

FJDynamics
G31 Pro / MT-10
3D Excavator Guidance System/
Machine•control.terminal
Quick Start Guide

Disclaimer

- The purchased products, services, and features are stipulated by the contract. All or part of the products, services, and features described in this guide may not be within the scope of your purchase or usage. Unless otherwise specified in the contract, all the content in this guide is provided "AS IS" without warranties of any kind, express or implied.
- The content of this guide is subject to change due to product upgrades and other reasons. FJDynamics reserves the right to modify the content of this guide without notice.
- This guide only provides guidance for use of this product. Every effort has been made in the preparation of this guide to ensure accuracy of the content, but no information in this guide constitutes a warranty of any kind, express or implied.
- The service life of the bucket and arm sensors, protective structures, and metal parts is impacted by construction conditions. Regularly check whether the sensors work normally and whether the protective covers, cable protection pipe clamps, and fixing screws are loose and rusty. Damage caused by collision and intentional destruction is not covered by the warranty.

Safety Instructions

Most accidents in product installation, operations, maintenance, and repair are caused by failure to comply with the safety instructions. Learning the safety instructions before installing and using the product can help avoid these accidents.

Personnel should receive training in tool use in advance so that they can install and use the product properly while complying with the safety instructions.

Do not perform any installation or commissioning operations of this product before you read and understand all the instructions.

Failure to comply with the safety instructions may cause personal injuries or even death of yourself and others.

1. Safety instructions for installation, maintenance, and repair

During installation, maintenance, and repair:

- Ensure that the machine is shut down.
- Put on a safety harness and attach it to a solid part when working at height on the machine.
- Ensure that there are no irrelevant personnel in a radius of 2 m–3 m around the machine.
- Ensure that the machine is on a level ground and properly supported when working under the machine.
- Keep the machine away from facilities such as high-voltage power lines.

- Use the electric wires and cables properly.
- Wear gloves to avoid cuts.

2. Safety instructions for operations

Before operation:

- Preheat the engine and the hydraulic system, and check the warning lights, horn, and other devices.
- Adjust the rear-view mirrors and ensure that you have the optimal view in the cab.

During operation:

- Remove obstacles around the machine and stay away from the machine if you are not a professional.
- Keep the machine away from high-voltage power lines, ditches, and cliffs.
- Sit on the seat and fasten the seat belt when operating the machine.
- Stop the machine when a fault occurs. Troubleshooting is prohibited when the machine is running.

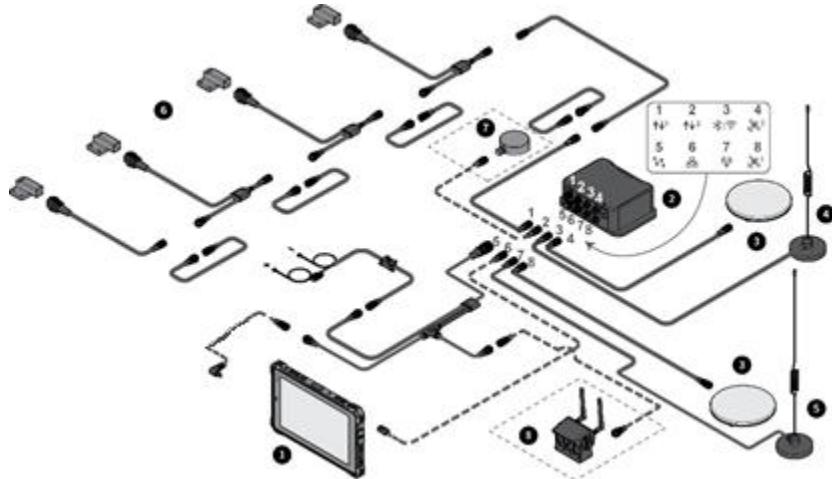
3. Safety instructions for disassembly

- Do not frequently disassemble this product after installation; otherwise, the ports and circuits can be damaged.
- Before disassembling this product, turn off all power supplies and disconnect the cable from the battery to avoid equipment damage and personal injuries.

4. Others

- Disassembling the product housing by yourself may invalidate the warranty.
- Damages caused by force majeure events, such as lightning strikes, overvoltage, and collision, are not covered by the warranty.
- Connect the devices strictly in accordance with this guide. When connecting the wiring harnesses and feeders, hold the end of the plug and gently plug or unplug it. Do not pull the plug by force or twist it, which may break the pins.
- Ensure that the power supply of this product meets the requirements. The supply voltage of this system is 10 V to 30 V DC.
- This equipment should be installed and operated with minimum distance 7.9 inches between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Hardware Specifications and Connection

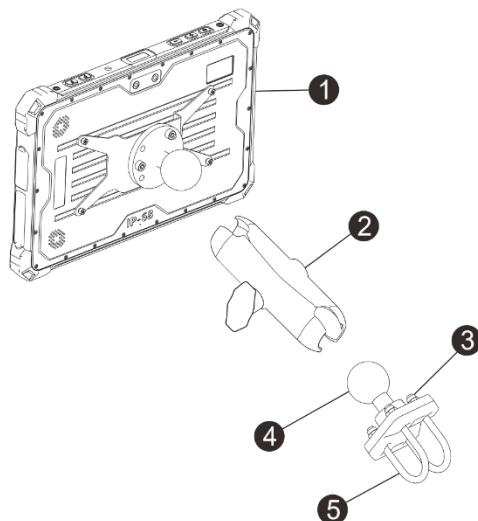


No.	Component	Specifications
1	Product Name: Machine control terminal Model No.: MT-10	<p>Size: 284×189×22.5 mm</p> <p>Basic configuration: 10.1 inches, 1920×1200 pixels, 1000 cd/m², 8 GB RAM, 128 GB ROM, octa-core 2.2 GHz</p> <p>Power supply: 5 V DC 3 A</p> <p>Wi-Fi: Wi-Fi 802.11(b/g/n) 2.4 GHz</p> <p>Bluetooth: Bluetooth 5.0 (BLE) ; range: 10 m</p> <p>Port: Type-C port×1, USB 2.0 port×1, 3.5 mm headphone jack×1 , TF card port×1 , SIM card port (4G) ×1, DC power port×1 ,pogo pin connector×1 ,RS232 port×1 ,RJ45 port×1</p> <p>Battery: 10000 mAh/3.8 V lithium battery, non-removable</p> <p>Operating temperature: 0°C to 40°C</p> <p>Storage temperature: -30°C to 70°C</p> <p>IP rating: IP68</p>
2	Product Name: 3D Excavator Guidance System Model No.: G31 Pro	<p>Size: 200×155×63 mm</p> <p>Communication: Wi-Fi, Bluetooth, and Ethernet</p> <p>Power supply: 9 V to 36 V</p> <p>Indicator: power, GNSS, radio, and Wi-Fi/Bluetooth</p> <p>Operating temperature: -20°C to 60°C</p> <p>Storage temperature: -40°C to 85°C</p> <p>IP rating: IP67</p>
3	GNSS antenna	<p>Passive indicators:</p> <p>Frequency range: four-constellation, full-frequency</p> <p>Gain: 4.5 dBi@1176-1278MHz, 5.5 dBi@1520-1608MHz</p> <p>Polarization: RHCP</p> <p>Horizontal coverage: 360°</p> <p>Output impedance: 50 Ω</p> <p>Output VSWR: ≤1.5</p> <p>Phase center error: ±2 mm</p> <p>Low-noise amplifier indicators:</p> <p>Active gain: L1: 38±2 dB; L2: 40±2 dB</p> <p>Noise figure: ≤2 dB</p> <p>Output VSWR: ≤2</p> <p>Operating voltage: 3.3 V to 12 V</p> <p>Operating current: ≤50 mA</p> <p>Mechanical properties:</p> <p>Operating temperature: -45°C to 85°C</p>

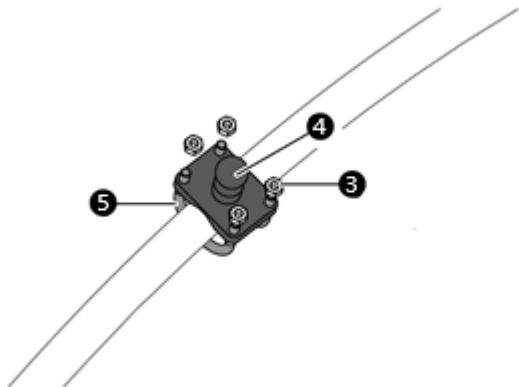
		Storage temperature: -55°C to 85°C Humidity: 95% non-condensing
4	Wi-Fi/Bluetooth antenna	Omnidirectional antenna Frequency range: 2400 MHz to 2500 MHz Output VSWR: ≤2 Gain: 2.86 dBi
5	Radio antenna	Frequency range: 902 MHz to 928 MHz Gain: 2.15 dBi Wire length: 4.5 m
6	Attitude sensor	Resolution: < 0.05° Operating voltage: 4.9 V to 32 V DC Output frequency: up to 100 Hz Operating temperature: -40°C to 85°C IP rating: IP67

Note: Camera ⑧ and wiring harnesses indicated in dashed lines are optional. The control box interface 2 in the standard version kit product does not have actual functionality. Sensor ⑨ is a rotation sensor for the rotary bucket of some excavators and is provided here only for reference. The Type-C port of the machine control box is only used for engineering debugging.

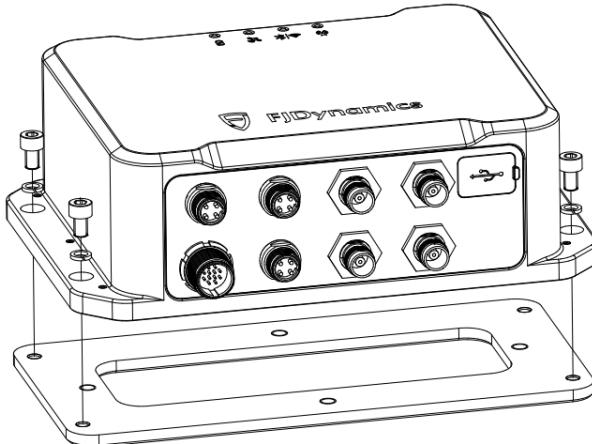
Installation of Machine Control Terminal and Machine Control Box



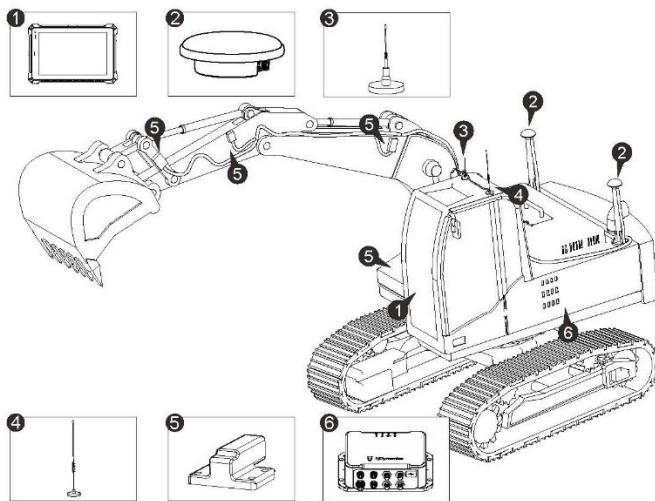
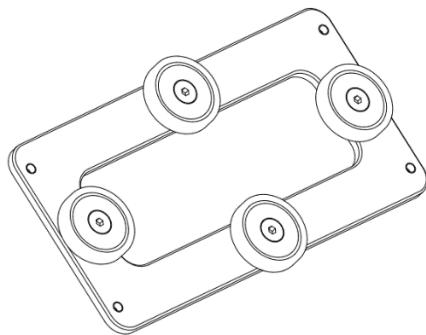
序号	名称	数量	规格	备注
1	Machine control terminal	1		
2	Adapter bracket	1		
3	Hexagon nut	4	M6	
4	Bracket base	1		
5	U-bolt	2		The control terminal bracket assembly is provided.

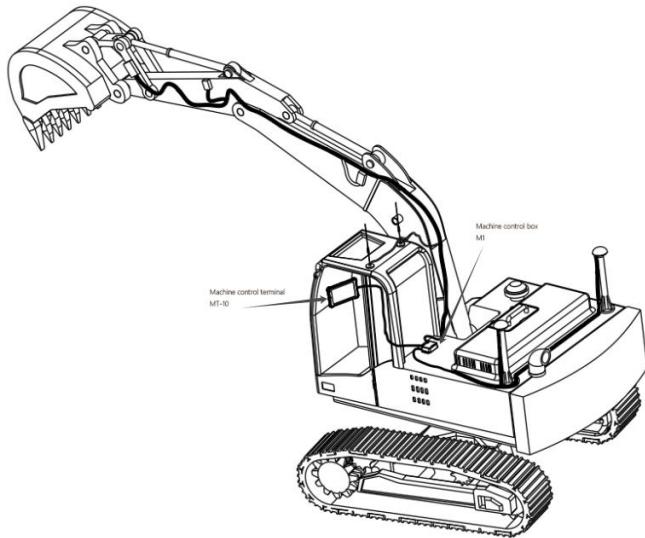


Fix the bracket base. Select an appropriate position inside the cab for easy operation. Then, fix the control terminal bracket base④ there with U-bolts④ and nuts③.



The machine control box is fixed to the control box fixed base with 4 screws and 4 standard spring washers, as shown in the above figure. The control box fixed base can be welded and fixed in the appropriate position of the excavator, or four magnets can be installed (as shown in the figure below, magnets fixed to the base with screws) and then attached to the appropriate position of the excavator.





Installation and Commissioning Procedure

Select a language → Sign up and log in → Enter the installation information → Connect to the machine control box → Connect to a signal source → Select a coordinate system → Select machine parameters → Complete

Connect to the machine control box

Method 1: Wired connection

Connect the connection cable to the network port of the machine control terminal and the network port of the machine control box.

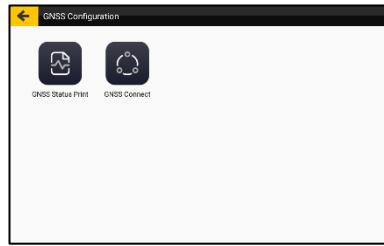
Method 2: Bluetooth/Wi-Fi connection

Step 1: Enable **Bluetooth** and **Hotspot** for the machine control box on the machine control terminal.

Step 2: Select the machine control box to connect from the device list.

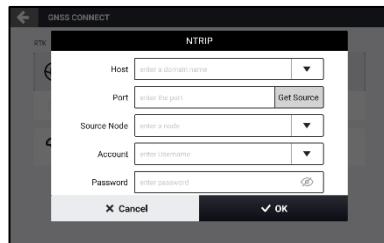
Connect to a signal source

Choose **GNSS Configuration > GNSS Connect.**



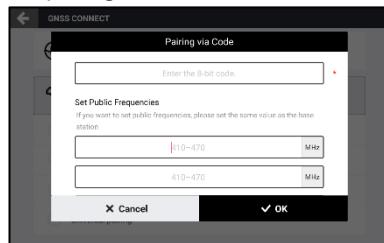
Network RTK

NTRIP connection: To connect to a network RTK, enter the host and port; tap **Get Source**, and the source node is obtained automatically; enter your account and password and then tap **OK**.

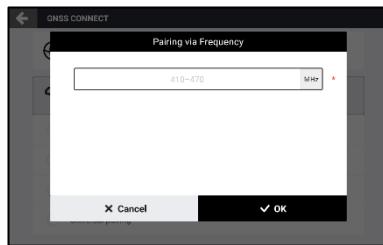


Base Station RTK

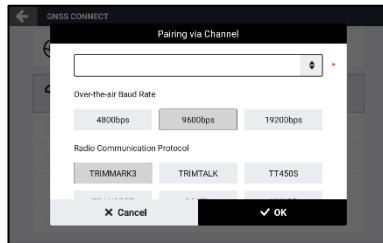
1. **Pairing via Code:** Turn on the mobile base station, tap **Pairing via Code** on the machine control terminal, and enter the pairing code of the mobile base station. Refer to the base station user manual for the pairing code.



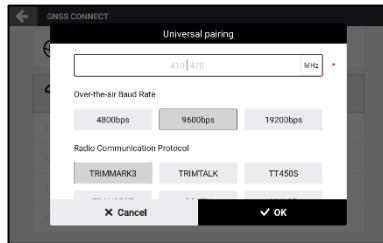
2. **Pairing via Frequency:** Turn on the mobile base station, tap **Pairing via Frequency** on the machine control terminal, and enter the frequency of the mobile base station. Refer to the base station user manual for the frequency.



3. **Pairing via Channel:** Turn on the mobile base station, tap **Pairing via Channel** on the machine control terminal, and enter the channel of the mobile base station.



4. **Universal pairing:** Turn on the mobile base station, tap **Universal pairing** on the machine control terminal, and enter the frequency, baud rate, and radio communication protocol of the mobile base station. Refer to the base station user manual for the parameters.

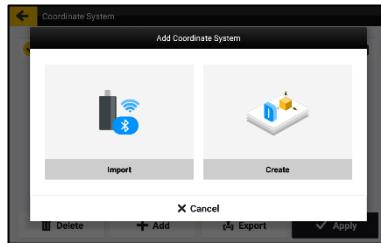


Preparations

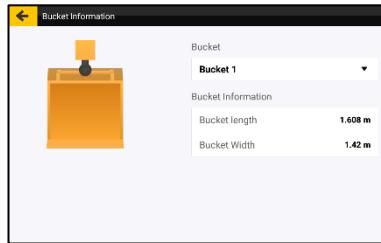
1. Check the signal source connection: Check whether the GNSS connection is normal.



2. Select a coordinate system: To ensure construction accuracy, select the same coordinate system as that used on site.

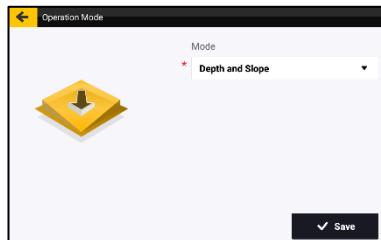


3. Select machine parameters: After you calibrate multiple machine models, the system generates many sets of machine parameters. Before construction, you need to select the corresponding machine parameters.

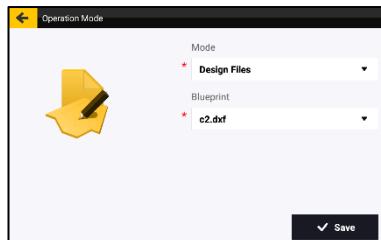


Operation Mode

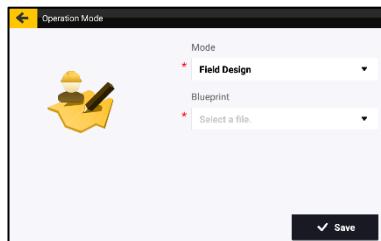
1. **Depth and Slope:** Set the depth, transverse slope, and longitudinal slope. It is suitable for simple operations without the need for drawings such as leveling and slope cutting.



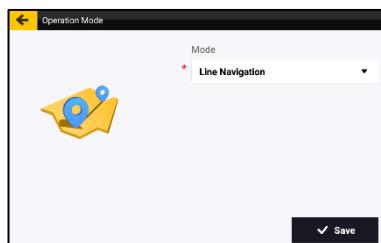
2. **Design Files:** Import .dxf, .xml, or .sjw drawings to facilitate construction. It is suitable for complex operations on curved surfaces.



3. **Field Design:** Mark points with the bucket tip to create drawings. It is suitable for simple and regular scenarios such as roads and ditches.



4. **Line Navigation:** Mark points with the bucket tip to create guidance paths for the excavator.



Hand Gestures

 A hand icon with two arrows pointing in opposite directions, indicating movement.	 A hand icon with a single arrow pointing upwards and to the left, indicating zooming.	 A hand icon with a circular selection circle at the tip, indicating selection.	 A hand icon with three curved arrows forming a circle, indicating 3D rotation.
Move	Zoom	Select	3D Rotate

SIMPLIFIED EU DECLARATION OF CONFORMITY

Hereby, FJ Dynamics Co., Ltd. Shenzhen Branch declares that the radio equipment type MT-10 and **G31 Pro** is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address: <http://www.fjdynamics.com>



WEEE



Correctly dispose of this product. This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle responsibly to promote the sustainable reuse of material resources. To safely recycle your device, please use return and collection systems or contact the retailer where the device was originally purchased.

Hearing Damage



High sound pressure Hearing damage risk

Do not listen at high volume levels for long periods.

Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment should be installed and operated with minimum distance 7.9 inches between the radiator & your body.

This device must be professionally installed.