Engine control unit manual

Presentation

The engine control unit is a supervision and protection instrument for Mechanical Diesel Engines. It has an LCD graphic 128x64 pixel display with amber backlight that displays the engine speed (RPM), the fuel level, the engine temperature and the engine hour meter; it has 6 lights to rapidly view the state of the main engine parameters.

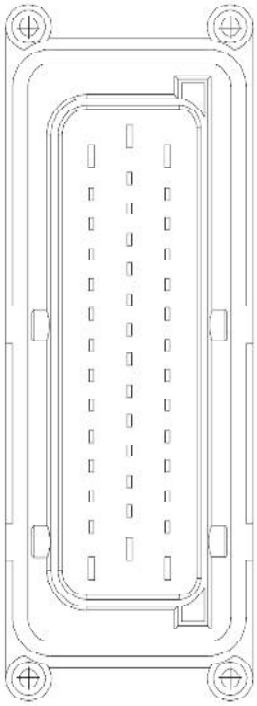
The parameters monitored by the instrument for the alarm signal are:

- Engine oil pressure
- Alternator charging voltage (D+)
- Engine water temperature
- Fuel air filter
- active alarm
- activation of spark plugs

1. Technical Specifications

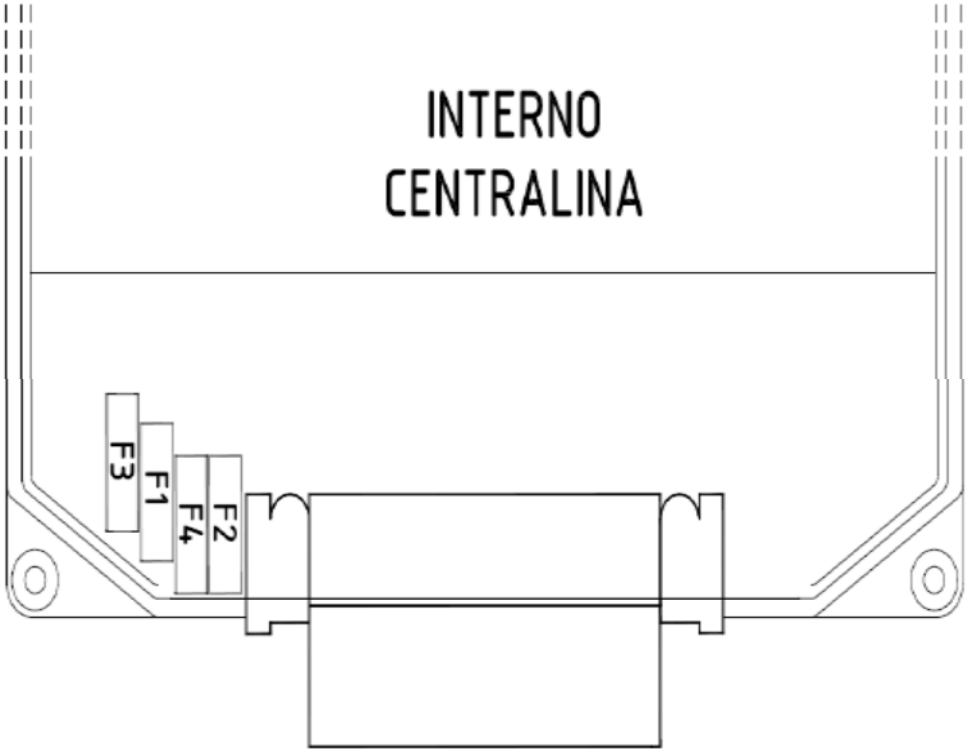
GENERAL DATA	
External dimensions	See *mechanical dimensions*
Weight	= 1530 g
Electronic protection degree	IP66
Terminal board protection degree	IP66
Operating temperature	-10 – 60 °C
Power supply	12 Vdc
Fixed consumption	≈ 122 mA + Alternator Pre-excitation
Display	Amber backlight 128x64 graphic LCD
Sound buzzer	90 dB at 30 cm
Keys for the interface with the device	2
DIGITAL INPUTS	
N° inputs	5
Input type	Negative
ALTERNATOR INPUT/OUTPUT	
Alternator (D+)	DC voltage measurement (0-35 Vdc) + pre-excitation at 150 mA
Engine revolutions (W)	Measurement of the pulses generated by the alternator 10Hz – 4kHz
RELAY OUTLETS	
N° of outputs	7
Type of outputs	5 Relay outputs and 2 PNP type

2. 40-pole connector pin-out



40-pole connector
1. Positive output under panel 2. Spark plug output (2 A) 3. CAN H 4. CAN L 5. Horn control input (+) 6. Not connected 7. Engine start input (+) 8. Oil pressure switch input (-) 9. Engine temperature analog input 10. Fuel level analog input 11. Fuel reserve digital input (-) 12. Not connected 13. Cleaner solenoid valve output (15A) 14. Solenoid pulse output active 1 second (15 A) 15. Battery positive 16. Solenoid retention output (2 A) 17. Not connected 18. Not connected 19. Not connected 20. Light signal digital input (+) 21. Output under protected key 10A for battery charge 22. Air filter digital input (-) 23. Not connected 24. Not connected 25. Not connected 26. Cleaner input (+) 27. Buzzer input (+) 28. Engine start-up output (8A) 29. Battery positive 30. Output under protected key 10A for hood lights 31. Horn output (15A) 32. Not connected 33. Not connected 34. Battery Negative 35. Engine stop input (+) 36. Diesel pump output 37. Not connected 38. Not connected 39. Not connected 40. D+ Alternator Input (with pre-excitation resistance) 41. W Alternator Input 42. Compressor cleaner output (15A)

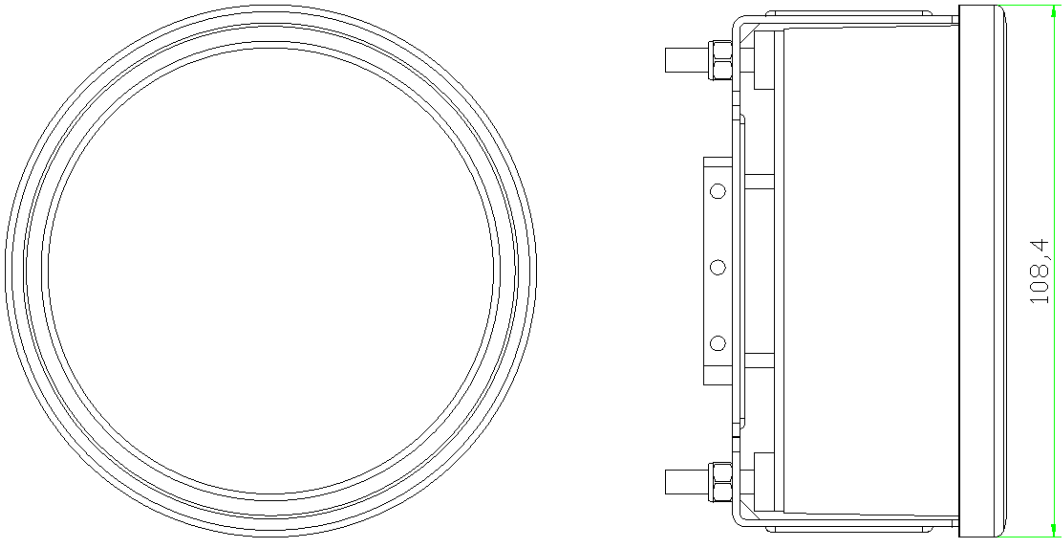
3. Fuses Layout

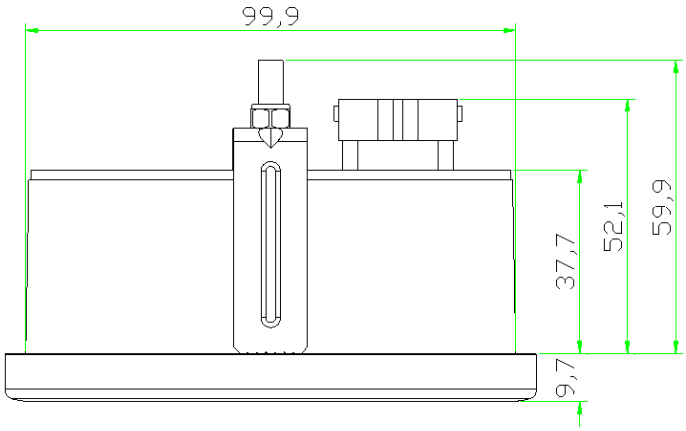


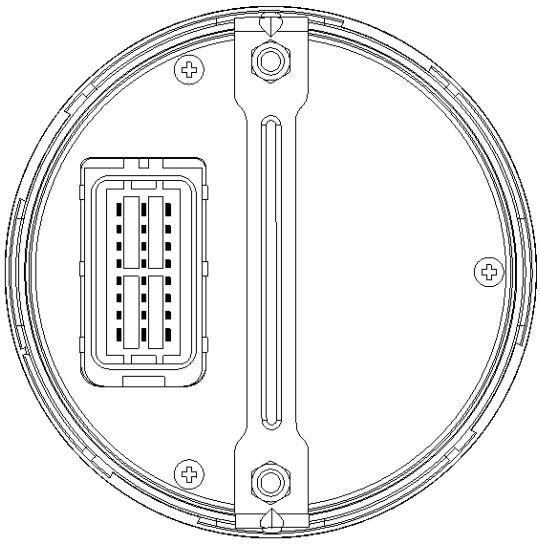
FUSIBILE	VALORE	FUNZIONE
F1	20A	Cleaner fuse
F2	15A	Starting motor fuse
F3	5A	Engine control unit fuse
F4	10A	Auxiliary power supply fuse

4. Mechanical dimensions

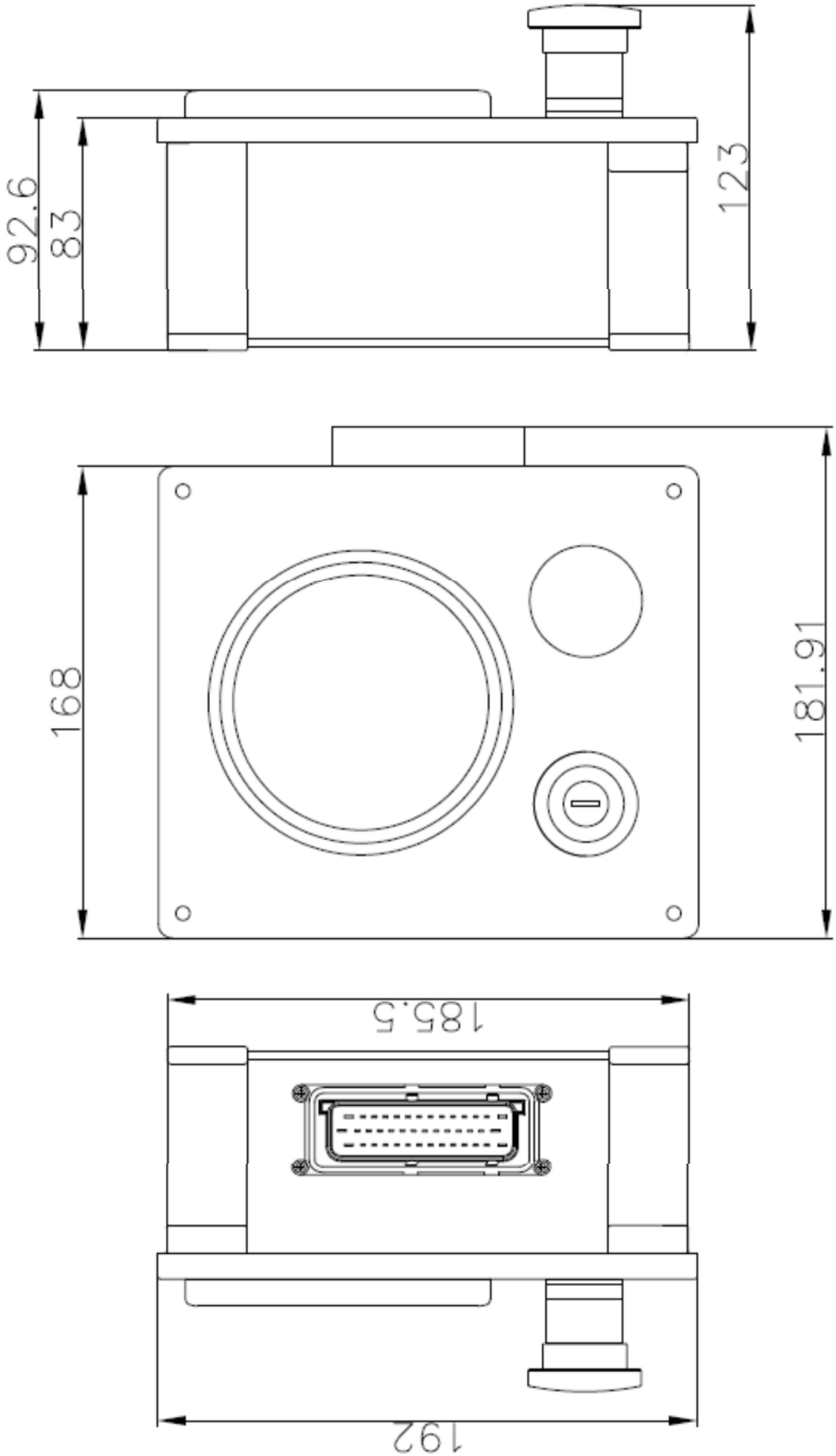
4.1 Mechanical dimensions instrument ATS-25



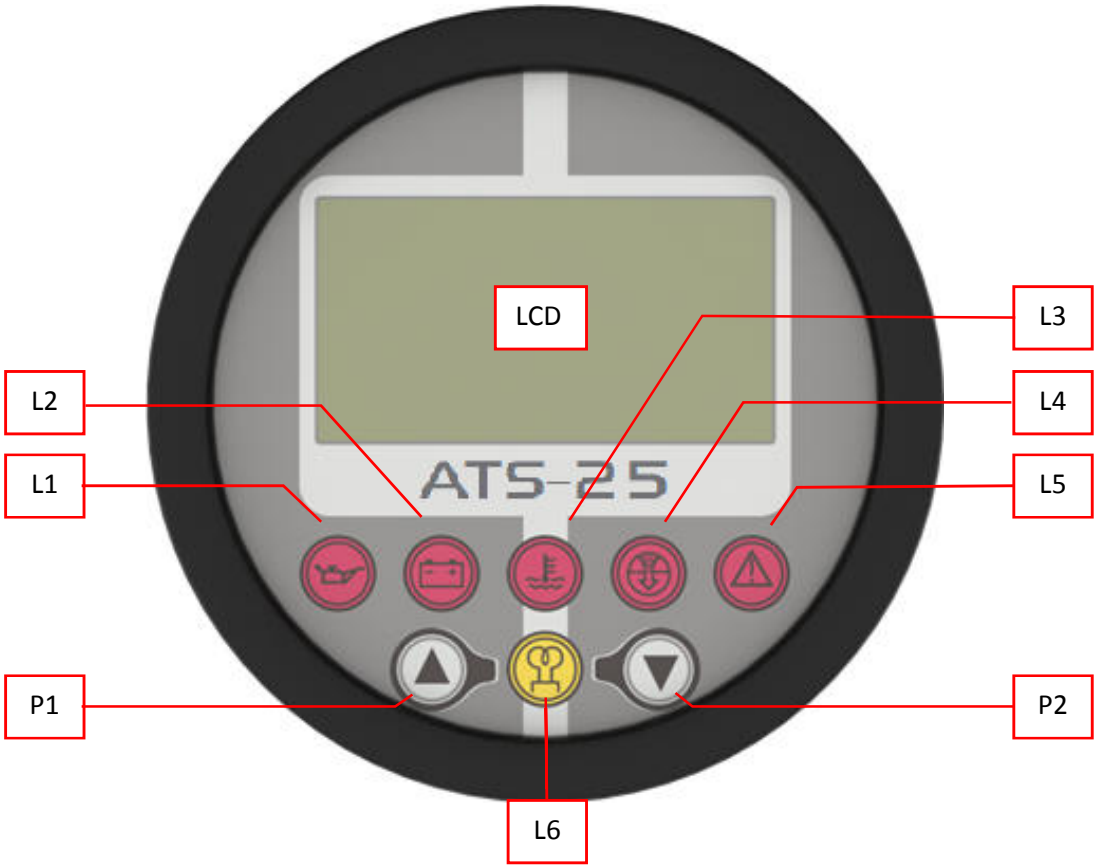




4.2 Mechanical dimensions Complete Box



5. Functional description



5.1 EQUIPMENT OVERVIEW

POS.	TYPE	DESCRIPTION
LCD	LDC 128X46	Graphic display with amber backlight for the display of data on the device
P1	KEY 1	Increment key, ESC key if held down
P2	KEY 2	Decrease key, ENTER key if held down
L1	OIL Led	Low oil pressure (digital input)
L2	BATTERY Led	Low alternator voltage
L3	TEMPERATURE Led	High water temperature (digital input)
L4	AIR FILTER Led	Air filter clogged (digital input)
L5	ALARM Led	Active Alarm
L6	SPARK PLUGS Led	Activated spark plugs

5.2 MAIN PAGE

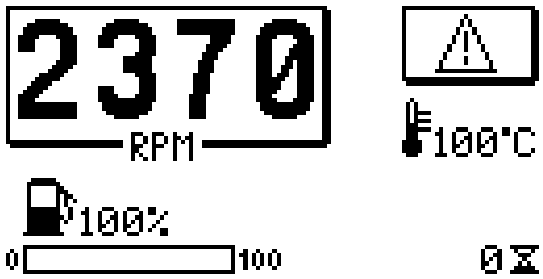


Figure 1: main page

ATS-25 is an engine parameter display instrument. Once powered up, the instrument displays the initial logo for a few seconds, after which it passes to the main screen as shown in figure 1.

The parameters displayed are:

- Engine speed (RPM): in the upper left part of the display is shown the engine rpm detected by the alternator W signal.
- Hour meter: in the lower right next to the hourglass symbol the operating hours are shown with the engine started.
- Fuel Level: in the bottom left the fuel level, both graphically and in percentage form, is shown on a horizontal bar.
- Engine water temperature: in the upper right the temperature value of the engine is shown in Celsius degrees.
- Signals display: different graphic symbols are shown in the display in the upper right relating to:
    - Active alarms
    - Cleaner function active
    - Lights on
    - Start input active
    - Stop input active

The control unit detects the "engine on" conditions to detect alarms that occur in case of engine running and to update the engine hour counter.
The engine on detection parameters are:

- RPM above the set threshold
- Alternator voltage above the set threshold
- Engine oil pressure switch open

The presence of only one of these parameters above the set thresholds identifies the engine running.
The control unit controls several parameters to detect engine anomalies and to turn it off if necessary to avoid causing damage to the engine.

The parameters controlled are:

- High engine water temperature
- Low engine oil pressure
- Lower alternator battery charging voltage
- High engine rpm
- High battery voltage
- Low battery voltage
- Clogged air filter

To correctly set the instrument there is a programming menu divided into several pages.

In case of activation of an alarm, an alarm indication will appear. It is possible to return to the main page by pressing the P1 or P2 key.

It is possible to reset all the alarms by pressing and holding down either the P1 key or the P2 key

for 5 seconds.

5.3 PROGRAMMING MENU

5.3.1 BASIC MENU

To enter the menu, keys P1 and P2 must be pressed for 5 seconds simultaneously. 3 digits will appear on the instrument indicated with "000".

Pressing the key P1 offers access to the basic menu where it is possible to change a number of options of the instrument but not the configuration of the machine. The display appears as in figure 2.

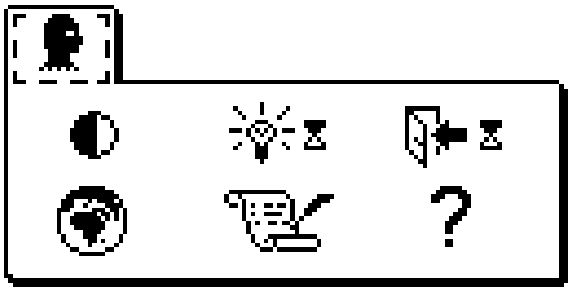


Figure 2: basic menu page

To confirm the menu page, press and hold down the P2 key for 5 seconds the key P2. After this step the first icon is selected and pressing the P2 key it is possible to move forward to the menu by selecting, one by one, the various parameter icons. Instead, pressing the P1 key it is possible to move back in the menu by selecting them in the opposite direction.

After selecting the desired parameter to enter the edit page, it is necessary hold down the P2 key for 5 seconds.

Through this menu it is possible to configure the following options:

Display contrast: entering this parameter it is possible to choose a number that identifies the contrast of the liquid crystals, which is useful to increase the contrast where the display appears very clear in the case of low temperatures to which the instrument is exposed.

Display lighting time: entering this parameter the display backlight ignition seconds are selected when the keys are no longer pressed. If selected at 0, the backlight does not turn off.

Exit time from the main menu: entering this parameter it is possible to select the exit minutes from the menu to display the home page when the keys are no longer pressed. If selected at 0 this function is disabled.

Language: entering this parameter it is possible to select the language for the non-symbolic menu items of the advanced menu. The selectable languages are Italian, English and French.

Historical alarms: entering this parameter displays a list of the last 10 alarms detected with the relevant indication of hours worked. It is possible to scroll through the list with the keys P1 and P2. If P2 is held down for 5 seconds it is possible to reset them but only if entering through the advanced menu.

Information and assistance: entering this page it is possible to view the distributor information for technical assistance on the instrument and the programmed software version is displayed.

On each page it is possible to change the parameter with the P1 and P2 keys. Confirm the parameter change by pressing and holding down the P2 key for 5 seconds and return without saving the change by pressing and holding down the P1 key for 5 seconds.

To return to the main page, press and hold down both the P1 and P2 keys for 5 seconds from any menu item.

5.3.2 ADVANCED MENU

To enter the menu, keys P1 and P2 must be pressed for 5 seconds simultaneously. 3 digits will appear on the instrument indicated with "000".
Pressing the key P2 increases the digit highlighted after which pressing the key P1 it is possible to move the position of the digit highlighted. Typing in the code "135" allows you to enter the advanced menu with which it is possible to change all the parameters of the instrument. The display appears as in figure 3.

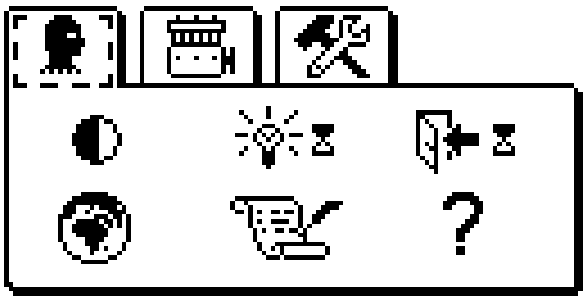


Figure 3: general set-up page of the advanced menu

To scroll through the three screens use the P1 and P2 keys. To confirm the menu page, press and hold down the P2 key for 5 seconds. After this step the first icon is selected and pressing the P2 key it is possible to move forward to the menu by selecting one by one the various parameter icons. Instead, pressing the P1 key it is possible to move back in the menu by selecting them in the opposite direction. To return to the selection of the screens hold down the P1 key for 5 seconds. As with the basic menu, after selecting the desired parameter, to enter the edit page, hold down the P2 key for 5 seconds.

The menu structure is shown in figure 4

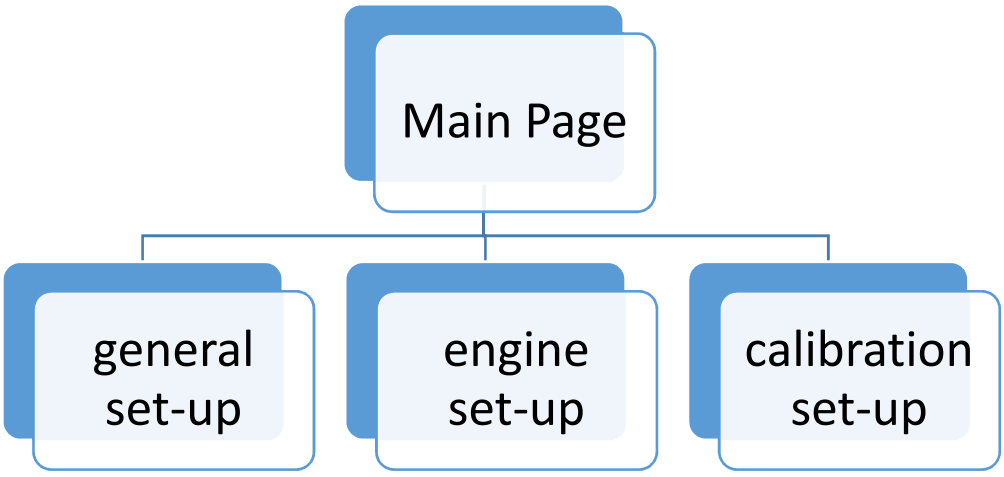


Figure 4: Advanced menu structure

GENERAL SET-UP

The general set-up is described in section 5.3.1 of the basic menu, with the exception of the "alarms history" parameter. Selecting the parameter it is possible to clear the entire history by holding down the P2 key for 5 seconds.

ENGINE SET-UP

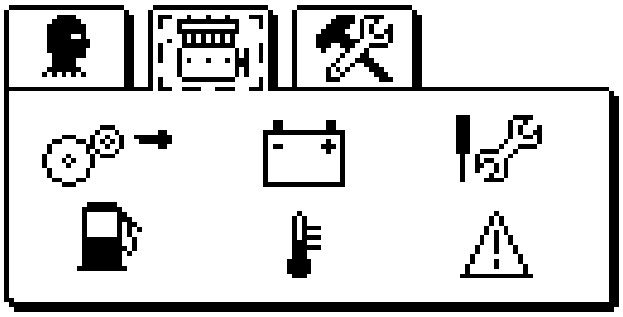


Figure 5: engine set-up page of the advanced menu

Start-up thresholds: this menu displays the list where there are several start-up parameters:

- 1-OIL THRESHOLD: Parameter to activate the "engine on" identification reading through the oil pressure switch
- 2-THRESHOLD D+: Value in volts above which the battery charging voltage indicates that the engine is running
- 3-RPM THRESHOLD: Value in RPM over which the engine speed indicates that the engine is running
- 4-START-UP: Parameter to activate the type of start-up; if it is set to MAN, the engine is activated, keeping the START button active. If it is removed before the engine is turned on, the procedure is interrupted; however, if set to AUTO, by pressing for a moment the start input, the system performs an automatic start procedure for engine starting, performing a timed cycle of start-ups and pauses until detection of the engine started.
- 5-N. START-UPS: Number of start attempts in the automatic cycle.
- 6-T. SPARK PLUGS: Activation time of start plugs upon each start-up.
- 7-T. START-UP: Activation time of starter motor in the automatic cycle.
- 8-T. PAUSE: Pause time between two start-up attempts in the automatic cycle
- 9-T. ENGINE DETECTION: Delayed detection time of engine
- 10-MAXIMUM RPM: Value in RPM for the alarm of maximum revolutions.

Battery alarm: this menu displays the list where there are several battery parameters:

- 1-L-Vdc-BAT: Value in volts below which the battery voltage indicates alarm
- 2-H-Vdc-BAT: Value in volts above which the battery voltage indicates alarm

Service maintenance value: Entering this menu it is possible to set a decremental hour counter for the next service. To signal the alarm at the end of the hours it is necessary to activate the relevant alarm.

Fuel level sensor: entering this menu it is possible to set the alarm threshold value for the fuel level and the curve of the sensor values at different percentages of fuel by setting the relative values in ohms.

Engine temperature threshold value: entering this menu it is possible to set the alarm threshold value for the temperature of the engine and the curve of the values of the sensor at different temperature values by setting the relative values in ohm.

Alarm setting menu: entering this menu the list of alarms that can be activated from the control unit are displayed. Below is a summary table of the various alarms present.

NUMBER	IDENTIFICATION	ALARM DESCRIPTION
1	Low engine oil pressure alarm	Digital pressure switch activated for mechanical motors with digital sensor, indicating low oil pressure. Check that the oil is at the correct level.
2	Alarm high engine cooling water temperature	Engine temperature above the set threshold. Check the level of coolant and clean the radiator area.
3	Low battery voltage alarm	Battery voltage level below the set threshold value. The battery voltage is low so it is necessary to recharge the battery or to replace it if necessary.
4	Alarm high battery voltage	Battery voltage level above the set threshold value. Check that the battery and the electrical system are correct
5	Alarm low voltage of charger alternator	Charger alternator voltage level below the set threshold value. Possible problem with the alternator belt, with the alternator or battery.
6	High engine speed alarm	Value of engine rpm above the set threshold, the engine was accelerated more than the maximum permitted. It is necessary to adjust the accelerator limit switch position.
7	Air filter alarm	Clogged air filter. Clean the air filter or replace it before starting the engine.
8	Maintenance hours alarm	The maintenance hour counter value is at zero. Routine maintenance prompt indication. It is necessary to perform maintenance.
9	Alarm fuel level	Value of the fuel level below the set threshold. It is necessary to refuel the vehicle or to check the connection to the sensor
10	Alarm fuel reserve	Fuel reserve input activation. It is necessary to refuel the vehicle or to check the connection to the sensor
11	Alarm start failure	Activation start failure alarm for the automatic starting system.

With the P1 and P2 keys it is possible to scroll between the list of alarms. Once the desired alarm is highlighted, it is possible to access its settings by pressing and holding down the P2 key for 5 seconds. Each alarm can be configured using the following parameters:

- ACTIVATION: alarm enable parameter: OFF to disable the alarm, ON to activate the alarm upon start-up of the control unit and RUN to activate the alarm only when the engine is running.
- RETENTIVE: Display alarm permanence parameter. OFF to ensure that the display disappears upon restoring of the alarm condition and ON to ensure that the display remains even if the condition has been restored.
- STOP: Engine stop parameter is activated. ON to stop the engine, OFF only for signalling without engine stop. (For mechanical engines automatic switch-off is not possible).
- DELAY: Parameter in seconds to insert an alarm activation delay relating to the sensor event signalling.
- SIGNAL: Parameter for acoustic signal activation on the horn in case of activation.

The following is a summary table of the various parameters for each alarm in its default configuration.

ENGINE	**ACTIVATION**	**RETENTIVE**	**DELAY**	**STOP**	**SIGNAL**
Low engine oil pressure alarm	RUN	YES	5	YES	YES
Alarm high engine cooling water temperature	ON	YES	5	YES	YES
Low battery voltage alarm	ON	NO	5	NO	YES
Alarm high battery voltage	ON	NO	5	NO	YES
Alarm low voltage charger alternator	RUN	YES	5	YES	YES
High engine speed alarm	RUN	YES	0	NO	YES
MOTOR	**ACTIVATION**	**RETENTIVE**	**DELAY**	**STOP**	**SIGNAL**
Air filter alarm	RUN	YES	5	YES	YES
Maintenance hours alarm	OFF	NO	0	NO	NO
Alarm fuel level	ON	NO	5	NO	YES
Alarm fuel reserve	ON	NO	5	NO	YES
Alarm start failure	ON	NO	0	NO	NO

With the P1 and P2 keys it is possible to select the parameter to be changed. By holding down the P2 key for 5 seconds the parameter editing phase is entered. It is possible to confirm by pressing and holding down the P2 key for 5 seconds otherwise exit without changing the parameter by pressing and holding down the P1 key for 5 seconds; it is possible to exit from the alarm menu by pressing and holding down the P1 key for 5 seconds.

CALIBRATION SET-UP

Figure 6: calibration set-up page of the advanced menu

Engine speed calibration: entering this menu it is possible to enter the engine speed calibration parameter. Start the engine and indicate on the display the value in RPM; finally press the P2 key for 5 seconds to confirm the calibration. Paragraph 6 describes the step by step procedure to perform the calibration.

CLEANER Cleaner procedure setting: Entering this menu it is possible to set the parameters for the cleaner procedure. This procedure consists of a cleaning cycle of the radiator divided into two active phases (phase 1 activation of compressor and solenoid valve, phase 2 activation only of solenoid valve), and a pause phase. The pause phase is reduced to 1 second if the engine temperature reaches a certain value. Through this menu it is possible to modify the timing of the two active phases, the time of the standard cycle and the rapid activation temperature of the cleaner.

6. Engine speed calibration

- Control unit ignition
- Start the engine
- Accelerate the engine until it reaches a stable value (E.g. 1000, 1050, 1100, 1150, 1200)
- Enter the advanced menu, pressing the following sequence of keys

    - Press P1 and P2 simultaneously ("000" appears on the display)
    - Press P2 once ("100" appears on the display)
    - Press P1,
    - Press P2 3 times ("130" appears on the display)
    - Press P1,
    - Press P2 5 times ("135" appears on the display)
    - Press P1

- From the Advanced menu, press P2 twice selecting the third screen
- Press and hold down P2 to enter the screen Icons
- Press and hold down P2 to enter the calibration page

Figure 7: calibration page

- With the arrows P1 or P2 select the speed value at which the engine is moving
- Keep P2 pressed down to confirm the calibration, returning to the menu
- Press P1 and P2 simultaneously to return to the Main Page

7. TABLE FOR ASSISTANCE AND ENGINE SERVICING

Help centre:
NAME:

TELEPHONE:

ENGINE MODEL:

ENGINE SERIAL NUMBER

Date:	Engine hours:	Description:

Loc. S.Onofrio, 6/A, 66034 Lanciano (CH) Italy
Tel.: +39087250221
Fax: +39087250231
e-mail: info@mdbsrl.com
Web Site: www.mdbsrl.com