Electronic fuel consumption measurement system

Fuel computer

FlowTrecs TS 4,3 Duo

Gasoline Preview System

v.3.5.1

D/N OK 0	Time	-.-
Set	Speed	24,0 km/h
Alarm	Fuel consumption	2,4 l/h
Map	Fuel economy	10,0 km/l
	Voltage	12,7 V
	Tachometer	2860 r/min
Close	Fuel remaining	18 l

FlowTrecs
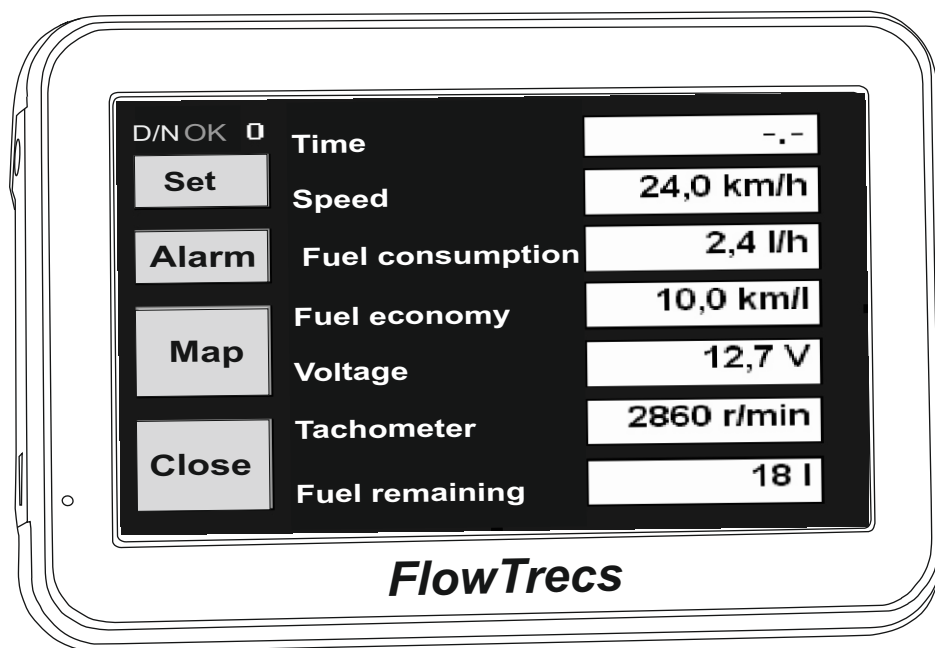
Twin engine 2x 20-300KM

C E

Introduction

The main purpose of the system is measurement of temporary fuel consumption (the amount of liters per hour), the mileage per 1 liter of fuel consumption or cost effectiveness ratio and the number of liters remaining in the tank. Besides, it additionally displays distance, time, speed, 12V battery voltage, map view.

Measurement of speed and navigation data are calculated on the basis of data from the satellite Global Positioning System, while fuel consumption is measured by a turbine flow sensor FS-20. An additional feature available in the device is navigation map based on Navigator Free software or Garmin map view based on free version of Glopus software. Untill registering on the webside http://www.glopus.de, view time is limited to 30 min, but Navigator Free is working free without limitations. In addition, anchor alarm is built-in. It indicates drift from boat anchor position, which is especially useful for river basins, where the river current can move the boat in danger area.

Apropriate use of the system allow significant savings in the fuel efficiency.

Detailed description.

The electronic fuel metering system "Flowtrecs" includes three main components:
1. Fuel Flow Sensor (FS-20) - 2pcs
2.. Voltage converter (DC-20D)
3. LCD screen - color TFT touch screen 4.3 "
    and mounting accessories and charger.

The main purpose is to show the data on fuel consumption (the number of liters per hour), the number of kilometers per 1 liter (fuel economy or consumption rate) and the number of liters remaining in the tank. Moreover, additionally displays time, distance, speed, voltage of 12V battery, range. Measurement of speed and navigation data are calculated on the basis of satellite Global Positioning System while fuel consumption is measured by a turbine flow sensors FS-20.

List of available features:

1. Fuel consumption in l / h
2. Total fuel consumption in liters (hidden function)
3. Fuel Economy indicator (km with 1 liter of fuel)
4. The amount of fuel in the tank (remainining)
5. Range
6. Speed
7. Voltage
8. Clock
9. Distance
10. Anchor Alarm
11. Map view (using Navigator Free or Garmin "img" maps)
12. Auto OFF
13. Day/night switching
14. Motohour counter MTH
15. Language selection (English, German, Polish)

Installation.

First we start with the fuel sensors mounted on the fuel line between the engines and fuel tank. After cutting the fuel line, push its ends to the fuel sensor noting the compliance with the direction of fuel flow direction (look at the arrow). Next, protect the fuel hose against sliding using clamps. Then insert the socket from a converter - sensor cable to the plug exiting from the sensor. Fix the sensors with outgoing hoses in a horizontal position, so that the fuel supply is departed horizontally and the upper surface of the sensor is placed horizontally.

As the sensor is waterproof, protect against water should be only the plug-socket connection by wrapping it by flexible tape.
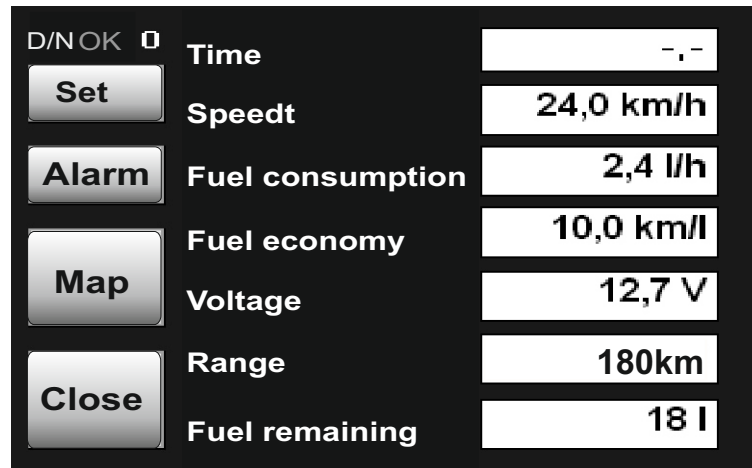
The next step is to mount and connect the converter DC-20. It should be mounted in a place not flooded by water, upright, facing down wires near the handlebar control. Somewhere under the control console. LCD cable (with the Mini USB plug) should be derived to the desktop to the place where the LCD screen will be placed. The cables from the fuel sensors should be inserted into the sockets outgoing from the converter. Remaining 2-wires should be connected to respective leads of the shifte or board harness:

1. Red - to the wire, where after switching ignition key, the voltage +12 V (Ignition) appears
2. Black - to ground (GND)

. After a successful power-up, (when the ignition key is turned ON), LED at the bottom of the converter should illuminate and now only remains the attachment of a suction cup base with the LCD panel, then plug in Mini USB connector into LCD panel and the system is ready to work.

Operation of fuel measurement

To start, you must activate the switch on the left top housing of LCD (push for a few second).The LCD displays the welcome screen, which after several seconds, switches to the application.

D/N OK 0		
Set	Time	-.-
Alarm	Speedt	24,0 km/h
	Fuel consumption	2,4 l/h
Map	Fuel economy	10,0 km/l
	Voltage	12,7 V
Close	Range	180km
	Fuel remaining	18 l

Main screen view

Visible are all measured parameters, giving the opportunity to observe all the data at the same time.
They are:
1. Time
2. Speed
3. Fuel consumption
4. Fuel economy
5. Battery voltage
6. Range
7. Fuel remaining

Besides on the left side you can see following buttons:

1. Set - for motor data settings
2. Alarm - for anchor alarm settings
3. Map - for map view
4. Close - for closing application

Moreover, upper left corner of the screen displays the status of the receiving satellite signal in the form of the string "OK" and the number of available satellites. Red lettering indicates no signal, whereas the green signal indicates the availability of satellites.

In addition, "D/N" characters are used as day/night switching. Touching this letters is changing the colors and brightness of the screen for better readability in the darkness.

Composite screen

When we want to watch a few parameters on one screen, combined display function is available. The screen is divided into 4 areas showing selected parameters. Selection is done by clicking once on the names of these parameters on the main screen. When you click, the color of parameter names change to green. The order you click determines the position of parameters on the screen. The first clicked is displayed in the upper left corner, the next in the upper right, the third in a left bottom, and the fourth in the bottom right as shown below.

Entering in composte screen is after you click on the OK sign. Return to the main screen is done by double clicking on the any of the composite screen subtitles. If there are not selected all four parameters, for example 3 only, one of the fields remain empty.

1   2

24,0 km/h	3,4 km/l
Speed	Fuel econ.
12,7 v	13:21
Voltage	Time

3   4
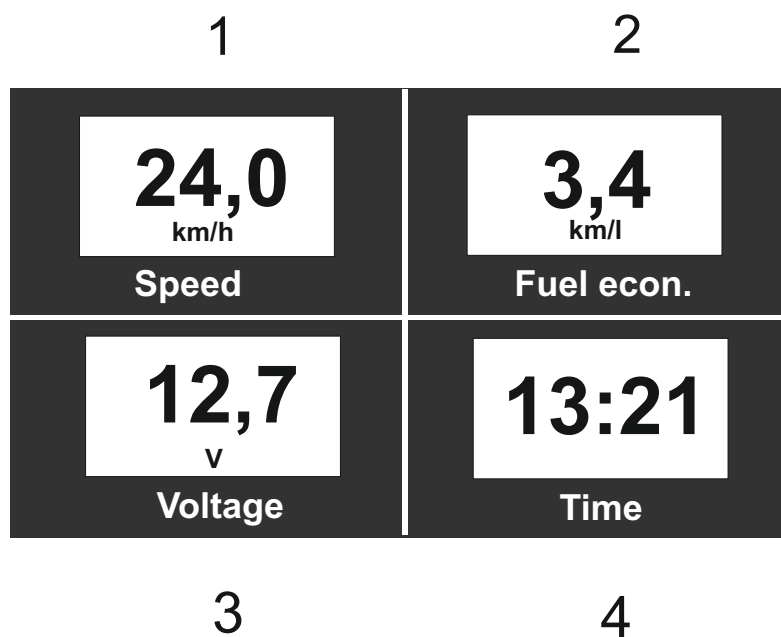
Composite screen view

Main screen description

Button "Set" (Settings)

In the windows on the screen, enter data of your engine:
1. Number of cylinders
2. Manufacturer's brand
3. Type of engine.
4. Type of engine mount (optional for now inactive)
5. Sensor S1 coefficient (factory preselected- don't change)
6. Sensor S2 coefficient (factory preselected- don't change)
7. Units selection (Gal/l, Nm/km)
8. Language selection
9. Sensor selection (factory preselected- don't change)

   Check box "Auto OFF", to select automatic shutting off after one hour of engine silence (fuel consumption is stopped , the engine is OFF).
   The slider "Volume" allows you to adjust the volume of clicks and the anchor alarm.
   Language selection is suitable for selecting one of 3 available language versions, DE, ENG, PL.
   To return to the main program without saving the settings, press the "Back" button and "Save" for saving your changes.
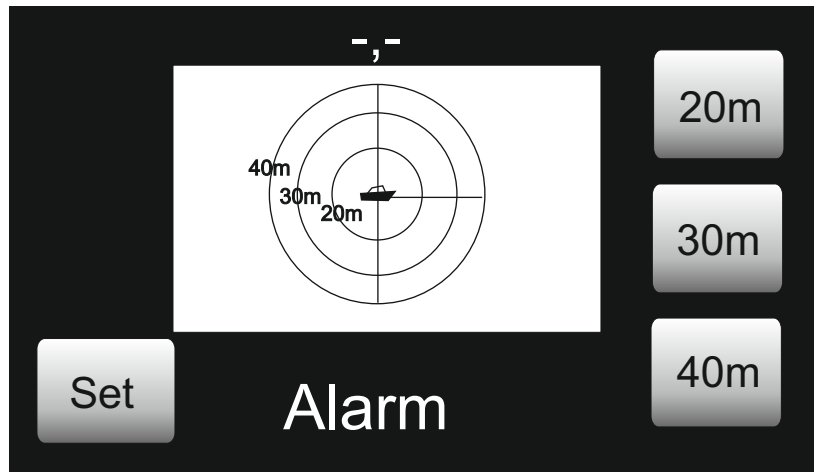
Settings screen

Button "Alarm"

Selecting this option allows you to set the anchor alarm distance for 20, 30 or 40 meters. It works in such a way that acoustic alarm is activated when the boat is moved from the base point, at a distance greater than selected.

This allow to avoid unintended danger caused by wind, current or waves.

Button "Map"

The "Map" launches navigation satellite system based on user map. It is useful for location of current boat position on the water, and track your movement. Maps are preinstalled on enclosed MicroSD card.

Support for the maps is described on Navigator Free or Glopus web pages (depending on the maps used).

www.glopus.de

www. navigatorfree.mapfactor.com

Its possible to use different mapping software , however it must be Win CE6 system compatible. The map should be installed on Micro SD card and the path to the map "exe" file must be entered within windows "\SDMMC\".

(see next page).

Selecting the different functions of the main screen

For greater clarity the individual data are displayed in a separate screens. This is done by double click on the words Time, Speed, etc.
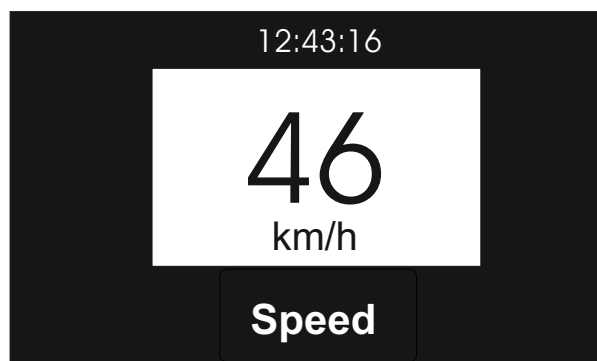
1. Time

```
┌─────────────────────────────────────────┐
│  ┌────────┐      ┌───────┐    ┌────────┐ │
│  │ 12,4km │      │ Reset │    │ 7,5 km │ │
│  └────────┘      └───────┘    └────────┘ │
│  Km counter                   Distance   │
│       ┌──────────────────────┐           │
│       │     15:48:55         │           │
│       └──────────────────────┘           │
│  Motohours           ┌───────┐ Averaging │
│  counter             │       │ time      │
│  ┌──────┐            │ Time  │ ┌───────┐ │
│  │  2h  │            │       │ │Auto ▼ │ │
│  └──────┘            └───────┘ └───────┘ │
└─────────────────────────────────────────┘
```

The upper part displays the total distance from the first run (Km counter) and the distance traveled since the last switching on.

The total distance is cleared by holding down for a few second button "Reset", while the distance is cleared by briefly pressing the same button. Below you can see the current time calculated on the basis of data from satellites. If the time visible on the screen is different than your local time, time zone adjustment is necessery. Please touch and hold the „Time" word for min 5s. You will then see „Time offset" screen, where you can adjust and save your time offset.

Left corner is showing Motohour counter. It is recording how many hours the engine was running since installing Flowtrecs system. User can't reset this counter. Back to the main screen is by doublle click on the word "Time."

2. Speed

```
┌─────────────────────────────────────────┐
│              12:43:16                    │
│       ┌──────────────────────┐           │
│       │                      │           │
│       │        46            │           │
│       │       km/h           │           │
│       └──────────────────────┘           │
│              ┌────────┐                  │
│              │ Speed  │                  │
│              └────────┘                  │
└─────────────────────────────────────────┘
```

The main screen displays the current speed , which is calculated based on data from satellites. If you see same lines only, there is no valid signal from the satellites. At the top of the screen, current time is visible.
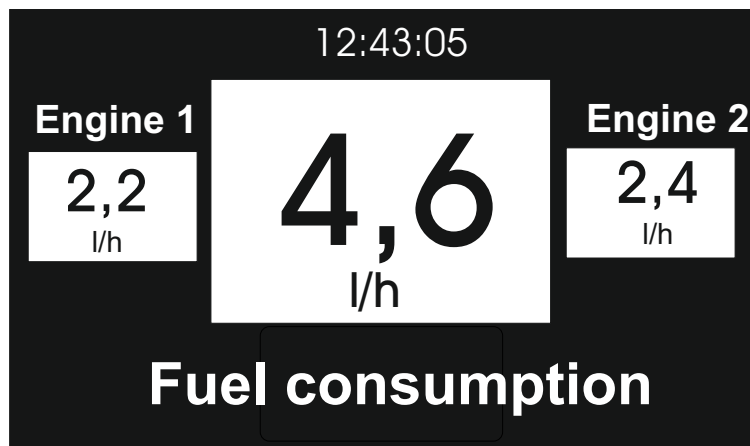
Example for Glopus Mapping Software

Above example is showing the path to Glopus "exe" file which is installed on SD card in catalogue named Glopus. .

Button "Close"

"Close" button exits the fuel measurement system, while maintaining previously recorded measurement data such as fuel remaining.
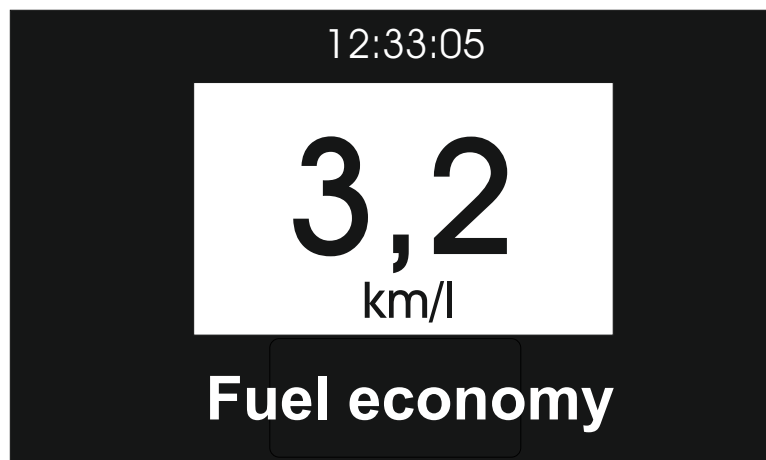
3. Fuel consumption

Indicates the current volume of fuel measured by both fuel flow sensors. In the middle - total consumption, sides displays- each engine. This values are averaged to enhance the stability of readout.

4. Fuel economy

Indicates the number of kilometers that you can travel consuming 1 liter of fuel. This value is averaged to increase the stability of the readout.

This is one of the most important parameters determining fuel economy. Large influence on its size has the speed, balast, and the trim setting. Appropriately choosing these factors can improve the economy by 50% , which means that you can increase range of travelling twice, by chan- ging the speed and trim only. Practice has shown, that when appropria- tely adjusting speed and trim, maximum fuel savings are in the range of 10-50%.

5. Battery voltage
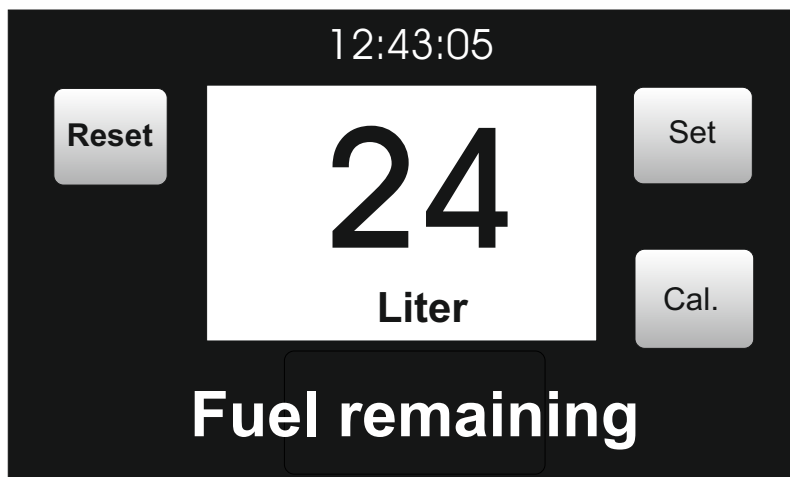

12:43:05

12,7

V
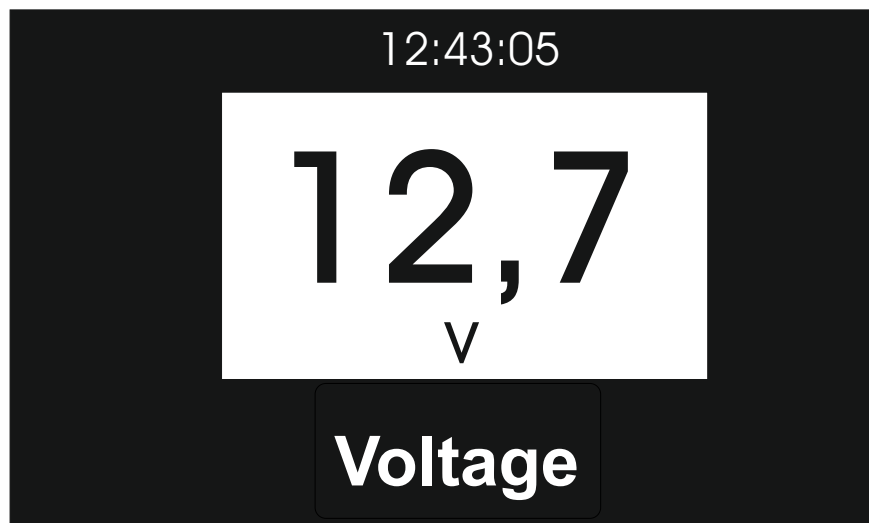
Voltage

Indicates the currently measured battery voltage level.

6. Range

12:43:05

180

KM
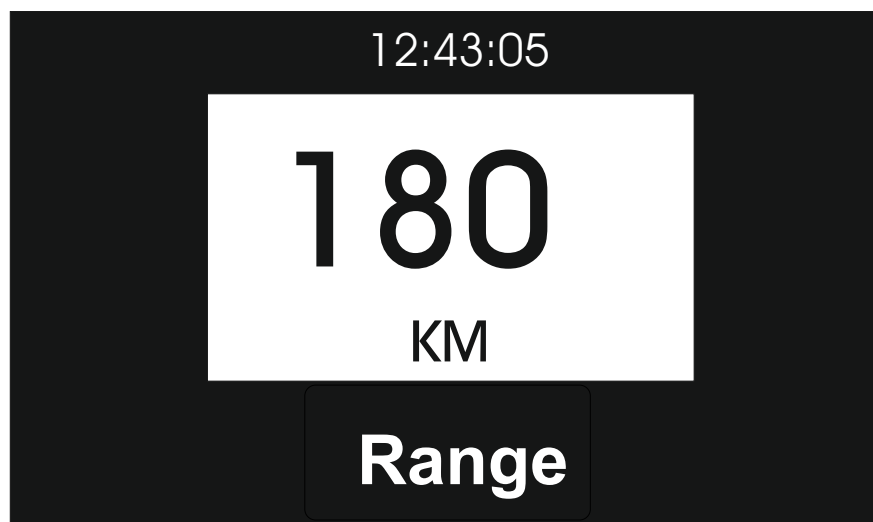
Range

Indicates boat range based on current fuel consumption and fuel quantity remaining in the tank.

7. Fuel remaining


```
12:43:05
```

**Reset**   **24** Liter   **Set**   **Cal.**

Fuel remaining

Indicates the amount of fuel left in the tank, (minus the amount of fuel consumed, as measured by the sensors). Inaccuracy of this volume is the same as flow measurement error of 5%, so you should always keep a reserve of fuel, so as not to get stuck in the basin with an empty tank.

There are following buttons available
- a. Set
- b. Calibration
- c. Reset

7a. Button "Set"

15 Liter   **∧**   **Save**   **∨**
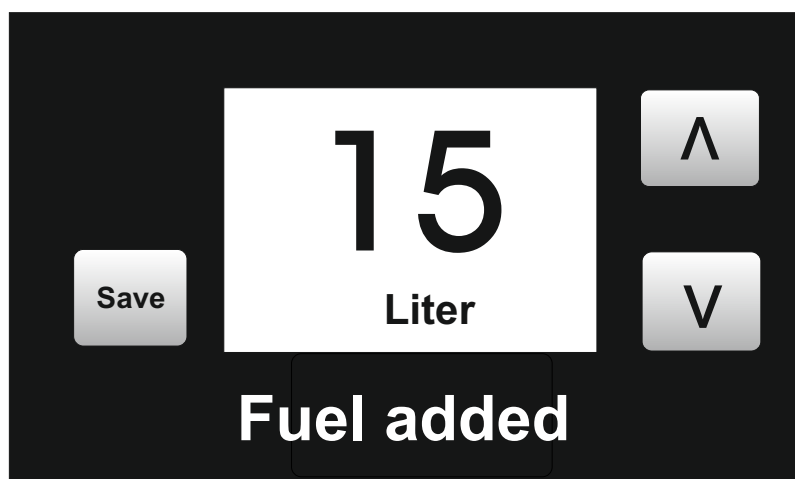
Fuel added

When you press the Set box, you see "Fuel added" and you can enter the amount of fuel added to the tank. Press the directional arrows on the buttons to reach its target, then press   "Save" to save. The amount entered is added to an already present in the tank, so indicated amount of fuel is increased.

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7.b Calibration button

Calibration screen

      Calibration is an operation that can be done to accurately adjust readings of the amount of fuel consumed to the amount of realy used fuel.

Flowmeters are factory pre-calibrated, but in order to obtain more precise indications, it can be calibrated for particular fuel system and a specific type of engine. The whole operation is to match the indicated amount of fuel consumed to the volume of fuel consumed in reality.

      After observing significant differences between readings of fuel remaining in the tank and real fuel amount, you can correct this by changing fuel consumption coefficient. Knowing f.ex. that the fuel remaining readings are 5% lower than real fuel amount, its necessery to lower fuel consumption rate by 5%.

Select then screen "Fuel remaining" and on this screen, select the "Cal" button and on the "Calibration" screen, press button „Start".

Now you can see the screen "Correction" in which you can correct (using directional arrows) coefficient of fuel consumption. In this case you should lower this coefficient by 5%. After correction ,choose "Save" and confirm when you see the windows "Save the correction ?"

(For twin engine kits, there are two independent mutiplier windows).

To cancel entering data for the calibration and back to main screen, tap twice "Correction" button.
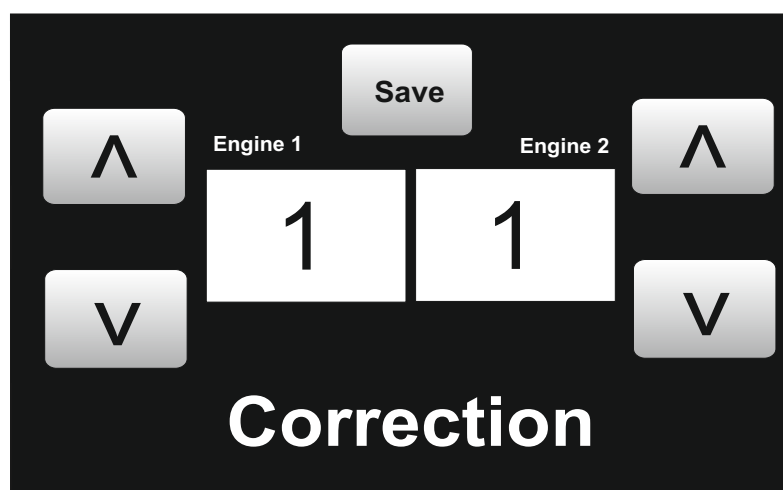
Correction screen

7c. Button Reset

By pressing and holding for a few seconds the "Reset" button, the volume of the fuel in the tank is set to "0" and this time you can enter into the memory, new fuel volume in the tank.

Fuel consumption counter

This function counts all the measured fuel consumption. It is on two different time zone divided. A periodic consumption, which Gasoline consumption for last rides shows and second, entire consumption for the whole season.. Both counters could be set to zero different ways:
Periodic consumption - 3 sek.Reset button press
Total consumption - 10 sek. Reset button press
In the top field you can enter personal information such as boat name, etc. Entry into this function is hidden and backed by a password.

Consumption counter input

Active touch area

Engine data settings   Volume

Cylinders   ☑ AutoOFF   Brand

| 1-Cyl ▼ |

| Honda ▼ |

Engine type   Type

| 2-Stroke ▼ |

| Outboard ▼ |

Language   S1   Units

| english ▼ |

| 1 |

| km/h, l ▼ |

Save   S2   Sensor   Back

| 1 |

| S ▼ |

To see the consumption data, it is necessery to hold the finger at least 5 sec. in the area of the white rectangle (invisible on the screen),then following screen will appear:

Password

| 1 | 2 | 3 | 4 | 5 | OK |
| 6 | 7 | 8 | 9 | 0 | BS | Back |

In this moment user should type the password to see the counter data. In the initial state the following sequence of numbers " 22222222 " is needed.

After confirmation (OK button), the screen is changed and the consumption data are displayed. If necessary, the user can set new password.

    Back button allows abandonment of this option and BS (Backspace) button deletes last enrolled characters.

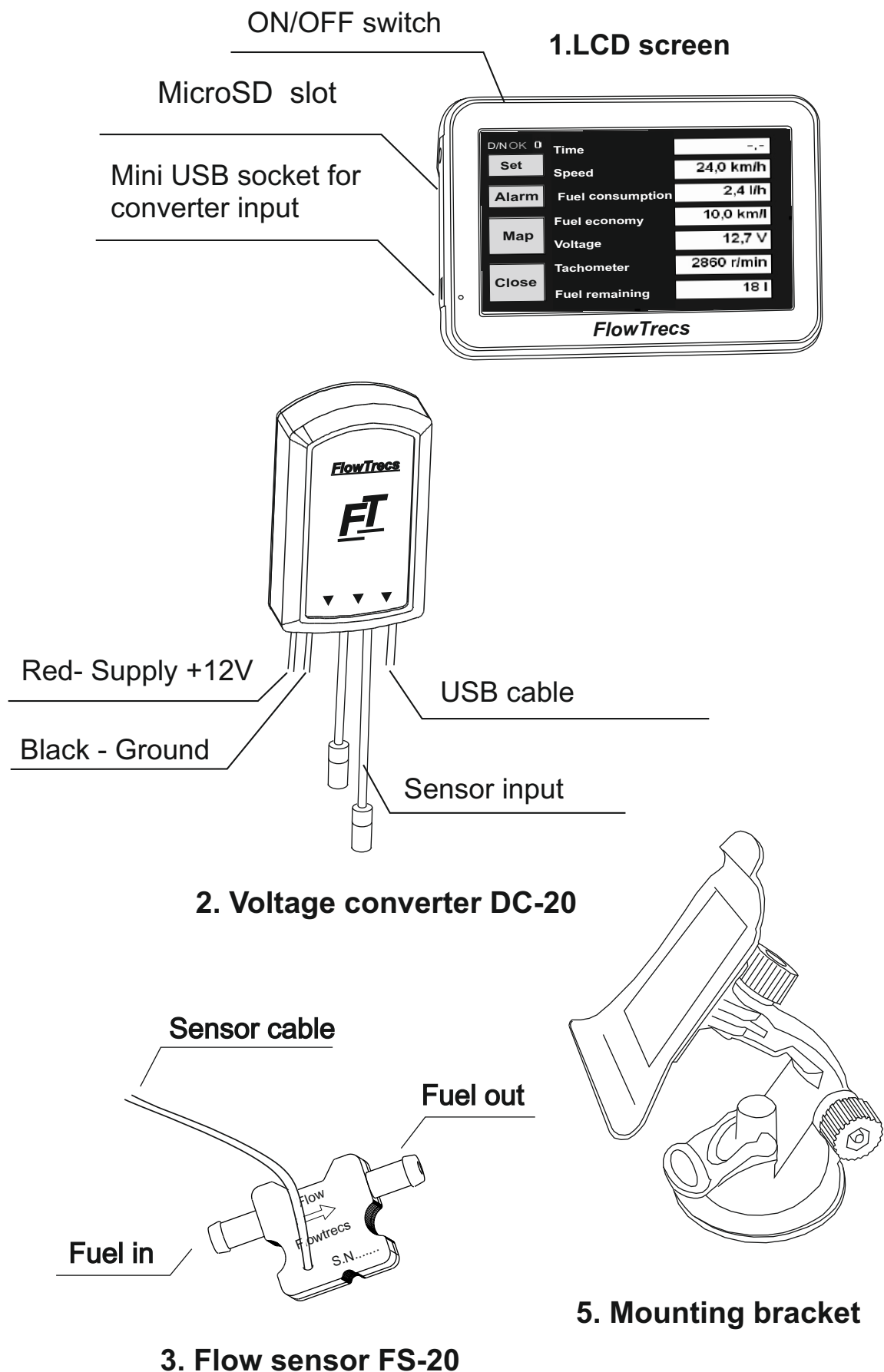# Flowtrecs TS 4,3 Duo available models specifications

There are 3 models available, for different engine power, with following technical details:

Type of system	Version S	Version M	Version L
Range of eng. power	20-60HP	60-130HP	130-300HP
Power supply	10-16VDC	10-16VDC	10-16VDC
Current consumption	0,8A	0,8A	0,8A
Flow meas. range	0.5-30l/h	1-60l/h	1.5-100l/h
Flow rate error	5%	5%	5%
Diameter of fuel conn.	9,5mm (3/8")	9,5mm (3/8")	9,5mm (3/8")

Parts included

1. Touch, colour LCD screen 4,3"(non waterproof)
2. Voltage converter DC-20
3. Fuel sensors FS-20 - 2pcs (waterproof)
4. Mounting bracket with suction base
5. Connection cable Jack 3.5mm (5 meter) 2pcs
6. Charger 12VDC
7. Nylon clamps

The view of the main components of the system

ON/OFF switch

1.LCD screen

MicroSD slot

Mini USB socket for
converter input

D/N OK 0	Time	-,-
Set	Speed	24,0 km/h
Alarm	Fuel consumption	2,4 l/h
	Fuel economy	10,0 km/l
Map	Voltage	12,7 V
	Tachometer	2860 r/min
Close	Fuel remaining	18 l

FlowTrecs

FlowTrecs

FT

Red- Supply +12V

USB cable

Black - Ground

Sensor input

2. Voltage converter DC-20

Sensor cable

Fuel out

Flow
Flowtrecs
S.N.......

Fuel in

5. Mounting bracket
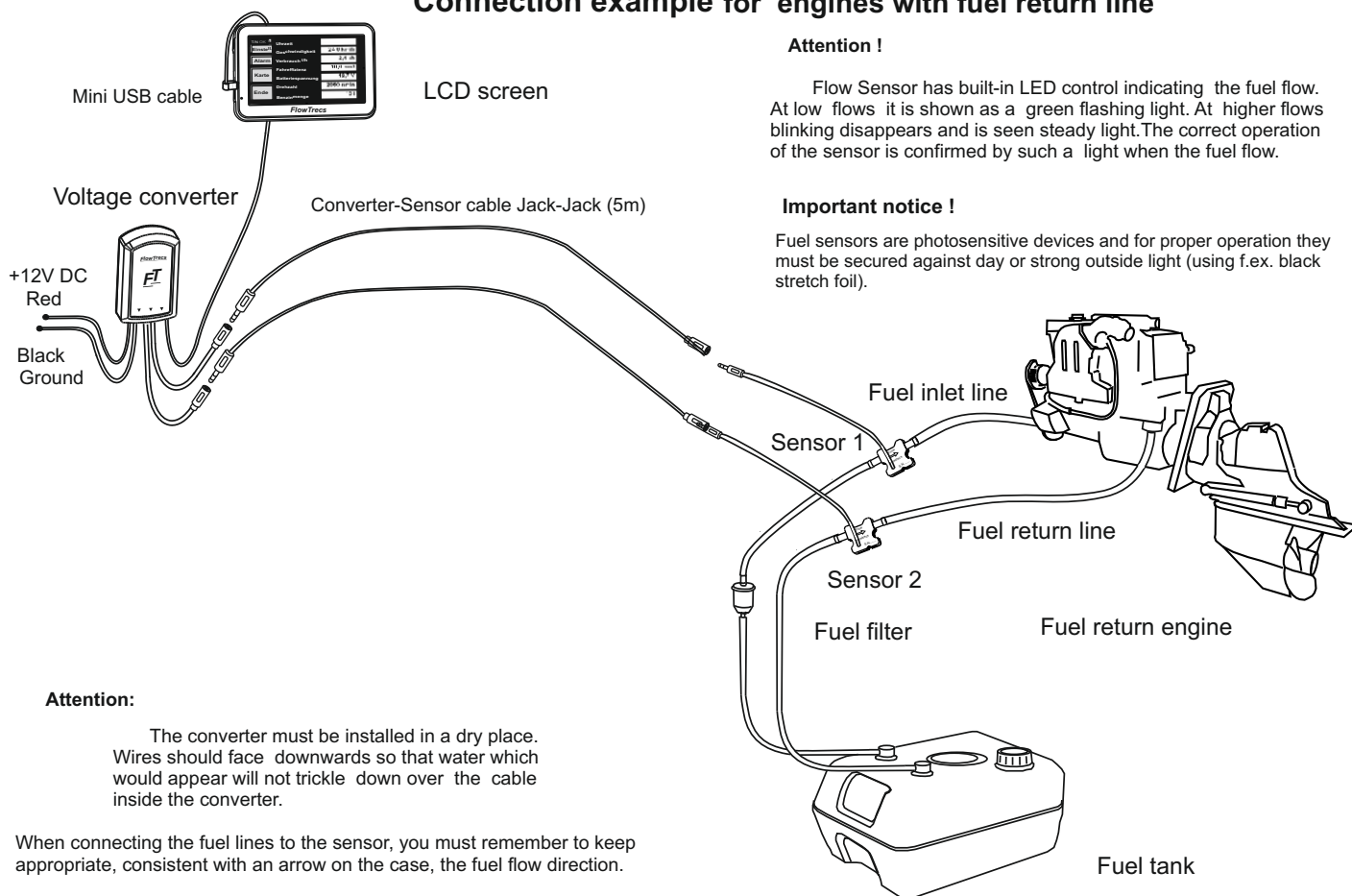
3. Flow sensor FS-20

Connection example for engines with fuel return line

Attention !

Flow Sensor has built-in LED control indicating the fuel flow. At low flows it is shown as a green flashing light. At higher flows blinking disappears and is seen steady light. The correct operation of the sensor is confirmed by such a light when the fuel flow.
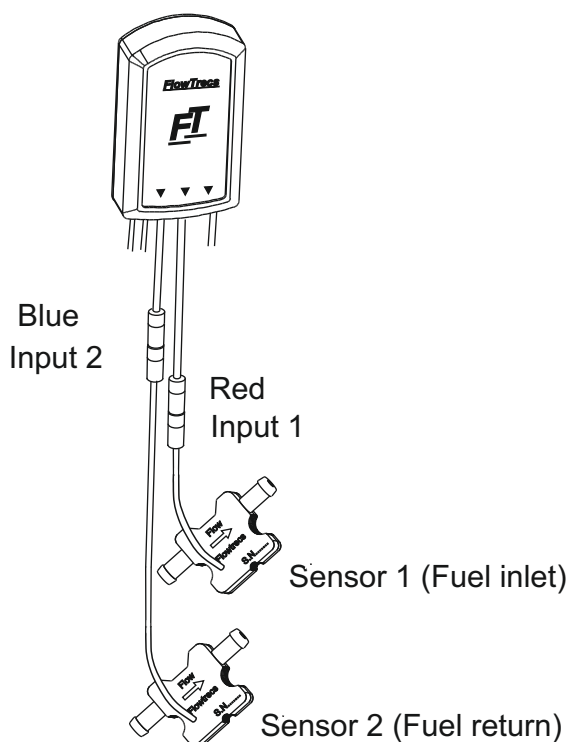
Important notice !

Fuel sensors are photosensitive devices and for proper operation they must be secured against day or strong outside light (using f.ex. black stretch foil).
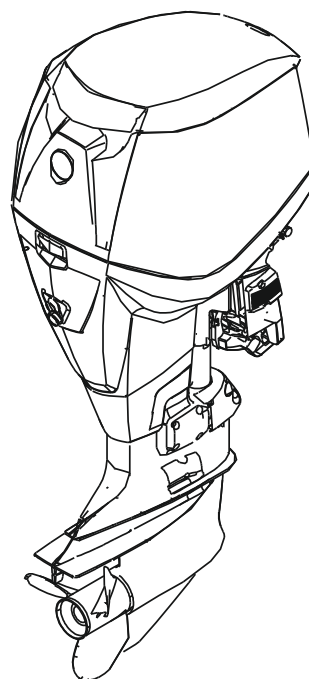
Mini USB cable

LCD screen

Voltage converter

Converter-Sensor cable Jack-Jack (5m)

+12V DC
Red

Black
Ground

Fuel inlet line

Sensor 1

Fuel return line

Sensor 2

Fuel filter

Fuel return engine

Attention:

The converter must be installed in a dry place. Wires should face downwards so that water which would appear will not trickle down over the cable inside the converter.

When connecting the fuel lines to the sensor, you must remember to keep appropriate, consistent with an arrow on the case, the fuel flow direction.

Fuel tank

Connection layout for twin sensor application

Blue
Input 2

Red
Input 1

Sensor 1 (Fuel inlet)

Pic. 7

Sensor 2 (Fuel return)

Notice !
Sensor for fuel inlet should be connected to the red input and fuel return sensor should be connected to blue input wire

FlowTrecs

www.flowtrecs.com