

# Electromagnetic Flowmeter

## RF3300-E



HART, RS 485 communication



Low Conductivity Media  $>5\mu\text{S}/\text{cm}$



Integrated/ Remote version



Compact and rugged (IP65 protection)

**Product  
Datasheet**

# ROCKSENSOR AT A GLANCE (ABOUT US)

Rocksensor is one of the global leaders specializing in Process Instrumentation, Research and Development and Designing of Industrial Automation Equipment. We provide highly precise pressure sensors and transmitters, flow metres, level transmitters and temperature transmitters with a prime focus to help our clients efficiently, safely and economically run complex industrial processes.

Rocksensor, headquartered in Switzerland, has its footprint in various geographical regions such as the US, Russia, South Korea, Italy, Germany, Singapore, Malaysia, Morocco, China, Taiwan, Australia, UAE, Brazil and India. Our clients come from some of the major industries such as Oil and Gas, Petrochemicals, Pharmaceuticals, FMCG, Automobiles, Water, Cement, Metal & Mining, and mainly from the Power Industry like Nuclear, Thermal, Hydro, and Solar.

Rocksensor deals in a wide range of highly accurate industrial automation instruments ensuring that even the complex industrial processes happen efficiently.

To fulfill the needs of our clients we make sure that our instruments work in even the harsh environmental conditions offering accurate recordings and communication.

We, at Rocksensor, believe in creating bonds that last a lifetime and create a success story for each and every client. Rocksensor aims to achieve a perfect fit in the global market landscape and establish our footprints across the globe.



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## 1. Introduction

Suitable for conductive medium with conductivity greater than  $30\mu\text{S}/\text{cm}$ , nominal diameter range is wide, output, using standard RS-485 serial communication interface, support the international standard MODBUS-RTU communication protocol and GPRS and other wireless and wired. Communication networking mode, with cumulative pulse equivalent output. Provide wireless meter reading system (computer management software and database) with remote network access.



**Integrated Type**



**Separate Type**



**Wall-Mounted**



**Non-Wall-Mounted**

## 2. Functional Features

- The measurement multiplicity and linearity of non-constant optimum
- Good reliability and resistance to interference
- Good pressure resistance and sealing
- Low pressure loss measuring tube
- High intellectual energy
- Maintenance free care

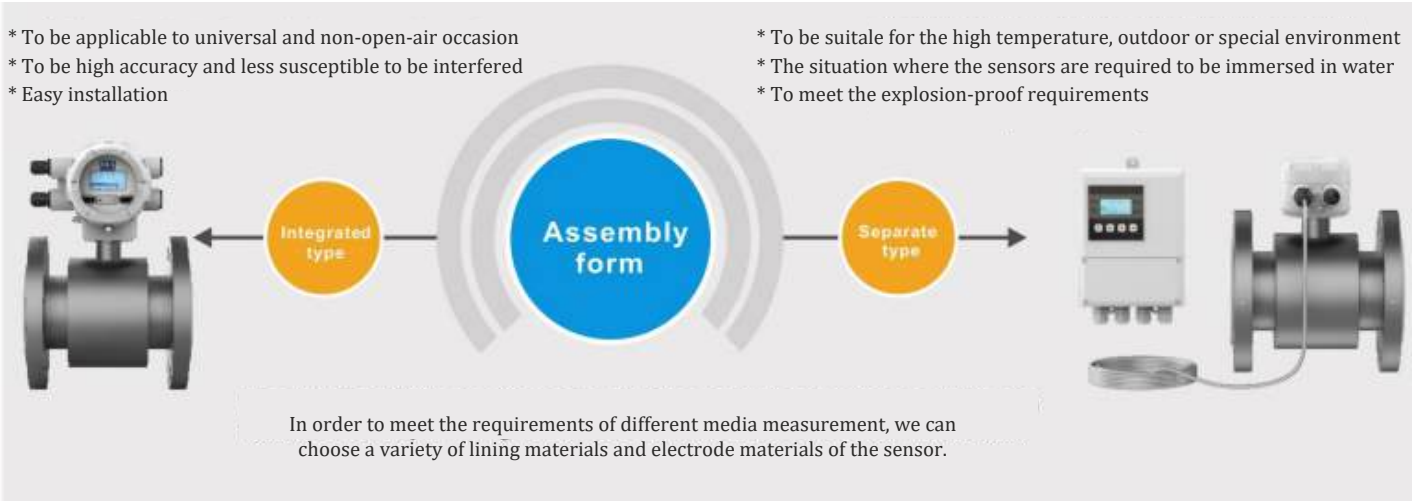
## 3. Industry Applications

Electromagnetic flowmeter is a kind of high precision, high reliability speed flowmeter, widely used in petroleum, chemical industry, steel, food, power, papermaking, water treatment, water supply, heating, environmental protection & other industries

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>● Petroleum</li> <li>● Chemical</li> <li>● Steel</li> <li>● Food</li> </ul> | <ul style="list-style-type: none"> <li>● Electricity</li> <li>● Paper</li> <li>● Water supply</li> </ul> |
|--|--|

## 4. Product Overview

The electromagnetic flowmeter is composed of a sensor and a converter. The sensor is composed of a measuring tube, an electrode, an exciting coil, an iron core and a shell. The converter will flow signal amplification, processing, calculation, can display instantaneous flow, cumulative flow, output pulse, analog current and other signals, used for fluid flow measurement and control. RF3300-E series electromagnetic flowmeter adopts intelligent converter, which not only has measurement, display and other functions, but also supports data transmission, wireless remote control, alarm and other functions.



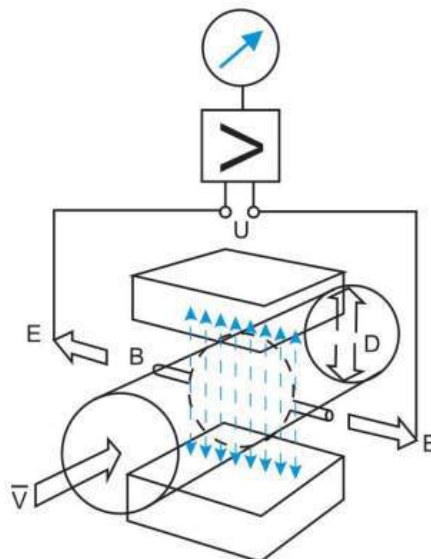
## 5. Working Principle

The working principle of electromagnetic flowmeter is based on Faraday's law of electromagnetic induction. The two electromagnetic coils of upper and lower ends in the right figure generate a constant or alternating magnetic field, and the induced electromotive force can be detected by the space on flow meter wall between two electrodes on the left and right when the conductive medium flows through the electromagnetic flow meter. The induced electromotive force is proportional to the conductive medium velocity, the magnetic flux density of the magnetic field and the conductor width (flow meter tube diameter), then the medium flow can be achieved through operation.

The induced electromotive force process parameters equation:

$$E=KBVD$$

Where: E- induced electromotive force; D- measuring tube diameter; B- magnetic induction intensity; V- average velocity; K- it is a coefficient that relates to the field distribution and axial length



## 6. Technical data

Parameters	Details	
Nominal Diameter	15-2000mm	
Velocity Range	0.5-10m/s	
Degree of accuracy	±0.5%, ±1%R (<DN20), ±0.2% (for >DN25)	
Medium Conductivity	Actual Conductivity≥30μS/cm (Std.), Conductivity>5μS/cm (optional ≤DN150)	
Nominal Pressure	1.0 ~ 4.0MPa	
Environment Temperature	LCD Display	-10°C~+55°C
	OLED Display	-30°C~+55°C
Medium Temperature	<b>Lining</b>	<b>Temperature Limited</b>
	CR	0~80°C
	PTFE	0~120°C
	FEP	0~120°C
	PFA	-10~180°C
	FVMQ	70~250°C
	PU	-20~60°C
Output Signal	4-20mA; Pulse/ Frequency 2KHz(Default), 5KHz(Max)	
Cable Entry Size	M20x1.5 (Standard waterproof connector, optional explosion-proof metal connector)	
Supply Voltage	4-wire Type, 110/220VAC(100-240VAC), 50Hz/60Hz; 24VDC ±10% Power Dissipation= ≤15Va	
Digital Communication	RS-485, Support standard Modbus-RTU protocol	
Signal Electrode and the ground electrode material	SS316L, Hastelloy B, Titanium, Tantalum, Platinum	
Form of electric pole	Interpolation, Extrapolating electrode need to customize	
Number of electrodes	Standard configuration 3-4 electrodes (two measuring electrodes plus a grounding electrode), according to the caliber configuration	
Flange Standard	DIN, ANSI or other	
Connecting flange material	Standard Carbon Steel, SS304/SS316 available as per requirement	
Grounding ring material	Standard Stainless Steel, other options Hastelloy C, Tantalum, Titanium	
	DN15-DN450	Stainless steel 1Cr18Ni9Ti (Ordinary austenitic stainless steel SUS321)
Housing material	Flow Tube: SS304	
	Flange/ Sensor Housing: Standard Carbon Steel, SS304/SS316 available as per requirement	
Level of protection	Separate body-type	IP67, IP68 (with Epoxy seal)
	Integrated type	IP65
Cable length (Separate body-type)	10m standard configuration connecting line, optional 1 ~ 50m	

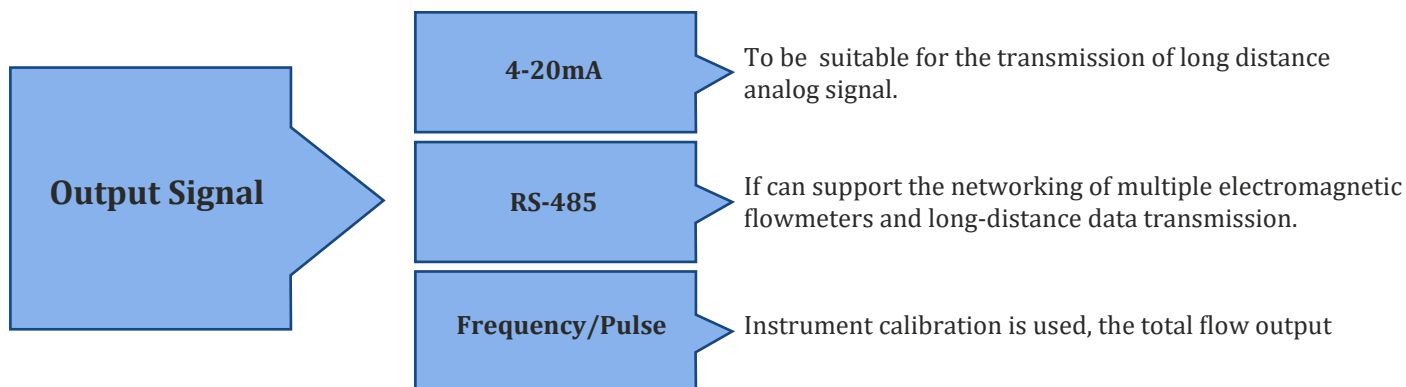


### The selection of electromagnetic flowmeter should be clear as follows:

- (1) The measured medium must be a conductive fluid, for gas, oil, organic solvents and other non-conductive medium can not be measure.
- (2) The measuring range of the electromagnetic flowmeter should be provided to the manufacturer when ordering the model and specification, and the manufacturer should calibrate in the measuring range to ensure the measuring accuracy of the instrument.
- (3) The user shall provide the parameters in the selection table, such as the measured medium, process parameters, flow rate and working temperature and pressure, to the manufacturer, and choose the right flowmeter according to these parameters.
- (4) Optional separate type electromagnetic flow timing, the user according to the converter installation position to the sensor distance, put forward the length of wiring requirements to the factory.
- (5) If the user needs to install accessories, such as supporting flange, metal ring pad, bolts, nuts, washers and other additional requirements, can be put forward when ordering.

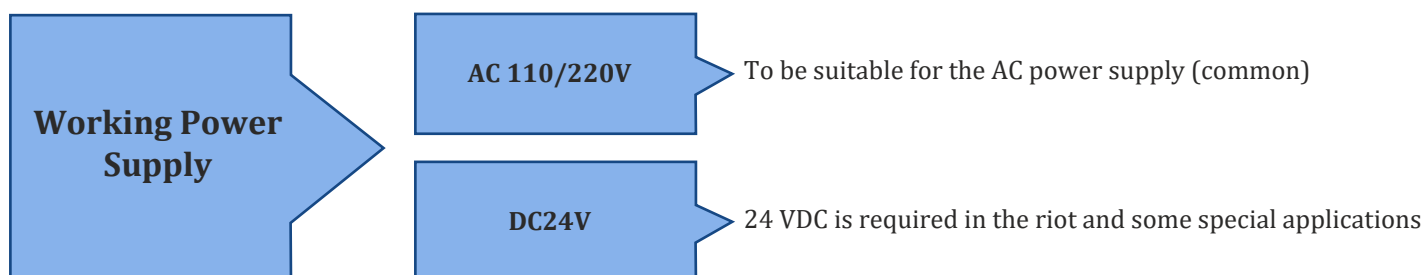
## 7. Output Signal

RF3300-E series electromagnetic flowmeter output signals are 4-20mA, RS-485, Frequency/ Pulse. Users need to select the output signal according to the actual situation and ancillary equipment.



## 8. Working Power Supply

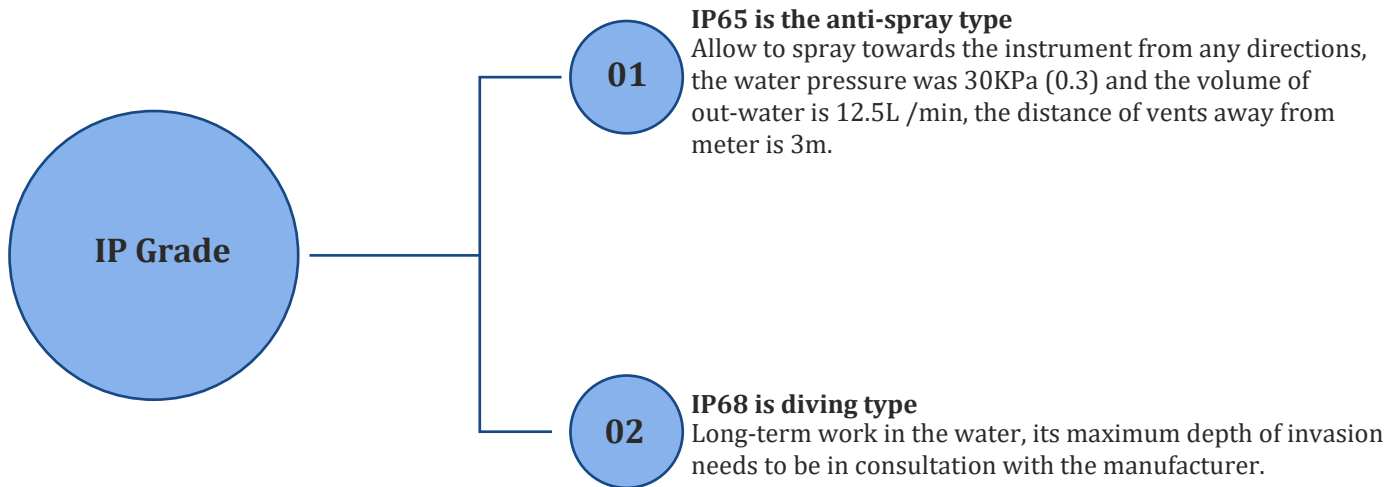
The power supply of RF3300-E series electromagnetic flowmeter has AC 110 / 220V (100-240V), and DC 24V.



## 9. Grounding Option

- Grounding ring is used to ground the process fluid measured so as to improve the stability of electromagnetic flowmeter. There is a possibility of erosion and abrasion since the grounding ring need to touch the process fluid measured. Generally the grounding ring should be changed after being used for a while.
- Instead of using grounding ring, RF3300-E series electromagnetic flowmeter has adopted grounding electrode to increase the convenience and reliability of using, which is already enough for achieving a good result for grounding.
- Some small-bore electromagnetic flowmeters have only got two electrodes. User can choose double grounding ring according to the field needs.
- When installing the grounding ring, it should be put on the right position of the pipe to avoid the influence of fluency of the process fluid measured.

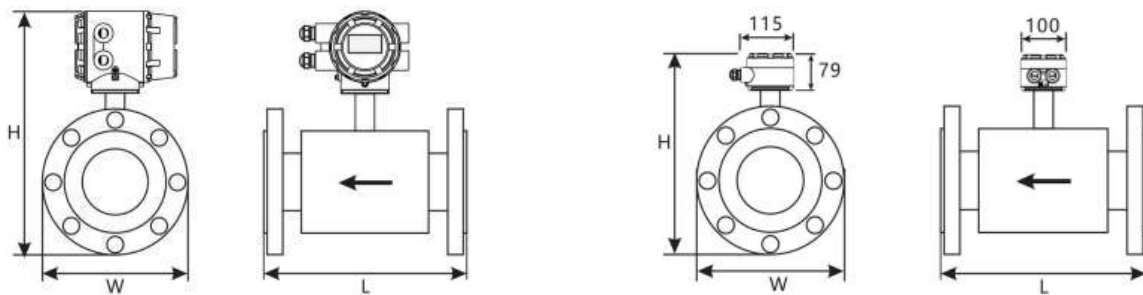
## 10. IP Grade



## 11. Notification of Electromagnetic Flowmeters

- Reducing pipe installation should refer to Electromagnetic Flowmeter installation reducing pipe technical description or electromagnetic flowmeter manual instruction.
- Installation of electromagnetic flowmeters has the appropriate technical requirements which can be seen Electromagnetic flowmeter installation manual instruction.
- The wiring way of electromagnetic flowmeter can be seen electromagnetic flowmeter wiring instructions or electromagnetic flowmeter manual instruction.
- Other matters may consult the supplier.

## 12. Dimensions



Flange type (integrated type)

Flange (separate type)

Caliber (mm)	Size			Weight (kg)
	L	W	H	
15	200	95	315	6
20		105	315	6.5
25		115	315	6.8
32		140	315	7.1
40		150	315	7.6
50		165	320	9.9
65		185	350	10.6
80		200	365	12.3
100	250	220	380	14.7
125		250	410	17.9
150	300	285	440	24.6



Caliber (mm)	Size			Weight (kg)
	L	W	H	
200	350	340	495	32.7
250	450	395	560	43.5
300	500	445	600	58
350	550	505	670	78
400	600	565	720	97
450		615	765	110
500		670	820	122
600		780	930	161
700	700	860	1010	241
800	800	975	1110	420
900	900	1075	1210	541
1000	1000	1175	1310	668
1200	1200	1405	1540	858

Caliber (mm)	Size			Weight (kg)
	L	W	H	
15	200	95	220	5.5
20		105	220	6
25		115	220	6.3
32		140	220	6.6
40		150	220	7.1
50		165	225	9.4
65		185	255	10.1
80		200	275	11.8
100	250	220	285	14.2
125		250	315	17.4
150	300	285	345	24.1
200	350	340	400	32.2
250	450	395	465	43
300	500	445	505	58
350	550	505	575	78
400	600	565	625	97
450		615	670	112
500		670	725	122
600		780	835	161
700	700	860	915	241
800	800	975	1015	420
900	900	1075	1115	541
1000	1000	1175	1215	668
1200	1200	1405	1445	858

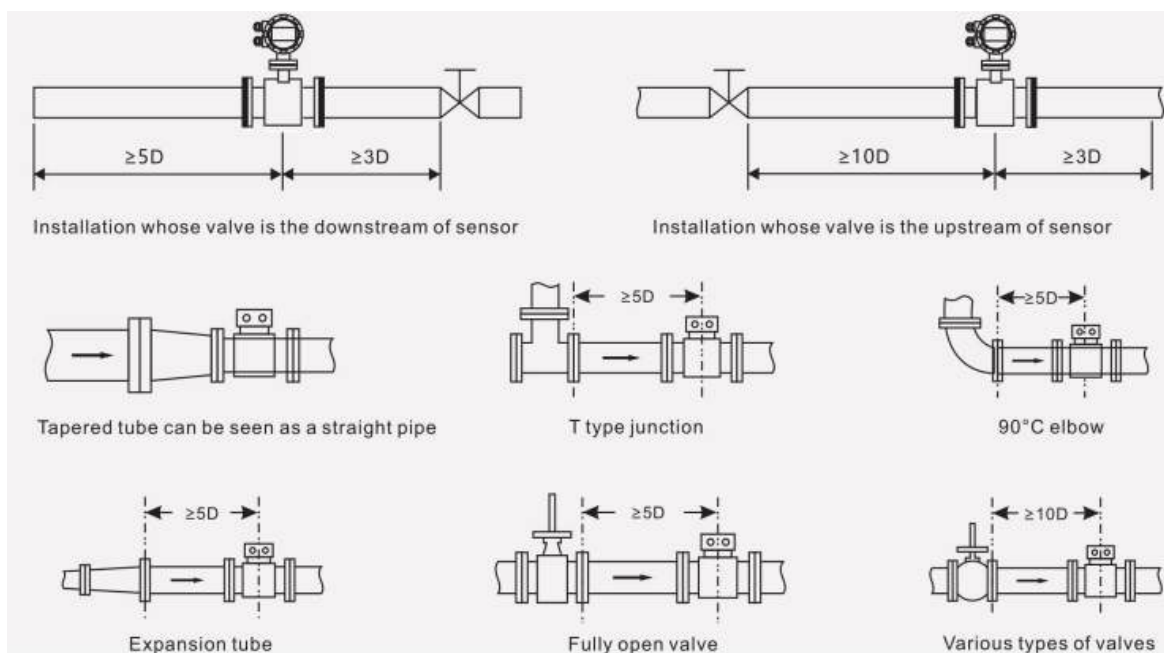
**Note:** Here the size and weight of electromagnetic may differ from the product and it can be standardized according to actual object.

### 13. Flow Range Table

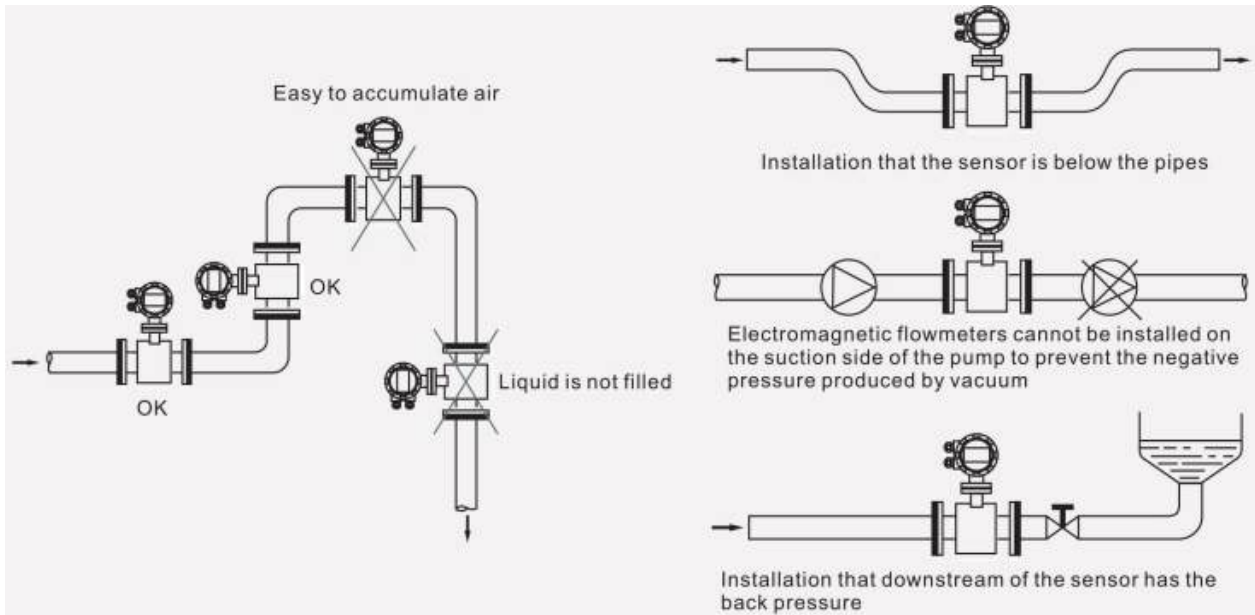
DN	FLOW RATE IN M <sup>3</sup> / H										
	0.5	1	2	3	4	5	6	7	8	9	10
mm	0.5	1	2	3	4	5	6	7	8	9	10
15	0.3	0.6	1.3	1.9	2.5	3.2	3.8	4.5	5.1	5.7	6.4
20	0.6	1.1	2.3	3.4	4.5	5.7	6.8	7.9	9	10.2	11.3
25	0.9	1.8	3.5	5.3	7.1	8.8	10.6	12.4	14.1	15.9	17.7
32	1.4	2.9	5.8	8.7	11.6	14.5	17.4	20.3	23.2	26.1	29
40	2.3	4.5	9	13.6	18.1	22.6	27.1	31.7	36.2	40.7	45.2
50	3.5	7.1	14.1	21.2	28.3	35.3	42.4	49.5	56.5	63.6	70.7
65	6	11.9	23.9	35.8	47.8	59.7	71.7	83.6	95.6	107.5	119.5
80	9	18.1	36.2	54.3	72.4	90.5	108.6	126.7	144.8	162.9	181
100	14.1	28.3	56.5	84.8	113.1	141.4	169.6	197.9	226.2	254.5	282.7
125	22.1	44.2	88.4	132.5	176.1	220.9	265.1	309.2	353.4	397.6	441.8
150	31.8	63.6	127.2	190.8	254.5	318.1	381.7	445.3	508.9	572.5	636.2
200	56.5	113.1	226.2	339.3	452.4	565.5	678.6	791.7	904.8	1017.9	1131
250	88.4	176.7	353.4	530.1	706.9	883.6	1060.3	1237	1413.7	1590.4	1767.1
300	127.2	254.5	508.9	763.4	1017.9	1272.3	1526.8	1781.3	2035.7	2290.2	2544.7
350	173.2	346.4	692.7	1039.1	1385.4	1731.8	2078.1	2424.5	2770.9	3117.2	3463.6
400	226.2	452.4	904.8	1357.2	1809.5	2261.9	2714.3	3166.7	3619.1	4071.5	4523.8
450	286.3	572.5	1145.1	1717.6	2290.2	2862.7	3435.3	4007.8	4580.4	5152.9	5725.5
500	353.4	706.9	1413.7	2120.6	2827.4	3534.3	4241.1	4948	5654.8	6361.7	7068.5
600	508.9	1018	2036	3054	4071	5089	6107	7125	8143	9161	10179
700	692.7	1385	2771	4156	5542	6927	8313	9698	11083	12469	13854
760	816.6	1633	3266	4899	6532	8166	9799	11432	13065	14698	16331
800	904.8	1810	3619	5429	7238	9048	10857	12667	14476	16286	18095
900	1145.1	2290	4580	6871	9161	11451	13741	16031	18322	20612	22902
1000	1413.7	2827	5655	8482	11310	14137	16964	19792	22619	25447	28274
1200	2035.7	4071	8143	12214	16286	20357	24429	28500	32572	36643	40715

### 14. Installation

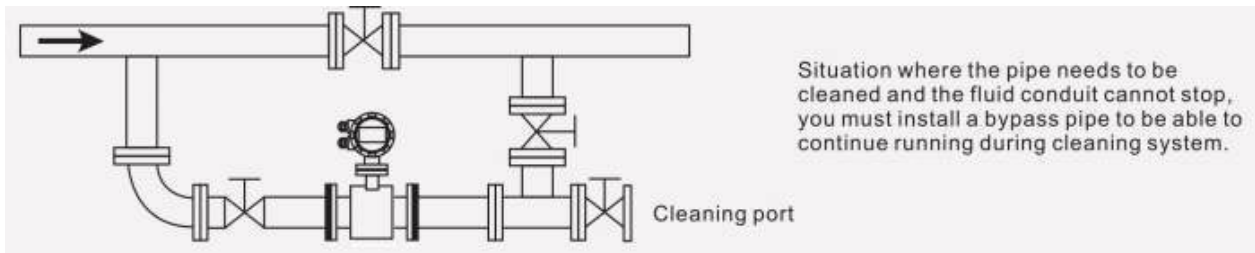
#### Straight pipe length requirements



Recommended mounting position



The connection which is easy to clean pipe

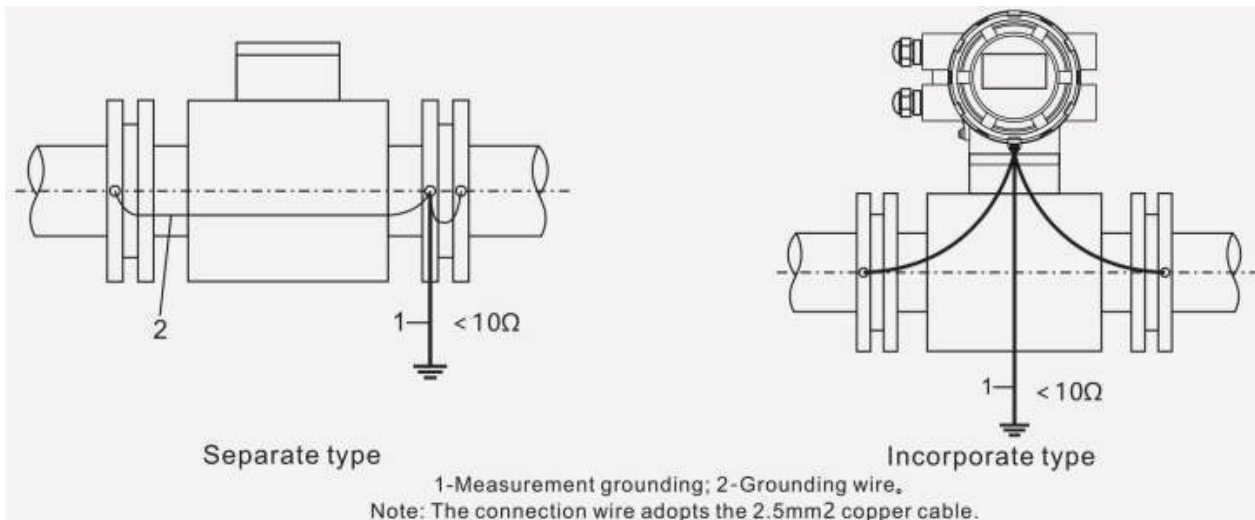


15. Grounding

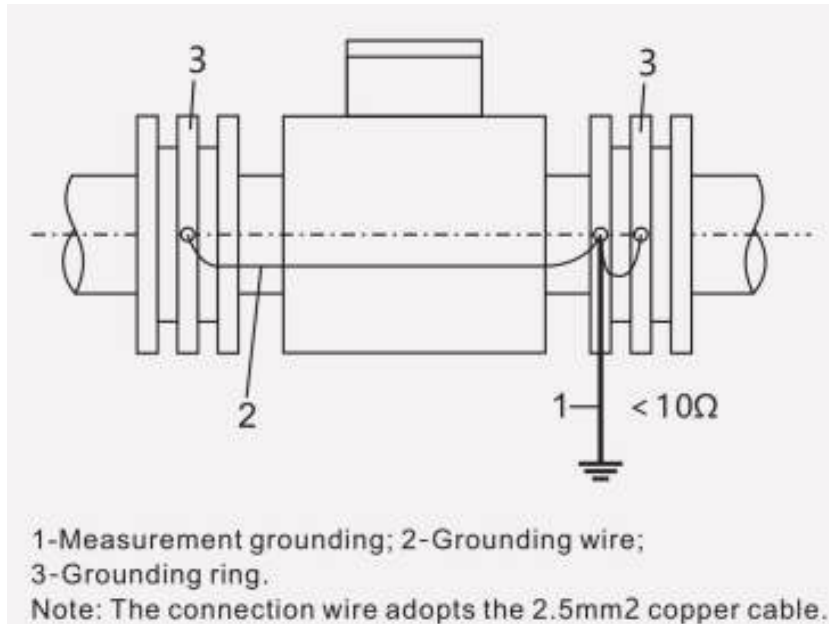
Electromagnetic flowmeter sensor should be well grounded, the measuring accuracy of flowmeter depends on the grounding effect in a considerable extent.

Sensor grounding at different installation situation

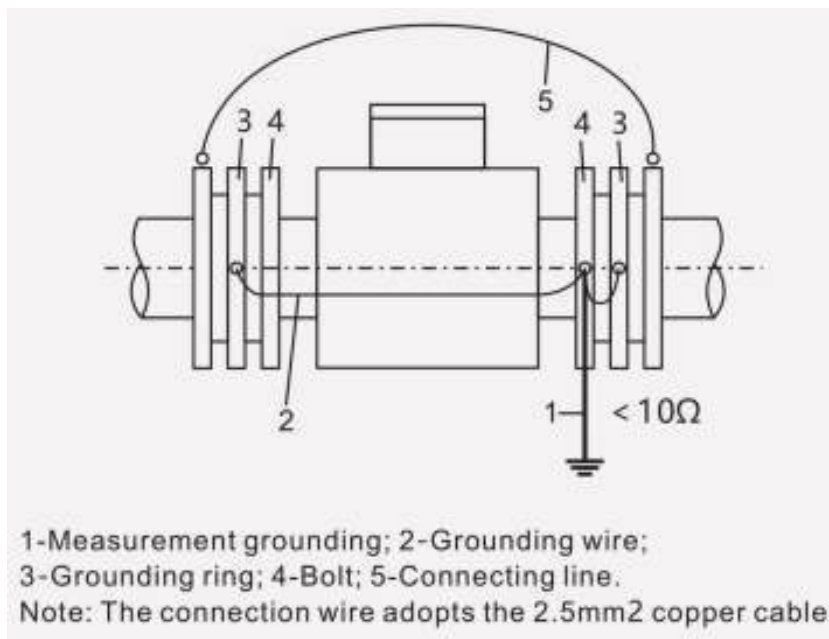
1. Grounding that sensor mounted on metal pipe.



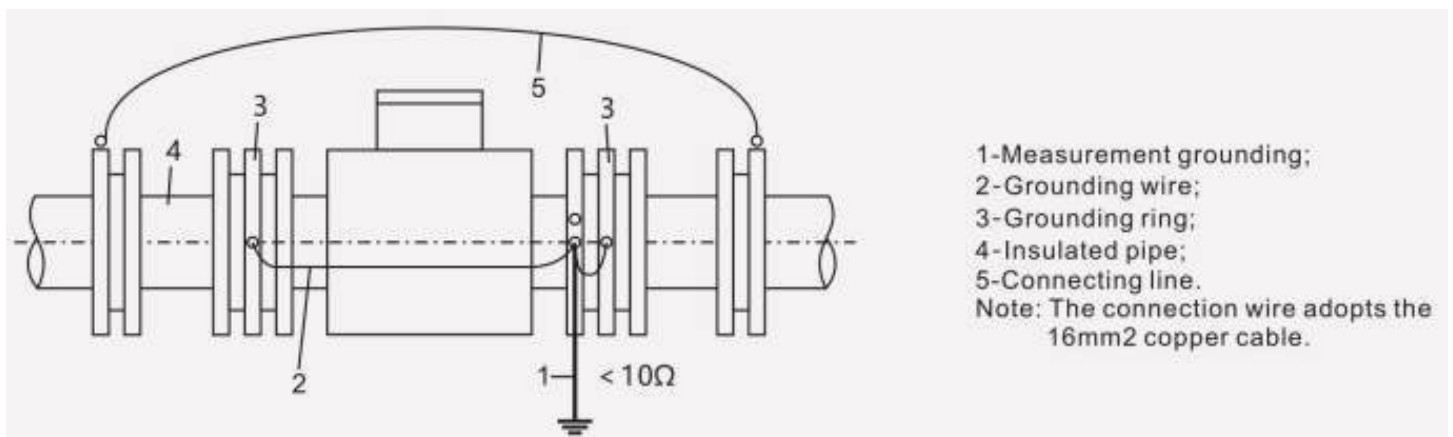
2. Grounding that the sensor mounted on the insulating pipes



3. Grounding that the sensor installed on the cathodic protection pipe



4. The sensor in installed in the pipeline stray strong current place



### 13. Model Selection Table

RF3300-E		Intelligent Electromagnetic Flowmeter																											
Code		1	2	3	4	5	6	7	8	9	10	11	12	13	14														
<b>Diameter</b>		10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, ....., 1400																											
<b>Transmitter</b>		<table border="1"> <tr> <td>Integrated</td> <td>S</td> </tr> <tr> <td>Remote (10m Cable)</td> <td>L</td> </tr> </table>														Integrated	S	Remote (10m Cable)	L										
Integrated	S																												
Remote (10m Cable)	L																												
<b>Electrode Material</b>		<table border="1"> <tr> <td>SS316L</td> <td>M</td> </tr> <tr> <td>Ti titanium</td> <td>T</td> </tr> <tr> <td>Ta Tantalum</td> <td>D</td> </tr> <tr> <td>Hastelloy</td> <td>H</td> </tr> <tr> <td>Pt platinum</td> <td>P</td> </tr> <tr> <td>Ni nickel</td> <td>N</td> </tr> <tr> <td>Customised</td> <td>X</td> </tr> </table>														SS316L	M	Ti titanium	T	Ta Tantalum	D	Hastelloy	H	Pt platinum	P	Ni nickel	N	Customised	X
SS316L	M																												
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Ta Tantalum	D																												
Hastelloy	H																												
Pt platinum	P																												
Ni nickel	N																												
Customised	X																												
<b>Output</b>		<table border="1"> <tr> <td>None</td> <td>0</td> </tr> <tr> <td>4 - 20 mA /1 - 5KHz</td> <td>1</td> </tr> <tr> <td>4 - 20mA</td> <td>2</td> </tr> </table>														None	0	4 - 20 mA /1 - 5KHz	1	4 - 20mA	2								
None	0																												
4 - 20 mA /1 - 5KHz	1																												
4 - 20mA	2																												
<b>Lining</b>		<table border="1"> <tr> <td>PFA</td> <td>A</td> </tr> <tr> <td>Rubber</td> <td>X</td> </tr> <tr> <td>Teflon</td> <td>F</td> </tr> <tr> <td>Polyethylene</td> <td>P</td> </tr> <tr> <td>Polyurethane rubber</td> <td>J</td> </tr> <tr> <td>Customised</td> <td>X</td> </tr> </table>														PFA	A	Rubber	X	Teflon	F	Polyethylene	P	Polyurethane rubber	J	Customised	X		
PFA	A																												
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Customised	X																												
<b>Display</b>		<table border="1"> <tr> <td>None</td> <td>0</td> </tr> <tr> <td>Display</td> <td>1</td> </tr> </table>														None	0	Display	1										
None	0																												
Display	1																												
<b>Communication</b>		<table border="1"> <tr> <td>No communication</td> <td>0</td> </tr> <tr> <td>RS-232</td> <td>2</td> </tr> <tr> <td>RS-485/ MODBUS</td> <td>3</td> </tr> <tr> <td>HART</td> <td>4</td> </tr> </table>														No communication	0	RS-232	2	RS-485/ MODBUS	3	HART	4						
No communication	0																												
RS-232	2																												
RS-485/ MODBUS	3																												
HART	4																												
<b>Explosionproof option</b>		<table border="1"> <tr> <td>N</td> <td>None (Standard)</td> </tr> <tr> <td>1</td> <td>Flameproof Exd</td> </tr> <tr> <td>2</td> <td>Intrinsic Safe Exia</td> </tr> </table>														N	None (Standard)	1	Flameproof Exd	2	Intrinsic Safe Exia								
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1	Flameproof Exd																												
2	Intrinsic Safe Exia																												
<b>Ingress Protection</b>		<table border="1"> <tr> <td>1</td> <td>IP65</td> </tr> <tr> <td>2</td> <td>IP67 (Remote)</td> </tr> <tr> <td>3</td> <td>IP68 (Remote)</td> </tr> </table>														1	IP65	2	IP67 (Remote)	3	IP68 (Remote)								
1	IP65																												
2	IP67 (Remote)																												
3	IP68 (Remote)																												
<b>Flange Material</b>		<table border="1"> <tr> <td>C</td> <td>Carbon Steel</td> </tr> <tr> <td>S1</td> <td>SS304</td> </tr> <tr> <td>S2</td> <td>SS316</td> </tr> <tr> <td>X</td> <td>Customised</td> </tr> </table>														C	Carbon Steel	S1	SS304	S2	SS316	X	Customised						
C	Carbon Steel																												
S1	SS304																												
S2	SS316																												
X	Customised																												
<b>Process Connection</b>		<table border="1"> <tr> <td>F</td> <td>Flange</td> </tr> <tr> <td>T</td> <td>Thread</td> </tr> <tr> <td>I</td> <td>Insertion</td> </tr> </table>														F	Flange	T	Thread	I	Insertion								
F	Flange																												
T	Thread																												
I	Insertion																												
<b>Body Material</b>		<table border="1"> <tr> <td>C</td> <td>Carbon Steel</td> </tr> <tr> <td>S1</td> <td>SS304</td> </tr> <tr> <td>S2</td> <td>SS316</td> </tr> <tr> <td>X</td> <td>Customised</td> </tr> </table>														C	Carbon Steel	S1	SS304	S2	SS316	X	Customised						
C	Carbon Steel																												
S1	SS304																												
S2	SS316																												
X	Customised																												
<b>Power supply</b>		<table border="1"> <tr> <td>1</td> <td>24VDC</td> </tr> <tr> <td>2</td> <td>220VAC</td> </tr> </table>														1	24VDC	2	220VAC										
1	24VDC																												
2	220VAC																												
<b>Ground loop</b>		<table border="1"> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>1</td> <td>With ground ring</td> </tr> <tr> <td>2</td> <td>With ground electrode</td> </tr> </table>														0	None	1	With ground ring	2	With ground electrode								
0	None																												
1	With ground ring																												
2	With ground electrode																												

## Field Instrumentation Range



### Pressure Measurement

- Smart Differential Pressure Transmitter
- Smart Gauge Pressure Transmitter
- Smart Absolute Pressure Transmitter
- Miniature Pressure Transducer without display
- Sanitary Gauge/ Absolute Pressure Transmitter

- Submersible Pressure Transmitter
- Remote Seal Differential P.T. with capillary
- Remote Seal Differential P.T. Direct Mount
- Remote Seal Gauge/Absolute P.T. with capillary
- Remote Seal Gauge/Absolute P.T. Direct Mount



### Flow Measurement

- Coriolis Mass Flowmeter
- Thermal Gas Mass Flowmeter
- Positive Displacement Flowmeter
- Electromagnetic Flowmeter
- Vortex Flowmeter

- Turbine Flowmeter
- Variable Area Flowmeter
- Clamp On Ultrasonic Flowmeter
- Inline Ultrasonic Flowmeter
- Portable Ultrasonic Flowmeter



### Level Measurement

- RADAR Level Transmitter Horn Antenna
- Compact RADAR Level Transmitter
- RADAR Level Transmitter Sanitary
- RADAR Level Transmitter
- Guided Wave RADAR Level Transmitter
- Guided Wave RADAR Level Transmitter
- RADAR Level Transmitter Lens Antenna

- RADAR Level Transmitter Rod Antenna
- Ultrasonic Level Transmitter
- Microwave Barrier Level Switch
- Admittance Level Switch Series
- Vibrating Rod Level Switch Series
- Tuning Fork Level Switch Series



### Temperature Measurement

- Head Mount Temperature Transmitter
- Temperature Transmitter for Sanitary Applications

- DIN Rail Temperature Transmitter
- Field Mount Temperature Transmitter

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