

TEK-WAVE 4300B FMCW Bluetooth Radar Level Transmitter

Instruction Manual

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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 Customer Support 796 Tek-Drive Crystal Lake, IL 60014 USA Tel: +1 847 857 6076

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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



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.



1 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



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).

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	1" 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 4: Mounting Bracket Back Angle



Fig 5: Mounting Bracket Top Angle





Fig 6: Mounting Bracket

2.5 Model Chart

Example	Tek-Wave 4300B	01	Α	01	в	015	Α	01	Α	#	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			А								1-1/2" Male NPT	
Connection			Х								Special	
Electrical Connection				01							1" Male NPT	
Range					В						45 Feet	
Cable Length						015					15'Cable	
Analog Output							А				4 to 20mA	
Digital Output								01			Bluetooth, HART, Modbus RS-485	
Enclosure & Ratings									А		IP68	
										TAG	Тад	
Ontions										FC	Factory Configuration	
Options										BKT	Mounting Bracket	
										USB	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.



- 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



Table 1: Wire Description

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

Fig 11: Wiring Connection

- 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"

Devid	ce List		STOP	÷
	SENSOR01	1.920ft	-72dbr	m
-		(0.000-7.000ft)	27.4%	5

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 starts 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.

Menu	
1.920	ft
5.079	ft
72	%
	Menu 1.920 5.079 72

5.2.2 Setting Parameters

Setting Parameters consist for sub menus

Settings	
Quick Setup	\rightarrow
Besic Setup	\rightarrow
System	\rightarrow
Security	\rightarrow
(



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".

Quic	k Setup	Quicl	< Setup	
Min	7.000 ft 🗡	Min	7.000 ft 🦯	•
Max	0.000 ft >	Max	0.000 ft >	
Tag No.	SENSOR01	Tag No.	SENSOR01	-
Level Confirm	\rightarrow	Level Confirm	\rightarrow	
11.1		11.1.		
Uplo		Uplo		
•	•		•	



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 →

Quicl	< Setup		Echo	Curve	P
Min	7.000 ft	∠			
Max Tag No.	0.000 ft SENSOR01	` <u>/</u>	2.67	5.33 8.0	D ft
			Distance:	1.920 ft	
			Refresh Range	\rightarrow	
Level Confirm	;	>		0.000	ft
Uplo	ad Data		Create Fa	ake Echo	
•	•		•		

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.

Basic Setup						
Damping Time	5	s 🖊				
Dielectric Constant	4-7	>				
Max. Dead Zone	0.225	ft 🗡				
Min. Dead Zone	7.500	ft 🗡				
Level Speed	0.512	ft/s 🖊				
Union	d Data					
Uploa						

*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.



Instruction Manual Tek-Wave 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.

tuick Setup			Echo Curve				Axis Position				
asic Setup	False echo	🗌 Echo curve	Start		🗌 Mod	ify false echo		11			
System	33							New	✓ Modify		
							X1	0.00	ft		
earization	2.2		-				X2	0.00	ft		
nmunication	yd (1578).						¥1	0.00	V		
Security	1.1										
Info	0										
	0		5.17	10.34		15.51					
	Min.0% 10.0	0 ft			Amplitude	0.000V					
	Max.100% 0.00	ft			Resolution	0.000					

• 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.

Juick Setup								Axis I	
Basic Setup	False echo	🗌 Echo curve	Start		Modify false	echo			
System								New	Mo
	3.3						X1	0.00	ft
inearization	22						X2	0.00	ft
mmunication	<u> </u>						¥1	0.00	V
	1.1-					_			
Security									
Info	0		17	10.24		15 51			
	0	5		10.34		15.51			
	Min.0% 10.00	ft			Amplitude 0.00	v			
	Max.100% 0.00	ft			Resolution 0.00	D			
		Describeral							



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

File Setting			
Quick Setup			
Basic Setup	Data	i Message	
System	Damping	1	s
	Dielectric constant	1.6-1.9	~
Linearization	Max. dead zone	0.00	ft
Communication	Min. dead zone	11.64	ft
Security	Change speed	1.64	ft/s
Info	False echo increase	15	%
IIIO	Upload	Download	

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

e Setting					
Quick Setup	Wa	ve Darameters		Current Calibration	
Basic Setup		ve Faranieters			
	Logic select	Largest v		4mA-> 0.00 mA Calibration	
System	Superiority	0.03 V	/	18mA-> 0.00 mA	
Linearization	Confirm time	10.00 s			
	Min. resolution	0.13 V	/	Simulation mA	
ommunication	Following	0.03 V	/	Start Stop	
Security	Upload	Download			
Info	Dista	ince Coefficient		Distance Calibration	
	Zero	0.30	ft	Actual Measured	
	Scale	1.00		1 0.00 -> 0.00 ft Calibration	
	Upload	Download		2 0.00 -> 0.00 ft	



• In the Communication screen the HART and Mobus communication paraments can be changed.

Tek-Wave 4300B V0.06			- 0
File Setting			
Quick Setup			
Basic Setup	Communica	ition	
System	HART address	00 ~	
March March	HART communication	Use ~	
Linearization	RS485 address	00 ~	
Communication	Baud	9600 ~	
Security	Parity	None ~	
Info			
	Upload	Download	
In Discount Di	4	04.73% C	1720

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

File Setting					(TEK1):
Quick Setup		Echo Lost Setun		lumo Setuo	
Basic Setup					
System	Output echo lost	Hold	Jump mode	Delay ~	
	Assign distance	0.00 ft Download	Jump distance	3.00 ft	
Linearization	i		Wait time	10.00 s	
ommunication		Current Output	luma and	200 Ata Davaland	
Security	Current direction	4-20mA 🗸	Jump speed	3.00 Ttys Download	
Info	Alarm output	Hold ~		Upload	
	Boot current	Hold ~ Download			
er Disconnec	t Distance: 1.53ft Level:	23.47ft Percent: 93.89% Current: 19.02m4	1		



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

Tek-Wave 4300B V0.06			
le Setting			
Quick Setup			
Basic Setup	Info		
System	Date of manufacture	20220125	
Linearization	Serial number	2022026107	
Lincunzation	Instrument model	000000004300B	
ommunication	Instrument tag	SEN26107	
Security	Software version	0.06;40A;13C	
Info	Upload	Download	

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





6 Menu Tree





Tek-Trol is a fully owned subsidiary of TEKMATION LLC. We offer our customers a comprehensive range of products and solutions for process, power and oil & gas industries. Tek-Trol provides process measurement and control products for Flow, Level, Temperature & Pressure Measurement, Control Valves & Analyzer systems. We are present in 15 locations globally and are known for our knowledge, innovative solutions, reliable products and global presence.