



Technology Solutions

TEK-WAVE 4300B

FMCW Bluetooth Radar Level Transmitter

Instruction Manual

Document Number: IM-4300B



www.tek-trol.com

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contact

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1 Safety Instructions

1.1 Intended Use

Tek-Wave 4300B FMCW Bluetooth Radar Level Transmitter is widely used to measure the level of storage tanks, open basins, pump or lift stations, water and wastewater treatment plants.

1.2 Safety Instructions from the Manufacturer

1.2.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to, direct, indirect, or incidental and consequential damages. Any product purchased from the manufacturer is warranted by the relevant product documentation and our Terms and Conditions of Sale. The manufacturer has the right to modify the content of this document of any time with any reason without prior notice and will not be answerable for the possible consequence of changes.

1.2.2 Product Liability and Warranty

The operator shall have authority for the suitability of the device for the specific application. The manufacturer accepts no accountability for the consequences of misuse by the operator. A wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract, shall also apply.

1.2.3 Information Concerning the Documentation

To prevent any injury to the operator or damage to the device, it is essential to read the information in this document and the applicable national standard safety instructions. This operating manual consists of all the information that is required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.3 Safety Precautions

You must read these instructions carefully before installing and commissioning the device. These instructions are an essential part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured. For additional information that is not discussed in this manual, contact the manufacturer.

The following safety symbol marks are used in this operation manual and on the instrument.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.4 Packaging, Transportation and Storage

1.4.1 Packaging

The original package consists of

1. Tek-Wave 4300B FMCW Bluetooth Radar Level Transmitter
2. Documentation



NOTE

Unpack and check the contents for damages or sign of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.4.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.4.3 Storage

If this product is to be stored for an extended period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- The storage location should comply with the following requirements:
 - Free from rain and water
 - Free from vibration and impact shock
 - At room temperature with minimal temperature and humidity variation
- Before storing a used flow meter, remove any fluid from the flow meter line completely. Properties of the instrument can change when stored outdoors.

1.4.4 Nameplate

The nameplate lists the order number and other important information, such as design details and technical data.



NOTE

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2 Product Description

2.1 Introduction

Tek-Wave 4300B FMCW Bluetooth Radar Level Transmitter continuously measures different liquids and solids levels in simple applications with lower pressure and temperature ranges demands. It is mainly suitable for water treatment, pumping stations, rain overflow basins, and level monitoring. In bulk solids applications, the sensors are used in small bulk solids silos or open containers.

The non-contact 80GHz radar transmitter includes Bluetooth technology for commissioning, operation and maintenance, which reduces cost and time. Every Bluetooth®-enabled smartphone or tablet can display output signal through an app (Android). Simple, safe and secure wireless remote access Radar Level Transmitter is suitable for installation in difficult places. Its unique radar chip design makes it the most compact radar that perfectly fits in limited space applications. Its full PVDF body resists outdoor conditions, sealed wiring and fully potted electronics eliminate water ingress and allows operation under harsh environmental conditions. Perfect application fit for water & wastewater and utilities in all industries



Fig 1: Tek-Wave 4300B FMCW Bluetooth Radar Level Transmitter

2.2 Working Principle

The Tek-Wave 4300B FMCW Bluetooth Radar Level Transmitter uses 80GHz Frequency Modulated Continuous Wave. The FMCW radar emits a high-frequency signal that increases linearly during the measurement phase (called the frequency sweep). The signal is emitted, reflected from the measuring surface and received with a time delay (t).

$$\text{Delay Time (t)} = 2D/C$$

Where,

D is the distance to the product surface.

C is the speed of light in the gas above the product.

The difference Δf is calculated from the actual transmit frequency and the receive frequency for further signal processing. This difference is directly proportional to the distance.

2.3 Specifications

Accuracy	±2mm
Measuring Range	45ft
Repeatability	±1mm
Frequency	76 to 81GHz
Resolution	1mm
Response Time	<2S
Process Temperature	-40°F to 176°F (-40°C to 80°C)
Process Pressure	-14.5 to 40psi (-1 to 3bar)
Beam Angle	8°
Process Connection	1-1/2" Male NPT
Electrical Connection	3/4" Male NPT with 15' lead wire
Digital Output	Bluetooth, HART, Modbus RS-485
Power	<0.5W (Power supply required 24VDc with minimum 25mA)
Analog Output	4-20mA (2-wire)
Enclosure & Ratings	IP68
Approvals	CE

2.4 Dimension Drawings

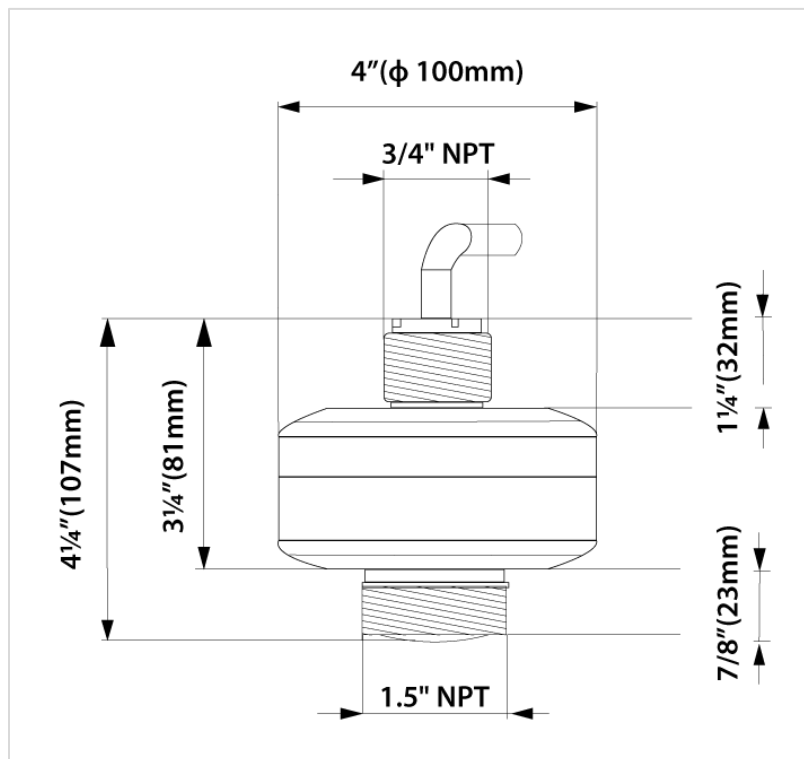


Fig 2: Front View

2.4.1 Mounting Brackets

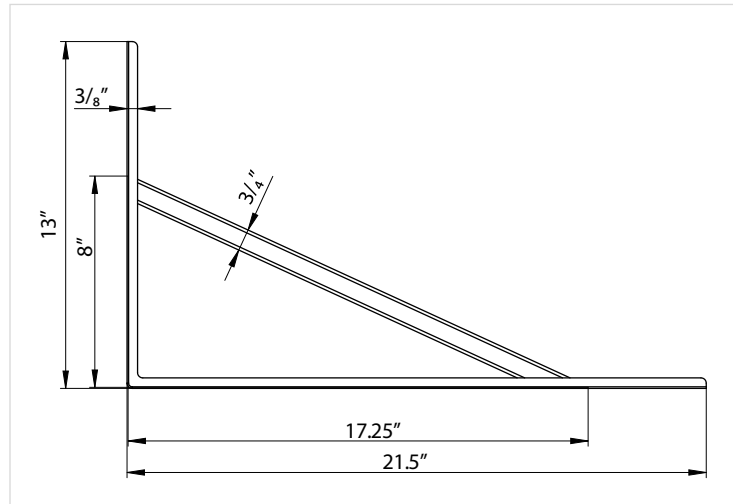


Fig 3: Mounting Bracket Side Angle

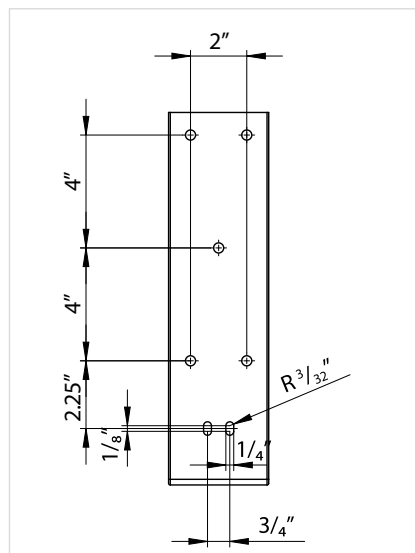


Fig 4: Mounting Bracket Back Angle

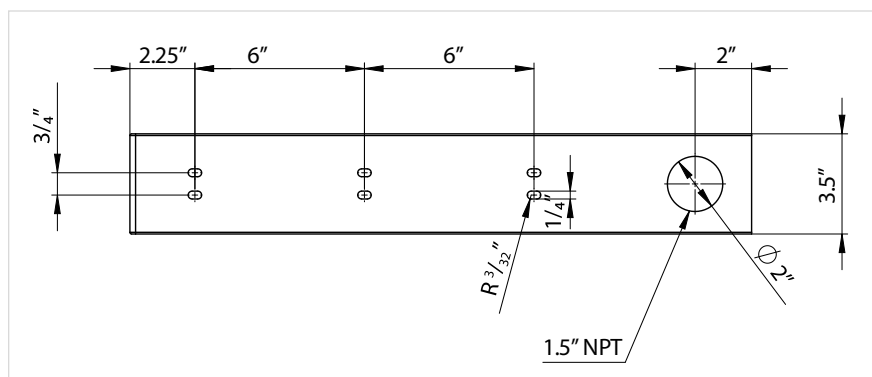


Fig 5: Mounting Bracket Top Angle

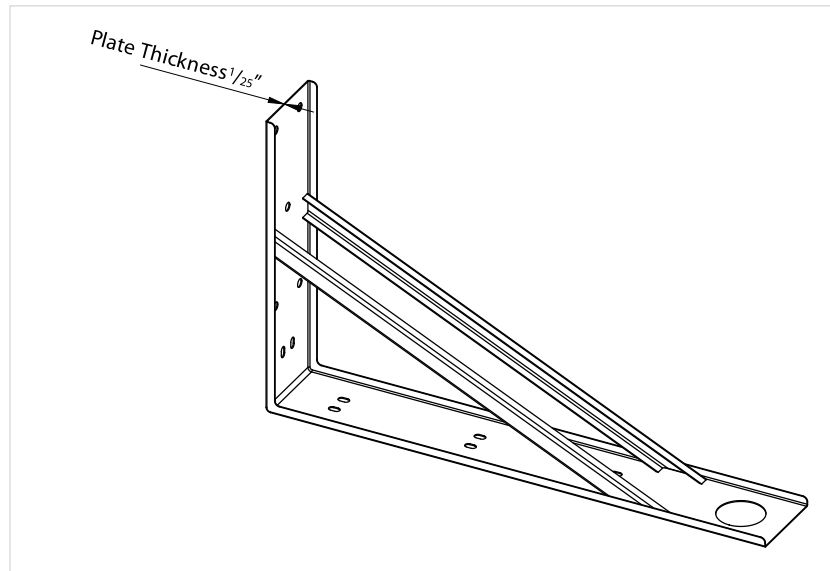


Fig 6: Mounting Bracket

2.5 Model Chart

Example	Tek-Wave 4300B	01	A	01	B	015	A	01	A	#	Tek-Wave 4300B-01-A-01-B-015-A-01-A
Series	Tek-Wave 4300B										FMCW Bluetooth Radar Level Transmitter
Output		01									18 to 36 VDC
Process Connection			A X								1-1/2" Male NPT Special
Electrical Connection				01							3/4" Male NPT
Range					B						45 Feet
Cable Length						015					15' Cable
Analog Output							A				4 to 20mA
Digital Output								01			Bluetooth, HART, Modbus RS-485
Enclosure & Ratings									A		IP68
Options										TAG FC BKT USB	Tag Factory Configuration Mounting Bracket Modbus Configuration Tool

3 Installations

This section covers instruction on installations and commissioning. Installations of the device must be carried out by trained, qualified specialists authorized to perform such works.



CAUTION

- When removing the instrument from hazardous processes, avoid direct contact with the fluid and the meter.
- All installation must comply with local installation requirements and local electrical code

3.1 Mounting

3.1.1 General mounting conditions

- The Tek-Wave 4300B should not be mounted closer than 8" (200mm) to the vessel wall.
- The Tek-Wave 4300B is not mounted in the center because interference can cause signal loss.
- The Tek-Wave 4300B is not mounted above the fill stream.
- A weather protection cover is recommended to protect the instrument from sun or rain.
- The radar antenna should be vertical to measure the media surface.

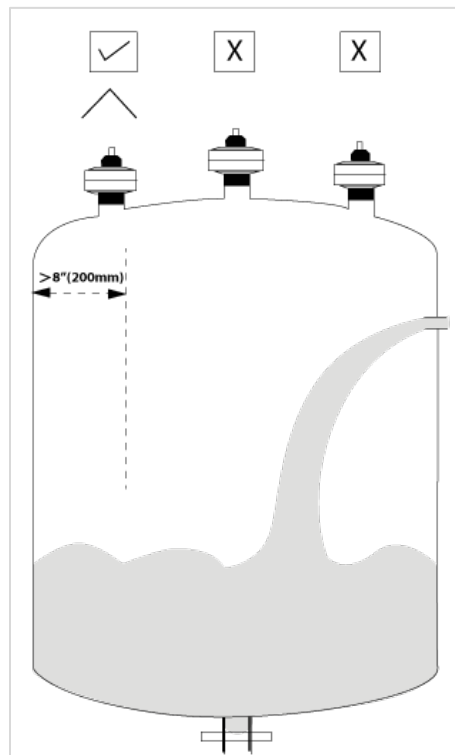


Fig 7: General Mounting Position

3.1.2 Stirring Fan in Vessel

- If there is a stirring fan in the vessel:
 - The instrument should be mounted at 1/2 of the distance from the inner wall to the stirring fan.
 - Carry out false echo storage to reduce the interference from the stirring fan.

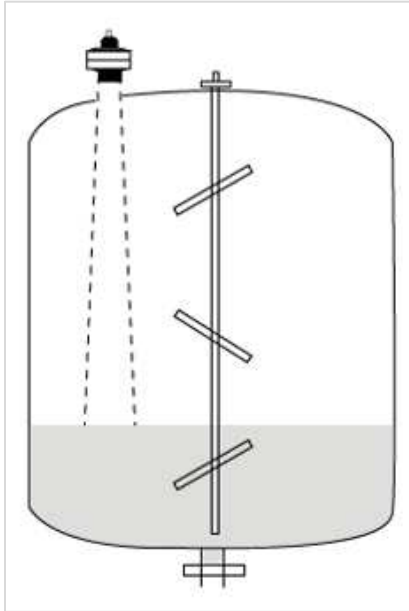


Fig 8: Mounting Position for Stirring Fan in Vessel

3.1.3 Reduction of Interference Echoes

Radar signals can spread by mounting metallic at a slope, which reduces the interference echoes.

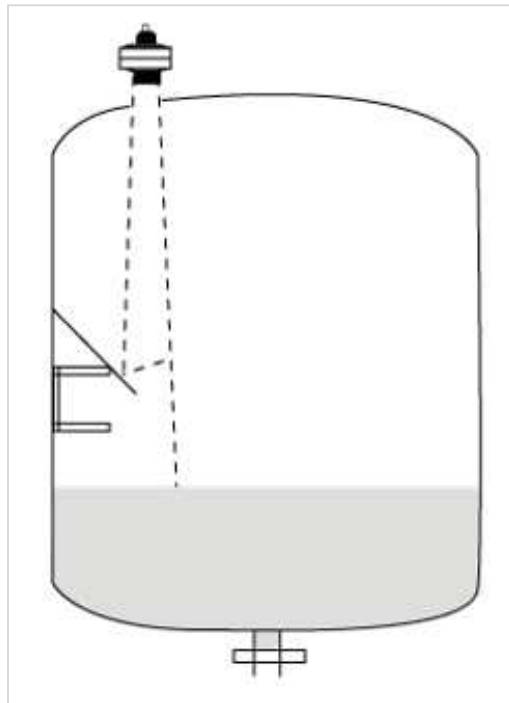


Fig 9: Mounting Position for Interference Echoes Reduction

3.1.4 Mounting with Bracket

- The instrument can also be mounted through a bracket with thread G1.
- The distance between the sensor and wall should not be closer than 8" (200mm).

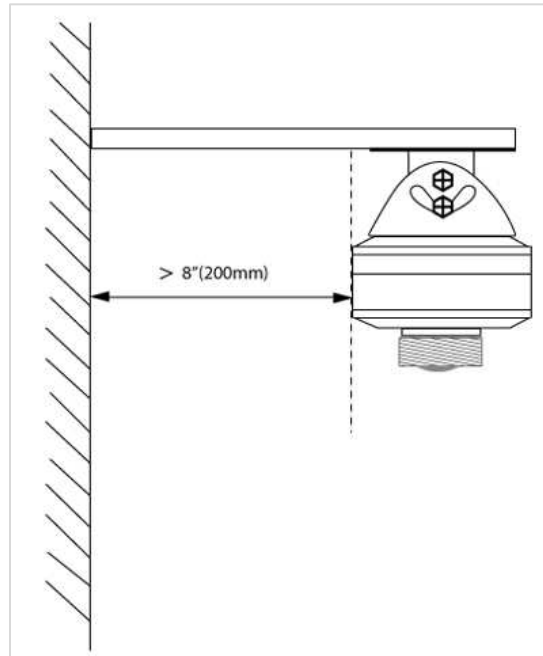


Fig 10: Mounting with Bracket

4 Electrical Connection

This section covers all electrical connection requirement. Electrical connection of the device must be carried out by trained; qualified specialists authorized to perform such work by the installation site.



WARNING

- Connect all electrical cables when the power is switched off. If the device does not have switch-off elements, then, overcurrent protection devices, lightning protection and/or energy isolating devices must be provided by the customer.
- The device must be grounded to a spot in accordance with regulations in order to protect personnel against electric shocks.



NOTE

When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.

4.1 Wiring Connection

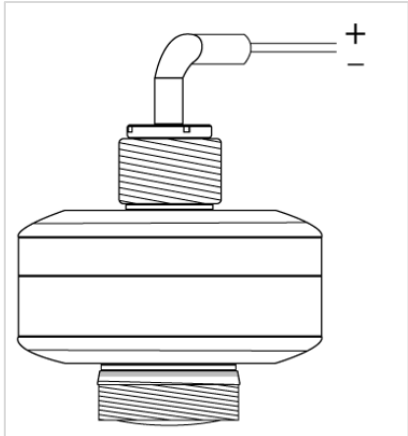


Fig 11: Wiring Connection

Table 1: Wire Description

Wire Color	Function
Brown	Voltage +
White	Voltage – (4-20mA)
Green	Modbus RS485 A
Yellow	Modbus RS485 B
Gray	Ground

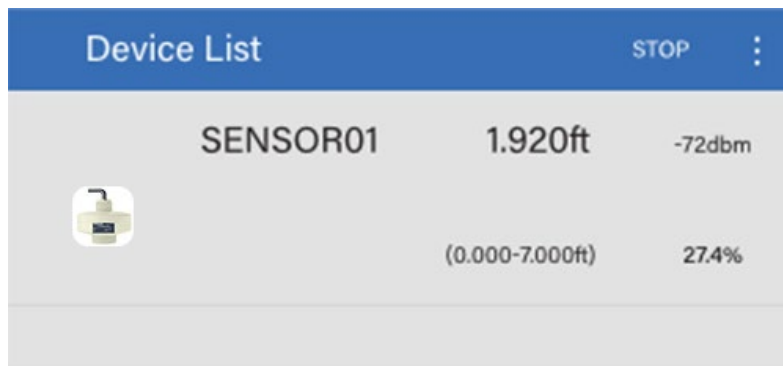
5 Operations (Setup with Smartphone/Tablet (Bluetooth) or Modbus Software)

5.1 Bluetooth Setup (Android Only)

- Install “Tek-Wave 4300B” on the google play store.



- Deny the APP to utilise the location and storage functions & Close the app.
- Go to settings>"Tek-Wave 4300B"> Hold Down the app till it indicates"APP info"
 - "APP info"> "Permissions">"Location">"Allow"
 - "APP info" >"Permissions">"Storage">"Allow"
- Start APP.
- Select Device “SENSOR 01”



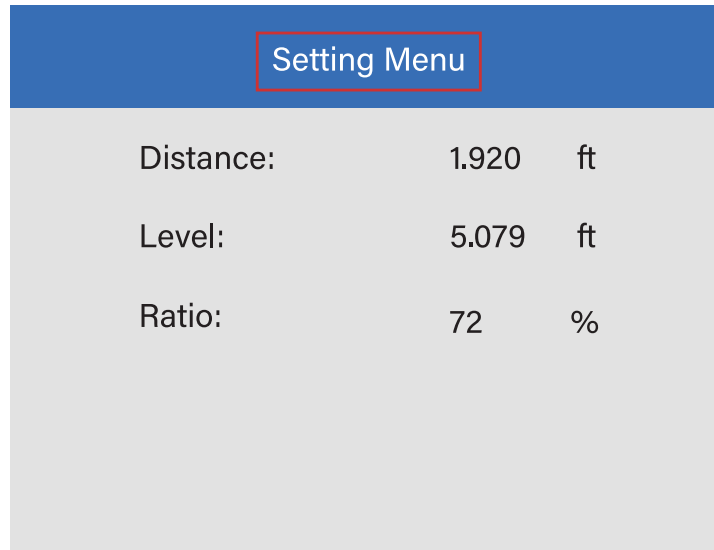
Note: - If the 4300B is having any Alarm like HH or LL. the output current will be either 20.5 mA or 3.8 mA. at this point the Bluetooth app will start connect/disconnect or get hang to previous screen until the unit reaches to normal operation.

Trouble shooting: Close the app and relaunch keep search for the 4300B unit repeatedly.

5.2 Setup

5.2.1 Main Menu

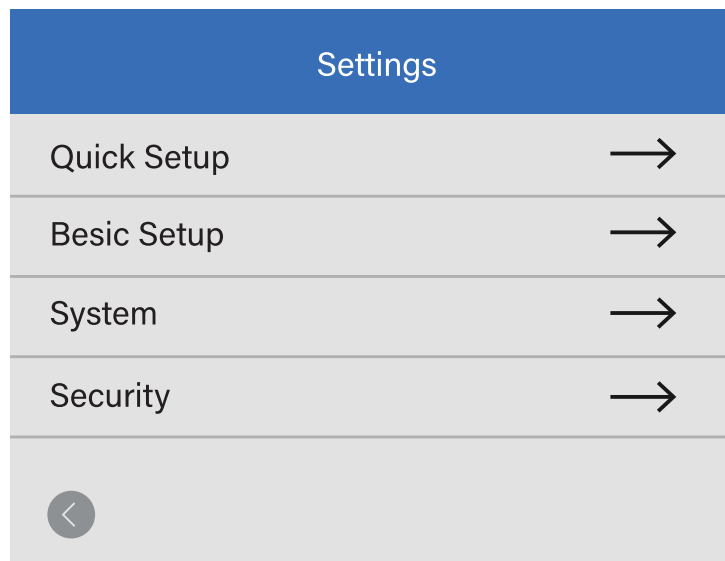
- You can find measuring distance, level and ratio on the main menu.
- Using Setting Menu, you can set the parameters.



Setting Menu		
Distance:	1.920	ft
Level:	5.079	ft
Ratio:	72	%

5.2.2 Setting Parameters



Setting Parameters consist for sub menus



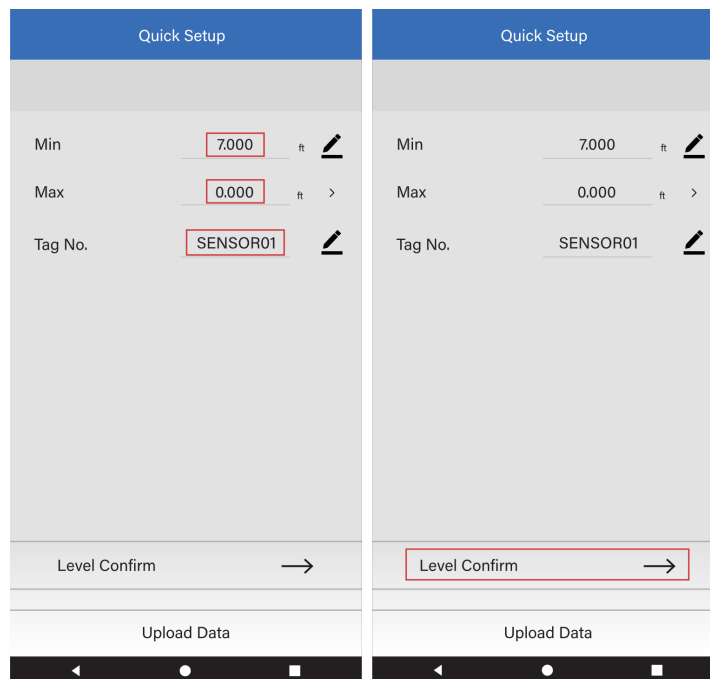
Settings	
Quick Setup	→
Basic Setup	→
System	→
Security	→
←	

5.2.2.1 Quick Setup

5.2.2.1.1 Set Measuring Range

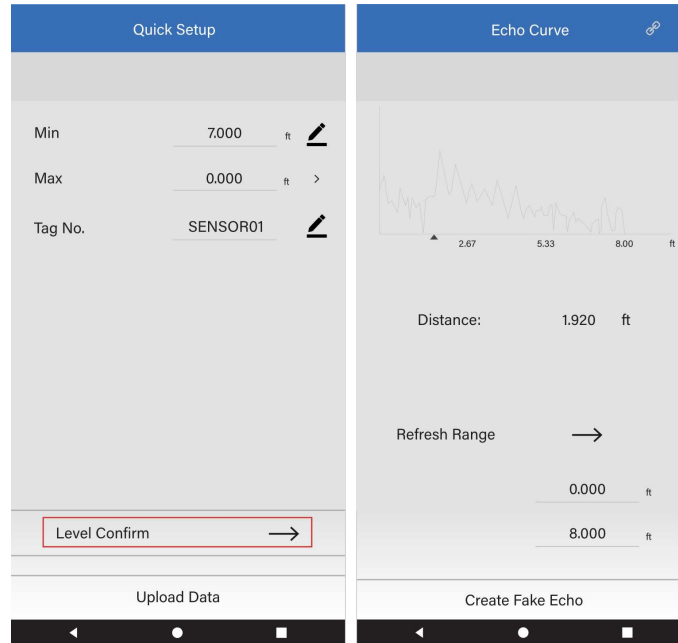
- Please enter “Quick Setup” to set the measuring range.
- Write minimum and maximum range and press  to save data.
- Write Tag number as per your application and press  to save data.

- You can upload data from the device by pressing “Upload Data”.



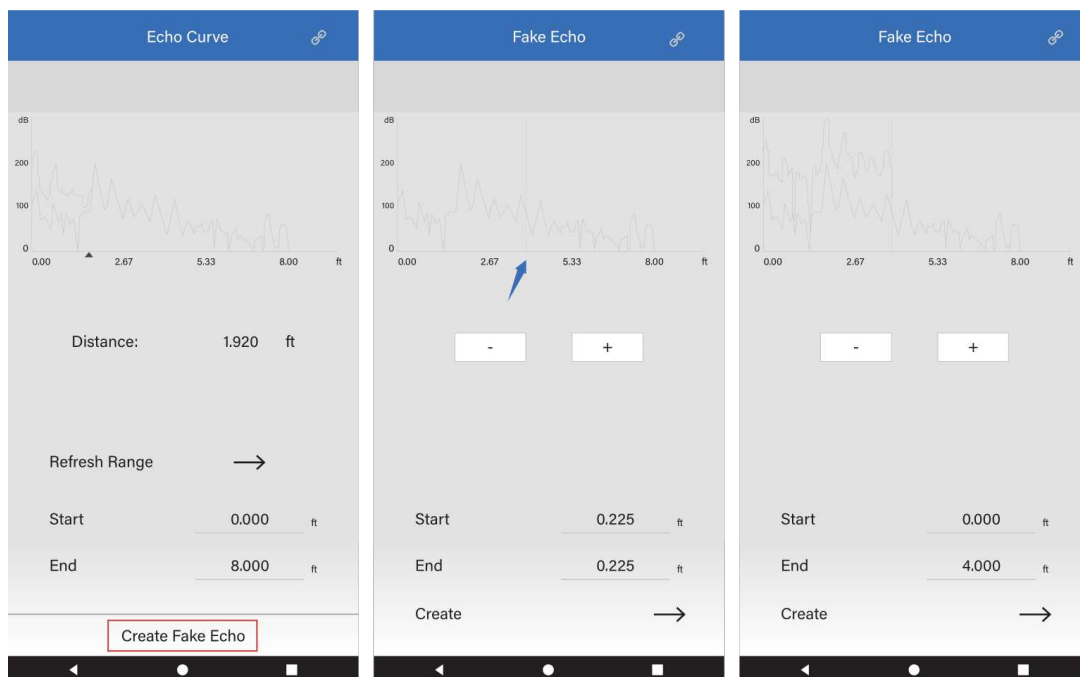
5.2.2.1.2 Check Echo Curve

- Enter menu with echo curve by entering “Level Confirm”.
- If you set a new measuring range and want to change the X range, please re-write the data on the End and save it by Refresh Range →



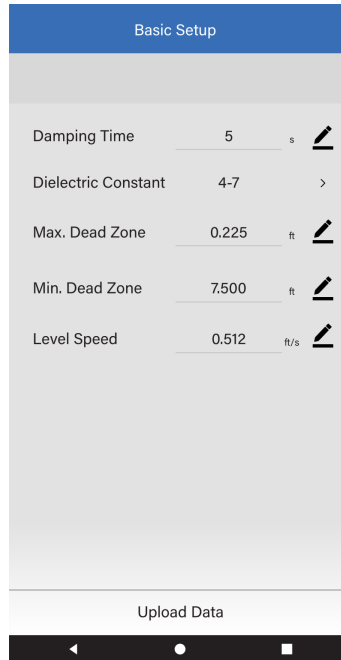
5.2.2.1.3 Create Fake Echo

- If there is an obstacle inside the tank that generates a fake echo, you will need to create a fake echo.
- Please use “+” or “-” to move the line indicated by the arrow to set the fake echo position of false echo and press → behind Create and you will get new double echo curve.



5.2.2.2 Basic Setup

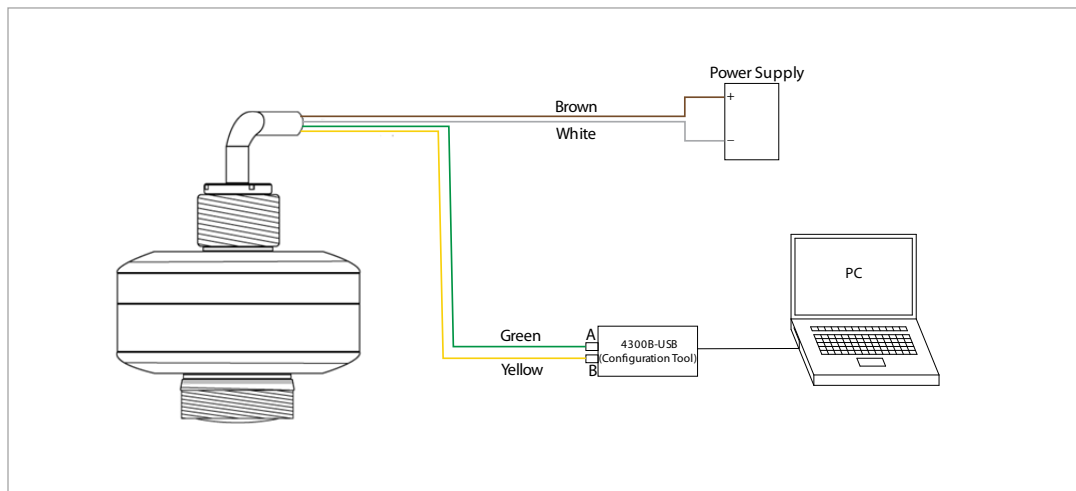
- You can set the following parameters according to field conditions.
- You can also upload data from the device by “Upload Data”.
- For most applications, the device can work properly after the setup of the above two menus.
- For more menu information, please contact us, and you can also refer to the menu overview.



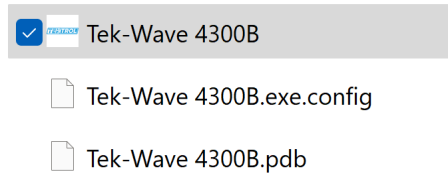
*Note: The distance between device and smartphone should be not more than 25’ to get better signal communication.

5.3 Modbus Software Setup

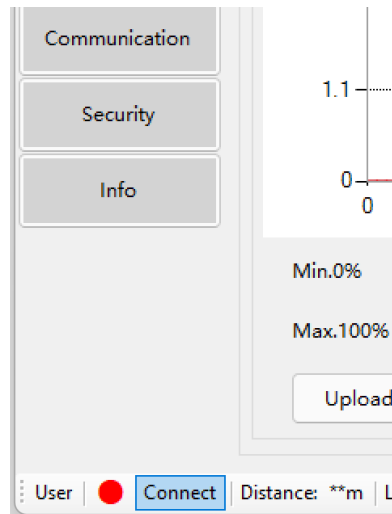
- Connect the 4300B to the 4300B-USB tool and power the 4300B.



- Launch the 4300B Modbus Program.



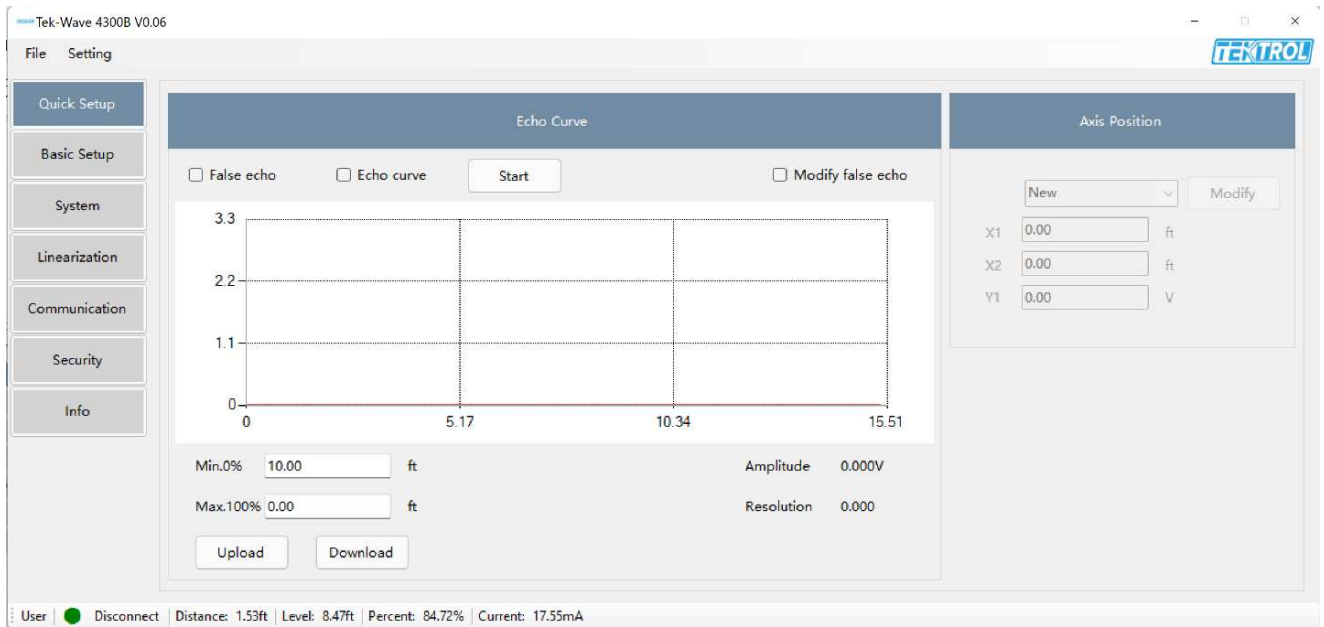
- When the program opens. Click Connect to Poll the 4300B.



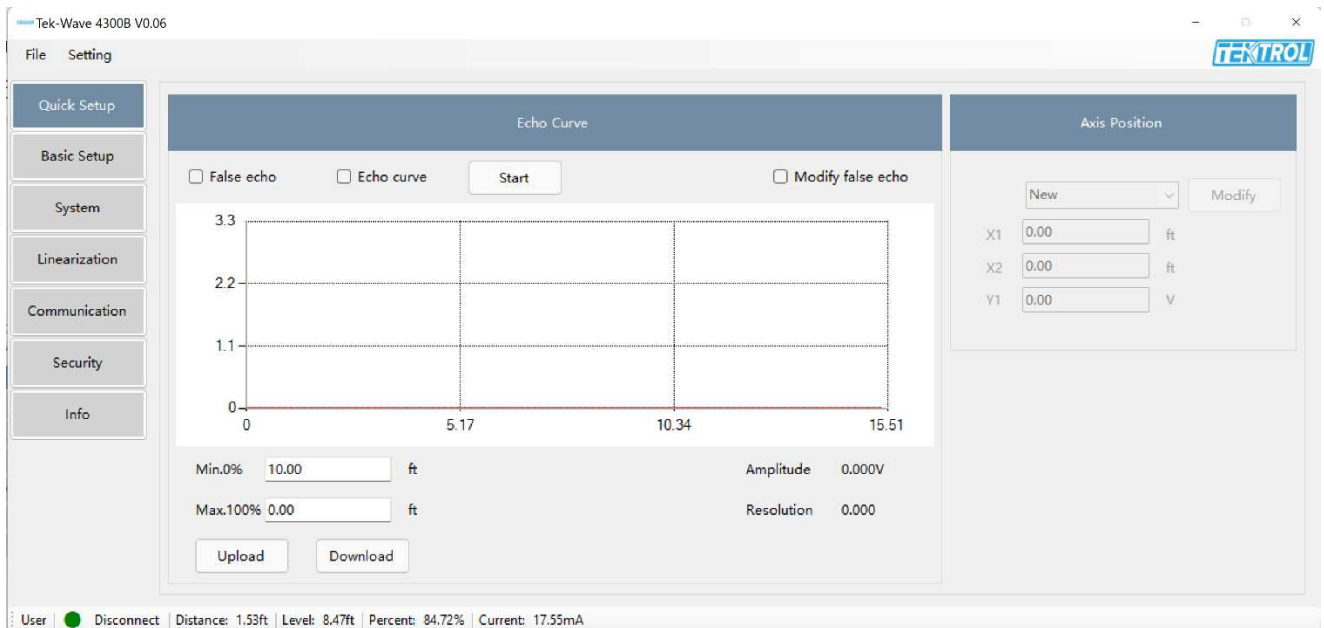
- It will take the software a few moments to find the 4300B.



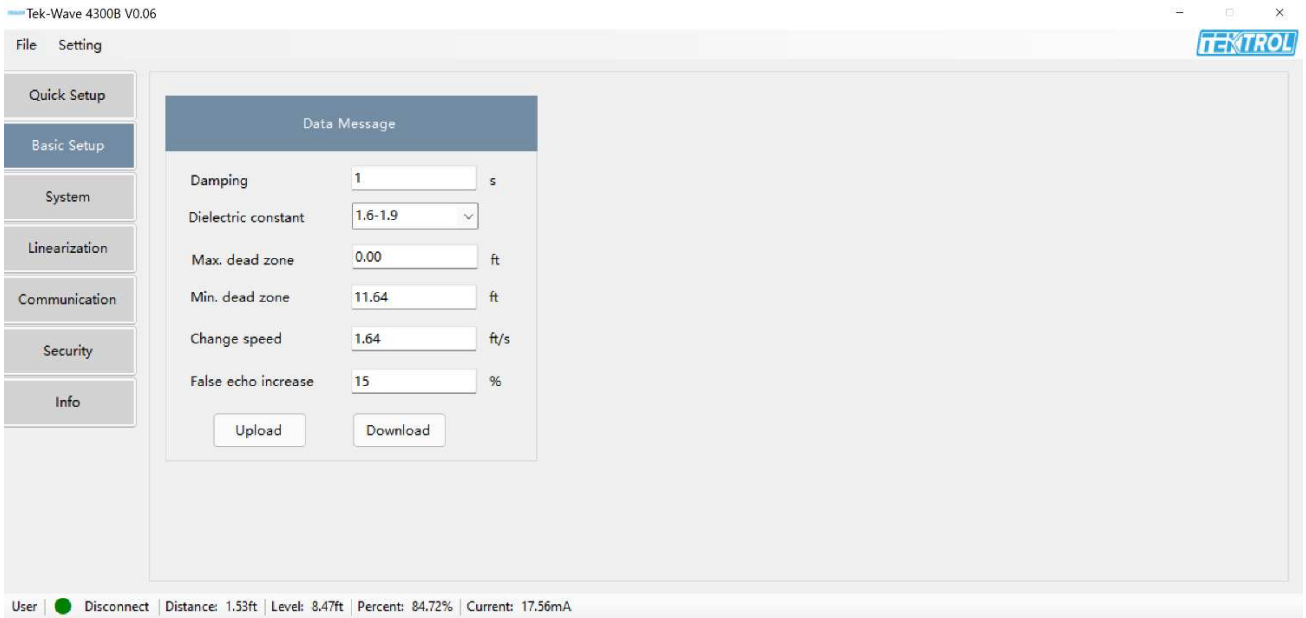
- When the Modbus program connects to the 4300B, there will be two red flashing lights on the 4300B-USB tool and a green Dot in the lower left side of the screen. The 4300B process data will appear on the bottom of the screen.



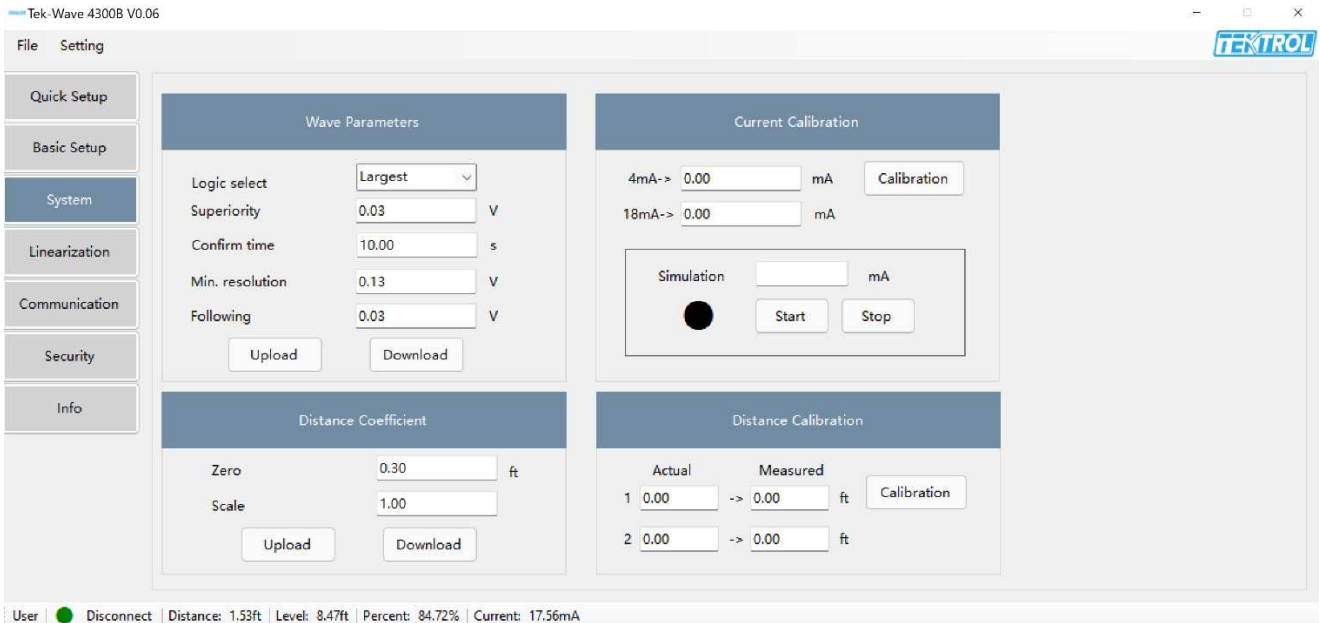
- From the Quick Setup screen the Max and Min range can be set up the Max range is your 4mA and the min range is you 20mA. You can also look at the Echo Curve on this screen.



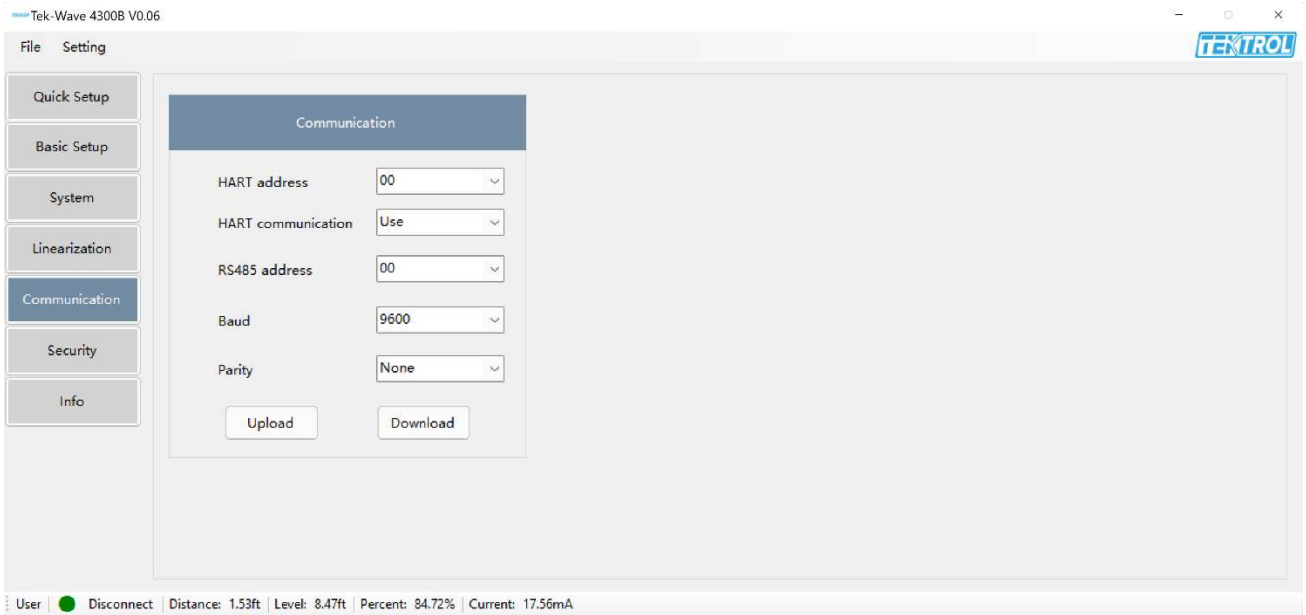
- In the Basic Setup screen the following parameter can be adjusted.



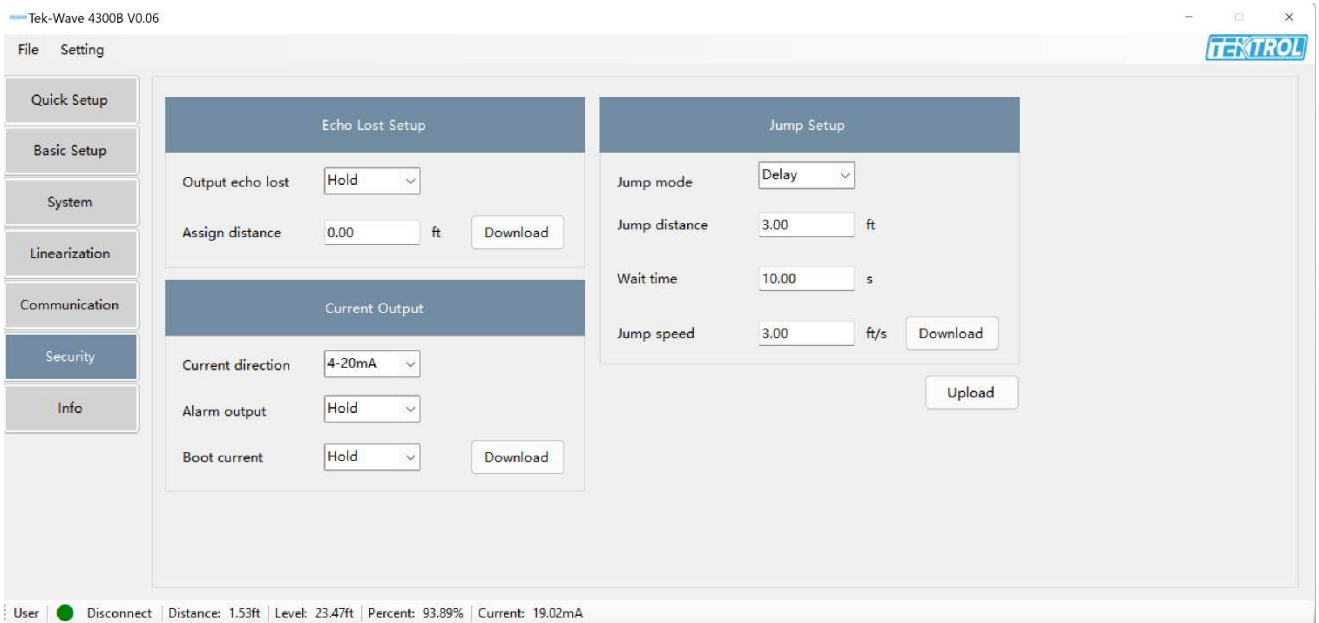
- In the System screen you can simulate a mA signal to make use you output is setup correctly at your PLC or Scada.



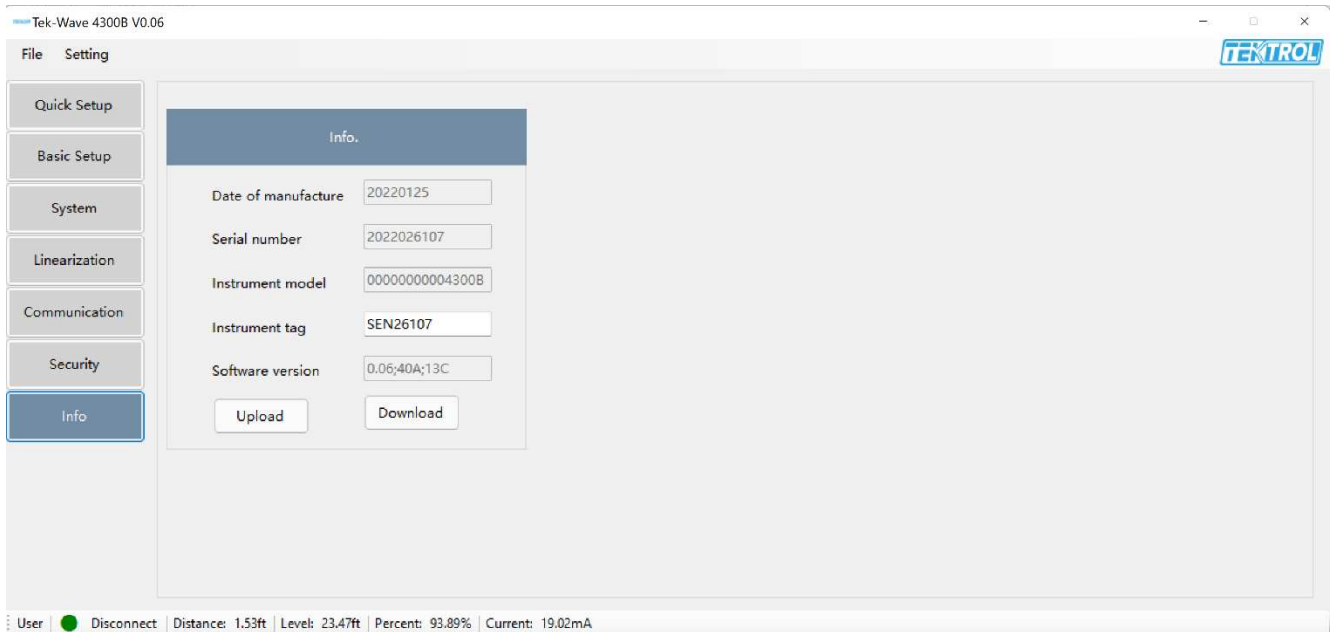
- In the Communication screen the HART and Mobus communication parameters can be changed.



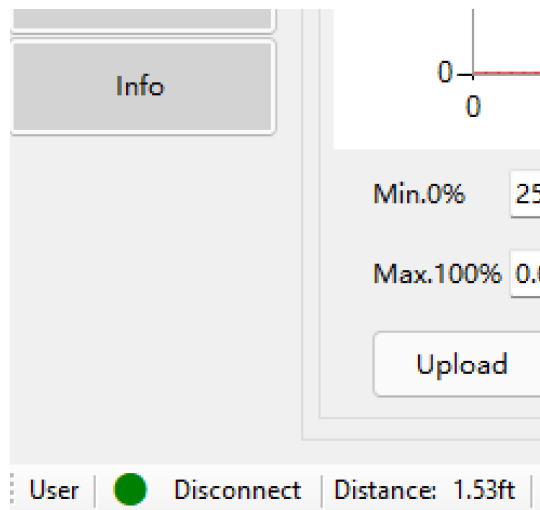
- The Security screen will allow the following parameters to be changed.



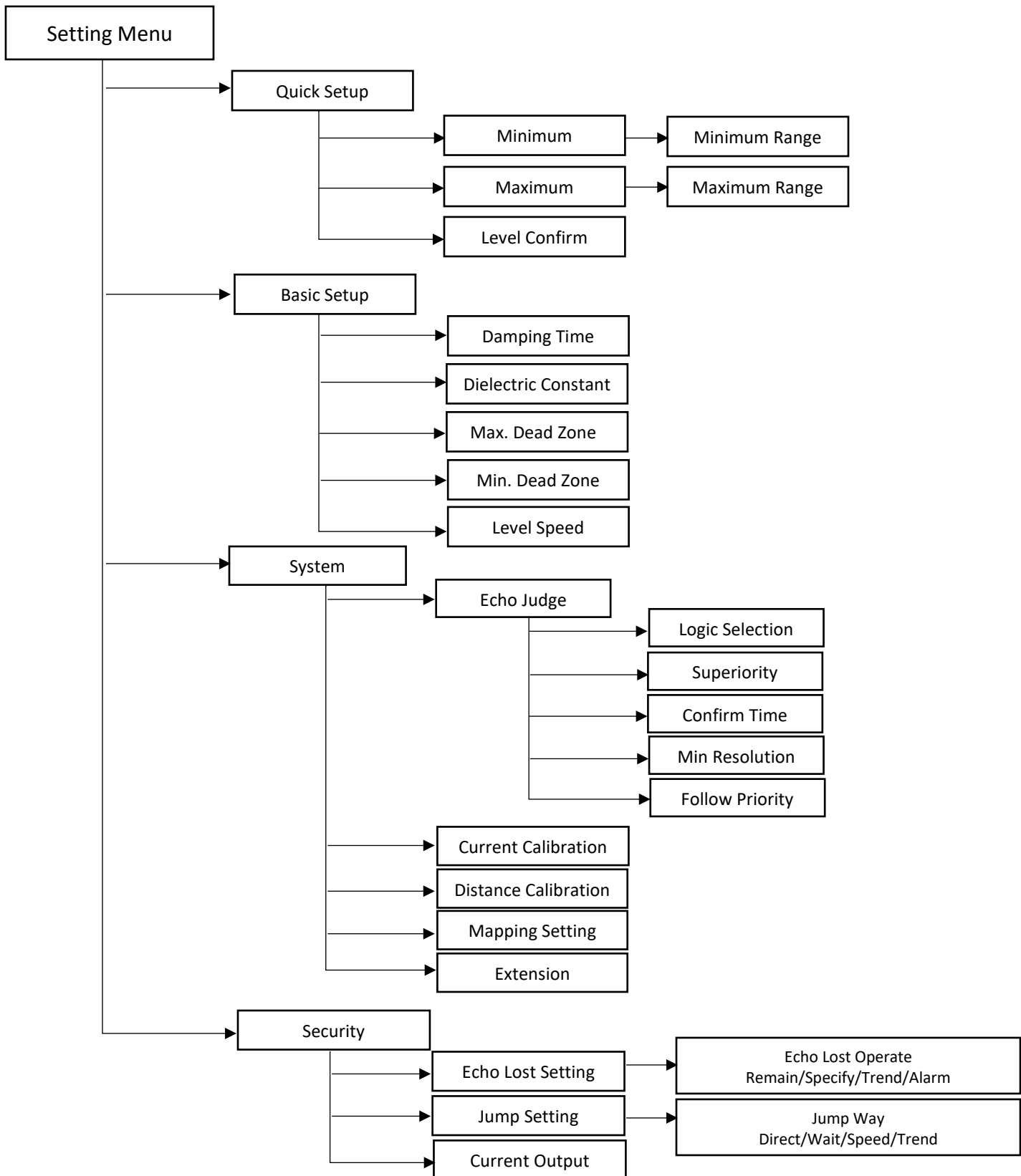
- The Info screen will give you all the manufacturing information about the 4300B.



- After you have uploaded all the modifications to the 4300B, click Disconnect and remove the 4300B from your PC.



6 Menu Tree





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