Electro-Magnetic Flow Meter

Operation Manual

CATALOG

1. Product Function Specification

1.1 Base Function

Implementation Ftandards

《JJG-1033-2007 electromagnetic flowmeter》。

Suitable to Size of the Sensor (mm）:

1，2，3、6、8，10、15、20、25、32、40、50、65、80、100、125、150、200、250、300、350、400、450、500、600、650，700、800、900、1000、1100，1200、1300，1400、1500，1600、1700，1800、2000、2200、2400、2600、2800、3000

Power Supply

Power supply：**85VAC --- 265VAC** or or **110vac to 420vac** or **24vdc**

The Velocity Range:

0.02 - 15 m / s, velocity resolution: 0.5 mm / sec

Requirement For Sensor And Excitation (AC and DC power supply type)

Excitation current can be set to 125mA、160mA、250mA

250mA excitation current is suitable to the resistance of two coil：35~ 65Ω；

125mA excitation current is suitable to the resistance of two coil：65 ~ 120Ω

excitation frequency：25Hz，12.5Hz，6.25Hz，3.125Hz

Empty-Pipe Check And Full-Pipe Check

Automatic & continuous measure the condition of liquid and diplay the empty pipe and full pipe message.

do not need the full -pipe calibration and Avoid false alarm

Output Signal (AC and DC power supply type)

Current output: 4 to 20mA,load;resistance：0～750Ω,Base deviation：0.1%±10μA。

Frequency output: Frequency range is 100 ～ 5000Hz；Photoelectric isolation, isolation voltage： > 1000VDC；

Pulse equivalent output: user defined pulse width,automatic conversion to square wave at high requency

;Photoelectric isolation, isolation voltage：> 1000VDC；

Alarm Output

Alarm output contact：**H-ALM** and **L-ALM ；** Photoelectric isolation, isolation voltage： > 1000VDC；Output driver：Maximum withstand voltage 36VDC, maximum load current 30mA.

Communcation

Communication ： RS485 (standard)

MODBUS interface：RTU format，Physical interface：RS-485，Electrical isolation：1000V；

Language And LCD Dispaly

English ,With LCD,display flow rate , total flow , velocity etc

three internal accumulator, record positive total flow and reverse total flow and net total

Nonlinear Correction Function：Multi segment linear correction,suitable to variety of sensors

Automatic Zero Calibration Function

Quick Response, Response time of 0.3 seconds

Electrode Self-Cleaning Function

Protection

with lightning protection circuit design. High efficiency anti interference circuit, suitable for all kinds of harsh .
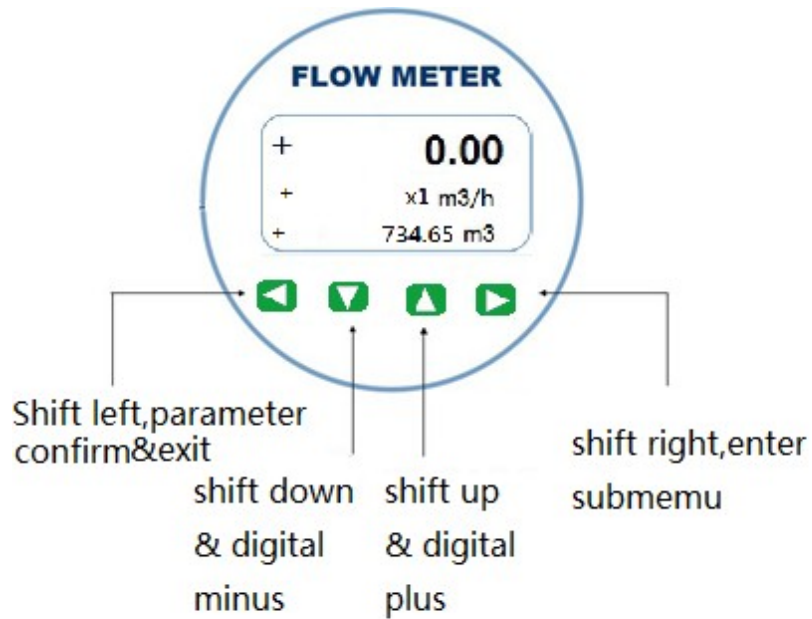
Grade of Protection: IP65 or IP68

1.2 Working conditions

Ambient temperature： – 20 ～ +65℃；Relative humidity：5% ～ 90%；Power: less than 10W (after

connecting the sensor).

2. Flowmeter Operation And Parameter Setting

2.1 Keyboard Definition and Display

2.2 Flowmeter Menu Structure

Main Menu			
Flow Rate			Flow Unit
Total Flow			Flow Decimal
Calibration		4mA Calibration	Flow Range
Communication		20mA Calibration	Flow Direct Ctrl
Factory Setup	Pipe Size		Flow Direct Rev
	Zero Calibration		Flow Cutoff
	Zero Value	Modbus Format	Flow Stable 1
	Sensor K	Device ID	Flow Stable 2
	Freq&Puls-Output	Data Bit	Flow Stable Coeff
	Alarm Setup	Baudrate	
	Exci Freq Sel	Check Mode	
	Linear Compensat		Total Unit
	Password Setup		Clear Total
	Language		PosTotal Preset
			NegTotal Preset

2.3 Flowmeter Parameter Description

● **Instantaneous flow rate setting**

Flow Unit	Optional: m³/h m³/m m³/s L/h L/m L/s Default： m³/h Define the flow unit of in display.
Flow Decimal	Optional： 0 1 2 3 Default： 2 Define the decimal of flow in display
Flow Range	Float： 99999999.00-0.00 m³/h Default： 100.0 m³/h When instant flow reaches this value,then the current equals to 20mA When this value chaned,current & flow alarm(high,low) will change
Flow Direct Ctrl	Optional: Bi.Dir Only Forward Only Backward Default： Bi.Dir When "Bi.Dir" Choosed, flow value can be positive and negagive When "Only Forward" Choosed,flow value can only be more than or equals to 0.The reverse flow will be 0. When "Only Backward" Choosed, flow value can only be less than or equals to 0.The forward flow will be 0.
Flow Direct Rev	Optional： Not Reversed Default： Not When "Not" Chossed,Keep the current flow value. When "Reversed" Choosed, the current flow value will be inversed.
Flow Cutoff	Float: 99.0 – 0.00 % Default： 0.5 % When the instant flow (absolute) is less than "flow range * this percent",the flow value will be 0.
Flow Stable 1	Float： "Flow Stable 2" - 0 Default： 16 When the flow is NOT stable,Turn up this value.We do not advice you turn this value bigger than 30.
Flow Stable 2	Float： 1000 – "Flow Stable 1" Default： 80 When the flow is NOT stable,Turn up this value till it is bigger the the biggest value in the third line.We do not advice you turn this value bigger than 200.

Flow Stable Coef	Float：60 - 0 Default：30 When fast response needed,turn this value smaller.

- **Total Flow Setup**：Define the relevant parameters of the total flow

Total Unit	Optional: m³ L Default： m³ Define the total unit in display.
Clear Total	Input the correct password to clear total.**Password:**951021
PosTotal Preset	Float：9999999999 – 0.00 m³ Default： The current positive total. **Note:** Need password(951021) When Setup,the current positive total will be covered.
NegTotal Preset	Float：9999999999 – 0.00 m³ Default： The current negative total. **Note:** Need password(951021) When Setup,the current negative total will be covered.

- **Calibration**

4mA Calibration	Float：5.0 – 3.0 Default： 4.0 Change this value with the value in the multimeter which measures the current of 4-20mA **Till** the value in the multimeter is 4.00mA.
20mA Calibration	Float：21.0 – 19.0 Default： 20.0 Change this value with the value in the multimeter which measures the current of 4-20mA **Till** the value in the multimeter is 20.00mA.

- **Communcation Setup**

Modbus Format	Optional: Modbus-RTU Modbus-ASCII Default： Modbus-RTU
Device ID	Number: 247 – 1 Default： 1
Data Bit	Readonly. Displayed "8" when in " Modbus-RTU "mode, "7" when in " Modbus-ASCII " mode.

Baudrate	Optional: 1200 2400 4800 9600 19200 38400 Default： 9600
Check Mode	Optional: None Even， Odd Default： None **Note:** When "Modbus-ASCII" Choosed,"None" can not be set.

● **Factory Parameter Setup： Password 951021**

Pipe Size	Optional: 1 1.5 2 3 6 8 10 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400 450 500 600 650 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 2000 2200 2400 2600 2800 3000 mm Default： 50 mm
Zero Calibration	Optional: Yes No Default： No When perform this function,you **MUST** insure the pipe filled with the stationary medium.
Zero Value	Note:if the value is on the high side,please check the sensor and connected cable,When "zero calibration" executed.
Sensor K	Float： 9.9000 - 0.0100 Default： 1
Freq&Puls-Output	See Freq & pulse setup
Alarm Setup	See alarm setup
Exci Freq Sel	Optional: 25Hz 12.5Hz 6.25Hz 3.125Hz Default： 6.25Hz

Linear Compensat	1，V-Compensate-m/s：Default value is 2. This parameter determines the upper limit of Unlinear compensate. 2，V-Compensate-mV：Default 0.0mV Formula： V-Compensate-mV =（Calibrated meter - Standard meter）/ Standard meter * the mV value (press "▲" 5 times at the flow display and it will appear in the last line) .
Password Setup	Setup the password of "Factory Setup"
Language	Setup the language

- **Freq and pulse equivalent output**

Freq Or PulseOut	Optional：Freq Pulse Equivlent Default： Freq When "Freq" choosed，output is freq. When " Pulse Equivlent " choosed，output is pulse equivlent.
Freq Range	Float：5000.0 - 1.0 Hz Default： 2000.0 Freq(output)(Hz)=(instant flow(m³/h) / Flow Range(m³/h) * Freq Range(Hz)
Pulse Equiv Unit	Optional：L m³ Default： L When "L" choosed, one pulse means n(=Pulse Equiv Val) L. When "m³" choosed, one pulse means n(=Pulse Equiv Val) m³.
Pulse Equiv Val	Float：59.99 – 0.001 Default： 1.0 See " Pulse Equiv Unit ".
Pulse Width（ms）	Float：500.0 – 0.1 ms Default： 0.25 **Note:** Do not exceed 500.
Pulse Level	Optional：Low High Default： High

- **Alarm Setup**

Alarm EmptyEnabl	Optional：Enable Disable Default： Enable When "Enable" choosed, the empty check will work. When "Disable" choosed, the the empty-full state is FULL pipe.
EmptyThreshld Up	Integer： 10000 – "EmptyThreshld Dn" Default： 5750 When the reference value(in the 3rd line) betweens the " EmptyThreshld Dn" and " EmptyThreshld Dn ",the empty-full state is empty.
EmptyThreshld Dn	Integer： "EmptyThreshld Up" - 0 Default： 3500 When the reference value(in the 3rd line) betweens the " EmptyThreshld Dn" and " EmptyThreshld Dn ",the empty-full state is empty.
Alarm Flow High	Float： 99.00 – 1.00 % Default： 99.0 % When the instant flow(absoulte) is bigger than "flow range * this percent",Alarm high is output. Note:This Value MUST bigger than " Alarm Flow Low".
Alarm Flow Low	Float： 99.00 – 0.00 % Default： 0.0 When the instant flow(absoulte) is less than "flow range * this percent",Alarm low is output. Note:This Value MUST less than " Alarm Flow High".

3. Wiring Diagram And Output Define

3.1 Integral Type Wiring Diagram (AC and DC Power Supply Type)

Pulse or requency meter
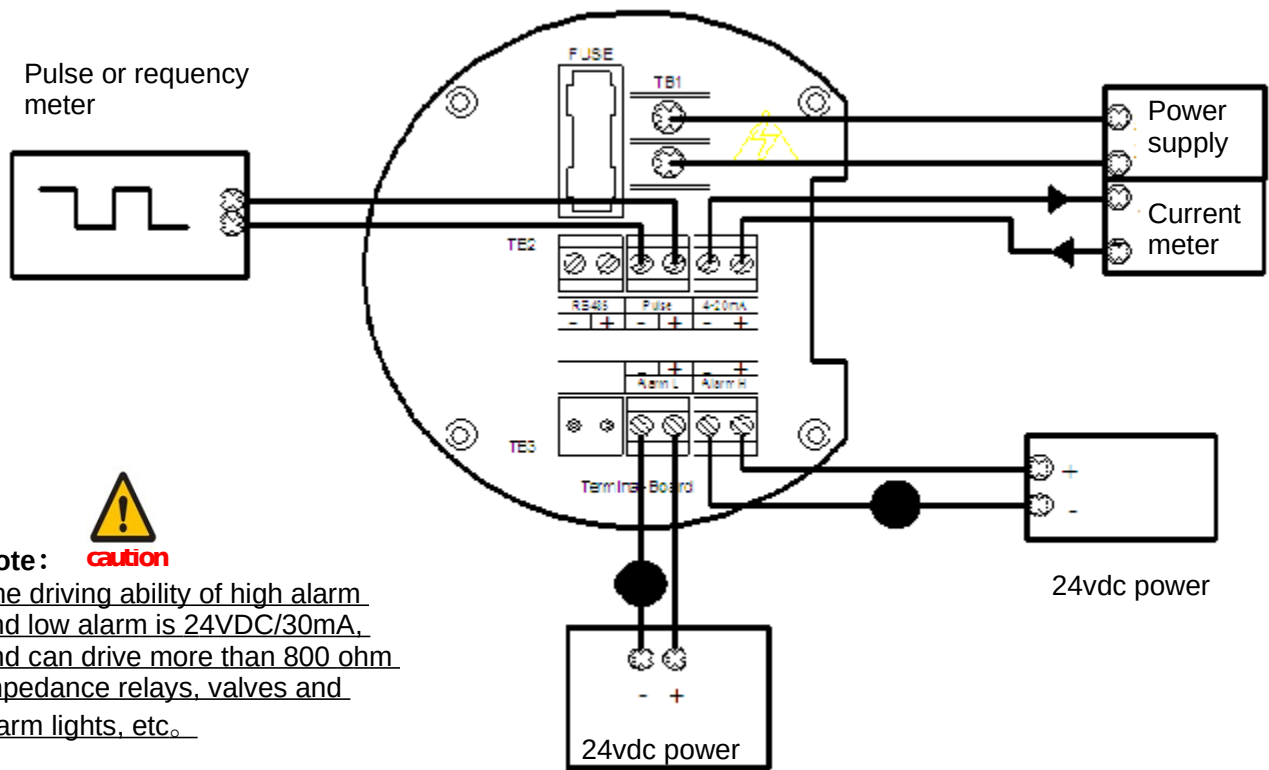
Note： **caution**
The driving ability of high alarm and low alarm is 24VDC/30mA, and can drive more than 800 ohm impedance relays, valves and alarm lights, etc。

Power supply

Current meter

24vdc power

24vdc power

The meaning of each terminal is as follows

Identification		Funcation	Remarks
L		AC 85 - 265V	L : AC220V power supply (Fire line)
N		AC 85 - 265V	N : AC220V power supply (Zero line)
24V		DC 18 - 36V **+**	Power supply 24V+
COM		DC 18~36v **-**	Power supply 24V-
4-20mA	**+**	4~20Ma **+**	The load resistance is less than or equal
	-	4~20mA **-**	to 500.ohm
Pulse	**+**	Frequency & pulse output **+**	
	-	Frequency & pulse output **-**	
RS485	**+**	RS485 **+**	RS485 output
	-	RS485 **-**	
Alarm H	**+**	High alarm output **+**	
	-	High alarm output **-**	Suggest use 24VDC intermediate
Alarm L	**+**	Low alarm output **+**	relay, Load current ≤ 30mA
	-	low alarm output **-**	

caution **:** √ 4 to 20mA current output is with Internal 24vdc voltage. Then external voltage is prohibited from providing this terminal。If the voltage is supplied to current terminal , then without current output。

√ pulse output is NPN mode.

3.2 Separate Type Wiring Diagram (AC and DC Power Supply Type)
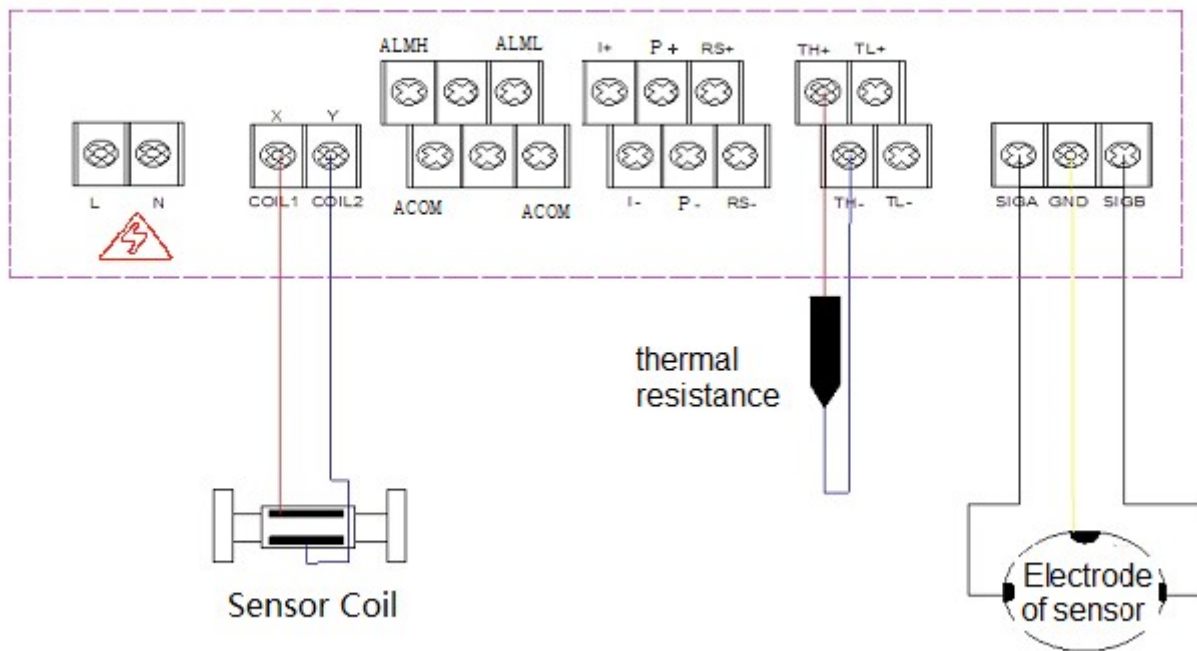
Identification	Funcation	Remarks
L	AC 85~265V	L: AC 86-220V fire line
PE		
N	AC 85~265V	N : AC 86-220V zero line
24V	DC 16~36V **+**	24VDC+ power supply
Com	DC 16~36V **-**	24VDC- power supply
I**+**	4~20mA output	The load resistance is less than or equal to 500 ohm
I**-**	4~20mAoutput	
F**+**	Frequency&pulse output **+**	
F**-**	Frequency&pulse output **-**	
RS**+**	RS485 **+**	RS485 output terminal
RS**-**	RS485 **-**	
TH **+**	Pt100 or Pt1000	Connect to inlet temperature sensor
TH **-**		
TL**+**	Pt100 or Pt1000	Connect to outlet temperature sensor
TL **-**		
coil1 (X)	connecting to excitation coil of sensor。	
coil2 (Y)		
SIGA	electrode A	Connect to signal electrode A
GND	Signal ground	Connect to the grounding electrode
SIGB	electrode B	Connect to Signal electrode B

3.3 Connection Between Transmitter And Sensor

Connect to coil of sensor
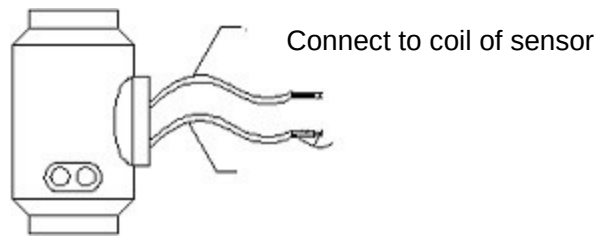
two core line (connect to the coil of sensor, three core wire with shield connection to the electrode of sensor .

3.4 Frequency Output Mode：

Frequency output range is 0 to 5000HZ, the frequency output corresponds to the percentage of flowrate.

$$F = \frac{Flow\ Rate}{Flow\ Range} \times Upper\ Frequency\ Limit$$

Frequency output mode is generally used to control the occasion, because it reflects the percentage of traffic, if the user is used for measurement occasions, it should choose the pulse output mode。

The frequency output is provided with an internal 24VDC power supply and NPN way。

If you need use the frequency output mode , then three parameters must setup:

- **Setup " Freq Or PulseOut " to freq**
- **Setup "freq range"**
- **Setup "flow range" (corresponding to freq range)**

3.5 Pulse Equivalent Output Mode：

Pulse equivalent value：0.001L, 0.01L, 0.1L, 1L etc。 The user should pay attention to the matching of the flow range and the pulse equivalent when selecting the pulse equivalent。 If the flowrate is too large and the pulse equivalent selection is too small, it will cause the upper limit of the pulse output, so the pulse output frequency should be limited to the following 2000Hz. If the flowrate is small and the pulse equivalent is too large, it will cause the meter to output a pulse for a long time。 In addition, it must be explained that the pulse output is different with the frequency output, the pulse output is a pulse equivalent to output a pulse, therefore, the pulse output is not very uniform. The general measurement of the pulse should use the counter meter, not choose the frequency meter.

Note: Pulse Equivlent ONLY support POSITIVE total flow.

The pulse output is provided with an internal 24VDC power supply and NPN way。

If you need use the pulse equivalent output mode , then three parameters must setup:

- **Setup " Freq Or PulseOut " to pulse equivalent**
- **Setup "Pulse Equiv Unit "**
- **Setup "Pulse Equiv Val"**

3.6 Analog Output Mode（4-20mA）

The current output corresponds to the percentage of instantaneous flow。 The current output is provided with an internal 24VDC power supply.。

$$I_0 = \frac{Flow\ Rate}{Flow\ Range} \times 16 + 4.0$$

For 4 ~ 20mA signal system, the current zero is 4mA. Therefore, in order to improve the resolution of the output analog current, the flow range of the flowmeter should be selected properly.

4. Key Points of Attention

4.1 Installation

The flow meter is installed correctly on the pipe to ensure the straight pipe section and the installation position and the grounding to meet the requirements，as shown in the following figure：

straight length：5×D   straight length：3×D

Grounding resistance less than 10 ohm

Inet
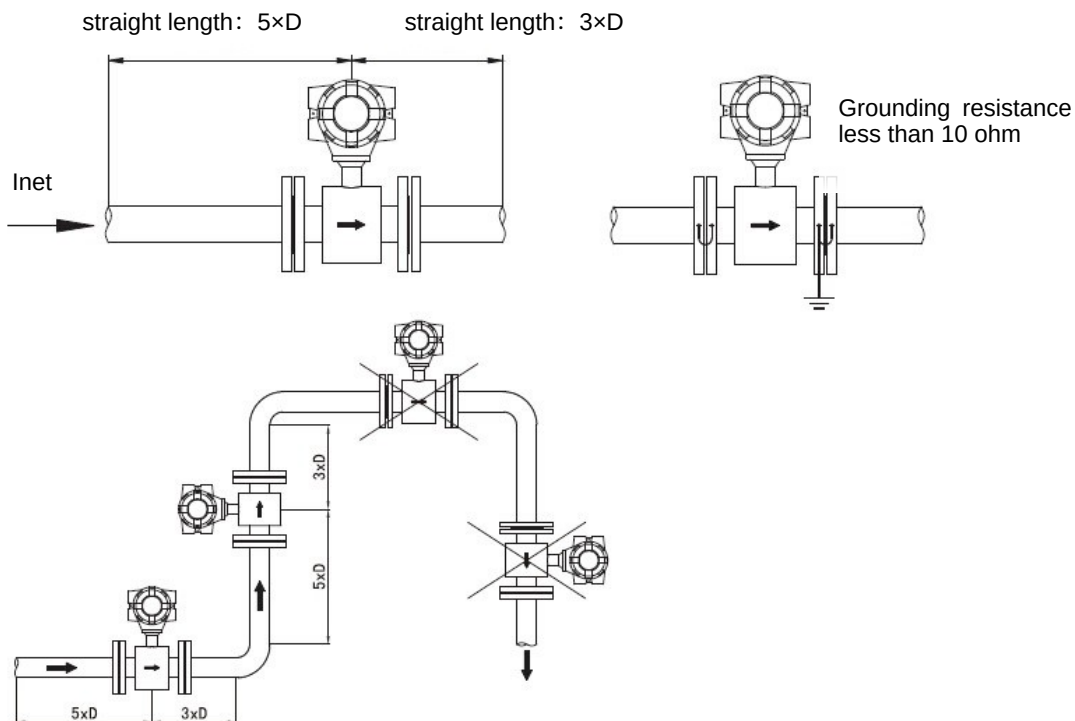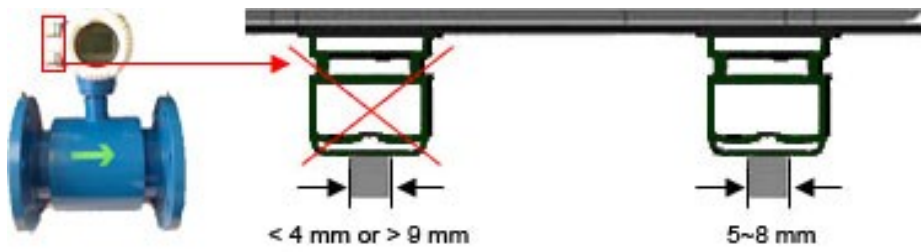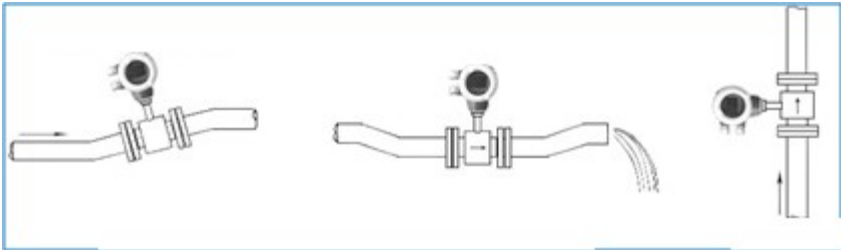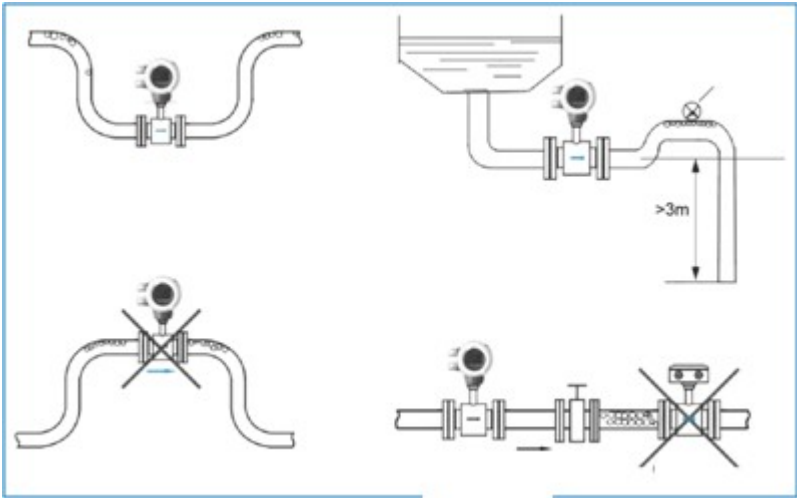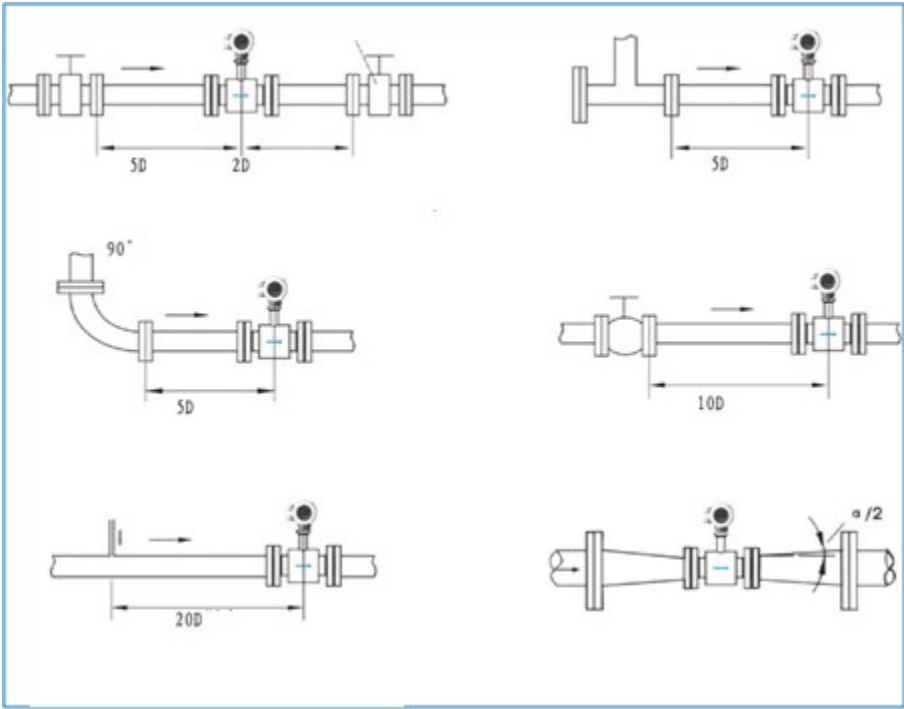
4.2 Power On And Preheat

The flow meter need to be warm up for at least 15 minutes after power on .

4.3 Set The Instrument Parameters Correctly

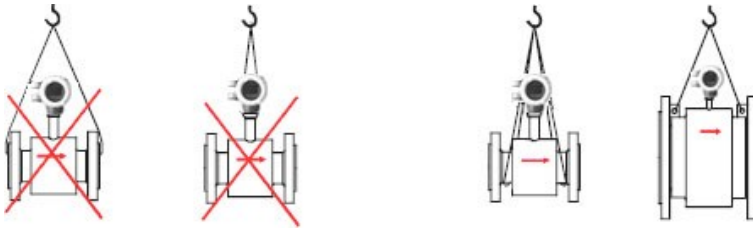Go to <factory setup>, setup the Reduced excitation frequency and size and another parameters

Go to <flowrate parameter setup>, setup the flowrate and another parameters

If use frequency output ,then go to < Freq and pulse equivalent output >, set the" Freq Or PulseOut" to "Freq" and " Freq Range "

If use Pulse equivalent output , then go to <Freq and pulse equivalent output>, set the" Freq Or PulseOut" to "Pulse Equivalent" ," Pulse Equiv Unit " and "Pulse Equiv Val".

4.4 Calibrate The Zero of Flowmeter

The zero calibration of flowmeter is very important for Instrument accuracy. Make sure that the pipe is filled with fluid and is in a static state and grounding , by using the automatic test function of the converter, the zero point of the instrument is obtained. Please note: the actual zero value must less 100mv , if the actual zero value is more than 15mV, maybe the accuracy will be affected.If the actual zero value is more than 50 mV, you must check the following item:

- the sensor maybe not ok;
- the grounding resistance maybe is not meet the requirement.
- Reduced excitation frequency and calculate the zero again .

4.5 Grounding is very important

The electromagnetic flow meter must connect to earth and the grounding resistance must less than 4 ohm . as the following :
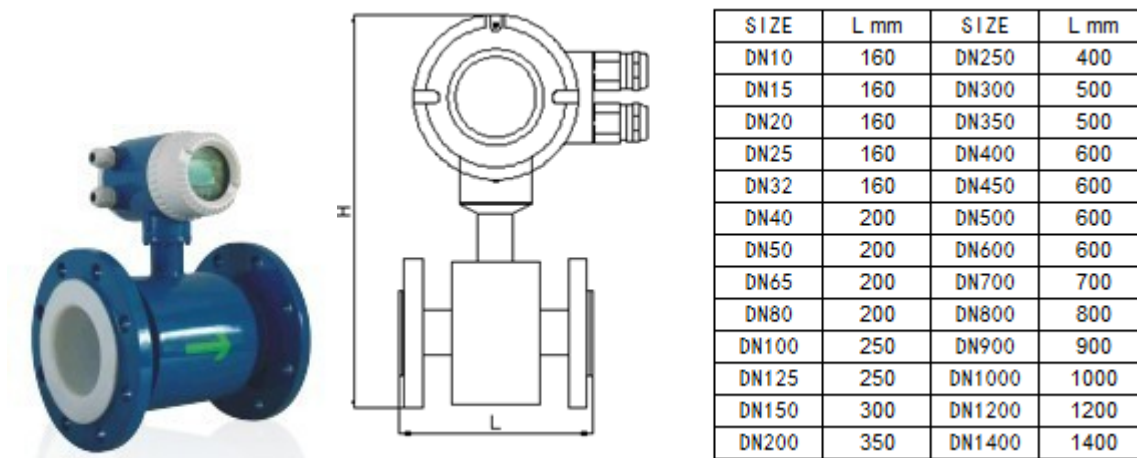

Earth
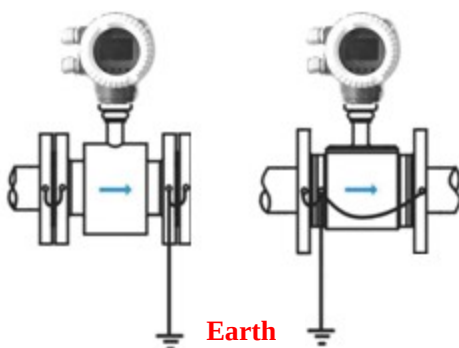
5.Packing and Storage

Flow meter transmitter is packed in a special foam box to prevent damage during transportation,Random files

include: operation manual, certificate, packing list, etc. In order to prevent the instrument from being damaged during transport, please keep the packing status of the manufacturing plant before it arrives at the installation site。 Storage sites should possess the following conditions: placed in the interior and rainproof and moisture-proof and small mechanical vibration。

6.Appendix

Appendix 1: Outline Dimension (Flange Type Electromagnetic Flowmeter)

SIZE	L mm	SIZE	L mm
DN10	160	DN250	400
DN15	160	DN300	500
DN20	160	DN350	500
DN25	160	DN400	600
DN32	160	DN450	600
DN40	200	DN500	600
DN50	200	DN600	600
DN65	200	DN700	700
DN80	200	DN800	800
DN100	250	DN900	900
DN125	250	DN1000	1000
DN150	300	DN1200	1200
DN200	350	DN1400	1400

Appendix 2 "RS485 Communication Address Table

Like the decimal 9.876543(Hex: 0x411E0652).If you use function code 03 then 0x0652 send first and 0x411E follows,if you use function code 04 then 0x411E send first and 0x0652 follows.

The following is a list of data variables that are supported by the instrument.

Address（D	Address（Hex	PLC Address	Data Format	Description

ec)	)			
144	0x90	40145	Double	Postive flow total(in double)
472	0x1D8	40473	Double	Negative flow total(in double)
1284	0x504	41285	Float	Postive flow total(in float)
1792	0x700	41793	Double	Instant flow rate(in double)
1800	0x708	41801	Float	Instant flow rate(in float)
2000	0x7D0	42001	Float	Instant flow rate(in float)
2002	0x7D2	42003	Float	Instant flow velocity(in float)
2004	0x7D4	42005	Float	Percent of flow rate(in float)
2006	0x7D6	42007	Long	0(Readonly)
2008	0x7D8	42007	Long	Interger part of postive flow total
2010	0x7DA	42011	Float	Decimal Part of positive flow total
2012	0x7DC	42013	Long	Interger part of negative flow total
2014	0x7DE	42015	Float	Decimal Part of negative flow total
2016	0x7E0	42017	Unsigned Short	Unit of instant flow
2017	0x7E1	42018	Unsigned Short	Unit of total
2018	0x7E2	42019	Unsigned Short	Status of alarm High(1:Alarm;0: No alarm)
2019	0x7E3	42019	Unsigned Short	Status of alarm Low(1:Alarm;0: No alarm)
2020	0x7E4	42020	Unsigned Short	Status of empty alarm(1:Alarm; 0:No alarm)
2021	0x7E5	42021	Unsigned Short	0
2022	0x7E6	42022	Float	Instant Energy(in

				Float)
2024	0x7E8	42024	Long	Interger part of positive energy total
2026	0x7EA	42026	Float	Decimal part of positive energy total
2028	0x7EC	42028	Long	Interger part of negative energy total
2030	0x7EE	42030	Float	Decimal part of negative energy total
2032	0x7F0	42032	Unsined Short	Unit of instant Energy
2033	0x7F1	42033	Unsigned Short	Unit of Total Energy
4112	0x1010	34113	Float Inverse	Instant flow rate(in float inverse)
4114	0x1012	34115	Float Inverse	Instant flow velocity(in float inverse)
4116	0x1014	34117	Float Inverse	Pecent of flow rate(in float inverse)
4120	0x1018	34121	Long Inverse	Integer part of positive flow total (in long inverse)
4122	0x101A	34123	Float Inverse	Decimal part of positive flow total(in float inverse)
4124	0x101C	34125	Long Inverse	Interger part of negative flow total(in long inverse)
4126	0x101E	34127	Float Inverse	Decimal part of negative flow total(in float inverse)
4128	0x1020	34129	Unsigned Short	Unit of instant flow unit
4129	0x1021	34130	Unsigned Short	Unit of flow total

4130	0x1022	34131	Unsigned Short	Status of alarm High(1:Alarm;0: No alarm)
4131	0x1023	34132	Unsigned Short	Status of alarm Low(1:Alarm;0: No alarm)
4232	0x1024	34233	Unsigned Short	Status of empty alarm(1:Alarm; 0:No alarm)

Appendix 3: Definition of Common Units

	m³/h	5
	m³/m	4
Flow rate	m³/s	3
	L/h	2
	L/m	1
	L/s	0
Total flow	m³	1
	L	0
	GJ/h	0
	GJ/m	1
	GJ/s	2
	KWh/h	3
Instant energy	KWh/m	4
	KWh/s	5
	KCAL/h	6
	KCAL/m	7
	KCAL/s	8
	GJ	0
Total energy	KWh	1
	KCAL	2