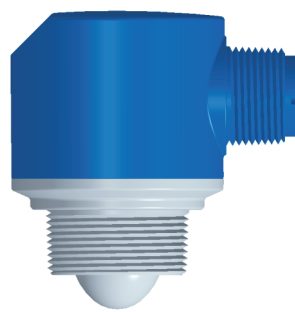
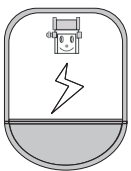
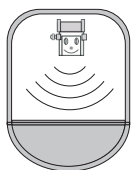
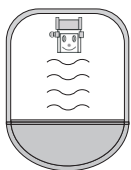




## LR Radar Level Instrument

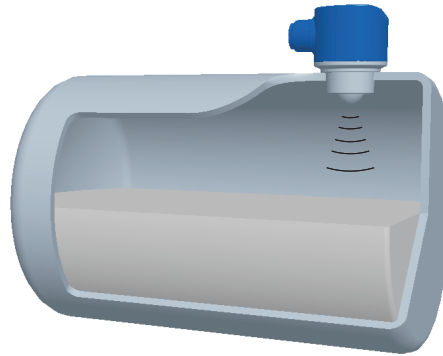




# Contents

1 Principle of measurement. ....	1
2 Brief description of instrument. ....	2
3 Requirement of installation. ....	6
4 Electrical connection. ....	11
5 Instrument commissioning. ....	16
6 Structure size. ....	19
7 Technical parameters. ....	23
8 Product model naming. ....	27
9 Accessories. ....	34

## 1. Principle of Measurement



- Principle

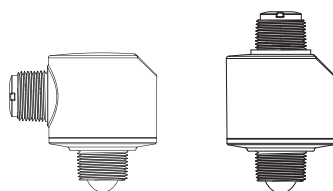
Frequency modulated continuous wave (FMCW) is adopted for radar level instrument (80G). The antenna transmits the high frequency and frequency modulated radar signal. The frequency of the radar signal linearly increases. The transmitted radar signal is reflected by dielectric to be measured and received by antenna. At the same time, the difference between the frequency of transmitted signal and that of the received signal is proportional to the measured distance. Therefore, the distance is calculated by the spectrum derived from the analog-to-digital conversion frequency difference and the fast Fourier transform (FFT).

- Features

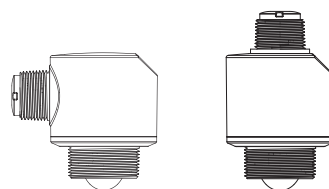
1. High frequency, small beam angle, and smaller unmeasurable zone which can help to measure the tanks with small diameter and can adapt to the connecting pipe on the tank;
2. Centralized energy and stronger anti-jamming capability which have significantly improved the measurement accuracy and reliability;
3. Small antenna size which facilitates the installation.

## 2. Brief description of instrument

LR80

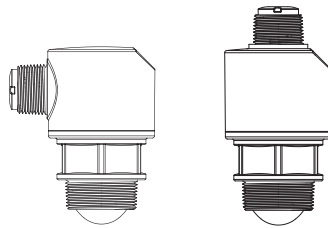


LR81

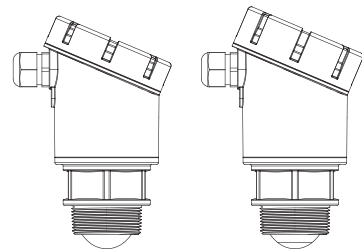


Application:	Liquid/Solid		Liquid/Solid	
Measurement range:	0~10m (Liquid)		0~15m (Liquid)	
	0~5m (Solid)		0~8m (Solid)	
Measurement accuracy:	±2mm		±2mm	
Process temperature:	(-40~80) °C		(-40~80) °C	
Process pressure:	(-0.1~0.3) MPa		(-0.1~0.3) MPa	
Frequency:	80GHz		80GHz	
Signal output:	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol		(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol	
Bluetooth	Yes		Yes	
Power Supply:	See page 22		See page 22	
Display/programming:	None		None	
Housing material:	PVDF		PVDF	
Antenna material:	PVDF		PVDF	
Installation form:	Thread		Thread	
Size:	G1" (up)	G1" (down)	G1" (up)	G1½" (down)
	1"NPT (up)	1"NPT (down)	1"NPT (up)	1½"NPT (down)
Protection Level:	IP68		IP68	

LR82

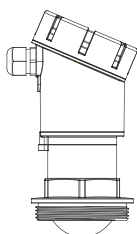


LR83

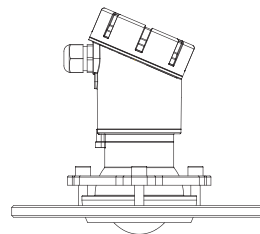


Application:	Liquid/Solid	Liquid/Solid
Measurement range:	0~30m (Liquid) 0~15m (Solid)	0~30m (Liquid) 0~15m (Solid)
Measurement accuracy:	±2mm	±2mm
Process temperature:	(-40~100) °C	(-40~100) °C
Process pressure:	(-0.1~0.3) MPa	(-0.1~0.3) MPa
Frequency:	80GHz	80GHz
Signal output:	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol
Bluetooth	Yes	Yes
Power Supply:	See page 22	See page 22
Display/programming:	None	Yes
Housing material:	PVDF	PBT
Antenna material:	PVDF	PVDF
Installation form:	Thread	Thread
Size:	G1" (up)      G1½" (down) 1"NPT (up)    1½"NPT (down)	G1½" (down) 1½"NPT (down)
Protection Level:	IP68	IP67

LR84



LR85



Application:	Liquid/Solid	Liquid/Solid
Measurement range:	0~120m (Liquid) 0~60m (Solid)	0~120m (Liquid) 0~60m (Solid)
Measurement accuracy:	±5mm	±5mm
Process temperature:	(-40~120) °C	(-40~120) °C
Process pressure:	(-0.1~0.3) MPa	Atmospheric
Frequency:	80GHz	80GHz
Signal output:	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol
Bluetooth	Yes	Yes
Power Supply:	See page 22	See page 22
Display/programming:	Yes	Yes
Housing material:	PBT	PBT
Antenna material:	PFA	PFA
Installation form:	Thread	Flange
Size:	M80X3 (down)	DN80/DN100/DN125/DN150 DN200/DN250
Protection Level:	IP67	IP67

LR86



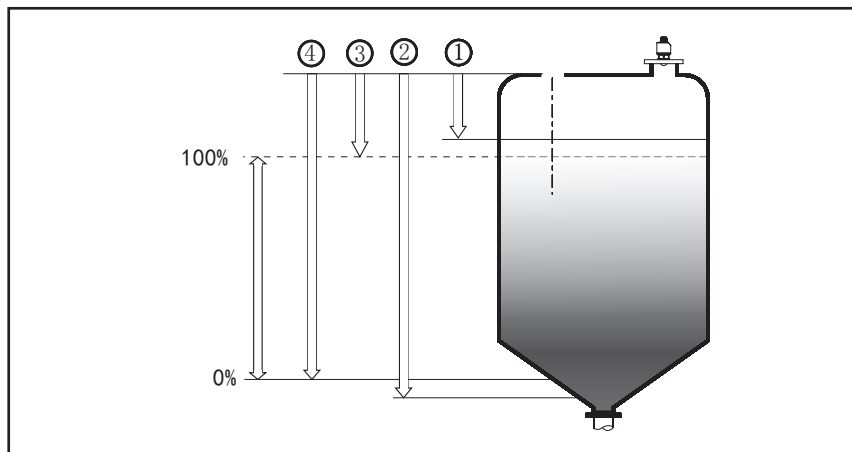
Application:	Liquid/Solid
Measurement range:	0~120m (Liquid) 0~60m (Solid)
Measurement accuracy:	±5mm
Process temperature:	(-40~80) °C
Process pressure:	Atmospheric
Frequency:	80GHz
Signal output:	(4~20) mA/HART RS485/MODBUS Protocol SDI Protocol
Bluetooth	None
Power Supply:	See page 22
Display/programming:	None
Housing material:	PVDF
Antenna material:	PFA
Installation form:	Thread
Size:	G1" (up)
Protection Level:	IP68

## 3 Requirement of installation

### ● Basic requirements

When the antenna transmits the microwave pulse, it has a certain transmitting angle. There shall be no obstacles in the area radiated by the transmitted microwave beam from the lower edge of the antenna to the dielectric surface to be measured. Therefore, it is necessary to avoid the facilities in the tank during installation, for example: human ladder, limit switch, heating equipment, supports, etc. If necessary, "Virtual Echo Learning" should be implemented. In addition, please note that the microwave beam should not intersect the charging material flow. During the installation of instrument, please also note that: the highest material level shall not enter the unmeasurable zone; the instrument shall be kept at a certain distance from the wall of tank; the installation of instrument should enable the transmitting direction of antenna to be perpendicular to the dielectric surface to be measured as much as possible.

### ● Graphic illustration

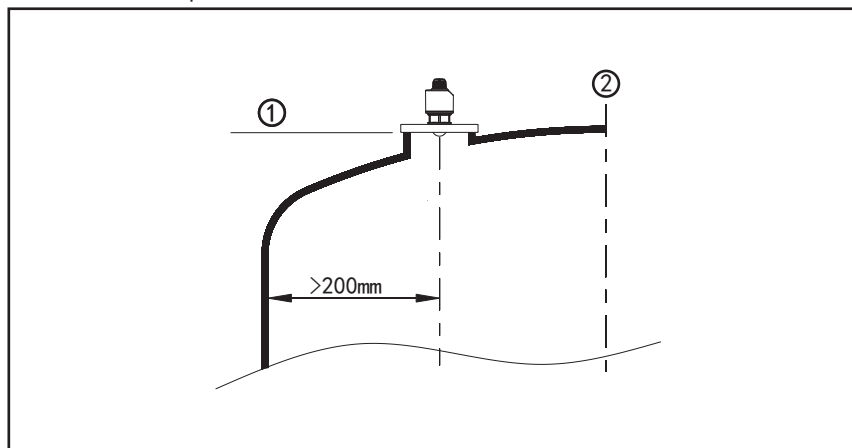


The reference plane for measurement is the sealing surface of threads or flanges.

- 1 Scope of unmeasurable zone
- 2 Setting of measurement range
- 3 Adjustment at high level
- 4 Adjustment at low level

Note: when the radar level instrument is used, please make sure that the highest material level does not enter the unmeasurable zone (No. 1 area shown in the figure).

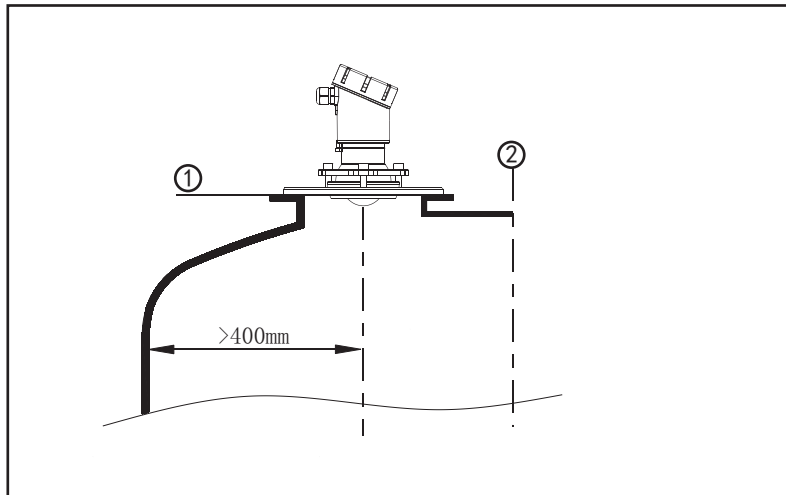
### ● Installation position



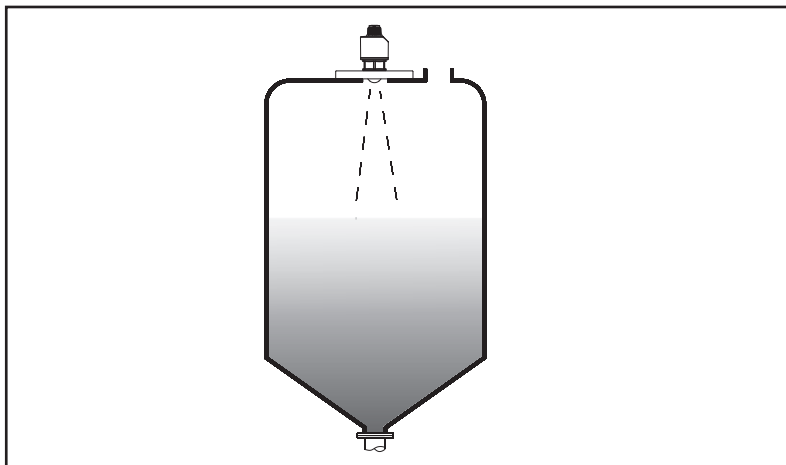
During the installation, please note the the instrument should be kept at a distance of 200mm at least from the vessel wall.

- 1 Reference plane
- 2 Center of the vessel or symmetry axis.

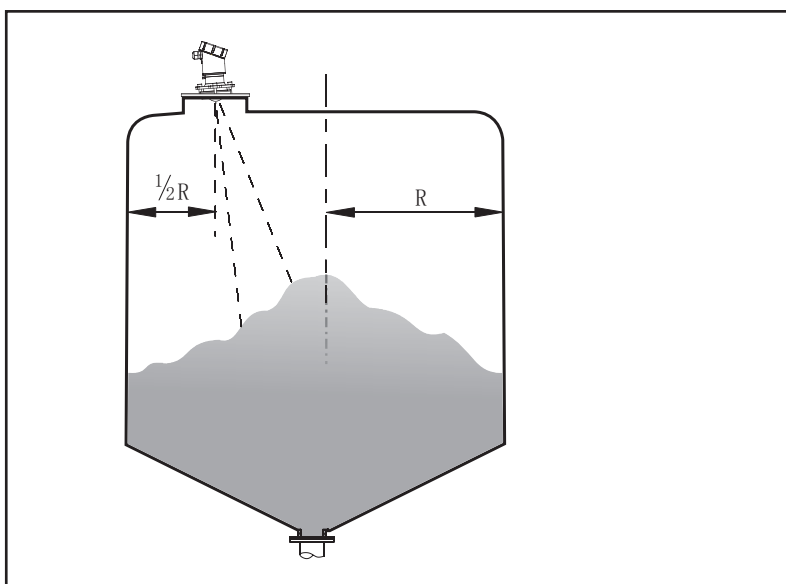




- 1 Reference plane
- 2 Center of the vessel or symmetry axis

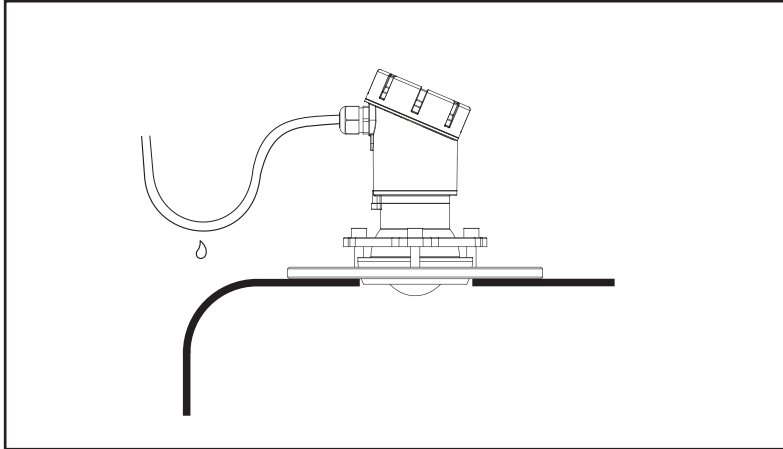


As for the conical vessel with flat tank top, the best installation position of instrument is the top center of the vessel, which ensures that the bottom of the container is measured.



Installation with gimbal installation

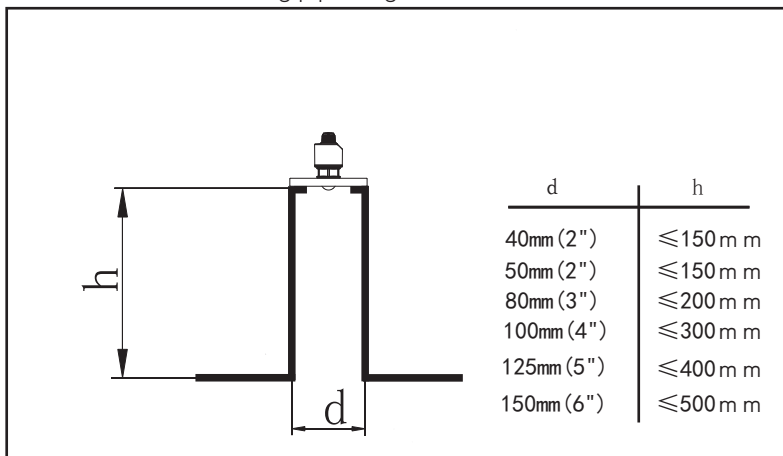
- Moisture-proof



As for the instrument installed in outside or wet indoor environment and cooling or heating tanks, the cable gland should be tightened and the cable at the cable entry should be bend downward for preventing moisture. As shown in the figure:

- Antenna extension

LR80~LR83 Connecting pipe diagram



If the reflection property of the dielectric to be measured is good, the antenna extension can also be longer than the length of antenna. See the following table for the standard length in such case. The standard length in such case. The ends must be ground without the bulges, for example, burrs. If necessary, "Virtual echo learning" function should be used. Eliminating the reflection on the ends of smaller connecting pipe also can achieve better measurement results.

LR84~LR86 Connecting pipe diagram

