



ibx100
HYDRAULIC ISOBUS
BLC embedded


BOOM LEVELING KIT

CE

4679003.600

Object Pool rel. 1.0.0

INSTALLATION, USE AND MAINTENANCE

 = Generic danger = Warning**ECU** = IBX100 remote control unit**VT** = Virtual Terminal**OP** = Object Pool**WARNING:**

THE NATIVE CONTROLS INSIDE YOUR VIRTUAL TERMINAL HAVE THE PRIORITY ON ALL THE CONTROLS DERIVING FROM THE IBX100. PLEASE, KEEP THIS IN MIND WHEN PROGRAMMING AND USING THE PRODUCT.

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MANUAL USE MODES

The section of this manual dedicated to the installation contains information for installers. For this reason we have used technical terms without providing explanations which would be necessary for end users only.

THE INSTALLATION MUST BE CARRIED OUT BY AUTHORIZED AND SKILLED PERSONNEL ONLY. ARAG IS NOT RESPONSIBLE FOR ANY OPERATION SPECIFIED IN THIS MANUAL CARRIED OUT BY UNAUTHORIZED OR UNSKILLED PERSONNEL.

LIMITATIONS

The descriptions of the assembly phases refer to a "general" Virtual Terminal, so specific models will not be mentioned, unless a certain installation procedure concerns exclusively one VT type.

RESPONSIBILITY

The installer must carry out "workmanlike" installations and ensure to the end user the perfect operation of the whole system both with ARAG components only and other brands' components.

ARAG always recommends using its components to install control systems.

The installer will be held responsible for any malfunction if he decides to use other brands' components even without actually changing the system parts or harness.

The compatibility check with components and accessories of other manufacturers shall be carried out by the installer.

If the ARAG components installed together with other brands' components get damaged because of what stated above, no direct or indirect warranty will be provided.

RISKS AND PROTECTIONS BEFORE ASSEMBLY

All installation works of IBX100 control unit, except the main connection (Refer to the manual supplied with IBX100 ISOBUS Hydraulic - Chap. Settings > AUX configuration) 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.

DO NOT WORK NEAR THE BOOM WHILE THE BLC CONTROL SYSTEM IS IN OPERATION.

PRODUCT DESCRIPTION

The BLC kit is the system for boom leveling control (BLC) that allows keeping the sprayer arm parallel to the field orientation and managing its distance from the ground through the dedicated control unit - IBX100 hydraulic control unit- so as to ensure an even spraying covering.

Since the BLC control is an hydraulic function of the machine, an IBX100 Hydraulic ISOBUS control unit is required.

The control unit could be previously installed to control other hydraulic functions on the machine.

If you do not have any control unit, order separately an IBX100 hydraulic control unit and the relevant connection cable.

To enable IBX100 Hydraulic ISOBUS for the use of BLC, ask for the activation code to ARAG ("9.1.1 Activation procedure" on page 10).

INTENDED USE

The equipment you have purchased is a standard ISOBUS system compliant with ISO11783 to be applied to a crop spraying boom.

This device is designed to work on agricultural machinery for spraying and crop spraying applications.

The machine is designed and built in compliance with ISO 14982 standard (Electromagnetic compatibility - Forestry and farming machines), harmonized with 2014/30/EU Directive.

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).
- In case of voltaic arc welding, remove connectors from the device and disconnect the power cables.
- Only use ARAG genuine spare parts and accessories.

PACKAGE CONTENT

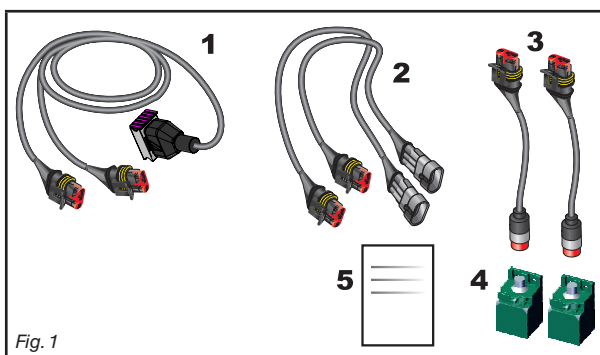


Fig. 1

- 1 Connection cable for sensors
- 2 Extension for sensors - 5 m (no. 2)
- 3 Adapter cables for ultrasonic sensors (no. 2)
- 4 Ultrasonic sensors (no. 2)
- 5 Purchase certification code

TO BE PURCHASED SEPARATELY:

- connection cable for IBX100 hydraulic control unit

TO BE PURCHASED SEPARATELY if not yet available on the existing system:

- IBX100 Hydraulic Isobus
- connection cable for hydraulic valves
- hydraulic valves for boom leveling



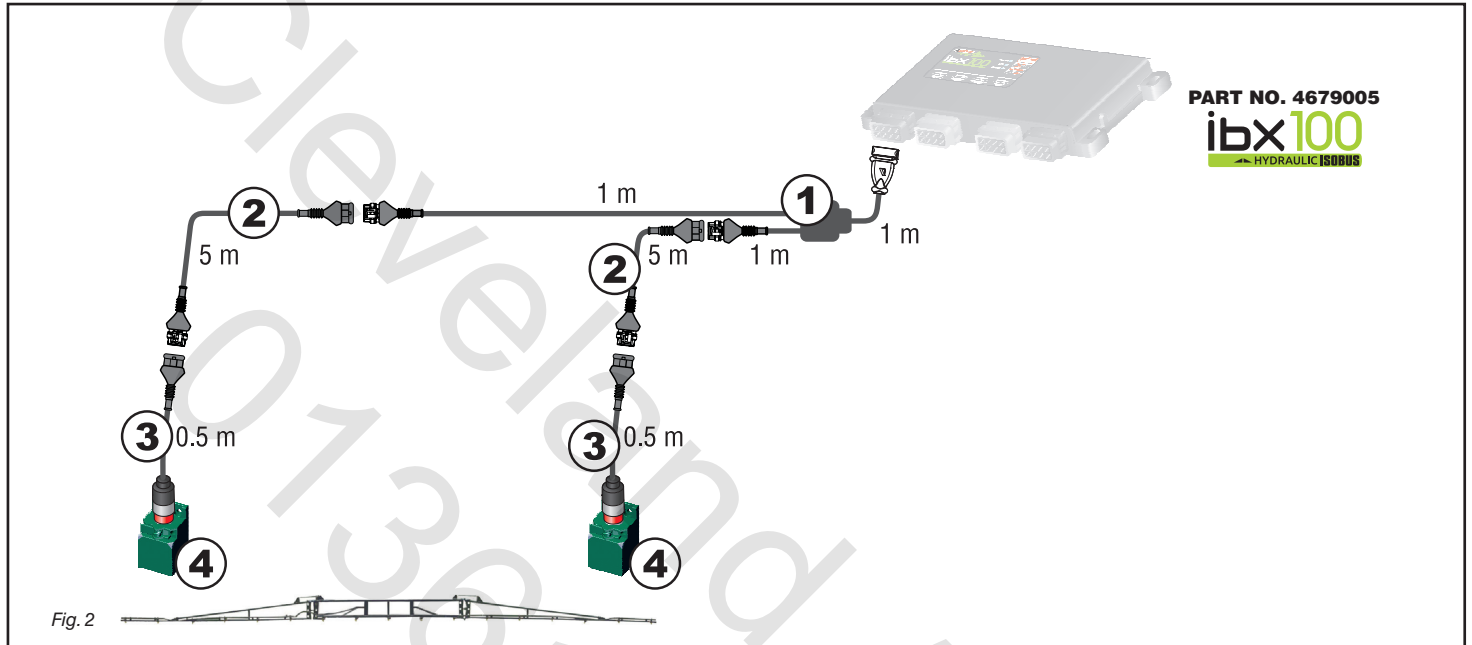
The kit supplied enables the BLC control function on an already existing system: therefore, the mechanical and hydraulic components are supplied by the machine manufacturer.

6 POSITION ON FARMING MACHINE

6.1 System typical composition

WARNING: DO NOT CONNECT ISOBUS CONNECTOR.
THIS CONNECTION WILL HAVE TO BE PERFORMED ONLY AT A LATER STAGE, ONCE ALL COMPONENTS HAVE BEEN INSTALLED (Refer to the manual supplied with IBX100 ISOBUS Hydraulic - Chap. System typical composition).

To connect all parts of the system correctly, make sure to use the proper connection cables.
 Consider any variants depending on system type.



Legend of connection cables:

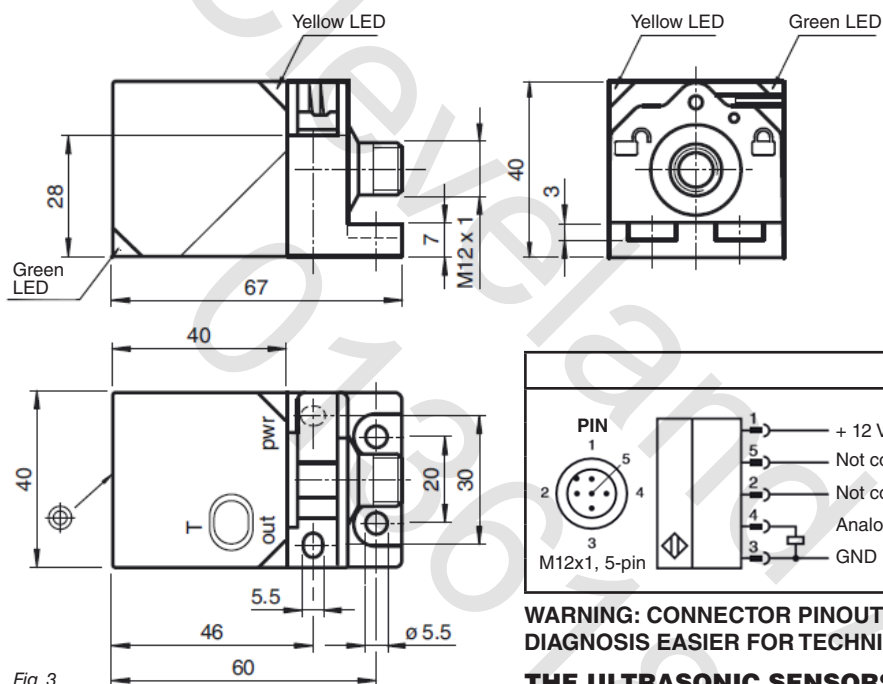
- 1 Connection cable for ultrasonic sensors
- 2 Extensions for ultrasonic sensors
- 3 Adapter cables for ultrasonic sensors
- 4 Ultrasonic sensors

7 INSTALLATION OF ULTRASOUND SENSORS

! It is the installer responsibility to check that all indications described are complied with.

! Precautions to follow for a long-lasting installation:

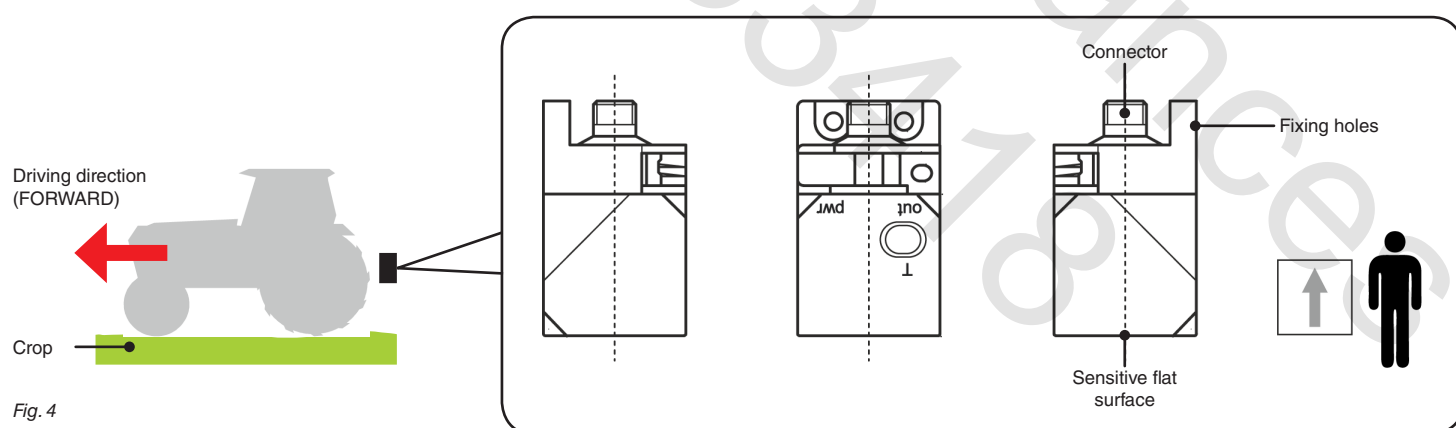
- Fix the sensor to a strong structure.
- Protect sensor body and connector with a guard.
- Keep sensor sensitive surface clean.
- Clean only with a soft wet cloth.
- Do not use aggressive detergents or products.
- Do not clean equipment with direct water jets.



WARNING: CONNECTOR PINOUT IS PROVIDED ONLY TO MAKE ANY SYSTEM DIAGNOSIS EASIER FOR TECHNICIANS / INSTALLERS.

! **THE ULTRASONIC SENSORS MUST NOT BE MODIFIED AND/OR REPLACED WITH DIFFERENT TYPES OF SENSORS SINCE THEY COULD CAUSE FIRES OR DAMAGE THE BOOM.**

INSTALLATION ORIENTATION



! For a correct operation, respect the installation direction (Fig. 4).

7.1 Sensor correct identification and positioning

Two types of layouts are available:

- **BASIC SETUP** - with a pair of sensors **US1** + **US2** (Fig. 5).

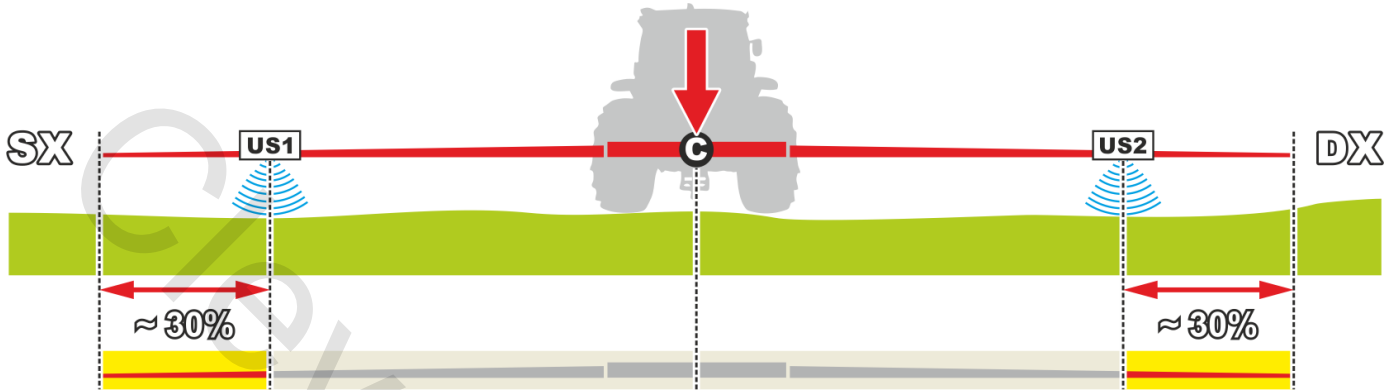


Fig. 5

Place the sensors in relation to the boom center **C**:

US1 (RH side) + **US2** (LH side) = external pair of sensors (far from boom center), at a distance from boom end corresponding approximately to 30% of the half-boom length.

- **COMPLETE SETUP** - with two pairs of sensors **US1** + **US2** and **US3** + **US4** (Fig. 6).

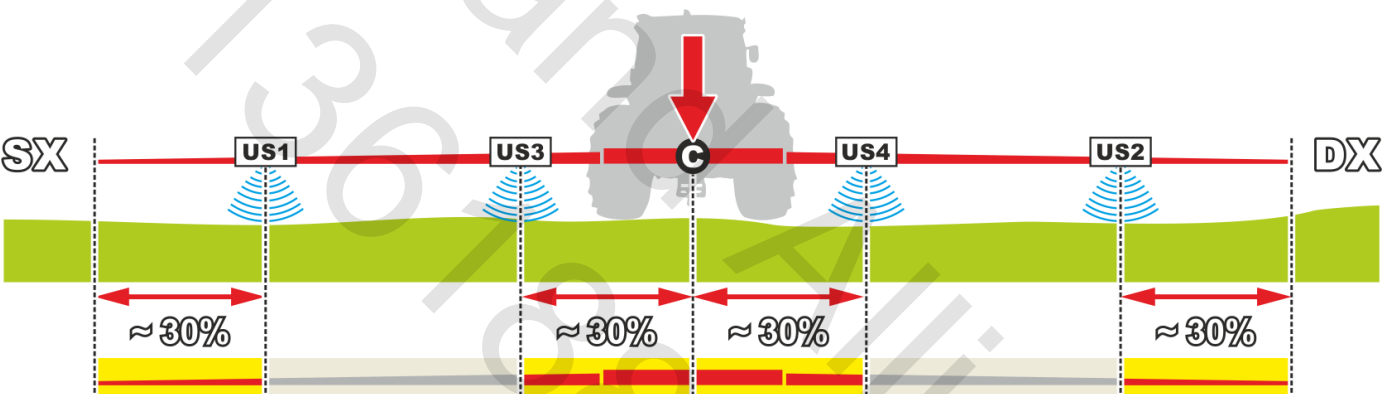


Fig. 6

Place the sensors in relation to the boom center **C**:

US1 (RH side) + **US2** (LH side) = external pair of sensors (far from boom center), refer to basic setup.

US3 + **US4** = internal pair of sensors (the ones closest to boom center), at a distance from boom center corresponding to approximately 30% of the half-boom length.

Install the **US1** / **US3** sensors on the LH side of the boom and the **US2** / **US4** sensors on the RH side (rear view of the tractor).

The configuration with two pairs of sensors is to be preferred: in case of very large booms, it allows creating an average of the distances of sensors from ground unevennesses.

Furthermore, the sensitive surface of the sensors must be positioned ALWAYS HIGHER than nozzle outlet (LV > 0 mm, Fig. 7).

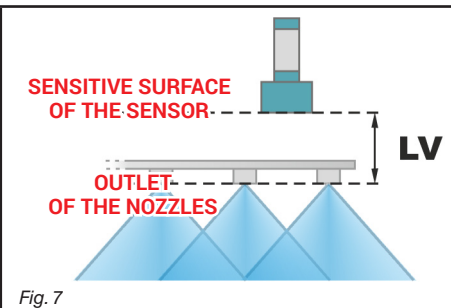


Fig. 7



CHECK THAT SENSORS ARE CONNECTED TO THE CORRESPONDING CONNECTORS AS PER THE MARKING INDICATED IN PAR. 8.3 ULTRASONIC SENSORS CONNECTION (BOOM LEVELING).

THE SYSTEM COULD NOT BE ACKNOWLEDGED OR BE ABLE TO OPERATE WITH DIFFERENT CONNECTIONS.

7.2 Sensor optimal orientation

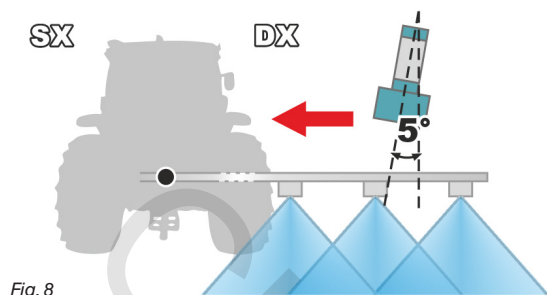


Fig. 8

• Lateral inclination (internal)

Sensors must be oriented towards the nearest side of the tractor; an inclination of 5° is recommended and useful to compensate the gradient of the boom due to the BLC system correction.

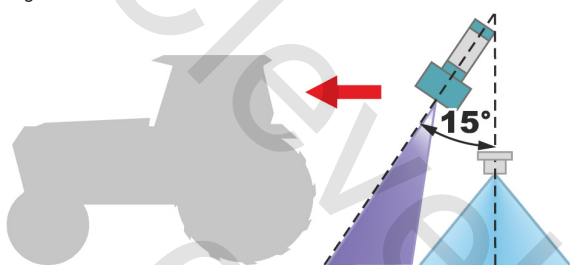


Fig. 9

• Forward inclination / height

As the ultrasound emission of the sensor has a conical shape with an amplitude of approx. 15° , advance the sensors by 15° with respect to the tractor travel direction. This inclination allows avoiding interferences with the cone outlet of the liquid sprayed by the nozzles.

To optimize the sensor measuring capacity it might be also useful to move the sensor position forward (always in relation to the travel direction) and / or increase their height with respect to the nozzle outlet.

ALWAYS avoid the range of action of the sensor to superimpose the spraying cone.

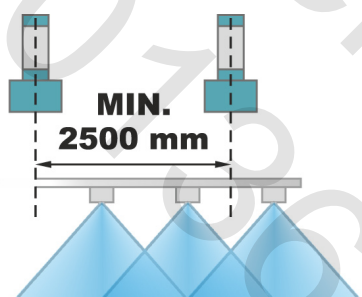


Fig. 10

• Minimum distance between the sensors

If the sensors are too close to one another ultrasound superimpositions may occur causing system errors: **respect the minimum distance of 2.5 m.**



It is the installer responsibility to check that the measurements detected by the sensors are correct and to avoid possible interferences with the cone outlet of the liquid sprayed by the nozzles.

8 WIRING CONNECTIONS



- Use original ARAG harnesses only.
- 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 any damage to the equipment, persons or animals caused by failure to observe the above instructions.

8.1 General precautions for a correct harness position

- **Securing the cables:**
 - secure the harness so that it does not interfere with moving parts;
 - route the harnesses so that they cannot be damaged or broken by machine movements or twisting.
- **Routing the cables to protect against water infiltrations:**
 - the cable branches must ALWAYS be facing down.
- **Fitting the cables to the connection points:**
 - Do not force the connectors by pushing too hard or bending them: the contacts may be damaged and system operation may be compromised.



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

8.2 IBX100 HYDRAULIC harness connection

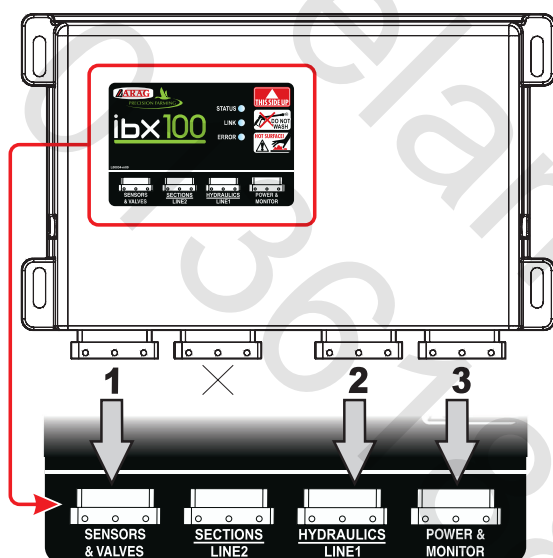


Fig. 11

NUM	CONNECTION POINTS
1	Ultrasonic sensors (boom leveling)
2	Hydraulic unit
3	VT / IBX100 Sprayer ISOBUS

8.3 Ultrasonic sensors connection (boom leveling)

CONNECTOR	CONNECTION
US1 ÷ US4	Ultrasonic sensor 1 ÷ 4
US5	NOT CONNECTED
AUX	NOT CONNECTED

REF. CABLE 1 - Fig. 2 on page 5

Close the unused connectors with the relevant caps supplied in the package.

9 REQUEST OF THE BLC FUNCTION ACTIVATION CODE

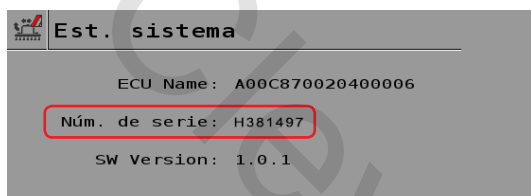
9.1 Menu > System status > Registration license

To activate the BLC function on the control unit, AN ACTIVATION CODE IS REQUIRED.

Ask the code to ARAG, by providing the following information:

- purchase identification code received with the kit.
- hydraulic control unit serial number ("SERIAL NO." label on control unit rear side) that can be viewed also from the Device status menu of the monitor in the example:

Menu > System status



9.1.1 Activation procedure

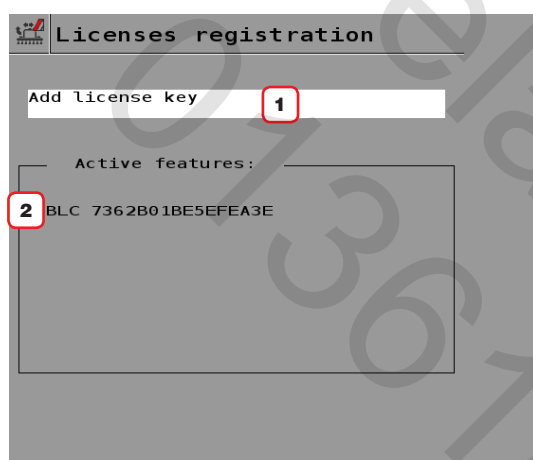


Fig. 12

1 Enter the supplied code and confirm.

The IBX100 will restart.

- Once finished, the activated function will be displayed by the system.
- Now the control unit is active: monitor shows all the menus for BLC control setup and use

2 Active functions.

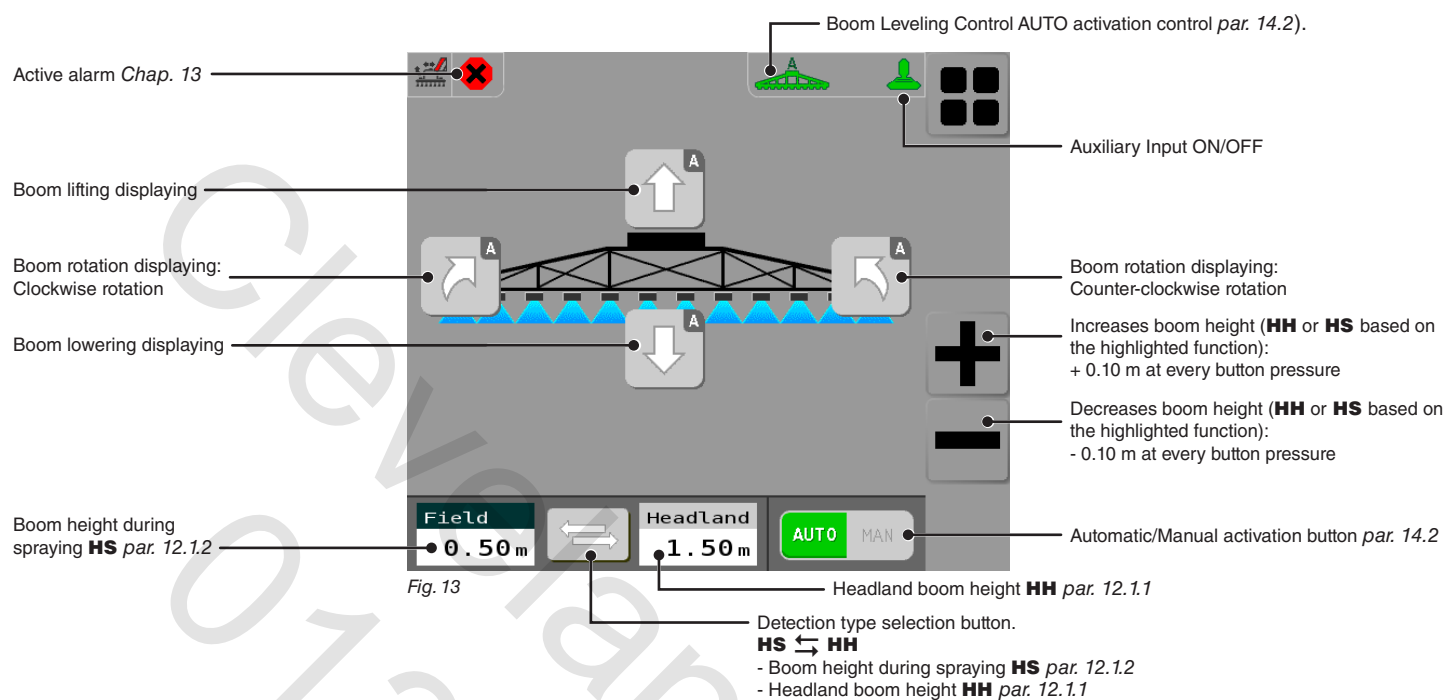


WARNING

AFTER CONTROL UNIT ACTIVATION, PROGRAM THE NECESSARY PARAMETERS (par. 10.2 and 10.3, shown in Fig. 15).

10 HOME

The main screen varies based on the active functions.



11 CONTROL LAYOUT

Goes to menu screen



Goes back by one screen



Goes back to HOME



Goes to the following page



Goes back to the previous page

ENTERING A NUMERICAL VALUE

Icons are given as a reference as they can vary depending on the *Virtual Terminal* used:



Deletes



Exits



Confirms



Before system setup, check:

- that all components are correctly installed;
- the correct connection to the power source;
- the component connection.



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

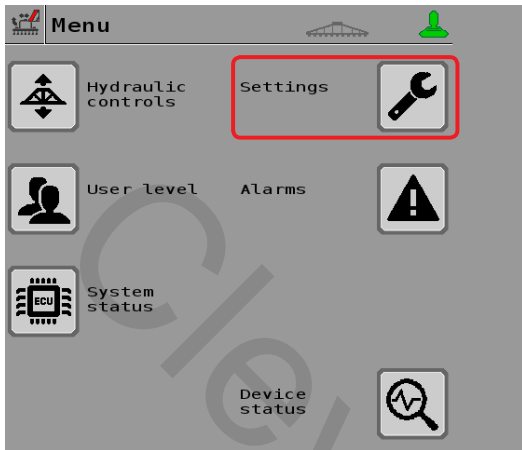


Upon first switching on, enter the device basic settings.



ONCE ALL MODIFICATIONS HAVE BEEN COMPLETED, UPON QUITTING THE CURRENT PAGE, THE SYSTEM WILL PERFORM AN AUTOMATIC SAVING

12 MENU > SETTINGS



Allows setting the BLC parameters

Fig. 14

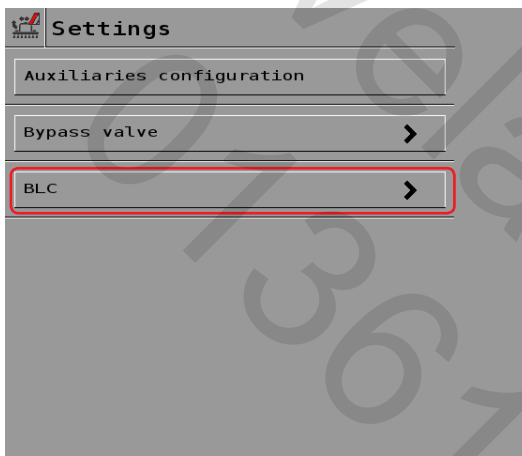


Fig. 15

CONTINUES >>>

12.1 Menu > Settings > BLC

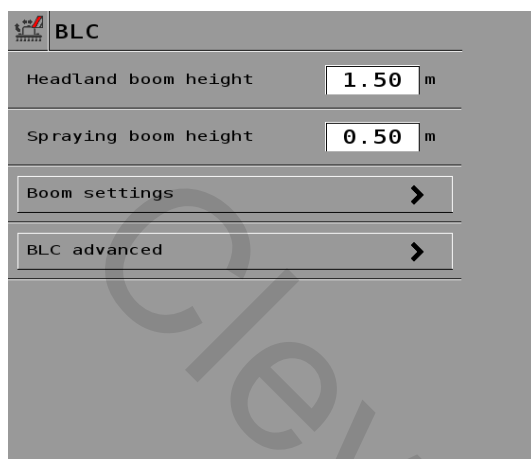


Fig. 16

Allows accessing the BLC setup pages.

12.1.1 Menu > Settings > BLC > Headland boom height (HH)

Distance between the boom and the crop in presence of obstacles or during tractor maneuvering phases. We will call these areas "HEADLAND". Activating the AUTOMATIC control (**AUTO** par. 15.4), the BLC system will carry out the corrections required to take the boom at this height, **BUT ONLY AFTER A SPECIFIC COMMAND BY THE OPERATOR**, which is preset in the Auxiliary Input or through VT (par. 14.2).



By editing the height values during the AUTO control, THE SYSTEM ACTIVATES THE MANUAL CONTROL for safety reasons. Once the modifications have been completed, re-activate the AUTO control (par. 15.4).

12.1.2 Menu > Settings > BLC > Spraying boom height (HS)

Distance between the boom and the crop DURING SPRAYING. Activating the AUTOMATIC control (**AUTO** par. 15.4), the BLC system will carry out the corrections required to keep the boom at this height.



By editing the height values during the AUTO control, THE SYSTEM ACTIVATES THE MANUAL CONTROL for safety reasons. Once the modifications have been completed, re-activate the AUTO control (par. 15.4).

12.1.3 Menu > Settings > BLC > Boom settings

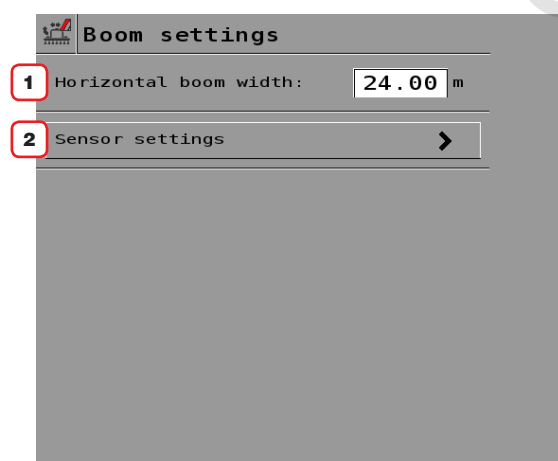


Fig. 17

1 Enter boom length value.

2 It allows enabling the number of sensors present inside the system installed on the farming machine (par. 12.1.4).

CONTINUES >>>

SYSTEM WITH 2 SENSORS



Fig. 18

Sensor settings		1/3
Sensor 1 enable:	<input checked="" type="checkbox"/>	
Sensor 2 enable:	<input checked="" type="checkbox"/>	
Sensor 3 enable:	<input type="checkbox"/>	
Sensor 4 enable:	<input type="checkbox"/>	

Fig. 19

EXTERNAL SENSORS

Sensor settings		2/3
External sensor posit. x1	-10.00 m	
External sensor posit. y1	0.10 m	
External sensor posit. x2	10.00 m	
External sensor posit. y2	0.10 m	

Fig. 20

Number of sensors: 2 (US1 + US2).
Number of ultrasonic sensors used by the BLC control.

External sensor posit. x1: indicates the distance between center **C** (point zero) and **US1** sensor. **The value must be negative** (Fig. 21).

External sensor posit. y1: indicates the **LV** distance between the sensitive surface of sensor **US1** and the outlet of the nozzles (Fig. 22). **The sensitive surface must be positioned ALWAYS HIGHER than the outlet (LV > 0 mm).**

External sensor posit. x2: indicates the distance between center **C** (point zero) and **US2** sensor. **The value must be positive** (Fig. 21).

External sensor posit. y2: indicates the **LV** distance between the sensitive surface of sensor **US2** and the outlet of the nozzles (Fig. 22). **The sensitive surface must be positioned ALWAYS HIGHER than the outlet (LV > 0 mm).**

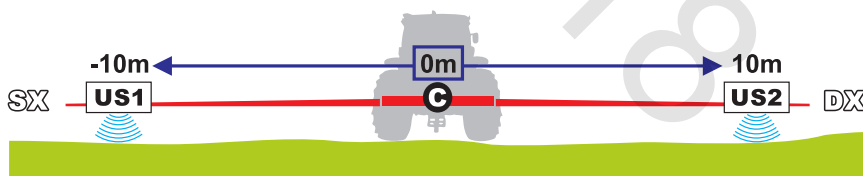


Fig. 21

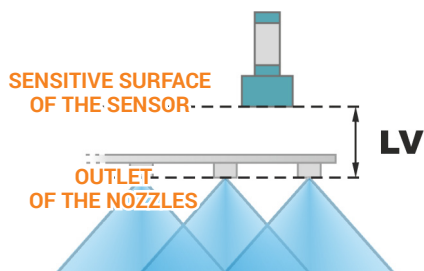


Fig. 22

SYSTEM WITH 4 SENSORS



Fig. 23

Sensor settings		1/3
Sensor 1 enable:	<input checked="" type="checkbox"/>	
Sensor 2 enable:	<input checked="" type="checkbox"/>	
Sensor 3 enable:	<input checked="" type="checkbox"/>	
Sensor 4 enable:	<input checked="" type="checkbox"/>	

Fig. 24

Number of sensors: 4 (US1 + US2 and US3 + US4).
Number of ultrasonic sensors used by the BLC control.

EXTERNAL SENSORS		Sensor settings	2/3
External sensor posit. x1	-10.00	m	
External sensor posit. y1	0.10	m	
External sensor posit. x2	10.00	m	
External sensor posit. y2	0.10	m	

Fig. 25

INTERNAL SENSORS		Sensor settings	3/3
Internal sensor posit. x3	-5.00	m	
Internal sensor posit. y3	0.10	m	
Internal sensor posit. x4	5.00	m	
Internal sensor posit. y4	0.10	m	

Fig. 26

EXTERNAL SENSORS - Sensor settings 2/3

See previous page.

INTERNAL SENSORS - Sensor settings 3/3

Internal sensor posit. x3: indicates the distance between center **C** (point zero) and **US3** sensor. **The value must be negative** (Fig. 21).

Internal sensor posit. y3: indicates the **LV** distance between the sensitive surface of sensor **US3** and the outlet of the nozzles (Fig. 22). **The sensitive surface must be positioned ALWAYS HIGHER than the outlet (LV > 0 mm).**

Internal sensor posit. x4: indicates the distance between center **C** (point zero) and **US4** sensor. **The value must be positive** (Fig. 21).

Internal sensor posit. y4: indicates the **LV** distance between the sensitive surface of sensor **US4** and the outlet of the nozzles (Fig. 22). **The sensitive surface must be positioned ALWAYS HIGHER than the outlet (LV > 0 mm).**

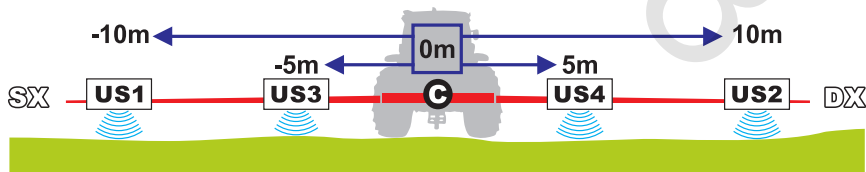


Fig. 27

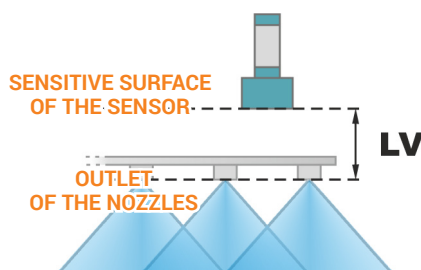
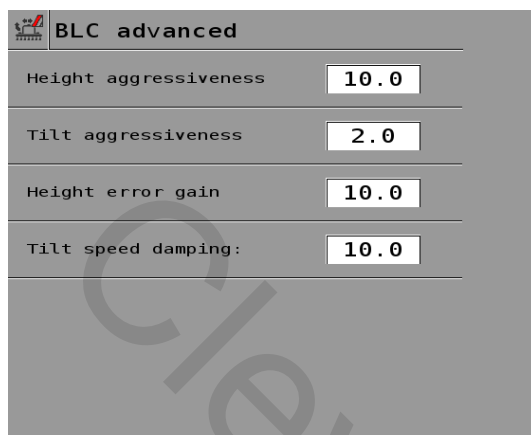


Fig. 28

12.1.5 Menu > Settings > BLC > BLC advanced



BLC advanced	
Height aggressiveness	10.0
Tilt aggressiveness	2.0
Height error gain	10.0
Tilt speed damping:	10.0

Fig. 29

This menu allows entering the boom dynamic characteristics.

All parameters are explained in detail in the following pages.



The values must be detected directly on the machine because strictly linked to the hydraulic / mechanical system of the machine.

DURING MEASURING PROCEDURES, MOVE THE BOOM ALONG THE MAXIMUM ALLOWABLE DISTANCE, COMPATIBLY WITH THE MACHINE MECHANICAL CHARACTERISTICS AND DIMENSIONS.

Height aggressiveness - BOOM HEIGHT CONTROL AGGRESSIVENESS

It adjusts the power applied by the BLC control to lift / lower the boom.

The easiest way to adjust the aggressiveness value is to check for the presence of swingings during boom movement - from maximum to minimum height. Too high or too low values make the control unstable and cause vibrations; adjust the aggressiveness value until reaching a smooth implement control without jerks.

Carry out this procedure with the BOOM COMPLETELY OPEN:

- 1 Check that the boom is perfectly horizontal to the ground.
- 2 Set the spraying height to the minimum value (**Spraying boom height** menu, par. 12.1.2 on page 14).
- 3 Bring the rotation speed of the power take-off to the typical operating value.
- 4 Disable the BLC control: activate the MANUAL mode (par. 14.2).
- 5 Set an aggressiveness value (Fig. 29).
- 6 Bring the boom to the maximum height (activate the lifting switch on the hydraulic control panel / VT / Joystick).
- 7 Enable the BLC control: activate the AUTOMATIC mode (par. 14.2).

The boom will move automatically to reach the spraying height:

- If boom movement is too slow and with jerks, the aggressiveness level is too **low**.

Repeat the procedure from point 4, increasing the value.

- If the boom moves too quickly and swinging the aggressiveness level is too **high**.

As before, **repeat the procedure from point 4**, decreasing the value.

The ideal adjustment is obtained when boom movement is smooth, without jerks.

CONTINUES >>>



The values must be detected directly on the machine because strictly linked to the hydraulic / mechanical system of the machine.
DURING MEASURING PROCEDURES, MOVE THE BOOM ALONG THE MAXIMUM ALLOWABLE DISTANCE, COMPATIBLY WITH THE MACHINE MECHANICAL CHARACTERISTICS AND DIMENSIONS.

Tilt aggressiveness - BOOM LEVELING CONTROL AGGRESSIVENESS

It adjusts the power applied by the BLC control to rotate the boom.

The easiest way to adjust the aggressiveness value is to check for swingings during boom rotation.

Too high or too low values make the control unstable and cause vibrations; adjust the aggressiveness value until reaching a smooth implement control without jerks.

Carry out this procedure with the BOOM COMPLETELY OPEN:

- 1 Set the boom rotation center **C** to maximum height.
- 2 Bring the rotation speed of the power take-off to the typical operating value.
- 3 Disable the BLC control: activate the MANUAL mode (par. 14.2).
- 4 Set an aggressiveness value (Fig. 29).
- 5 Bring the boom LH end to the minimum height (activate the lifting switch on the hydraulic control panel / VT / Joystick).
- 6 Enable the BLC control: activate the AUTOMATIC mode (par. 14.2).

The boom will rotate automatically to reach the horizontal position:

- If boom movement is too slow and with jerks, the aggressiveness level is too **low**.

Repeat the procedure from point 3, increasing the value.

- If the boom moves too quickly and swinging the aggressiveness level is too **high**.

As before, **repeat the procedure from point 3**, decreasing the value.

The ideal adjustment is obtained when boom movement is smooth, without jerks.



The Tilt aggressiveness parameter works in combination with the following Tilt speed damping parameter: if aggressiveness setup is not as desired, increase the gain and repeat the adjustment.

Height error gain - PROPORTIONAL GAIN ON BOOM HEIGHT CONTROL

This parameter works in combination with the aggressiveness of the boom height control.

It reduces the error between the set spraying height and the one effectively reached with the BLC system.

Before entering the gain factor, set the aggressiveness (menu Height aggressiveness par. 12.1.5 on page 17).

The easiest way to determine the value is to check the boom height after the BLC system has completed the correction; adjust the gain, if necessary.

Carry out this procedure with the BOOM COMPLETELY OPEN:

- 1 Check that the boom is perfectly horizontal to the ground.
- 2 Set the spraying height to the minimum value (**Spraying boom height** menu, par. 12.1.2 on page 14).
- 3 Bring the rotation speed of the power take-off to the typical operating value.
- 4 Disable the BLC control: activate the MANUAL mode (par. 14.2).
- 5 Bring the boom to the maximum height (activate the lifting switch on the hydraulic control panel / VT / Joystick).
- 6 Set a gain value (Fig. 29).
- 7 Enable the BLC control: activate the AUTOMATIC mode (par. 14.2).

The boom will move automatically to reach the spraying height.

Check the height reached:

- If the boom has exceeded the set height, **repeat the procedure from point 4**, decreasing the value.
- If the boom has not reached the set height, **repeat the procedure from point 4**, increasing the value.

Now, if the boom lifting control exceeds the set height, lower the aggressiveness and repeat the procedure relevant to the gain.

Tilt speed damping: - DAMPING ON BOOM ROTATION CONTROL

This parameter works in combination with the aggressiveness of the boom leveling control.

It allows the BLC system to rotate the boom without swingings or position errors.

Before entering the damping factor, set the aggressiveness (menu Tilt aggressiveness Fig. 29):

if the setup of Tilt aggressiveness is not carried out properly increase the value (Fig. 29).

13 MENU > ALARMS

This screen summarizes the alarm notifications active for the operators.

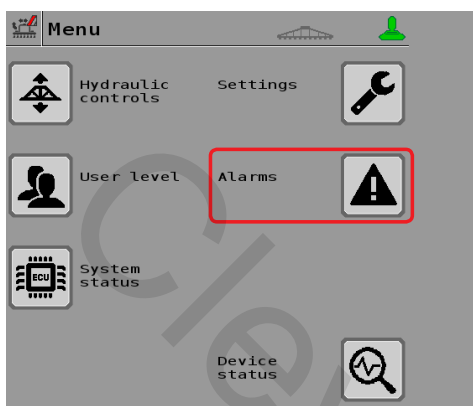


Fig. 30

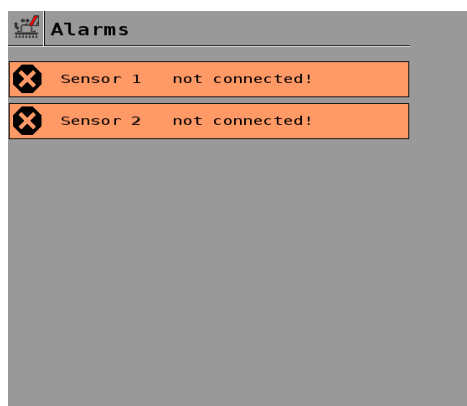


Fig. 31



For the procedure to be followed when an alarm occurs, please refer to par. 16.1.

14 MENU > DEVICE STATUS

This screen shows the status of the set and installed sensors.
The display will show the current sensor reading.



Fig. 32

Device status		
Sen. 1 distance	0.01 mA	0.00 m
Sen. 2 distance	0.00 mA	0.00 m
Sen. 3 distance	0.00 mA	0.00 m
Sen. 4 distance	0.00 mA	0.00 m

Fig. 33

15 USE

15.1 BLC - OPERATION

15.2 Fixed geometry

The BLC control considers the boom as a single body: it is then a **fixed geometry** control as the division at boom section is negligible. **The boom must be COMPLETELY open.**

To keep the boom in the desired position, the BLC control performs two types of independent corrections at the same time:

• Boom leveling

The boom rotates with respect to the center (**C** in Fig. 34) of the mechanical arm, leveling the inclination with respect to the crop.

1 Counter-clockwise rotation (orange - **CCW**),

2 Clockwise rotation (yellow - **CW**),

• Boom height control

The boom moves vertically controlling the height ($\uparrow L$, $\uparrow C$ and $\uparrow R$ in Fig. 34) with respect to the crop.

3 Lifting (blue - **UP**)

4 Lowering (light blue - **DOWN**),

The ultrasonic sensors (**US1÷US4** in Fig. 34) installed on the boom provide the data required for the correction, determining the distances

$\uparrow L$ / $\uparrow C$ / $\uparrow R$ from boom to crop.

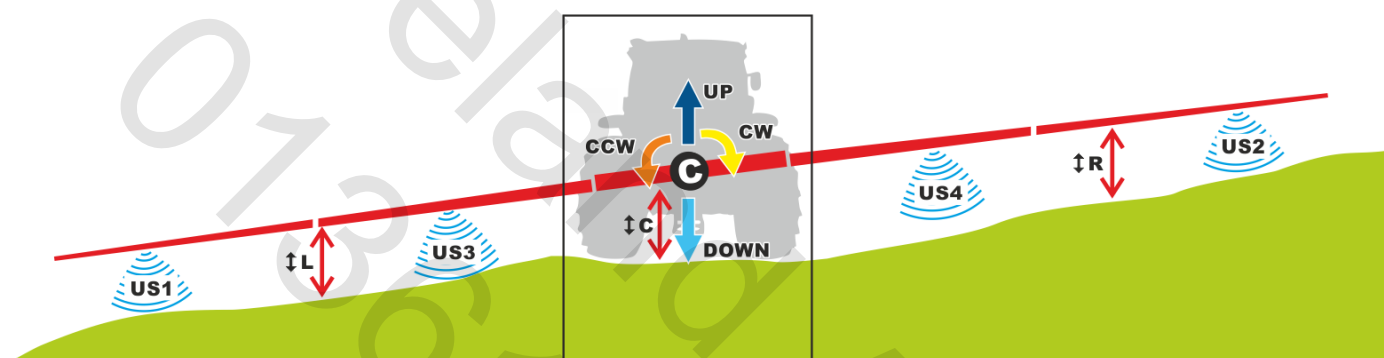


Fig. 34



WARNING

• Ultrasonic sensors do not distinguish between crop and soil as they detect the first object encountered. Boom height is the distance between the arm and the crop (when present).

• The boom, during leveling, rotates with respect to the boom instantaneous center of rotation (**C POINT**).

15.3 Hydraulic control

Thanks to the IBX100 hydraulic control unit the BLC control automatically activates:

- the leveling and boom height control hydraulic functions
- system hydraulic drain valve (pilot valve)

Check that the hydraulic system and the valves are connected to the IBX100 hydraulic control unit.



WARNING: DURING AUTOMATIC LEVELING, THE SYSTEM ACTIVATES THE PILOT VALVE, HENCE THE HYDRAULIC CIRCUIT IS PRESSURIZED.

OTHER HYDRAULIC FUNCTIONS (MOVEMENTS, DRIVES, ETC...) CONNECTED TO THE SAME SYSTEM CAN BE ACTIVATED BY SENDING THE CONTROL ONLY TO THE SUITABLE VALVE, SINCE THE PILOT VALVE IS ALREADY ACTIVATED BY THE BLC. MAKE SURE THAT THIS DOES NOT JEOPARDIZE MACHINE SAFETY.

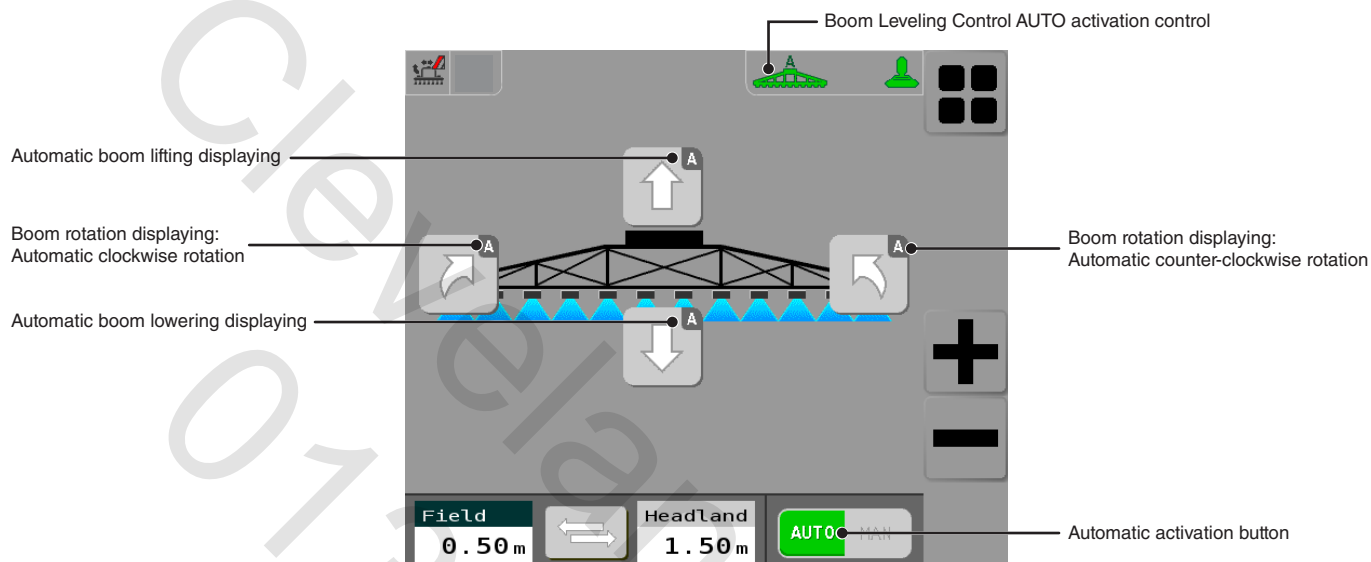
14.1 Start-up

Before starting the BLC system, set the working and headland heights, described in *par. 12.1 Menu > Settings > BLC on page 14.*

- To activate the BLC control, set the control mode to AUTOMATIC (AUTO).
- To deactivate the BLC control, set the control mode to MANUAL (MAN).

14.2 AUTOMATIC and MANUAL mode

- To activate the BLC control, set the control mode to AUTOMATIC A (press **AUTO** to activate it).



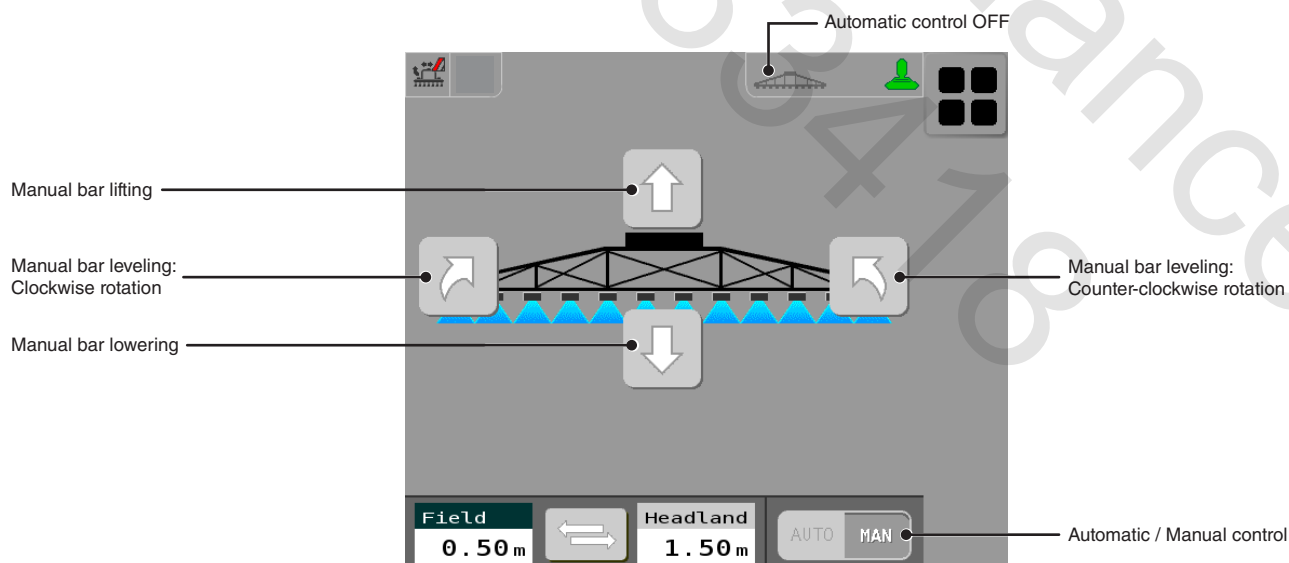
If necessary, during spraying, in automatic mode **AUTO** ONLY, it is possible to press buttons **+** and **-** to achieve a real-time variation of the **HH** or **HS** values based on the selected function.

This variation **DOES NOT EDIT THE VALUES ENTERED IN THE MENU > SETTINGS > BLC** (par. 12.1.1 - 12.1.2)

Use the joystick to activate the automatic **AUTO/MAN** manual mode by pressing the button this function has been assigned to



- To deactivate the BLC control, set the control mode to MANUAL M (press **MAN** to activate it).



15.4 Automatic control AUTO

In this mode, the BLC control **AUTOMATICALLY ACTIVATES** the hydraulic valves duly adjusting the height and tilting of the spraying boom.

When the BLC system works in automatic mode, the IBX100 hydraulic unit:

- calculates the optimal spraying height **HS** (*distance between nozzle outlet and crop*);
- activates the boom correction functions, adjusting rotation angle and height;
- tries to reach the set height **HS** and orientation within a specified tolerance.

HEADLAND DETECTION

The headland will be detected through VT, Joystick, Switch panel, to manage spraying height **HS** and headland height **HH**, by performing the suitable corrections.

Control types:

- HEADLAND DETECTION THROUGH VT:

Button 1

Press button **1** to shift from **Field** to **Headland** mode.

Press button **1** again to shift from **Headland** to **Field** mode.

In **Headland mode (2)**, the IBX100 unit moves the boom to the headland height **HH** (*par. 12.1.1*).

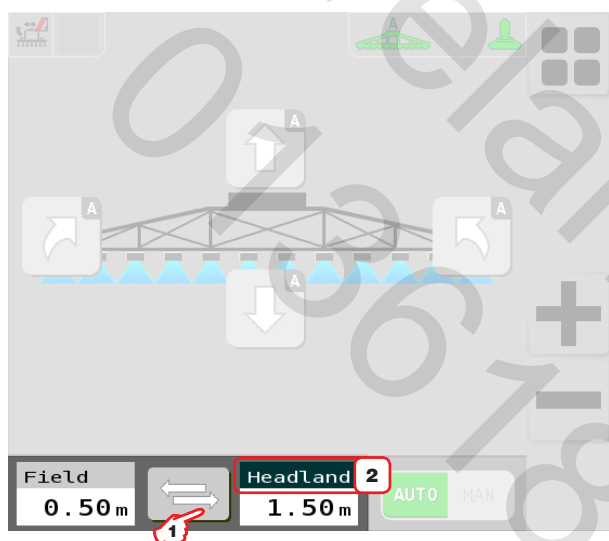


Fig. 35

In **Field mode (3)**, the IBX100 unit moves the boom to the set spraying height **HS** (*par. 12.1.2*).

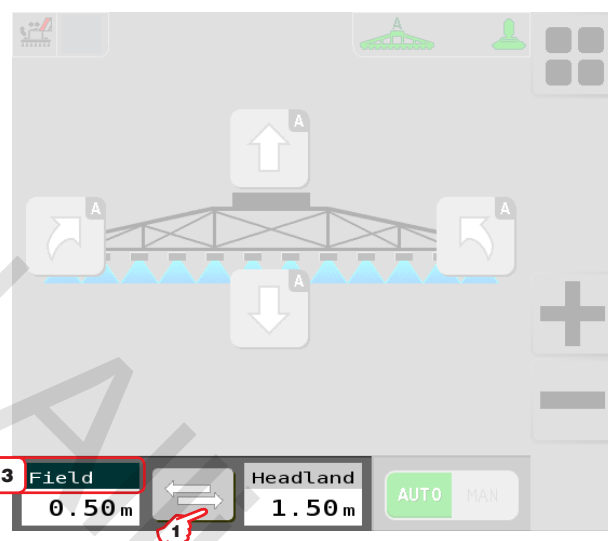


Fig. 36

- HEADLAND DETECTION THROUGH THE "HEIGHT" SWITCH OF THE SWITCH PANEL:

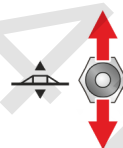
Headland control provided by the boom lifting switch (pre-existing control panel), as follows:

• SHORT PRESS OF THE "HEIGHT" SWITCH (UP)

The IBX100 unit moves the boom to the headland height **HH**.

• SHORT PRESS OF THE "HEIGHT" SWITCH (DOWN):

The IBX100 unit moves the boom to the set spraying height **HS**.



- HEADLAND DETECTION THROUGH JOYSTICK:

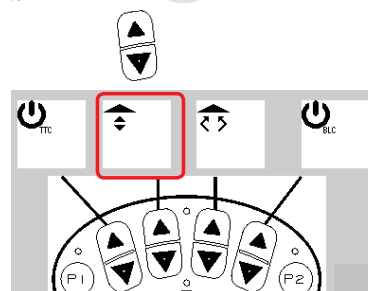
Headland control given by the button the boom height function has been assigned to:

• SHORT PRESS OF THE "HEIGHT" SWITCH (UP)

The IBX100 unit moves the boom to the headland height **HH**.

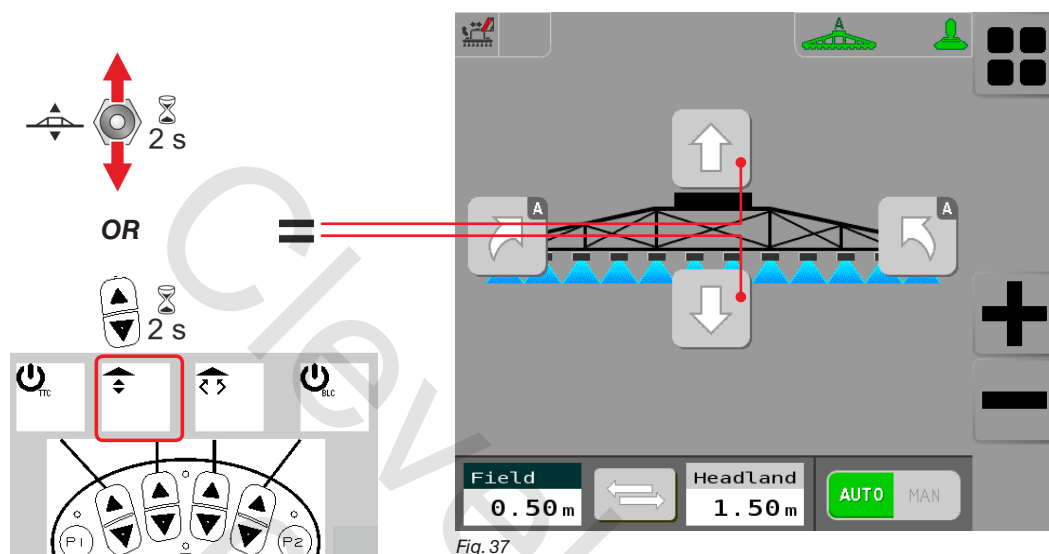
• SHORT PRESS OF THE "HEIGHT" SWITCH (DOWN):

The IBX100 unit moves the boom to the set spraying height **HS**.

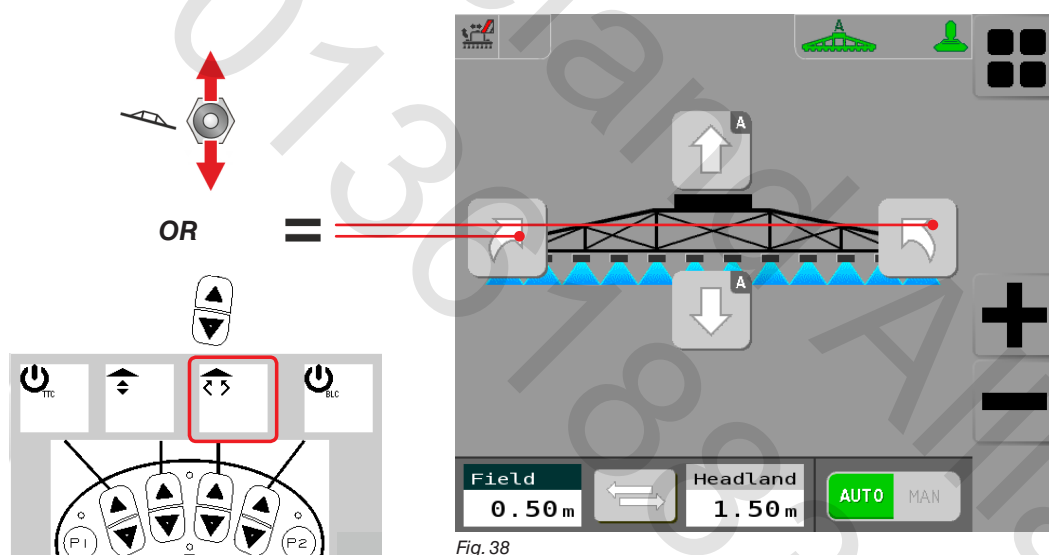


15.5 Semi-automatic mode

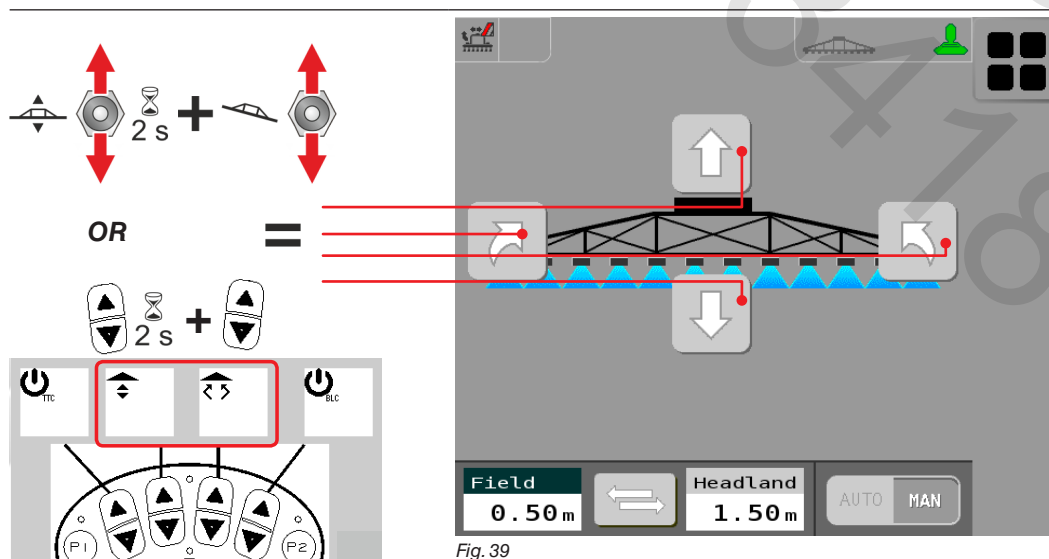
Once the BLC function is in AUTO mode, the boom height and tilt control can be manually managed by the control panel, independently of each other.



- If the operator keeps the switch controlling **boom height** pressed for approximately 2 seconds, this movement (ONLY) becomes MANUAL.



- If the operator presses the switch controlling **leveling**, this movement (ONLY) becomes MANUAL.



- If the operator presses **both** switches (one after the other), the SYSTEM shifts to MANUAL mode. The MANUAL movement is active until a new automatic enabling is provided.

15.6 Manual control M

In this mode, the BLC control **DOES NOT PERFORM ANY ADJUSTMENT.**

The hydraulic valves are activated by the operator with the connected control panel, VT or Joystick.

16 MAINTENANCE / DIAGNOSTICS / REPAIRS

16.1 Error messages / Troubleshooting

Error Displayed / Detected during operation	LED status	Number of blinks	Cause	Remedy
The BLC item is not present inside the settings menu	---	---	The BLC activation license key has not been entered	Request the release code (see par. "9.1.1 Activation procedure" on page 10)
Sensor 1 not connected! Sensor 2 not connected! Sensor 3 not connected! Sensor 4 not connected!	Red Blinking	8	The ultrasonic sensors are not connected	Check connections on the relevant connecting cable
			The sensor connecting harnesses are damaged	Replace the cable
			Wrong setup	Make sure that the correct number of sensors has been programmed
Sensor 1 out of range! Sensor 2 out of range! Sensor 3 out of range! Sensor 4 out of range!	Red Blinking	8	The measured current value (mA) is outside the set operating limits. Possible sensor fault	Replace the sensor
"Boom performance is too fast or too slow when moving up and/or down"	---	---	Setting of Height aggressiveness values. Wrong height error gain	Adjust the "Height aggressiveness" parameter (par. 12.1.5 on page 17)
			Poor hydraulic circuit performance	Adjust the "Height error gain" parameter (par. 12.1.5 on page 17)
Boom rotation performance is too fast or too slow	---	---	Setting of Tilt aggressiveness values. Wrong Tilt speed damping	If, after adjusting the above-listed parameters, the boom is too fast/slow, contact the machine manufacturer to make boom more or less reactive
			Poor hydraulic circuit performance	Adjust the "Tilt aggressiveness" parameter (par. 12.1.5 on page 17)
				Adjust the "Tilt speed damping" parameter (par. 12.1.5 on page 17)
				If, after adjusting the above-listed parameters, boom rotation is too fast/slow, contact the machine manufacturer to make boom more or less reactive

16.2 Data and units of measurement shown Setup menu

Menu	Data		Min.	Max.	UOM	DEFAULT
Settings > BLC	Headland boom height		0.20	5.00	m	1.50
	Spraying boom height		0.20	5.00	m	0.50
	Boom settings	Horizontal boom size	0.00	100.00	m	24.00
		Enable sensors 1	--	--	--	X
		Enable sensors 2	--	--	--	X
		Enable sensors 3	--	--	--	-
		Enable sensors 4	--	--	--	-
		Pos. Sens. External x1	-100.00	100.00	m	-10.00
		Pos. Sens. External y1	-100.00	100.00	m	0.00
		Pos. Sens. External x2	-100.00	100.00	m	10.00
		Pos. Sens. External y2	-100.00	100.00	m	0.00
		Pos. Sens. Internal x3	-100.00	100.00	m	0.00
		Pos. Sens. Internal y3	-100.00	100.00	m	0.00
		Pos. Sens. Internal x4	-100.00	100.00	m	0.00
		Pos. Sens. Internal y4	-100.00	100.00	m	0.00
	BLC advanced	Height aggressiveness	0.0	100.0	m	10.0
		Tilt aggressiveness	0.0	100.0	m	2.0
		Height error gain	0.1	9999.0	m	10.0
		Tilt Speed Damping	0.0	9999.0	m	10.0

17 TECHNICAL DATA

ULTRASONIC SENSORS P&F UC4000-L2-I-V15

Power supply voltage	10 ÷ 16 Vdc
Operating temperature	-25 °C ÷ +70 °C -13 °F ÷ +158 °F
Storage temperature	-40 °C ÷ +85 °C -40 °F ÷ +185 °F
Weight (without cables)	120 g
Output signal	4 ÷ 20 mA
Measurement distance	200 ÷ 4000 mm
Protection rating	IP67
Connector	M12x1, fpm, 5-pole

18 END-OF-LIFE DISPOSAL

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

19 GUARANTEE TERMS

1. ARAG s.r.l. guarantees this apparatus for a period of 360 days (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 Center 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 Center.
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 unauthorized 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 organizational needs of the Assistance Center.
No guarantee conditions will be recognized 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 recognize any further expressed or intended guarantees, apart from those listed here.
No representative or retailer is authorized to take on any other responsibility relative to ARAG products.
The period of the guarantees recognized 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 recognize 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.

20 EU DECLARATION OF CONFORMITY

The declaration of conformity is available at the website www.aragnet.com, in the relevant section.

Only use genuine ARAG accessories or spare parts to make sure manufacturer guaranteed safety conditions are maintained in time. Always refer to the internet address www.aragnet.com.

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