# EngiBOX

Product model number: UX0EMS10AM
Software: version 1.1.0R or more recent
Firmware: version 1.1.0R or more recent

# User and Installation Manual

**IMPORTANT: Before using this manual check if your Engine product model number corresponds to the above model number.**

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# DISCLAIMER & WARNINGS

The information displayed by the EngiBOX is not certified for use for VFR or IFR flights.
The EngiBOX is meant as an aid to VFR flight and is not a substitute for certified instruments. All critical information is presented for reference only and must be verified by the user. The EngiBOX is not a substitute for on-board instruments.
The pilot in command assumes total responsibility and risk associated with the use of this device and remains solely responsible for flying in safe conditions. AvMap disclaims any liability deriving from an improper use of the device, in a way that may violate the flight and navigation rules, regulations and safety.

# 1. Overview

EngiBOX is an Engine Monitoring System (EMS), developed especially for Rotax Engines, displaying the engine parameters with an update rate of five times per second and recording 160 hours of data in the internal memory. It is a rugged and reliable system designed for fixed panel installation.

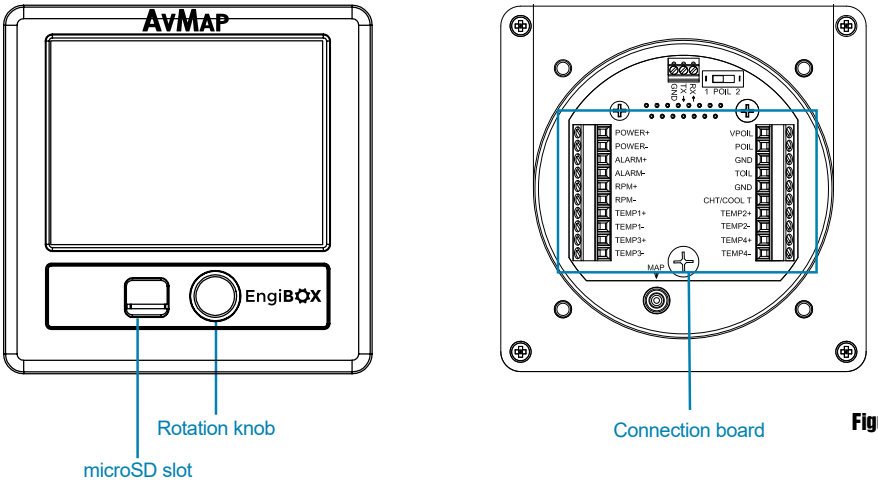



**Figure 1**

**Note**: For connection specifications see Chapter 2.

**microSD card**
A microSD card is provided together with the Engibox. The microSD card is a blank card without data preloaded. The microSD card should be used for software updates and export logged data from the EngiBOX to the microSD card.
**Note**: For more details see Chapter 4.

**Rotation knob**
Pressing the rotation knob allows to confirm a selection, while rotating the knob allows to change selection.

**EngiBOX connection board:**

- 1 x Power input 10-35 VDC, free wire connection
- 4 x Thermocouple sensor input
- 2 x Resistance thermometer sensor input
- 1 x Oil pressure sensor input
- 1 x RPM pick-up
- 1 x Serial connection
- 1 x Manifold pressure sensor
- 1 x Alarm output

**Note**: Software 1.1.0R does not support serial connection and alarm out.

**Compatible Engines**

- 2 stroke Air cooled: Rotax 447 UL SCDI, Rotax 503 UL DCDI
- 2 Stroke Liquid cooled: Rotax 582 UL DCDI, Rotax 618 UL DCDI
- 4 Stroke Liquid cooled: Rotax 912 DCDI series, Rotax 912S DCDI series, Rotax 914 DCDI series

**EngiBOX displays:**

- Exhaust Gas Temperature (EGT)
- Revolutions Per Minute (RPM)
- Manifold Pressure (MAP)
- Oil Pressure (OIL P)
- Oil Temperature (OIL T) / Air Temperature (AIR T)
- Cylinder Head Temperature (CHT) / Coolant Temperature (CT)
- Hobbs meter

EngiBOX measures the engine parameters to warn you instantly if any measurement exceeds the engine limits and registers instantly the data on the internal memory.
The registered data can be either exported to the micro SD card provided along with the product or send to the EngiBOX Web Portal through the EngiBOX mobile app. In this way, data can be analyzed from home and be shared with the engine service center to receive instant support.

**Further EngiBOX features:**

- Wizard to initialize the engine,
- Parameters displayed in two alternative views: graphic or numeric,
- Graph page to analyze the performance per each engine parameter (last 20 minutes),
- Clock page to show flight time, engine lifetime (Hobbs meter) and time since last overhaul.

**Note**: Engine inizialization may not be needed in case unit installation has been already performed by the engine service center or the aircraft manufacturer.

# 2. Installation

The installation procedure is divided in the following steps:

- Mechanical installation
- Connections & wiring

## 2.1 Mechanical installation

EngiBOX is designed to be installed on the aircrafts instrument panel, in a standard 3 1/8” (79,5 mm) diameter hole. Make sure you have enough space on the front and behind the cockpit panel to install the EngiBOX.
Check the EngiBOX main dimensions reported in Figure 2.
The instrument has to be installed from the front of the panel and screwed from behind the panel according to Figure 3.

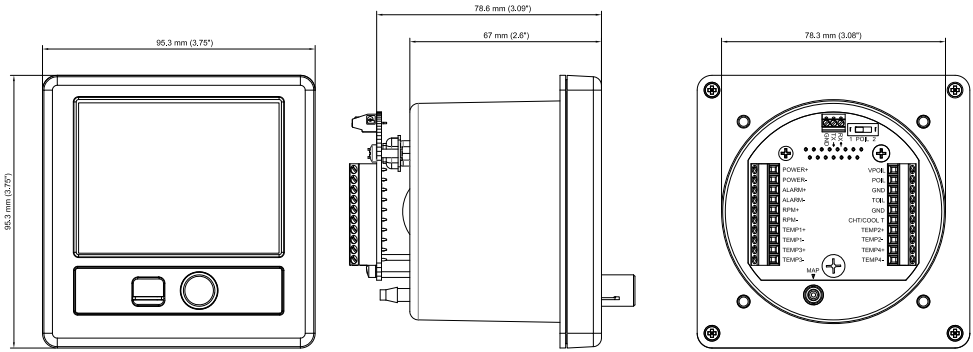



**Figure 2**

The screw length that need to be used for panel installation depend on the panel thickness and is based on the following formula:

$$5mm \leq l - t \leq 8mm$$

l = length of the screw
t = thickness of the panel

Use the screws and metal washer included in the box for standard panel thickness of up to 3mm. For thicker instrument panels, use longer screws and use the formula to choose the right screw length.

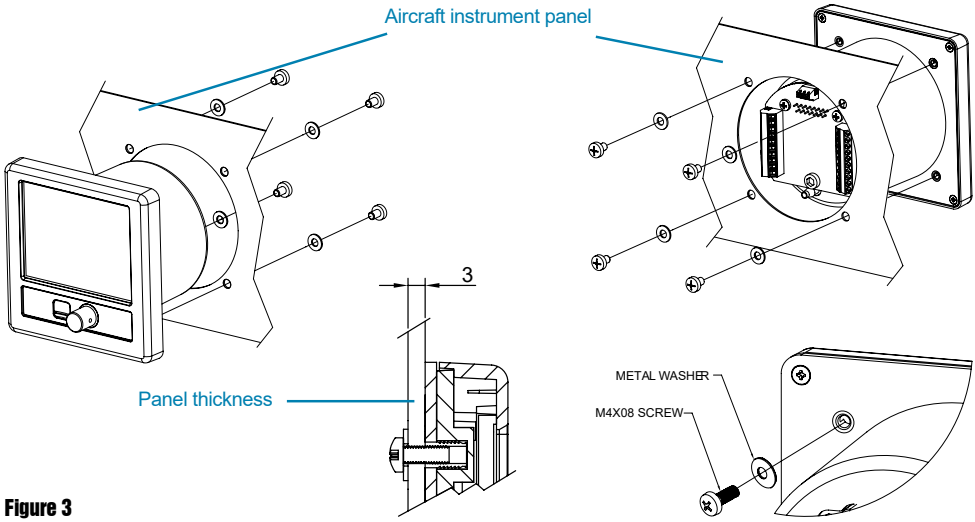



**Figure 3**

**IMPORTANT:** Make sure you respect the screw length formula to avoid damaging the plastic of the EngiBOX. Use light thread locker to prevent screw loosening with vibration. Use the cutting template, included in the box, to cut out the panel. (see Figure 4)

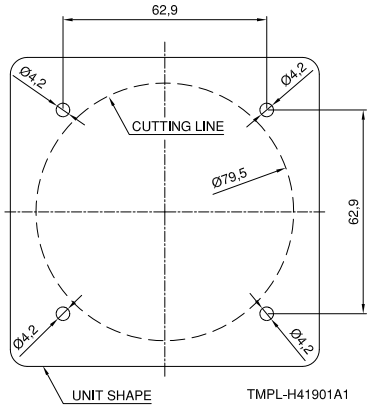



**Figure 4**

## 2.2 Connections & wiring

### Compatible sensors

| Sensors | |
|---|---|
| **4 x INPUT Thermocouple ungrounded (type K and J)**<br>*Thermocouple ungrounded type K Rotax P/N: 966370*<br>*Thermocouple ungrounded type J Rotax P/N: NA* | |
| Application: | Exhaust Gas Temperature (EGT) (2 Stroke / 4 Stroke)<br>Cylinder Head Temperature (CHT) (2 Stroke) |
| **2 x INPUT Resistance thermometer (type: NTC and PT-100)**<br>*NTC: Rotax P/N 965530 and 965531*<br>*PT-100: Rotax P/N 966385* | |
| Application: | Air Temperature, Coolant Temperature (2 Stroke)<br>Oil Temperature, Cylinder Head Temperature / Coolant Temperature (4 Stroke) |
| **1 x INPUT Oil Pressure pick-up (Keller 4-20 mA and VDO resistive 10 bar/150 psi)**<br>*Keller 4-20 mA Rotax P/N: 456180*<br>*VDO resistive Rotax P/N: 956357 / 956415* | |
| Measuring range: | 0 to 10 bar / 0 to 150 psi |
| Application: | Oil Pressure (4 Stroke) |
| **1 x RPM pick-up** | |
| Measuring range: | 0 to 9990 rpm |
| **1 x INPUT Manifold Pressure** | |
| Measuring range: | 0 to 70 inHg |

### Usage of other instruments in parallel

- Thermocouple sensors (for EGT and CHT) and Manifold pressure input can be used in parallel with other measurement instruments.
- To use EngiBOX RPM input in parallel with another RPM instrument depends on capacity of the other instrument. EngiBOX applies a 100 ohm load on RPM. Verify if the other RPM instrument is able to correctly measure RPM with a 100 ohm load applied between RPM input and instrument ground. This is equivalent to EngiBOX RPM usage in parallel with another RPM instrument.
- Thermoresistance sensors (for OIL T, CHT, CT and Air T) and Oil pressure sensors can not be used in parallel with other measurement instruments.

**WARNING: Thermocouple sensors must be ungrounded, not be referred to GND or negative external power.**

## Connection board

EngiBOX has several sensor input ports, which can be occupied variably according to the connected engine type. On the back of the EngiBOX there are several connections, see Figure 5.

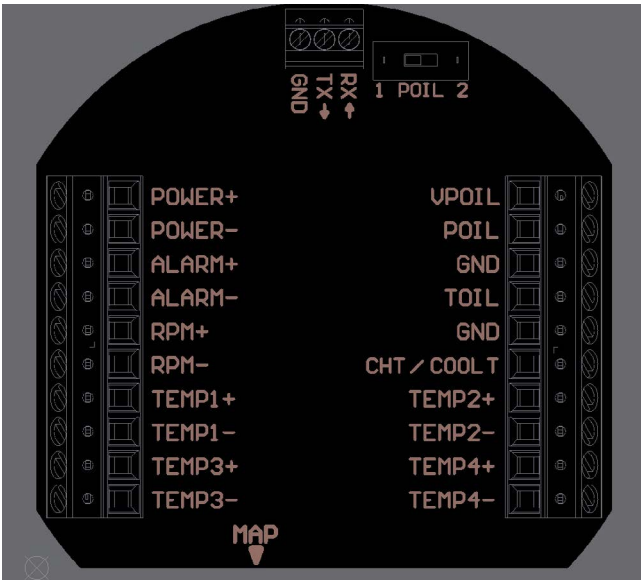



**Figure 5**

**Note:** See Table 1 or 2 for the connection specification relative to your engine type.

### 4 Stroke Engines - Connection Diagram

**Table 1**

| LEFT | | | RIGHT |
|---|---|---|---|
| external power positive input | POWER + | VPOIL | auxiliary power source for oil pressure sensor (not used for VDO resistive sensor of 1 wire) |
| external power negative input | POWER - | POIL | oil pressure sensor input |
| output at external power voltage + (disabled) | ALARM + | GND | oil temperature Ground (only if PT-100 semsor is used) |
| output at external power voltage - | ALARM - | TOIL | oil temperature input |
| RPM positive input | RPM + | GND | CHT or CT Ground (only if PT-100 sensor is used) |
| RPM negative input | RPM - | CHT / COOLT | CHT or CT input |
| EGT PTO R + | TEMP1 + | TEMP2 + | EGT PTO L + |
| EGT PTO R - | TEMP1 - | TEMP2 - | EGT PTO L - |
| EGT MAG R + | TEMP3 + | TEMP4 + | EGT MAG L + |
| EGT MAG R - | TEMP3 - | TEMP4 - | EGT MAG L - |

**Note:** See the compatible sensor table for each parameter at page 8.

### Manifold Pressure (MAP)

Connect a flexible plastic tube with an inside diameter of 4mm (0,16 inches) to the EngiBOX MAP port and to the Engines manifold pressure connecting nipple. Make sure the tube fit tightly.

**Note:** see your Rotax manual for the manifold pressure connecting nipple position or contact your Rotax Service Center for assistance.

### Oil Pressure

The EngiBOX connection board is pre-configured to be used with the Keller type 4-20 mA pressure sender for Oil pressure. The POIL sensor selector switch is set to “2” (ON).
Instead, if the resistive 10 Bar/150 psi VDO type pressure sender is connected it is neccessary to set the POIL sensor selector switch to “1”. See Figure 6.

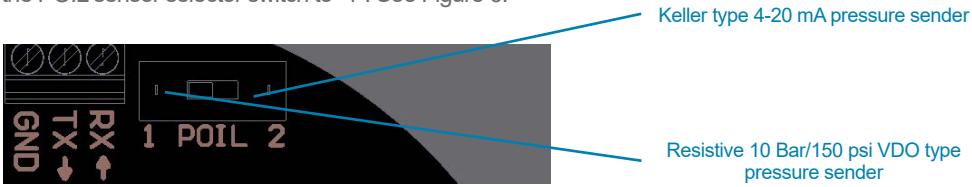



**Figure 6**

### 2 Stroke Engines - Connection Diagram

**Table 2**

| LEFT | | | RIGHT |
|---|---|---|---|
| external power positive input | POWER + | VPOIL | NOT USED |
| external power negative input | POWER - | POIL | NOT USED |
| output at external power voltage + (disabled) | ALARM + | GND | CT Ground (only if PT -100 sensor is used) |
| output at external power voltage - | ALARM - | TOIL | CT input |
| RPM positive input | RPM + | GND | air temperature Ground (only if PT-100 sensor is used) |
| RPM negative input | RPM - | CHT / COOLT | air temperature input |
| EGT PTO + | TEMP1 + | TEMP2 + | CHT PTO + |
| EGT PTO - | TEMP1 - | TEMP2 - | CHT PTO - |
| EGT MAG + | TEMP3 + | TEMP4 + | CHT MAG + |
| EGT MAG - | TEMP3 - | TEMP4 - | CHT MAG - |

**Note:** See the compatible sensor table for each parameter at page 8.

**Note:** PTO stands for power take off side and MAG for magneto side of the engine.

### Power supply

Power the EngiBOX from an 10 to 35 Vdc supply. Mount on the power wire (RED) the 1A fuse holder, provided in the box, to protect against short circuits.

**Note:** Use the Aeronautical grade wires for power supply that are supplied together with the EngiBOX (black -- / red ++). For connection see the connection board (see Fig. 5).

**IMPORTANT: In order to avoid any possible disturbance on the sensors make sure you have a direct power connection between the mass of the engine and the EngiBOX power-terminal.**

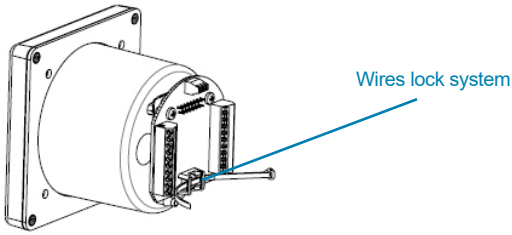
**Serial Connection**

The EngiBOX has serial RS232 connection ports to interface to an external device.
**Note:** current software 1.1.0R does not support serial in/out interface.

**Wires lock system**

Use the wire lock system to tighten all wires together that are connected to the EngiBOX (see Figure 7).

**Figure 7**




**WARNING:** At installation of the sensors take into consideration the following:

- Do not solder or tin-plate the sensor wire when connecting the sensor wire into the terminal.
- Make sure the sensor wire is completely inserted into the terminal connection. Open completely the terminal before inserting the sensor wire, insert the sensor wire and then close the terminal with the screw.
- Use the wire lock system to tighten all sensor wires together that are connected to the EngiBOX. This to avoid that weight of the sensors on the terminal will cut the sensor wire and will create loose contact and false readings.
- Route sensor lines to be protected against excessive temperatures.
- Route sensor lines free of vibrations, but with some flexibility.
- Sensor lines to be without kinks and must not chafe.
- The threads of the thermocouple sensors and pick-up of Resistance thermometer sensors have to be greased with Loctite ANTI-SEIZE, to ensure trouble free removal.
- Shortcomings in these points can result in false readings, interruption of lines or the ruin of pick-up lines and sensors.
  **Note:** Usually, the sensors are furnished by the supplier with pickup lines of 2 m (6' - 6") length, but can be extended to a max. length of 4 m (13').
- Thermocouples to be extended with compatible resistor cables only. Connections have to be soldered and insulated, preferably by shrink tube.
- Never establish connections by clamping, danger of false reading due to higher contact resistance. Thermocouple compatible resistor cables are available in a specialist store or from your local Rotax Service Center.
- All other sensors can be extended by suitable stranded copper wire.

**ATTENTION:** Always bear in mind, you are dealing with measuring devices when you install sensors, and handle these sensitive components carefully.
AvMap declines any responsibility of the connections to the engine. AvMap strongly advise to follow the instructions of the Rotax engine manual and the installation to be performed by a qualified Rotax Service Center. For any question, please contact your local Rotax Service Center.

# 3. Initialization and First Use

## 3.1 Initialization procedure

The engine initialization procedure is necessary to pair EngiBOX to the connected engine model.
**Note:** Engine initialization may not be needed in case unit installation has been already performed by the engine service centre or the aircraft manufacturer.

When you connect EngiBOX to the power for the first time, you will see the Initialization message. Follow the wizard, pressing the knob to start the initialization according to these steps:

1. Enter date and time (UTC)
   - Press the knob to open the controller.
   - Rotate the knob to choose the value.
   - Press the knob again to close the controller.
   - Finally, press the knob to confirm and proceed.

2. Select the engine type
   - Rotate the knob to select your engine type and press the knob to confirm.
   - EngiBOX asks you for confirmation, press again OK to proceed.

3. Enter the engine ID
   - Rotate the knob to select the character and press to confirm.
   - Select OK and press the knob to proceed.

4. For each engine parameter:
   - Rotate the knob and confirm if you want to activate or disable the function.
   - Rotate the knob and confirm the sensor type that is installed on the connection board.
   - Rotate the knob to go back to the parameter title and press the knob to confirm the setting and proceed.

5. The recap page shows all the entered data
   - Press the knob to confirm, or select cancel to start again from the beginning.

**Note**: After this step the initialization is completed. The device is operating in test mode and data will not be registered till next power on.

**IMPORTANT:** After initialization confirmation the EngiBOX is programmed for the selected engine model and engine ID. Only authorized service centres and AvMap Support can reprogram the EngiBOX and restart the initialization procedure.

5. Bluetooth Test

Next step is the Bluetooth test. For this test you need your Smartphone/Tablet (with Bluetooth 4.0), where you have already downloaded the EngiBOX app (that you can get for free from the App Store).

- Choose Skip or OK and press the knob to confirm.
- Activate the Bluetooth on your Smartphone / tablet.
- Launch the EngiBOX app. The app will scan for EngiBOX in the surroundings and the list of found devices will appear in the left column.
- Select your EngiBOX according to the EngiBOX ID.
  **Note**: Follow instructions reported in paragraph 5.4 to read the EngiBOX ID.
- Follow the wizard to register your EngiBOX (needed just the first time).
- Power off the unit.

## 3.2 First Use

The first time you power on the EngiBOX after the initialization, you need to enter all the settings.

1. Language:
   - Rotate the knob to choose the desired language.
   - Press the knob to tick the checkbox.
   - Press the knob to confirm and proceed.

2. Units:

Set the desired unit of measure for pressure (Bar, Kg/cm2, Psi), manifold pressure (Hpa, inHg) and temperature (C°, F°).

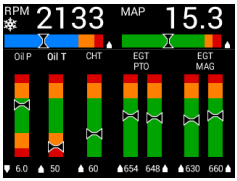
- Press the knob to open the  controller.
- Rotate the knob to choose the desired unit of measure.
- Press the knob again to confirm and proceed.

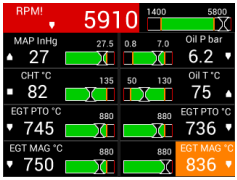
3. Date and time (UTC):
   - Rotate the knob to select month, day, year, hours, minutes and seconds.
   - Press the knob to open the controller.
   - Rotate the knob to choose the value.
   - Press the knob again to close the controller.
   - Finally, press the knob to confirm and proceed.

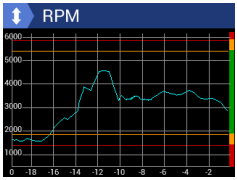
4. Warning page:
   - Read the warning.
   - Select OK and press the knob to confirm and proceed.
   - EngiBOX is ready to be used.

# 4. How to operate the unit

**EMS data – view 1:** data are displayed highlighting graphically engine trends, warning and alarm limits.
**EMS data – view 2:** data are displayed highlighting the values of engine trends, warning and alarm limits.
**Graph Pages:** graphs available for performance analysis of the last 20 minutes for each engine parameter.
**Clock Page:** includes flight time, total lifetime and time since the last overhaul.



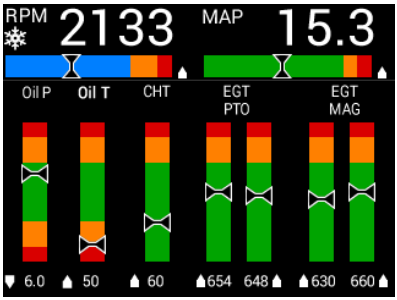



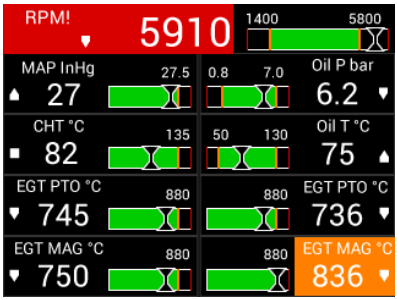



## 4.1 EngiBOX Data views

According to your engine model you will be able to monitor different data:

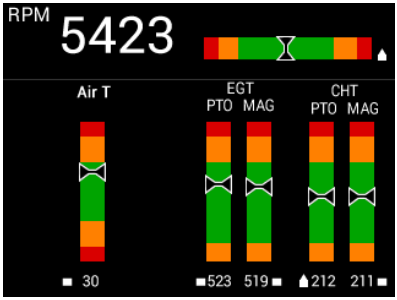
**Rotax 912 series, Rotax 912S series and Rotax 914 series**

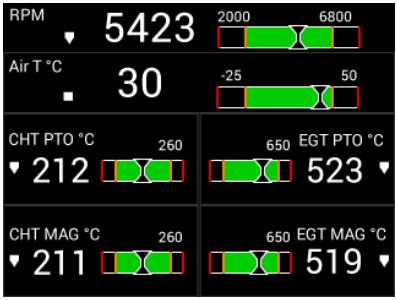



- Revolutions per Minute (RPM)
- Manifold Pressure (MAP)
- Oil Pressure (Oil P)
- Oil Temperature (Oil T)
- Cylinder Head Temperature (CHT) / Coolant Temperature (CT)
- Exhaust Gas Temperature (EGT), PTO left and right
- Exhaust Gas Temperature (EGT), MAG left and right

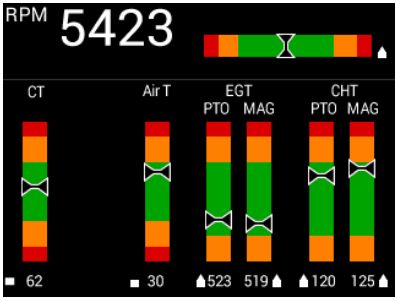
### Rotax 447 UL, Rotax 503 UL and Rotax 618 UL

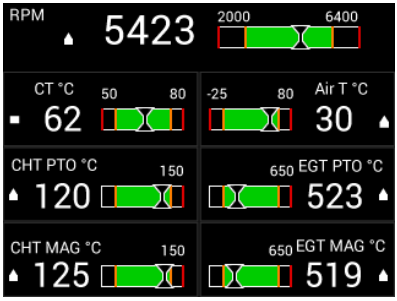


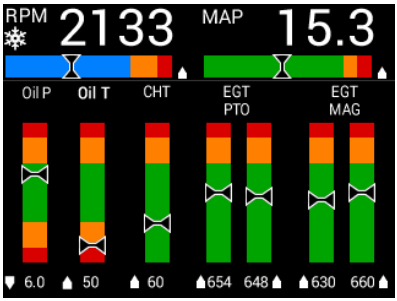

- Revolutions per Minute (RPM)
- Air Temperature (Air T)
- Exhaust Gas Temperature (EGT), PTO
- Exhaust Gas Temperature (EGT), MAG
- Cylinder Head Temperature (CHT), MAG
- Cylinder Head Temperature (CHT), PTO

### Rotax 582 UL




- Revolutions per Minute (RPM)
- Coolant Temperature (CT)
- Air Temperature (Air T)
- Exhaust Gas Temperature (EGT), PTO
- Exhaust Gas Temperature (EGT), MAG
- Cylinder Head Temperature (CHT), PTO
- Cylinder Head Temperature (CHT), MAG




### 4.1.1 EMS data – View 1

In the first data page the engine trends, warning and alarm limits are highlighted graphically. Each parameter is shown with 3 elements: the pointer in a coloured bar, the numeric value, the trend icon.

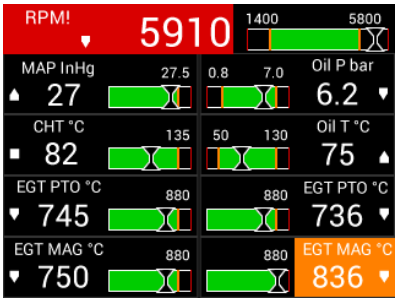
**Coloured bar legend:**

- Blue (only for RPM bar) is shown when the engine is yet too cold for take off. Once the right oil temperature is reached, the RPM bar turns green.
- Green area: normal operation
- Yellow area: warning limit
- Red area: exceeding alarm limit

**Note:** see Appendix "Engine warning and alarm limits" to know the values for your engine.

**Trend icon legend:**

- Arrow up: the value is increasing
- Arrow down: the value is decreasing
- Square: the value is stable
- Red cross: sensor not connected /sensor failure




### 4.1.2 EMS data – View 2:

The second data page highlights values. Each parameter is shown with 4 elements: the pointer in the coloured bar, the numeric value, numeric alarm limit, the trend icon.

**Coloured bar legend:**

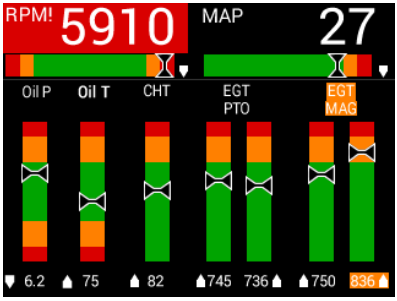
- Black area: below or above the warning and alarm limits
- Green area: normal range of values
- Yellow line: warning limit
- Red line: exceeding alarm limit. The alarm limit value is shown in white above the black area.

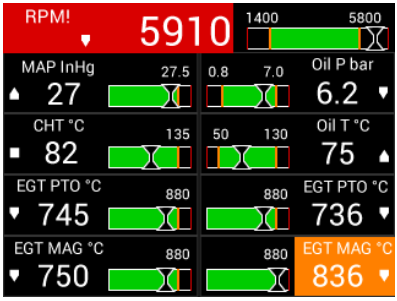
**Trend icon legend:**

- Arrow up: the value is increasing
- Arrow down: the value is decreasing
- Square: the value is stable
- Red cross: sensor not connected /sensor failure

### 4.1.3 Alarms

**Warning limit:** the black background for each value turns yellow when the parameter is approaching the warning limit.

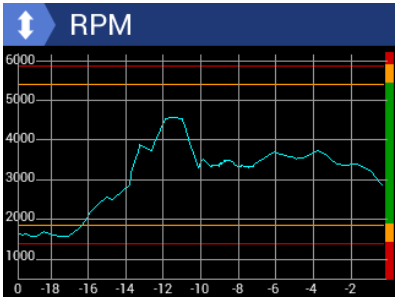



**Alarm limit:** the black background for each value turns red when the alarm limit is exceeded.

**Alarm Reminder ! :** Once an alarm has been activated, an exclamation mark appears next to the parameter abbreviation and remains there even when the parameter goes back to the normal value.

This mark is a useful reminder, in facts, in case you have not noticed the alarm, you can always see the exclamation mark at the end of your flight next to the parameter abbreviation. Go to Settings and open the Alarms page to check date and time of the alarm activation (Chapter 5). The exclamation mark will remain on the display till you clear the alarms in the Alarms page.




### 4.2 Graphs

Graphs are available for performance analysis of the last 20 minutes for each engine parameter.

To change parameter, press the knob: the arrow icon in the top left corner becomes orange, and you can now rotate the knob to cycle among the parameter.

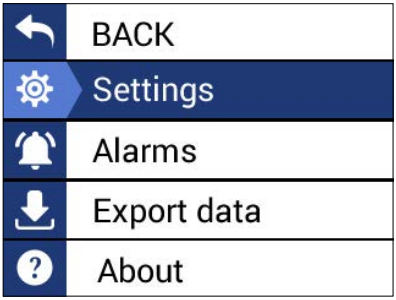
Press again the knob to go back and continue cycling among the pages.

### 4.3 Clock page

The clock page includes time, flight time, total lifetime (Hobbs Meter), time since the last overhaul and date. The EngiBOX will ask you monthly to check and confirm the time.

When Bluetooth is activated, a blue Bluetooth symbol is shown on the Clock page.
When the EngiBOX is paired to another device, a green Bluetooth symbol is shown on the Clock Page.

# 5. Menu




To access the Menu press and hold the knob for 5 seconds, the Menu page will appear. To go back to the main pages, press again for 5 seconds, or wait: the Menu page will be closed automatically after 10 seconds of inactivity. Rotate the knob to select a menu item and press to confirm: Settings, Alarms, Export data and About.

## 5.1 Settings

In the settings page you can set up brightness, language, Bluetooth, units of measure, date and time, sensors; and you can perform a Factory Settings Reset.

### 5.1.1 Brightness:

- Rotate the knob to select Brightness
- Press the knob to open the brightness controller
- Rotate the knob to choose the desired display brightness
- Press the knob again to close the brightness controller
- Rotate the knob to choose BACK and press to confirm and exit

### 5.1.2 Language:

- Rotate the knob to choose the desired language
- Press the knob to tick the checkbox
- Rotate the knob to choose BACK and press to confirm and exit

### 5.1.3 Bluetooth:

- Rotate the knob to choose Activate
- Press the knob to tick the checkbox
- Rotate the knob to choose BACK and press to confirm and exit
- When Bluetooth is activated a blue Bluetooth symbol is shown on the Clock page.
- When the EngiBOX is paired to another device a green Bluetooth symbol is shown on the Clock Page.

### 5.1.4 Units:

Set here the desired unit of measure for pressure (Bar, Kg/cm2, Psi), manifold pressure (Hpa, inHg) and temperature (C°, F°).

- Rotate the knob to choose the desired unit
- Press the knob to tick the checkbox
- Rotate the knob to choose the unit of measure and press the knob to confirm
- Rotate the knob to choose BACK and press to confirm and exit

### 5.1.5 Date and time:

- Rotate the knob to select month day, year, hours, minutes and seconds
- Press the knob to open the controller
- Rotate the knob to choose the value
- Press the knob again to close the controller
- Rotate the knob to choose BACK and press to confirm and exit

### 5.1.6 Sensors:

For each engine parameter:

- Confirm if you want to activate or disable the function on the display.
- Confirm the sensor type that is installed on the connection board.

### 5.1.7 Settings Reset:

- You will be asked for confirmation
- Select OK and Press the knob to confirm

## 5.2 Alarms:

You can find here the recap of the alarms that have been activated with: status, value, date and time (see table 3, Alarm Tags). Once you have read the alarm, press clear to remove the exclamation mark from the data view pages. Rotate the knob to select OK and press to confirm.

**Table 3**

| ALARM TAGS | |
|---|---|
| NC | Sensor is not connected |
| S/C | Sensor is shorted |
| FAIL | Sensor is not working correctly |
| ALM HI | Alarm high, engine related alarm |
| WARN HI | Warning high, engine related alarm |
| WARN LO | Warning low, engine related alarm |
| ALM LO | Alarm low, engine related alarm |

## 5.3 Export Data

Engine parameters are monitored with an update rate of five times per second. Data are recorded and stored in the internal memory up to 160 hours.

In order to download the data log you can use:

- The EngiBOX mobile app for iOS and Android (see chapter 7)
- The microSD card (insert the microSD card into the EngiBOX and choose Export Data to export the stored data from the device on the microSD card)

**Note:** data can be stored on your EngiBOX Portal account for engine analysis (see chapter 8).

### 5.4 About

You can read here: the EngiBOX ID, Boot version, Loader version, Software version, Engine type, Total lifetime of the engine and Time since last overhaul. Rotate the knob to choose BACK and press to exit.

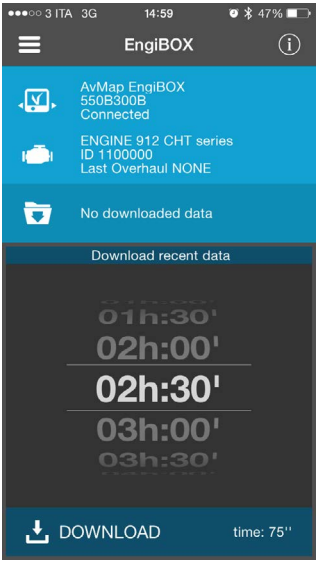
**IMPORTANT:** the EngiBOX ID is needed to register your EngiBOX through the EngiBOX APP, in order to download data and get customer support.

# 6. Software update

Software updates are released by AvMap for free. You just need to register your EngiBOX at http://www.avmap.it/support/Registration. Registration is needed to get Customer Support.

1. Visit http://www.avmap.it/support/download, choose Select > Aeronautical products > Instruments > EngiBOX to find out if there is a software update for your EngiBOX.
2. Click on Download. (You need to be registered on the AvMap website) if you are not logged in, you can insert your login and Password received at the moment of registration.
3. Copy the software file on the microSD card.
4. Insert the microSD card into the EngiBOX while the EngiBOX is turned OFF.
5. Turn the EngiBOX ON providing power to the device. Automatically the EngiBOX starts the update procedure. At the end of the update procedure the devices asks to press the knob to proceed.
6. After the update process the EngiBOX starts up. You can check the software version in the About page (see paragraph 5.4).

# 7. EngiBOX App




You can download the EngiBOX mobile app (iOS and Android) for free on your Smartphone / tablet.

## 7.1 App installation

1. Activate the Bluetooth on your Smartphone / tablet
2. Launch the EngiBOX app. The app will scan for EngiBOX in the surroundings and the list of found devices will appear in the left column.
3. Select your EngiBOX according to the EngiBOX ID.
4. In case of first use, follow the wizard to register your EngiBOX.

## 7.2 Download data for analysis and instant support

1. Launch the EngiBOX mobile app.
2. Select your EngiBOX from the left column to connect to it.
3. The app shows: EngiBOX ID, connection status. Engine model, Engine ID number and date of last overhaul. In order to download available data touch DOWNLOAD DATA.
4. Choose how many minutes you want to download: the minimum is the last 30 minutes of activity, the maximum 10 hours and 30 minutes (see the estimated time for download in the bottom right corner)
5. When the download is complete, press SEND to send the data to your EngiBOX Portal account. If you wish to share the data with a Service Center to get instant support service, select your favourite Service Center on the EngiBOX App. The service center will receive all your engine logs.

Once the operation is completed, contact the service center to get Instant Support Service.

# 8. EngiBOX Web Portal

With the EngiBOX App or micro SD card you can import your engine data log on your EngiBOX portal account.

Thanks to the EngiBOX Portal, you can manage your Engine at home, view your flights and the recorded engine performance.
You can share your engine data with your Rotax Service Center anytime you need maintenance or help.

- Safely store your engine data: always available on your EngiBOX Portal account.
- Always in control: check your engine performance from anywhere /any platform.
- Get better diagnosis and support: share your data with your Rotax Service Center for a full analysis.

**IMPORTANT:** Register your account at engibox.avmap.it

# 9. Technical Specifications

**Hardware:**

- Dimensions: 95 x 95 x 88 mm
- Fitting standard 3-1/8” (79.5 mm) panel hole
- Weight: 250g
- Display: 3.5” colour LCD, with anti reflective coat 320x240 pixels, 500 cm/m2
- Micro SD slot
- Real Time Clock
- Bluetooth Low Energy
- Power Input range: 10-35 VDC
- Current consumption @ 12VDC: 150 mA MAX
- Operating Temperature range: -20° C / +70° C
- Manifold pressure sensor
- Sensor probe connection board:
  - 4 x Thermocouple sensor input for EGT
  - 2 x Resistance thermometer sensor input for Oil T, CHT, CT or Air T
  - 1 x Oil pressure sensor input for Oil P
  - 1 x RPM pick-up
  - 1 x Serial connection (RS-232, NMEA for GPS input)

**Software:**

- Engine data displayed in two alternative views
- Warn you instantly if any measurement exceeds the engine limits.
- Update rate of five times per second.
- Data are recorded and stored in the internal memory (up to 160h)
- Data export to Micro SD or EngiBOX Mobile App
- Download the free EngiBOX smartphone App to get Instant Support Service
- Graph page for each engine parameter
- Clock page including flight time, total lifetime, time since overhaul

**Compatible Sensors:**

- Thermocouple sensor ungrounded:
  - Thermocouple ungrounded Type K, Rotax P/N: 966370
  - Thermocouple ungrounded Type J, Rotax P/N: NA
- Resistance thermometer sensor:
  - Standard Rotax NTC sensor, Rotax P/N 965530 and 965531
  - Optional Rotax PT100 sensor, Rotax P/N 966385
- Oil pressure sender:
  - Standard Keller type 4-20 mA pressure sender, Rotax P/N 456180
  - Resistive 10 Bar/150 psi VDO type pressure sender, Rotax P/N 956357 and 956415

**IMPORTANT:** Sensor probes are not included in the box.

**Compatible Engines:**

- Rotax Engine series: 447, 503, 582, 618, 912, 912s, 914.

**Note:** All compatible engines are preconfigured in the software installation wizard.

**Included accessories:**

- Aeronautical grade wires for power supply
- Mounting KIT (Cutting template, 4x metal washers and 4x screws)
- 1x 1A fuse holder
- Blank microSD card
- Microfiber cleaner cloth

# 10. Product conformity information

## 10.1 FCC compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Changes or modifications not expressly approved by AvMap Satellite Navigation could void the user's authority to operate the equipment.

**Compliance information statement**

| | | |
|---|---|---|
| Identification of the product | Name | P/N |
| | EngiBOX | UX0EMS10AM |
| Certified components | BT module<br>FCC ID: QDS-BRCM1078 | |
| Applicable compliance statements | This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:<br>(1) This device may not cause harmful interference, and<br>(2) This device must accept any interference received, including interference that may cause undesired operation. | |
| Responsible party | Name | AvMap Satellite Navigation Inc. |
| | Address | 25 Enterprise Zone Drive,<br>Riverhead, NY 11901 USA |
| | Phone | +1-800-363-2627 |
| | Website | www.avmap.us |

### 10.2 Simplified EU declaration of conformity

Hereby, AvMap Srl, Viale Zaccagna 6, 54033 Carrara (MS), Italy declares that the radio equipments in the following table are in compliance with Directive 2014/53/EU.

| | |
|---|---|
| EngiBOX | UX0EMS10AM |

The full text of the EU declaration of conformity for every single product is available at the following internet address: **eudeclaration.avmap.it**

# Appendix: Engine warning and alarm limits

## 4 Stroke Engines (912/912S DCDI Series)

| Engine Model: 912 DCDI Series*, with Coolant Temperature (CT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 1,5 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 1,8 | 0 | 1700 |
| Warning up | 840 | 130 | 110 | 5 | 27 | 5500 |
| Alarm up | 880 | 140 | 120 | 7 | 27,5 | 5800 |
| Max | 900 | 150 | 150 | 8 | 30 | 6000 |
| *912 UL / 912 A / 912 F | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

| Engine Model: 912 DCDI Series*, with Cylinder Head Temperature (CHT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CHT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 1,5 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 1,8 | 0 | 1700 |
| Warning up | 840 | 130 | 140 | 5 | 27 | 5500 |
| Alarm up | 880 | 140 | 150 | 7 | 27,5 | 5800 |
| Max | 900 | 150 | 160 | 8 | 30 | 6000 |
| *912 UL / 912 A / 912 F | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

| Engine Model: 912S DCDI Series*, with Coolant Temperature (CT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 0,8 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 2 | 0 | 1700 |
| Warning up | 840 | 120 | 110 | 5 | 27 | 5500 |
| Alarm up | 880 | 130 | 120 | 7 | 27,5 | 5800 |
| Max | 900 | 140 | 150 | 8 | 30 | 6000 |
| *912 ULS / 912 S | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

| Engine Model: 912S DCDI Series*, with Cylinder Head Temperature (CHT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CHT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 0,8 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 2 | 0 | 1700 |
| Warning up | 840 | 120 | 125 | 5 | 27 | 5500 |
| Alarm up | 880 | 130 | 135 | 7 | 27,5 | 5800 |
| Max | 900 | 140 | 145 | 8 | 30 | 6000 |
| *912 ULS / 912 S | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

## 4 Stroke Engines (914 DCDI series)

| Engine Model: 914 DCDI Series*, with Coolant Temperature (CT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 1,5 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 1,8 | 0 | 1700 |
| Warning up | 900 | 120 | 110 | 5 | 35,4 | 5500 |
| Alarm up | 950 | 130 | 120 | 7 | 39,8 | 5800 |
| Max | 970 | 140 | 150 | 8 | 39,9 | 6000 |
| *914 UL / 914 F | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

| Engine Model: 914 DCDI Series*, with Cylinder Head Temperature (CHT) | | | | | | |
|---|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | OIL T (°C) | CHT (°C) | OIL P (bar) | MAP (InHg) | RPM |
| Min | 0 | 0 | 0 | 0 | 0 | 0 |
| Alarm low | 0 | 50 | 0 | 1,5 | 0 | 1400 |
| Warning low | 0 | 55 | 0 | 1,8 | 0 | 1700 |
| Warning up | 900 | 120 | 125 | 5 | 35,4 | 5500 |
| Alarm up | 950 | 130 | 135 | 7 | 39,8 | 5800 |
| Max | 970 | 140 | 145 | 8 | 39,9 | 6000 |
| * 914 UL / 914 F | | | | | | |
| Note: Cold engine: When oil temperature is under warning low limit, RPM must be under 3500. In cold engine status EngiBOX will give a warning at 3500 RPM and an alarm at 4000 RPM. | | | | | | |

## 2 Stroke Engines (447 UL SCDI, 503 UL DCDI, 582 UL DCDI, 618 UL DCDI)

| Engine Model: 447 UL SCDI | | | | |
|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | CHT PTO - CHT MAG (°C) | AIR T (°C) | RPM |
| Min | 0 | 0 | -50 | 0 |
| Alarm low | 0 | 0 | -25 | 2000 |
| Warning low | 460 | 190 | 0 | 2300 |
| Warning up | 580 | 230 | 40 | 6500 |
| Alarm up | 650 | 260 | 50 | 6800 |
| Max | 680 | 275 | 60 | 7000 |
| Note: Cold engine: When Cylinder Head Temperature is under warning low limit, RPM must be under 2500. In cold engine status EngibOX will give a warning at 2500 RPM and an alarm at 3000 RPM. | | | | |

| Engine Model: 503 UL DCDI | | | | |
|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | CHT PTO - CHT MAG (°C) | AIR T (°C) | RPM |
| Min | 0 | 0 | -50 | 0 |
| Alarm low | 0 | 0 | -25 | 2000 |
| Warning low | 460 | 180 | 0 | 2300 |
| Warning up | 580 | 220 | 40 | 6500 |
| Alarm up | 650 | 250 | 50 | 6800 |
| Max | 680 | 275 | 60 | 7000 |
| Note: Cold engine: When Cylinder Head Temperature is under warning low limit, RPM must be under 2500. In cold engine status EngiBOX will give a warning at 2500 RPM and an alarm at 3000 RPM. | | | | |

| Engine Model: 582 UL DCDI | | | | | |
|---|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | CHT PTO - CHT MAG (°C) | CT (°C) | AIR T (°C) | RPM |
| Min | 0 | 0 | 0 | -50 | 0 |
| Alarm low | 0 | 0 | 50 | -25 | 2000 |
| Warning low | 500 | 110 | 55 | 0 | 2300 |
| Warning up | 620 | 130 | 75 | 40 | 6000 |
| Alarm up | 650 | 150 | 80 | 50 | 6400 |
| Max | 680 | 180 | 95 | 60 | 7000 |
| Note: Cold engine: When Coolant Temperature is under warning low limit, RPM must be under 2500. In cold engine status EngiBOX will give a warning at 2500 RPM and an alarm at 3000 RPM. | | | | | |

| Engine Model: 618 UL DCDI | | | | |
|---|---|---|---|---|
| Limits | EGT PTO - EGT MAG (°C) | CHT PTO - CHT MAG (°C) | AIR T (°C) | RPM |
| Min | 0 | 0 | -50 | 0 |
| Alarm low | 0 | 0 | -25 | 2000 |
| Warning low | 500 | 110 | 0 | 2300 |
| Warning up | 620 | 130 | 40 | 6900 |
| Alarm up | 650 | 150 | 50 | 7000 |
| Max | 680 | 180 | 60 | 7300 |
| Note: Cold engine: When Cylinder Head Temperature is under warning low limit, RPM must be under 2500. In cold engine status EngiBOX will give a warning at 2500 RPM and an alarm at 3000 RPM. | | | | |

# EngiBOX

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