





**TTC** embedded

**DRAW BAR / STEERING AXLE MANAGEMENT KIT**

**CE**

**4679003.602**

**INSTALLATION**

	= Generic danger
	= Warning
<b>TTC</b>	= Axle / draw bar control system
<b>ECU</b>	= IBX100 remote control unit

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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.**

## • 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.

## 1 RISKS AND PROTECTIONS

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



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

**KEEP AT A SAFE DISTANCE FROM THE STEERING SYSTEM / IMPLEMENT WHILE THE TTC CONTROL SYSTEM IS IN OPERATION.**

**ENSURE THE TTC CONTROL IS DISABLED BEFORE CARRYING OUT ANY MAINTENANCE / OPERATION ON THE STEERING SYSTEM OR IMPLEMENT.**

**MECHANICALLY LOCK THE STEERING MECHANISM USING THE RELEVANT PIN, AND ENSURE THE TTC CONTROL IS DEACTIVATED BEFORE TRAVELING ON PUBLIC ROADS.**

## 2 PRODUCT DESCRIPTION

The system to control the draw bar / axle (TTC) through the dedicated control unit - IBX100 hydraulic control unit - allows the Bravo 400S and Delta 80 monitors to manage the towed implement following the steering direction of the tractor and steer the wheels of the trailer to precisely follow the tracks of the tractor and minimize damage to the crop.

The TTC control function is available from the following software versions:

- V3.1.0 of Delta 80 and Bravo 400S monitors;
- V2.0.0 of IBX100 hydraulic control unit.
- V3.0.0 of Sprayer ECU IBX100.

Since the TTC control is a hydraulic function of the machine, a hydraulic control unit IBX100 will be necessary.

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

If this is not the case, order an IBX100 hydraulic control unit, and the relevant connection cable, separately.

To enable the IBX100 hydraulic control unit for use request the activation code to ARAG (*Activation procedure on page 8*).

## 3 INTENDED USE

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

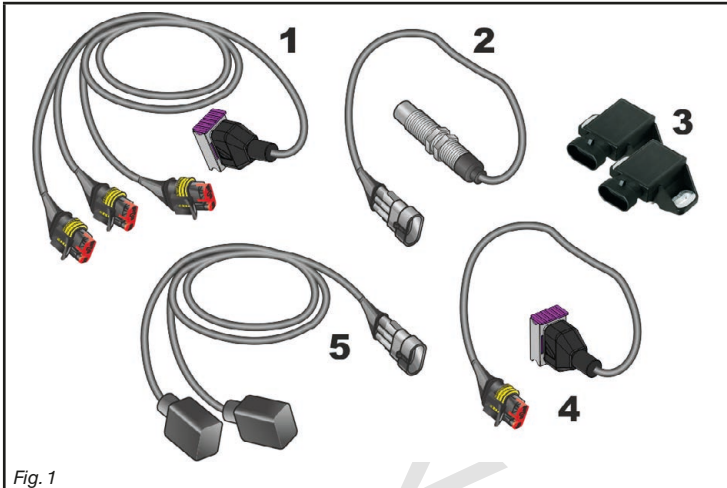
**The machine is designed and built in compliance with ISO 14982 standard (Electromagnetic compatibility - Forestry and farming machines), harmonized with 2004/108/EC Directive.**

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

**5 PACKAGE CONTENT**



- 1 Connection cable for sensors
- 2 Inductive sensor (no. 1)
- 3 Angular sensors (no. 2)
- 4 Extension for hydraulic valves - 5 m
- 5 Hydraulic valve connection cable
- 6 Instruction manual (DVD-ROM)
- 7 Purchase certification code

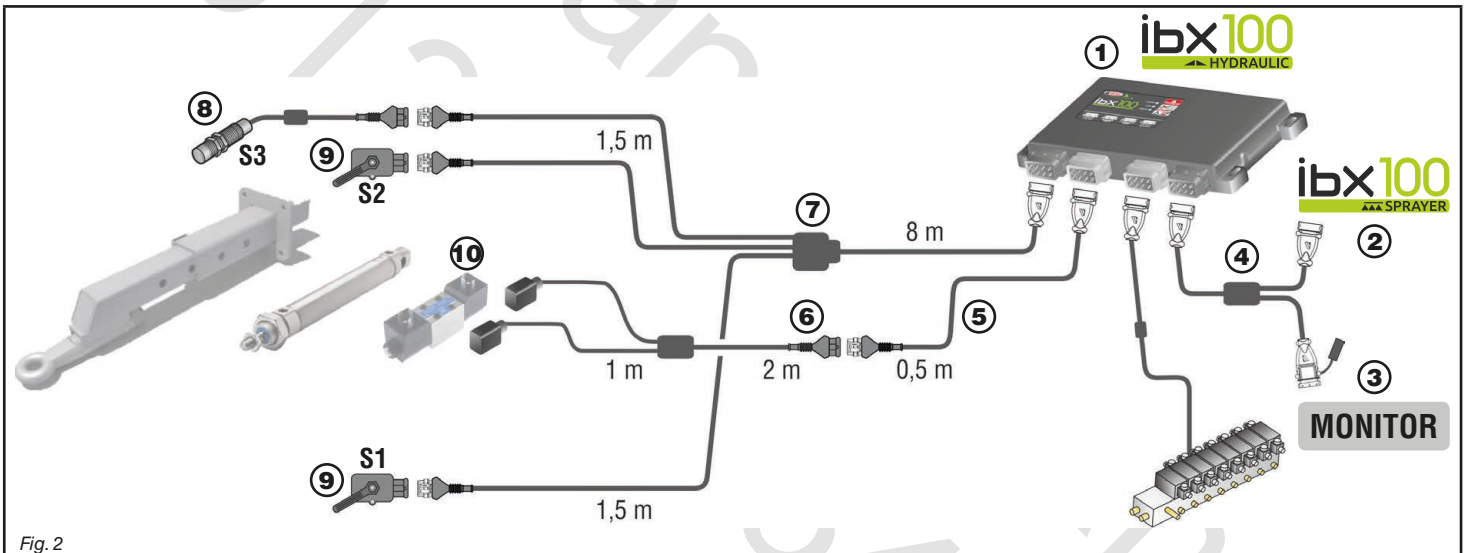
**THE FOLLOWING MUST BE PURCHASED SEPARATELY:**

- IBX100 hydraulic unit
- connection cable for Sprayer IBX100
- hydraulic valves

 The kit supplied enables the TTC 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**



**Legend:**

- 1 IBX100 hydraulic control unit
- 2 IBX100 sprayer control unit
- 3 Monitor
- 4 IBX100 hydraulic unit / IBX100 Sprayer / Monitor connection cable
- 5 Extension for hydraulic valve connection
- 6 Hydraulic valve connection cable
- 7 Connection cable for sensors
- 8 Inductive sensor **S3** for mechanical safety lock detection (ON / OFF)
- 9 Angular sensors to measure the steering angle of the tractor (**S1**) and the steering draw bar / axle direction (**S2**).
- 10 Steering hydraulic valves

**7 INSTALLATION OF ANGULAR SENSORS S1 AND S2**



It is the installer responsibility to check that all indications described are complied with. The images relevant to sensors are purely indicative.

The supplied angular sensors are used to measure both the steering angle of the tractor (**S1**) and the steering draw bar / axle direction (**S2**).

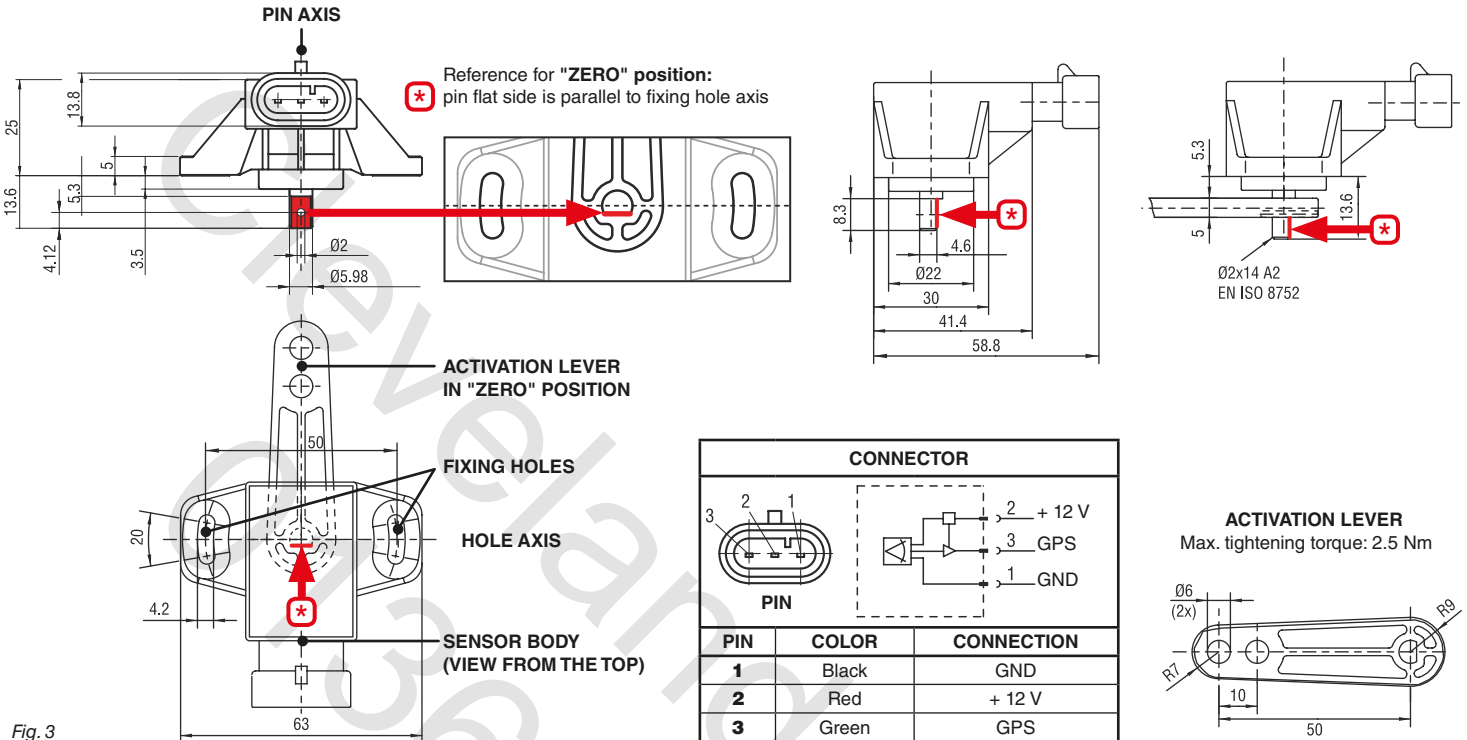


Fig. 3

The activation lever can be mounted on the sensor pin in two ways, opposite to the pin flat side (Fig. 3).

It can also be replaced by a custom lever supplied by the implement manufacturer, with technical features linked to the mechanical geometry of the steering.



In both cases, it is necessary to adopt some installation precautions:

- Damp the lever activation system to avoid any mechanical stress on the sensor pin.
- Cover the pin rotation area with a protection guard to avoid dirt or external material to block pin rotation.
- Lock the sensor body on the equipment structure to avoid variations on the sensor signal output interval. Use the two fixing holes: maximum tightening torque is 2.5 Nm, with Ø10 mm washers.
- Clean only with a soft wet cloth.
- Do not use aggressive detergents or products.
- Do not clean equipment with direct water jets.

**WARNING**

It is the manufacturer's responsibility to avoid, as much as possible, stresses on sensor pin to avoid damaging the sensor and giving rise to dangerous malfunctions of the TTC control.

The sensor output signal considered as preset by the IBX100 hydraulic control unit has the following characteristics:

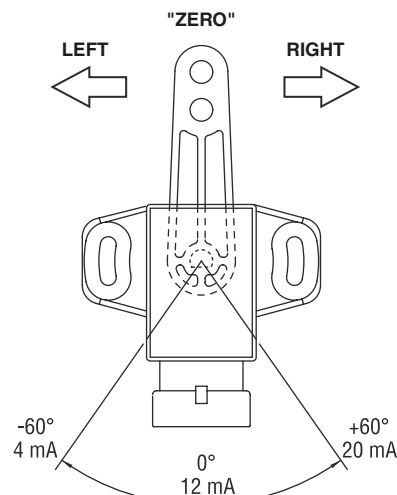


Fig. 4

## 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 catalog, having technical features suitable for the use to be made of them.**

013361883418  
Cleveland Alliances

8.2 Wiring harness connection

**IBX100 HYDRAULIC UNIT**

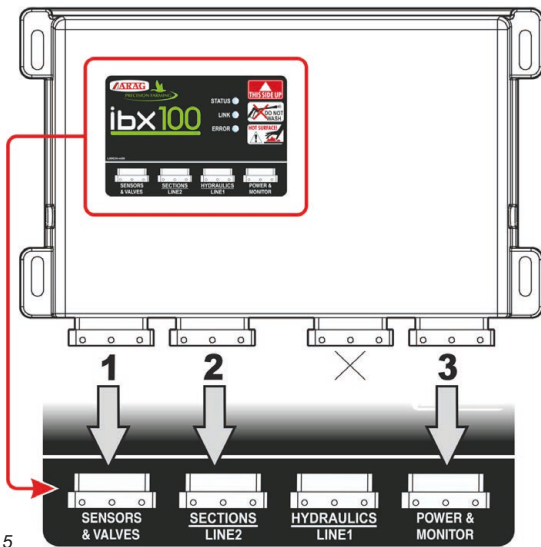


Fig. 5

CONNECTOR	CONNECTION	REF. CABLE - par. 6.1
1	Sensors	7
2	Steering hydraulic valves	5 - 6
3	IBX100 Sprayer / Monitor	4

Connect harnesses as specified in the table; each one of them shall be connected to the corresponding socket on the remote control unit.

**IBX100 SPRAYER**

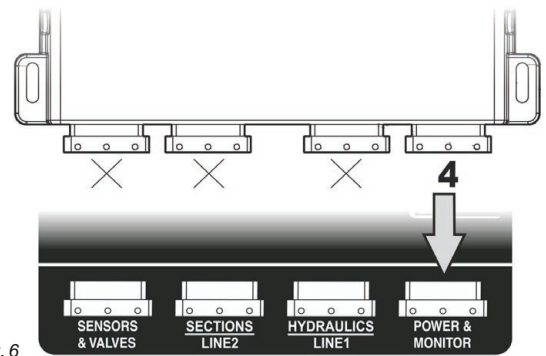
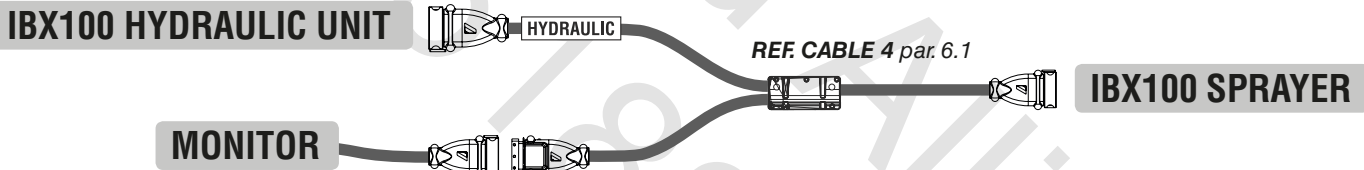


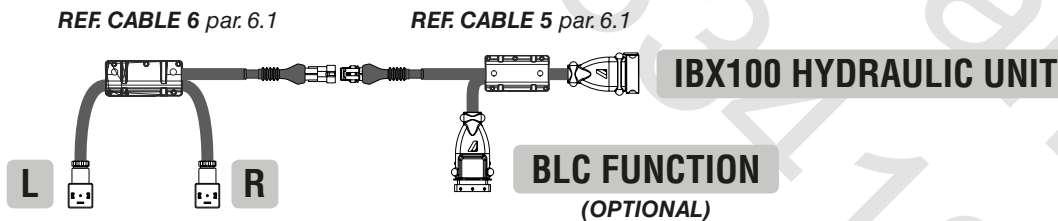
Fig. 6

CONNECTOR	CONNECTION	REF. CABLE - par. 6.1
4	IBX100 hydraulic unit	4

8.3 IBX100 hydraulic unit / IBX100 Sprayer / Monitor connection

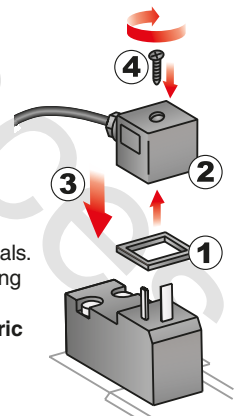


8.5 Steering hydraulic valve connection



CONNECTOR	MOVEMENT	CONTROL
L	Steering to the LEFT	ON / OFF
R	Steering to the RIGHT	ON / OFF

Fix the connectors to the relevant valves according to the indicated initials.  
 • Position seal (1) onto connector (2), then connect the latter pressing it fully home (3): **during this operation, take special care not to bend valve electric contacts.**  
 • Insert screw inside connector, and screw it (4) until it is tightened.



8.4 Sensor connection

CONNECTOR	PRIORITY CONNECTION	ALTERNATIVE CONNECTION
B	Speed sensor <b>S5</b> from BLC cable (optional, sensor not included)	--
F	Inductive sensor <b>S3</b> - BLOCK	--
G	Angular sensor <b>S2</b> - IMPLEMENT	--
L	Angular sensor <b>S1</b> - TRACTOR included in the kit	ON / OFF sensor <b>S1L</b> LEFT SIDE TRACTOR - not included
R	--	ON / OFF sensor <b>S1R</b> RIGHT SIDE TRACTOR - not included
H	Sensor <b>S4</b> - Function not available	--

**REF. CABLE 7 - par. 6.1**  
 Close the unused connectors with the relevant caps supplied in the package.

## 9 HYDRAULIC CONTROL UNIT ACTIVATION

### 9.1 Activation code request

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

Request the code to ARAG by providing these data:

- purchase certification code, received with the kit.
- hydraulic control unit serial number ("SERIAL NO." label on the back of the control unit), visible also in the monitor menu Device status (example of Fig. 7).

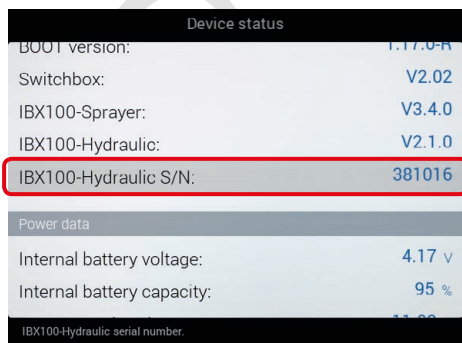


Fig. 7

### 9.2 Activation procedure

- Select the item **IBX100-Hydraulic feature unlock** (Fig. 8, menu **Implement** of the monitor) and press **OK**.
- Select the functionality **TTC** to be activated (Fig. 9). **OK**: to confirm **ESC**: to cancel.
- Enter the 16-digit code as in the example Fig. 10: press **OK** to confirm each character, and **OK** again to save the code (when the symbol **ok** is selected).
- A confirmation message is displayed once the operation is completed. Restart the device.
- The control unit is now active: all menus for the configuration and use of the TTC control are visible on the monitor.

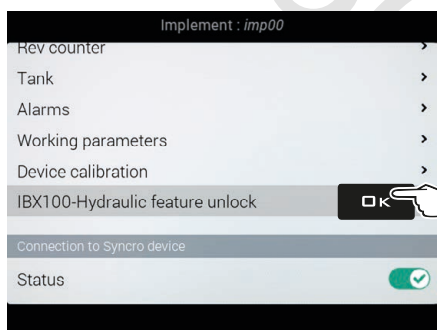


Fig. 8

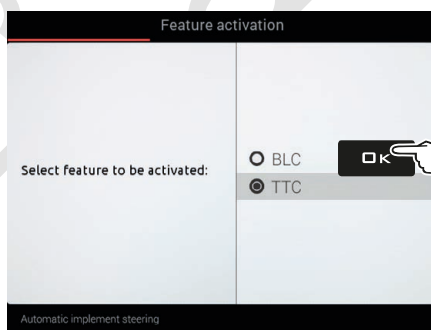


Fig. 9



Fig. 10

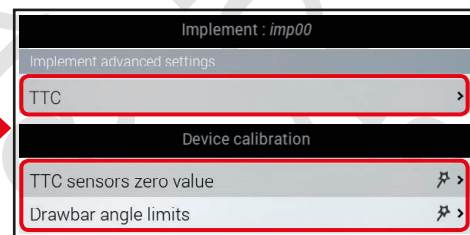
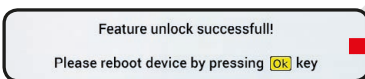


Fig. 11



**WARNING**  
**AFTER THE ACTIVATION OF THE CONTROL UNIT, PROGRAM ALL REQUIRED PARAMETERS (par. 10.2 and 11, displayed in Fig. 11). TO ACTIVATE THE TTC SYSTEM, ENABLE THE STATUS (par. 10.2.1) AND CARRY OUT THE START PROCEDURE (par. 13.1).**



10 SETUP

10.1 Tests and checks before programming

Before setup, check:

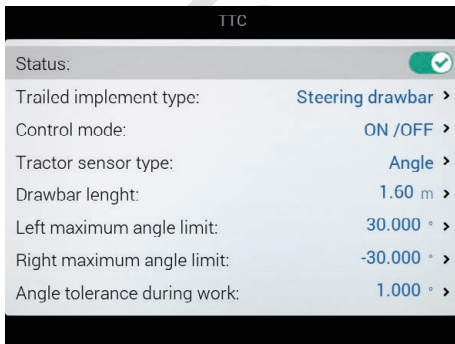
- that all components are correctly installed;
- the correct connection to the power source;
- the component connection.



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

10.2 Implement > Implement advanced settings > TTC

10.2.1 Status



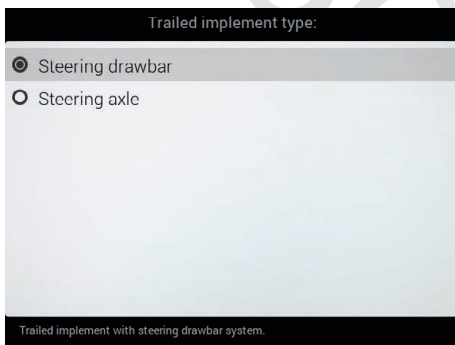
It allows enabling/disabling the TTC system ( TTC activated / TTC deactivated).



**ONCE ENABLED, THE TTC SYSTEM IS READY TO BE USED; FOR SAFETY REASONS, IT MUST BE STARTED WITH A SPECIFIC PROCEDURE (par. 13.1). WITHOUT THE RELEVANT PROCEDURE, THE TTC CONTROL DOES NOT START OPERATING.**

Fig. 12

10.2.2 Trailed implement type



Steering system type.

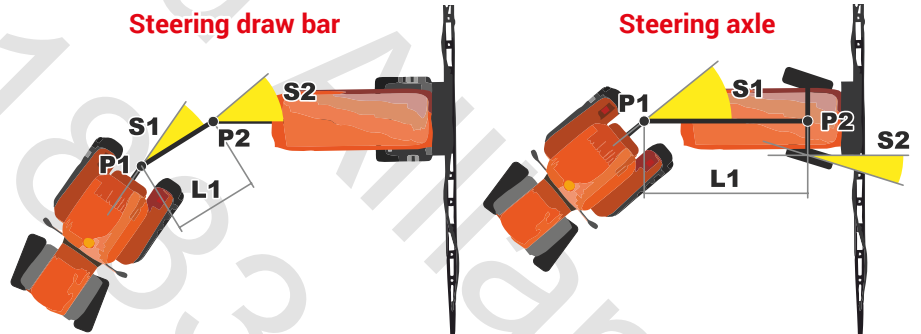


Fig. 14

Fig. 15

10.2.3 Control mode



Hydraulic steering valve type.

The hydraulic steering valves can be both ON / OFF and proportional valves, even if the implement angular sensor **S2** is a proportional sensor. The steering activation through the hydraulic proportional valves offers better performance in terms of control smoothness and precision.

Fig. 16

F1 Enter selected character	F2 Delete selected character	F7 F8 Scroll (LEFT / RIGHT)	F4 F6 Scroll (UP / DOWN)	Increase / decrease of data	OK Confirm access or data change	Esc Exit the function or data change
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### 10.2.4 Tractor sensor type



Fig. 17

Sensor **S1** type, to measure the tractor steering angle:

- **Angle:** an angular sensor is installed (**S1**).
- **Digital:** two digital sensors are installed (**S1L** + **S1R**, ref. par. 8.4).

### 10.2.5 Drawbar length

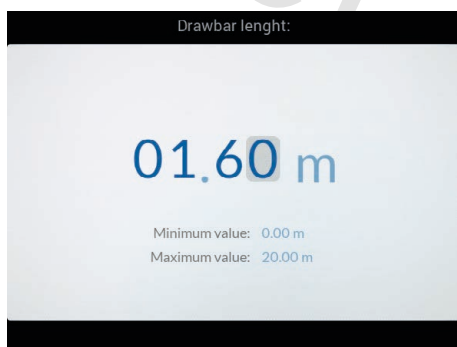


Fig. 18

Distance **L1**, measured between **P1** and **P2** (Fig. 19 and Fig. 20).

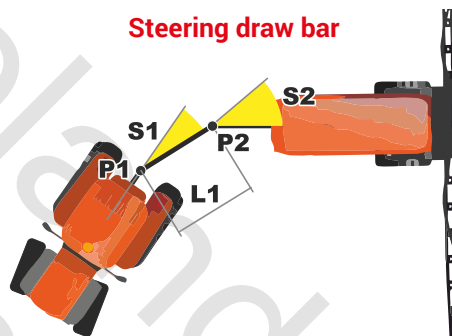


Fig. 19

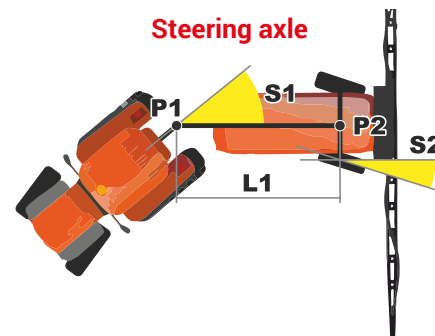


Fig. 20

### 10.2.6 Angle tolerance during work



Fig. 21

Tolerance angle compared to set angle **S2**.

The TTC control stops automatically adjusting the steering if the maneuver angle **S2** is close to the **S2** reference value, angular difference lower than specified tolerance.

A too low value requires the TTC control to continuously correct the steering; in addition, a low tolerance is difficult to respect also when the system requires very high values of minimum actuation and hydraulic valve gain (par. 10.2.7 and 10.2.8).

### 10.2.7 Hydraulic valves Min actuation

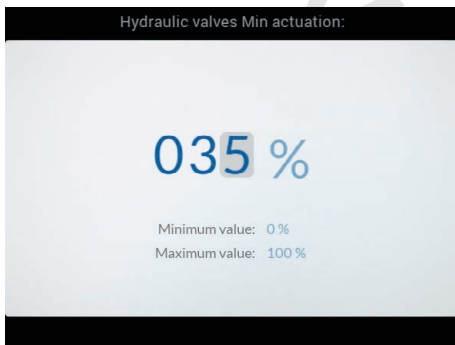


Fig. 22

Minimum activation applied to the coil of the proportional steering valves.

During steering curve management, **the minimum set correction is constant**, regardless of the detected error.

Too low or too high values prevent an efficient correction:

- in case of too low values the hydraulic system (cylinder or steering valves) does not move;
- a too high value does not allow refining the correction on small position errors.



**The value is a parameter typical of each implement: the steering geometry and the hydraulic components are strictly connected to the factory model.**



**Follow this procedure to determine the correct value.**

**ONLY IF the item Control mode is set to Proportional (par. 10.2.3).**

- 1 Bring the rotation speed of the power take-off to the typical operating value.
- 2 Enable the TTC control: activate the AUTOMATIC mode (par. 13.1).
- 3 Operate the vehicle until the trailer is aligned with the tractor (angle **S2** becomes null).
- 4 Enter a minimum value for the menu **Hydraulic valves gain during work** (par. 10.2.8).
- 5 Enter a minimum hydraulic valve activation value.
- 6 Try moving to the left or to the right with respect to the alignment line, checking that the TTC system corrects the steering angle **S2** at least on one of the two sides:
  - if correction is correct, lower the value again;
  - otherwise (**S2** remains null), increase the value.
- 7 Repeat the procedure from point 4, adjusting the value to the allowed minimum (correct): this will be the final value to set.

### 10.2.8 Hydraulic valves gain during work

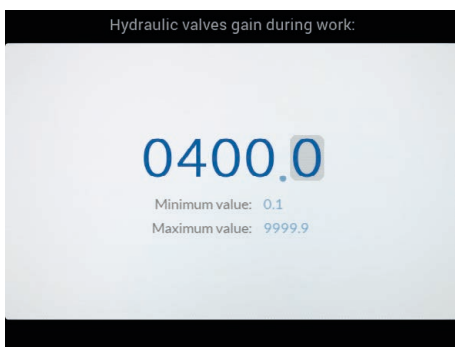


Fig. 23

Adjust the intensity of the corrections made via the TTC control:

- set a low value to obtain a smooth and slow correction;
- set a high value to obtain a reactive and fast correction.

Too high or too low values make the control unstable and cause vibrations. This type of correction is **proportional** compared to the detected error.



**This adjustment works in combination with the minimum hydraulic valve activation value (par. 10.2.7).**



**The value must be detected directly on the machine: the steering geometry and the hydraulic components are strictly connected to the factory model.**

### 10.2.9 Hydraulic valves balance R to L



Fig. 24

It balances the intensity of the corrections comparing the right side with the left side.

To set the correct value follow this procedure:

- move to the alignment position;
- use the manual controls (*par. 13.2*) to move the implement in the two far right and left positions;
- take note of the required maneuver times.

The highest time indicates the side with lower control intensity.

Set value **1** if the time used for the two controls is identical (intensity coincides as well).



**The set value refers ALWAYS to the right side:**

- lower the value to reduce the control intensity to the right;
- raise the value to increase it.

### 10.2.10 Minimum speed limit



Fig. 25

Tractor minimum speed threshold below which the TTC system stops the automatic adjustment.

Refer to the procedure described in *par. 13.1* to restart the TTC automatic control: up until that moment the steering control can be activated only in manual mode (*par. 13.2*).

### 10.2.11 Maximum speed limit



Fig. 26

Tractor maximum speed threshold above which the TTC system stops the automatic adjustment.

Refer to the procedure described in *par. 13.1* to restart the TTC automatic control: up until that moment the steering control can be activated only in manual mode (*par. 13.2*).

10.2.12 Implement angle sensor inversion

TTC	
Minimum speed limit:	1.0 km/h >
Maximum speed limit:	15.0 km/h >
Slip correction factor:	1.000 >
Implement sensor Max angle:	120 ° >
Implement angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor sensor Max angle:	120 ° >
Tractor angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor angle sensor filter:	1.0000 >
Tilt sensor Max angle:	120 ° >

Inversion of sensor **S2** output signal.

Inversion enabled /  inversion disabled.

Depending on the sensor installation position and orientation, the TTC control could work correctly with inverted output signal (of the sensor), as follows: 4mA (+ 60°) / 20mA (-60°).



Refer to *par. 7 Installation of angular sensors S1 and S2* to check the standard conditions.

Fig. 27

10.2.13 Tractor angle sensor inversion

TTC	
Minimum speed limit:	1.0 km/h >
Maximum speed limit:	15.0 km/h >
Slip correction factor:	1.000 >
Implement sensor Max angle:	120 ° >
Implement angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor sensor Max angle:	120 ° >
Tractor angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor angle sensor filter:	1.0000 >
Tilt sensor Max angle:	120 ° >

Inversion of sensor **S1** output signal.

Inversion enabled /  inversion disabled.

Depending on the sensor installation position and orientation, the TTC control could work correctly with inverted output signal (of the sensor), as follows: 4mA (+ 60°) / 20mA (-60°).



Refer to *par. 7 Installation of angular sensors S1 and S2* to check the standard conditions.

Fig. 28

10.2.14 GPS speed source

TTC	
Implement sensor Max angle:	120 ° >
Implement angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor sensor Max angle:	120 ° >
Tractor angle sensor inversion:	<input checked="" type="checkbox"/> Inversion enabled / <input type="checkbox"/> inversion disabled.
Tractor angle sensor filter:	1.0000 >
Tilt sensor Max angle:	120 ° >
GPS speed source:	<input checked="" type="checkbox"/> GPS enabled / <input type="checkbox"/> GPS disabled.
Digital sensor input logic:	Standard >

It allows setting the GPS system to detect the speed:

GPS enabled /  GPS disabled.

If the speed is not supplied by the GPS signal, connect an external speed sensor **S5** to the IBX100 hydraulic control unit. The sensor is not included in the kit.



Connect the sensor as indicated in *par. 8.4 Sensor connection*.

Fig. 29

## 11 CALIBRATION OF ANGULAR SENSORS (S1 / S2)

**BEFORE PERFORMING ANY OPERATION, CHECK THAT NO OPERATORS AND/OR OBSTACLES ARE WITHIN THE MACHINE RANGE OF ACTION.**

Calibration procedures must be carried out directly on the machine to optimize TTC system performance.

The trailer must be aligned with the tractor to have null S1 and S2 angles (Fig. 30 and Fig. 31).

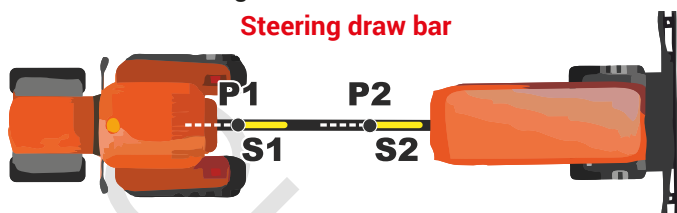


Fig. 30

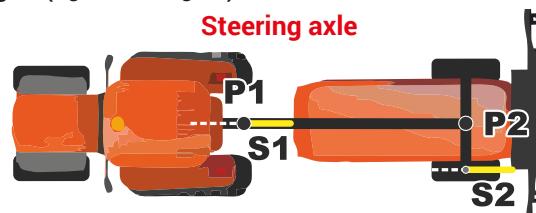


Fig. 31

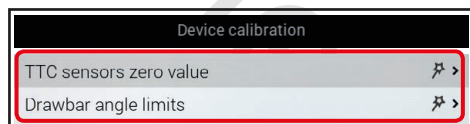


Fig. 32

Menu Settings > Implement > Device calibration

### 11.1 TTC sensors zero value

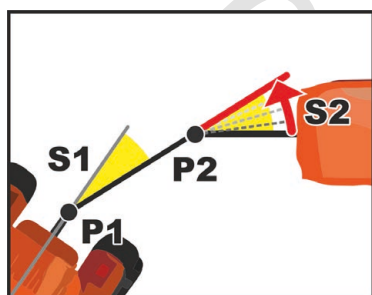


Fig. 33

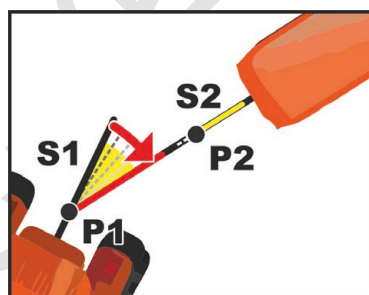


Fig. 34

Perform this procedure in sequence:

**1** Disable the TTC control: activate the MANUAL mode (par. 13.2).

**2** Move the trailer until it is aligned with the tractor: **check the movement by pressing shortly on the keys to avoid machine shaking and increase precision.**

The S2 angle becomes null, (Fig. 33).

**3** Lock the S2 position of the trailer using the steering lock pin (highly recommended).

**4** Drive along a straight path until the steering angle S1 of the tractor is also null (Fig. 34).

**5** Stop the tractor.

**6** Perform the calibration procedures described in the next paragraphs.

#### • Tractor angle sensor

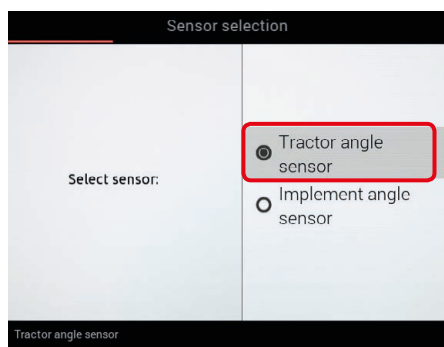


Fig. 35

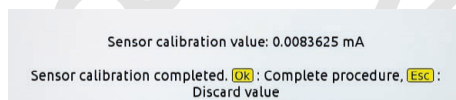


Fig. 36

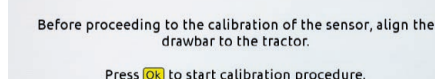


Fig. 37

**1** Select the item **TTC sensors zero value** (Fig. 32) and press **[OK]**.

**2** Select **Tractor angle sensor** (Fig. 35) and press **[OK]**.

**3** The message in Fig. 36 is displayed: follow the instructions, then start the procedure by pressing **[OK]**.

**4** Press **[OK]** to reset the sensor residual signal.

**5** Leave the machine in alignment position and perform the calibration of the **Implement angle sensor**.

**Value out of range!**

If this alarm is displayed, faulty values have been detected: check the sensor operation.

#### • Implement angle sensor

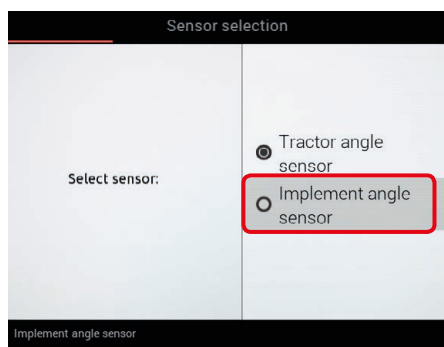


Fig. 38

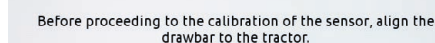


Fig. 39

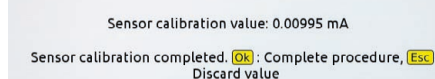


Fig. 40

**1** Select the item **TTC sensors zero value** (Fig. 32) and press **[OK]**.

**2** Select **Implement angle sensor** (Fig. 38) and press **[OK]**.

**3** The message in Fig. 39 is displayed: follow the instructions, then start the procedure by pressing **[OK]**.

**4** Press **[OK]** to reset the sensor residual signal.

**Value out of range!**

If this alarm is displayed, faulty values have been detected: check the sensor operation.

CONTINUES

After calibrating both sensors, check the relevant output signals in the alignment position (Fig. 41).

**Menu Settings > Device status > TTC**

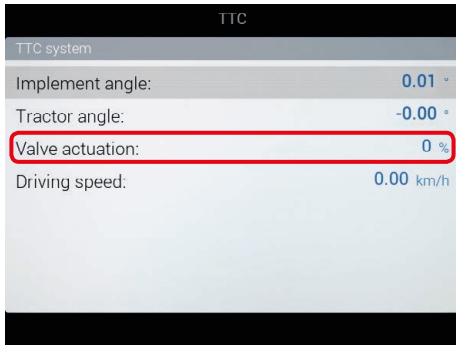


Fig. 41



The item Valve actuation indicates the implement **S2** position: if the set position has been reached, the value is 0%.

**11.2 Drawbar angle limits**

It allows detecting the sensor **S2** output value when the trailer is in the maximum steering position, at the left and right limit angles.



**BEFORE PERFORMING ANY OPERATION, CHECK THAT NO OPERATORS AND/OR OBSTACLES ARE WITHIN THE MACHINE RANGE OF ACTION.**

**Remove the locking pin to avoid damaging the machine.**

Perform this procedure in sequence:

- 1 Disable the TTC control: activate the MANUAL mode (par. 13.2).
- 2 Check that the steering locking pin has been removed.
- 3 Move the trailer until reaching the left limit.
- 4 Record the **S2** angle value (Fig. 43).
- 5 Move the trailer until reaching the right limit.
- 6 Record the **S2** angle value (Fig. 44).

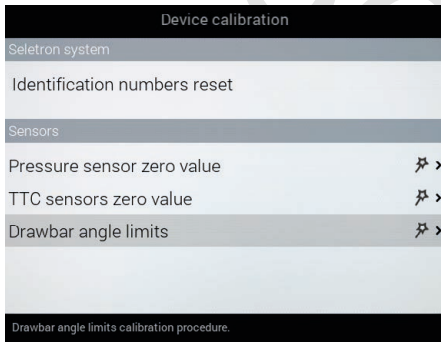


Fig. 42

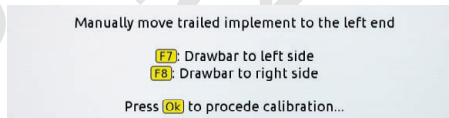


Fig. 43

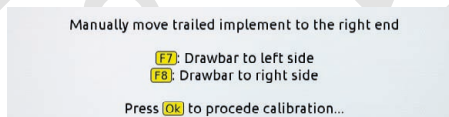


Fig. 44

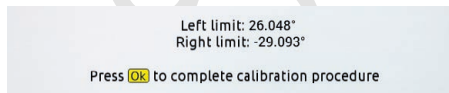


Fig. 45

- 1 Select the item **Drawbar angle limits** (Fig. 42) and press **OK**.
- 2 The messages in Fig. 43 and Fig. 44 will be displayed: follow the instructions shown for both screens.
- 3 Press **OK** to complete the calibration procedure.

## 12 TTC CONTROL - HOW IT WORKS

### 12.1 Types of control

The components for the TTC control can be installed on two different types of machines, different in terms of geometry and path control mechanical actuation:

- **Steering draw bar:** by measuring the draw bar angle, IBX100 is able to control the hydraulic cylinder of the draw bar and to change the trailer steering angle.
- **Steering axle:** by measuring the draw bar angle, IBX100 is able to control the hydraulic cylinder connected to the steering axle and to change the direction of the trailer wheels.

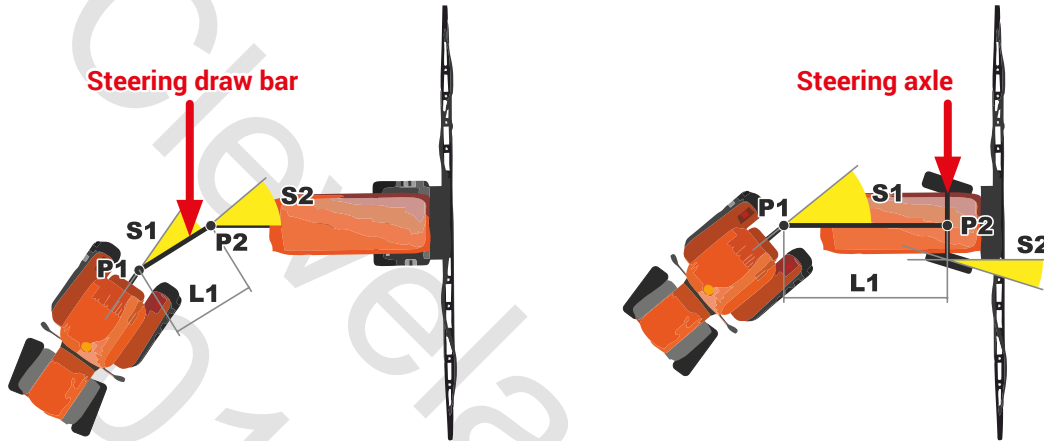


Fig. 46

Fig. 47

For both applications it is necessary that:

- the angular sensor of tractor **S1** is fixed as close as possible to the tractor hooking point - point **P1**;
- the angular sensor of implement **S2** is fixed as close as possible to the implement steering point - point **P2**;
- specify the distance (**L1**) between **P1** and **P2** - menu **Drawbar lenght**, par. 10.2.5;
- the steering hydraulic valves and the hydraulic cylinder control angular sensor **S2**;
- the lock sensor **S3** controls that the steering locking pin is in correct position.



**The images are purely indicative: the steering geometry and the hydraulic components are strictly connected to the factory model.**

### 12.2 Hydraulic control

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

- the steering hydraulic valves
- the system hydraulic drain valve (pilot valve)

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



**PAY ATTENTION TO THE ADDITIONAL FUNCTIONS, EXTERNAL TO THE TTC CONTROL:**

**AS ALL HYDRAULIC FUNCTIONS ARE COORDINATED BY A SINGLE PILOT VALVE, WHEN THE TTC SYSTEM IS IN OPERATION, THE EXTERNAL FUNCTIONS WILL BE TEMPORARILY DEACTIVATED.**



**13 USE**

The following operations are required to start the TTC system:

- 1 ACTIVATION** of the hydraulic control unit, with the specific procedure (par. 9.2). This operation is **COMPULSORY** to display all system use and configuration menus on the monitor.
- 2 ENABLING**, from the menu Status (par.10.2.1), that makes the automatic control ready to be used. **OFFLINE mode access with NO JOB ACTIVE.**
- 3 START** (par. 13.1). **ONLINE mode access with one JOB ACTIVE.**



**WARNING**

- For safety reasons, soon after control unit activation, the TTC system is disabled.
  - Once enabled, the automatic leveling is ready to be activated, unless the status is disabled by the operator (menu Status, par. 10.2.1).
  - The automatic control will be disabled upon job interruption.
- At the beginning of a new spraying, the operator will have to repeat the activation.

**13.1 START - ON/OFF automatic control**

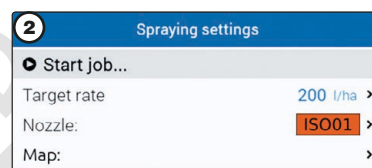
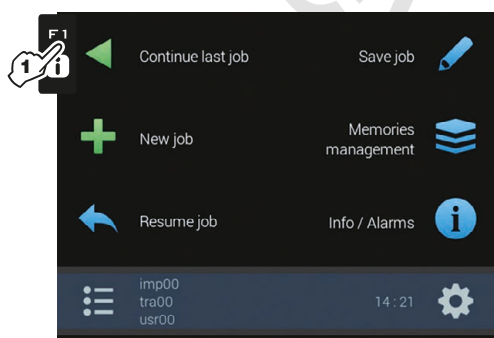


Fig. 49

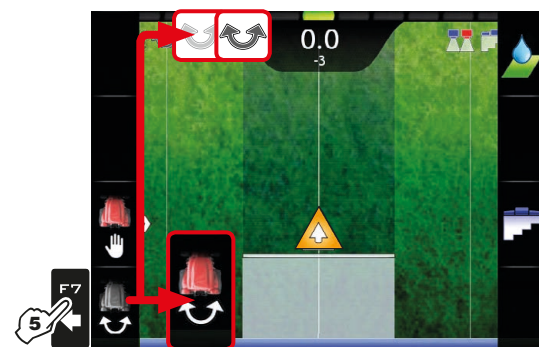


Fig. 50

- 1** Start a new spraying with the **F3 New job** function (menu Home).
- 2** Check the **Spraying settings** in Fig. 49; change them, if necessary.
- 3** Select and press to switch to guidance mode.
- 4** In the guidance screen, press **AUTO**.
- 5** Press **F7** (Fig. 50) to start / stop the steering draw bar automatic control.



**TTC - AUTOMATIC CONTROL ON**

In this mode, the TTC control **AUTOMATICALLY ACTIVATES** the hydraulic valves, properly controlling the trailer steering angle (for the steering draw bar) or the direction of the wheels (for the steering axle).

During spraying, towed implement positioning (estimated) is displayed on the monitor, from the menu **Home > Settings > Device status > External signals > TTC** - Fig. 51.

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

- measures the **S1 angular position** (par. 12.1);
- calculates the optimal angular position **S2**;
- activates the hydraulic steering valves and the cylinder to correct the angular position **S2**;
- tries to reach the set position, within a specified tolerance.

TTC	
TTC system	
Implement angle:	0.01 °
Tractor angle:	-0.00 °
Valve actuation:	0 %
Driving speed:	0.00 km/h

Fig. 51

The TTC control is affected by the tractor speed, as follows:

**1 Low speed threshold: the detected speed is lower than the minimum speed limit (par. 10.2.10)**

- The TTC control remains enabled (, par. 10.2.1).
- The automatic controls are locked: bring the vehicle to an adequate speed, within the maximum and minimum limit.
- Restart the automatic control with the **F7 FUNCTION**

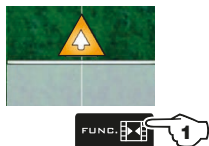
**2 Speed within the job range: the speed detected is between the maximum and minimum limits (par. 10.2.10 and 10.2.11)**

- The TTC control remains enabled (, par. 10.2.1).
- The automatic controls are operating.

**3 High speed threshold: the detected speed is higher than the maximum speed limit (par. 10.2.11)**

- An automatic alignment control is carried out immediately.
- The TTC control remains disabled (, par. 10.2.1) and the automatic controls are locked:
  - bring the vehicle to an adequate speed, within the maximum and minimum limit;
  - enable the TTC control (, par. 10.2.1);
- restart the automatic control with the **F7 FUNCTION**

13.2 Manual control



- 1 In the guidance screen, press **FUNG.**
- 2 Press **F5**. A list of options concerning available manual controls will appear (Fig. 52). Pressing each key will enable the corresponding function:
  - F1** moves the trailer to the left;
  - F3** moves the trailer to the right;
  - F5** aligns the trailer to the tractor.

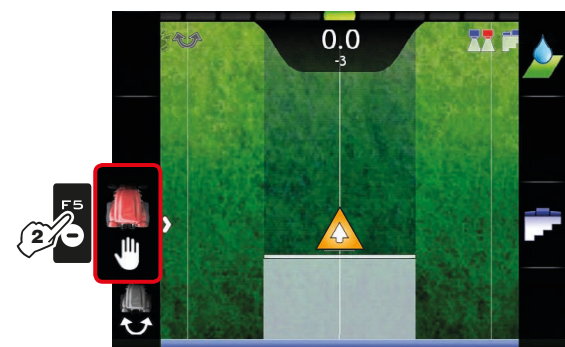


Fig. 52

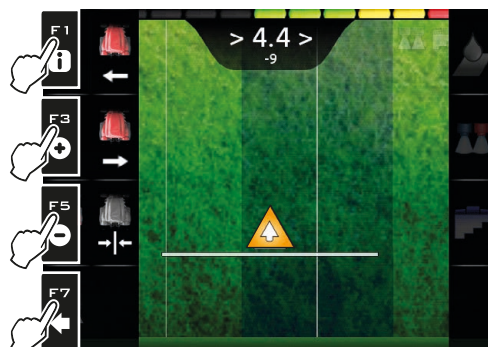


Fig. 53

**TTC - MANUAL CONTROL**

The manual control allows the operator to manage the direction of the trailer using specific controls. Available controls:



**1 Trailer alignment**

The implement is automatically guided to the left or to the right in order to reduce the angle **S2** and bring it to zero. The direction of the control depends on the real implement **S2** position: the IBX100 hydraulic control unit receives the command, recognizes the real **S2** position and decides towards which side to drive the implement.



**2 Left movement**

The trailer is moved to the left side of the tractor. The command is carried out in any case, regardless of the implement **S2** real position.



**3 Right movement**

The trailer is moved to the right side of the tractor. The command is carried out in any case, regardless of the implement **S2** real position.

Once the TTC control has been enabled , the manual controls are always available also when the automatic control is in operation:



- if the manual control is ON, it temporarily replaces the automatic control;
- if the manual control is OFF, the system resumes the automatic control.

The manual controls **TEMPORARILY** replace the TTC control, which remains enabled (, par. 10.2.1).

13.3 Operation errors

In case of error, the TTC system will be deactivated immediately .

**THE AUTOMATIC ALIGNMENT IS NOT CARRIED OUT AND THE CONTROLS TO THE HYDRAULIC VALVES ARE DEACTIVATED.**

Solve the problem, then enable the TTC control (, par. 10.2.1), and restart the automatic control with the **F7** function .

13.4 Error messages

MALFUNCTION	CAUSE	REMEDY
TTC tractor-sensor error!	Faulty sensor.	Check the angular sensor integrity and the connections to the connection cables.
TTC implement-sensor error!	Faulty sensor.	Check the angular sensor integrity and the connections to the connection cables.
Speed lower TTC function limit!	Tractor speed too low	Increase tractor speed (it must be higher than the set minimum limit, ref. par. 10.2.10).

## 14 TECHNICAL DATA

### ELOBAU 424A11A120 ANGULAR SENSORS

Power supply voltage	10 ÷ 16 V
Operating temperature	-40 °C ÷ +85 °C -40 °F ÷ +185 °F
Output signal	4 ÷ 20 mA
Measurement angle	-60 ÷ 60 °
Protection rating	IP67
Connector	AMP Superseal, fpm, 3 poles

## 15 END-OF-LIFE DISPOSAL

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

## 16 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.

## 17 EU DECLARATION OF CONFORMITY

The declaration of conformity is available at the website [www.aragnet.com](http://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 ARAG spare parts catalog.

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