## 1 Product Overview



Application: Level measurement in liquids, especially erosive liquids, under

easy process condition

Measurement Range: 10m Measurement Accuracy: ±5mm Antenna Material: PVDF/PTFE **Process Connection:** G11/2A Process Temperature: - 40...+130℃ -1.0...3.0 bar Process Pressure: Frequency Range: 26GHz

LM-RD-55

Signal Output:

Application:

2-Wire/4-Wire 4...20mA/HART

easy process condition Measurement Range: 30m Measurement Accuracy: ±3mm

Antenna Material: Stainless Steel 316L/PTFE Process Connection: G1 1 / 2 A/11/2NPT Process Temperature: - 40...+200°C Process Pressure: -1.0...40bar

Frequency Range: 26GHz

Signal Output:

2-Wire/4-Wire 4...20mA/HART

LM-RD-56

LM-RD-57

Application: Level measurement of strong erosive medium under certain

pressure/temperature limit and easy process condition

Level measurement under certain pressure/temperature limit and

Measurement Range: ±3mm Measurement Accuracy:

Stainless Steel 316L horn /PTFE vibrator Antenna Material: conical surface vibrator, coagulation resistance Antenna Structure:

Process Temperature: - 40...+150℃ Process Pressure: -1.0...16bar 26GHz Frequency Range:

Signal Output: 2-Wire/4-Wire 4...20mA/HART



LM-RD-58

Application:

Solid/storage/process/ vessels under dust/crystallization/condensation

conditions 70m

Measurement Range: Measurement Accuracy: ±15mm

Antenna Material: 1. Stainless Steel 316L horn /PTFE vibrator 2. Stainless Steel 316L/ PTFE vibrator

3. plastic horn / PTFE vibrator

Antenna Structure: 1. pointed cone vibrator, low coagulation resistance

2. conical surface vibrator, coagulation resistance

3. conical surface vibrator, dewdrop and coagulation resistance

Process Temperature: - 40...+200°C

Process Pressure: -1.0...40bar (standard atmosphere with universal joint)

Frequency Range: 26GHz

2-Wire/4-Wire 4...20mA/HART Signal Output: Process Connection: Thread, Flange and Universal Joint





Application: Solid/atmosphere temperature/standard atmosphere vessels

Measurement Range: 15m
Measurement Accuracy: ±10mm

Antenna Material: horn antenna/with PTFE enclosure

Antenna Structure: 1. pointed cone vibrator, low coagulation resistance 2. conical surface vibrator, coagulation resistance

3. conical surface vibrator, dewdrop and coagulation resistance

Process Temperature: -40...+80°C

Process Pressure: standard atmosphere

Frequency Range: 26GHz

Signal Output: 2-Wire/4-Wire 4...20mA/HART

Process Connection: Thread, Flange

#### Antenna Structure Selection



No: R Material: PTFE

Specification: Φ44/length 137

Φ44L/length 237

Features: corrosion attack



No:

Material: Stainless Steel Specification: Φ48/length140

Φ78/length227 Φ98/length288 Φ98L/length474 Φ123/length620

Features: temperature

tolerance/pressure proof



No: V

Material: Stainless Steel (with

PTFE enclosure)

Specification: Ф98/300

Ф98L/480 Ф123/625

atmosphere

temperature/standard atmosphere



No: S

Material: PP (with PTFE enclosure)

Specification: Φ98/length280

Φ98L/length440

Features: atmosphere

temperature/standard atmosphere



No: U

Features:

Material: PTFE Specification: DN 50

DN 80

DN 100

Features: corrosion

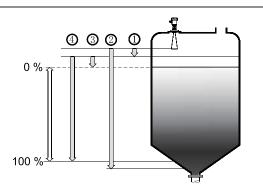
attack/pressure proof

## 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

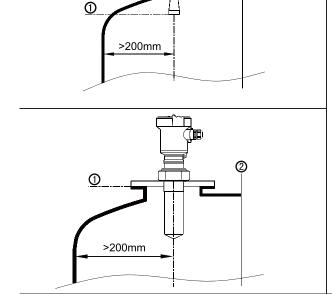


Reference Plane for Measurement: the thread or seal plane of flange Measurement blanking zone: the area between measurement reference plane and the antenna end.

- 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 is in operation.

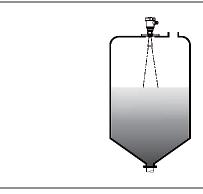
## **Mounting Position**



Note: Minimum distance of 200mm between measurement and vessel wall during installation

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





The best mounting position for a conical vessel with flat top is the center of its top, as the effective measurement can reach the bottom of vessel.

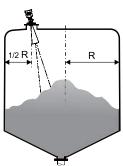
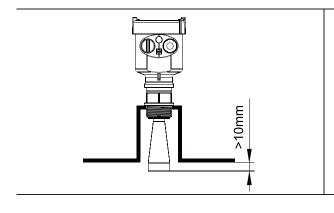


Illustration of radar level measurement with universal joint.

## Socket

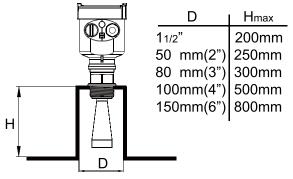


The transducer end must at least protrude 10mm out of socket.

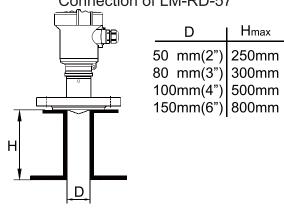
#### Illustration

In case of strong reflective properties of target medium and big socket diameter, you can mount measurements on sockets higher than the antenna length. The recommended values for socket heights are shown in the illustration below. The socket end should be smooth and burr-free, if possible also rounded. Moreover, false echo storage must be carried out afterwards.

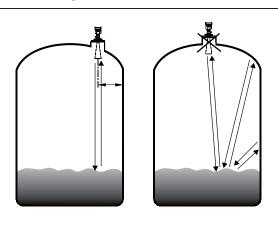
## Illustrative Diagram on Socket Connection of LM-RD-56



## Illustrative Diagram on Socket Connection of LM-RD-57

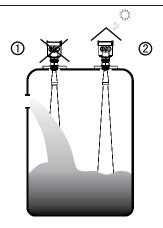


## Illustrative Diagram on Installation



Wrong: Measurements are mounted in the center of concave or arched vessel tops, which results in multiple echoes and should be avoided during installation.

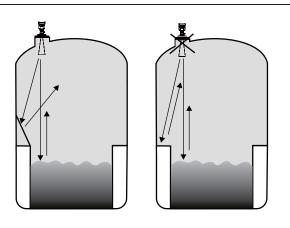
The left figure shows correct installation!



- 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.

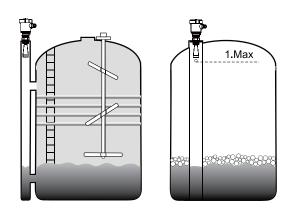


### Scattering Installation



When the radar level measurement is installed, its beam emission direction should avoid the objects in the container that tend to protrude reflection.

## Installation with Standpipe



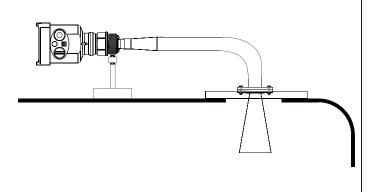
You are advised to opt for installation with standpipe (or bypass tube) to avoid the influence on measurement caused by barriers inside vessels or foam generation.

If the measurement is undertaken by LM-RD-5X inside the 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 of Bend-pipe Radiator



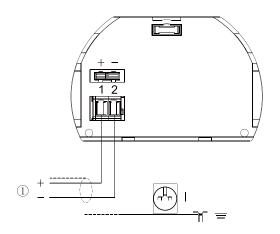
If bend-pipe radiator is installed on the radar level measurement, the impact of high temperature on measurement can be avoided when measurement is made at high temperature.

#### 3 Electrical Connection

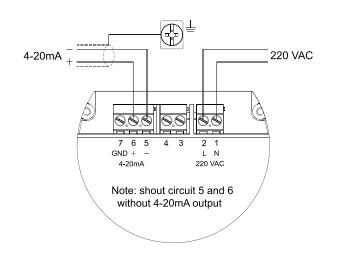
## Wiring Diagram

2-wire wiring used for HART

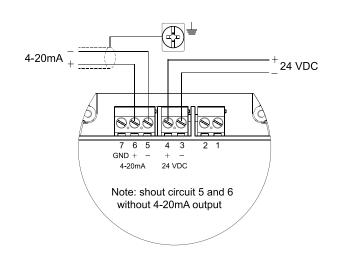
1. Power supply and signal output



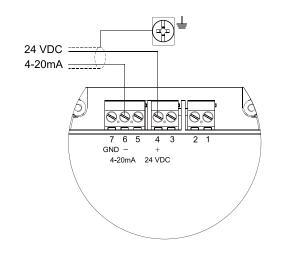
4-wire/2- chamber, 220 VAC power supply, 4-20mA output



4-wire/2- chamber, 24 VDC power supply, 4-20mA output

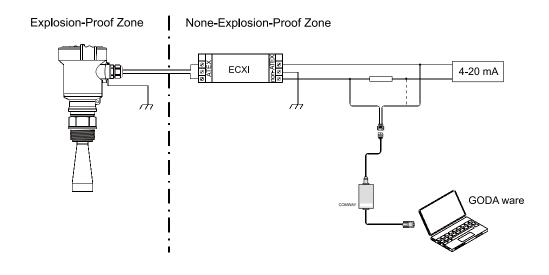


4-wire/2- chamber, 24 VDC power supply, 4-20mA output

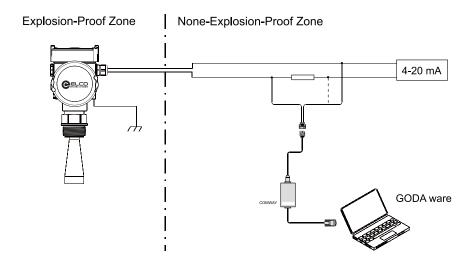




## Explosion Proof Connection- Intrinsically Safe



## Explosion Proof Connection- Intrinsically Safe+ Flameproof Approval

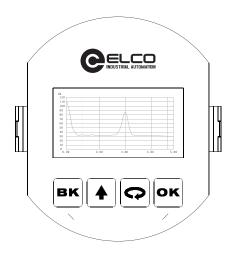


## 4 Adjustment Instructions

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



[ok]: - Enter programming mode;

- Confirm programming options;
- Confirm modifications to parameters.

[ - Choose programming options;

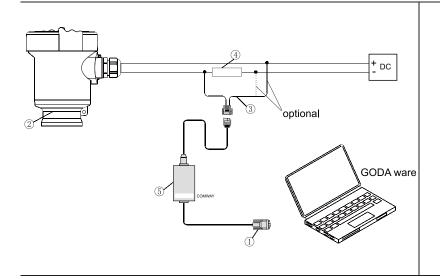
- Choose the digit of parameters to edit;
- Display the contents of parameters.

[ ]: - Modify parameter values;

[BK]: - Programming mode exit;

- Return to higher menu level;
- Shortcut key mode, display echo curve.

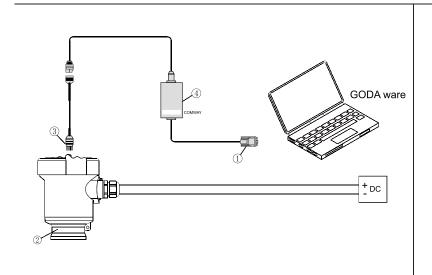
#### **GODA** ware



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

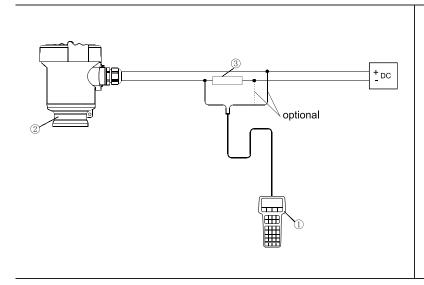




Connect with another unit through  $I^2C$ 

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

## HART Handheld Programmer

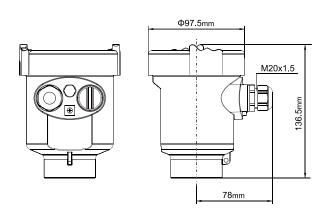


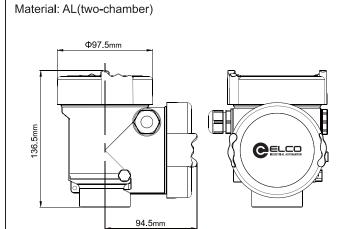
- 1. HART handheld programmer
- 2. LM-RD-5X
- 3. Resistance 250ohm

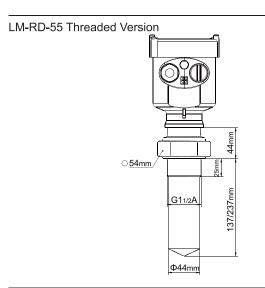
## 5 Dimensional Drawings (Unit: mm)

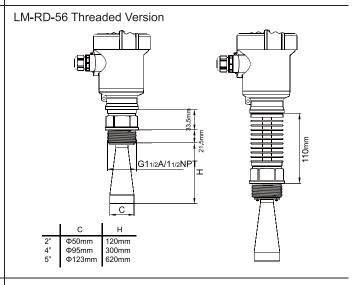


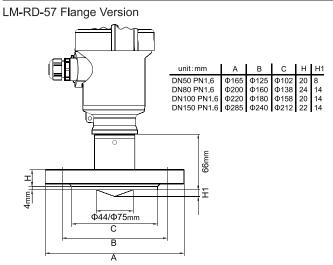
Material: AL/316L

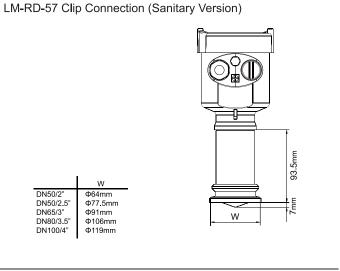






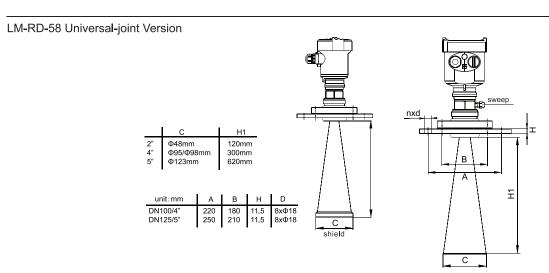




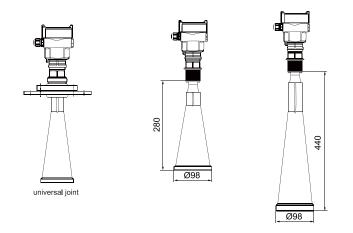




# 



#### LM-RD-59



## 6 Technical Specifications

General Parameters			
Housing: Aluminium, Stainless Steel PBT-FR	Weight		
Seal ring between housing and housing cover: Silicone	LM-RD-55: 1kg (Depend on process connections and housings)		
ViewPoint window on housing: Polycarbonate	LM-RD-56: 2kg (Depend on process connections and housings)		
Ground terminal: Stainless Steel	LM-RD-57: 3kg (Depend on process connections and housings)		
	LM-RD-58: 7kg (Depend on process connections and housings)		
	LM-RD-59: 7kg (Depend on process connections and housings)		
Voltage Supply			
Standard Version: 1536V DC			
Intrinsic Safe Version: 24V DC			
Power Consumption: Max. 22.5mA			
Ripple Allowed: <100Hz Uss<1V			
<100100KHz Uss<10mV			
4-wire/2-chamber: Intrinsic Safe+ Explosion-Proof 24V DC±10%, 220V AC±10%			
Power Consumption: Max. 4VA, 2.1W			

Output

Antenna

Material

Output Signal: 4...20mA/HART

Resolution: 1.6µA

Fault Signal: Constant current output: 20.5 mA;22 mA,3.8mA

Stainless Steel

316L PTFE

2-wire load resistance: See diagram below 4-wire load resistance: Max. 500ohm Integration Time: 0...99sec,adjustable

Model	LM-RD-55	LM-RD-56	LM-RD-57	LM-RD-58	LM-RD-59
Process Connection	Thread G11/2A	Thread G11/2A		Thread G1 <sup>1</sup> / <sub>2</sub> A	Thread G1 <sup>1</sup> / <sub>2</sub> A
		Thread 11/2NPT	Flange 316L	Flange 316L	Flange 316L
			Sanitary Version 316I	Thread 1 1/2NPT	Thread 1 1/2NPT

**PTFE** 

Stainless Steel

316L PTFE

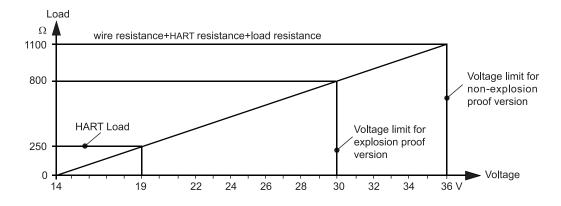
Stainless Steel

316L PTFE

## 2-Wire Load Resistance Diagram

**PVDF** 

PTFE





#### Characteristic Parameters of Transducer

Blanking Distance	End of Antenna
Max Measurement Distance	
LM-RD-55	10m(Liquids)
LM-RD-56	30m(Liquids)
LM-RD-57	20m(Liquids)
LM-RD-58	70m
LM-RD-59	15m
Microwave Frequency	26GHz
Measurement Interval	1sec (Depend on parameter settings)
Adjustment Time	1sec (Depend on parameter settings)
Resolution of Display	1mm
Accuracy	See the accuracy illustration diagram below
Temperature for Storage/ Transport	<b>-40+80</b> ℃
Process Temperature (Probe)	
LM-RD-55	<b>-40+130</b> ℃
LM-RD-56	<b>-40+200</b> ℃
LM-RD-57	<b>-40+150</b> ℃
LM-RD-58	<b>-40+200</b> ℃
LM-RD-59	<b>-40+80</b> ℃
Relative Humidity	< 95%
Pressure	Max.40bar
Vibration Proof	Mechanical vibration 10m/s2 10150Hz

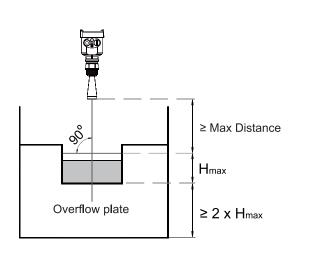
## 7 Open Channel Flow

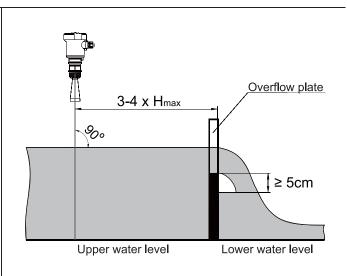
Application in the measurement of open channel flow

According to the provisions stated in Open Channel Weirs & Flumes Flowmeter (JJG-1990) OF National Metrological Verification Regulation, the volume of liquid flow can be calculated through measuring the liquid level in weirs and flumes among open channels with level measurement given the condition that the weirs and flumes placed in open channels are both approved in the regulation.

Radar level measurement offers nonlinear output mapping function, which enables users to utilize the GODA ware to setup the nonlinear output mapping according to the certain relation between liquid level and volume of liquid flow and eventually complete the measurement of open channel flow.

## Schematic Diagram of Open Channel Flow





## 8 Selection & Ordering Information

LM-RD-55	LM-RD-56		
Explosion Proof Approval  P Standard (Without Approval)  I Intrinsically Safe (Exia II C T6)  C Intrinsically Safe+ Ship Approval (Exia II C T6)  G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia	Explosion Proof Approval  P Standard (Without Approval)  C Intrinsically Safe+ Ship Approval (Exia II C T6)  Approval (Exd [ia] ia II C T6)  Shape of Antenna/Material  B (T) horn antenna Φ48mm/ Stainless Steel 316L		
II C T6) Shape of Antenna/Material/Process Temperature B (R型) sealing horn/PTFE/-40+130℃  Process Connection/Material GP Thread G11/2A NP Thread 11/2NPT FA Flange DN50/PTFE FX special customized	C (T) horn antenna Φ48mm/ Stainless Steel 316L C (T) horn antenna Φ78mm/ Stainless Steel 316L H (T) horn antenna Φ98mm/ Stainless Steel 316L I (T) horn antenna Φ98mm(extension)/ Stainless Steel 316L J (T) horn antenna Φ123mm/ Stainless Steel 316L K (S) horn antenna Φ98mm/PP/PTFE closure L (S) horn antenna Φ98mm/(extension)/PP/PTFE closure M (V) horn antenna Φ98mm/Stainless Steel 316L/PTFE closure N (V) horn antenna Φ98mm(extension)/Stainless Steel 316L/PTFE closure P (V) horn antenna Φ123mm/Stainless Steel 316L/PTFE closure X special customized		
Length of Vessel Rocket  A Rocket 100mm  B Rocket 200mm  Electronic	Process Connection/Material  GO no selection GP Thread G11/2A/ Stainless Steel 316L GA Thread11/2NPT/Stainless Steel 316L GB Thread G11/2A/PP GC Thread G11/2A/ Stainless Steel 316L/-60+250°C GD Thread G11/2A/ Stainless Steel 316L/-60+400°C,40MPa GE Thread G11/2A/ Stainless Steel 316L(Sweep) GX special customized		
A 4-20mA/2-Wire	Flange Selection/Material		
B 4-20mA/HART(2-Wire)	specification code PP PTFE Stainless Steel		
C 4-20mA/22.8-26.4V DC/HART 2-wire/4-wire D 198-242V AC/HART 4-wire	DN50         FA         FB         FC           DN80         GA         GB         GC           DN100         HA         HB         HC		
Housing/Protection	- <u>DN125   IA   IB   IC </u>		
A Aluminium/IP67 B Plastic/IP66	FO no selection FX special customized		
D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67	Seal/Process Temperature  2 Viton/-60+150°C  3 Kalrez/-60+250°C		
Cable Entry	4 Graphite/-60+400℃		
M M20x1.5 N 1/2NPT	Electronic A 420mA 2-Wire B 420mA HART (2-Wire)		
Display Programming	C 420Ma/22.826.4V DC/HART 2-wire/4-wire		
A Yes X No	D 198242V AC/HART 4-wire  Housing/Protection  A Aluminium/IP67 B Plastic/IP66  D Aluminium (2-chamber)/IP67 G Stainless Steel 316L/IP67		
Note: Version I (Exia II C T6) must be matched with electronic components B and housing A;  Version C (Exia II C T6) must be matched with	Cable Entry M M20x1.5 N 1/2NPT		
electronic components B and housing G;  Version G (Exd [ia] ia II C T6) must be matched	Display Programming A Yes X No		
with electronic components C&D and housing D; Refer to GB/T9119-2000 PN1.6MPa dimension for target configuration flange, 15 for thickness.	Note: Version I (Exia II C T6) must be matched with electronic components B and housing A; Version C (Exia II C T6) must be matched with electronic components B and housing G; Version G (Exd [ia] ia II C T6) must be matched with electronic components C&D		
Example: LM-RD-55PBGPABANA	and housing D; Refer to GB/T9119-2000 PN1.6MPa dimension for target configuration flange,15 for thickness. Example: LM-RD-56PBGCFA2BANA		



LM-RD-57	LM-RD-58			
Explosion Proof Approval P Standard (Without Approval) I Intrinsically Safe (Exia II C T6)	Explosion Proof Approval  P Standard (Without Approval) C Intrinsically Safe+ Ship Approval (Exia II C T6) G Intrinsically Safe+ Flameproof			
C Intrinsically Safe+ Ship Approval (Exia II C T6) G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia II C T6)	Approval (Exd [ia] ia ][ C T6)  Shape of Antenna/Material  B (T) horn antenna Φ48mm/ Stainless Steel 316L C (T) horn antenna Φ78mm/ Stainless Steel 316L  H (T) horn antenna Φ98mm/ Stainless Steel 316L			
Material of Antenna/Process Temperature  B (U) Stainless Steel recombined with PTFE Flange DN50  C (U) Stainless Steel recombined with PTFE Flange DN80  D (U) Stainless Steel recombined with PTFE Flange DN100  X special customized	K (S) horn antenna Ф98mm/PP/PTFE closure			
A 420mA 2-Wire	Process Connection/Material			
B 420mA HART (2-Wire) C 420 mA /22.826.4V DC/HART 2-wire/4-wire D 198242V AC/HART 4-wire	GO no selection GP Thread G11/2A/ Stainless Steel 316L GA Thread11/2NPT/Stainless Steel 316L GB Thread G11/2A/PP GC Thread G11/2A/ Stainless Steel 316L/-60+250°C GD Thread G11/2A/ Stainless Steel 316L/-60+400°C,40MPa GE Thread G11/2A/ Stainless Steel 316L(Sweep) GX special customized			
Housing/Protection				
A Aluminium/IP67	Flange Selection/Material			
B Plastic/IP66	specification code PP PTFE Stainless Steel Universal Joint(PP) Universal Joint(stainless steel)			
D Aluminium (2-chamber)/IP67	DN50         FA         FB         FC         -         -           DN80         GA         GB         GC         -         -			
G Stainless Steel 316L/IP67	DN100         HA         HB         HC         HD         HE           DN125         JA         JB         JC         JD         JE			
Cable Entry	FO no selection			
M M20x1.5	FX special customized			
N 1/2NPT	Seal/Process Temperature  2 Viton/-60+150°C			
Display Programming	3 Kalrez/-60+250℃ 4 Graphite/-60+400℃			
A Yes	- Couplino com 100 c			
X No	Electronic A 420mA 2-Wire B 420mA HART (2-Wire) C 420Ma/22.826.4V DC/HART 2-wire/4-wire D 198242V AC/HART 4-wire			
Note: Version I (Exia II C T6) must be matched with electronic components B and housing A;  Version C (Exia II C T6) must be matched with electronic components B and housing G;  Version G (Exd [ia] ia II C T6) must be matched	Housing/Protection  A Aluminium/IP67  B Plastic/IP66  D Aluminium (2-chamber)/IP67  G Stainless Steel 316L/IP67			
	Cable Entry M M20x1.5 N 1/2NPT			
with electronic components C&D and housing D; Refer to GB/T9119-2000 PN1.6MPa dimension for target configuration flange, 15 for thickness	Display Programming  A Yes  X No  Note: Version I (Exia II C T6) must be matched with electronic components B and housing A;  Version C (Exia II C T6) must be matched with electronic components B and housing G;  Version G (Exd [ia] ia II C T6) must be matched with electronic components C&D and housing D;  Refer to GB/T9119-2000 PN1.6MPa dimension for target configuration flange, 15 for thickness.			
Example:LM-RD-57PDCANA	Example: LM-RD-58PBGCHB2AANA			

#### LM-RD-59

#### **Explosion Proof Approval**

- P Standard (Without Approval)
- I Intrinsically Safe (Exia II C T6)
- G Intrinsically Safe+ Flameproof Approval (Exd [ia] ia II C T6)

#### Shape of Antenna/Material

- K (S) horn antenna Φ98mm/PP/PTFE closure
- L (S) horn antenna Φ98mm(extension)/PP/PTFE closure
- X special customized

#### Process Connection/Material

- GB Thread G11/2A/PP
- GX special customized

#### Process Connection/Material

- HA DN100 Flange/PP
- HD DN100 Universal-joint Flange/PP
- GX special customized

#### Seal/Process Temperature

2 Viton/-60...+80°C

#### 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

### Housing/Protection

- A Aluminium/IP67
- B Plastic/IP66
- D Aluminium (2-chamber)/IP67

#### Cable Entry

- M M20x1.5
- N 1/2NPT

#### **Display Programming**

- A Yes
- X No

Note: Version I (Exia II C T6) must be matched with electronic components B and housing A; Version G (Exd [ia] ia II C T6) must be matched with electronic components D and housing D; Refer to GB/T9119-2000 PN1.6MPa dimension for target configuration flange, 15 for thickness.

Example: LM-RD-59PKGBHA2BANA