m.a.e.
ELETTRONICA

TECHNICAL MANUAL

for electronic dashboard

MLC_RJ cod. 001.000.2101

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1.0	Updating chapter 5.1 and 15	12.11.2008
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This document replaces and deletes all the previous releases

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!!!!!! ATTENTION!!!!!!

BEFORE GOING ON PLEASE CAREFULLY READ ELECTRICAL FEATURES AT

CHAPTER 15

VERIFYING THE FUNCTIONAL VOLTAGES FOR CORRECT OPERATION OF THE

SPEEDOMETER

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1. AIM

This document constitutes the technical manual for **MLC_RJ** dashboard for 50cc power up – 50cc - 125cc.

2. REFERENCES

M.A.E. electronic devices' general contract

3. SYSTEM DESCRIPTION

50cc power up

50cc / 125cc

Connector

Microcontroller

E²prom memory

Vehicle power supply
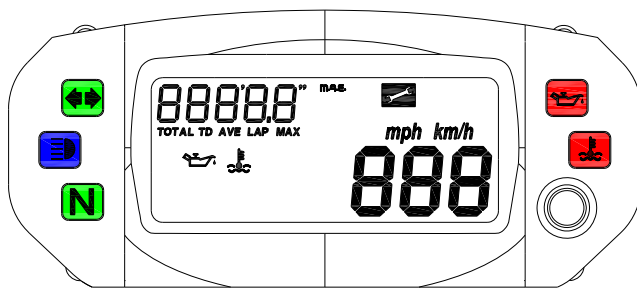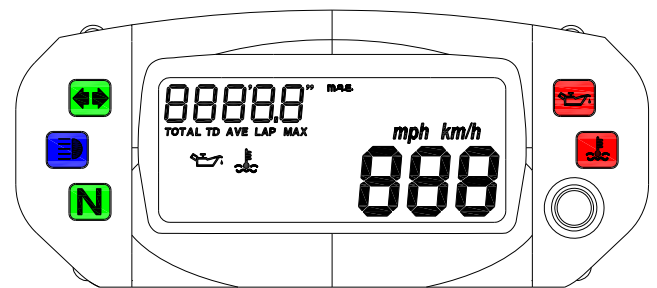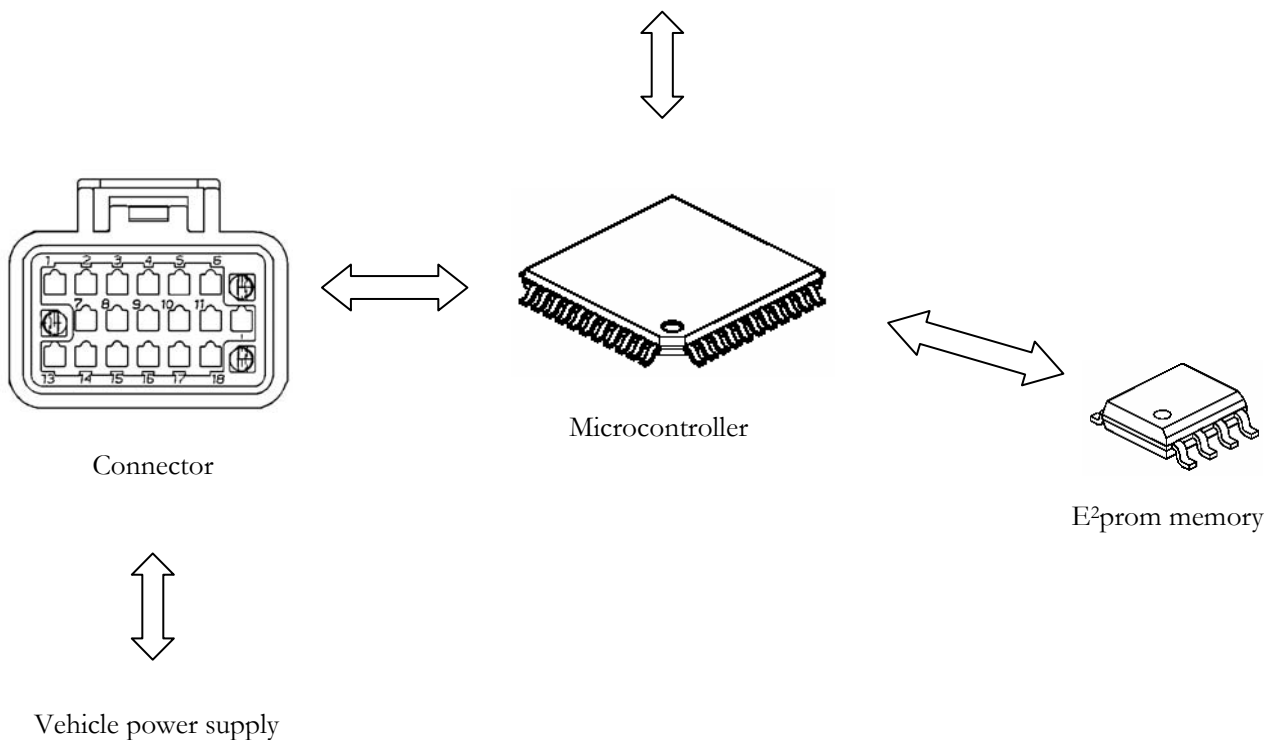
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4. COMPONENTS DEFINITION

4.1. LCD
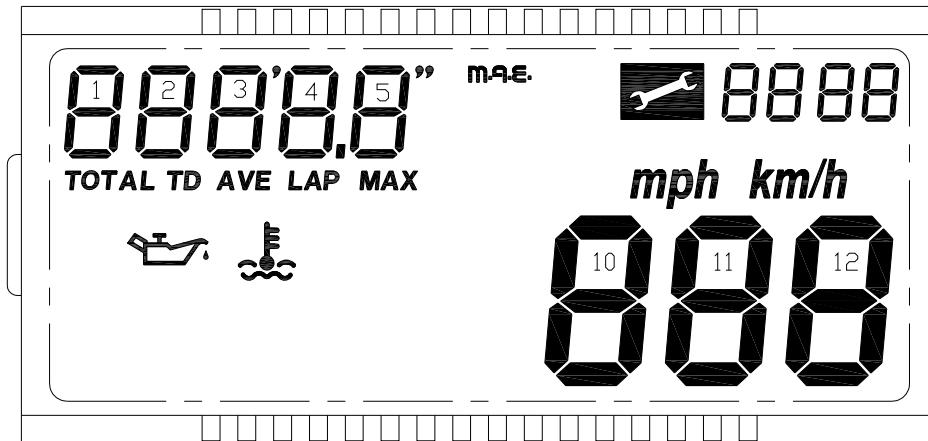
Picture 4-1: lcd

Obs. 4-1: **Service logo is active only for 50cc power up vehicles**

4.2. Mode Button

The dashboard has a normally OPEN button on board.
Functions and using of the button are described in the following chapters.

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5. FIRST INSTALLATION OF DEVICE

During the first installation of the device (and all the times that the dashboard is disconnected and reconnected to power supply), the display shows the software release and date of production.

The software can handle the following models: Enduro and SuperMotard with the following cylinder capacity: 50cc power up – 50cc – 125cc.

The functions of the device depend on the selected model as described in the following chapters.
The first time that the dashboard is connected to power supply the user can select the cylinder capacity (picture 5-1) and the model (picture 5-2).
The selection will be saved in permanent memory and it will be possible to change selection only by erasing memory.
It is possible to confirm the desired selection by pushing the button during the corresponding screen.
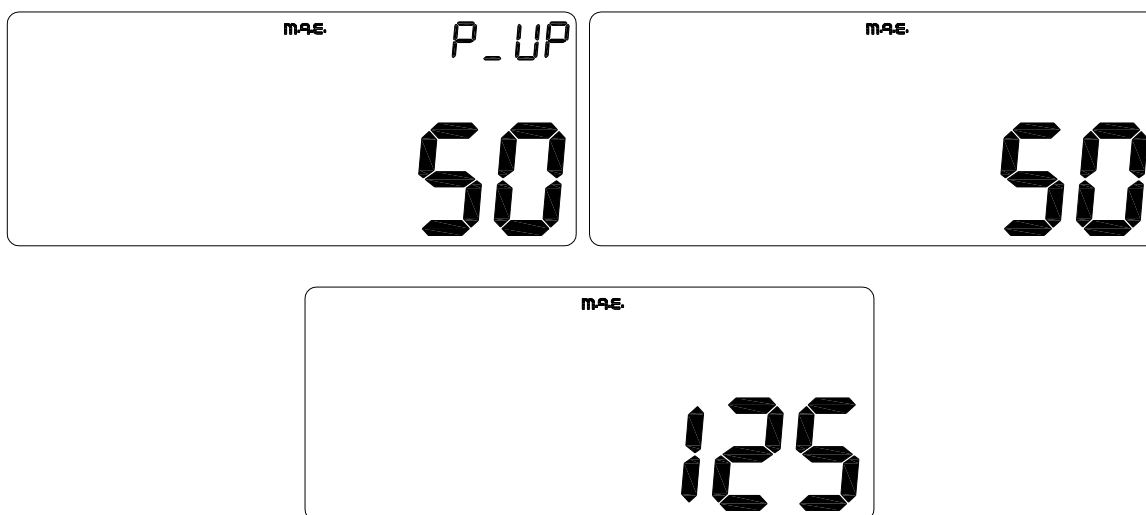
Picture 5-1: cylinder capacity selection: 50cc power up – 50cc – 125cc
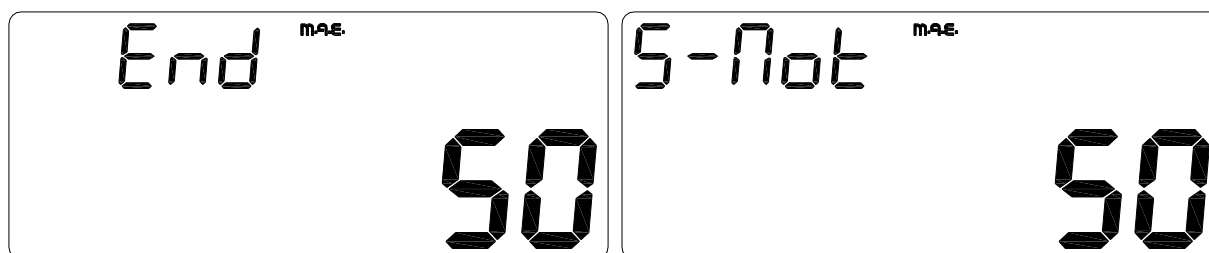
Picture 5-2: model selection: Enduro - supermotard

The scroll of the different options is automatic and every screen will be shown for about 2 seconds.

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5.1. Default parameters

		Wheel pulses	circumference [mm]
Enduro	*50cc power up*	6	2180
	50cc - 125cc	3	2065
SuperMotard	*50cc power up*	6	1910
	50cc - 125cc	3	1950

It is always permitted to change parameters as described in chapter 10.

Obs.5-1: If during the selection the input #15 is connected to gnd, the selection will NOT be saved.

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6. FUNCTIONAL CHARACTERISTCS

6.1. Instant speed

The information is always (see obs. 6-1) shown on digits 10÷12 (picture 6-1)

If the selected measurement unit is km/h (default value), the corresponding logo is on; using the button and entering the Set-Up menu, it is possible to change the measurement unit setting mph (picture 6-1).
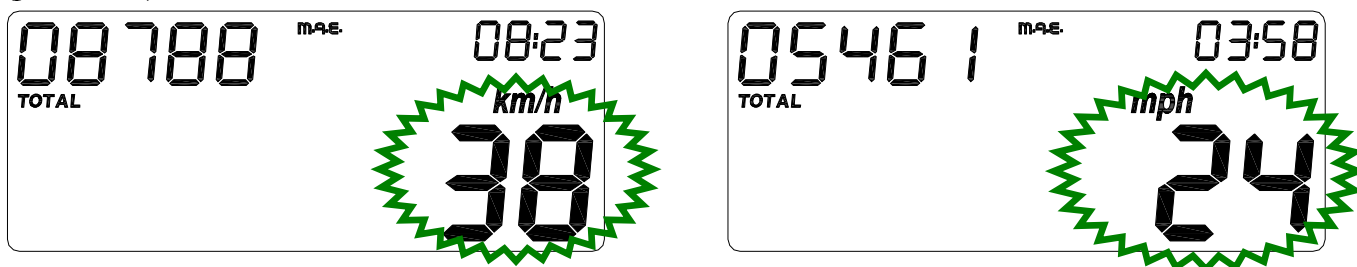
Picture 6-1: speed in km/h and mph

The speed is updated every 0,5 seconds

The default parameters are:

ENDURO						
Modello	Circonf. [mm]	Imp./giro ruota	Cost.Tech. [imp/min]	Velocità Massima	Sovrastima	Risoluzione
50cc p. up	2180	6	45,87	240 km/h 149 mph	6% costante su tutta la scala	1km/h – 1mph
50cc 125cc	2065	3	24,21			

SUPERMOTARD						
Modello	Circonf. [mm]	Imp./giro ruota	Cost.Tech. [imp/min]	Velocità Massima	Sovrastima	Risoluzione
50cc p. up	1910	6	52,36	240 km/h 149 mph	6% costante su tutta la scala	1km/h – 1mph
50cc 125cc	1950	3	25,64			

It always possible to change circumference value and wheel pulses number using the instructions described in the chapter 10.

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6.2.   Total distance (TOTAL)

The information is shown on digits 1÷5 with *TOTAL* logo on, as picture 6-2.

Picture 6-2: total distance

The data is permanently saved in a non volatile memory (E^{2}prom refreshed every km).
If there are no data in the memory, the display will show *00000*.

The information is always calculated in km. However it can be shown in km (default value) or in miles. It is possible to change the unit measure by the Set Up menu.

It is not possible to set to zero this information during the normal work of the device.

6.3.   Partial distance (TD)

This information is shown on digits 1÷5 with TD logo on, as picture 6-3.

Picture 6-3: partial distance

The visualized data represents the vehicle covered distance expressed in miles or km (depending on the selected measurement unit), with resolution 0.1 (miles or km).

This counter starts automatically with the first pulse of the hall sensor.

The data is not permanently saved in E^{2}PROM

It is possible to set to zero this information by keeping pushed the button for about 2 seconds, till when is shown the value *000.0*.
It is possible to set to zero TD when the speed is zero and also when the speed is not zero. Setting to zero TD will cause setting to zero also AVE and LAP.
 If TD overflow *999.9* the device sets automatically to zero TD, AVE and LAP, and restarts the counter.

The data is permanently saved in a non volatile memory (E^{2}prom refreshed every 100m).

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6.4. Average speed (AVE)

This function describes the correct working/visualization of average speed function related to *TD* and *LAP*.

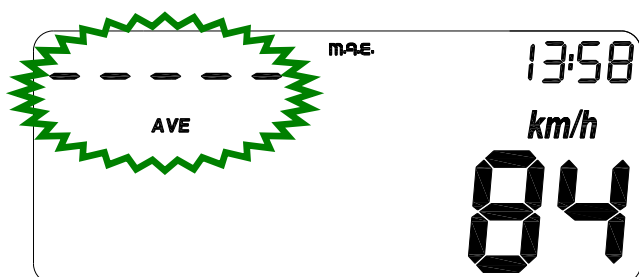The information is visualized by using digit 1÷5 and logo *AVE* (Picture6-4).

The data represents the average speed of the vehicle (expressed in Km/h or in Mph depending on the selected measurement unit) that is calculated as ratio between covered distance (TD) and the time used to cover this distance (LAP).
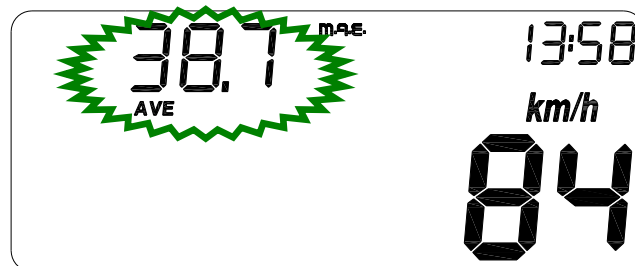
Picture 6-4: average speed

The average speed is updated every 0,1 Km (or 0,1 Miles, depending by measurement unit selected) and is represented without over speed.

If the data is out of range, it will be visualized - - - -, as shown in picture 6-5

The data is not permanently saved in E^{2}PROM.

It's possible to set to zero the counter of this parameter pushing the button for about 2 seconds, in correspondence of the function AVE, till when the value *0.0* appears.

The setting to zero of AVE, which is possible both when the vehicle is stopped or when the vehicle is running produces the setting to zero of TD and LAP too.

Picture 6-5: average speed too high

AVE setting to zero is foreseen when LAP function arrives to *23:59:59* value or when TD function rises *999.9* value

Obs. 6-1: **Without power supply the AVE data will be lost.**

6.5. Automatic Chronometer (LAP)

This function describes the correct working/visualization of the chronometer related to TD and AVE.

This information is visualized by using digit 1÷5 and logo LAP.

The data represents the effective route time of the vehicle in the form mm:ss if hours = 0 and in the form hh:mm if hours > 0 (Picture 6-6).
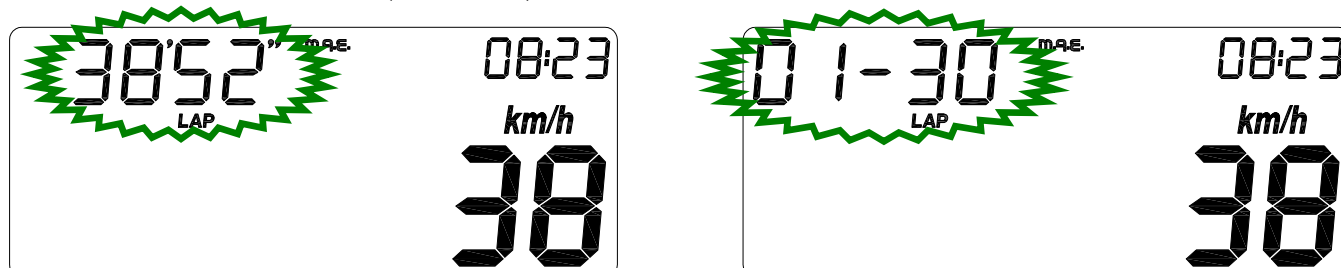
Picture 6-6: chronometer

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It is automatically activated by the first pulse coming from the speed sensor and it stops after 3 seconds from receiving of the last pulse which arrives from the speed sensor.

If hours >0, when LAP is operative, the digit that separates the hours from the minutes is shown blinking, while it is shown fixed when LAP is not operative

If hours = 0, when LAP is operative, the digit (' and ") that separates the minutes from the seconds is shown blinking, while it is shown fixed when LAP is not operative

The data is not permanently saved in E^2PROM.

It is possible to set to zero the counter of this parameter by pushing the *Set* button for about 2 seconds, in correspondence of the function LAP till when the value *00'00''* appears.

The setting to zero of LAP, which is possible both when the vehicle is stopped or when the vehicle is running, produces the setting to zero of TD and AVE too.

If the data gets over the value 23-59 (which means 23h59'59"), the system provides to set to zero LAP, TD and AVE, then it starts again the counting.
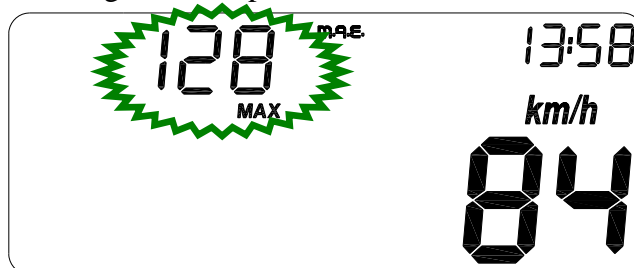
Obs. 6-2: ***Without power supply the LAP data will be lost.***

6.6. Maximum speed (MAX)

This information is shown on digits1÷5 with MAX logo on, like picture 6-7.

This data represent the maximum speed raised by the vehicle, represented in km/h or mph depending on the unit selected for speed.

Picture 6-7: maximum speed

It is possible to set to zero this data by keeping pushed the button on the MAX function for about 2 seconds till when *00* appears.

It is possible to set to zero MAX when speed=0 and also when speed>0

When the measurement unit is changed, the MAX value is converted.

The data is not permanently saved in E^2PROM

Obs. 6-3: ***Without power supply the MAX data will be lost.***

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7. ALARMS

7.1. Temperature alarm

The WTEMP alarm is done by showing the ⚓ logo on the lcd and the related led.
The alarm starts when the high level of the temperature activates the electric contact and the alarms switched off when the temperature level decreases under the low level and the contact is open.
To avoid false messages, the alarm activation and deactivation are delayed of 5 seconds.

7.2. Oil alarm

The OIL alarm is done by showing the logo 🛢 on the lcd and the related led.
The alarm starts when the oil low level activates the electric contact and the alarms switched off when the oil level is over the minimum and the contact is open.
To avoid false messages, the alarm activation and deactivation are delayed of 5 seconds.

8. DIAGNOSTIC (only 50cc power up)

Every time that ECU sends an error message, the dashboard activates the alarm procedure: blinking of the Wtemp led according with the error sent by ECU and turning on the 🔧 symbol on the display.

units ➜ 0,5sec ON + 0,5sec OFF
tens ➜ 1,0sec ON + 1,5sec OFF
start ➜ pause 3,0sec
end ➜ pause 3,0sec

Obs.8.1: *If wtemp alarm is active, the led will be switched on fixed till when the wtemp alarm stop will be active.*

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9.   BACKLIGHT AND SERVICE LEDS

9.1.   High beam led
The system has to switch on the led when the input n.5 of the connector is high, at the same time of high beam signal.

9.2.   Turn indicators led
The system has to switch on the led when the inputs n.13 or n.14 of the connector are high, at the same time of indicators lights signal.

PLEASE NOTE: Signal must arrive to the device already alternate.

9.3.   Oil led
The system switches on the led when input n.7 is low, corresponding to a low oil level.

9.4.   Neutral led
The system switches on the led when input n.10 is low, corresponding to the gear neutral position.

9.5.   Wtemp led
The system switches on the led when input n.9 is low, corresponding to a high temperature level.

9.6.   LCD backlight
LCD backlight is orange.
Vehicles without battery ➔ the backlight is on only is the engine is turned on
Vehicles with battery ➔ the backlight is on when the key is turned on

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10. SET-UP MENU

The entry in the Set up menu is possible only when speed =0 by keeping pushed for about 5 seconds the mode button when the device is on the TOTAL function (the entry is not permitted if the lithium battery is the only power supply to reduce battery consumption)

Obs. 10-1: **To prevent wrong working of the device due to wrong parameters, is not always possible to change all the parameters of the device:**
- Input #15 not connected (default condition): it is possible to change measurement unit.
- Input #15 connected to ground: it is also possible to change circumference and wheel/turn pulses.

The changes done in the Set up menu are permanently saved in memory only if the procedure is correctly completed by exiting from the Set up menu by the mode button. All other way of exit not will allow permanent changes.
The correct exit from Set up menu is possible by keeping pushed the mode button (during the selected value of the rpm pulses if input #15 is connected to gnd or during the selected measurement unit if input #15 is not connected) till when the device will return to standard situation

Obs. 10-2: *Once inside the regulation menu:*
- *if 20 sec. will pass without the button mode is pushed, or*
- *if speed>0, or*
- *(vehicles without battery) if the engine is turned OFF, or*
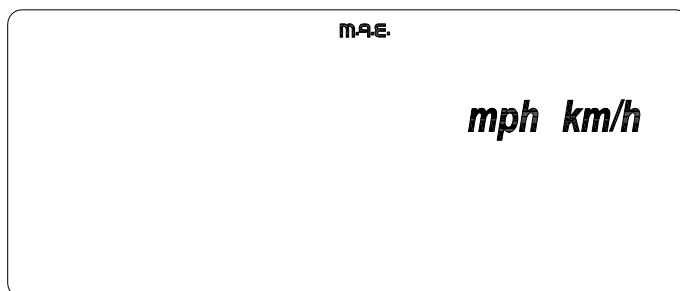- *(vehicles with battery) if the key is turned OFF*

the system will be automatically taken to the standard operating mode without saving the modification.

10.1. Parameters regulation with #15 not connected

10.1.1. Measurement unit regulation
During the measurement unit modification, only the two logo km/h and mph (as picture 10-1) will be active, with the unit selected that will be shown blinking (f=1Hz, Duty=50%).

A short press of the button will change the unit selected, while with a long press of the button the device will return to set up menu

Picture 10-1: measurement unit modification

Obs. 10-3: *In the measurement unit modification:*
- *if speed >0, or*
- *if 20 seconds pass without pushing button, or*
- *(vehicles without battery) if the engine is turned OFF, or*
- *(vehicles with battery) if the key is turned OFF*

the device will automatically return to standard working and modifications will NOT be saved.

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10.2. Parameters regulation with #15 connected to ground

10.2.1. Wheel circumference regulation

During the regulation of the wheel circumference, there will be active only digit 2÷5 with the letter "*c*" (Picture 10-2)
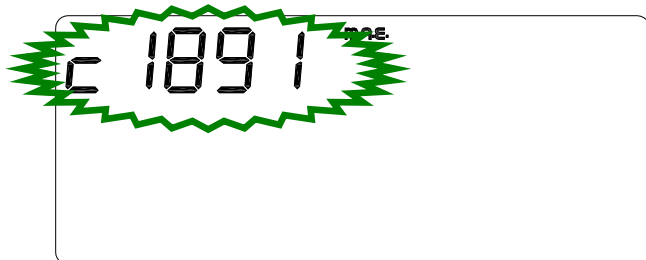
It is possible to modify the blinking digit (f=1Hz, Duty=50%): a short pressure of the button increases the value, a long pressure will pass to another digit or to next parameter.

Maximum value: 2500mm
Minimum value: 1000mm

Picture 10-2: wheel circumference regulation

Obs. 10-4: *If will be set a value out of the range, the device will set circumference value to default parameter.*
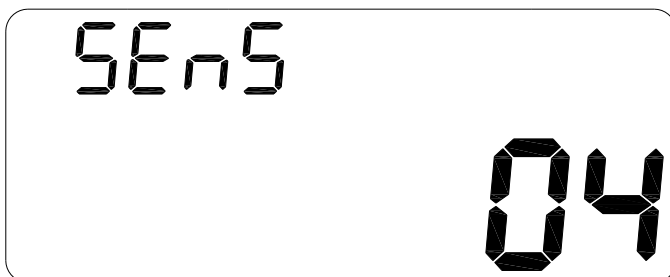**Obs. 10-5:** *If the device is disconnected from power supply, after the re-connection it will shows the default circumference, depending on the model selected.*

10.2.2. Measurement unit modification

Vedi par. 10.1.1

10.2.3. Wheel/turn pulses regulation

The regulation oh the wheel pulses is possible by pushing the mode button when the picture 10-3 is showed by the display. The number of pulses will be show blinking (f=1Hz, Duty=50%) and "SENS" will be showed fixed.

A short push will increase the pulses number, while a long push will confirm the value and will pass to the following regulation.

Maximum: 12 pulses

Picture 10-3: wheel pulses reguulation

Obs. 10-6: *If the device is disconnected from power supply, after the re-connection it will shows the default wheel pulses, depending on the model selected.*

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11.   MODE BUTTON

With the mode button is possible:

- To Scroll the different functions.
- To set to zero partial distance, average speed, lap and maximum speed.
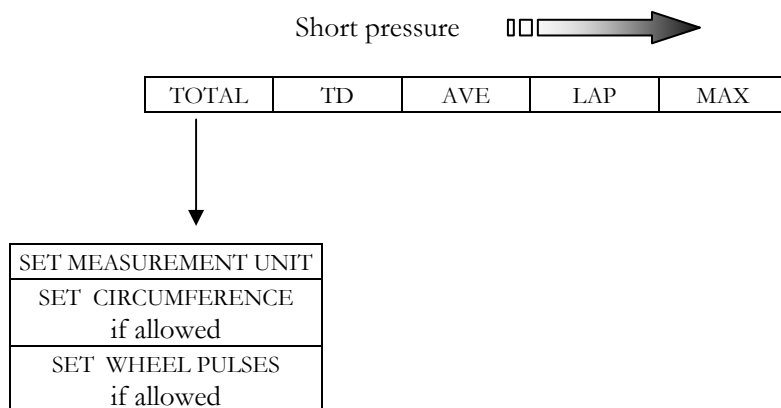- To enter the Set up menu

The function scroll is always possible and does not depends on the vehicle speed. To change function, the button must be pushed for a short time (tmin = 1sec.).

Setting to zero TD AVE LAP and MAX is always possible and not depends on the vehicle speed..

Entering in the Set up menu is possible only if speed=0.

The mode button is active with engine on for model without vehicle battery and is active when the key is on position for other models.

11.1.   Sequence of functions

Short pressure ▯▯▭ ➡

TOTAL	TD	AVE	LAP	MAX

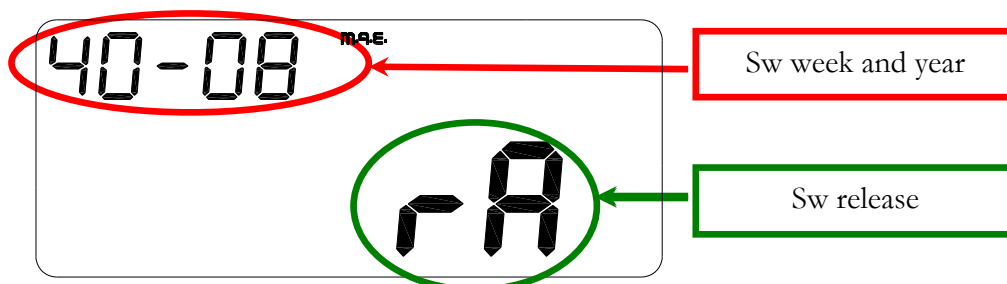| SET MEASUREMENT UNIT |
|----------------------|
| SET CIRCUMFERENCE if allowed |
| SET WHEEL PULSES if allowed |

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12. START-UP

When the device is connected to power supply, it will show a sequence of information :

- 1st page: Software and date release (for about 3 seconds) picture 12-1.
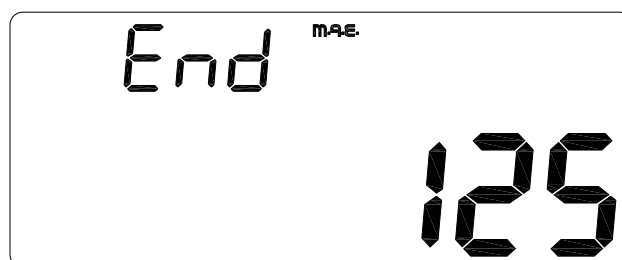

Sw week and year

Sw release

Picture 12-1: sw release

- 2nd page: Model choose (see chapter 5)

- 3th page: LCD check (Picture 12-2)
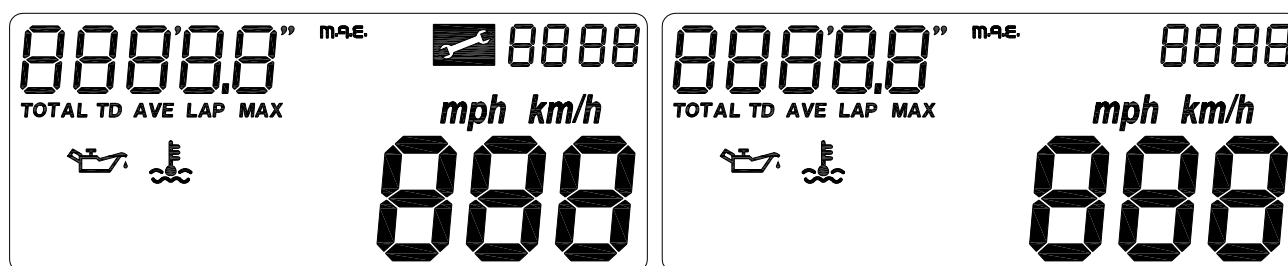
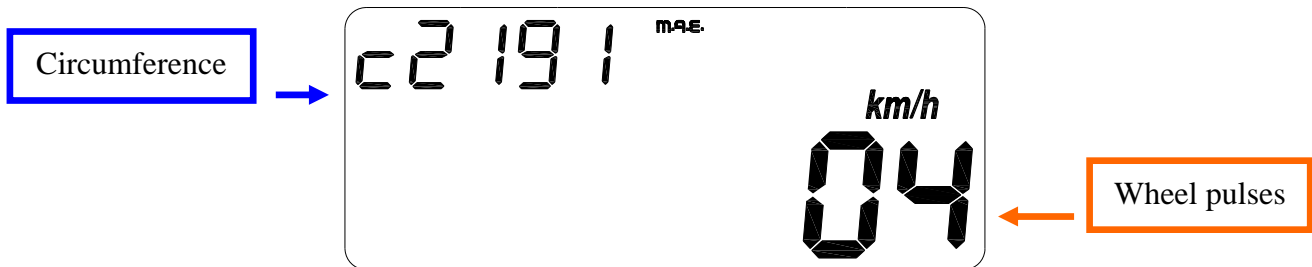**Picture 12-2: lcd check 50cc power up (left) and 50cc-125cc (right)**

- 4th page: Selected model (Picture 12-3)

Picture 12-3: selected model

- 5th page: Selected parameters (Picture 12-4)

Picture 12-4: selected parameters

During these pages the device check all the led and display backlight.
After this, the device shows the standard screen.

13.   SLEEP-MODE AND WAKE-UP

13.1.   Models with vehicle battery

SLEEP MODE   ➔   the microcontroller goes to sleep mode, with low current absorption, when the key is turned off.

In this mode, all activities are stopped, the display and the backlight are switched off and only the clock updating is active.

It is always possible going to sleep mode.

WAKE UP ➔ The awakening from sleep mode is made by turning the key on. After the awakening there is:

- Check of the display and of the leds for about 3 seconds
- Showing of picture 12-2, 12-3 and 12-4 for about 3 seconds
- The last function selected before sleep mode will be resumed and all the device functions are enabled.

13.2.   Models without vehicle battery

SLEEP MODE   ➔ when the vehicle is turned off, the microcontroller will not have power supply, so AVE LAP and MAX will be lost. There will be no current absorption.

WAKE UP ➔ the device will be turned on when the vehicle will be turned on.
After the awakening there is:

- Showi of sw release
- Check of the display and of the leds for about 3 seconds
- Showing of picture 12-2, 12-3 and 12-4 for about 3 seconds
- Function TOTAL displayed.

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14. TESTING MENU

<div style="border: 2px solid red">

!! ATTENTION !!

The use of the functions provided by testing menu is exclusively reserved for qualified staff.

To avoid inconveniences and/or wrong working of the device, it is reccomanded to

**USE ONLY IF NECESSARY** *the functions of this menu and*

NOT TO COMMUNICATE *to the final user the contents of this chapter.*

</div>

The access to the testing menu is possible **only** during the installation of the device on the vehicle, by connecting to gnd input #15 (usually not connected) and keeping pressed the button during the connection of the device..

In this way it twill be possible to delete E^2prom (DEL_MEM)

14.1. E^2prom erasing (DEL_MEM)

the display will show a message to confirm the correct erasing of the memory (*CLEAR MEM*, Picture 14-1)
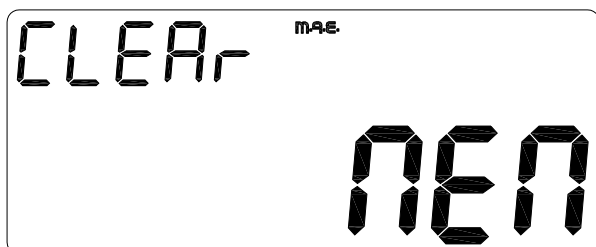
ATTENTION: the operation is NOT reversible and it will be NOT possible to restore the data erased.

Picture 14-1: memory erasing

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15. ELECTICAL CHARACTERISTICS

Maximum characteristics:

Param. No.	characteristic	Simb.	Min.	Max	Units
PM1	Maximim voltage	V_{MAX}	—	17	V
PM2	Storage Temperature	T_{Sto}	-30	+80	°C
PM3	Maximum current on inputs	I_{InMax}	—	20	mA
PM4	Maximum current from outputs	I_{outMax}	—	20	mA

Operative characteristics:

Param. No.	characteristic	Simb.	Min.	Typ.	Max	Units
PO1	Power supply voltage	V_{DD}	7	12,0	16	V
PO2	Minimum voltage for backlight	V_{Rld}	10			V
PO3	Operative temperature	T_{Op}	-20	—	+70	°C
PO4	Current absorption during On with led on (Vbatt=13,0V)	I_{on}	—	tbd	tbd	mA
PO5	Current absorption during On with led off (Vbatt=13,0V)	I_{on_spie}	—	tbd	tbd	µA

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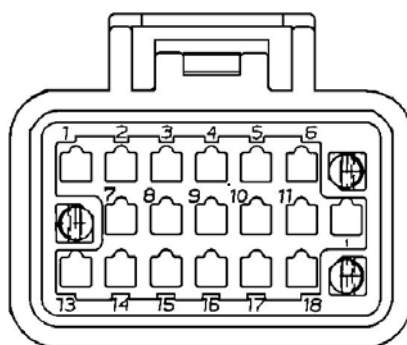
16. CONNECTOR CONFIGURATION

The connector is on the bottom part of the pcb.

Supplier **AMP**
Coe **C-282415-1** (female) 18 pin

#	Significato	#	Significato
1	Vehicle power supply	10	Neutral
2	-------- not connected	11	-------- not connected
3	-------- not connected	12	Diagnostic (only power up) -------- not connected (other)
4	P15	13	Right turn indicator
5	High beam	14	Left turn indicator
6	Hall sensor power supply	15	-------- not connected [1]
7	Oil	16	GND
8	Hall sensor input	17	GND
9	Wtemp	18	GND

(1) Input #15 (usually not connected), if connected to gnd allows the use of functions described in chapter 10

Female (cables side)