FLYBOX®

VIGILUS

Operating manual

Revision 1.0, 18/7/2017
For firmware version 2.14

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SECTIONS

INSTRUMENT CONFIGURATION

OPERATING INSTRUCTIONS

TECHNICAL SPECIFICATIONS

Thank you for purchasing a Flybox® product. We hope it fully satisfy you and makes your flights pleasant and secure.
Developing Vigilus, our intent was to create a compact but complete Engine Information System , easy to install and use.

SYMBOLS USED IN THE MANUAL

NOTE: Used to highlight important informations.

CAUTION: Used to warn the user and indicate a potentially hazardous situation or improper use of the product.

WARNING: Used to indicate a dangerous situation that can cause personal injury or death if the instruction is disregarded.

NOTE: Keep this manual in the aircraft.
This document must accompany the instrument in the event of change of ownership.

NOTE: This device is intended for installation onto non type certified aircraft only, because it has no aviation certifications. Refer to your local aviation authorities to check if this device may be installed in your aircraft.

CAUTION: Read entirely this manual before installing the instrument in your aircraft, and follow the installation and operating instructions described here.

CAUTION: The pilot must understand the operation of this instrument prior to flight, and must not allow anyone to use it without knowing the operation. Don't use this instrument in flight until you are sure of the correct operating of the same.

CAUTION: When the installation is finished you must do a test, prior to flight, switching on all the possible source of electric noise and checking the properly operation of this instrument.

CAUTION: The software of this instrument can be subject to change, update, addition or removal of functions, so also the operating mode of the instrument can be subject to change. Always refer to the installation and operating manual updated with the software version used in your instrument. To obtain updated manuals, please visit www.flyboxavionics.it.

WARNING: For safety reasons, the Vigilus operational procedures must be learned on the ground.

WARNING: Do not solely rely on this instrument to determine the primary engine informations. Always compare the informations provided with other primary instruments to recognize eventual malfunctions.

WARNING: Responsibility for installation lies entirely with the installer. Responsibility for operations lies entirely with the operator. Responsibility for any calibration, settings or any other customization lies with the person performing these operations.

WARNING: It's up to the installer to check the correctness of the settins for its engine, even using one of the Vigilus preset, because engine manufacturers may change parameters without notice. The engine preset of the Vigilus are a help but needs to be checked by the installer.

IMPORTANT: **If you do not agree with the notices above do not install this instrument in your aircraft, but return the product for a refund.**

Microel s.r.l. reserves the right to change or improve its products. Information in this document is subject to changes without notice.

Contents

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SECTION 1

1.1 PRIMARY ACTIONS AFTER INSTALLATION

WARNING: Do not fly until you have performed at least the actions indicated below:

1 - Select the engine type: the first parameter to setup is the engine selection, because it reset all the parameters to the default value. The engine selection can be made by entering in the Main menu → Settings → Global Settings → Aircraft as explained in chap.1.3.5.

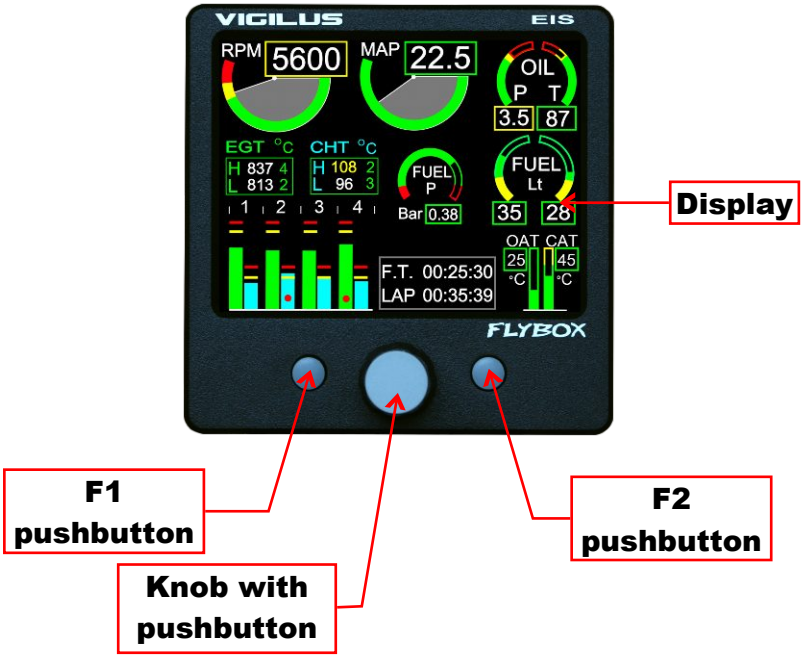
2 - Tank level sensors: (if connected). It's indispensable to perform the calibration for all the tank level sensors connected to the Vigilus. Without performing calibration and settings no indication will be furnished.
It is responsibility of the user to check during the first flights and over time the goodness of the calibration and therefore the instrument indications.
The verification can be done in any moment, for example by simply checking the quantity put to fill the tank: if you know that the tank filled contain 40 liters and the Vigilus indicate as remaining quantity 10.0 liter, you know that to fill the tank you must put approximately 30 liters. Of course keeping in mind that in ground the indications will be different that in flight because of the flight's attitude. This problem is present also in the traditional analog gauge indicators, but is more difficult to detect because of the non-numeric indication.
Another verification is, in case of low remaining quantity (i.e. 4~5 liters), drain and measure it.

3 - Fuel computer: (if installed). If it's installed the fuel flow transducer, BEFORE rely on informations provided by the fuel computer section you must:

- Verify that the K-factor set in the Vigilus is pertinent to the installed fuel flow transducer (for the Flybox® TFTHP is 416400).

- Execute the fuel flow transducer calibration as explained in chapter 1.4. Without calibration the fuel computer informations may be wrong, even if the nominal K-factor is correct for the fuel flow transducer used.
After calibration, the K-factor should have been calculated automatically and at best for every single installation. You must still check for some time if the remaining quantity indicated are reliable compared to the refuelling performed. For example, if the instrument indicate a remaining quantity of 35 liters and you know that the tanks capacity is 80 liters, filling the tanks should require approximately 45 liters; in case of much difference redo the calibration.
Consider also that, during use, little errors accumulate and if you never fill the tanks you never “reset” all these errors.

1.2 PANEL INDICATORS AND COMMANDS



The knob with pushbutton can be rotated (for example to increment or decrement a value) or pressed like a pushbutton (for example to enter in a submenu).
Inside the menus it's always indicated the meaning of the pushbuttons (for example: exit, back, etc…)

- ***Display cleaning:***

To clean the display use the supplied smooth cloth, slightly moistened with cleaner. Use a cleaner that is specified as safe for anti-reflective coatings.

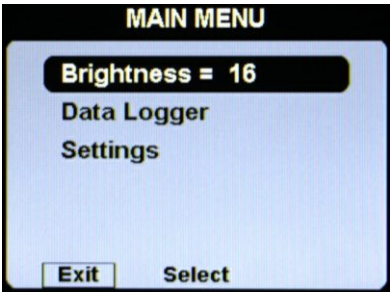
CAUTION: Avoid any chemical cleaners or solvents that can damage the display anti-reflective coating or plastic components. Do not use cleaners containing ammonia.Do not spray water or cleaner directly onto the display.

1.3 INSTRUMENT CONFIGURATION

Before using the Vigilus you need to configure it; read completely this chapter and follow step by step the sections to completely configure all the sensors, alarms and preferences available.

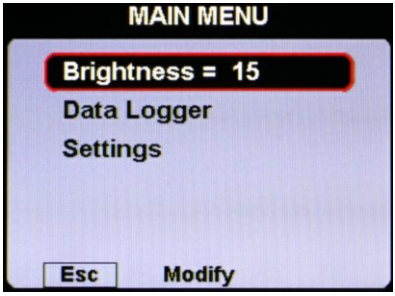
1.3.1 ENTERING & BROWSING THE MENUs

Press the knob for 1 second to enter in the main menu:



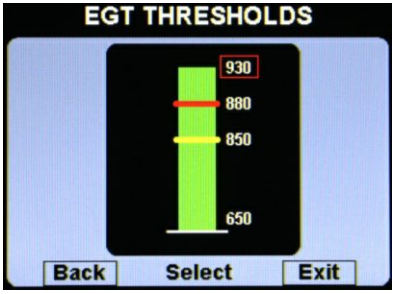
- Press the "**EXIT**" pushbutton to exit the menu.
- Rotate the knob to select an item of the menu.
- Click the knob to enter in the selected item.

For example, to change the display brightness:

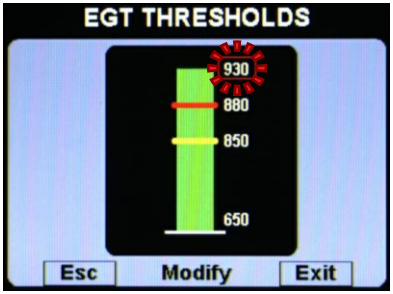


- Rotate the knob to select the "**Brightness**" item.
- Click the knob and the item become highlighted in flashing red: it means that you can edit this value by rotating the knob.
- Click again the knob to store the new value for the brightness OR press the "**ESC**" pushbutton to exit without saving the changes.

Also when inside a parameters page, the editing philosophy is the same, for example:



On this example, by rotating the knob you select the parameter that you want to edit (the selected parameter is highligted in red).



If you click the knob the highlight become flashing red to indicate that you are editing that parameter. Rotate the knob to change the value and press the knob to store the new value

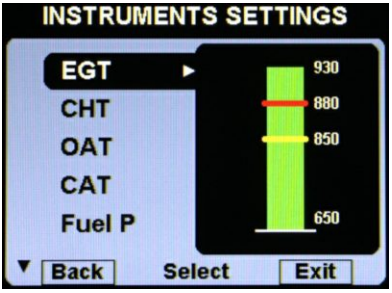
If you don't want to store the new value press "Esc" pushbutton to cancel the editing or press "Exit" pushbutton to exit the menu and return to the main pages.

1.3.2 MAIN MENU:

- **Brightness:** display brightness adjustment (1=min. brightness, 16=max. brightness). Default value=16.
- **Data Logger:** enter in the datalogger menu (see section 4).
- **Settings:** enter in the settings menu (see next chapter).

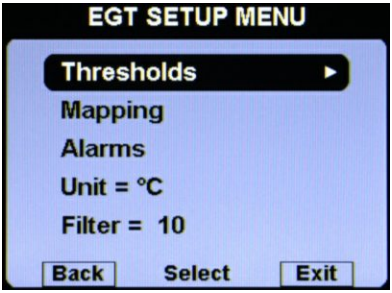
1.3.3 SETTINGS MENU:

1.3.4 INSTRUMENTS MENU:

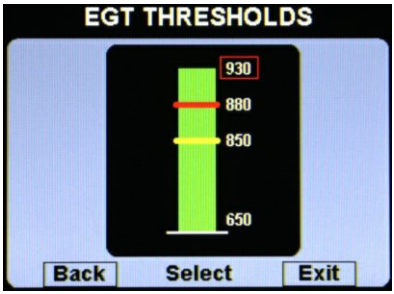


On this menu you can set all the parameters for each available measurement. On the right window there is a preview of the thresolds for the selected item; click the knob to enter in a item.

EGT SETUP MENU:

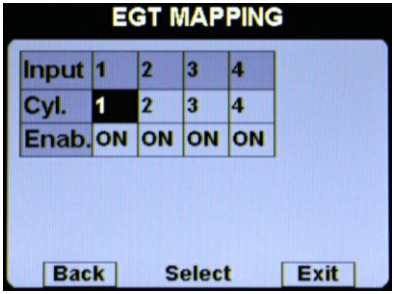


- ***EGT THRESHOLDS SUBMENU:***



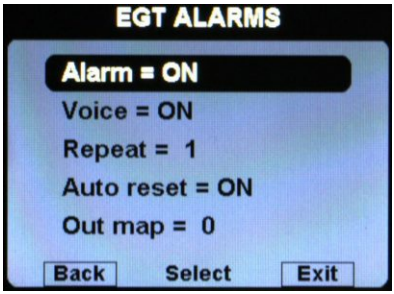
- **Thresholds:** set the thresholds of the EGT bars: min value (bottom of the bar), yellow threshold, red threshold and max value (top of the bar).

- ***EGT MAPPING SUBMENU:***



- **Mapping:** although we recommend to perform a clean installation, with this feature it's possible to reassign or disable the different EGT inputs available in the remote module: for example you can assign the input#1 of the remote module to the engine cylinder#3 and so on. You can also disable each inputs, useful for example if a sensor fails and you don't want to display the indication for that sensor.

- ***EGT ALARMS SUBMENU:***



- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when a EGT measurement exceeds the red threshold (default=ON).

- **Voice = ON/OFF:** enable/disable the audio alert notification on EGT alarms (default=ON).

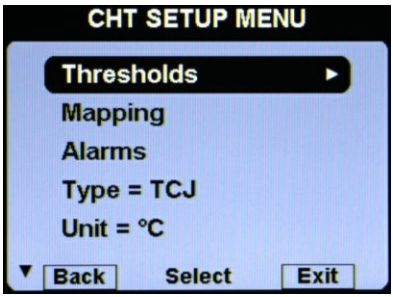
- **Repeat:** Set the number of times that the vocal alarm for the EGT is repeated on the audio output (range:1~5, default=1).

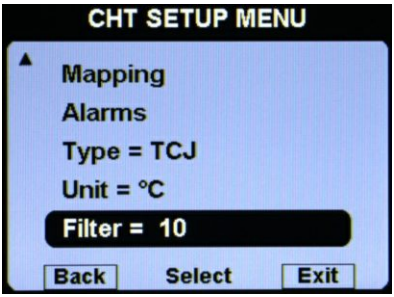
- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement that activated this alarm has dropped below the alarm threshold, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement that activated this alarm has dropped below the alarm threshold (default=ON).

- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit. Set to zero to disable this function (default=0).

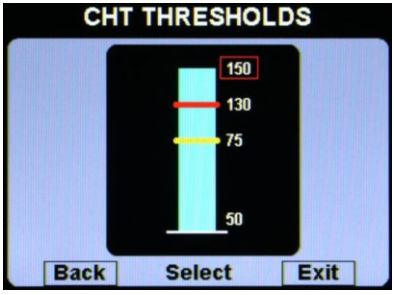
- **Unit: °C / °F:** Set the unit of measure for the EGT temperatures; choose between °Celsius (°C) or °Fahrenheit (°F). Default=°C.
- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

CHT SETUP MENU:



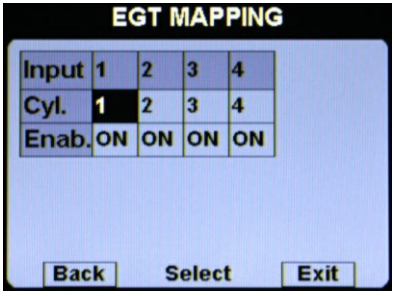


- ***CHT THRESHOLDS SUBMENU:***



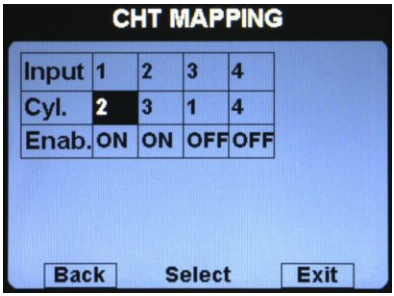
- **Thresholds:** set the thresholds of the CHT bars: min value (bottom of the bar), yellow threshold, red threshold and max value (top of the bar).

- ***CHT MAPPING SUBMENU:***



- **Mapping:** although we recommend to perform a clean installation, with this feature it's possible to reassign or disable the different CHT inputs available in the remote module: for example you can assign the input#1 of the remote module to the engine cylinder#3 and so on. You can also disable each inputs, useful for example if a sensor fails and you don't want to display the indication for that sensor.

For example, for Rotax 912/914 engines the default situation will be the following:



Since the Rotax engines are provided with two CHT sensors, but the first is for the cylinder#2 and the second is for the cylinder#3, this configuration make sure that the first input of the remote module (where is connected the first sensor) is referred to the cylinder#2, while the second input of the remote module (where is connected the second sensor) is referred to the cylinder#3; the third and fourth inputs are disabled (Enab. = OFF).

- ***CHT ALARMS SUBMENU:***

- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when a CHT measurement exceeds the red threshold (default=ON).

- **Voice = ON/OFF:** enable/disable the audio alert notification on CHT alarms (default=ON).

- **Repeat:** Set the number of times that the vocal alarm for the CHT is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement that activated this alarm has dropped below the alarm threshold, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement that activated this alarm has dropped below the alarm threshold. (default=ON)

- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit. Set to zero to disable this function (default=0).

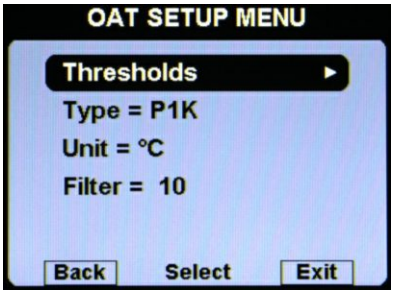
- **Type:** Select the type of CHT sensors installed:
  TCJ: J-type thermocouples
  P1K: PT1000 resistive sensors
  ROX: standard ROTAX CHT sensors (default)

NOTE: It's not possible to mix different type of CHT sensors (i.e. 2 Rotax + 2 thermocouples).

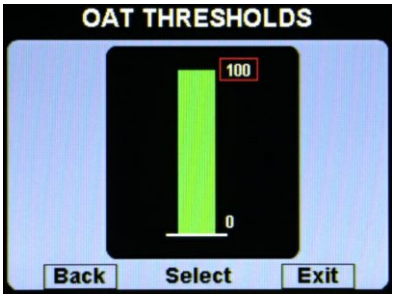
- **Unit: °C / °F:** Set the unit of measure for the CHT temperatures; choose between °Celsius (°C) or °Fahrenheit (°F).Default=°C.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

OAT (OUTSIDE AIR TEMP.) SETUP MENU:



- ***OAT THRESHOLDS SUBMENU:***



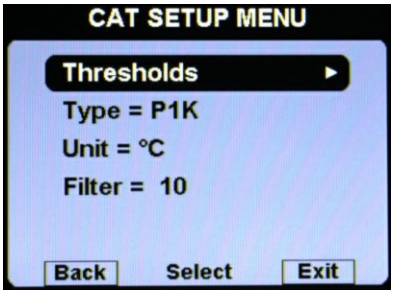
- **Thresholds:** set the min value (bottom of the bar) and the max value (top of the bar).

- **Type:** Select the type of OAT sensor installed:
  P1K: PT1000 resistive sensors (default).
  NO: No sensor installed (disable the indication).

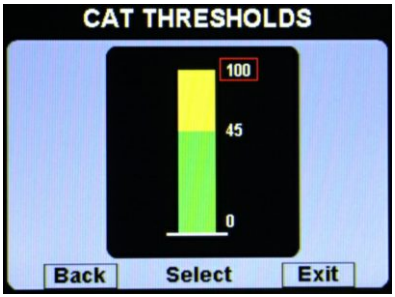
- **Unit: °C / °F:** Set the unit of measure for the OAT temperature; choose between °Celsius (°C) or °Fahrenheit (°F).Default=°C.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

CAT (CARBURETOR AIR TEMP.) SETUP MENU:



- ***CAT THRESHOLDS SUBMENU:***



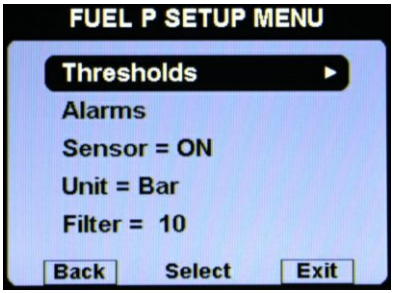
- **Thresholds:** set the min value (bottom of the bar), the yellow threshold and the max value (top of the bar).

- **Type:** Select the type of CAT sensor installed:
  P1K: PT1000 resistive sensors (default).
  NO: No sensor installed (disable the indication).

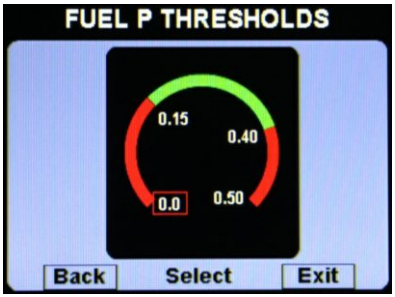
- **Unit: °C / °F:** Set the unit of measure for the CAT temperature; choose between °Celsius (°C) or °Fahrenheit (°F).Default=°C.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

FUEL PRESSURE SETUP MENU:



- ***FUEL P. THRESHOLDS SUBMENU:***



- **Thresholds:** set the min value (bottom of the bar), the low red threshold, the high red threshold and the max value (top of the bar).

- ***FUEL P. ALARMS SUBMENU:***

- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the oil pressure is outside of the green zone (either high or low). Default=ON.

- **Voice = ON/OFF:** enable/disable the audio alert notification on fuel pressure alarms (default=ON).

- **Repeat:** Set the number of times that the vocal alarm for the fuel pressure is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the green zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the green zone (default=ON).

- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.
  Set to zero to disable this function (default=0).

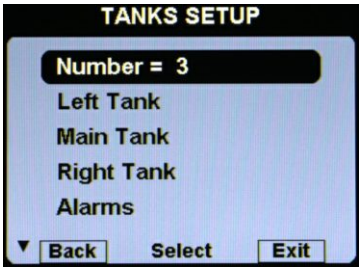
- **Sensor = ON/OFF:** Set to ON if you have installed the fuel pressure sensor, set to OFF if you have not installed it (the indication will be disabled).Default=ON.

- **Unit = Bar / Psi:** Set the unit of measure for the fuel pressure indication.Default=Bar.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

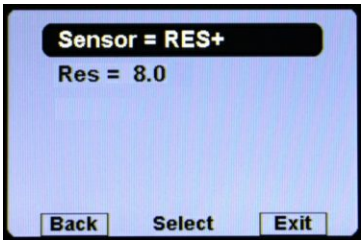
FUEL LEVEL SETUP MENU:

- ***TANKS SUBMENU:***



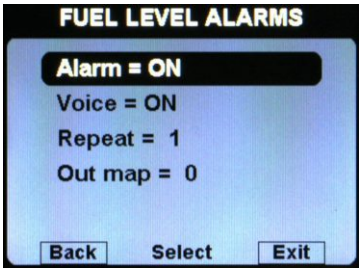
- **Number = 1/2/3:** Set the number of fuel level sensors installed and connected to the remote module.
  If you have not connected any fuel level sensors, set to zero.
  If you set one tank, it will be named “Main tank”.
  If you set two tanks, they will be named “Left tank” and “Right tank”. Default=2.

- ***LEFT/MAIN/RIGHT TANK SUBMENU:***



- **Sensor:** Set the fuel level sensor type installed for the selected tank:
  "**RES+**" for resistive fuel sensors that increase resistance as you add fuel (default).
  "**RES-**" for resistive fuel sensors that decrease resistance as you add fuel.
  If you don't know what type of resistive sensors are installed please see chapter 1.5.1 "Fuel level sensors checkings".
  "**CAP**" for capacitive fuel sensors.
  "**DRES**" for fuel sensors model "DRES".
- **Res:** Set the amount of fuel below which is activated the alarm of low fuel level for the selected tank (range:1~40 l, default=8l).

- ***FUEL LEVEL ALARMS SUBMENU:***



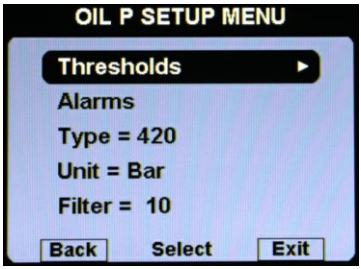
Alarm = ON/OFF: enable/disable the alarm (alert indication on display) for the low fuel on any of the available tanks (default=ON).

- **Voice = ON/OFF:** enable/disable the audio alert notification on low fuel alarms (default=ON).
- **Repeat:** Set the number of times that the vocal alarm for the fuel levels is repeated on the audio output (range:1~5, default=1).
- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.
  Set to zero to disable this function (default=0).

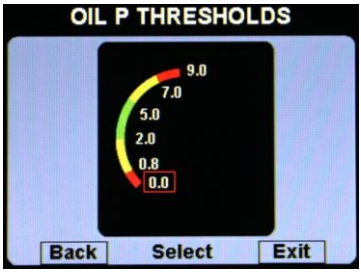
- ***CALIBRATIONS SUBMENU:***

Calibration of the fuel tanks (see chapter 1.5 "Fuel level sensors calibration").

OIL PRESSURE SETUP MENU:



- ***OIL P. THRESHOLDS SUBMENU:***



- **Thresholds:** set the min value (bottom of the bar), the low red threshold, the low yellow threshold, the high yellow threshold, the high red threshold and the max value (top of the bar).

- ***OIL P. ALARMS SUBMENU:***

- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the oil pressure is too low (below the low yellow threshold) or too high (above the high red threshold). Default=ON,
- **Voice = ON/OFF:** enable/disable the audio alert notification on oil pressure alarms (default=ON).
- **Repeat:** Set the number of times that the vocal alarm for the oil press. is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the safe zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the safe zone (default=ON).

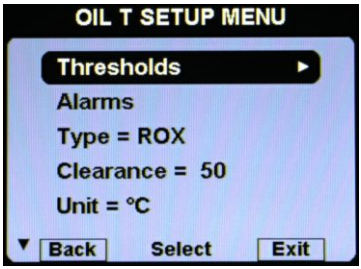
- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.
  Set to zero to disable this function (default=0).

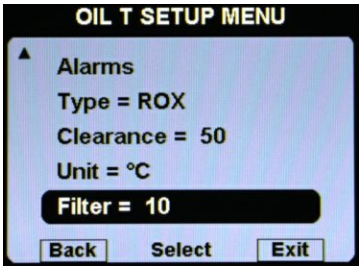
- **Type:** set the type of oil pressure sensor installed:
  NO: not installed (disable the indication).
  RES: ROTAX Resistive (engine before 2008/05).
  420: ROTAX 956413 or Flybox® 602000 (default).
  JAB: standard JABIRU sensor.

- **Unit = Bar / Psi:** Set the unit of measure for the oil pressure indication (default=bar).

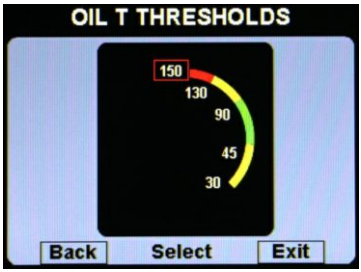
- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

OIL TEMPERATURE SETUP MENU:



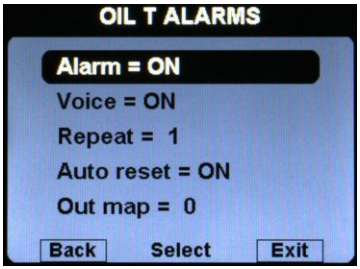


- ***OIL T. THRESHOLDS SUBMENU:***



- **Thresholds:** set the min value (bottom of the bar), the low yellow threshold, the high yellow threshold, the high red threshold and the max value (top of the bar).

- ***OIL T. ALARMS SUBMENU:***



- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the oil temp. is too low (below the low yellow threshold, only in flight) or too high (above the high red threshold). Default=ON.

- **Voice = ON/OFF:** enable/disable the audio alert notification on oil temp. alarms (default=ON).

- **Repeat:** Set the number of times that the vocal alarm for the oil temp. is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the safe zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the safe zone (default=ON).

- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit. Set to zero to disable this function (default=0).

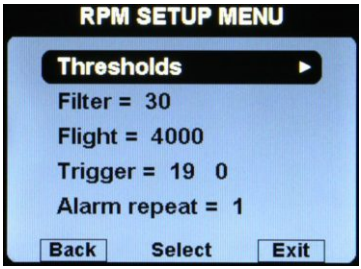
- **Type:** set the type of oil temperature sensor installed:
  NO: not installed (disable the indication).
  ROX: standard ROTAX oil temperature sensor (default).
  JAB: standard JABIRU sensor.
  P1K: PT1000 resistive sensor.

- **Clearance:** setpoint to allow warming the oil before takeoff (used for the "WARMUP/READY" status indicator). Range:0~999°C, default=50°C.

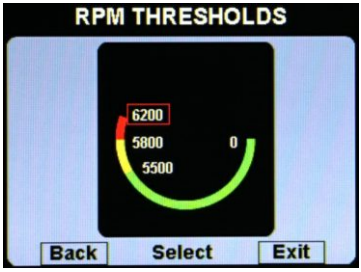
- **Unit: °C / °F:** Set the unit of measure for the oil temperature; choose between °Celsius (°C) or °Fahrenheit (°F).Default=°C.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

RPM SETUP MENU:



- ***RPM THRESHOLDS SUBMENU:***



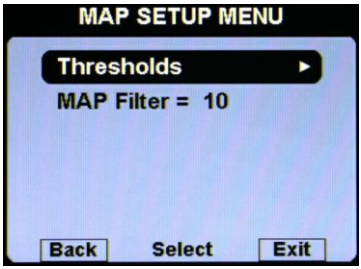
- **Thresholds:** set the min value (bottom of the bar), the yellow threshold, the red threshold and the max value (top of the bar).

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range:0~100, default=30).
- **Flight:** set the RPM required to start the flight timer (the flight timer start automatically when the engine's RPM meets or exceeds this parameter for 30 seconds). Range:0~9990, default=4000.
- **Trigger:** set the electrical threshold for the RPM input. The number on the right is the actual reading of the RPM, to check immediately while modifying the trigger value.
  For signal amplitude of 0~5 Volt set a value of 20.
  For signal amplitude of 0~12 Volt set a value of 27.

For Rotax 912 engine tipically this parameter should not be changed, let the default value (19). Min-Max range is 0~31.

- **Alarm repeat:** Set the number of times that the vocal alarm for the engine overspeed is repeated on the audio output (range:1~5, default=1).

MAP SETUP MENU:

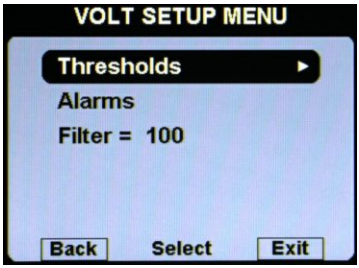


- ***MAP THRESHOLDS SUBMENU:***

- **Thresholds:** set the min value (bottom of the bar), the yellow threshold, the red threshold and the max value (top of the bar). If you don't want the yellow and red zone, set the same value on all the three upper thresholds.

- **MAP Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=200).

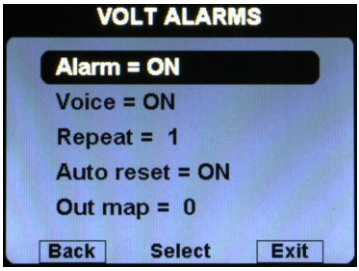
VOLT SETUP MENU:



- ***VOLT THRESHOLDS SUBMENU:***

- **Thresholds:** set the min value (bottom of the bar), the low red threshold, the high red threshold and the max value (top of the bar).

- ***VOLT ALARMS SUBMENU:***



- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the voltage is too low (below the low red threshold) or too high (above the high red threshold).Default=ON.

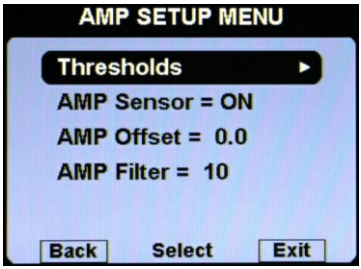
- **Voice = ON/OFF:** enable/disable the audio alert notification on high or low voltage alarms (default=ON).
- **Repeat:** Set the number of times that the vocal alarm for the high or low voltage is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the safe zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the safe zone (default=ON).

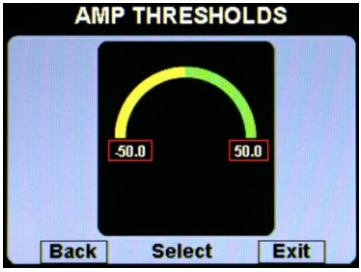
- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.
  Set to zero to disable this function (default=0).

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

AMP SETUP MENU:



- ***AMP THRESHOLDS SUBMENU:***



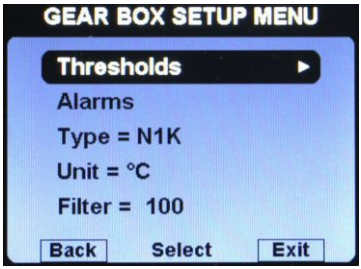
- **Thresholds:** set the min value (negative bottom of the bar) and the max value (top positive of the bar).

- **AMP Sensor = ON/OFF:** Set to ON if you have installed the current sensor, set to OFF if you have not installed it (the indication will be disabled). Default=ON.

- **AMP Offset:** Calibration of battery current sensor. See “Current sensor” section in chapter 2.4 of the installation manual for explanation.

- **AMP Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=10).

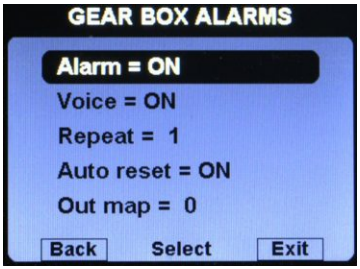
GB T (GEARBOX TEMPERATURE) SETUP MENU:



- ***GEARBOX THRESHOLDS SUBMENU:***

- **Thresholds:** set the min value (bottom of the bar), the yellow threshold, the red threshold and the max value (top of the bar).

- ***GEARBOX ALARMS SUBMENU:***



- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the gearbox temp. is too high (above the red threshold). Default=ON.

- **Voice = ON/OFF:** enable/disable the audio alert notification on gearbox temp. alarms (default=ON).

- **Repeat:** Set the number of times that the vocal alarm for the gearbox temp. is repeated on the audio output (range:1~5, default=1).

- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the safe zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the safe zone (default=ON).

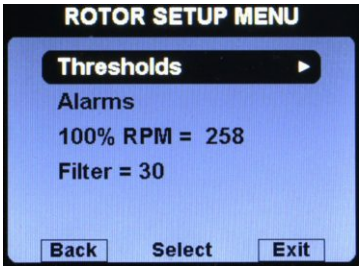
- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.

- **Type:** set the type of oil temperature sensor installed:
  N1K: NT1000 resistive sensor (default).
  P1K: PT1000 resistive sensor.
  ROX: ROTAX oil temperature sensor.

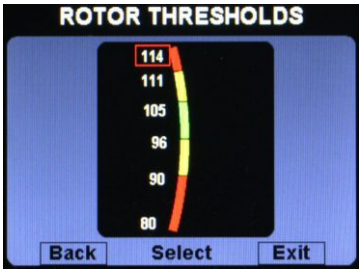
- **Unit: °C / °F:** Set the unit of measure for the oil temperature; choose between °Celsius (°C) or °Fahrenheit (°F).Default=°C.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

ROTOR SETUP MENU:

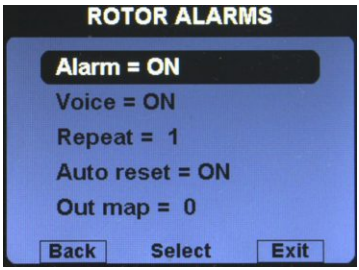


- ***ROTOR THRESHOLDS SUBMENU:***



- **Thresholds:** set the min value (bottom of the bar), the low yellow threshold, the green threshold, the high yellow threshold, the red threshold and the max value (top of the bar).

- ***ROTOR ALARMS SUBMENU:***



- **Alarm = ON/OFF:** enable/disable the alarm (alert indication on display) that occurs when the rotor is on a red zone. Default=ON.

- **Voice = ON/OFF:** enable/disable the audio alert notification on rotor alarms (default=ON).

- **Repeat:** Set the number of times that the vocal alarm for the rotor is repeated on the audio output (range:1~5, default=1).

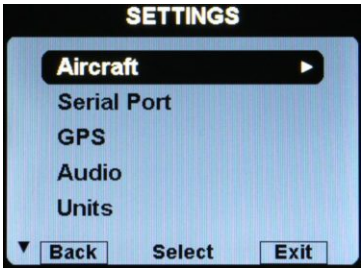
- **Auto reset = ON/OFF:** if set to ON, if a alarm condition is activated but the measurement has returned in the safe zone, the Vigilus automatically reset the alarm indication. If set to OFF, the user must manually reset the alarm indication, even if the measurement has returned in the safe zone (default=ON).

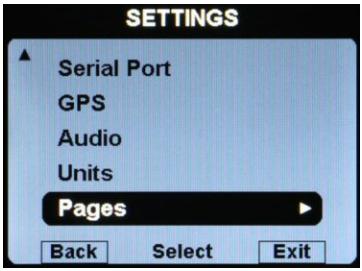
- **Out map:** you can choose to enable one of the four outputs available on the remote module when the alarm is activated, useful for example to turn on an alarm light on the cockpit.
  Set to zero to disable this function (default=0).

- **100% RPM:** set the number of rotor rpm that corresponds to the 100% of the rotor speed.
  NOTE: The default is zero, so you are forced to set the correct value for your helicopter to enable the indication.

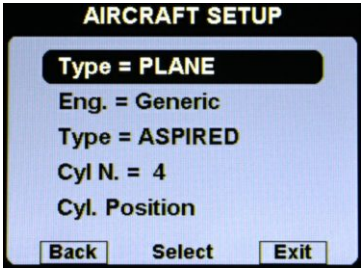
- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).

1.3.5 GLOBAL SETTINGS MENU:





AIRCRAFT SETUP



- **Type = PLANE/HELICOPTER:** Select if the Vigilus is installed in a plane or in a helicopter.

- **Eng.:** Select the engine installed in your aircraft:
  Rotax 912
  Rotax 914
  Rotax 912iS
  EPAPower
  Generic

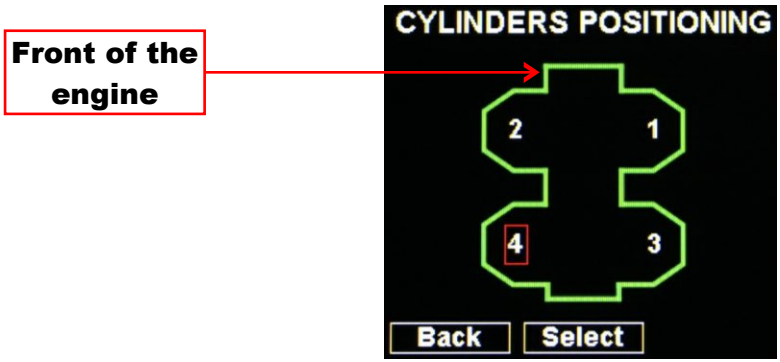
  By choosing one of the engine presets (Rotax 912, Rotax 914, Rotax 912iS, EPAPower), the Vigilus set all its parameters to the default value for the selected engine.

***CAUTION*: Even if the Vigilus presets all the parameters for the selected engine, it's up to the installer to check the compliance of all the settings and thresholds to the engine specifications.**

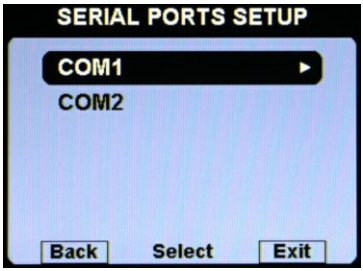
By choosing "Generic" you must manually select the engine type (aspired or injection) and the number of cylinder. After selecting the "Generic" setup, you must manually set also all the other Vigilus parameters and thresholds according to your engine specifications.

NOTE: Since the engine selections reset all the parameters, you should set this as the first thing and never change it anymore, unless you want to reset all the parameters to the default value.

- **Cyl. Position:** Choose the cylinders position, to have a correct indication in the graphical temperatures page.



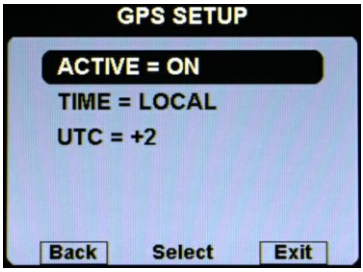
SERIAL PORTS SETUP



- **COM1 Setup:** Enter in the COM1 submenu to choose the
- **Baud Rate:** This serial port is used to connect an external GPS so the baud rate should be set at the same value set in the external GPS (default=4800 bps).

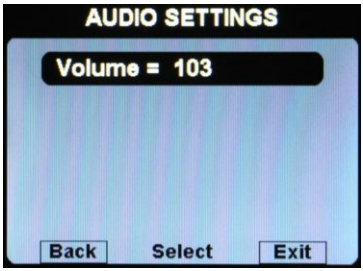
- **COM2 Setup:** COM2 serial port actually not used.

GPS SETUP



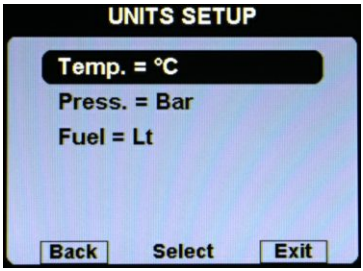
- **Active = ON/OFF:** Enable or disable the GPS. If enabled, the Vigilus use the GPS to indicate the time on the chronometer page. If disabled no time is shown in the chronometer page (default=OFF).
- **Time = UTC / LOCAL:** Set if you want to see the time in the UTC time zone (default setting) or in your local zone. If local is selected, you should set also the:
- **UTC:** set the offset between your local time and the UTC time.

AUDIO SETTINGS



- **Volume:** Set the volume for the vocal alarm on the audio output (range: 0~110, default=103). Set to zero to mute the audio output.

UNITS SETUP



This menu globally set the units of measure for all the available indications.

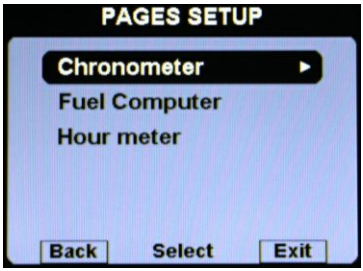
NOTE: When you change the units of measure on this menu, all the single units of measure of each indications will be changed accordingly, so if you have already set different units of measure for each indications on the Instruments submenus, they will be overwritten.

- **Temp.:** Set the unit of measure for all the temperatures; choose between °Celsius (°C) or °Fahrenheit (°F). Default=°C

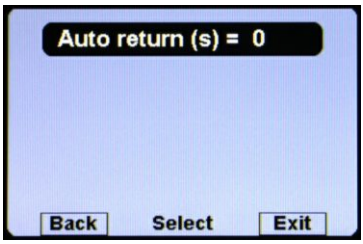
- **Press.:** Set the unit of measure for all the pressure indications (except MAP that it's always indicated in InHg); choose between Bar or Psi. Default=Bar.

- **Fuel:** Set the unit of measure for the fuel quantities. Choose between liters (Lt) or US Gallons (Gal). Default=lt.

PAGES SETUP

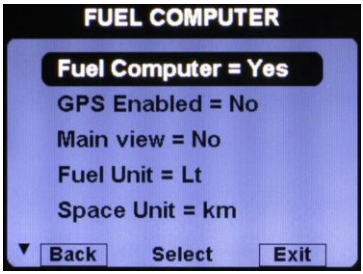


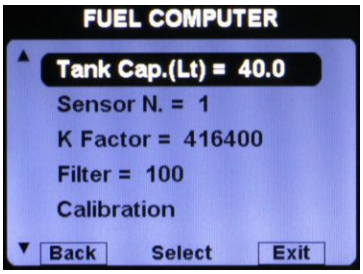
Set, for each of the three information pages available in the Vigilus (Chronometer page, Fuel Computer page and Hour meter page), the auto return time on the main engine data page:



The time is in seconds: if you set 10, after 10 seconds of showing the selected page, Vigilus will return automatically to show the main engine data page.
To disable the auto return for the selected page, set the value to zero. Default=0.

1.3.6 FUEL COMPUTER MENU:





- **Fuel Computer = YES/NO:** Enable or disable the fuel computer page.

- **GPS Enabled = YES/NO:** Enable or disable the GPS for the two indications that require it (RANGE and RESERVE); you must correctly connect the GPS to use this features. Default=NO.

- **Main view = YES/NO**: Enable or disable the indication of the estimated remaining fuel on the main engine data page. Please note that if enabled, it replace the fuel level indications (so if it's enabled, on the main engine data page you will have the estimated remainind fuel calculated by the fuel computer, NOT the fuel level read by the fuel level sensors). Default=NO.

- **Fuel Unit:** Set the unit of measure for the fuel quantities. Choose between liters (Lt) or US Gallons (Gal). Default=Lt.

- **Space Unit:** Set the unit of measure for the distances. Choose between kilometers (km) or nautical miles (NM). Default=Km.

- **Tank Cap.:** Set the tank capacity (if there are more than one tank set the total capacity of the tanks). Default value is set to zero to force the user the first time to set the capacity.

- **Sensor N.:** Set the number of fuel flow transducers installed. Actually only one fuel flow transducer is supported.

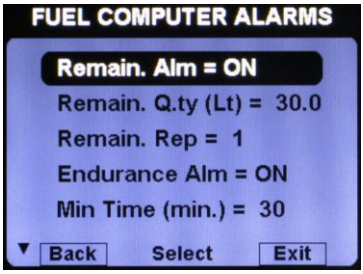
- **K factor:** Set the fuel flow transducer's K-factor, if installed. The K-factor of a fuel flow transducer is the number of electric pulses for 1 gallon of fuel consumption. If you have the K-factor in liters, multiply the value by 3.78 before entering it. Default value is 416400 (nominal k-factor of Flybox® TFTHP flow transducer).

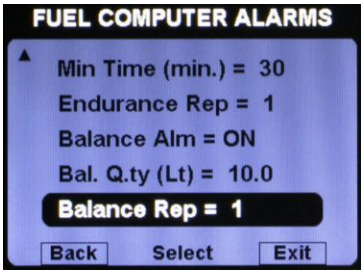
NOTE: For the Rotax 912iS engine the fuel flow is read by the ECU so this parameter isn't used.

- **Filter:** This parameter affect the readings and the gauges displayed: a low value means that the readings will be more fast and unfiltered (but subject to fluctuations), an high value means that the readings will be more slow and stable (range: 0~999, default=100).
- **Calibration:** Calibration of the K-factor of the fuel flow transducer, if installed. Refer to chapter 1.4 "Fuel flow transducer calibration".

NOTE: It's recommended to execute the K factor calibration as soon as possible to have the maximum accuracy in the fuel flow measurements.

- ***ALARMS SUBMENU:***





- **Remain. Alm = ON/OFF:** Enable or disable the alarm on remaining fuel quantity (default=ON).
- **Remain. Q.ty:** Set the fuel quantity for the "Remain. Alm". When the remaining fuel of the Fuel Computer is below this setpoint the alarm is activated (range: 0.1~99.9 lt, default=30.0 lt).
- **Remain. Rep:** Set the number of times that the vocal alarm for the remaining fuel quantity is repeated on the audio output (range:1~5, default=1).

- **Endurance Alm = ON/OFF:** Enable or disable the alarm on endurance (default=ON).
- **Min Time:** Set the minimum time, in minutes, for the "Endurance Alm". When the endurance indication of the Fuel Computer is below this setpoint the alarm is activated (range: 0~999 min, default=30 min).
- **Endurance Rep:** Set the number of times that the vocal alarm for the endurance is repeated on the audio output (range:1~5, default=1).
- **Balance Alm = ON/OFF:** Enable or disable the alarm for tanks balance (default=ON).
- **Bal. Q.ty:** Set the fuel quantity for the "Balance Alm". If the "Balance Alm" is enabled, the Vigilus will activate an alarm every time the quantity of fuel used equals this value, showing "TANK BALANCE" on the display.
  This function is useful to keep balanced two wing tanks, switching from one to the other after using a certain quantity of fuel (range: 0.1~99.9 lt, default=10.0 lt).
- **Balance Rep:** Set the number of times that the vocal alarm for the tanks balance is repeated on the audio output (range:1~5, default=1).

1.3.7 ABOUT MENU:

On this screen it's possible to read current firmware versions, useful to check if your Vigilus and remote module are updated to the latest versions.

NOTE: This manual is referred to the Vigilus firmware version indicated on the first page.

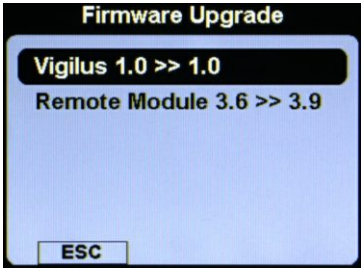
1.3.8 FIRMWARE UPGRADE MENU:

This menu is used for upgrading the firmware versions of the Vigilus and the connected remote module, using a USB flash drive.
If you have received the upgrade files for the Vigilus and/or remote module, copy them in a USB flash drive.
You can then check or upgrade by following this procedure:

1- From the settings setup menu, select “Firmware upgrade”.

2- Insert the USB flash drive with the upgrade files in the USB receptacle on the Vigilus harness.

3- From the screen that appears, you can check if your Vigilus and remote module needs an upgrade:



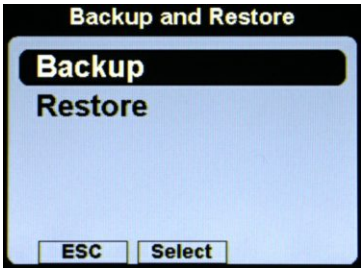
On this example you can see that the remote module needs to be upgraded from version 3.6 to version 3.9.

4- Select if you want to upgrade the Vigilus or the Remote module and then click the knob to start the upgrade.

5- Wait until the firmware upgrade is completed then turn off the power and remove the flash drive.

NOTE: Before the firmware upgrade the Vigilus automatically perform a backup of the settings on the USB flash drive. If there is already a backup file on the USB flash drive, it will be overwritten so before upgrading the firmware move it in another location if you want to keep it. The backup function is explained in the next chapter.

1.3.9 BACKUP AND RESTORE MENU:



This menu is used to save or restore all the settings and calibrations on your Vigilus.

- **Backup:** Insert a USB flash drive in the USB receptacle on the Vigilus harness and then click the knob on this item to save all the settings on the USB flash drive. The filename of the backup is “Backup.vig”.

NOTE: It’s recommended to perform the backup right after finishing to set the instrument and copy the “Backup.vig” file in a safe place to have the opportunity to recall the settings if needed.

- **Restore**: Insert the USB flash drive where you have previously performed the backup (or manually copy the backup file “Backup.vig” in a USB flash drive) and then click the knob on this item to restore all the settings on the Vigilus.

NOTE: All current parameters will be overwritten after the restore.

1.4 FUEL FLOW TRANSDUCER CALIBRATION

To increase accuracy in the fuel flow measurement you must calibrate the transducer by following this steps.

NOTE: it's recommended to perform the calibration right after installing the Vigilus+Remote module and repeat it once a year.

1- With the aircraft in level attitude, fill the tank/s of fuel; note that in the step #4 it's required to refill the tank/s at the exact level reached here.

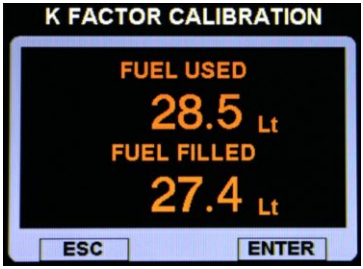
2- Turn-on the Vigilus and select "**FILLED**" when asked for the fuel quantity.

3- Burn at least 3/4 of fuel in the tank/s: a greater amount of burned fuel will increase the accuracy, and you can do this step in more flights: at the start of each flights you must not add fuel in the tank/s and you must select "**NO REFUEL**" when asked after turning on the Vigilus.

4- Fill the tank/s with the exact same level reached in the step #1, accurately measuring the quantity of fuel added in the tank/s.

5- Turn on the Vigilus and select "**NO REFUEL**" (even though you have refilled it's required to select "**NO REFUEL**").

6- Enter in the Main menu → Settings → Fuel Computer → Calibration; the following screen will appears:



7- Now you must insert in the "**FUEL FILLED**" the exact quantity of fuel that you have added and measured in step #4; probably it doesn't correspond exactly to the "FUEL USED" because this is the measurement from the transducer not yet calibrated and it's showed for reference only. To insert the value rotate the knob and press "ENTER" to confirm. To exit without saving, press "ESC".

8- When you confirm by pressing "ENTER" the display will briefly shows the newly calculated K-factor and return to the Fuel computer menu. The transducer is now calibrated and the K-factor is automatically stored in memory; you can safely exit the setup menu or turn off the Vigilus.

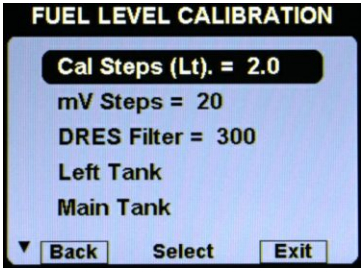
NOTE: it's recommended to annotate the K-factor value so that if you inadvertently modify it it's possible to manually reenter the value without doing again the calibration (however the fuel flow transducer calibration may be repeated in any moment).

1.5 FUEL LEVEL SENSORS CALIBRATION

Before using the fuel level indications it's necessary to calibrate all the aircraft fuel tanks by following the procedure explained in this chapter.

The calibration is divided in more calibration steps, in each step you will fill the tanks with predetermined fuel quantity; the calibration ends when the tank is completely filled.

The parameters available in the calibration menu are:

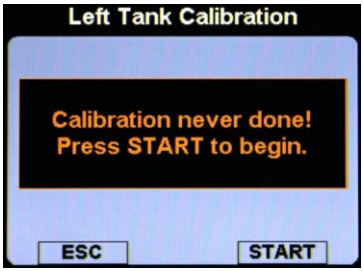


- **Cal Steps:** With this parameter it's possible to choose the fuel quantity to add at each calibration step. Choose a proper value considering the tanks capacity and how many calibration steps you want to execute.
  For example with a 40 liters tank and “Calibration fuel step” set to 2 it's required 40 / 2 = 20 calibration steps. Consider also that the maximum number of calibration steps that is possible to store in memory for every tank is 50.
  The “Cal. steps” parameter is used for all the tanks calibrations, don’t modify it once you have choosed a value (range:1~100 lt, default=2 lt).
- **mV Steps:** Minimum thresold to detect fuel sensor movements (default = 20, don't modify this value).

- **DRES Filter:** Filter for DRES sensors only. Not used for the other sensor types.

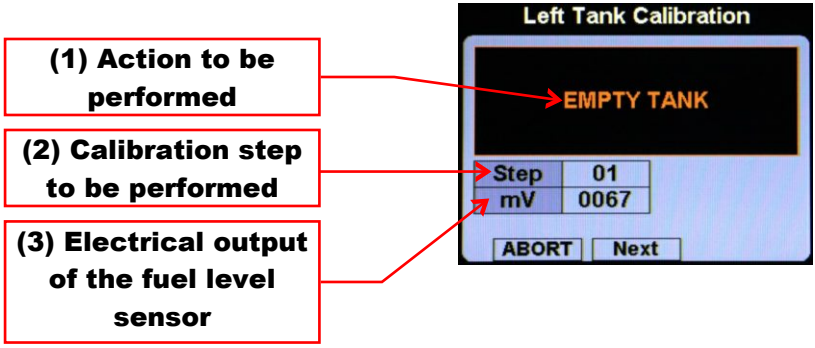
START OF THE CALIBRATION:

- **Left Tank / Main Tank / Right Tank:** Choose which tank you want to calibrate. For example if you select the left tank this screen will appears:



If you've never performed the calibration before for the selected tank, you will see the "Calibration never done!" indication.

- **Press the "START" button to start the calibration;** the display will shows this screen:



- **Step#01** (EMPTY TANK): Drain the tank such that **only the unusable fuel remain in the tank**. Wait until the indication (3) is stable and then click the knob [NEXT] to confirm and go to the next step.

- **Step#02**: Add to the tank the indicated fuel quantity (it's the same quantity choosed with the "Cal. steps" parameter), on this example it's required to add 2 liters of fuel:

Action to be performed: Add 2 liters of fuel

Wait until the indication is stable and click the knob [NEXT] to confirm and go to the next step.
NOTE: to reach the maximum accuracy in the calibration it's important that the fuel quantity is exactly measured.

- **Next steps:** repeat the above step (add the same amount of fuel then click the knob [NEXT] to confirm) until the tank is completely filled.

- **When the tank is filled:** click the knob [NEXT] to confirm the last calibration step and then click the "END" button to end the calibration (when asked on display "Confirm calibration end?" Click the "YES" button and then click the "CLOSE" button).

- **The calibration for the selected tank is now completed.** If you reenter in the tank menu that you have just finished to calibrate, you can see a calibration summary:

To exit from this screen, click the "ESC" button.
It's recommended to perform a backup operation after finishing the calibrations (see chap.1.3.9)

NOTE: A common problem for many fuel level sensors is that they can't completely measure the tank capacity, so one or both of this conditions can occur (see also “Fuel level sensors” section on chap.2.4 of the installation manual):

- As you add fuel to an empty tank it takes a certain amount of fuel before the fuel sensor start to move from the bottom.
- As you drain fuel to a filled tank it takes a certain amount of fuel before the fuel sensor start to move from the top.

If one of this conditions occurs during the calibration, the Vigilus notice that the fuel sensor doesn't produce an electrical change and ask the user if fuel was really already added for that calibration step:

If you are sure to have already added the fuel click on “YES” otherwise click on “NO” to go back to the previous calibration step.

Please note that the amount of fuel that is not measurable, it will not be counted, so for example if your tank have a capacity of 40 liters but only 30 is measurable by the fuel level sensor, after the calibration you will see 30 liters when the tank is full.

1.5.1 FUEL LEVEL SENSORS CHECKINGS

To configure correctly the fuel level indicators, you need to know what type of fuel level sensors are installed in your aicraft. The resistive sensors can be of two types:

- Sensors that increase resistance as the fuel level increase
- Sensors that decrease resistance as the fuel level increase

If you don't know what type of resistive sensors are installed in your aircraft, follow this procedure:

- Empty the tank that you want to check.
- On the Vigilus enter in the calibration for that tank (Main menu → Instruments → Fuel L → Calibrations → Left/Right/Main Tank).
- From the screen that appear click on “START” button
- Annotate the numerical value (mV):

- Add a certain amount of fuel in the tank and check if the numerical indication increase or decrease: if increase then the sensors installed increase the resistance as you add fuel (RES+), if decrease the sensors decrease the resistance as you add fuel (RES-).

To exit from the calibration screen click on “ABORT”.
Repeat the procedure for any other unknown sensors installed.

1.6 FUEL COMPUTER ACTIVATION

If you have purchased the optional fuel computer key for your Vigilus, follow this procedure to activate it:

- Enter in the main menu → Settings → Password.
- Insert the password "**301293**", rotating the knob to change the digit and pressing it to confirm.
- Write down the ID code that appears and communicate it to your Flybox® dealer.
- After you have received the "KEY" code from your Flybox® dealer you can reenter in this password and insert the received key (rotate the knob to change the digit and press it to confirm).
- If the code is correct the Vigilus shows on display "FUEL COMPUTER ENABLED".
- Press the "ESC" pushbutton to exit.

WRITE DOWN HERE THE ACTIVATION DATA:

S/N: _____ (serial number on the back of the Vigilus)

ID: _____

KEY: _____

SECTION 2

2.1 USING THE VIGILUS

The Vigilus is organized in 4 monitoring pages:

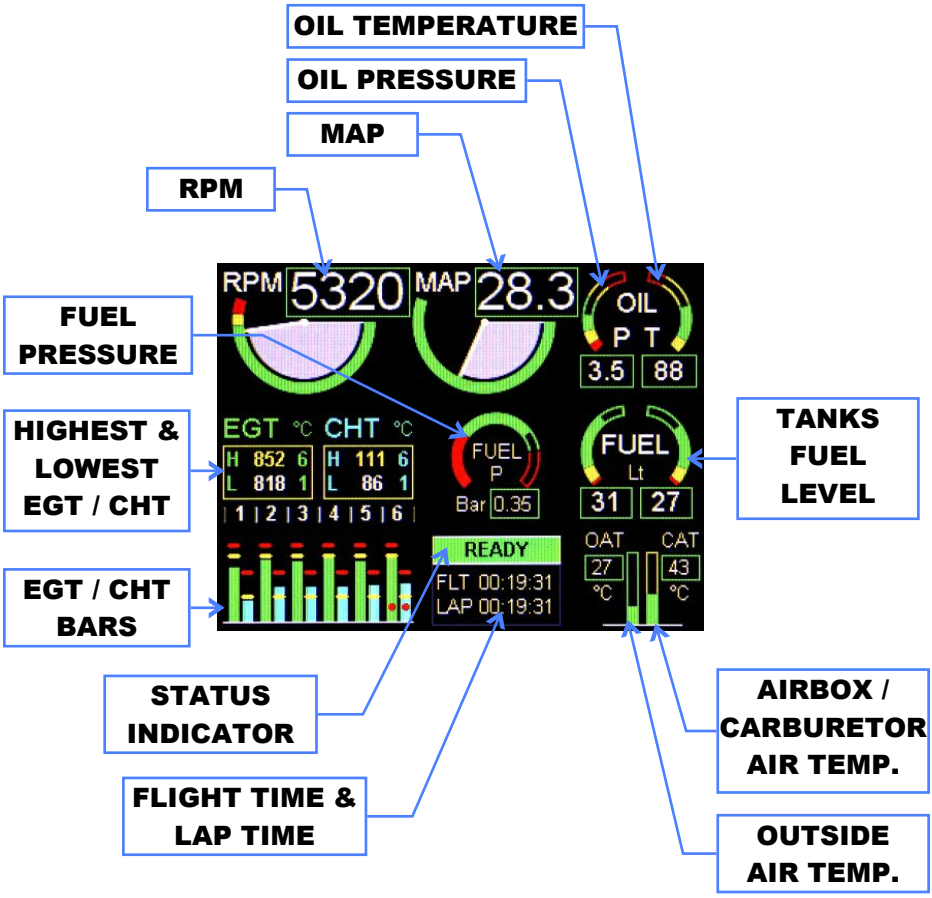
- **Page1**: Main engine data page and temperature page
- **Page2**: Chronometer page
- **Page3**: Fuel management page
- **Page4**: Hourmeter page

After power-on the Vigilus shows the main engine data page (Page1).
To switch between the four pages rotate the knob; when you are on Page 2,3 or 4 the Vigilus can return automatically to display Page1 after a set time. To enable this function, see chap.1.3.5, section “Pages setup”.

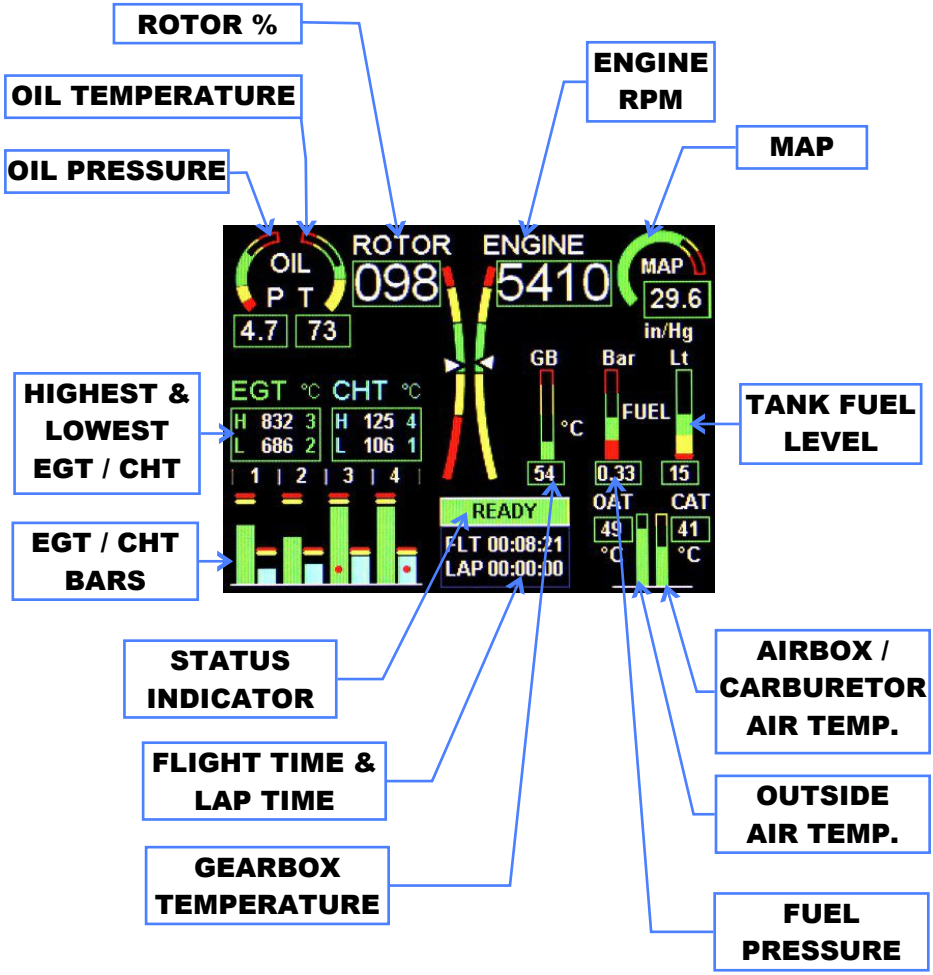
NOTE: in this manual is presented the full version of the pages but your Vigilus may differ depending on the optionals and sensors installed in your aircraft.

2.2 PAGE1: Main engine data page

PLANE VERSION:



HELICOPTER VERSION:



On this page all the important engine data is clearly displayed in both graphical and numerical indications. The green, yellow and red zones of the various gauges is completely customizable as explained in chap.1.3.4 “Instruments menu”; when a measurement is on a yellow or red zone the corresponding numerical indication change color to yellow or red; when in red zone the corresponding gauge is also blinking.

The available indications are:

- **Tachometer** with both graphical and numerical indication.
- **MAP** with both graphical and numerical indication, in inches of mercury.
- **Oil pressure** with both graphical and numerical indication in BAR or PSI, depending on what unit of measure you have choosen in the settings.
- **Oil temperature** with both graphical and numerical indication in°Celsius or °Farhenheit, depending on what unit of measure you have choosen in the settings.
- **Fuel pressure** with both graphical and numerical indication in BAR or PSI, depending on what unit of measure you have choosen in the settings.
- **Tanks fuel level**: The fuel level indications here are obtained by reading the fuel level sensors installed in your aircraft and connected to the Vigilus. The indications are approximated, do not solely rely on the Vigilus to determine the fuel available in the tanks but always refer to primary instrument installed in your aircraft.

CAUTION: Before using the fuel level indications you must be sure to have already set the following parameters:
- Set the unit of measure: US gallons or liters (set this before all the other parameters). See parameter "Unit" on menu Settings → Instruments → Fuel L → Tanks.
- Set the number of tanks used (see parameter "Number" on menu Settings → Instruments → Fuel L → Tanks).
- Set the type of level sensors installed (see parameter "Sensor" on menu Settings → Instruments → Fuel L → Tanks → Left/Main/Right tank).
- Execute the calibration for each used tanks (see chap.1.5).

- **Highest & lowest EGT / CHT:** on this window you can read the numerical indication of the highest (denoted by "H") and lowest (denoted by "L") EGT and CHT, with also the indication of what cylinder is referred:

- **EGT / CHT bars:** graphical representation of the EGT and CHT temperature of every cylinder; the EGT are the green bars, the CHT are the light blue bars. The highest EGT and CHT are indicated by a red dot over the bars.

- **OAT:** outside air temperature, with both graphical and numerical indication in°Celsius or °Farhenheit, depending on what unit of measure you have choosen in the settings.

- **CAT:** Airbox/carburetor air temperature, with both graphical and numerical indication in°Celsius or °Farhenheit, depending on what unit of measure you have choosen in the settings.

- **Status indicator:** This is a useful indicator that you should check before takeoff.
  When the essential measurements are not in a safe area the indicator shows "**WARMUP**" in red background; the measurements taken in consideration are the oil pressure (must be in green zone), the oil temperature (must be warmer than "Clearance" parameter), the fuel pressure (must be in green zone), the CAT (must be in green zone) and all the CHTs (must be in green zone).
  When all the measures becomes in its safe zone the indicator change state to "**READY**" in green background, that automatically disappear 30 seconds after take-off.

- **Flight time:** The flight timer starts automatically when the engine meets or exceeds for 30 seconds the value set in the "Flight" parameter (see chap.1.3.4, section "RPM setup menu") and it stops automatically when the engine is turned off (0000 RPM).

- **Lap time:** The lap time starts at the same time of the flight time explained above but it can be reset during flight (see chap.2.3).

- **ROTOR % (helicopter version only):** Shows the rotor %, with both graphical and numerical indication.

- **Gearbox temperature (helicopter version only)**: with both graphical and numerical indication in°Celsius or °Farhenheit, depending on what unit of measure you have choosen in the settings.

VARIANT FOR ROTAX 912iS:

The engine page for the Rotax 912iS version is slightly different from the aspirated version; the differences are:

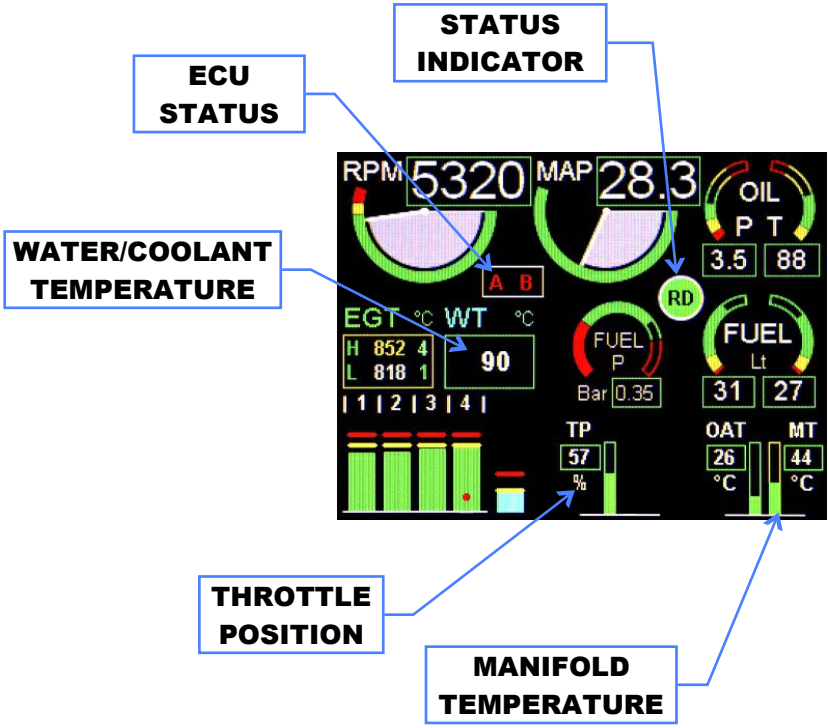
1 - **WT** (Water temperature) instead of CHT (Cylinder head temperature): 912iS have only one sensor for the water/coolant temperature.

2 - **MT** (Manifold temperature) instead of CAT (carburetor temperature).

3 - **TP**: Throttle position 0~100%

4 - The **STATUS INDICATOR** became a smaller circular version to save space for the throttle position gauge. The function of the status indicator remain the same:
When the essential measurements are not in a safe area the indicator shows "**WU**" in red background; the measurements taken in consideration are the oil pressure (must be in green zone), the oil temperature (must be warmer than "Clearance" parameter), the fuel pressure (must be in green zone), the MT (must be in green zone) and the WT (must be in green zone).
When all the measures becomes in its safe zone the indicator change state to "**RD**" in green background, that automatically disappear 30 seconds after take-off.

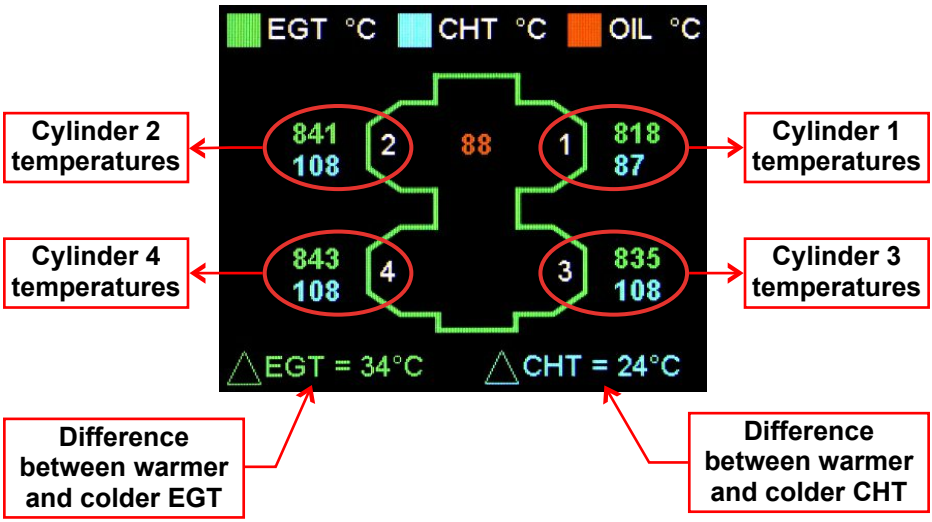
5 - **ECU STATUS:** This status indicate if the Vigilus is communicating properly with the two ECUs (A and B) of the Rotax 912iS engine.
If the communication is ok with both A and B ECUs the two indications are in green [**A B**].
If the communication is missing with one of the ECUs the relative indication is in red (for example [**A B**] or [**A B**]).



Page1 - Variant for Rotax 912iS

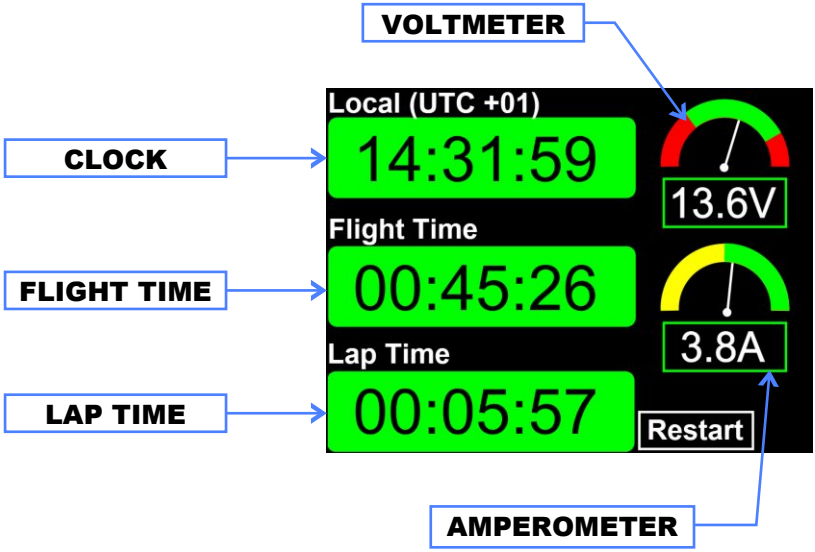
2.2.1 TEMPERATURE PAGE

By pressing the F1 pushbutton (the left pushbutton) you can switch between the main engine data page and the temperature page. This page shows, with a graphical representation of the engine, the temperatures of CHT, EGT, Oil and the difference between warmer and colder CHT and EGT.



NOTE: you can customize the cylinders position by going in the menu → Settings → Global settings → Aircraft → Cyl. Position.

2.3 PAGE2: Chronometer page



The information available on this page are:

- **Clock**: Shows the time, if a GPS is connected and enabled on the Vigilus. To enable the GPS and set the time zone, go in the menu → Settings → Global Settings → GPS.

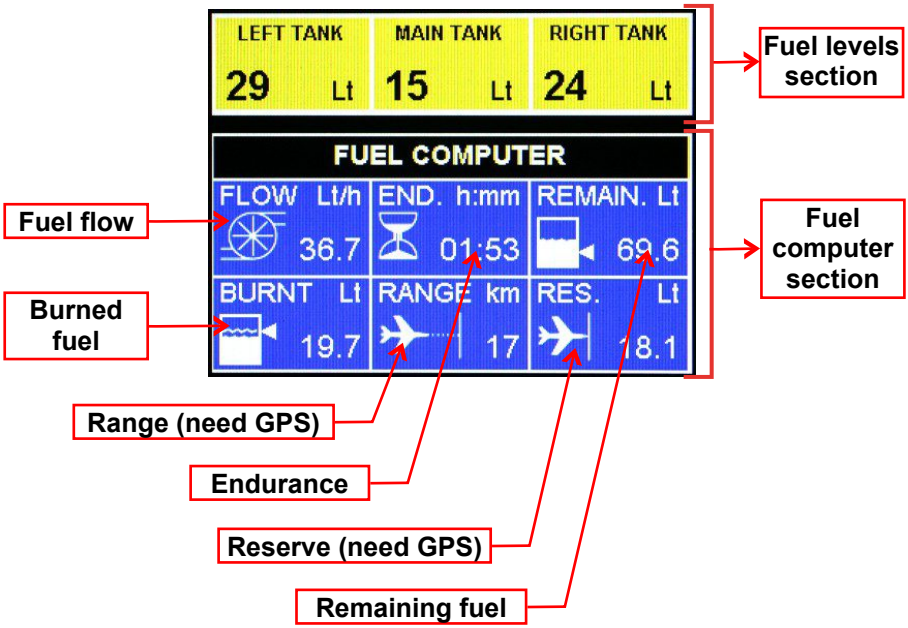
- **Flight time**: The flight timer starts automatically when the engine meets or exceeds for 30 seconds the value set in the "Flight" parameter (see chap.1.3.4, section "RPM setup menu") and it stops automatically when the engine is turned off (0000 RPM).

- **Lap time:** The lap time starts at the same time of the flight time explained above but it can be reset during flight by pressing the "RESTART" button (right button).

- **Voltmeter**: Shows the battery voltage (the voltage is measured on the power supply line of the remote module).

- **Amperometer**: Shows the battery current, if the optional Flybox current sensor is installed. The current shown here may have different meaning depending on where you installed the current sensor (refer to “Current Sensor” section on chap.2.4 of the installation manual).

2.4 PAGE3: Fuel management page



- **Fuel levels section:**

The fuel level indications are obtained by reading the fuel level sensors installed in your aircraft and connected to the remote module of the Vigilus. The indications are approximated, do not solely rely on the Vigilus indications to determine the fuel available in the tanks, but always refer to primary instrument installed in your aircraft.

Before using the fuel llevels section you must be sure to have already set the following parameters:

- Set the unit of measure: USgallons or liters (set this before all the other parameters). See parameter “Unit” on menu Settings → Instruments → Fuel L → Tanks.

- Activate only the number of tanks used (see parameter “Number” on menu Settings → Instruments → Fuel L → Tanks).

- Set the type of level sensors installed (see parameter “Sensor” on menu Settings → Instruments → Fuel L → Tanks → Left/Right/Main Tank).

- Execute the calibration for each used tanks (see chap.1.5).

- **Fuel Computer section:**

Before using the fuel computer section you must be sure to have already set the following parameters:

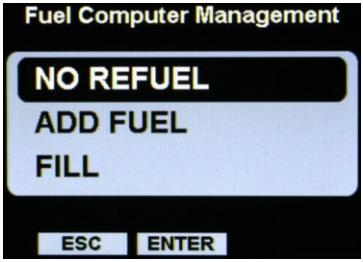
- Set the unit of measure: USgallons or liters (set this before all the other parameters). See parameter “Fuel unit” on menu Settings → Fuel Computer.

- Set the unit of measure: kilometers or nautical miles. See parameter “Space unit” on menu Settings → Fuel Computer.

- Set the total tank/s capacity. See parameter “Tank Cap.” on menu Settings → Fuel Computer.

- Set the K-factor. The K-factor of a fuel flow transducer is the number of electric pulses for 1 gallon of fuel consumption (if you have K-factor in liters you must multiply this value by 3.78 before set k-factor in the Vigilus). If you use Flybox® TFTHP fuel flow transducer, set the k-factor to 416400.
It's recommended also to execute the K-factor calibration as soon as possible to have the maximum accuracy (refer to chapter 1.4 “Fuel flow transducer calibration”).

Everytime after powering-on, the Vigilus ask if you have refuelled the tank; you must choose one of the 3 options available (rotate the knob to select and press to confirm):



NO REFUEL: Select this option if you have not refuelled the tank.
ADD FUEL: Select this option if you have added fuel to the tank (on the next screen that appears you can insert the exact amount of fuel added).
FILLED: Select this option if you have filled the tank; the display will show the quantity that has been added to reach the full level. Before using this option you must have already set the tank/s capacity in the fuel computer setup.
If you press "**ESC**" pushbuttons no change are made, but the next time that you reach the fuel management page it ask again until you choose one of the three options.

NOTE: If you need to correct a wrong fuel quantity add, select "ADD FUEL" and insert a negative value.

Now the fuel computer is ready to operate; the available indications are:

- **FUEL FLOW:** According to the selected unit of measure the flow is indicated in liters per hour (Lt/h) or gallons per hour (Gl/h).
- **REMAINING FUEL**: Display the fuel remaining in the tank/s. According to the selected unit of measure the quantity is indicated in liters (Lt) or gallons (Gal).

WARNING: The remaining fuel displayed here is not a measurement of the fuel in the tank, but it is calculated from the initial quantity entered by the user and the burned quantity measured by the fuel flow transducer (or measured by the Rotax ECU for the 912iS version).

- **BURNED FUEL:** Display the fuel burned from the starting. According to the selected unit of measure the flow is indicated in liters (Lt) or gallons (Gal).

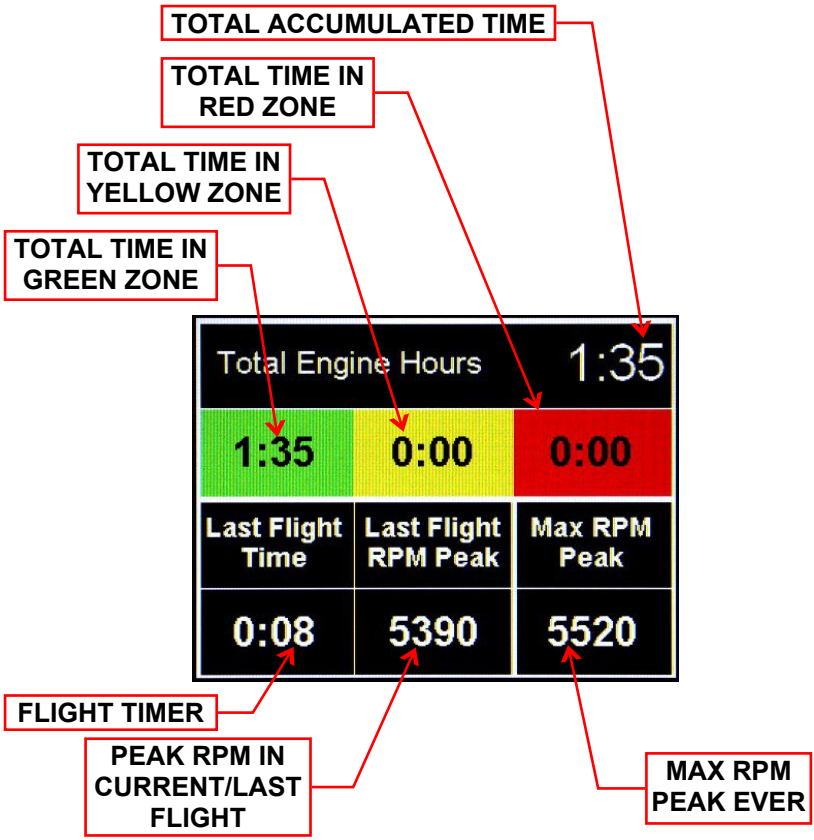
- **ENDURANCE**: Display the time to empty, calculated considering the fuel remaining and the actual fuel flow.
  If it is not possible to calculate the time to empty (for example when the engine is not running) the display shows --:--

- **RANGE**: Display the range calculated considering the fuel remaining, the actual fuel flow and the ground speed furnished by the GPS.
  If the display shows “NO GPS!” it means that the GPS is disabled (see parameter “GPS Enabled” on menu Settings → Fuel Computer). If the display shows “WAITING GPS RMC” it means that the GPS is enabled but not connected, turned off or it don't have the fix.
  If it is not possible to calculate the range (for example when the engine is not running) the display shows --:--

- **RESERVE**: Display the fuel remaining at destination; the destination is intended as the approaching GPS waypoint.
  If the number is negative it means that there is not enough fuel to reach the destination.
  To enable this indication you must connect an external GPS and enable the “RMB” sentence on it; you must also set to “YES” the parameter “GPS Enabled” on menu Settings → Fuel Computer.
  If the display shows “NO GPS!” it means that the GPS is disabled (see parameter “GPS Enabled” on menu Settings → Fuel Computer). If the display shows “WAITING GPS RMB” it means that the GPS is enabled but not connected, turned off or it don't have the fix.
  If it is not possible to calculate the reserve (for example when the engine is not running) the display shows --:–

2.5 PAGE4: Hourmeter page

PLANE VERSION:



The informations available on this page are:

- **Total accumulated time:** Total time accumulated by the engine. This time is further divided in **total time accumulated in green, yellow and red zones**.

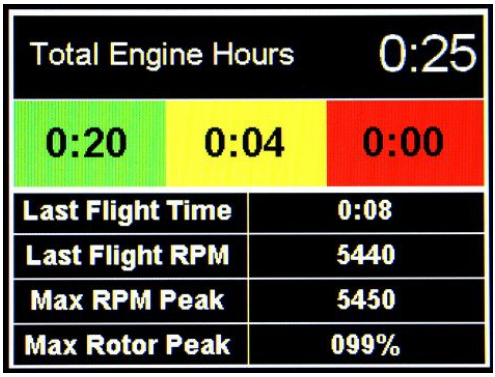
- **Flight timer**: The flight timer starts automatically when the engine meets or exceeds for 30 seconds the value set in the

"Flight" parameter (see chap.1.3.4, section "RPM setup menu") and it stops automatically when the engine is turned off (0000 RPM).

- **Peak rpm in current/last flight**: Maximum peak RPM reached by the engine in the current flight (if you are in fly) or in the last flight (if you are grounded); it remains stored in memory until you begin a new flight.

- **Max rpm peak ever**: Maximum peak RPM reached by the engine during its life.

HELICOPTER VERSION:



For the helicopter version, there is also this indication:

- **Max rotor peak**: Maximum peak rotor reached during its life.

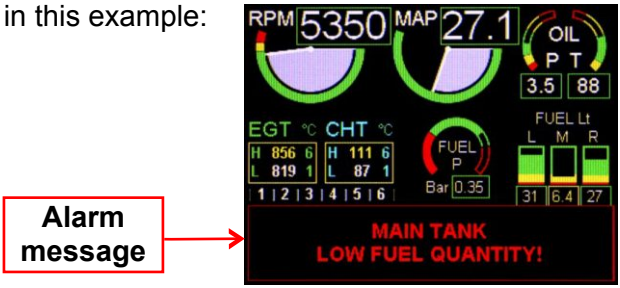
SECTION 3

3.1 ALARMS

Vigilus continuously monitor all the sensors and when a measurement exceed its setpoint the corresponding alarm is activated (if enabled).

An alarm condition is indicated in this ways:

- A red flashing message appears on the bottom of the display, as in this example:



- One of the four programmable outputs of the remote module is activated (if enabled).
- Vocal alert on the audio output is activated (if enabled).

To reset any alarm condition press or rotate the knob or press a button; in case of multiple alarms the alarm pages is presented in sequence.

The possible alarm conditions are:

- “HIGH BATTERY VOLTAGE!”
- “CAUTION! LOW BATTERY VOLTAGE”
- “EGT 1~6 HIGH TEMPERATURE”
- “CHT 1~6 HIGH TEMPERATURE”
- "HIGH FUEL PRESSURE!"
- "CAUTION! LOW FUEL PRESSURE"
- "HIGH OIL PRESSURE!"

- "CAUTION! LOW OIL PRESSURE"
- "HIGH OIL TEMPERATURE!"
- "LOW OIL TEMPERATURE!"
- "CAUTION! ENGINE OVERSPEED"
- "LEFT TANK LOW FUEL QUANTITY!"
- "RIGHT TANK LOW FUEL QUANTITY!"
- "MAIN TANK LOW FUEL QUANTITY!"
- "LOW TOTAL RESERVE!"
- "FUEL COMPUTER RESERVE!"
- "MINIMUM FUEL ENDURANCE!"
- "TANK SWITCHING!"
- "WARNING! REMOTE MODULE DISCONNECTED"

3.2 SENSOR ALARMS

Another type of alarms is the sensor alarms, that occur when the Vigilus cannot find a sensor needed for a measurement: if this happen you should check possible damage to the wiring or to the sensor itself.

The sensors taken in consideration are only those enabled in all the instruments submenu (refer to chap. 1.3.4 “Instruments menu”). For this reason you must ensure to have enabled only those sensors installed in your aircraft and let disabled all the rest to avoid false alarms.

The possible sensor alarms are:

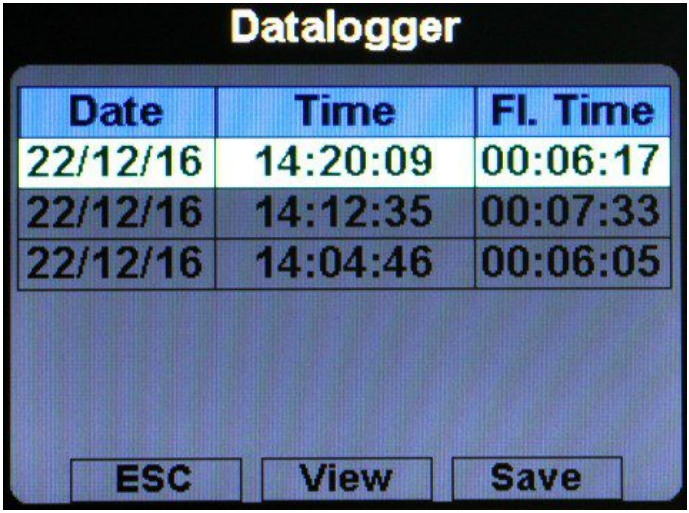
- "EGT1~6 SENSOR ERROR”
- "CHT1~6 SENSOR ERROR”
- "FUEL PRESSURE SENSOR ERROR!"
- "OIL PRESSURE SENSOR ERROR!"
- "OIL TEMPERATURE SENSOR ERROR!"
- "CAT SENSOR ERROR!"
- "OAT SENSOR ERROR!"

SECTION 4

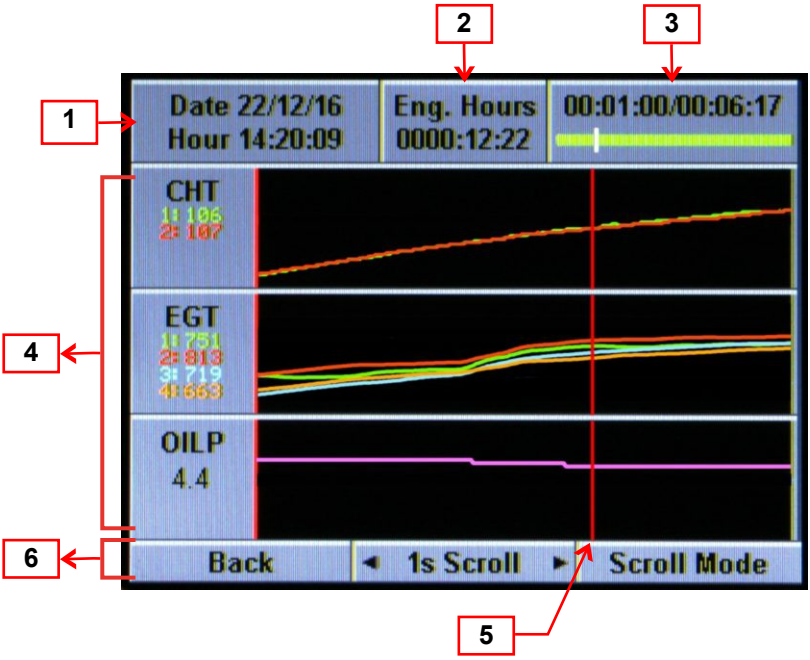
4.1 DATALOGGER

The datalogger is a useful data recording tool that permits later viewing in both graphical or numerical representation. It also allow the download of the data in a USB flash drive.
Data are organized in separate recording sessions, each time the engine is started a new recording session will be initiated.
The memory can store 100 hours of data, with a sample rate of 1 second. Older data are automatically erased to make room for the new ones.
The datalogger menu shows a list of flights, sorted by date (the most recent flight is the first on the list). The “Time” column indicate the start of the flight while the “Fl. Time” column indicate the fligh time.

NOTE: the date and time indications is read from an external GPS, if connected; if no GPS is connected to the Vigilus, these indications will not be available.



- To select a flight rotate the knob; the currently selected flight is highlighted.
- To save a flight on a USB flash drive click the “SAVE” button; the name of the created file is “Flight_[Date]_[Time].CSV” or, if no date and time is available, “Flight_NO_GPS_0000x.CSV”. The format of this file is a generic “comma-separated value” file format, importable by any spreadsheet software like Excel. Inside this CSV file there are all the parameters recorded by the Vigilus.
- To view a flight select it and then click the knob; a screen like this will appear:



1. **Date and time**: Date and time referred to the cursor position (5).
   NOTE: the date and time indications is read from an external GPS, if connected; if no GPS is connected to the Vigilus, these indications will not be available.

2. **Engine hours**: Total accumulated engine hourmeter referred to the cursor position (5).

3. **Progress indicator:** as you scroll through the flight, the progress indicator let's you see at which point of the entire flight you are pointing with the cursor.

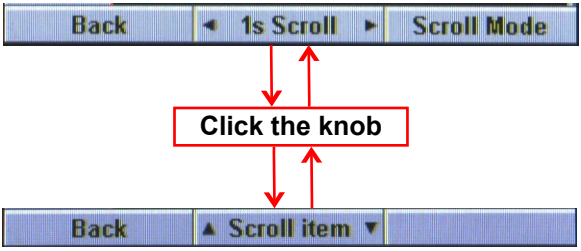
4. **Graphics and numerics data:** 3 graphics per page, divided in more pages. For each measurement you can also see if, at the cursor position, the measurement was in an alarm condition: if after the numerical indication there is the "L" letter it means that the measurement was under the low threshold; if after the numerical indication there is the "H" letter it means that the measurement was over the high threshold; if after the numerical indication there is the "P" letter it means that there was a probe error (probe disconnected for example).

5. **Cursor**: The cursor permits to analyze the flight throughout its duration. All numerical values are relative to the actual position of the cursor (rotate the knob to move the cursor).

6. **Knob and pushbutton functions**:

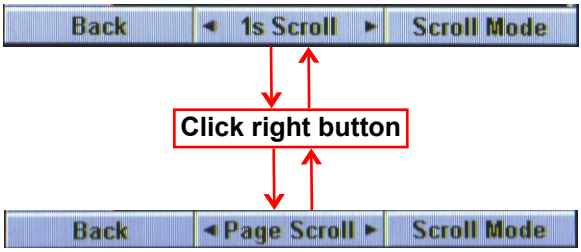
   - Press the left button (Back) to go back to the datalogger menu

   - Rotate the knob to move the cursor through the flight or click the knob to switch to the "Scroll item" mode:



When this mode is active, rotate the knob to scroll through the item/measurements available; click again the knob to go back to the cursor scroll mode.

- Press the right button (Scroll mode) to switch between the “1s scroll” mode and the “Page scroll” mode:



With the “1s scroll” mode, rotating the knob move the cursor by 1 step (that is 1 second of flight record); with the “Page scroll” mode, rotating the knob move the cursor by 1 page (so it works as a fast forward/rewind).

LIST OF THE RECORDED MEASUREMENTS:

The datalogger record and shows all the data measured by the Vigilus, so depending on the version and assuming that you have installed all the optional probes, the available graphs are, in the order:

- CHT
- EGT
- Oil pressure
- Oil temperature
- Gearbox temperature (for helicopter only)
- CAT: Carburetor/airbox temperature
- OAT: Outside air temperature
- Battery voltage
- Battery current
- MAP: Manifold absolute pressure
- RPM
- Rotor RPM (for helicopter only)
- Fuel pressure
- Fuel flow
- Tanks fuel from level sensors
- Remaining fuel quantity calculated by the fuel computer
- Burned fuel calculated by the fuel computer

SECTION 5

5.1 VIGILUS DEFAULT CONFIGURATION TABLE

- Factory default configuration is for **ROTAX 912 A/F/S/UL/ULS/ULSFR engine:**

Measure	BOTTOM LIMIT	LOW YELLOW SETPOINT	GREEN SETPOINT	HIGH YELLOW SETPOINT	RED SETPOINT	TOP LIMIT
CHT (°C)	50	–	–	75	130	150
EGT (°C)	650	–	–	850	880	930
OIL temp. (°C)	30	–	45	90	130	150
OIL press. (BAR)	0	0.8	20	50	7.0	9.0
CAT (°C)	0	–	–	45	–	100
OAT (°C)	0	–	–	–	–	100
RPM	0	–	–	5500	5800	6200
MAP	0	–	–	50	50	50
Fuel press. (BAR)	0.00	–	0.15	–	0.40	0.50
Voltage (V)	10	–	11.5	–	15	16
Current (A)	-50	–	–	–	–	50

- For **ROTAX 914 F/UL** engine the only difference of the default values is the EGT:

EGT (°C)	850	–	–	950	950	1000

- Write here your configuration, if it differs from the default:

Measure	BOTTOM LIMIT	LOW YELLOW SETPOINT	GREEN SETPOINT	HIGH YELLOW SETPOINT	RED SETPOINT	TOP LIMIT
CHT (°C)		–	–			
EGT (°C)		–	–			
OIL temp. (°C)		–				
OIL press. (BAR)						
CAT (°C)		–	–		–	
OAT (°C)		–	–	–	–	
RPM		–	–			
MAP		–	–			
Fuel press. (BAR)		–		–		
Voltage (V)		–		–		
Current (A)		–	–	–	–	

TECHNICAL SPECIFICATIONS

VIGILUS:

- 3.5” TFT color LCD screen.
- Display brightness: 1000nits, adjustable.
- Standard 3 1/8” (80mm) panel mount
- Dimensions: 86 x 86 x 30.3 mm
- Weight: 185 g
- Supply voltage: 10 ~ 30 V=
- Supply current: 200mA Max
- Operational temperature range: -20 ~ +70°C
- Audio LineIn and LineOut for intercom
- Microphone input
- 2 CAN Bus communication interfaces
- GPS input: standard RS-232, data format: NMEA-0183, sentences required: $GPRMC and $GPRMB
- 1 USB port
- Internal storage for 100 hours of datalog
- Optional video input from Flybox® USB video adapter

REMOTE ENGINE MODULE:

- Dimensions: 135 x 79 x 20 mm
- Weight: 185 g
- Supply voltage: 10 ~ 30 V=
- Supply current: 50mA Max
- Operational temperature range: -20 ~ +70°C
- 1 CAN Bus communication interface
- 4 programmable outputs (active low, 300mA / 4W max)

SENSORS INPUTS:

- Current input from Flybox® sensor
- 2 Fuel flow inputs from Flybox® transducer
- Fuel pressure from Flybox® transducer
- RPM tachometer input
- Rotor tachometer input for helicopter version
- Oil pressure from Flybox®, ROTAX or JABIRU sensors
- 2 Oil temperature inputs from ROTAX, JABIRU or PT1000 sensors
- Carburetor/Airbox from PT1000 sensor
- Outside air temperature from PT1000 sensor
- 6 Cylinder head temperature from ROTAX, J-type thermocouples or PT1000 sensors
- 6 Exhaust gas temperature from K-type thermocouples
- 3 inputs for fuel level sensors: resistive (300 ohm max) or capacitive (0-5V)

WARRANTY:

This product is warranted to be free from defects for a period of 12 months from the user invoice date.

The warranty only cover the manufacture's defects; shall not apply to product that has been improper installed, misused or incorrect maintenance, repaired or altered by non-qualified person.

Date	Revision	Description
7/2017	1.0	First official release

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