

ELECTROMAGNETIC FLOWMETER

HEF Series

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1. SUMMARY

1.1 Features

- Measurement is not affected by the variation of flow density, viscosity, temperature, pressure and conductivity. High accuracy measurement is guaranteed according to the linear measurement principle.
- No obstacle in the pipe, no pressure-loss and lower requirement for straight pipeline.
- DN10 to DN1000 covers a wide range of pipe size. A variety of liners and electrodes are available to satisfy different flow characteristic.
- Programmable low frequency square wave field excitation, improving measurement stability and reducing power consumption.
- Implementing 16 bits MCU, providing high integration and accuracy; Full-digital processing, high noise resistance and reliable measurement; Flow measurement range up to 1500:1.
- High definition LCD display with backlight.
- RS485 interface supports digital communication.
- Intelligent empty pipe detection and electrodes resistance measurement diagnosing empty pipe and electrodes contamination accurately.
- SMD component and surface mount technology (SMT) are implemented to improve the reliability.

1.2 Main Applications

PROFLOW electromagnetic flowmeter can be used to measure the volume flow of conductive fluid in a closed pipeline. It is widely applied in the flow measurement and control in the fields of chemical and petroleum industry, metallurgy industry, water and waste water, agriculture and irrigation, paper making, food and beverage industry and pharmaceutical industry.

1.3 Ambient Conditions

Ambient temperature: sensor: -25°C to + 60°C; converter: -25°C to + 60°C.

Relative humidity: 5% to 90%;

1.4 Working Conditions

Maximum fluid temperature:

Compact type: 60°C

Remote type: Teflon 150°C

Neoprene 80°C; 120°C

Polyurethane 70°C

Fluid conductivity: ≥ 5 S/cm

2. Working Principles

Measuring Principles

The measuring principle of electromagnetic flowmeter is based on the electromagnetic induction law of Farady. The sensor is mainly composed of measuring tube with isolate lining, a pair of electrodes installed by penetration of the measuring tube wall, a pair of coils and iron core to produce working magnetic field. When the conductive fluid flows through the measuring tube of the sensor, the voltage signal in direct proportion to the average flow velocity of the fluid will be induced on the electrodes. The signal is amplified and treated by the transmitter to realize various display functions.

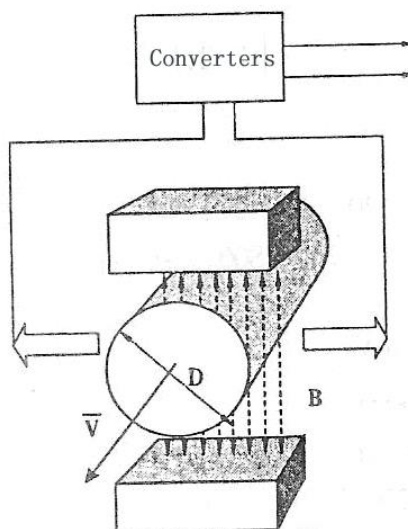


Figure one: Principle of Electromagnetic Flowmeter

3. Product Classification

3.1 Product components

Electromagnetic flowmeter is composed of sensor and converter. The remote-type also needs a special double-layer shielded cable to connect the converter and the sensor.

3.2 Product models

PROFLOW electromagnetic flow meter has two forms: compact-type and remote-type. There are seven kinds of electrode materials and four kinds of lining materials available for sensor.

Model Code Selection Table:

Code No.	Meter Type		
HEF SERIE	Integrated Type Electromagnetic Flow Meter		
Code No.	Nominal Diameter	HEF SERIE	
10	DN10mm	•	
15	DN15mm	•	
20	DN20mm	•	
25	DN25mm	•	
32	DN32mm	•	
40	DN40mm	•	
50	DN50mm	•	
...	...	•	
150	DN150mm	•	
200	DN200mm	•	
250	DN250mm	•	
300	DN300mm	•	
...	...	•	
1000	DN1000mm	•	

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Code No.	Power Supply	HEF SERIE	
A	85V~265V AC	•	
D	DC 24V	•	
Code No.	Nominal Pressure	HEF SERIE	
Y1	6Bar	DN10~DN1000	
Y2	10Bar	DN10~DN600	
Y3	16Bar	DN10~DN150	
Y5	40Bar	DN10~DN50	
Code No.	Communication Output	HEF SERIE	
M	4~20mA.DC	•	
C	Pulse + 4-20mA	•	
T	RS485 MODBUS RTU	•	
A	4~20mA + RS485 MODBUS protocol	•	
Code No.	Lining Materials	HEF SERIE	
X2	Soft rubber	•	
X3	Polychloroprene rubber	•	
X4	Polyurethane rubber	•	
X5	Teflon	•	
X6	F46 poly perfluoro ethylene ally	•	
Code No.	Electrode Materials	HEF SERIE	
B1	Stainless steel containing molybdenum	•	
B2	Hastelloy B alloy (HB)	•	
B3	Hastelloy C alloy (HC)	•	
B4	Titanium Ti	•	
B5	Tantalum Ta	•	
B6	Platinum Pt	•	
Code No.	The Sensor Housing And Flange Materials		
F1	Carbon steel	•	
F2	Stainless steel	•	
Code No.	Electronic Meter Protection Grade (Optional)		
P1	IP65	•	
Code No.	Sensor Shell Protection Grade (Optional)		
P2	IP67	•	
P3	IP68	•	
Code No.	The Grounding Ring (Optional)		
R	Three-electrode Type (Equal to ground ring)	•	
Code No.	Explosion Proof Type (Optional)		
E	Explosion proof type(24v.DC)	○	

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Note: "●" on behalf of optional, "○" is mean not optional.

Specifications Of Flow Span and Dimension

DN(mm)	MPa	Flow range (m ³ /h)	Mounting dimensions (mm)				(Kg)
		Flow velocity 0.03~12m/s	L	D	D _o	n*Φa	
10	4.0	0.006~7.5	200	90	60	4Φ14	8
15		0.007~9.5	200	95	65	4Φ14	9
20		0.015~16.9	200	105	75	4Φ14	11
25		0.02~26.5	200	115	85	4Φ14	13
32		0.04~46.5	200	140	100	4Φ18	14
40		0.05~67.8	200	150	110	4Φ18	15
50		0.08~106	200	165	125	4Φ18	16
65	1.6/2.5	0.12~179	200	185	145	4Φ18	24
80		0.2~270	200	200	160	8Φ18	28
100		0.3~420	250	220	180	8Φ18	30
125		0.45~630	250	250	210	8Φ18	35
150		0.65~950	300	285	240	8Φ22	40
200	1.0	1.2~1690	350	340	295	8Φ22	45
250		1.8~2650	400	395	350	12Φ23	50
300		2.55~3817	500	445	400	12Φ23	60
350		3.5~5195	500	505	460	16Φ23	145
400		4.53~6785	600	565	515	16Φ26	180
450		5.73~8580	600	615	565	16Φ26	215
500		7.1~10602	600	670	620	20Φ26	245
600		10.2~15268	600	780	725	20Φ30	335
700	0.6	13.9~20780	700	895	840	24Φ30	435
800		18.1~27140	800	1015	950	24Φ35	545
900		22.9~34350	900	1115	1050	28Φ35	655
1000		28.3~42410	1000	1230	1160	28Φ35	810

Flange standard: in line with the international GB9116-88 and DIN2501 or according to user's demand.

1. flow range need to be adjusted according to the user, If users don't make any special explanation, it will be produced according to standard flow production.
2. if users have other special requirements, in the selection it must be marked.

4. TECHNICAL SPECIFICATION

4.1 The flowmeter is compliant to Standard “JB/T 9248-1999 Electromagnetic Flow Meter”.

4.2 Span of flow speed: 0.03~12m/s

4.3 DN size: 10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000

4.4 Accuracy: 0.5%

4.5 Nominal Pressure: 4.0MPa(DN10-50)
1.6MPa(DN65-150)
1.0MPa(DN200-600)
0.6MPa(DN700-1000)
Or other specified by order

4.6 Materials

Electrode Forms and Materials:

Electrode design has four forms: standard form, scraper form, detachable form and grounding electrode.

Electrode material is selectable from stainless steel containing Mo, stainless steel coated with carbonized tungsten, Hastelloy B, Hastelloy C, Titanium, Tantalum and platinum-iridium alloy.

Flange material: carbon steel

Grounding ring: stainless steel

Inlet protection ring: carbon steel, stainless steel

4.7 Enclosure

IP65: standard type

IP67: By Customized.

IP68: only available for remote-type sensor with neoprene or polyurethane liner, not including flameproof model.

4.8 Flameproof Standard

DN10-DN600 compact-type: md II BT4

DN10-DN1000 remote-type: sensor and converter both installed in dangerous area: md II BT4.

DN10-DN1000 remote-type: sensor installed in dangerous area and converter installed in safe area: md II BT4

4.9 Connection Cable

Special cable is needed to connect the sensor and the converter for remote-type flowmeter. The cable length should not exceed 100 meters. A 10-meter cable is supplied free of charge and the rest is to be ordered.

4.10 General Specification of Converter

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- Power supply: AC 85-265V, 45-63Hz, $\leq 15W$; DC 24V(18-36V)
- Converter display and operation: four keys are available to set all parameters. External handheld or PC can be used to do the configuration. High resolution LCD display with backlight, empty pipe detection and self-diagnostic function are equipped in the converter.
- Digital communication: RS485MODBUS,REMOTE Optional
- Output Signals:
 - Current output: fully-isolated, 4-20mA/0-10mA
load resistance: 0-10mA: 0-1.5K Ω ; 4-20mA: 0-750 Ω .

- Frequency output: bidirectional flow output. Frequency output is proportional to the flow percentage of the full range. The converter provides fully isolated transistor open collector frequency output ranged from 1 to 5000 Hz. The external DC power supply should not exceed 30V and maximum collector current is 250mA.

- Pulse output: bidirectional flow output. The converter can output up to 5000cp/s pulse series, which is dedicated to external totalization. Pulse factor is defined as volume or mass per pulse. It can be set to 0.001L/p, 0.01L/p, 0.1L/p, 1L/p, 2L/p, 5L/p, 10L/p, 100L/p, 1m³/p, 10 m³/p, 100 m³/p or 1000 m³/p. Pulse width is selectable from auto, 10ms, 20ms, 50ms, 100ms, 150ms, 200ms, 250ms, 300ms, 350ms and 400ms. Photo-coupler isolated transistor open collector circuit is used for pulse output. The external DC power supply should not exceed 35V and maximum collector current is 250mA.

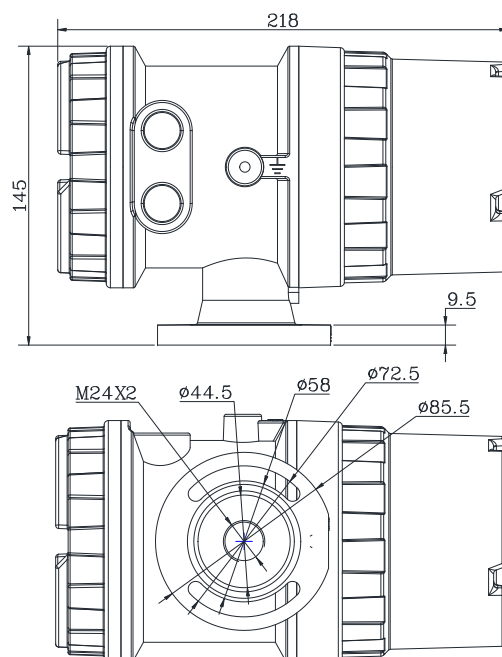
- Flow direction indication: The converter is capable of measuring both forward and reverse flow and recognizing its direction. The converter outputs 0V low level for forward flow, while +12V high level for reverse flow.

- Alarm output: Two channels of photo-coupler isolated open collector circuit are used for alarm signal output. There are two alarm outputs: high limit alarm and low limit alarm. The external DC power supply should not exceed 35V and maximum collector current is 250mA.

- Damping constant: Damping time is selectable from 0.1 to 99.9s.

5. APPEARANCE AND INSTALLATION

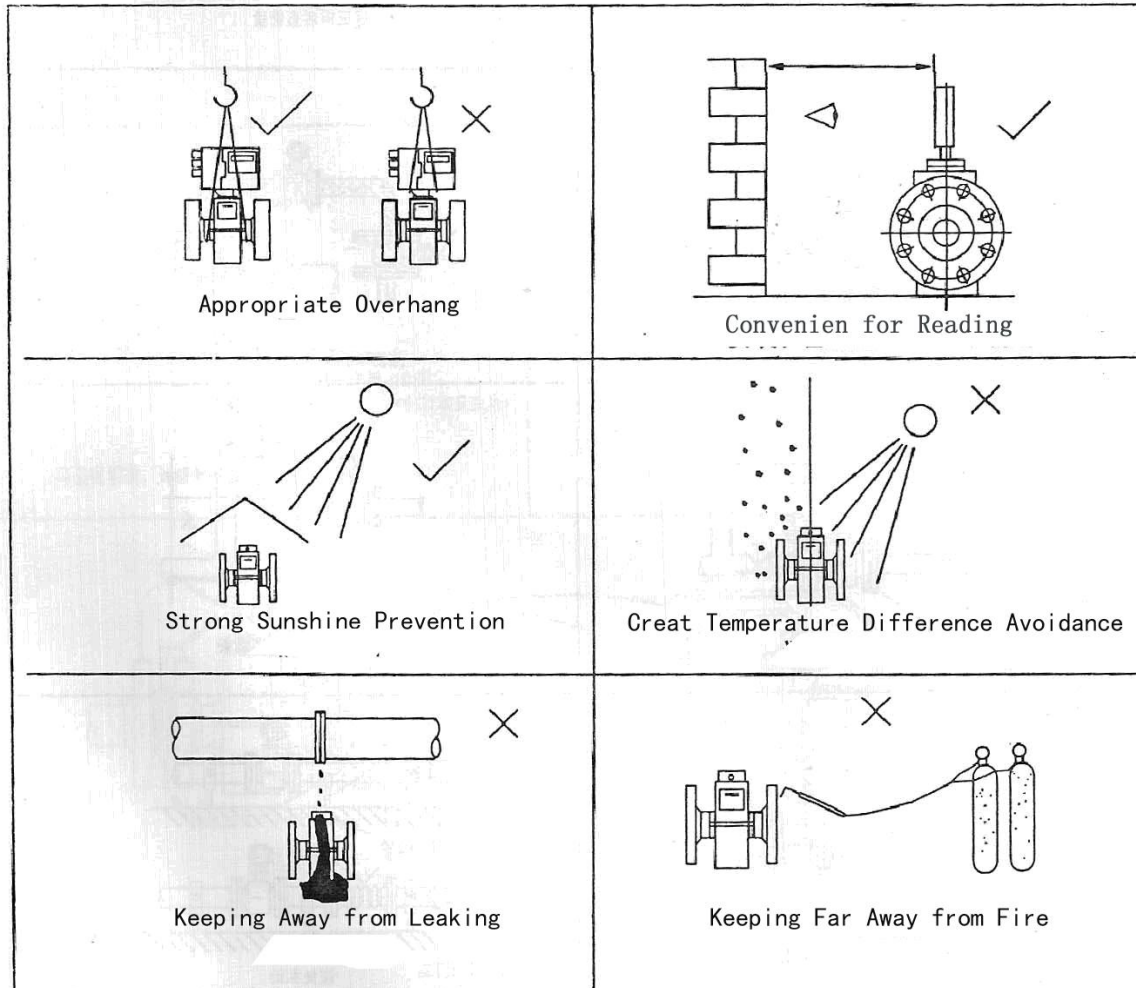
Dimensions of Converter



PROFLOW

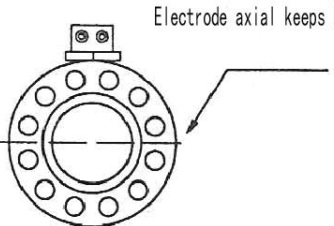
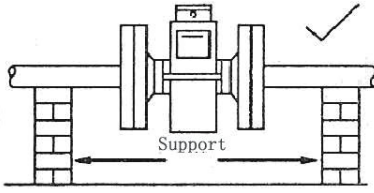
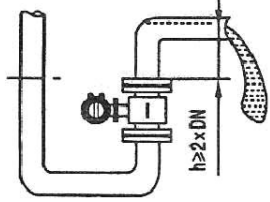
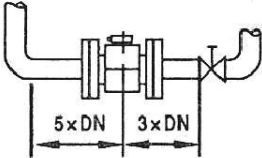
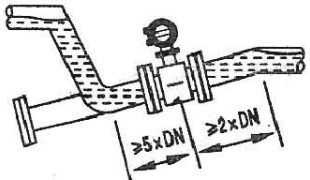
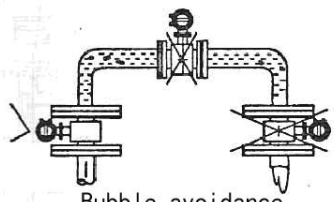
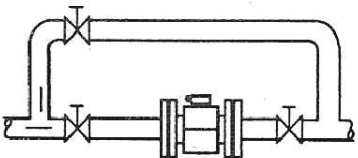
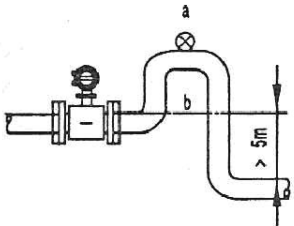
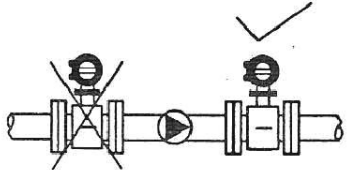
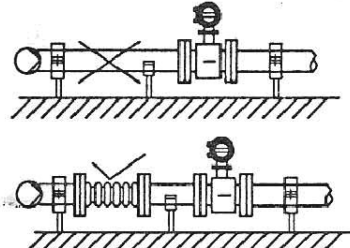
6. INSTALLATION

The installation of flowmeter is shown as Fig below.



The correct installation flowmeter

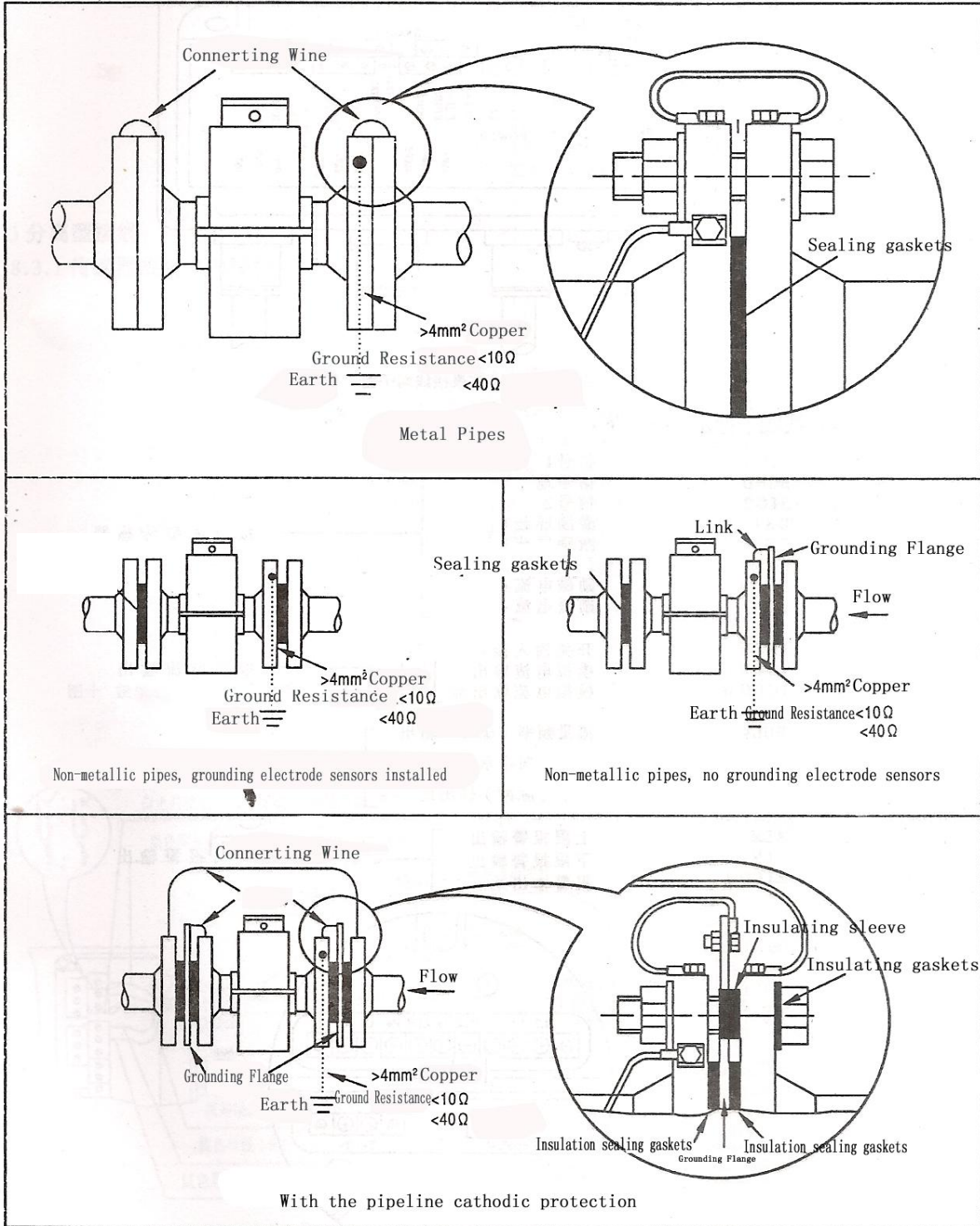
PROFLOW

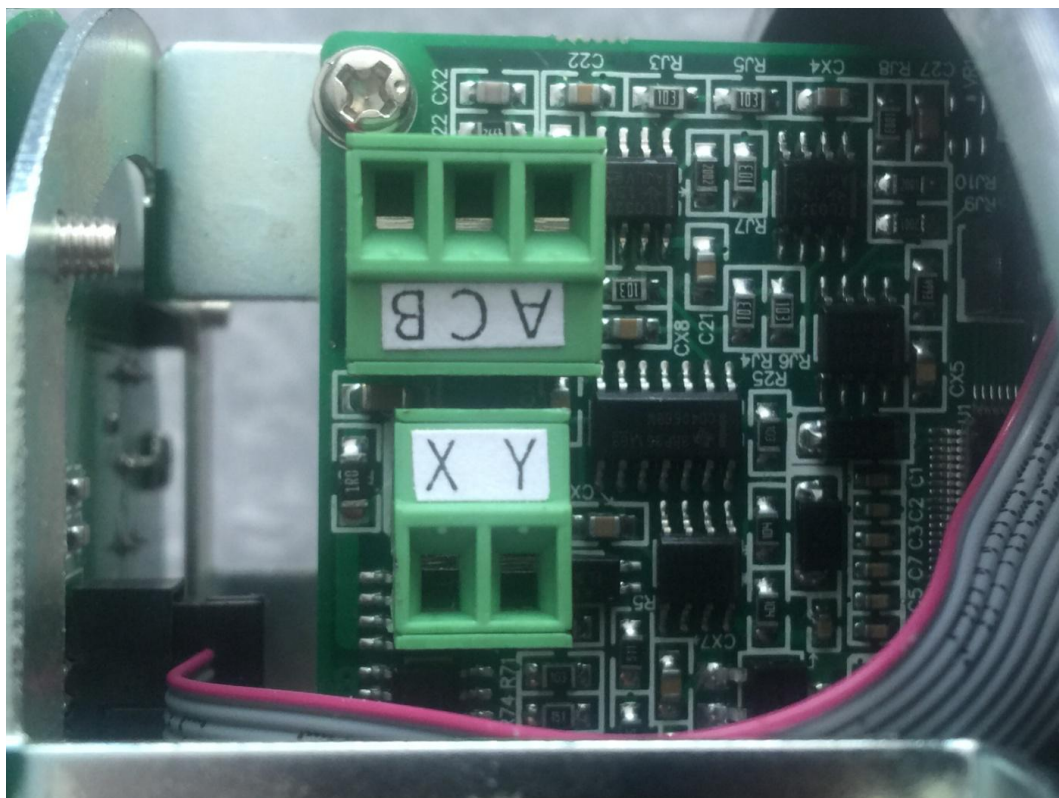
 <p>Electrode axial keeps horizontal</p> <p>Level Installation</p>	 <p>Reasonable Support</p>
 <p>Full of Pipe</p>	 <p>Ensure the Requir. of the Straight Pipe section</p>
 <p>Measurement for the Precipitable</p>	 <p>Bubble avoidance</p>
 <p>Easy to Maintenance and Clean-up</p>	 <p>Negative Pressure and Non-filled pipe Avoidance</p>
 <p>Not Installed in Front of the Inlet of Pump</p>	 <p>Strong Shake Avoidance</p>

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7. WIRING

7.1 GROUDING





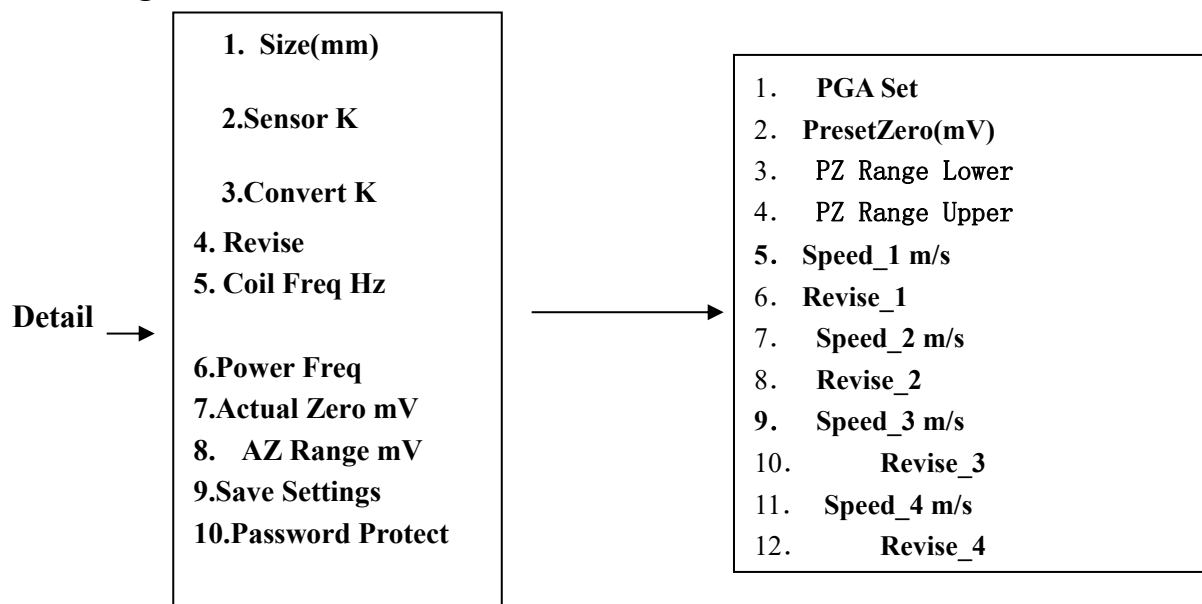
Warning: when connecting the signal of the sensor, it is absolutely forbidden to mix the signal line A, B, C and the excitation X, Y signal line. If the wrong connection occurs, it will cause permanent damage to the converter!

NO.	Label	Function	Remarks
1	X	Excitation drive X	Loading resistance:10~100Ω
2	Y	Excitation drive Y	
3	A	Input Signal A	
4	C	Input Signal COM Port	
5	B	Input Signal B	

Installation of electromagnetic flow transmitter

The installation principle of electromagnetic flow transmitter is as follows: when used as a complete set of explosion-proof type flow meter, the flow meter must comply with the national explosion-proof standard GB 3836.1-2010, part 1, electrical equipment for explosive gas environment. General requirements and GB 3836.2-2010 electrical equipment for explosive environment; Part 2: the explosion-proof performance test of the whole machine is conducted according to the relevant requirements of the explosion-proof type "d". The electrical connection shall meet its requirements.

Detailed configuration menu structure



Note: This interface only appears when the flowmeter performs flow detection. It should be automatically hidden after pressing the “↑” button and then returning to the measurement state after performing the “Save Factory Settings” operations. When the interface is used for the flow verification of the flowmeter, the zero point value of the flowmeter and the instantaneous flow rate of the flowmeter are monitored.

Warning: The instantaneous flow corresponding voltage value of the meter should not exceed 1200mV at the maximum flow rate.

Quick Handbook for Electromagnetic Flow Transmitters

1 power supply terminal diagram:

Warning !

When accessing the power leads, Please strictly distinguish between 220VAC and 24V/DC.

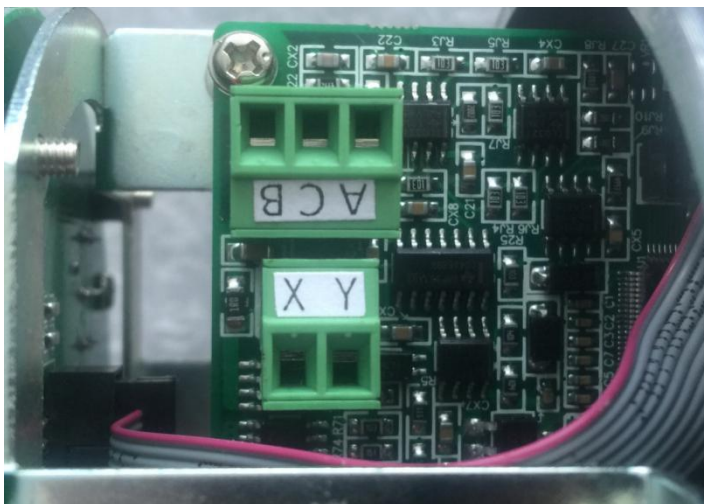
It is absolutely forbidden to connect the power supply to the signal output terminal, otherwise it may cause permanent damage to the instrument!

Serious warning: When connecting the power cord, please confirm the power type. It is absolutely forbidden to connect the AC power to the DC converter. If the wrong wiring occurs, it will cause permanent damage to the converter!

Power supply terminal description

No.	Mark	Function	Remarks
L	L	AC 85~265v power supply	L is AC220v power supply
N	N	AC 85~265v power supply	N is AC220v power supply
+	+	DC 18~36v power supply+	power supply 24v+
-	-	DC 18~36v power supply -	power supply 24v-

2. Connection of excitation signal and input signal:



Pay attention to

Warning: When the signal of the sensor is connected, the signal line A B C and the excitation X Y signal line are absolutely prohibited to be mixed. If the wrong wiring occurs, the converter will be permanently damaged!

2.1 Turn off the power when connecting the input and output signal lines!

2.2 Please pay attention to the polarity of the connecting cable when connecting X and Y!

2.3 Please also pay attention to the polarity of the cable when connecting the measuring electrode signal cable!

Output terminal description

No.	Mark	Function	Remarks
1	+	4~20mA +	Load resistance $\leq 500\Omega$, when Hart communication, use external 24vDC power supply
2	-	4~20mA -	
3	+	Frequency or pulse output +	Frequency or pulse output amplitude is +24v, load current $\leq 50\text{mA}$
4	-	Frequency or pulse output -	
5	+	RS-485 Data +	
6	-	RS-485 Data -	