Ti5

USER MANUAL

V100R002.E01

HEXAGON
AGRICULTURE

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DO NOT PRINT

Introduction

This manual contains important information on how to install, configure and use the Ti5, as well as security information.

- Carefully read this User Manual before connecting the equipment;

- To ensure your safety, please observe the instructions contained in the User Manual and Safety Manual issued by the manufacturer of agricultural machinery.

The symbols used in this manual have the following meanings:

Type	Description
⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potential hazard or misuse situation which, if not avoided, may result in minor or moderate injury, mate-rial, financial loss and environmental damage, or all of them.
ℹ IMPORTANT	Important information that should be observed, so that the equipment to be used in a technically correct and efficient way.

Contends

Safety instructions

The following instructions are intended to inform users about the risks inherent in the operation of Ti5 and how to avoid them.

⚠️ **WARNING**   Use Ti5 for agricultural and forestry purposes only. Do not use the equipment in any other type of vehicle.

Is not allowed to:

- Use it outside the restrictions imposed in this manual;

- Open the equipment with tools, except as permitted in writing by technical assistance;

- Modify or alter the product;

- Use the Ti5 with obvious damage or defects;

- Use it with accessories from other manufacturers without approval.

⚠️ **WARNING**   Ti5 must not be used without the user having knowledge of the correct use of the equipment. Misuse may lead to personal injury and damage.

⚠ **DANGER**	The unauthorized modification of the vehicle for assembly or installation of the product can change the functioning and safety of the agricultural machinery.
⚠ **WARNING**	Verify the results of measurements after fall or improper use, transfer or modification of the product, or its storage for long periods of time.

Care and Precautions

- It is not recommended the use of Ti5 during lightning storms, due to the risk of being struck by lightning;

- Keep a safe distance to electrical installations and components;

- If the equipment is long standing and unused it is recommended turning off all the components and cables;

- To clean your monitor, use a soft cotton tissue with 50% isopropyl alcohol. Use the moistened cloth on the monitor. For better visualization of the dirt and finger marks, clean the monitor when it is switched off.

Disposal

Incorrect disposal of the product can cause the following problems:

- Release of poisonous gases, in the case of combustion of polymers;
- Improper use of the product, imposing bodily risks;
- Contamination of the environment.

⚠️ **WARNING**

Ti5 should not be mixed with household waste.
Dispose the product appropriately in accordance with the regulations in force in the country of use.

1   System Overview

The Ti5 is a complete system of precision agriculture guidance which features the following functions:

> **IMPORTANT**
>
> You can only use two functions simultaneously.

GUIDANCE

VARIABLE RATE
CONTROLLER OF FERTILIZERS

SEED
MONITORING'

SPRAYER
SECTION CONTROL

SEEDING
CONTROLLER

1.1   System components

01

02

03

04

05

06

07

08

09
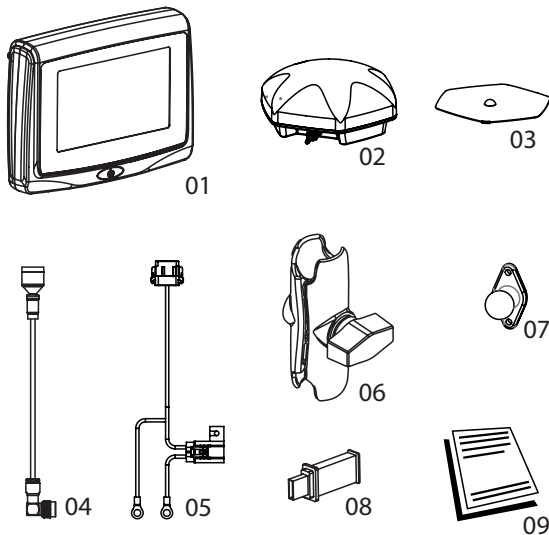
Item	Description
1	Ti5 Monitor
2	GNSS Antenna
3	Antenna fixation plate
4	Antenna cable
5	Power cable
6	Arm - mounting bracket
7	Ball - mounting bracket
8	USB Flash Drive
9	Product documentation

1.2 Views

⚠ **WARNING**

Touch screen operation
The Ti5 is designed to be used with the touch of your fingers on the screen of the monitor.
Do not operate with sharp objects, such as pens or screwdrivers as these may damage and
affect the warranty of your equipment.

Type	Description
1	5" color touch screen
2	Power button
3	CAN communication port
4	USB interface for data transfer
5	Fixing bracket
6	GNSS antenna connection
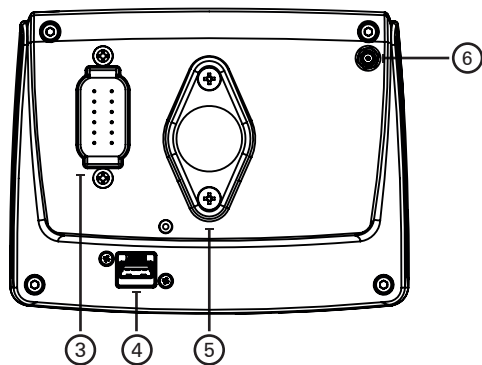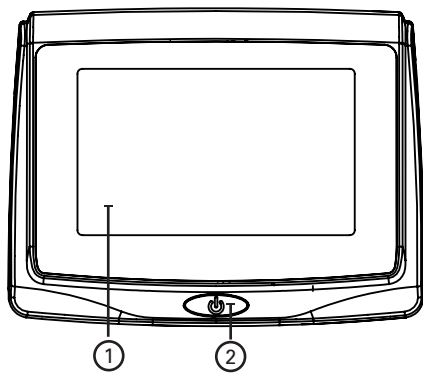
1.3   CAN connector pinout

DTM15 - 12P
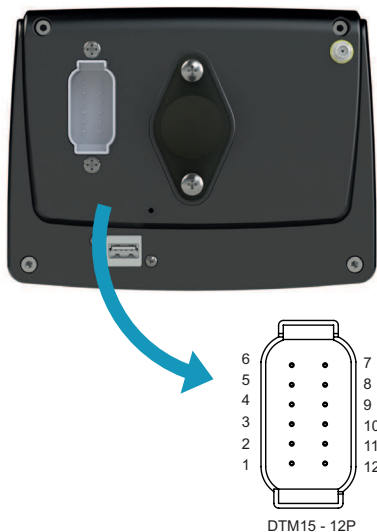
Type	Description
1	Vcc Out
2	CAN CON P
3	Buzzer OUT
4	Vcc OUT
5	Net Class Bat +
6	COM TX CON
7	Bat -
8	COM RX CON
9	SNS M IN
10	Bat -
11	CAN CON N
12	Net Class Bat -

1.4   Product identification

The indication of the type (model) and your product serial number are on a label on the back of Ti5. Record the type and serial number in your manual and always inform this data when connecting the service center.
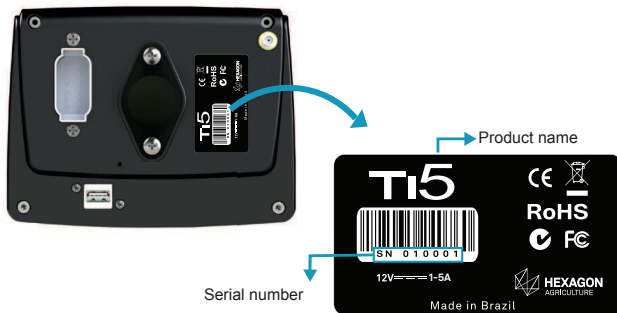
Product name

Serial number

2   Installation

2.1   Ti5 Install

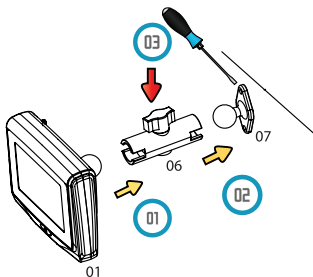Find an appropriate location to assemble the Ti5 monitor, which must be within reach of the operator when seated in a normal operating position and apparent in front of the operator's field of vision.

1. Mount the ball support at the desired location of the vehicle;

⚠️ **WARNING** Do not assemble the Ti5 in a place where it can be reached by an airbag.

2. Connect the mounting arm ball and the monitor support, fixing firmly through the clip;
3. Position it in a location visible to the operator and verify that the assembly is tight and secure;
4. Connect the power cable to a battery or location indicated by the manufacturer of the machine and the other end to the back of Ti5.

2.2 Antenna installation

⚠️ **WARNING** Clean the roof of the cabin to prepare the antenna installation. The product recommended for cleaning is isopropyl alcohol.

1. The Ti5 antenna should be mounted on the roof of the vehicle, preferably in the center line of the vehicle and further possible on the flat part of the ceiling;
2. The installation area must be clean and dry;
3. Attach the GNSS antenna on the roof of the vehicle. It has magnets that fixate on the metal roof of the vehicle. In case of vehicles with non-metallic ceiling, use a metal bracket for fixation.In this case, glue the double-sided tape on the back of the bracket as shown in the picture. Remove the plastic protective tape and paste on the vehicle roof.

4. The cable must not be cut, twisted, or excessively bent, because its execution may be degraded and the system may fail. The cable must be connected correc– tly behind the Ti5. The antenna should be mounted horizontally and not inclined to ensure optimum reception of GNSS signal.

Double-sided mounting the antenna support

FRONT VIEW   REAR VIEW
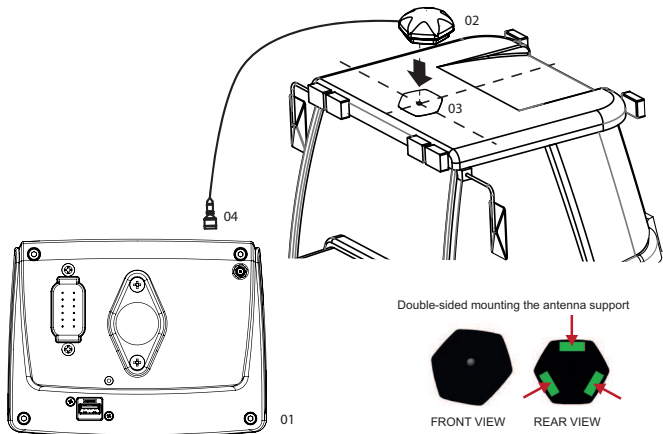
3 Running the Ti5 for the first time

3.1 Connecting your monitor

⚠️ **WARNING**   It is recommended to start the vehicle before starting the trip computer.

To turn the monitor on, press and hold the power button ⊚ on the front of the module for 1 second. The working section screen appears on the display of the Ti5.

1. You can select an existing section or create a new section. To add a new section, press the button New;

2. A new window will appear "New Work Section." Touch ✔ **OK**;

3. Click New to insert the name of the Farm with a maximum of 12 letters. Confirm the name and press ✔ **OK** to enter the name of the Field;

4. Click New to insert the name of the Field with a maximum of 12 letters. Confirm the name and press ✔ **OK** to enter the name of the Activity;

5. Click New to insert the name of the Activity with a maximum of 12 letters. Confirm the name and press ✔ **OK** to go back to work section screen;

6. By activating the box Open last job on start the work section screen will no longer appear when connecting the equipment, starting directly in the operating window, and in the last section;

(i) IMPORTANT To disable the option "Open last job on start ", select the Work Section button in the settings menu.

7. Click ✔ **OK** to save and complete the operation performed.

3.2   Main Navigation Screen

After selecting the working section, the operation screen is displayed. During operation there will be visible only the information and features displayed in the figure below, in order to provide a broader view of the field.

01	Alerts
02	Guidance
03	Satellites number
04	Information on the operation
05	Button Stop operation
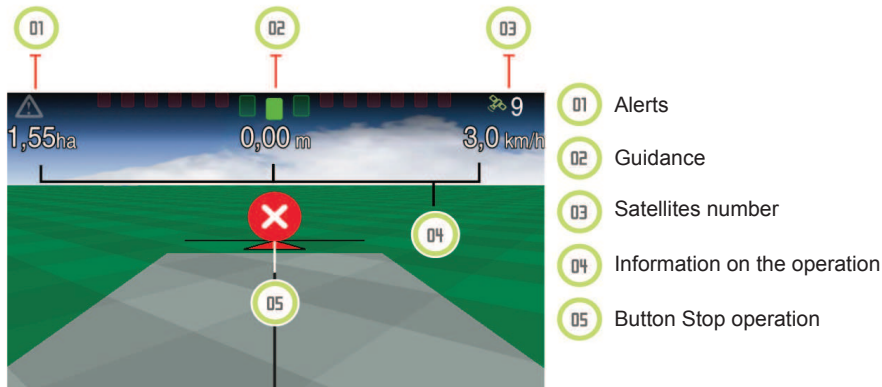
3.2.1   Menu buttons on the left of the screen

When you drag your finger from the left corner of the screen to the center, you will see a tab with buttons.

Guidance

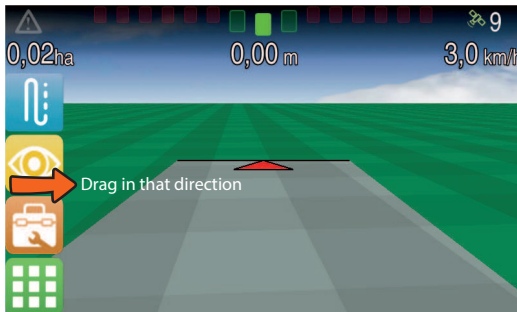Buttons for settings of the reference lines Guidance.   .

View

Buttons for Guidance View Form, screen intensity and delete trace.
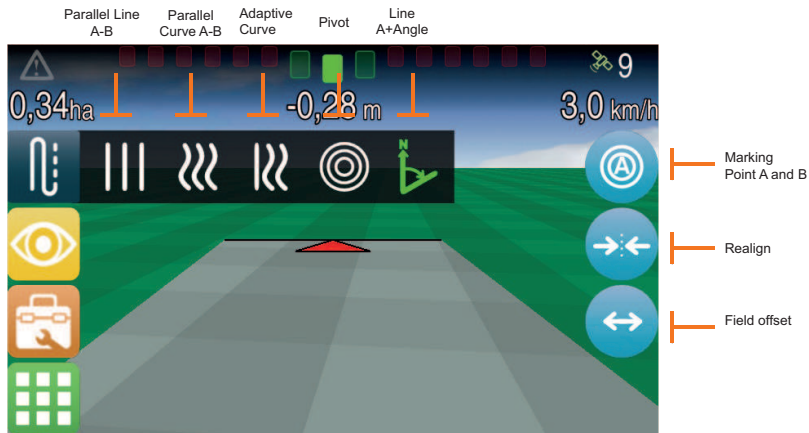
Tools

Perimeter Marking;

Configuration Menu

Access to the main menu.

3.2.2 Guidance Menu

When pressing the guidance button, five types of lines are available. In the menu on the right, the row orientation buttons are displayed.
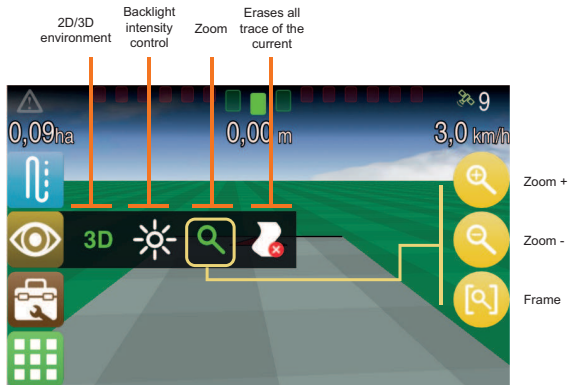
Parallel Line A-B Parallel Curve A-B Adaptive Curve Pivot Line A+Angle

Marking Point A and B

Realign

Field offset

IMPORTANT   Further explanations on the functionality of the buttons above, see chapter Guidance.

3.2.3   Display Menu

When pressing the display button, you can change the viewing environment 2D to 3D, change the screen brightness and clear the trace of the current section.'

2D/3D environment

Backlight intensity control

Zoom

Erases all trace of the current

Zoom +

Zoom -
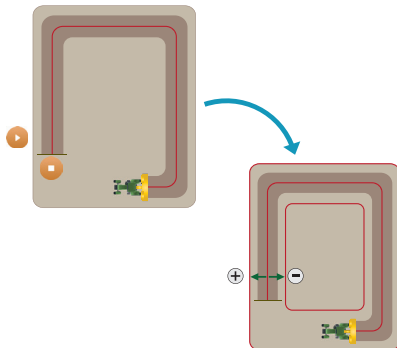
Frame

0,09 ha

0,00 m

3,0 km/h

9

3.2.4   Tool Menu

In the button Tool Menu, these functions related to Perimeter Marking, trace and flag are available.
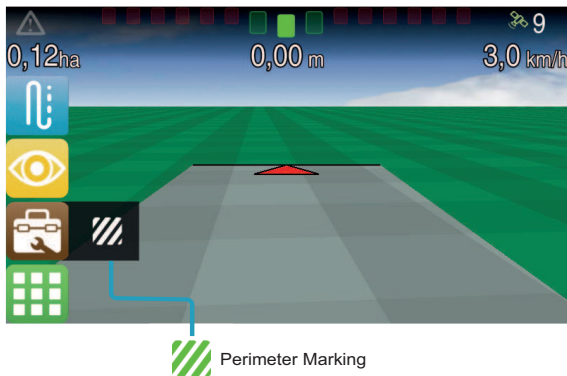

 Perimeter Marking

3.2.4.1 Perimeter Marking

With the Tool Menu it is possible to delimit the perimeter of an area. To do this, proceed as follows:

1. Press the button ▨ Perimeter and then press Start ▶ ;

2. Enter the name of the new map;

3. Enter the lateral displacement (m) for marking the perimeter. For positive values the line is shifted out of the agricultural vehicle marking and for negative values the line is shifted into the markup; For example, if you are operating an 18-meter bar sprayer inside the field, add 9 meters positive for the sprayer pass over the field end line.

4. 4. At the end of the perimeter marking, press Stop ▪.

3.2.5   Information settings
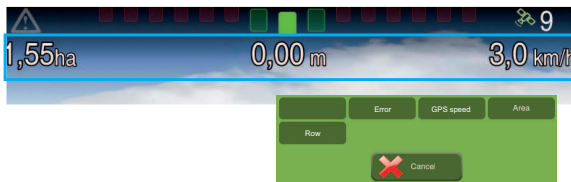
On the operational screen there can be displayed up to 4 information. To modify them, press and hold for 2 seconds up on the information. A new window opens for selection of information to be displayed. Information options vary according to the implement setting in use.

To add new information, press for 2 seconds in the marked area with rectangles in the figure above.

To delete, press for 2 seconds over an information and click on the button that does not contain information.
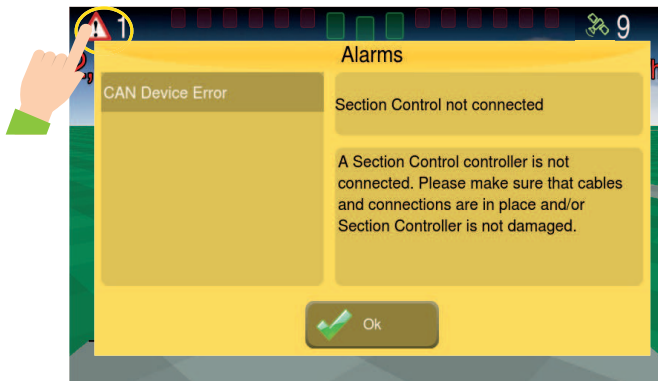
3.2.6　Alarms

 **IMPORTANT**　Before starting any operation, make sure that no alert is active.

In case of any alert, press the alert icon. A bar will be displayed with information relating to the alert and how to solve a problem.

Information	Description
Motor	Motor is not spinning at the speed indicated.
Speed	Operation out of the speed range.
Diff	GNSS could not synchronize Diff.
GPS without communication	Ti5 can't communicate with the GNSS.
GPS synchronizing	GNSS is synchronizing with the satellites or looking for satellites
CAN	Indicates that there is some error in the CAN connection, and may be the lack of any connected device, any device connected that shouldn't be, or even if a device is in conflict with another.
External Power Supply	External power supply is faulted in some driver.
Seed Monitoring	Error in some activity out of Seed Monitoring.
Energy	Battery voltage is low.

3.3 GPS information

Press the GPS signal button in the upper right corner of the screen for GPS information.
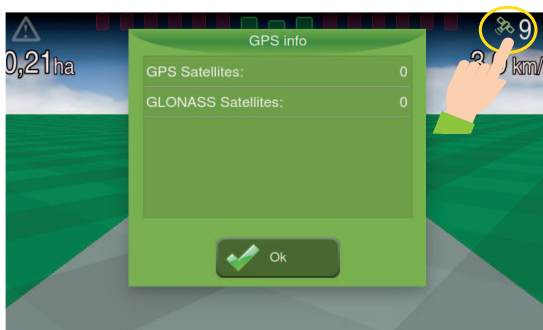
3.4   Turning off your monitor

Press the on/off button on the front of the module until the confirmation box appears. Select ✔ **Yes** and wait until the screen turns off.

⚠ **WARNING**   Do not disconnect the monitor from power before the screen turns off completely.
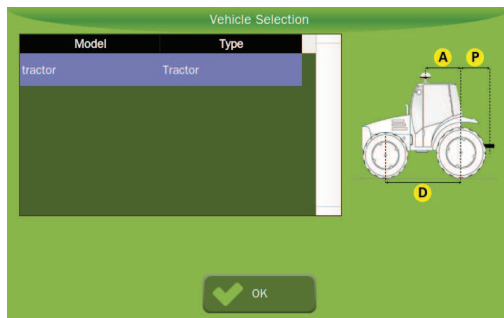
4   Setting

IMPORTANT
When starting for the first time only the Vehicle, Implement and Work Section buttons will be enabled. So that the Guidance, Auto pilot, Planting, Spraying and Fertilization buttons are actives it must be first made the activation and registration of the vehicle and implement.

Function	Description
Guidance	Guidance related settings.
Auto Steering	Settings related to the electric and hydraulic auto pilot.
Fertilization	Dosing and input of fertilization settings.
Spraying	Dosing and spray nib settings.
Planting	Planting related settings.
Vehicle	Selection of the vehicle that will be used in the operation.
Implement	Selection of the equipment that will be used in the operation and execution of tests.
GNSS	Inactive in normal mode.
Jobs	Selection of the location (folder) in which there are written the data collected by the monitor.
Files	Location to extract data and/or insert maps via usb flash drive.
Settings	Displays information about the Ti5.
Start	Enters the operation mode of the Ti5.

4.1   Vehicle

Select the vehicle, an illustration of it will be shown.

Model	Type
tractor	Tractor

OK

(i) IMPORTANT If there are none vehicles created, you will not be able to access the Settings Menu of the Autopilot.

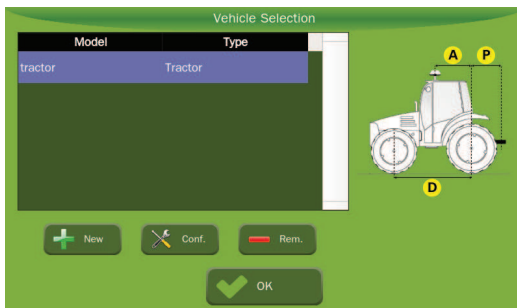**⚠ WARNING** If selected a wrong vehicle or with wrong information all work may be incorrect.
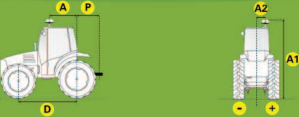

4.1.1   Inserting a new vehicle

To insert a new vehicle, follow the steps below:

1.   Enter the settings screen and press the button ⚒ **Settings**;
2.   On the Settings screen, click **Advanced** System module;
3.   Confirm the operation by clicking ✅**OK**;
4.   Enter the screen 🚐**Vehicle**;
5.   Select button ➕ **New**.

6. Enter your vehicle measures in meters. For measurements less than 1 meter, insert the value in fractional form. For example, for a measurement of 60 cm insert the value of 0.60. Before taking the measures, make sure the vehicle is on level ground and straight, with the center line of the body parallel to the wheels.

7.   After introducing all necessary measures of the Vehicle, press ✔ **Save**.

4.1.2 Configuring the vehicle

1. Verify if the Ti5 is in the **Advanced** System Module;
2. Enter the screen 🔵 **Vehicle**;
3. Select button 🔧 **Settings**;
4. Edit the desired fields;
5. Press ✅ **Save**.

4.1.3 Removing the vehicle

1. Verify if the Ti5 is in the **Advanced** System Module;
2. Enter the screen 🔵 **Vehicle**;
3. Select the Vehicle you want to remove;
4. Press button ➖ **Remove**;
5. Confirm the operation by pressing ✅ **OK**.

4.2 Implement

ℹ️ **IMPORTANT**   According to the implement selected there are enabled or disabled functions in the Settings Menu. For example, when selecting light bar it will only be enabled the function Guide and Auto pilot (if a Vehicle is configured).

To select an implement proceed as follows:

1. Select the type of implement in the box in the left of the screen;
2. Verify if the information is correct, and then tap ✅ **OK**.

4.2.1   Adding, deleting, and editing new implements

1. Enter the Settings screen and press button ✕ **Setting**;
2. On the Settings screen, click **Advanced** System Module;
3. Confirm the operation by pressing ✅ **OK**;
4. Select button ⬛ Implement.

5. To add, press ✚ **New**;

6. Enter the requested data and press ✔ **Create**;

7. Enter the settings of the agricultural Vehicle and press ✔ **Save**;

8. To edit the data, tap ✖ **Edit**;

9. Edit data and press ✔ **Save**;

10. To eliminate the implement, click ▬ **Delete**;

11. Confirm the operation by pressing ✔ **Yes**.

4.2.2   Tests

By pressing 🔘 **Test** you have access to tests relating to registered implements.

Motor Actuator	Seed sensor	Flowmeter calibration
Motor test	Seed calibration	Spraying simulation
Gate teste	Weigh Cell	Pneumatic Simulator

✔ Ok

ℹ️ **IMPORTANT**	In tests using implement hydraulic motor, place the Vehicle with the motor in the rotation recommended by the manufacturer (i.e., 1,800 RPM on a tractor) for a minimum flow of 48 l/ min in the hydraulic system.

Motor Actuator

Test to verify if the hydraulic motors are working properly.

Procedure:

1. Actuate the hydraulic system of the vehicle and place in the rotation of work;
2. Press ▶ **Start**;
3. Reduce the reference value until the read value does not coincide with the set value anymore. This read value is the RPM Min. value;
4. Increase the reference value until the read value does not coincide with the set value anymore. This read value is the RPM Max. value;
5. Verify if the readings are consistent with the reference;
6. Press ⏹ **Stop** at the end.
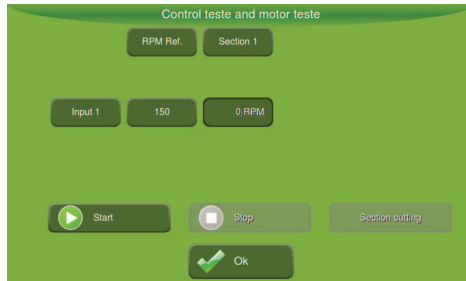
Section cutting test
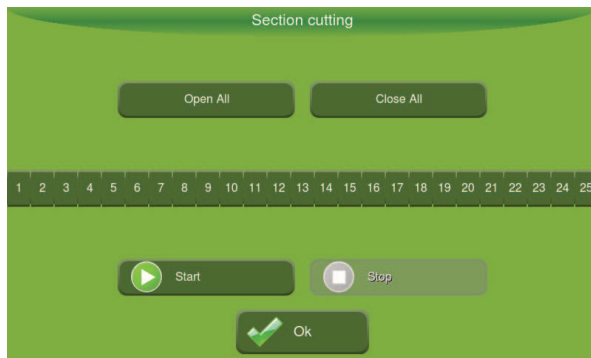
Procedure:

1. Press ▶ **Start**;
2. Press the buttons to check the operation: Open all, Close all or;
3. Individually select each section that you want to turn on or off by tapping the number of each;
4. Press ⏹ **Stop** after checking operation.

Seed Sensors

Test performed to check or install the entries and modules that are connected to the sensors.

Available in two modes:

Modes	Description
Test	Used to verify if the rows are connected correctly to the doors of the modules, triggering the sensors through the passage of seeds or fertilizer.
Installation	Used for automatic settings of the inputs on the modules those are connected to each seed and fertilizer sensor (if available).

Procedure:

Planting monitor instalattion test

Row:	-	Mode:	Test
Module:	-	Restart	
Input:	-		
Tested input:	0		
Need input:	25		
Available Input:	54		

Ok

1. Press **Restart**;
2. Place seed or fertilizer in order to trigger the sensor and check which input, and line module has been activated;
3. Verify if that is correct.

Installation mode procedure:

Planting monitor instalattion test

Row:	-	Mode:	Installation	Box:	Seed	02
Module:	-	01		Start		03
Input:	-			Stop		
Tested input:	0			Back		
Need input:	25			Skip		
Available Input:	54					

Ok

1. Press the box mode (1) to change to Installation;
2. Select the Seed box or Fertilizer box (2);
3. Press Start (3);
4. It will be indicated in which line number must be triggered the sensor;
5. Insert at least 3 seeds. It will be identified automatically the input module the sensor is connected to;
6. After the test ends, the next row will begin to be shown and so on.

Flowmeter Calibration

Procedure:

1. Configure the Reference (PPS) with the average value of working pressure of the spray nib used. For example, if you are using a spray nib that works from 2 to 6 BAR, fit the PPS for reading 4 BAR in the gauge;

2. Place the sprayer in the rotation and the collection container in the correct position;

3. Adjust the time using the arrow keys and press ▶ **Start**;

4. Finished the count, the system automatically closes sections;

5. Verify if the value on the flowmeter is close to the reference value;
6. Multiple the value collected from a nib (or average, in the case of using two or more burners) by the total number of nibs and notify the Volume to the on-board computer;
7. The on-board computer will inform the Relation (PPL).

Seed Calibration

This simulator has the function to verify:

- the operation of the seed dosage hydraulic motors;
- wheel speed;
- correct detection of the number of seeds in each row.

Procedure:

1. Enter the RPM reference for hydraulic motors;
2. Select the number of the section that will be active in simulation;
3. Select the wheel section number which will be used as a reference speed;
4. Press ▶ **Start**;
5. Verify if the counters and motors are working properly;
6. Press ⏹ **Stop**;
7. Verify if the number of seeds read by the sensor and collected are equal;
8. If the values are more than 5% apart, adjust the Sensor Adjustment value (%), stating the calculated difference in percentage. Follows formula for calculation:

$$\text{Sensor Adjustment (\%)} = \left(\frac{(\text{Seeds Collected})}{(\text{Seeds Read on Sensor})} -1 \right) \times 100$$

Spraying simulator
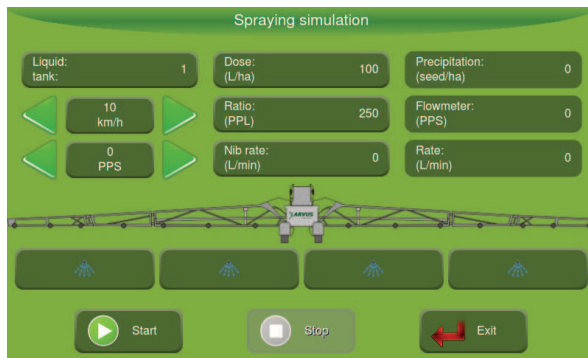
Procedure:

1. Set the minimum and maximum flow in **Nib rate**;
2. Enter the value of the Dose (L/ha);
3. Turn on the water pump and put the spray on work rotation;
4. Press ▶ **Start**;

5. Put the value of Reference in "0" PPS and increase gradually, making sure that the value of the **Flowmeter (PPS)** follows, until the pressure gauge located on the hydraulic command indicates the minimum amount of pressure for the spray nib used or until the range of application is satisfactory;

6. Repeat the process from the minimum value until the pressure gauge indicates the maximum amount of pressure or the range of application is satisfactory, taking care to ensure that the value of the **Flowmeter (PPS)** follows the reference;

7. If the value of the speed (km/h) is not compatible, make the exchange of nibs for different flow rates.

IMPORTANT

As the flow rate of the system is different for each type of nib, this procedure should be repeated every time there is a change in the spray tip.

Gate Test (Optional function)

Procedure:

1. Enter the Reference to trigger the gate to the desired position;
2. Tap **Open all** to open completely the gate;
3. Tap **Close all** to close completely the gate;
4. Check the current position of the gate in the Position box;

5. Select Gate Configuration to select the Gate type (Fixed, 2 or multiple stag-

6. For gain adjustment, set a reference value on the Gate Test screen and wait for the gate to reach such reference:

• Increase the gain if the gate stops too far from reference,

• Decrease the gain if the gate fails to stabilize near the reference.

IMPORTANT   If the values of the position are reversed, the position of the sensor should be reversed.

7. Press Gate Calibration, to calibrate the gate;

8. Tap ▶ Next so that the gate is closed.

4.3   Exporting and importing data

Data transfer between the Ti5 and a USB flash drive is made by the menu Settings - Files.

01 Transfer Ti5 for USB Flash Drive.

02 Transfer USB Flash Drive for Ti5.

03 Delete files stored on Ti5.
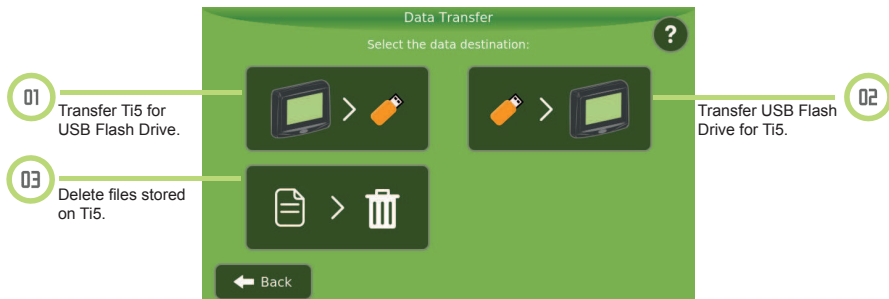
4.3.1   Transfer Ti5 for USB Flash Drive

To export the data with field information stored in Ti5 for USB flash drive, follow these steps:

1. The USB interface is located at the bottom rear of Ti5.
   Insert a USB flash drive compatible the USB port.
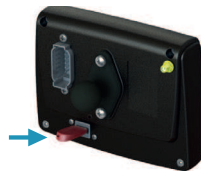
2. Touch the button ![export icon] Export to USB.

3. Select the type of data to be transferred: Operation Map or Prescription map.
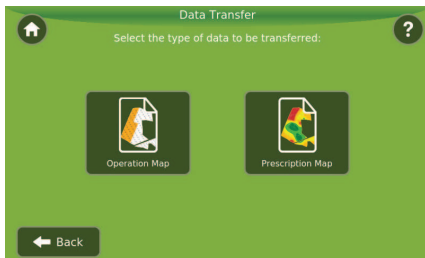
Operation map: Map containing information collected by Ti5 such as seed sensor line to line, date and time of GPS, tractor error in relation to the guide, application of seeds, fertilizer, liquid, application wide, tractor speed, alarms, data collection once per second and more.

Prescription map: Maps with application recommendations.

4. When selecting **operation map** is listed items that can be transferred. Choose one item or more and press ✔ OK.
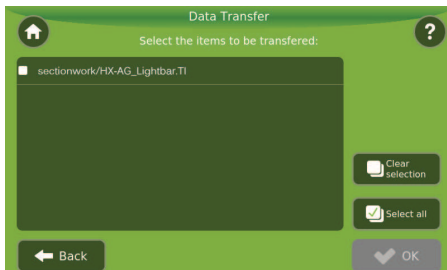
5. On the next screen are offered the options to export data. Operation map data can be exported in the following formats:

- Ti (SAIG) files;
- Google Earth kml files;
- shapefile shp, dbf, prj and shx files.

It is possible to select more than one format for export.

6. After selecting the desired formats press ✔ **OK**.
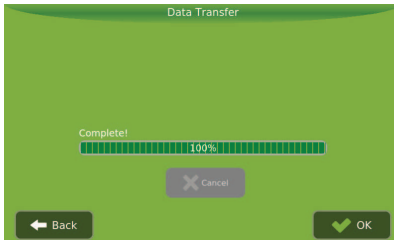
7. Press ✔ OK again to complete the process.

You can also export the prescription maps. In this case, follow the procedure below:

1. Press Prescription Map;
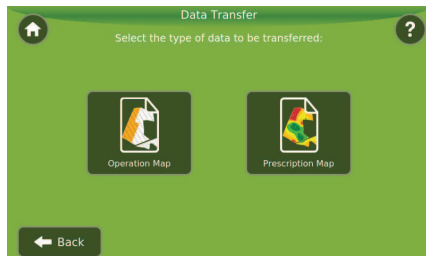
2. Select the map to be downloaded and press ✔ OK;
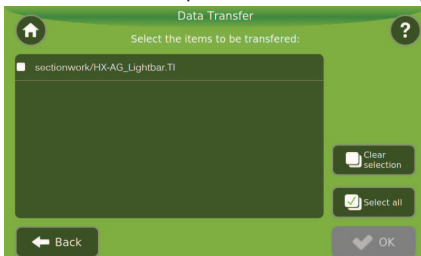
3. Wait for the transfer and press ✔ OK.

4.3.2 Transfer USB Flash Drive for Ti5

To import the data tored in the USB Flash drive for the Ti5, follow these steps:

1. The USB interface is located at the bottom rear Ti5. Insert a USB flash drive compatible the USB port.

2. Select Import Files the pen drive for Ti5.

3. Select the type of data to be transferred: Operation Map or Prescription map.
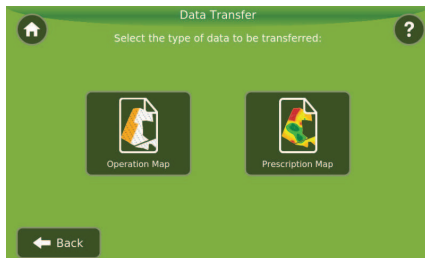
| (i) **IMPORTANT** | Importing the Operation Map used to load maps for simulation. |

4. Select the map to be downloaded and press ✅ OK;
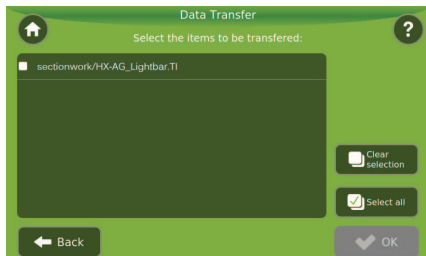
5. Wait for the transfer and press ✅ OK.

4.3.3 Ti5 delete data

To delete Ti5 data come into File menu and select "**Delete Files**."
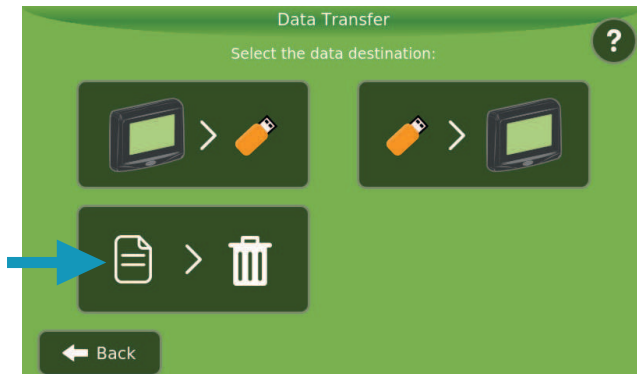
1. Select the type of file you want to delete in map application or recommendation map.
2. Select the item and press ✔OK.
3. Wait for the progress and press ✔OK.

4.4   Settings

On the settings screen general system data are available.

Settings		
About	System module: ADVANCED	Network troubleshooting
Language & Region	Password change	Activation
Support	Storage module: Unique	Firmware Update
External button: Pilot	Enable Network	
	Ok	

Buttons
Advanced mode
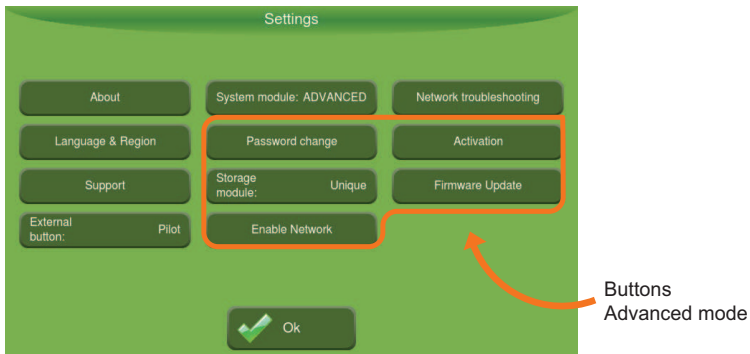
4.4.1 About

It informs the version of the Ti5 software, the temperature of the processor (CPU) and the screen (LCD) and brings information on the GNSS data.
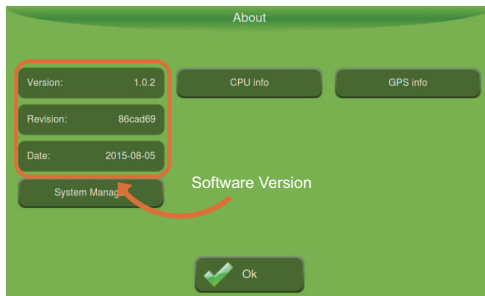
4.4.2 Language and Region

In this screen, it is possible to choose the language of information visualization in the Ti5. To select the language, touch the language and region button.

1. Select the language desired.
2. Press OK.

For time zone specified in Time Zone:

Press + and - to inform local time. Each touch changes the offset of the time by 15 minutes from the UTC (Coordinated Universal Time).

In theme, you can select the maps, trace and overlap colors.
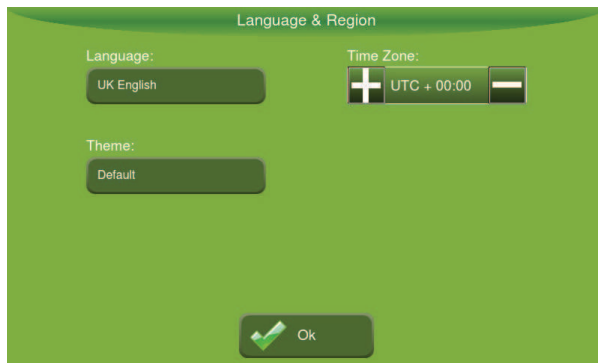
4.4.3 System Module

Allows modifying the mode by entering the password for normal or advanced.
Normal: Level where the end user has access only to the basic functions of operation. It is the level dedicated to the operator.
Advanced: Allows access to advanced settings and implement issues. It is the level dedicated to the technician.

4.4.4 Support

Access to the installation configuration, settings and advanced tests for specialized technicians.

4.4.5 Network Troubleshooting

Display of drivers connected to the CAN network

Commands	Description
OK	All function drivers are connected.
NC, X	Function driver number X is not in the network.
EX, X	Spare Driver X in the network.
Conflict	Two drivers with the same address.
Not installed	Implement does not require this type of driver.

Net diagnose

Titanium	
Controler	NOT INSTALLED
Deep	NOT INSTALLED
Sprayer	
Gate	NOT INSTALLED
Auto Steering	NOT INSTALLED
Planting Monitor	NOT INSTALLED
Transport	WAIT
Machine Monitor	NOT INSTALLED
Cutting Section	
Logic Controler	NOT INSTALLED

Restart

Device info

Ok
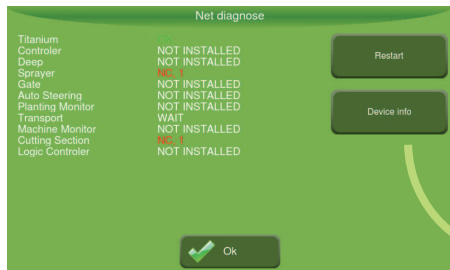
01 Clears the address of all devices connect-
ed to the CAN.

02 Checking of the FW version.
Checking of the Power Supply voltage.

Device info

Device	Version	Auxiliary power
Controller	48.00.00	11,7 V

Ok
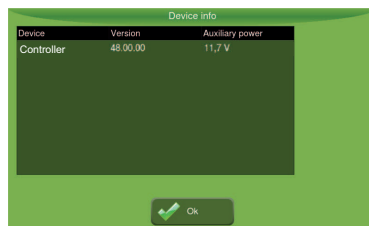
The information of the table below is available only for users in advanced system module:

Information	Description
Password change	Allows you to change the password of access to the Advanced Mode.
Storage module	Single - A single file per section of work. Diary - Splits per day of operation.
Activation	Enter the activation of new implements.
Enable network	Enables Remote Connection (3G or GPRS)
Firmware Update	Drives software update. Available only for skilled technicians.

5   Guidance
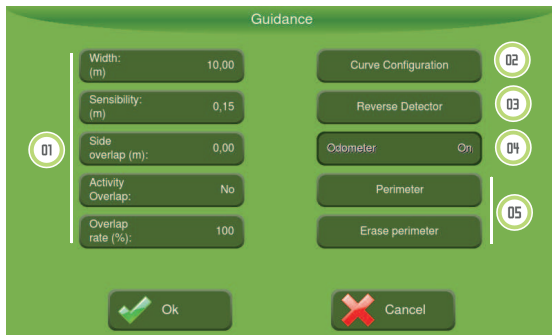
Navigation aid systems allow for the economy of inputs and better use of the work area, once they minimize overpassing during application of inputs and treatment of culture.
Feature the following working precision by up to 95% of the time:

Use this configuration	For
GNSS L1 - GPS+Glonass	28 cm (passages up to 30 min.)
GNSS L1/L2 - GPS+Glonass	15 cm (passages up to 30 min.)
GNSS L1/L2 with TerraStar	4 cm (absolute)
RTK	2 cm (absolute)

5.1   Setting

The setting for guidance is available in the Settings Menu Guidance button.

5.1.1   Parameters

To change the value of a parameter, field 1 of the figure above, press the desired option, and then type the value in the window.

5.1.1.1 Width

Indicate the value of the width of the passing according to the implement selected.

5.1.1.2 Sensibility (m)

Specify the deviation necessary to light an LED guidance.
This value is associated with the 5 LEDs of the central position of the guidance. For other LEDs, the on-board computer divides the remaining width value passing between each of the LEDs. To:

- increase sensitivity, decrease spacing;
- decrease sensitivity, increase spacing.

Example: to enter a sensitivity of 15 cm type 0.15.
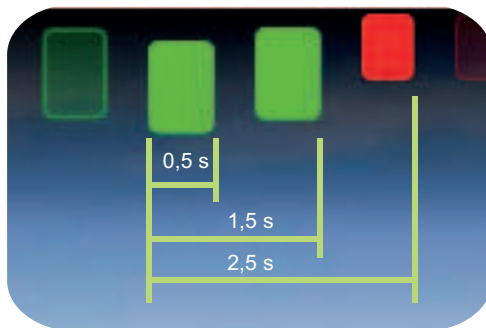
5.1.1.3   Side overlap

Overlap application (remount). Mainly used in the sprayer implements.
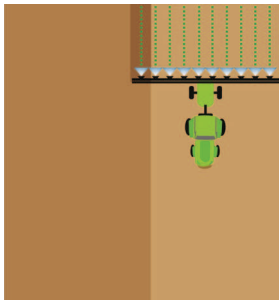
5.1.1.4   Activity Overlap

Apply again in area already applied, overlapping the activity on application map.

5.1.1.5   Overlap rate (%)

Apply the percentage of overlap necessary for the implementation or a section to turn off automatically.
For example: To put the overlap rate in 50% and the section having length of 4 m, when superimposing over 2 m, this section will be switched off.

Overlap rate 100%

Overlap rate 50%
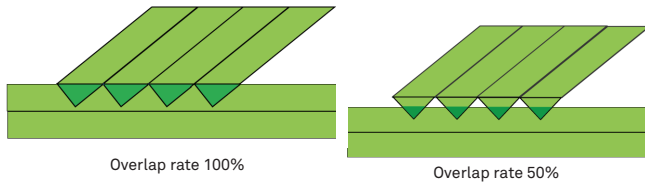
5.1.2 Curve configuration

5.1.2.1 Maneuver Detection

The maneuver detection is the point at which the system detects that the agricultural vehicle has reached the end of the row. To indicate this maneuver, the operator must turn the tractor more than 90 degrees indicating that it is coming back.

Enter the Delta angle (degrees) and the distance in meters between lines so that the onboard computer finalizes the capture of an adaptive curve (detects the movement of U at the end of the row).

For example, as shown above, the Ti5 will consider that the operator has completed the capture of adaptive and will generate new rows based on the new reference, so the tractor direction ranges over 100 degrees (Delta angle) in the last 15 meters of displacement (Distance).

5.1.2.2 Adaptive Detection

In adaptive detection, the operator enters the parameters used to start capturing a new adaptive curve. For example, using data from the figure above, so the operator travels a distance higher than 5m (distance) with an error higher than 0.30m (Error), the Ti5 will start capturing a new adaptive.

5.1.2.3 Curve Detection

Parameter to filter (pilot navigation) and smooth the curve obtained.

Between points

In the detection of curves between points, the onboard computer performs a pre-filtering of points obtained upon acquisition of the curve. The operator enters the minimum distance between the two points. In the figure above, Ti5 will use only the points captured every 3m to generate the reference curve

Spline Points

Softens the final trajectory inserting intermediate points on the curve to be displayed to the operator. This parameter does not affect the driver's behavior; however, raising it brings in a greater load on the processor and slowness in the calculation of parallels. Recommended value 3.

Curve Filter

The curvature filter serves to soften the curvature in the control of the pilot. If the value used is 1 m, for example, the curvature used in control will be the average of the points 1 m forward from the current position.

Minimum radius

The minimum radius is the smallest radius that can be done comfortably without causing damage to the Vehicle or implement. In this field you can enter the value of the radius more suitable to your Vehicle.

For example, in generating a new curve, if it has a path with a radius lower than indicated, Ti5 soften the affected region to make it it driveable by the pilot. If you wish to disable the function, you can put zero in this parameter.
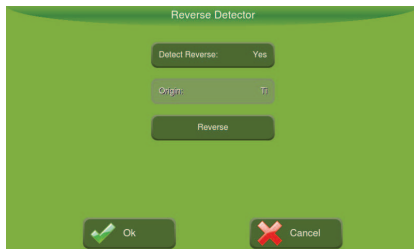
5.1.3 Reverse Motion Detection

Enable this feature so that Ti5 detects automatically when the tractor is in reverse.

ⓘ **IMPORTANT**   It is recommended to keep this option active for the correct marking of the trace and so the auto pilot functions well after a reverse.

In the Operation screen, while Ti5 is detecting reverse, a button with a red arrow downward indicating the reverse detection will be available. If the tractor is moving forward, not backwards, the operator should click this button to make this indication.
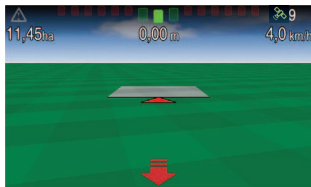
When starting a movement forward, a green up arrow indicating this movement will appear. This arrow will be available for 10 seconds.

WARNING

Press the icon ⬛ to indicate the correct movement if the tractor is moving backwards not forward.

The occurrence of a false move is more common to the first GNSS timing or after a long period stopped of the tractor. But it can happen even with the moving tractor.

5.1.4   Odometer

The operator enters the maximum distance and the point at which they want to receive the alarm. The system shows the progress of distance and alert when is near the maximum limit thereof online. It can be used in other operations or as a simple odometer.

To enable the function leave On in the Guidance menu.

5.1.5   Perimeter

For selection of perimeters already saved, press the Perimeter button and select the desired area.

To clear the perimeter , press the erase perimeter .

5.2   Types of guidance

IMPORTANT   Before starting the operation, it is IMPORTANT to verify if the dimensions of the Vehicle and implement are correct.

WARNING   For the Guidance to work correctly, it is needed to verify if the GNSS is presenting the correct operation. Do not start while the alerts "Synchronizing GNSS," "GNSS without communication," "DIFF" are shown, or with number of satellites below 4.

Types of guidance serve to define a row in the field. The Ti5 operates in:

- Line A–B;
- Line A+Angle;
- Parallel Curve A–B;
- Adaptive Curve;
- Pivot.

5.2.1   Parallel Line A–B

The linear trajectory A-B is used to define a row in the field in which all work rows will be parallel.
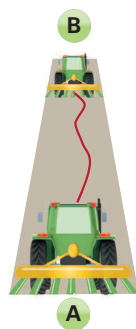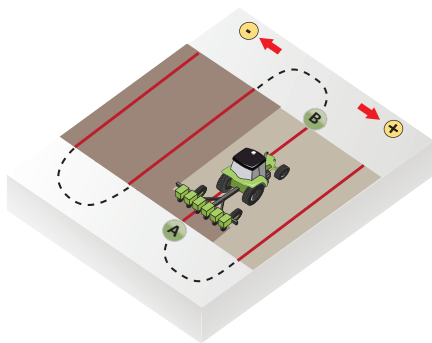
WARNING   The linear trajectory must be set before the self-direction is used.
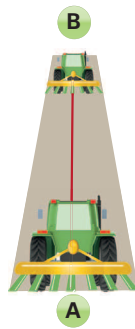
Configuring path points

1. On the operation screen, tap the button 📱 **Guidance**;
2. From the submenu, select the trajectory mode as ||| **Linear**;
3. Position your Vehicle in the field about the point where you want to start and press 🔵 **Point A** to mark the beginning of the row;
4. Drive to the desired end point in the field and press 🔵 **Point B** to mark the end of the trajectory. The shortest distance between the route points A and B is 30 meters.

At the end of this procedure it is created a reference row 0 (zero) and parallel rows to both sides. Rows on the right will be positive (+) and the rows on the left will be negative (-). Consider point A is behind the tractor and point B ahead of it.

Even if between point A and B do not cross a rectilinear path, references to this guide are taken only from two points made.

Traveled path

Read guide Ti5

5.2.2   Line A+Angle

The linear trajectory A + Angle is used to define a row in the field in which all rows of work are parallel and are defined through an initial route point and a defined angle towards north.

Configuring path points

1. On the operation screen, tap the button 🎛 **Guidance**;
2. From the submenu, select the trajectory mode as ▷Line A + Angle;
3. Position your Vehicle in the field about the point where you want to start and press ⓐ **Point A** to mark the beginning of the row;
4. Press button Ⓑ **Point B** and enter the degree. The reference row uses as a base the North-South row.
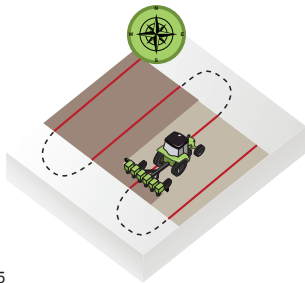
At the end of this procedure it is created a reference row 0 (zero) and parallel rowss to both sides. Rows on the right will be positive (+) and the rows on the left will be negative (-).

5.2.3   Parallel Curve A-B

The parallel curve A-B is used when you want to work with an area of soft curves. This keeps the exact path between points A and B, instead of creating a straight line. All the following guidelines will match the reference row, leaving visible only the reference row and the reference in which the tractor is passing.

Configuring path points

1. On the operation screen, tap button 🔠 **Guidance**;
2. From the submenu, select the trajectory mode as 〽️**Parallel curve**;
3. Position your Vehicle in the field about the point where you want to start and press 🔵 **Point A** to mark the beginning of the row;
4. Drive to the desired end point in the field and press 🔵**Point B** to mark the end of the trajectory. The shortest distance between the route points A and B is 30 meters.

Vehicle Front

B

A

Behind the vehicle

5.2.4   Adaptive Curve

The adaptive curve pattern provides guidance along the curve and updates guidance after each furrow considering any deviation that has been carried out. To record a deviation, it is required to be within the adaptive detection requirements in Guidance. It continuously records the path and provides guidance that is equal to the last path held.
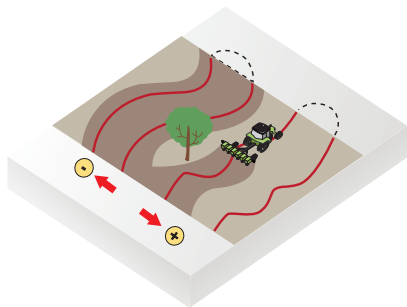
Configuring path points

1. On the operation screen, tap 📶 **Guidance**;

2. From the submenu, select trajectory mode as 〰 **Adaptive Curve**;

3. Position your Vehicle in the field about the point where you want to start and press 🅰 **Point A** to mark the beginning of the row;

4. Drive to the desired end point in the field and press 🅱 **Point B** to mark the end of the trajectory. The shortest distance between the route points A and B is 30 meters.

01

If the curve U is a distance less than 60% of the distance between lines, considered in the distance parameter in maneuver detection, TI5 considers the previous line, and does not draw new reference line.
To draw a new line press the point B. again

To set the curvature U enter with delta angle and distance parameters in maneuver detection in the Guidance menu..

02

If the error and Distance values are greater than the specified parameters in Adaptive Detection the reference line is disregarded and a new line is drawn.

5.2.5   Pivot

Use the pivot orientation mode in areas that use central pivot irrigation. With this pattern you can drive concentric circles around the central pivot.
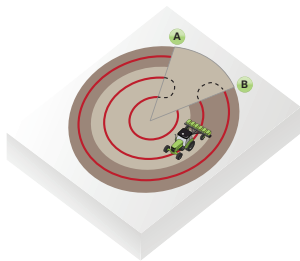
Configuring path points

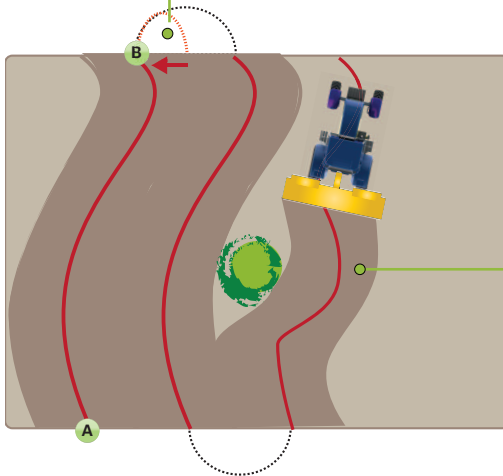1.   On the operation screen, tap ⬛ **Guidance**;
2.   From the submenu, select trajectory mode as ◎ **Pivot**;
3.   Position your Vehicle at the beginning of the curve trajectory;
4.   Click 🔵 **Point A**;
5.   Do a full turn and click 🔵 **Point B**.

5.3   Erasing the reference rows

The reference rows stored in the Ti5 can be erased simultaneously. Once erased these cannot be retrieved.

Procedure

1. On the operation screen, tap View;
2. From the submenu, select button Clear;
3. In the dialog box that appears tap to confirm the deletion or
4. Tap to cancel the operation.

5.4   Field offset

The field offset is used to move the row 2 cm each click, either to the left or to the right. It is recommended when it is necessary to make a fine adjustment on the row that may have moved.

Procedure

1. On the operation screen, tap the button **Guidance**;
2. Tap the type of the desired direction
3. Press the icon Field offset.
4. Press the arrows to the offset desired direction.

5.5 Re-aligne

The GNSS system is subject to variations of information. It is recommended to use the function Re-aligne when stopping operation for some time and if when starting the line doesn`t shown in the same location. Function Realign transfers the line about the point where the antenna/tractor is, aligning it with the guide (zero error).

Procedure

1. On the operation screen, tap 🖳 **Guidance**;
2. From the submenu, select button ↔ **Re-aligne**.

3.
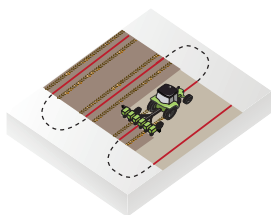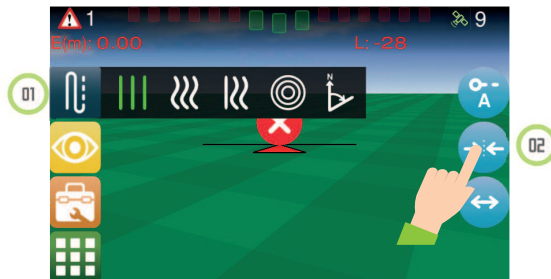
01   Tractor working over the row.
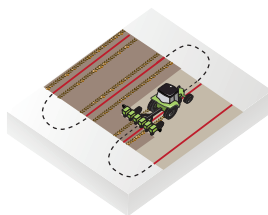
02   After a few hours, when start working the row is not in the same location (trace).
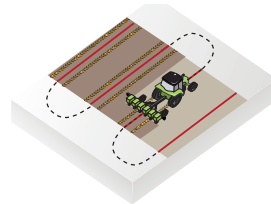
03   With the tractor on the right trace, press Realign so that the row comes back to be aligned with the tractor antenna.

6   Fertilization

The rate application process aims to equalize the soil nutrients and, with this, optimize the use of resources.

6.1   Configuration

3.   Enter the screen Settings and press button 🔧 Fertilization;

3.   If the equipment has more than one feeder, it will appear in tabs at the top (Input Box 1, Input Box 2, etc.) Do the settings of each input.

3.   On the Fertilization screen, choose the desired rate type.

Ferilization

Fertilizer Container 1

Fix rate (kg/ha): 500

Fertilizer Calibration: Insumo1

Ok

Prescription/Map

○ Fix Rate   ○ Variable Rate   ○ Map Fix Rate

map
recom
test

Dose 1: (Kg/ha)   500

Dose 2: (Kg/ha)   1.000
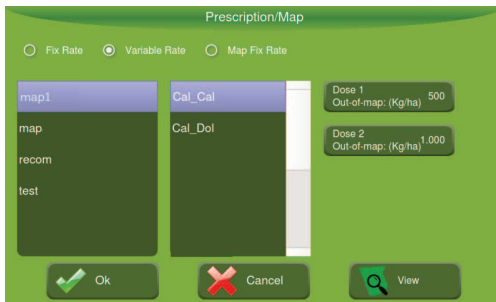
Ok   Cancel   View

6.1.1   Fix Rate

1. Fill the primary dosing in Kg/ha, that corresponds to Setpoint 1 in the lower bar of the Operation screen;

2. Fill the secondary dosing in Kg/ha, that corresponds to Setpoint 2 in the lower bar of the Operation screen;

3. Click ✔ *OK.*

6.1.2   Variable rate

1. Select the map;

2. Select the recommendation.

3. The inputs will be applied as recommendation of the map;

4. In order to visualize the map and Dosage, click on View.
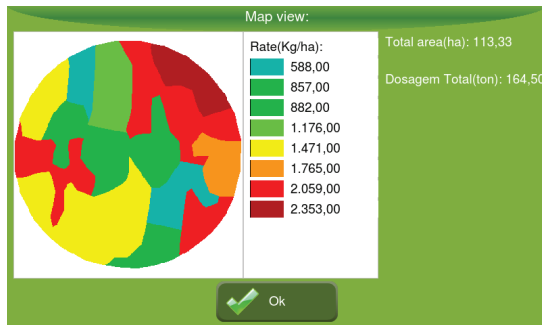
5. Enter the desired value in Dosage off the map (kg/ha) or enter "0" to cut the application; this value corresponds to the Setpoint 1 on the bottom bar of Operations screen;

6. Enter the desired value in a secondary Dosage off the map (kg/ha); This value corresponds to the Setpoint 2 in the bottom bar of Operations screen;

7. Click on ✔ Ok.

6.1.3 Map Fix Rate

1. Select a map;
2. Enter the primary dosage in Kg/ha; that corresponds to the Setpoint 1 on the bottom bar of Operations screen;
3. Enter the secondary dosage in Kg/ha; that corresponds to the Setpoint 2 on the bottom bar of Operations screen;
4. When the operation occurs inside the map this dosage is applied (independent of the recommendation of the map being different). When leaving the map the application will be switched off and there is no input application;
5. It is possible to use a map created by the Perimeter function on Operations screen > Activities.

6.1.4 Calibration

Select the input that will be calibrated and press ✖ **Conf**.

ⓘ **IMPORTANT**	Inputs can vary in size and/or density. Whenever possible there should be made calibration for any mode of operation (fixed rate or variable rate).

Procedure for fixed gate

ⓘ **IMPORTANT**	In tests using hydraulic motors of the implement, place the Vehicle with the motor in the rotation recommended by the manufacturer (i.e. 1,800 RPM on a tractor) so that it has a minimum flow of 48l/min. in the hydraulic system.

1. Adjust the time using the arrows to the right and left.

⚠️ **WARNING** Never use a time less than forty seconds.

2. With the tractor in work rotation and the hydraulic command triggered, press Start. Make sure the speed of the hydraulic motor is close to the reference speed (manufacturer is 150 RPM), with few variations.

3. The on-board computer will do a countdown of time and will automatically shut off at the end of the countdown. With the aid of a suitable scale, enter the weight of the material collected in Kg.

Calibration procedure for 2-stage and multiple gates
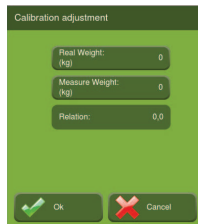
1. Mark the Multi-Calibration field with a "v";
2. Select Low gate and enter the desired time for collection;
3. With the tractor in work rotation and the hydraulic command triggered, press ▶ **Start**;
4. Collect the input and weigh it with the aid of a suitable scale.
5. Enter the weight in the Ti5;
6. Select High gate and redo the above steps;
7. Click OK and check the speed ranges for minimum and maximum recommendations of the map.

Fine-tune of input calibration

For calibration correction a fine-tuning can be made.

Procedure

1. Clean the weight and area accumulated on the screen Operations > Short-cuts > Cleaning;
2. Apply a known quantity of input;
3. Enter the actual weight (weight of the amount of input applied);
4. Enter the weight reading on the monitor (total weight of the input marked in Input on the operation screen);
5. Reapply a known quantity of fertilizer, and verify if the weight applied is close to the total input read by the monitor (+/- 5%). If not, redo the above procedure.

1. In the Fertilization screen, click on Input Calibration.
2. Enter a dosage in Kg/ha.

After calibration, insert the minimum dosage and the maximum dosage of the selected map to check the operating speed range (km/h) that the system can operate.

6.2   Operation

6.2.1   Start operation

Press button in the center of the screen to start the operation.

The suspended operation button only starts to operate as soon as you meet the following requirements:

- The implement moves;
- is above the cutting speed; and
- within the operating speed range.

Once met the requirements, the application will start automatically and the trail will be drawn.
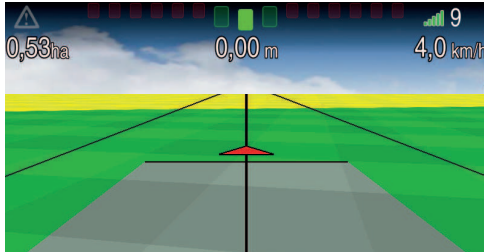
To aid in the operation, the system offers bottom bars with some features. To access them, drag your finger in the direction from the bottom up. In the first movement the bar with the sections will appear. When there is only one section of this bar does not appear. In the second stage, the second bar with the lateral movement to the right will appear odometer functionality.
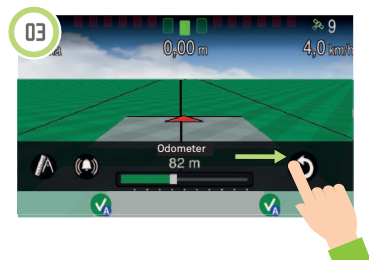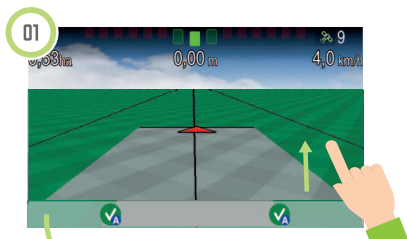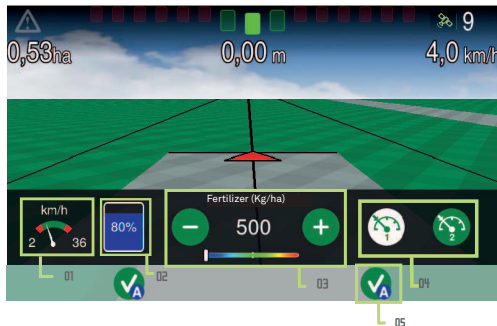
The bottom bar presents the following functions:

01 km/h

The pointer shows the recommended operating range for the speed (green) as well as the maximum and minimum limits for the application (red).

02 Tank Level

The user configures in liters or kilograms how much fueled the machine and the system deducts what has already been applied, indicating the current level of the tank. When the value falls below 10%, the tank is in red as a warning. To put a new value in liters or kilograms, press on the tank level icon.

03 Central Menu

The recommendation appears in kg/ha. It can be changed in real time via side menu "-" and "+". The decrease is 5 kg / ha. The range below the number indicates how much is being applied.

Fertilizer 1 (kg/ha)

− 500 +
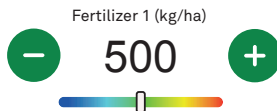
The range center is the value of the recommendation. When the indicator is more to the right, the implement is applying more than recommended and when is more to the left, less than recommended.

04 Setpoints "1" and "2"

Configurable through Fertilization menu give access to predefined doses by the user. It is possible to switch between the two whenever needed, simply press on the desired recommendation.

05 Sections

The sections may present the following status:

Icon	Description
	Off manually
	On automatically
	Off automatically

Odometer function
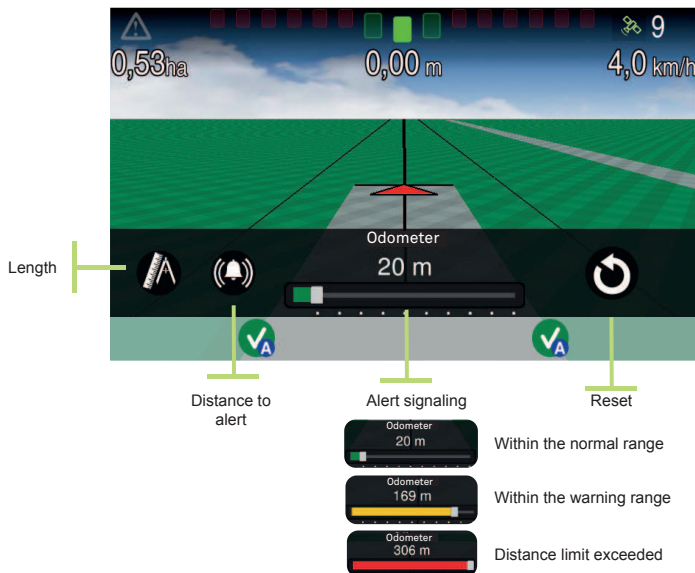
Length

Distance to alert

Alert signaling

Reset

Odometer 20 m	Within the normal range
Odometer 169 m	Within the warning range
Odometer 306 m	Distance limit exceeded

7.2.2   Suspend application

To suspend the application, press the center of the screen. The suspended operation button will appear in the center of the screen confirming the cessation of input application. During the period in which the operation is suspended the trail is not drawn on the map.
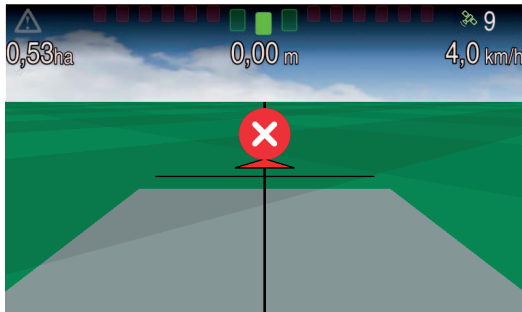
IMPORTANT   It is possible to suspend the operation using one button or a pedal.

7   Spraying

The spraying implement performs automatic control of the spraying bars, minimizing overlap in the input application and makes automatic control of the applied flow, ensuring the recommended doses, even with variations of the engine operating speed. Also, it does the automatic closing of the section, avoiding the excess spraying.
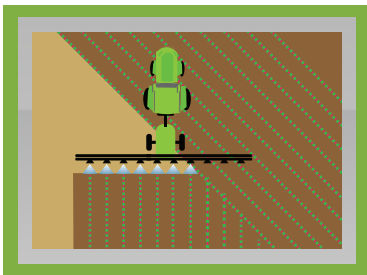
7.1   Configuration

IMPORTANT   You can only enter the Settings by selecting the implement Sprayer or Planter which applies liquid pesticides.
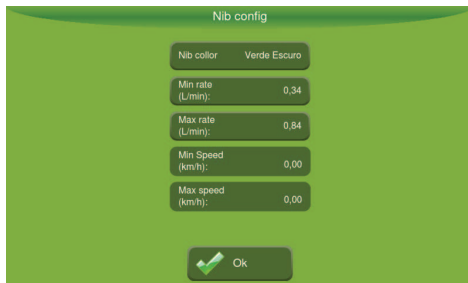
If the equipment has more than one feeder, it will appear in tabs at the top, being required to make a setting for each one.

7.1.1 Map/Recommendation

Check instructions of item 6.1.

7.1.2 Nib Configuration

Through the specifications of the nib manufacturer, insert the fields color, minimum flow and maximum flow.

IMPORTANT More Settings are available in the Implements Menu > Test > Spray Simulator and Flowmeter Calibration.

7.2   Operation

7.2.1   Start operation

Press the button in the center of the screen to start the operation.

The suspended operation button only starts to operate as soon as you meet the following requirements:

- The implement moves;
- is above the cutting speed; and
- within the operating speed range.

Once met the requirements, the application will start automatically and the trail will be drawn.

On the operation screen, choose appropriately the information you want to have on the screen.
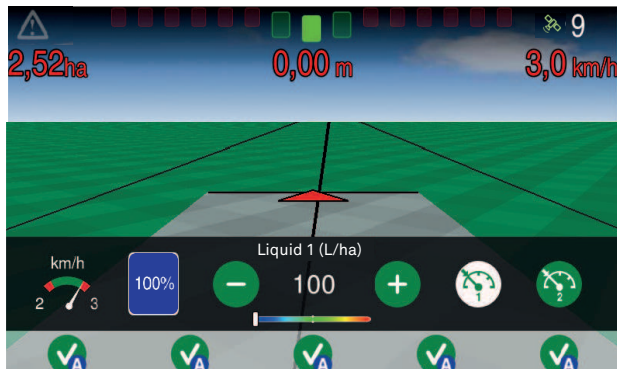
To see the spray bar at the bottom of the screen, drag from the bottom to the top. On the side click on and to ⊕ increase or ⊖ decrease 5 L/ha the dosage.

For knowledge of the functionality of the other buttons, check item 6.2.1

7.2.2   Suspend application

To suspend the application, press the center of the screen. The suspended operation button will appear in the center of the screen confirming the cessation of input application. During the period in which the operation is suspended the trail is not drawn on the map.
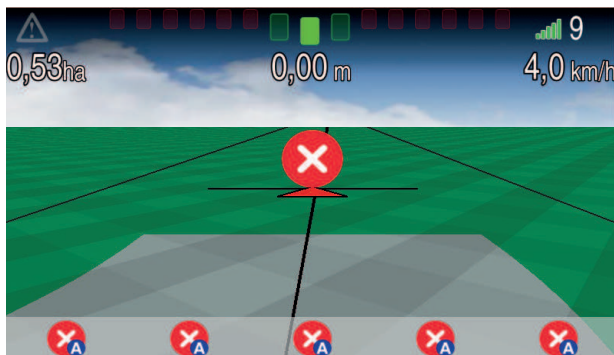
IMPORTANT   It is possible to suspend the operation using one button or a pedal.

7.2.3   Section Control

Shutdown and automatic activation of the sections is done to the extent that the sprayer goes into applied and non-applied areas, respectively. When a section overlaps the above percentage configured, it turns off automatically. When a section is not overlapping anymore the application is connected automatically.

Manual shutdown of sections

By dragging your finger on the inside of the screen to central direction, it opens a bar showing the sections and the situation of each.

In the figure below, the right section was turned off manually showing the symbol X. The other sections are functioning normally.

8   Planting

The monitoring system of planting allows for seed saving, avoiding failures and excess applications. In addition, it improves the utilization of the working area, bringing gains to culture because it enables the application of techniques of precision farming.
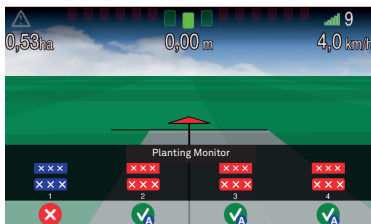
The system has the following characteristics:

- Population measurement (above and below the recommendation);

- Monitors up to 96 rows of seed or fertilizer;

- Failures and reduced duplication;

- Planting with variable rate;

- Elimination of excess planting;

- Control of different products (1 seed and 3 inputs);

- Improved calibration (set simply and quickly);

- Automatically opens and closes the clutches of the planter or disables the hydraulic motors driving the rows.

8.1 Configuration
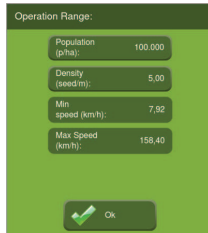
ⓘ IMPORTANT   You can only enter the Settings by selecting the Planter implement.

Fields	Description
Map	Check instructions of item 6.1.
Population	When activated the fixed rate the population can be inserted directly (p/ha) or through the field Density (seed/m), being automatically calculated the Spacing (cm/seed).
No. of seeds on disk	It is the value for the filling of holes of the feeder disc.
Wheel circumference (m)	It is the value used if the speed is calculated through the wheel of the tractor or implement and not by GNSS.

Operating range

Enter the minimum and maximum population values of the recommendation map selected and check the minimum and maximum speed for operation. At the time of operation it will only be applied within the range shown.

8.2   Operation

8.2.1   Start operation

Press the button in the center of the screen to start the operation.

The suspended operation button only starts to operate as soon as you meet the following requirements:

- The implement moves;
- is above the cutting speed; and
- within the operating speed range.

Once met the requirements, the application will start automatically and the trail will be drawn.

To see the display bar at the bottom of the screen, drag from the bottom to the top. On the side click on ⊖ and ⊕ to increase or decrease 5 L/ha the dosage.

For knowledge of the functionality of the other buttons, check item 6.2.1

8.2.2   Suspend application

To suspend the application, press the center of the screen. The suspended operation button will appear in the center of the screen confirming the cessation of input application. During the period in which the operation is suspended the trail is not drawn on the map.
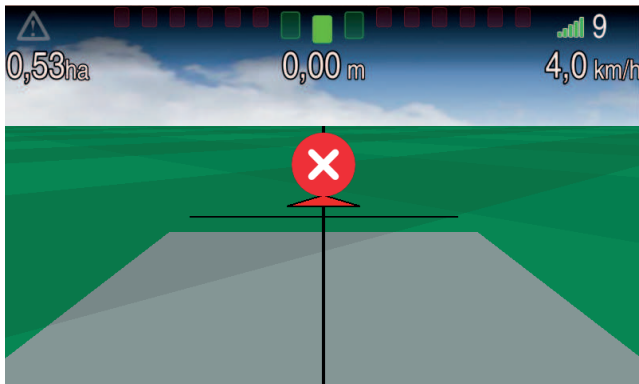
IMPORTANT   It is possible to suspend the operation using one button or a pedal.

8.2.3   Planting Monitor
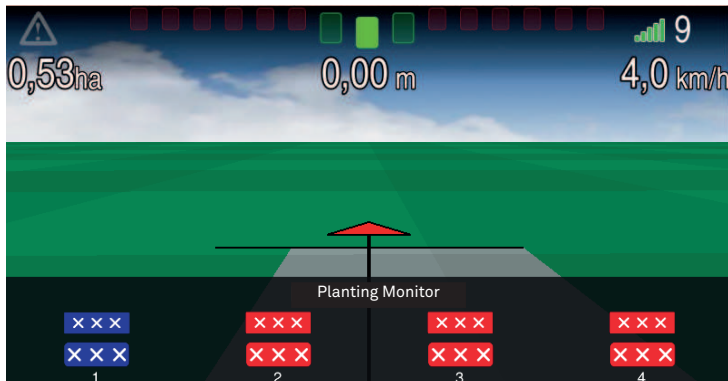
Sensor adjustment

To adjust the sensor check the procedure for Planting Sensors, described on page 43.

Preview

On the Planting screen it is possible to choose which of the Plating Monitor pre-view modes will be used: Standard or advanced.

In Standard mode by dragging your finger from the bottom to the center the planting monitor bar appears, as shown below.
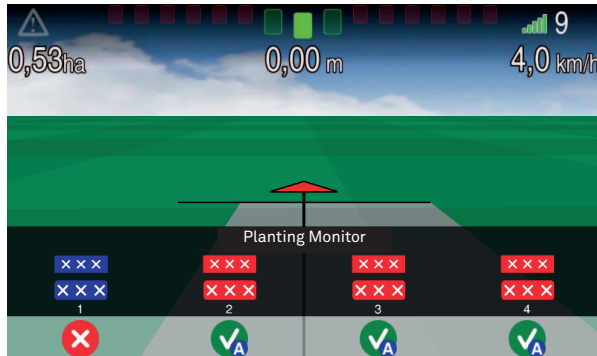
Each section is indicated by the number and its icons, whose meaning is now described on page 117.

In standard mode planting monitor screen, the icons may be displayed as follows:

Square edges
Fertilizer

Round edges
Seed

These may have the following filling of colors:

Color	Meaning
Red	It's not applying. With problems
Blue	Suspended operation.
Green	Normal application

For the status indication of each row, the following icons may be visualized:

Icons	Meaning
	All rows are applying normally;
	All rows are not applying.
	One or more rows are not applying. For more information, press the icon.

In the advanced mode, the bars are visualized, which increase or decrease according to the density that it is being applied in each row due to the recommended one.
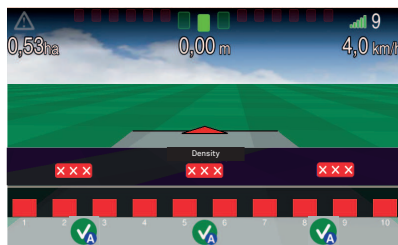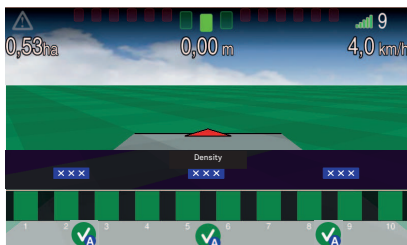
The green color indicates that the population is within the recommended and the red color is below the recommended.
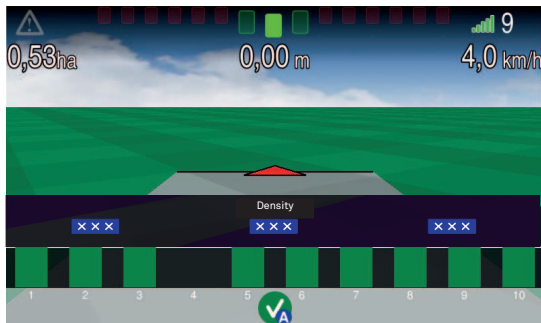
When one of the bars does not show up in the screen, there is indication of failure of density in one of the rows.

Tolerance

Enter the values of tolerance desired. For Standard view, the tolerances are considered by 30% regardless of the saved values. For view in advanced mode, the tolerances are considered according to the information entered.

8.2.4   Section Cutting

Automatic Shutdown and Starting

The automatic shutdown and activation of the sections is done in so far as the planter goes into applied and non-applied areas.

Action	Motive
Automatic Shutdown	Section overlaps the configured percentage.
Automatic Activation	Section is not overlapping.

9   Technical Features

Monitor Data
Material: LCD Screen 5 ", 800X480 pixel, 16M colors touch screen
Dimension: 162X125X45mm
Weight:: 1000g
Supply voltage: 12VDC
Lightbar: 0,6A

Environmental Specification
Operating temperature: -20 to +60 [°C]
Storage temperature: -30 to +80 [°C]
Protection degree: IP67
Humidity: Up to 95%

Interfaces
CAN: 1 x Rear
USB: 1 x Rear
RS-232: 1 x Rear

Receiver
Channel Settings: 14 GPS L1
Horizontal position accuracy (RMS)
        Single Point L1: 1,5m
        SBAS (GPS only): 0,7m
Measurement precision (RMS)
        L1 C/A Code: 5cm
        L1 Carrier Phase: 0.6mm
Data rate
        Measurements: Up to 10 Hz
        Position: Up to 10 Hz
Signal re-acquisition: < 1.0s (typical)
Time accuracy: GPS 20ns RMS
Velocity accuracy: < 0.05m/s RMS
Velocity: < 515 m/s
Antenna LNA power output
        Output Voltage: 5 V (nominal)
        Maximum Current: 100 mA

10   Troubleshooting

Problem	Solution
Ti5 won't turn on	**Check:** Power supply; Fuse; If the connections are firmly fixed; If the cable is not broken (do test with multimeter to check the voltage).
Problem with GNSS	Verify if the GNSS is in area with sight to the sky. In covered areas the signal is very low and cannot be located properly; Check the antenna cabling; Measure voltage of GNSS cable (5v); GNSS Port and Model correctly selected on GNSS menu.
Motor does not move	Perform testing and calibrations in Ti5; Correct hoses connections (pressure and tank); Check: If the command is fired to the right direction; If the operation is not stopped at Ti5; If the encoder is (flashing when turning), If it is below the cutting speed or the operation range.

Problem	Solution
Problems with map	Files SHP, SHX and DBF should be inserted in the same location as the flash drive; The map name cannot contain special characters and spaces; Avoid long name.
Problems in spraying	Perform calibration and simulation; Check the filter; Check valve and flowmeter cabling; Be sure it is below the cutting speed limit and the operation range.
Application failure on input and output of copings.	Verify if the distances of the antenna-pin and pin-implement are correct.
Problems with the pilot.	**Check** The reservoir oil level; Leaks; The pilot driver fixing; Direction sensor.

11 Glossary

CAN
The Controller Area Network is a network of internal communication that intercommunicates components within the Vehicle. It must guarantee delivery of messages, lack of conflicts between messages, minimum time for delivery, low cost and ability to operate reliably in a magnetic field environment.

DIFF
Diff is a method of correction of GNSS positioning. Without DIFF the pilot may not operate properly.

GNSS
The global positioning system is a satellite navigation system that provides a mobile receiver apparatus its position.

Latitude
The Latitude is the angle between the plane of the equator to the reference surface. The latitude is measured North and South from the equator, between 90° South, at the South Pole and 90° North,

Longitude
The longitude is measured along the Ecuador, and represents the distance between a point and the Greenwich Meridian. It is also measured in degrees, and goes from 0º to 180º degrees East or West.

L/ha
liters per hectare.

L/min
liters per minute.

Pl/ha
Plants per hectare.

PPL
Pulse per liter.

PPS
Pulse per second.

Pulse
Electrical information provided by flowmeter.

Ratio
In the inputs it is the weight ratio applied on the hydraulic motor RPM. On spraying it is the number of flowmeter pulses on liters.

RPM
Revolutions per minute supplied by the hydraulic motor sensor.

Section
Set of nibs of the spray bar or the planting/fertilizing lines
which can be disconnected or connected simultaneously.

Attachment A – Certificate of Warranty

Product description

Precision Farming Hexagon Agriculture Ti5.

Warranty

1. The Hexagon Agriculture ensures the proper functioning of the above products and which it markets, pledging to make in the period of twelve (12) months, as comprised by three (3) months of legal guarantee in addition to the nine (9) months offered by contract from the date of issuance of the respective invoice, repairs and replacements of parts and materials that present manufacturing defect checked under normal use and to the purposes for which they are intended, being responsible for the cost of parts to be replaced as well as by its manpower, falling back to the buyer the cost with the transport of technicians and/or send/return of the part for repair.

* Except for whips, sensors and connectors, where the term is 3 months.

1.1 Any defect that may be found in the product shall be immediately reported to the manufacturer, and such notification is formalized by electronic mail via the address comercial@hexagonagriculture.com and support@hexagonagriculture.com.

1.2. This Guarantee Agreement shall be submitted together with the relevant invoice, which will integrate it for all purposes and made.

Warranty Exclusion

2. The responsibility of Hexagon Agriculture will be deleted when:

a. There is removal/alteration of the serial number or product identification label;
b. Any removal of product seal;
c. The product is connected to a voltage different from that laid down in the installation/operation manual;
d. The product is put up in inappropriate place, at odds with the rules laid down in the installation/operation manual;
e. The product is used in violation of rules laid down in the installation/operation manual, or even for purposes other than that to which it was intended;
f. fThe product has suffered any kind of accident, provided that such claim is not due to the defect.

Warranty Limitation

3. The hereby granted warranty does not extend to damages and/or malfunction of the product identified above, when the following assumptions are met:

a.   Use and/or operation in disagreement with the operation manual;

b.   Scratches, cracks, dents, deformation and/or any other damages resulting from accidents during transport or handling;

c.   Failure to care for cleanliness and lubrication provided in the instruction manual, including the use of materials and chemicals not recommended by Hexagon Agriculture;

d.   Failure to send the installation sheet signed to Hexagon Agriculture;

e.   Operation with parts and dubious origin materials or of poor quality;

f.   Alterations, repairs, assembly/disassembly, facilities/uninstalls performed by persons or technicians not accredited by Hexagon Agriculture;

g.   Malfunction or failure due to problems of electricity supply;

h.   Use of improper package in shipment of the product for repair;

i.   Acts of God and force majeure;

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