Version 1.01.2014

RLM ELECTROMAGNETIC FLOW METER

USER MANUAL

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General Description

Electromagnetic flow meter suits for all kinds of liquids flow measuring such as electronic conductivity liquid, mud and slurry etc. on the basis of its min. conductivity. The result cannot be affected by temperature, pressure, viscosity and density.

It can also be used for measuring corrosive material as long as the right material has been chosen for the lining material. Solid medium will not affect the result. Flow sensor and intelligent converter compact or separately composes a complete flow meter.

Application

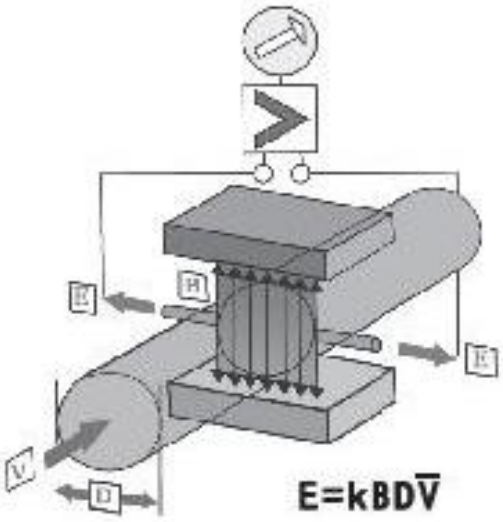
The main application area;

- Pure Water, sewage water
- Electronic manufacturer and assign
- Chemistry and Industrial medicine
- Food Industry

Features

- No move assembly, no abrasion
- Measuring range rate: 1：100
- No flow enhance equipment
- Suits for various of electronic conductivity liquid
- No affect from temperature, viscosity, pressure and density
- Anti-corrosion
- Measure both to and reverse flow
- Huge display, easy operate
- Long-term EEPROM to save data when lose power
- Support MODBUS/HART communication protocol
- Wide working volts range
- Self diagnose

Working principle



It's measuring principle bases on Faraday electromagnetic induction law：

When the liquid flow through the measuring pipe which all around magnetic field, the two vertical directions will have the induced electromotive force which is proportional with the mean velocity of stream.

Flowmeter consists of sensor and converter. Converter transfer field current to inner loop of the sensor to engender magnetic field. Conductivity liquid flow through the measuring pipe and get induced force because of cutting magnetic line. By then the electrode around the pipe wall incept induced force and transfer them to converter through signal wire. Converter filer induced force, spread, calculate and exchange them into proportional standard Current signal and frequency signal.

Electromagnetic flow sensor

Sensor's shell is sealed with carbon steel, only electrode and lining contact with medium.

Technical specification:

Reaches 8 element liquid crystal displays, current clock to indicate flow data. Two kinds of units to choose：**m3** or **L.**

Structure	Inserted style, compact type or separate type
n liquid or solid-liquid two phase fluid, conductivity >0.5μs/cm2	
Range	0.01m/s ~ 12m/s
Accuracy	Range between 0.1m/s ~ 10m/s can be 0.5%
DN（mm）	6 mm~3000 mm

PN6, PN10, PN16, PN25, PN40, PN63, PN100, PN160, PN250, PN420.

Output signal	4~20mA or frequency

RS485，support MODBUS protocol (not standard), Support HART (option)

Connection	DN6~DN3000 flange connection
Connection standard	Suits for all kinds of flange standard（eg：BS EN1092-1）
Standard	Accuracy apply to EN1434-1：2003 standard
CE certificate	Apply to LVD 2006/95/EC and EMC 2004/108/EC

EN 61326-1：2006 radiation standard (express apply to BS EN50081-1) EN 61326-1 ： 2006 anti-jamming standard (express apply to BS EN50082-1), EN - 1:2001

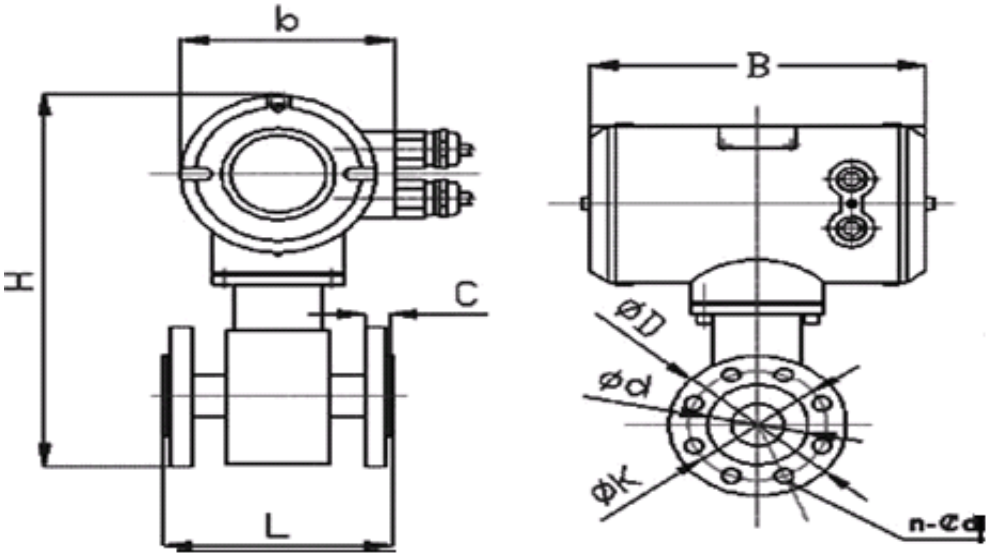
Protection grade	IP65, IP67 & IP68
Power supply	AC 85 ~ 260V or DC 24 V
Ambient temperature	5~55°C
Ambient humidity	<85 % r.h (no condensation)

Flow spec technical spec

Application area Conductivity fluid such as cold and warm water, pure water and corrosive. Material etc.

DN (mm)	6mm~~3000mm
PN	PN6, PN10, PN16, PN25, PN40, PN63, PN100, PN160, PN250, PN420.
Electrode material	SS 316L
Lining material	PTFE or customize
Medium temp	0~70°C max is 180°C
Shell material	Carbon steel
Protection grade	IP65 / IP67 / IP68
Connection	all applys（eg：BS EN1092-1）

Size Specification



Flange type size spec

DN (mm)	Lining Material			Flow Range			Size (mm)				Connection Size (mm)		
	Ne	FEP	PTFE	Normal	Min	Max	L	H	B	b	φK	n-φd	φD
10		•		0.7	0.03	2.8	160	254	152	102	65	4-φ14	95
15		•		1.5	0.06	6.4	160	254			65	4-φ14	95
20		•	•	2.5	0.11	11	160	254			75	4-φ14	105
25		•	•	3.5	0.18	18	160	254			85	4-φ14	115
32		•	•	6	0.29	29		270			100	4-φ18	140
40		•	•	10	0.45	45	200	280			110	4-φ18	150
50	•	•	•	15	0.71	71		294			125	4-φ18	165
65	•	•	•	25	0.19	119		313			145	8-φ18	185
80	•	•	•	40	1.81	181		326			160	8-φ18	200
100	•	•	•	60	2.83	283	250	344			180	8-φ18	220
125	•	•	•	100	4.42	442		372			210	8-φ18	245
150	•	•	•	150	6.36	636	300	403			240	8-φ22	285
200	•	•	•	250	11.3	1130	350	460			295	12-φ22	340
250	•	•	•	400	17.66	1766	400	511			350	12-φ22	390
300	•	•	•	600	25.43	2543	500	565			400	12-φ22	440
350	•	•	•	750	34.62	3462		620			460	16-φ22	500
400	•	•	•	900	45.22	4522	600	675			550	16-φ22	565
450	•		•	1200	57.23	5723		727			565	20-φ26	615
500	•		•	1500	70.65	7065		782			620	20-φ26	670
600	•		•	2500	101.74	10174		782			725	20-φ30	780
700	•		•	4000	138.47	13847	700	1068			840	24-φ30	895
800	•		•	5000	180.86	18086	800	1157			950	24-φ34	1010
900	•		•	6000	228.91	22891	900	1230			1050	28-φ34	1110
1000	•		•	8000	282.60	28260	1000	1332			1160	28-φ36	1230
1200	•			10000	406.91	40691	1200	1592			1340	32-φ36	1405
1400	•				553.90	55390	1400	1870			1560	36-φ36	1630
1600	•				723.46	72346	1600	2080			1760	40-φ36	1830
1800	•				915.62	91562	1800	2300			1970	44-φ39	2045

Remarks:

1) Above "•" means different DN can choose different lining material
   DN50~ DN2000 Ne lining material
   DN10~ DN400 FEP;
   DN25~ DN1000 PTFE
2) When chosen DN smaller than DN50, sensors standard PN is PN10
   DN65~ DN200, PN16;
   DN250~ DN1000, PN10;
   DN1200 or above, PN6
3) If required pressure higher than normal pressure. It needs to customize

Converter

Based on micro- technology, converter has advantages of intelligent instrument does such as high standard, easy structure

Intelligent converter use thunder protection method design circuit which applies to various bad environments

Long- Term store

Following data can be noted: instantaneous flow, electric information, damage information, total flow and Max. Instantaneous flow

Total flow and reverse flow notes to current total flow. Max instantaneous can store 36 months (monthly store), 15 years (yearly store), lose power information can have 100 items, damage information have 20 items

Display Description

Converter has a 8 element crystal display with a diagram display pattern

This data can be displayed: instantaneous flow, total forward and reverse flow, all kinds of alarm information and stored information.

Specifications:

Indication	128 * 64 Graphical LCD
Power supply	220 VAC ± 15 %
Power Consumption	1 Watt maximum
Flow Range	Used with line size 15mm to 3000mm
Max. Operating Temperature:	70 °C
Storage Temperature	0 – 80 °C
Humidity	0 – 80 non condensing
Accuracy	+- 1% of full scale
Relay Output Rating	NO and Common contacts with 230V 5A maximum
Program Variables:	Saved in non-volatile EEPROM. No battery backup necessary. Data retention 100 years maximum
Programming Method:	From keypad provided in the instrument
RTC & EEPROM	Inbuilt Real Time Clock, Memory to store periodic records, Alarm Records
Housing:	Wall Mount, Panel Mount, Compact type
Communication	RS485 Isolated
Output	4-20mA programmable according to Qmax, Pulse programmable with number of pulses per unit where unit can be liter or m3

PRECAUTIONS

a. Do not connect AC signals beyond the rated values to the unit. Irreparable damage will arise.

b. Instrument power supply tolerance is +-15% from the rated supply voltage. Variations beyond the stated limit may damage the instrument.

GENERAL OPERATION

1.Flow Setup

Instantaneous flow rate setting	
1.1 PV Unit	Optional: L/s L/m L/h m3/s m3/m m3/h USG/s USG/m USG/h kg/s kg/m kg/h t/s t/m t/h Default = m3/h Display the instantaneous flow rate display unit
	Optional: 0 1 2 3 Default = 0 Display the instantaneous flow of decimal places displayed
1.3 Flow Range	Float： 99999999.00-0.00 m3/h Default = 100.0 m3/h Scale flow refers to the instantaneous flow rate reaches the set value, Current output = 20mA Changing this parameter will affect: Current output, high and low flow alarm
1.4 **Flow Cut-off**	Float: 9.90 – 0.00 % Default = 0.0 % When the instantaneous flow rate is less than the absolute value of this setting scale flow × percentage, making instantaneous flow = 0
1.5 Percentage of Low Flow Alarm **Low Alarm**	Float: 99.00 – 0.00 % Default = 0.0 When the absolute value of the instantaneous flow rate is less than the percentage scale flow × this setting, the output low alarm signal This setting value must be <high flow alarm setting percentage!
1.6 Percentage of High Flow Alarm **High Alarm**	Float: 99.00 – 1.00 % Default = 90.0 % When the instantaneous flow rate is greater than the absolute value of the percentage scale flow × this setting, the output signal is high alarm This setting must be> low flow alarm setting percentage!
1.7 Damping Time	Float: 30.0 – 0.1 Default = 1.0 Define traffic smoothing time constant, the larger this value is more stable flow, but the longer the response time
1.8 Flow Direction	Optional: Bid. (Two Way), For (Forward), Rev (Reverse) Default: Bid (Two Way)

	When set to Positive, the reverse flow will not be displayed (display 0) When set to reverse, the forward flow will not be displayed (display 0) When set to Both, the forward and backward flow can be displayed
1.9 Flow Direction Indication	Optional Forward (Forward) Reverse (Reverse) Default= Forward (forward) When the flow rate is displayed as a negative value, this option can be switched to the positive flow display

2.Total Flow

Volume Settings	
2**.1 Total Unit**	Optional: L, M3, USG, Kg, t Default= m3 Definition of total units displayed
2.2 Total Decimal	Optional: 0, 1, 2, Default= 1 Defines the total number of decimal places displayed
2.3 Total Reset **Clear Total**	Optional: No, Yes Default= No Clear Total
2.4 Preset amount m3 **Preset Total**	Float: 9999999999- 0.00 m3 Default= Total Current Set this value, the current value of the total amount will be covered by this setting

Note: If the total is displayed "Over Flow", please timely processing (Cleared or Preset, so as not to affect the normal measurements

3.Meter Calibration

Calibration

Meter Calibration	
3.1 4 mA Calibrate	Float: 5.0- 3.0 Default= 0.0 Perform this function, with an ammeter to measure the 4-20 mA current output, the input meter readings, the meter automatically calibrate the internal operations
3.2 20 mA Calibrate	Float: 21.0- 19.0 Default= 0.0 Perform this function, with an ammeter to measure the 4-20 mA current output, the input meter readings, the meter automatically calibrate the internal operations
3.3 Zero Calibrate	Optional: No Yes Default= No Confirm the measurement tube is filled tube and fluid at rest, after a full warm- up, perform this function, the instrument automatically Zero Calibration

4.Pulse Setup

Pulse Output Setting	
4.1 Freq Max (Hz)	Float: 5000.0 – 100.0 Hz Default= 2000.0 Current flow corresponding to the output frequency (Hz)= (Current flow rate (m3/h)/ scale flow (m3/h)* frequency limit (Hz)
4.2 Liter/ Pulse	Float: 9999.0- 0.0 Default=0.0 When the pulse equivalent= 0.0, by the " Upper frequency limit Hz" setting determines the frequency output When the pulse equivalent> 0.0, by the " Pulse equivalent L/P" Setting determines the frequency output
4.3 Pulse width (ms)	Float: 1000.0- 0.0 ms Default= 0.0 When this value is "0", the output of the pulse duty cycle of 1.1
4.4 Pulse Level	Optional: Low (Active Low) High (Active high) Default= Low (Active Low) The parameter is relate with the "Pulse width" setting When setting is low, The pulse width of the low pulse level is the setting value of " Pulse Width" When set to high, the pulse width of the high pulse level is the setting value of "pulse width".

5.Communication Setting

Communication Setting	
5.1 RS485 Protocol	Optional; Modbus- RTU Modbus-ASCII Default= Modbus- RTU
5.2 Baud Rate	Optional: 1200 2400 4800 9600 19200 38400 Default= 9600
5.3 Data Bit	Optional: 7, 8 Default= 8 In RTU protocol, can't select 7 data bits
5.4 Check Mode	Optional: None Odd Even Default= None
5.5 Device ID	Digital: 247-1 Default= 1

6.Factory Setting

Factory Setting		
6.1 Sensor Size (mm)	Optional: 1 1.5 2 3 4 5 6 8 10 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400 450 500 600 700 750 800 900 1000 1100 1200 1300 1350 1400 1500 1600 1700 1800 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 mm Default = 100 mm	
6.2 **Sensor K**	Float： 9.9000 - 0.0100 Default = 0.16 This Parameter is determined during the actual flow calibration This parameter is only associated with the sensor, which means that the sensor characteristic Value New Sensor K value confirm New Sensor K= original Sensor K/（Checked value/standard said)	
6.3 Empty Check	Optional: Enable Prohibit Default = Enable After sensor good grounding, set this to Enable, normal measuremen	
6.4 Linearity	6.4.1 Adjust_SW	Optional: Prohibit Enable Default= Prohibit This is set to Enable, fix it enabled
	6.4.2 Compensation Point_9 m/s' **POINT_9 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 8 setting value!
	6.4.3 Compensation Coefficient_9 Coefficient_9	Float: 3.00- 0.05 Default= 1.0
	6.4.4 Compensation Point_8 m/s' **POINT_8 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 7 setting value!
	6.4.5 Compensation Coefficient_8 Coefficient_8	Float: 3.00- 0.05 Default= 1.0
	6.4.6 Compensation Point_7 m/s' **POINT_7 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 6 setting value!
	6.4.7 Compensation Coefficient_7 Coefficient_7	Float: 3.00- 0.05 Default= 1.0
	6.4.8 Compensation	Float: 20.0- 0.0

	Point_6 m/s' **POINT_6 (m/s)**	Default= 0.0 This setting value must be > Compensation point_ 5 setting value!
	6.4.9 Compensation Coefficient_6 Coefficient_6	Float: 3.00- 0.05 Default= 1.0
	6.4.10 Compensation Point_5 m/s' **POINT_5 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 4 setting value!
	6.4.11 Compensation Coefficient_5 Coefficient_5	Float: 3.00- 0.05 Default= 1.0
	6.4.16 Compensation Point_4 m/s' **POINT_2 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 3 setting value!
	6.4.17 Compensation Coefficient_4 Coefficient_4	Float: 3.00- 0.05 Default= 1.0
	6.4.14 Compensation Point_3 m/s' **POINT_3 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 2 setting value!
	6.4.15 Compensation Coefficient_3 Coefficient_3	Float: 3.00- 0.05 Default= 1.0
	6.4.16 Compensation Point_2 m/s' **POINT_2 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 1 setting value!
	6.4.17 Compensation Coefficient_2 Coefficient_2	Float: 3.00- 0.05 Default= 1.0
	6.4.18 Compensation Point_1 m/s' **POINT_1 (m/s)**	Float: 20.0- 0.0 Default= 0.0 This setting value must be > Compensation point_ 0 setting value!
	6.4.19 Compensation Coefficient_1 Coefficient_1	Float: 3.00- 0.05 Default= 1.0

Note: The Low alarm relay output connector, it is necessary according to the corresponding relay type with a good power supply, see the wiring schematic

Install Structure

Connect with sensor composing a compact flow meter; connect through a signal wire to compose a separate flow meter. Separate flow meter. Separate converter i8nstall on the wall or rack.

DN

When the normal flow over 0.5 m/s. choose flow meter with the same DN as measuring pipe when in this case: lower flow velocity, cannot suffice measuring requirement or accuracy. (With high accuracy, min velocity should be 1 m/s)

Electrode material

Material	Symbol	Anti-corrosion
SS316L	V	Suit for industrial water, domestic water, sewage water and other acid liquid etc.
Titanium	Ti	Suit for Sea water, chloride, hypochlorous
Hoag's alloy C	Hc	Bears the oxidized acid, like nitric acid, nitration mixture, chromic acid and sulfuric acid mixture. Also bears the oxidized salts or other oxidant environment corrosion. To the sea water, the alkaline solution, the oxide compound solutions have the good inoxidizability.
Hoag'salloy B	Hb	To the sulfuric acid, the phosphoric acid, the hydrofluoric acid and so on non-oxidized acid, the alkali salt have the good corrosion resistivity
Tantalum	Ta	Besides hydrofluoric acid, nearly ability all chemical mediator corrosion. Because its price is expensive, only uses in the hydrochloric acid and the strong sulfuric acid
Tungsten carbide	W	Has the outstanding wear-resisting performance, uses in attrition medium specially and so on mud, paper pulp.

Lining material selection

Lining material	Anti - corrosion	Working temp.	Application area
(Ne)	Bears the general low concentration acid and alkali salt the corrosion	0~70°C	Uses in the process water, the sewage, the low concentration acid and alkali salt brine. May reach most greatly according to the request 95°C.DN50~DN2000 may choose the Ne lining material.
(FEP)	Heat-resisting, the inoxidizability is good, the mechanical strength is high, the anti-attrition performance is good, cleans up when the Surface is not easy to damage the inside lining.	-20~180°C	Besides the mortar and so on strong wear ability medium's all fluids, may use in likely the tap water place hygienic request, may reach most greatly according to the request 180°C DN6~DN400 may choose the FEP lining material
(PTFE)	May resist all chemical mediator nearly the corrosion, the wear ability is bad	-40~180°C	Cannot use in the negative pressure pipeline and the Wear ability strong fluid.DN25~DN1000 may choose the PTFE lining material.

Temperature Selection

Sensor has four working temp to choose: 70°, 95°, 130°, Max is 180°

Ground Loop Selection

When this condition is bad, please install ground loop at both side of the sensor when medium has a high abrasion, and choose neck ground loop to protect lining

Protection Grade

Compact types choose IP65; for cold water choose IP67 or IP68

Structure

Compact flow meter is the first choice under normal situation

Choose separate meter with IP67 or IP68 protection grade when sensor can be swallowed by the liquid when the temp is high choose separate flow meter.

Signal Output

With source frequency output means no outside power needed; if not. It must with external power supply frequency output exit can set with alarm output to indicate reverse flow (low level) or forward flow (high Level) or instantaneous and total flow.

4-20 mA can indicates instantaneous flow data signal.

Power Supply

220V AC or 24 V DC, 220 V AC is the priority selection

Ambient Temperature

Install site shall avoid perpendicular sunlight influence, ambient temp should be 5°C~55°C

Avoid Jamming source

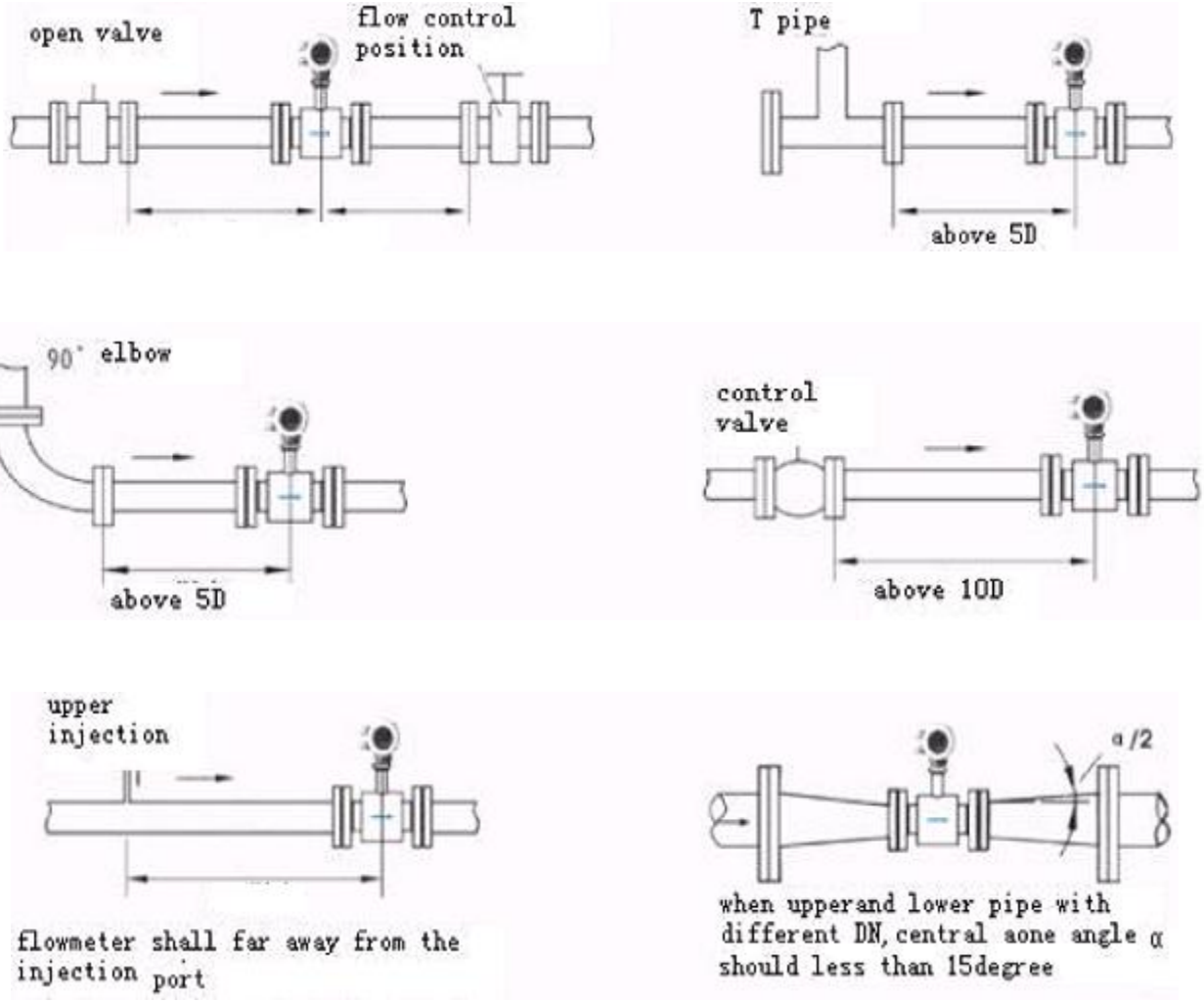
Must choose not strong electromagnetic flow meter field radiation place to install the flow meter, avoids for example the electric motor, the transformer, the frequency changer and so and which could be easily to bring about the electromagnetic interference to the equipment. Flow meter survey principle based on the faraday law of electromagnetic induction, the primary signal which it produces is week, insufficient mill volt. If flow meter has a strong magnetic radiation, its accuracy can be influenced even its normal work.

Length of the straight pipe

Avoiding all kinds of assemblies such as valve, elbow etc., try to lengthen the straight pipe, make sure its length over fifth DN of the upper parts, lower parts over two DN.

Installation

Avoiding all kinds of assemblies such as valve, elbow etc., try to lengthen the straight pipe, make sure its length over fifth DN of the upper parts, lower parts over two DN.

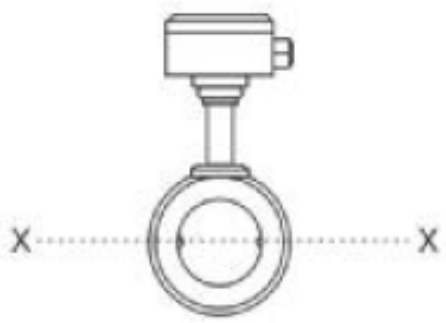


Liquid conductivity shall stay stable

If the upper position has different medium in, it can cause unstable conductivity and affect the results. In this case, move the inject position to the lower parts If the injection position has to be upper position, then far away from the flow meter. 20 times of the DN is perfect to keep the liquid mix.

Keep the electrode axes level

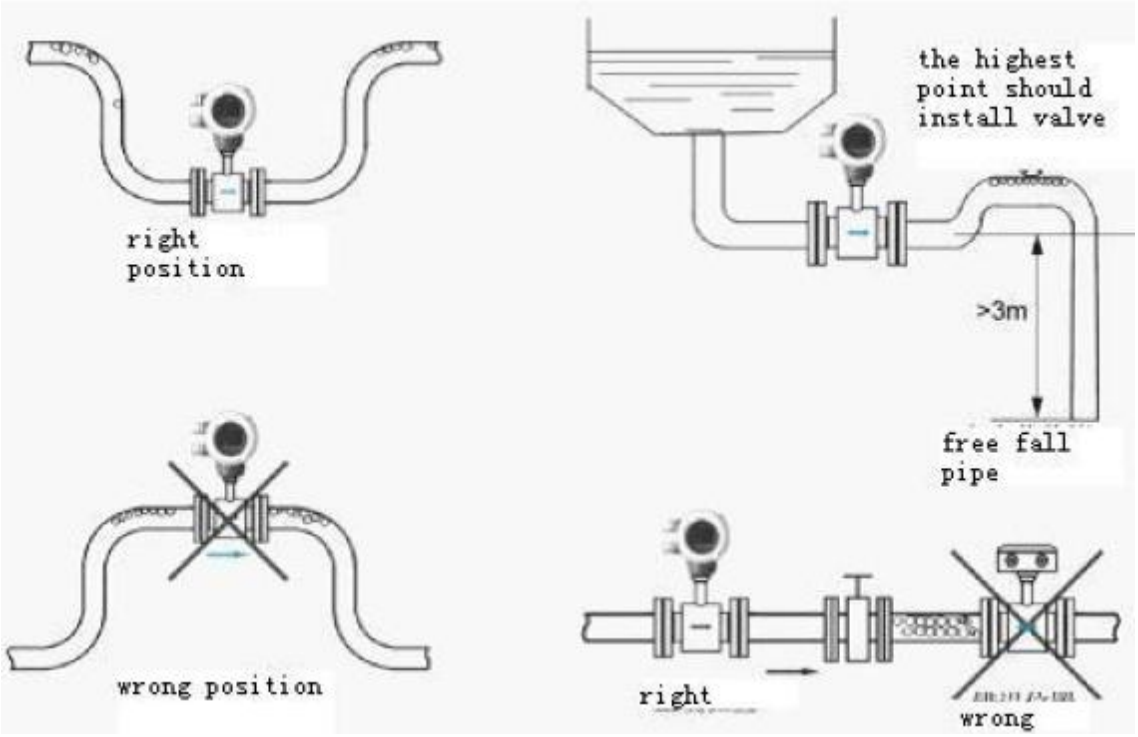
Flow meter's connection shall correspond to install direction。



If installation condition limit, please maintain the permission angle of tilt ≤45°.

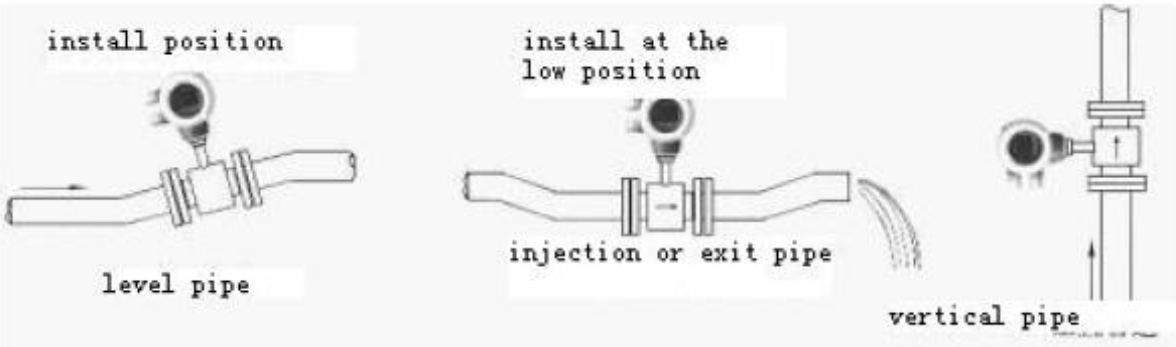
No bleb

Make sure there's no bleb before install



Full pipeline

Flow meter can be installed in horizontal, vertical and tilt way. However, pipeline shall fill with liquid and no bleb.

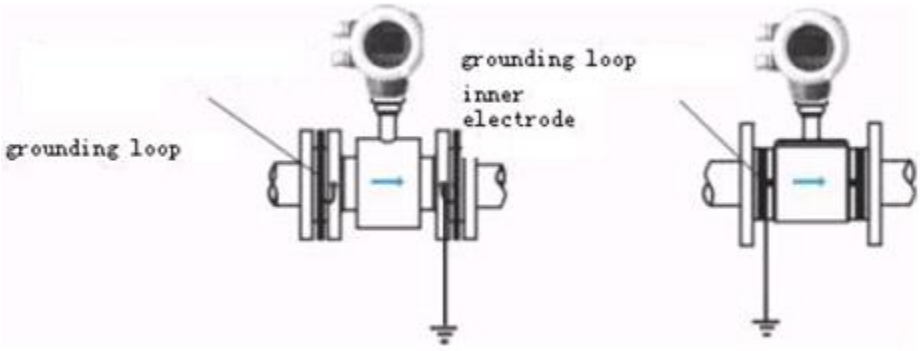


Install way
If medium has solid grain, vertical install way suggested. Flow meter's axes should be level when install in case of any bled.

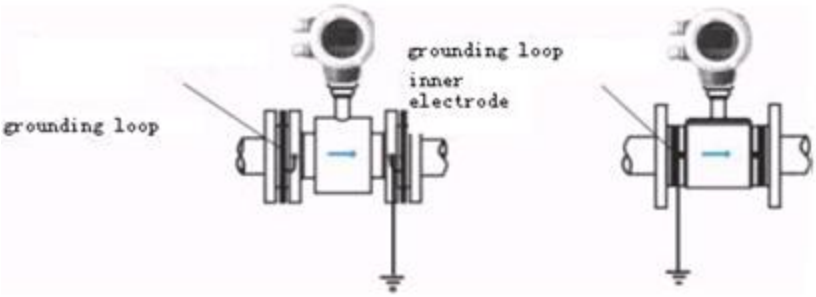
Pipe install
Avoid flow meter's upper and lower pipe tilt; keep them straight to the upper and lower flange. Any sealed draff should be cleaned and plus shim. After installation, no seal work to protect the lining.

Grounding
Since flow meters induce signal is weak, it can be easily affected by other signal. The sensor and converter should be at the same electronic level with the liquid and grounding together.

Normal metal pipe (no need of grounding)
However, liquid should get through to shell with the earth line.

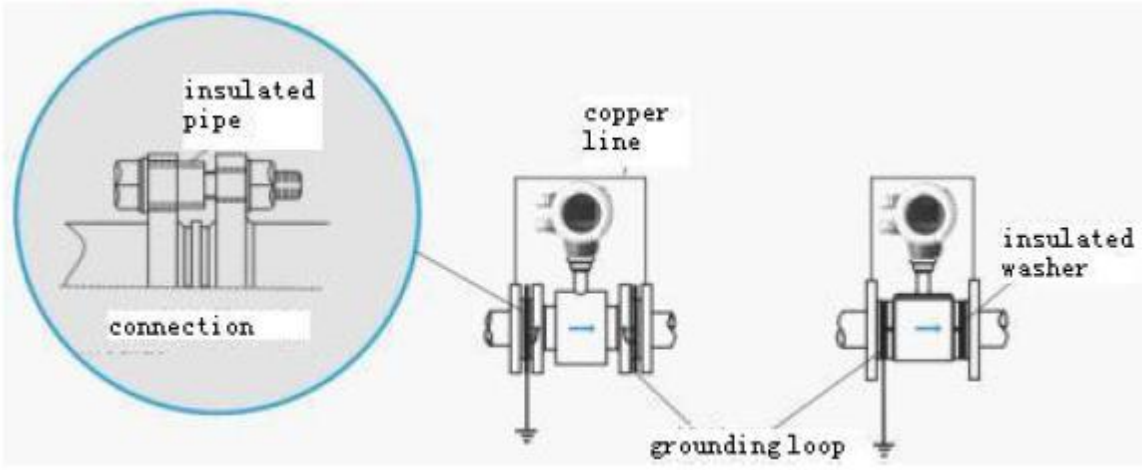


Insulated pipe (plastic pipe, rubber pipe etc.)



Cathodic protection pipe

Flange connects with copper line and insulated with the earth line.

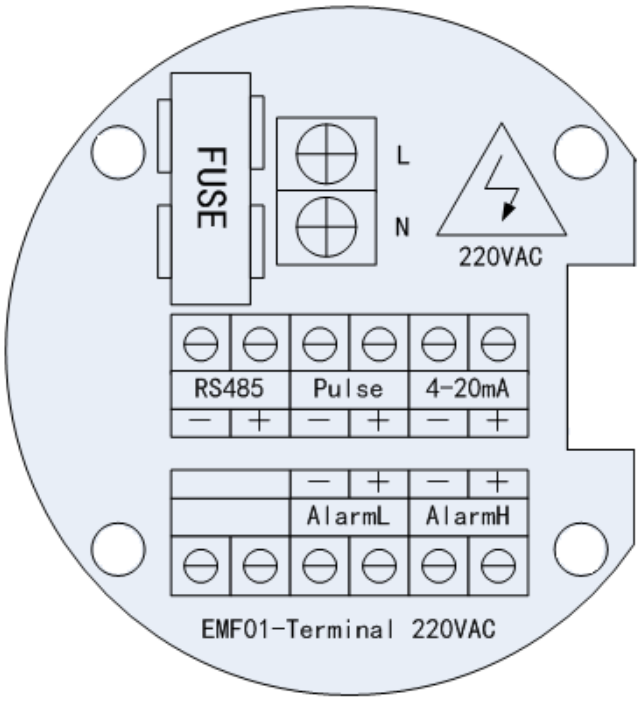


Remark: when sensor installs at the insulated pipe, grounding loop can be avoided.

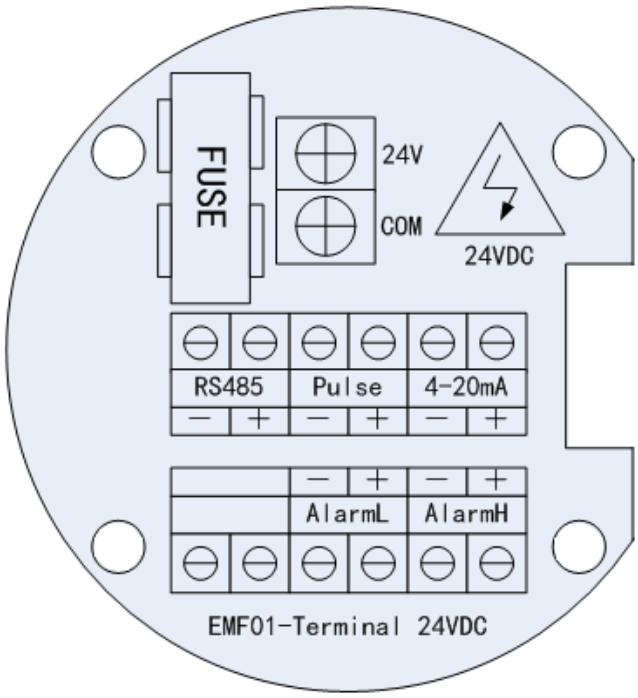
Wiring connection

- All connection should follow the direction.
- All wire should be DN 5～8mm , The power cable uses 2 cores to protect the parallel Line (core cross-sectional area ≥0.75mm2). The signal cable uses 2core shielded Wires (core cross-sectional area ≥0.75 mm2).
- After the wiring completes, must inspect the outer covering lid and the electric cable tightens the attachment, in order to avoid the dust or the water enter. After the wiring, tightens not to be possible to replace, prevents the water leakage or affected with damp
- When the scene walks the line use threading tube, should pay attention threads Tube's lower extremity to keep the freeing port, prevents the water to enter the Flowmeter through the threading pipe flow

Schematic layout of terminals



220V AC power supply terminal block schematic



24V DC power supply terminal block schematic

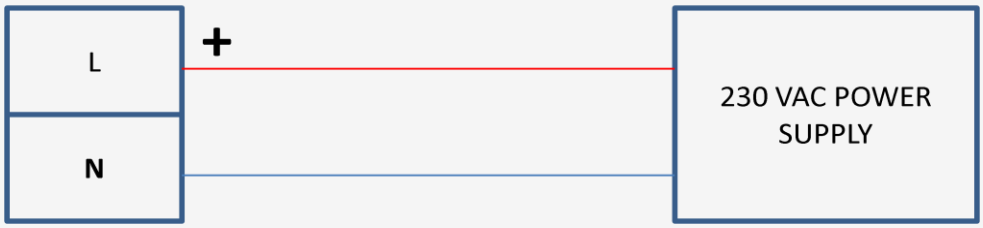
Note: The picture is only schematically, the specific kind prevail!

2 **Terminal Descriptions**

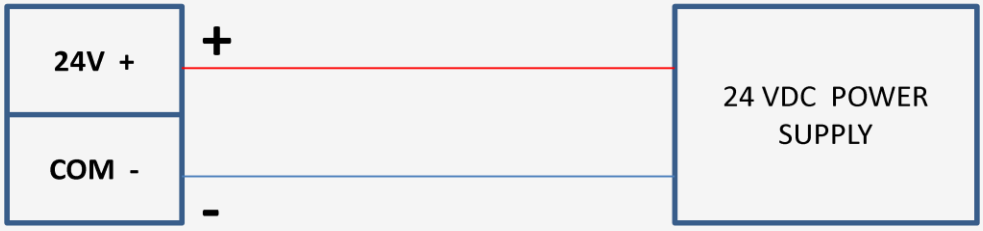
Marked		function	remark
L		AC85~265v power supply	L is Ac220v power supply
N		AC85~265v power supply	N is Ac220v power supply
24V		DC 18~36v power supply+	Power supply 24v+
COM		DC 18~36v power supply-	Power supply 24v-
4-20mA	+	4~20mA output +	Current output is active, does not require nor external 24V power supply to the current output terminals, the load resistance ≤ 500Ω
	-	4~20mA output -	
Pulse	+	Frequency or pulse output+	Frequency or pulse output is active, the load current ≤ 30mA
	-	Frequency or pulse output -	
RS485	+	RS485 output+	RS485 output
	-	RS485 output-	
Alarm H	+	High alarm output+	High alarm output relay 24VDC recommended to pick up the load current ≤ 30mA
	-	High alarm output-	
Alarm L	+	Low alarm output+	Low alarm output relay 24VDC recommended to pick up the load current ≤ 30mA
	-	Low alarm output-	

NOTE: The low alarm relay output connector, it is necessary according to the corresponding relay type with a good power supply, see the wiring schematic.

3. Power wiring diagram

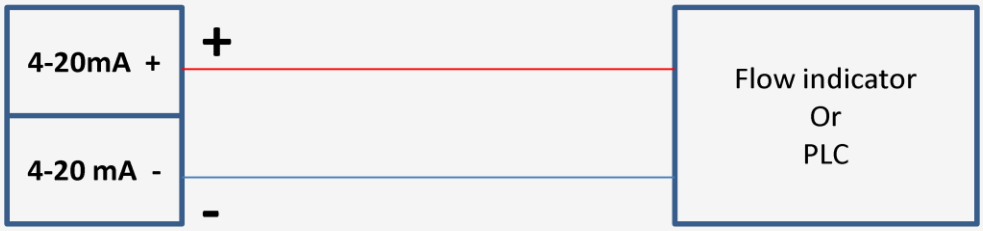


220VAC power supply

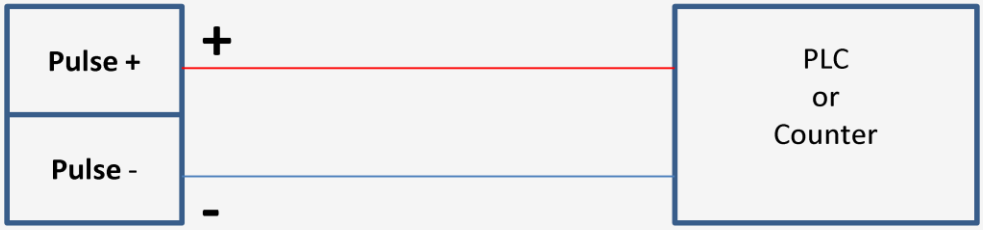


24V DC power supply

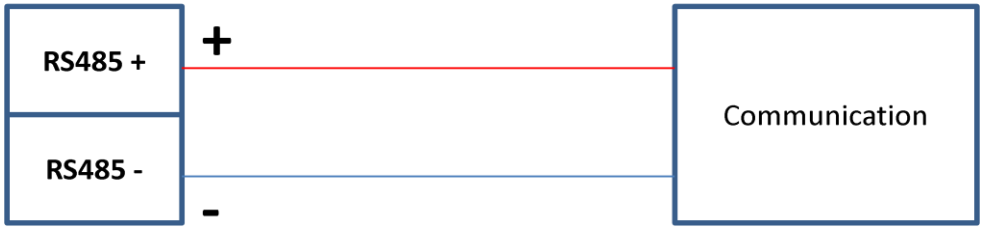
4. 4-20mA current output wiring diagram (no external power supply)



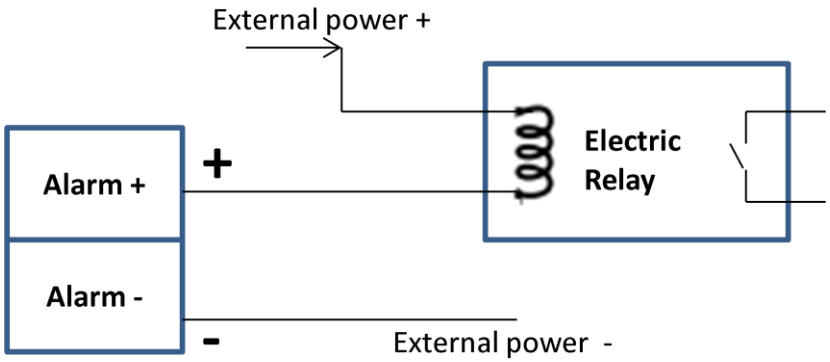
5. Pulse output wiring diagram (no external power supply)



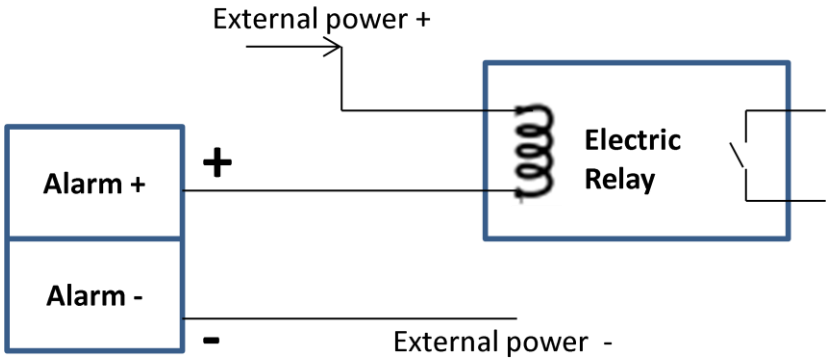
6. RS485 output wiring diagram



7. High alarm output wiring diagram (requires external power supply)

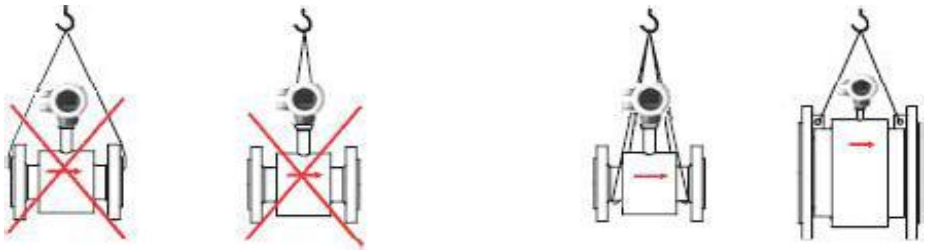


8 .Low alarm output wiring diagram (requires external power supply)



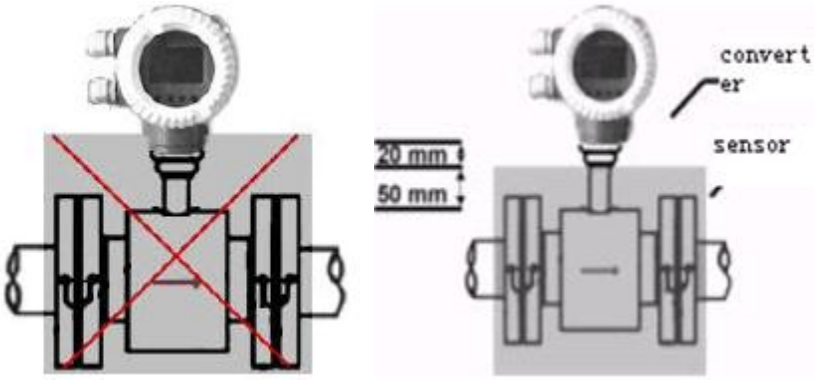
Carry and lining protection

Avoid using club or corb to hang flow meter in case of damage of lining.
For Flowmeter with DN80 size or above size, avoid carrying converter or junction box with hand since they can't bear strong weight.



Keep warm of the pipe

Pack sensor with cotton at shown position



Remark shadow part indicates the right place to cover cotton. If flowmteter has been wrong packed like the left picture shown, the Flowmeter will not work normally due to its heat. The right packet keeps a distance of20mm between cotton and converter's bottom. Meanwhile, the sensor should be well-packed to prevent the heat.

Cable gland

- All cable is M16×1.5，OD suits for 5~8mm
- After connection, use glue water seal cable and exit.
- Screw gland after seal in case of any condensation.

4) System configuration

Setting Items	Range	Default	Meaning
Scale range (m3/h)	Change with sensor's DN	When sensor normal rate are the same	The scale division current capacity marked has corresponded to the 20mA electric current output transient flow value
Flow signal%	0.0~9.0	0.0	Eg ： flow range=100m3/h, small flow=1.0% Then when instantaneous flow<1m3/h cancel
Direction	Forward, reverse, double direction	Double direction	When establishes as forward, the reverse current capacity will not measure and the demonstration; When establishes for reverse, the forward current capacity will not measure and the demonstration;
Flow indicate	Forward, reverse	Forward direction	When the heat energy table installed counter-, but needed to demonstrate that was the forward current capacity, then chose reverse
Scale frequency	100-5000	2000	No setting
Pulse	≥0.00555	See pulse table	Pulse/liter.
Pulse length		50ms	Indicates flux and cumulative energy pulse width. Its scope changes along with the pulse equivalent's value's change, is 100ms most greatly. works as the establishment is 0, expressed that the pulse width is 100ms
Protocol	MODBUS-RTU, MODBUS-ASC	MODBUS-RTU	Custom set freely
Transfer rate	1200, 2400,4800, 9600,19200, 38400	9600	
Data digitally	7 ，8	8	
Verify	NONE ， ODD ， EVEN	NONE	
Stop position	1 ，2	1	
Address	1~127	1	Equipment address setting

Calculation of pulse (liter/pulse)

As we know, pulse frequency (Hz) =current instantaneous flow (L/s)/pulse (L/P).

A proper pulse frequency is 1Hz。 In this case,

Pulse (L/P) =instantaneous flow (L/s)/1(Hz). It is because when pulse doesn't change, use max. Instantaneous flow to replace current instantaneous flow is proper. And we can easily see:

Pulse (L/P) = max flow (L/s) or ： pulse (L/P) = max. Instantaneous flow/3.6 (m3/h).

Trouble shooting

Error	**Contents**	**Reason**
Output at 0 mA.	No power to transmitter.	Check power source and Connections to the transmitter.
	Analog output improperly Configured.	Check the analog power switch. See Hardware Switches for Proper settings.
	Electronics failure.	Replace the electronics boards.
Output at 4 mA	Transmitter in multidrop mode.	Configure Poll Address to 0 to take transmitter out of Multidrop mode.
	Low Flow Cutoff set too high.	Configure Low Flow Cutoff to a lower setting or increase flow to a value above the low flow cutoff.
	Flow is in reverse direction.	Enable Reverse Flow function.
	Shorted coil.	
	Empty pipe.	Coil check.
	Electronics failure.	Fill pipe.
		Replace the electronics boards
Pulse output at zero, Regardless of flow.	No power to transmitter.	Check power source and Connection to the transmitter.
	Wiring error.	Check pulse output wiring at digital output terminals. Refer to wiring diagram for pulse output.
	Reverse flow.	Enable Reverse Flow function.
	Electronics failure.	Replace the electronics boards.
Reading doesn't	Transmitter, control system, or	Check all configuration variables for the

appear to be within rated accuracy	other receiving device not configured properly.	transmitter, flowtube, Communicator, and/or control system. Perform a loop test to check the integrity of the circuit.
	Electrode Coating.	Use replaceable electrodes Downsize flow tube to increase flow Rate above 3 ft/s. Periodically clean flowtube.
	Air in line.	Move the flowtube to another location in the process line to ensure that it is full under all conditions.
	Flow rate is below 1 ft/s (specification issue).	See accuracy specification for specific transmitter and Flow tube.
	Auto zero was not performed when the flow tube is full, or flow rate is zero.	Perform the auto zero function
	Flow tube failure–Shorted electrode.	Perform flow tube tests electrode.
	Flow tube failure–Shorted or open coil.	Perform flow tube tests coil
	Transmitter failure.	Replace the electronics boards.

Noisy Process	Chemical additives upstream of magnetic flow meter. Sludge flows– Mining/Coal/Sand/ Slurries (other slurries with hard particles). Styrofoam or other insulating particles in process. Electrode coating. Air in line.	Move injection point downstream of magnetic flow meter, or move magnetic flow meter. Decrease flow rate below 10 ft/s. Consult factory. Use replaceable electrodes Downsize flowtube to increase flow rate above 3 ft/s. Periodically clean flowtube. Move the flowtube to another location in the process line to ensure that it is full under all conditions.
Meter output is unstable.	Electrode incompatibility. Improper grounding. High local magnetic or electric fieKF-700s. Control loop improperly tuned. Sticky valve (look for periodic Oscillation of meter output). Flowtube failure. Analog output loop problem.	Check Magnetic Flow meter Material Selection Guide for chemical compatibility with electrode material. Check ground wiring. See wiring and grounding procedures. Move magnetic Flowmeter (20–25 ft. away is usually acceptable). Check control loop tuning. Correct valve sticking. Perform Flowtube Tests. Check that the 4–20 mA loop matches the digital value. Perform loop test.

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