

FJDynamics AT2 Auto Steer System Hardware Installation Manual

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Read Before Installation:



Follow this manual for installation.

Improper installation may cause machine damage and poor performance.
If you have any questions during installation, contact our customer service.

Disclaimer

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- This manual only provides guidance for use of this product. Every effort has been made in the preparation of this manual to ensure accuracy of the content, but no information in this manual constitutes a warranty of any kind, express or implied.

Preface

Thank you for purchasing FJDynamics' product. This manual provides detailed hardware installation guide. If you have any questions, contact the local dealer.

Purpose and Intended Users

This manual introduces the physical characteristics, installation procedures, and technical specifications of the product as well as the specifications and use of the wiring harnesses and connectors.

Based on the assumption that the users are familiar with the terms and concepts related to this product, this manual is intended for users who have read the preceding content and have experience in hardware installation and maintenance.

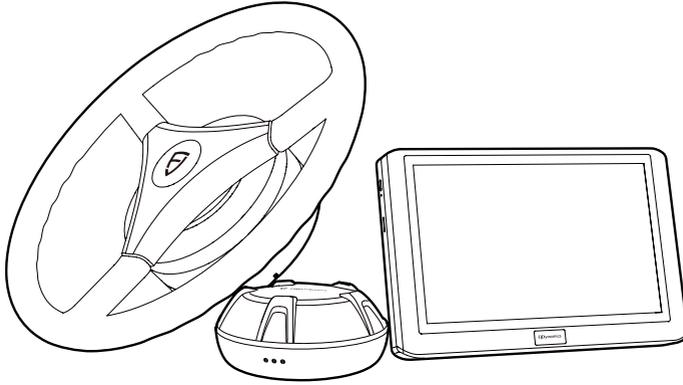
Technical Support

FJDynamics' official website: www.fjdynamics.com

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1 Product Introduction



FJDynamics AT2 Auto Steer System is an autosteering system that is launched by FJDynamics for agricultural machinery and supports assisted straight line driving. The system consists of the control terminal, GNSS receiver, electric steering wheel, and wiring harnesses. The control terminal runs the software developed by FJDynamics.

2 Preparation Before Installation

2.1 Safety Instructions

Before installation, read the safety advice in this manual carefully to avoid doing harm to people and equipment.

Note that the following safety advice cannot cover all possible dangerous situations.

2.1.1 Installation

- Do not install and commission the equipment in environments with high temperature, heavy dust, harmful gases, flammables, explosives, electromagnetic interference (for example, around large radar stations, transmitting stations, and substations), unstable voltages, great vibration, and strong noise.
- Do not install the equipment in places where water is likely to accumulate, seep, drip, and condense; otherwise, the equipment ports could be damaged.

2.1.2 Disassembly

- To avoid accidental damage, do not frequently disassemble the equipment after installation.
- Before disassembly, turn off all power supplies and disconnect the cable from the battery to prevent equipment damage.

2.1.3 Electrical Operations

- Electrical operations must be performed by qualified personnel in accordance with local laws and regulations.
- Carefully check the working area for potential hazards, such as wet ground.
- Before installation, learn about the position of the emergency stop button. Use this button to cut off the power supply in case of accidents.
- Do not put the equipment in a humid place. Prevent the liquids from entering the equipment.
- Stay away from radio transmitting stations, radar stations, high-frequency and large-current equipment, and other high-power radio equipment.
- Direct or indirect contact with high voltage or utility power may cause death.

2.2 Installation Requirements

To ensure the normal operation of the equipment, the installation site must meet the following requirements.

2.2.1 Installation Position

- Ensure that the installation position is firm enough to support the equipment and its accessories.
- Ensure that there is enough space to install the equipment at the installation position, without any obstruction or obstacle.

2.2.2 Temperature and Humidity

- The temperature and humidity of the working environment should be kept within a reasonable range to ensure the normal operation and service life of the equipment. Avoid high temperature and humidity. In summer, protect the control terminal from direct sunlight, and note that appropriate space must be maintained between the shelter and the control terminal.
- The equipment will be damaged if it works under improper environmental temperature and humidity.
- When the relative humidity is too high, insulating materials may not perform well, causing leakage currents. Mechanical property changes, rusting, and corrosion may also occur.
- When the relative humidity is too low, insulating materials will dry and contract, and static electricity may occur and damage the electric circuits of the equipment.

2.2.3 Air

• Ensure that the contents of salt, acid, and sulfide in the air are within a reasonable range. Some hazardous substances will accelerate the rusting and corrosion of metals and the aging of parts. Keep the working environment free of harmful gases (for example, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, and chlorine).

2.2.4 Power Supply

- Input voltage: The system supports the input voltage of 9–36 V.
- Ensure that the power line is connected properly to the positive and negative terminals of the battery. Keep wiring harnesses away from hot objects.

2.3 Installation Tools

Prepare the following tools before installation.

Installation Tools for FJDynamics AT2 Auto Steer System				
No.	Tool	Specifications	Qty.	Function
1	Cross screwdriver	PH0*75 small size	1	Install the SIM card.
2		PH2*100 medium size	1	Install the GNSS receiver and bracket.
3	Allen key	3	1	Install the splined sleeves.
4		5	1	Install the motor bracket and nameplate bracket.
5	Open-end wrench	8	1	Install the GNSS receiver bracket on top of the machine.
6		11	1	Fix the U-bolts of the control terminal.
7		13	2	Install the motor bracket.
8		12/14	2	Install the battery cables (bolt size depends on the machine model) and motor bracket.
9		18/21	1	Disassemble and install the front axle shaft cover bolts (bolt size depends on the machine model).
10	Sleeve	8	1	Install the GNSS receiver bracket on top of the machine.
11		24/27	1	Disassemble and install the lock nut of the original steering wheel.

12	Electric drill	/	1	Work with sleeves.
13	Tweezers	/	1	Install the SIM card.
14	Ejector pin	/	1	Install the SIM card.
15	Box cutter	/	1	Unpack.
16	Scissors	/	1	Cut cable ties.
17	Tape measure	5 m	1	Measure vehicle parameters.
18	Open-end wrench	9/10	1	Spare part.
19	Extra-long box-end wrench	11/13/14	1	Spare part.

2.4 Unpacking and Inspection

Unpack and check the items according to the following list.

No.	Assembly	Component		Qty.	Remarks	
1	Electric steering wheel	Steering wheel		1	Install splined sleeves.	
2		Steering motor		1		12 V/24 V
3		Small self-sealing bag	Hexagon socket head cap screw M4×14	6		
4			Spring washer M4	6		
5			Plain washer M4	6		
6	Control terminal	Control terminal		1	Fix the control terminal.	
7		Control terminal bracket		1		
8		Control terminal mounting base		1		
9		Nut		4		
10		U-bolt		2		

11	GNSS receiver	GNSS receiver		1	Fix the GNSS receiver and bracket.	
12		GNSS receiver bracket		1		
13		Small self-sealing bag 1	3M sticker	2		
14			Assembly bolt M4×12	4		
15		Small self-sealing bag 2	Self drilling screw	4		
16	Nameplate bracket	Nameplate bracket		1	With the nameplate mounted.	
17		Small self-sealing bag	Hexagon socket head cap screw M6×16	2	Fix the nameplate bracket.	
18			Spring washer M6	2		
19			Plain washer M6	2		
20	Wiring harnesses	Power wiring harness		1		
21		GNSS receiver wiring harness		1		
22		Main wiring harness		1		
23		Spare main wiring harness		1		
24		Attitude sensor wiring harness		1		
25		Radio antenna	Sucker base		1	
26			Radio antenna		1	
27			3M sticker		1	Fix the radio antenna.
28	Others	Large self-sealing bag	Packing list	1		
29			Warranty card	1		
30			Software user manual	1		
31			Hardware installation manual	1		
32			Certification	1		
33			Nylon cable tie	20		



Above is the general shipping configuration. The actual shipment is subject to the contract and may differ slightly. Check the items in the package according to the packing list or the contract. If there is any doubt or discrepancy, contact your dealer.

3 Inspection

Read Chapter 2 carefully, and ensure all requirements specified in this chapter are met before installation.

3.1 Inspection Before Installation

Before installation, make a detailed plan and arrangement regarding the installation position, power supply, and wiring of the equipment, and ensure that:

- There is sufficient space to facilitate equipment installation and heat dissipation.
- The environmental temperature and humidity meet the requirements.
- The power supply and wiring meet the requirements.
- The selected power supply matches the system power.
- For a user-specific equipment, ensure that the specific requirements are met.

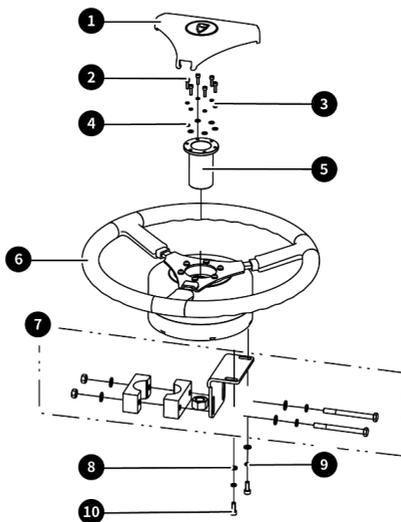
3.2 Precautions

- Cut off the power supply when installing the equipment.
- Place the equipment in a dry environment.
- Do not place the equipment in a high-temperature environment.
- Keep the equipment away from high-voltage cables.
- Keep the equipment away from strong thunderstorms and electric fields.
- Unplug the power supply before cleaning.
- Do not clean the equipment with liquids.
- Do not open the equipment enclosure.
- Fix the equipment firmly.

4 Installation

4.1 Installing the Electric Steering Wheel

4.1.1 Components

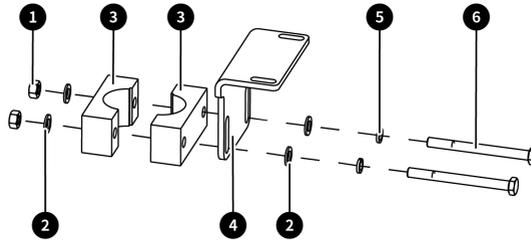


Electric Steering Wheel Assembly

No.	Name	Qty.	Remarks
1	Dust cap	1	
2	Hexagon socket head cap screw M4×14	6	
3	Spring washer M4	6	
4	Plain washer M4	6	
5	Splined sleeve	1	Packed in the accessory box and selected according to the machine model.
6	Electric steering wheel	1	
7	2# motor bracket	1	Packed in the accessory box and shown below.

8	Plain washer M6	2	
9	Spring washer M6	2	
10	Hexagon socket head cap screw M6×16	2	

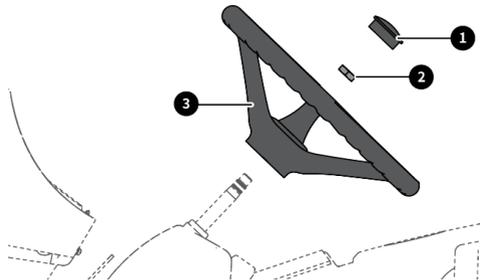
*An example of 2# motor bracket is shown below



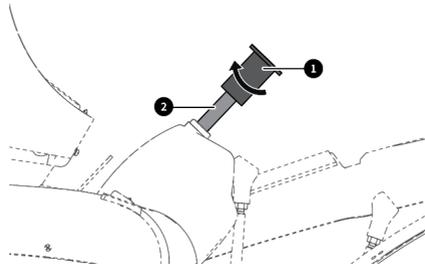
No.	Name	Qty.	Remarks
1	Hexagon nut M8	2	
2	Plain washer M8	4	
3	Steering column hoop	2	
4	Steering motor mounting bracket	1	
5	Spring washer M8	2	
6	Hexagon bolt M8×80	2	

4.1.2 Installation Steps

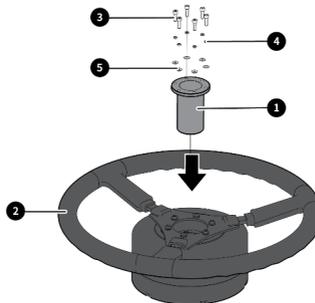
1. Remove the dusk cap ❶ of the original steering wheel on the machine, unscrew the lock nut ❷ (keep the nut for later use), and pull out the original steering wheel ❸.



2. Install the splined sleeve ① on the steering column ②, and check whether the splined sleeve is appropriate by rotating it to see whether there are any sways or gaps. As the steering column on the machine varies, you may try several splined sleeves to select the one that fits.

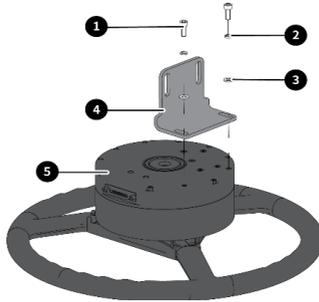


3. Remove the selected splined sleeve ① from the steering column, put it into the steering motor of the electric steering wheel ②, and then fix the splined sleeve and the motor with six M4×14 hexagon socket head cap screws ③, six M4 spring washers ④ and six M4 plain washers ⑤.

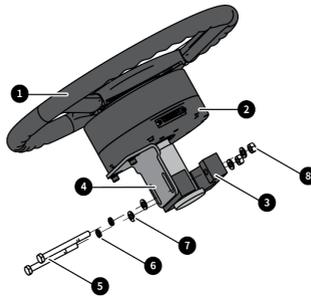


4. Fix the steering motor ⑤ and motor bracket ④ with two M6×16 hexagon socket head cap screws ①, two M6 spring washers ②, and two M6 plain washers ③. Do not fully torque the screws at this time.

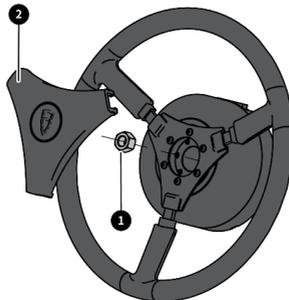
! **Note:** As the dashboard under the steering wheel varies, select an appropriate motor bracket according to the specific machine used. The 2# motor bracket is only shown and illustrated as an example.



5. Install the electric steering wheel ❶ on the machine, and adjust the position of the motor port ❷ to facilitate the wiring harness connection (it is recommended to adjust it to the position convenient for connection with the control terminal). Install the steering column hoop ❸, adjust the position of the motor bracket ❹, and tighten it with two M8×80 hexagon bolts ❺, two M8 spring washers ❻, two M8 plain washers ❼, and two M8 hexagon nuts ❽ to ensure that the motor bracket is firmly installed and the outer ring does not rotate with the bracket.

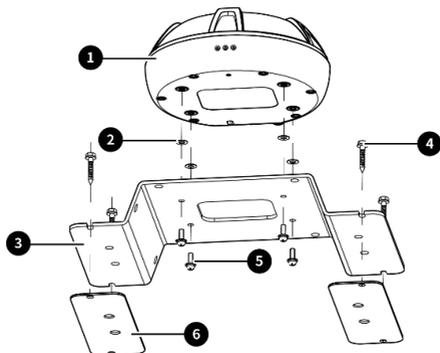


6. Install the lock nut ❶ removed in step 1 on the splined sleeve and install the dust cap ❷.



4.2 Installing the GNSS Receiver

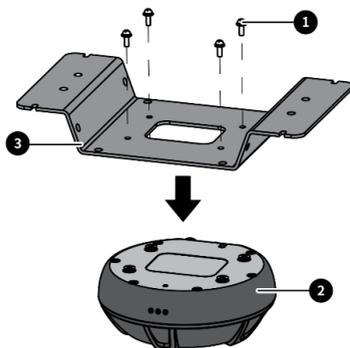
4.2.1 Components



No.	Name	Qty.	Remarks
1	GNSS receiver	1	
2	Anti-vibration pad M4	4	Pre-installed at the bottom of the GNSS receiver
3	GNSS receiver bracket	4	
4	Self drilling screw	4	
5	Assembly bolt M4×12	4	
6	3M sticker	2	

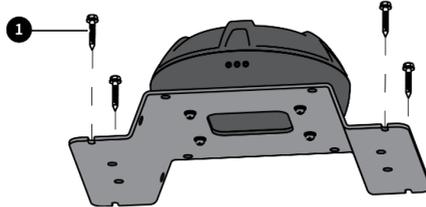
4.2.2 Installation Steps

1. Connect the GNSS receiver bracket (3) to the GNSS receiver (2) with four M4×12 assembly bolts (5).

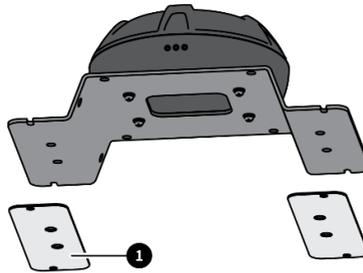


2. Install the GNSS receiver and bracket at the top of the machine where it is firm and has low vibration by any of the following methods: 1. self drilling screw; 2. 3M sticker; and 3. self drilling screw + 3M sticker.

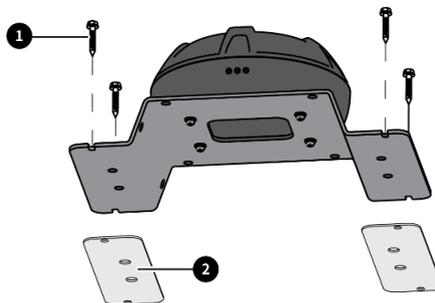
*Example 1: Installing with self drilling screws



*Example 2: Installing with 3M stickers ①

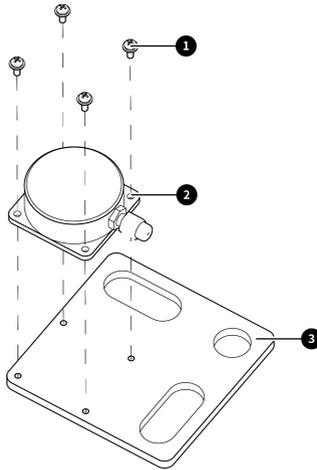


*Example 3: Installing with self drilling screws ① and 3M stickers ②



4.3 Installing the Attitude Sensor

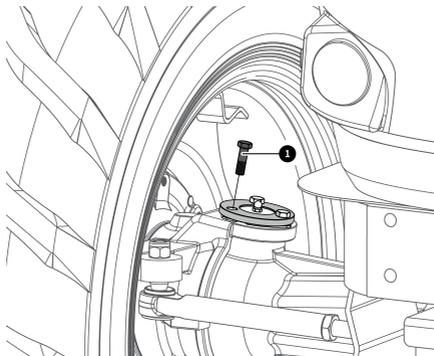
4.3.1 Components



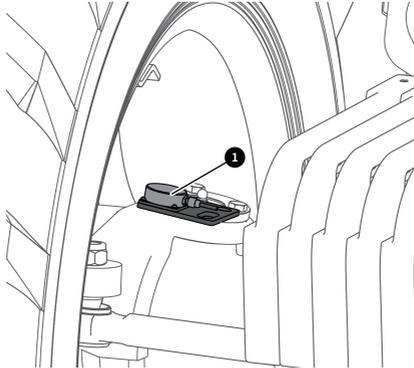
No.	Name	Qty.	Remarks
1	Assembly bolt M3×8	4	
2	Attitude sensor	1	
3	Attitude sensor bracket	1	

4.3.2 Installation Steps

1. Remove the front axle shaft cover bolts ❶.

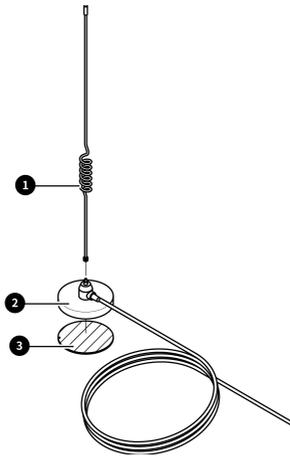


2. Install the attitude sensor ❶ on the front axle, adjust the wiring harness, and install and tighten the bolt removed in step 1.



4.4 Installing the Radio Antenna

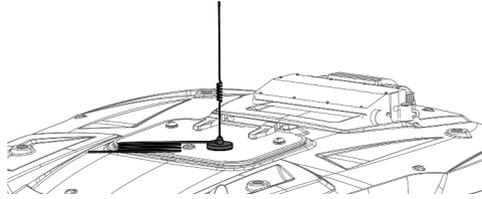
4.4.1 Components



No.	Name	Qty.	Remarks
1	Radio antenna	1	
2	Sucker base	1	
3	3M sticker	1	

4.4.2 Installation Steps

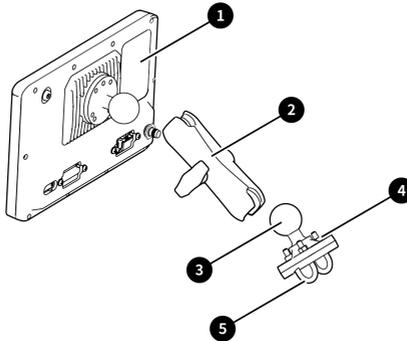
- If there is no suitable metal plane on top of the machine, select and clean a suitable plane to install the antenna. Attach the 3M sticker on the sucker base of the radio antenna, and attach the antenna to the selected position.



- If there is a suitable metal plane on top of the machine, wipe the plane clean, and then directly suck the radio antenna to the plane.

4.5 Installing the Control Terminal

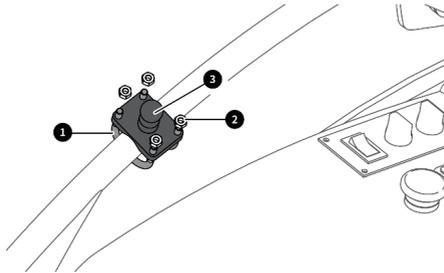
4.5.1 Components



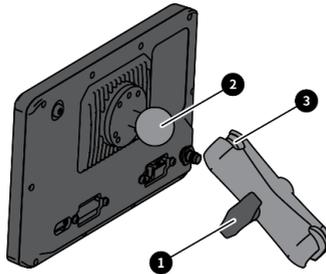
No.	Name	Qty.	Remarks
1	Control terminal	1	
2	Control terminal bracket	1	
3	Control terminal mounting base	1	Provided together with the control terminal bracket
4	Nut	4	
5	U-bolt	2	

4.5.2 Installation Steps

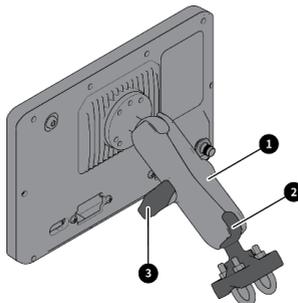
1. Fix the control terminal mounting base ③ with two U-bolts ① and four nuts ② at an appropriate position of the door armrest on the lap bar side of the cab.



2. Turn anticlockwise the hand screw ① to loosen it, and place the ball joint ② of the control terminal into the socket ③ of the control terminal bracket.



3. Place the socket of the control terminal bracket ① on the ball joint ② of the control terminal mounting base in the same way as in step 2, and turn the hand screw ③ clockwise to fix the control terminal.



4.6 Installing the SIM Card

4.6.1 Components

No.	Name	Qty.	Remarks
1	SIM card	1	Micro-SIM

Notes:

1. Purchase a SIM card that supports the frequency bands of the 4G communication module of the control terminal.

Ensure that the SIM card supports the following 4G frequency bands:

LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28

LTE-TDD: B38/B39/B40/B41

UMTS: B1/B2/B4/B5/B6/B8/B19

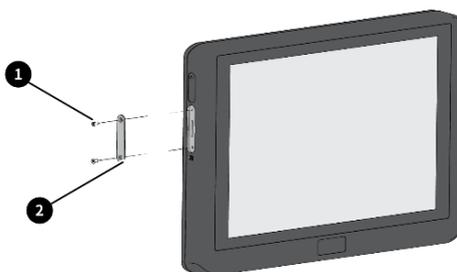
GSM: B2/B3/B5/B8

2. Ensure that you have data service with your SIM card.

3. After installing the SIM card, turn on the control terminal and set the APN and network type in the Android system settings if it is required according to the SIM card manual.

4.6.2 Installation Steps

1. Use a cross screwdriver to remove the screws ❶ of the SIM card cover on the left of the control terminal and remove the SIM card cover ❷ .

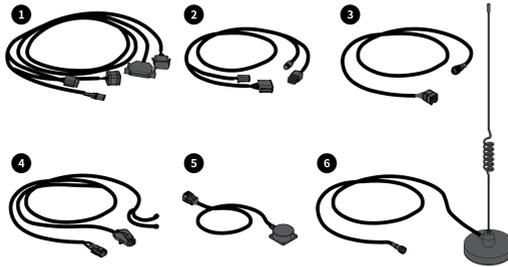


2. Slowly insert the SIM card into the slot with the chip facing the screen side, and use an ejector pin and tweezers when necessary.

3. Install the SIM card cover with a cross screwdriver.

4.7 Installing Wiring Harness

4.7.1 Components



No.	Name	Qty.	Remarks
1	Main wiring harness	1	
2	Spare main wiring harness	1	
3	GNSS receiver wiring harness	1	
4	Power wiring harness	1	
5	Attitude sensor wiring harness	1	
6	Radio antenna	1	

4.7.2 Installation Steps

Install the wiring harnesses according to the figure below.

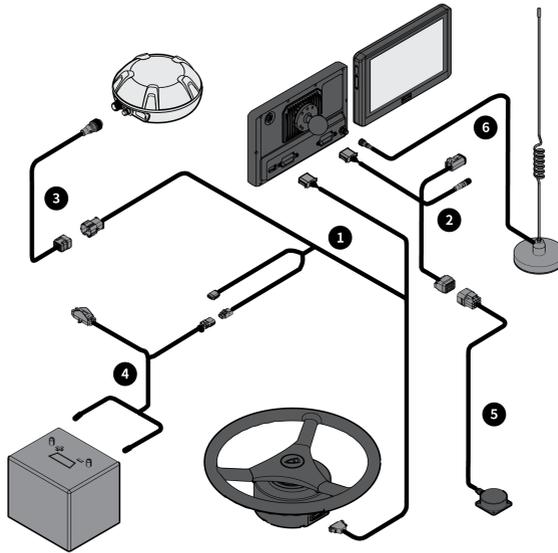
Notes:

1. Do not plug or unplug the harness connectors or connect equipment when the power is on. Ensure that the machine and the battery are turned off.
2. Avoid high temperature and rugged places when wiring.
3. Connect the power wiring harness to the negative terminal first, and then connect it to the positive terminal and other wiring harnesses.
4. Keep the radio antenna away from the GNSS receiver, and ensure that it is firmly sucked and unobstructed.

Installation Tips:

1. Main/Spare wiring harness: Lock the door on the right side of the cab, and then sort out the wiring harness and fix it on the right door handle or the A-pillar at the right front of the cab with nylon cable ties.

2. GNSS receiver wiring harness: Extend the wiring harness from the roof (such as the sunroof) along the cab to the right front of the seat.
3. Power wiring harness: Connect the negative connector of the wiring harness to the negative terminal of the battery, and do not connect the positive connector of the wiring harness at this time. Fix the wiring harness along the right side of the machine with nylon cable ties, and connect it into the cab from the right front of the cab.
4. Attitude sensor wiring harness: Leave 10 cm of the wiring harness at the sensor side, fix the wiring harness along one side of the machine with nylon cable ties, and connect it into the cab from the front of the cab.
5. Radio antenna: Route the wiring harness in the same direction as that of the GNSS receiver, and keep the antenna away from the receiver.



5 System Commissioning

5.1 Site Requirements

1. Ensure that the vehicle is in good condition and all parts work properly.
2. Ensure that there are no tall trees, buildings, or other obstacles around the site to protect the operation from signal interference.
3. Ensure that there are no high-voltage power lines within 150 m around the site.
4. The site ground should be level and no smaller than 50 m×10 m.
5. The site should have flat concrete pavement or asphalt pavement.
6. Commissioning should be carried out on non-public roads. Ensure that no irrelevant personnel stay around the vehicle during commissioning to prevent accidents.

5.2 Power-on

5.2.1 Inspection Before Power-on

1. Check whether the power supply is connected correctly.
2. Check whether the supply voltage is satisfactory.

5.2.2 Inspection After Power-on

1. Check whether the power indicator of the control terminal is lit.
2. Turn on the control terminal, and check whether the system program starts normally.

5.3 Parameter Calibration

For details, refer to the **FJDynamics AT2 Auto Steer System Software User Manual**.

6 Appendix

6.1 Specifications

No.	Component	Specifications
1	Control terminal	Size: 275×180×40 mm Basic configuration: 10.1-inch capacitive touch screen, LED backlight, 1280×800 pixels, 700 nit LCD, speaker, 2G RAM, 8G ROM; Various communication interfaces; Power supply: 9 V – 36 V Signals received: radio, satellite, and 4G Relative humidity: 0% – 95%, at 40°C (non-condensing) Wi-Fi: 2.4 GHz frequency band, frequency range: 2412 MHz – 2484 MHz, output power: 2.4 GHz 11 n 14±2 dBm Operating temperature: -20°C to 70°C Storage temperature: -40°C to 85°C IP rating: IP65

2	GNSS receiver		<p>Size: 162 mm×64.5 mm Frequency band: GPS L1C/A, L1C, L2P(W), L2C, L5; GLONASS L1, L2; BDS B1I, B2I, B3I, B1C, B2a; Galileo E1, E5a, E5b, SBAS Operating voltage: 9 V – 36 V Operating current: < 300 mA IMU accelerometer accuracy: 0.5 mg IMU gyroscope accuracy: 0.1°/s Roll/pitch: 0.2° Operating temperature: -20°C to 70°C Storage temperature: -40°C to 85°C IP rating: IP66</p>
3	Electric steering wheel	Steering wheel	Diameter: 410 mm
4		Steering motor	<p>Supply voltage: 12 V or 24 V Peak torque: 20 Nm (12 V); 30 Nm (24 V) IP rating: IP65</p>
5		Splined sleeve	Multiple sizes
6	Radio antenna		<p>Frequency range: 410 MHz – 470 MHz or 902 MHz – 928 MHz Voltage standing wave ratio: ≤2.0 Gain: >1±0.5 dBi Impedance: 50 Ω Polarization: vertical Size: ø82 mm×490 mm or ø 82 mm×301 mm Operating temperature: -20°C to 60°C</p>
7	Attitude sensor		<p>Supply voltage: 5 V Output frequency: max. 200 Hz Resolution: < 0.1° Operating temperature: -20°C to 85°C IP rating: IP67</p>

