Cleveland Alliances
01361883418

BRAVO 400 SERIES COMPUTERS WITH INTEGRATED GPS GUIDE

4674X501
4674X701
4674X511
4674X711
4674X721
46742DX1

Software rel. 1.2X

INSTALLATION, USE AND MAINTENANCE

SYMBOL LEGEND

	= **Generic danger**
	= **Warning**
	= **Only for version with nozzle holder control**

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This manual is an integral part of the equipment to which it refers and must accompany the equipment in case of sale or change of ownership. Keep it for any future reference; ARAG reserves the right to modify product specifications and instructions at any moment and without notice.

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1 RISKS AND PROTECTIONS BEFORE ASSEMBLY

All installation work must be done with battery disconnected, using suitable tools and any individual protection equipment deemed necessary.

Use ONLY clean water for treatment tests and simulations: using chemicals during simulated treatment runs can seriously injure persons in the vicinity.

2 BRAVO DSB

ARAG has designed and manufactured a diagnostics system for Bravo series computers and the systems to which they may be connected.
BRAVO DSB **(code 467003)** provides reliable diagnostics of computer, control unit or the whole system so as to enable the resolution of any potential problems experienced with the BRAVO DSB system.

3 INTENDED USE

The device you have purchased is a computer which, when connected to a valve or suitable control unit, makes it possible to control all phases of treatment in agricultural applications directly from the cabin of the agricultural machine in which it is installed.
BRAVO 400 is a satellite navigator which can be used for agricultural purposes thanks to its GPS receiver.

BRAVO 400 is not a road navigator and should only be used on agricultural land.

This device is designed to work on agricultural machinery for crop spraying applications.
The machine is designed and built in compliance with EN ISO 14982 standard (Electromagnetic compatibility - Forestry and farming machines), harmonized with 2004/108/EC Directive.

4 PRECAUTIONS

- **Do not aim water jets at the equipment.**
- **Do not use solvents or fuel to clean the case outer surface.**
- **Do not clean equipment with direct water jets.**
- **Comply with the specified power voltage (12 Vdc).**
- **If doing arc-welding, disconnect the connectors from BRAVO 400 and disconnect its power cables.**
- **Only use ARAG genuine spare parts and accessories.**
- **Bravo 400 can control the hydraulic valves that open and close the job boom.**

The computer does not feature emergency stop devices: the manufacturer must provide all necessary safety devices for the hydraulic boom control.
Any time the hydraulic boom section is opened or closed the computer emits an acoustic signal and the display shows the relevant indication. The manufacturer should also provide acoustic and optical warnings in the vicinity of the boom.

5 CONTENTS OF THE PACKAGE

The table below shows the components you will find inside the BRAVO 400 computer package:

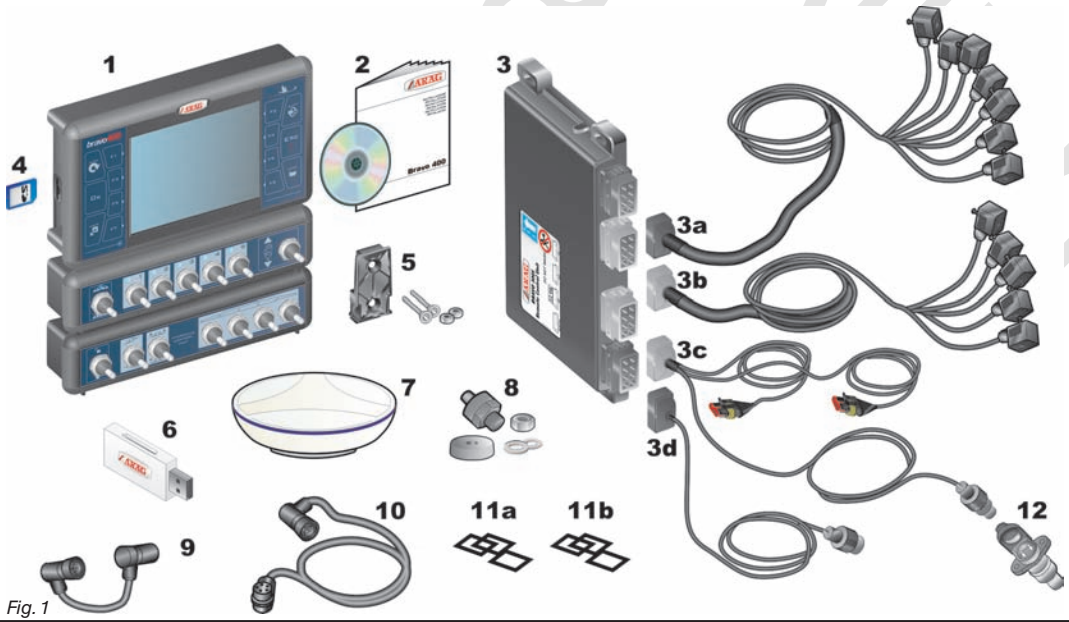

Fig. 1

Legend:
1 Bravo 400
2 User's guide
3 Control unit (RCU) with relevant harnesses
3a Connection cable to oil-hydraulic assembly
3b Connection cable to control unit
3c Connection cable to power sensors
3d Connection cable to monitor
4 SD memory card
5 Mounting kit
6 Drive for SD memory card
7 GPS receiver
8 Receiver support
9 Connection cable to switches panel / monitor
10 Connection cable to GPS receiver
11a Seals for section valve connectors
11b Seals for oil-hydraulic valve connectors
12 Power connector

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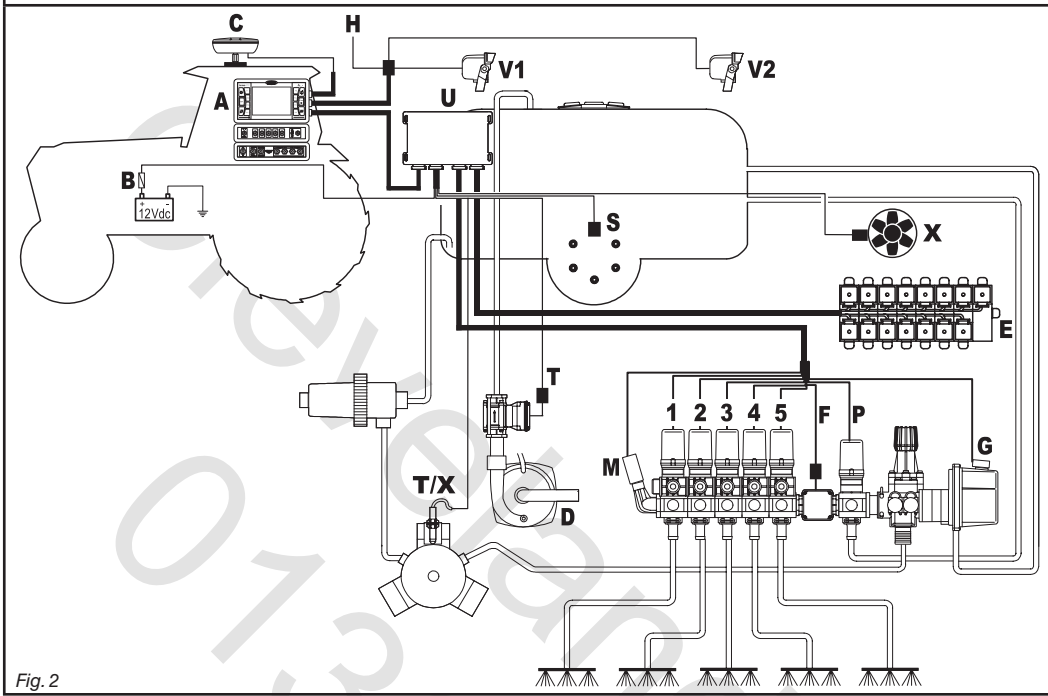
6 POSITION ON THE MACHINE

6.1 Recommended system layout

ASSEMBLY DIAGRAM FOR CROP SPRAYERS WITH DIAPHRAGM PUMP

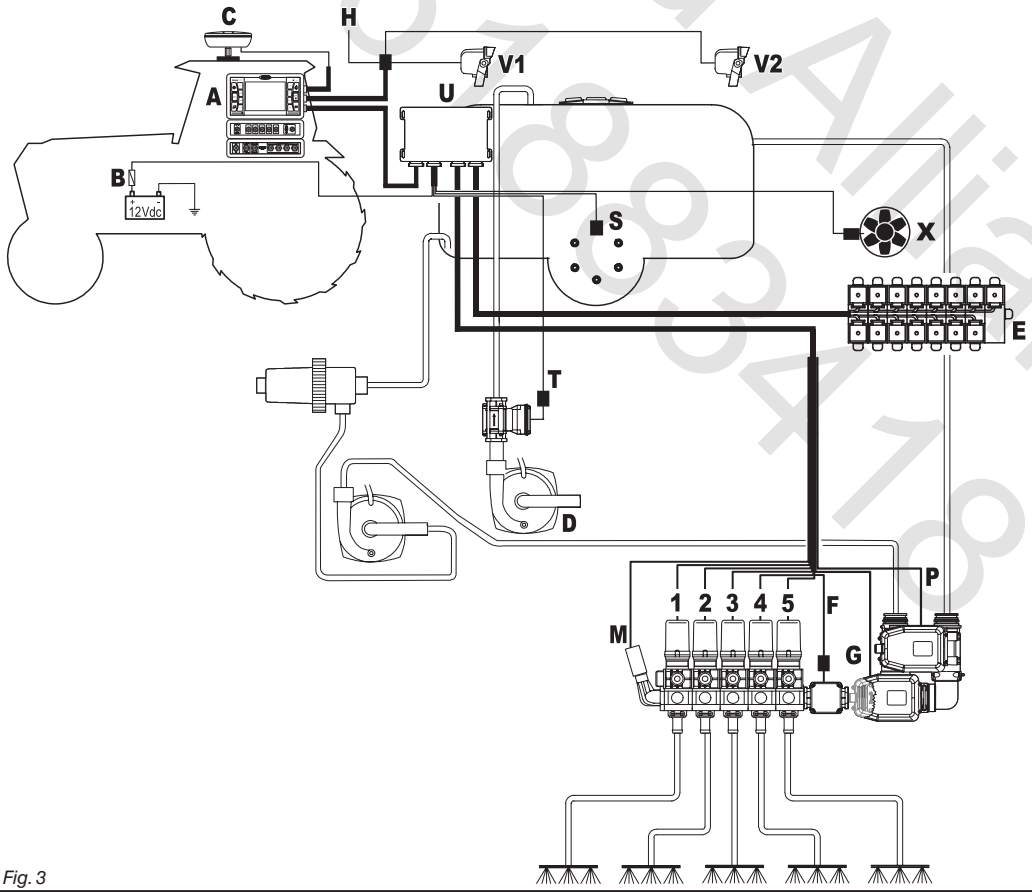


Legend:

- **A** Monitor
- **B** Battery
- **C** GPS receiver
- **D** Filling pump
- **E** Oil-hydraulic assembly
- **F** Flowmeter
- **G** Main valve
- **H** External main control
- **M** Pressure sensor
- **P** Control valve
- **S** Speed sensor
- **T** Filling flowmeter or Pump Protector
- **U** Control unit (RCU)
- **V1** Camera 1
- **V2** Camera 2
- **X** RPM sensor or Pump Protector
- **1-5** Section valve

Fig. 2

ASSEMBLY DIAGRAM FOR CROP SPRAYERS WITH CENTRIFUGAL PUMP



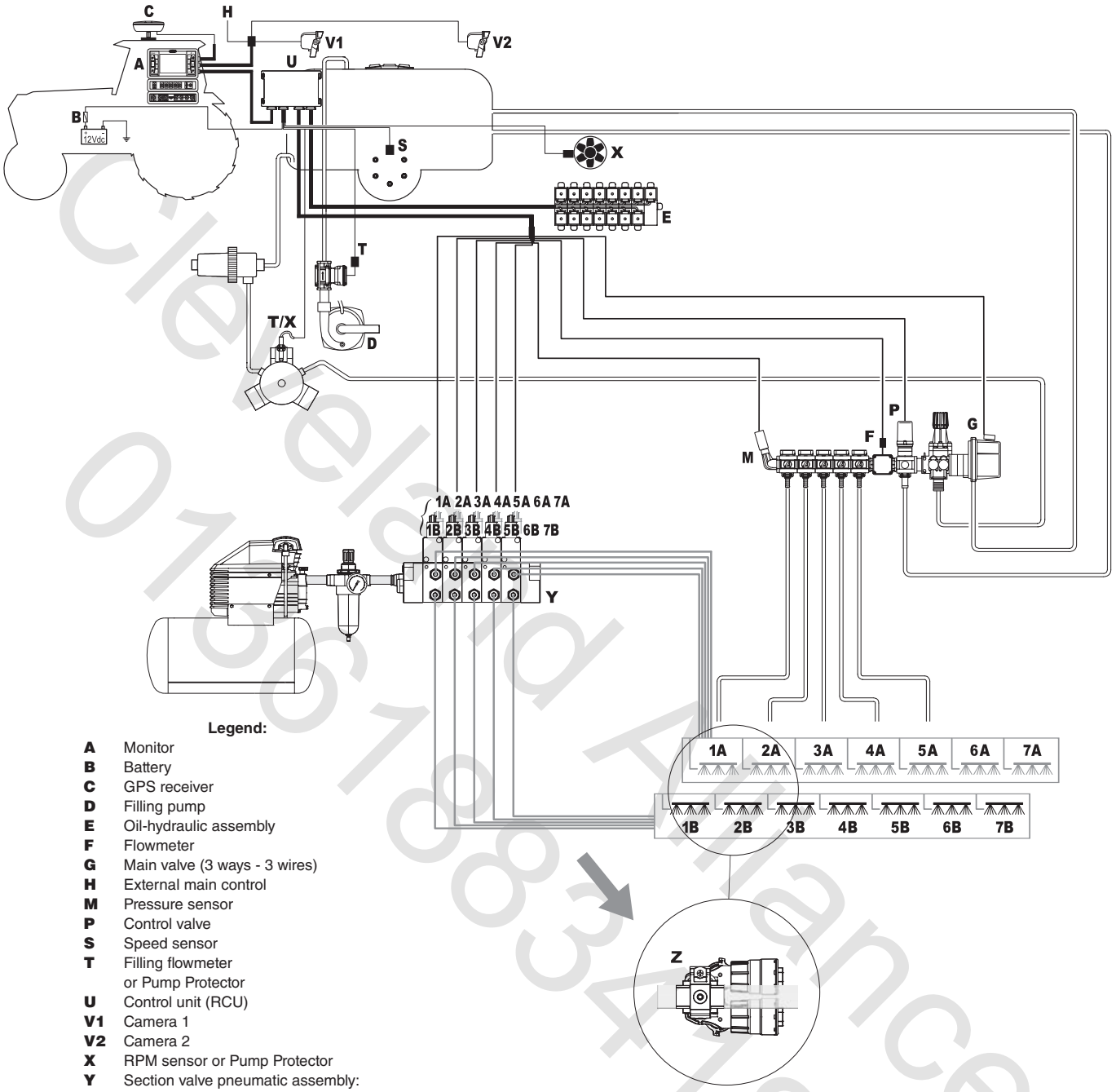
Legend:

- **A** Monitor
- **B** Battery
- **C** GPS receiver
- **D** Filling pump
- **E** Oil-hydraulic assembly
- **F** Flowmeter
- **G** Main valve
- **H** External main control
- **M** Pressure sensor
- **P** Control valve
- **S** Speed sensor
- **T** Filling flowmeter
- **U** Control unit (RCU)
- **V1** Camera 1
- **V2** Camera 2
- **X** RPM sensor
- **1-5** Section valve

Fig. 3

CONT'D

ASSEMBLY DIAGRAM FOR CROP SPRAYERS WITH DIAPHRAGM PUMP - WITH NOZZLE HOLDER CONTROL selejet



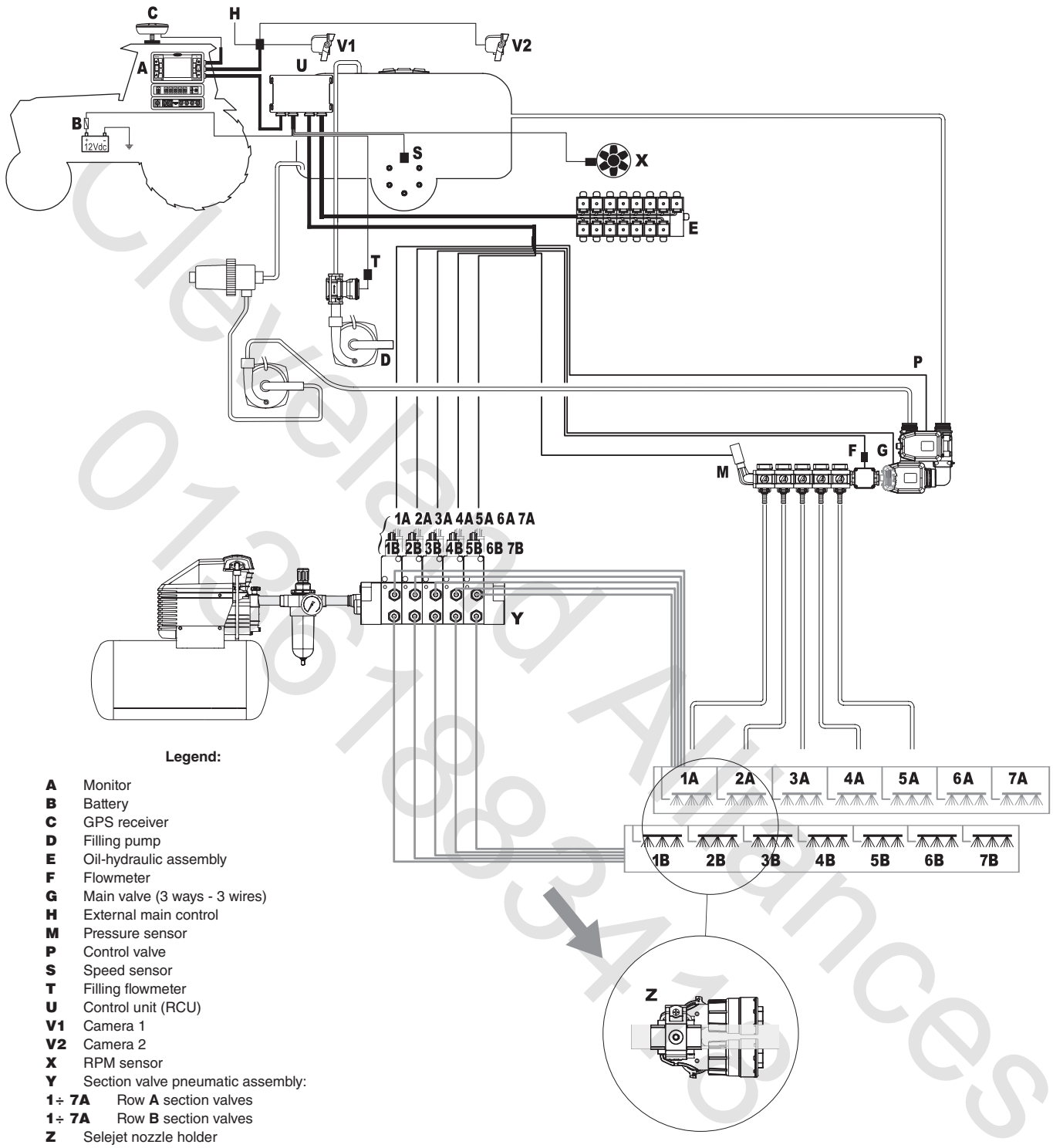
Legend:

- **A** Monitor
- **B** Battery
- **C** GPS receiver
- **D** Filling pump
- **E** Oil-hydraulic assembly
- **F** Flowmeter
- **G** Main valve (3 ways - 3 wires)
- **H** External main control
- **M** Pressure sensor
- **P** Control valve
- **S** Speed sensor
- **T** Filling flowmeter or Pump Protector
- **U** Control unit (RCU)
- **V1** Camera 1
- **V2** Camera 2
- **X** RPM sensor or Pump Protector
- **Y** Section valve pneumatic assembly:
- **1÷ 7A** Row **A** section valves
- **1÷ 7A** Row **B** section valves
- **Z** Selejet nozzle holder

Fig. 4

CONT'D

ASSEMBLY DIAGRAM FOR CROP SPRAYERS WITH CENTRIFUGAL PUMP - WITH NOZZLE HOLDER CONTROL sele JET



Legend:

- **A** Monitor
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- **V1** Camera 1
- **V2** Camera 2
- **X** RPM sensor
- **Y** Section valve pneumatic assembly:
- **1÷ 7A** Row **A** section valves
- **1÷ 7A** Row **B** section valves
- **Z** Selejet nozzle holder

Fig. 5

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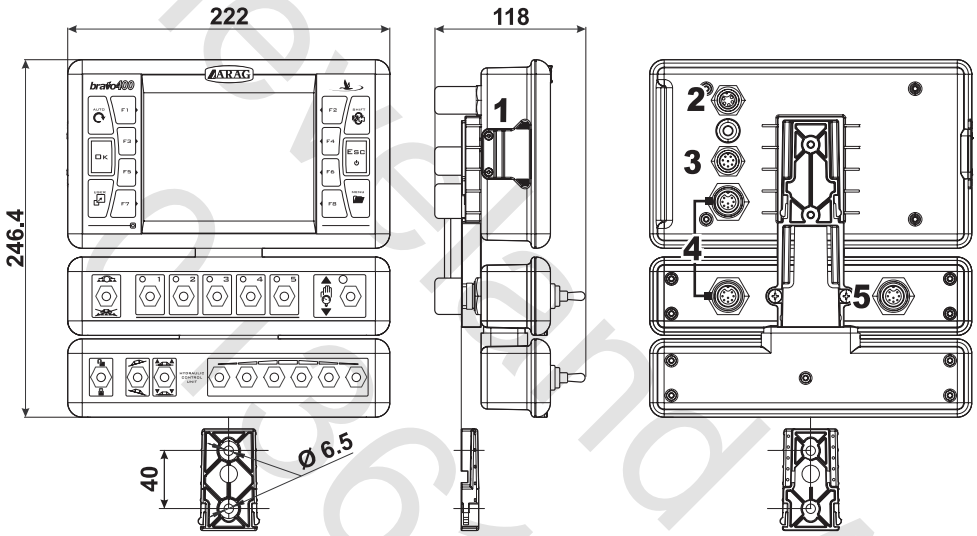
6.2 Monitor and control unit location

• The BRAVO 400 series computer must be installed in the machine control cabin. Observe the following precautions:

- do NOT install the monitor in areas where it would be subjected to excessive vibrations or shocks, to prevent any damage or accidental use of the control keys;
- install the device in a visible position within easy reach by hand; bear in mind that the computer should not obstruct the operator's freedom of movement or block his view.

• Control unit (RCU): locate the control unit in the rear side of the machine near the control unit and the oil-hydraulic/pneumatic assemblies.

Note the connections required for the computer to operate (Fig. 6 and 7), the required length of the cables, and provide adequate space for connectors cables.
An identification symbol is located next to each connector to indicate its function. For the configuration of the systems, refer to par. 6.1 - Recommended system layout.



ITEM	CONNECTION POINTS
1	SD memory card
2	Connection to GPS receiver
3	Connection to cameras + External main control
4	Connection to switches panel / monitor
5	Control panel power supply + Connections to RCU

Fig. 6

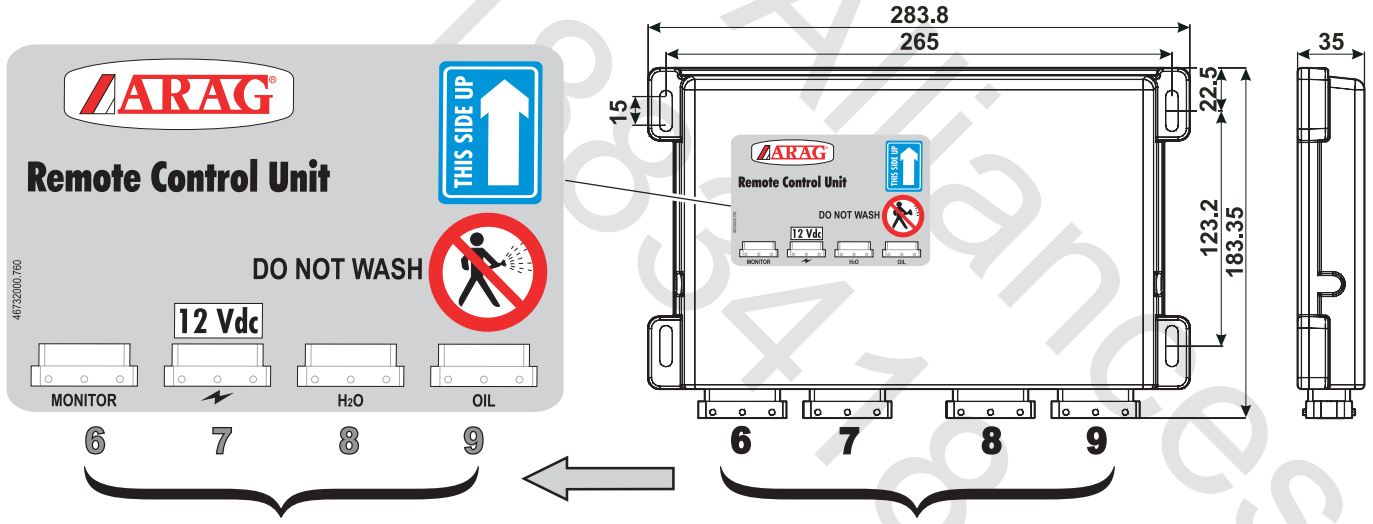


Fig. 7

ITEM	CONNECTION POINTS
6	Monitor
7	Power and sensors
8	Control unit
9	Oil-hydraulic assembly

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6.3 Mounting the bracket

The monitor must be mounted after having fixed the bracket at the desired location (the previous paragraph shows the bracket drilling template).
The bracket must be extracted from the monitor seat (**A**, Fig. 8) and fixed using the provided screws (**B**).
Make sure the bracket is securely mounted, fit the monitor on it, and push it in until it locks in place (**C**).

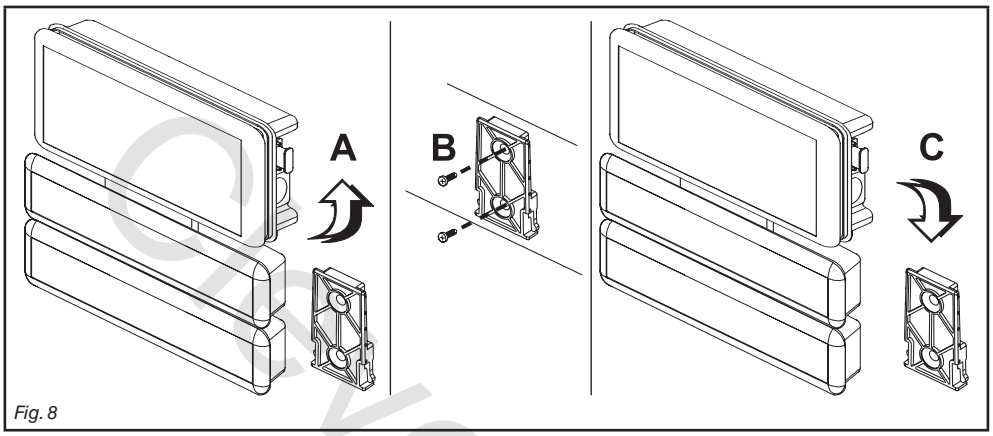

Fig. 8

6.4 Securing the control unit (RCU)

Observe the control unit assembly sense shown in Fig. 9 (connectors downwards).

Any other kind of positioning is not allowed.

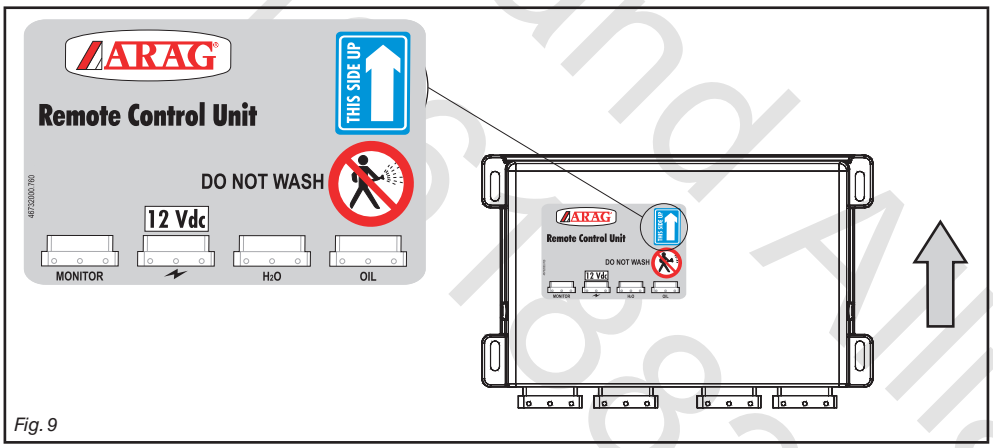

Fig. 9

6.5 Control unit location

The control unit must be fixed with the special brackets supplied and fitted to the unit, positioning it as shown in the manual provided with the assembly.

MAKE SURE TO FOLLOW ALL THE SAFETY INSTRUCTIONS GIVEN IN THE CONTROL UNIT'S MANUAL.

6.6 Location of oil-hydraulic and pneumatic assemblies

The oil-hydraulic and pneumatic assemblies must be installed in the machine in a point protected against weather and the liquid sprayed by the machine.

ARAG IS NOT LIABLE FOR ANY DAMAGE CONSEQUENT ON INSTALLATION BY UNQUALIFIED PERSONS. IN CASE OF DAMAGE TO THE SYSTEM CAUSED BY INCORRECT INSTALLATION OR CONNECTIONS, THE WARRANTY IS AUTOMATICALLY VOIDED.

WARNING! DO NOT CONNECT OIL-HYDRAULIC / PNEUMATIC ASSEMBLIES OTHER THAN THE FORESEEN ONES (SEE ARAG GENERAL CATALOGUE).
ARAG IS NOT LIABLE FOR DAMAGE TO THE PRODUCT, FAULTS OR RISKS OF ANY NATURE CONSEQUENT ON CONNECTING THE MODULE TO NON-ORIGINAL RECEIVERS OR THOSE NOT SUPPLIED BY ARAG.

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6.7 Locating the GPS receiver

The user must position the GPS receiver as indicated in this manual and make sure the new vehicle height does not interfere with any obstacle.

Installing the GPS receiver:

Installation of the receiver on agricultural equipment must observe certain basic requirements:
it shall be positioned on the highest position of the agricultural equipment (including trailer); receiving angle toward the sky shall be as large as possible.

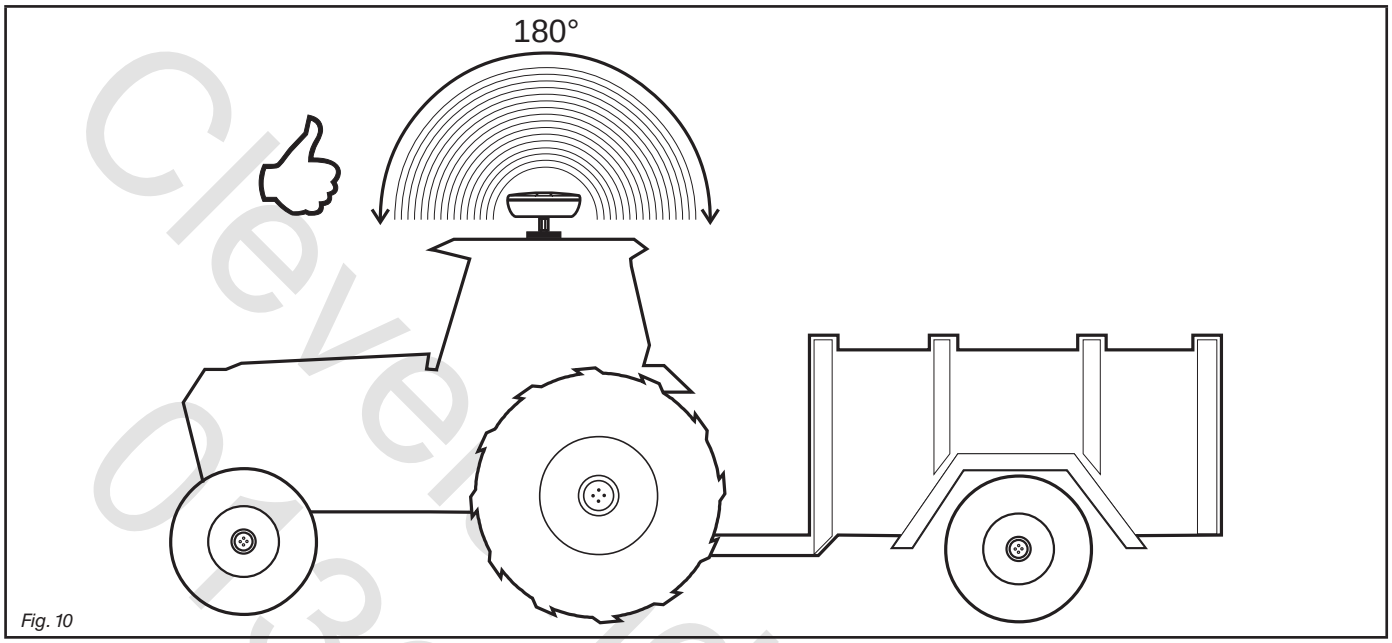

Fig. 10

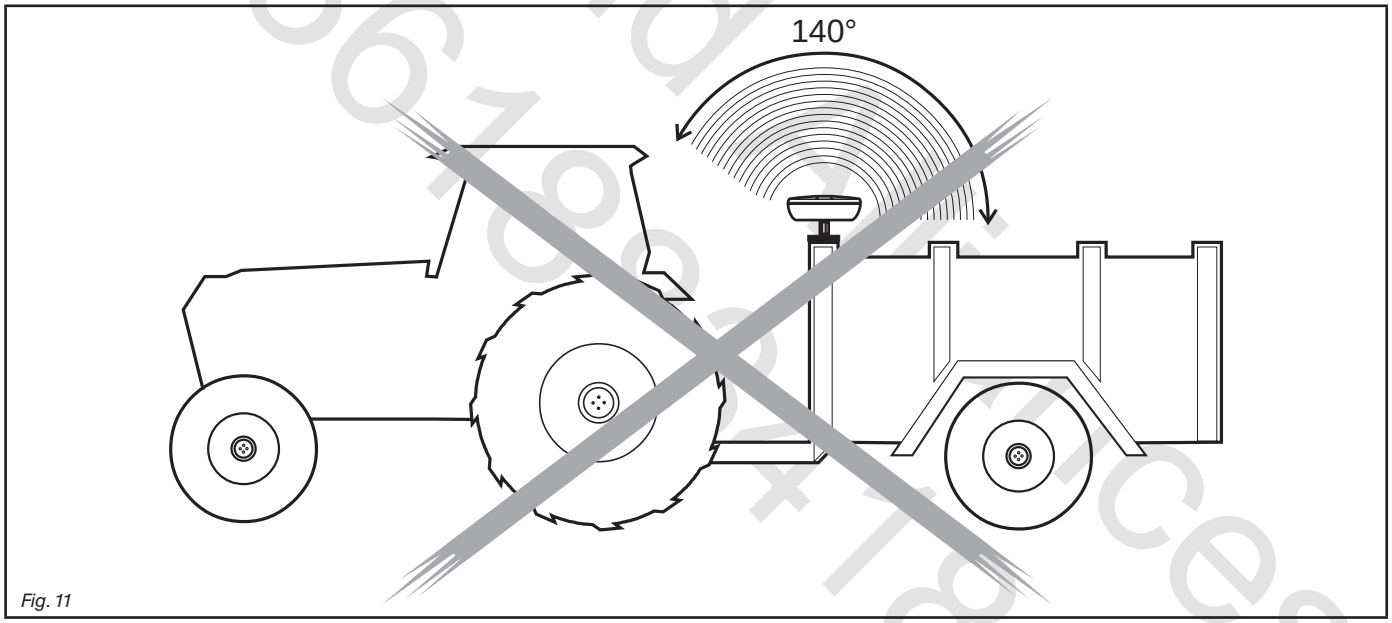

Fig. 11

The receiver shall be installed on vehicle longitudinal axis (Fig. 12).

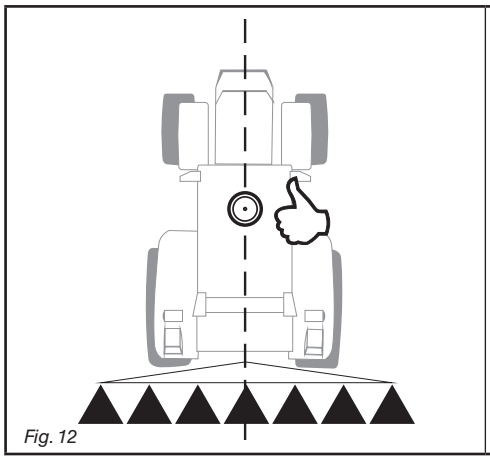

Fig. 12

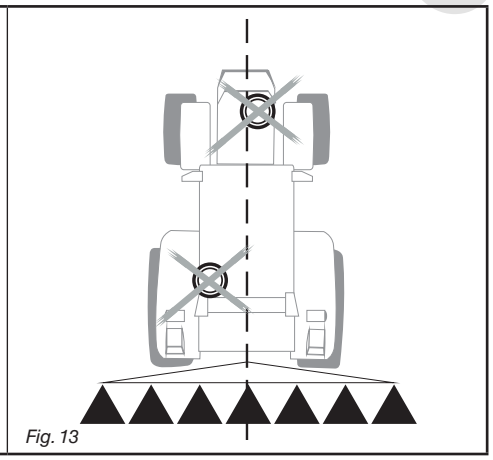

Fig. 13

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Securing the GPS receiver:

If the support used for fastening the receiver is in iron or steel, use the supplied magnet. Magnet features a threaded pin on which receiver is to be mounted, by screwing it on until it locks (Fig. 14).

Make sure that the receiver is mounted to a perfectly flat metal surface, free of any surface treatment capable of reducing the strength of the magnet itself.

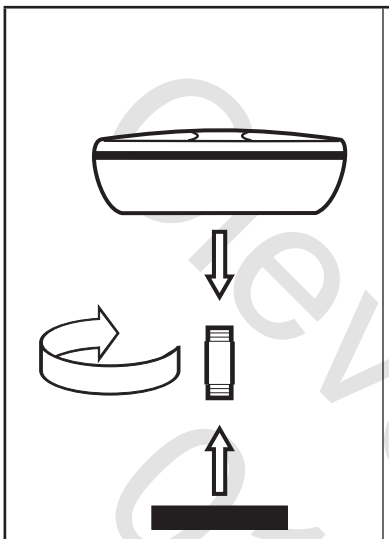

Fig. 14

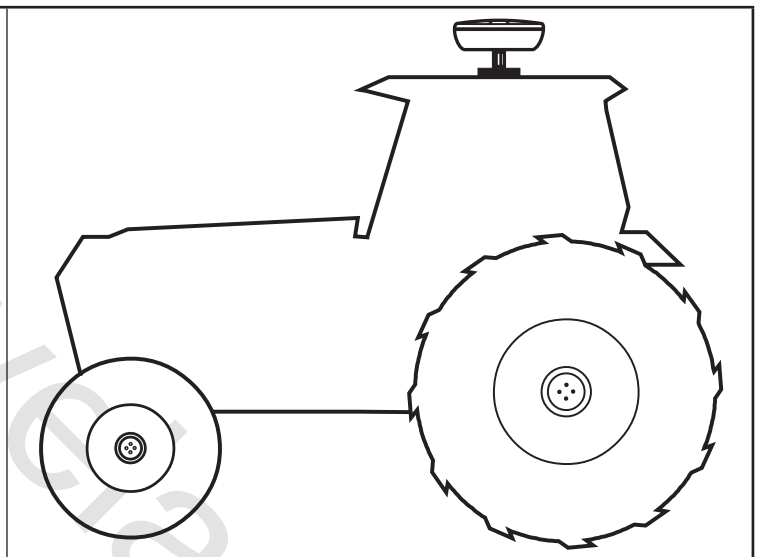

Fig. 15

If you are not sure that the magnet mounting system is completely secure, you'd better screw pin directly onto the machine chassis, as indicated in Fig. 16, by drilling and fastening it from inside using an M10 nut.

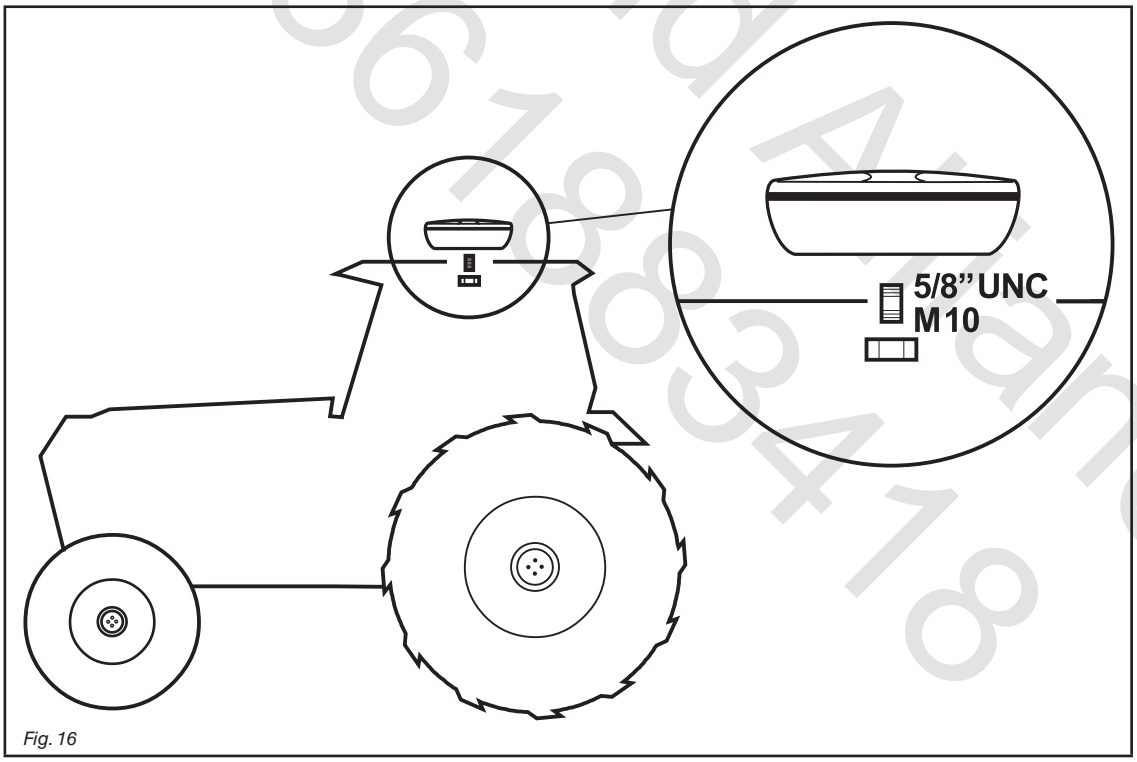

Fig. 16

The operator is responsible for checking that the mounting system is completely secure. ARAG is not liable for damage of any nature caused by the receiver working free, independently of which mounting system is used.

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7 CONNECTING THE COMPUTER TO THE AGRICULTURAL EQUIPMENT

7.1 General precautions for cable position

• Securing the cables:
- secure the harness so that it does not interfere with moving parts;
- route the harnesses in such a way that they cannot come into contact with moving parts.

• Routing the cables to protect against water infiltrations:
- branches in the cable runs must ALWAYS be oriented downwards (Fig. 17a).

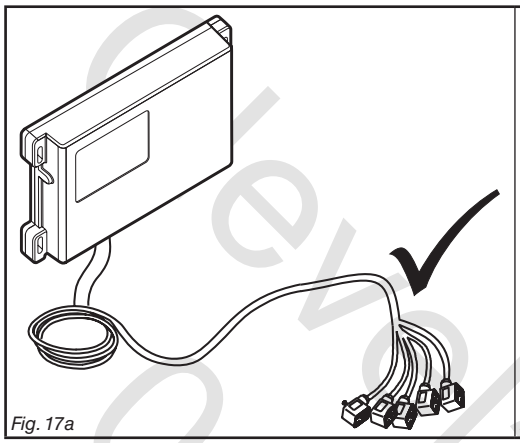
Fig. 17a

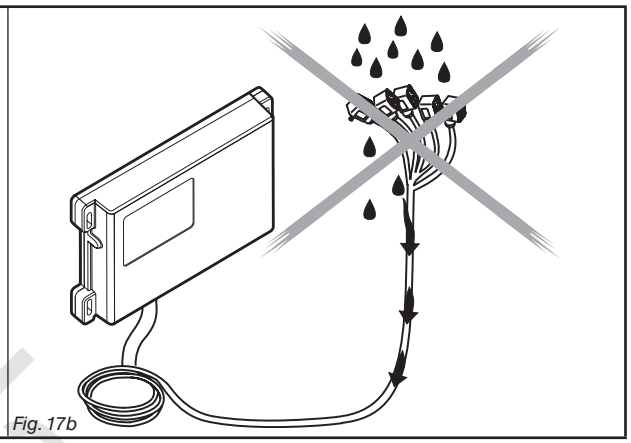
Fig. 17b

• Fitting the cables to the connection points:
- do not force the connectors by pushing too hard or bending them: the contacts can be damaged and computer operation compromised.

Use ONLY the cables and accessories indicated in the catalogue, having technical features suitable for the use to be made of them.

7.2 Power supply connection

Inside the package (component **12**, Fig. 1) you will find the power connector required for the connection to the machine's battery;
Fig. 18c shows the drilling template for installing the power connector.
Connect the power connector to the battery wires using two 6 mm faston connectors, as shown in figs. 18a and 18b.
Use the cable provided in the package (component **3**, Fig. 1) to connect the computer to its power supply.

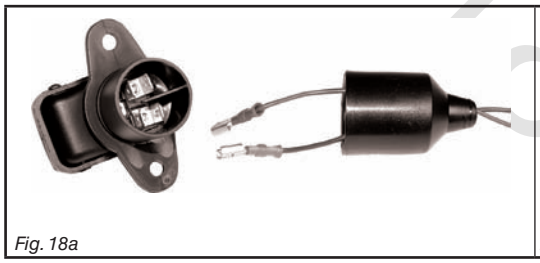
Fig. 18a

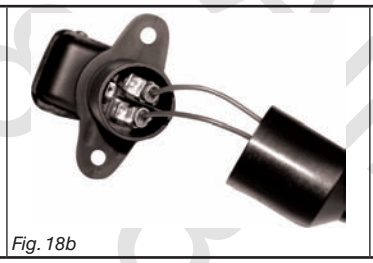
Fig. 18b

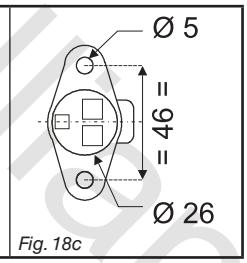

Fig. 18c

WARNING:
To avoid short circuits, do not connect the power cables to battery before the installation is completed.
Before powering up the computer and control unit, make sure the battery voltage is as specified (12 Vdc).

BRAVO 400 is powered directly from the battery (12 Vdc): it must ALWAYS be switched on from the computer; when finished, switch the computer off manually using the suitable key on the control panel.

Keeping BRAVO 400 on for long periods of time when the machine is off may run down the tractor battery: be sure to switch off the computer if the machine is to be left unused with the engine off for some time.

Connect the power source as shown in Fig. 19: **the computer must be connected directly to the machine's battery. DO NOT connect the computer to key-operated switch (15/54).**

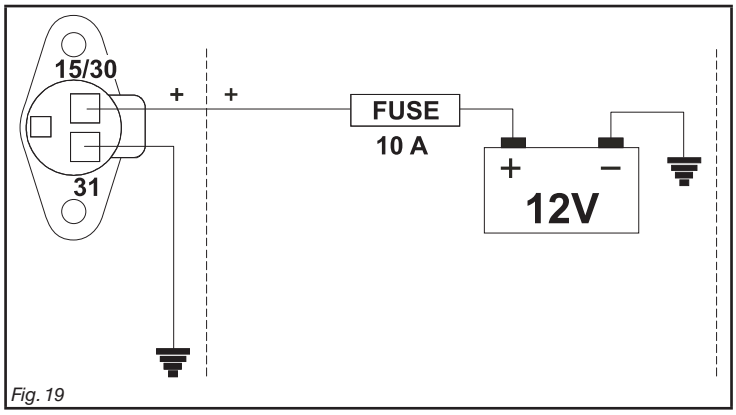

Fig. 19

WARNING:
• The power circuit shall ALWAYS be protected by a 10 A fuse like the ones for automotive applications.
• All cables connected to the battery shall have a minimum cross-section of 2.5 sq. mm.
To avoid short-circuits, connect the power cable connector only after completing installation.
• Use cables with suitable terminals ensuring correct connection of all wires.

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8 HARNESS CONNECTION TO CONTROL UNIT, PNEUMATIC ASSEMBLY AND OTHER AVAILABLE FUNCTIONS

- **Use only the cables provided with the ARAG computers.**
- **Take care not to break, pull, tear or cut the cables.**
- **Use of unsuitable cables not provided by ARAG automatically voids the warranty.**
- **ARAG is not liable for damage to the equipment, persons or animals caused by failure to observe the above instructions.**

8.1 Connecting the switches panel

Inside the package (component **9**, Fig. 1) you will find the power cable connector required for the connection to the machine's battery.
Fix the connectors (connection points at par. 6.2), properly insert the ring nut and turn it clockwise until it locks.

8.2 Connecting the remote control unit (RCU)

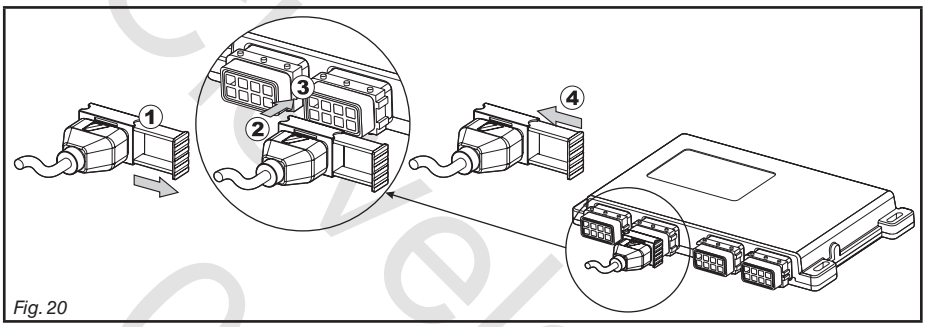

Fig. 20

- Open the connector rail (**1,** Fig. 20).
- Insert the connector (**2**) into the outlet (**3**) and push it: **be careful not to bend the contacts upon insertion**.
- Fully tighten the rail (**4**).

Connect the harnesses as indicated in par. 6.2; make sure to connect each harness to the relevant outlet on the remote control unit. In case the insertion proves difficult do not force the connectors and check the indicated position.

8.3 Connecting the control unit valves

- **Use ARAG valves: use of unsuitable valves not provided by ARAG automatically voids the warranty.**
ARAG is not liable for damage to the equipment, persons or animals caused by failure to observe the above instructions.
- **All valve connectors must be equipped with seals before installation (Fig. 22).**
- **Make sure the seals are correctly fitted to avoid infiltration of water when using the control unit.**

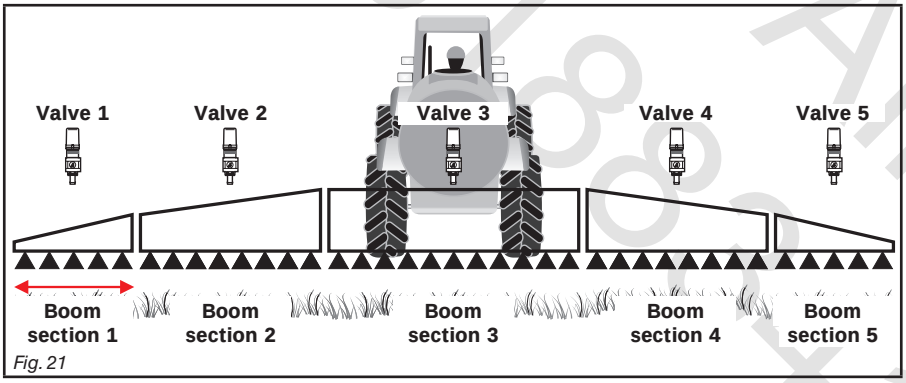

Fig. 21

Connector 1 shall control the valve which in turn is connected to the boom section 1, and so on with the other valves.
Connect "connector 1" to "valve 1", and then the other connectors, with rising numbers from left to right: **the boom section 1 is the left one looking the machine from the rear side** (Fig. 21)**.**

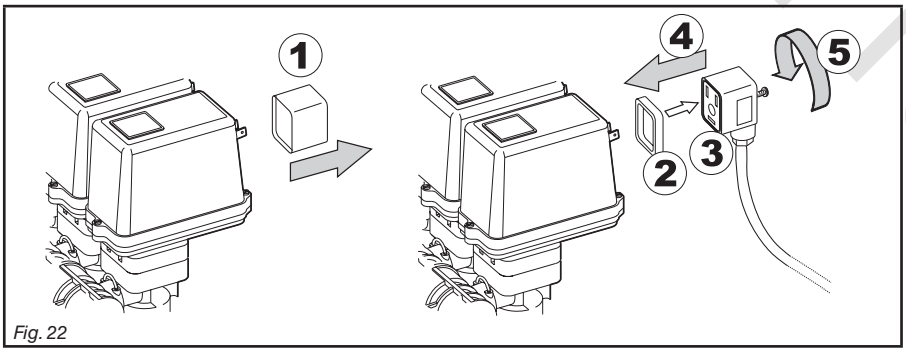

Fig. 22

Fix the connectors to the relevant valves according to the initials indicated in your assembly general diagram (par. 6.1 - Recommended system layout).

- Remove the protection cap (**1**, Fig. 22) from the electric valve.
- Place the seal (**2**) onto the connector (**3**), and push the connector fully on (**4**): **be careful not to bend the contacts upon insertion on the valve**.
- Tighten the screw (**5**) fully home.

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• ONLY FOR sele JET

Bravo 400 can control up to 7 sections with a suitable pneumatic assembly.
WARNING! ! The main valve shall be a 3-wire one (the valve code features a "T" at the end).

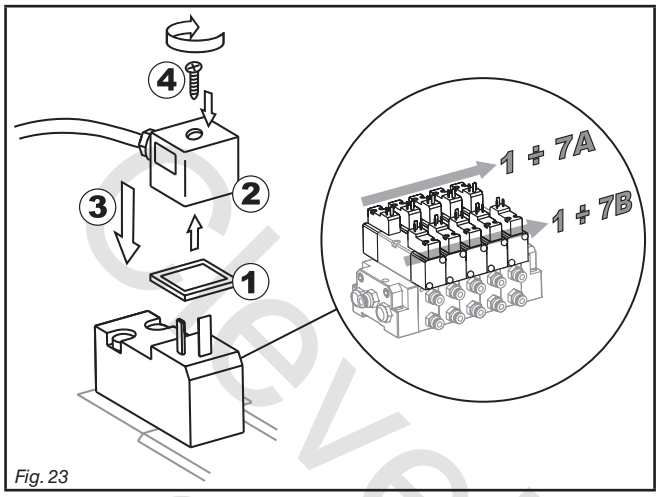

Fig. 23

Fix the connectors to the relevant valves according to the initials indicated in your assembly general diagram (par. 6.1 - Recommended system layout).

• Place the seal (**1**) onto the connector (**2**), and push the connector fully on (**3**): **be careful not to bend the contacts upon insertion on the valve**.
• Insert the screw into the connector and fully tighten it (**4**).

• ONLY FOR SEQUENTIAL VERSION:
WARNING!
The main and section valves connected to the computer shall be of the 3-wire type (the valve code features a "T" at the end).
In case less than 13 section valves are required, always start to connect from section 1 until the last one in sequence.

Example:

- Connections for **8** valves: sec. 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8
- Connections for **11** valves: sec. 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8+ 9 + 10 + 11 etc.

8.4 Connecting the hydraulic valves

Bravo 400 can control up to 9 hydraulic functions through double action valves.

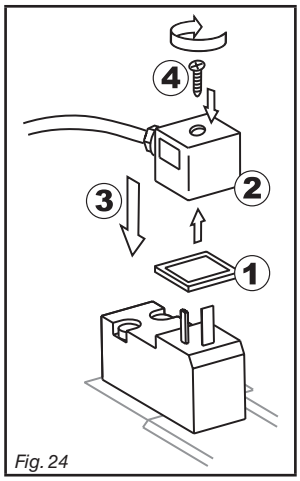

Fig. 24

Fix the connectors to the relevant valves according to the initials indicated in your assembly general diagram (par. 6.1 - Recommended system layout).

• Place the seal (**1**) onto the connector (**2**) and push the connector fully on (**3**): **be careful not to bend the contacts upon insertion on the valve**.
• Insert the screw into the connector and fully tighten it (**4**).

Following is the use of the switches located on the hydraulic function control panel.

• Connect the connector marked with "DD" to the pilot valve, followed by the other connectors as indicated in the table:

CONTROL	MOVEMENT		CONNECTOR
Section movement / AUX switch opening 1 - 2 - 3 - 4 - 5 - 6	Opening	⇧	**1 ÷ 6 A**
	Closing	⇩	**1 ÷ 6 C**
Boom height	Opening	⇧	**AA**
	Closing	⇩	**AC**
Boom locking	Opening	⇧	**BA**
	Closing	⇩	**BC**
Boom leveling	Opening	⇧	**CA**
	Closing	⇩	**CC**

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8.5 Connecting the sensors

Fix the connectors to the relevant functions according to the initials indicated in your assembly general diagram (par. 6.1).

Harness cables are marked with a symbol denoting their functions:please see the table for correct harness instructions.

Use ARAG sensors: use of unsuitable sensors not provided by ARAG automatically voids the warranty.
ARAG is not liable for damage to the equipment, persons or animals caused by failure to observe the above instructions.

ITEM	CONNECTION PRIMARY	ALTERNATIVE CONNECTION
M	Pressure sensor	--
F	Flowmeter	--
T	Filling flowmeter	Pump Protector
X	RPM sensor	Pump Protector

The "Pump Protector" sensor **(code 4664000.100)** when connected to the computer, detects and signals breakage of the pump diaphragm or indicates when the oil drops below its minimum level.

The preferred sensor input is always marked with an "X" on the harness; if this input is not available, use the secondary input marked "T".

WARNING:
the secondary connection “T” shall be used only if connection "X" is already occupied by another sensor.
Do not use the secondary input "T" if no sensor is connected to the "X" input otherwise the computer will not be able to acknowledge the Pump Protector sensor.

- The products are supplied with the sensor installation instructions.
The following speed sensors can also be used as RPM sensors:
• inductive speed sensor (**code 467100.086);**
• magnetic speed sensor (**code 467100.100).**

- Connection of:
• flowmeter;
• pressure sensor;
• Pump Protector;
• filling flowmeter;
• RPM sensor.

All ARAG sensors use the same type of connector. Connect the sensor connector to the relevant harness; make sure it is correctly fitted and push it until locking it.

Fig. 24

Fig. 25

8.6 Connecting the cameras

Bravo 400 can be connected to one or two cameras **code 46700100** (to be purchased separately) using the suitable cables specified on the ARAG catalogue.
Connect the connector to the monitor (connection points at par. 6.2) and bring the other cable end to the camera: properly fit the ring nut and turn it clockwise until it locks.

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8.7 SD memory card

The SD memory card is used to exchange data with the BRAVO 400 computer.

Make sure the card is not protected before installing it (Fig. 26a).
ONLY use the SD card supplied with the package.

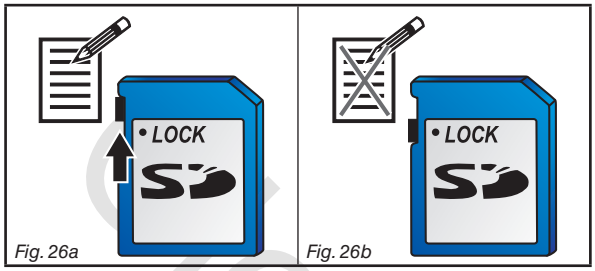

Fig. 26a *Fig. 26b*

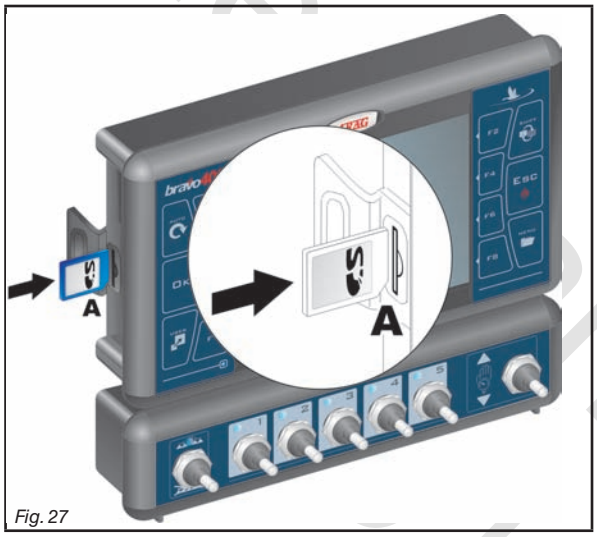

Fig. 27

• Insertion
Insert the memory card making sure to orient it correctly:
the card cut edge **A** must be faced downward; push the card until it engages into place and close the slot with the cover.

• Removal
Press and immediately release the card into the slot and slide it out.

Store the SD memory card into the suitable case (supplied) when not in use.

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9 PROGRAMMING

9.1 Pre-programming tests and checks

Before computer programming, ensure:
- **that all components are correctly installed (control unit and sensors);**
- **the connection to the power source;**
- **that all components are correctly connected (control unit and sensors).**

Failure to correctly connect system components or to use specified components might damage the device or its components.

9.2 Switching on

Fig. 28

Fig. 29

1 Hold the push-button depressed until Bravo 400 displays the page shown in Fig. 28.
After that, Bravo 400 shows the software version (Fig. 29).

FIRST START-UP OF THE DEVICE

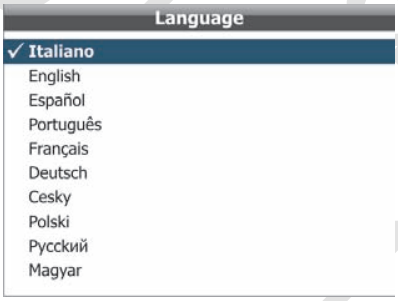


Fig. 30

Upon first start-up, after showing the software version, Bravo 400 immediately displays the page where to set the use language (Fig. 30).
Enter value and proceed to the normal switch-on procedure (Fig. 31).

NORMAL SWITCH-ON PROCEDURE

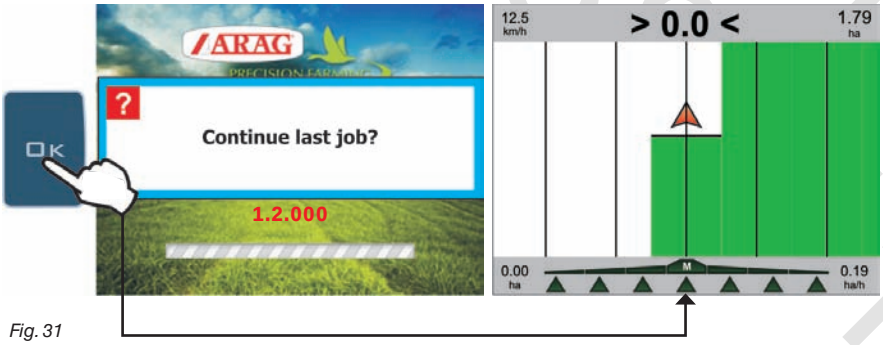


Fig. 31

After showing the software version, Bravo 400 displays the following message **Continue last job?** (Fig. 31).

Button **OK** allows to continue the last job done before switch-off.

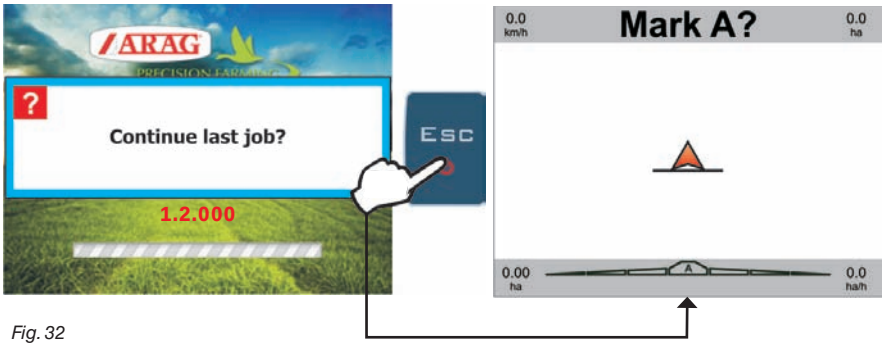


Fig. 32

Button **ESC** moves on to a new job without saving the last one done before switch-off.

WARNING: all job data not duly saved will be lost.

Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | **Par. 9.4**

9.3 Switching off

Fig. 33

Fig. 34

Hold **ESC** button depressed until Bravo 400 displays the page shown in Fig. 33.
Release the button and device will switch off after a few seconds.

While switching off, Bravo 400 automatically saves current job.

Do NOT push any button or cut the power during switching off until the Bravo 400 display is OFF.
WARNING: ALWAYS use the suitable button to switch device off; failure to do so will cause ALL jobs and programming data to be lost.

9.4 Using the programming keys

SELECTION AND ACCESS TO MENU ITEMS

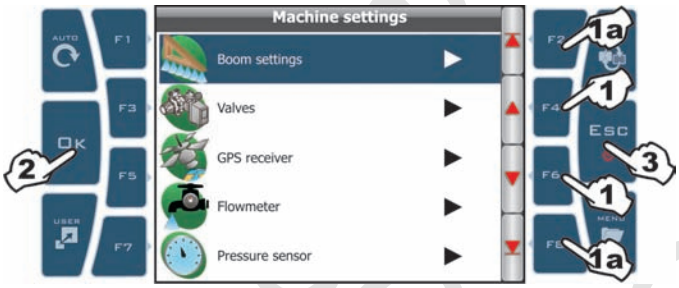


Fig. 35

1 Press repeatedly to toggle from one item to another (selected item is highlighted by a blue line)
1a Press repeatedly to toggle from one page to another
2 Press to open the selected item or confirm any changes
3 Press to quit current page or exit without confirming changes

ENTERING A NUMERICAL VALUE

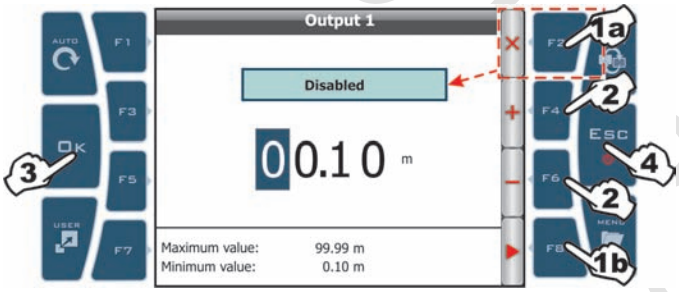


Fig. 36

1a Press to disable displayed data (in the example **Output 1**).
In this case, display will show item **Disabled**
1b Press to activate data and shift cursor from one figure to another
2 Press to edit highlighted figure (+ increase, - decrease)
3 Press to confirm entered value
4 Press to quit current page or exit without confirming changes

ENTERING TEXT

Fig. 37

1 Press a few times to select character to type
2 Press to confirm selected character
3 Press to save name
4 Press to quit current page or exit without confirming changes

Legend:

Job_0**0** Entered name
Cursor
1 Selected character
Shift cursor across name characters
Delete character before cursor
Caps lock on / off

10 ADVANCED PROGRAMMING - MACHINE SETTINGS

The computer can be programmed with the all data required to ensure a correct distribution of the treatment product.

must be done once only, when installing the computer.
WARNING: you will be allowed to access this menu only when the machine is NOT moving.

ACCESS TO MACHINE SETTINGS MENU

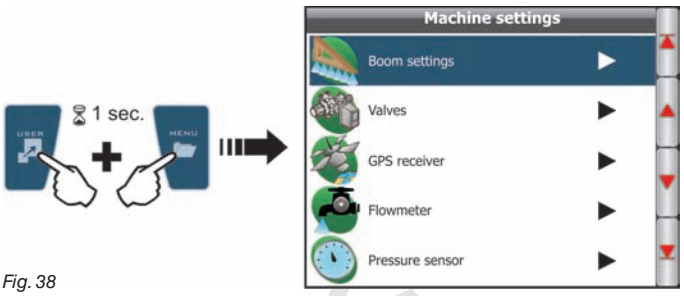


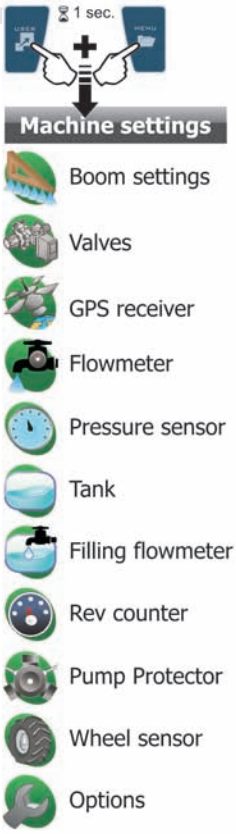
Fig. 38

- On the guidance page keep buttons **USER** and **MENU** pressed at the same time for about one second until the menu is displayed **Machine settings**.
- Select the desired menu item and set-up the data.

When present, the symbol ✓ indicates the active option.

For correct use of keys while programming refer to par. 9.4.

MACHINE SETTINGS - MENU LAYOUT



- **Boom settings** Par. 10.1
  - Nozzle number Par. 10.1.1
  - Output 1 ÷ 13 Par. 10.1.2
- **Valves** Par. 10.2
  - Boom sections Par. 10.2.1
  - Auto switch-off Par. 10.2.2
  - Pressure regulator Par. 10.2.3
  - Main valve Par. 10.2.4
  - Selejet Par. 10.2.5
  - Section activation time Par. 10.2.6
- **GPS receiver** Par. 10.3
  - Position Par. 10.3.1
  - Distance Par. 10.3.2
  - Antenna height Par. 10.3.3
  - DGPS Par. 10.3.4
- **Flowmeter** Par. 10.4
  - Type Par. 10.4.1
  - Minimum flowrate alarm Par. 10.4.2
  - Maximum flowrate alarm Par. 10.4.2
  - Constant Par. 10.4.3
- **Pressure sensor** Par. 10.5
  - Pressure sensor Par. 10.5.1
  - Maximum pressure Par. 10.5.2
- **Tank** Par. 10.6
  - Capacity Par. 10.6.1
  - Minimum level alarm Par. 10.6.2
- **Filling flowmeter** Par. 10.7
  - Type Par. 10.7.1
  - Constant Par. 10.7.2
- **Rev counter** Par. 10.8
  - Rev counter Par. 10.8.1
  - Constant Par. 10.8.2
  - Minimum speed alarm Par. 10.8.3
  - Maximum speed alarm Par. 10.8.3
- **Pump Protector** Par. 10.9
  - Pump Protector
- **Wheel sensor** Par. 10.10
  - Wheel sensor
- **Options** Par. 10.11
  - Language Par. 10.11.1
  - Timezone Par. 10.11.2

Fig. 39

01 Versions

10.1 - Boom settings ····➤ ····➤ ····➤

Boom settings - 20.00 m		
Nozzle number	40	
Output 1	Section	4.00 m
Output 2	Section	4.00 m
Output 3	Section	4.00 m
Output 4	Section	4.00 m
Output 5	Section	4.00 m
Output 6	-	
Output 7	-	
Output 8	-	
Output 9	-	
Output 10	-	

Fig. 40

According to the programming both the boom aspect on the display (par. 12.6) and the total length value (near the Boom settings menu, Fig. 40)

····➤ 10.1.1 Nozzle number

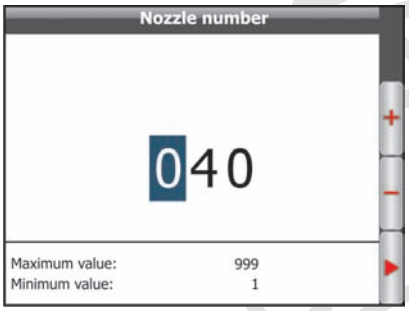


Fig. 41

Indicate the total number of nozzles on the boom.

ONLY FOR selejet

Indicate the total number of nozzle holders fitted on the boom despite the actual number of nozzles.
For example: with 80 nozzles enter value '40'.

····➤ 10.1.2 Output 1 ÷ 13

- Indicate the Bravo 400 output connection by entering the width of each boom section. Repeat the programming for each item of Fig. 40.
- Disable the disconnected. Message **Disabled** will appear on the display.

AUX option: available for system diagnosis for ARAG personnel ONLY.

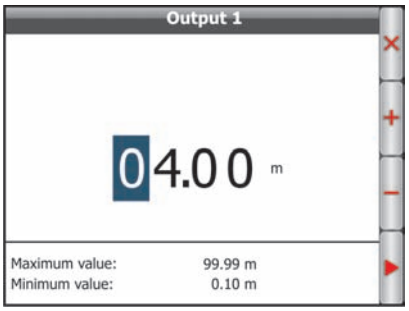


Fig. 42

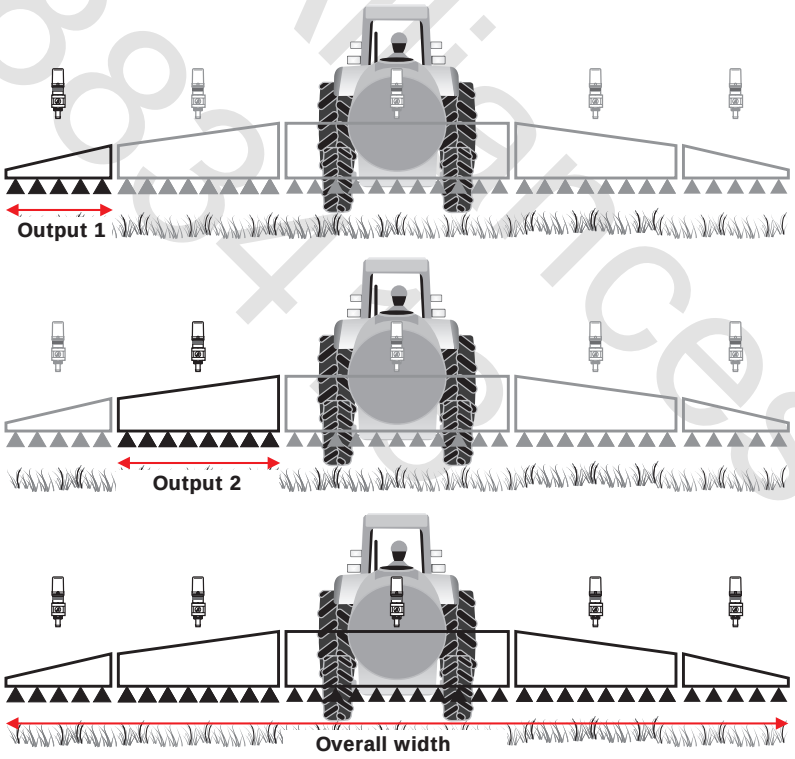


Fig. 43

Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

10.2 - Valves ····➤ ····➤ ····➤

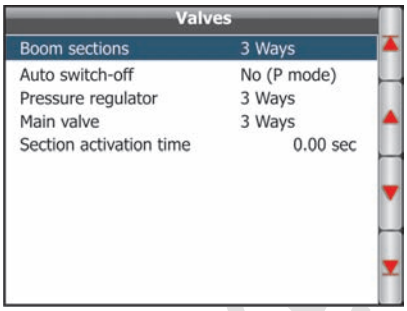


Fig. 44

In this menu set the type of valves installed on the system and the relevant data.

····➤ 10.2.1 Boom sections

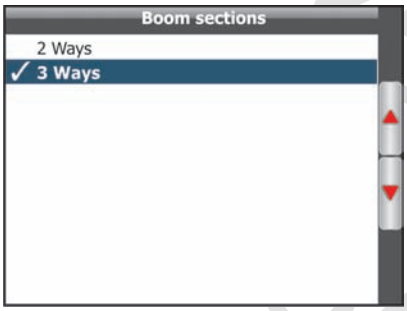


Fig. 45

Indicate the type of section valves installed.
- **2 Ways** = valves without calibrated backflows
- **3 Ways** = valves with calibrated backflows

····➤ 10.2.2 Auto switch-off

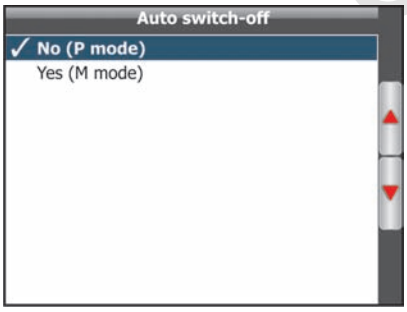


Fig. 46

Indicate the section valve operation mode, especially if the section automatic closing is active when the main valve is closed.

- **"P" operation mode (option No):**
section valves are operated independently.
Main switch control functions do not affect section valve opening or closing.

- **"M" operation mode (option Yes):**
section valves are closed or opened from the main switch provided that section valve switches are set in the appropriate position; in other words, if section switches are set to OFF (lever down), operating the main switch does not affect the sections. If one or more section valve switches are set to ON (lever up), opening or closing the main switch opens or closes the section valves as well.

M operation (option Yes) must be activated when:
- System features no main valve (menu Main valve > None - par. 10.2.4)
- Bravo 400 is connected to a nozzle holder control selejet **(menu Selejet > Enabled, par. 10.2.5)**

····➤ 10.2.3 Pressure regulator

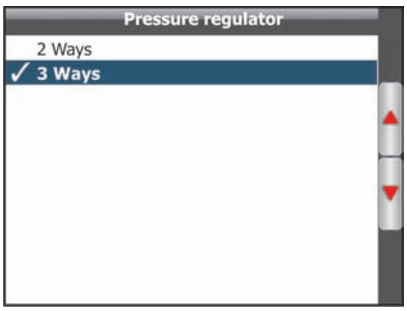
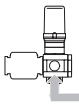


Fig. 47

Indicate the type of control valve installed.

- **2 Ways** = 

- **3 Ways** =

10.2.4 Main valve

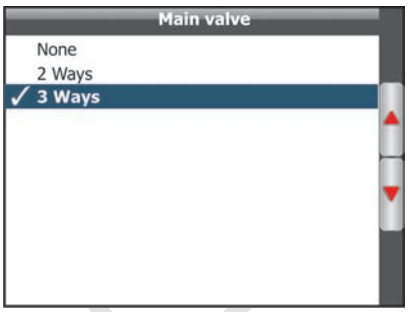


Fig. 48

Indicate the type of control main valve installed.
- **None**
- **2 Ways** = discharge valve
- **3 Ways** = main valve

When the option None is active, the M operating mode must be set (option Yes) in the Auto switch-off menu (par. 10.2.2).

10.2.5 Selejet

Fig. 49

Indicate the type of system the Bravo 400 is installed on (with or without nozzle selejet holder control).
- **Disabled** = without nozzle holder control
- **Enabled** = with nozzle holder control

The layout of the User menu changes according to the option enabled here, to allow the best configuration of Bravo 400 considering the system.

10.2.6 Section activation time

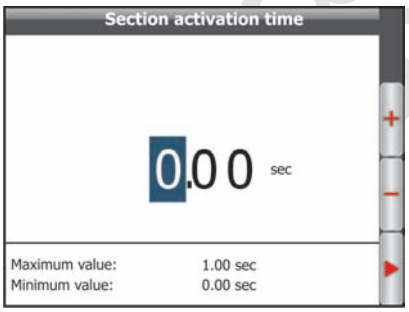


Fig. 50

Indicate the time between section valve control and actual start/stop of product spraying.
The computer will use this information to precisely open and close the section valves.

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10.3 - GPS receiver

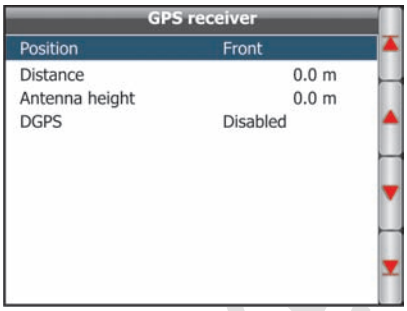

Fig. 51

In this menu it is possible to set the data of the GPS receiver installed on the system.

10.3.1 Position

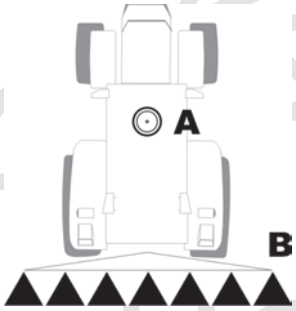

Fig. 52

Indicate the antenna position with respect to the crop spraying boom.
In the example shown in Fig. 52, antenna **A** is installed in **Front** of the spraying boom **B**.

WARNING: before setting this item change the Distance (Fig. 53): if Distance zero, the Position item can not be modified.

10.3.2 Distance

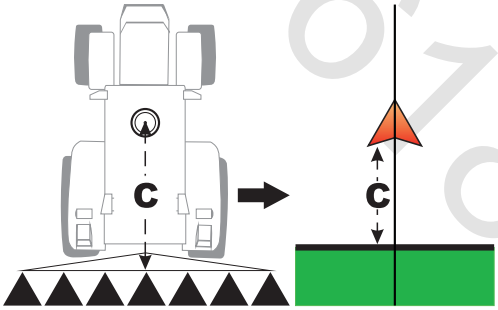

Fig. 53

Indicate distance **C** between antenna and work point (Fig. 53).

Depending on entered value, the displayed sketch will change accordingly.

10.3.3 Antenna height

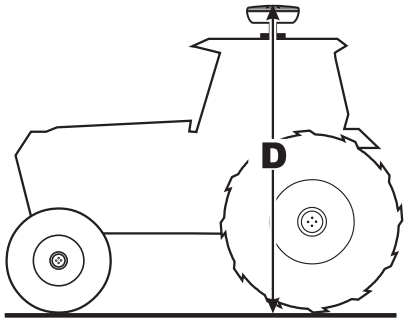

Fig. 54

Indicate antenna height **D** with respect to the ground (Fig. 54).

10.3.4 DGPS

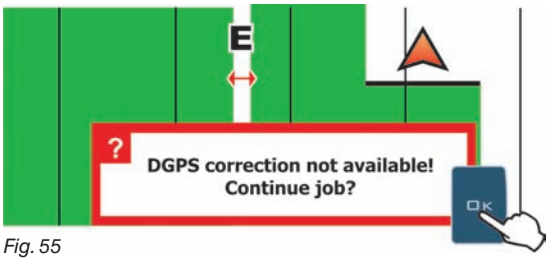

Fig. 55

Allows you to enable the DGPS differential correction function (SBAS): SBAS differential correction signal is a free signal only available in some areas world-wide that ensures a higher work accuracy.

WARNING: this function can only be used in Europe (EGNOS), United States of America (WAAS) and Japan (MSAS).

Enabling / disabling the differential correction during the job can trigger a considerable measure error between the vehicle position and the tracks treated until that moment (**E**, in Fig. 55).
The following passes will instead be measured correctly (at the same distance from one another).
In the example shown in Fig. 55, press **OK** to continue job. IMMEDIATELY AFTER we recommend to align the tracks using the "Align" function (par. 13.1.7 - **F6** Align).

10.4 - Flowmeter

In this menu it is possible to set the data of the flowmeter installed on the system.

The following table shows the values automatically set by selecting the flowmeter code (they can be also modified).

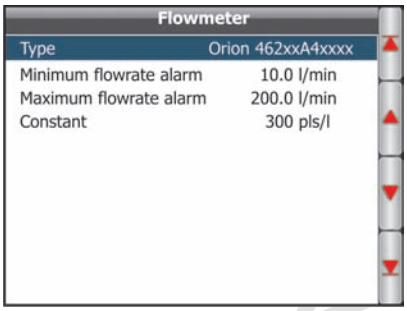

Fig. 56

ORION FLOWMETERS

TYPE	Constant (pls/l)	Rate min. (l/min)	Rate max. (l/min)
4621xA0xxxx	6000	0.5	10.0
4621xA1xxxx	3000	1.0	20.0
4621xA2xxxx	1200	2.5	50.0
4621xA3xxxx	600	5.0	100.0
462xxA4xxxx	300	10.0	200.0
4622xA5xxxx	150	20.0	400.0
4622xA6xxxx	100	30.0	600.0
Other	625	10.0	200.0

WOLF FLOWMETERS

TYPE	Constant (pls/l)	Rate min. (l/min)	Rate max. (l/min)
462x2xxx	1025	2.5	50.0
462x3xxx	625	5.0	100.0
462x4xxx	250	10.0	200.0
462x5xxx	132	20.0	400.0
462x7xxx	60	40.0	800.0

10.4.1 Type

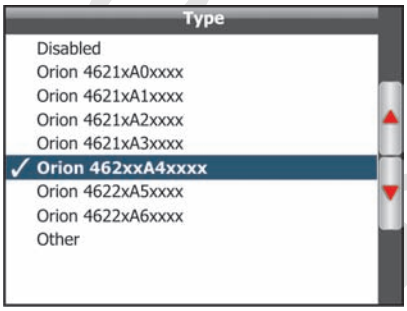

Fig. 57

Indicate the type of flowmeter installed.

When the option Disabled is active, the items Minimum flowrate alarm, Maximum flowrate alarm and Constant are no longer displayed.

10.4.2 Rate alarms

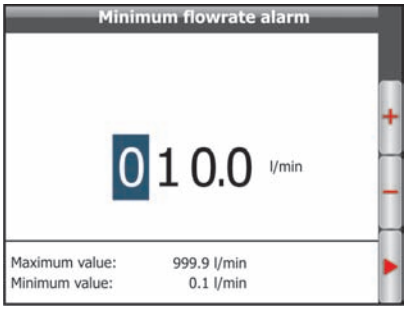

Fig. 58

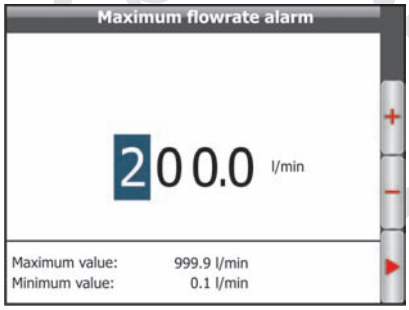

Fig. 59

The rate alarms (minimum or maximum) activate when the flowmeter rate exceed the set limits during the job.

Refer to par. 14.3 - Error Messages for the steps to take during the alarms.

10.4.3 Constant

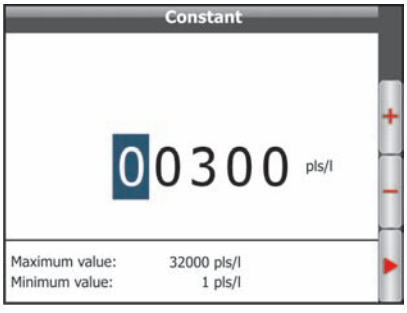

Fig. 60

Indicate the constant relevant to the installed flowmeter.

10.5 - Pressure sensor

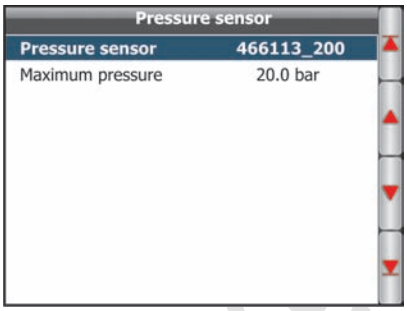

Fig. 61

In this menu it is possible to set the data of the pressure sensor installed on the system.

The following table shows the values automatically set by selecting the sensor code (anyway, they can be modified).

ARAG PRESSURE SENSOR

TYPE	Max pressure (bar)
ARAG 466113.200	20.0
ARAG 466113.500	50.0
Other	20.0

The pressure sensor has a different use according to the situations.

• **Flowmeter enabled:**
displays the job pressure when the machine operates within the flowmeter limits.
When the flowmeter operates outside the limits the measured pressure is used to calculate the spray rate.

• **Flowmeter disabled:**
the pressure sensor is always used to calculate the spray rate.

10.5.1 - Pressure sensor

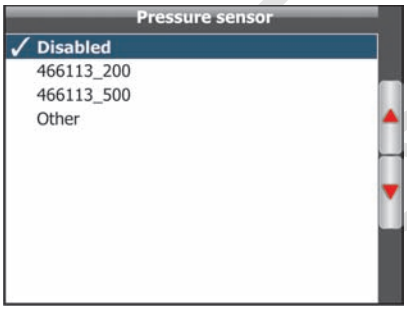

Fig. 62

Indicate the type of pressure sensor installed.

When the option Disabled is activated, the item Maximum pressure is no longer displayed (Fig. 61).

10.5.2 Maximum pressure

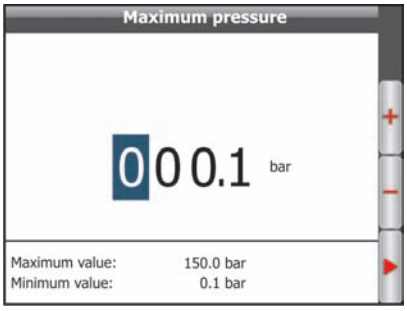

Fig. 63

Indicate the full scale relevant to the pressure sensor installed on the system.

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10.6 - Tank

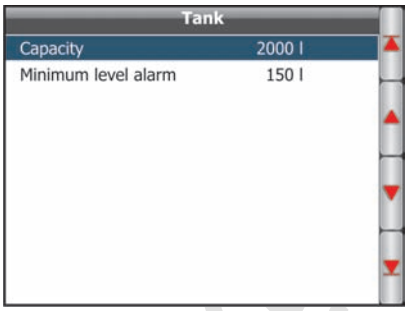

Fig. 64

In this menu it is possible to set both tank capacity and reserve value.

10.6.1 Capacity

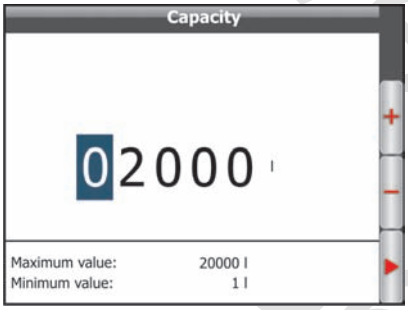

Fig. 65

Indicate the tank capacity.

10.6.2 Minimum level alarm

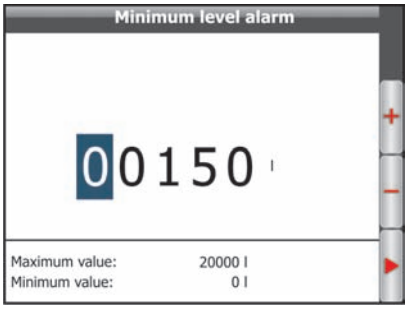

Fig. 66

Indicate the reserve value.
The tank alarm is triggered when the level drops below the set value during the job.

Refer to par. 14.3 Error messages for the steps to take during the alarm.

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10.7 - Filling flowmeter

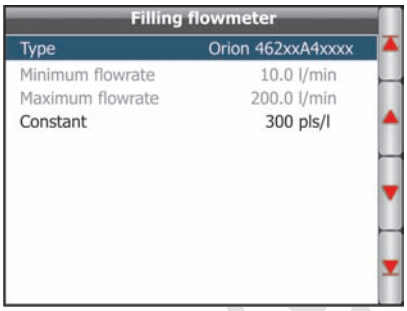

Fig. 67

In this menu it is possible to set the data of the filling flowmeter installed on the system.

The following table shows the values automatically set by selecting the flowmeter code (they can be also modified).

ORION FLOWMETERS

TYPE	Constant (pls/l)	Min. rate (l/min)	Max. rate (l/min)
462xxA4xxxx	300	10.0	200.0
4622xA5xxxx	150	20.0	400.0
4622XA6XXXX	100	30.0	600.0
Other	625	10.0	200.0

WOLF FLOWMETERS

TYPE	Constant (pls/l)	Rate min. (l/min)	Rate max. (l/min)
462x4xxx	250	10.0	200.0
462x5xxx	132	20.0	400.0
462x7xxx	60	40.0	800.0

10.7.1 Type

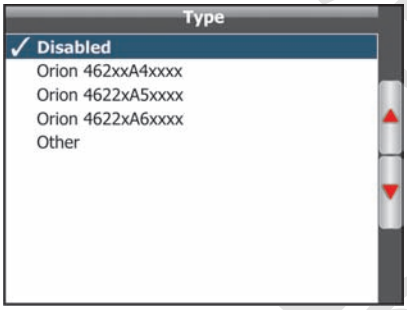

Fig. 68

Indicate the type of flowmeter installed.

When the option Disabled is active, the items Minimum flowrate, Maximum flowrate (Fig. 67) and Constant are no longer displayed.

10.7.2 Constant

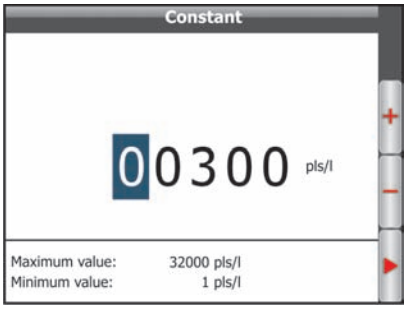

Fig. 69

Indicate the constant relevant to the filling flowmeter installed on the system.

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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10.8 - Rev counter

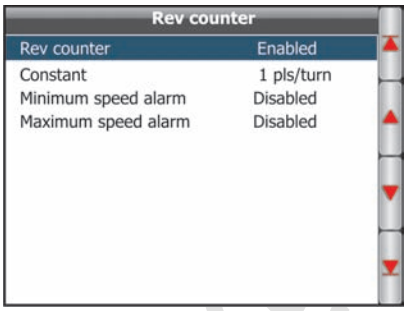

Fig. 70

In this menu it is possible to set the data of the rev counter installed on the system.

10.8.1 - Rev counter

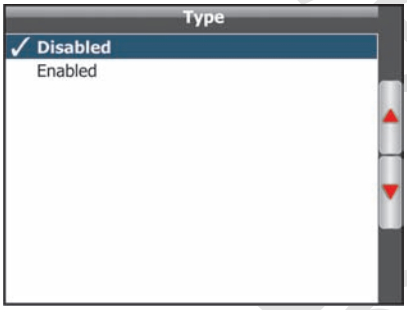

Fig. 71

Indicate if the rev counter is installed.

When the option Disabled is activated, the items Constant, Minimum speed alarm, and Maximum speed alarm (Fig. 70) are no longer displayed.

10.8.2 Constant

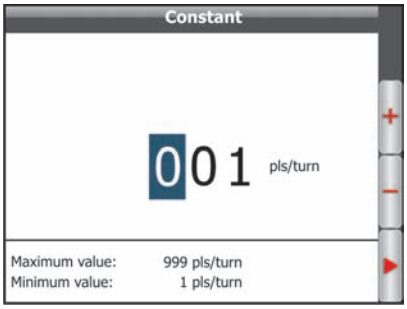

Fig. 72

Indicate the constant relevant to the installed rev counter.

10.8.3 Speed alarms

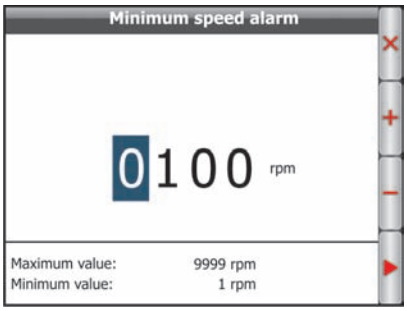

Fig. 73

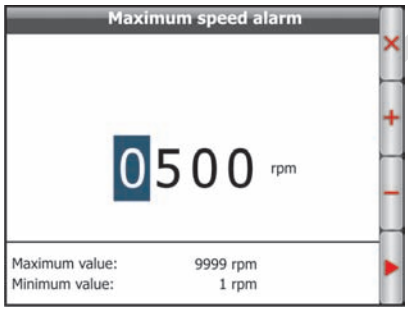

Fig. 74

The speed alarms activate when the measured RPM exceed the set limits.
In case of minimum speed this control operates only when the spraying is active (main ON).

Alarms can be disabled with the relevant button: the item **Disabled** will be displayed.

Refer to par. 14.3 - Error Messages for the steps to take during the alarms.

10.9 - Pump Protector

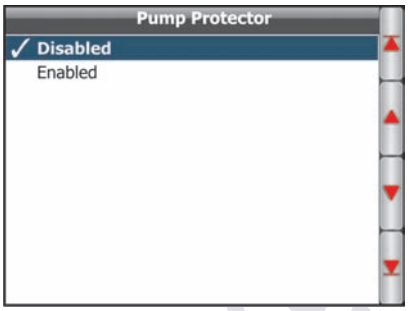

Fig. 75

In this menu indicate if the Pump Protector is installed on the system..

10.10 - Maximum speed alarm

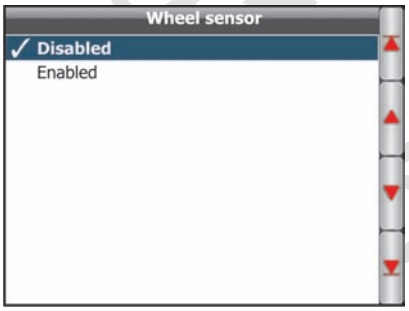

Fig. 76

In this menu indicate if the wheel sensor is installed on the system..

When the wheel sensor is Enabled set the machine as described in par. 11.8 - Speed.

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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10.11 Options

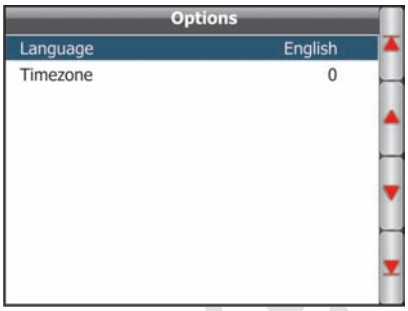

Fig. 77

In this menu set the Bravo 400 system options.

10.11.1 - Language

Fig. 78

Set the Bravo 400 user's language.

10.11.2 Timezone

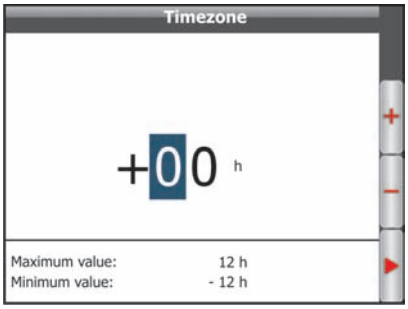

Fig. 79

Set the local time zone with reference to the Greenwich prime meridian *.
Local time will be constantly updated thanks to the signal detected by the GPS receiver.

*** List of main time zones:**

United Kingdom, Portugal, Liberia	0
Azores Islands	-1
Mid-Atlantic Islands	-2
Argentina, Brazil	-3
AST (USA), Venezuela	-4
EST (USA), Colombia	-5
CST (USA), Eastern Mexico	-6
MST (USA)	-7
PST (USA)	-8
AKST (USA)	-9
HST (USA), Hawaii	-10
Midway Islands	-11
Enewetak	-12

Central Europe (Germany, France, Italy)	+1
Latvia, Lithuania, Romania, Greece, Israel	+2
Western Russia, Iraq	+3
United Arab Emirates	+4
Pakistan	+5
Kazakhstan	+6
Thailand	+7
China, Western Australia	+8
Japan	+9
Eastern Australia	+10
Eastern Russia	+11
Fiji Islands, New Zealand	+12

Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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11 USER PROGRAMMING - USER MENU

ACCESS TO USER MENU

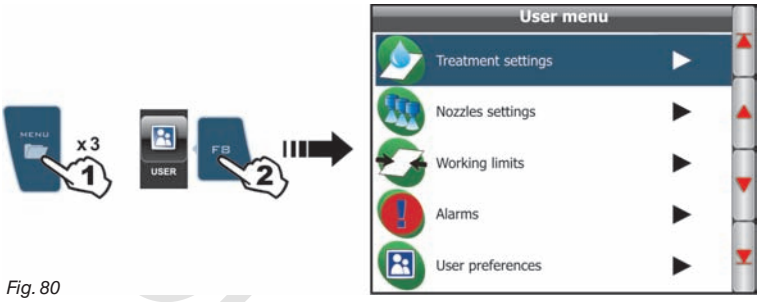

Fig. 80

1 On the guidance or treatment page press MENU button three times in sequence, until reaching the function icon

2 Press F8 to access the **User menu**; select the desired item and set the data.

When present, the symbol ✓ indicates the active option.

For correct use of keys while programming refer to par. 9.4.

USER PROGRAMMING - MENU STRUCTURE

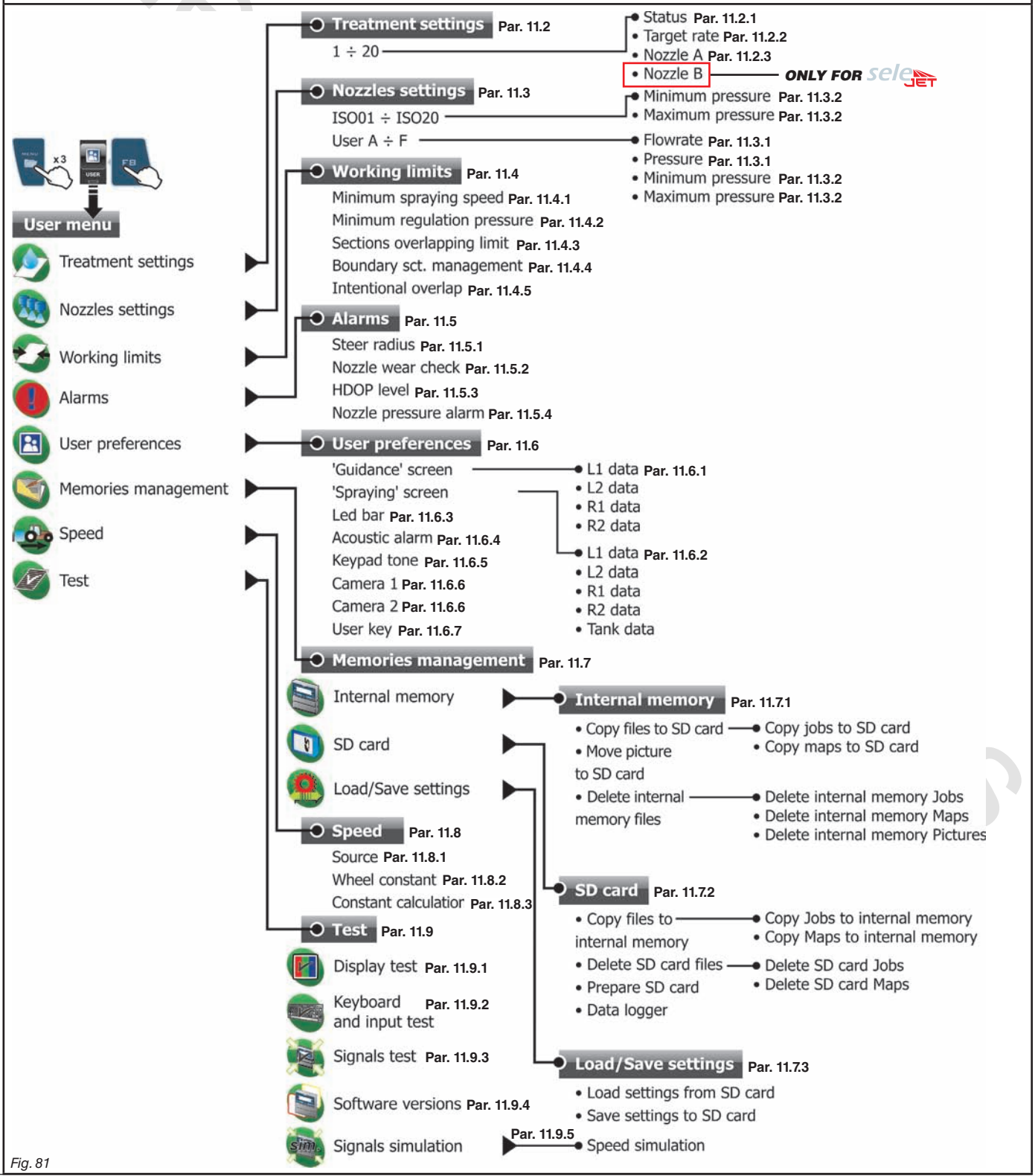

Fig. 81

11.1 How does the SELEJET system work

In a traditional system, the farming machine speed depends on the minimum and maximum pressure of nozzle in use and on desired spray rate. For instance, if we were spraying 100 l/ha with a violet evenfan nozzle ISO110025, the minimum operating speed shall be 6.9 km/h (corresponding to a pressure of 1 bar) while maximum speed shall be 13.9 Km/h (corresponding to a pressure of 4 bars).
This operation field can be restrictive for the features of both crop to be treated and machine.

Operation field of possible combinations of ISO11002 and ISO110025 nozzles

Coupled with a specific pneumatic control unit and the relevant nozzle holders (refer to ARAG general catalogue), Bravo 400 in Selejet mode automatically selects the nozzle or the suitable combination of two different nozzles (**A** and **B**) for the speed and required spray rate.
This system allows for widening the machine operating range, i.e. in the above instance, using ISO11002 yellow (**A**) and ISO110025 violet (**B**) nozzles, that work correctly at a speed from 5.5 km/h to 24.9 km/h.

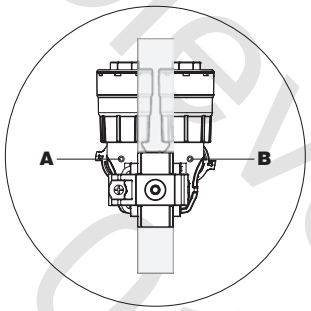

Fig. 82

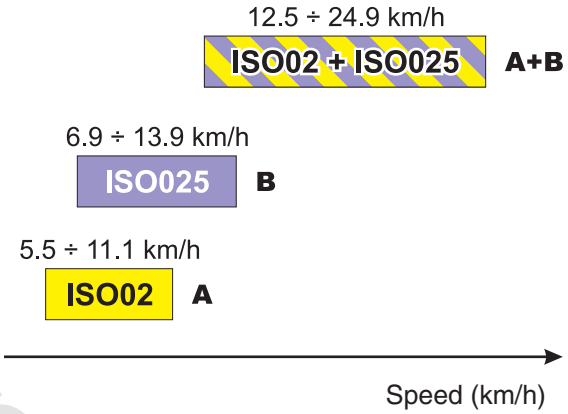

Fig. 83

According to the set data and those detected by the sensors, Bravo 400 select the suitable nozzle configuration constantly checking that:
- the spraying pressure always remains within the job features set for each single nozzle;
- in case of many possible nozzle configurations, the operating pressure of the configuration in use is as close as possible to the operating range of the nozzle;
- required number of nozzle changes is as low as possible.

When setting a treatment in Selejet mode make sure to couple compatible nozzles.
For example:
- ***Compatible nozzles**: the rate at 1 bar of the ISO025 nozzle is LOWER than the rate at 5 bars of the ISO02 nozzle (Fig. 84).*
- ***NOT compatible nozzles**: the rate at 1 bar of the ISO05 nozzle is HIGHER than the rate at 5 bars of the ISO02 nozzle (Fig. 85).*

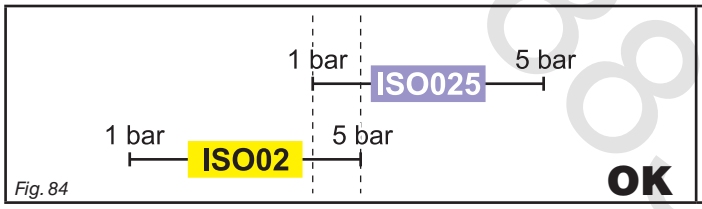

Fig. 84

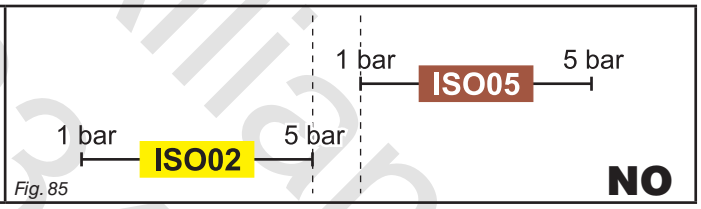

Fig. 85

In the same way, the overall rate of both nozzles at MINIMUM pressure shall be LOWER than the rate of the high rate nozzle at MAXIMUM pressure.

When setting the job (par. 11.2 and 13.1.2) Bravo 400 automatically checks the rates and in case the conditions are not respected the computer will display the message Wrong nozzle configuration!

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11.2 - Treatment settings

In this menu it is possible to set 20 different types of treatments.
Select the treatment to be set (Fig. 86) and enter the features (Fig. 87). Repeat the programming for each treatment.

ONLY FOR selejet
The column of nozzles (**C**) is double since each treatment can be associated with two nozzles (Fig. 88).

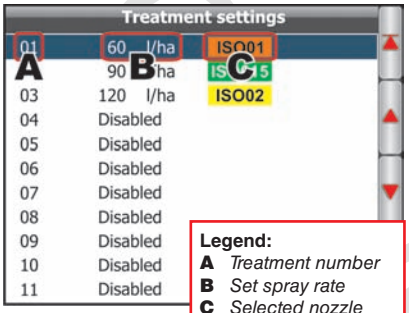

Fig. 86

Fig. 87

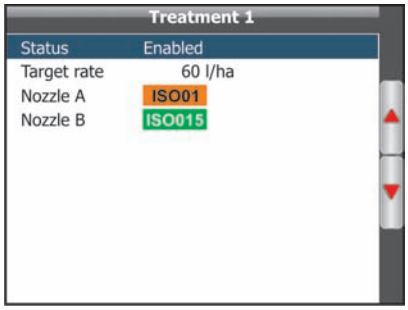

Fig. 88

11.2.1 Status

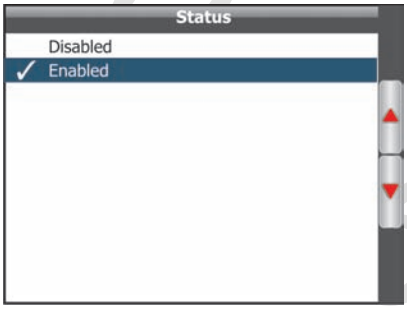

Fig. 89

Allows for enabling/disabling the selecting treatment.

11.2.2 Target rate

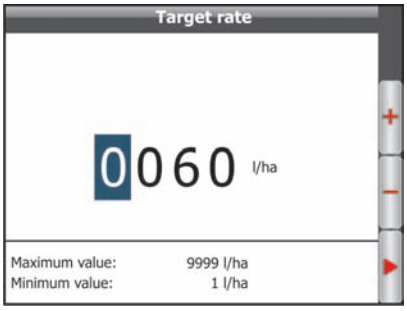

Fig. 90

Set the spray rate value for the selected treatment.

11.2.3 Nozzle

Fig. 91

Link the nozzle type to the selected treatment.
Bravo 400 can calculate the pressure without the pressure sensor based on the rate of the used nozzle.

ONLY FOR selejet
As explained in paragraph 11.1 each treatment can be associated with two nozzles (Fig. 88), it is thus necessary to program the items **Nozzle A** and **Nozzle B**: if you need to use only one of the two nozzles, program only that one and disable the other selecting the relevant item [✕].

Example: **Nozzle A** ISO01 , **Nozzle B** [✕].

11.3 - Nozzles settings

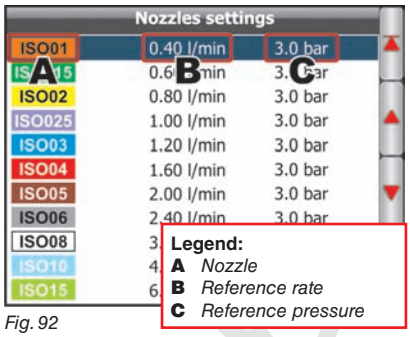

Fig. 92

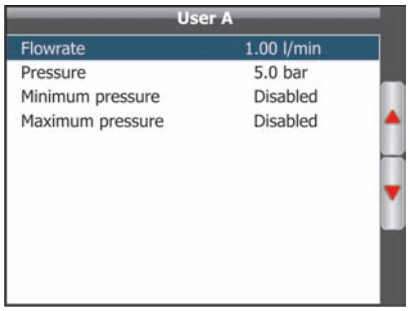

Fig. 93

In this menu it is possible to set 12 types of ISO nozzles and 6 "Users" (A, B, C, D, E, F).
Select the nozzle to be set (Fig. 92) and enter the features (Fig. 93).
Repeat the programming for each nozzle.

11.3.1 Flowrate - Pressure

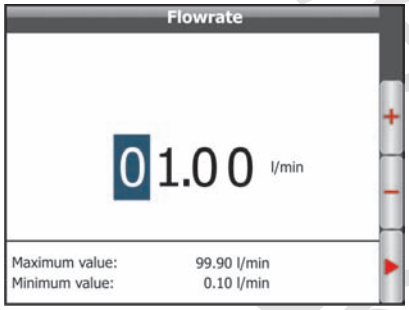

Fig. 94

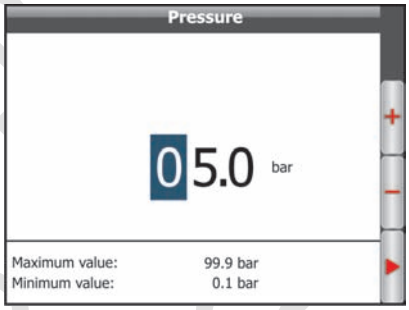

Fig. 95

Set the reference rate and pressure for the selected nozzle.
Bravo 400 can calculate the pressure without the pressure sensor based on the rate of the used nozzle.

The Flowrate and Pressure data can be ONLY modified for the "User" nozzles and not for the "ISO" ones.

11.3.2 Minimum pressure - Maximum pressure

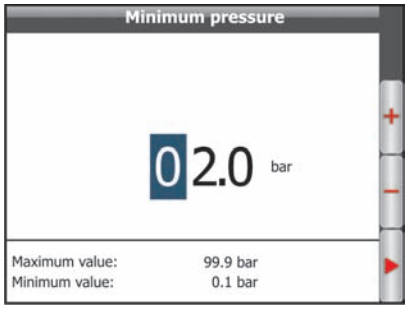

Fig. 96

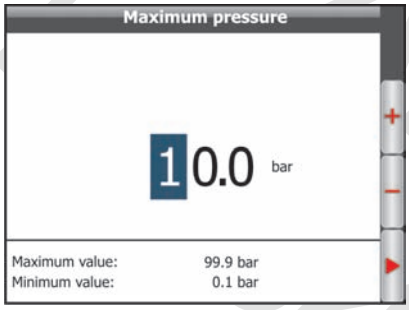

Fig. 97

Set the pressure limits for the selected nozzle.

Enable the suitable function in the Alarms menu (par. 11.5.4 - Nozzle pressure alarm) to allow Bravo 400 triggering an alarm when the nozzle is out of the set limits.

ONLY FOR seleJET

On the basis of the limits of the nozzle in use Bravo 400 select the suitable nozzle during the treatment; for this reason it is **necessary to set them correctly.**

11.4 - Working limits

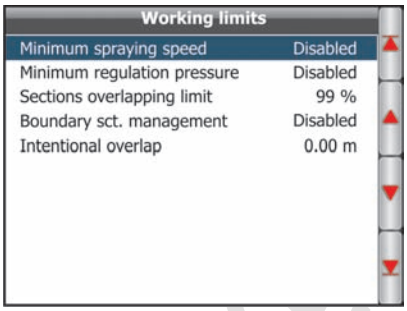

Fig. 98

In this menu it is possible to set the machine working limits.

11.4.1 Minimum spraying speed

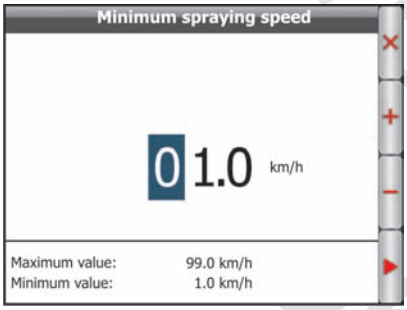

Fig. 99

Set the working minimum speed: Bravo 400 closes the main valve when the tractor speed is lower than the set one. The datum can be disabled with the relevant button: the item **Disabled** will be displayed.

11.4.2 Minimum regulation pressure

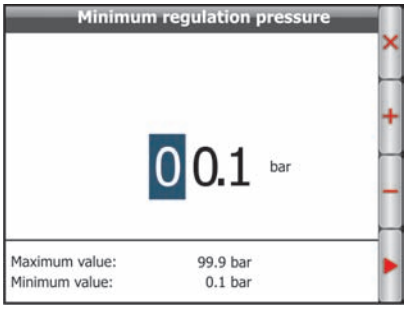

Fig. 100

Set the minimum working pressure: Bravo 400 automatically blocks the proportional valve regulation when the pressure is lower than the set one.
The datum can be disabled with the relevant button: the item **Disabled** will be displayed.

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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11.4.3 Sections overlapping limit

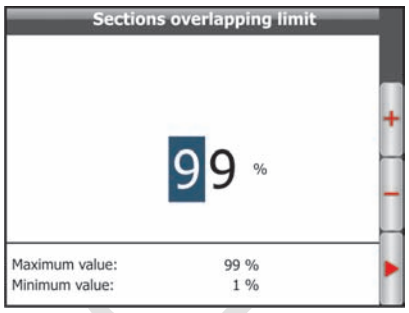

Fig. 101

Enables you to set the allowed threshold for spraying overlapping.
When this value is exceeded, Bravo 400 restores the correct treatment: according to the active operation mode Bravo 400 will request to close the relevant valves or will automatically close the boom sections (par. 12.6).

Overlapping limit: 1%

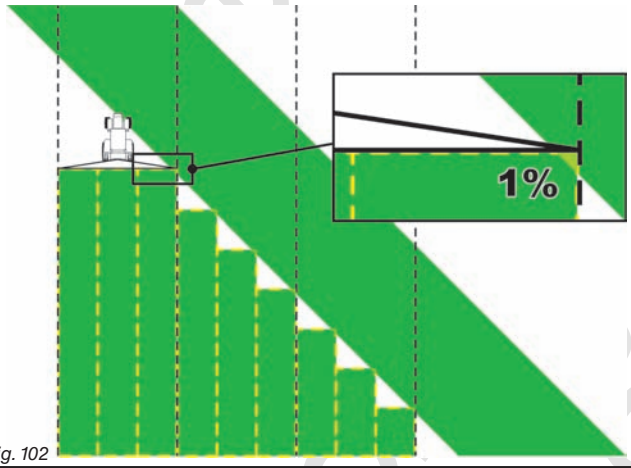

Fig. 102

Overlapping limit: 99%

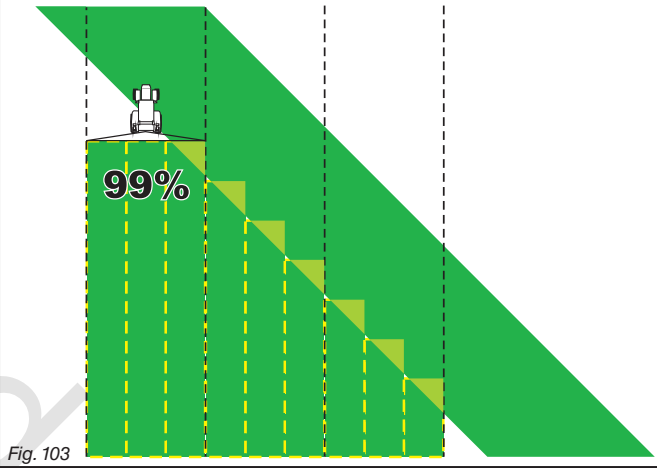

Fig. 103

11.4.4 Boundary sct. management

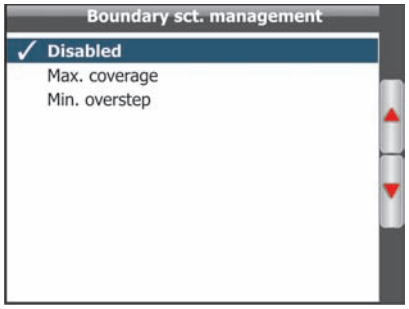

Fig. 104

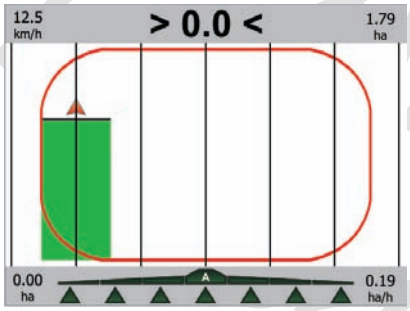

Fig. 105

Determines the moment when Bravo 400 requires to open or close the section valves spraying outside the field boundaries.

- **Min. overstep option:** in Fig. 106 the request of closing / opening the section valves will be triggered upon the least action out of field boundaries.
- **Max. coverage option:** in Fig. 107 the request of closing / opening the section valves will ONLY be triggered when the machine is spraying out of field boundaries for the whole coverage.

To use these settings you need to:
- have marked field boundaries (red track in Fig. 105), using the function "Area" (par. 13.1.8).
- have enabled the section automatic control:
the icon A indicates the active automatic control.

Min. overstep

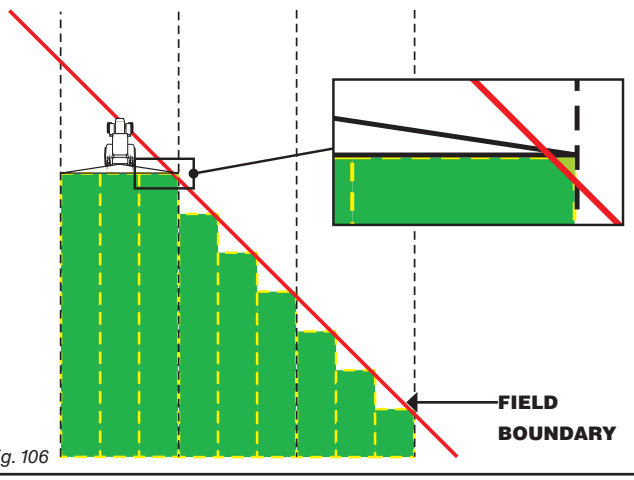

Fig. 106

Max. coverage

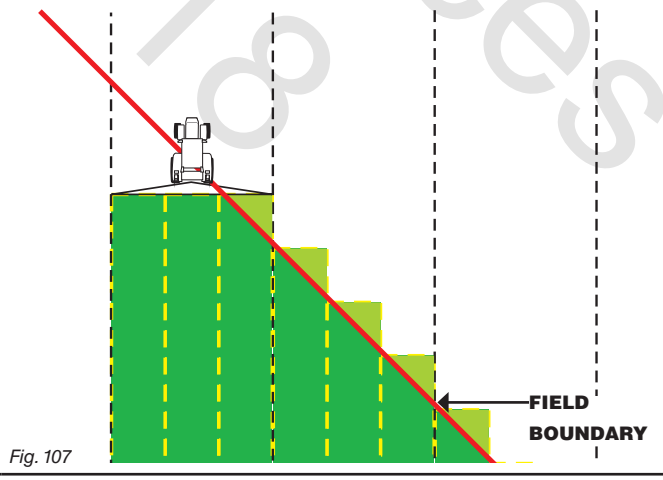

Fig. 107

F2 F8 Scrolling menu pages
F4 F6 Scrolling menu items
F2 Reset / disable data
F4 F6 Increase / decrease data
F8 Shift the cursor
OK Confirm access or datum change
Esc Exit function or datum change
Par. 9.4

11.4.5 Intentional overlap

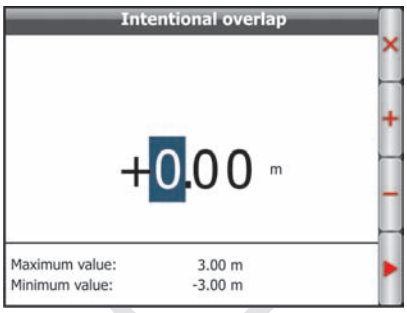

Fig. 108

Set an overlapping width between the sprays (Fig. 109) to avoid untreated areas due to driving imprecision. Otherwise, a negative value will lead to an untreated space between the sprays (Fig. 110).

Intentional overlap +3.00 m

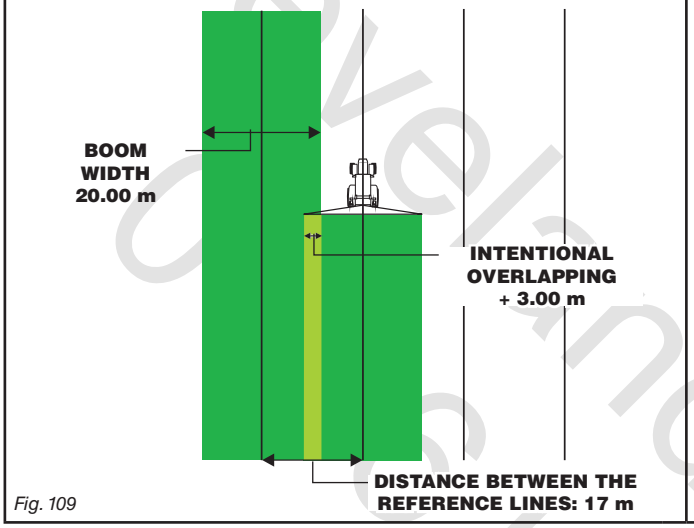

Fig. 109

Intentional overlap -3.00 m

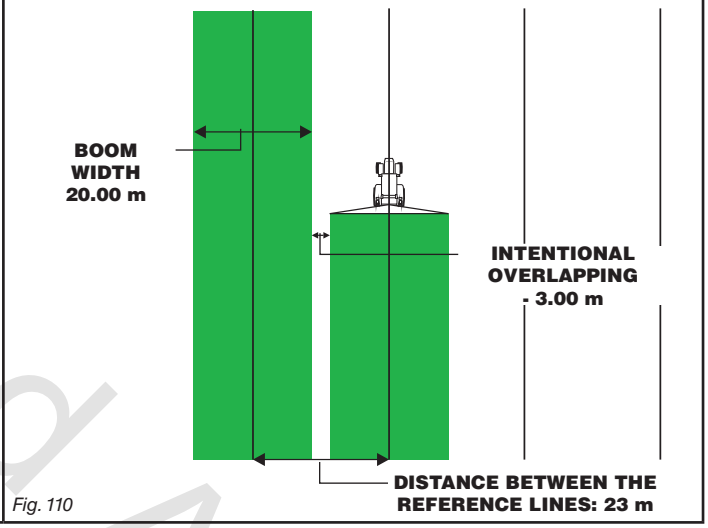

Fig. 110

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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11.5 - Alarms

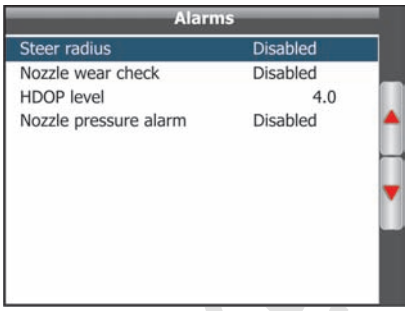

Fig. 111

In this menu it is possible to set the Bravo 400 operating alarms.

Refer to par. 14.3 - Error Messages for the steps to take during the alarms.

11.5.1 Steer radius

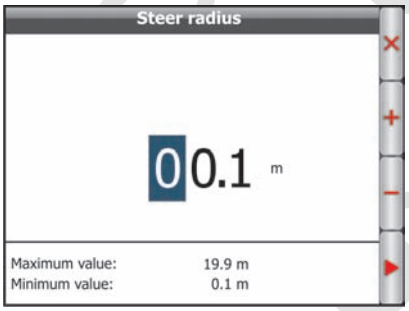

Fig. 112

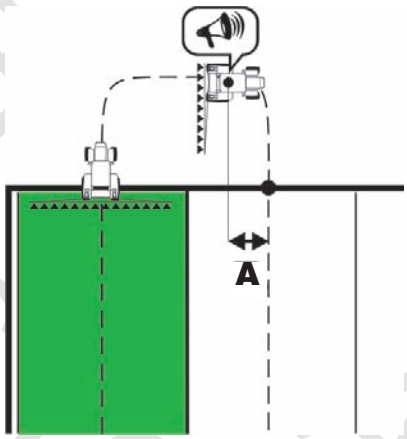

Fig. 113

Entered value allows system to trigger an acoustic alarm at the exact moment when operator must turn to center the following track, without leaving any unsprayed areas or overlapping areas.
This distance should correspond to tractor steering radius (**A** in Fig. 113), used at field end to revert travel direction and resume spraying on the nearby track, but value shall be adjusted according to the operator skills and vehicle speed.
Alarm is triggered ONLY if vehicle travel direction creates an angle wider than 60° compared to the track to be run through.

11.5.2 Nozzle wear check

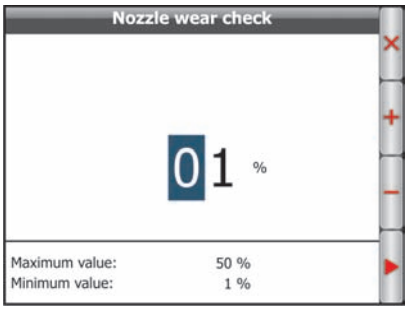

Fig. 114

This alarm can ONLY be activated if the system features both the flowmeter and the pressure sensor: Bravo 400 compares the actual rate measured by the flowmeter and by the pressure sensor.
When the difference between the two rate values exceeds the set percentage the alarm is triggered.
The alarm can be disabled with the relevant button: the item **Disabled** will be displayed.

11.5.3 HDOP level

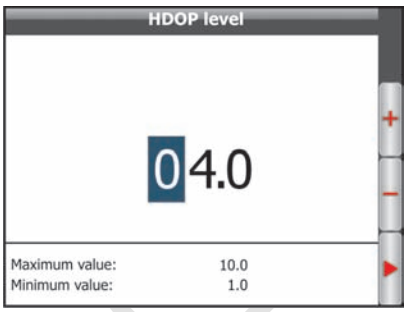

Fig. 115

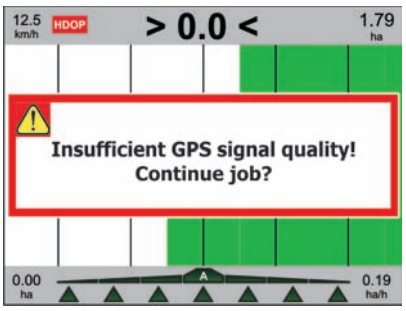

Fig. 116

"HDOP" is the value by which satellites number and position affect latitude and longitude accuracy; the lower the value, the higher the accuracy.
Accuracy alarm is triggered when HDOP value measured by the GPS receiver exceeds set threshold: in this case Bravo 400 asks the operator whether to continue job underway (Fig. 116).
We suggest NOT to set values higher than 4.0.

11.5.4 Nozzle pressure alarm

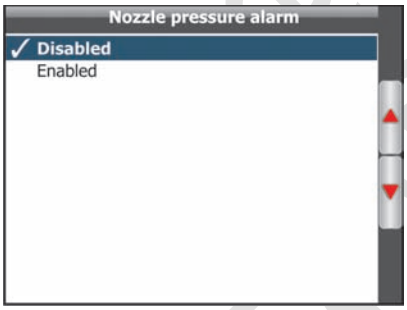

Fig. 117

Allows enabling the pressure alarm for the nozzle in use:
out of the limits set in the **Minimum pressure** / **Maximum pressure** menu (par. 11.3.2), the computer triggers an alarm.

Refer to par. 14.3 - Error Messages for the steps to take during the alarms.

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

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11.6 - User preferences

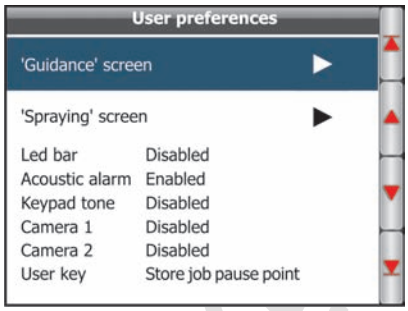

Fig. 118

In this menu it is possible to set the Bravo 400 sound and display preferences.

11.6.1 'Guidance' screen

• L1 - L2 - R1 - R2 data

Allows setting spraying job data you wish to view on guidance page (Fig. 119).

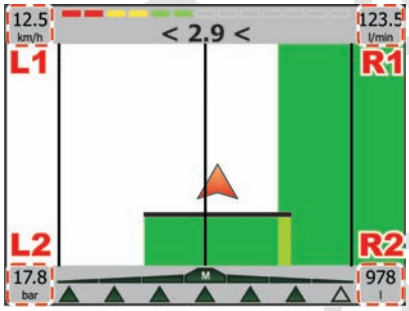

Fig. 119

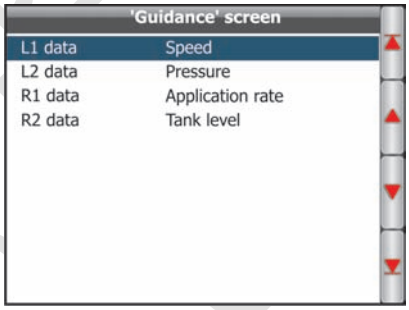

Fig. 120

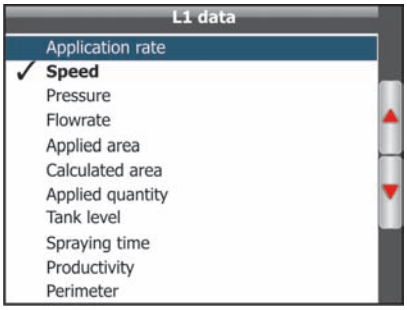

Fig. 121

11.6.2 'Spraying' screen

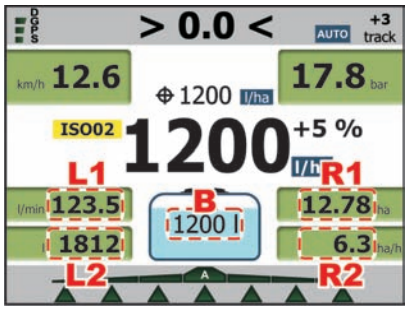

Fig. 122

• L1 - L2 - R1 - R2 data

Allows setting spraying job data you wish to view on spraying screen (Fig. 122).

• Tank data

Allows setting tank data you wish to view on spraying screen (**B**, Fig. 122).

If the Both item is set, the values alternate.

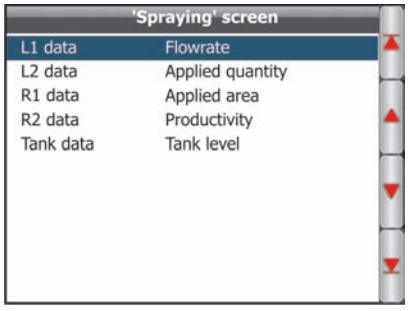

Fig. 123

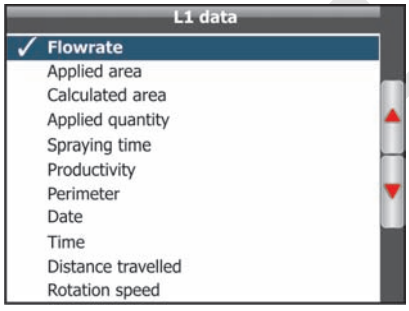

Fig. 124

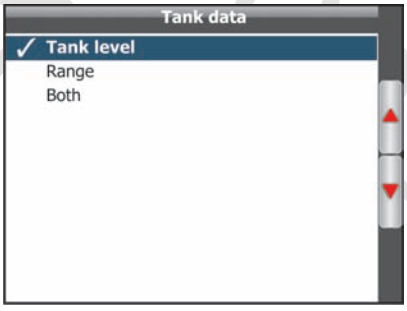

Fig. 125

11.6.3 Led bar

Fig. 126

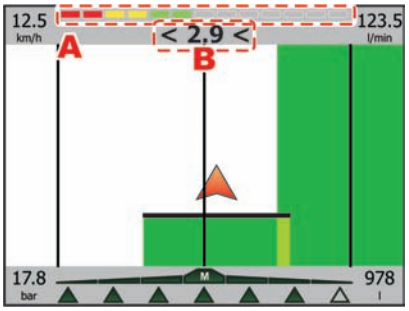

Fig. 126a

It allows to display on the guidance screen the led bar (**A** in Fig. 126a) which graphically represents the deviation (**B**).

11.6.4 - Acoustic alarm

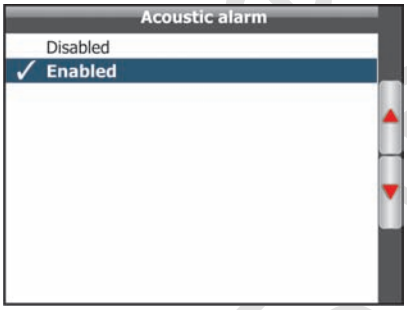

Fig. 127

Allows enabling/disabling acoustic warning activated during alarms.

11.6.5 Keypad tone

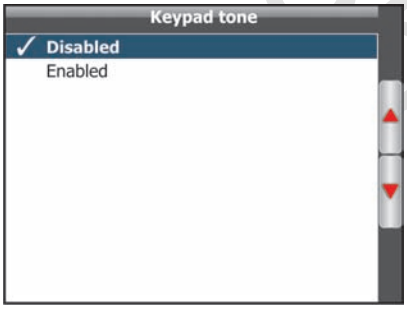

Fig. 128

Allows enabling/disabling tone activated when pressing keys.

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11.6.6 Camera 1 / Camera 2

Up to 2 cameras can be connected to Bravo 400 to check the working areas out of the operator view (i.e.: when going in reverse).
The menu allows to select the display mode of each camera (Fig. 130 - 131).

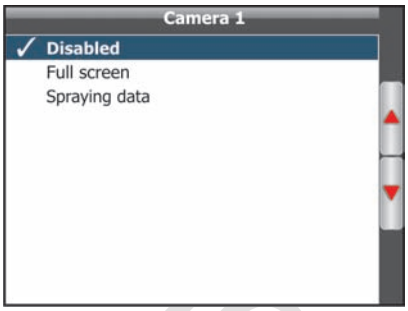


Fig. 129

FULL SCREEN

Fig. 130

SPRAYING DATA

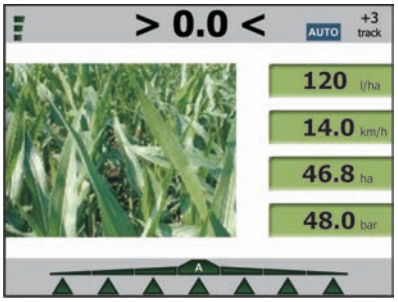


Fig. 131

11.6.7 User key

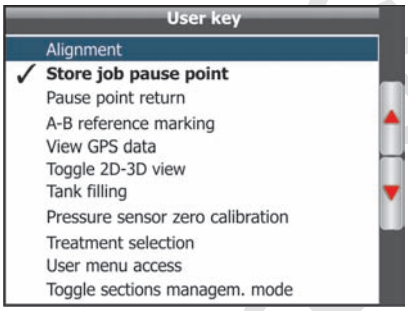


Fig. 132

Allows customization of the **USER** key.
When button is pressed, one of the following options is executed:
- Alignment (par. 13.1.7 - **F6** Align).
- Pause point storing (par. 13.1.3 - **F2** Pause).
- Pause point return (par. 13.1.5 - **F4** Return).
- New reference A-B marking (par. 13.2.2 - **F2** Mark AB).
- GPS data displaying (par. 13.2.6 - **F7** GPS).
- 2D-3D displaying change (par. 13.2.3 - **F3** 2D/3D).
- Tank filling (par. 13.1.9 - **F8** Tank).
- Pressure sensor zero setup (par. 13.2.7 - **F8** Pressure).
- Spraying selection (par. 13.1.1 and 13.1.2 - **F1** Job type).
- Access to user menu (par. 13.3.4 - **F8** User).
- Section control mode change (par. 11.4.4 - **Working limits** / **Boundary sct. management**).

Retired Alliances 361883418

11.7 Memories management

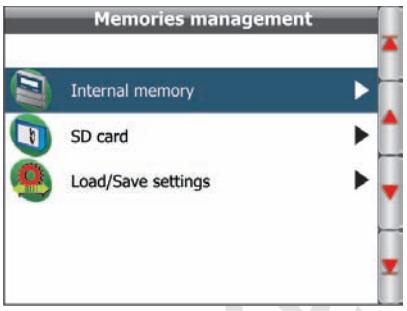


Fig. 133

Allows you to load, save and/or delete information stored on Bravo 400 or on a remote memory (SD card); this data concern jobs done, spraying images, maps or machine configurations.
The possible operations will be explained in the paragraphs below.

Preparing the SD card for data exchange: refer to par. 11.7.2.

11.7.1 - Internal memory

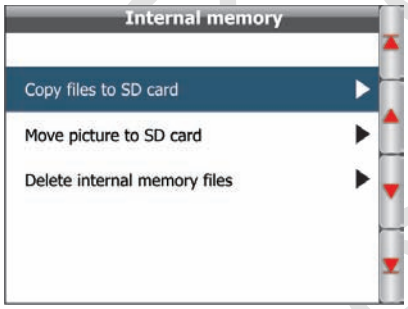


Fig. 134

Copy files to SD card

Allows you to transfer saved data, about jobs or maps, from Bravo 400 internal memory to a SD card.

Insert the SD card into the suitable groove to display the menu items (par. 6.2).
Without the card the message SD card not found! is displayed.

- **Copy jobs to SD card**

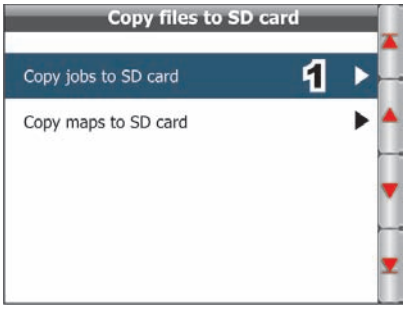


Fig. 135

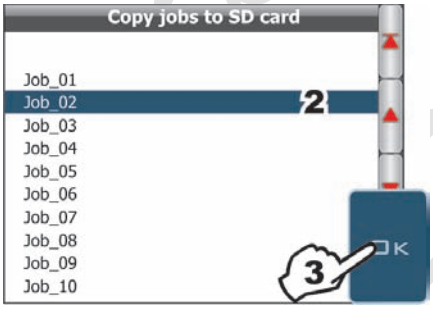


Fig. 136

1 Select the item **Copy jobs to SD card** (Fig. 135) and press OK;
2 Scroll down the job list (Fig. 136) and select the file to copy;
3 Confirm copy by pressing OK.
A confirmation message is displayed once copy is completed (Fig. 137). Press ESC.

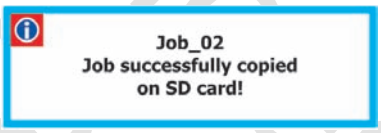


Fig. 137

- **Copy maps to SD card**

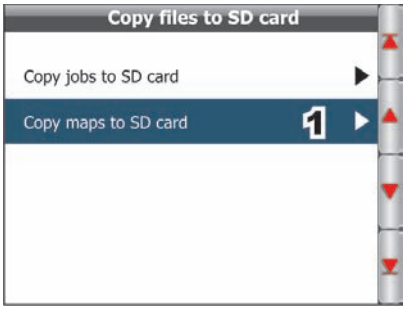


Fig. 138

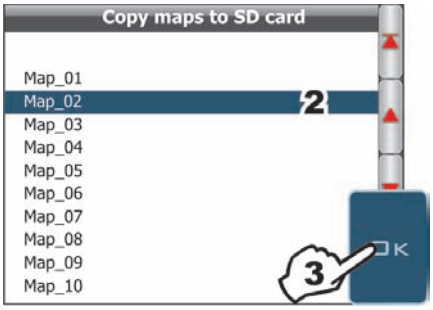


Fig. 139

1 Select the item **Copy jobs to SD card** (Fig. 138) and press OK;
2 Scroll down the map list (Fig. 139) and select the file to copy;
3 Confirm copy by pressing OK.
A confirmation message is displayed once copy is completed (Fig. 140). Press ESC.

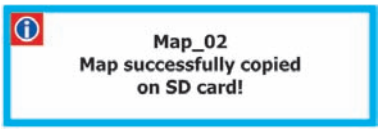


Fig. 140

CONT'D

Copy files to SD card *(CONTINUED)*

ERROR MESSAGES

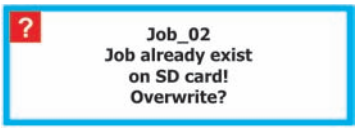


Fig. 141

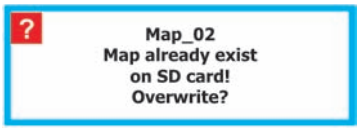


Fig. 142

The SD card already contains a file with this name.
Following are the two possible instances:
- Press OK to replace file.

WARNING: ALL data concerning replaced file will be lost.

- Press ESC to avoid replacing file: check file content or change its name before repeating saving control.

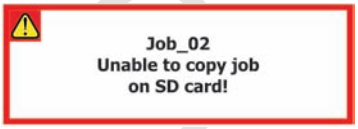


Fig. 143

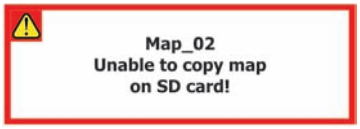


Fig. 144

Possible causes:
- Space available on SD card is over: delete some files from the memory as explained under par. 11.7.2 - **SD card / Delete SD card files** and try saving again.

Move picture to SD card

Allows moving to SD card the pictures saved during spraying.

WARNING: once moved on SD card the picture is AUTOMATICALLY deleted from the Bravo 400 memory.

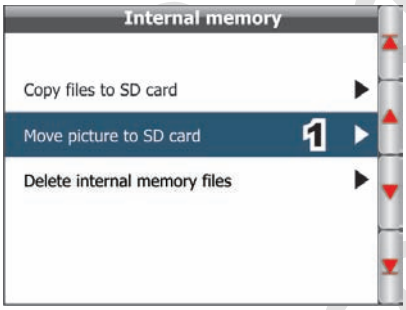


Fig. 145

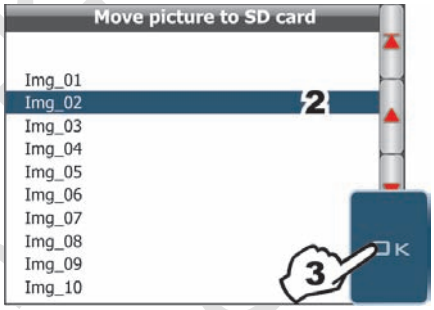


Fig. 146

1 Select item **Move picture to SD card** (Fig. 145) and press OK;
2 Scroll down the picture list (Fig. 146) and select the files to move;
3 Confirm by pressing OK.
A confirmation message is displayed once saving is completed (Fig. 147). Press ESC.

Fig. 147

ERROR MESSAGES

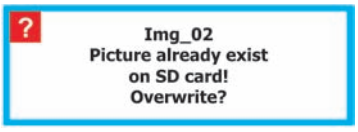


Fig. 148

The SD card already contains a file with this name.
Following are the two possible instances:
- Press OK to replace file.

WARNING: ALL data concerning replaced file will be lost.

- Press ESC to avoid replacing file: check file content or change its name before repeating saving control.

Fig. 149

Possible causes:
- Available space on SD card is over: delete files from the memory as explained under par. 11.7.2 - **SD card / Delete SD card files** and try saving again.

CONT'D

Delete internal memory files

Allows you to delete saved data, about jobs, pictures or maps, from Bravo 400 internal memory.

• Delete internal memory Jobs

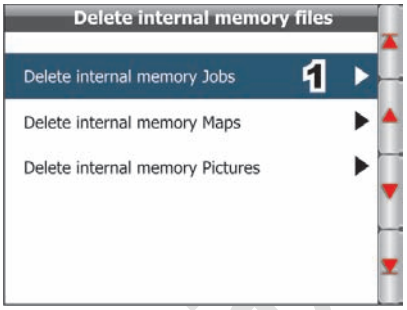


Fig. 150

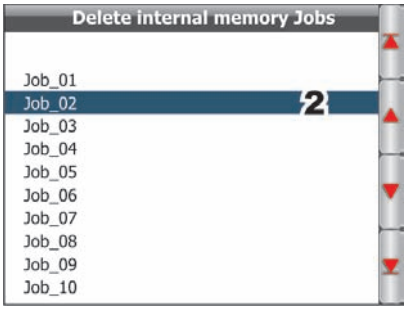


Fig. 151

1 Select item **Delete internal memory Jobs** (Fig. 150) and press **OK**;
2 Scroll down the job list (Fig. 151) and select the files to delete;
3 The message shown in Fig. 152 is displayed: confirm deletion by pressing **OK**.

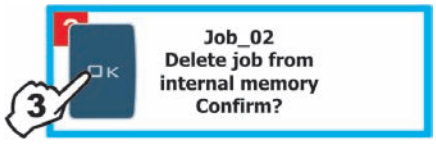


Fig. 152

• Delete internal memory Maps

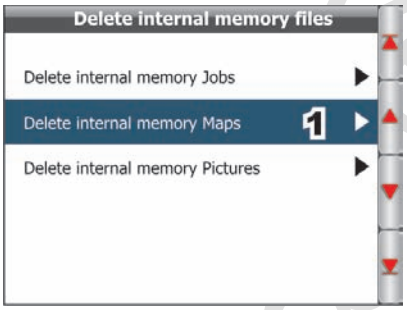


Fig. 153

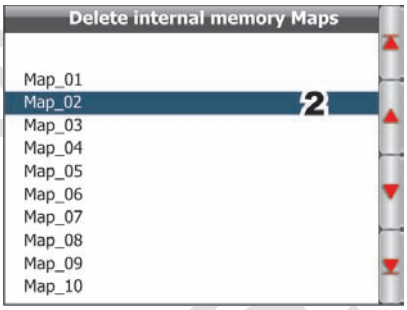


Fig. 154

1 Select item **Delete internal memory Maps** (Fig. 153) and press **OK**;
2 Scroll down the map list (Fig. 154) and select the files to delete;
3 The message shown in Fig. 155 is displayed: confirm deletion by pressing **OK**.

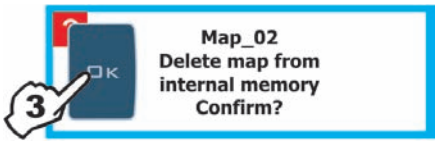


Fig. 155

• Delete internal memory Pictures

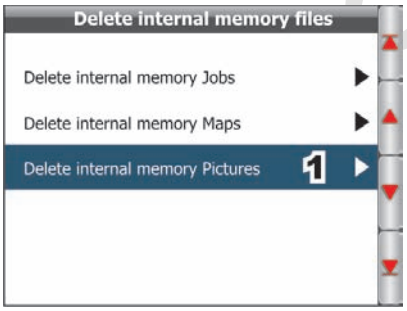


Fig. 156

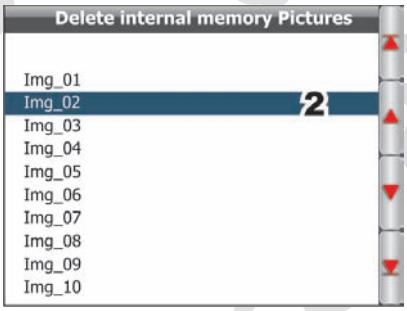


Fig. 157

1 Select item **Delete internal memory Pictures** (Fig. 156) and press **OK**;
2 Scroll down the picture list (Fig. 157) and select the files to delete;
3 The message shown in Fig. 158 is displayed: confirm deletion by pressing **OK**.

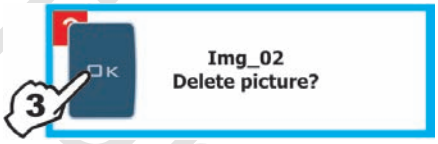


Fig. 158

END OF PAR. 11.7.1 - I

11.7.2 - SD card

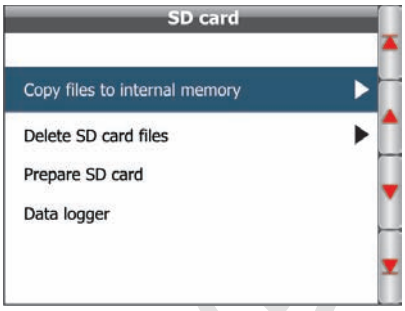


Fig. 159

Insert the SD card into the suitable groove to display the menu items (par. 6.2).
Without the card the message SD card not found! is displayed.

Copy files to internal memory

Allows you to transfer saved data, about jobs or maps, from a SD card to the Bravo 400 internal memory.

- **Copy Jobs to internal memory**

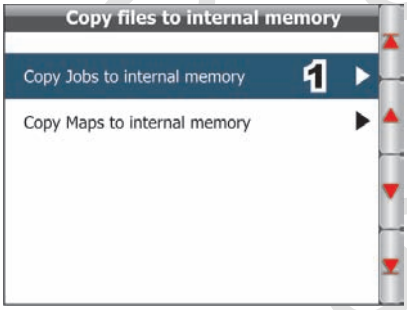


Fig. 160

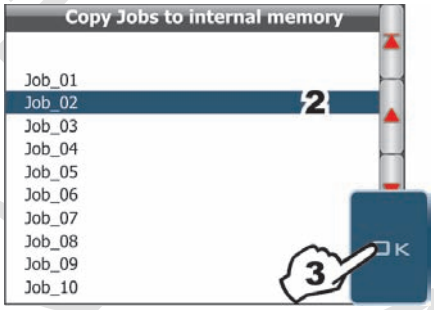


Fig. 161

1 Select the item **Copy Jobs to internal memory** (Fig. 160) and press **OK**;
2 Scroll down the job list (Fig. 161) and select the file to copy;
3 Confirm copy by pressing **OK**.
A confirmation message is displayed once copy is completed (Fig. 162). Press **ESC**.

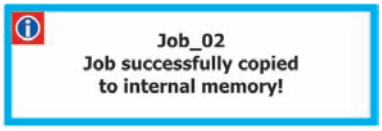


Fig. 162

- **Copy Maps to internal memory**

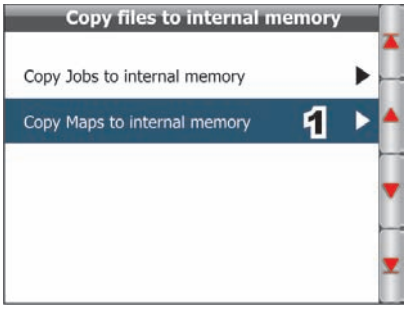


Fig. 163

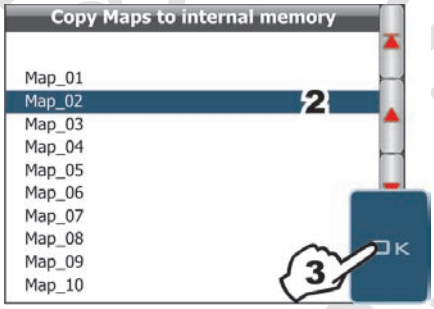


Fig. 164

1 Select item **Copy Maps to internal memory** (Fig. 163) and press **OK**;
2 Scroll down the map list (Fig. 164) and select the file to copy;
3 Confirm copy by pressing **OK**.
A confirmation message is displayed once copy is completed (Fig. 165). Press **ESC**.

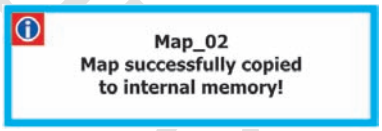


Fig. 165

ERROR MESSAGES

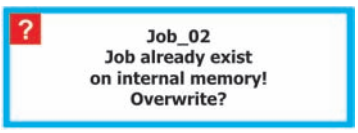


Fig. 166

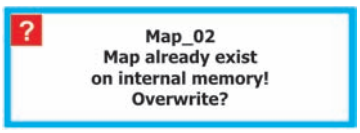


Fig. 167

The internal memory already contains a file with this name.
Following are the two possible instances:
- Press **OK** to replace file.
WARNING: ALL data concerning replaced file will be lost.
- Press **ESC** to avoid replacing the file: check file content or change name before repeating save option.

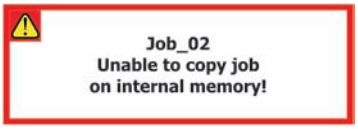


Fig. 168

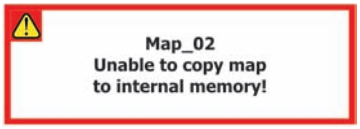


Fig. 169

Possible causes:
- Space available on internal memory is over: eliminate some files as explained under par. 11.7.1 **Internal memory / Delete internal memory files** and try saving again.

CONT'D

Delete SD card files

Allows you to delete saved data, about jobs or maps, from SD card.

- **Delete SD card Jobs**

Fig. 170

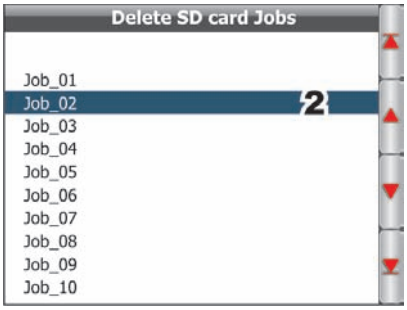


Fig. 171

1 Select item **Delete SD card Jobs** (Fig. 170) and press OK;
2 Scroll down the job list (Fig. 171) and select the file to delete;
3 The message shown in Fig. 172 is displayed: confirm deletion by pressing OK.

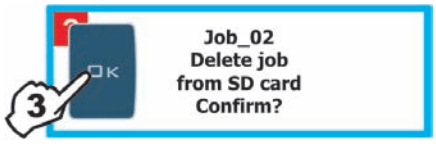


Fig. 172

- **Delete SD card Maps**

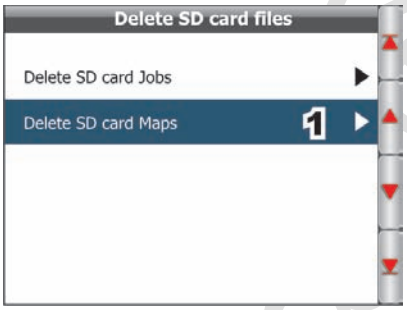


Fig. 173

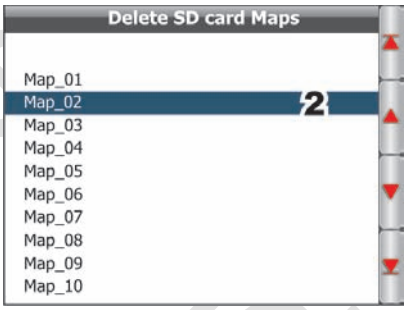


Fig. 174

1 Select item **Delete SD card Maps** (Fig. 173) and press OK;
2 Scroll down the map list (Fig. 174) and select the file to delete;
3 The message shown in Fig. 175 is displayed: confirm deletion by pressing OK.

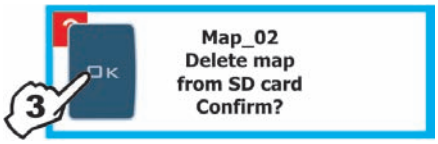


Fig. 175

CONT'D

➤Prepare SD card

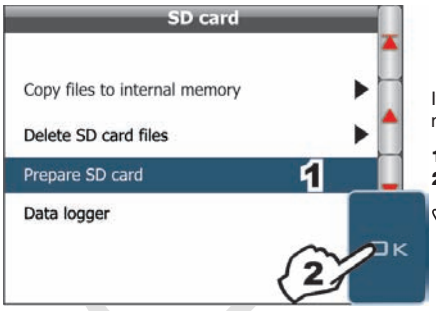


Fig. 176

It allows to save folders on SD card to correctly exchange data as described in the **Memories management** menu (par. 11.7).

1 Select the item **Prepare SD card**.
2 Press **OK**. SD card is now ready to use.

After this operation has been carried out the item Prepare SD card is disabled (grey color). Use the SD card in the package.

➤Date logger

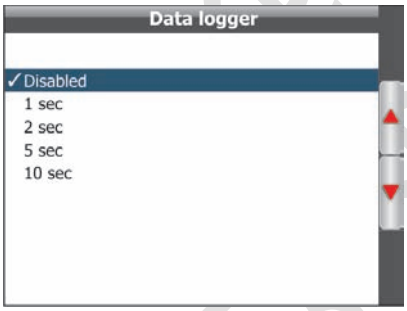


Fig. 177

It allows to enable / disable saving on the SD card the job data and the machine geographic position during the spraying. Set a save interval (1, 2, 5, 10 s) to enable data recorder.

"SPRAYER.LOG" DATA LOGGER FILE

With data recorder enabled Bravo 400 creates a file "**Sprayer.log**" on SD card, where job data are saved * at the interval set in the **Date logger** menu.
Logging becomes active when the main control in ON.

Data inside the file can be displayed on Personal Computer with a text editor.
They consist of a header followed by data strings (see example below).
Each time the configuration is changed or the job is started / restarted a new header followed by data will be generated.

Header legend:
#01: Manufacturer
#02: Software version
#03: Number of sections, width of each section (cm)
#04: Description of data in the following strings
Header example:
#01:Arag s.r.l.
#02:1.2.000 - beta 4
#03:7, 140, 420, 420, 525, 420, 420, 140
#04: day, time, lat, lon, rate, speed, flow, pressure, rpm, sprayed liters, sprayed surface, active nozzles, sections

Data string legend:
30/11/2010 = Date (DD:MM:YY)
13:24:53 = Time (HH:MM:SS)
-25.45568848 = Latitude (in degrees)
-51.87777710 = Longitude (in degrees)
60 = Spray rate (l/ha)
9.5 = Speed (km/h)
21.9 = Rate (l/min)
4.0 = Pressure (bar)
856 = Rotation speed (rpm)
67 = Sprayed fluid (l)
10719 = Area covered (m2)
ISO01 = Nozzle used
1111110 = Section status (1 open, 0 closed: in the example all sections are open except the last one)
Example of data string:
30/11/2010,13:24:53, -25.45568848, -51.87777710, 60, 9.5, 21.9, 4.0, 856, 67, 10719, ISO01, 1111110

***** *These data are represent just a mere example. In real facts they will always be different according to the type of spraying.*

END OF PAR. 11.7.2 - SD CARD

F2 F8 Scrolling menu pages | F4 F6 Scrolling menu items | F2 Reset / disable data | F4 F6 Increase / decrease data | F8 Shift the cursor | OK Confirm access or datum change | Esc Exit function or datum change | Par. 9.4

Clearing Alliances 1883418

11.7.3 - Load / Save settings

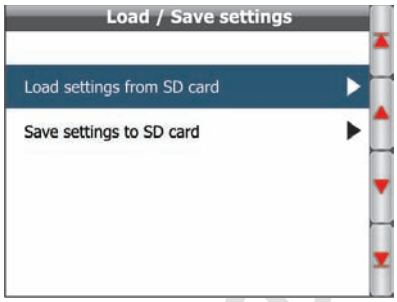


Fig. 178

Bravo 400 settings can be loaded or saved to SD card to be able to restore device settings when needed, solve problems or set another Bravo 400 without having to repeat all operations manually.

Once installation is completed, and you checked machine correct operation, we recommend you to store the whole configuration onto SD card.

Insert the SD card into the suitable groove to display the menu items (par. 6.2).
Without the card the message SD card not found! is displayed.

Load settings from SD card

Allows you to select a configuration file stored on SD card and reset Bravo 400.

WARNING: UPLOADING A CONFIGURATION FILE TO BRAVO 400 WILL DELETE ALL SETTINGS MADE SO FAR.

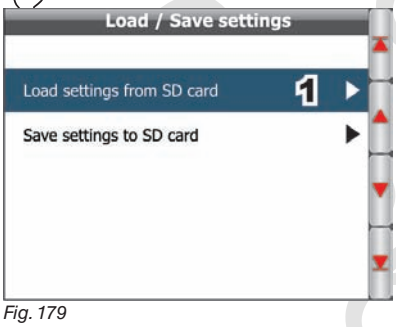


Fig. 179

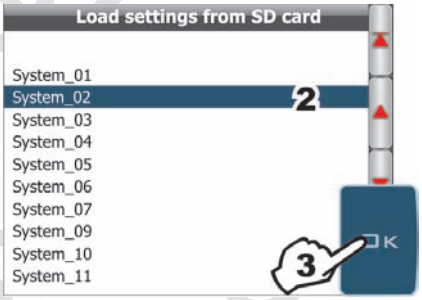


Fig. 180

1 Select item **Load settings from SD card** (Fig. 179) and press **OK**;
2 Scroll down the configuration list (Fig. 180) and select the file to copy;
3 Confirm loading by pressing **OK**.
A confirmation message is displayed once setting is completed (Fig. 181). Press **ESC**.

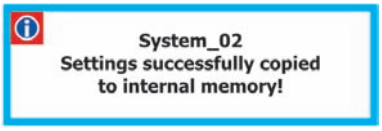


Fig. 181

Save settings to SD card

Allows saving Bravo 400 configuration to SD card: you can upload it again at a later moment, any time it is necessary to repeat the same settings.

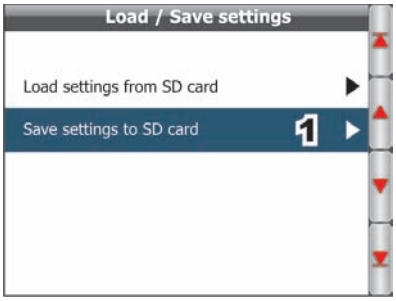


Fig. 182

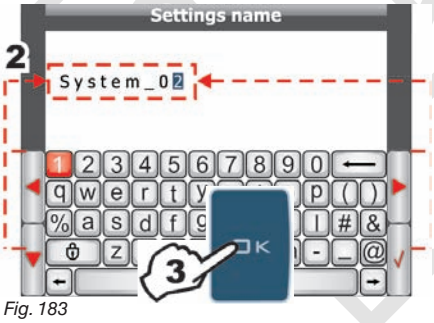


Fig. 183

1 Select item **Save settings to SD card** (Fig. 182) and press **OK**;
Bravo 400 prompts you to set a new name.
2 Enter file name using keys shown in Fig. 183, as described in par. 6.3 - Using the programming keys;
3 Confirm name by pressing **OK**.
A confirmation message is displayed once saving is completed (Fig. 184). Press **ESC**.

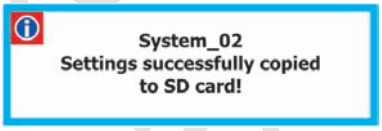


Fig. 184

ERROR MESSAGES

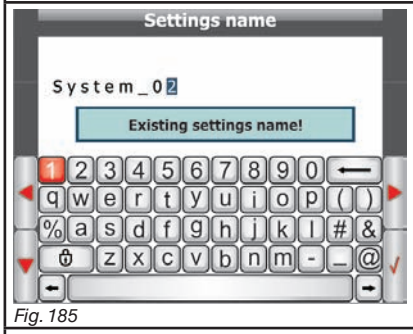
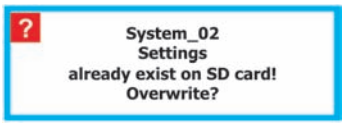


Fig. 185



The SD card already contains a file with this name. Following are the two possible instances:
- Press **OK** twice to replace file.
WARNING: ALL data concerning replaced file will be lost.
- Press **ESC** to avoid replacing file: check file content or change its name before repeating saving control.

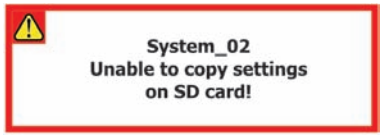


Fig. 186

Fig. 187

Possible causes:
- Space available on SD card is over: eliminate some files from SD card and try saving again.
If the problems persist, please contact the service centre.

Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | **Par. 9.4**

11.8 - Speed

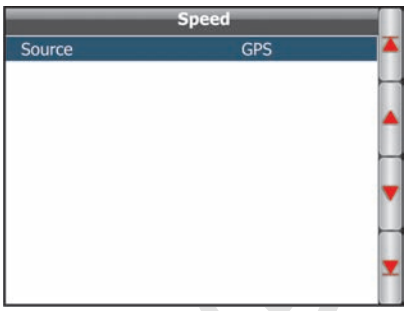


Fig. 188

The information about the speed is usually received by the GPS connected to Bravo 400.
Without signal from GPS this menu allows to select the wheel sensor as alternative source, and calculate data according to the inputs received by the speed sensor on the wheel.

This menu is displayed ONLY when the wheel sensor is Enabled (par. 10.10).

11.8.1 Source

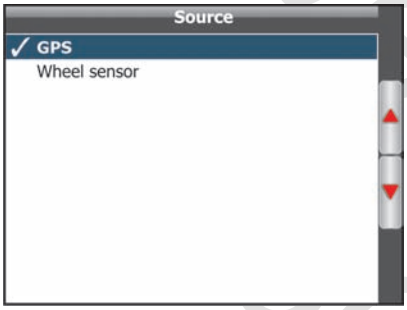


Fig. 189

It allows to select the source to calculate the speed.
When the item **Maximum speed alarm** is set, the speed is calculated with the inputs coming from the speed sensor installed on the wheel.
Set the wheel constant with the menus **Wheel constant** or **Constant calculation**.

Take measurements with tyres at the operating pressure.
This test must be performed on medium-hard terrain; for application to very soft or very hard terrain, rolling diameter may vary, leading to inaccurate output calculation; when this is the case, repeat the procedure. During the test cover the distance with the tank filled up to half capacity with water.

Wheel constant

It allows to enter the wheel constant value calculated with the suitable formula.
The wheel constant can be calculated with a good approximation detecting the distance travelled by the wheel with the speed sensor.
The longer the distance travelled, the more accurate wheel constant calculation.

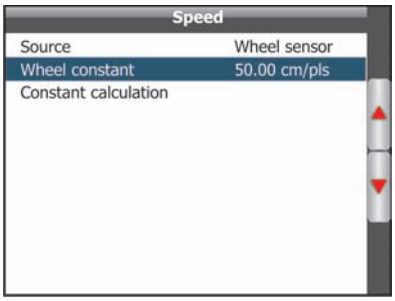


Fig. 190

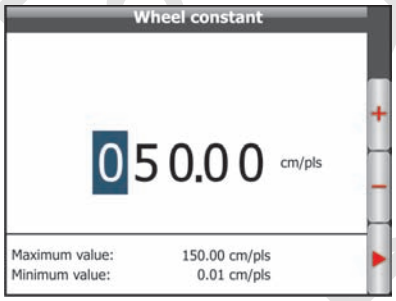


Fig. 191

Select the item **Wheel constant** and enter the calculated value.

$$Kwheel = \frac{\text{distance travelled (cm)}}{\text{no. of detection points x wheel rpm}}$$

<distance travelled> , distance expressed in cm covered by the wheel along measurement travel.
<no. of measurement points> number of measurement points (e.g. magnets, bolts, etc.), mounted on wheel.
<no. of wheel revolutions> number of wheel revolutions required to travel measurement distance.

Constant calculation

It allows to calculate and save the wheel constant with the formula below:

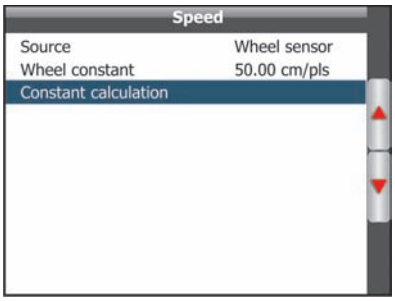


Fig. 192

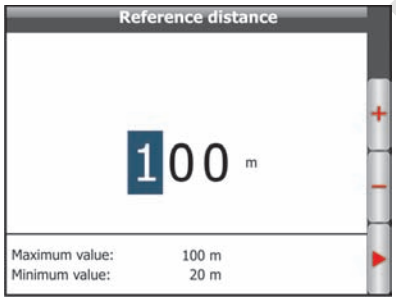


Fig. 193

- Measure a straight path at least 100 m long.
- Select the item **Constant calculation** (Fig. 192) and press OK;
- The screen in Fig. 193 will be automatically displayed:
enter the **Reference distance** to be covered and press OK.
The message will be displayed
Drive trough setted distance and press OK key
- Travel the required distance. When finished, stop the tractor.
- Press OK to stop counting: the computer will show the calculated constant. Wheel constant has been stored.

11.9 - Test ····➤ ····➤ ····➤

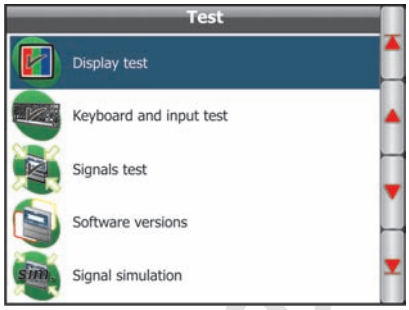


Fig. 190

Allows you to check Bravo 400 correct operation:

Tests are READING-ONLY data.

11.9.1 - Display test ····➤ ····➤ ····➤

Fig. 191

Test basically consists in switching display on to check its correct operation; press **ESC** to quit.

11.9.2 - Keyboard and input test ····➤ ····➤ ····➤

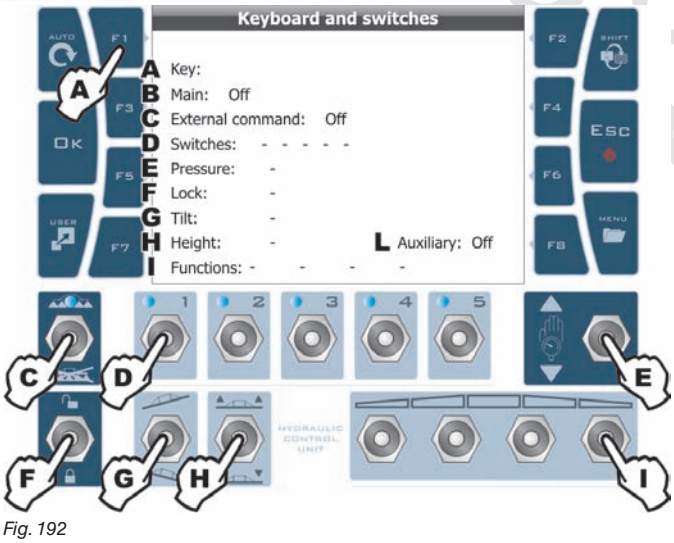
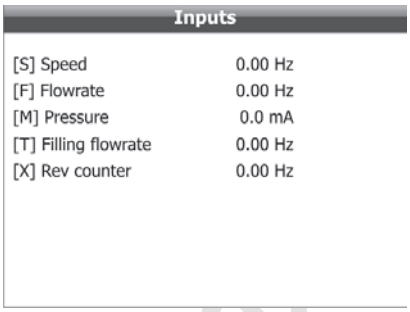


Fig. 192

Press all keys or switches one at a time: if operation is correct, the display will show the name of relevant control.

A Key:
(F1 / F2 / F3 / F4 / F5 / F6 / F7 / F8 / Auto / Ok / User / Shift / Esc / Menu)
B Main valve: (On / Off)
C External command: (On / Off)
the display shows the presence of a main external control to start the spraying.
D Switches: (1 / 2 / 3 / 4 / 5)
ONLY FOR SEQUENTIAL VERSION:
Right: (Open / Close) **Left: (Open / Close)**
E Pressure: (+ / -)
F Lock: (Unlock / Lock)
G Tilt: (Left / Right)
H Height: (Down / Up)
I Functions: (Open / Close)
L Auxiliary: (On / Off)

11.9.3 - Signals test



Inputs

[S] Speed	0.00 Hz
[F] Flowrate	0.00 Hz
[M] Pressure	0.0 mA
[T] Filling flowrate	0.00 Hz
[X] Rev counter	0.00 Hz

Bravo 400 detects frequency and current generated by each sensor on the system.

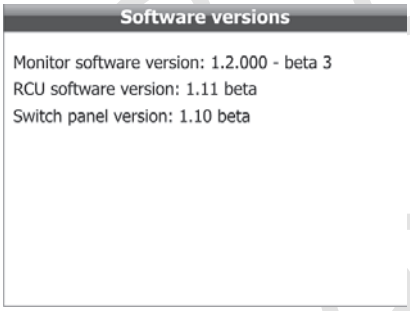
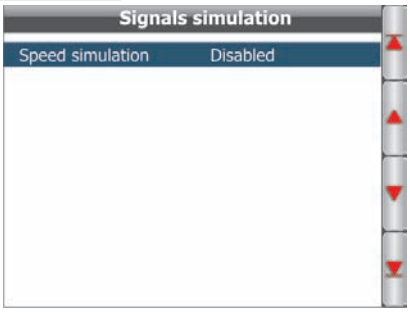


Fig. 193

11.9.4 - Software versions

Software versions



Monitor software version: 1.2.000 - beta 3
RCU software version: 1.11 beta
Switch panel version: 1.10 beta

Bravo 400 displays the software versions.

Fig. 194

11.9.5 - Signals simulation

Signals simulation

Speed simulation	Disabled

It allows to enable/disable the speed simulation
The simulation allows to test setup with stopped machine (par. 12.5).

Fig. 195

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Scrolling menu pages | Scrolling menu items | Reset / disable data | Increase / decrease data | Shift the cursor | Confirm access or datum change | Exit function or datum change | Par. 9.4

55

12 USE

12.1 Computer controls

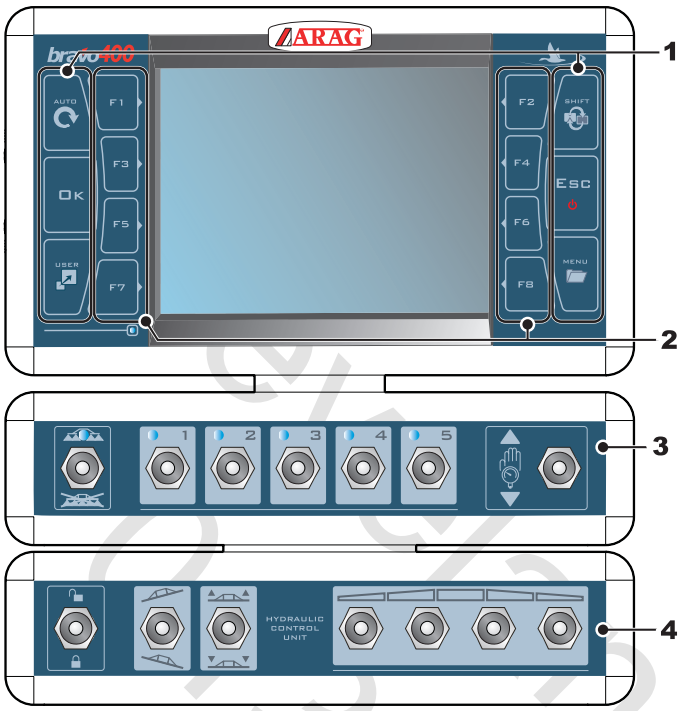

Fig. 196

Legend:

1 Control and display keys
2 Function keys
3 Operating switches for control unit valves
4 Oil-hydraulic function operating switches (hydraulic valves)

12.2 Using keys

SELECT / EDIT/ SAVE DATA

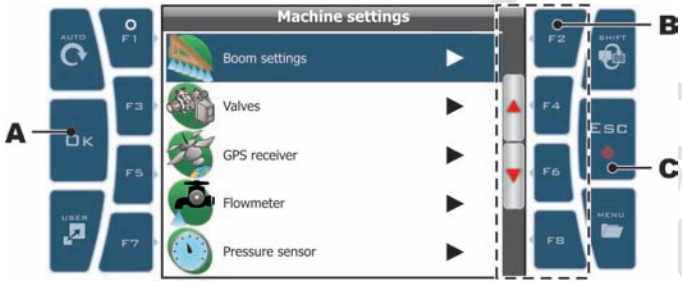

Fig. 197

A OK Confirmation key
B F2 ÷ F6 Context-sensitive keys
Use these keys to edit data: their function is linked to displayed content, so **use of these keys will be explained during the description of the procedures.**
C ESC
Switch on / off; stop modifying data.

NAVIGATION

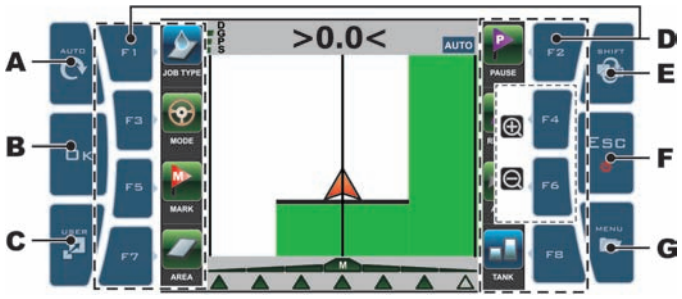

Fig. 198

A AUTO Enables / disables automatic output (par. 12.7).
E OK Confirmation key.
C USER Customizable key (par. 11.6.7).
D F1 ÷ F8:
• Job functions (sect. 13).
Use these keys to do specific job functions: their function is linked to displayed content when functions list is displayed.
• Other uses (par. 12.5).
Use keys to carry out specific functions (zoom setup, etc.): each function is connected with what is displayed.
E SHIFT It shifts the display pages.
In sequence: guidance screen, spraying screen, camera 1/2, job data, field overview, prescription map.
Hold depressed key (1 s) to go back to guidance screen.
F ESC :
• Power-up/shut-down.
• Function list disabling.
• Function interruption.
G MENU Activates / shifts / deactivates the function list (pressed in succession).

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12.3 Operating switches for control unit valves

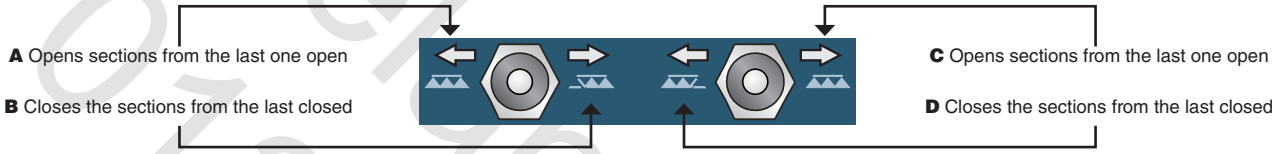
Upon computer switching the section valves are open.
If main control is ON the message Disable spraying command!: no function can be accessed until main control is set again to OFF.

Main control ON	Main control OFF	Open section	Closed section	Output increase	Output decrease

ONLY FOR SEQUENTIAL VERSION:

Main control ON	Main control OFF	Section operating switches Open section Closed section		Output increase	Output decrease

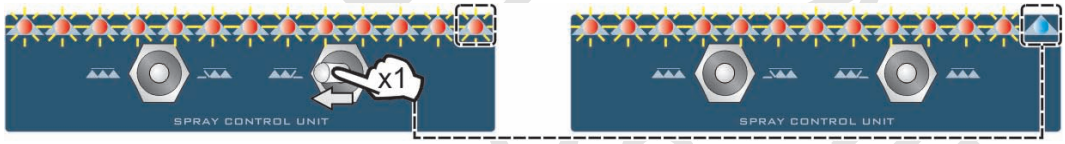
• Switches for sequential control



The valves can be opened and closed from the right to the left and vice versa with the section control switches.
Prolonged pressure opens / closes the sections of half boom.

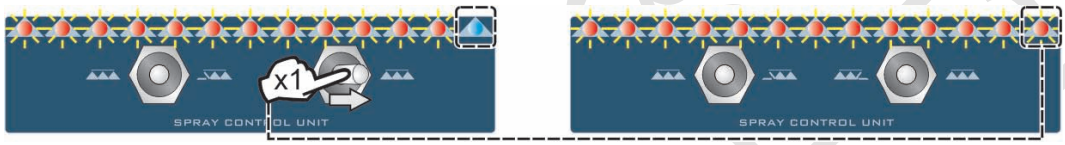
Examples:

• Closing of one section



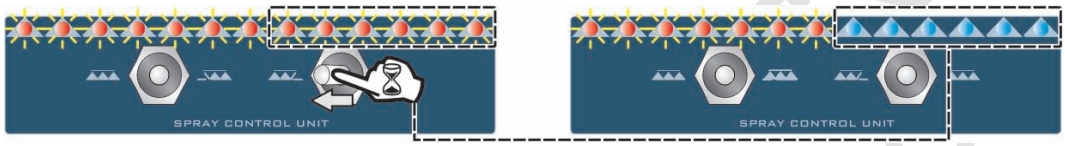
As in the example here, shift once the switch to the left to close the first open section. Shift several times to close sections in sequence.

• Opening of one section



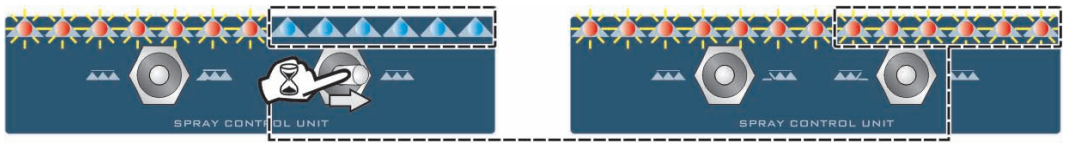
In the example here, shift once the switch to the right to open the first closed section. Shift several times to open sections in sequence.

• Simultaneous closing of half boom sections



As in the example here, keep the switch shifted to the left to close the boom open half.

• Simultaneous opening of half boom sections



As in the example here keep the switch shifted to the right to open the boom closed half.

12.4 Operating switches for hydraulic valves

Boom release	Boom locking	Boom clockwise leveling	Boom counter-clockwise leveling	Boom height increase	Boom height decrease	Boom section movement: opening	Boom section movement: closing

Cleveland Sprayers

12.5 Display

GUIDANCE PAGE

Following page

DAY DISPLAY MODE

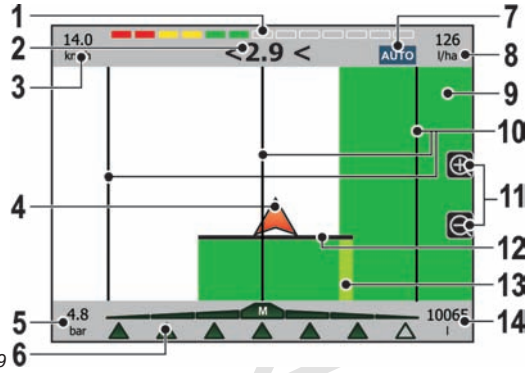


Fig. 199

NIGHT DISPLAY MODE

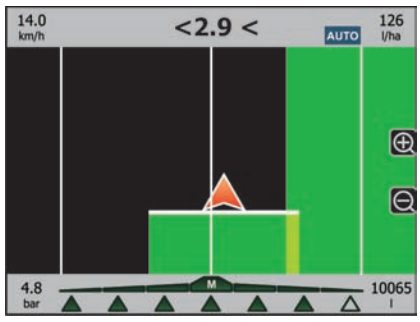


Fig. 200

Accessory function keys:
F1 Increases the display brightness
F4 Increases the display zoom
Maximum zoom: keep key pressed
F6 Decreases the display zoom
Minimum zoom: keep key pressed
F7 Decreases the display brightness
***** *Spraying data list that can be displayed: Application rate, Speed, Pressure, Flowrate, Applied area, Calculated area, Applied quantity, Tank level, Tank range, Spraying time, Productivity, Perimeter, Date, Time, Rotation speed, Direction, GPS signal quality, Track number, Target rate, Available memory.*

SPRAYING SCREEN

Following page

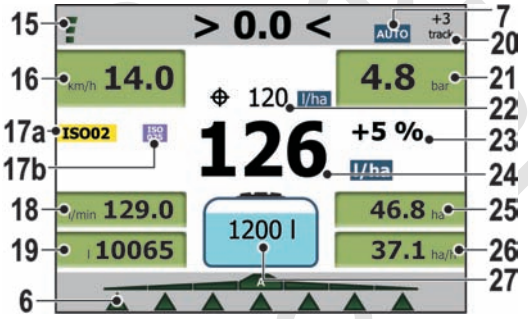


Fig. 201

Accessory function keys:
F1 Increases the display brightness
F2 Increases the simulated speed
F7 Decreases the display brightness
F8 Decreases the simulated speed

ONLY FOR
F3 Open/closes nozzle **A** when manual control is active (ref. **7** in Fig. 199).
F4 Open/closes nozzle **A** when manual control is active (ref. **7** in Fig. 199).

****** *Spraying data list that can be displayed: Flowrate, Applied area, Calculated area, Applied quantity, Spraying time, Productivity, Perimeter, Date, Time, Rotation speed, Direction, Track number.*

CAMERA 1 / CAMERA 2

Following page

SPRAYING DATA DISPLAY

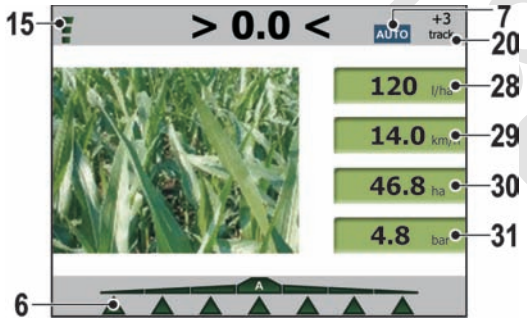


Fig. 202

FULL SCREEN DISPLAY

Fig. 203

Accessory function keys:
F1 Increases the display brightness
F7 Decreases the display brightness

Bravo 400 can be connected to one or two cameras to check the job areas.
Use the **User preferences** menu (par. 11.6) to set one of the two display modes (Fig. 202 and 203).

• **Picture saving:**
Any time you press **OK** the picture is saved on the internal memory under the name **Img_(number).jpg**.
Upon each saving the picture number in the name will increase progressively.
Up to 100 different names can be saved: then BRAVO 400 starts numbering again and replaces the files beginning from **Img_00.jpg**.

• **Picture moving:**
- Use the option **Move picture to SD card** (par. 11.7.1).
- Move pictures from SD card to PC to display it.

Legend:

1 Led bar. Every led corresponds to 50 cm.
2 Deviation: distance between tractor position and the track to be followed.
3 L1 data: spraying datum, can be personalized by the user* (par. 11.6.1).
4 Machine position
5 L2 data: spraying datum, can be personalized by the user* (par. 11.6.1).
6 Boom sections: each triangle corresponds to one section (par. 12.6)
7 Output control status (AUTO / MAN, par. 12.7)
8 R1 data: spraying datum, can be personalized by the user* (par. 11.6.1).
9 Sprayed area
10 Reference tracks
11 Zoom change onto display
12 Point where spraying job is performed
13 Sprayed areas overlap
14 R2 data: spraying datum, can be personalized by the user* (par. 11.6.1).
15 Insufficient GPS signal quality!
16 - Speed
17a Nozzle in use
17b Nozzle in use **(ONLY FOR SELEJET VERSION)**
18 L1 data: spraying datum, can be personalized by the user* (par. 11.6.2).
19 L2 data: spraying datum, can be personalized by the user** (par. 11.6.2).
20 Spray pass number: the reference line, calculated with function "Mark AB", is number 0, the left tracks are negative whereas the right ones are positive.
21 Pressure
22 Set spray rate
23 Output percentage variation
24 Instantaneous spray rate
25 R1 data: spraying datum, can be personalized by the user* (par. 11.6.2).
26 R2 data: spraying datum, can be personalized by the user* (par. 11.6.2).
27 Residual quantity inside the tank
28 Instantaneous spray rate
29 - Speed
30 Sprayed area
31 Pressure

CONT'D

JOB DATA

Following page

Job data		
Sprayed area	46.8	ha
Calculated area	0.00	ha
Applied quantity	10065	l
Spraying time	01:15	hh:mm
Productivity	37.1	ha/h
Target rate	120	l/ha
Average rate	135	l/ha
Nozzle A	ISO02	
Nozzle B	ISO025	
Job start date	15/12/09	dd/mm
Job start time	10:49	hh:mm
Perimeter	0.00	m

Fig. 204

Displayed data and relevant units of measurement are specified in par. 15.1.

Nozzle A and Nozzle B data are displayed in the version ONLY selectJET
For any other version the reference datum is Nozzle.

FIELD OVERVIEW

Following page

DAY DISPLAY MODE

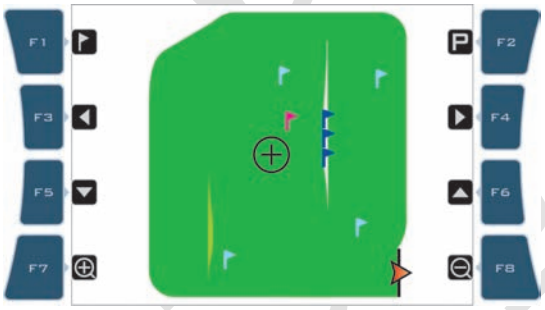


Fig. 205

NIGHT DISPLAY MODE

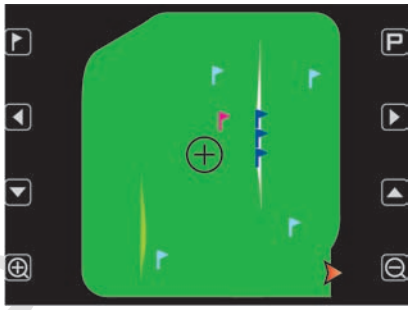


Fig. 206

Points of interest marked on field:

Waypoint, inserted with function "**WAYPT**" (par. 13.3.2)

Job breaking point, inserted with function "**PAUSE**" (par. 13.1.3)

Point of interest inserted with function "**P.O.I.**" (par. 13.1.6)

Indicators:

Machine position
Point where spraying job is performed

Cursor

Sprayed area

Sprayed areas overlap

Accessory function keys:

F1 Mark/remove the "Waypoint" point

F2 Mark/remove the point (job interruption)

F3 Shift cursor to the left

F4 Shift cursor to the right

F5 Shift cursor down

F6 Shift cursor up

F7 Increase the display zoom

F8 Decrease the display zoom

OK Mark/remove the "P.O.I." point

PRESCRIPTION MAP

Back to guidance screen

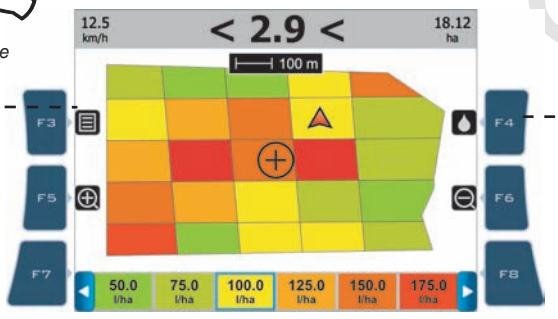


Fig. 207

Map data		
Total quantity to apply:	4078	l
Total area:	37.49	ha
Area at rate 50.0 :	6.92	ha
Area at rate 75.0 :	6.76	ha
Area at rate 100.0 :	8.06	ha
Area at rate 125.0 :	5.32	ha
Area at rate 150.0 :	6.22	ha
Area at rate 175.0 :	2.54	ha
Area at rate 225.0 :	1.68	ha

Fig. 209

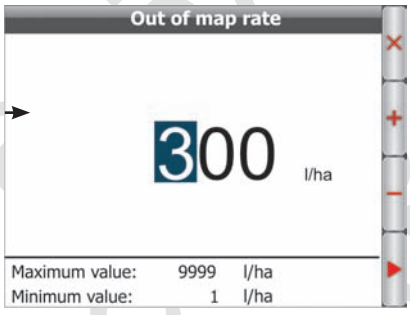


Fig. 208

Accessory function keys:

F3 Display prescription map data (Fig. 209)

F4 Modify spray rate in the areas out of map (Fig. 208)

F5 Increase the display zoom

F6 Decrease the display zoom

F7 Shift to the left the spray rate values

F8 Shift to the right the spray rate values

Indicators:

100 m Scale

Cursor

Machine position

Machine position when outside the displayed area

Spray rate value legend; the blue box indicates the spray rate in the current machine position

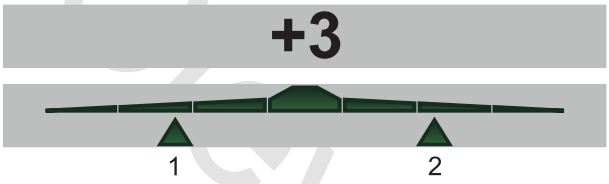
END OF PAR. 12.5 - DISPLAY

12.6 Spraying boom

Spraying boom display changes according to number of bar sections set during machine configuration (par. 10.1.2).

The display shows the following:
- Boom section number (max. 13)
- Section control
- Spraying status (ON / OFF)
- Boom section status (ON / OFF)
- Opening or closing indications.

BOOM SECTION NUMBER



DISPLAYED ONLY IS 1 SECTION IS SET:
the display shows the number of the track vehicle is covering.

The display does not actually indicate the boom number, it is shown here just for ease of reference.

SECTION CONTROL

MANUAL control active M **:** manually open or close the section valves.

AUTOMATIC control active A **:** section valves are opened or closed automatically: details are specified further on in this manual.

To change the section valve control use the F4 AUTO/MAN function (par. 13.2.4).

BOOM SECTION STATUS INDICATION

Main valve OFF

Main valve ON

Section ON

Section OFF

Area to be sprayed.
OPEN SECTION

Area already sprayed.
CLOSE SECTION

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CONT'D

OPENING OR CLOSING INDICATIONS

- Section manual control (M)

When overlapping exceeds the set **Sections overlapping limit**, Bravo 400 requires to CLOSE the affected sections (Fig. 210).
Close the section valve with the relevant switch: Bravo 400 will confirm the closing on the display.
As far as vehicle moves on, signal will be triggered for every section.

When overlapping goes back to allowed limits, Bravo 400 prompts you to OPEN affected sections (Fig. 211).
Open the section valve with the relevant switch: Bravo 400 will confirm the opening on the display.
As far as vehicle moves on, signal will be triggered for every section.

CLOSING PROMPT

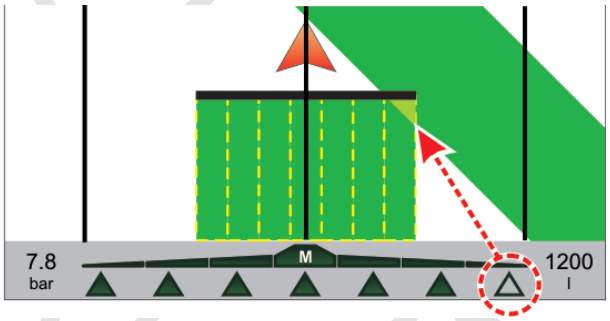


Fig. 210

OPENING PROMPT

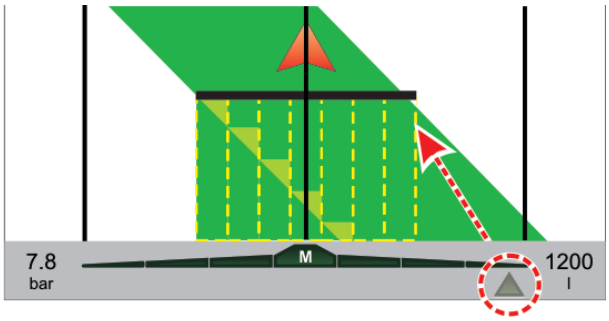


Fig. 211

- Sections automatic control (A)

When overlapping of JUST ONE or ALL boom sections exceeds the set **Sections overlapping limit**, Bravo 400 CLOSES the affected sections.
There is no need to operate the switches.
Bravo 400 automatically closes the sections and displays in real time the spraying interruption.

When overlapping goes back to allowed limits, Bravo 400 automatically open the affected sections and displays in real time the spraying recovering.

SECTIONS AUTOMATIC CLOSING

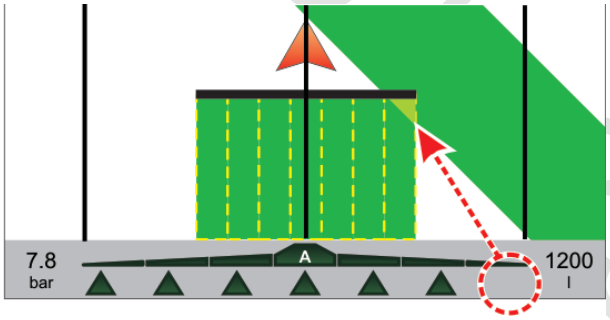


Fig. 212

SECTIONS AUTOMATIC OPENING

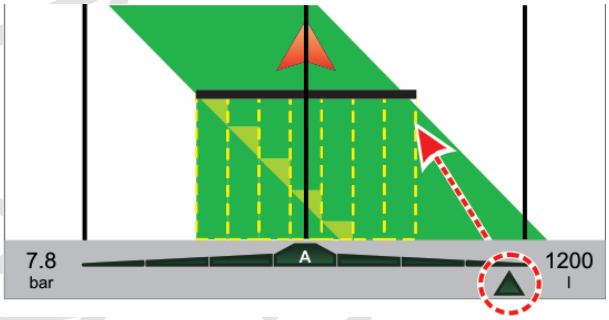


Fig. 213

Original Instructions

END OF PAR. 12.6 - SPRAYING BOOM

12.7 Spray rate regulation

Bravo 400 regulates the chemical products output in two different ways:

• Automatic regulation AUTO
Bravo 400 keeps the set spray rate constant regardless from the changes in speed and boom section status.

In this case spray rate can be set with the suitable function F1 **JOB TYPE** (par. 13.1.1), or loading a prescription map by one SD card (par. 12.8).

If necessary, spraying can be adapted to the crop by temporarily increasing or decreasing the spray rate up to ±50% with the suitable switch (par. 12.3).

• Manual regulation MAN

Manual regulation shall be carried out with the suitable switch (par. 12.3).

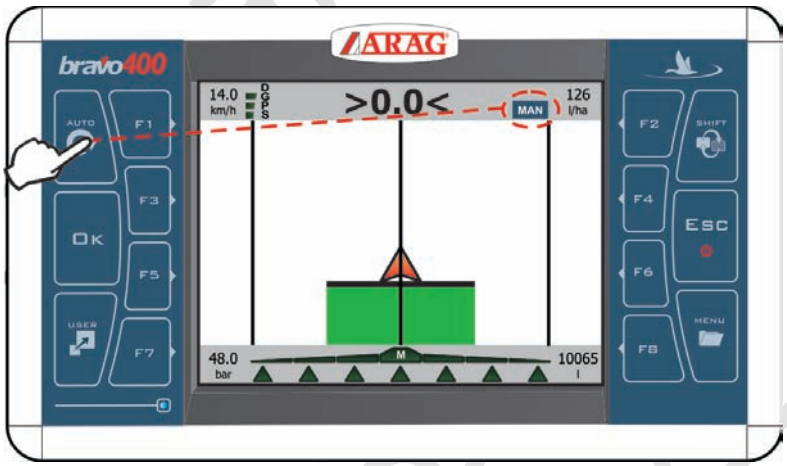


Fig. 214

Output mode selection:
Press the AUTO key to select the desired mode:
the display will show type of regulation active during the job.
(*DEFAULT: AUTO*)

12.8 Importing and using a prescription map

Bravo 400 can vary the spray rate using data from a "prescription map", indicating exactly the quantity of fluid to be sprayed at any point of the field.

Map is created using suitable analysis and simulation software, and defines, position by position, which is the spray rate to be used to obtain optimum soil yield with the least waste of material and time.
To enable Bravo 400 to read and use the gathered information, some basic requirements are necessary:

- The prescription map shall be in "Shapefile ESRI® " format.
- The database field containing the spray rate to be used for the various areas shall be named "Rate".
- Other fields can be present in the database provided that they exclusively contain numerical values (any alphabetic character will prevent the correct import).

Now it is necessary to transfer the prescription map (through SD card) to Bravo 400:

• Save map to SD card.
• Copy map from SD card to internal memory using the **Copy Maps to internal memory** option (par. 11.7.2 **Memories management** / **SD card** / **Copy files to internal memory**).
• Start spraying.
Execute function F1 **New job** (13.3.1) or F1 **Job resume** (par. 13.2.1): Bravo 400 will request you to select the prescription map to be used.
• Operate the spraying: Bravo 400 will apply the suitable spray rate to the treated area according to the position detected by the GPS receiver (Fig. 215).
If tractor is on a "white" area of the map, i.e. without displaying a spray rate, Bravo 400 will use the value set in **Out of map rate** (Fig. 216), which is **Disabled** by default (spraying disabled).

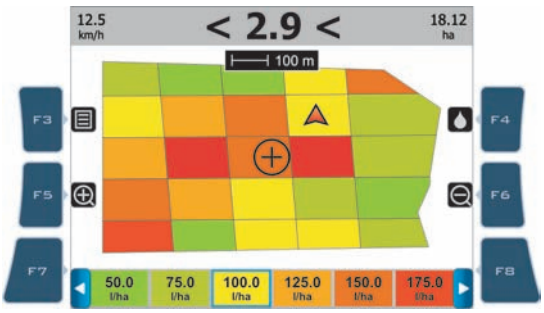


Fig. 215

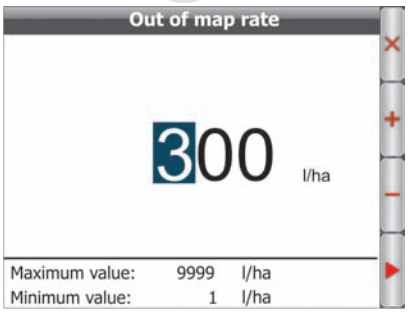


Fig. 216

ESRI® is a trademark owned by ESRI, California, USA

12.9 Spraying a field

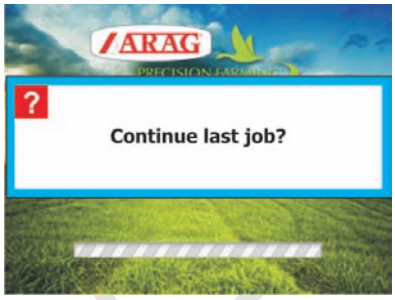


Fig. 217

Let's consider to wish to spray field by parallel lines, but only after spraying field borders.

• Switch Bravo 400 on (par 9.2).
After self-diagnosis routine, system asks if you wish to continue a previous job (Fig. 217).
Press ESC to start a new spraying job.

• Select driving mode you wish to use during spraying job: execute function

(par. 13.1.4).

• Select or set the spraying to perform with the suitable function

(par. 13.1.1 - 13.1.2).

• Set the tank level with the suitable function

(par. 13.1.9).

• Set at the beginning of field to spray (Fig. 218).

• Operate the switch for the main control valve to start spraying.

• Start driving along field border. During this path, message **Mark A?** is displayed

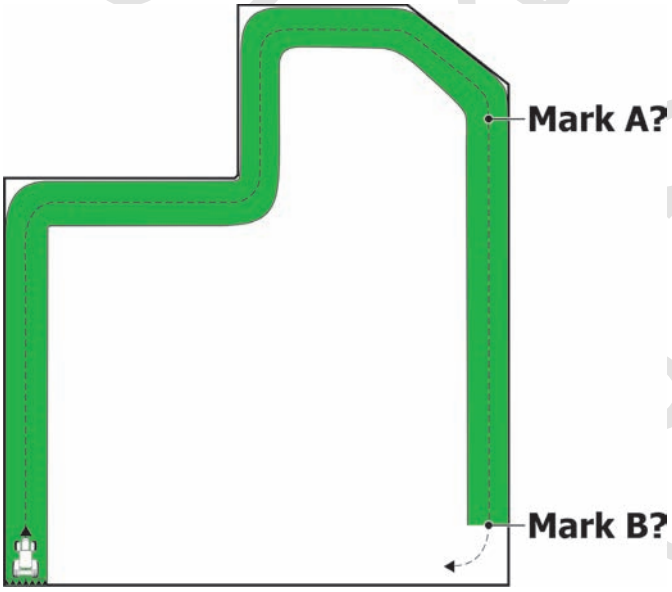


Fig. 218

MARKING POINTS A AND B

• While driving field border you will mark two points A and B

(as described under par. 13.2.2 - function

).

This operation is essential for Bravo 400 to guide you,
during spraying, on tracks parallel to the reference one obtained marking points A and B.

We recommend that you mark A and B at the ends of a straight length as long as possible and while vehicle is moving: the longer the marked length across points A and B, the lower the error caused by your deviation while driving.

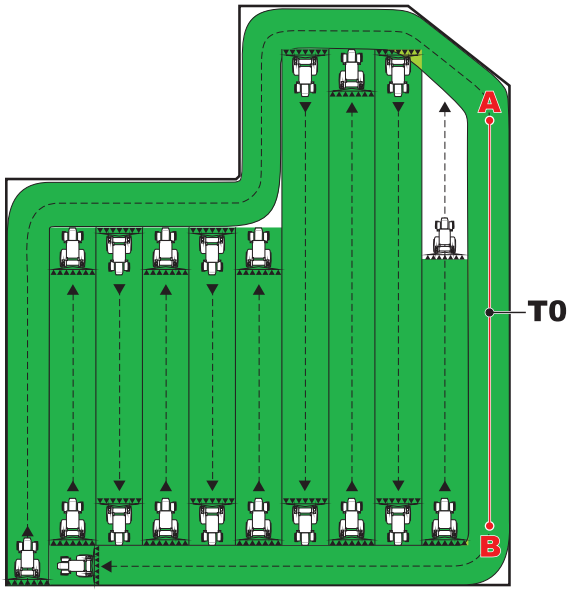


Fig. 219

• Once straight line A/B (**T0**) is tracked, the whole field could be sprayed along tracks parallel to it (Fig. 219), following the reference tracks that will be displayed (Fig. 220).

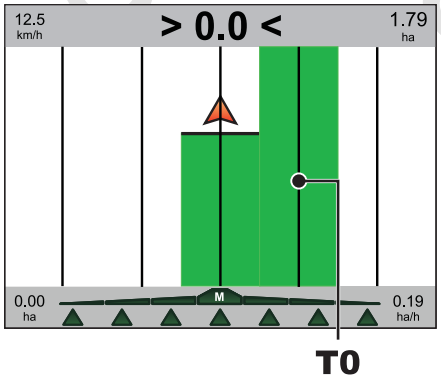


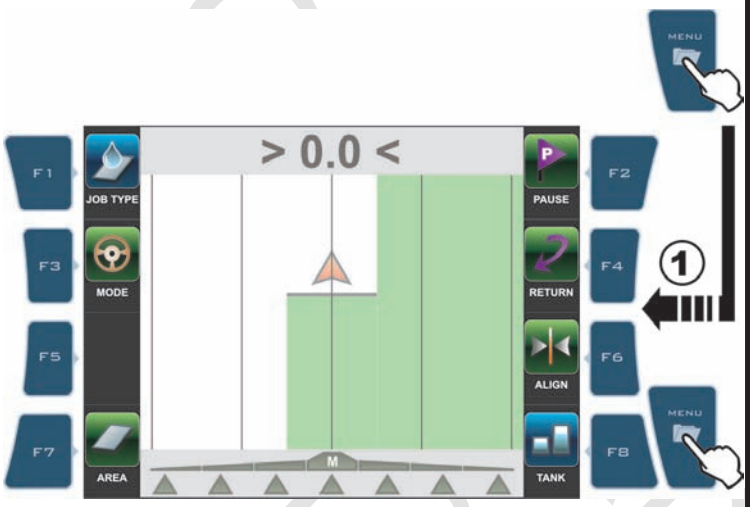
Fig. 220

13 WORK FUNCTIONS

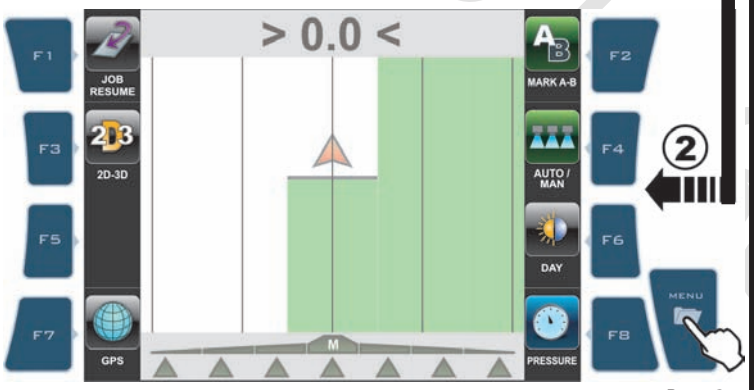
Work functions list display: press MENU key.
when list is active, pressing every key will activate the corresponding function displayed on the side; USE MENU to scroll the pages.

The table below gives an overview of all possible work functions and corresponding function key:

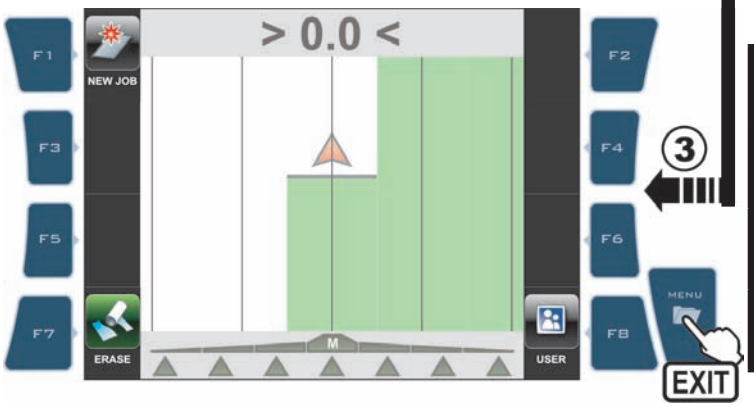
The display actually does not show the page numbers, indicated here for ease of reference.



Page **2**



Page **3**



	FUNCTION	Par.
PAGE 1	**F1 Job type** Select the type of treatment to perform	13.1.1 13.1.2
	F2 Pause Saves one operation breaking point on the display	13.1.3
	F3 Mode Select the driving mode between **Straight parallel** and **Curved parallel**	13.1.4
	F4 Return Activate procedure to go back to job breaking point previously stored using function "Pause"	13.1.5
	F5 P.O.I. Save one "P.O.I." on the display	13.1.6
	F6 Align Shift the closest reference track and realign it to machine position	13.1.7
	F7 Area Activate the procedure to calculate the field area, while driving on borders	13.1.8
	F8 Tank Activate the tank filling procedure	13.1.9
PAGE 2	**F1 Job resume** Activate the procedure to resume a spraying job previously interrupted	13.2.1
	F2 Mark AB Store two field points A and B, that Bravo 400 will use to create a line to be used as a reference track for spraying job underway	13.2.2
	F3 2D-3D Toggle from 2D display mode to 3D and vice versa	13.2.3
	F4 Auto / Man Activate/Deactivate automatic control of section valves	13.2.4
	F6 Day / Night Toggle from day display driving mode to night one and vice versa	13.2.5
	F7 GPS Display the data transmitted to GPS receiver	13.2.6
	F8 Pressure Activate the "zero" calibration procedure of pressure sensor	13.2.7
PAGE 3	**F1 New job** Start a new job	13.3.1
	F2 Waypt Activate the procedure to go back in sequence to "Waypoints"	13.3.2
	F7 Erase Delete stored job data	13.3.3
	F8 User Access to user menu	13.3.4

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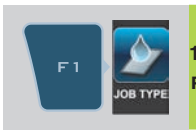
13.1 Functions List: PAGE 1



13.1.1
F1 Job type

Select the type of treatment to perform among those pre-set in the **Treatment settings** menu (par. 11.2), or temporarily change the treatment underway.

1 Press **F1**. The display will show the features of treatment underway (Fig. 222).
In this screen it is possible to change the treatment values (Fig. 223 - 224), or select a pre-set one (Fig. 225).
2 Press **F4** or **F6** to select the item to change.
3 Confirm selection.

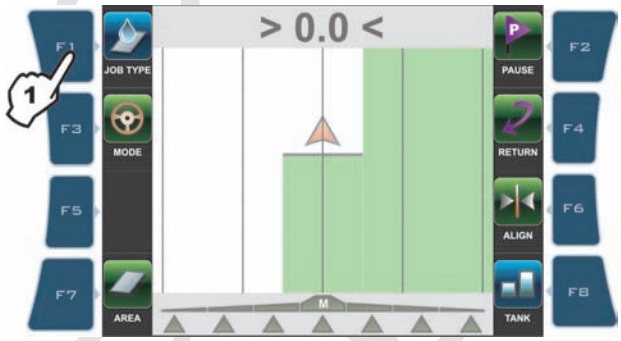


Fig. 221

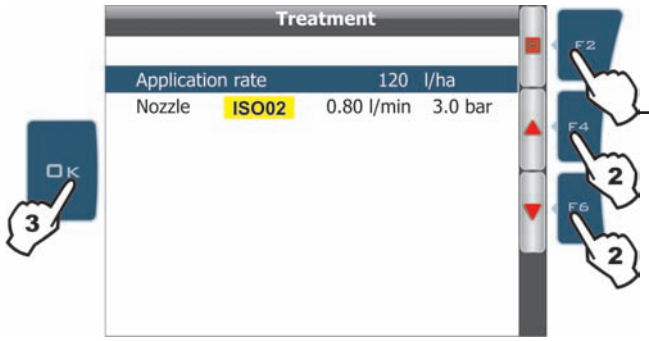


Fig. 222

SPRAY RATE CHANGE

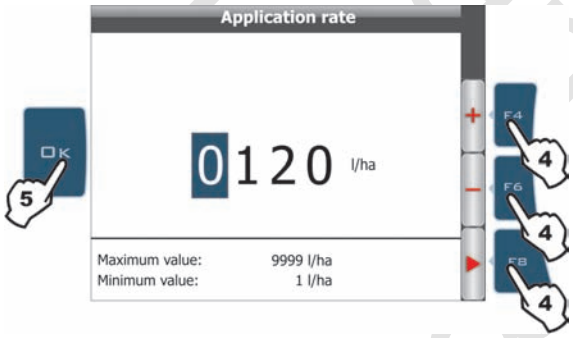


Fig. 223
4 Change the value (+ increase, - decrease).
5 Confirm datum.

NOZZLE CHANGE

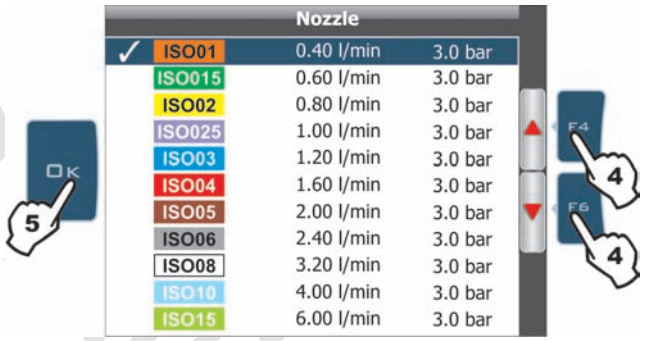


Fig. 224
4 Select nozzle.
5 Confirm selection.

Above changes are only TEMPORARY and are not stored among the pre-set treatments.

SELECTING ONE PRE-SET TREATMENT

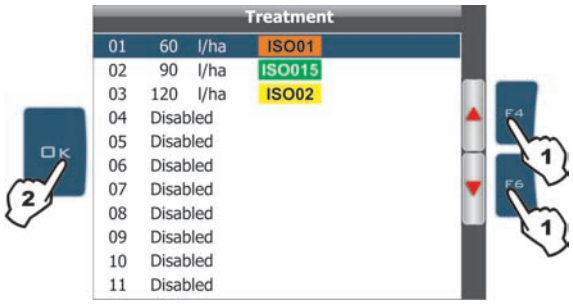


Fig. 225

1 Select the treatment to use.
2 Confirm selection.

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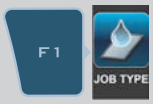

13.1.2
F1 Job type

ONLY FOR seleJET

Select the type of treatment to perform among those pre-set in the **Treatment settings** menu (par. 11.2), or temporarily change the treatment underway.

1 Press **F1**. The display will show the features of treatment underway (Fig. 227).
In this screen it is possible to change the treatment values (Fig. 228 - 229), or select a pre-set one (Fig. 230).
2 Press **F4** or **F6** to select the item to change.
3 Confirm selection.

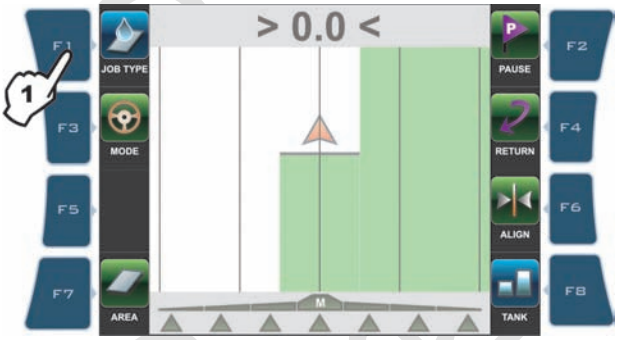

Fig. 226

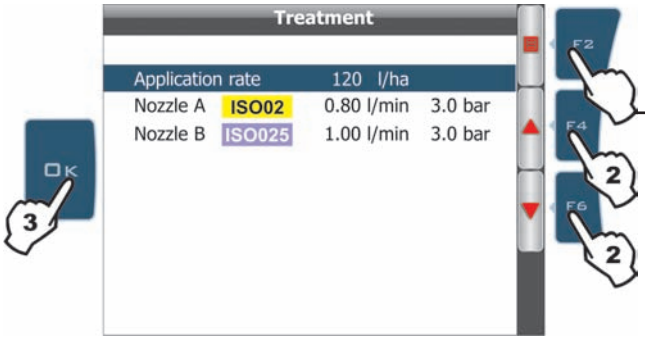

Fig. 227

SPRAY RATE CHANGE

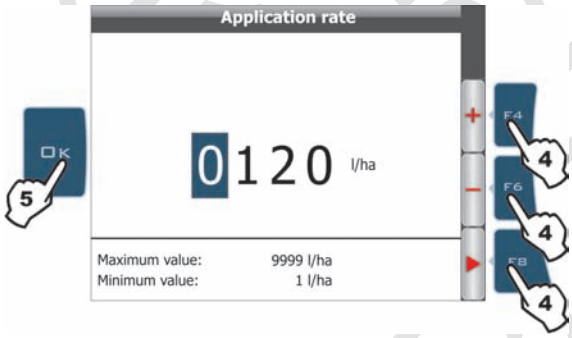

Fig. 228
4 Change the value (+ increase, - decrease).
5 Confirm datum.

NOZZLE CHANGE

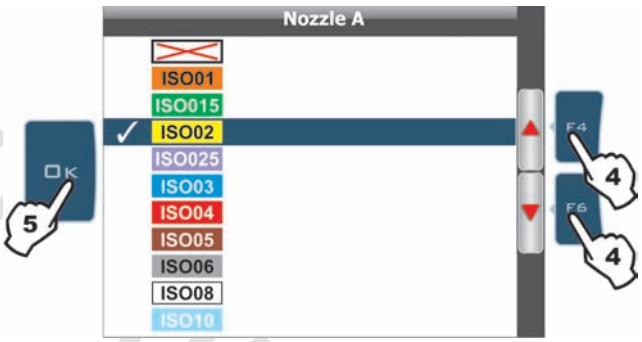

Fig. 229
4 Select nozzle **A** (option disables the nozzle)
5 Confirm selection.
6 Repeat the operation for nozzle **B**.

Above changes are only TEMPORARY and are not stored among the pre-set treatments.

SELECTING ONE PRE-SET TREATMENT

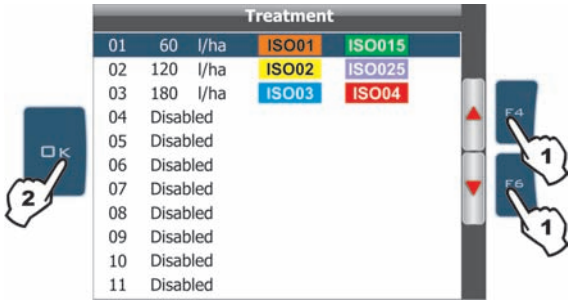

Fig. 230

1 Select the treatment to use.
2 Confirm selection.

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13.1.3
F2 Pause

Stores the job breaking point "Pause" on the field marked with a flag on the display.
Flag can be seen on guidance screen (Fig. 231) and on field full zoom page (Fig. 232).

"Pause" breaking point can be stored using the two procedures described below:

GUIDANCE PAGE

1a Press **F2** when you are in the position to be stored:
flag will be positioned at that point (**A** in Fig. 231).

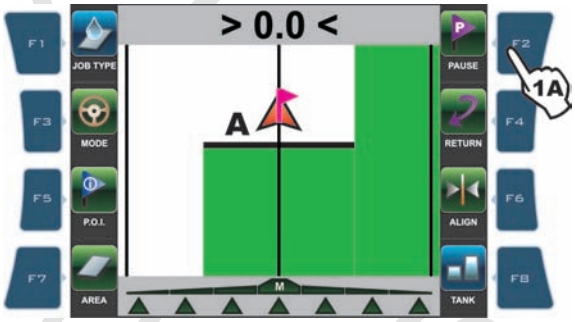

Fig. 231

Bravo 400 can store only one breaking point, so that every time you set a flag, the previous one will be deleted.

FIELD FULL ZOOM

From this page, you can store a field point even if tractor is in another position.

1b Press keys **F3**, **F4**, **F5**, **F6** to shift position of cursor **B** (Fig. 232) on field.
2b Once you reach the desired position, **PRESS F2**.
3b If a breaking point already exists, confirmation prompt is displayed: press **OK**.

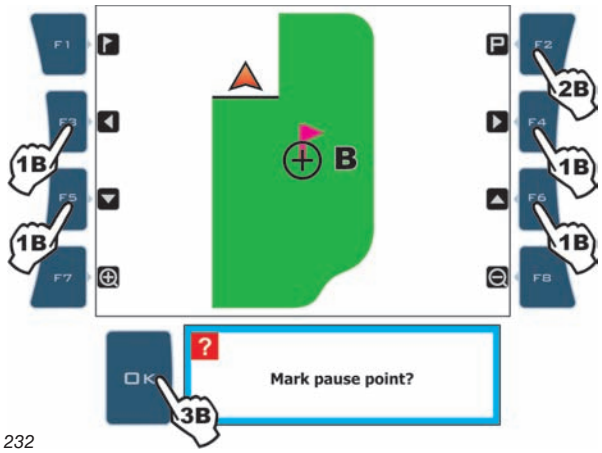

Fig. 232

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13.1.4 F3 Mode

Select driving mode between **Straight parallel** and **Curved parallel**.

1 Press **F3**.
2 Selection page is displayed: press **F4** or **F6** to scroll across items.
3 Confirm selection.

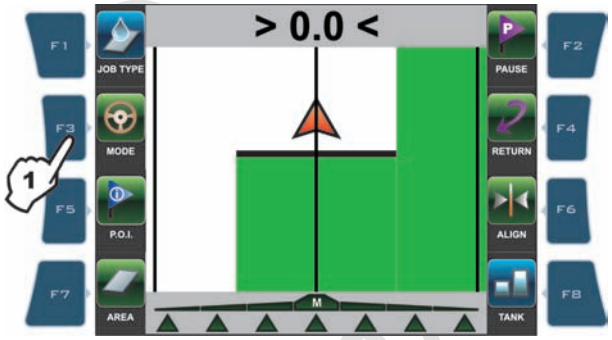

Fig. 233

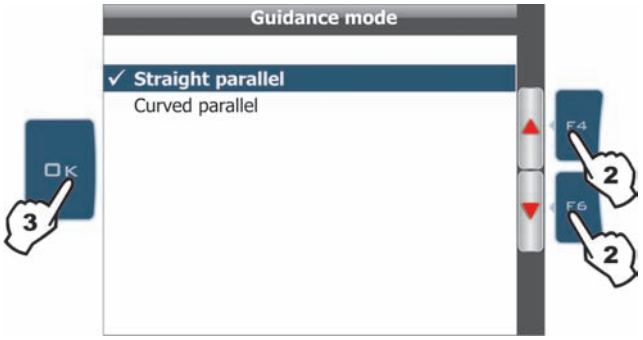

Fig. 234

STRAIGHT PARALLEL

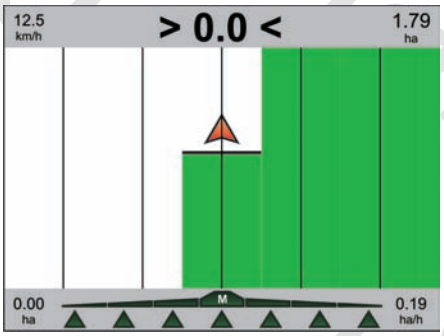

Fig. 235
Track on display will be used as driving reference and are perfectly straight and parallel with each other.

CURVED PARALLEL

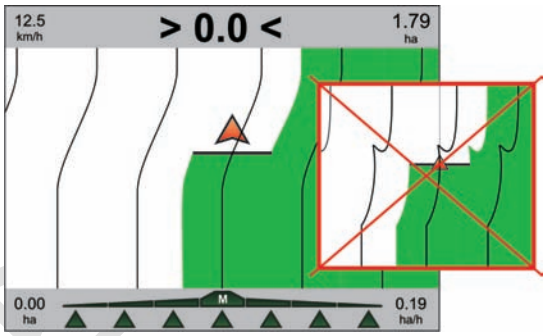

Fig. 236
Displayed tracks will be used as driving reference and are parallel with each other, they feature no straight but ONLY with trajectories with not too sharp curves.

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13.1.5
F4 Return

Activate the procedure to go back to job breaking point , as previously stored using the function "Pause" (par. 13.1.3)

Press **F4** to receive guidance information and go back to point of interest "Pause" (Fig. 237):
- A fuchsia line connecting the middle position to the flag shows the trajectory to be followed to get closer to marked point (**C** in Fig. 237).
- The display shows in fuchsia the number of tracks to be crossed before reaching point (**D** in Fig. 237):
in the example, **+** next to the number indicates you shall move to the right, **-** indicates you shall move to the left.
Carry on driving.
- When you reach the track with the breaking point, the display shows the distance between your position and the point (**E** Fig. 238).
- Move along the track and check that distance in metres decreases: you are getting closer to the point.
When you are nearby, you can see the flag displayed.
- Once you reach the flag position, distance value gets to "zero" (Fig. 239): press **OK** or **ESC** to quit this procedure.

OK *Bravo 400 recalls spraying job guidance information and flag is deleted.*
ESC *Bravo 400 recalls spraying job guidance information but flag remains memorised.*

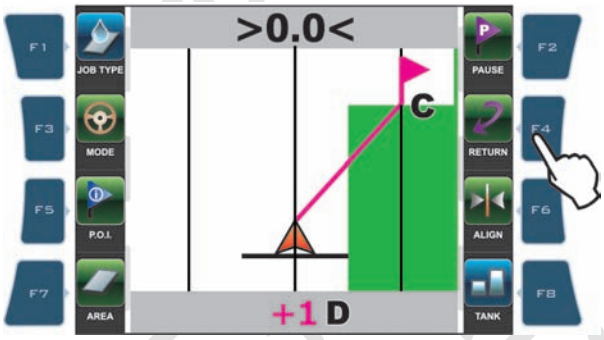

Fig. 237

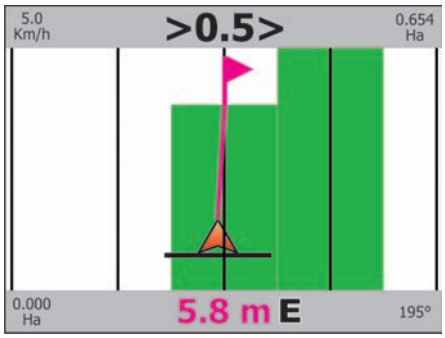

Fig. 238

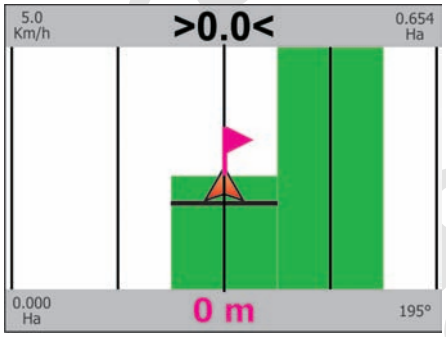

Fig. 239

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13.1.6
F5 P.O.I.

Save one "P.O.I." on display (Fig. 240 and 241). More points can be marked.
"P.O.I." can be stored with the two procedures below:

GUIDANCE PAGE

1a Press **F5** when you are in the position to be stored:
flag will be positioned at that point (**A** in Fig. 240).

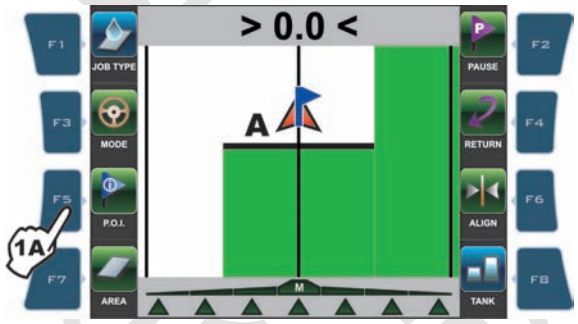

Fig. 240

FIELD FULL ZOOM

From this page, you can store a field point even if tractor is in another position.

1b Press keys **F3**, **F4**, **F5**, **F6** to shift position of cursor **B** (Fig. 241) on field.
2b Once you reach the desired position, **PRESS OK**.

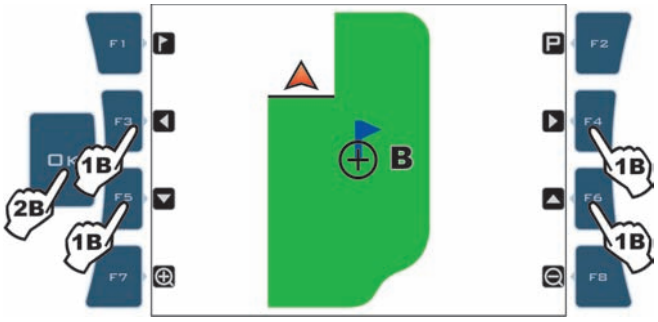

Fig. 241
Here you can also delete one point previously stored:
press keys **F3**, **F4**, **F5**, **F6** to shift the cursor position **B** near or above the marked point, and press **OK**.

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13.1.7
F6 Align

Shift the closest reference track and realign it to machine position

Press **F6** if you need to realign, maintaining the same direction (such as with maize, sugar cane).
- Set to the position you would like to set as new reference track and press **F6**.
- The "old" reference track **F** (Fig. 242) shifts and aligns to tractor centre: all other reference tracks shift accordingly.
- The "old" deviation value **>4.2<** (**G**) becomes **>0.0<** because it takes the "new" track as reference.

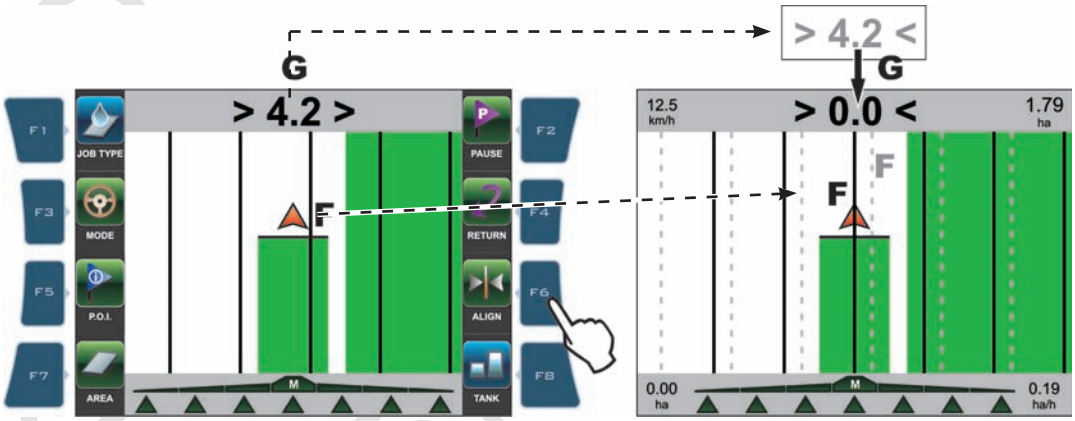

Fig. 242

After using the "Align" function, it is not possible to recover the initial reference track.

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13.1.8 F7 Area

Activate the procedure to calculate the field area, while driving on borders

1 Press **F7** to start the procedure and calculate the area (functions list is no longer displayed).
Message **Select field border** is displayed to set machine side to be used as field outer edge.
2 Press **F5** (**Left**) or **F6** (**Right**): the display will show a red line drawing the field border as far as the tractor moves along.

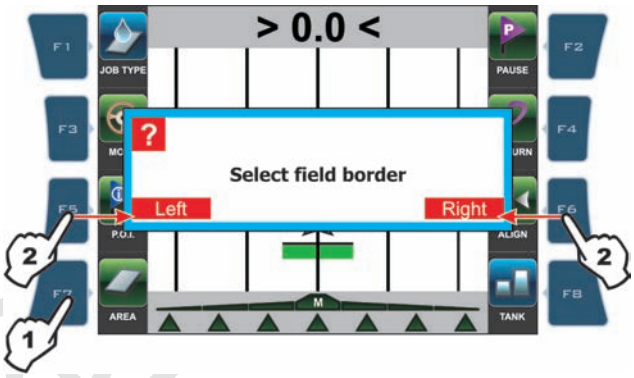

Fig. 243

Following are the two possible instances:

FIELD BORDER ON MACHINE LEFT-HAND SIDE

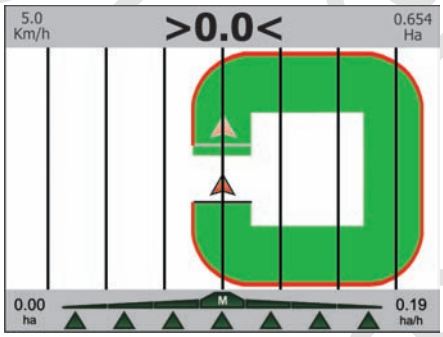

Fig. 244

Field outer edge (red line) follows the path of the outermost section valve open. When all section valves are closed, field border (red line) starts from boom centre.

FIELD BORDER ON MACHINE RIGHT-HAND SIDE

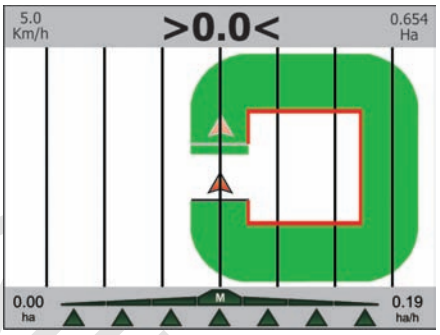

Fig. 245

3 Drive along field borders or border of the area to be calculated.
To complete the procedure, view again the corresponding functions list page (Fig. 243) and press **F7**.
4 Message **Boundary closure?** is displayed. Press **OK** (Fig. 246).
5 To view calculated data (**Calculated area** area and **Perimeter**), press **SHIFT** a few times until viewing **Job data** page on the display (Fig. 247).

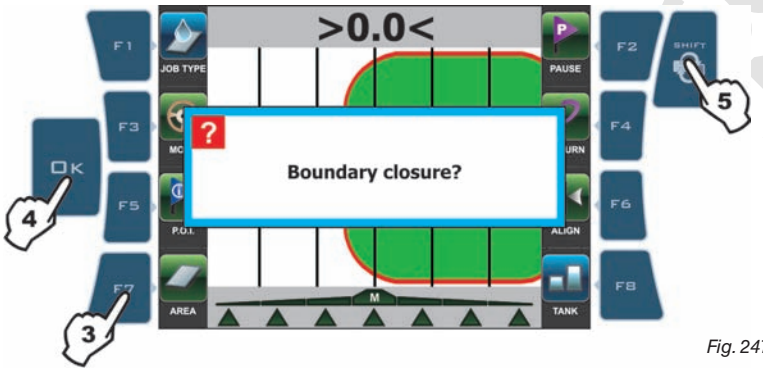

Fig. 246

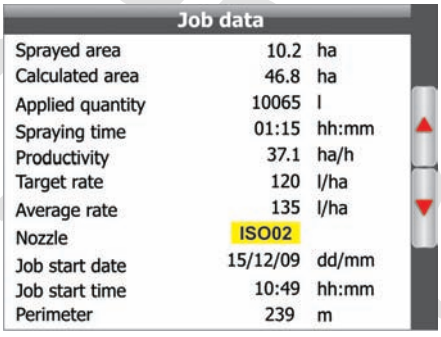

Fig. 247

13.1.9
F8 Tank

It controls the tank filling.

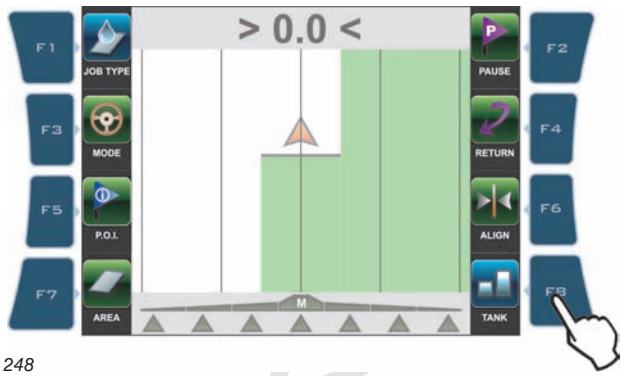

Fig. 248

Press **F8** to display the **Tank filling**.
Here many functions can be activated:
- Reset level (Fig. 249)
- Filling (Fig. 250)
- Manual setup of filled quantity (Fig. 251)

If the filling flowmeter is connected the display shows the filling data in real time.

RESET LEVEL

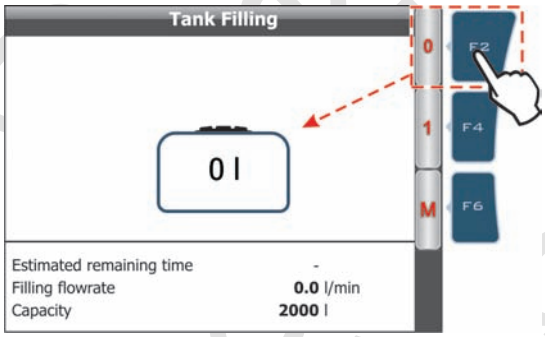

Fig. 249

Press **F2** to reset the tank level.
The icon on display indicates the empty tank.

TANK FILLING

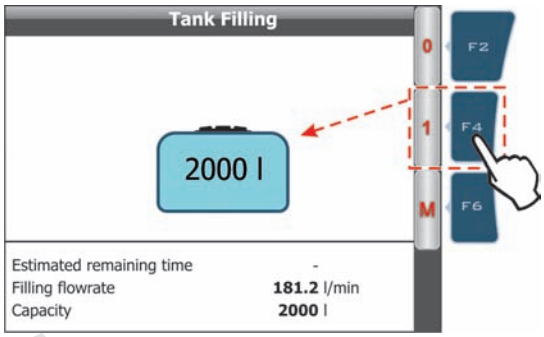

Fig. 250

Press **F4** to bring the tank level to the maximum value.
The icon on display indicates the full tank.
The capacity was set with the advanced programming (par. 10.6.1)

MANUAL SETUP OF FILLED QUANTITY

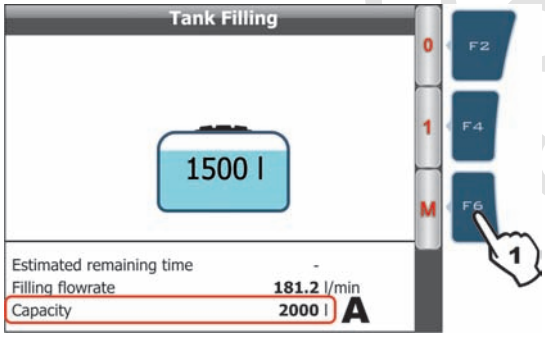

Fig. 251

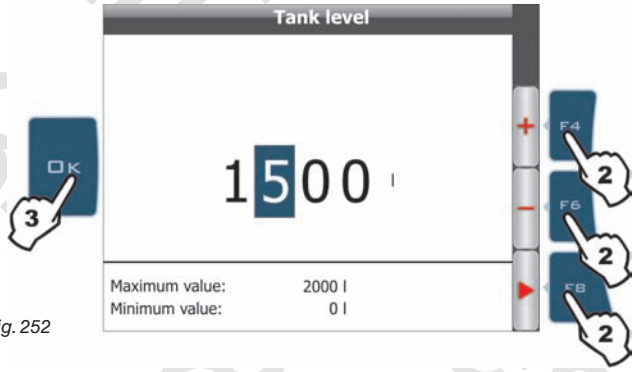

Fig. 252

1 Press **F6** to set the quantity of fluid poured into the tank.
2 Set the value.
3 Confirm datum.
The icon on display indicates the tank level reached.

It is not possible to set values exceeding the tank capacity (A in Fig. 251). In this case the screen in Fig. 252 shows the message Value out of range!

13.2 Functions list: PAGE 2

13.2.1 F1 Job resume

Activate the procedure to resume a spraying job previously interrupted (Fig. 253)

Fig. 253

1 Press **F1** to resume a job previously interrupted, among the saved ones. Confirmation prompt is displayed to start procedure.
2 Press **OK**.

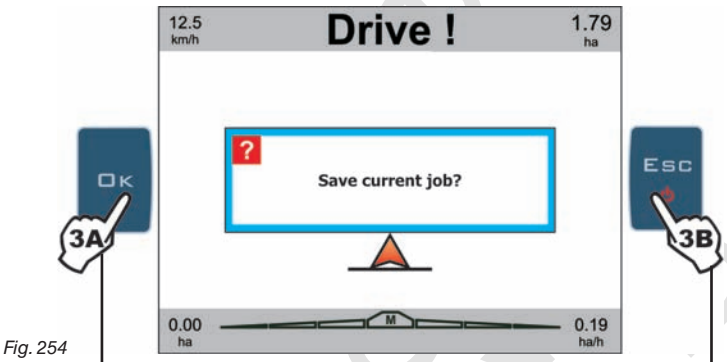

Fig. 254

3 Bravo 400 prompts you to save the job you were performing before starting the procedure. Press **OK** (**3A**) or **ESC** (**3B**):

3A **OK** allows you to save job: enter a name (Fig. 255).
Type in name as described under par. 9.4 - Using the programming keys.

3B **ESC** lets you go to job selection page (Fig. 256) without saving job: **work data displayed so far will be lost**.

4 Bravo 400 asks you to select job to be resumed.
Press keys to select among listed jobs.
5 Press **OK** to confirm machine selection.

Fig. 255

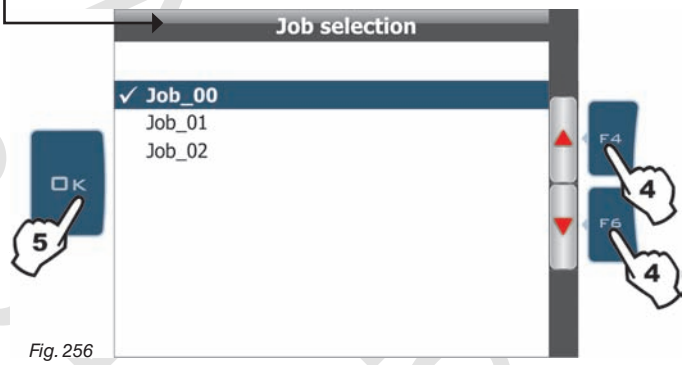

Fig. 256

CONT'D

13.2.1 F 1 Job resume *(CONTINUED)*

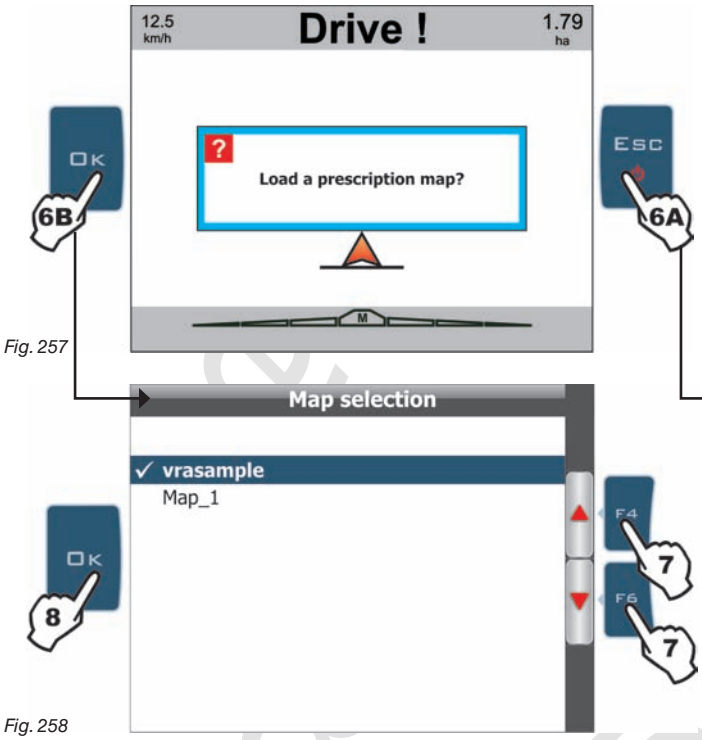

Fig. 257

Fig. 258

With at least one map (on internal memory), Bravo 400 asks whether you wish to use a prescription map (par. 12.8) to do the treatment.
Press **OK** (**6B**) or **ESC** (**6A**).

6A ESC to go to guidance screen (Fig. 259).

6B OK lets you select a prescription map among the listed ones (Fig. 258).

7 Press keys to select map.
8 Press **OK** to confirm machine selection.
Drive and perform the job.

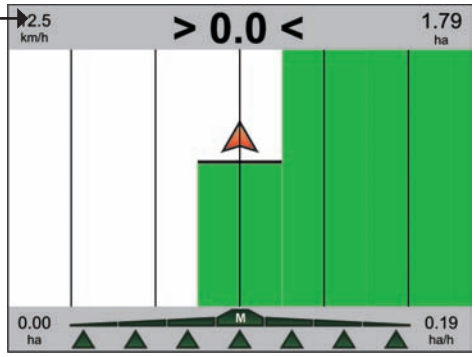

Fig. 259

When resuming an "old" job, BRAVO 400 gives guidance indications by recalling active conditions upon saving:

- Driving mode
- Marking points A and B
- Marking points to calculate the area.

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13.2.2
F2 Mark AB

Stores two points A and B on field; they are used by Bravo 400 to create a line to be used as reference track (**T0**, Fig. 263) for spraying job underway.

Mark points A and B as follows:
1 Press **F2**: **Mark new AB reference?**
2 Press **OK**.
3 Drive along the path you wish to use as a reference for the spraying job. Prompt **Mark A?** is displayed Press **OK**.
4 Message **Drive!** is displayed Continue to drive; once you covered the minimum distance (30 m / 95.5 ft), request **Mark B?** is displayed Press **OK**.
The display will show the reference track **T0** and all tracks to follow when spraying (Fig. 263).

Fig. 260

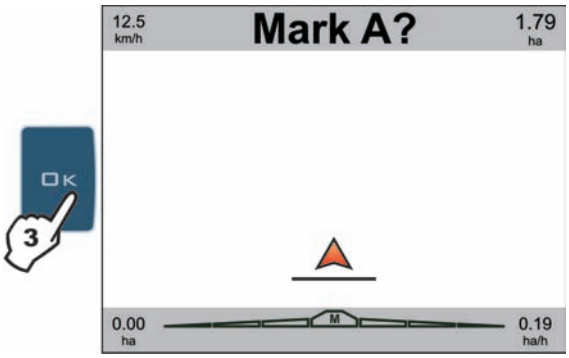

Fig. 261

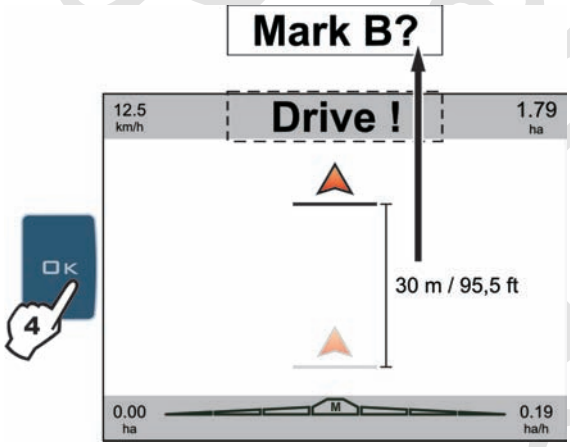

Fig. 262

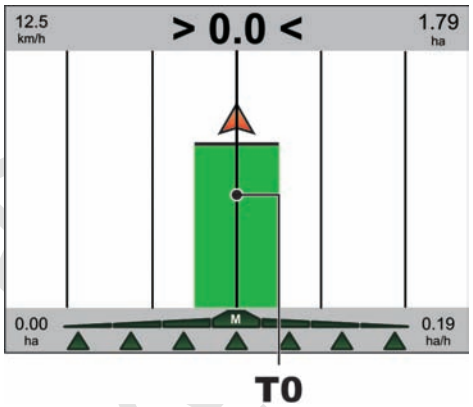

Fig. 263

Using the "Mark AB" function, Bravo 400 deletes the previous T0 reference track (if any), and prompts you to store two NEW points A and B on field, which create a NEW reference track.
Points A and B can only be marked with vehicle moving. It is NOT possible to recover the previous T0 track.

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13.2.3
F3 2D-3D

Toggle from 2D display driving mode to 3D one and vice versa (figures 264 - 265)

Default display mode is 2D. Following are the two possible instances:

3D DISPLAY	2D DISPLAY
1a 2D display mode is active. Press **F3** to swap to 3D.	**1b** 3D display mode is active. Press **F3** to swap to 2D.

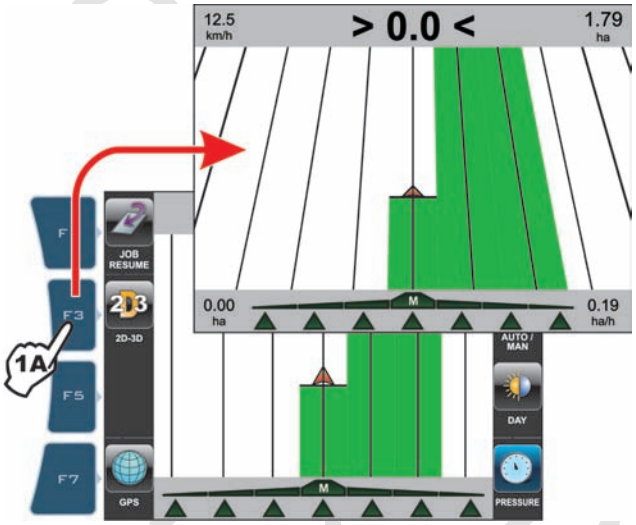

Fig. 264

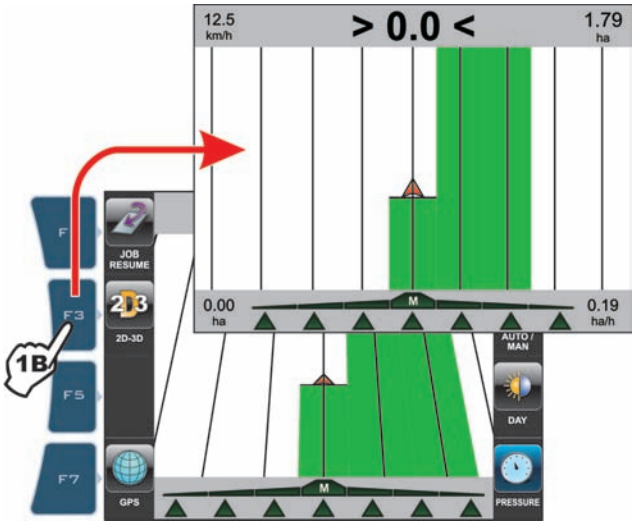

Fig. 265

Alliances
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13.2.4 F4 Auto/Man

Activate/deactivate automatic control of section valves (figures 266 - 267)

Default control mode is automatic. Following are the two possible instances:

MANUAL CONTROL (OPENING / CLOSING)

1A Automatic control is active (**A** in Fig. 266).
Press **F4** to shift to manual control.

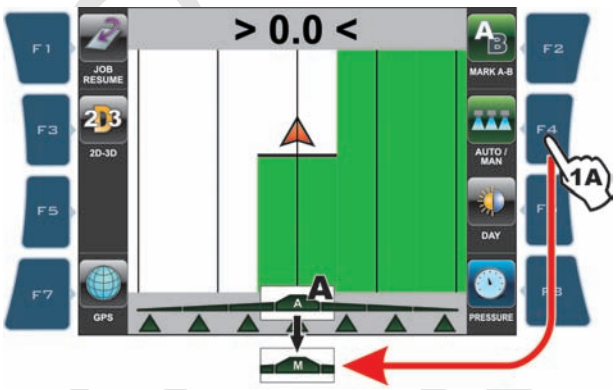

Fig. 266

AUTOMATIC CONTROL (OPENING / CLOSING)

1B Manual control is active (**B** in Fig. 267).
Press **F4** to shift to automatic control.

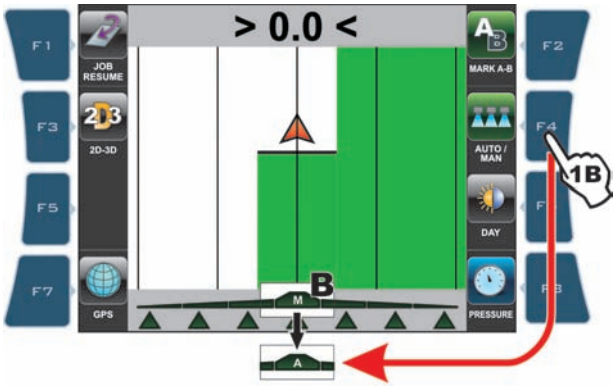

Fig. 267

13.2.5 F6 Day / Night

Toggle from day display driving mode to night one and vice versa (figures 268 - 269)

Default display mode is Day. Following are the two possible instances:

DAY DISPLAY MODE

1A Night display mode is active.
Press **F6** to shift to Day mode (Fig. 268).

Fig. 268

NIGHT DISPLAY MODE

1B Day display mode is active.
Press **F6** to shift to Night mode (Fig. 269).

Fig. 269

13.2.6
F7 GPS

Press **F7** to display the data transmitted by the GPS receiver (Fig. 271).

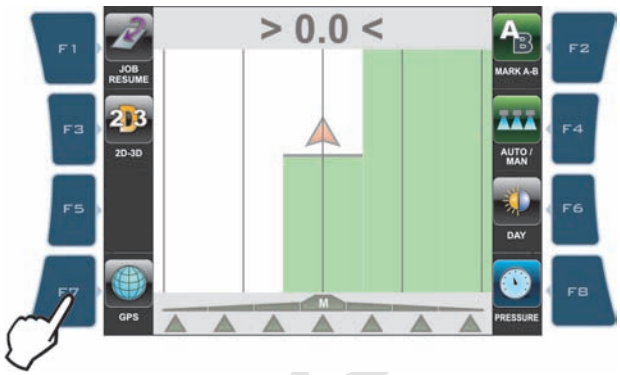

Fig. 270

GPS data		
Longitude	**44.784617**	deg.
Latitude	**10.877977**	deg.
Altitude	**2.6**	m
Tilt	**1.8**	deg.
Number of satellites	**10**	
HDOP	**0.8**	
DGPS	**Enabled**	
DGPS Age	**3.6**	sec
Update frequency	**5**	Hz
Baud	**19200**	Bd

Fig. 271

13.2.7
F8 Pressure

Activate the "zero" setup procedure of pressure sensor.

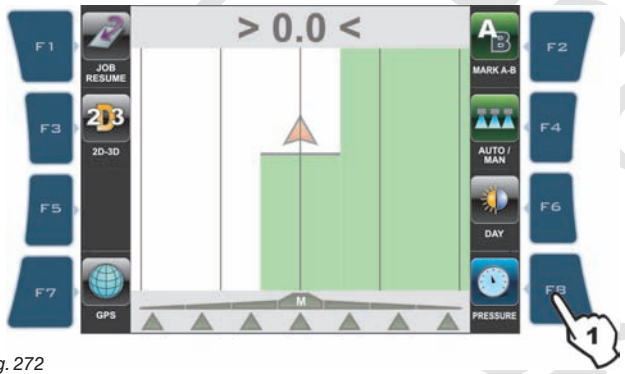

Fig. 272

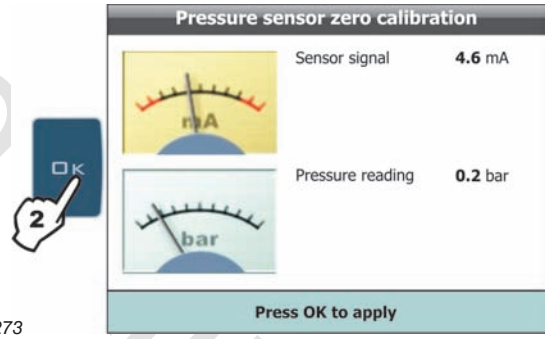

Fig. 273

In case a pressure value is display **despite the absence of pressure inside the circuit** , it is necessary to perform zero setup of the sensor:
1 Press **F8** to display the **Pressure sensor zero calibration** screen (Fig. 273).
2 Press **OK** to reset the pressure sensor residual signal.
Bravo 400 automatically quits the procedure and displays the job screen with the pressure value of **0.0 bar**.

Value out of range!.
This alarm appears when abnormal pressure values have been detected: check sensor for correct operation.
if problem persists, check for residual pressure in the system.

END OF PAR. 13.2 - FUNCTIONS LIST - PAGE 2

13.3 Functions list: PAGE 3

13.3.1 F1 New job

Start a new spraying job (Fig. 274)

Fig. 274

1 Press **F1** to start a new spraying job.
Confirmation prompt is displayed to start procedure.
2 Press **OK**.

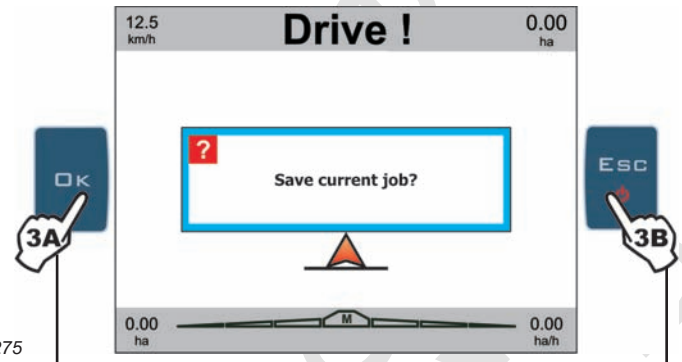

Fig. 275

Bravo 400 requests you to save job you were carrying out before starting the procedure. Press **OK** (**3A**) or **ESC** (**3B**):

3A OK allows you to save job: enter a name (Fig. 276).
Type in name as described under par. 6.3 - Using the programming keys.

3B ESC lets you go to prescription map selection screen (Fig. 277- 278) without saving job: **work data displayed so far will be lost**.

Fig. 276

Fig. 277

CONT'D

13.3.1 F 1 New job *(CONTINUED)*

Fig. 278

Continues from Fig. 277: with at least one map (on internal memory), Bravo 400 asks whether you wish to use a prescription map (par. 12.8) to do the treatment. Press ESC (**4A**) or OK (**4B**).

4A ESC to go to guidance screen (Fig. 280).

4B OK lets you select a prescription map among the listed ones (Fig. 279).

5 Press keys to select map.
6 Press OK to confirm machine selection.
Drive and perform the job.

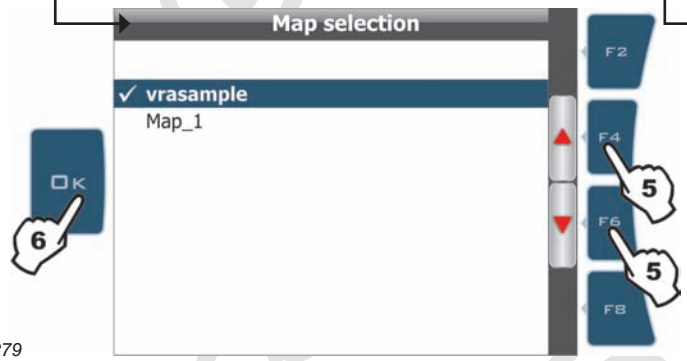

Fig. 279

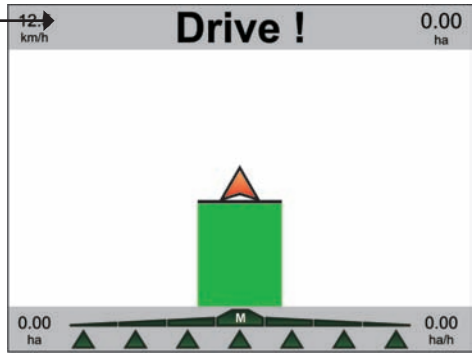

Fig. 280

At the beginning of a new job Bravo 400 provides driving indications using the "Straight parallel" mode.
See function "Mode" (par. 13.1.4) to change the driving mode.
WARNING: Bravo 400 SAVES the job starting point ONLY when performing one of the following operations:
- Spraying activation (main control valve ON)
- Marking point A (function "Mark AB", par. 13.2.2)
- Marking original point to calculate the area (function "Area", par. 13.1.8)

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13.3.2
F2 Waypt

Save one "Waypoint" onto display (Fig. 281 and 282).
Afterwards it is possible to activate the procedure to follow the saved points in sequence.

"Waypoints" can be saved with the procedure below:

FIELD FULL ZOOM

From this page, you can store a field point even if tractor is in another position.

1 Press keys **F3**, **F4**, **F5**, **F6** to shift position of cursor **A** (Fig. 282) on field.
2 Once you reach the desired position, **PRESS F1**.

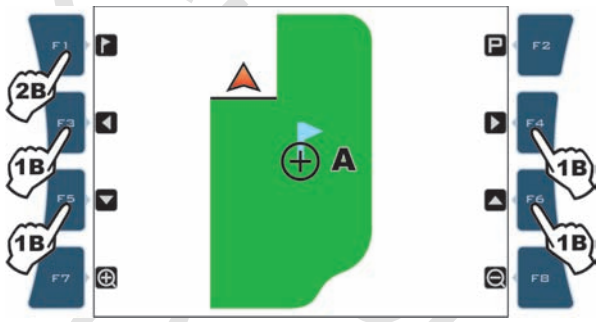


Fig. 282

Here you can also delete one point previously stored:
press keys **F3**, **F4**, **F5**, **F6** to shift the cursor position **A** near or above the marked point, and press **F1**.

• Procedure of sequential return to the "Waypoints".

Lets suppose to mark "Waypoints" **B**, **C**, **D** (Fig. 283).
Press **F2** to receive driving information and return **to the first marked "Waypoint"** (**B** in Fig. 283):
- A light blue line connecting the middle position to the flag shows the trajectory to be followed to get closer to first marked point (**B** in Fig. 284).
- The display shows in light blue the number of tracks to be crossed before reaching point (**E** in Fig. 284):
in the example, **+** next to the number indicates you shall move to the right, **-** indicates you shall move to the left.
Carry on driving.
- When you reach the track with the "Waypoint", the display shows the distance between your position and the point (**F** Fig. 285).
- Move along the track and check that distance in metres decreases: you are getting closer to the point.
When you are nearby, you can see the flag displayed.
- When reaching the flag the distance value becomes "zero" (Fig. 286): press **OK** to receive information to reach the following point (**C** in Fig. 286),
or **ESC** to quit the procedure.
OK *pressed several times displays return information of each "Waypoint", following the point marking order.*

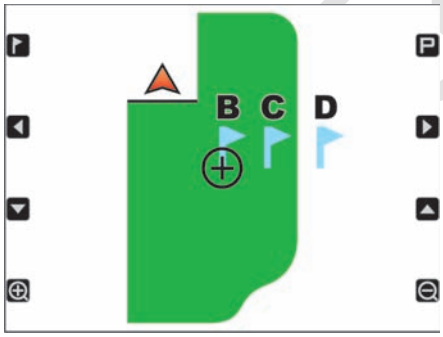


Fig. 283

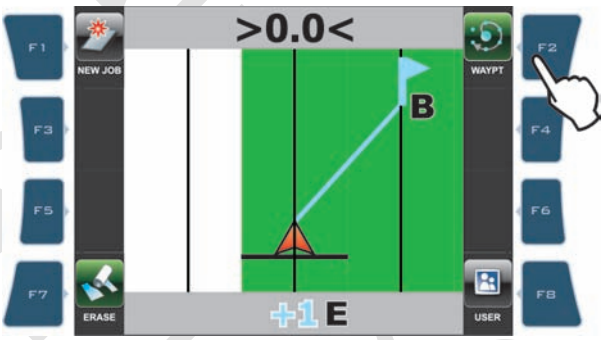


Fig. 284

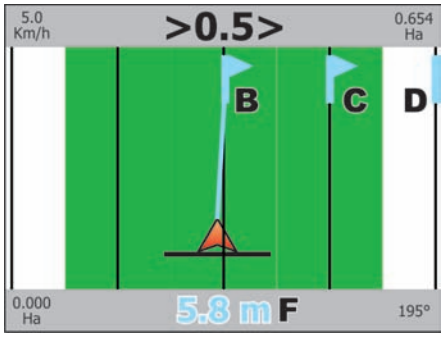


Fig. 285

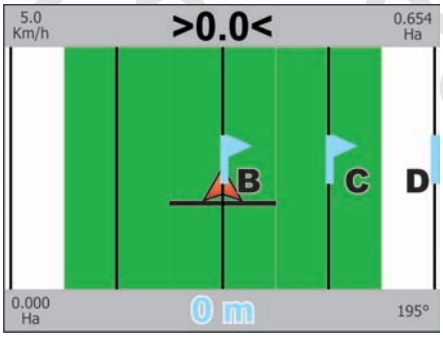
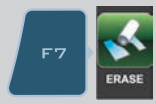


Fig. 286



13.3.3 F7 Erase

Delete completed job data.

1 Press **F7** to delete data. **Erase job's information?** (Fig. 287).
2 Press **OK**.

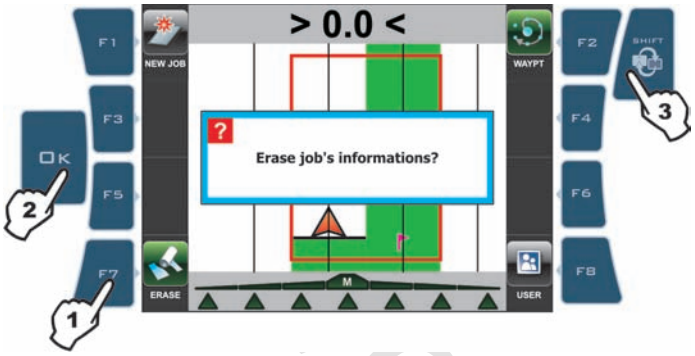


Fig. 287

REFERENCES ABOUT GUIDANCE PAGE

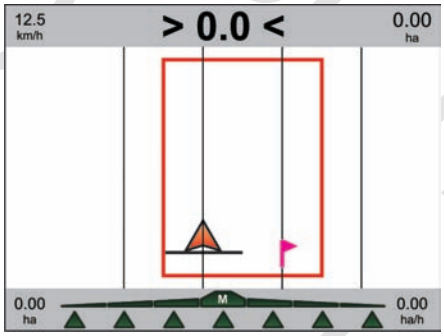


Fig. 288

The sprayed areas are erased and the job data reset.
Inside the memory there remain (if any):

- the reference tracks (par. 13.2.2 - **F2** Mark AB);
- the job breaking point (par. 13.1.3 - **F2** Pause);
- the points of interest "P.O.I." (par. 13.1.6 - **F5** P.O.I.);
- the "Waypoints" (par. 13.3.2 - **F2** Waypt);
- the perimeter drawn during the procedure for calculating the area (par. 13.1.8 - **F7** Area).

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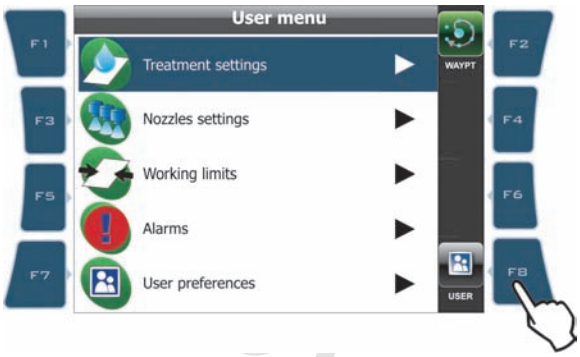
13.3.4
F8 User

Access to user menu (Fig. 289).



Press **F8** to display the **User menu**.
Refer to chapt. 11 to correctly program all menu items.

Fig. 289

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END OF PAR. 13.3 - FUNCTIONS LIST - PAGE 3

14 MAINTENANCE / DIAGNOSTICS / REPAIRS

14.1 Alarm display

When one alarm is triggered, Bravo 400 displays the error in the active screen (par. 12.5 - Display).
The display changes according to the active screen:

FULL DISPLAY	ONLY SYMBOL ⚠	NO DISPLAY
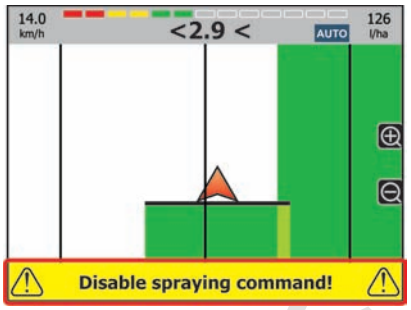	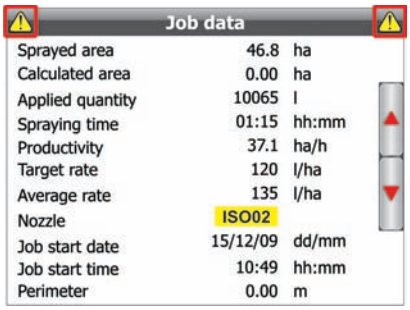	
Fig. 290	*Fig. 291*	*Fig. 292*

• Error messages full display (Fig. 290)
Bravo 400 displays a yellow bar with the description, as in the example of Fig. 290.
This display appears in all screens (par. 12.5), except those regarding: Full screen camera (Fig. 292), Job data (Fig. 291) and any programming menu.

• Only symbol (Fig. 291)
Bravo 400 EXCLUSIVELY displays the yellow triangle WITHOUT description as shown in Fig. 291.
This display appear ONLY in **Job data** (Fig. 291) and programming menu screens (sect. 10 and 11).
To consult the error message press SHIFT several times until selecting a full display screen.

• No display (Fig. 292)
This case applies ONLY to the **Camera / Full screen** page (Fig. 292).
During the alarm an acoustic intermittent signal will be emitted. Press ESC to temporarily disable the acoustic signal (1 minute).
To consult the error message press SHIFT several times until selecting a full display screen.

14.2 Pump failure alarm

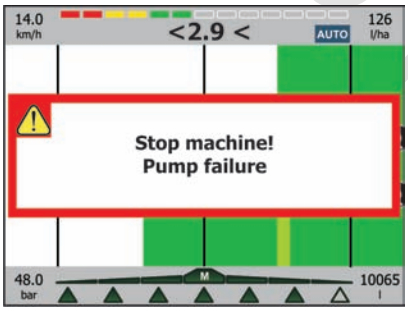

Fig. 293

The message **Stop machine! Pump failure** concerns a particularly serious fault in the system.
For this reason it is always shown in the centre of the display (Fig. 293).
Should you need to continue the job press ESC to close the error windows.
The alarm will remain active with the display modes explained under par. 14.1.
Stop the machine and check the pump as soon as possible.

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14.3 Error messages

DISPLAYED MESSAGE	DURATION	CAUSE	REMEDY	JOB MODE
Disable spraying command!	**continue**	Main switch ON upon computer switching on	• Move main switch downwards (position OFF)	--
Drive! Machine stopped	**continue**	Main switch ON with machine stopped	• Start the machine • Move main switch downwards (position OFF)	**MAIN ON + AUTO**
Unable to load last job!	**continue**	File regarding last job is damaged	**DATA FROM LAST JOB CAN NOT BE RECOVERED**	--
Map loading failed! Select another map?	**continue**	Format of map to be loaded is not valid **(Par. 12.8)** or the file is damaged	Press **OK** to continue the procedure and select another map.	--
			• Press **ESC** to cancel procedure.	--
Low memory available! delete jobs to free memory	**continue**	Available memory is not sufficient to save or start a new job.	• Access the procedure to delete the jobs from the internal memory **(par. 11.7.1)**.	--
Connection to RCU not detected!	**continue**	Communication problems detected between monitor and control unit (RCU)	• Check the connection cable (and connectors) status between monitor and control unit **(par.6.2)**	--
		Damaged cables	• Replace cables	--
GPS receiver not connected!	**continue**	Wrong connection of cable for receiver to Bravo 400	• Check connection with receiver **(par. 6.2 - 6.7)**.	--
		Connection cable to receiver is damaged.	• Replace cable.	--
		Receiver is damaged.	• Replace receiver.	--
Insufficient GPS signal quality! Continue job?	**continue**	Position and number of satellites do not allow for suitably accurate guidance	• Press **OK** to continue job. **Bravo 400 will output inaccurate data.**	--
			• Press **ESC** and wait for signal quality to improve.	--
GPS receiver invalid data!	**continue**	Connecting to satellites.	• Wait for connection to be established.	--
DGPS correction not available! Continue job?	**continue**	DGPS signal not present within work area.	• Press **OK** to continue job. Bravo 400 could generate a displaying error in the guidance screen **(par. 10.3.4)**: carry out tracks alignment using "Align" function **(par. 13.1.7)**.	--
		DGPS connection in progress.	• Press **ESC** and wait for connection to be established: the display shows **DGPS correction not available! Please wait...** until connection is established.	--
Stop machine! Pump failure	**continue**	Pump oil level too low or mixed with water	• Stop the machine and check the pump status	--
Activate pump! Missing flowrate	**continue**	Main switch ON with machine stopped but zero rate	• Start the pump and move the machine	**MAIN ON + AUTO**
Minimum tank level reached!	**5 sec.**	The tank level is lower than the set reserve value	• Fill-in the tank **(par. 13.1.9)**	**MAIN ON**
		The minimum value is not set correctly	• Check the set reserve value **(par.10.6.2)**	
Automatic regulation blocked!	**5 sec.**	The pressure does not reach the set limit	• Increase the machine speed	**MAIN ON + AUTO**
		The limit has not been set correctly	• Check the set limit **(par. 11.4.2)**	
Decelerate! Pressure too high	**continue**	The pressure exceeds the maximum level allowed for the nozzle in use	• Decrease the machine speed • Regulate the operating pressure so as to respect the previously set limits for nozzles in use • Check setting of minimum pressure for the nozzle in use **(par. 11.5.4)**	**MAIN ON**
Accelerate! Insufficient pressure	**continue**	The pressure does not reach the minimum value for the nozzle in use	• Increase the machine speed • Regulate the operating pressure so as to respect the previously set limits for nozzles in use • Check setting of minimum pressure for the nozzle in use **(par. 11.5.4)**	**MAIN ON**
Flowmeter out of range!	**5 sec.**	Rate out of the limits allowed by flowmeter	• Adapt job conditions to flowmeter limits (speed, pressure, etc...) • Check that the flowmeter constant value has been set correctly **(par. 10.4.3)**	**MAIN ON**

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DISPLAYED MESSAGE	DURATION	CAUSE	REMEDY	JOB MODE
Decelerate! Insufficient flowrate	**continue**	The rate does not reach the value required for output	• Decrease the machine speed • Check that the flowmeter constant value has been set correctly **(par. 10.4.3)**	**MAIN ON + AUTO**
Accelerate! Too High flowrate	**continue**	The rate exceeds the value required for output	• Increase the machine speed • Check for correct setup of menu **Machine settings** (boom width, flowmeter, etc... - **sect. 10**)	**MAIN ON + AUTO**
Reduce rotation speed!	**continue**	RPM exceeds the maximum allowed value	• Decrease the rotation speed of the moving part • Check the constant set for the rev counter **(par. 10.8.2)**	**--**
Increase rotation speed!	**continue**	RPM does not reach the minimum value	• Increase the rotation speed of the moving part • Check the constant set for the rev counter **(par. 10.8.2)**	**MAIN ON**
Check nozzles wear status!	**continue**	Difference between detected and calculated rate (according to selected nozzle data) higher than set limit	• Check that set nozzle coincides with that installed on the boom **(par. 11.2.3)** • Replace nozzles	**MAIN ON + AUTO**
Switch box connection not detected!	**continue**	Communication problems detected between monitor and switches	• Check state of connection cable (and connectors) between monitor and switches panel	**--**
		Damaged cables	• Replace cables	
Stop machine before enter menu	**continue**	Moving machine.	• Stop the machine. **Machine MUST be stopped to access the Machine settings menu.**	**--**
Disable RPM meter!	**continue**	Attempt to enable the Pump Protector sensor with rev counter sensor already activated	• Disable RPM sensor **(par. 10.8)** **Rev counter and Pump Protector sensors use the same input: it is NOT possible to enable them at the same time**	**--**
Disable pump protector!	**continue**	Attempt to enable the rev counter sensor with Pump Protector sensor already activated	• Disable Pump Protector sensor **(par. 10.9)** **Rev counter and Pump Protector sensors use the same input: it is NOT possible to enable them at the same time**	**--**
Enable main valve!	**continue**	Attempt to set the "**P**" operating mode with main valve set to **None**	• Set the type of main valve in the control unit (options **2 Ways** / **3 Ways**, **par. 10.2.4**) **It is NOT possible to program "P" operating mode with main valve set to None.**	**--**
Enable M mode!	**continue**	Attempt to set main valve to **None** with "**P**" operating mode active	• Set "**M**" operating mode **(par. 10.2.2)** **It is NOT possible to set the main valve to None when "P" operating mode is active.**	**--**

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14.3 Troubleshooting

FAULT	CAUSE	REMEDY
The display does not switch on	No power supply	• Check power supply connection.
	Computer is OFF	• Press the ON button
Valve controls take no effect	Valves not connected	• Connect the connectors
One valve does not open	No power supply to valve	• Check valve electric connection and operation
Speed reading is erratic	Job start procedure was initiated at a point distant from field to be sprayed.	• Repeat the job start procedure **(par. 12.9)** nearby the field.
Output volume readout inaccurate	Wrong setup	• Check boom width setting **(par. 10.1.2)** • Check flowmeter constant setting **(par. 10.4.3)** • Check section valve type setting **(par. 10.2.1)**
Distance travelled count displayed does not match actual distance covered	Wrong setup	• Check boom width setting**(par. 10.1.2)** • Check connections to speed sensor
Dispensed fluid count displayed does not match litres/gpm actually dispensed	Wrong setup	• Check flowmeter constant setting **(par. 10.4.3)** • Check section valve type setting **(par. 10.2.1)**
	Use of three-way section valves without setting calibrated backflows	• Perform setting
Unable to reach output volume value set for the automatic operation	Wrong setup	• Check spray rate setup **(par. 11.2.2)** • Check boom width setting **(par. 10.1.2)**
	System not adequately sized to provide required rate	• Check maximum pressure valve setting • Make sure control valve is adequate for specific system
	Control valve malfunction	• Check valve operation
Instantaneous pressure readout inaccurate	Wrong setup	• Check full scale setting for pressure sensor
	Pressure sensor not calibrated	• Perform calibration **(par. 13.2.7)**
	Pressure sensor wrong installation	• Check connections to pressure sensor
Instantaneous pressure is not displayed	Wrong setup	• Check pressure sensor setting **(par. 10.5)**
	Computer does not receive signals from pressure sensor	• Check connections to pressure sensor
	Pressure sensor wrong installation	• Check connections to pressure sensor
Rpm readout inaccurate	Wrong setup	• Check rpm sensor constant setting **(par. 10.8)**
Rpm value not displayed	Monitor does not receive signals from rpm sensor	• Check connections to rpm sensor
	Rpm sensor wrong installation	• Check connections to rpm sensor
Pump failure alarm permanently active	Monitor does not receive signals from Pump Protector sensor	• Check connections to Pump Protector sensor

14.4 Cleaning rules

- Clean only with a soft wet cloth.
- DO NOT use aggressive detergents or products.
- DO NOT aim water jets directly at monitor and control unit.

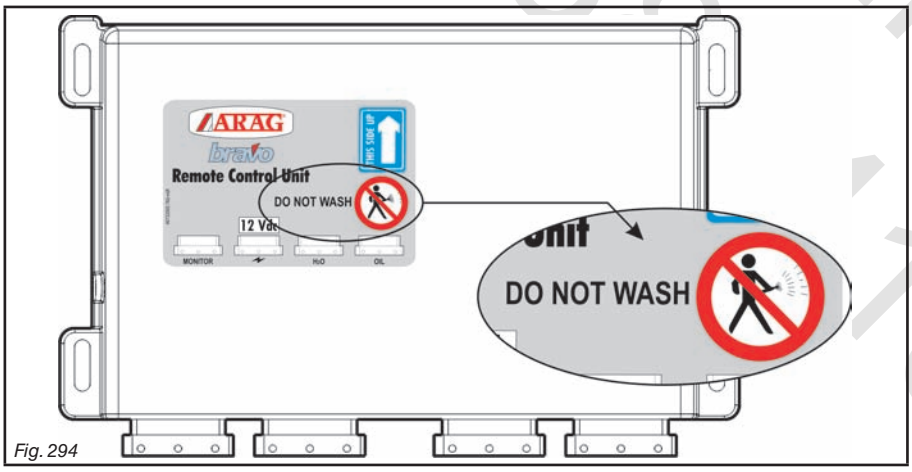

Fig. 294

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15 TECHNICAL DATA

DESCRIPTION	Bravo 400
Display	LCD 5.7", 65000 colors, 500 cd/m^2
Rated power supply	12 Vdc (9 ÷ 15 Vdc)
Consumption (valves excluded)	1.1 A
Working temperature	0 °C ÷ 50 °C +32 °F ÷ +122 °F
Storage temperature	-20 °C ÷ 70 °C -4 °F ÷ +158 °F
Digital inputs	for open collector sensors: max 2000 imp*/s
Analog input	4 ÷ 20 mA
Wight (without harness)	monitor: 1400 g (Bravo code 46747511) RCU: 1200 g
SD card reader	Yes
Protection against polarity inversion	•
Protection against short-circuit	•

15.1 Displayed data and relevant units of measurement

• Machine settings

Data	Description	Min.	Max.	UoM	DEFAULT	Other possible settings
Boom settings	Nozzle number	1	999	nr	40	--
	Output 1 ÷ 5	0.1	99.99	m	4.0 m	--
	Output 6 ÷ 13	0.1	99.99	m	Disabled	
Valves	Boom sections	--	--	--	3 Ways	2 Ways
	Auto switch-off	--	--	--	No (P mode)	Yes (M mode)
	Pressure regulator	--	--	--	3 Ways	2 Ways
	Main valve	--	--	--	3 Ways	None, 2 Ways
	Selejet	--	--	--	Disabled	Enabled
	Section activation time	0.0	1.0	s	0.0 s	--
GPS receiver	Position	--	--	--	Front	Rear
	Distance	0.0	10.0	m	0.0 m	--
	Antenna height	0.0	9.9	m	0.0 m	--
	DGPS	--	--	--	Disabled	Enabled
Flowmeter	Type	--	--	--	Orion 462xxA4xxxx	Disabled, Orion 4621xA0xxxx, Orion 4621xA1xxxx, Orion 4621xA2xxxx, Orion 4621xA3xxxx, Orion 4622xA5xxxx, Orion 4622xA6xxxx, Wolf 462x2xxx, Wolf 462x3xxx, Wolf 462x4xxx, Wolf 462x5xxx, Wolf 462x7xxx, Other
	Allarme Flowrate minima	0.1	999.9	l/min	10.0 l/min	--
	Maximum flowrate alarm	0.1	999.9	l/min	200.0 l/min	--
	Constant	1	32000	pls*/l	300 pls*/l	--
Pressure sensor	Pressure sensor	--	--	--	Disabled	466113_200, 466113_500, Other
	Maximum pressure	0.1	150.0	bar	20.0 (466113_200) 50.0 (466113_500)	--
Tank	Capacity	1	20000	l	2000 l	--
	Minimum level alarm	0	20000	l	150 l	--
Filling flowmeter	Type	--	--	--	Disabled	Orion 462xxA4xxxx, Orion 4622xA5xxxx, Orion 4622xA6xxxx, Wolf 462x4xxx, Wolf 462x5xxx, Wolf 462x7xxx, Other
	Minimum flowrate	0.1	999.9	l/min	10.0 l/min	--
	Maximum flowrate	0.1	999.9	l/min	200.0 l/min	--
	Constant	1	32000	pls*/l	300 pls*/l	--
Rev counter	Rev counter	--	--	--	Disabled	Enabled
	Constant	1	999	pls*/turn	1 pls*/turn	--
	Minimum speed alarm	1	9999	rpm	Disabled	--
	Maximum speed alarm	1	9999	rpm	Disabled	--
Pump Protector	--	--	--	--	Disabled	Enabled
Maximum speed alarm	--	--	--	--	Disabled	Enabled
Options	Language	--	--	--	English	Italian, English, Spanish, Portuguese, French, German, Czech, Polish, Russian, Hungarian
	Timezone	+12	-12	h	0 h	--

* pls= impulse

CONT'D

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• User menu

Data	Description		Min.	Max.	UoM	DEFAULT	Other possible settings
Treatment settings	Treatment 1	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	60 l/ha	--
		Nozzle	--	--	--	ISO01	
	Treatment 2	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	90 l/ha	--
		Nozzle	--	--	--	ISO015	
	Treatment 3	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	120 l/ha	--
		Nozzle	--	--	--	ISO02	
	Treatment 4	--	--	--	--	Disabled	Enabled
	Treatment 5	--	--	--	--	Disabled	Enabled
	Treatment 6	--	--	--	--	Disabled	Enabled
	Treatment 7	--	--	--	--	Disabled	Enabled
	Treatment 8	--	--	--	--	Disabled	Enabled
	Treatment 9	--	--	--	--	Disabled	Enabled
	Treatment 10	--	--	--	--	Disabled	Enabled
	Treatment 11	--	--	--	--	Disabled	Enabled
	Treatment 12	--	--	--	--	Disabled	Enabled
	Treatment 13	--	--	--	--	Disabled	Enabled
	Treatment 14	--	--	--	--	Disabled	Enabled
	Treatment 15	--	--	--	--	Disabled	Enabled
	Treatment 16	--	--	--	--	Disabled	Enabled
	Treatment 17	--	--	--	--	Disabled	Enabled
	Treatment 18	--	--	--	--	Disabled	Enabled
	Treatment 19	--	--	--	--	Disabled	Enabled
	Treatment 20	--	--	--	--	Disabled	Enabled

Nozzle:
ISO01, ISO015, ISO02, ISO025, ISO03, ISO04, ISO05, ISO06, ISO08, ISO10, ISO15, ISO20, A, B, C, D, E, F

To perform any setting it is necessary to enable the spraying

ONLY VERSION selejet Treatment settings	Treatment 1	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	60 l/ha	--
		Nozzle A	--	--	--	ISO01	
		Nozzle B	--	--	--	ISO015	
	Treatment 2	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	90 l/ha	--
		Nozzle A	--	--	--	ISO02	
		Nozzle B	--	--	--	ISO025	
	Treatment 3	Status	--	--	--	Enabled	Disabled
		Target rate	1	9999	l/ha	120 l/ha	--
		Nozzle A	--	--	--	ISO03	
		Nozzle B	--	--	--	ISO04	
	Treatment 4	--	--	--	--	Disabled	Enabled
	Treatment 5	--	--	--	--	Disabled	Enabled
	Treatment 6	--	--	--	--	Disabled	Enabled
	Treatment 7	--	--	--	--	Disabled	Enabled
	Treatment 8	--	--	--	--	Disabled	Enabled
	Treatment 9	--	--	--	--	Disabled	Enabled
	Treatment 10	--	--	--	--	Disabled	Enabled
	Treatment 11	--	--	--	--	Disabled	Enabled
	Treatment 12	--	--	--	--	Disabled	Enabled
	Treatment 13	--	--	--	--	Disabled	Enabled
	Treatment 14	--	--	--	--	Disabled	Enabled
	Treatment 15	--	--	--	--	Disabled	Enabled
	Treatment 16	--	--	--	--	Disabled	Enabled
	Treatment 17	--	--	--	--	Disabled	Enabled
	Treatment 18	--	--	--	--	Disabled	Enabled
	Treatment 19	--	--	--	--	Disabled	Enabled
	Treatment 20	--	--	--	--	Disabled	Enabled

Nozzle (A or B):
[X], ISO01, ISO015, ISO02, ISO025, ISO03, ISO04, ISO05, ISO06, ISO08, ISO10, ISO15, ISO20, A, B, C, D, E, F

To perform any setting it is necessary to enable the spraying

CONT'D

Cleveland Alliances 01361888415

• **User menu** *(CONTINUED)*

Data	Description		Min.	Max.	UoM	DEFAULT	Other possible settings
Nozzles settings	ISO01	Flowrate	--	--	l/min	0.4 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO015	Flowrate	--	--	l/min	0.6 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO02	Flowrate	--	--	l/min	0.8 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO025	Flowrate	--	--	l/min	1.0 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO03	Flowrate	--	--	l/min	1.2 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO04	Flowrate	--	--	l/min	1.6 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO05	Flowrate	--	--	l/min	2.0 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO06	Flowrate	--	--	l/min	2.4 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO08	Flowrate	--	--	l/min	3.2 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO10	Flowrate	--	--	l/min	4.0 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO15	Flowrate	--	--	l/min	6.0 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	ISO20	Flowrate	--	--	l/min	8.0 l/min	--
		Pressure	--	--	bar	3.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	A	Flowrate	0.1	99.9	l/min	1.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	B	Flowrate	0.1	99.9	l/min	2.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	C	Flowrate	0.1	99.9	l/min	3.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	D	Flowrate	0.1	99.9	l/min	4.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	E	Flowrate	0.1	99.9	l/min	5.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--
	F	Flowrate	0.1	99.9	l/min	6.0 l/min	--
		Pressure	0.1	99.9	bar	5.0 bar	--
		Minimum pressure	0.1	99.9	bar	Disabled	--
		Maximum pressure	0.1	99.9	bar	Disabled	--

CONT'D

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• User menu *(CONTINUED)*

Data	Description		Min.	Max.	UoM	DEFAULT	Other possible settings
Working limits	Minimum spraying speed		1.0	99.0	km/h	Disabled	--
	Minimum regulation pressure		0.1	99.9	bar	Disabled	--
	Sections overlapping limit		1	99	%	99%	--
	Boundary sct. management		--	--	--	Disabled	Max. coverage, Min. overstep
	Intentional overlap		-3.00	+3.00	m	0.00	--
Alarms	Steer radius		0.1	19.9	m	Disabled	--
	Nozzle wear check		1	50	%	Disabled	--
	HDOP level		1.0	10.0	--	4.0	--
	Nozzle pressure alarm		--	--	--	Disabled	Enabled
User preferences	'Guidance' screen	L1 data	--	--	--	Speed	Application rate, Speed, Pressure, Flowrate, Applied area, Calculated area, Applied quantity, Tank level, Tank range, Spraying time, Productivity, Perimeter, Date, Time, Rotation speed, Direction, GPS signal quality, Track number, Target rate, Available memory.
		L2 data	--	--	--	Pressure	
		R1 data	--	--	--	Application rate	
		R2 data	--	--	--	Tank level	
	'Spraying' screen	L1 data	--	--	--	Flowrate	Flowrate, Applied area, Calculated area, Applied quantity, Spraying time, Productivity, Perimeter, Date, Time, Rotation speed, Direction, Track number.
		L2 data	--	--	--	Applied quantity	
		R1 data	--	--	--	Applied area	
		R2 data	--	--	--	Productivity	
		Tank data	--	--	--	Tank level	Range, Both
	Led bar		--	--	--	Disabled	Enabled
	Acoustic alarm		--	--	--	Enabled	Disabled
	Keypad tone		--	--	--	Enabled	Enabled
	Camera 1		--	--	--	Enabled	Full screen, Spraying data
	Camera 2		--	--	--	Enabled	Full screen, Spraying data
	User key		--	--	--	Store job pause point	Alignment, Store job pause point, Pause point return, A-B reference marking, View GPS data, Toggle 2D-3D view, Tank filling, Pressure sensor zero calibration, Treatment selection, User menu access, Toggle sections managem. mode.
Speed	Source		--	--	--	GPS	Maximum speed alarm
	Wheel constant		0.01	150.00	cm/pls*	50.00 cm/pls*	--
	Distance		20	100	m	100 m	--

* pls= impulse

• Job data

Data		Min.	Max.	UoM
Applied area		0.00	99999	ha
Calculated area		0.00	99999	ha
Applied quantity		0	99999	l
Spraying time		00:00	99:59	hh:mm
Productivity		0.00	99999	ha/h
Target rate		0	99999	l/ha
Average rate		0	99999	l/ha
Nozzle		ISO01	F	--
Nozzle A	ONLY VERSION selec JET	ISO01	F	--
Nozzle B		ISO01	F	--
Job start date		01/01/00	31/12/99	dd/mm
Job start time		00:00	23:59	hh:mm
Perimeter		0.00	99999	m

END OF PAR. 15.1 DISPLAYED DATA AND RELEVANT UNITS OF MEASUREMENT

Crewland Alliances 01361883418

16 END-OF-LIFE DISPOSAL

Dispose of the system in compliance with the established legislation in the country of use.

17 GUARANTEE TERMS

1. ARAG s.r.l. guarantees this apparatus for a period of 360 day (1 year) from the date of sale to the client user (date of the goods delivery note). The components of the apparatus, that in the unappealable opinion of ARAG are faulty due to an original defect in the material or production process, will be repaired or replaced free of charge at the nearest Assistance Centre operating at the moment the request for intervention is made. The following costs are excluded:
- disassembly and reassembly of the apparatus from the original system;
- transport of the apparatus to the Assistance Centre.
2. The following are not covered by the guarantee:
- damage caused by transport (scratches, dents and similar);
- damage due to incorrect installation or to faults originating from insufficient or inadequate characteristics of the electrical system, or to alterations resulting from environmental, climatic or other conditions;
- damage due to the use of unsuitable chemical products, for spraying, watering, weedkilling or any other crop treatment, that may damage the apparatus;
- malfunctioning caused by negligence, mishandling, lack of know how, repairs or modifications carried out by unauthorised personnel;
- incorrect installation and regulation;
- damage or malfunction caused by the lack of ordinary maintenance, such as cleaning of filters, nozzles, etc.;
- anything that can be considered to be normal wear and tear;
3. Repairing the apparatus will be carried out within time limits compatible with the organisational needs of the Assistance Centre.
   No guarantee conditions will be recognised for those units or components that have not been previously washed and cleaned to remove residue of the products used;
4. Repairs carried out under guarantee are guaranteed for one year (360 days) from the replacement or repair date.
5. ARAG will not recognise any further expressed or intended guarantees, apart from those listed here.
   No representative or retailer is authorised to take on any other responsibility relative to ARAG products.
   The period of the guarantees recognised by law, including the commercial guarantees and allowances for special purposes are limited, in length of time, to the validities given here.
   In no case will ARAG recognise loss of profits, either direct, indirect, special or subsequent to any damage.
6. The parts replaced under guarantee remain the property of ARAG.
7. All safety information present in the sales documents regarding limits in use, performance and product characteristics must be transferred to the end user as a responsibility of the purchaser.
8. Any controversy must be presented to the Reggio Emilia Law Court.

Cleveland Alliances 01361883418

Cleveland Alliances
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Conformity Declaration CE

ARAG s.r.l.
Via Palladio, 5/A
42048 Rubiera (RE) - Italy
P.IVA 01801480359

Dichiara

che il prodotto
descrizione: **Computer**
modello: **Bravo 400**
serie: **46742xxx e 46747xxx**

risponde ai requisiti di conformità contemplati nelle seguenti Direttive Europee:
2004/108/CE
(Compatibilità Elettromagnetica)

Riferimenti alle Norme Applicate:
EN ISO 14982
(Macchine agricole e forestali - Compatibilità elettromagnetica
Metodi di prova e criteri di accettazione)

Rubiera, 13 ottobre 2010

Giovanni Montorsi

(Presidente)

Cleveland Alliances 01361883418

Only use genuine ARAG accessories or spare parts to make sure manufacturer guaranteed safety conditions are maintained in time. Always refer to ARAG spare parts catalogue.

Cleveland Alliances
01361883418

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