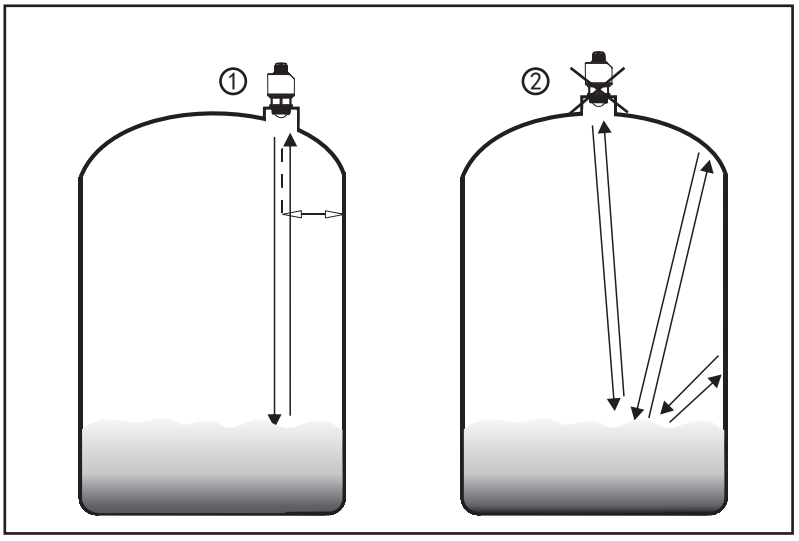
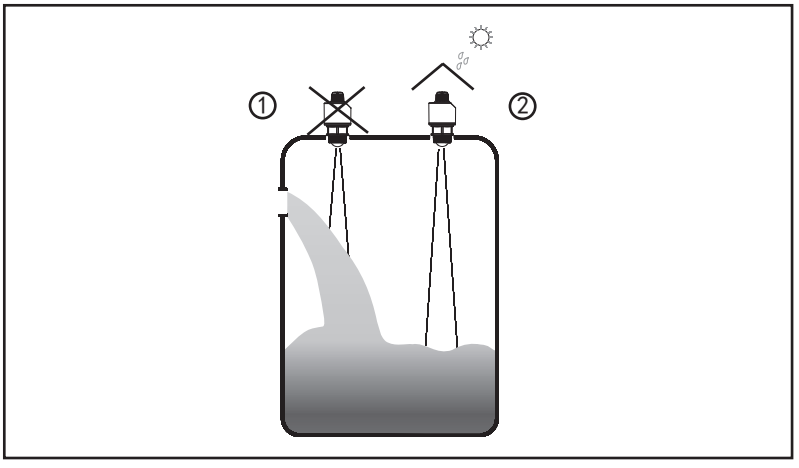
- Rights and wrongs of installation position

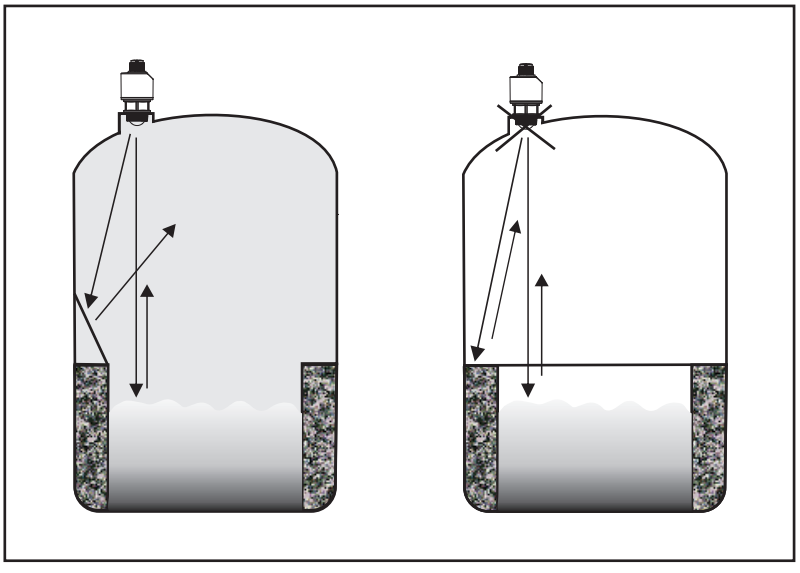


1 Correct
2 Error: Instruments are installed in the arched or round top of tank, which will result in multiple echoes. So it should be avoided as much as possible during the installation.



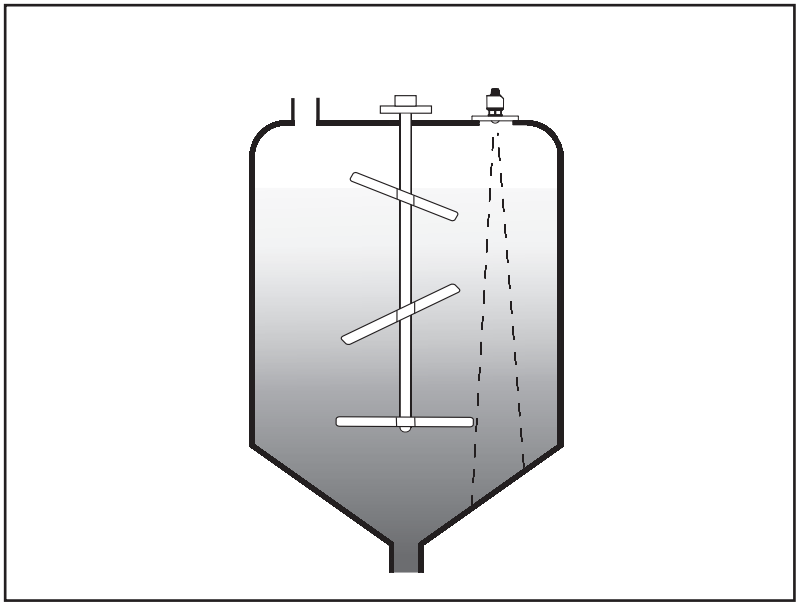
1 Error: Instruments should not be installed above the charging material flow, in order to ensure that the dielectric surface is to be measured, rather than the charging material flow.
2 Correct Note: Sun-shading and rain-proof measures. should be adopted for the outdoor installation.

- Installation of reflecting plate



If there are barriers in the tank, the reflecting plate can be installed to reflect the reflected wave of barriers out. If necessary, "virtual echo learning"ban be implemented.

Agitation



If there are agitation in the tank, the instruments should be installed as far away from agitators as possible. Once the installation is completed, the "virtual echo learning" should be carried out while agitators are running, to eliminate the influence of fraud echo generated by mixing blades. If foam or wave is generated due to the agitation, the waveguide installation method should be adopted.

4 Electrical connection

● Supply voltage

(4–20)mA/HART(2–Wire)

Power supply and the output current signal are carried by the same two-core cables. See the technical data on page 22 for the detailed range of supply voltage. A safety barrier should be placed between the power supply and instrument for the intrinsically safe version.

RS485/MODBUS protocol output

See the technical data on page 22 for the detailed range of supply voltage.

● Installation of connecting cables

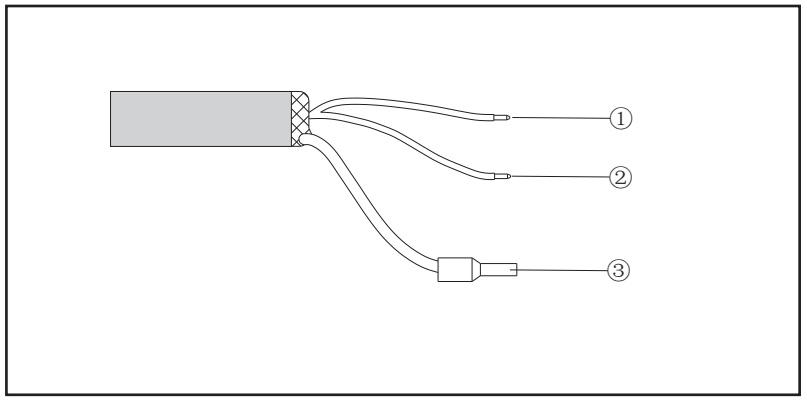
LR80～LR82 and LR86 have been assembled in the factory. If needs to be extended, two core cables on the market can be selected. In case of electromagnetic interference, it is recommended to use the shielded cable.

The outside diameter of LR82-LR85 power supply cables should be (5-9)mm to ensure the sealing of cable entry. In case of electromagnetic interference, it is recommended to use the shielded cable.

● Shielding and wiring of cables

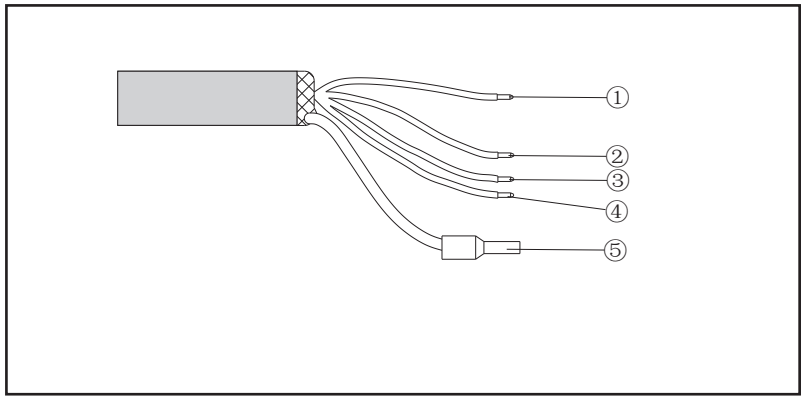
To shield the cable, it is recommended that the cable shield be grounded at one end of the power supply side.

● LR80～LR82 and LR86 Wiring mode



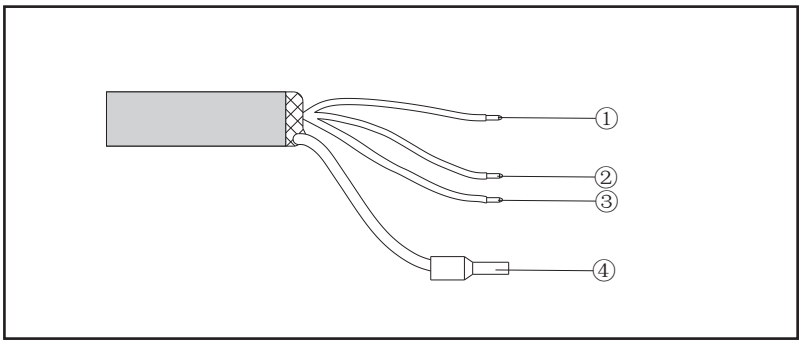
(4–20) mA output / HART 2–Wire
(electronic unit B)

	Color	Explain
1	Brown	Power supply +, output signal
2	White	Power supply– , output signal
3	Black	Shield



RS485/MODBUS protocol
(electronic unit R)

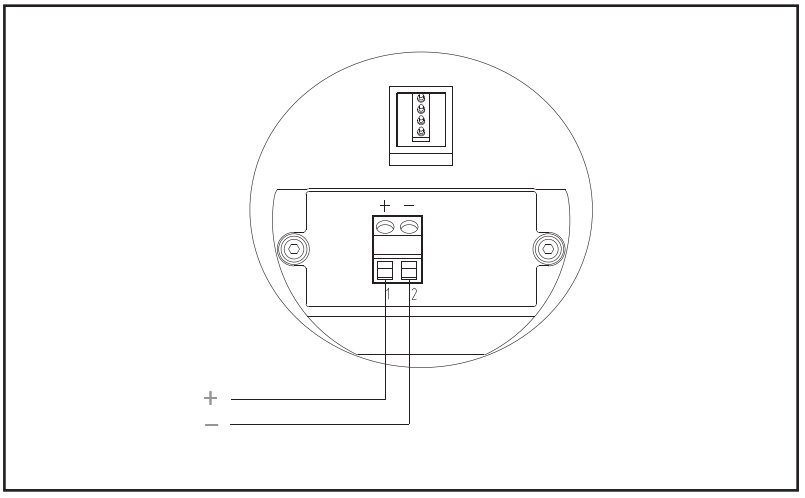
	Color	Explain
1	Brown	Power supply +
2	White	Power supply–
3	Green	Signal A
4	Yellow	Signal B
5	Black	Shield



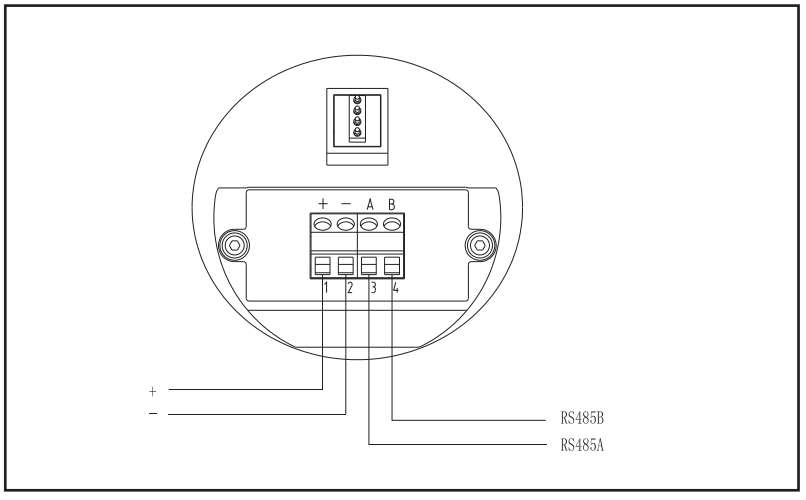
SDI protocol
(electronic unit S)

	Color	Explain
1	Brown	Power supply +
2	White	Power supply−
3	Green	SDI
4	Black	Shield

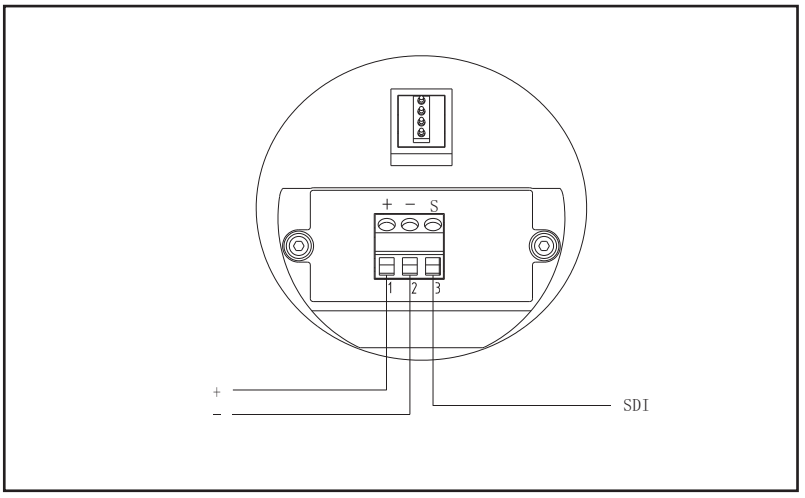
- LR83~LR85 Wiring mode



(4−20) mA output / HART 2−Wire
(electronic unit B)



RS485/MODBUS protocol
(electronic unit R)



SDI protocol
(electronic unit S)

Wiring

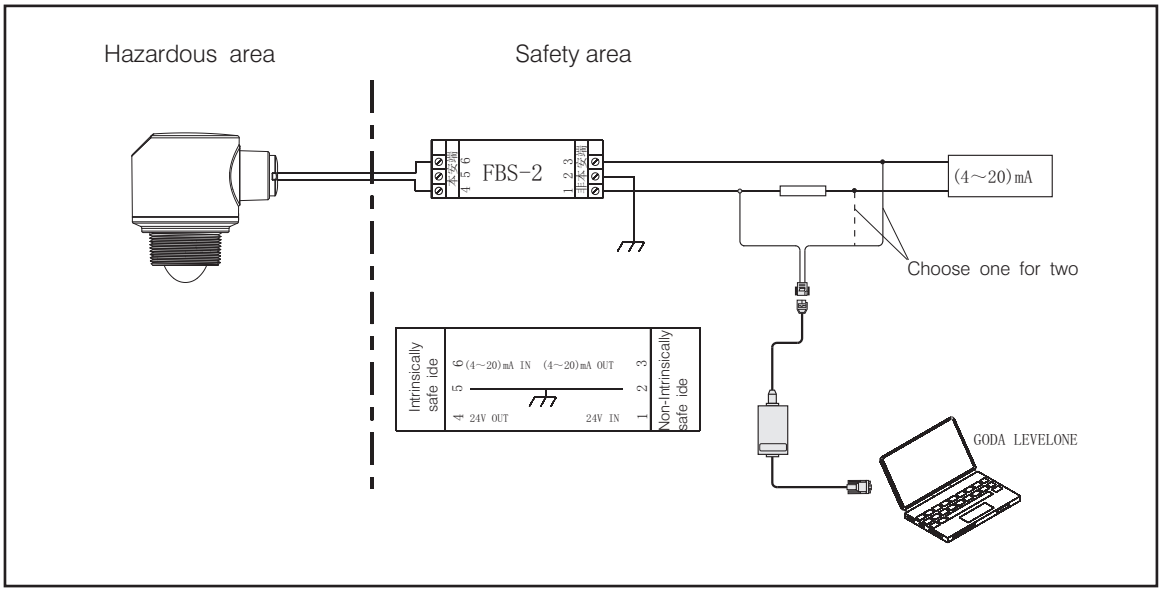
The protection of the product is the intrinsic safety.
Ex marking: Ex ia ⅡC T6～T4 Ga;Ex ia IIIC T85℃～120℃ Da. PVDF or PBT housing material is adopted for the intrinsically safe level instrument. The glue sealing structure is adopted for the electronic parts to ensure the sparks generated by the circuit fault will not be discharged. The product is applicable to the continuous level measurement for the media of inflammable gas of Ex ia ⅡC T6～T4 Ga. The product is applicable to the continuous level measurement for the media of dust of Ex ia IIIC T85℃～120℃ Da.
When the intrinsic safety instrument is used, safety barrier should be applied for its power supply. FBS-2 safety barrier is an associated equipment of this product, and its protection type is intrinsically safe. Ex marking: [Ex ia] ⅡC, with supply voltage of 24V DC±5%, short-circuit current of 130.5mA and working current of (4-20)mA. The shielded cable should be adopted for all cables. The max length from the instrument to safety barrier is 500m. Distributed capacity≤0.1μF/Km, distributed inductance ≤1mH/Km. During installation, instrument should be grounded.

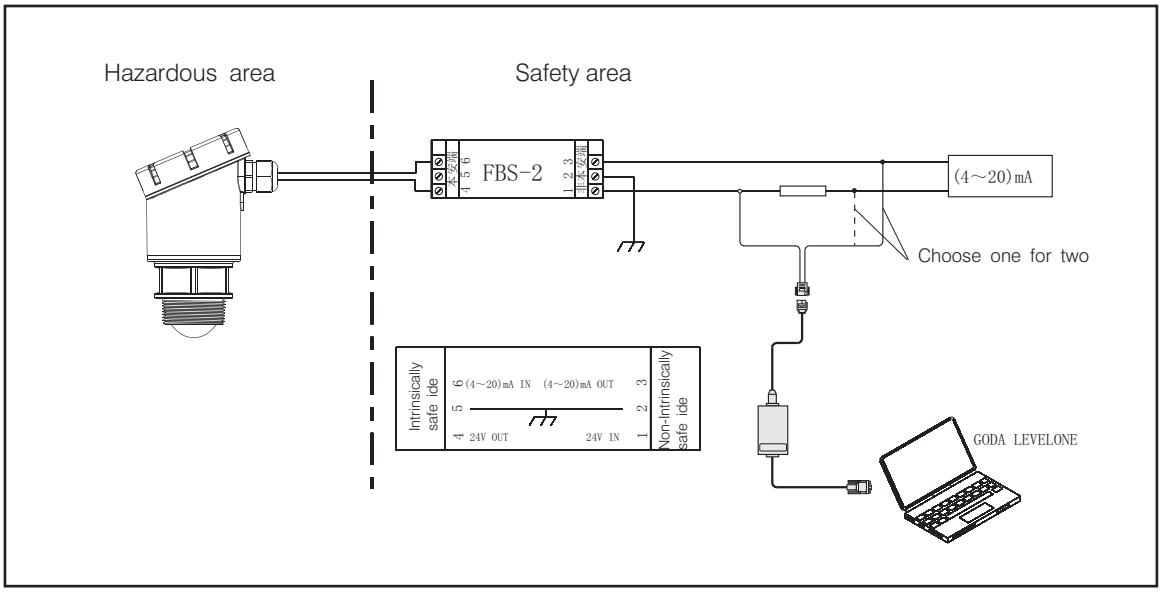
Ta of mainframe(℃)	Process temperature at The antenna(℃)	T class of whole equipment	Ex marking
-40～50	-40～50	T6/ 85 ℃	Ex ia ⅡC T6 Ga;Ex ia IIIC T85℃ Da
-40～60	-40～95	T5/ 100℃	Ex ia ⅡC T5 Ga;Ex ia IIIC T100℃ Da
-40～70	-40～120	T4/ 120℃	Ex ia ⅡC T4 Ga;Ex ia IIIC T120℃ Da
Protection Level		IP67	IP68
LR Radar Level Instrument		LR83～LR85	LR80～LR82, LR86

The safety barrier parameters

The Safety barrier	FBS-2 (4-20)mA, (2-Wire)
Port Properties	Between 4 and 6 terminals
Uo	25.2V
Io	130.5mA
Po	0.82W
Co	100nF
Lo	0.3mH
Um	250VDC/AC
Device Maximum Input	Between 1 and 2 terminals
Ui	30.6V
Ii	131mA
Pi	1.0W
Ci	0μF
Li	102μH

Wiring of FBS-2 intrinsically safe





Warning:

1. The housing includes the materials of plastic to avoid the ignition risk caused by impact or friction.
2. Sunshine will cause the aging of plastic parts, shade shade should be used for plastic shell and window.
3. Avoid the impact of external force on the whole meter.
4. Do not impact transparent windows.

5 Instrument debugging

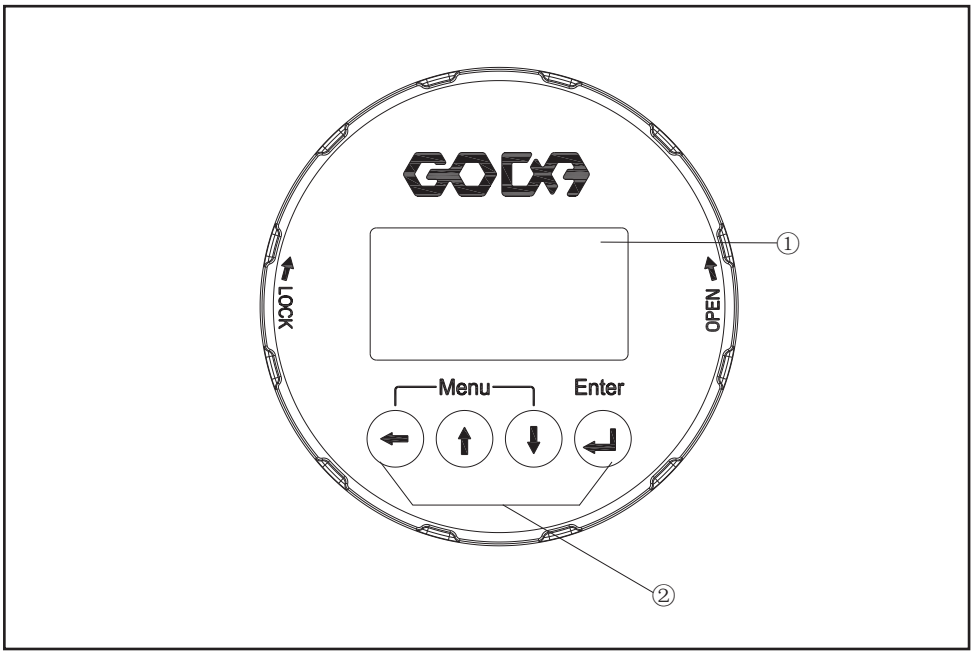
● Debugging method

There are four debugging methods for LR8X:

1 Display/debugging module(View Point),LR84,LR85 only
2 Host computer debugging software GODA LEVELONE
3 HART hand-held programmer
4 Bluetooth debugging

ViewPoint is a pluggable display/debugging tool. The debugging can be done through operating with buttons on ViewPoint. The language for the debugging menu is optional. After debugging. ViewPoint is only used for display in general, and the measurement value can be seen clearly through the glass window.

Display/debugging module



1 Liquid crystal display
2 Button

[↵]Button
-Enter programming mode;
-Confirm programming options;
-Confirm parameter modification.

[↓] Button
-Choose programming options;
-Choose the parameter bit to edit;
-Display of parameters.

[↑]Button
-Modify parameter values;

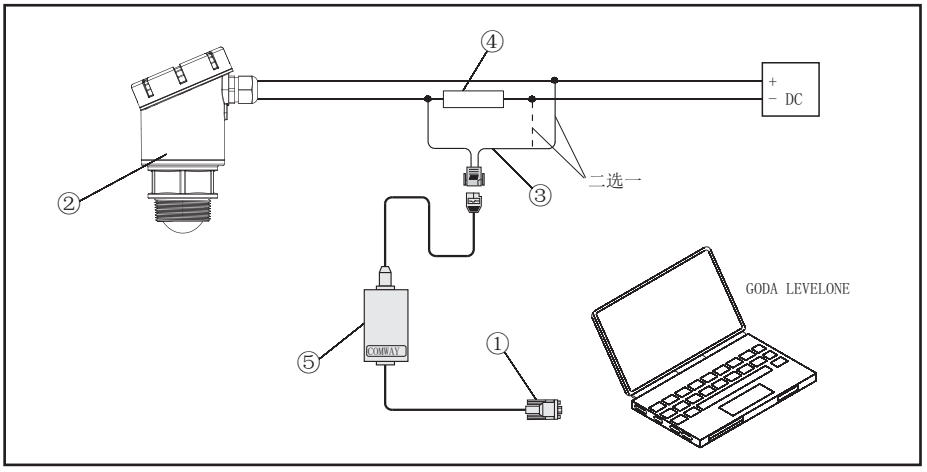
[←] Button
-Exit programming mode;
-Return to higher level menu.

Shortcut keys

[←]displays the frequency spectrum

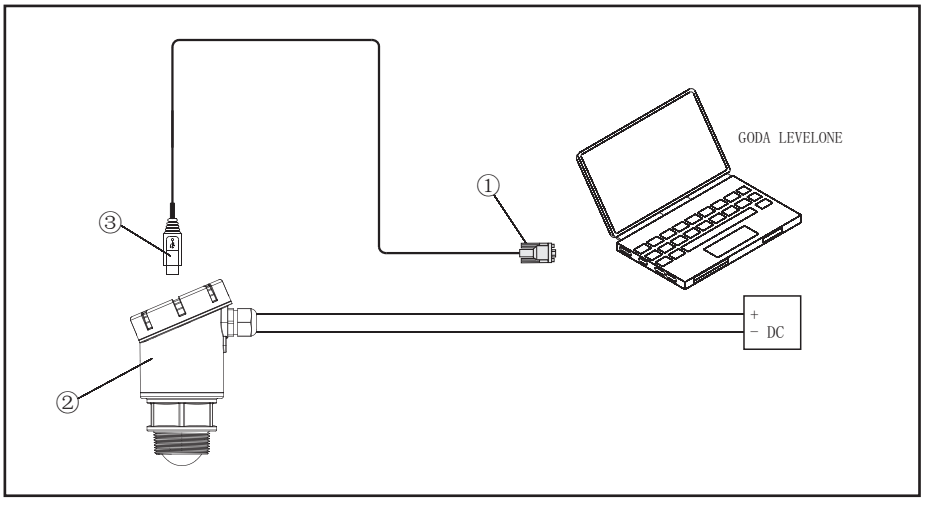
Debugging of host computer

Connect to the host computer via HART



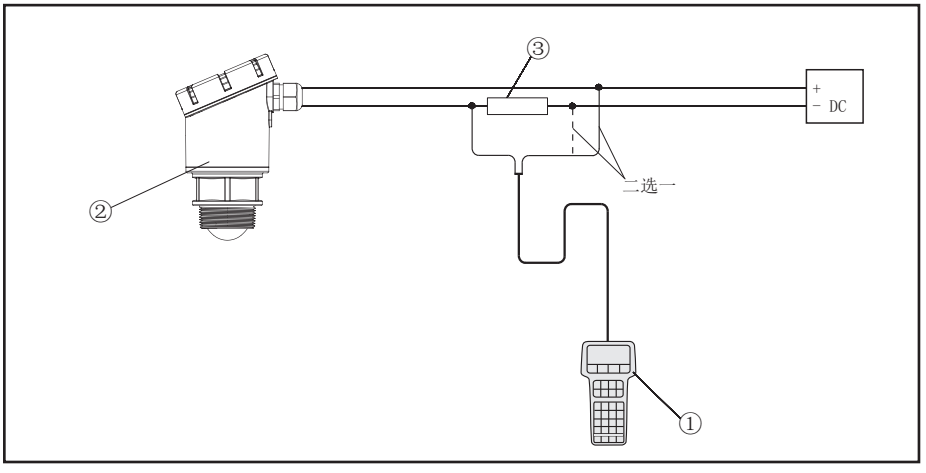
1 RS232 interface or USB interface
2 LR8X
3 HART adapter used for COMWAY converter
4 250Ω
5 COMWAY converter

Connect to the host computer via USB



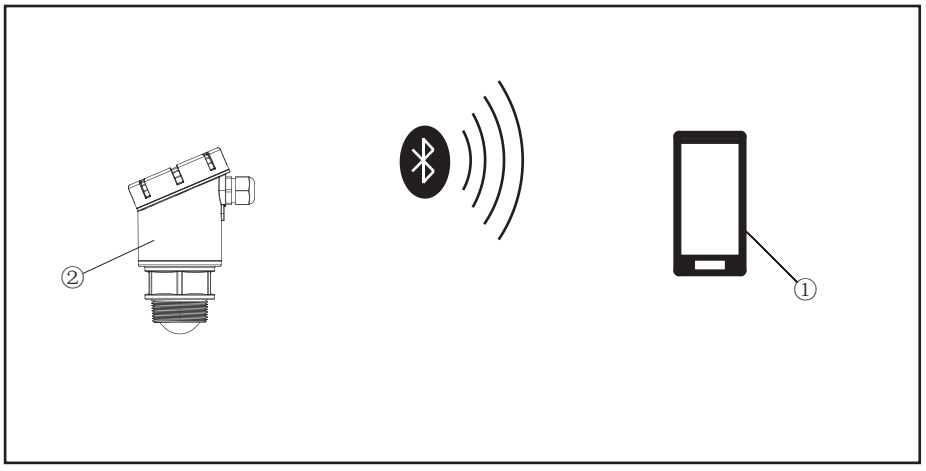
1 RS232 interface or USB interface
2 LR8X
3 USB interface

HART hand-held programming of LR8X



1 HART hand-held programmer
2 LR8X
3 250Ω

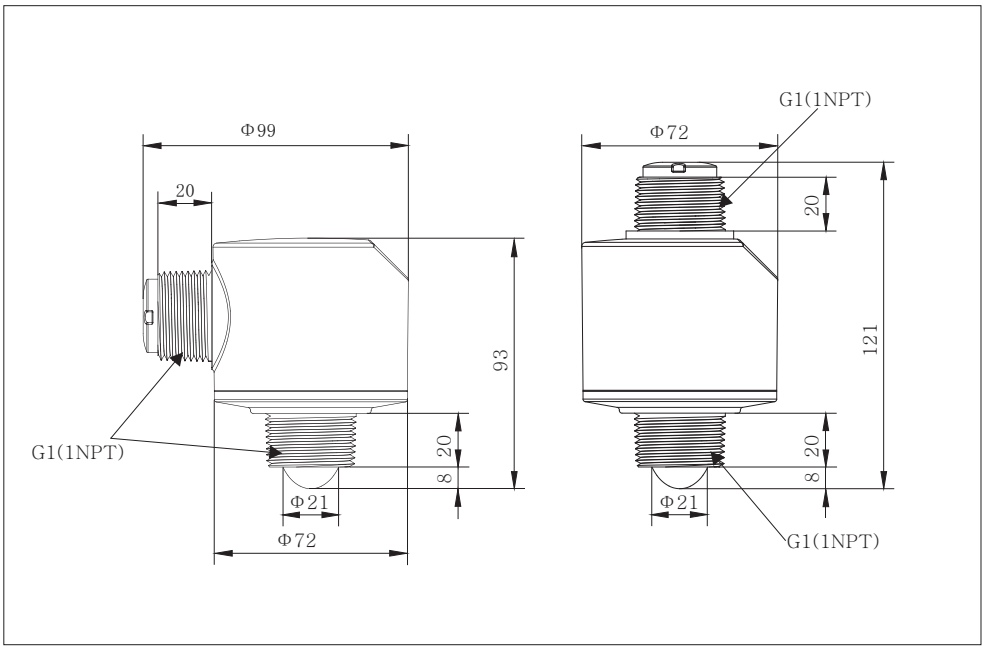
LR8X is connected to mobile phone via Bluetooth



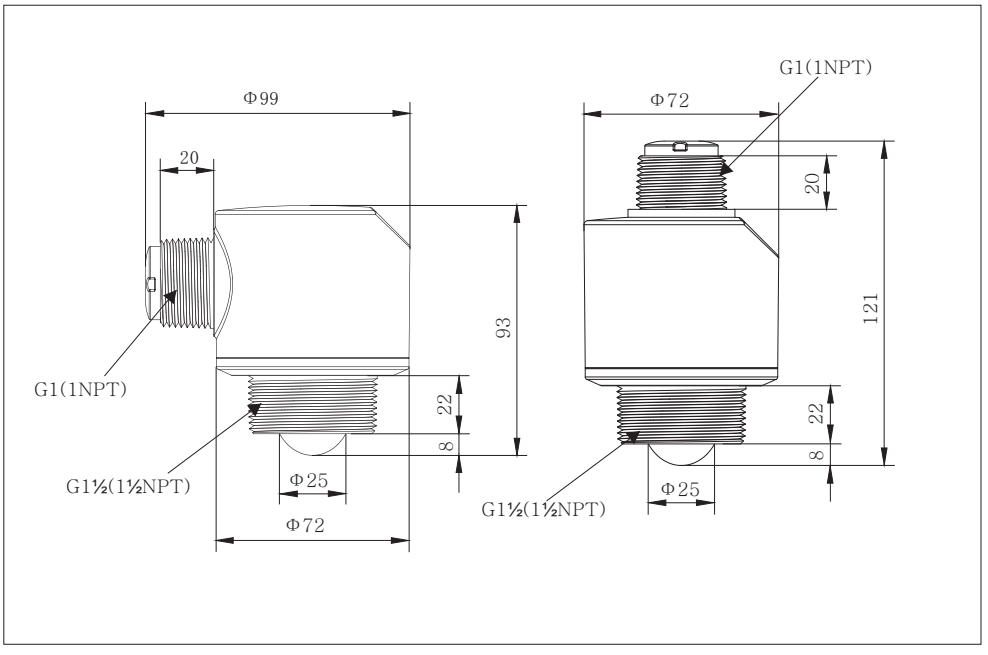
1 Mobile phone
with Bluetooth
2 LR8X

6 Structure size (unit: mm)

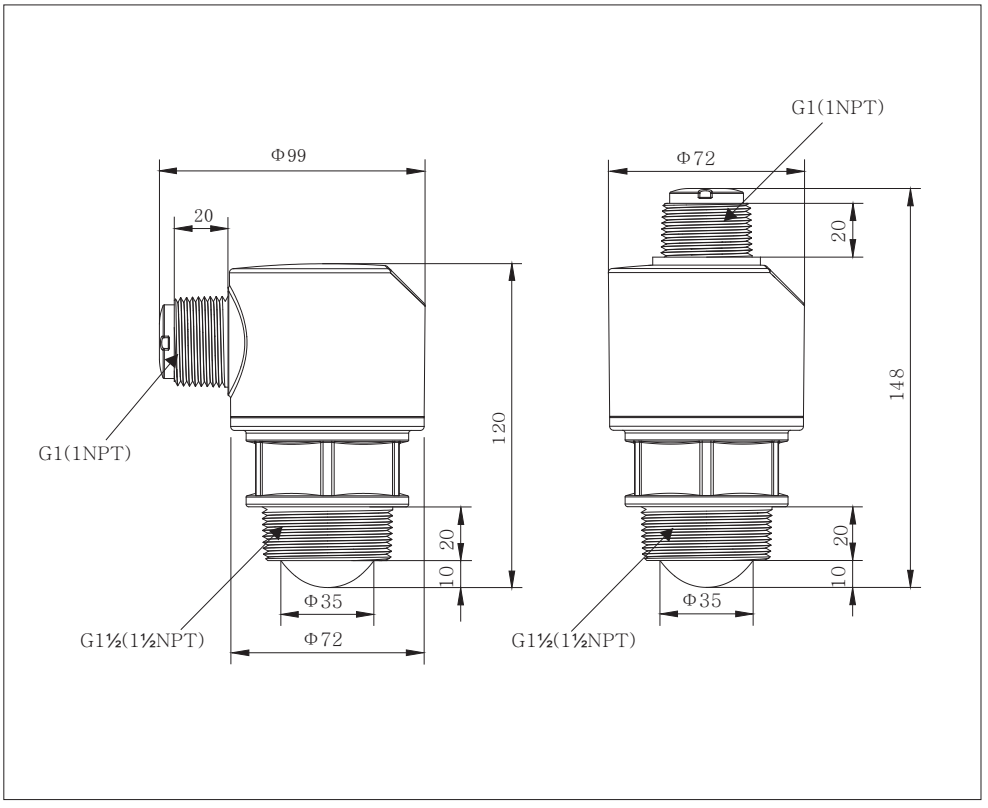
LR80



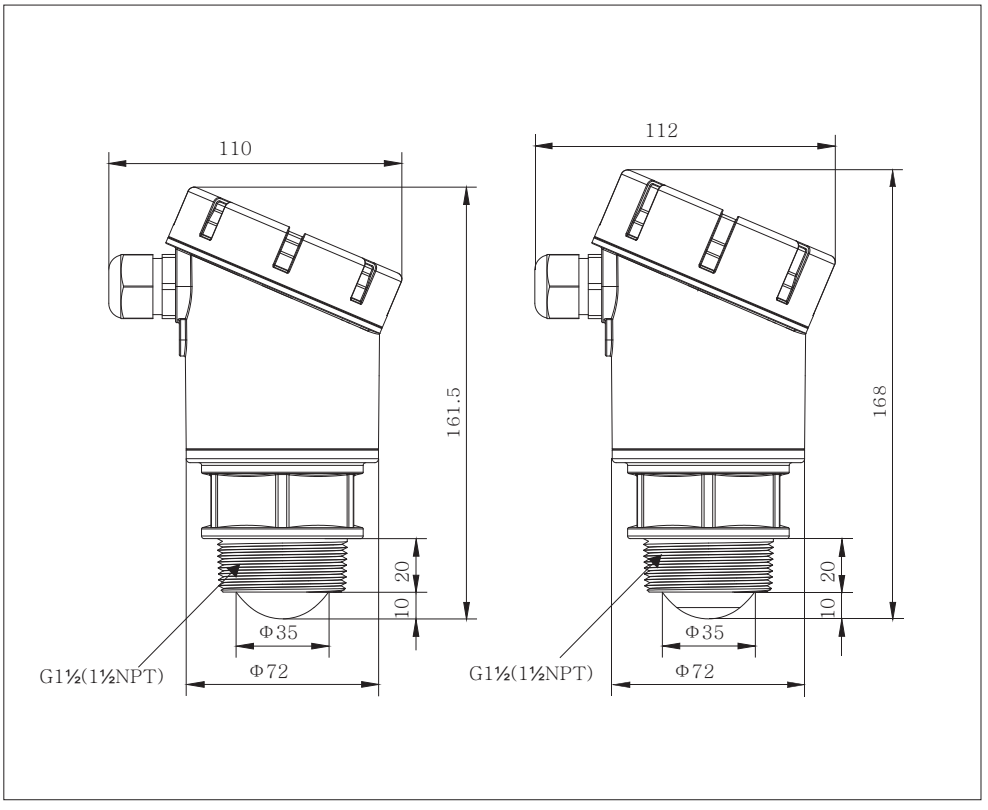
LR81



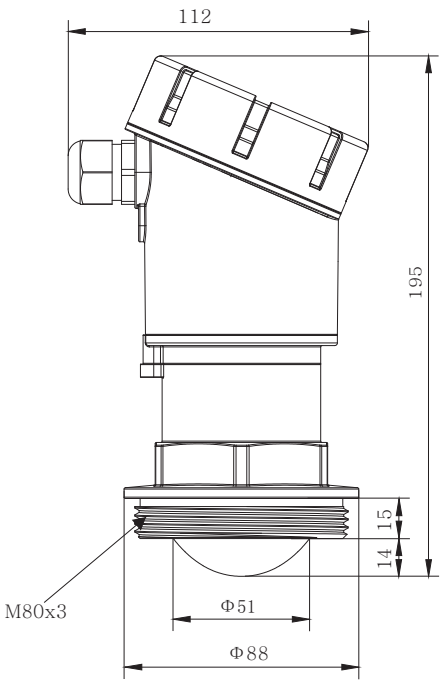
LR82


Φ99
20
120
G1(1NPT)
20
10
Φ35
G1½(1½NPT)
Φ72
G1(1NPT)
Φ72
20
148
20
10
Φ35
G1½(1½NPT)

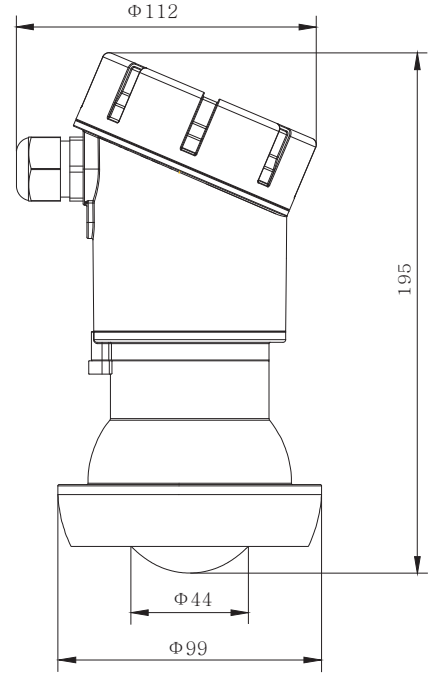
LR83


110
161.5
20
10
Φ35
G1½(1½NPT)
Φ72
112
168
20
10
Φ35
G1½(1½NPT)
Φ72

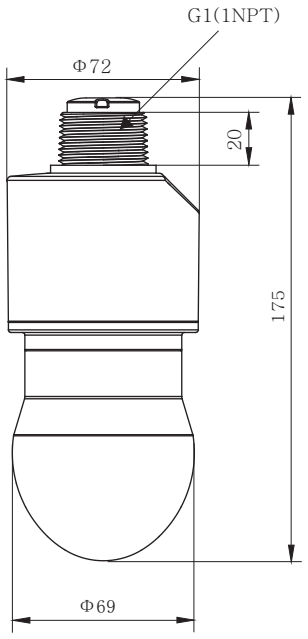
LR84



LR85



LR86

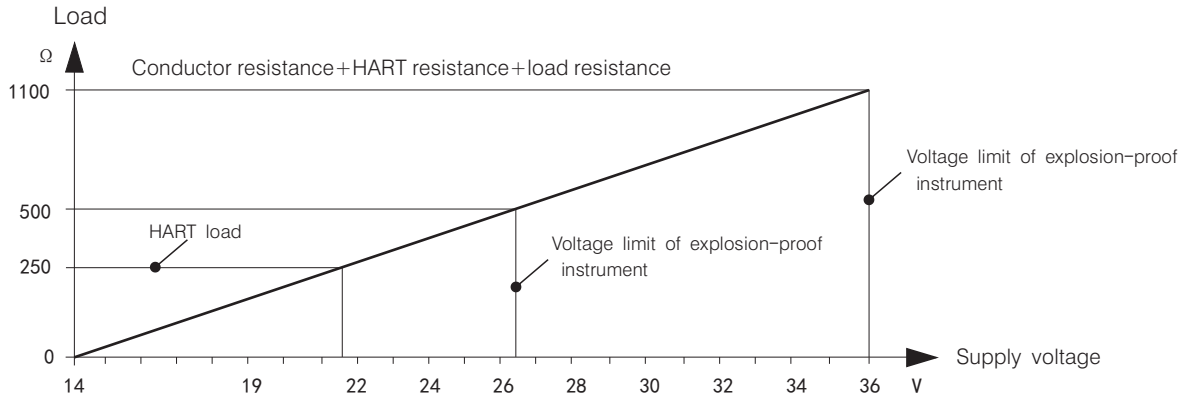


7 Technical parameters

● General date

	Housing	plastic PBT or PVDF
	Sealing between the housing and housing cover	FKM
	Window on housing	Transparent PC
	Weight	
	-LR80	0. 6Kg
	-LR81	0. 7Kg
	-LR82	0. 7Kg
	-LR83	0. 8Kg
	-LR84	0. 8Kg
	-LR85	1. 0Kg
Supply voltage	-LR86	1.0Kg
2-Wire (4～20mA)	Standard type	(12～30) V DC
	Intrinsically safe	(12～30) V DC
	Power consumption	max.22.5mA
	Ripples are allowed	
	-<100Hz	Uss<1V
	-(100～100K) Hz	Uss<10mV
4-Wire (RS485) (SDI)	Standard type	(9～27) V DC
	Power consumption	max.1.5W
Cable parameters	Cable entry/plug (LR83～LR85)	One M20X1.5 cable entry (cable with diameter of 5.....9mm) , and M20x1.5 blind plug
	Spring collecting terminals	Used for conductor with cross section of 2.5mm^2
	Output signal	(4～20) mA/HART/RS485/MODBUS protocol
	Resolution	0. 3 μ A
	Fault signal	Current output is unchanged: 20.5mA;22mA; 3.9mA
Output parmeter	-2-Wire load resistance	Refer to the following diagram
	Integral time	(0～40) s, adjustable

2-Wire load resistance figure



- Feature parameters

Unmeasurable area		Ends of antenna	
Maximum measurement		Liquid	Soild
	-LR80	10m	5m
	-LR81	15m	8m
	-LR82	30m	15m
	-LR83	30m	15m
	-LR84	120m	60m
	-LR85	120m	60m
	-LR86	120m	60m

Microwave frequecny	76～80GHz
Measurement interval	About 1S (depending on the setting of parameters)
Adjust time [1)]	About 1S (depending on the setting of parameters)
Display resolution	1 mm
Accuracy	See the accuracy figure
Temperature for storage and transport	(-40～80) ℃
Relative humidity	<95%
Pressure	Max. 2. 5MPa
vitration-proof	Mechanical shock $10m^2/s$, (10～150) Hz

Operating temperature

Standard type (-40～80) ℃

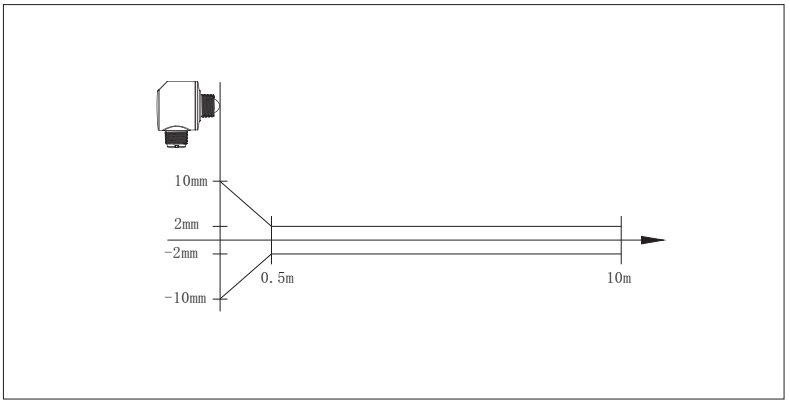
The Intrinsic Safety types

Ta of mainframe(℃)	Process temperature at The antenna(℃)	T class of whole equipment
-40～50	-40～50	T6/ 85 ℃
-40～60	-40～95	T5/ 100℃
-40～70	-40～120	T4/ 120℃

1) Time required for giving the correct level after severe sudden change of level (max error of 10%).

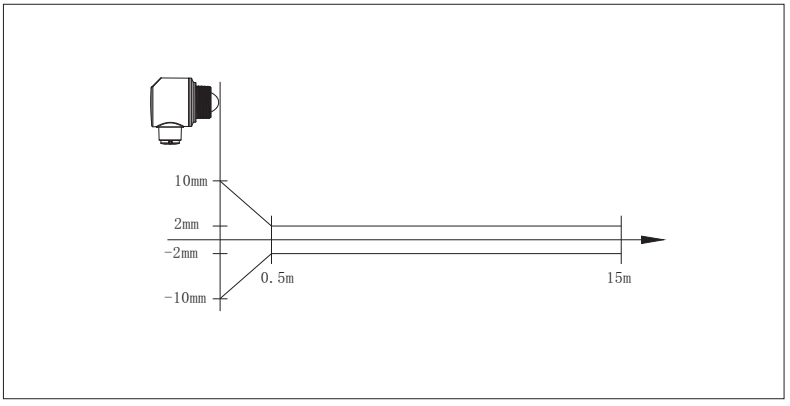
LR80 3dB Transmitting angle 8°

Accuracy Refer to the following diagram



LR81 3dB Transmitting angle 8°

Accuracy Refer to the following diagram



LR82,LR83 3dB Transmitting angle 6°

Accuracy Refer to the following diagram