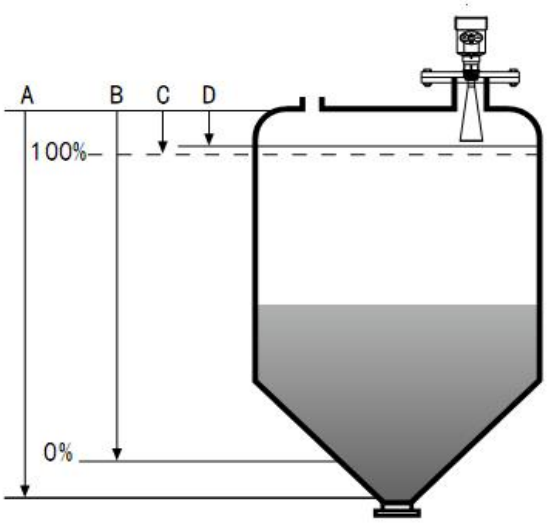
RD80X Non-Contact Radar Level Transmitter

The RD8X series radar sensor is a 26Ghz or 80Ghz high frequency microwave pulse radar level gauge. An electromagnetic wave of about 11 mm is emitted through the radar antenna system, and reflection is formed on the material surface by focusing of the bell antenna. The reflected echo is received through the antenna system. Since the transmission speed of electromagnetic waves is equivalent to the speed of light it is almost instantaneous to transmit to reception. The radar transmits and receives about 80 times per second. Through the microprocessor of the radar control system, the time difference of the transmitted wave to the received wave is accurately calculated by calculating the average value. The calculation of the internal software is used to convert the radar zero point to the material. The empty height of the bit. Thereby a continuous measurement of the material level is achieved. Output 4-20MA analog current signal, directly access to the automation system (such as PLC / DCS / digital display, etc.) to achieve automatic control of tank level.

1、Measurement diagram

The radar level antenna transmits a narrower microwave pulse and is transmitted downward through the antenna. After the microwave contacts the surface of the measured medium, it is reflected back and received by the antenna system again. The signal is transmitted to the electronic circuit part and automatically converted into a level signal (because the microwave propagation speed is extremely fast, the electromagnetic wave reaches the target and is reflected back to the receiver. The time used is almost instantaneous). Millimeter wave radar. It has the characteristics of narrow antenna beam, high resolution, frequency bandwidth and strong anti-interference ability.



A Range setting

B Low adjustment

C High adjustment

D Blind zone

The reference plane for measurement is: the bottom surface of the thread or the sealing surface of

the flange.

Note: When using the radar level timer, make sure that the highest level cannot enter the measurement dead zone (the area shown in D in the figure).

26G radar level gauge features：

- Small antenna size for easy installation; non-contact radar, no wear, no pollution.
- Almost free from corrosion and foam; almost unaffected by changes in water vapor, temperature and pressure in the atmosphere.
- Severe dust environment has little effect on the work of high frequency level gauge.
- shorter wavelengths for better reflection on sloping solid surfaces.
- The beam angle is small, the energy is concentrated, and the echo capability is enhanced while avoiding interference.
- The measurement blind zone is smaller, and it will also achieve good results for small can measurement.
- High signal-to-noise ratio for better performance even under fluctuating conditions.
- High frequency, the best choice for measuring solid and low dielectric constant media.

2、Specifications

RD81

Application: Various corrosive liquids
Measuring range: 20 meters
Process connection: thread, flange
Medium temperature: -40～120° C
Process pressure： -0.1～0.3MPa
Precision： ±5mm
Protection level： IP67
Frequency Range： 26GHz
Explosion-proof grade： Exib Ⅱ CT6 Gb
Signal output：4...20mA/HART(Two lines / four lines)
RS485/Mod bus

RD82

Application: Temperature, pressure, slightly corrosive liquid
Measuring range: 30 meters
Process connection: thread, flange
Medium temperature： -40～150℃
Process pressure： -0.1～4.0MPa
Accuracy： ±3mm
Protection level： IP67
Frequency Range： 26GHz
Explosion-proof grade： Exib Ⅱ CT6 Gb
Signal output：4...20mA/HART(Two lines / four lines)

RS485/Mod bus

RD83

Application: Solid material, strong dust, easy to crystallize, condensation occasion

Measuring range: 70 meters

Process connection: universal flange

Medium temperature： -40～250℃

Process pressure： -0.1～0.1MPa

Accuracy： ±15mm

Protection level： IP67

Frequency Range： 26GHz

Explosion-proof grade： Exib Ⅱ CT6 Gb

Signal output：4...20mA/HART(Two lines / four lines)

RD84

Application: Solid material, strong dust, easy to crystallize, condensation occasion

Measuring range: 70 meters

Process connection: universal flange

Medium temperature： -40～250℃

Process pressure： -0.1～0.1MPa

Accuracy： ±15mm

Protection level： IP67

Frequency Range： 26GHz

Explosion-proof grade： Exib Ⅱ CT6 Gb

Signal output：4...20mA/HART(Two lines / four lines)

RS485/Mod bus

RD85

Application: solid particles, powder

Measuring range: liquid 30 m / solid block 20 m / solid powder 15 m

Process connection: thread, flange

Medium temperature： -40～250℃

Process pressure： -0.1～4.0MPa(Flat flange)

-0.1～0.1MPa（Universal flange）

Accuracy： ±10mm

Protection level： IP67

Frequency Range： 26GHz

Explosion-proof grade： Exib Ⅱ CT6 Gb

Signal output：4...20mA/HART(Two lines / four lines)

RS485/Mod bus

RD86

Application: Hygienic liquid storage container, strong corrosive container

Measuring range: 20 meters

Process connection: flange

Medium temperature： -40～150℃

Process pressure： -0.1～0.1MPa

Accuracy： ±3mm

Protection level： IP67

Frequency Range： 26GHz

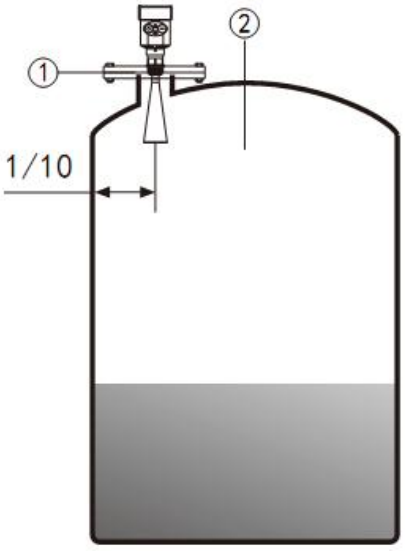
Explosion-proof grade： Exib ⅡCT6 Gb

Signal output：4...20mA/HART(Two lines / four lines)

RS485/Mod bus

3、Installation requirements

- **Installation instructions**

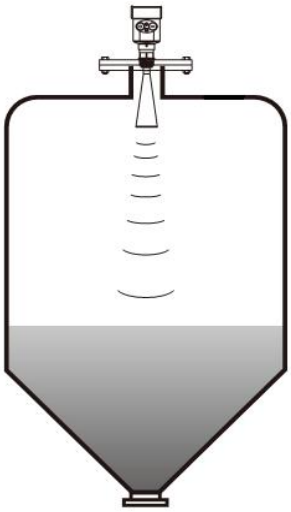


Installed at 1/4 or 1/6 of the diameter.

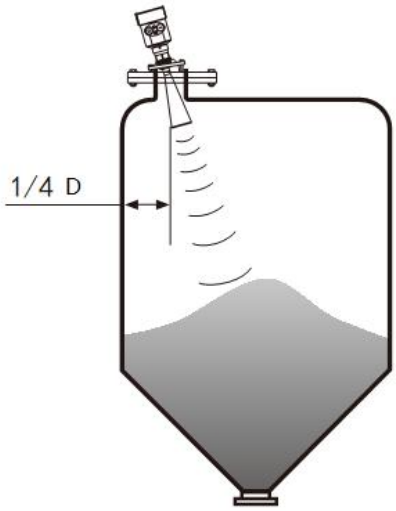
Note: The minimum distance from the tank wall should be 1/10 of the tank height.

Note: 1 datum 2 container center or axis of symmetry

- The top surface of the conical tank can be placed in the middle of the tank top.
  It is guaranteed to measure the bottom of the cone.



When there is a material pile, the antenna should be aligned perpendicular to the material surface. If the material
Uneven, large stack angle must use universal flange to adjust the angle of the horn
Make the horn as close as possible to the finish.

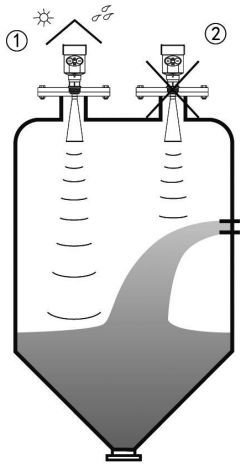


(Because the inclined solid surface causes echo attenuation,
Even the problem of losing the signal)

Typical error installation：

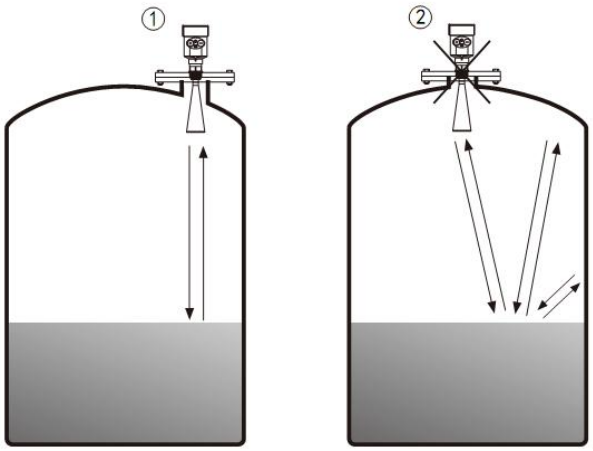
Conical tanks cannot be installed above the inlet.
At the same time, attention should be paid: sun protection and rain protection measures should be taken during outdoor installation.

① correct ②error



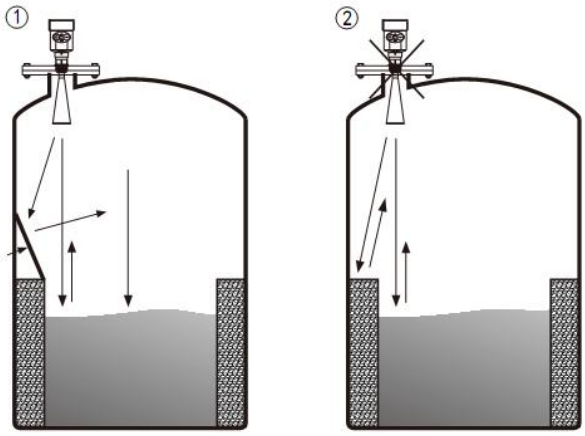
- The meter cannot be installed in the middle of an arched or rounded tank top. In addition to generating indirect echoes, it is also affected by multiple echoes. Multiple echoes may be larger than the true echo signal threshold because multiple echoes can be concentrated through the top. So can't be installed in the center。

①correct ②error

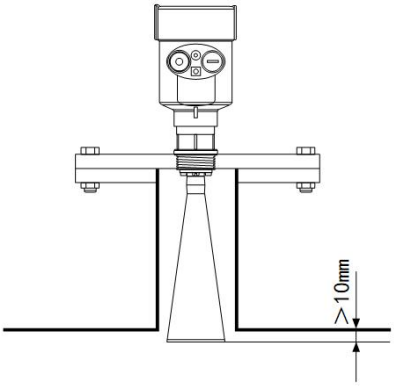


- When there are obstacles in the tank that affect the measurement, a reflector should be added to measure normally.

①correct ②error



- Take-over height requirements: The antenna must be inserted into the tank at least 10 mm away。



4、Electrical connections

- **Power supply voltage**

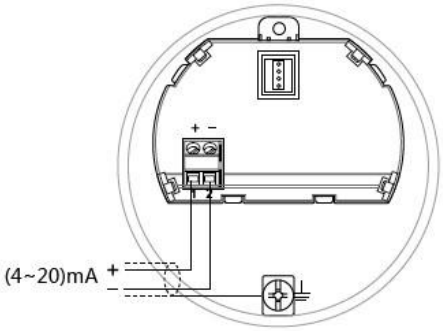
(4~20) mA/HART (two-wire system) The power supply and output current signals share a two-core shielded cable. See the technical data for the specific supply voltage range. For intrinsically safe type, a safety barrier must be added between the power supply and the meter.

4~20) mA/HART (4-wire system) The power supply and current signals are separated, and each cable is used separately. See the technical data for the specific supply voltage range.

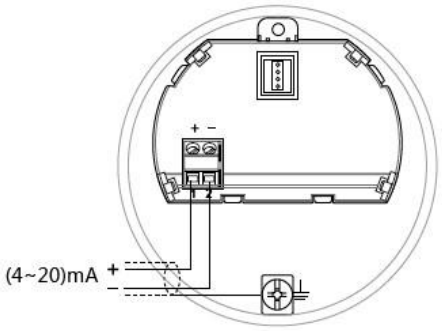
RS485/Modbus A separate shielded cable is used for each of the power supply and Modbus signal lines. See the technical data for the specific supply voltage range.

- **Connection method**

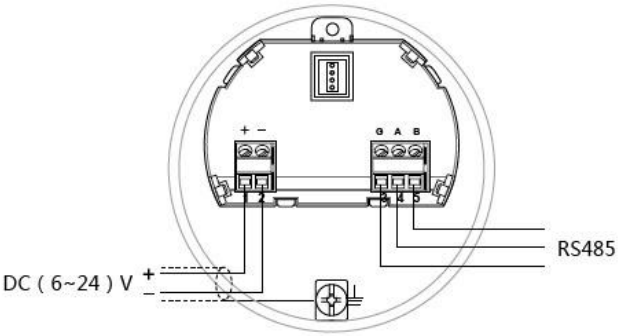
24V The two-wire wiring diagram is as follows：



220V Four-wire wiring as shown below：



24V RS485/Modbus Wiring diagram is as follows：



- **Safety guidance**

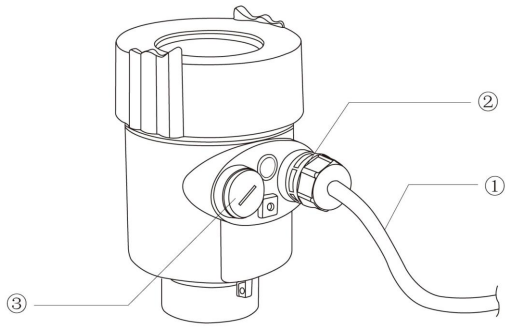
Please observe the requirements of the local electrical installation regulations!

Please observe local regulations regarding the health and safety of personnel. All operations on the electrical components of the instrument must be performed by trained professionals.

Please check the nameplate of the instrument to ensure that the product specifications meet your requirements. Make sure that the supply voltage is the same as that on the instrument nameplate.

- **Protection level**

The instrument fully meets the requirements of protection class IP66/67, please ensure the waterproofness of the cable gland. As shown below：



How to ensure that the installation meets the requirements of IP67:

Make sure the seal head is not damaged.

Make sure the cable is not damaged.

Make sure that the cable you are using meets the electrical connection specifications.

Before entering the electrical interface, bend the cable down to ensure that water does not flow into the housing, see 1

Please tighten the cable gland, see 2

Please block the unused electrical interface with a blind plug, see 3

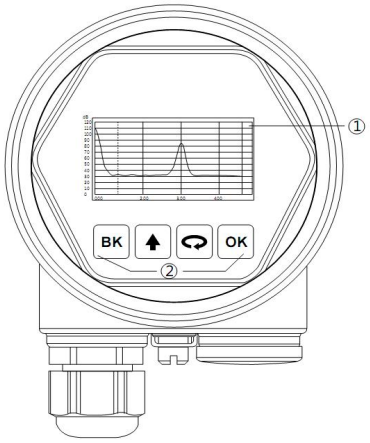
5、Instrument debugging

- Three debugging methods：
  - ① Display/button
  - ② Host computer debugging
  - ③ HART handheld programmer
- Display/button

The instrument is debugged by the four buttons on the display screen. The language of the debug menu is optional. After commissioning, it is generally only used for display. The measured value can be read very clearly through the glass window.

Display/button

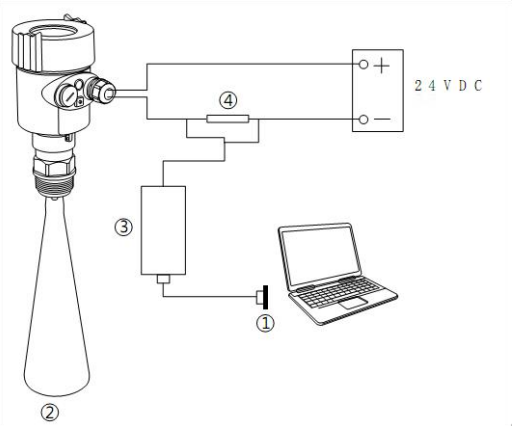
① LCD
② button



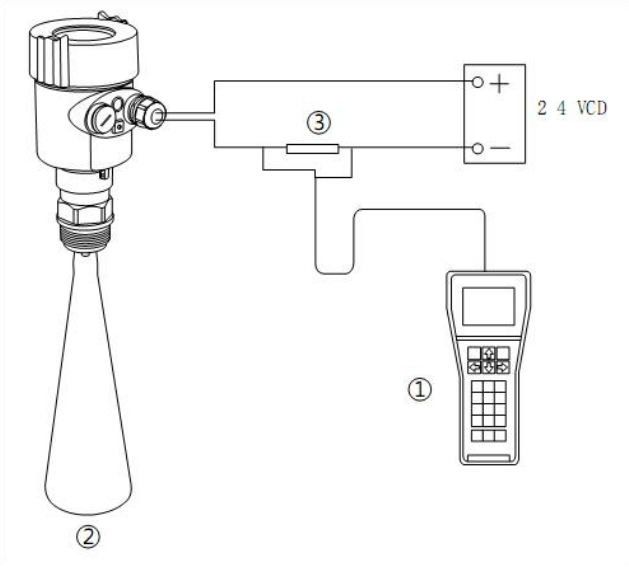
- Host computer debugging

Connected to the host computer via HART

① RS232 interface / or USB interface
② Radar level gauge
③ HART adapter
④ 250Ω resistor



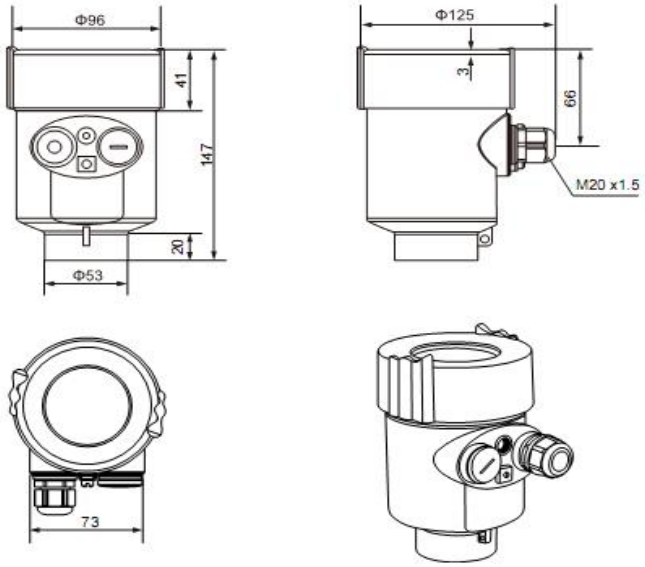
- HART handheld programmer programming



① HART handheld programmer
② RD90XRadar level gauge
③ 250Ω resistor

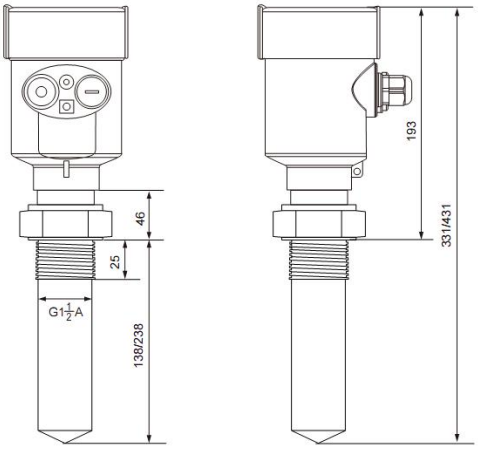
6、Structure Size （unit： mm）

- Case

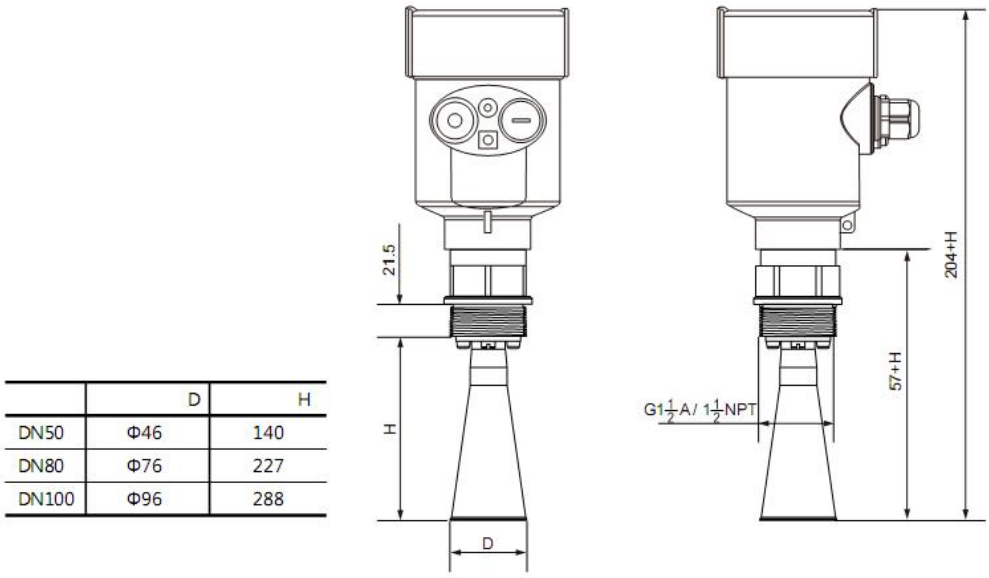


- Physical Dimension

RD81

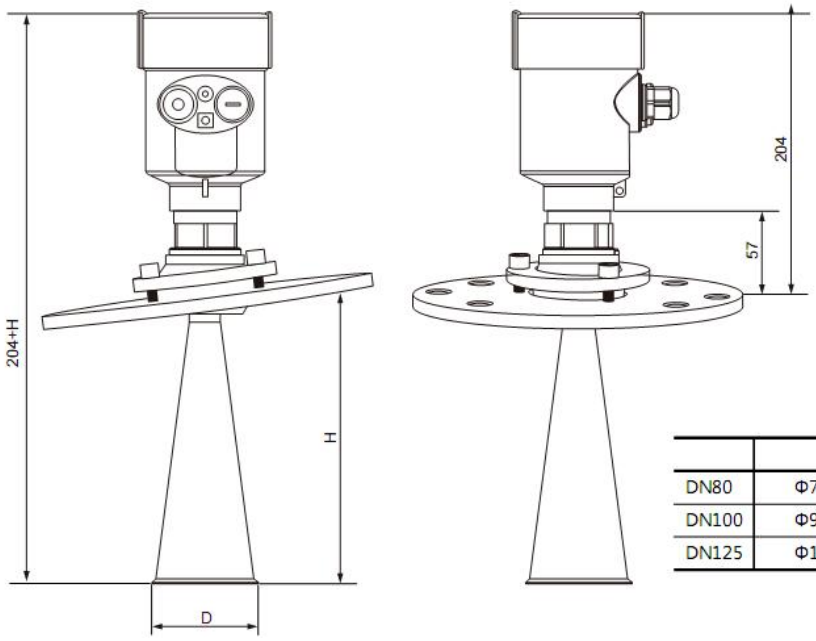


RD82



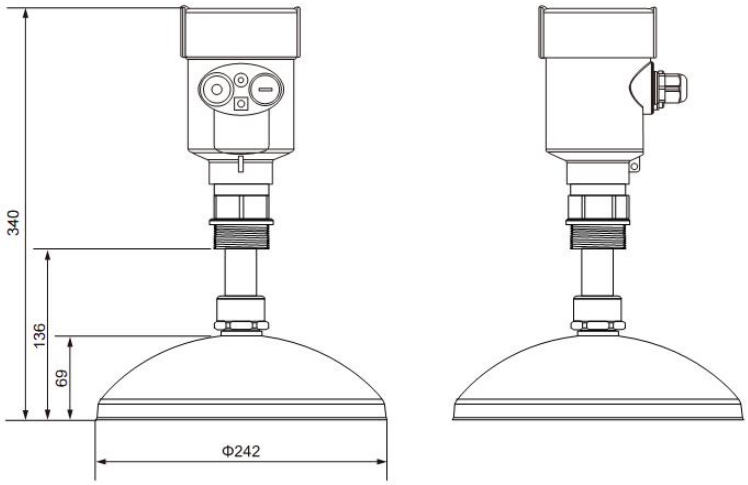
	D	H
DN50	Φ46	140
DN80	Φ76	227
DN100	Φ96	288

RD83

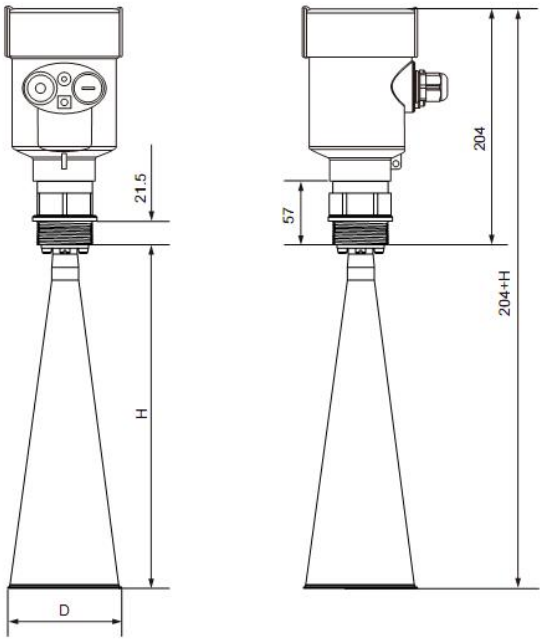


	D	H
DN80	Φ76	227
DN100	Φ96	288
DN125	Φ121	620

RD84

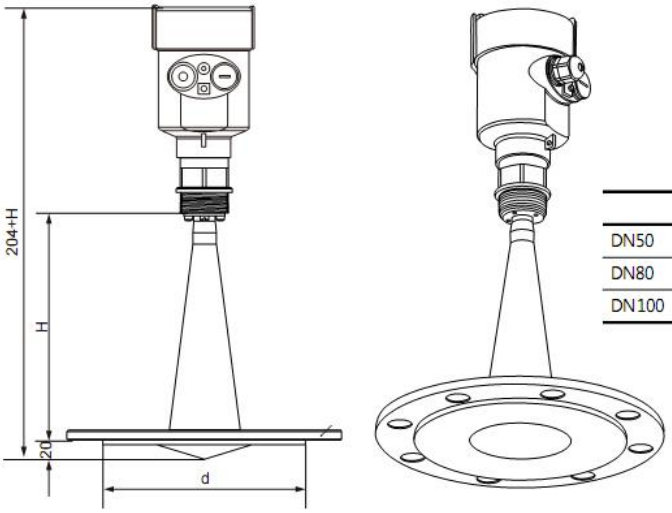


RD85



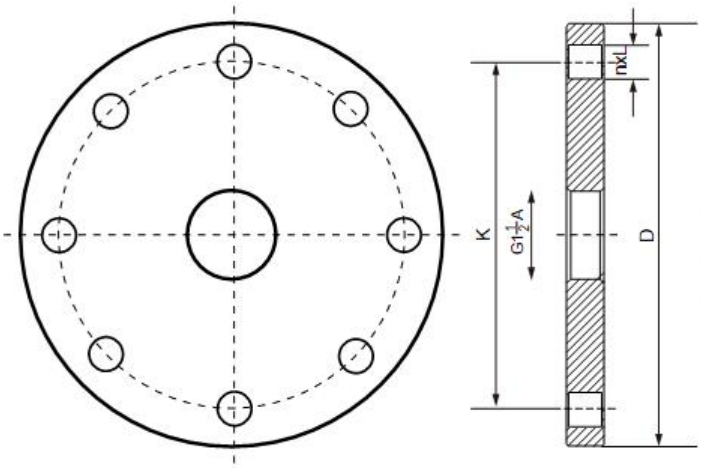
	D	H
DN80	Φ76	227
DN100	Φ96	288
DN125	Φ121	620

RD86



	D	H	d
DN50	Φ46	140	99
DN80	Φ76	227	132
DN100	Φ96	288	156

- **Flange selection**



	D	K	n	L
DN50	Φ165	Φ125	4	18
DN80	Φ200	Φ160	8	18
DN100	Φ220	Φ180	8	18
DN125	Φ250	Φ210	8	18
DN150	Φ285	Φ240	8	22
DN200	Φ340	Φ295	12	22
DN250	Φ405	Φ355	12	26

7、Technical Paremeters:

Shell

Seal between the outer casing and the outer casing cover	Silicone Rubber
Shell window	Polycarbonate
Ground terminal	stainless steel

Supply voltage

Two-wire system	Standard type	(16～26) V DC
	Intrinsically safe	(21. 6～26. 4) V DC
	Power consumption	max 22. 5mA / 1W
	Allow ripple	
	- <100Hz	Uss<lV
	- (100～100K) Hz	Uss<l0mV

Cable parameter

Cable entry/plug	M20xl.5 Cable entry
Terminals	Wire cross section 1.0mm²

Output parameters

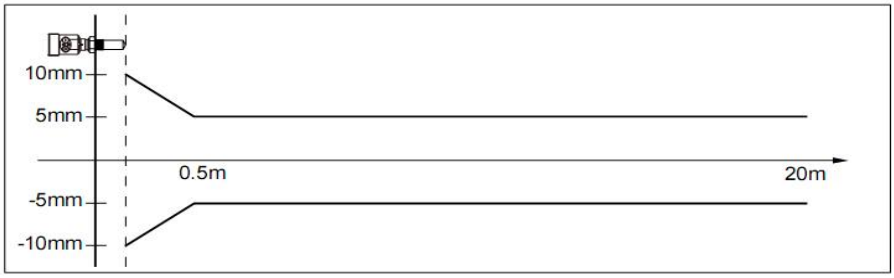
output signal	(4～2 0) mA
Protocol	HART
Resolution	1. 6u A
Fault signal	Current output is unchanged；20. 5mA 22mA；3.9mA
Integration time	(0～50)s，Adjustable

Blind zone	Antenna end
Maximum measurement distance	70 meters
Microwave frequency	26GHz
Communication Interface	HART Protocol
Measurement interval	About 1 second (depending on parameter settings)
Adjust the time	About 1 second (depending on parameter settings)
display resolution	1mm
Working storage and transportation temperature	(-40～100) ℃
Process temperature (temperature of the antenna section)	(-40～250)℃
pressure	Max. 4MPa
Shockproof	Mechanical vibrationl0m/s² , (10～150)Hz

8、Instrument Linear

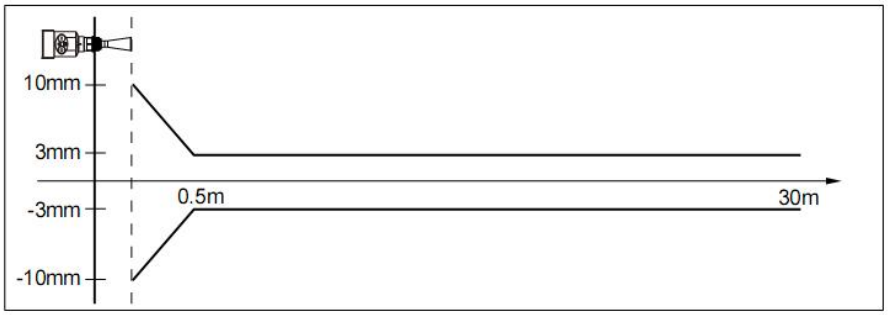
RD81

Launch angle	20°
Precision	See below



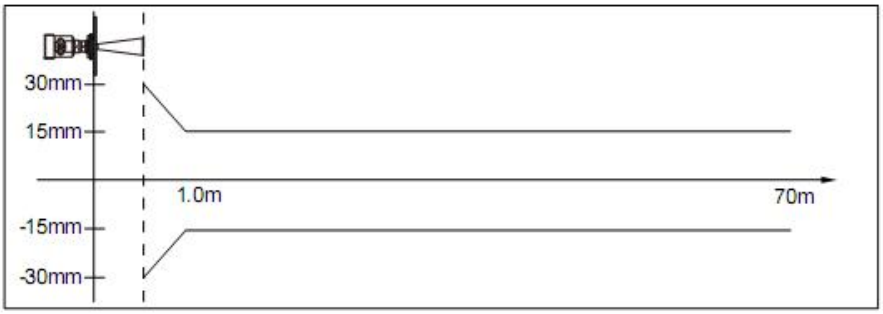
RD82

Launch angle	Depending on the antenna size
-¢ 46mm	18°
-¢ 76mm	12°
-¢ 96mm	8°
Precision	See below



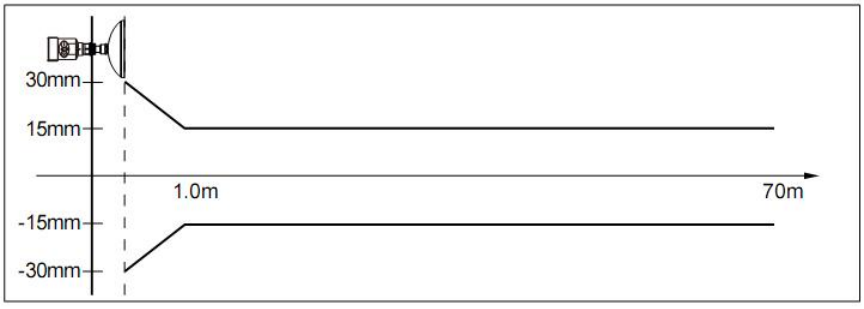
RD83

Launch angle	Depending on the antenna size
-¢ 76mm	12°
-¢ 96mm	8°
-¢ 121mm	6°
Precision	See below



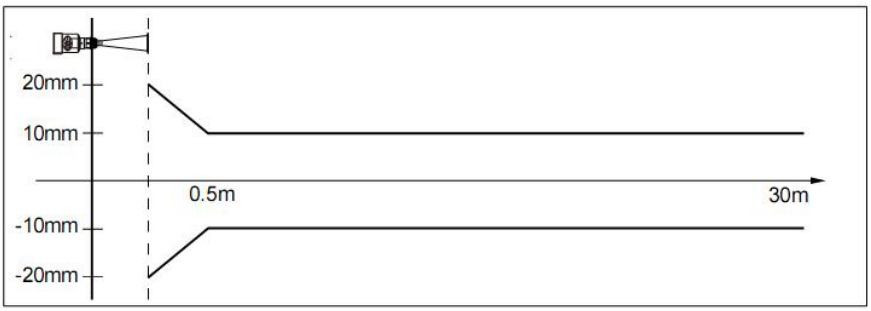
RD84

Launch angle	Depending on the antenna size
-¢ 196mm	4°
-¢ 242mm	4°
Precision	See below



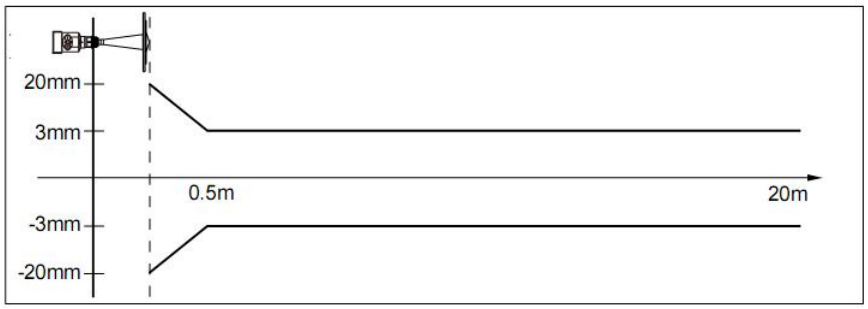
RD85

Launch angle	Depending on the antenna size
-Ø 76mm	12°
-Ø 96mm	8°
-Ø 121mm	6°
Precision	See below



RD86

Launch angle	Depending on the antenna size
-Ø 46mm	18°
-Ø 76mm	12°
-Ø 96mm	8°
Precision	See below



9、Model Selection Table

- RD81

license
P Standard type (non-explosion proof)
I Intrinsically safe (Exib IIC T6 Gb)
D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)
Antenna type / material / process temperature
F Sealed horn / PTFE (-40~120℃)
Process connection/material
G Thread G1½″ A
N Thread 1½″ NPT
A Flange DN50/PP
B Flange DN80/PP
C Flange DN100/PP

Y Special custom

Container take-up length

A take over 100mm

B take over 200mm

Electronic unit

2 （4~20）mA/24V DC Two-wire system

3 （4~20）mA/24V DC/HART Two-wire system

4 （4~20）mA/220V AC/ Four-wire system

5 RS485/Modbus

Enclosure rating

L aluminum /IP67

G stainless steel 304/IP67

Cable entry

M M20 x l. 5

N ½ ″ NPT

Live display/programming

A band X Without

● RD82

license

P Standard type (non-explosion proof)

I Intrinsically safe (Exib IIC T6 Gb)

D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)

Process connection/material

G Thread G1½ ″ A/ stainless steel 304

N Thread 1½ ″ NPT/ stainless steel 304

A Flange DN50/ stainless steel 304

B Flange DN80/ stainless steel 304

C Flange DN100/ stainless steel 304

Y Special custom

Antenna type / material

A Horn antenna Φ46mm/ stainless steel 304

B Horn antenna Φ76mm/ stainless steel 304

C Horn antenna Φ96mm/ stainless steel 304

Y Special custom

Seal / process temperature

V Viton/（-40~150） ℃

K Kalrez/（-40~250） ℃

Electronic unit

2 （4~20）mA/24V DC Two-wire system

3 （4~20）mA/24V DC/HART Two-wire system

4 （4~20）mA/220V AC/ Four-wire system

5 RS485/Modbus

Enclosure rating

L aluminum /IP67

G stainless steel 304/IP67

Cable entry

M M20 x l. 5

N ½ ″ NPT

Live display/programming

A band

X Without

● RD83

license

P Standard type (non-explosion proof)

I Intrinsically safe (Exib IIC T6 Gb)

D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)

Process connection/material

G Thread G1½″ A/ stainless steel 304

N Thread 1½″ NPT/ stainless steel 304

B Thread DN80/ stainless steel 304

C Thread DN100/ stainless steel 304

D Thread DN125/ stainless steel 304

E Thread DN150/ stainless steel 304

F Thread DN200/ stainless steel 304

H Thread DN250/ stainless steel 304

M Thread DN80/ Universal joint / Carbon steel nickel plating

K Thread DN100/ Universal joint / Carbon steel nickel plating

T Thread DN125/ Universal joint / Carbon steel nickel plating

Z Thread DN150/ Universal joint / Carbon steel nickel plating

W Thread DN200/ Universal joint / Carbon steel nickel plating

V Thread DN250/ Universal joint / Carbon steel nickel plating

Y Special custom

Antenna type / material

B Horn antenna Φ76mm/ stainless steel 304

C Horn antenna Φ96mm/ stainless steel 304

D Horn antenna Φ121mm/ stainless steel 304

Seal / process temperature

V Viton/（-40~150） ℃

K Kalrez/（-40~250） ℃

Electronic unit

2 （4~20）mA/24V DC Two-wire system

3 （4~20）mA/24V DC/HART Two-wire system

4 （4~20）mA/220V AC/ Four-wire system

5 RS485/Modbus

Enclosure rating
L aluminum /IP67
G stainless steel 304/IP67
Cable entry
M M20 x l. 5
N ½″ NPT
Live display/programming
A band X Without

- RD84

license
P Standard type (non-explosion proof)
I Intrinsically safe (Exib IIC T6 Gb)
D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)
Process connection/material
G Thread G1½″ A/ stainless steel 304
N Thread 1½″ NPT/ stainless steel 304
B Thread DN80/ stainless steel 304
C Thread DN100/ stainless steel 304
D Thread DN125/ stainless steel 304
E Thread DN150/ stainless steel 304
F Thread DN200/ stainless steel 304
H Thread DN250/ stainless steel 304
M Thread DN80/ Universal joint / carbon steel nickel plating
K Thread DN100/ Universal joint / carbon steel nickel plating
T Thread DN125/ Universal joint / carbon steel nickel plating
Z Thread DN150/ Universal joint / carbon steel nickel plating
W Thread DN200/ Universal joint / carbon steel nickel plating
V Thread DN250/ Universal joint / carbon steel nickel plating
Y Special custom
Antenna type / material
B Parabolic antenna Φ196mm/ stainless steel 304
C Parabolic antenna Φ242mm/ stainless steel 304
Seal / process temperature
V Viton/（-40~150） ℃
K Kalrez/（-40~250） ℃
Electronic unit
2 （4~20）mA/24V DC Two-wire system
3 （4~20）mA/24V DC/HART Two-wire system
4 （4~20）mA/220V AC/ Four-wire system
5 RS485/Modbus
Enclosure rating
L aluminum /IP67
G stainless steel 304/IP67
Cable entry
M M20 x l. 5
N ½″ NPT
Live display/programming
A band X Without

● RD85

license
P Standard type (non-explosion proof)
I Intrinsically safe (Exib IIC T6 Gb)
D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)
Process connection/material
G Thread G1½″ A/ stainless steel 304
N Thread 1½ ″ NPT/ stainless steel 304
B Flange DN80/ stainless steel 304
C Flange DN100/ stainless steel 304
D Flange DN125/ stainless steel 304
E Flange DN150/ stainless steel 304
F Flange DN200/ stainless steel 304
H Flange DN250/ stainless steel 304
M Flange DN80/ Universal joint / carbon steel nickel plating
K Flange DN100/ Universal joint / carbon steel nickel plating
T Flange DN125/ Universal joint / carbon steel nickel plating
Z Flange DN150/ Universal joint / carbon steel nickel plating
W Flange DN200/ Universal joint / carbon steel nickel plating
V Flange DN250/ Universal joint / carbon steel nickel plating
Y Special custom
Antenna type / material
B Horn antenna Φ76mm/ stainless steel 304
C Horn antenna Φ96mm/ stainless steel 304
D Horn antenna Φ121mm/ stainless steel 304
Seal / process temperature
V Viton/（-40~150） ℃
K Kalrez/（-40~250） ℃
Electronic unit
2 （4~20）mA/24V DC Two-wire system
3 （4~20）mA/24V DC/HART Two-wire system
4 （4~20）mA/220V AC/ Four-wire system
5 RS485/Modbus
Enclosure rating
L aluminum /IP67
G stainless steel 304/IP67
Cable entry
M M20 x l. 5
N ½ ″ NPT
Live display/programming

● RD86

license
P Standard type (non-explosion proof)
I Intrinsically safe (Exib IIC T6 Gb)
D Intrinsically safe type + explosion-proof type (Exd [ib] ib IIC T6 Gb)

Process connection/material
B Flange DN80/ stainless steel 304
C Flange DN100/ stainless steel 304
D Flange DN125/ stainless steel 304
E Flange DN150/ stainless steel 304
F Flange DN200/ stainless steel 304
Y Special custom
Antenna type / material
B Horn antenna Φ46mm/ stainless steel 304
C Horn antennaΦ76mm/ stainless steel 304
D Horn antenna Φ96mm/ stainless steel 304
Seal / process temperature
V Viton/（-40~150） ℃
Electronic unit
2 （4~20）mA/24V DC Two-wire system
3 （4~20）mA/24V DC/HART Two-wire system
4 （4~20）mA/220V AC/ Four-wire system
5 RS485/Modbus
Enclosure rating
L aluminum/IP67
G stainless steel 304/IP67
Cable entry
M M20 x l. 5
N ½″ NPT
Live display/programming
A band X Without