



Operation Instruction Manual

Non-Contact Radar Level Sensor

LevelD.86-A

1. Product Overview

1.1 Introduction

LevelD.86-A radar level transmitter is an 80GHz high-frequency intelligent level measuring instrument, which outputs (4~20) mA analog signals and has a maximum range of up to 35 meters. The antenna is further optimized, and the new fast microprocessor can perform higher-speed signal analysis and processing, so that the instrument can be used for level measurement of **liquid storage tanks**.

1.2 Principle

A radar level transmitter emits a continuous radar wave signal from an antenna. The signal is a frequency modulated continuous wave, or FMCW. There is a frequency difference between the continuous wave emitted from the radar level Transmitter antenna and the echo returned from the surface of the object, the frequency difference is proportional to the distance between the antenna and the surface of the object. After receiving the ECHO, the electronic components are processed by special processing, such as Fourier Transform, and a unique high precision algorithm is used to make the instrument accurately measure the height of the object.

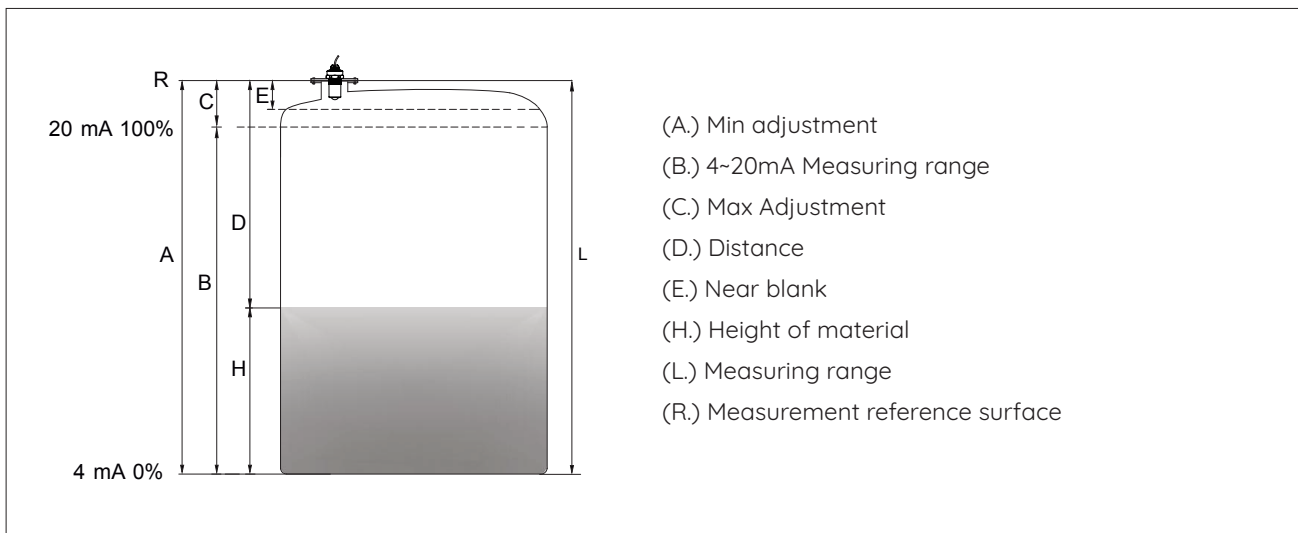


Figure 1

1.3 Characteristics

- The radar object level transmitter adopts a working frequency of 80GHz and has the following characteristics:
- Non-contact measurement, no wear, no pollution.
- The antenna size is small, easy to install.
- Shorter wavelength, better reflection on an inclined solid surface.
- The measuring blind area is smaller, and good results can be obtained for small storage tanks.
- The small beam angle and concentrated energy enhance the echo ability, and it is beneficial to avoid the interference.
- Almost impervious to corrosion and steam.
- Almost unaffected by changes in temperature and pressure in the atmosphere.
- And in the serious dust environment the instrument can read the accurate level of the Real Echo.
- High signal-to-noise ratio, even in the case of fluctuations can also have better performance.
- 80Ghz frequency is the best choice for measuring solid and low dielectric constant media, which is satisfied with the measurement of dielectric constant $\epsilon_r \geq 1.8$.

2. Specification

Versions	LevelD.86-A-10	LevelD.86-A-20	LevelD.86-A-35
Measuring Range	0-10 meter	0-20 meter	0-35 meter
Accuracy	± 2 mm	± 4 mm	± 6 mm
Process Connection (Bottom/Top)	G1-1/2" and G1"		
Technology	Non-Contact, Radar, 80GHz (77...81 Ghz)		
Blind Area	100 mm		
Angle	6°		
Cable	Integrated, 5 meters (cable dia is approx 6 mm)		
Working Temperature and Humidity	-40.....+80 °C < 95 RH%		
Protection	IP68		
Body Material	ABS (Body color may change)		
Output Signal	4-20 mA (2 wire) (Resolution : 1,6 micro A)		
Power Supply	24 Vdc (Typical) (16...26 Vdc) (0,6 Watt)		
Dimension	Check next page		
Connectivity	Bluetooth (for configuration, Android App is available)		
Vibration Resistance	Mechanical Vibration 10m/s ² (10~150) Hz		
Measurement Interval	1 second (depends configuration)		
Damping Time - Filter	1 - 100 second selectable by App		

3. Installation

Please take note of the following to ensure proper instrument installation.

- ① Please reserve enough space for installation.
- ② Please avoid installation with strong vibration.

3.1 Installation Location

Install at $1/6$ or $1/4$ of tank diameter

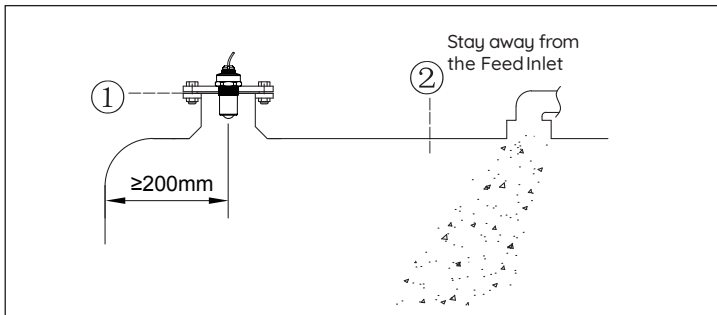


Figure 2

Minimum Distance from tank wall $\geq 200\text{mm}$

Note : ① Datum Plane
② Container Center or symmetrical axis

The instrument should be mounted in the middle of the tank top if the tank is flat-topped conical tank, to ensure that the bottom of the cone can be measured

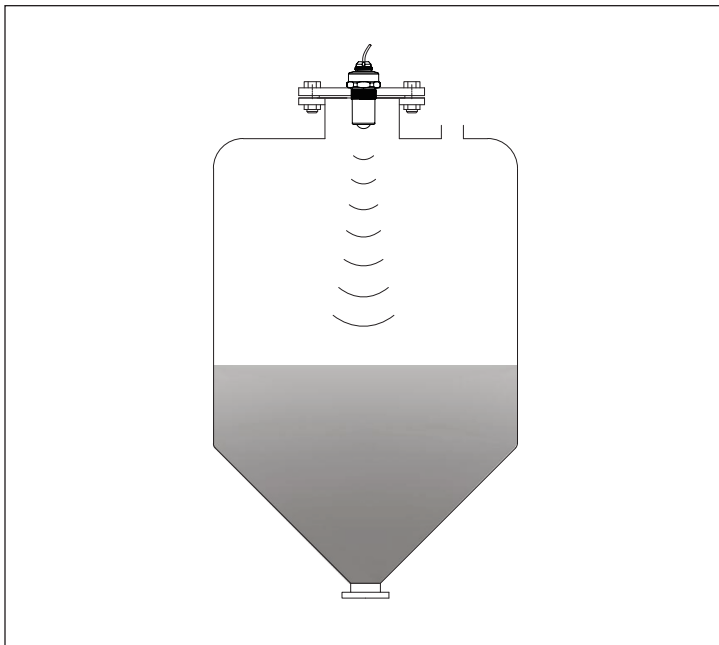


Figure 3

3. Installation

3.1 Typical **wrong** installations

- It cannot be installed above the inlet.

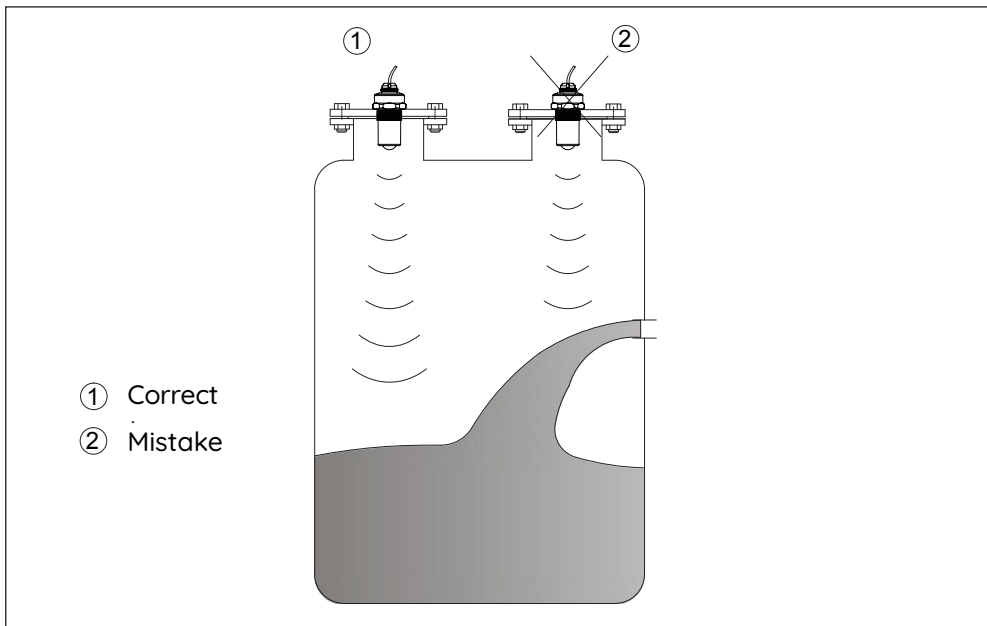


Figure 4

The instrument cannot be installed in the middle of the arc tank roof, and it will be affected by multiple echoes. Because the curved tank roof can focus multiple echoes, the multiple echoes may be stronger than the true echo signal amplitude, so it cannot be installed in the center position.

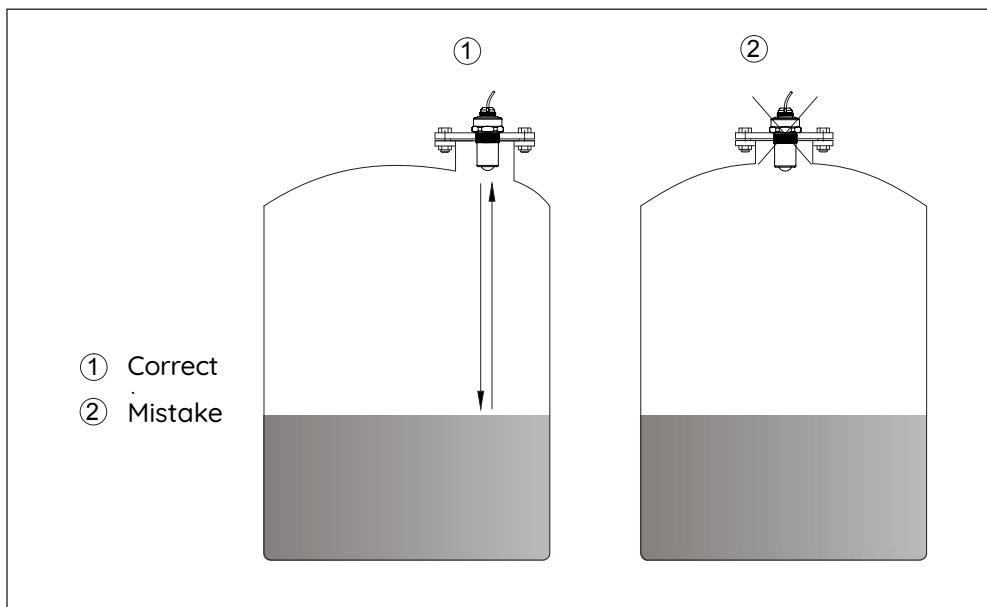


Figure 5

3. Installation

3.3 Tank Connection Tube

- ▶ It is strongly recommended that the on-site container installation short pipe height is $\leq 200\text{mm}$. It is a very reasonable installation method for the short tube height of the container to be installed less than or equal to 200mm.
- ▶ If the length of the container connection is long, please refer to Figure 6. The longest installation short tube should be smaller than the size shown in Figure 6 as far as possible, and the end must be smoothed without burrs and other protrusions. If necessary, use the "**false echo storage**" function to eliminate the reflected signal at the end of the tanks nozzle, and you can also obtain better measurement results.

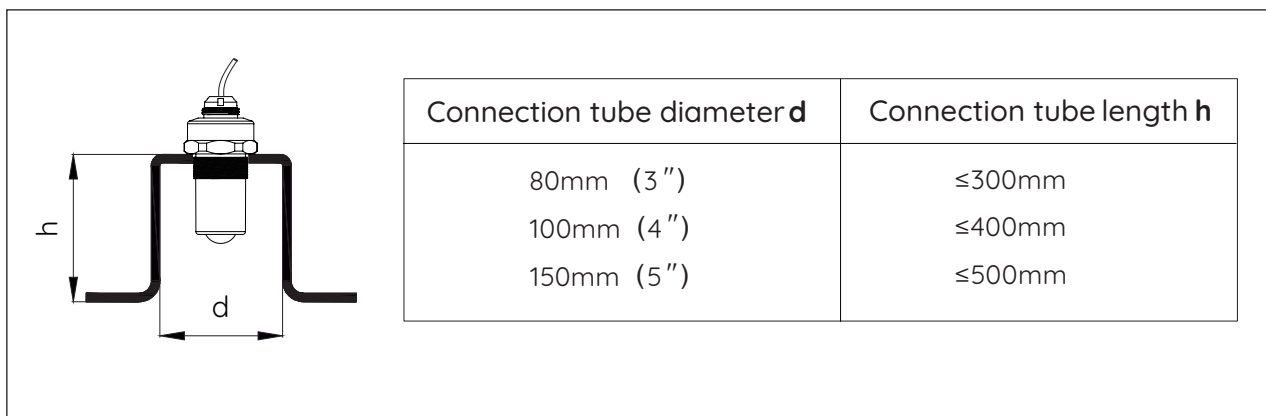


Figure 6

3. Installation

3.4 Launch angle and False Reflections

The beam angle of radar level transmitter depends on the size of antenna.

If the radar signal can reach the surface of the medium vertically and there is no device in any container to block and reflect the signal, such measurement conditions are the best.

Be sure to the beam transmit perpendicular to the dielectric surface along the axis of the sensor, and avoid any device in the whole beam angle, especially in the nearest 1/3 area from the antenna.

For the far false reflector, the energy of the radar signal is scattered over a large area, so the reflected false signal is very weak and will not have a great impact on the measurement like the near false echo.

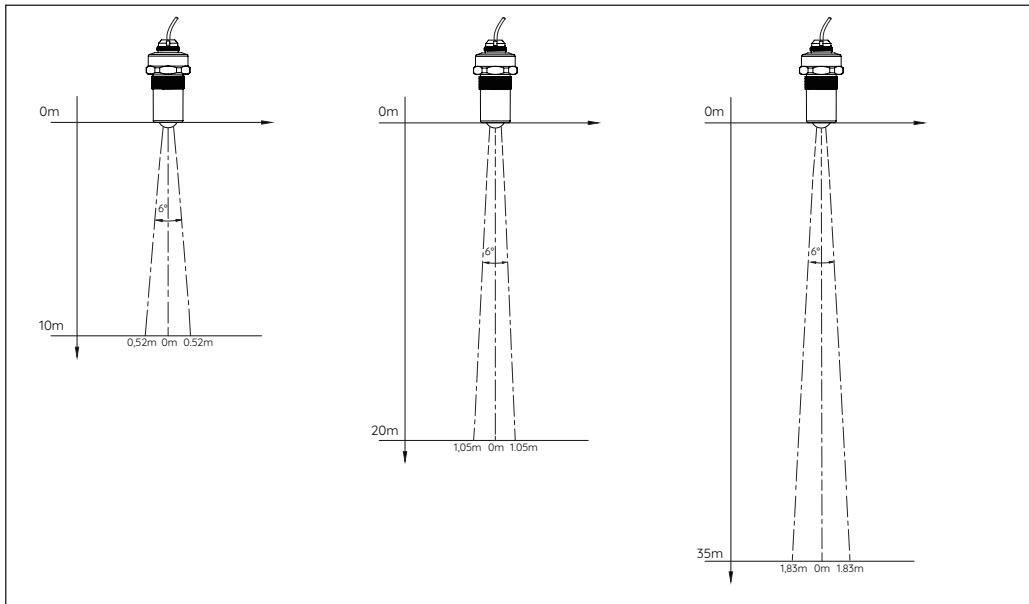


Figure 7

3.5 Physical Installation

► Bracket mounting

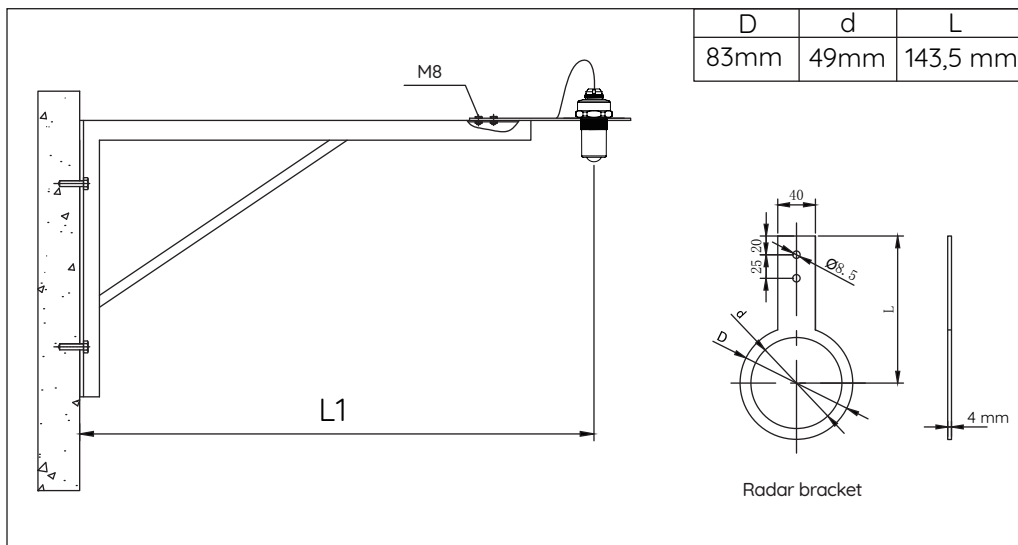


Figure 8

4. Electrical Connection

4.1 Supply Voltage

The power supply and the output current signal share a two-core shielded cable. For the intrinsically safe type, a safety barrier must be added between the power supply and the instrument.

4.2 Installation of Connecting Cables

Cable diameter : 6mm. Generally, shielded cables are used for wiring.

4~20mA (two-wire system) power supply cable can use two-core cable.

4.3 Cables shielding and connection

Ideally, the shield is grounded at both ends. However, it should be noted that there will be ground compensation current passing through.

When both ends are grounded, a capacitor with ground potential can be connected to the grounded end (for example: inside the switch cabinet). (eg: 1 F; 1500V).

Use a ground with the lowest resistance possible.

NOTE : THIS INSTRUMENT IS NOT FOR USE IN Atex - Intrinsically Safe - Ex-Proof Areas or Applications.

It is Non-Atex product.

4.4 Wiring Mode

4-20 mA output, 2 wire system

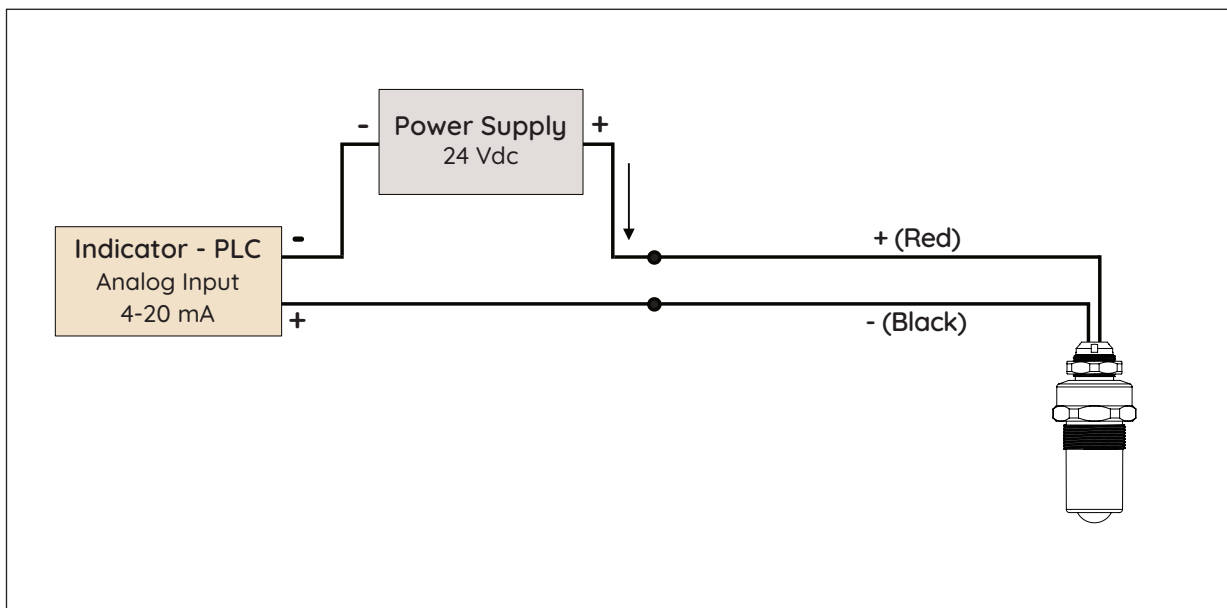


Figure 9

5. Configuration

5.1 Diagram of Configuration

LevelD.86A has built-in Bluetooth communication to let use do configuration easily by a mobile device which has bluetooth.

This is only one option to do set-up for LevelD.86A. There is no additional device or tool for configuration.

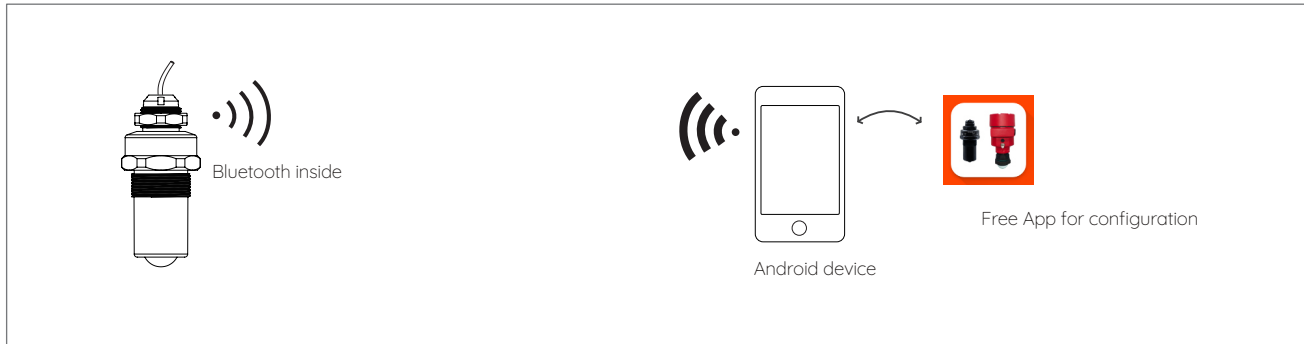


Figure 10

5.2 App for Android Mobile

- The name of App is “**Level Tool 1**”
- Ask to your supplier to get Android App

Some screen pages from App :

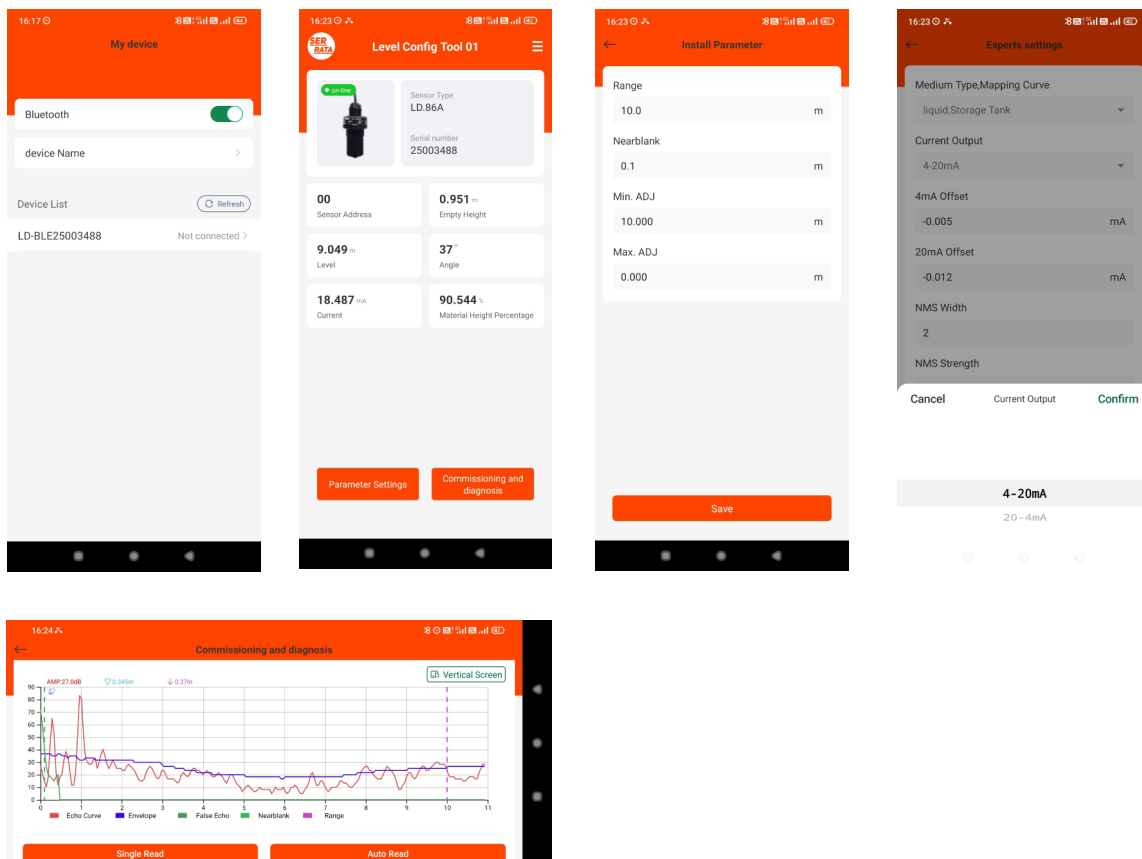


Figure 11

5. Configuration

5.3 App for iOS (iPhone) Mobile

- The iOS (iPhone) version of “**Level Tool 1**” App is not available yet.
- This is knowledge of what it can do, not a promise. Don’t hesitate ask!

Some screen pages from App ;

Not Available

Figure 12

6. Dimension

6.1 Dimension

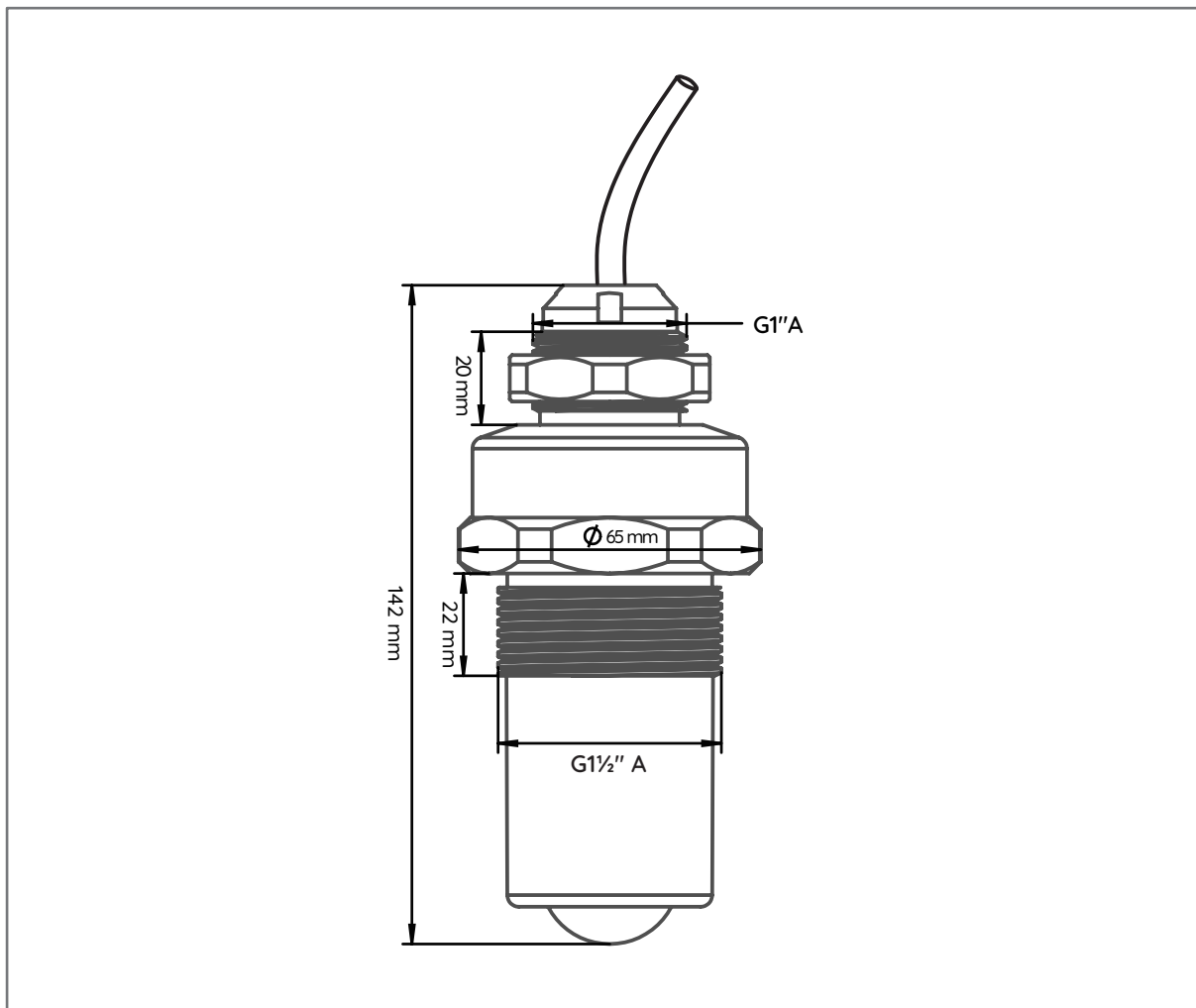


Figure 13

7. Transport and Storage

7.1 Transport and Storage

In addition to the requirements of JB/T 9329, the transport and storage conditions of level meter shall be in accordance with the following requirements:

1. The material level transmitter should be transported strictly according to the characteristics of the products and the requirements of the specifications.
2. The level gauge shall be stored in a dry ventilated room at -20 ~ 60°C with a relative humidity of not more than 80% . Not to be mixed with corrosive substances. After long-term storage of the instrument should be carried

End of User Manual

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LevelD.86A