KIT HYDRA 590 and CB9

COMPUTER FOR SPRAYERS

INSTRUCTIONS FOR USE

NO. 1401-EN
REV. 5

EN

CE

This product complies with EMC requirements in accordance with Directives 2004/108/EC and subsequent amendments
and reference to Applied Regulation EN ISO 14982

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MC elettronica S.r.l. *is not obliged to give notice of any further modifications to the product.* The Information provided in this manual does not allow unauthorised personnel to tamper with the product in any way. *The guarantee on the equipment will no longer be valid if tampering should be detected.*

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1. Rules and general warnings

1.1 Introduction

This manual gives all the specific information that you need for a proper use of the equipment.
After buying the instrument, read the manual carefully and refer to it any time you have doubts on how to use the equipment or when you have to carry out maintenance operations.
Keep the manual on the machine. If this is not possible, keep it ready at hand.

ALL RIGHTS RESERVED. THIS MANUAL IS INTENDED FOR CUSTOMERS ONLY. ANY OTHER USE IS FORBIDDEN.

1.2 Terms of guarantee

- SUBJECT OF THE GUARANTEE: the guarantee is applied to the product and to those parts which are marked with the serial number or any other identification number used by *MC elettronica;*
- HOW LONG THE GUARANTEE IS EFFECTIVE: *MC elettronica* guarantees the *KIT HYDRA 590 and CB9 and its accessories* for a period of **1 year** from the manufacturing date (printed on the identification plate on the back of the Monitor).
  The guarantee covers the product and any repair carried out within the agreed terms.
  The guarantee does not apply in the event of:
  - accidental damage;
  - improper use;
  - changes which have not been agreed upon, improper installation (or set-up);
  - damage caused when any equipment manufactured by companies other than *MC elettronica* and mechanically and electrically connected to our instruments, breaks or does not function properly;
  - acts of God (lightning, floods, fire or any other causes which do not depend on *MC elettronica*).

  Repairs under guarantee, which must be carried out in the laboratories of our authorized centres, are entirely free of charge provided the equipment is directly transported to said laboratories or sent free port. Transport charges and risks are entirely borne by the Customer.
  The above-mentioned guarantee is valid unless otherwise stated between *MC elettronica* and the Customer.

> ***Warning***
> *MC elettronica* declines any liability for damage or direct or indirect charges, as a consequence of improper use or inability of the Customer to use the equipment separately and/or together with other instruments.

1.3 Service

Service is available in all the countries where the equipment is officially supplied by *MC elettronica* (during and after the guarantee period).
Any kind of operation to be performed on the *KIT HYDRA 590 and CB9* must be carried out in accordance with the instructions provided in this manual or as agreed with *MC elettronica*.
If not, the relative terms of guarantee might become void.

2. General description

The HYDRA 590 system is designed to be installed on self-propelled or towed sprayers, and is used to:

- Check the product dosing and automatic and manual distribution
- Check the opening and closing of the section valves on the machine, up to 9 sections
- Check the section bar movement, up to 5 usable movements
- Check the air sleeve speed, with 2 user programmable speeds.
- Connect to a GPS guidance system to automatically close sections and prescription maps (Avmap, Trimble)

The computer only works with an ECU Water/Oil Hydra control unit, code 20CEN-HYDRA-0001.

2.1 Installation instructions with 7 sections additional module

Proceed with the installation of the Kit Hydra590 / CB9 as described below:

- Secure the main ECU (20CEN-HYDRA-0001) as close as possible to the water section valves in a vertical position and so that the connectors are arranged on the RH and LH as in the photo
- Secure the extra oil ECU (20CEN-0006 / Caffini version CFN-CEN-0001) close to the previous Main ECU in a vertical position with the connector facing downwards
- Secure the Hydra590 / CB9 monitor and the 7 sections oil command (20COM-0001 / Caffini version CFN-COM-0001) in the cab
- Connect the power of the Hydra 590 / CB9 to the oil command, via the adaptor cable (CAV-0307)
- Connect the output cable of the oil command via the CAN_BUS cable (CAB-0035 / Caffini version CFN-CAB-0003 x 13m or CAB-0034 / Caffini version CFN-CAB-0004 x 7m) to the main ECU
- Connect the grey connector of the cable to the main ECU (CAB-0037 / Caffini version CFN-CAB-0007 x 13m or CAB-0036 / Caffini version CFN-CAB-0006 x 7m), the S. Seal connectors to the relative sensors and the +12 V. power supply connector to the tractor.
- Connect the cable black connector to the main ECU (version for Arag valves: 20CAB-HYDRA570-0009 / 20CAB-HYDRA570-0009 or else version for Bertolini valves: 20CAB-HYDRA570-0003 / 20CAB-HYDRA570-0007), to the relevant section valves, to the main water valve and the pressure valve.
- Connect the brown cable connector to the main ECU (20CAB-HYDRA570-0002 / 20CAB-HYDRA570-0006) to the relative oil EV and to the proportional air sleeve if installed.
- Connect the cable with the black connector of the CAB-0038 / Caffini version CFN-CAB-0001 to the 7-section oil ECU and the variable geometry EV outputs (EV6A-EV6B, for the LH part and EV7A-EV7B part for the RH part)
- The S.Seal 4-way must be connected to the S.Seal connector left free of the CAN_BUS cable coming from the CB9 monitor (CAB-0035 / Caffini version CFN-CAB-0003 x 13m or CAB-0034 / Caffini version CFN-CAB-0004 x 7m)

- The S.Seal 4-way must be connected to the S.Seal connector left free of the CAN_BUS cable coming from the 7m monitor (CAB-0037 / Caffini version CFN-CAB-0007 x 13m or CAB-0036 / Caffini version CFN-CAB-0006 x 7m)

Warning
Pay particular attention to connect this last described cable to the 7-sections additional oil ECU (20CEN-0006 / CFN-CEN-0001)

- Finally, check that the SW ver 0.05 or higher is loaded in the main ECU. To check it enter the Hydra590 / CB9 menu and read the installed version at the top right of the blackened bar; if it is not present, proceed with the update

Notes: Always check the status LED for the presence of any anomalies in the kit

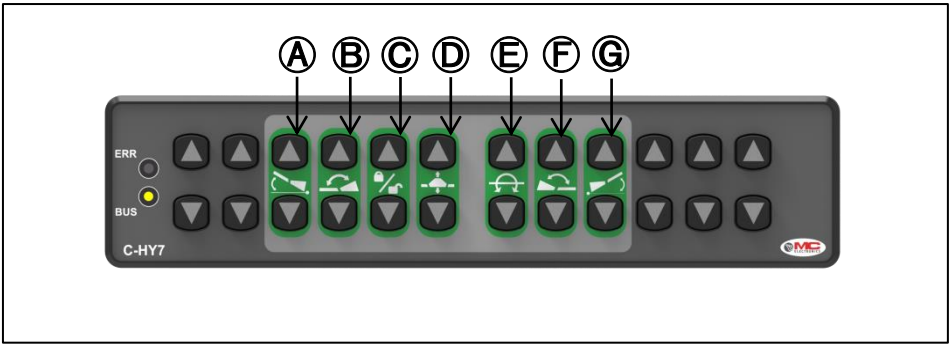
LED colour	Meaning
Flashing green	System connected and operating
Steady green	No CAN communication
Steady red	EV outputs short circuit or device not detected

2.2 Connections of the solenoid valves to the cable

The cable 20CAB-HYDRA570-0006 coming from the main ECU and the CAB-0038 / CFN-CAB-0001 cable coming from the 7-section ECU must be connected to the respective EV according to the table below:

REF	Function	UP button	DOWN button	Notes
A	Variable Geo LH part	EV6A	EV6B	Optional 7-sections oil
B	LH bar movement	EV2A	EV2B	Standard
C	Mechanical block movement	EV1A	EV1B	Standard
D	Bar height	EV4A	EV4B	Standard
E	Bar levelling	EV5A	EV5B	Standard
F	RH bar movement	EV3A	EV3B	Standard
G	Variable Geo RH part	EV7A	EV7B	Optional 7-sections oil

UC50 Command Reference:



3. Front view

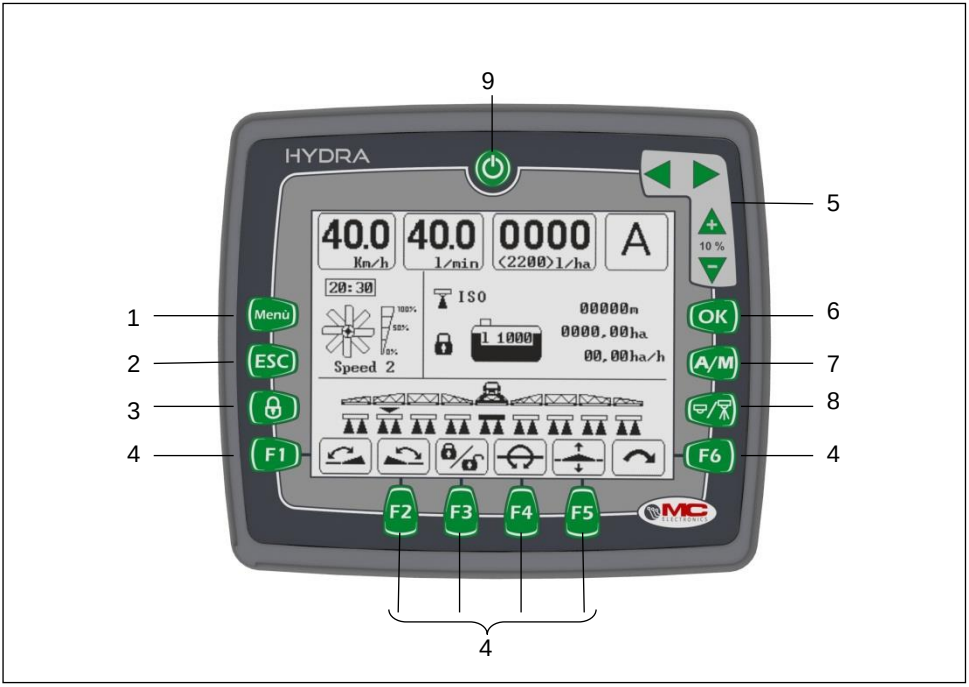


Figure 1

The front panel allows the user to view all the data relating to the working cycle. The following elements can be seen on the panel:

1. **Menu**: To enter the programming menus and then return to the initial screen.
2. **ESC**: To go back one screen in the programming menus.
3. **Lock**: To lock and unlock hydraulic functions.
4. **F1-F2-F3-F4-F5-F6:** Keys associated with the corresponding function shown on the display.
5. **Arrow keys:** RH, LH, UP, DOWN menu navigation keys.
6. **OK:** enter key.
7. **A/M:** Automatic / manual dosing key.
8. **General:** spraying start / stop.
9. **ON/OFF:** system switch-on and switch-off.

3.1 Sprayer work screen

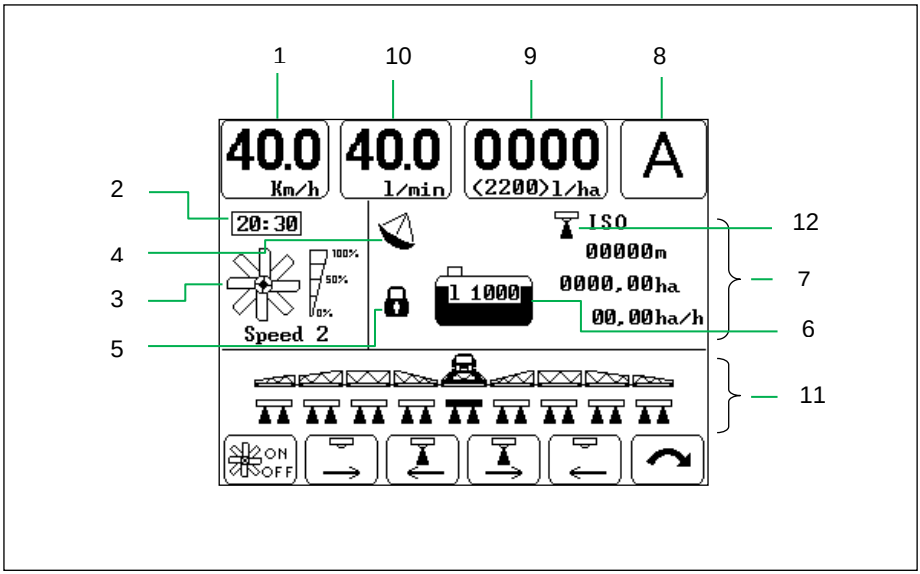


Figure 2

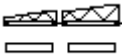
1. **Speed**
2. **Clock.**
3. **Air sleeve:** if the icon is visible, the air sleeve is on.
4. **GPS automatic closing:** if the icon is visible, automatic closing is active.
5. **Lock:** if visible, oil sections cannot be enabled.
6. **Tank:** Content left in the tank.
7. **Various information:** Nozzle being used (visible if pressure mode active), linear metres treatable with the content left, hectares treated with the content left, hourly output
8. **Mode display**

	Automatic mode ON. With the UP and DOWN arrow keys, a + / - 10% increase or decrease can be obtained with each press

Automatic mode OFF: The current speed is lower than the set automatic speed and higher than the set minimum speed.
Manual mode: Pressure can only be adjusted manually via the up and down arrow keys (Fig. 1 button no. 5)
Sprayer OFF: Ready for spraying but speed below the minimum speed or stopped.

9. **Instantaneous litres / ha, and set litres / ha.**
10. **Instantaneous litres minute**. (If pressure sensor installed, alternatively also bars)
11. **Active nozzle graphical bar**.
12. **Nozzle being used** (only visible if pressure method active)

3.2 Bar status display

	Inactive sections.
	Active sections ready for spraying.
	Active sections and spraying under way.

3.3 Function keys part 1 (water)

- **F1**= (function in sequence every time you press the key) air sleeve activation speed1> speed2> air sleeve switch-off.
- **F2**= (function in sequence every time you press the key) sequentially disables sections towards the right, starting with the first active on the LH
- **F3**= (function in sequence every time you press the key) sequentially enables sections towards the left, starting with the first inactive on the RH
- **F4**= (function in sequence every time you press the key) sequentially enables sections towards the right, starting with the first inactive on the LH
- **F5**= (function in sequence every time you press the key) sequentially disables sections towards the left, starting with the first active on the RH
- **F6**= switches to the next set of icons

N.B.: If in the **"settings menu > work**" the **localised** spreading mode is selected, icons change as follows:

- **F2**= in spraying localised mode, the selection cursor is moved to RH
- **F3 and F4**=in spraying localised mode, the section under the cursor is enabled or disabled (the two keys behave in the same way as F3 and F4)
- **F5**= in spraying localised mode, the selection cursor is moved towards LH

The cursor is over the sections graphical bar and is visible only if "Localised" mode is selected as shown below (Fig. 3)

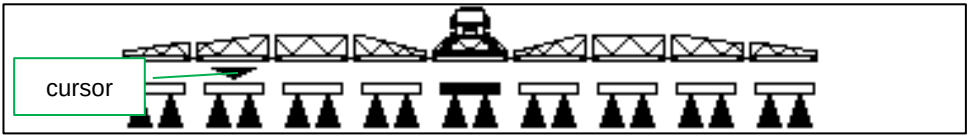
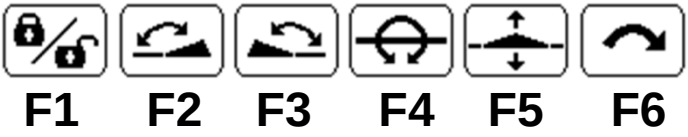


Figure 3

3.4 Function keys part 2 (oil)



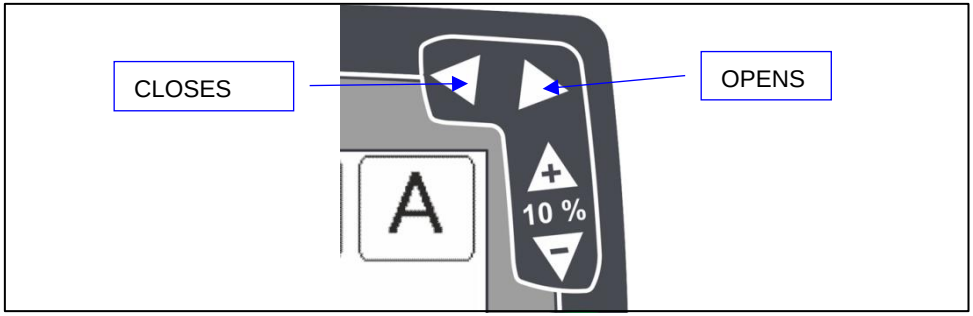


Figure 4

- **F1**= enables or disables mechanical lock double-acting hydraulic valve (active = icon in the negative, inactive = icon in the positive). Opens via > arrow keys, and closes via < arrow keys (Fig. 4).
- **F2**= enables or disables LH bar double-acting hydraulic valve (active = icon in the negative, inactive = icon in the positive). Opens via > arrow keys, and closes via < arrow keys. (Fig. 4).
- **F3**= enables or disables RH bar double-acting hydraulic valve (active = icon in the negative, inactive = icon in the positive). Opens via > arrow keys, and closes via < arrow keys. (Fig. 4).

N.B. only the F2 and F3 keys can be active simultaneously.

- **F4**= enables or disables tilting bar double-acting hydraulic valve (active = icon in the negative, inactive = icon in the positive). Opens via > arrow keys, and closes via < arrow keys. (Fig. 4).
- **F5**= enables or disables bar lifting lowering double-acting hydraulic valve (active = icon in the negative, inactive = icon in the positive). Opens via > arrow keys, and closes via < arrow keys. (Fig. 4).
- **F6**= switches to the next set of icons

If even just one of the valves is selected by pressing the keys >opens and <closes, the valve EVBYP = BYPASS will also be activated.

When switching between selections, the previous selection is deactivated except for F2 and F3, which can be used simultaneously.

3.5 Function keys part 3 (tank loading)

- **F1**= with this key, the content of the tank is set as entirely empty
- **F2**= with this key, the content of the tank is set as entirely full (value related to the tank capacity entered into the settings menu.)
- **F3**= pressing this button, you can manually enter the desired amount by simply acting on the up and down arrow keys. The increase or decrease will be visible inside the tank icon. Press ESC to exit the setting, OK to store the value.
- **F6**= returns to the initial set of icons
- **F4 and F5** = empty icons useful for future developments

4. Virtual Terminal setting menu

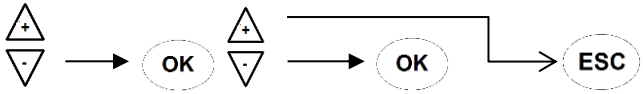
To enter the VT settings, just switch the VT on by pressing ON and immediately afterwards (within a second) press the Menu button.
The following settings are possible in this menu:

- Language: (Italian, English, French, German, Spanish, Portuguese, Russian, Romanian, Hungarian, Polish)
- Units of measure: Metric, English
- Contrast adjustment: 0% - 100%
- Brightness adjustment: 0% - 100%
- Buzzer volume: 0% - 100%
- Automatic Switch-Off: From OFF to 60 minutes
- Date/time adjustment
- ECU SW update

VT SET	
Language	English
Units	Metric
Backlight	100%
Contrast	75%
Buzzer volume	100%
Date - Time	>>
Auto power-off	OFF
ECU Software update	>>

VT SET	
Language	English
Units	Metric
Backlight	100%
Contrast	75%
Buzzer volume	100%
Date - Time	>>
Auto power-off	OFF
ECU Software update	>>

Figure 5

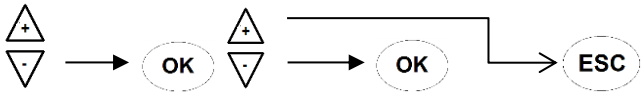


To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 5)

DATE - TIME	
Year	14
Month	12
Day	17
Hour	10
Minutes	15

DATE - TIME	
Year	14
Month	12
Day	17
Hour	10
Minutes	15

Figure 6



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 6)

4.1 VT (Virtual Terminal) update

To update the Virtual Terminal, you must be use the SD card with the following characteristics:

- SD card;
- Maximum capacity 2GB;
- Not HC, not XC;
- Formatted FAT16 (not FAT32).

Follow the operations below to be able to operate:

- Enter the SD card with the update file named: HYDRA_VT.HEX
- Press and hold down the arrow keys **LH e RH** (< and >) and simultaneously the **ON** key; you will hear a short **"**beep", and the update progress bar will be displayed on the screen.
- Press "**OK**" to begin updating; you will see the black bar scroll to the bottom.
- Switch off and on with **"ON/OFF"** (Fig. 7)

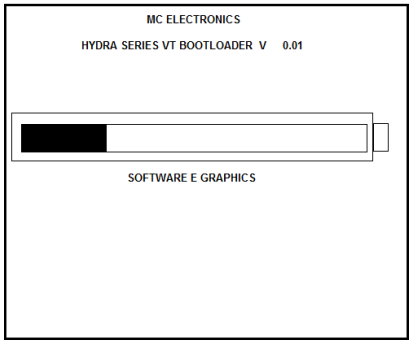


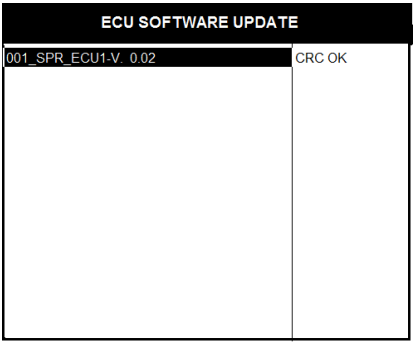
Figure 7

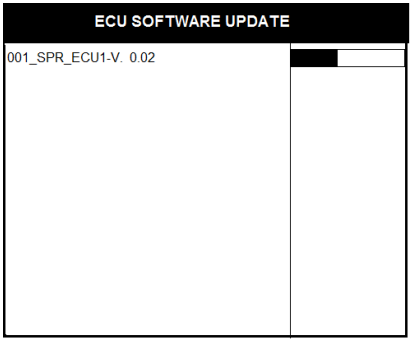
4.2 ECU SW update

To update the ECU, you must be use the SD card with the following characteristics:

- SD card;
- Maximum capacity 2GB;
- Not HC, not XC;
- Formatted FAT16 (not FAT32).

Follow the operations below to be able to operate:





- Insert the SD into the slot with the update file named: SPR_ECU1.HEX.
- The previous version is displayed; for loading, press the "**OK**" key; the progress bar is displayed and finally, if everything is correct, "CRC OK".

If the update is not successful, an error code is displayed, e.g.:
"ERR 68". In this case, contact Technical Support.

5. ECU spray setting menu

To enter the ECU settings menu, simply press menu (twice) when the system is already on. To exit, press the same key.

5.1 Dosing

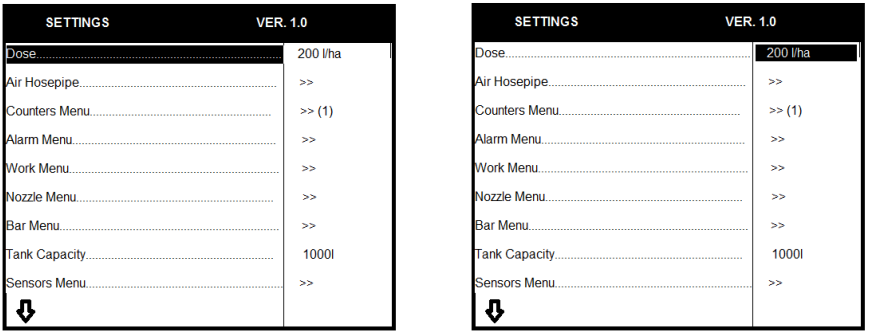
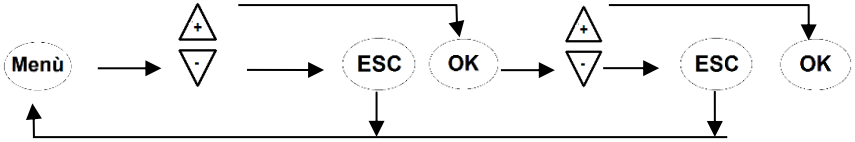


Figure 8



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 8)

5.2 Air sleeve

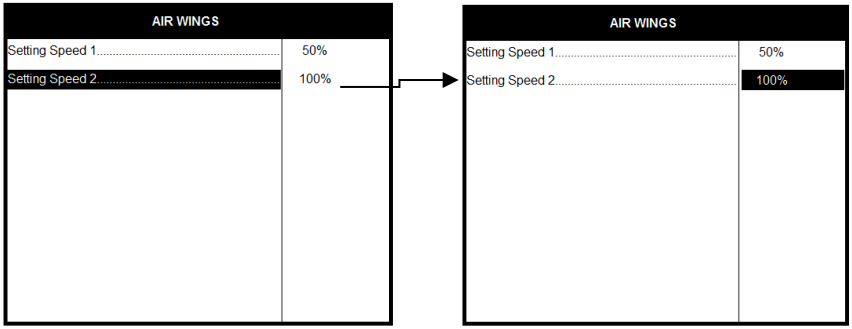
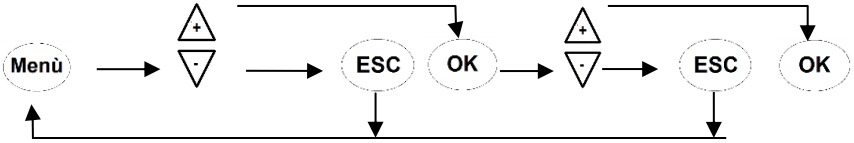


Figure 9



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 9)

5.3 Counter menu

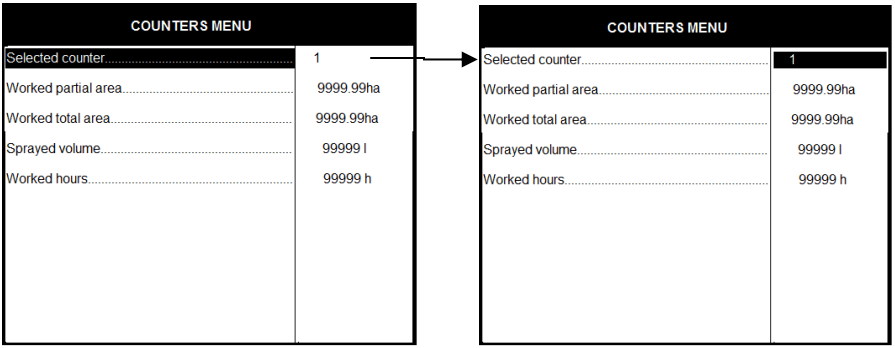
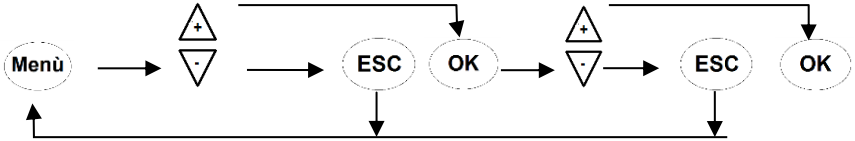


Figure 10



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 10)

Procedure:

Selected counter: Use the OK key to enter the value setting; the arrows to select the totaliser number you wish to view; OK to confirm or ESC to exit without making any changes. In this sub-menu, you can see the data of up to 10 counters; with the reset function, the data of each counter displayed is zeroed. If the data of a given counter is not reset, when working with that displayed in the main menu, data is incremented. In this way, a contractor can suspend work from a customer and resume it at a different time, taking into account the counter number associated with a given customer.

5.4 Counter reset

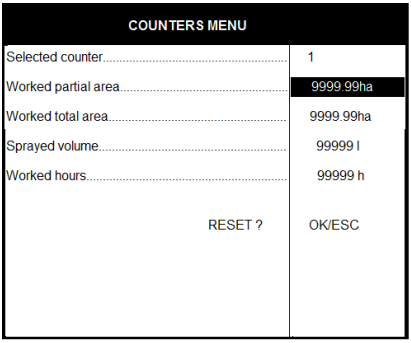


Figure 11

In the counter menu, by selecting with the arrow keys and confirming with "OK", the following can be reset: Partial and total processed area, delivered volume, and worked hours. For every reset operation, the following confirmation will be requested: "Do you want to reset?" Answer "OK" or "ESC" to exit without making any changes. (Fig. 11)

6. Alarm menu

6.1 Dose alarm

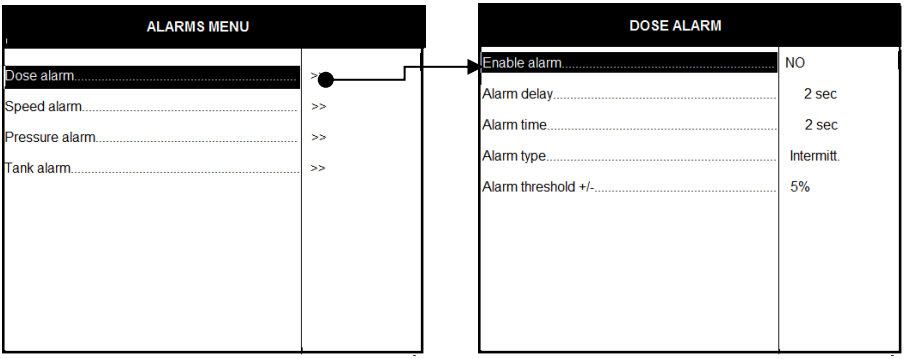
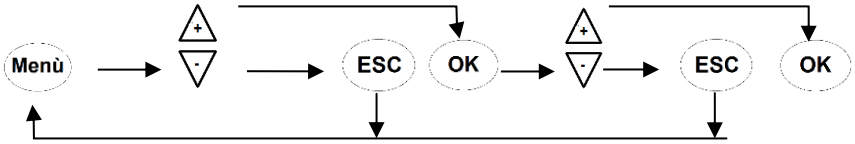


Figure 12



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 12).

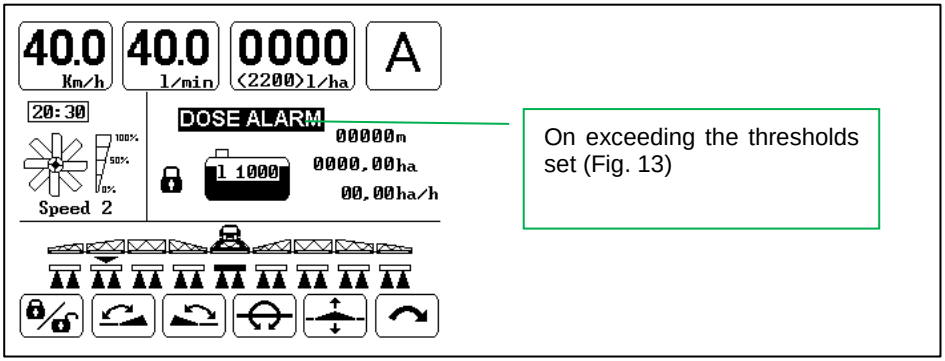


Figure 13

6.2 Speed alarm

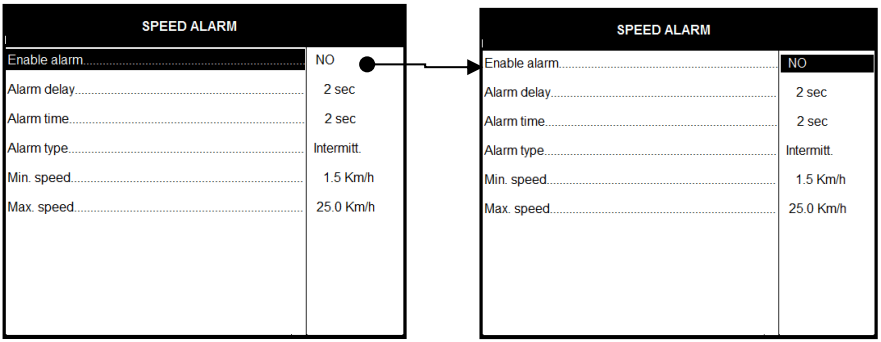
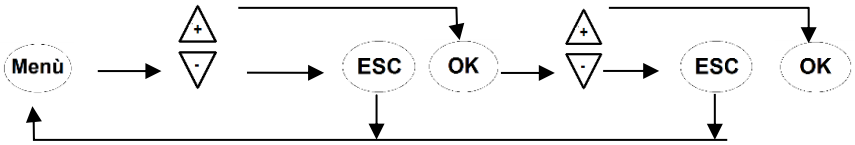


Figure 14



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 14)

- Speed Alarm: Signalled with a pop-up as in the case of dosing (Fig. 13)

6.3 Pressure alarm

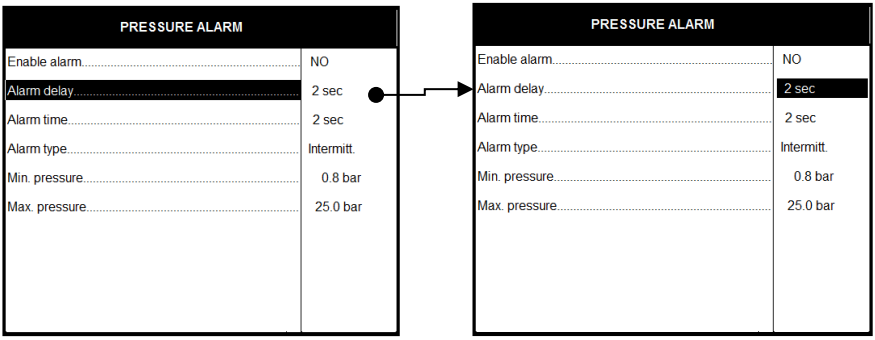
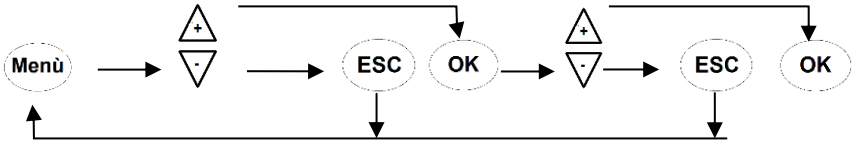


Figure 15



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 15)

- Pressure alarm: With minimum and maximum pressure signalled with a pop-up as in the case of dosing (Fig. 13)

6.4 Tank alarm

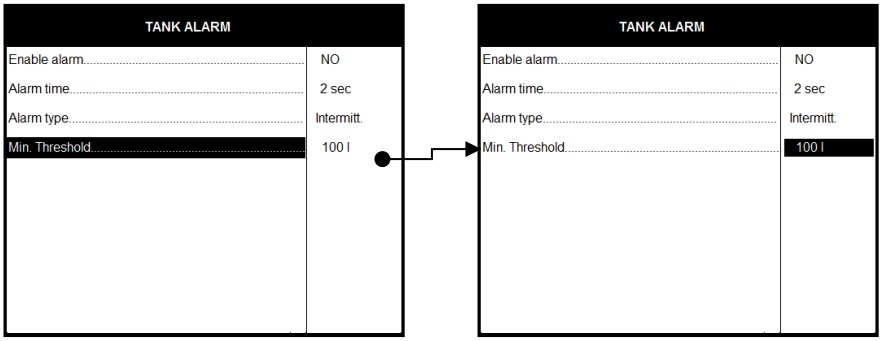
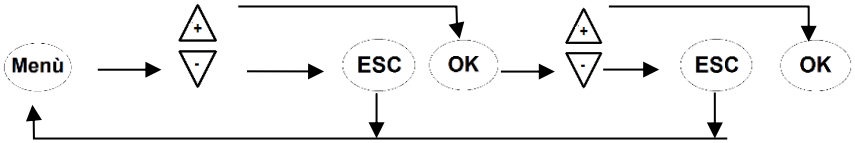


Figure 16



To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 16)

- Tank alarm: Signalled with a pop-up as in the case of a dose alarm (fig.13)

7. Work menu

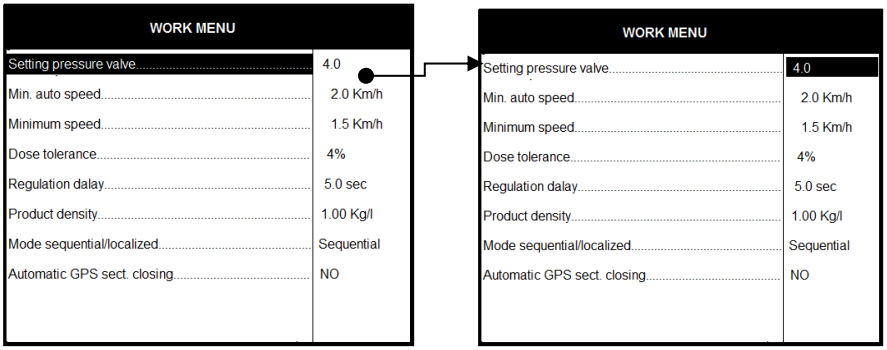


Figure 17

To select the parameter to be modified, use the arrow keys; OK to confirm; the ESC key to exit without making any changes (Fig. 17)

- **Pressure adjustment valve**: By varying this parameter, the speed at which the valve adjusts to bring the pressure back within the parameters set in Automatic Mode is varied as the vehicle speed varies.
- **Automatic minimum speed**: This is the speed below which automatic mode is disabled (icon A/crossed out), distribution continues but the dose can only be modified manually via the Up and Down arrow keys. When the vehicle speed returns above the set limit, automatic mode ("A" icon) is resumed. This helps the operator to keep the spreading speed as constant as possible.
- **Minimum speed**: This is the speed below which distribution stops and the section valves close, along with the main valve. (crossed out nozzle icon). The type of alarm can be set in the alarm menu > speed
- **Dose tolerance**: This value determines the set dose deviation percentage for which the pressure valve is actuated.
- **Adjustment wait**: Wait time in sec. before pressure adjustment is actuated in automatic mode.
- **Product density**: The density of the product used expressed in dm3.
- **Section opening type**: Sequential/Localised.
- **Section automatic closing via GPS**: Yes/No

8. Nozzle menu

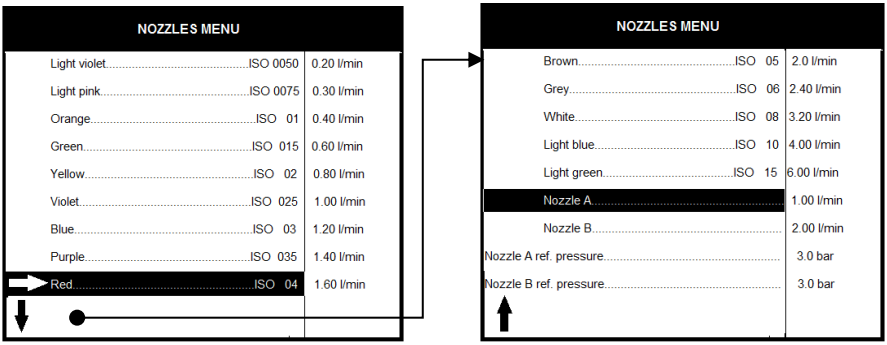
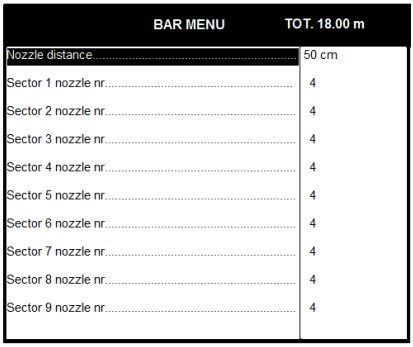


Figure 18

The flow rate refers to a 3-bar pressure; for nozzles A and B, the reference pressure can be changed.

9. Bar menu



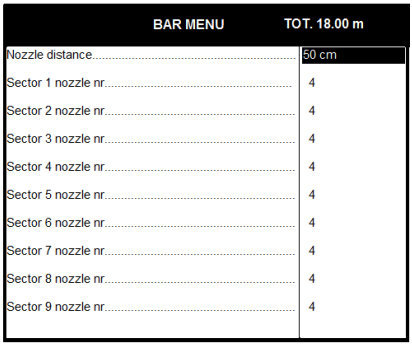


Figure 19

On entering the distance between the nozzles and the number for each sector, the bar total width will be displayed at the top (Fig. 19). This menu is not visible in pressure mode

10. Sensor menu

10.1 Speed sensor

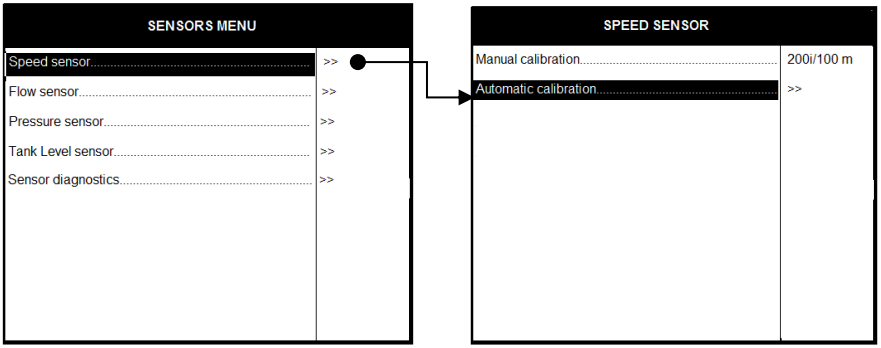


Figure 20

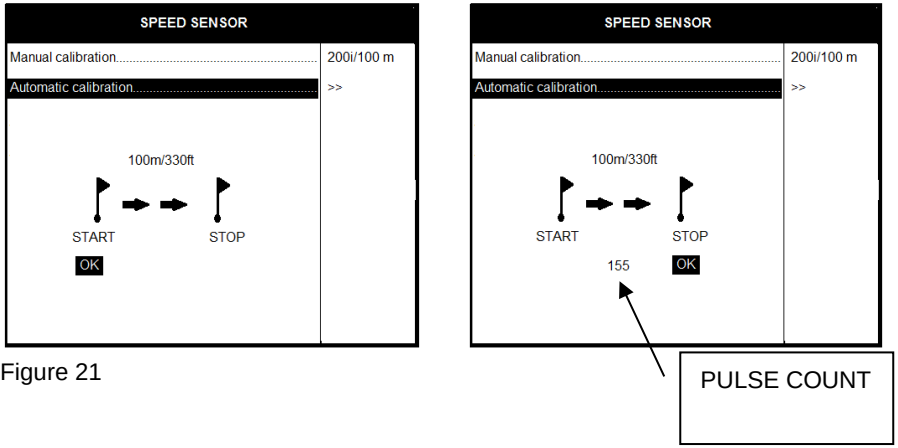
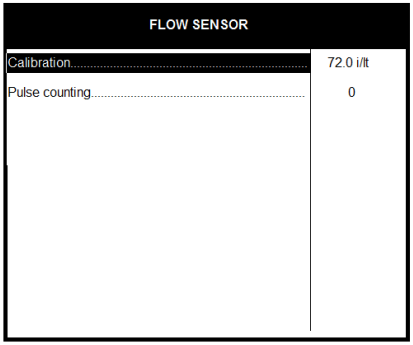


Figure 21

The calibration of the speed sensor can be: Manual by entering the wheel pulse number for 100 metres. Or automatic by selecting Start; covering 100 metres and giving the Stop, the counted wheel pulses will be automatically transferred to the pulses/100 m field. (Fig. 21)

10.2 Flow meter sensor



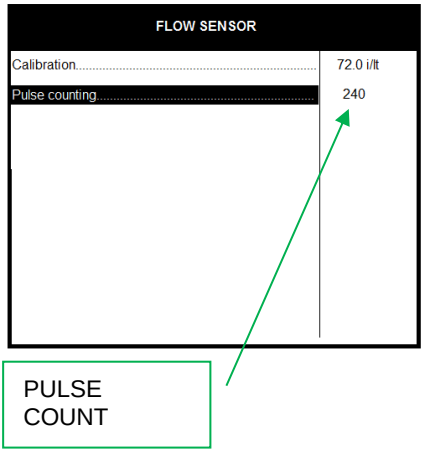


Figure 22

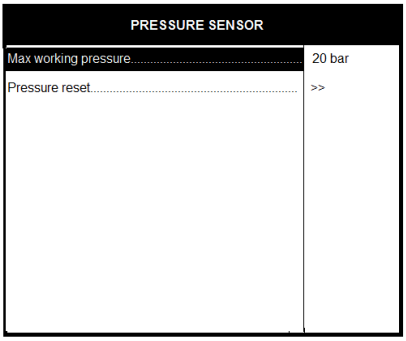
Calibration: Can be manual by entering the number of i/l specified on the characteristics of the flow meter, or with a system suitable for quantities with the appropriate graduated gauge. (Fig. 22)
Have a suitable sized container available.
Procedure:

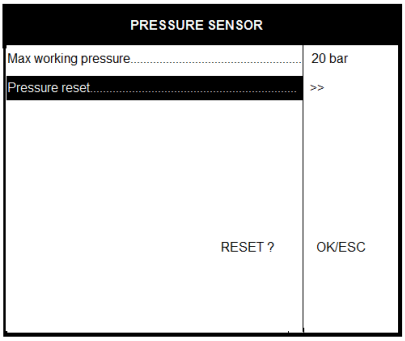
manual mode
closed sections except that for liquid collection
select **pulse counting**
Start spraying
Fill the container with the desired quantity (e.g. 10 l)
Stop spraying
Measure the quantity delivered
Count **i/l = counted pulses / litres delivered**
Report the results in the calibration field

Example: 720 i/10 l = 72 i/l

N.B. Do the test solely with water in the tank

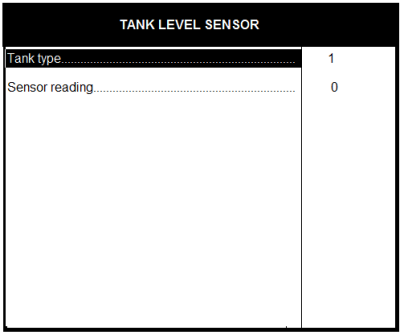
10.3 Pressure sensor

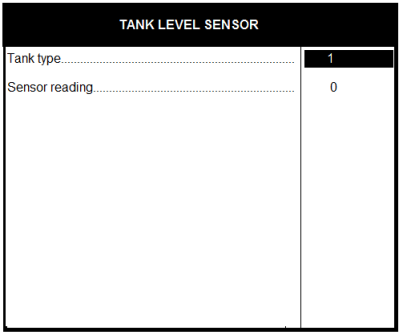




With this menu, you can enter the max. working pressure and reset the sensor for perfect calibration.

10.4 Tank level sensor





In this menu, you can select the type of tank installed and read the level sensor for preparing conversion tables in litres of the various tanks. The table must be sent to MC Electronics to be uploaded into the SW. Menu not visible if the sensor is not installed and activated on the reserved menu.

Table example:

Tank numbering and model	
Read value	**Loaded litres**
250	100
300	500
400	1000
500	1500
600	2000
700	2500

The more readings there are, the more precise the system is

10.5 Sensor diagnostics

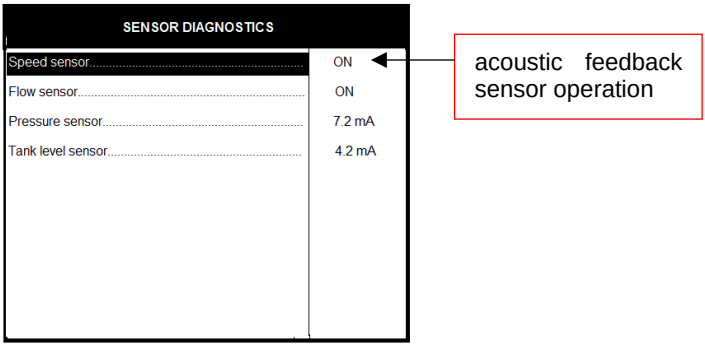


Figure 23

In this menu, the correct operation of the sensors is tested. Pressure sensor and tank level data is in mA.

11. Season counters

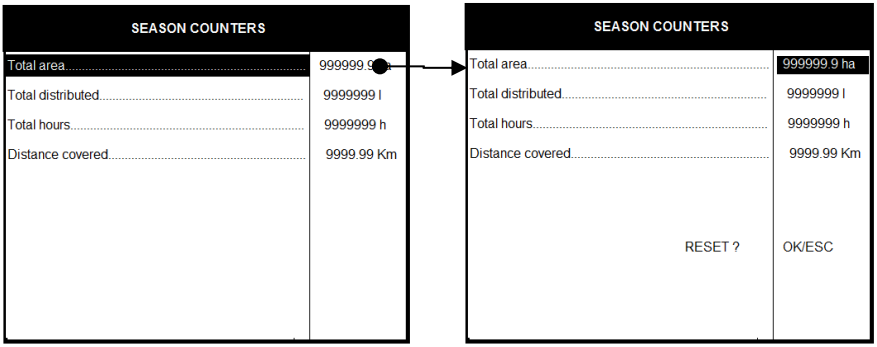


Figure 24

At the end of the season, counters can be individually reset by selecting them with the up and down arrow keys, and confirming with "OK".

12. Simulated speed

By selecting "**simulated speed**" from the menu and confirming with "OK", the main work screen appears. On the speed indication fields, the "SIM" writing under the number represents a travel simulation. Speed may vary +/- with the RH and LH arrow keys ("> / <"). Use this function to test the system when the machine is at a standstill. All functions can be activated. To return to normal mode, press "ESC". (Fig. 25)

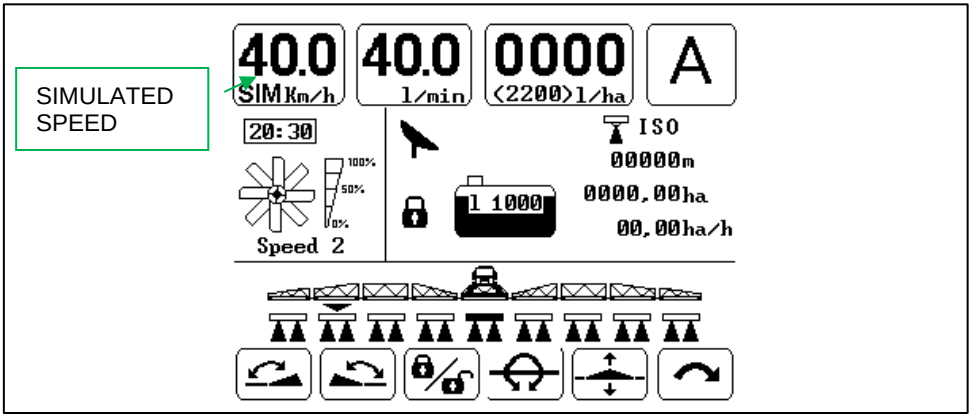


Figure 25

13. Pressure working method

The computer comes with the flow meter working method as a default parameter. If instead a pressure working method is installed with the related sensor (mode selectable on the reserved menu), by pressing the "Menu" button once, the pressure work simulation mode can be accessed.
Use the up and down arrow keys to select the parameters to be modified; "OK" to store; "ESC" to exit without making any changes, or to return to the main work menu.

- If you modify dosing, only speed is adjusted
- If you modify all other variables, only dosing is adjusted

Working width and number of nozzles are not editable, but are provided only as a reminder. These can only be modified in the settings menu during system installation. (Fig. 26) During simulation, no parameters can be stored; it serves solely as a calculator.

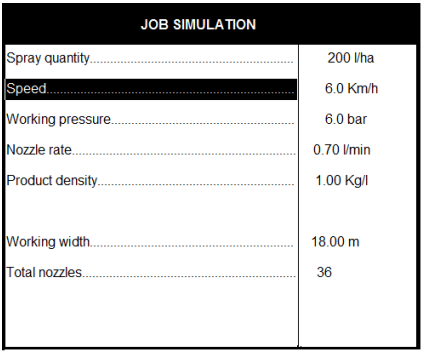


Figure 26

14. Reserved menu

To enter this menu, a **PASSWORD** is required. It is reserved to the assistance service only.

15.Trailmatic Option

The Hydra / CB9 system is equipped with software to control the steering shaft (Trailmatic) and is used to keep the shaft aligned with the articulation of the tractor, moving the articulated joint on the tool hydraulically. This, together with correct geometry, allows the tool to follow the path just created by the tractor.
Perform special manoeuvres by moving the hydraulic joint of the tool manually.
In order for this option to work properly, you must install the ECU oil CFN-CEN-0001 with its wiring and position inductive sensors (art. 2573).

15.1 Trailmatic graphical interface

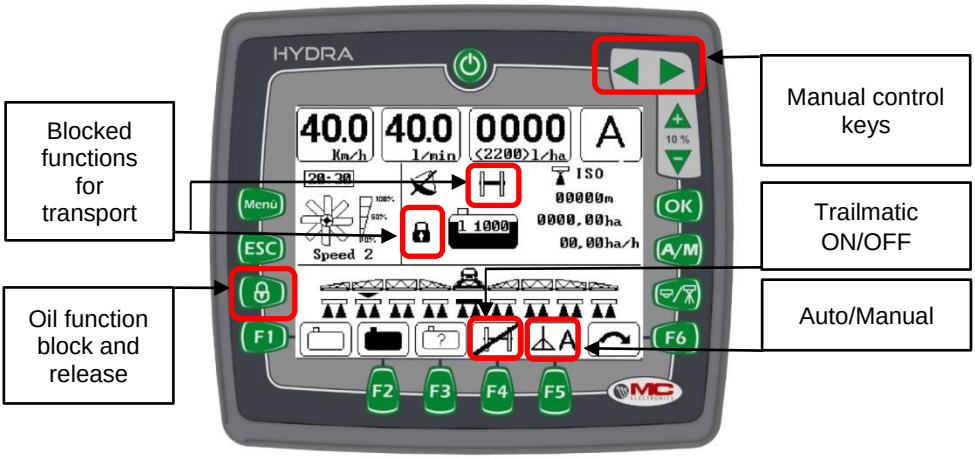
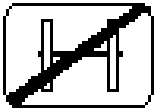
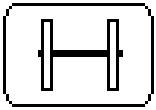
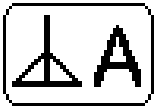
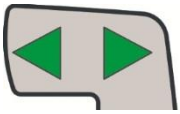


Figure 27

Access the trailmatic control by scrolling the key function bar with F6 as shown in the Figure (press twice).

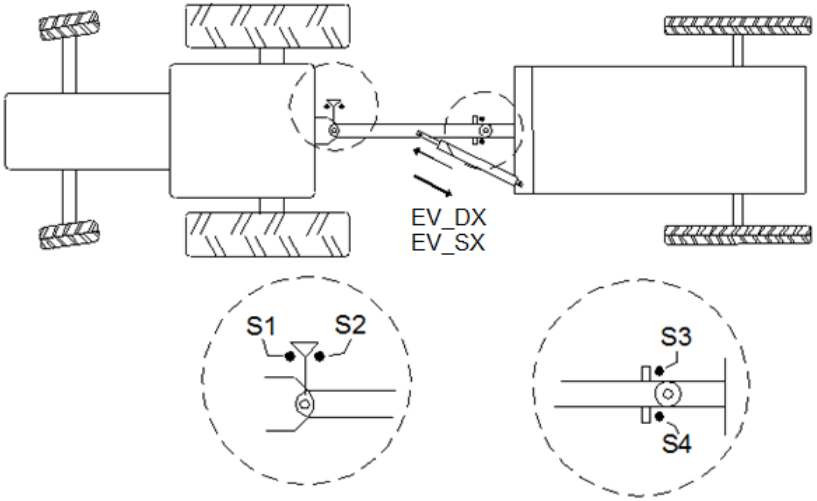
Key function:

 F4	Trailmatic OFF
 F4	Trailmatic ON
 F5	Automatic mode engaged.
F5	Manual mode: move the shaft by actuating the RIGHT and LEFT arrow keys (fig. 26)
	Key to block and release the hydraulic functions. (If the hydraulic block is activated: closed padlock function; the system realigns the shaft in automatic mode for road transport).
	Keys to manually move the shaft RIGHT and LEFT (EV_DX and EV_SX are activated)

Function icons:

	Aligned shaft. It is activated when S1- S2- S3- and S4 are not active.
	Steering to the RIGHT: EV_DX is activated to realign the shaft with the hook of the tractor and when S3 is activated, this indicates that steering is to the RIGHT
	Steering to the LEFT: EV_SX is activated to realign the shaft with the hook of the tractor and when S4 is activated, this indicates that steering is to the LEFT
	Closed padlock: disables all oil function keys and realigns the shaft, ready for road transport.

15.2 Mechanical sensor layout



16.Troubleshooting

PROBLEM	CAUSE	ACTION
No ignition	Reverse polarity of supply voltage	Check the connection to the battery
	Supply voltage interruption	Check cables, fuse and battery terminals
	No communication between VT and ECU	Check CAN-BUS cable for connection to VT-ECU
	Total failure	Send to assistance
Speed is not displayed	There are no wheel sensor pulses	Sensor cable interruption wheel
		Wheel sensor with incorrect distance from magnet, calibrate
		The red part of the magnet must be facing the sensor
	Faulty sensor	Replace sensor
The surface is not correctly displayed	Incorrect bar parameters	Enter number of nozzles and distance between them
	Speed calibration	Re-calibrate wheel pulses
The delivered dose is not displayed	Flow meter connection interrupted	Restore cable
	Blades blocked	Open flow meter and clean or replace blades

17. Technical data

Technical features:	
Nominal power supply voltage	12Vdc +4/-2Vdc
Max. current consumption	15A (including solenoid valve limited by SW)
Display	Backlit monochrome monitor 5.7” res. 320x240
Analogue inputs	2 for analogue sensors 4-20mA
Digital inputs	3 for NPN sensors with internal pull-up
Outputs	10+1 oil solenoid valve + bypass max 2.5A, 9 with reversed polarity for sections, max 2.5A, 1 with reversed polarity for general, max 2.5A 1 with reversed polarity for pressure adjustment max 5A
PWM outputs	1 for proportional air sleeve solenoid valve control, max 2.5A
IP Protection degree	IP65
Dimensions	Monitor:180x155x71.5 mm ECU : 190x170x60
Weight	Monitor: 350g ECU: 400g

CAUTION!!

DO NOT WASH WITH POWER WASHER PRESSURE JET.

WARNING: THIS PRODUCT CONTAINS TIN AND LEAD.
IT MUST BE DISPOSED OF AT THE END OF ITS LIFE CYCLE AT THE DESIGNATED DISPOSAL FACILITIES OR DELIVERED DIRECTLY TO MC ELETTRONICA SRL (ITALY).

www.mcelettronica.it

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