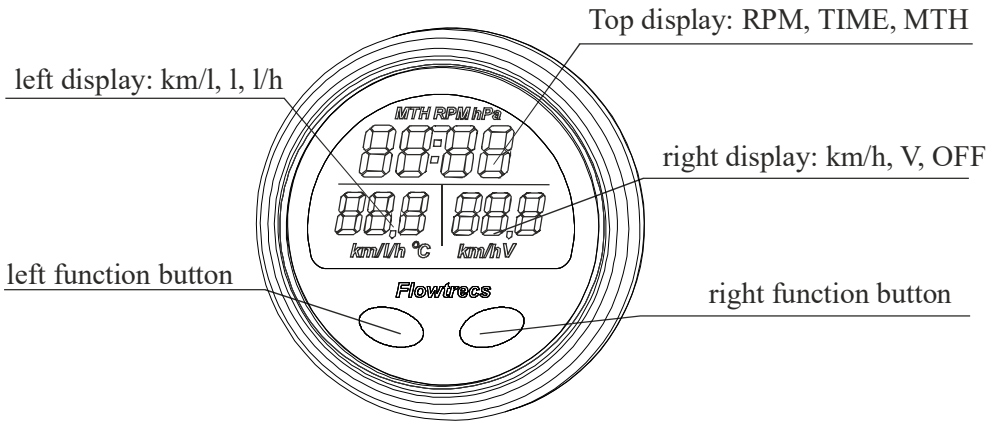
1.OPERATION DESCRIPTION

Multi-functional meter “Flowtrec INOX ” is recommended for motorboats. It indicates the parameters of engine operations as well as the boat's movement in a way which allows the users for maximum fuel efficiency. Apart from the basic parameters, such as engine's RPM , boat's speed, fuel consumption in l/h, amount of fuel, voltage, motohours it indicates an essential parameter like fuel economy showing the number of kilometres one can travel on 1 litre of fuel. It is known that fuel consumption is determined by many factors some of which can be controlled and adjusted by the driver (speed, weight distribution, engine trim settings, boat propeller size). But how one is supposed to know how to select all those settings while having no real metering data ? How to know that e.g. by cutting the speed by 5 km/h or by lifting the engine up they can travel 20 km instead of 15 km on the same amount of fuel.

The change of fuel consumption in relation to speed in non-linear and it's hard to optimize it without objective data. The only effective solution in this case is the measurement of a real fuel consumption and the boat's speed as well as calculating the economy rate which specifies the number of kilometres covered on 1 litre of fuel. Its very important for economical operation of the boat because this allow the users noticeably limit the fuel consumption.

Obviously it doesn't happen automatically since the reading of a measured parameters does not limit fuel consumption. It's up to the man acting upon these readings and changing the RPM, trim and ballast that can really limit the consumption of fuel.

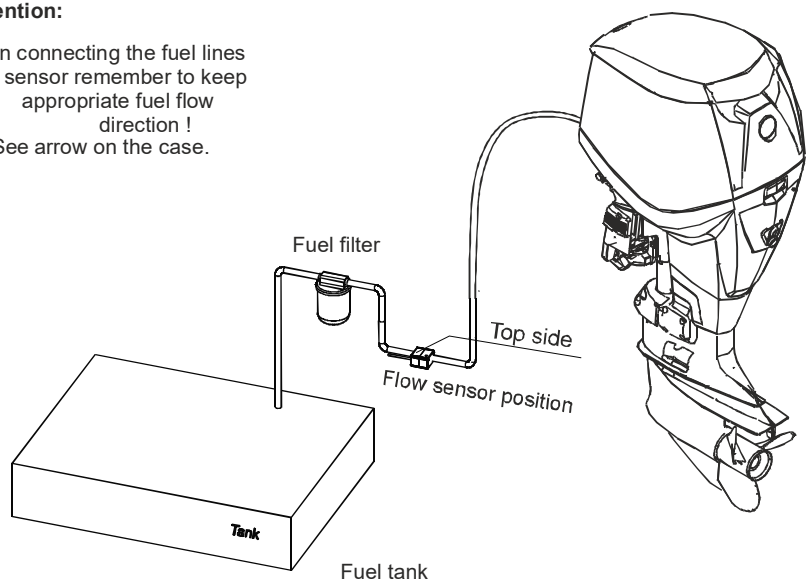
2. LCD SCREEN VIEW



20. CONNECTING FUEL LINE

Attention:

When connecting the fuel lines to sensor remember to keep appropriate fuel flow direction ! See arrow on the case.



21.TECHNICAL SPECIFICATIONS

Sensor type	S	M	L	XL	XXL
Range of engine power	20-60KM	60-130KM	130-250KM	250-350KM	350-500KM
Power supply	10-16VDC	10-16VDC	10-16VDC	10-16VDC	10-16VDC
Power consumption	ok.50mA	ok.50mA	ok.50mA	ok.50mA	ok.50mA
Flow measurement range	0.5-20l/h	1-40l/h	1,5-90l/h	2-120l/h	3-200l/h
Fuel measurement error rate	ok. 5%	ok.5%	ok.5%	ok.5%	ok.5%
Diameter of fuel connection	9,5mm (3/8")	9,5mm (3/8")	11,5mm (3/8")	11,5mm (3/8")	11,5mm (3/8")
Protection degre	IP64	IP64	IP64	IP64	IP64
External instrument diameter	62mm	62mm	62mm	62mm	62mm
Instrument height	17mm	17mm	17mm	17mm	17mm

17. SETTING OF UNITS

To adopt display units to the different countries and regions, its posiible to select following units:

1. Volume
   a. Litres
   b. Galons E (UK)
   c. Galons U (USA).
2. Speed
   a. Km/h (automatically Kilometers as distance units are selected)
   b. Knots (automatically Nautic Miles as distance units are selected)

Changing of units is possible when left button is pressed and holded down while powering the device. At that moment the upper display is showing current units, which could be changed by short pressing of the left button. In the left bottom display, appropriate units ikons are then visible („l" or Gal"). Changes are possible within closed loop: Litr, Gal E, Gal U and Litr again. When right volume units are selected, press both buttons together to switch to speed units. Upper display is showing SPEE, and right bottom display is showing Km/h or Kts icon. Short pressing of the right button is changing this icon alternately. Having both units right selected, press both buttons together to save the settings and go back to the main screen.

18. SETTING EVERAGING TIME (FLOW)

If to big fuel flow fluctuation are obeserved, its necessery to increase fuel flow everaging time. When left display is switched to **km/l** readings, press and hold left button for ca. 5 sek. Then on the top of screen you will see PErl sign and the left disply begin to blinkshowing current value of everaging time (5 SEC). Using buttons you can increase this value up to 40sec, however we suggest to set value 2 times bigger then previous one, f. ex. 10sec. To save settings press both buttons shortly together. If new settings are still unsatisfactory, you can try to set another value again.

19. ADDITIONAL FUNCTIONS (Data log)

These functions allow viewing of several recorded data such as:

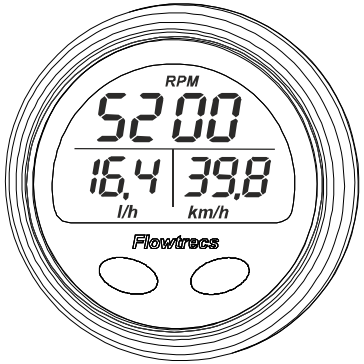
1. DISt - total travel
2. USEd - total fuel consumtion
3. EFFI - everage fuel economy
4. FLO - everage fuel consumption
5. HIGH - max. recorded speed
6. USUA - everage speed

These amounts are recorded in real time in the counters memory and are available until clearing the counters. Since the reset, the counting of the parameters begins again. Resetting the counters is password protected to hinder the possibility of erasure by unauthorized persons.
Entering into the recorded data is done by selecting on the upper screen Mothour (MTH) option and holding at this moment both buttons together for min. 5 seconds.
Data on the upper screen will then switch to the Dist, and in the lower left corner is visible Total distance traveled since the installation of the device or clearing the counters. Other data appear on the screen after successive pushes of each button: switch left turn: Dist, EFFI, Used, FLO and back Dist etc . and the right HIGH USUA.of
Back to normal display - after a short pressing of both buttons.

To delete records (all counters at the same time), press and hold both buttons simultaneously for minimum 5 seconds. You will then see on the top screen PASS word. Using the buttons wright down the number 222. Right button increases the value of the displayed number while the left button decreases (holding the button longer, increase the speed of value changes). After setting the number 222, hold both buttons simultaneously for minimum 5 seconds. On the upper display will then appear sign „donE" and from that moment all data are set to zero and the device will start counting all the parameters again.

3. LCD SCREEN DESCRIPTION

Flowtrecs Mini is equipped with multi-functional screen which displays metering data chosen by the user. Data in the upper screen is changed by simultaneously pressing both buttons for a short time. Switching data works in a loop so by subsequent presses we can access other readings such as: Time, motohours, RPM, and again Time, etc.



Data on side screens are changed by short presses of particular buttons and it works in a loop too. So by subsequently pressing the left button we will see on the left screen: km/l, l, l/h. Similarly by pressing the the right button such data as: km/h, V, OFF will be displayed

4.TACHOMETER

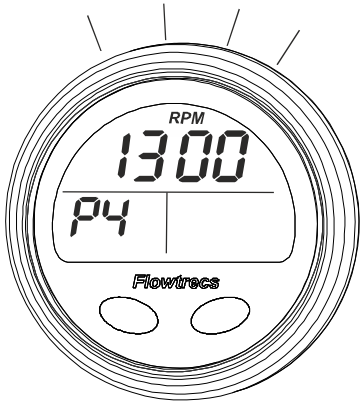
The tachometer function is active when the icon RPM is visible on the top screen. If it's not visible we must simultaneously press both buttons a few times until it's displayed. The measurement engine's RPM speed is carried out by the analysing the rate of tacho pulses from shifter (for outboard engines) or from ignition circuits (for inboard engines). These pulses should be conducted to the green wire coming out of the bundle. In na case of carbureted engines it's necessary to use the pulse limiter because of their excessive amplitude (delivered as separate part).

Attention: In case of direct connection of the green wire to pulses in carbureted engine the input circuit of pulse measurement will be permanently damaged.

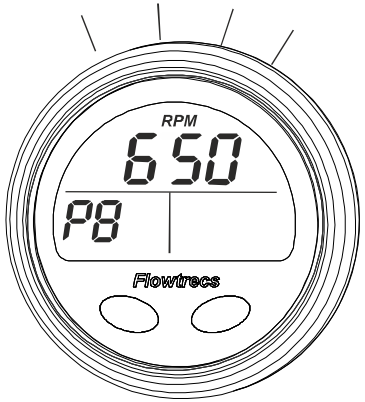
For injection engines the green measuring wire can be directly connected to the shifter. If tacho pulses are not available in shifter, an additional sensor of RPM should be used in the form of hallotron placed near the flywheel. After correct connection of the measuring green wire and choosing the function of RPM measurement we start the engine, leave it in idle and observe the readings on the top screen. If they are in the range of 600-700 RPM it indicates that the parameter settings of tachometer are correct and can be regarded as finished. If readings are different e.g. 1300-1400 RPM it means the necessity to change the multiplier of tachometer reading. To do that we must press and hold both buttons simultaneously for a few seconds until the RPM reading is blinking and until the reading from P2 to P12 etc. is seen in the bottom left corner of the screen. It is the multiplier by which the number of tacho pulses are multiplied indicating the actual RPM value. This multiplier is to be changed with buttons (left down and right up) in such a way that the RPM speed displayed on the top screen matches the actual engine speed. At this moment it's necessary to press again both buttons simultaneously (this time shortly) to write new settings and resume normal operation.

The screen view while correcting tachometer reading

the screen before multiplier correction



the screen after multiplier correction



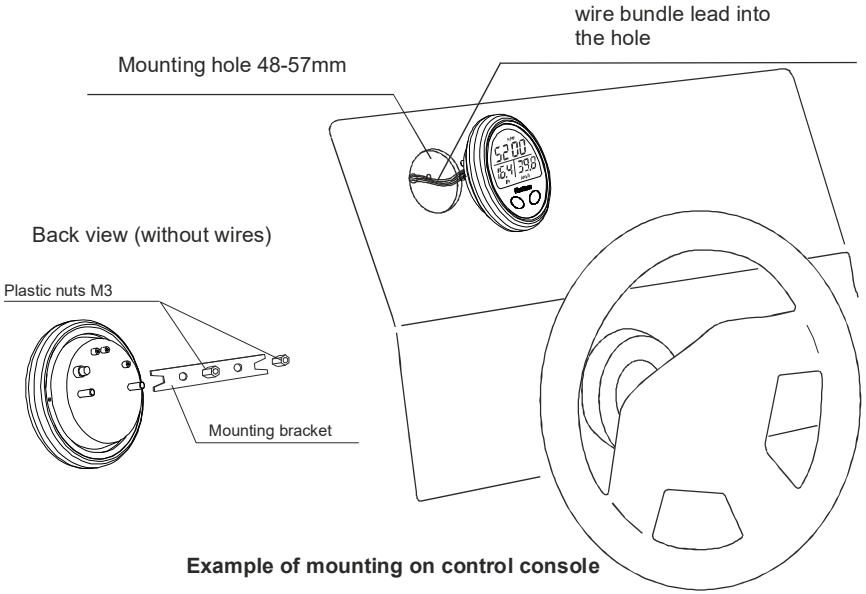
5. MOTOHOUR COUNTER (MTH)

Motohour function is active when icon MTH is visible on the top screen. If it isn't, we must press both buttons simultaneously a few times until it pops up on the screen.

Motohour screen view (MTH)



Motohours indicate the total time of engine's operation with the minimum fuel consumption of more than 0.5l/h. It means motohours are not calculated if fuel consumption was smaller than that, for example if the engine was off but left with ignition on.

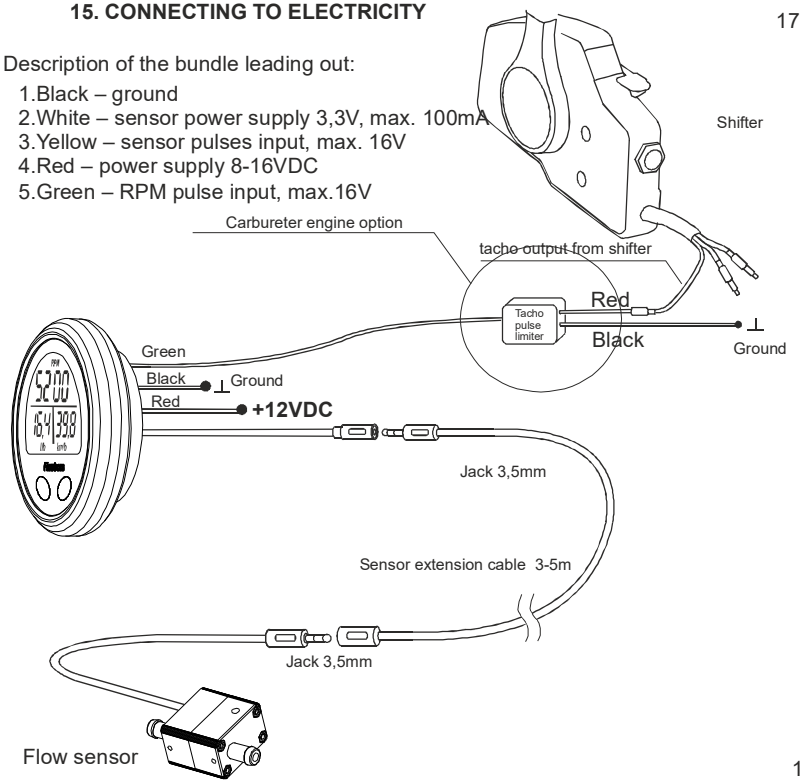


Example of mounting on control console

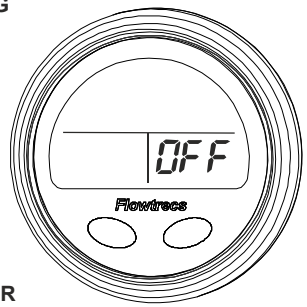
15. CONNECTING TO ELECTRICITY

Description of the bundle leading out:

1. Black – ground
2. White – sensor power supply 3,3V, max. 100mA
3. Yellow – sensor pulses input, max. 16V
4. Red – power supply 8-16VDC
5. Green – RPM pulse input, max.16V



14. AUTOMATIC ON/OFF SWITCHING



If Flowtrecs is switched off with OFF butto or automatically and if the RPM measurement is connected, after starting the engine automatic switch on will take place, setting the screen to RPM and Speed read-out. After turning engine off, RPM and Speed read-out will be replaced by Time and Voltage readings.
Any subsequent engine start-up will revert the screen to RPM reading. Manual change of the top screen readings is possible at any time by pressing both buttons simultaneously.

16.INSTALLING FLOW SENSOR

Flow sensor should be installed in fuel line between the engine and the fuel tank, as indicated in picture on p. 20. The fuel hose which can be connected to sensor should have internal diameter 8-9mm (3/8"). After cutting fuel hose , push its ends onto the fuel sensor ends paying attention to consistency of fuel flow direction with the direction of an arrow on sensor's case and securing it against sliding with nylon clamps. Then insert sensor's plug into the extension cable socket and fix the sensor along fuel lines in horizontal position so that the hoses are leading out horizontally and the upper surface of sensor is in horizontal position. The sensor should be placed above the fuel tank so that in case of fuel lines loosening, there will be no fuel leak. .
It should be also located away from area where it will be effected by excessive heat or vibration from the engine.
Having fixed the sensor we must spill it (remove the air from its inside which gets into fuel system while installing). To do this using bulb primer for sucking fuel, we must pump some amount of fuel through the sensor. While spilling, the LED control visible inside the sensor should be flashing (if the sensor is connected to a clock and the clock is on). With low volume flow it is visible as a green blinking light. With large volume flow the blinking disappears and a steady light can be observed.

A correct operation of sensor is confirmed by LED blinking during the flow of fuel.

15. INSTALLATION RECOMMENDATION

Flowtrec Mini unlike other gauges doesn't require cutting out large mounting hole since it is adapted to mounting it on the surface of control console. It's enough to make a few openings of a small diameter and secure it with nuts from behind the console. One of the openings (the middle one) should have the diameter of 9-10mm for running a bundle of wires through it and the other two 3-4mm each. It's important for the dividing line of openings to run horizontally because it determines the position of the display on the console and if it slopes, the screen on the console will slope as well. After drilling the openings we unscrew and put through the large opening the fuse rim which is in the wire bundle,

The next step is to connect together the 3 quick couplings coming out of the bundle with couplings from the connecting box . Colour compatibility of connected wires must be preserved. Into the socket which is coming out of connecting box we insert the cable plug to connect the sensor and t his connection we secure with insulation tape to prevent the impact of water and damp. If the function of engine's RPM measurement is used, we connect the green wire to the output of tacho signal in shifter or another tachometer (if it's installed). If not the green wire can be left disconnected .
The other end of the extension cable to sensor we connect to the fuel sensor and this connection must be secured against water impact. At the end we connect device's earth (ground) - (black wire) to the negative voltage pole from the battery and the red voltage wire to positive voltage pole (+12VDC)

6. CLOCK FUNCTION

The clock which shows time is synchronised to the GPS signal from satellites, although only minutes and seconds are synchronised leaving the user to set hours at least once. After powering up and changing the left screen to km/l ,the message GPS appears on it which indicates waiting for the satellite signal, whereas on the top screen the operating system version is displayed.

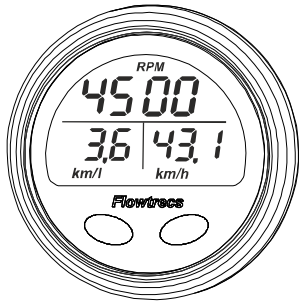


Within several seconds to a few minutes (depending on the history of previous start ups of the device) the message GPS should disappear and the actual minute time ought to appear in minute position. Then we can manually set the correct time which will be remembered as the time zone for the GPS operation.

In order to set proper time we must hold both buttons simultaneously for a few seconds until the hour figure starts blinking. Then we use the left (down) and the right (up) buttons to adjust hours.
After setting proper time we must press again both buttons simultaneously, this time shortly, to make the minute read-out blink and if we don't wish to modify them (because the value is correct from the GPS signal) press both buttons again to exit the procedure of time setting. If the satellite signal is unavailable, minutes must be set in the same way as hours.

7. FUEL ECONOMY INDICATOR

This indicator is visible on the left screen when the icon “km/l”is displayed. The indicator provides essential information from the fuel consumption point of view, determining the efficiency of the boat operation. On the basis of data from the fuel consumption measured byfuel sensor as well as the boat's speed measurement from GPS – the fuel consumption indicator is calculated. It defines the distance (in km)which can be covered on one litre of fuel. The bigger the indicator is,the longer distance can be covered on a specified amount of fuel, so in order to sail efficiently one must aim to maximize the value of thisparameter by changing trim settings and rotation speed of the motor.

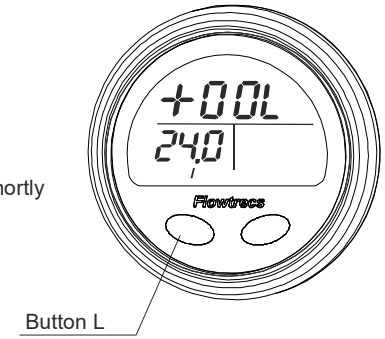


8. FUEL AMOUNT

Fuel amount function determines the amount of fuel left in the tank, after subtracting the amount of used fuel from the amount fuelled up. In order for it to be credible it is advised to fill up the tank occasionally and knowing the capacity of the tank, insert in the data field the amount filled. Inserting the fuel amount happens as follows: choose “fuel amount” (icon “l”) with the left button which then we must hold for a few seconds. The message “+00L” will appear on the top screen denoting the fuel added which now we can insert by using the right button (forwards) or the left button (backwards). By a single click we add (or subtract) individual litres and also by holding the buttons the changes of figures are faster to shorten the time of inserting large amounts of fuel. On the bottom left-hand screen the total amount of fuel is visible, that is the fuel which was left in the tank from the previous fuelling added up to the currently added fuel.

To save new fuel amount figures, press both buttons shortly together.

If we want to clear the reading of fuel in the tank, then while inserting the fuel amount we must hold both buttons together for a few seconds.

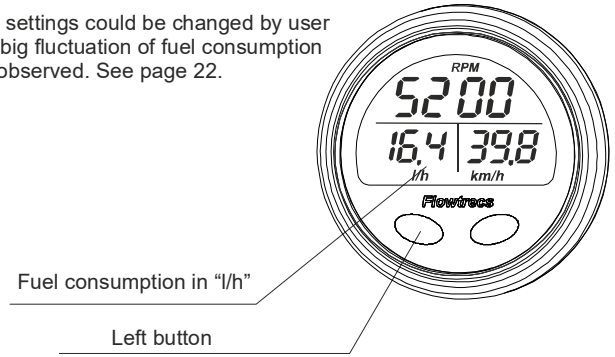


9. FUEL CONSUMPTION

Fuel consumption is displayed on the left screen, when the icon “l/h” is visible on the bottom of the screen.

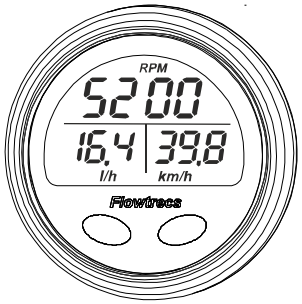
It's a momentary value, averaged within 5 seconds in order to minimize read-out fluctuations with variable fuel usage by the engine (factory settings).

This settings could be changed by user if to big fluctuation of fuel consumption are observed. See page 22.



10. SPEED

Speed in relation to earth is displayed on the right screen, when the icon “km/h” is visible and when correct signal from GPS satellite system is received. Lack of GPS signal is signalled on the right screen (after choosing “km/l” indicator) by displaying the message GPS. A correct GPS signal should appear within a few minutes from powering the device up.



11. BATTERY VOLTAGE



Battery voltage is indicated on the right screen , when the icon “V” is displayed. It should be remembered that the displayed value is also averaged due to the fact that sharp voltage hikes are not visible.

12. SCREEN ILLUMINATION

In order to illuminate the screen the left button must be pressed while voltage is being displayed on the right screen. To switch illumination off we must press left button again while voltage is also being displayed on the right screen.

13. OFF SWITCH

There are a few methods to switch the device off. The first one is to remove the power supply. The second one is by using the right button after switching the right screen into OFF mode. The third one by automatic switch off. The first method has a disadvatage which is loosing the start data of GPS and a long restart of GPS system (lasting up to a few minutes). In case of switching off with right button or automatic switch off this problem won't take place and the start-up is much shorter. In order to perform switching off with the button, first we must press the right button until the message OFF is displayed on the right screen. At this moment hold the right button for a few seconds until the message OFF disappears from the screen. From this moment the device is switched off but stays in ready mode of the GPS system with minimal power consumption (3mA).

Automatic switch off takes place after 12 hours of the lack of input pulses from Tacho or fuel sensor. To start the device again press any of the buttons.