

WSC GPS

COMPUTER FOR SPRAYER MACHINES

INSTRUCTIONS FOR USE

Item number:
-82.8452.97.3 WSC GPS 7 outlets

Year of manufacture: 2018

EN

IDROMECCANICA BERTOLINI
Reggio Emilia - Italy

WSC GPS

Manufacturer: IDROMECCANICA BERTOLINI S.p.A.
Address: Via Cafiero 20
42124 REGGIO EMILIA – ITALY
Tel. +39 0522 306641 Fax +39 0522 306648
E-mail: email@bertolinipumps.com
Internet: www.bertolinipumps.com

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MANUFACTURER'S DECLARATION

Machine Directive 2006/42/EC
EMC Directive 2004/108/EC
ISO 14982

Idromeccanica Bertolini S.p.A.
declares under its own responsibility that the computer of the series

WSC GPS

with serial number
(to be indicated by the purchaser as shown on the identification plate)

- is built to be incorporated into a machine or to be assembled with other machinery to constitute a machine covered by Directive **2006/42/EC**;

- compliance at all points with the provisions of this Directive is the responsibility of the manufacturer of the machine that incorporates the computer.

- meets the conformity requirements of Directive 2004/108/EC (Electromagnetic compatibility) and ISO 14982 (Agricultural and forestry machinery - Electromagnetic compatibility - Test methods and acceptance criteria);

- meets the conformity requirements of the RoSH Directive

- Therefore declares that the above product may not be put into service until the machine in which it will be incorporated or of which it will become a component has been identified and its conformity with the provisions of Directive **2006/42/EC** has been declared, i.e. until the product referred to in this declaration forms a single body with the final machine.

Reggio Emilia 14.02.06

Luigi Quaretti
(Managing Director – Idromeccanica Bertolini S.p.A.)

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INTRODUCTION

1 INTRODUCTION

1.1 GENERAL RULES AND PRECAUTIONS

This instruction manual provides all the specific information necessary for familiarisation with and correct use of the equipment in your possession.
It must be read carefully when purchasing the equipment and consulted whenever any doubts arise on its use or maintenance.
The manual must be kept on board the machine or, where this is not possible, it must be kept in a known and accessible place for easy reference.

ALL RIGHTS ARE RESERVED. THIS MANUAL IS INTENDED
EXCLUSIVELY FOR USE BY THE CUSTOMER. ANY OTHER USE IS PROHIBITED.

1.2 ASSISTANCE SERVICE

Assistance can be obtained in all countries where the machine is officially distributed by ***Idromeccanica Bertolini*** (during and after the warranty period).
Any type of operation required on the *WSC* Computer must be carried out according to this manual or by following any agreements made with ***Idromeccanica Bertolini.***
If this is not the case, the relevant guarantee conditions may be annulled.

1.3 WARRANTY

Idromeccanica Bertolini S.p.A. undertakes, within a maximum period of **one year** from the date of delivery of the product, to provide a replacement for any parts that have manufacturing defects.

The guarantee is valid only when the defect can be verified by the *"Assistance Service"* and when it not attributable to improper use or lack of maintenance of the product.

Parts subject to normal wear and tear from use are excluded from the guarantee (parts made of rubber or plastic, gaskets), as are labour costs and any other request for damages or indemnity (for example, due to damage or suspension of use of the products)

"Idromeccanica Bertolini S.p.A." **IS NOT** responsible in terms of warranties and compensation for damages caused in the event of:

- Transport damage (breakages, scratches, dents or similar)
- Use of the product different to those indicated in the manual
- Use that does not comply with the specific regulations in force
- Improper installation or defects originating from insufficiency or inadequacy of the electrical system, or alterations deriving from environmental, climate or other types of conditions.
- Use of unsuitable liquids
- Negligence, neglect, tampering, unskilled use or repairs carried out by unauthorised personnel

Poor maintenance

- Modifications or interventions not expressly authorized by ***"IDROMECCANICA BERTOLINI S.p.A."***
- Use of spare parts and accessories that are not original and/or specific for the product
- Use of tubes and connections that are not prescribed by this manual or not suitable for the product and its use.

Furthermore, the following are not covered by the guarantee:

- Installation and adjustment
- System consultancy or makeshift inspections
- Various maintenance operations (such as cleaning of filters, nozzles etc.)
- Normal depreciation due to use

In any case:

The restoration of the equipment will be carried out within time limits that are compatible with the organizational requirements of the Assistance Centre.

- The products to be repaired must be previously washed and cleaned from residues of the chemicals used.
- Repairs carried out under warranty do not give rise to extensions or renewal of the warranty.
- NOBODY is authorized to modify the terms and conditions of the warranty or to issue other written or verbal terms and conditions.
- Parts replaced under warranty remain the property of ***"IDROMECCANICA BERTOLINI S.p.A"***.

If the product has been tampered with, "***Idromeccanica Bertolini S.p.A."*** declines all obligations under the warranty.

If the safety valve is missing, or in the case of tampering with the pressure regulation valve of the regulator itself, *Idromeccanica Bertolini S.p.A.* declines all obligations under the warranty, as also in the case of accessories not supplied by the Company.

Products may only be returned for any type of verification with the written authorisation of ***Idromeccanica Bertolini S.p.A.*** and only carriage paid.



SAFETY PRECAUTION:

TO AVOID RISKS FOR THE OPERATOR AND DAMAGE TO THE SPRAYING SYSTEM, ALWAYS SWITCH ON THE COMPUTER FIRST AND ONLY THEN START THE PUMP. IF YOU START THE PUMP WITH THE COMPUTER SWITCHED OFF, YOU WOULD NOT BE ABLE TO CONTROL THE PRESSURE.

2 OVERVIEW AND ASSEMBLY

2.1 OVERVIEW

The WSC Computer includes the following components
• Computer
• SD card
• Cables

The computer is mounted in the tractor cab and also contains the command for controlling the spraying treatment.
The pressure regulator, section valves, main valve, sensor signals such as wheel sensor, flow meter etc. are transmitted directly to the computer via the supplied cable.

2.1.1 SD CARD



The SD card is a commercial card, also available on the market, that offers several advantages for the operation of the computer, in particular:

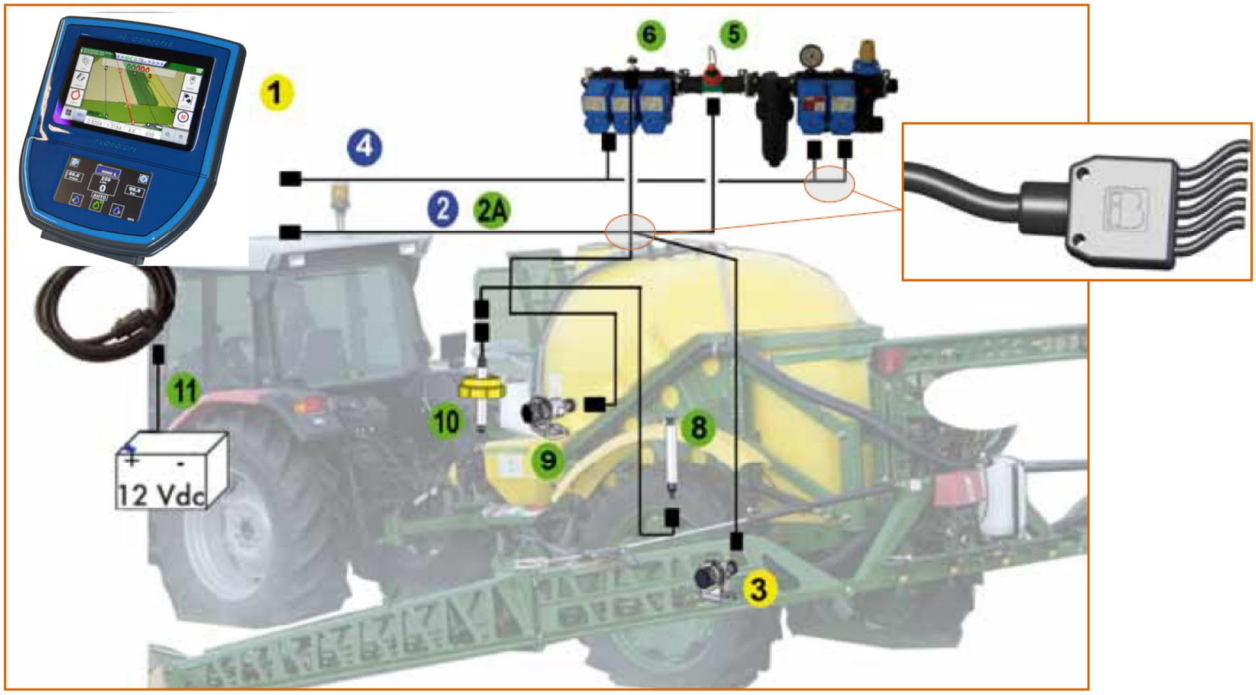
- Rapid export and import of machine configuration during first installation (number of sections/nozzles/sensors/etc.)

- Rapid export and import of treatment programs (nozzles/litres per hectare/drops/etc.).

- Updating of the internal firmware of the computer (can be sent via e-mail) so that you always have the latest version available or create customer-specific customizations depending on the application of the computer

WSC GPS

- WSC GPS



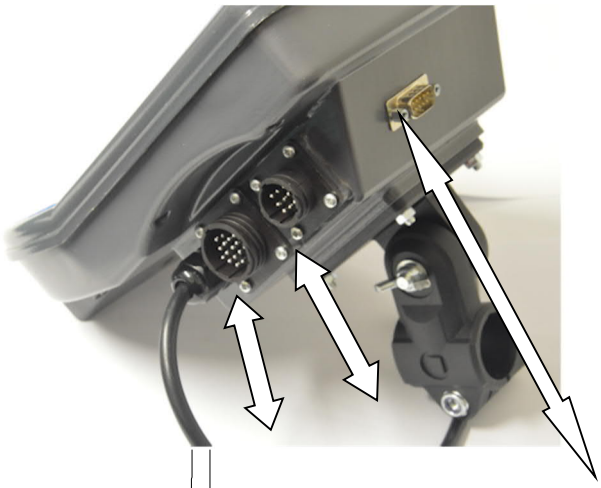
COMPUTER KIT			
POS.	DESCRIPTION	Length of cables (m)	Code
1	Control panel	-Power supply 2.5 -Valves and sensors 0.3	82.8452.97.3
3	Speed sensor	/	
CABLES KIT			
POS.	DESCRIPTION	Length of cables (m)	Code
2	Connection cable VG+VV+2 sections	4	82.8035.10.A
	Connection cable VG+VV+3 sections		82.8036.10.A
	Connection cable VG+VV+5 sections		82.8107.00.2
	Connection cable VG+VV+7 sections		82.8155.00.2
3	Sensor connection cable	4+ 1.5 (pressure/flow rate) 3 (speed)	82.8304.97.3

OPTIONAL				
POS.	DESCRIPTION	Length of cables (m)	Characteristics	Code
5	Flow meters	1.5	10÷100L/min - 20bar – turbine – G.1”1/4F.	82.8286.97.3
			10÷100L/min -50bar– electromagnetic – G.1”1/4F.	82.8298.97.3
			3÷60L/min -50bar – electromagnetic – G.1”1/4F.	82.8299.97.3
			3÷60L/min -50bar – electromagnetic – G.3/4F.	82.8300.97.3
6	Pressure transducer	/	0-40Bar	82.7765.20.2
7	Sensor connection cable	3	Cable for the connection of 3 additional sensors	82.8308.00.2
8	Tank level sensor	/	Range 0-4Mt –Signal 4-20mA – Connection G.1/4”	82.8315.00.2
9	Pump/fan revolution sensor	/	Complete with support bracket	82.8212.00.2
10	Oil level sensor	2	Complete with locking rings for the oil tank cap	82.8013.00.2
11	Battery cable	4.5	Three-pole Cobo connector - eyelet terminals	82.8168.00.2

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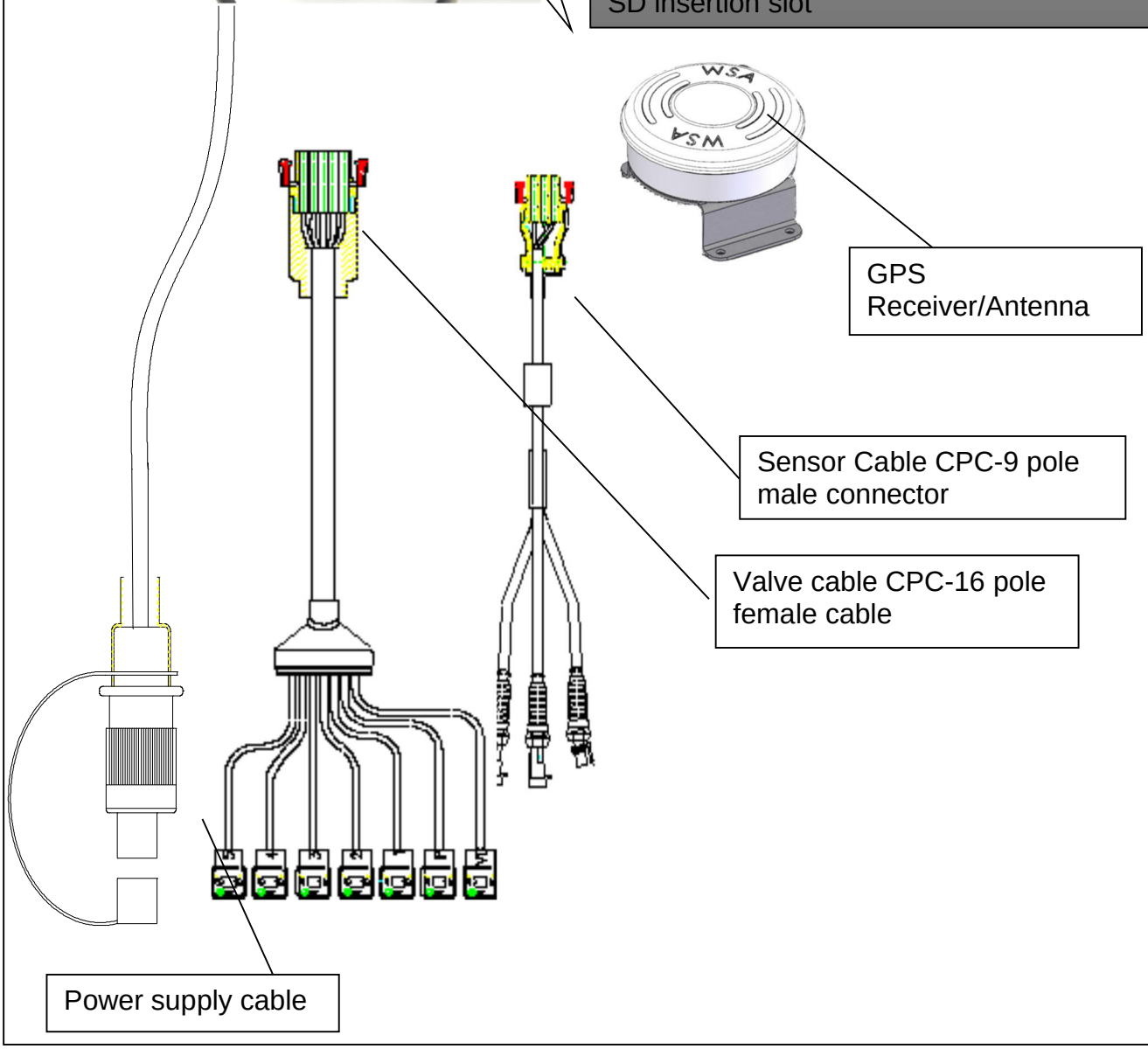
2.2 ASSEMBLY

Connect the cables supplied with the computer according to the wiring diagram below.





SD insertion slot



Install the computer in the tractor cab with the supplied equipment. Make sure that you choose a convenient position for the operator to operate.
The operating unit is activated via the switch at the rear.

2.2.1 Power supply

On the latest tractor types that are equipped with a DIN 9680 power socket, the WSC power cable can be plugged directly into the tractor's DIN socket (see the overview).

In older tractors not equipped with a DIN socket, the battery cable (11) (see page 8) is required and must be connected directly to the battery. The battery cable is not standard and must be ordered separately.
The use of the battery cable, which is fused with a 30 A fuse, ensures that the WSC is always adequately supplied with power.

When connecting the battery, take care to connect the poles correctly.

The red conductor with the 30 A fuse must be connected to the + pole, and the black conductor to the - pole.
Make sure the contacts are clean!

Never use the cigarette lighter as it cannot provide the necessary power!
The other end of the cable is equipped with a standard plug, which must be connected in a dry and protected area at the rear of the tractor or in the tractor cab.

Before connecting the WSC to the 12 Volt system:
- Make sure the electrical components and cables are not damaged. Damaged cables are no longer water resistant and can cause short circuits.
- Check the length of the cables: they must be long enough to allow curves
- Check that the plug is connected correctly to the operating unit.
- The 12V battery must, of course, be sufficiently charged (at least 10.8V).

Note: make sure that the cables (power cable, valve cable and sensor cable) are properly positioned between the tractor and the sprayer during operation so that no one can trip over them and the cable does not become entangled.
In any case, the cable must not be too tight, otherwise it could tear during steering or during handling. Also make sure that the cables do not come into contact with moving or overheated parts of the tractor.



If live parts or cables are damaged, a short circuit may occur. Therefore the power cable must always be equipped with a 30 A fuse. Without the appropriate fuse, a short circuit can cause a fire.

2.2.2 Valve cable

Secure the end of the valve cable that contains the valve connectors to the metal structure of the sprayer properly so that there are no dangling parts. Make sure that the connection between the valve cable and the computer is in a convenient position for connection and disconnection, because every time the sprayer is disconnected, this connection must also be interrupted.

2.2.3 Sensor cable

Secure the valve cable to the metal structure of the sprayer properly so that there are no dangling parts. Make sure that the connections between the cable and the various transducers are in positions that are protected against water, dust, oils, etc. Make sure that the connection between the sensor cable and the computer is in a convenient position for connection and disconnection, because every time the sprayer is disconnected, this connection must also be interrupted.

2.2.4 Installing the antenna

The GPS antenna/receiver must be positioned on the highest part of the agricultural machine (including the trailer). The skywards reception angle must be as wide as possible (no obstructions restricting its view of the sky). It must be positioned as centrally as possible in relation to the sheets/surfaces underneath. It must have sufficient space for the connection cable to exit, which must not have any bends that are too tight or be exposed to possible breakage.

The GPS receiver can be fastened mechanically either by using the appropriate bracket or magnetically if placed on a suitable surface using the magnets on the underside of the receiver.

2.2.5 Installing the pressure sensor

Install the sensor as close as possible to the consumer terminals, or on the pressure gauge connection on the distributor tap assembly, and always as far away as possible from the pressure regulation valve.
Position the pressure sensor as shown in Fig. 9 so that it detects the flow pressure of the sections.

The pressure sensor must always be installed in a position protected from pressure peaks.
Since its operation is essential for proper reading of pressure parameters, protect the cable against breakage and/or abrasion that may occur during use.
If it is necessary to install an extension cable for the sensor cable, please contact *"Bertolini Technical Service".*

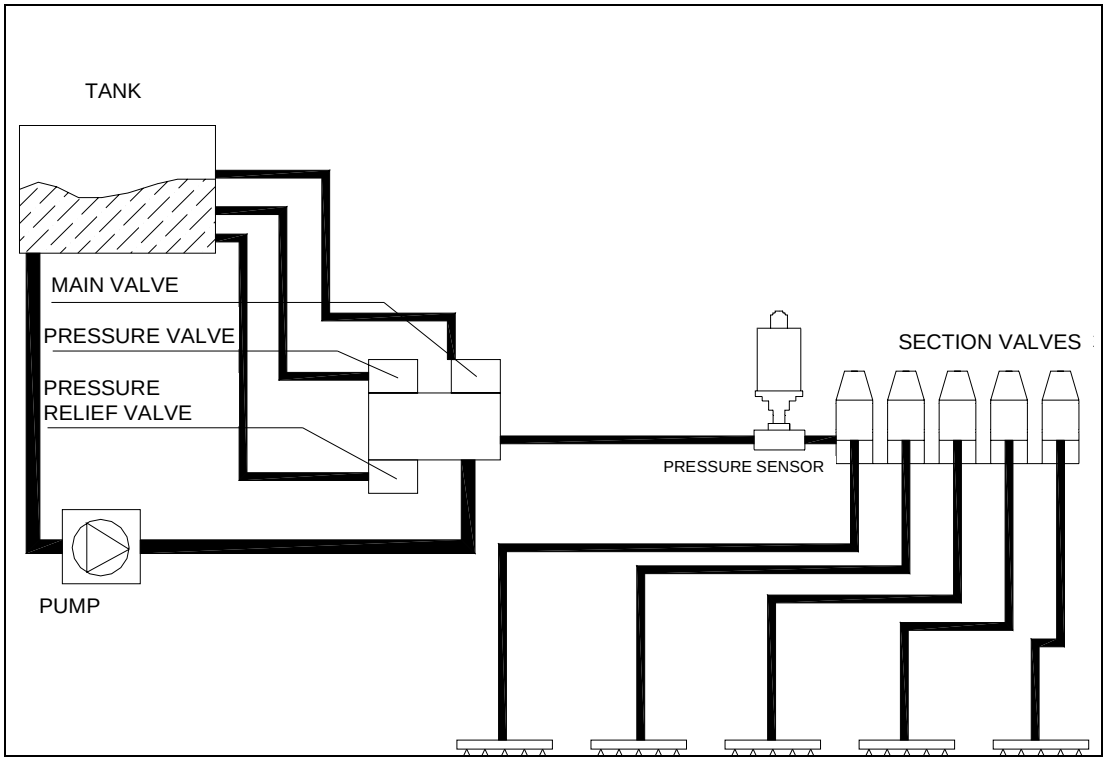


Figure 4 Installing the pressure sensor.

<u>Warning!</u> The pressure sensor is oversized for its intended use. However, it is preferable to place it in an area protected against water hammers that could damage it. <u>There is no liability under the warranty for sensors damaged by water hammer or overpressure in general.</u>

3. COMPUTER

The WCS GGPS operating unit (Fig. 5) consists of two parts:

- GPS Navigator.
- Treatment Display.

The GPS Navigator provides the user with visual indications of the treatment in progress, providing a graphic representation of the area treated and to be treated, together with indications of the routes to be followed for the completion and optimization of the work.
The treatment display monitors and manages the hydraulic part of the system, keeping the set values constant when dynamic conditions such as speed and overlapping of passes vary. In addition, it manages acquisition from the sensors present on the machine, the corresponding displays of parameters and adjustment operations on the volumetric valve. **Management of system functions and programming are carried out using the touchscreen on each screen displayed.**

3.1 SAFETY AT START-UP



Warning! Each time the WSC GPS is switched on using the button on the back of the main box, make sure that the switch for driving the main valve (Pos.1 fig. 10) is in the OFF position (facing down).

3.2 ACTUATORS

The following spraying functions can be remotely controlled electrically on the operating unit (Fig. 10):

“Spraying” On/Off (1)

When the main valve button (1) is in the OFF position  the section valves (7) (Fig. 6) are in the closed position regardless of the status of the corresponding manual or automatic control. Conversely, if the main valve button is in the ON position  the open or closed status of the individual valves is determined by manual or automatic operation.



Opening/Closing sections (2)
When the section switch (2) is in the OFF position, the section valves (7) (Fig. 6) are closed; when it is in the ON position, the section valves are open (switch up = valve open and LED on)

Pressure regulation +/- (3)
When the control (3) is actuated, the proportional valve is moved. If operation is automatic, the work target is changed. If operation is manual, the pressure regulation valve motor (6) is operated directly (Fig. 6) in the required direction (+  or - ), for as long as the button is pressed. During this function, the volumetric valve moves at a slower speed than for normal control to allow the operator a greater regulation sensitivity.

WSC GPS



Fig. 5

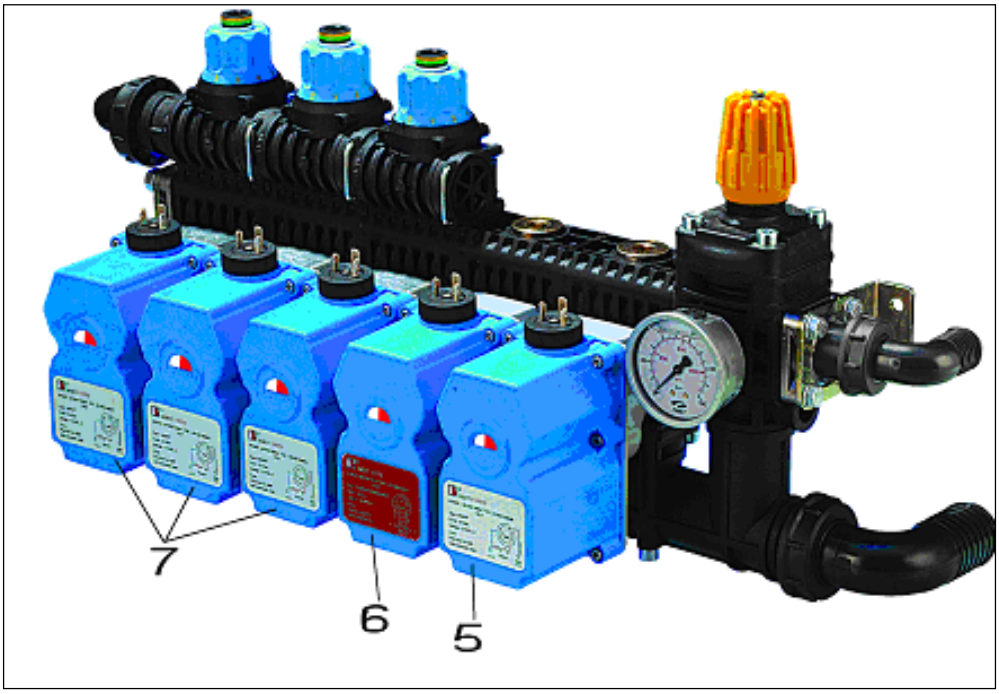


Fig. 6

3.3 SPRAYING COMPUTER

3.3.1 General information

The WSC GPS computer ensures that the flow rate in litres per hectare, regardless of driving speed and current work size, always corresponds precisely to the programmed nominal values and that any overlapping of two adjacent passes does not resulted in overdosing of the area.

The computer always calculates the required flow rate (l/min) to be transmitted to the nozzles on the basis of the programmed l/ha, the current driving speed (km/h) and the current work size.
The required flow rate Q (l/min) can be calculated using the following formula:

$$Q\ (l/min) = \frac{\text{work size (m)} \times \text{driving speed (km/h)} \times l/ha}{600}$$

The flow rate calculated in this way is compared to the actual liquid flow rate at the nozzles.
The actual value is determined by the flow meter installed between the pressure regulator and the section valve.
If the actual flow rate does not correspond to the calculated flow rate, the pressure regulator is activated while the two values are identical to the calculated flow rate.
The flow rate of the liquid is adjusted immediately by the pressure regulator if the driving speed or the size of the active work area (section conversion) is changed. The flow rate in litres per hectare always remains constant.

It is possible to change the quantity of product distributed in certain parts of the field using manual mode. You just need to press a button to return to automatic mode, and then maintain the nominal value set in the program.

The WSC computer has four types of alarm: one for maximum and minimum pressure thresholds, one for maximum and minimum flow rate thresholds, one for maximum and minimum speed and one for minimum pump oil level. Any anomalies that occur are indicated, both with an acoustic alarm and with a text message on the display, which also flashes, to make the problem more visible to the operator.

During normal treatment functionality, 7 operating parameters can be monitored **simultaneously**:

- *Forward speed*
- *Operating pressure (measured or calculated)*
- *Operating flow rate*
- *Pump rpm*
- *Liquid in tank*
- *Dosage set*
- *Dosage dispensed.*

The computer is able to adjust the dosage on the basis of pressure and flow rate in equal measure. If both instruments are present, the adjustment is made by flow rate and the pressure value indication is the value read by the relative transducer. Switching from one regulation mode to the other takes place automatically, depending on the inputs detected, without the need to perform any programming.

3.3.2 Main Treatment screen

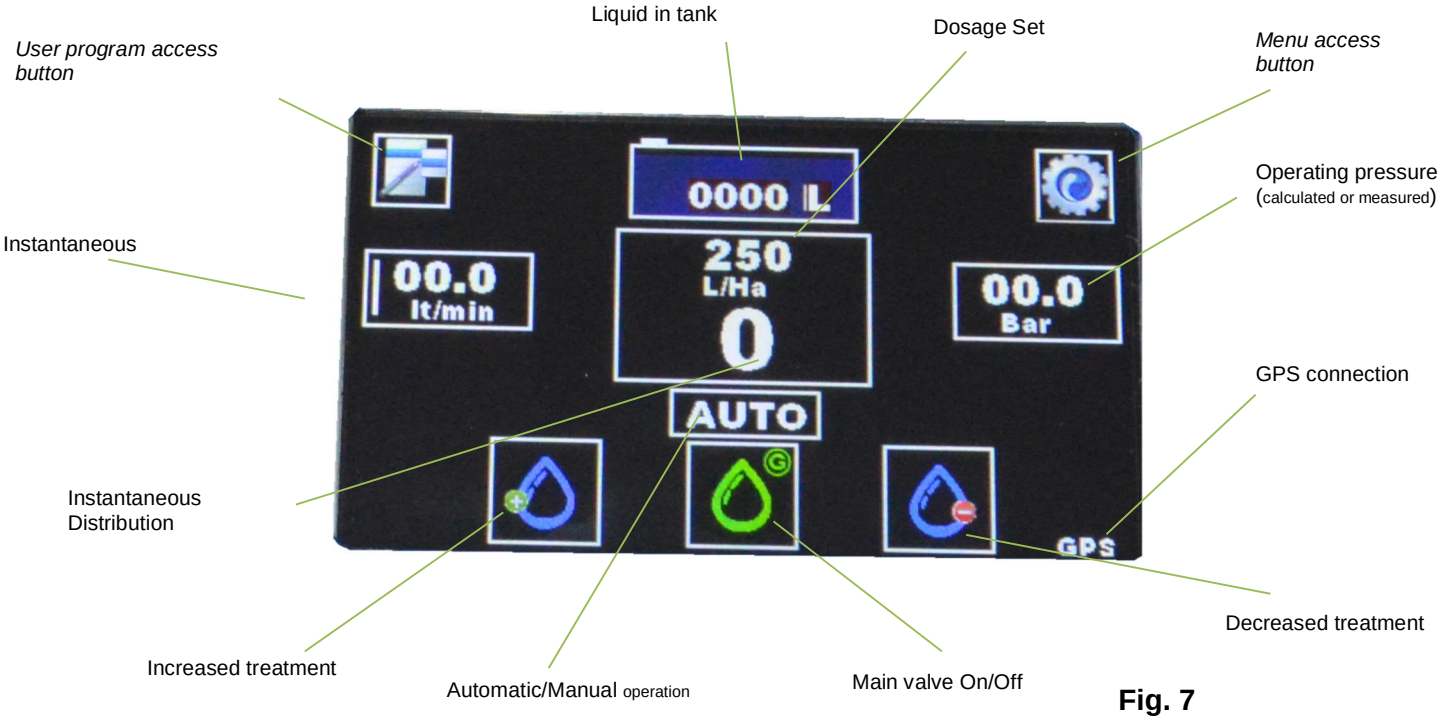


Fig. 7

The amount of residual liquid is displayed as a percentage if no load curve has been entered, or in litres if the curve is present. The units of measurement displayed vary according to the international system adopted (EU/US).

3.3.3 Access to menus

Since the display on board the computer is a touchscreen, there are no external buttons and everything is managed by pressing directly on the relevant areas of the screen.

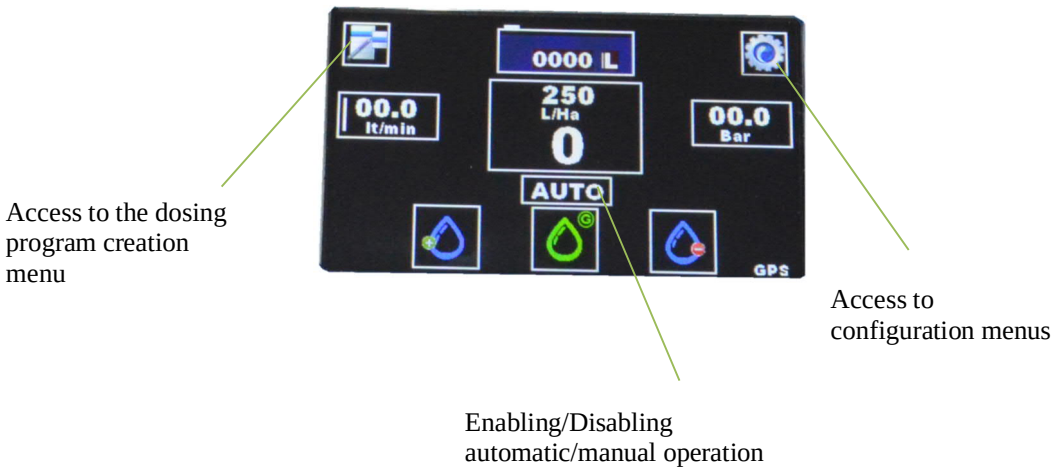
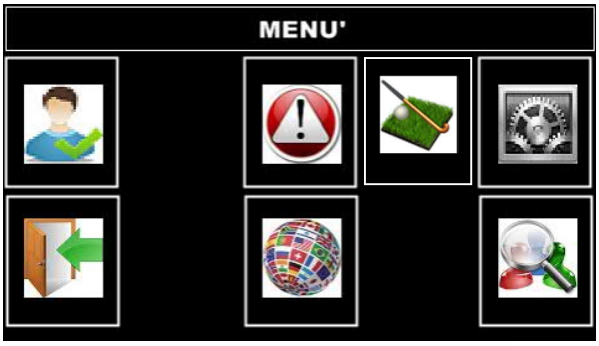


Fig. 8

The configuration menus are accessed by pressing the button on the right side of the screen **(Fig. 8)**



CONFIGURATION MENU **Fig. 9**

You can access the program creation menu by pressing the button on the screen **(Fig. 8)**



PROGRAMS MENU **Fig. 10**

3.3.4 Structure of the menus

The program is structured into 4 menu types:

- User menu.
- Manufacturer menu (password protected).
- Alarm settings menu.
- Graphic appearance menu

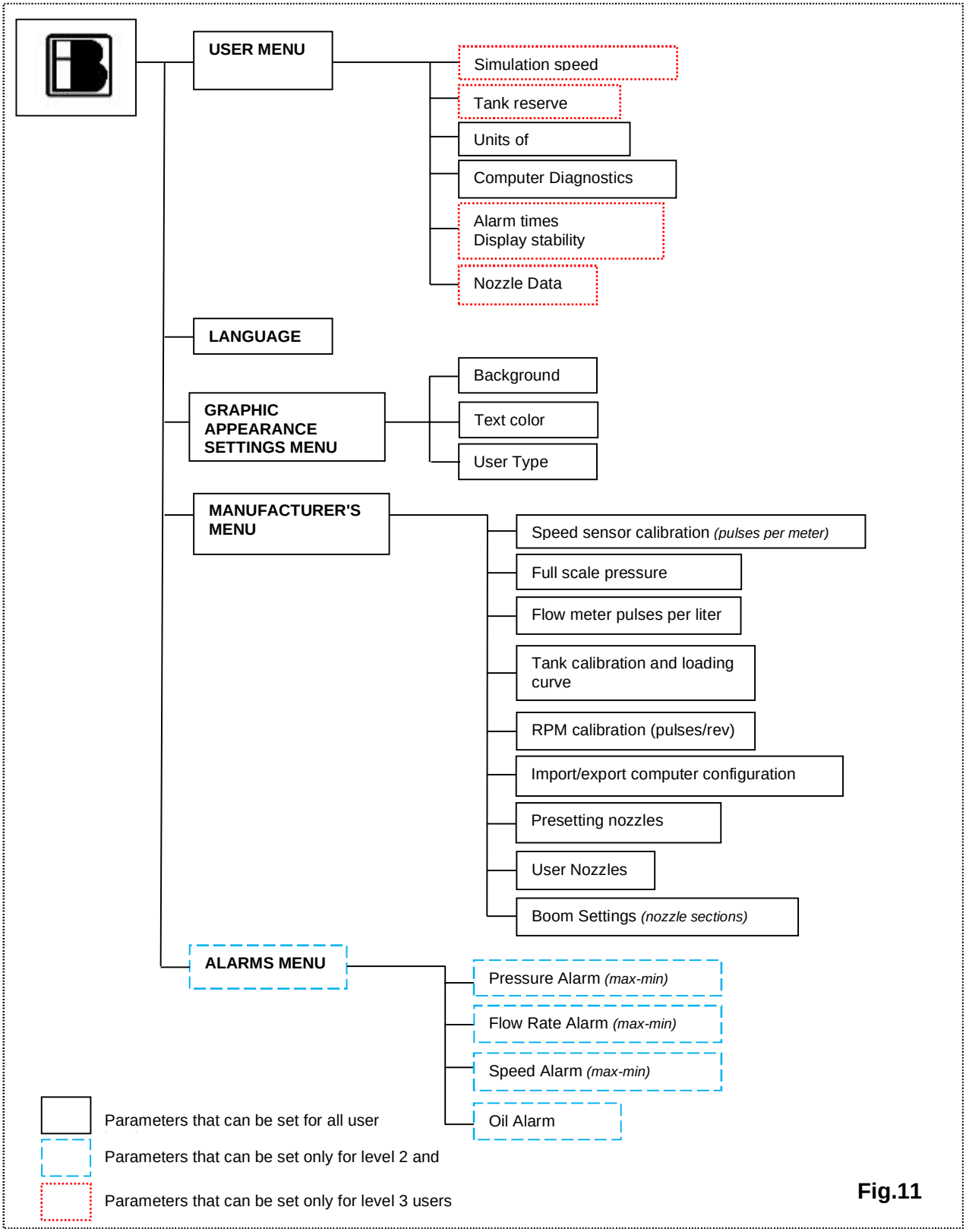


Fig.11

3.4 ENTERING AND CHANGING DATA

Data are recorded and changed in the same way in all the menu screens. **Select the parameter to be modified by pressing that parameter on the touchscreen.**
The value can be changed using the numeric keypad shown on the display.

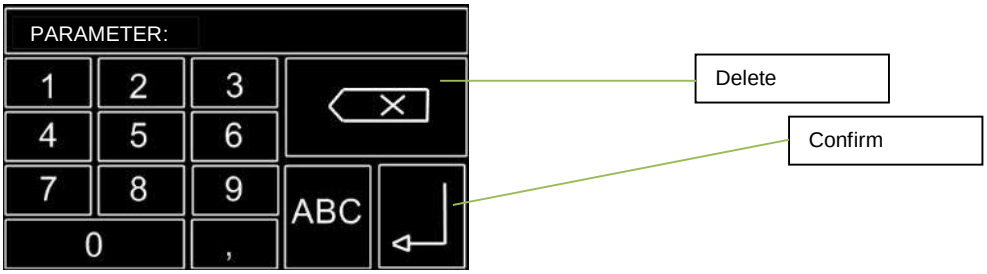


Fig. 12

4 MAIN TREATMENT MENU

The main menu is the menu level that the user uses during the treatment. It consists of a single screen containing all the information related to the treatment in progress.

4.1 MAIN SCREEN

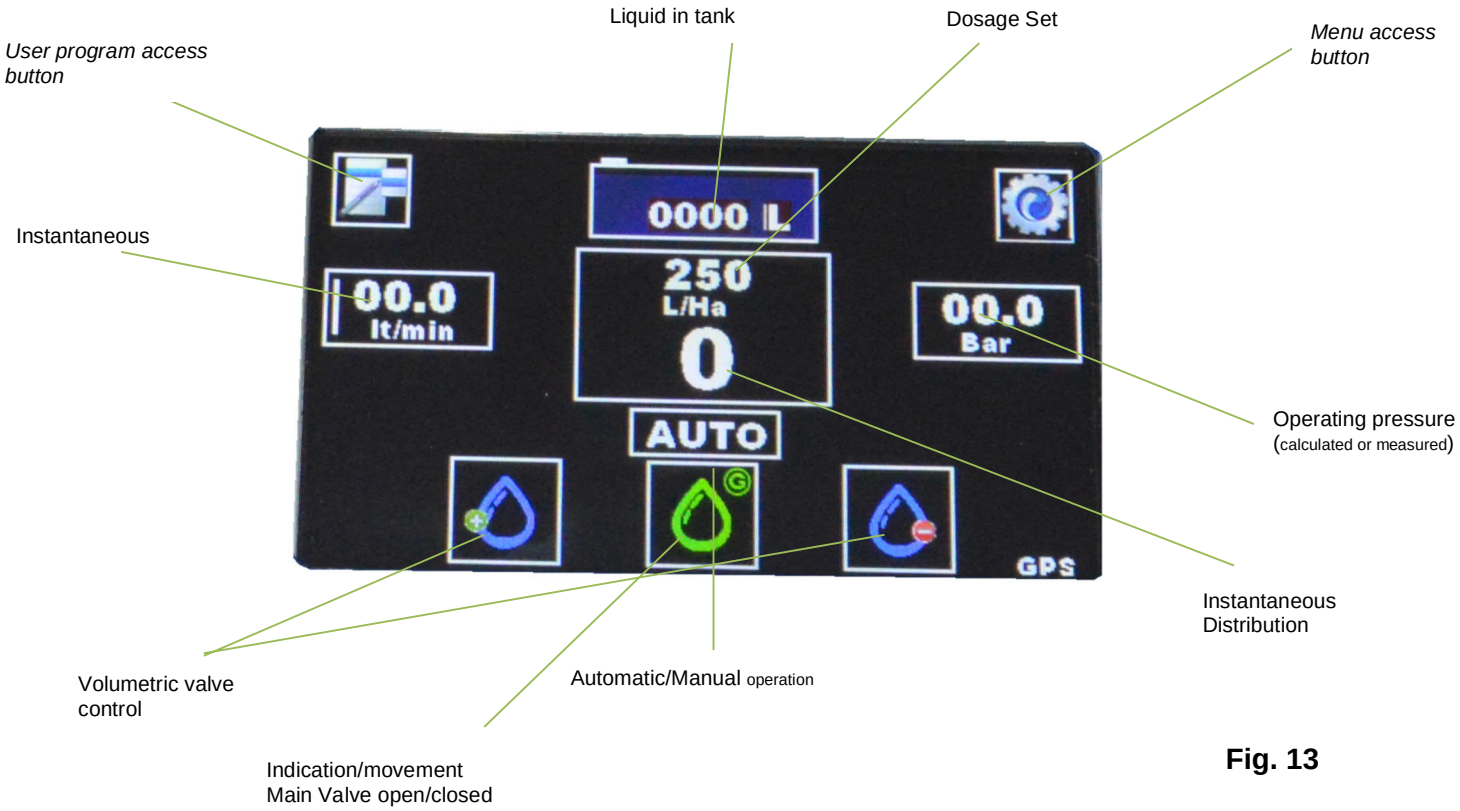


Fig. 13

4.1.1 Main Valve Open/Close

By pressing the  or  symbol on the display you can open or close the main valve.

Main valve closed 

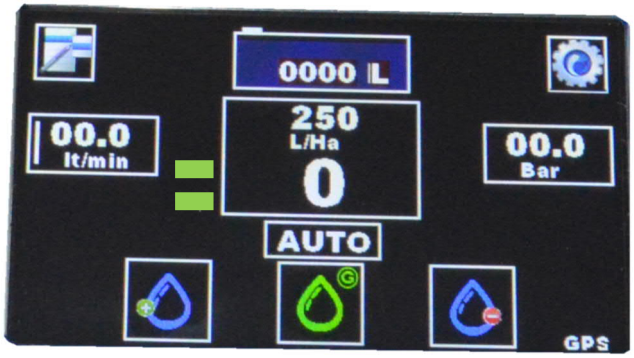
Main valve open 

Caution! If the main valve is closed, the movement of the section valves is inhibited.

4.1.2 Volumetric valve movement

By pressing the  or  symbol on the display you can move the volumetric valve.
If the computer is in automatic mode, pressing one of these two buttons will increase or decrease the programmed dosage by 10% (max 50%).

If the computer is in manual mode, pressing the  button increases the pressure in the system while pressing the  button decreases it.
The corresponding change appears on the display and a red or green rectangle indicates whether the value has been increased or decreased.



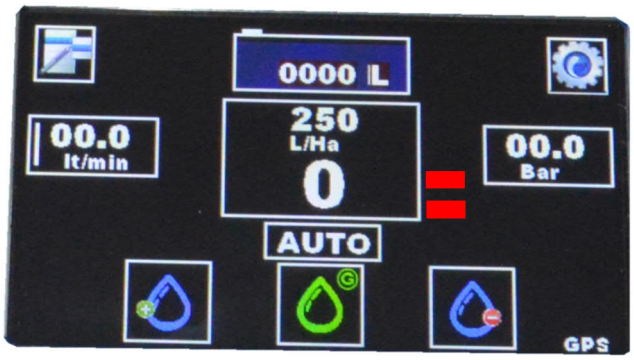


Fig. 14

In manual mode, the set value is not maintained automatically...

4.1.3 Automatic/Manual mode

The operating mode is shown in the central part of the display.

AUTO
MAN

Automatic or manual mode
When the operating unit is running, the computer automatically selects automatic mode.
To change over to manual mode, press the AUTO button on the display.
On the display, the text AUTO is replaced by the text MAN and the surrounding area is shaded in black. In manual mode, the volumetric valve can be moved by pressing one of the two buttons  or  The computer is not able to keep the dosage value constant when the functional parameters change.
It should be noted that the movements of the volumetric valve in this mode are slowed down in order to allow the operator greater sensitivity when adjusting the desired parameters.
To exit from MANUAL mode, simply press the text MAN on the display.

4.1.4 Dosage l/ha

During treatment the actual dosage dispensed is displayed at the centre of the screen. The programmed nominal value slightly above this. If the control system is working in automatic mode, the nominal and actual values must be almost identical. If the values do not match, check the table "problems and solutions".
The nominal value can be changed temporarily by entering manual mode, or by using the volumetric valve drive buttons.
The nominal value can be modified permanently by changing this value in the corresponding user program.

4.1.5 Flow rate l/min

During treatment the display shows the instantaneous flow rate value read by the flow meter, if present. If the system is regulated by pressure instead of flow rate, the flow rate value indicated is calculated based on the operating parameters present.

4.1.6 Pressure in Bar

During treatment the display shows the instantaneous pressure value read by the pressure transducer, if present. If the system is regulated by flow rate instead of pressure, the pressure value indicated is calculated based on the operating parameters present.

4.1.4 Liquid in the tank

During treatment, the display shows the value of the residual liquid present in the tank. This value can be displayed in two ways: as a percentage (%) if no tank load curve has been entered in the computer parameterization, or in litres (L) if the load curve is present in the system. When the value set as the reserve is reached, the residual liquid value becomes red.

4.2 ALARMS

When an alarm is activated it is shown on the treatment screen and the cause that triggered the alarm is shown on the display.
When an alarm occurs, an intermittent beep is activated and the backlighting of the display starts flashing. To silence the alarm, simply press a non-active part of the display (e.g. speed or pressure). Even if the alarm has been silenced, the backlight flashing persists until the fault is resolved.

The alarms that can be set/displayed are:

- Magnet pressure alarm;
- Minimum pressure alarm;
- Maximum flow rate alarm;
- Minimum flow rate alarm;
- Maximum speed alarm;
- Minimum speed alarm;
- Oil alarm;
- Drop alarm;

The alarm texts are translated into the selected language.
The drop alarm is an atypical alarm because it is not indicated either by an acoustic warning or by flashing of the display, but simply by the appearance of the drop symbol on the work screen.

WSC GPS

PROGRAMMING MENU

5 CONFIGURATION MENUS

To access the configuration menus section, press the area of the display on the main screen.

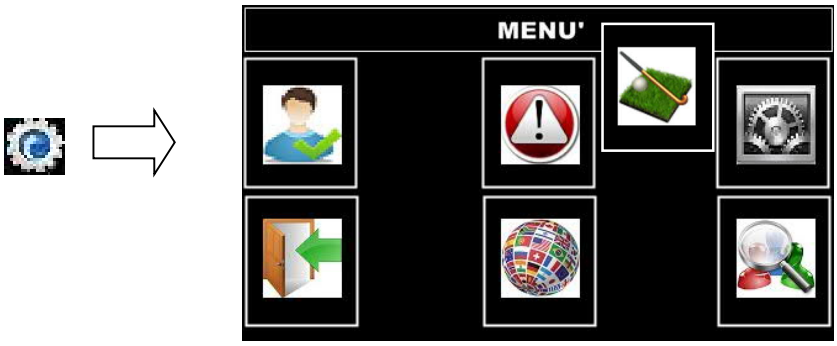


Fig.15

User menu

Manufacturer's Menu (password

Alarms menu

Reset Totalizers

Language selection menu

Graphic appearance setting menu

Exit

5.1 USER MENU

In the user menu you can configure all the settings required for end user management of the computer and to make it as functional as possible for the operator who uses it.



Fig. 16

Simulation speed setting

Tank liquid reserve

Exit

EU/US Unit of Measurement

System hardware

Filter/Alarm activation delay settings

Nozzle Pre-selection

Nozzle Programming

5.1.1 Simulation Speed Setting

Speed simulation should, if possible, be the speed at which treatment is normally carried out. Speed simulation is automatically used as replacement data if there is no speed signal available, e.g. speed sensor failure.

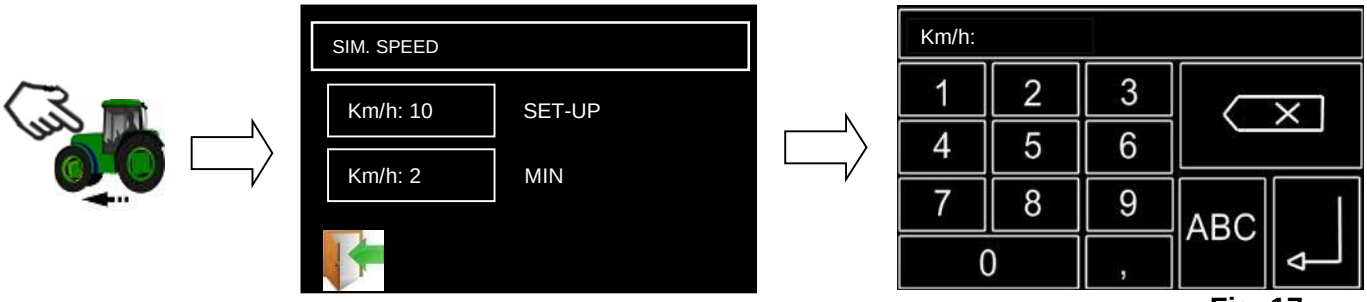


Fig. 17

In this menu you can set the desired simulation speed (parameter indicated by the text SIM). Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming by pressing enter will enable the change.
In this section you can also set the speed at which all sections will be closed automatically (parameter indicated by the text MIN).

5.1.2 Tank Reserve Setting

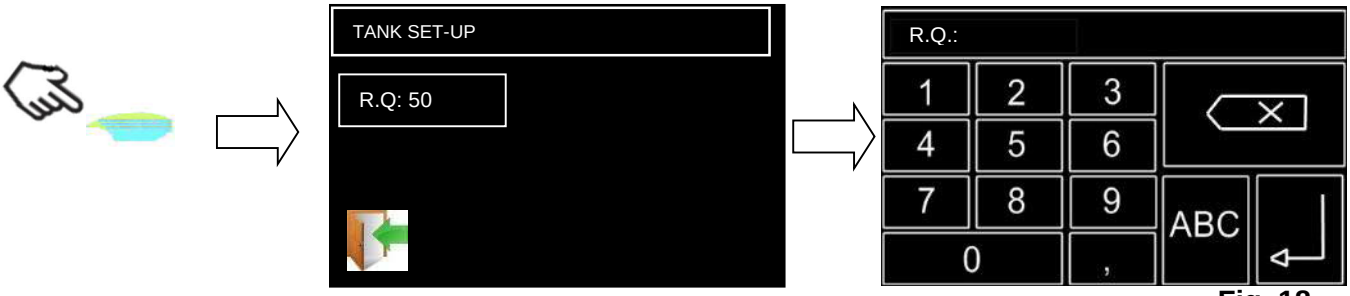


Fig. 18

In this menu you can set the value for the liquid reserve in the tank. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

5.1.3 System hardware status

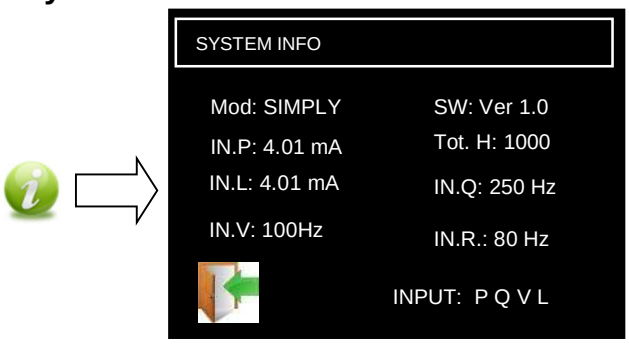


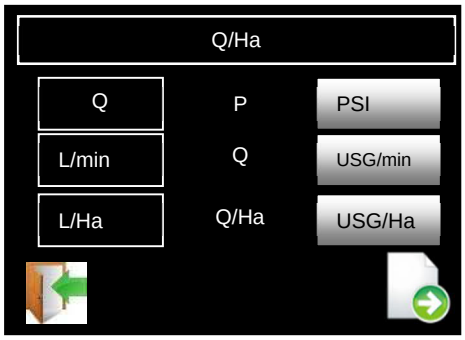
Fig. 19

This menu read-only. No changes or programming is possible.

This page shows the computer model and firmware version, the status of system inputs and total hours of operation.

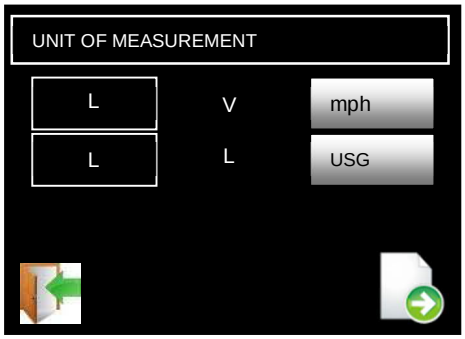
Mod.: identifies the computer model
SW.: identifies the version of the software installed on your computer
IN.P: identifies the current value of the pressure transducer.
Tot.H : identifies the total number of hours worked by the computer.
IN.L: identifies the current value of the tank liquid transducer.
IN.Q : identifies the frequency value of the flow rate transducer.
IN.V : identifies the frequency value of the speed transducer.
IN.R : identifies the frequency value of the pump rpm transducer (RPM).
INPUT : identifies which inputs have been detected.
(P pressure, Q flow rate, V speed, L tank, R pump rpm).

5.1.4 Unit of Measurement Setting



In this menu you can select the desired units of measurement and associate them to each quantity. Simply press on the relevant new unit of measurement in order to change it.
Then press the Exit button to return to the top level of the menu.
Press the down arrow key to move to the next page.

Fig. 20



P	Pressure
Q	Flow rate
Q/Ha	Dosage
V	Speed
L	Tank liquid quantity

Fig. 21

5.1.5 Filters and Alarm Delay setting

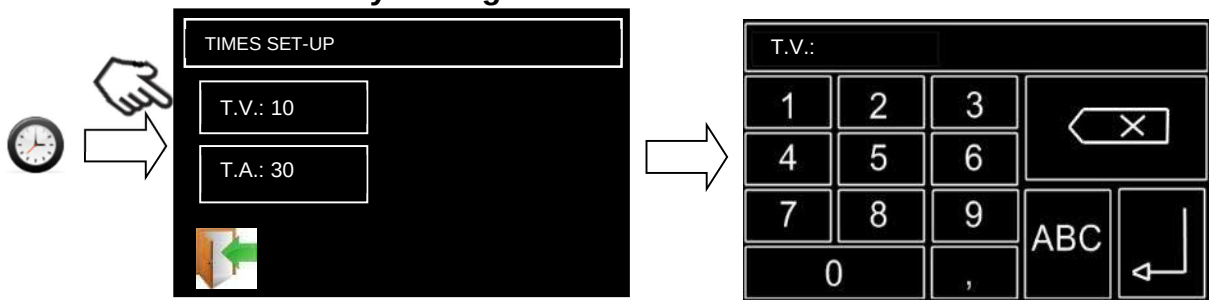


Fig. 22

In this menu you can set a filter for the display stability of the parameters displayed on the main screen **T.V.**. This value has a range from 1 to 99: the larger the number, the more stable the display will be. ***Changing the parameter does not reduce the proportional valve regulation time.***
Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming by pressing enter will enable the change.

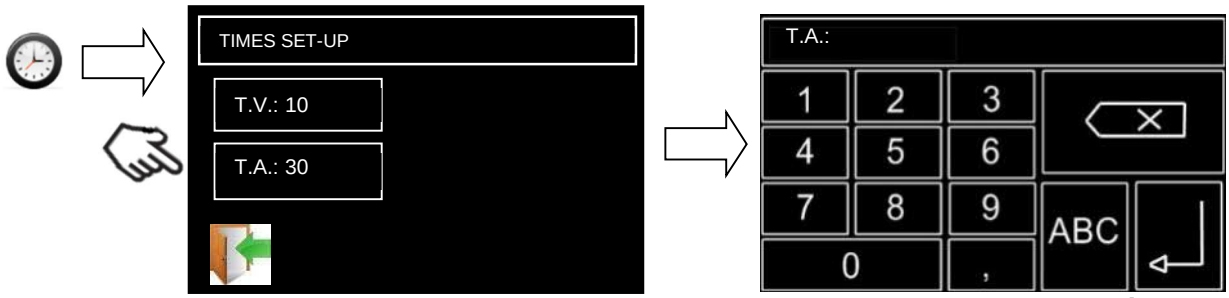


Fig. 23

On this page you can also set the delay time for signalling alarm status **T.A.** expressed in seconds. The alarm signal delay is used to allow the system or the operator to avoid receiving incorrect signals due to transients of the system, for example during the product delivery start and end phases. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming by pressing enter will enable the change.

5.1.6 Nozzle Setting

In this menu the nozzle database is created. The data entry structure is the same as the one shown in the technical specifications for the nozzles issued by the manufacturers. You can enter a maximum of 7 nozzles, to which you can associate a name of up to 11 characters. For each nozzle you can enter 6 working ranges, with a drop type in each range as required.

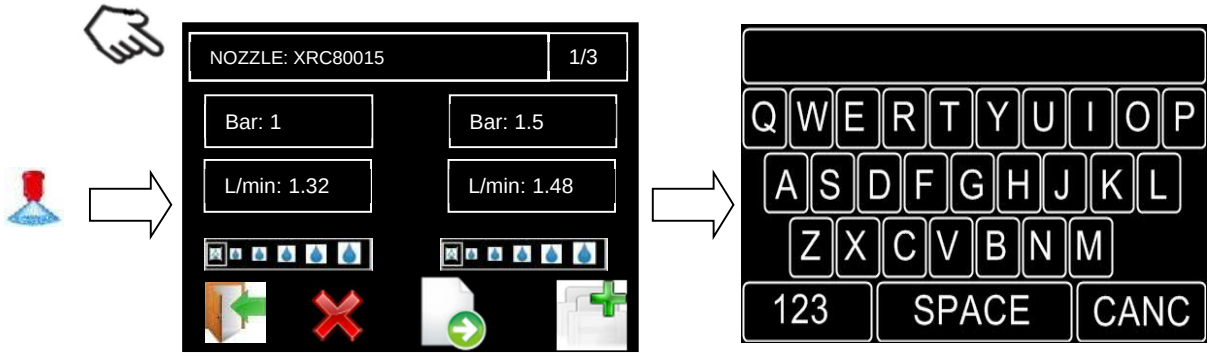


Fig. 24

By pressing next to “NOZZLE:” on the display you can assign a name to the nozzle you are inserting (max 11 characters). You can enter numbers and letters using the keypad. To save space, the keyboard has been divided into two parts. By pressing the ABC and 123 keys you can enable the portion of the letters that are not displayed or the numeric keypad.

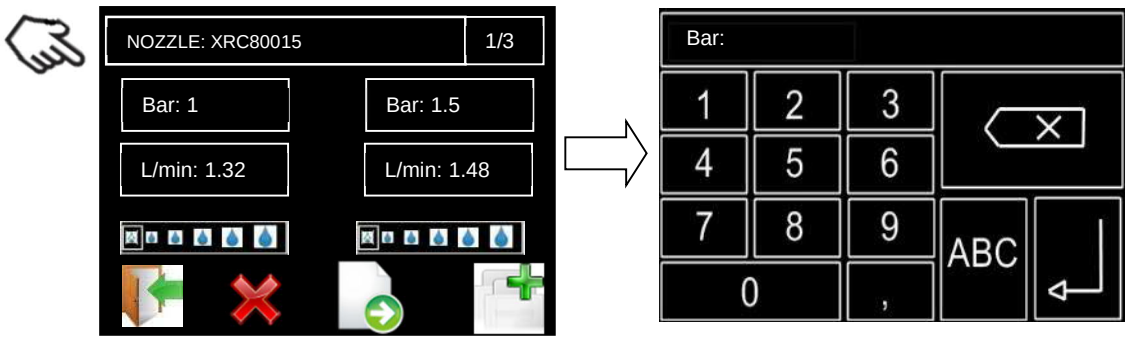


Fig. 25

By pressing the display on the Bar parameter, you can enter the first operating pressure indicated by the manufacturer.

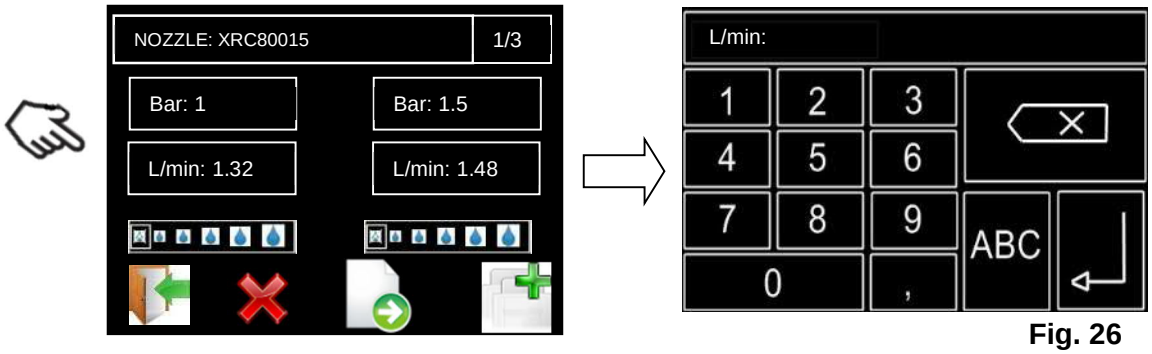


Fig. 26

By pressing the display on the L/min parameter, you can enter the flow rate for the first operating pressure indicated by the manufacturer.

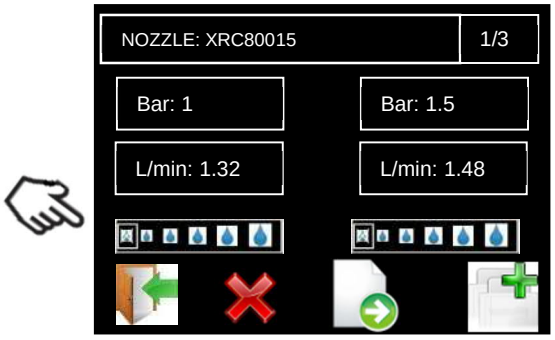


fig. 27

By pressing the display on the parameter indicating the drop type, you can enter the drop size indicated by the manufacturer next to the fields previously entered. You can then repeat the above operations for the remaining fields on the screen. Since it is possible to enter 6 operating ranges but only two are displayed per screen, you have to press the key to enable input for the following fields. **It is not mandatory to enter all 6 nozzle operating ranges: 2 are sufficient.**
If the drop type is not present or if you do not want to enable the drop alarm for this nozzle, simply set the drop indicated with the symbol in all the fields that are filled in. When you have finished filling in all the data, to make the parameters effective, press the button.

You can scroll and view all loaded nozzles using the button.

5.2 ALARM MENU

In the alarm menu you can activate and deactivate the various available alarms. Alarms are deactivated by setting the parameters of each sub-menu to the value 0. By entering a value other than 0 the alarm becomes active.

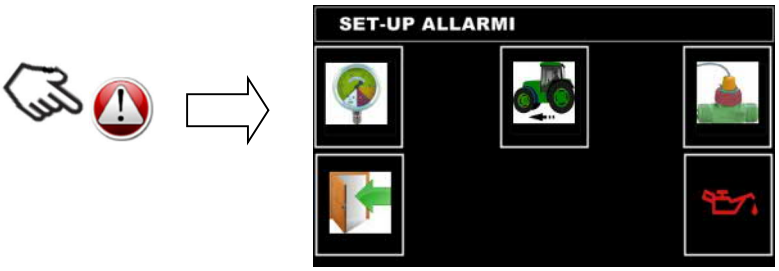


Fig. 28


Pressure alarm setting


Flow-rate alarm setting


Exit


Speed alarm setting


Oil alarm setting

5.2.1 Pressure Alarm Setting

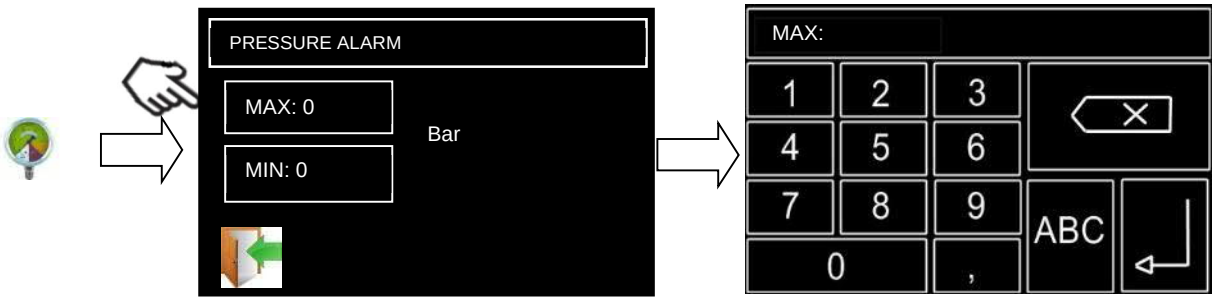


Fig. 29

In this menu you can set the pressure value above which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

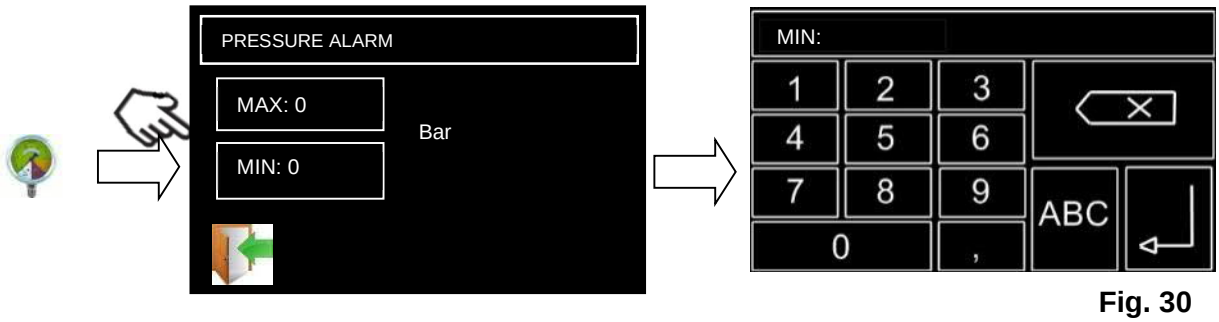


Fig. 30

In this menu you can set the pressure value below which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

5.2.2 Flow Rate Alarm Setting

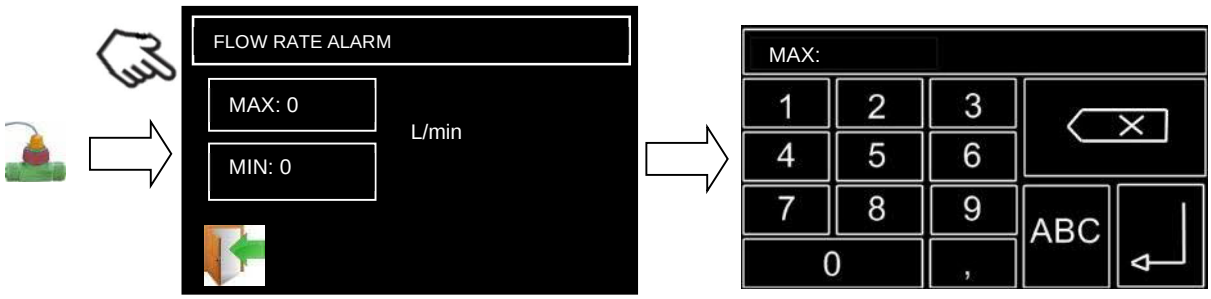


Fig. 31

In this menu you can set the flow rate value above which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

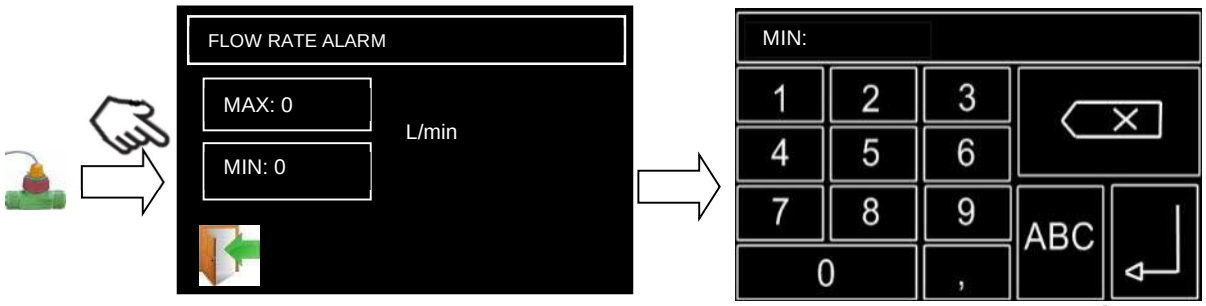


Fig. 32

In this menu you can set the flow rate value below which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

5.2.3 Speed Alarm setting

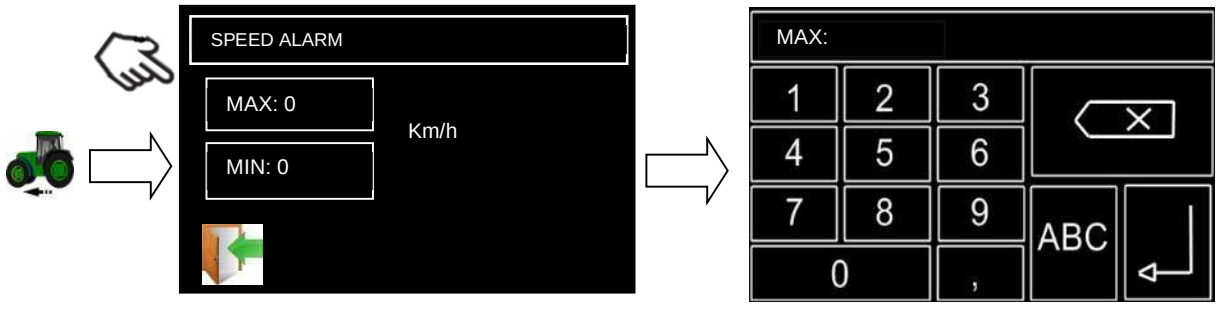


Fig. 33

In this menu you can set the speed value above which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

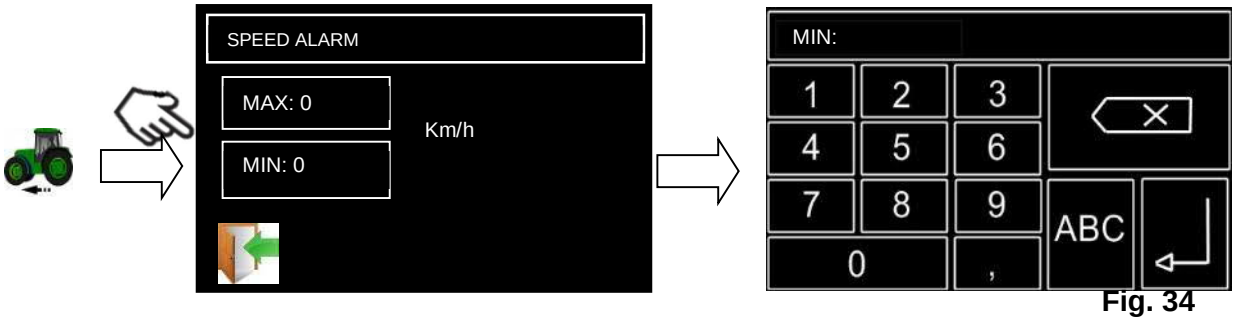
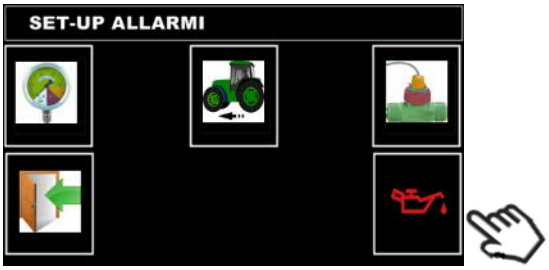


Fig. 34

In this menu you can set the speed value below which the alarm will be activated. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

5.2.4 Oil Alarm Setting

To enable the oil alarm there is no need to enter any parameter. Simply press on the oil icon, which will change status from active to inactive or vice versa.




oil alarm not active


oil alarm active

Fig. 35

5.3 MANUFACTURER'S MENU

The manufacturer's menu allows configuration of the mechanical parameters related to the machine. For reasons of safety, this menu is password protected so that it is not freely accessible by the end user.



Fig. 36

Speed transducer setting

Pressure transducer configuration

Flow meter configuration

Tank loading curve and level transducer settings

Rpm sensor configuration

Import/Export Computer Configuration

Exit

Presetting nozzles

User Nozzle Creation

Boom Geometry Configuration / Atomizer Geometry Configuration

5.3.1 Pressure transducer setting

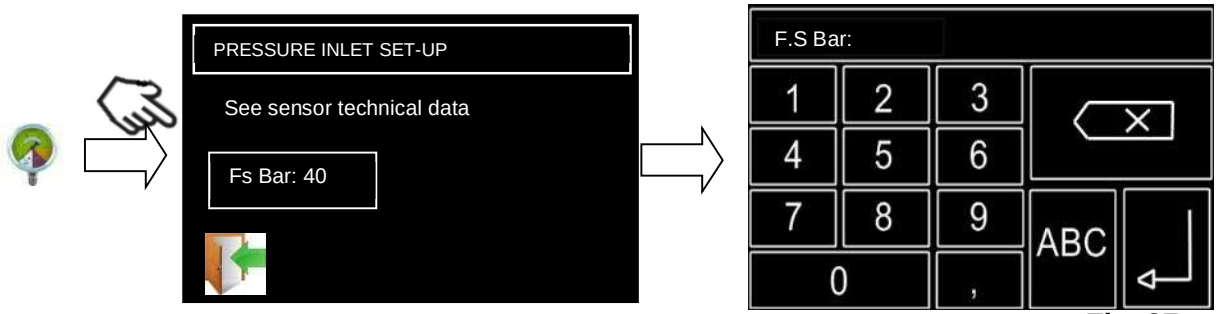


Fig. 37

In this menu you can set the full-scale value of the pressure transducer. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing. You can get this value from the rating plate on the transducer itself.

5.3.2 Flow Meter Setting

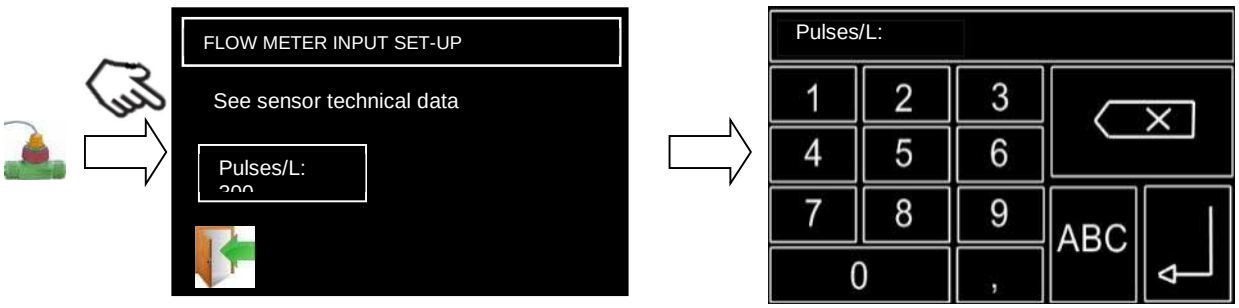


Fig. 38

In this menu you can set the value of the pulses per litre for the flow meter. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing. You can get this value from the rating plate on the transducer itself.

5.3.3 Speed transducer setting

The speed transducer is a sensor that can transmit a certain number of pulses per metre travelled. Several types of sensors can perform this function. The most common one is a proximity sensor that reads a certain number of metal bodies (e.g. wheel bolts) at every turn. Alternatively a radar sensor mounted on the tractor can also be used. In this case, the number of pulses must be set manually according to the information in the use and maintenance manual for the transducer.

To calculate the driving speed, the system must know how many pulses the speed sensor emits per metre of distance travelled. The number of pulses depends on the wheel circumference and the number of detectors read per revolution. (*For calculation see paragraph 8.5*)

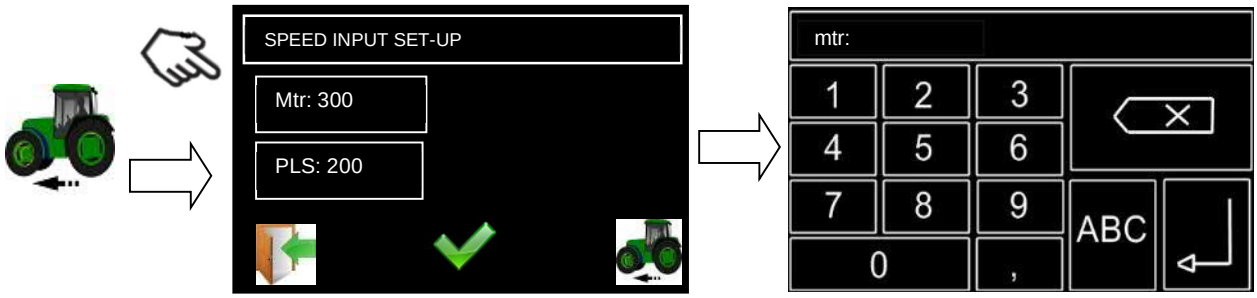


Fig. 39

In this menu you can set the value of the meters within which the number of pulses is known. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

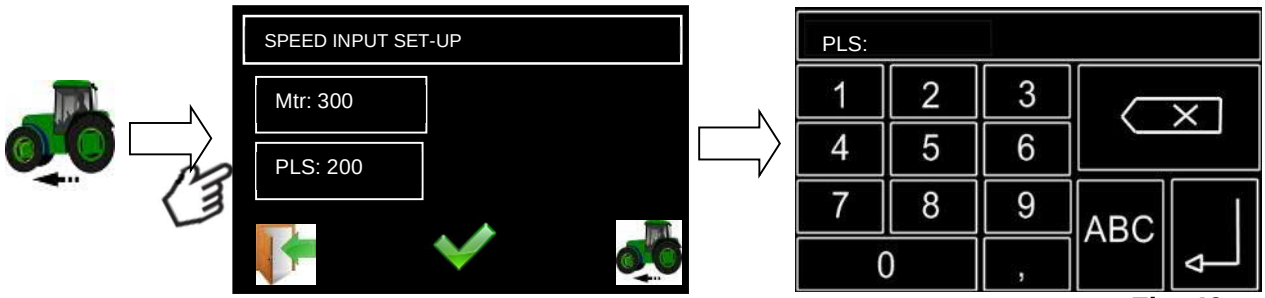


Fig. 40

In this menu you can set the value of the pulses read in the meters indicated previously. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key enables editing.

5.3.4 Speed transducer self-calibration

It is also possible to perform speed sensor self-calibration.
To perform the self-calibration, you must enter the value of the meters you intend to travel.

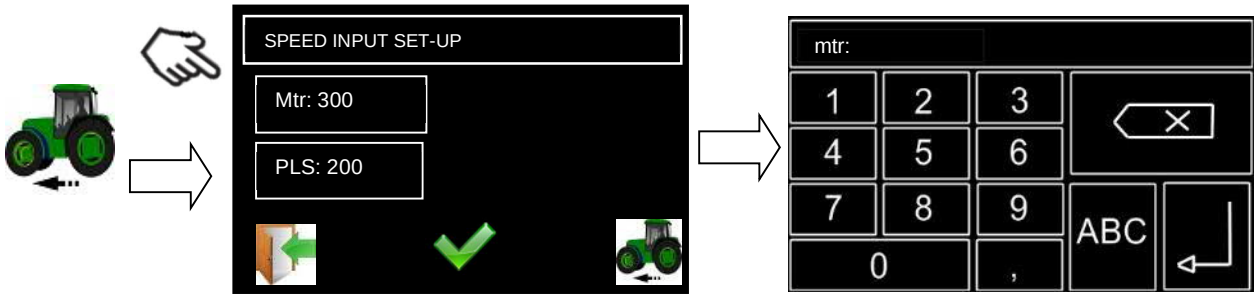


Fig. 41

Next, press the button with the tractor symbol. The start of the procedure is preceded by an intermittent buzzer sound, when the text GO!! appears. You can now start driving the vehicle forward.

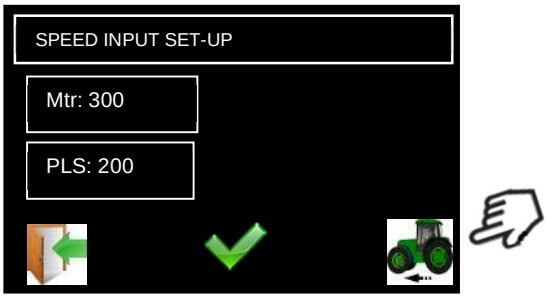


Fig. 42

As you move forward, the number of pulses detected is shown in the PLS field on the display. Once you have travelled the set distance to complete acquisition of the number of pulses, simply press any point on the screen. From this point onwards, even if you travel several meters, the number of pulses detected will not be increased.

To finish acquisition and store the data detected, press the button.

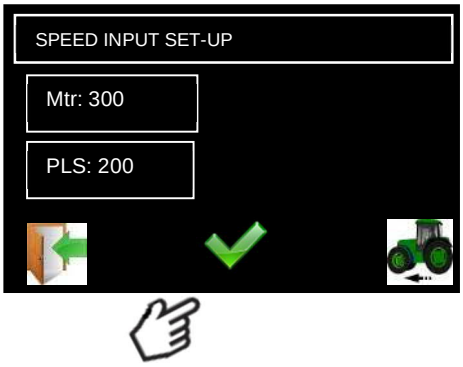


Fig. 43

5.3.5 Tank parameter setting

To calculate the amount or level of residual liquid in the tank, a pressure transducer that reads the water column inside the tank must be used. The system must know the full scale of the transducer (expressed in bar) and the height of the tank (expressed in meters). **These two values are enough to display the percentage of the height of the liquid present.**

If you want to know the value of the litres contained in the tank, you must enter the tank load curve. The load curve is divided into 10 percentage points to which the relative amount of liquid can be associated.

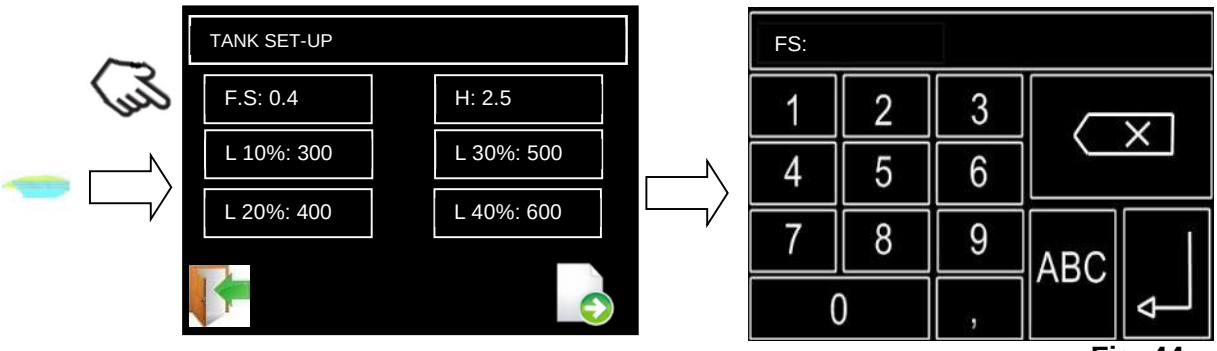


Fig. 44

In this field you can set the full-scale value of the pressure transducer used for measuring the water column in the tank. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

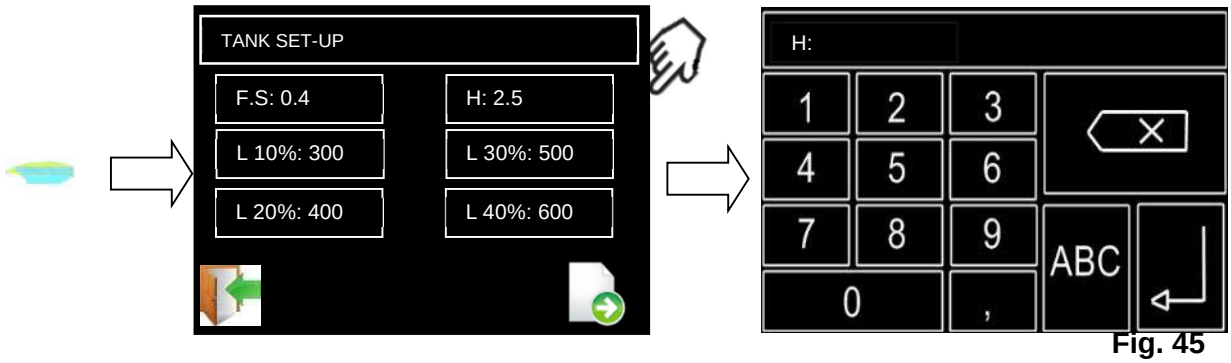


Fig. 45

In this field you can set the tank height value (expressed in meters). Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

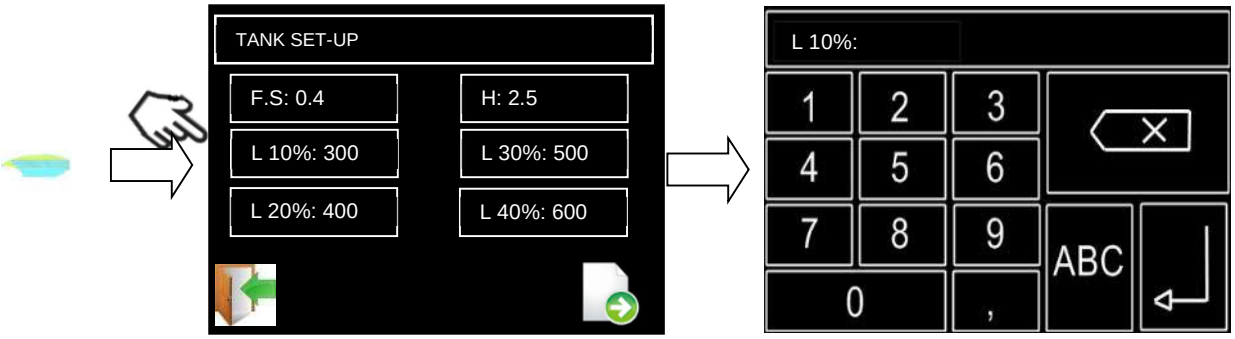


Fig. 46

In this field you can set the amount of liquid (litres) in the tank when 10% full. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

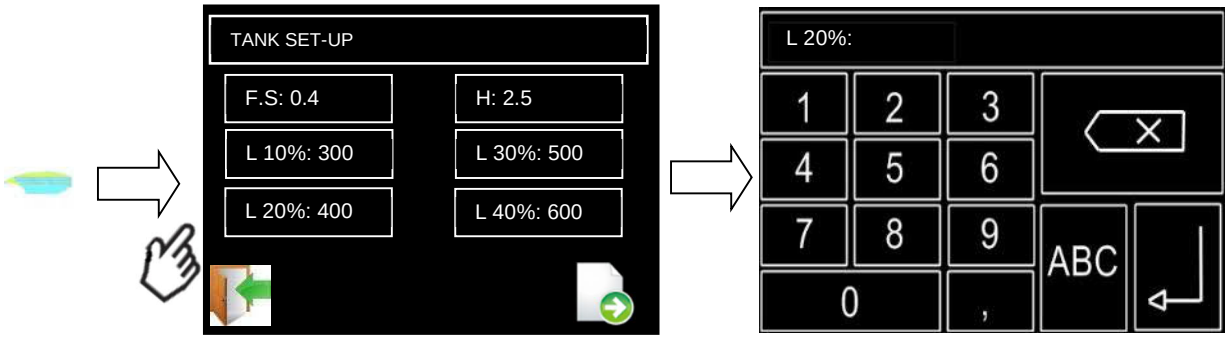


Fig. 47

In this field you can set the amount of liquid (litres) in the tank when 20% full. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

Proceed as described above for all the points on the load curve.

<u>You do not need all 10 points. Instead you can enter just the 10% and 100% values</u>. The number of points to be entered in the load curve depends on the geometry of the tank and the precision you want to give the operator.

5.3.7 RPM sensor configuration

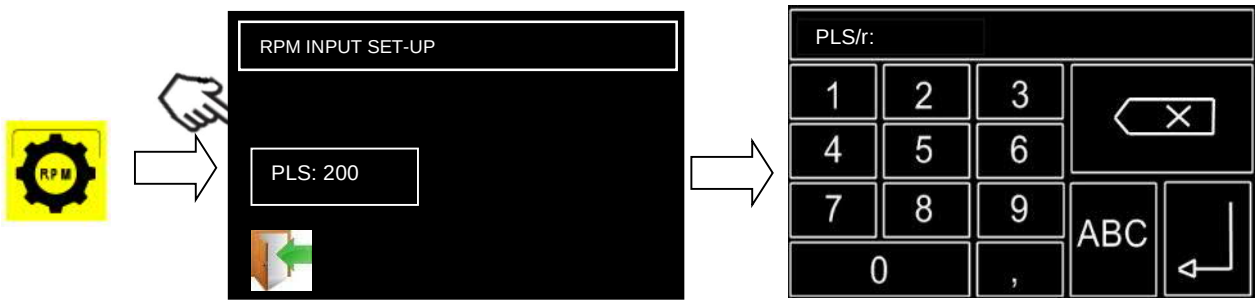


Fig. 48

In this menu you can set the value of the pulses per revolution of the PTO (or other rotating components depending on the location of the sensor) in order to obtain the rpm of the pump. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

5.3.8 Boom Geometry Configuration

To calculate the correct dosage distribution, it is essential to know how the sprayer boom is structured: number of sections, section size, distance between nozzles.

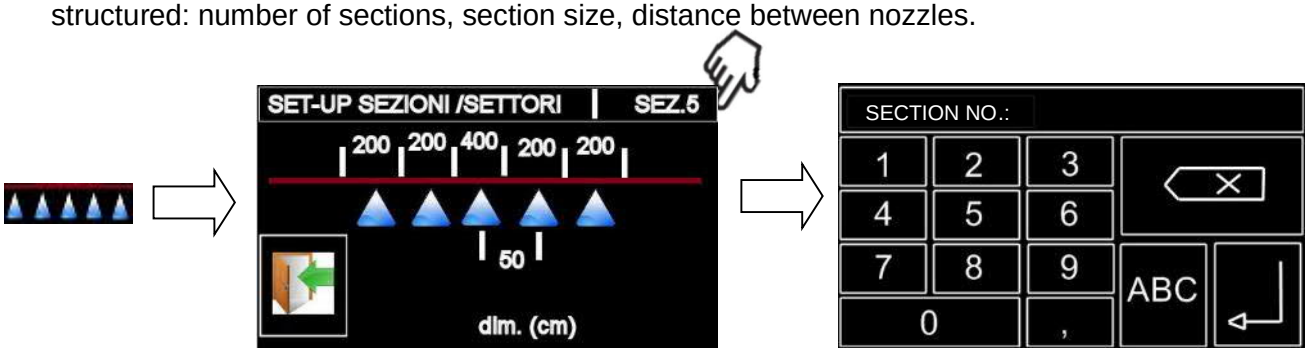


Fig. 49

In this field you can set the value of the number of boom sections (MAX 7). Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change. Changing this parameter involves enabling/disabling the fields relating to the size of the sections.



Fig. 50

In this field you can set the value of the distance between the nozzles (expressed in cm). Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

The sizes of individual sections must be entered from the outermost section on one end to the outermost section on the other.

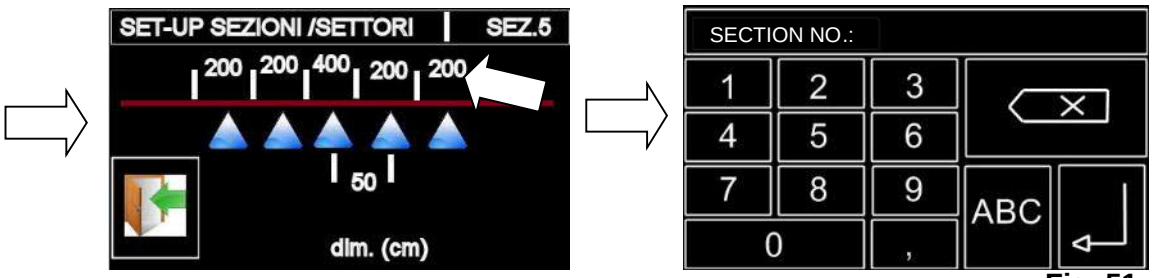


Fig. 51

The boom is sized simply by dimensioning the graphic representation. The dimensions of each individual section will be inserted in cm. When you press the display on the dimension you wish to set, a data entry window will appear in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.
Proceed as described above for all the enabled sections.

5.3.9 Import/Export Parameter Configuration

To perform this procedure, you need an SD CARD that must be inserted in the slot on the left side of the computer (SEE DIAGRAM ON PAGE 9).

In this section of the menu you can export or import the full configuration of the WSC computer.



Fig. 52

This procedure can be especially convenient if you need to prepare more than one machine at the same time because after configuring the first computer, you can export the data from the newly configured computer and import them onto the other computers, thus avoiding the need to enter all the configuration parameters manually.

5.3.9.1 Export parameter Configuration

The export procedure starts by pressing the touchscreen on the data export field. A screen will then appear in which you must enter the name you want to give to the export file. When you press the enter key, which confirms the name entered, the data will be exported to the SD card into a file with the name entered.



Fig. 53

When the export step is completed, a report is displayed on the screen indicated whether or not the parameters have been exported.



Fig. 54

To complete the procedure, simply press anywhere on the screen.
The file created has the extension .cfg. You are advised not to edit it using a PC.
Remarks on the file name:

- the file name must have a maximum length of 8 characters.
- the name must not contain the space character
- it must not contain the extension or the type (.cfg) (this will be added automatically)

Following the example shown above, you only need to enter the text preceding the . (dot) CONFIG1

5.3.9.2 Import Parameter Configuration

The import procedure starts by pressing the touchscreen on the data import field. A screen will then appear containing a list of the configuration files present on the SD card.

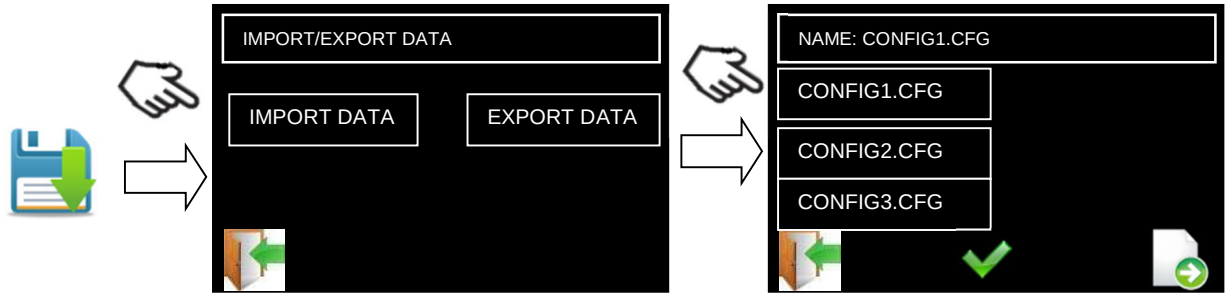


Fig. 55

When you press on the name indicating the file to be loaded, the name of the file you want to load will be displayed at the top of the screen.

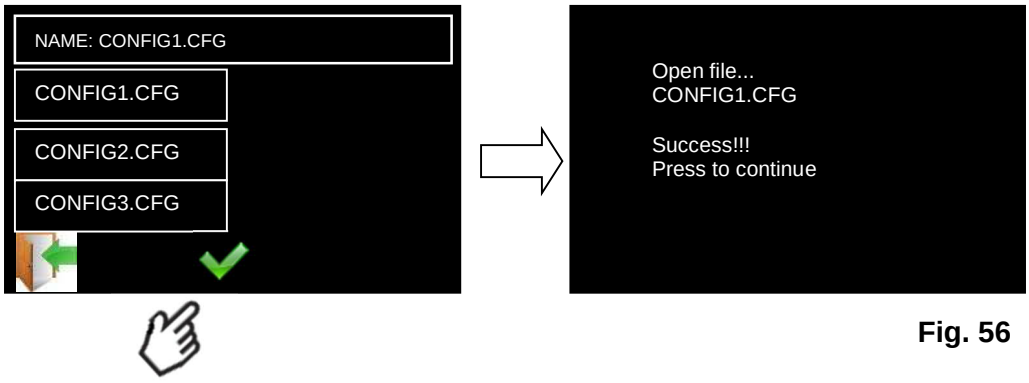


Fig. 56

Pressing the ✔ button will load the data contained in the selected file.
In this case too, a screen will appear summarizing the success or failure of the operation.

5.3.10 Presetting nozzles

In this menu you need to preload the nozzles mounted on the machine so that when the user is creating dosing programs, only nozzles actually present will be available and not a list of items that could be confusing. A maximum of four nozzles can be preloaded.

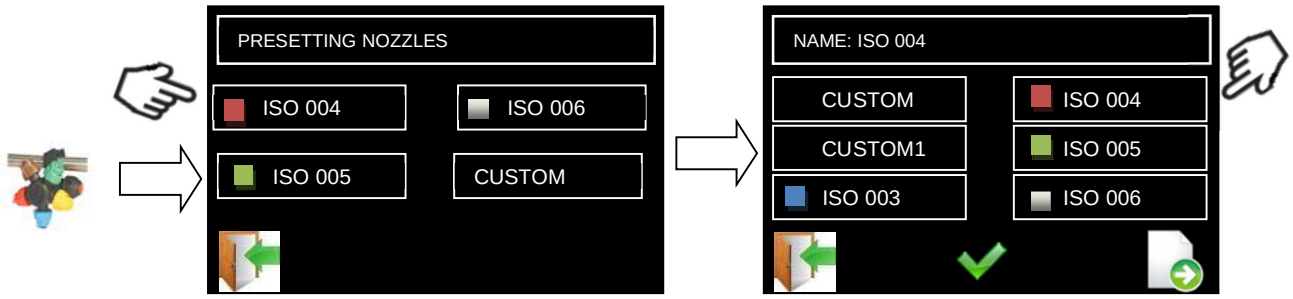


Fig. 57

The nozzles to be preloaded are assigned by filling in the 4 areas present in the input screen of the menu. By pressing on each of these areas a list of nozzles is displayed from which you can choose. When you press on the nozzle you want to load, the top of the screen will be filled in with the chosen nozzle. Then when you press the button, the selection is confirmed. Press the exit button to return to the previous screen. At this point you can fill in the remaining three pre-selection fields. The "database" from which you can preload the nozzles consists of:

- ISO nozzles
- custom nozzles (if inserted)

The ISO nozzles present are:
ISO 01, ISO 015, ISO 02, ISO 025, ISO 03, ISO 04, ISO 05, ISO 06, ISO 07, ISO 08, ISO 10, ISO 15

5.3.11 Setting Nozzles

In this menu the nozzle database is created. The data entry structure is the same as the one shown in the technical specifications for the nozzles issued by the manufacturers. You can enter a maximum of 7 nozzles, to which you can associate a name of up to 11 characters. For each nozzle you can enter 6 working ranges, with a drop type in each range as required.

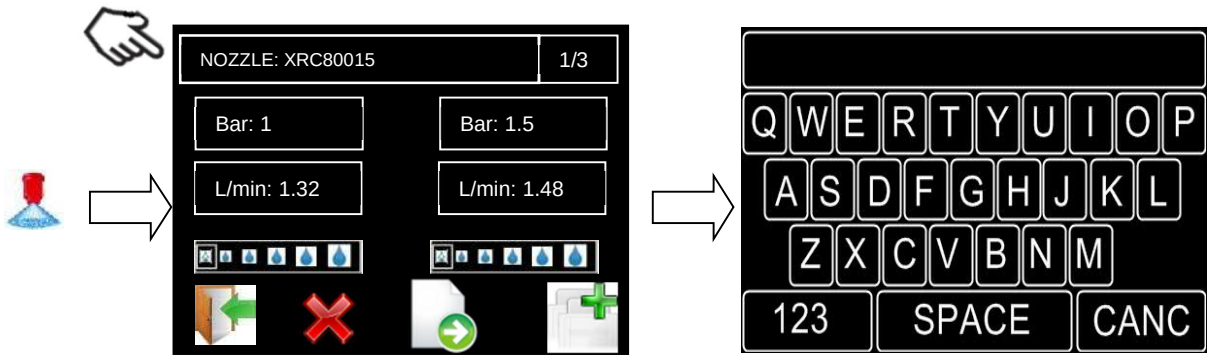


Fig. 58

By pressing next to "NOZZLE:" on the display you can assign a name to the nozzle you are inserting (max 11 characters). You can enter numbers and letters using the keypad. To save space, the keyboard has been divided into two parts. By pressing the ABC and 123 keys you can enable the portion of the letters that are not displayed or the numeric keypad.

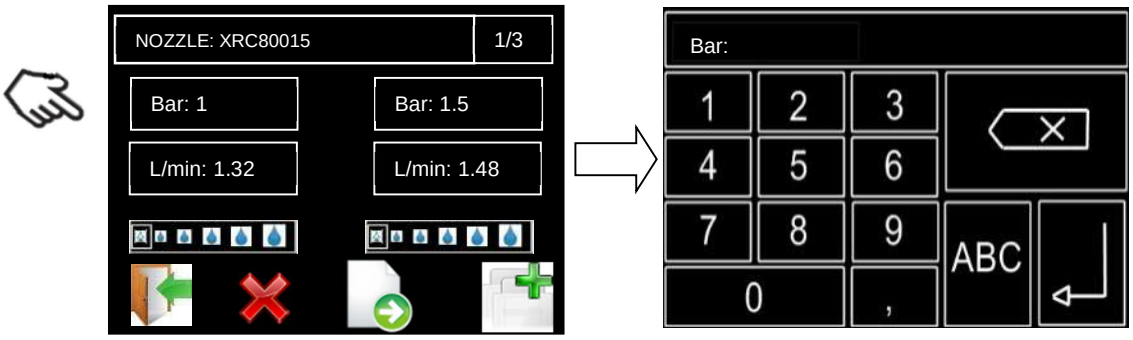


Fig. 59

By pressing the display on the Bar parameter, you can enter the first operating pressure indicated by the manufacturer.

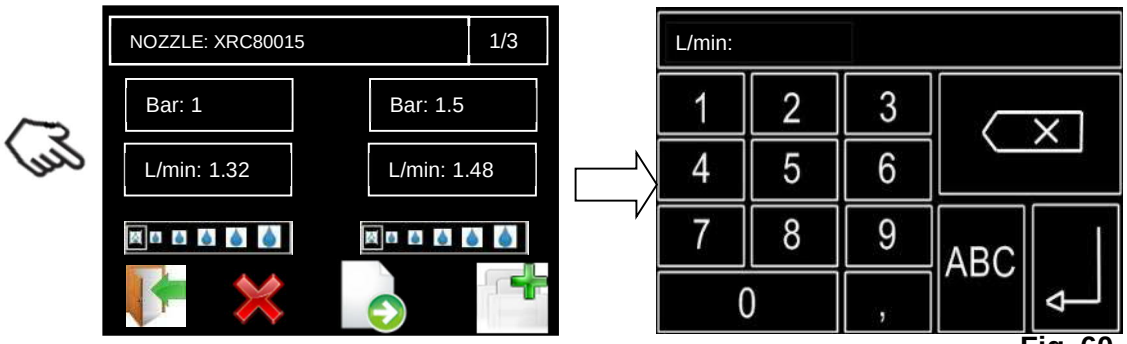


Fig. 60

By pressing the display on the L/min parameter, you can enter the flow rate for the first operating pressure indicated by the manufacturer.

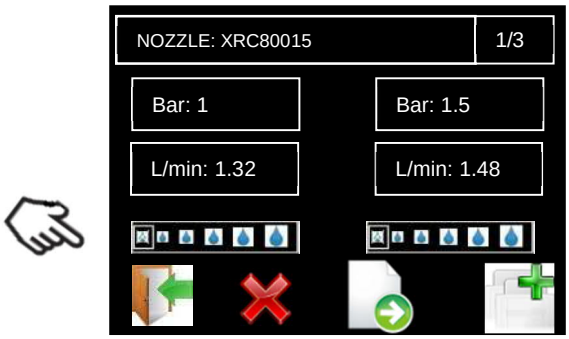


Fig. 61

By pressing the display on the parameter indicating the drop type, you can enter the drop size indicated by the manufacturer next to the fields previously entered. You can then repeat the above operations for the remaining fields on the screen. Since it is possible to enter 6 operating ranges but only two are displayed per screen, you have to press the key to enable input for the following fields. **It is not mandatory to enter all 6 nozzle operating ranges: 2 are sufficient.**
If the drop type is not present or if you do not want to enable the drop alarm for this nozzle, simply set the drop indicated with the symbol in all the fields that are filled in. When you have finished filling in all the data, to make the parameters effective, press the button.

You can scroll and view all loaded nozzles using the button.

5.4 LANGUAGE SETTING

In this menu you can select the desired language. Simply press on the flag indicating the country of the language you want to use.
Then press the Exit button to return to the top level of the menu.

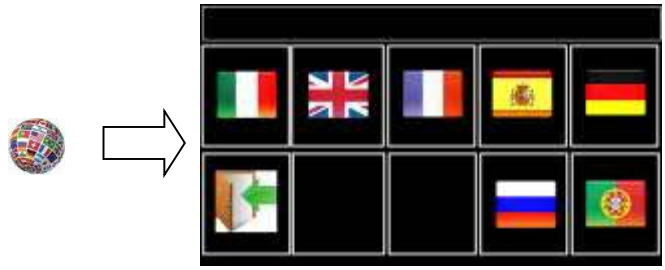


Fig. 62

5.5 USER SETTINGS

In this menu you can select the background and text colours on the display.
By selecting the TEXT CL parameter, you can change the colour of the text.

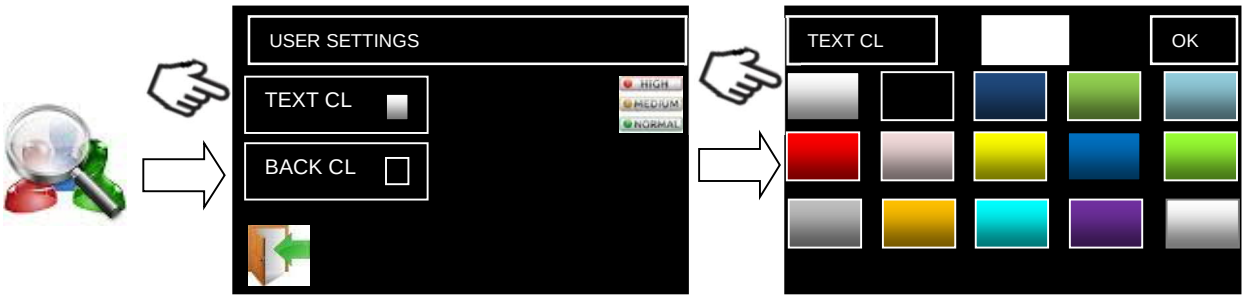


Fig. 63

After selecting the desired colour, which appears in the central box next to the text of the field being changed, pressing OK will enable the selection

By selecting the BACK CL parameter, you can change the background colour.

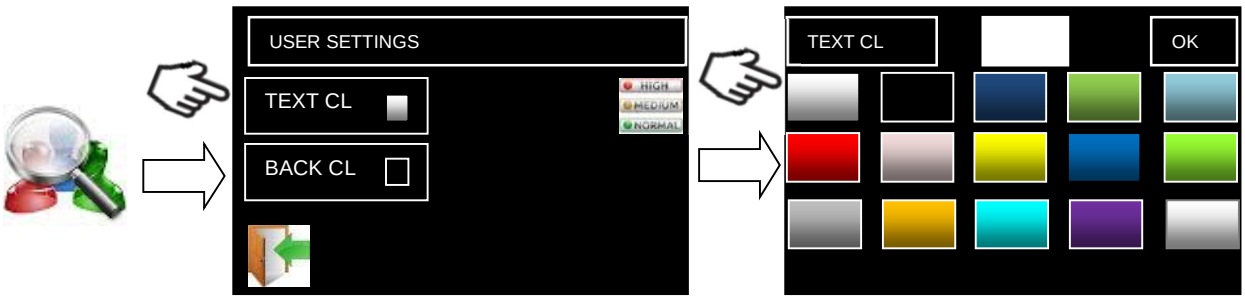


Fig. 64

After selecting the desired colour, which appears in the central box next to the text of the field being changed, pressing OK will enable the selection

In this section you can also change the level of the user. By pressing the key and positioning the red cursor on the selected level, you can change the type of user. The changes become active when you exit the menu.

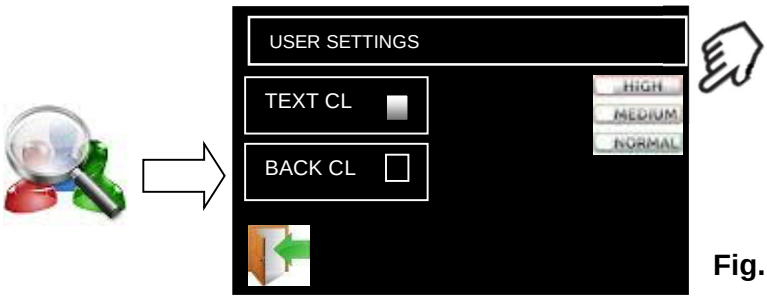


Fig. 65

5.6 RESET TOTALIZERS

This menu displays the amount of litres distributed and the hectares treated.

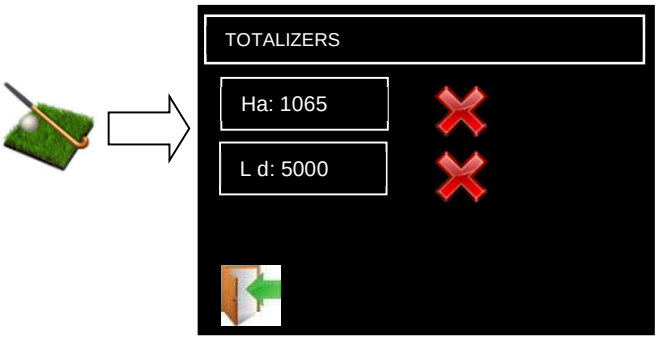


Fig. 66

You can reset the displayed values to zero by pressing the corresponding red X.

5.7 PROGRAMS MENU

The dosing program that will be used for distributing the product is configured in this section. It is possible to create up to 5 programs. Each program is identified by a number (e.g. 1/5, 2/5, etc.)

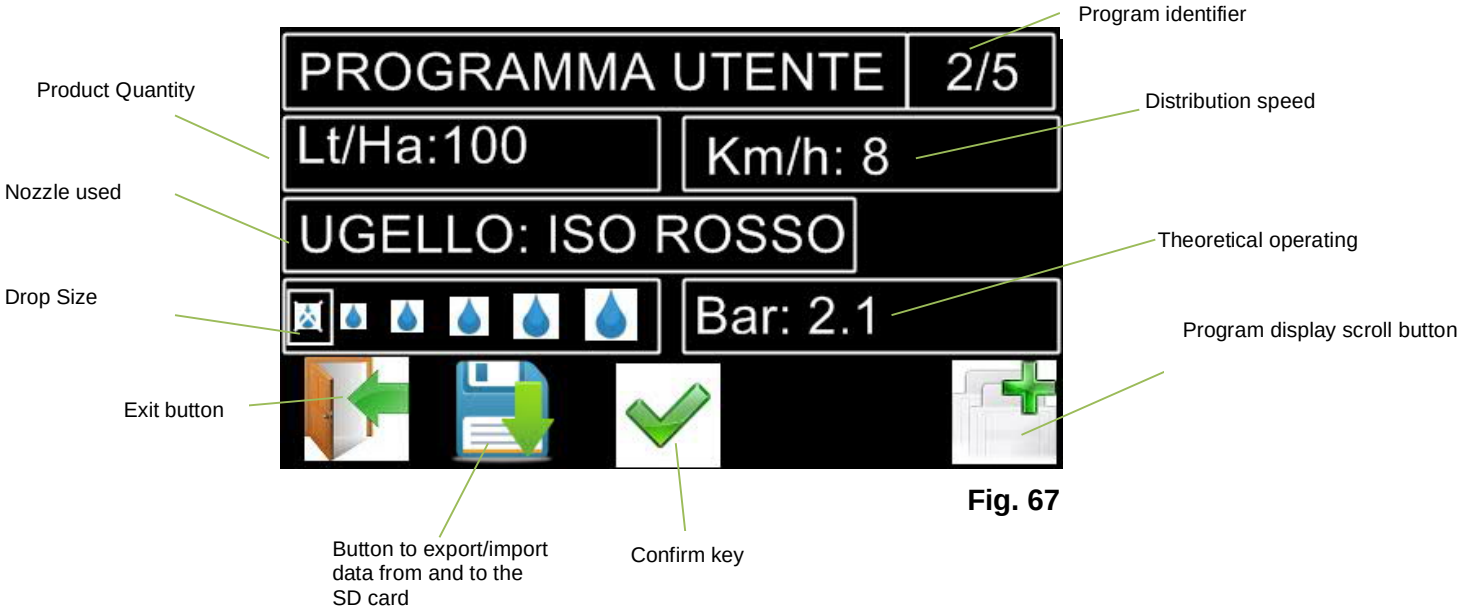


Fig. 67

To load and run the treatment program, simply scroll through the programs using the key. Once you have identified the desired program, press the key to exit. The treatment data for the loaded program will be displayed in the main screen.

5.7.1 Creating a new program

Press the display on the button indicated by the symbol.

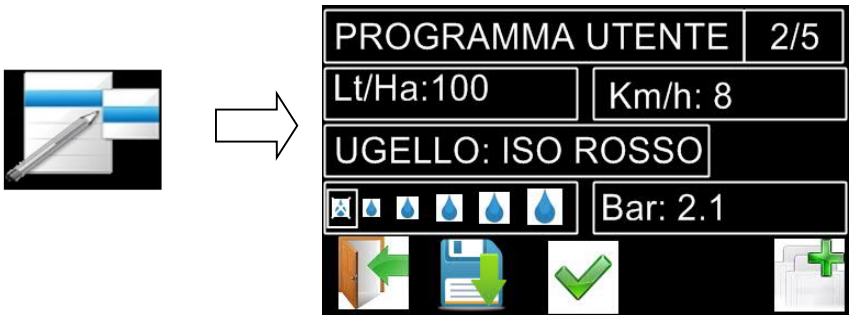


Fig. 68

Scroll through the programs present down to the last available empty program. If 5 programs have already been created, you will have to modify an existing one.

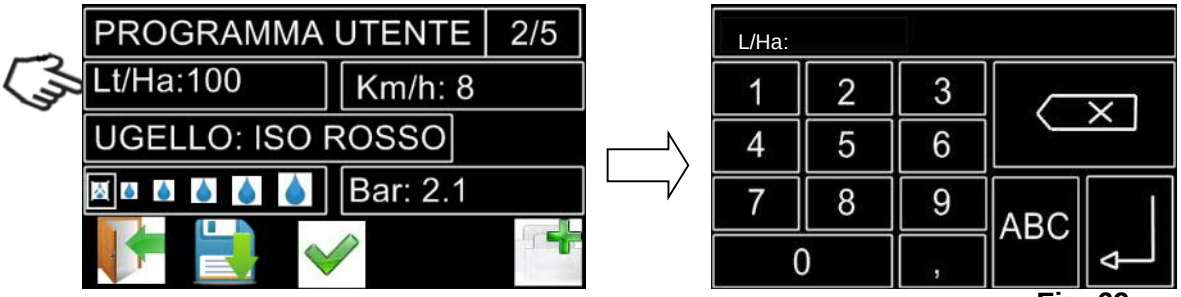


Fig. 69

In this field, you can set the value of the litres per hectare that you wish to dispense. Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.

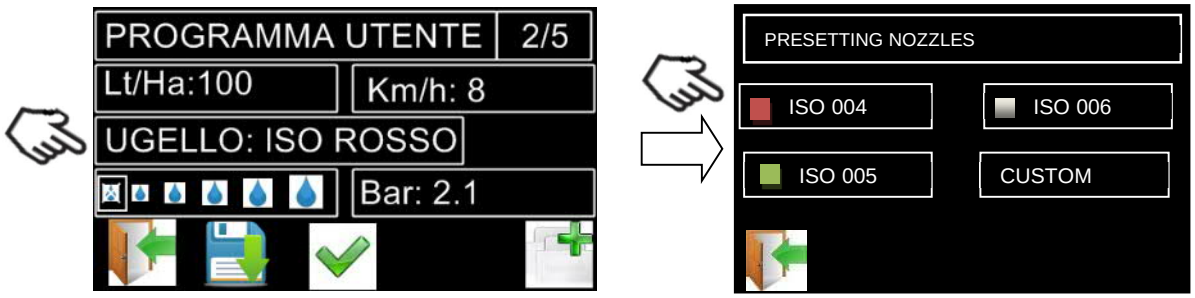


Fig. 70

In this field you can set the nozzle you want to use in the treatment. The nozzle to be loaded is selected from among the pre-programmed ones. Pressing on the parameter enables editing. A data entry window will appear, in which you can select the new nozzle to be used in the program. Confirming with the Exit key will enable the change.



Fig. 71

In this field you can enable or disable the drop alarm signal according to the desired size. Pressing on the parameter enables editing.
If the drop size for the selected nozzle is not present in the database, a **?** will appear next to the nozzle loaded. During data entry, program operation is simulated. The theoretical operating pressure and the corresponding type of drop size are calculated based on l/ha, km/h and nozzle type. If the drop size that is set is different to the drop size calculated in the simulation, a > or < symbol appears in place of the **?** symbol, prompting the operator to increase or decrease the drop size.

In this field you can set the value of the simulation speed or the speed you expect to maintain during the treatment. The default value suggested is the value stored in the simulation speed user menu. **Changes in this parameter automatically change the simulation speed if the created program is confirmed.**

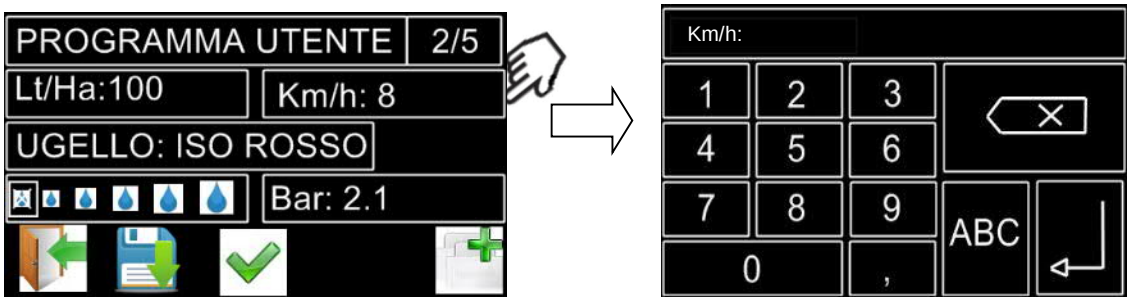


Fig. 72

Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change.
Based on the data entered so far, the simulation is performed automatically, indicating the theoretical operating pressure.

(**Only valid for atomizer version**)
In addition to the data described previously, an additional field must be added in dosing programs for atomizers: the distance between one row and the next to be treated.

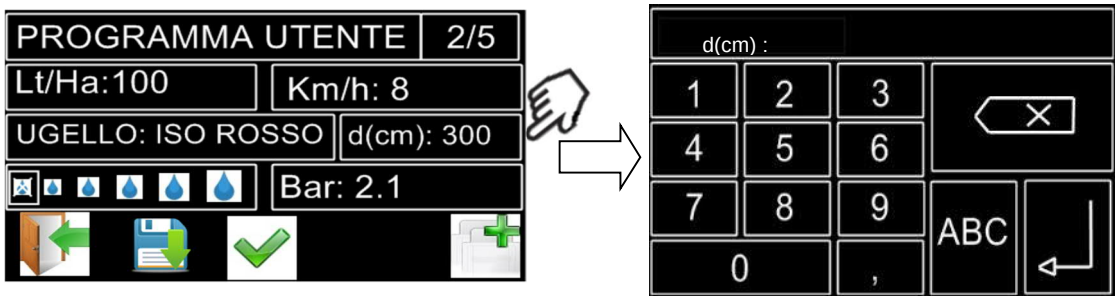


Fig. 73

Pressing on the parameter enables editing. A data entry window will appear, in which you can insert the new value of the parameter. Confirming with the Enter key will enable the change. The unit of measurement of the distance is expressed in cm.

After entering all the data, to make the program effective press the button. If you do not press the confirm button the program will not be saved and will be lost. It was decided to include a button to confirm the insertion of a program so that the operator would be free to perform all the desired simulations.

5.7.2 Import/Export treatment programs

To perform this procedure, you need an SD CARD that must be inserted in the slot on the left side of the computer (SEE DIAGRAM ON PAGE 9).

In this section of the menu you can export or import the dosing programs of the computer.



Fig. 74

This procedure can be useful for creating an archive of the products distributed.
The information extracted includes:

- Chemical product dispensed
- The name of the field treated
- Work start date and time
- Work end date and time
- Dosage
- Theoretical operating pressure
- Nozzle Name
- Treatment speed set
- Hectares Treated
- Litres dispensed

The program to be exported or to be possibly replaced in the case of importing from an SD card is selected in the dosing program entry screen (fig. 73). Press the key to select the program you want to work on.

5.7.2.1 Export Treatment Programs

The export procedure starts by pressing the export data field on the touchscreen. A screen will then appear in which you must enter the name of the chemical distributed, the name of the field that was treated, the work start date and time, the work end date and time and the file name under which you want to save the information. When you press the key, which confirms the parameters entered, the data will be exported to the SD card into a file with the name entered.



Fig. 75

When the export step is completed, a report is displayed on the screen indicated whether or not the parameters have been exported.



Fig. 76

To complete the procedure, simply press anywhere on the screen.
The file created is a text file that can be viewed on a computer using any editor.
Remarks on the file name:

- the file name must have a maximum length of 8 characters.
- the name must not contain the space character
- it must not contain the extension or the type (.txt) (this will be added automatically)

Following the example shown above, you only need to enter the text preceding the **.** (dot) CLIENTE1
Date and time format (dd/mm/yy hh:mm)

5.7.2.2 Import Treatment Programs.

The import procedure starts by pressing the touchscreen on the data import field. A screen will then appear containing a list of the configuration files present on the SD card.



Fig. 77

When you press on the name indicating the file to be loaded, the name of the file you want to load will be displayed at the top of the screen.

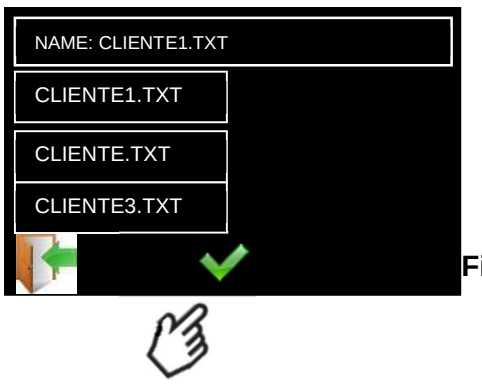


Fig. 78

By pressing the ✔ button, the data contained in the selected file will be loaded and a summary screen will appear containing the data of the loaded program.



Fig. 79

By pressing the ✔ key, the data will be saved and the program initially opened will be replaced.

By using the ✖ button, no replacement of existing programs will be made.

6 GPS NAVIGATOR DISPLAY MAIN MENU

The Main Menu has 2 side buttons, 4 Menu buttons and a Quick Guide button.



Fig. 80

The sidebar is shown on every page and allows you to perform the same actions everywhere.

The side buttons:



MAP: Access the map at any time, from any page. The map is a georeferenced virtual view of the field and terrain, where the field boundaries, the area worked, the saved points and other elements that are saved and stored in the database are represented.



BACK: to go back one step.

The centre buttons:



START NEW JOB: start a new job (Provide more details)



CONTINUE LAST JOB: Continue a previously saved job.



DATABASE: Opens the tools database, saved fields database and jobs database.

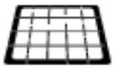


CONFIGURATION: to set user preferences and configure external devices



QUICK GUIDE: to open this quick start guide.

6.1 FIELDS DATABASE

To open the fields database, press on the database in the main menu, then press on the fields button. 

All the fields created are contained in the fields database.
To create a new field, press START NEW JOB.

How to modify the data of a field:

1. Select the desired field to display a graphic representation and all the details of the field: name, perimeter, area, obstacles.
2. Tap the green bar at the top to change the name of the field

How to change the marks:

1. Press the MARK button to open the list of saved marks.
2. Select one of the marks and change the name.

How to export the fields database in Google Earth™ format:
1. Press EXPORT TO KMZ to save everything to the micro SD, or to the USB if you are using the CBox
2. Remove the micro SD from the navigator and insert it into a compatible reader connected to the PC to transfer the files.

6.2 JOBS DATABASE

To open the jobs database, press the DATABASE button from the main menu, and then choose JOBS. 

All jobs created are saved in the jobs database. The navigator records the data for each job, including notes, total time of work, area worked, tool profile etc.

How to continue a saved job:

To open a job and continue it:

1. Open the Main Menu and press on CONTINUE LAST JOB 
2. The last job will be displayed. To choose another job from the database, press the LIST icon to open the list of paused jobs.
3. Press to select a job from the list of paused jobs.

Alternatively, you can open a saved job from the database:

1. In the Database menu, press JOBS, to open a job 
2. Scroll through the list by dragging it with one finger, and select the job you want to continue
3. The information page opens. On this page, you can view and edit the job data.
4. To start the job, press the START button 

Note: The START button will be present only if the selected job is compatible with your GPS position.

6.3 TOOLS DATABASE

To open the tools database, press the DATABASE button in the Main Menu and then press the TOOLS button. The list contains all the saved tools, listed with their name and length. When the tool is the sprayer boom, this icon appears. 

Create a standard tool

1. Open the tools database
2. Select the  button
3. Enter the name of the tool
4. Press OK: the configuration page opens
5. Enter the data, such as total width etc...
6. Press OK to register the new tool in the database.

Create a new tool with sprayer boom

1. Create a tool by following the steps as described above
2. Open the configuration window and click on SPRAYER BOOM. Choose your sprayer boom from the list and press on the black arrow.
3. A basic diagram of your sprayer boom will appear in the dialog box. Press on the diagram to edit it.
4. Set the number of sections (with or without nozzles).
5. Each section is represented in the diagram with the number of nozzles and its length. Select each section to change the number of nozzles and their distance.
6. Press the back arrow to return to the tool configuration window.

6.4 START NEW JOB

A job is an activity carried out on a field using a specific tool. To work a field, you have to start a job and follow the instructions.

1. From the Main Menu, press START NEW JOB 
and fill in the form by choosing the field, the tool and entering the other data, then press the button

2. To start a previously saved job, from the Main Menu press on CONTINUE LAST JOB. 

To choose another job from the database, press on the LIST icon to open the list of paused jobs. Once you have chosen the job, press the START button.

7 GPS NAVIGATOR DISPLAY MAIN SCREEN

7.1 MAP

The Map is a virtual and georeferenced view on which the field, the boundaries, the worked area, the marks, and other elements that you can create and save in the database are represented.

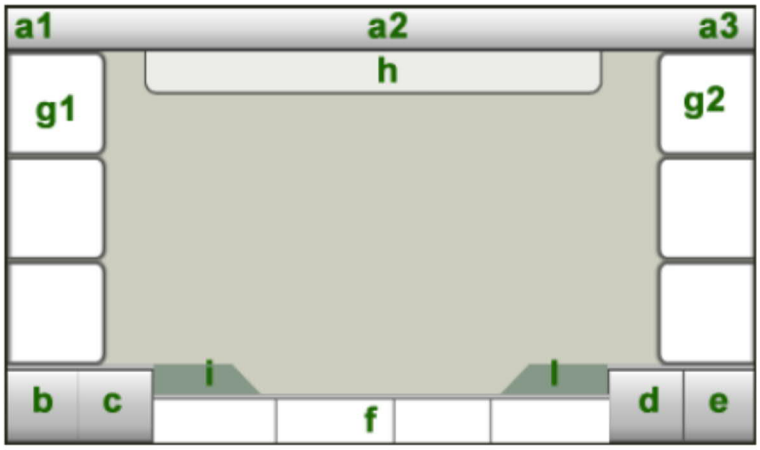


Fig. 81

a1 Top bar: Information about the job in progress. Select to open the information page.
a2 Top bar: Information on the tool and position correction indicator.
a3 Top bar: status icons, showing which external devices are connected as tools with the sections and the remote control. Press for further actions.
b Menu button: opens the main menu
c Camera Button (available when there is a video camera connected)
d Zoom out
e Zoom in
f Bottom bar: data box
g1 Map Menu, left column
g2 Map Menu, right column
h Virtual sprayer boom
i GPS Icon
l Ladder and compass

During work, the vehicle is represented by the following icon:



To explore the map, tap the screen and then drag the map with your finger.
To increase or decrease the zoom level, use your two fingers, moving them closer or further apart, or use the buttons at the bottom right.
The bottom bar shows the area of the field, the area worked, the distance covered and your speed.

At the bottom left you can find:
The MENU button, which returns to the Main Menu
The CAM button, which opens the video camera view if connected.

Tap the screen to return to the map.
The Map Menu consists of two columns, one on the left and one on the right of the screen, which show all the actions you can take during the job.

7.1.1 Map Menu

On the left:

 AB: allows you to draw the guide lines.

 **FIELD:** starts recording the perimeter of a field.

 **HEADLAND:** to set the headland area of your field.

On the right:

 **MARK:** Press the Mark button to place it in your current position.

 **SHIFT:** The Shift function allows you to adjust the position of the guide lines to compensate for GPS drift.

 **JOB:** Start and pause a job

When a button is selected, the column scrolls outwards and the submenu, if any, appears.

Explore the map and create marks

You can explore the map by simply dragging it with your finger. You can change the zoom level using both fingers as described above.
While exploring the map, you can save the position of a mark, whether this is an obstacle or another object:

1. Tap the screen to place the cursor on the desired point
2. Press the MARK button 

To return to the map in work mode, select the  button

7.2 START A NEW JOB

1. Select START NEW JOB and fill in the form. 
2. Press the START button 
3. The map is displayed. To start the job, press the JOB button 

To pause the job, press the same button again. 

The job is automatically saved in the database and you can open and resume it at any time.

7.3 CREATE AND MEASURE A FIELD

To create a new field: 

1. Press the FIELD button.
2. Start driving along the boundaries of the field: the navigator will immediately start recording your track and the boundary, calculating the perimeter and area.
3. To close and save the field perimeter, press the FIELD button again. 

7.3 HEADLAND MANAGEMENT

Headland management allows you to optimize the spraying and sowing operations, especially for irregular and triangular areas.

At the start of work, you can create a headland area within the perimeter of the field, based on the width of the work area. If the headland function is active, the sprayer boom will automatically close whenever the operator is above the headland area.

To set the headland:
Press the HEADLAND button and enter its width

The headland function is not in operation if the field perimeter is not available.

7.4 SET THE GUIDE LINES

During the job, you can draw the guide lines by selecting the AB button 

A sub-menu will ask you to select one of the available options:

- Parallel lines
- Contour

Once the option is selected, point A will be placed on the current position.

To position point B, select the same button, which will now show the B icon 

Once the guide lines are created, the position correction indicator appears at the top of the map, with arrows that light up depending on how far you are deviating from the guide line.
If you are working with a sprayer boom, the virtual boom will also be displayed.

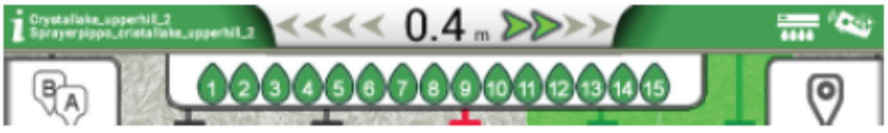


Fig. 82

Using the GPS, the navigator calculates the area worked and closes sections automatically in the case of overlapping. The virtual boom shows which sections are open (in green) and which are closed (in red).
The top status bar shows the driving correction required in order to return to the guide lines with the value in meters and with a number of arrows (1 to 4 arrows depending on the width of the necessary correction). 

7.4.1 Shifting the guide lines

Shifting guide lines manually allows you to compensate for the slippage of the GPS with respect to the actual position of the vehicle.

1. Press the SHIFT  button
2. A sub-menu opens: press the shift right or shift left button as many times as necessary. Each time you press the button, the guide lines are shifted by a measurement that you can set in the SETUP page
3. Once the operation is completed, the value of the shift applied and the direction (R or L) will be displayed on the SHIFT button.

7.5 MANUAL MANAGEMENT OF SECTION VALVES

During the job, you can open or close sections manually.

Press on the drops indicating the sections



Fig. 83

In the new window, click on the section you wish to move. The colour of the symbol will indicate the status of the section (red closed, green open).



Fig. 84

<u>With this operation the behaviour of the section changes from automatic to manual and the navigator will no longer be able to move the section in case of overlapping.</u>

The manual or automatic status of the valve will be displayed by the indicator above each section: A if automatic, M if manual.
To associate automatic operation to the valve again, press the indicator above the section so that the letter A appears.

8 NAVIGATOR SETTING

The configuration page is divided into two parts.

On the left: the list of topics;

On the right: the content of each topic.

Select a topic and view the content to choose from the available options.

The available settings are:

UNIT: Select to choose the unit of speed, distance, area, weight and volume.
USER PREFERENCES: Select to set preferences for: brightness, language, time zone, time, and date format.
SATELLITES: Select to view the satellite page and logs.
MAP LAYOUT: Select to choose the desired background.
REMOTE CONTROL: Select to perform pairing and to check the battery status.
SYSTEM INFO: Select to view system information and check for available software updates.

9 PROBLEMS AND SOLUTIONS

POSSIBLE PROBLEM	CHECK
Wheel sensor and the flow sensor are not working	- Is the computer being supplied with 12V voltage? 1) - Is the sensor LED on ? (not available for flow rate sensors.) - Does the sensor work during tests? - Are all the wires connected correctly?
The pressure sensor is not working	- Is the computer being supplied with 12V voltage? 1) - is the pressure being powered with a voltage ≥ 12V ? - are all the wires connected correctly?
Driving speed displayed incorrectly	- Is the sensor working? Is it set up properly? - Are the wheel and radar set up properly? - Has calibration been performed correctly? - Is the system running at the simulated speed?
Flow rate displayed incorrectly	- Is the sensor working? - Has calibration been performed correctly?
Pressure displayed incorrectly	- Is the sensor working? - Has calibration been performed correctly?
The sections do not open	- Are all the cables connected correctly? - Is the switch of the operating unit in the “ON” position? - Is the switch of the main valve in the “ON” position? - Is the section LED on? - Is the system supply voltage ≥ 12V ?
Flow rate regulation malfunction	- Is the speed sensor working correctly? - Are the flow rate sensor and pressure sensor working correctly? - Are the Flow Rate and Pressure programmed correctly? - Is the system running at the simulated speed? - Is the pressure regulator working correctly? - Are all the settings correct? - Have all the calibration processes been carried out correctly? - Are the connections correct?
Difference between nominal and actual flow rate actual value	- Is the pressure regulator working without any faults? - Is the flow rate sensor working without any faults?

1) **All checks to be carried out on the operating unit card must be carried out by qualified personnel!**

USEFUL INFORMATION

10 USEFUL INFORMATION

10.1 TECHNICAL DATA

Supply voltage	10 ÷ 16 Vdc
Maximum current consumption	max 250 mA at 12 Vdc (excluding valves)
Operating Temperature	-10 °C / +70 °C
Weather conditions	Relative humidity 80%
Transport and storage	
Temperature	-25 °C /+75 °C
Weight	1300 g.
Dimensions(WxHxD)	160 x 220 x 80 mm
Regulations	
Protection Class	IP 54
EMC	In accordance with Directive 2004/108/EC and ISO 14982
Display	Colour TFT 4.3"; Resolution 480x272 pixels
Processor	32 bit STM32F103 64MHz
Boot	from SD card
Inputs	2 inputs 4-20mA 4 digital inputs
Outputs	1 RS-232 1 CAN BUS 9 Relay Outputs
Memory	SD Card slot

10.1.1 Flow meter sensor

Supply voltage	from 9 to 24 VDC
Output signal	Open collector (square wave)
STANDARD operating range	10 ÷ 100 l/min
TURBO operating range	10 ÷ 100 l/min
Number of “STANDARD” pulses/litre	68
Number of “TURBO” pulses/litre	647
Operating temperature	0 °C /+60 °C
Max operating pressure	40 bar
Degree of protection	IP 67

10.1.2 Pressure sensor

Supply voltage	from 8 to 28 VDC
Output signal	4-20 mA
Operating temperature	-15 °C /+80 °C
Max operating pressure	15 bar
Degree of protection	IP 65

10.2 WARNINGS

- The cross section of the power cable to the computer must not be less than 2.5 mm^2 and it must be connected directly to the battery or to a socket that supports a minimum absorption of 10 A.
- **The computer must never be connected to normal cigarette lighter sockets**.
- Pay particular attention to the charge status of the battery and make sure that the alternator is functioning properly; a low battery or worn alternator will accentuate positive or negative voltage peaks, which could damage the internal electronic circuits.
- During assembly and at each subsequent check, it is recommended to apply a generous amount of silicone dielectric grease to the connector terminals in order to prevent oxidation or bad contacts.

All Bertolini valves are designed to operate with a nominal voltage of 12 V direct current (12 VDC), i.e. with the normal battery present on the most common agricultural vehicles. The regular operating range of the valves is from 10 V to 14.5 V; outside this range operational problems could arise or damage could be caused to the internal electronic circuit.

- Always remove the battery connection cables while it is being recharged.
- Do carry out electric welding with the power wires connected; make sure that they are both (+ and -) disconnected to avoid uncontrollable voltage peaks.
- To ensure correct dispensing during treatment and to maximise the reliability of the data provided by the computer, the state of wear of the nozzles must be checked at every treatment. If two or more nozzles are worn, replace them all.

Frequencies higher than: carrier 80 MHz - amplitude 30 V/m - AM modulation - 80% - 1 kHz, may cause malfunctions and/or distribution errors of the computer and/or the equipment connected to it.

10.3 HOW TO CALCULATE THE FLOW RATE OF THE NOZZLES

As a result of normal wear of the nozzles, it is necessary to periodically check their flow rate, and therefore their efficiency, as follows:

Get the system operating in working conditions.
Determine the flow rate (Q - litres dispensed in one minute) of a nozzle using a graduated container.
Compare the measured values with the corresponding values shown in the tables provided by the manufacturer of the nozzles used.

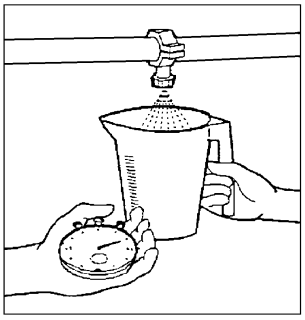


Fig. 85

If you want to check the litres dispensed per hectare (l/ha), enter the data in the following formula

$$\mathbf{LHa} = \frac{600 \times Q}{I \times V}$$

Where:

Lh = applied volume (l/ha)

Q = nozzle flow rate (l/min)

I = Interspace between nozzles (m)

V = forward speed (km/h)

10.4 HOW TO CALCULATE THE PUMP FLOW RATE CORRECTLY

1. Boom flow rate:



$$D = \frac{\text{LHa x V (km/h) x L (m)}}{600}$$

Where:
D = Boom flow rate (l/min)
LHa = Applied volume (l/ha)
V = Treatment speed
L = Working width (boom)
Q = Litres per hectare

Example: $D = \frac{200 \text{ x } 7 \text{ x } 12}{600} = 28 \text{ l/min}$

2. Pump flow rate:

Dp = D + Dr + Da

Dr=Flow rate regulation = 10% min
Da=Flow rate agitation = 5% vol. barrel

Example: Dp = 28 + (28 x 10%) + (600 x 5%)
= 28 + 2.8 + 30
Dp = 60.8 l/min

Note: If the return flow rate in the barrel is too high it can cause the formation of foam.

10.5 PRACTICAL METHOD FOR CALCULATING THE NUMBER OF SPEED SENSOR PULSES

If you do not have a straight section 100 meters in length to calculate parameter “C” you can proceed as follows:
Supposing you start the mechanical vehicle in order to perform a certain number of revolutions, (this example assumes 10 revolutions, but in any case, the more revolutions there are, the more precise the measurement will be).
Then measure the distance covered on the ground from the starting point to the arrival point as shown in fig. 86 (in this case we assume a distance of 40 meters was measured).

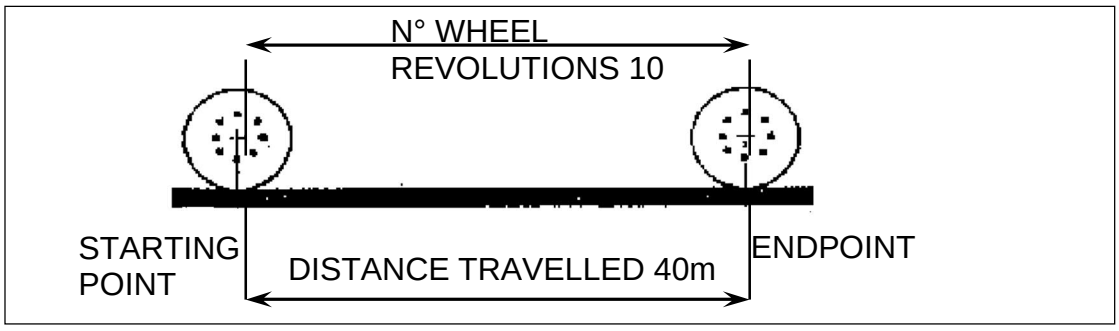


Fig. 86

The wheel circumference is obtained by dividing the distance travelled by the number of wheel revolutions.

Therefore we have:

$$C = \frac{40\ \text{metri}}{10\ \text{giri}} = 4\ \text{metri}\ (400\ \text{Cm})$$

The number to be programmed in the “wheel circumference” constant will be equal to the wheel circumference, expressed in cm, divided by the number of references (bolts), in this example 8.

$$Cost. = \frac{400\ \text{Cm}}{8\ \text{rif.}} = 50\text{Cm}\ (\text{numero da programmare nella cotante "circonferenza ruota"})$$

WSC GPS

10.6 MEMO OF LOTS PROGRAMMED

Lot No.	Lot name	Date saved	Notes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

WSC GPS

Manufacturer: IDROMECCANICA BERTOLINI S.p.A.
Address: Via Cafiero 20
42124 REGGIO EMILIA – ITALY
Tel. +39 0522 306641 Fax +39 0522 306648
E-mail: email@bertolinipumps.com
Internet: www.bertolinipumps.com