6.3G Radar Level Measurements

1 Product Overview

LM-RD-51

Application:	Liquids level measurement under easy process conditions
Max Measurement Range:	30m
Measurement Accuracy:	±10mm
Antenna Material:	PP/PTFE
Process Connection:	G1 1 / 2 A
Process Temperature:	- 40…+120℃
Process Pressure:	-1.0…3.0 bar
Frequency Range:	6.3GHz
Signal Output:	2-Wire/4-Wire 4…20mA/HART

LM-RD-52

Application:	Liquids level measurement, especially for strong erosive ones, under easy process conditions and certain temperature/pressure limits
Max Measurement Range:	30m
Measurement Accuracy:	±10mm
Antenna Material:	PTFE
Process Connection:	PTFE Loose Flange with Stud End
Process Temperature:	- 40…+150℃
Process Pressure:	-1.0…16bar
Frequency Range:	6.3GHz
Signal Output:	2-Wire/4-Wire 4…20mA/HART

LM-RD-53

Application:	Storage/process vessels under hazardous working condition
Max Measurement Range:	35m
Measurement Accuracy:	±10mm
Antenna Material:	Stainless Steel 316L/PTFE
Process Connection:	Flange 316L
Process Temperature:	- 40…+200℃
Process Pressure:	-1.0…40.0bar
Frequency Range:	6.3GHz
Signal Output:	2-Wire/4-Wire 4…20mA/HART

LM-RD-54

Application:	Storage/process vessels under hazardous working condition
Max Measurement Range:	70m
Measurement Accuracy:	±20mm
Antenna Material:	Stainless Steel 316L/PTFE
Process Connection:	Flange 316L
Process Temperature:	- 40…+200℃
Process Pressure:	-1.0…40.0bar
Frequency Range:	6.3GHz
Signal Output:	2-Wire/4-Wire 4…20mA/HART

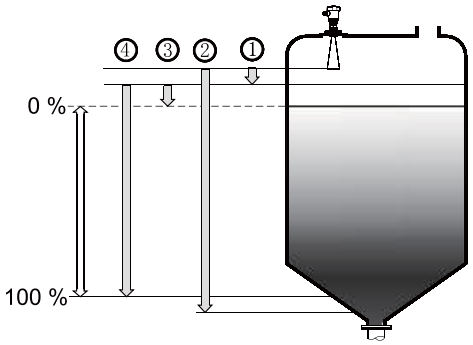
6.3G Radar Level Measurements

2 Mounting Requirement

Be cautious during the installation:

1. the highest level of target medium must Not enter into blanking zone;
2. the measurement must keep certain distance to vessel walls;
3. every possible measure needs to be taken to position the measurement so that the direction of antenna emission is perpendicular to the surface of measured medium
4. the installation of measurements in explosion proof area must abide by relevant local or federal safety regulations. Aluminium housing should be used on intrinsically safe version, which is also applicable in explosion proof areas. The measurement must be connected with ground in this case.

Illustration

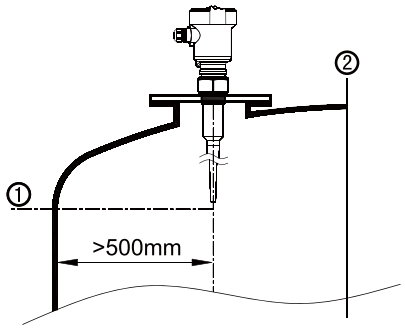


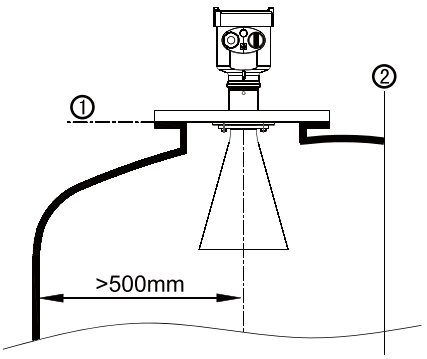
Reference Plane for Measurement: the thread or seal plane of flange
Measurement blanking zone: the area between measurement reference plane and the antenna end.

1. Blanking Zone
2. Empty (Max. Measurement Distance)
3. Max. Measurement Range
4. Min. Measurement Range

Note: The highest level of measured medium must not enter into blanking zone while radar level measurement measurement is in operation.

Mounting Position



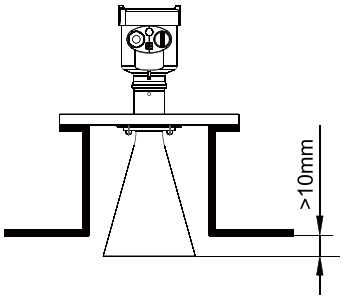


Note: Minimum distance of 500mm between measurement and vessel wall during installation

1. Reference Plane
2. Center of Vessel or Symmetrical Axis

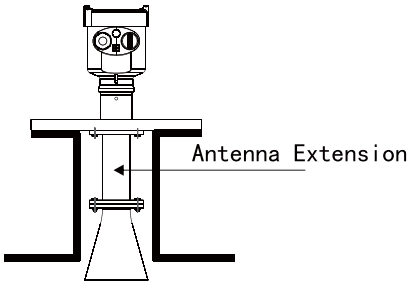
6.3G Radar Level Measurements

Socket



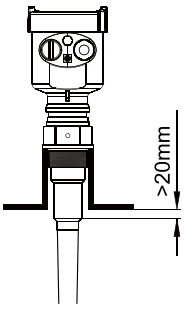
Horn Antenna

The transducer end must at least protrude 10mm out of socket.



Antenna Extension

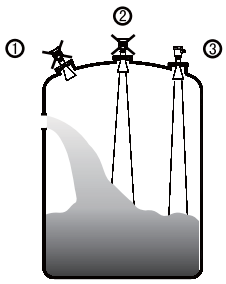
You are advised to use antenna extension if the antenna itself is shorter than socket.



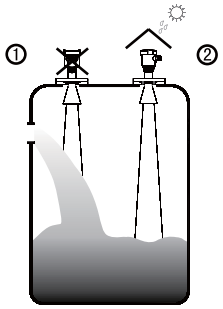
Rod Antenna

The working part of antenna, i.e. the cone-shaped body of antenna must be fully exposed from the socket. In order to meet the application requirement of various sockets, different radar level measurements of variable length are available for customers to choose from.

Illustrative Diagram on Installation



1. Wrong: Fail to turn the antenna perpendicular to the surface of target medium.
2. Wrong: Measurements are mounted in the center of concave or arched vessel tops, which results in multiple echoes.
3. Correct



1. Wrong: Mount the measurement in/above filling stream, which results in the measurement of filling stream not the target medium.
2. Sun shield or rain-proof is required for outdoor mounting.

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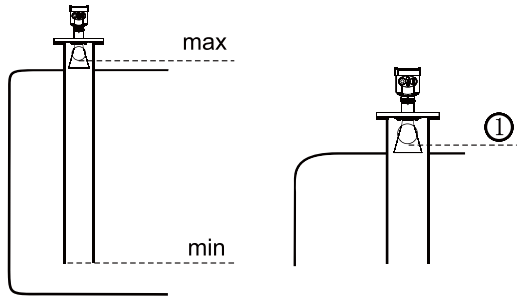
Installation with Standpipe

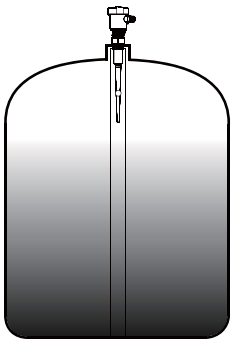


You are advised to opt for installation with standpipe (or bypass tube) to avoid the influence on measurement caused by barriers inside vessels, foam generation.

If the measurement is undertaken by LM-RD-5X inside a metal standpipe, the minimum inner diameter of standpipe should be 50mm. Avoid large cracks or welding seam when connecting standpipe. False echo storage must be carried out as well in this case.

1. Vent hole of diameter 5…10mm

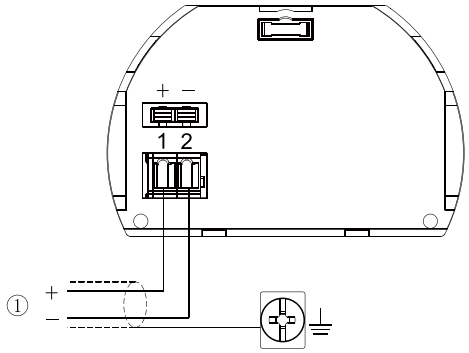
Note: You must NOT mount measurement inside standpipe while measuring adhesive medium.



Installation with a plastic standpipe can avoid the generation of multiple false echoes while the measurement being mounted on the center of vessel top. You are advised to use PP or PTFE if the measured medium is strong acidic or alkaline.

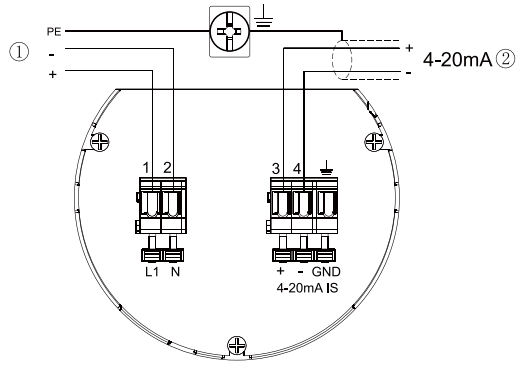
3 Electrical Connection

Wiring Diagram



2-wire wiring used for HART

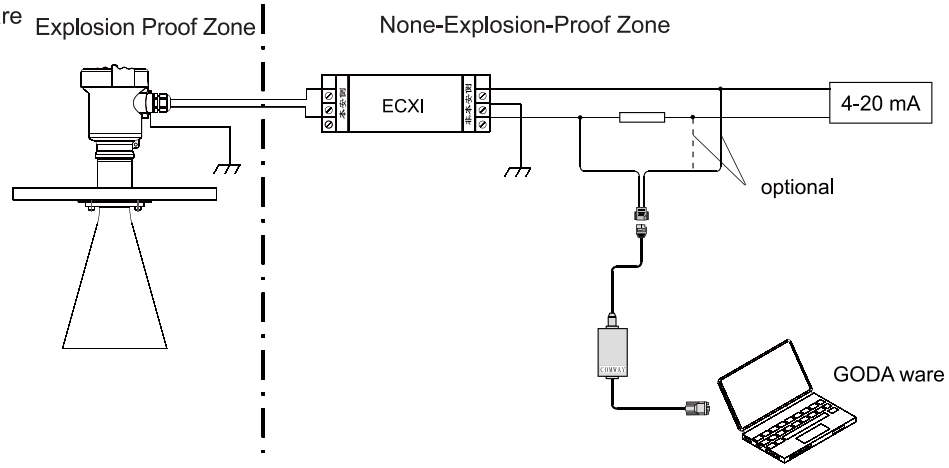
1. Power Supply and Signal Output



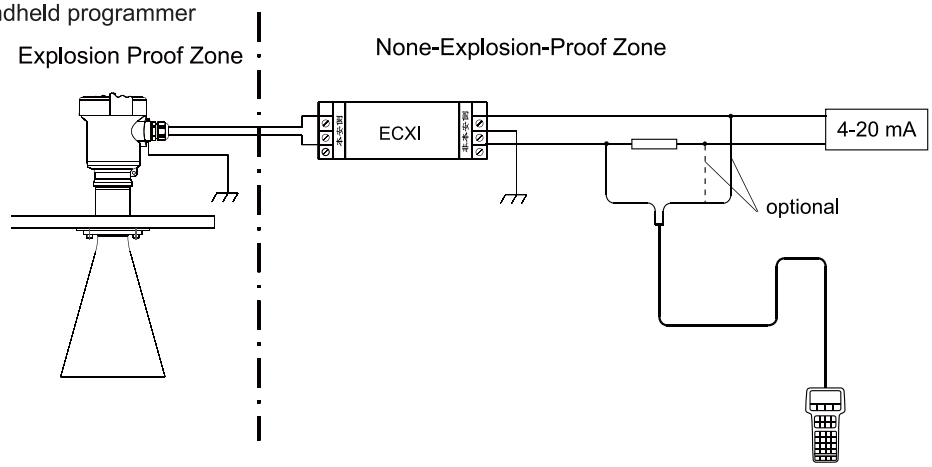
Wiring plan suitable for 4-wire/2-chamber structure

1. Power Supply
2. Signal Output

Adjust with GODA ware



Adjust with HART handheld programmer



4 Adjustment Instructions

Adjustment Methods

Three adjustment methods available for LM-RD-5X

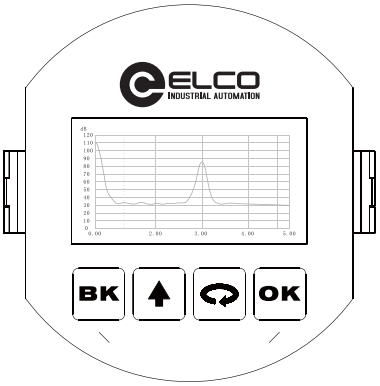
1 Display /adjustment module
2 An adjustment software-GODA ware
3 HART handheld programmer

Display/Adjustment Module

ViewPoint is a pluggable display/adjustment module. The adjustment can be done through operating with four buttons on ViewPoint. Optional menu operation languages are available for selection.

ViewPoint is only used for display after adjustment in that the measurement results can be seen clearly through the glass window.

Display/Adjustment Module



[OK]: - Enter programming mode;
- Confirm programming options;
- Confirm modifications to parameters.

[ ]: - Choose programming options;
- Choose the digit of parameters to edit;
- Display the contents of parameters.

[ ]: - Modify parameter values;

[BK]: - Programming mode exit;
- Return to higher menu level;
- Shortcut key mode, display echo curve

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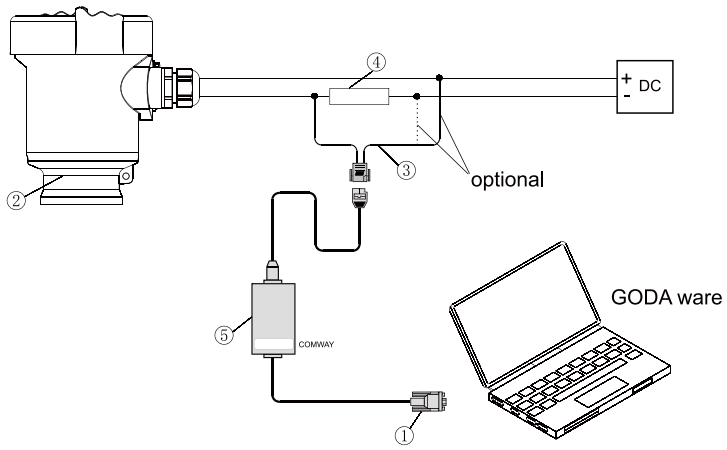
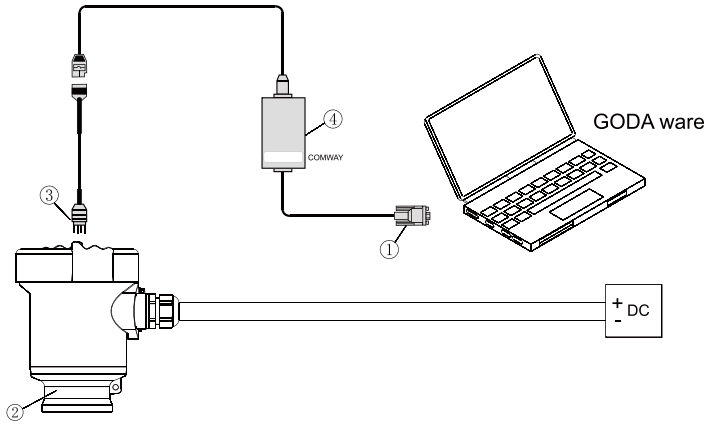
GODA ware



Connect with another unit through HART

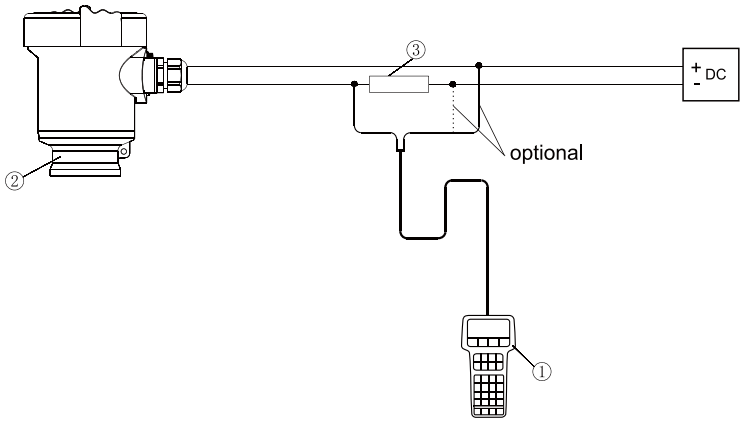
1. RS232 connection cable
2. LM-RD-5X
3. HART adapter used on COMWAY convertor
4. Resistance 250ohm
5. COMWAY convertor



Connect with another unit through I2C

1. RS232 connection cable
2. LM-RD-5X
3. I2C adapter used on COMWAY convertor
4. COMWAY convertor

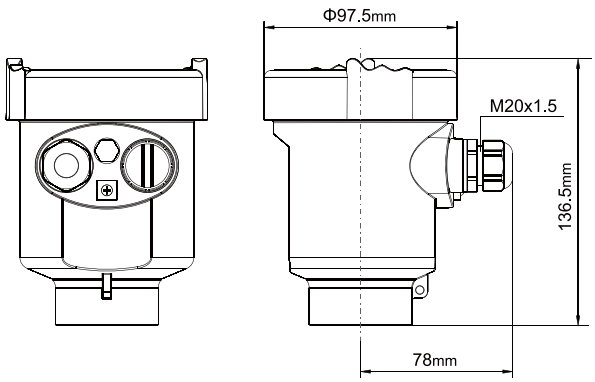
HART Handheld Programmer



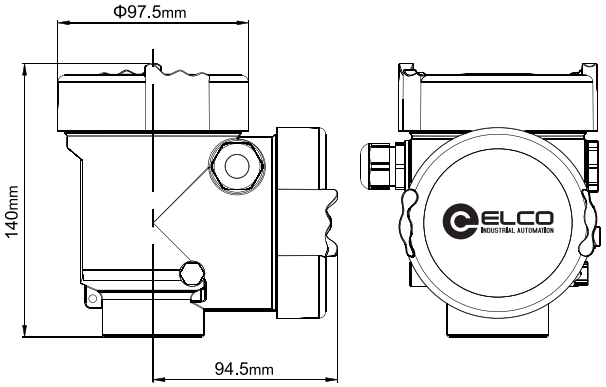
1. HART handheld programmer
2. LM-RD-5X
3. Resistance 250ohm

5 Dimensional Drawings (Unit: mm)

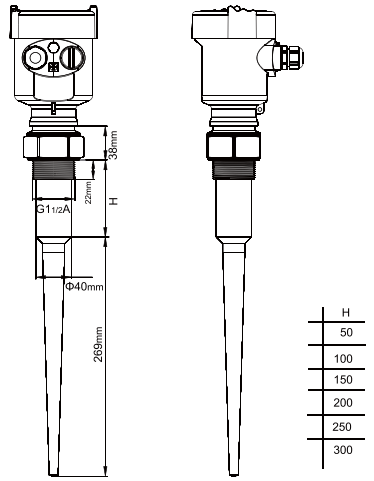
Material: AL/316L



Material: AL(two-chamber)

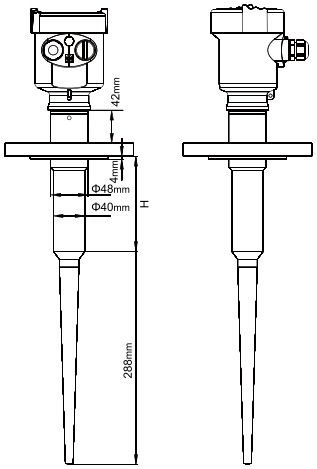


LM-RD-51 Threaded Version



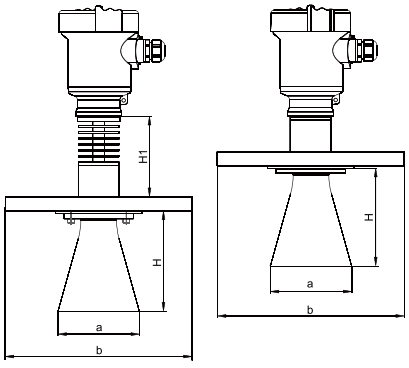
H
50
100
150
200
250
300

LM-RD-52 Flange Version



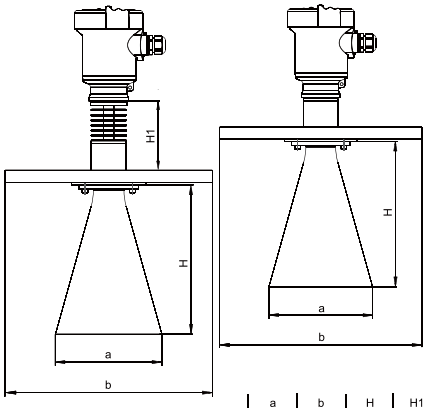
H
50
100
150
200
250
300

LM-RD-53 Flange Version



	a	b	H	H1
DN50		Φ165		123
DN80	Φ75	Φ200	60	123
DN100	Φ96	Φ220	120	123
DN150	Φ146	Φ285	205	123

LM-RD-54 Flange Version

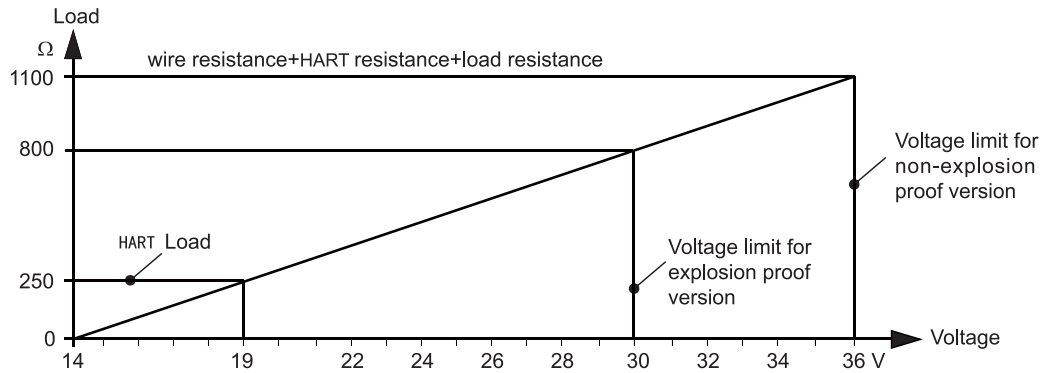


	a	b	H	H1
DN150	Φ146	Φ285	205	123
DN200	Φ197	Φ340	296	123
DN250	Φ244	Φ405	380	123

6 Technical Specifications

General Parameters		
Material	Weight	Process Connection
Antenna: PTFE or PP	LM-RD-51: 2kg(Depend on process connections and housings)	Process Connection LM-RD-51: Flange Process Connection LM-RD-52: Flange
Flange: Stainless Steel 316L	LM-RD-52: 5kg(Depend on process connections and housings)	Process Connection LM-RD-53: Flange Process Connection LM-RD-54: Flange
Housing: Aluminium, Stainless SeteelPBT-FR	LM-RD-53: 6kg(Depend on process connections and housings)	
Seal ring between housing and housing cover:Silicone	LM-RD-54: 10kg(Depend on process connections and housings)	
ViewPoint window on housing: Polycarbonate		
Ground terminal: Stainless Steel		
Voltage Supply		
Standard Version: 15…36V DC		
Intrinsic Safe Version: 15…30V DC		
LM-USL-553 2-wire: 20…36V DC		
Power Consumption: Max. 22.5mA		
Ripple Allowed: <100Hz Uss<1V		
<100…100KHz Uss<10mV		
4-wire/2-chamber: Intrinsic Safe+ Explosion-Proof 24V DC±10%, 220V AC±10%		
Power Consumption: Max. 4VA, 2.1W		
Output		
Output Signal: 4…20mA/HART		
Resolution: 1.6μA		
Fault Signal: Constant current output: 20.5 mA;22 mA,3.8mA		
2-wire load resistance: See diagram below		
4-wire load resistance: Max. 500ohm		
Integration Time: 0…99sec,adjustable		

2-Wire Load Resistance Diagram



6.3G Radar Level Measurements

Characteristic Parameters of Transducer

Blanking Distance	End of Antenna
Max Measurement Distance	
LM-RD-51	30m(Liquids)
LM-RD-52	30m(Liquids)
LM-RD-53	35m
LM-RD-54	70m
Microwave Frequency	6GHz
Measurement Interval	1sec (Depend on parameter settings)
Adjustment Time	1sec (Depend on parameter settings)
Beam Angle	See the diagram below
Resolution of Display	1mm
Accuracy	10mm/ <0.1%
Temperature for Storage/ Transport	-40...+80℃
Process Temperature (Probe)	
LM-RD-51	-40...+120℃
LM-RD-52	-40...+150℃
LM-RD-53	-40...+200℃
LM-RD-54	-40...+200℃
Relative Humidity	< 95%
Pressure	Max.40bar
Vibration Proof	Mechanical vibration 10m/s2 10…150Hz

Size of Antenna	LM-RD-53/54			LM-RD-51/52
	Horn			Antenna
	DN150	DN200	DN250	
Beam Angle α	20°	16°	14°	24°

7 Selection & Ordering Information

LM-RD-51	LM-RD-52
Explosion Proof Approval	**Explosion Proof Approval**
P Standard (Without Approval) I Intrinsically Safe (Exia ⅡC T6) C Intrinsically Safe+ Ship Approval (Exia ⅡC T6) G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia ⅡC T6)	P Standard (Without Approval) I Intrinsically Safe (Exia ⅡC T6) C Intrinsically Safe+ Ship Approval (Exia ⅡC T6) G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia ⅡC T6)
Shape of Antenna/Material/Process Temperature	**Shape of Antenna/Material/Process Temperature**
A Plastic Rod/PP/-40…+120℃ B Plastic Rod/PTFE/-40…+120℃	B Plastic Rod/PTFE/-40…+150℃
Length of Vessel Rocket	**Length of Vessel Rocket**
A 50mm B 100mm C 150mm D 200mm E 250mm F 300mm X special customized	A 50mm B 100mm C 150mm D 200mm E 250mm F 300mm X special customized
Process Connection/Material	**Process Connection/Material**
GP Thread G1 1/2A NP Thread 1 1/2NPT YP special customized	FC PTFE Loose Flange with Stud End DN50 PN1.6 Stainless Steel316L FD PTFE Loose Flange with Stud End DN80 PN1.6 Stainless Steel316L FE PTFE Loose Flange with Stud End DN100 PN1.6 Stainless Steel316L FK PTFE Loose Flange with Stud End DN150 PN1.6 Stainless Steel316L YP special customized
Electronic	**Electronic**
A 4…20mA 2-Wire B 4…20mA HART (2-Wire) C 4…20 mA /22.8…26.4V DC/HART 2-wire/4-wire D 198…242V AC/HART 4-wire	A 4…20mA 2-Wire B 4…20mA HART (2-Wire) C 4…20Ma/22.8…26.4V DC/HART 2-wire/4-wire D 198…242V AC/HART 4-wire
Housing/Protection	**Housing/Protection**
A Aluminium/IP67 B Plastic/IP66 D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67	A Aluminium/IP67 B Plastic/IP66 D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67
Cable Entry	**Cable Entry**
M M20x1.5 N 1/2NPT	M M20x1.5 N 1/2NPT
Display Programming	**Display Programming**
A Yes X No	A Yes X No
Note: Version C (Exia ⅡC T6) must be matched with electronic components A&B and housing G; Version G (Exd [ia] ia ⅡC T6) must be matched with housing D. Example: LM-RD-51PABNPBANA	Note: Version C (Exia ⅡC T6) must be matched with electronic components A&B and housing G; Version G (Exd [ia] ia ⅡC T6) must be matched with housing D. Example: LM-RD-51PBCFDAANA

6.3G Radar Level Measurements

LM-RD-53	LM-RD-54
Explosion Proof Approval	Explosion Proof Approval
P Standard (Without Approval) I Intrinsically Safe (Exia ⅡC T6) (only select aluminium housing) C Intrinsically Safe+ Ship Approval (Exia ⅡC T6) (only select stainless steel housing) G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia ⅡC T6) (see Note below for housing selection)	P Standard (Without Approval) I Intrinsically Safe (Exia ⅡC T6) C Intrinsically Safe+ Ship Approval (Exia ⅡC T6) G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia ⅡC T6)
Shape of Antenna/Material	Shape of Antenna/Material
C Horn Φ50mm/ Stainless Steel 316L (Only applicable for installation with standpipe) D Horn Φ80mm/ Stainless Steel 316L (Only applicable for installation with standpipe) E Horn Φ100mm/ Stainless Steel 316L F Horn Φ150mm/ Stainless Steel 316L G Horn Φ200mm/ Stainless Steel 316L	F Horn Φ150mm/ Stainless Steel 316L G Horn Φ200mm/ Stainless Steel 316L H Horn Φ200mm extension/ Stainless Steel 316L
Length of Vessel Rocket	Length of Vessel Rocket
A ----- B 200mm C 500mm D 1000mm E 2000mm X special customized	A – B 200mm C 500mm D 1000mm X special customized
Process Connection/Material	Process Connection/Material
FA Flange DN50 PN1.6 Stainless Steel 316L FB Flange DN80 PN1.6 Stainless Steel 316L FC Flange DN100 PN1.6 Stainless Steel 316L FD Flange DN150 PN1.6 Stainless Steel 316L FE Flange DN200 PN1.6 Stainless Steel 316L YP special customized	FB Flange DN150 PN1.6 Stainless Steel 316L FC Flange DN200 PN1.6 Stainless Steel 316L YP special customized
Seal/ Process Temperature	Seal/ Process Temperature
2 Viton/-40…+130℃ 3 Kalrez/-20…+130℃ 4 Viton/-40…+200℃ with radiator fins (process temperature >100℃) 5 Kalrez/-20…+200℃with radiator fins (process temperature >100℃)	2 Viton/-40…+130℃ 3 Kalrez/-20…+130℃ 4 Viton/-40…+200℃ with radiator fins (process temperature >100℃) 5 Kalrez/-20…+200℃with radiator fins (process temperature >100℃)
Electronic	Electronic
A 4…20mA 2-Wire B 4…20mA HART (2-Wire) C 4…20Ma/22.8…26.4V DC/HART 2-wire/4-wire D 198…242V AC/HART 4-wire	A 4…20mA 2-Wire B 4…20mA HART (2-Wire) C 4…20Ma/22.8…26.4V DC/HART 2-wire/4-wire D 198…242V AC/HART 4-wire
Housing/Protection	Housing/Protection
A Aluminium/IP67 B Plastic/IP66 D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67	A Aluminium/IP67 B Plastic/IP66 D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67
Cable Entry	Cable Entry
M M20x1.5 N 1/2NPT	M M20x1.5 N 1/2NPT
Display Programming	Display Programming
A Yes X No	A Yes X No
Sweep	Sweep
A Yes X No	A Yes X No
Note: Version C (Exia ⅡC T6) must be matched with electronic components A&B and housing G;Version G (Exd [ia] ia ⅡC T6) must be matched with housing D. Example: LM-RD-53PEAFA2AANAX	Note: Version C (Exia ⅡC T6) must be matched with electronic components A&B and housing G;Version G (Exd [ia] ia ⅡC T6) must be matched with housing D. Example: LM-RD-54PFAFB2BANAX