

EFIX eSteer 20 USER MANUAL



Precision Agriculture | Oct 2024



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1.1 Copyright

1.1.1 Copyright 2023-2024

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1.1.2 Trademarks

All product and brand names mentioned in this publication are trademarks of their respective holders.

1.2 Safety Warnings

When using the EFIX eSteer 20 GNSS Auto Steering System, please observe the following safety warnings:

Before using the system, carefully read and understand the operating instructions in the user manual to ensure proper use of the system.

During system operation, strictly follow local traffic regulations and safety standards to ensure safe operation in safe environments and conditions.

Regularly check the condition and performance of the system and equipment when using the system to ensure normal operation and high-precision navigation performance.

Maintain concentration and alertness during system operation, avoid fatigue and distraction, and prevent accidents.

Avoid using the system in hazardous areas such as steep or cliff edges, water puddles, or muddy ground to prevent personal injury or equipment damage.

Stop using the system immediately and contact the system manufacturer or supplier for technical support and maintenance services when the system experiences abnormality or failure.

Protect the equipment from physical damage or weather factors when operating the system to ensure long-term stability and reliability.

Observe the relevant maintenance and upkeep requirements of the system and equipment during operation to prolong the life of the equipment and ensure normal operation.



Pay attention to the safety of the surrounding environment and other personnel when using the system to avoid accidents and stop the machine promptly to handle any abnormal situations.

The above is for reference only, and specific safety warning content may vary slightly depending on the device model and local regulations and standards. When using the EFIX eSteer 20 GNSS Auto Steering System, please carefully read and observe the relevant safety warnings and usage instructions to ensure the safety and normal operation of the system.

2 Introduction

The EFIX eSteer 20 user manual describes how to install and use the EFIX® eSteer 20 system. In this manual, "the system" refers to the eSteer 20 agricultural system unless otherwise stated. Even if you have used other agricultural products before, EFIX recommends that you spend some time reading this manual to learn about the special features of this product.

2.1 Technical Support

If you have a problem and cannot find the information you need in this manual or EFIX website www.efix-geo.com, contact your local EFIX dealer from which you purchased the system(s).

If you need to contact EFIX technical support, please contact us by email support@efix-geo.com

2.2 Disclaimer

Before using the system, please make sure that you have read and understood this User Guide, as well as the safety information. EFIX holds no responsibility for the wrong operation by users and for the losses incurred by the wrong understanding about this User Guide. However, EFIX reserves the rights to update and optimize the contents in this guide regularly. Please contact your local EFIX dealer for new information.

2.3 Your Comments

Your feedback about this user guide will help us to improve it in future revision. Please email your comments to support@efix-geo.com



3 Installation

3.1 Product Package

All components are into one box.

List of main components:

Device name	Model	Image	Quantity
Electric steering wheel	ESW-2	EFR PROPERTY OF THE PROPERTY O	1
Receiver	ESR-2	G. C.	1
Tablet	ESD-1 Pro	EFR ₂	1
Camera	X-MC011A	22.2	1
Ball holder			2
Double socket arm		=	1
Standard bracket			1



T-bracket		1
T mount kit (A&B)	B A A	1
Integrated main cable		1
Radio Antenna	-	1

3.2 Installation Steps

3.2.1 Steering system inspection

Before installation, please check whether the vehicle steering gear is normal, whether the dead zone (steering clearance) is appropriate.

Dead zone < 20°	Available range
20° <dead 70°<="" <="" td="" zone=""><td>Available to install NX610 but necessary to modify the dead zone to 10~30 degrees.</td></dead>	Available to install NX610 but necessary to modify the dead zone to 10~30 degrees.
Dead zone > 70°	Repair the vehicle first.

3.2.2 Original steering wheel removal

a) Remove the protective cover of the original steering wheel;





b) Stabilize the steering wheel, use the sleeve tool to loosen the original vehicle spline screws, and remove the original vehicle spline screws;



c) Pull out the steering wheel forcefully. If it is difficult to remove, it is necessary to strike the spline shaft to loosen it with a hammer and to be careful to avoid the steering wheel damage, or use of high quality puller tool to avoid damage on original steering wheel and shaft



3.2.3 Steering wheel installation

a) If the sleeve can fit the spline, please remove the protective cover of the steering wheel, place the sleeve in it, and fix the sleeve with M5*11 phillips screws (6 pcs);





b) Install T bracket or standard bracket on the motor with M5*16 hexagon screws (2 pcs);



c) Fix the T mount kit to the shaft with M8*60 hexagon screws (2 pcs);



d) Insert T bracket through T mount kit;





- e) Hold the steering wheel and tighten the spline screws with tools;
- f) Screw the T bracket to the T mount kit tightly with M10 nuts (2 pcs);



g) Finally shake the steering wheel, check whether it's tight, and check again whether the steering clearance is too large.

3.2.4 Receiver installation

- a) The receiver needs to be installed on the central axis of the vehicle roof as possible, and the installation direction should be parallel to the vehicle as possible;
- b) After confirm the installation position, wipe the roof clean and make sure the bracket installation is spotless;
- c) Adjust the receiver bracket to make sure the receiver is placed horizontally, also the receiver arrow must face forward.





3.2.5 Tablet installation

The tablet installation requires the ball base to be installed in locations as suggested shown in the picture, and avoid damaging to the original vehicle cables. Usually there are two kinds of installation methods to fix the mounting bracket.

- a. Drill more than 3 dovetail screws on the A-pillar or B-pillar to fix the ball base then install tablet with RAM bracket.
- b. Fix the ball base with U bolt on the tractor crossbar and adjust it according to the driver's habits.



c) After complete the installation, it is available to adjust the tablet to a suitable position;



Note: After installation, the vehicle is unmanned and the safe distance for use exceeds 40cm

3.2.6 Camera installation

The camera can be installed anywhere (within the wire harness length range).





3.2.7 Cables connection

Name	Cable diagram	Connection
Integrated main cable	A F	A → Receiver B → Motor C → Wheel angle sensor cable (Optional) D → Tablet Port E → Battery F → Camera G: Rocker switch

a) Wiring precautions

- When wiring, first confirm the location of the threading holes, and thread the wiring harnesses outside through the threading holes in sequence;
- When wiring, first arrange the outer wiring harnesses, then arrange the wiring harnesses in the cab;
- When wiring, pay attention to avoid high temperature, oily, sharp and abrasive areas, fans, exhaust pipes and other nearby areas;
- When wiring, keep a certain length to avoid over-tightening and loosening; the wiring harnesses layout should be smooth and cannot be twisted;
- When wiring, leave enough length in case of wheel turning to right/left all the way because the wheel angle sensor will rotate together with steer wheel;
- After wiring, cut off the extra length of cable ties. After complete the installation, please store the original vehicle accessories properly and clean up the garbage.

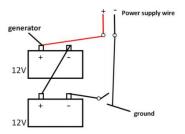
b) Electrical connection method and precautions

- Before connect to receiver, display, and steering wheel connectors, please connect to battery first to avoid damage caused by direct power-on or multiple power-offs;
- In the process of connecting the power cord to the battery, first connect to the



positive electrode then to the negative electrode;

- Pay attention to the use of the wrench when connecting the positive electrode, and it is strictly forbidden to bonding (when the wrench contacts the positive electrode of the battery, the other end of the wrench is strictly prohibited from touching any conductive items, especially the metal parts of the original vehicle);
- 12V / 24V battery, when using the original battery power supply, please connect the positive wire to the positive electrode and the negative wire to the negative electrode;
- 12V / 24V battery, when additional battery is connected in series, connect the positive wire to the positive electrode and the negative wire to the negative electrode of the other battery, as shown in the diagram below.





4.1 Power On

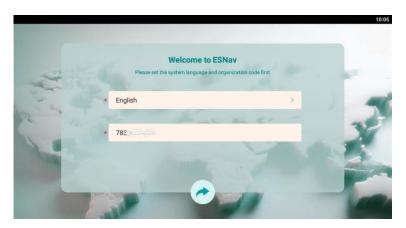
Press the orange button in 2 seconds, and the system will boot.

Note: Pls do not turn the steering wheel when turning on the system because the motor will initialize internally.



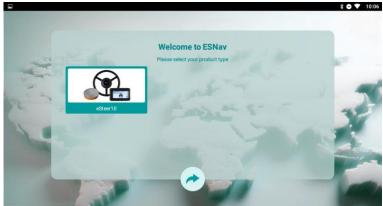
4.2 Boot guide

1. It is necessary to enter the corresponding dealer code and language to enter the software.

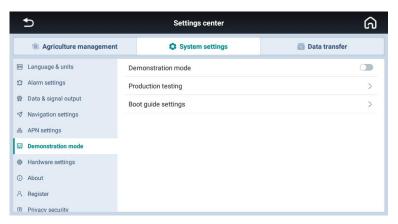


2. Select the corresponding navigation system, then it will be able to enter into the software.





3. If users want to change the dealer code, it is necessary to go to [Settings center -> System settings -> Demonstration mode -> Boot guide settings], then repeat the process again.



4.3 Software registration

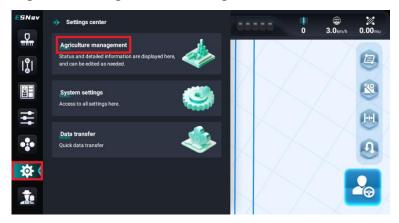
Go to [Settings center -> System settings -> Register] to check whether the software is registered. It is necessary to register [Software registration], [RTK] and [Auto steering] features usually, please contact EFIX technicians when it shows that they are Not activated and provide the tablet SN to get the online registration. Other features like ISOBUS, Cloud service are with additional charges.

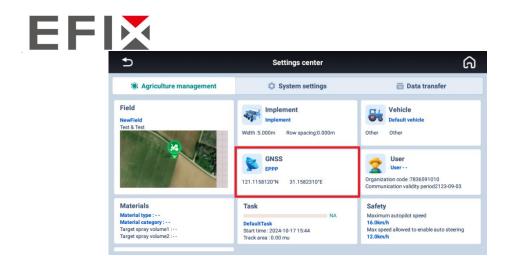




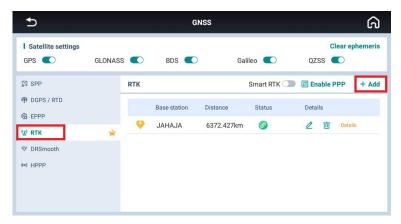
4.4 New GNSS Mode

1. Go to [Settings center -> Agricultural management -> GNSS]





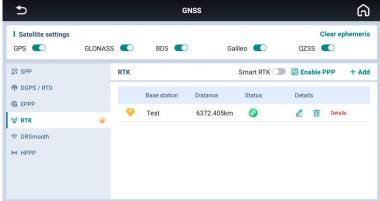
2. For example, please select RTK mode and add a new work mode.



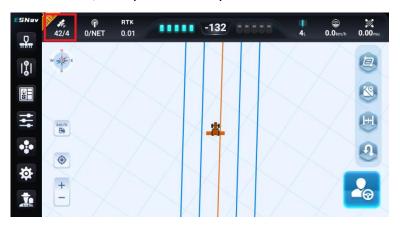
3. If CORS(NTRIP) protocol is selected, please make sure that the IP, port, source table, user name and password are typed correctly as local provider provided.







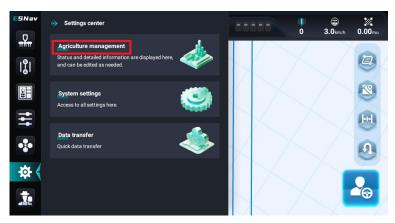
4. Go back to the main interface to check the status bar. When the GNSS solution is getting Fix with number 4 , the system is ready to use.



4.5 New Vehicle

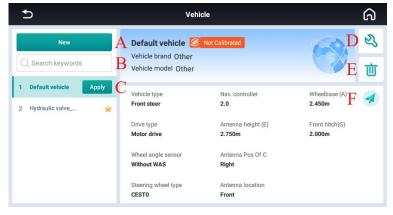
4.5.1 Vehicle selection

1. Go to [Settings center -> Agriculture management -> Vehicle -> New] to create a new vehicle.

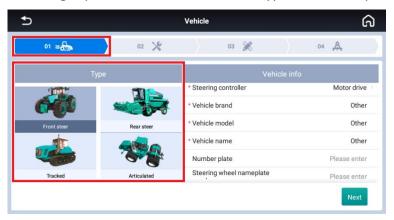






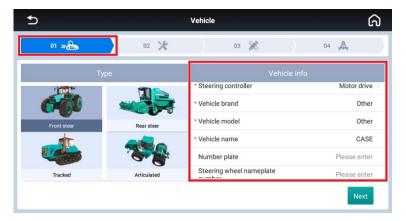


- A: Add a new vehicle.
- B: Quickly search the vehicle by keywords when there are many vehicles.
- C: Click to apply the vehicle.
- D: Edit the vehicle parameters.
- E: Delete the vehicle.
- F: Click to export the vehicle by the share code.
- 2. Select the tractor type including Front steer, Rear steer, Tracked, Articulated, Transplanter on the right part. Here take Front steer type as an example.

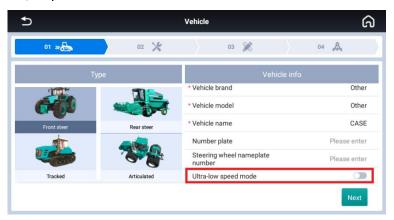




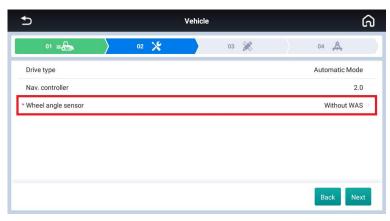
3. Select the steering controller including Hydraulic Drive and Motor Drive, vehicle brand and vehicle model.



4. Also Ultra-low speed mode can be enabled here as well, with supporting minimum 0.1km/h speed.

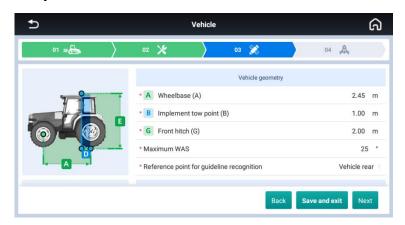


5. Go to next page to select the wheel angle sensor type which includes Potentiometer, GAsensor Device and Without WAS.





4.5.2 Vehicle parameters



Wheelbase(A): Measure the distance between front wheel rotation axis and rear wheel rotation axis. Note that the tape measure needs to be parallel to the ground.



Implement Tow Point(B): Use the default value of 0 and it will be used in the futural development.

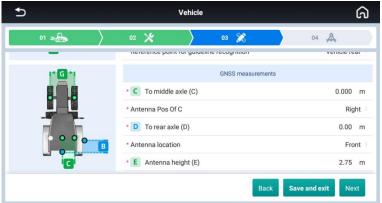
Front hitch(G): Measure the distance between the two front wheels.



Maximum WAS: The default is 25, which represents the maximum angle the vehicle can turn.

Reference point for guideline recognition: It is available to select vehicle head or vehicle rear.





To Middle Axle(C): If the receiver is not mounted on the central axis, measure the distance from the receiver to the central axis. If it is on the central axis, enter 0. In reality it is always better enter 0 and do the rest in assembly error calibration.



Antenna Pos of C: Fill in according to the receiver position.

To Rear Axle(D): Measure the horizontal distance from the antenna center to the rear wheel center. (It is convenient and accurate to project the antenna center and the rear wheel center onto the ground, then measure it.)



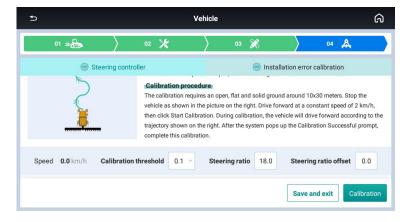
Antenna location: The relative position between the antenna center(the position of the antenna center should be referred to the blue indicator) and the rear axis. Select **Front** if the antenna is in front of the rear axis, select **Rear** if the antenna is behind the rear axis.

Antenna height(E): Measure the vertical height from the antenna center to the ground.



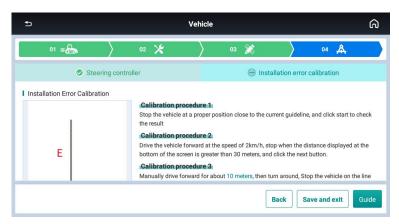


4.5.3 Steering Calibration



- 1. The calibration requires an open, flat and hard ground about 10*30 meters.
- 2. Keep the tractor run at 2km/h and click [Calibration]. During the process, the steering wheel will turn automatically.
- 3. When the screen shows "Waiting for calibrating...", around 2 minutes later, the calibration will be successful.

4.5.4 Installation error calibration



1. Stop the vehicle at a proper position, click start to check the result and it will set a guideline automatically.



2. Drive the vehicle forward at the speed of 2km/h, stop when the distance displayed at the bottom of the screen is greater than 30 meters, and click the Next button.



3. Manually drive forward for about 10 meters, then tum around and stop the vehicle on the same guideline, click the Next button.



4. Drive the vehicle forward at a speed of 2km/h again, stop when the display is less than 1 meter from the starting point, click the End button. Wait for the system to automatically complete the calculation.



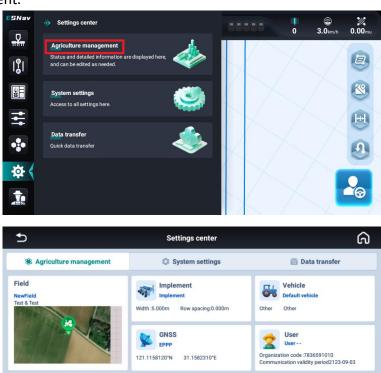
4.6 New Implement

4.6.1 Implement selection

Materials

Material type: -Material category: -Target spray volume1:-Target spray volume2:--

1. Go to [Setting center -> Agricultural management -> Implement -> New] to add a new implement.



DefaultTask Start time: 2024-10-17 15:44 Track area: 0.00 mu Safety

Maximum autopilot speed 16.0km/h Max speed allowed to enable auto steering 12.0km/h





A: Add a new implement.

B: Quickly search the implement by keywords when there are many implements.

C: Click to apply the implement.

D: Edit the parameters of the implement.

E: Delete the implement.

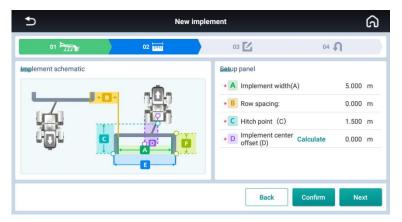
F: Click to export the implement by the share code.

2. In this interface, the customer can select task type including General, Spraying, Ridge building, Planting, Spreading, Harvest, Scatter sowing, Water and fertilizer, and Tilling, enter the implement name, and select the implement mounting method.





4.6.2 Implement parameters



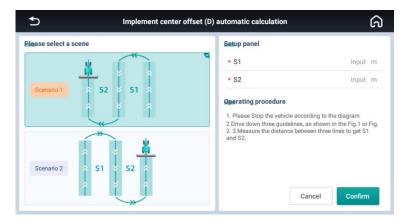
Implement width: The width of the implement, and the default value is 5m.

Row Spacing: The distance between two rows, and the default value is 0m.

Hitch Point: The distance from hitch point to implement, and the default value is 1.5m. The current algorithm do not use this value, so it has no practical significance.

Implement center offset: The offset from implement center to vehicle center.

If there is a row spacing issue with skip or overlap, it is necessary to click **Calculate** to make offset calculation.



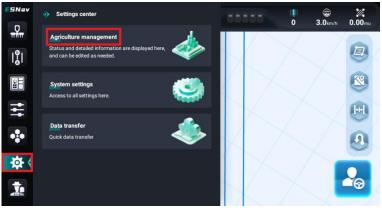
There are two methods to choose, please follow the instruction to complete the procedure.

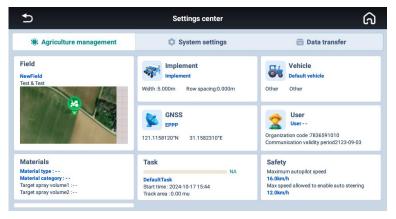
4.7 New Field & Guideline

4.7.1 New field

1. Go to [Settings center -> Field].









A: Field overview. It is available to zoom in and zoom out as well as to choose the map type.

B: Quickly search the field by keywords when there are many fields.

C: Click to create a new field.

D: Select to display fields by distance or time.

E: Click to export the field by the share code.

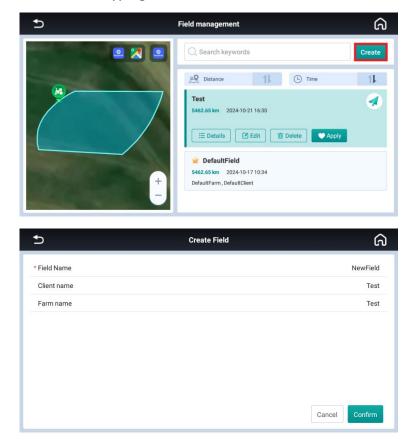
F: Enter the field details interface.

G: Edit the field name.

H: Delete the field.



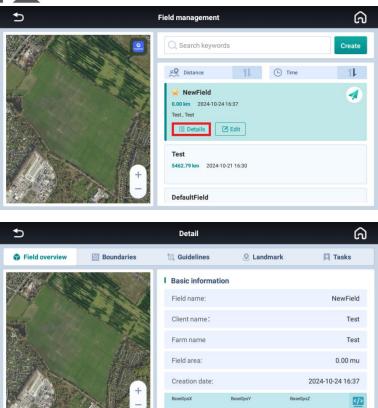
2. Create a new field with typing field name, client name and farm name.



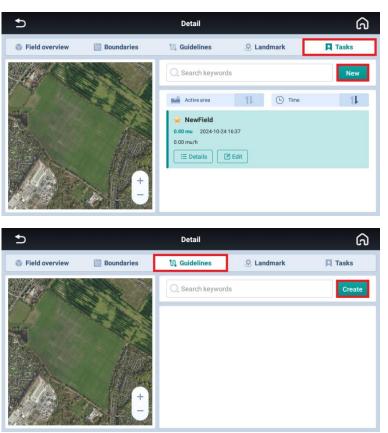
4.7.2 New task & guideline

1. Go to Details and it is able to create new boundary, guidelines, landmarks and tasks.





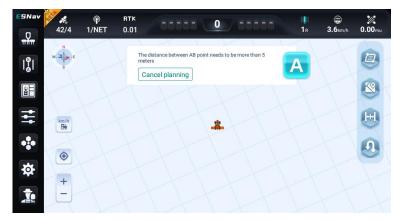
2. Here create a new task and AB/ free curve guidelines first.



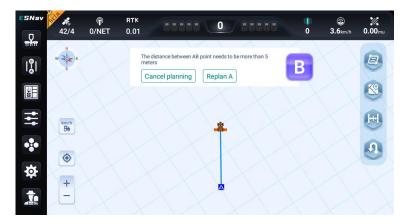




3. Plan AB line by clicking A in the current location.

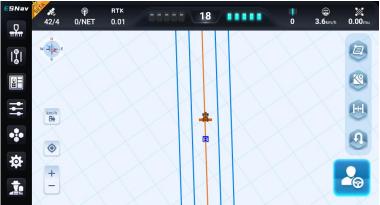


4. Drive to another end of the field and click B.

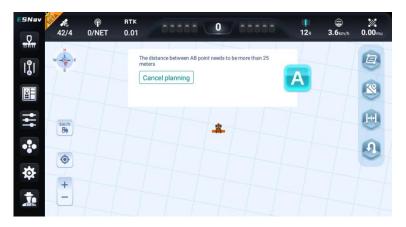


5. New AB line is created successfully.





6. Click A to start the free curve line.

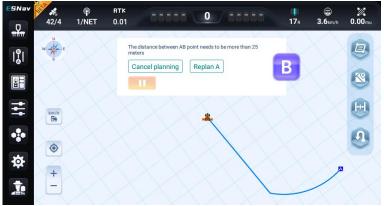


7. Click Pause to create the straight line.

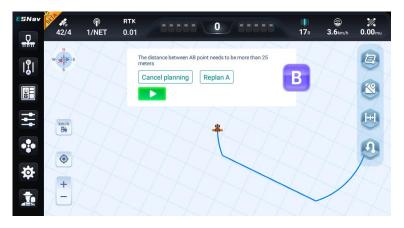


8. Click Continue to continue creating the curve line.





9. Click B to finish the Free curve creation.



10. New Free curve is created successfully.





4.8 Starting Autopilot

After completing the above basic steps, it is available to start autopilot right now.

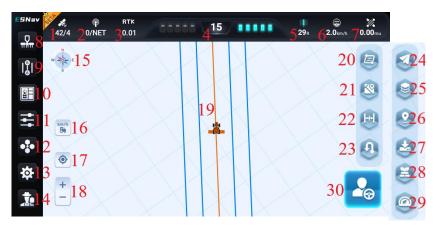


4.9 Turn Off

Press the orange button in 4 seconds, the system is switched off.







1. Satellite status

There are two numbers displayed in the form of X / Y.

X represents the number of tracked satellites;

Y represents the RTK status:

1: Single/Autonomous 2: DGPS/SBAS 4: Fix 5: Float

2. Base station status

There are two numbers displayed in the form of X / Y.

X represents the signal latency. The smaller the X, the more stable the signal is, usually the recommended value is less than 10 in auto steering mode for better performance.

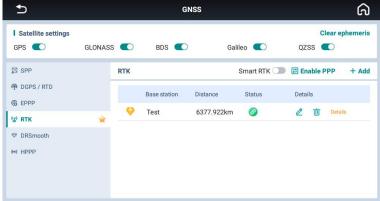
Y is the current radio channel number if it's radio mode; Y will change to NET if it's network mode.

3. GNSS mode and position accuracy

Click the Satellite status bar to enter the GNSS Correction Settings.







4. Lateral deviation

The real-time deviation between the current vehicle location and the marked guideline. The value is negative when the vehicle is on the left side of the guideline and positive when the vehicle is on the right side of the guideline. The unit is 1cm per grid.

5. Guideline number

The current guideline number where the vehicle is located at(the original guideline is 0).

6. Vehicle speed

Real-time vehicle speed.

7. Worked area

Mu is the default unit, and it's adjustable in **Basic Settings**. Click this icon to view the detailed task report. This interface allows to view historical tasks and create new tasks.



Worked Area: The painting/drawing area with overlap.

Remaining Area: The area which is subtracted effective area from boundary area.



Boundary Area: The inner area of boundary.

Effective Area: The painting/drawing area without overlap.

8. Implement

It consists of Implement parameter, implement menu, center offset, and ISOBUS mode switch.



Implement parameter means the current implement information;

Implement menu means the implement library;

Center offset means quick row spacing adjustment: Click the two arrows to adjust the implement offset. For example, if the row spacing is 50cm. After driving two rows, check the actual right row spacing and find it is 45cm. In this case, click the left arrow 5 times to shift 5cm to the left. Also it is necessary to do one click restore.



ISOBUS mode switch: Enable or disable the ISOBUS mode.

9. Guideline





AB Line: Create a guideline by locating two points. The current location will be used as point A, then drive the vehicle to the other end of the field as point B.

A+ Line: The current position will be used as point A to create the A+ line, which uses the heading of the vehicle as azimuth. This feature is recommended to be used in special scenarios that require fast line creation.

Free curve: Free curve can combine the straight AB line and the identical curve. With the use of optimized algorithm, the curve line is more stable.

90° Line: 90° Line can rotate the AB line or A+ line for 90°. It requires an existing AB Line or A+ Line in the guideline list.

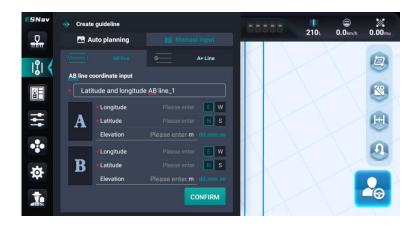
Center pivot: The circular curve can be applied to the case where the vehicle drives a circular automatically, like cutting grass.

Looped guideline: Looped guideline needs 4 points to create a shape and it will generate several separate quadrangle guidelines automatically.

Regular harrowing: Harrowing in the field with a regular boundary. It can be applied to the case that the user needs a fuel-efficient target-ground route.

Whole area path line: Whole area path line needs 4 points to create a shape and it will generate path lines automatically.

All Path: It allows the user to create many different curve line segments which are the actual trajectory of the vehicle. It is mainly used for vine yards.





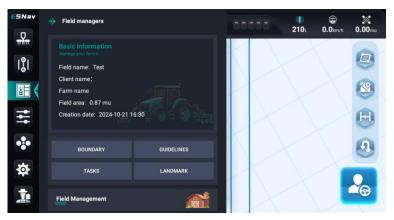
AB line coordinate input: Enter the coordinates of point A and point B, and click CONFIRM to get a new AB line.



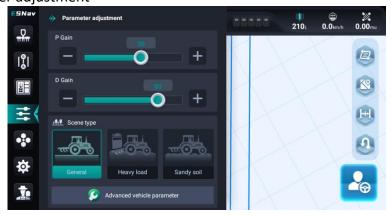
A+ line coordinate input: Enter the coordinates of point A and Azimuth, and click CONFIRM to get a new A+ line.

10. Field managers

It is accessible to manage boundary, guidelines, tasks, and landmark quickly. Also it is available to quickly access to field library.



11. Parameter adjustment





P Gain: Motor Adjustment speed ratio. The smaller the value, the slower the adjustment.

With wheel angle sensor, the recommended value is 20/25 but on the vehicle with small horsepower or small steering ratio generally less than 13, the recommended value is 25/30.

Without wheel angle sensor, the recommended value is 25/30 but on the vehicle with small horsepower or small steering ratio generally less than 13, the recommended value is 30/35.

D Gain: The higher the frequency, the more obvious the vibration of the motor movement; the smaller the frequency, the more stable the motor movement.

With wheel angle sensor, the recommended value is 80.

Without wheel angle sensor, the recommended value is 60/80.

Scene type

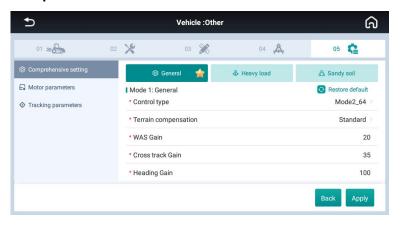
As for now, only the first scene type is allowed to use, and the other 2 scene types are not available, as they are still under testing and developing.

Routine: This type is mainly suitable for regular fields.

Heavy load: This type is suitable when the vehicle is carrying heavy loads.

Sandy soil: This type is used for sandy fields.

Advanced vehicle parameter



Control type: It is available to select between Mode 1 and Mode2_64. The default is Mode2_64.

Terrain compensation: It includes Slope and Standard two types. It is only useful for tracked vehicle. When switch to algorithm mode NX01, please use the standard; When switch to algorithm mode NX64, please use the slope.

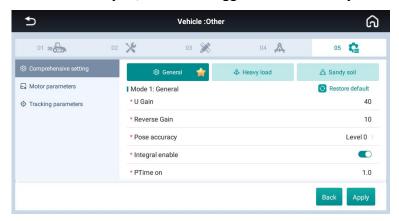
WAS Gain: The default is 20, which is only valid in the without-angle mode. The smaller the steering sensitivity, the more sensitive the front wheel turns. When the



vehicle steering clearance is large or the working soil is soft and sloping, the value needs to be reduced and set to 10.

Cross track Gain: No need to adjust, use online aggressiveness to adjust sensitivity.

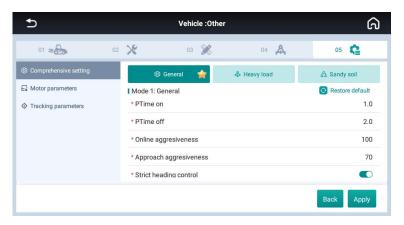
Heading Gain: No need to adjust, use online aggressiveness to adjust sensitivity.



Reverse Gain: The default is 10. When the vehicle is reversed by automatic steering, the deviation correction sensitivity is used. When the vehicle is reversing, the steering wheel swings left and right, so the value needs to be reduced.

Pose accuracy: When the vehicle is stationary, the software shows a speed of 0.2/0.3/0.4 km/h. It can be switched to level 1 which can eliminate the speed display. The default is level 0.

Integral enable: Turning it off can optimize the fixed lateral deviation issue for front-steer vehicles. However, for other vehicles, it is unnecessary to turn it off. The default is on.



PTime on: Judgment time ratio on the line. The default value is 1.0.

PTime off: Judgment time of approaching to the line, the default value is 2.0.

Online aggresiveness: The default is 100. The sensitivity of the vehicle's online automatic driving bias correction. If deviation is prone to occur and deviation correction is slow, increase this value to 130/150.

Approach aggresiveness: The default is 70, which controls the speed of the vehicle entering the guideline. If the steering wheel swings greatly when the vehicle enters the line, reduce the value, 40/50.



12. UI style

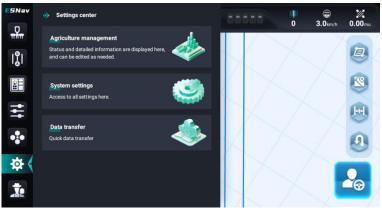


Themes: There are 2 modes, including Day and Night.

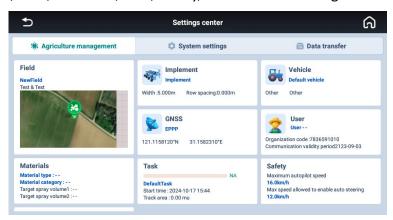
View switch: It is possible to choose between 3D and 2D depending on the customer's will.

Camera: Turn on or turn off the rear camera which is for monitoring the implement.

13. Settings center

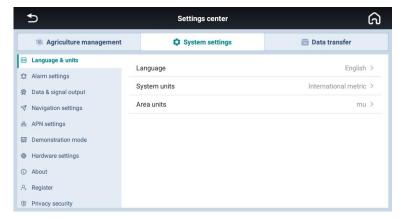


Agriculture management: It is feasible to use modules such as Field, Implement, Vehicle, GNSS, User, Materials, Task, Safety, and Troubleshooting as shown below.

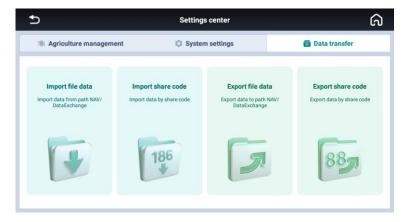




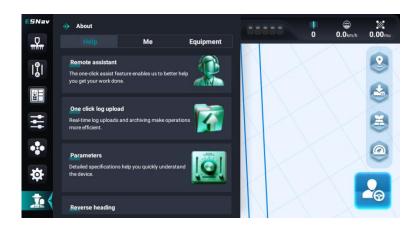
System Settings: In this part, the customer can edit many useful and basic settings.



Data transfer: In this part, it is available to share data by code and import or export file by USB disk.



14. About



Remote assistant: Contact technicians for remote assistance via an identification code.