Contents

A Flowmeter and Sensor

B Transducer

A Flowmeter and Sensor

1.Functions

1.1 Characteristics of Products

a) Simple structures, reliable, no movable parts and long service life

b) No parts of intercepting fluid, no pressure loss and fluid clogging

c) Nomechanicalinertia,quick response andgoodstability, application in automatic examination, regulation and controlling

d) Measuring accuracy is uninfluenced by the physical parameters such as style, temperature, viscosity, density and pressure.

e) Employ PTFE or rubber liner and different combination of electrode materials such as Hastelloy C, Hastelloy B,316L, Titanium and can meet the needs of different mediums.

f) The transducer exploits 16-bit insertion-type micro-processor with fast calculation and high accuracy.

g) All the digits are quantity disposed, strong capability of resisting disturbance, reliable measurement, high accuracy,and the flowrate range can extend to 150:1.

h) LCD display with high resolution

i) With double-direction flowrate measurement and double-direction total amount accumulating function. And there are three calculators inside which can respectively display forward total flow, reverse total flow and difference value accumulative amount.

j) Output: current frequency outputs in double directions and RS-485 or RS232 digital communicational signal ouput.

k) Employ SMD fittings and SMT technology with high reliability of circuit.

1.2 Main Applications

Electromagnetic flowmeters are applied to measure the volumetric flow of conductive liquid and serosity serum in seal pipes. They are applicable for petro chemistry, steel-iron metallurgy, feedwater and draining, water irrigation, water disposition, controling of the total amount of sewage, electric power, paper making, pharmaceutical, food, etc.

2.Forms and Constitutions

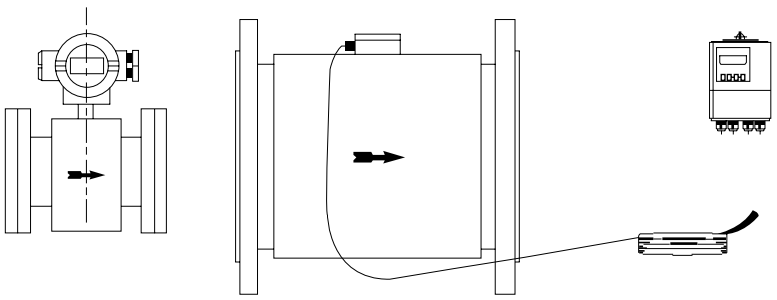
2.1 Constitutions

Electromagnetic flowmeter is composed of sensor and transducer.

2.2 Forms of Products

The liner and electrodes of electromagnetic flowmeter's sensor have many types of materials optional.

The transducer and sensor can constitute integral type flowmeters or detachable (remote) type flowmeters.



Integral Type Detachable Type

2.3 Figure and Mounting Size

2.3.1 Figure of DN15~DN150 Integral Type and Sensor

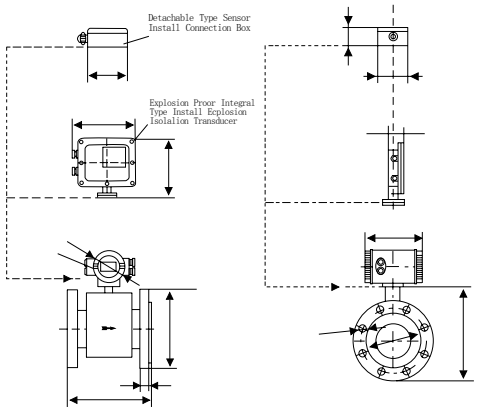


Figure Size & Weight sheet 1

DN	L	H	Reference weight (kg)	
			Integral type	Sensor
15	200	220	10	7
20	200	220	12	9
25	200	230	14	11
32	200	235	15	12
40	200	245	16	13
50	200	250	17	14
65	200	270	25	22
80	200	285	29	26
100	250	300	31	28
125	250	330	35	32
150	300	360	41	38

Flange Size (standard: GB/T 9119) sheet 2

DN	Pressure 1.6 MPa					Pressure 4.0 MPa				
	D	d1	d0	n	b	D	d1	d0	n	b
15	95	65	14	4	16	95	65	14	4	16
20	105	75	14	4	18	105	75	14	4	18
25	110	85	14	4	18	110	85	14	4	18
40	150	110	18	4	20	150	110	18	4	20
50	165	125	18	4	20	165	125	18	4	20
65	185	145	18	4	20	185	145	18	8	22
80	200	160	18	8	22	200	160	18	8	22
100	220	180	18	8	22	235	190	22	8	26
150	285	240	22	8	24	300	250	26	8	28

2.3.2 Figure of DN200~DN600 Integral Type and Sensor

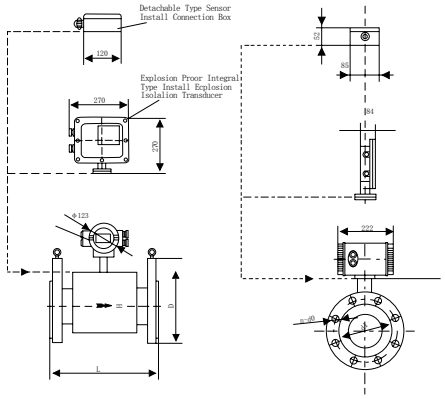


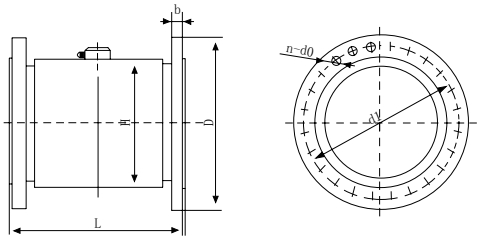
Figure Size & Weight sheet 3

DN	L	H Ø ~	Reference weight (kg)
200	350	310	45
250	450	358	50
300	500	410	60
350	550	465	145
400	600	515	180
450	600	564	215
500	600	614	245
600	600	722	335

Flange Size (standard : GB/T 9119) sheet 4

DN	Pressure 1.6 MPa					Pressure 4.0 MPa				
	D	d1	d0	n	b	D	d1	d0	n	b
200	340	295	24	12	26	340	295	22	8	34
250	405	355	26	12	28	395	350	22	12	38
300	460	410	28	12	32	445	400	22	12	42
350	520	470	30	16	35	505	460	22	16	46
400	580	525	32	16	38	565	515	26	16	50
450	640	585	40	20	42	615	565	26	20	57
500	715	650	44	20	46	670	620	26	20	57
600	840	770	54	20	52	780	725	30	20	72

2.3.3 Figure of DN700~DN2600 Sensor



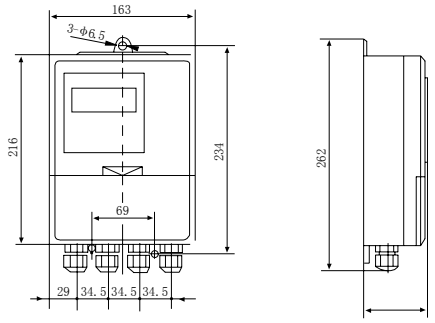
Remarks:①DN700~DN2600have no integral type;
②Figure of DN2700~DN1600Explosion-separation type sensor is the same as normal instrument

DN	L	H Ø ~	Reference weight （kg）	DN	L	H Ø ~	Reference weight （kg）
700	700	836	435	1600	1600	1736	1555
800	800	936	545	1800	1800	1960	2085
900	900	1036	655	2000	2000	2160	2610
1000	1000	1136	810	2200	2200	2364	3210
1200	1200	1336	875	2400	2400	2564	3910
1400	1400	1536	1235	2600	2600	2764	4510

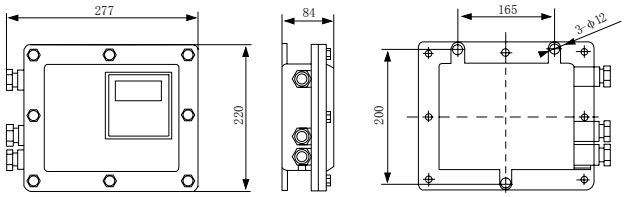
Figure Size (standard:GB/T9119) sheet 5

DN	Pressure (MPa)	D	d1	do	n	b
700	1.0	895	840	30	24	34
800		1015	950	33	24	36
900		1115	1050	33	28	38
1000		1230	1160	36	28	38
700	0.6	860	810	26	24	26
800		975	920	30	24	26
900		1075	1020	30	24	26
1000		1175	1120	30	28	26
1200		1405	1340	33	32	28
1400		1630	1560	36	36	32
1600		1830	1760	36	40	34
1800		2045	1970	39	44	36
2000		2265	2180	42	48	38
2200		2475	2390	42	52	42
2400		2685	2600	42	56	44
2600		2905	2810	48	60	46

2.3.4 Figure of Detachable Type Transducer



Normal Remote Type Transducer

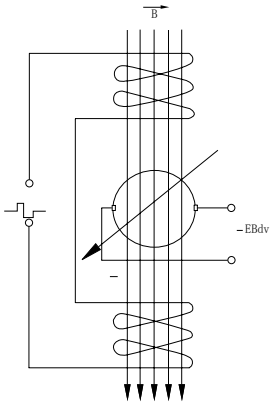


Explosion Proof Remote Type Transducer

3.Operation Theory and Structural Characteristics

3.1 Operation Theory

Electromagnetic flowmeter is based on Faraday's law of eletromagnetic induction. The measuring pipe is a non-magnetic-conductive alloy short pipe with a inside-liner of insulated materials. Along the pipeline the two electrodes perforate the pipe and are fixed on the measuring pipe.The head of the electrodes is basically paralleled with inner surface of the liner. When the coils of the excitation impulse the excitation from square-wave of two sides, a working magnetic field with magnetic flux density B generates in the direction vertical with the measuring pipeline. At this time if the flux with specific electro-conductivity flows through the measuring pipe, the line of magnetic force will induct electromotive force E. Electromotive force E is in positive proportion to magnetic flux B, the product of the inside diameter d of measuring pipe and average flow velocity v, electromotive force E(signal of the flow) is examined by electrodes and sent through cable to transducer. After the transducer magnifies the signal of flow, the flow rate of flux is displayed, and the pulse and analog current which are used to control and regulate the flow rate are output.



E = K B d V

In the equation: E ---- signal voltage of interelectrodes(v)

B----density of magnetic flux(T)

d---- inner diameter of measuring pipe(m)

V ---- average flow velocity(m/s)

In the equation, d is a constant. Because the excitation current is constant B is also a constant. We can know from E = KBdV that flow rate of volume Q is in positive proportion to signal voltage E, that is, signal voltage of flow rate induction E is in linear relation to flow rate of volumn Q. So if only E is measured flow rate Q can be defined. This is the basic operating principle of electromagnetic flowmeter.

From E = KBdV we can know that the temperature of the measured flux medium, density, pressure, electro-conductivity and the liquid-solid proportion of the liquid-solid mixed flux medium will not affect the result of the measurement. To moving condition if only it accords with the flow of axial symmetry (such as laminar flow) it will not affect the result of the measurement. So we say that electromagnetic flowmeter is a genuine flowmeter of volume. On the part of the manufacturer and users, if only practically demarcate with average water can the flow of volume of any other conductive flux medium be measured, without any modification. This is a prominent merit of electromagnetic flowmeter while any other flowmeter doesn't possess. In the measuring pipe there's no active and choking parts, therefore there's nearly no loss of pressure, and the reliability is very high.

3.2 Structure of Sensor

Electromagnetic flowmeter has compact structure and short connecting size. Its liner and electrode materials fit for many kinds of liquids and serosity serums. Because it uses square-wave impulse excitation, the wattage dissipation of the whole machine and zero are stable and have high reliability.

The main constitutions of sensor are measuring pipe, electrode, excitation loop, magnetic yoke and shell body; remote type flowmeter has additionally single wiring box.

The sensor with rubber and polyurethane liners is intrinsically sinking structure. If the sensor sinks to submarine or is installed at the place where easy to be flooded by water, after the finish of site wiring and right definition, the wiring box needs to be blocked up with seal sticky, and should double seam according to the random use instruction of seal sticky.

4. Main Technical Datas

4.1 Technical Datas of Whole Machine and Sensor

Performing Standard	JB/T9248-1999				
Nominal Diameter	15,20,25,32,40,50,65,80,100,125,150,200,250,300,350,400,450,500,600, 700,800,900,1000,1200,1400,1600,1800,2000,2200,2400,2600				
Max flow velosity	15m/s				
Accuracy	DN15~DN600	±0.3% of indicating value (flow velocity≥1m/s); ±3mm/s (flow velocity＜1m/s)			
	DN700~DN2600	±0.5% of indicating value (flow velocity≥0.8m/s); ±4mm/s (flow velocity＜0.8m/s			
Fluid electro-conductivity	≥5μS/cm				
Nominal pressure	4.0MPa	1.6MPa	1.0MPa	0.6MPa	
	DN15~DN150	DN15~DN600	DN20~DN1000	DN700~DN2600	
Ambient Temperature.	Sensor	-40~+80℃			
	Transducer and Integral type	-15~50℃			
Liner Material	F4, polychlorobutadiene rubber, polyurethane, F46, Fs				
Max fluid temp erature	Integral type	70℃			
	Remote type	PTFE / F4 liner	100℃;150℃(need special order)		
		polychlorobutadiene rubber liner	80℃;120℃(need special order)		
		polyurethane	80℃		
		F46	100℃;150℃(need special order)		
		Fs	80℃		
Signal electrode and earthing electrode material	Stainless steel 00Cr17Ni14Mo, 0Cr18Ni12Mo2Ti, Hastelloy C, Hastelloy B, Titanium, Tantalum, Pt/iridium alloy, stainless steel painting tungsten carbide				
Electrode scraper machinism	DN300~DN1600				
Connecting flange material	Carbon steel				
Earthing flange material	Stainless steel 1Cr18Ni9Ti				
Import Protection flange material	DN65~DN600	Stainless steel 1Cr18Ni9Ti			
	DN700~DN1600	Carbon steel			
Enclosure Protection	DN15~DN2600 remote type rubber or polyurethane liner sensor			IP68	
	Other sensors and all transducers			IP65	
Explosion-proof Marker	md II BT4	Integral type, IP65, magnetic key, DN15~DN600			
		Detachable type, IP65, magnetic key, DN15~DN1600			
	m II BT4	Remote type, IP65,transducer in safe area, DN15~DN1600			
Space length (Remote type)	Generally the transducer is no more than 100m long from the sensor ; beyond 100m need special order				

4.2 Technical Data of Transducer

Electric power	DC	18~36V
	AC	85~265V，45~63Hz
Power	< 20W (go with the sensor)	
Inside Calculator	All positive-going flowrate, negative-going flowrate and difference-value flowrate have total amount calculator	
Output signal (programmabler)	Current output	a)Output signal: Double-direction and two-way, complete isolation0~10mA/4~20mA b)loading resistance: if 0~10mA then 0~1.5KΩ; if 4~20mA then 0~750 KΩ c)Basic error: on the basis of basic error of the above measurement add ±10μA
	Frequency output	a)positive-going and negative-going flowrate output; upper limit of output frequencycan be set between 1~5000 Hz b)With photoelectric isolated transistor collecting electrode open-circuit double-direction output c)Outside power not more than 35V, when breaking over,the biggest current of collecting electrode is 250mA
	Pulse output	a)Positive-going and negative-going flowrate output; upper limit of output pulse can extend to 5000cp/s b)Equivalent weight of pulse is 0.0001~1.0m3/cp c)Width of pulse automaticly set to be 20ms or square wave e)With photoelectric isolated transistor collecting electrode open-circuit double-direction output f)Outside power not more than 35V, when breaking over,the biggest current of collecting electrode is 250mA
	Flow direction indicating output	a)can measure positive and negative going fluid flowrate, and can judge the flow direction of fluid b)When displaying positive-going flowrate, output +10V high level c)When displaying negative-going flowrate, output 0V low level
	Alarm output	a)Two-way with photoelectric isolated transistor collecting electrode open-circuit alarm output b)Outside power not more than 35V, when breaking over,the biggest current of collecting electrode is 250mA c)alarm conditions: fluid hollow pipe, excitation disconnection,flowrate beyond limit
	Communicational interface	RS-232C, RS-485, MODBUS, communicational interface, with thunder-resistant protection

Damping Time	Selectable between 0~100s (90%)
Electrical Isolation	Analog input, analog output, alarm power and pulse output, AC, earthing insulating voltage not less than 500V
Normal Working Conditions	Ambient temperature: integral type –10~+60℃ Relative humidity: 5%~90%
Reference Conditions of Test	Environmental temperature: 20±2℃ Relative humidity: 45%~85% Power voltage : 220±2% Power frequency : 50Hz±5% Content of harmonic wave less than 5%

4.3 Measuring Range of Flowrate

The upper-limit flow velocity of flowrate measuring range can be selected between 0.3m/s~15m/s; lower-limit flow velocity can be 1% of the upper-limit value. Under the reference condition that repeatability error is ±0.1% of the measuring value the accuracy of flowmeter is shown in the below sheet.

Vs: set span (m/s)

Nominal diameter	Span m/s	accuracy
15~20	Below 0.3	±0.25%FS
	0.3~1	±1.0R
	1~15	±0. 5%R
25~600	0.1~0.3	±0.25%FS
	0.3~1	±0. 5%R
	1~15	±0. 3%R
700~2600	Below 0.3	±0.25%FS
	0.3~1	±1.0R
	1~5	±0.5%
%FS : relative span; %R: relative measuring value		

5. Mounting and Use

5.1 Requirements to Outside Environment

a. Flowmeters should avoid being installed in the places where the temperature is changeable and high temperature radiation of equipment exists. If must , it is required to have measures of heat insulation and ventilation

b. It is better to install the flowmeters indoors. If it must be installed outdoors, attention must be given to avoid being caught by rain, flooded by ponding and exposed to the sun. It is required to have measures of moisture-proof and guard against being exposed to the sun.

c. Flowmeters should avoid being installed in the situation that includes corrosive gas. If must, it is required to have measures of ventilation.

d. In order to make the installation and maintenance convenient, around the flowmeters abundant room must be guaranteed

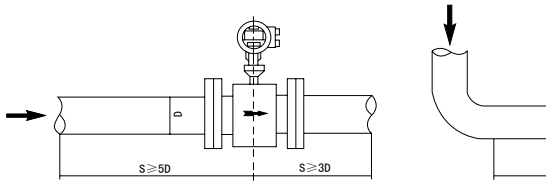
e.Strong magnetic fields and sources of vibration must be avoided existing in the places for installing flowmeters. If the pipe vibrates greatly, there should be support at both sides to fix the pipe.

5.2 Requirements to Straight Pipe Section

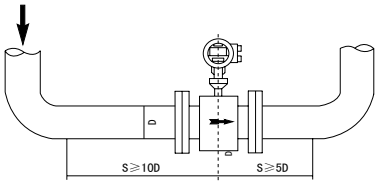
In order to improve the effects of eddy current and malformation of current fields, there are some certain requirements to the length of front and back straight pipe of flowmeters, otherwise the measuring accuracy will be affected (power converter can be installed but must avoid being installed near or after the regulation valve and the half-open valve).

sheet 9

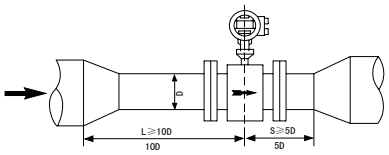
Pipe Installation Types	Installation Instruction Diagram	Standard- pipe Type	
		Front straight pipe L	Back straight pipe S
Bent pipe	Picture a	10D	5D
Horizontal pipe	Picture b	5D	3D
Backward position of valve	Picture c	10D	5D
Flaring pipe	Picture d	10D	5D
Backward position of mercury	Picture e	15D	2D
Shrinkage pipe	Picture f	5D	2D
Mixed liquid	Picture g	30D	3D



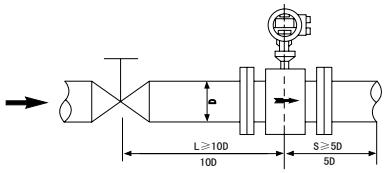
Picture a Horizontal pipe Length Requirements to front adn back straight pipe part



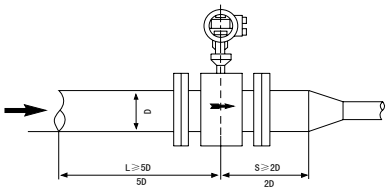
Picture b Bent pipe Length Requirements to front adn back straight pipe part



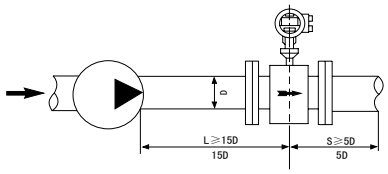
Picture c Flaring pipe Length Requirements to front adn back straight pipe part



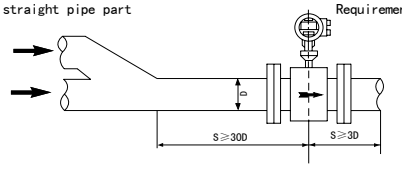
Picture d Backward position of valve Length Requirements to front adn back straight pipe part



Picture e Shrinkage pipe Requirements to front adn back straight pipe part



Picture f Backward position of mercury Length Requirements to front adn back straight pipe part



Picture e Mixed liquid Requirements to front adn back straight pipe part

5.3 Requirements to Craft Pipe

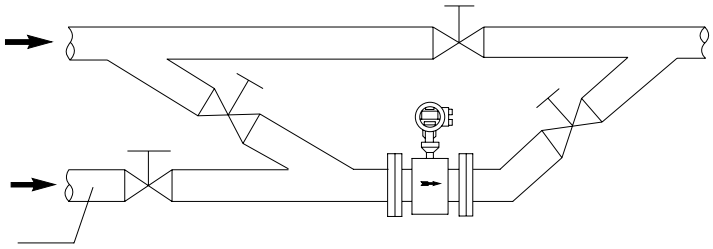
Flowmeters have some certain requirements to upstream and downstream craftpipe, otherwise the measuring precision will be affected.

a. Inner diameter of upstream and downstream craft is the same as that of sensor, and it should meet the needs: 0.98DN≤ D≤1.05DN (in the equation DN : inner diameter of sensor, D: inner diameter of craft pipe)

b. Craft pipe and the sensor must be concentric, deviation of the same axis should be no more than 0.05DN

5.4 Requirements to by-pass Tube

In order to conveniently examine and repair flowmeters, it is better to install by-pass tube for flowmeters. Additionally, to those heavily polluted flux and flowmeters need to be cleaned while the flux cannot be stopped, by-pass tube must be installed.

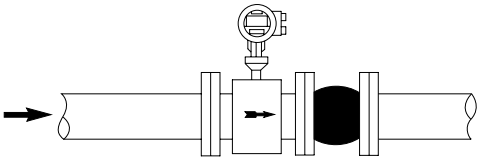


a. Convenience of examination and repair of flowmeters

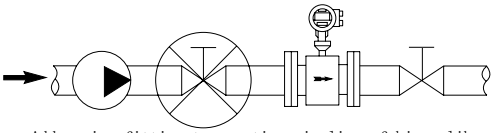
b. In terms of heavily polluted flux by-pass tube must be installed

c. Fluid cannot be stopped while the flowmeters need to be cleaned

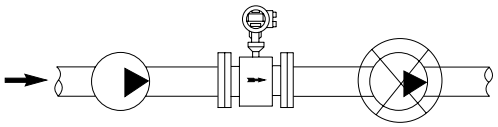
5.5 Installation Requirements of Flowmeters on the Pipeline



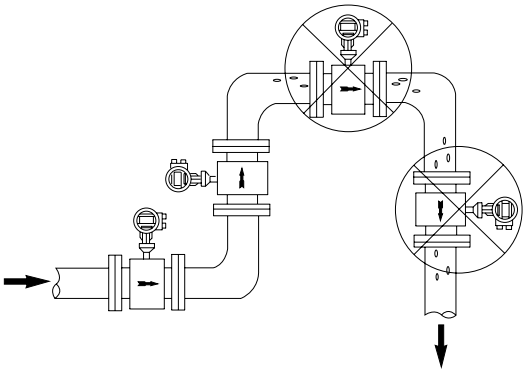
On long pipeline control calve and cutting valve need to be installed on the dowmstream of flowmeters



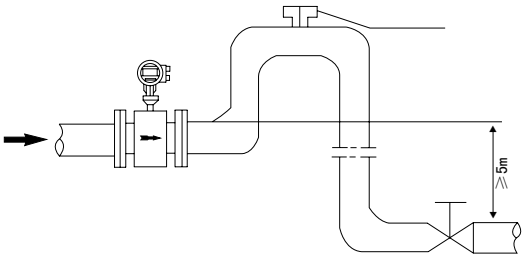
Add spring fitting to mounting pipeling of big caliber flowmeter(above DN200)



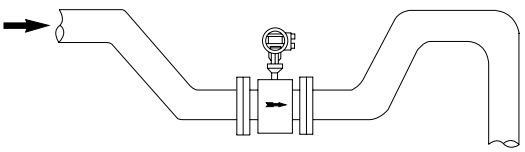
In order to prevent vacuum flowmeters should be installed at the back of the pump



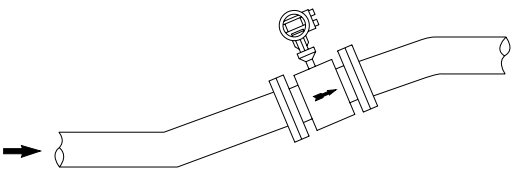
To avoid causing error by attached gas in measurement, mounting of flowmeter



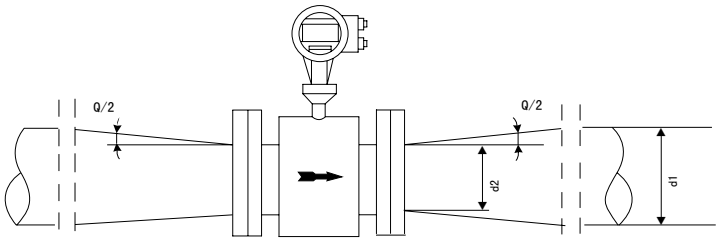
In order to prevent vacuum when the length of drop pipe exceeds 5m it is required to install automatic exhaust valve on the highest of the downstream of flowmeters



Opened fillin or exhaust flowmeter is installed in low part district



Horizontal pipeline flowmeters are installed on the slightly upward district of the pipeling

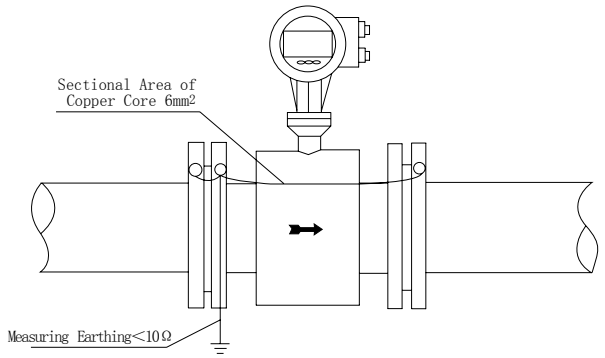


When upstream and downstresm pipeline of flowmeter is tapered pipe,central cone angle of tapered pipe should be<15°

5.6 Earthing of Sensors

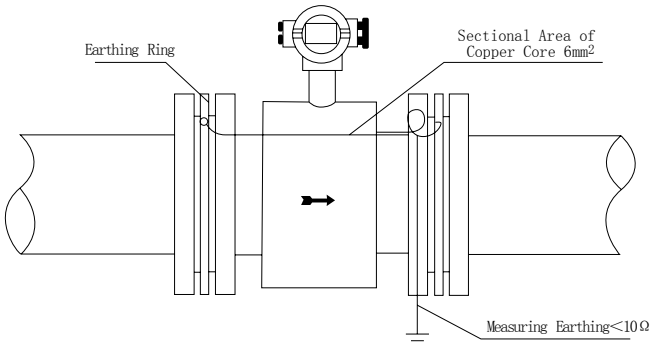
To ensure the reliable work of the instrument, improve the measuring accuracy and not be disturbed by outside parasitic electric potential, sensorsr should bear good independent earth line. Earthing resistance<10Ω.If the pipe connecting sensor is covered with insulating barrier or nonmetallic pipe, earthing loop should be added at both sides of sensors.

a. Ways of earthing on metal pipe : The internal of metal pipe has no insulating barrier

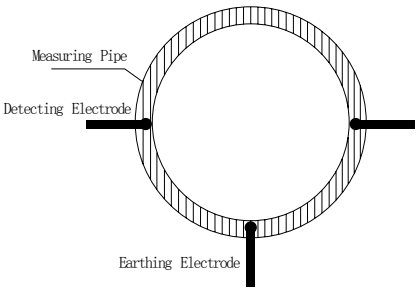


Mounting of Sensor in Metallic Pipeling (inner wall has no insulating layer)

b. Ways of earthing on plastic pipe or insulant paint pipe: earthing loop should be added on both surfaces of sensors to make the moving measured mediums in the pipe connect with ground with zero electric potential. Otherwise electromagnetic flowmeters cannot work normally.



Mounting of sensor on plastic pipeline or pipeline with insulating layer or paint



Remarks:If there's earthing electroed in sensor then no need foradding earthing ring,Role of earting electrode is the same sa that of earthing ring.

5.7 Installation of Sensors on Protectional Pipe in Negative Pole

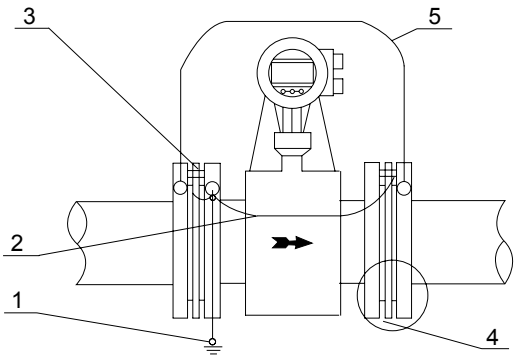
The pipe protecting electrolysis from eroding usually is insulant on both inside and outside. So the measured medium has no earth electric potential. Therefore the sensors must use earthing loop.

To the pipe bearing the protection of erosion-proof, the sensor and connecting pipe at two sides are usually insulant. Therefore the medium is not conductional with earth. The following points must be given attention when the installation is performed.

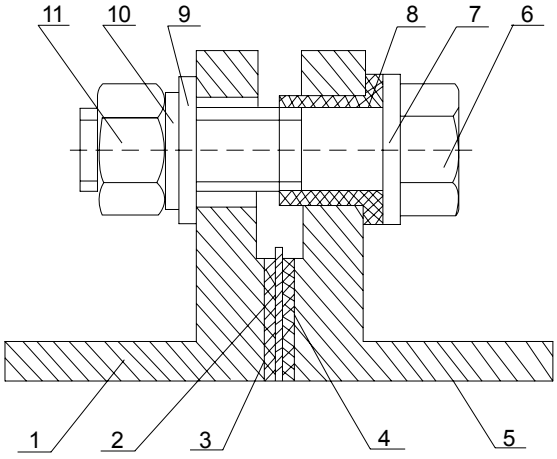
a. Earthing loop is installed on the two surfaces of sensors. They must be insulant with flange of craft pipe and connect the sensor through earth line2. The materials of earthing loop should bear the erosion of mediums. The standard material that the manufacturer provides is stainless steel.(1Cr18Ni9Ti).

b. Flange of craft pipe at two sides of the instrumentation should be connected with the sensor circled by the copper wire whose cross-sectional area is 4mm2 to make the protectional potential in the nagative pole isolate with the sensor. Pay attention not to connecting to the sensor.

Flange connects with the blot and must be insulated with the flange of craft pipe. Users themselves must prepare the liner bushing and cushion ring made of insulant materials.

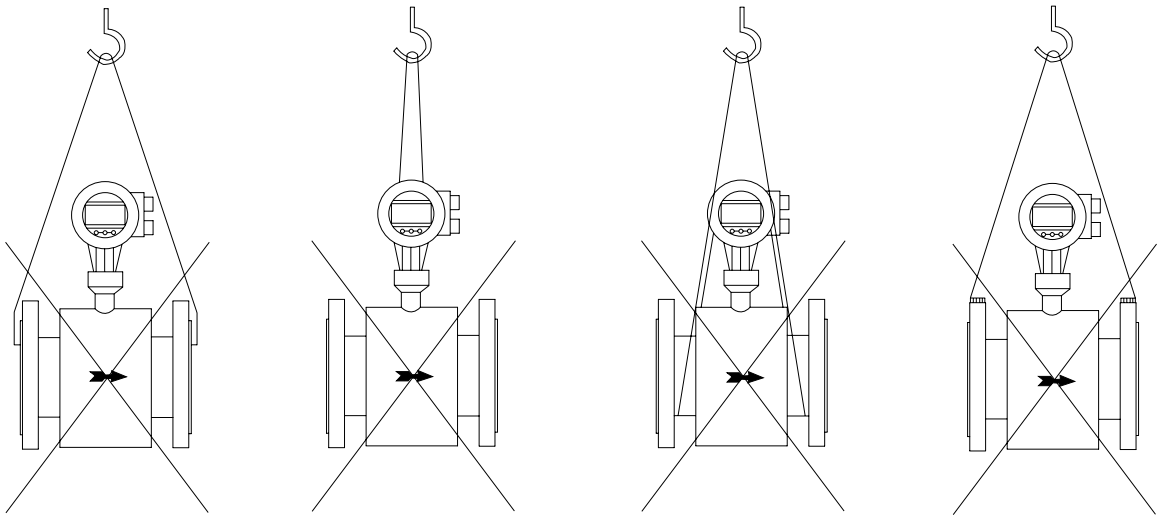


1.Measuring Earthing < 10Ω
2.Earthing Wire Sectional Ares of Copper Core 6mm^2
3.Earthing Ring
4.At mounting blot should be insulant wiht flange
5.Connect conducting wire Sectional Area of Copper Core > 4mm^2



1.Sensor 2.Liner(PTFE or F46) 3.Earting Ring
4.Insulant Sealed Pad 5.Pipeline 6Blot
7.Wahter 8.Insulant bushing 9.Flat Pad
10.Spring Pad 11.Blot

5.8 Transportation of Electromagnetic Flowmeters



Attention at Transportion

5.9 Points for Attention in Terms of the Installation of Flowmeters

a. The installation size must be computed accurately, otherwise easily revealed or unable to install.

b.The flow direction of the flux must keep in accordance with the arrow of flow direction.

c. The axis of electrodes of flowmeters must be approximately horizontal, otherwise the measuring accuracy will be affected.

d. The flange at two sides of the sensor must keep parallel otherwise be easily revealed.

e. To avoid forming whirlpool and flowing, the craft pipe, the seal piece and flowmeter must share the same axis and cannot be staggered.

f. When installing the flowmeter, it is prohibited that the electric welding works near the flange of the flowmeter. Lest that the liner of the flowmeter be burned.

g. To craft pipes of different natures the corresponding ways of ground connection should be applied.

h. To those mediums with a nature of erosion, it is better to install them vertically and the measured medium flows from down to up. By doing so can avoid the solid pellets from depositing in the pipe of the flowmeter, make the erosion of the liner even and prolong the use life.

For those measuring pipes whose caliber is more than 200mm to make the installation convenient, telescopic heads can be applied.

B Transducer

6. Basic Circuit of Transducer

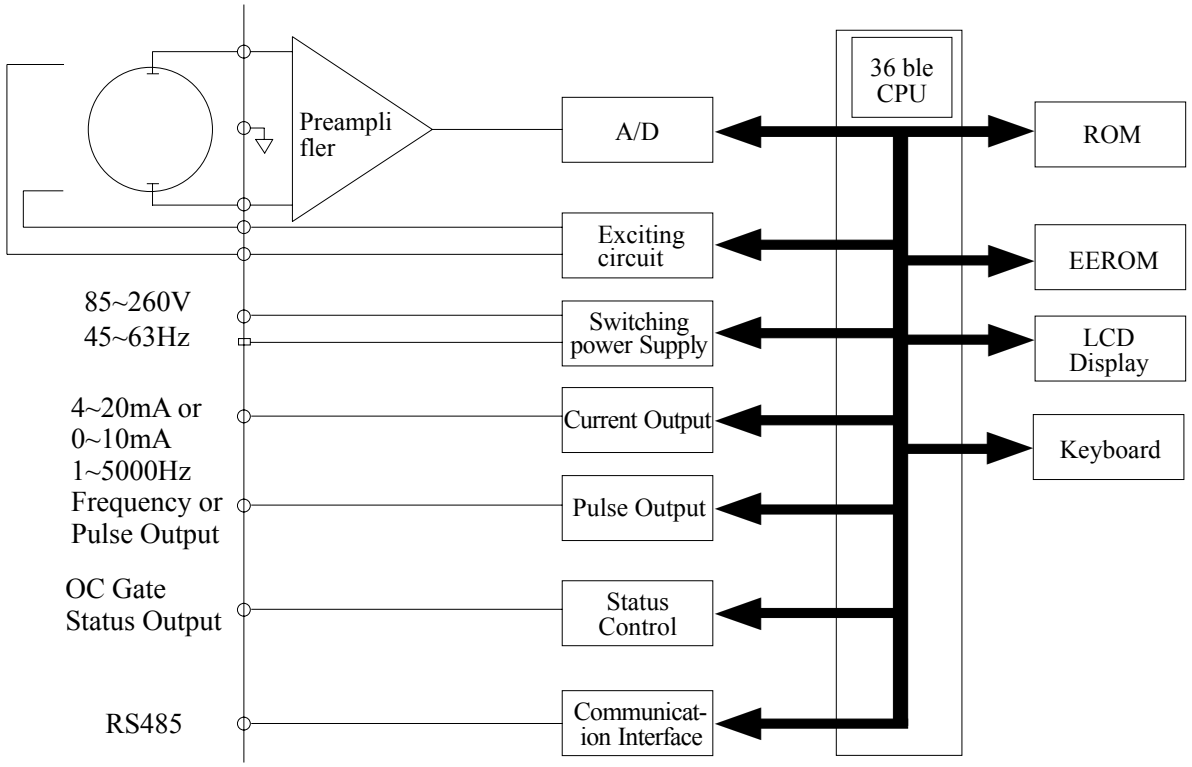


Fig.6 Structure of Transducer Circuit

The transducer can supply excitation current to the coil in the sensor of electromagnetic flowmeter-the head amplifier amplifies the electromotive force from the sensor and converts it into standard signals of current or frequency so that the signals can be used for displaying, controlling and processing. See structure of transducer circuit shown in Fig.6.

7. Operation Instructions of Transducer

7.1 Keys and Display

7.1.1 Keyboard Definition and LCD Display of Square Meter

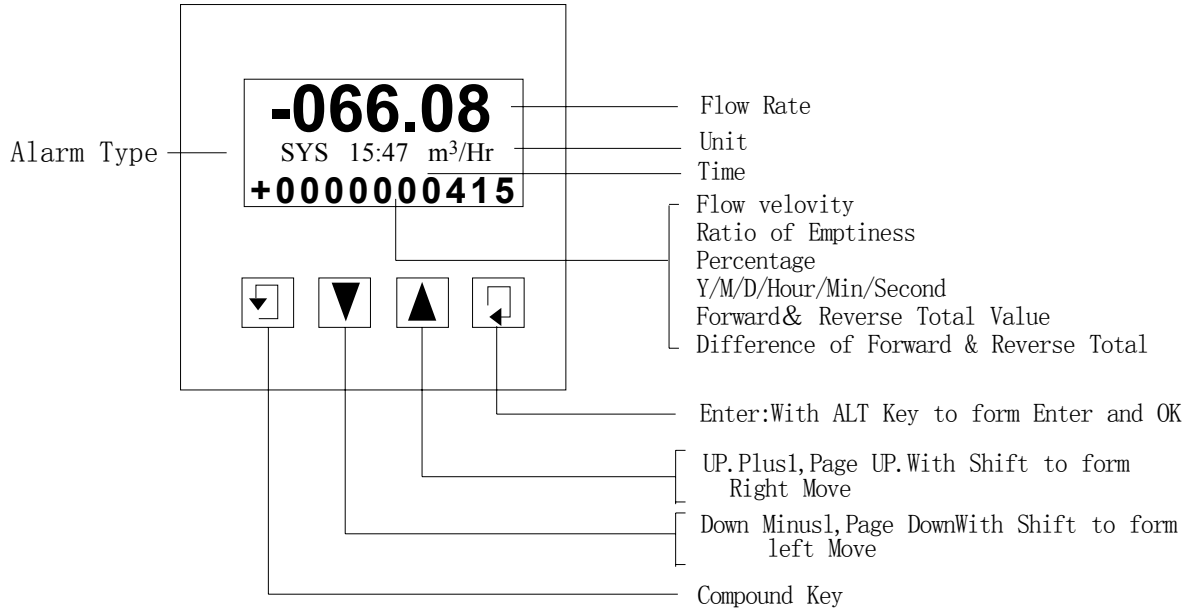


Fig. 7.1.1 Keyboard Definition and LCD Display of Square Meter

7.1.2 Keyboard Definition and LCD Display of Round Meter

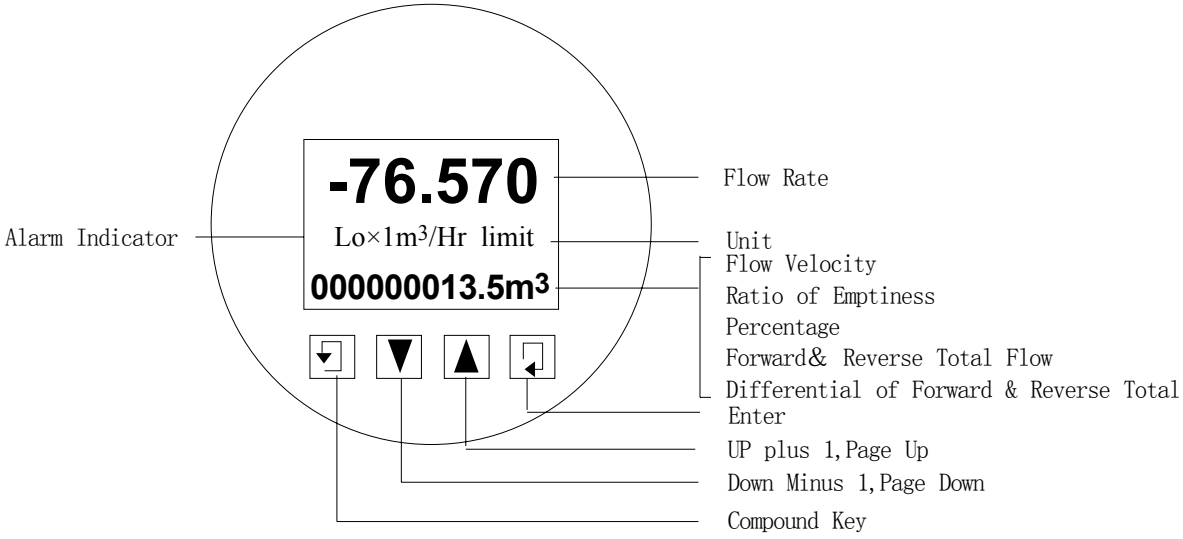


Fig. 7.1.2 Keyboard Definition and LCD Display of Round Meter

Note: When measuring, press “Compound Key + Enter”, appear password of changing status, base on distinction of secrecy, and change the password as we provide; then press “Compound Key + Enter” again, enter the status of setting parameter. If you want to return to the running status, press “Enter” for several seconds.

7.2 Picture of Transducer

7.3 Wiring Diagram

7.3.1 Wiring and Marking of Square Meter Terminal

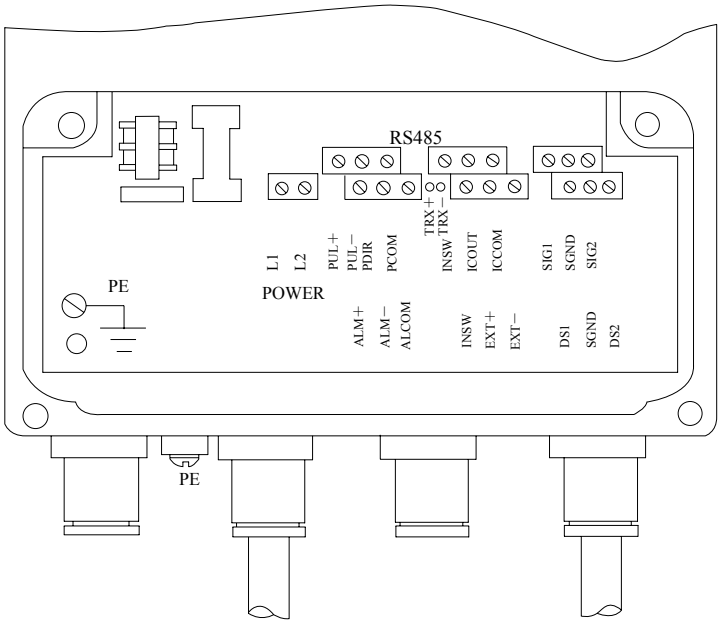


Fig.7.3 (a) Wiring Diagram of Square Meter

Marking Implication of Each Square Meter Wiring Terminal as follows:

SIG1 Signal l
SGND Signal Ground
SIG2 Signal 2
DS1 Shielded Exciting 1
DS2 Shielded Exciting 2
INSW 12V Pull Power
EXT+ Exciting Current +
EXT- Exciting Current -

TO Separate Model Sensor

VDCIO 24V Pull Power
ICOUT Analog Current Output
ICCOM Analog Current Output Vround

Analog Current Output

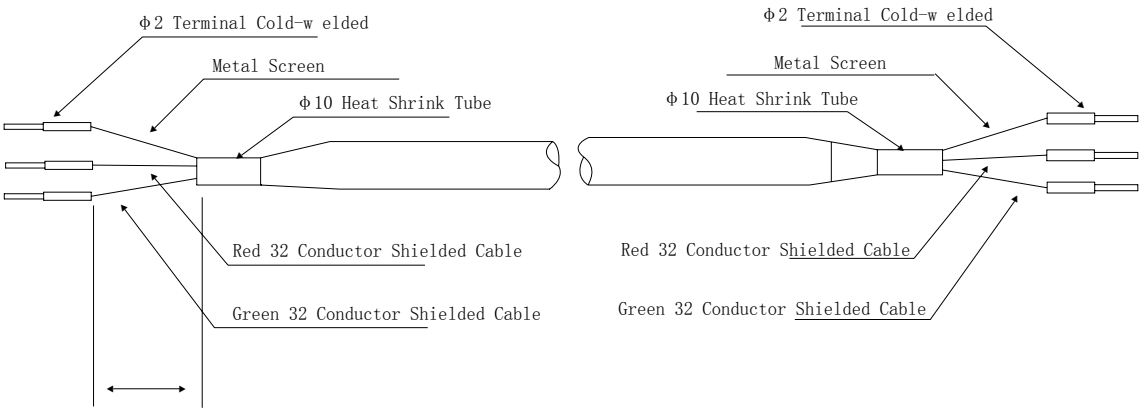
PUL+ Flow Frequency (Pulse) Output
PUL-
PDIR Flow Direction
PCOM Frequency (Pulse) Output Ground

Frequency (Pulse) Output

ALM+ Upper Limit Alarm Output
ALM- Low Limit Alarm Output
ALCOM Alarm Output Ground

Two Alarm Output

7.3.2 Disposition and Marking of Square Meter Signal Wire



Cable for Flow Signa Is:RWP2×32/0.2

Fig.7.3 (b) Connection and Labels of Signal Lines in Square Meter

7.3.3 Wiring and Marking of Round Meter Terminal

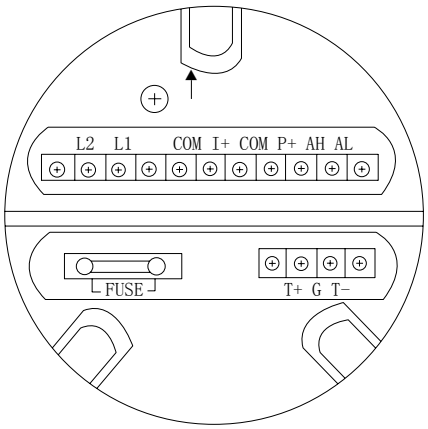


Fig.7.3 (c) Wiring Terminal Figure of Square Meter

Marking Implication of Round Meter as Follows:

I+	Current Output for Flow Measurement
COM	Current Output Ground for Flow Measurement
P+	Frequency(Pulse) Output for Bi-directional Flow
COM	Frequency (Pulse) Output Ground
AL	Alarm Output for Lower Limit
AH	Alarm Output for Upper Limit
COM	Alarm Output Ground
FUSE	Fuse for Power Supply
T_1＋	+Communication Input Signal
T_2—	-Communication Input Signal
G	RS232 Communication Ground
L_1	220V（24V）Power Supply
L_2	220V（24V）Power Supply

7.3.4 Disposition and Marking of Round Meter Signal Line

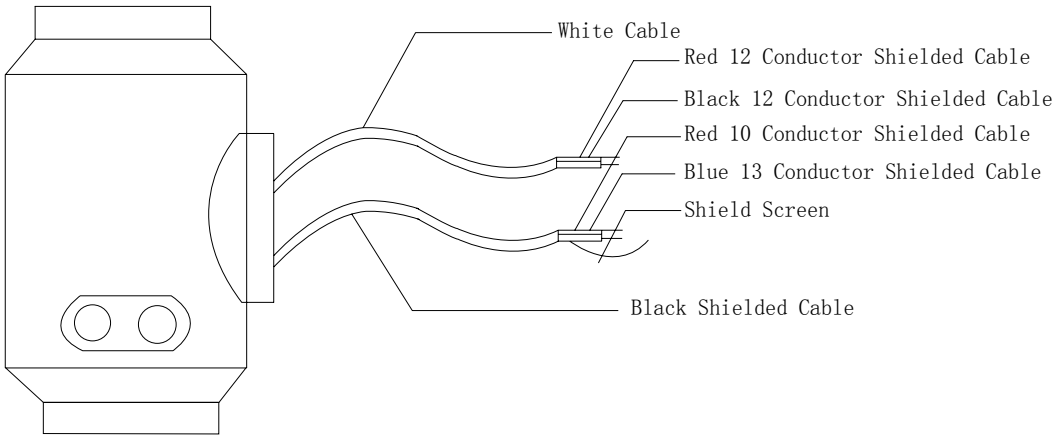


Fig.7.3 (d) Disposition and Marking of Round Meter Signal Line

Marking of round meter signal line as follows:

Bi-strand white wire (for excitation current): 12 –strand red core wire

12 –strand black core wire

Bi-strand black shielding wire: 10 – strand red core wire connected to “Signals 1”

10 – strand blue core wire connected to “Signals 2”

Shielding wire connected to “Signal Ground”

7.4 Characteristic and Connection of Cable

7.4.1 Signal Line of Flowrate

For remote (detachable) type flowmeter, in case the electro-conductivity of measured fluid is more than 50μS/cm the flowrate signal transporting cable may use shielding signal cable with model PVVP 2*0.2 mm^2 The length should be no more than 100m. Signal cables have to be connected to sensors before dispatch. Connections of signal cables are shown in Fig.7.3 (b) for square meter and Fig.7.3 (d) for round meter.

The transducer provided equal potential excitation shielding signal output voltage to decrease the effect of distributed capacitance transmitted by cable to the measurement of flowrate signal. When the measured electro-conductivity is less than 50μS/cm of long-distance transmission you can use bi-core and bi-shielding signal cable with equal potential shielding. For instance, STT3200 exclusive cable or BTS type tri-shielding signal cable.

7.4.2 Excitation Current Wire

Excitation current wire can use soft two-core insulating rubber cable wire, suggesting Model RVVP2*0.3mm^2. The length of excitation current wire is the same as that of signal cable. When using STT3200 exclusive cable the excitation cable and signal cable combined as one whole.

7.4.3 Output and Power Line

All output and power line are prepared by user according to practical conditions. But attention must be given to meet the needs of loading current.

Attention: when DIP switch next to terminal is set to ON, the side transducer provided 28V power supply and 10 KΩ up-pulling resistance to isolated OC gate frequency output (PUL+, PUL-), Alarm Output (ALM+.ALM-), and Status Control（INSW）. Therefore, when using frequency output together with sensor to test, DIP switch may be set to ON; leading out frequency signal from PUL+ and PCOM terminals.

Pulse current output and alarm current output external power supply and load. See Fig.7.4 (a). When using sensitive load, stream-continuous diode as shown in the figure should be added.

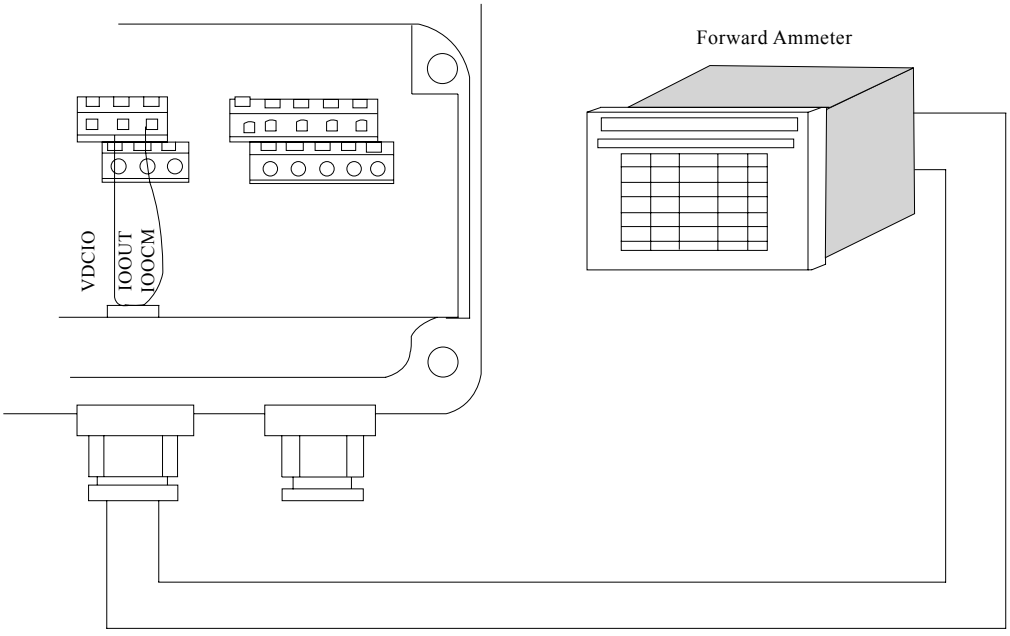


Fig.7.4 (a) Current Output Diagram

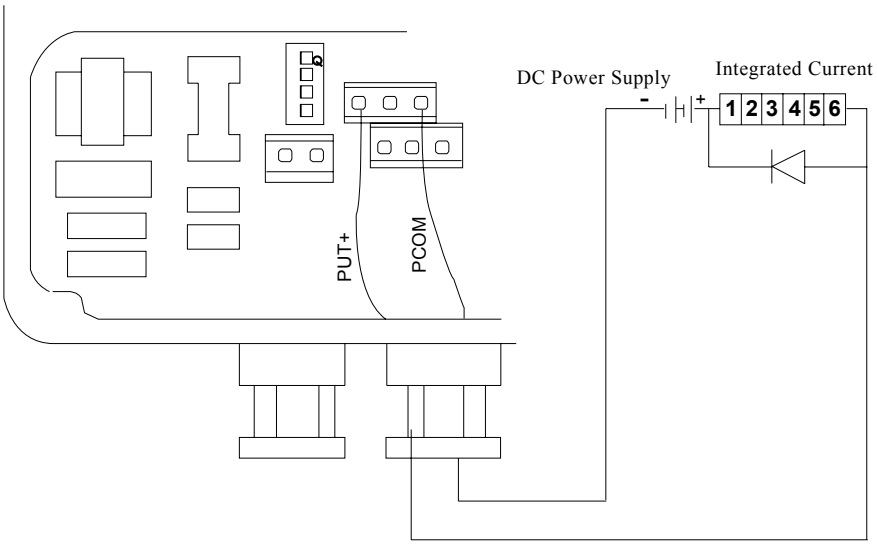


Fig.7.4 (b) Connection of Electromagnet Counter

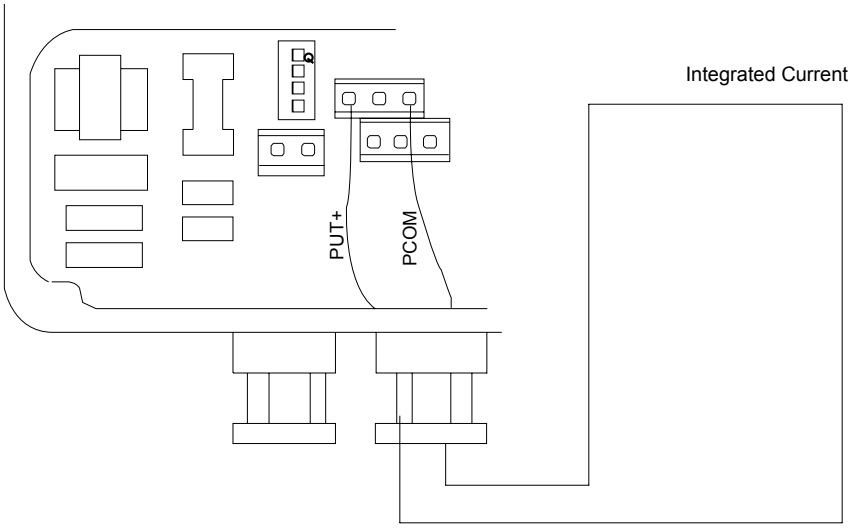


Fig.7.4 (c) Connection of Electronic Counter

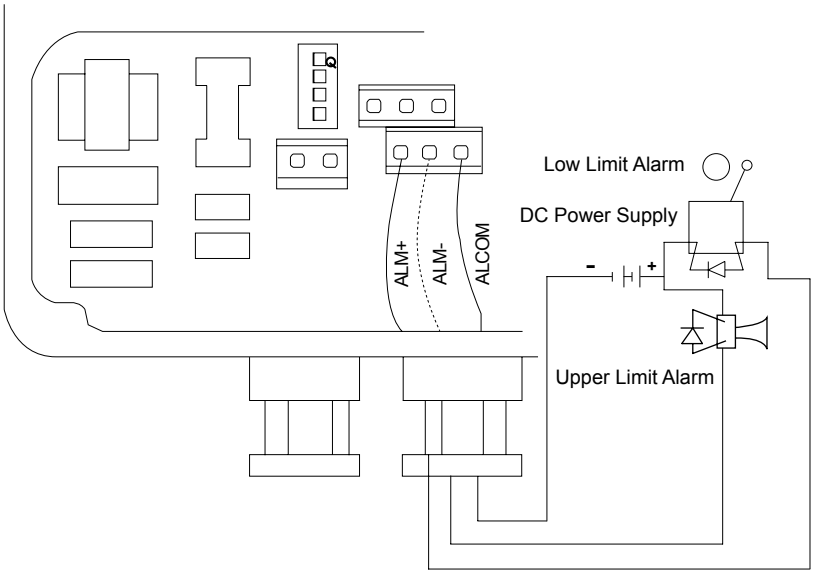


Fig.7.4 (d) Connection of Alarm Output

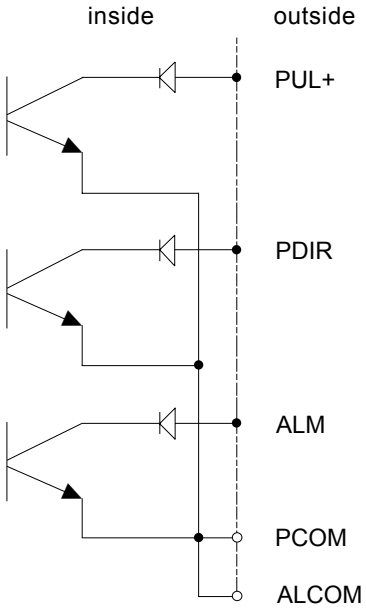


Fig.7.4 (e) Connection of OC Gate

7.4.4 Grounding

Earthing terminal PE should be grounding copper wire with diameter not less than 1.6mm^2 to connect with the earth. Earthing resistance from housing of transducer to earth should be less than 10Ω.

7.5 Output of Digital Quantity

Digital output refers to frequency output and pulse output. Frequency output and pulse output use the same output point on wiring. Therefore, users cannot choose both frequency output and pulse output at the same time but either of them.

7.5.1 Frequency Output

Frequency output range: 0~5000HZ. Frequency output corresponds with flow percentage,

$$F = \frac{\text{Measure value}}{\text{Full scale value}} \cdot \text{Frequency Range}$$

Upper limit of frequency output is adjustable. User may choose from 0 to 5000 Hz, or a little lower one, such as 0 to 1000 Hz or 0 to 5000 Hz, etc.

Frequency output mode is generally used for controlling purpose because it affects percentage flow rate; if for measurement purpose then select pulse output mode.

7.5.2. Pulse Output

Pulse output mode is mainly used for measurement; output one pulse, represents one equivalent flow rate, such as 1L or 1M3, etc.

Pulse output equivalent are divided into: 0.001L, 0.01L, 0.1L, 1L, 0.001 M3, 0.01 M3, 0.1 M3, 1 M3. Users should pay attention that flow range of flowmeter matches with pulse equivalent when choosing pulse equivalent. For volume flow, calculation formula is as follows:

$Q_L = 0.0007854 \times D^2 \times V$（L/S）or $Q_M = 0.0007854 \times D^2 \times V \times 10^{-3}$（$M^3$/S）

Here: D — Diameter（mm） V — Velocity（m/s）

If flow rate is too large while selected pulse equivalent is too small, it will cause pulse output exceed upper limit. Therefore, pulse output frequency should be limited under 3000 Hz. If flow rate is too small

while pulse equivalent is too large it will cause the instrument output one pulse in long time.

Additionally, pulse output is different from frequency output; pulse output is when accumulation is enough for one pulse equivalent then output one pulse, therefore, pulse output is not very even. Generally, counter instrument instead of frequency instrument should be selected for pulse output measurement

7.5.3 Connection of Digital Quantity Output

Digital quantity output has three junctions: digital output junction, digital grounding wire junction and flowrate direction junction. The signs are as follows:

POUT ———— digital output junction

PCOM ———— digital grounding wire junction

PDIR ------- flowrate direction junction

Generally, the fluid flows towards one direction, meanwhile, use only need to use output junction and grounding wire junction. If user wants to know flow direction of fluid they may use flowrate direction junction to complete.

POUT is collector open-circuit output, user may refer to the following circuit:

7.5.3.1 Digital Quantity Level Output Connection

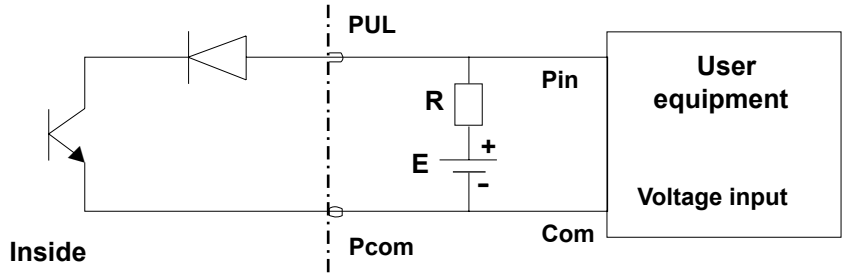


Fig.7.5 (a) Connection of Digital Quantity Electrical Level Output

7.5.3.2 Digital Quantity Output connecting Photoelectric Coupler (such as PLC etc.)

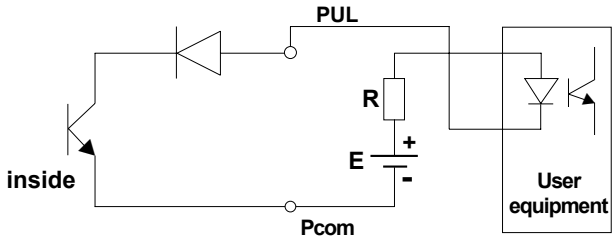


Fig.7.5 (b) Digital Quantity Output connecting Photoelectric Coupler

Generally, user photo coupler need about 10mA current. Therefore, E/R=10mA, E=5~24V.

7.5.3.3 Digital Quantity Output Connecting Relay

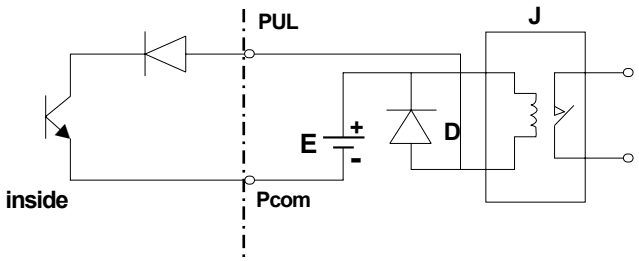


Fig.7.5 (c) Digital Quantity Output Connecting Relay

Generally, the E required by middle relay is about 12V or 24V. D is the stream-continuous diode. At present, the internal of most middle relay has this diode. If middle relay itself has no diode, user should connect one from external.

Digital quantity output parameters are as follows:

POUT and PDIR

Parameter	Test Condition	Min Value	Typical Value	Max Value	Unit
Voltage	IC=100 mA	3	24	36	V
Current	Vol≤1.4V	0	300	350	mA
Frequency	IC=100mA Vcc=24V	0	5000	7500	HZ
High Electric Level	IC=100mA	Vcc	Vcc	Vcc	V
Low Electric Level	IC=100mA	0.9	1.0	1.4	V

7.6.3 Current Output Connection of Transducer

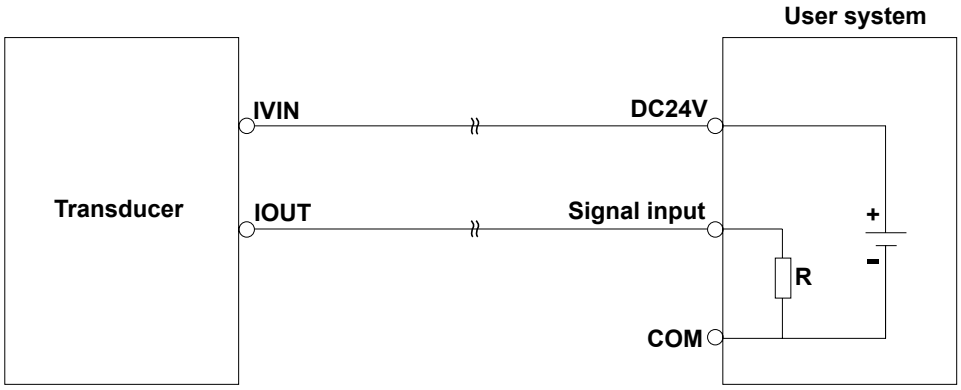


Fig.7.6 (a) Two-wire Connection

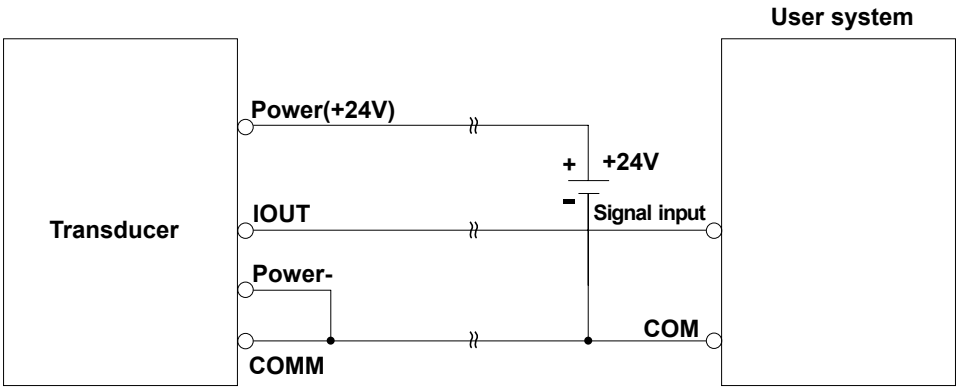


Fig.7.6 (b) Three-wire Connection

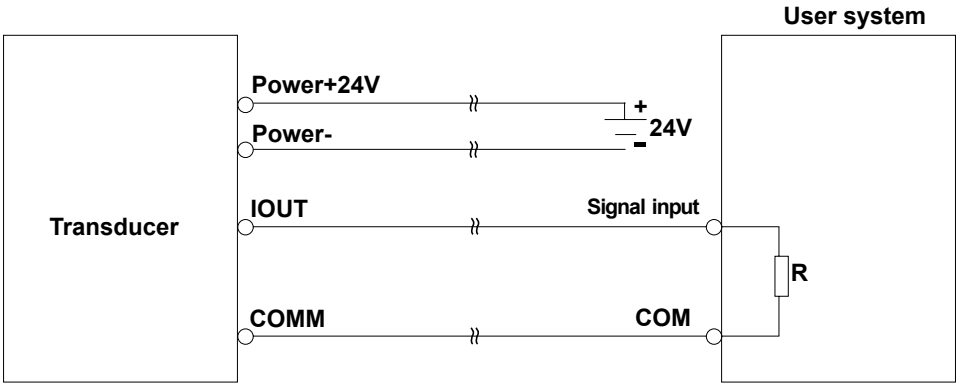


Fig.7.6 (c) Four-wire Connection

8. Parameters Setting

After connecting transducer and sensor to fluid pipeline (no matter calibration or use), you should initially do the following work:

- Tighten well the pipelines before and after the sensor with copper wire
- Make sure the sensor connect well with the earth
- Make sure the fluid in the pipeline static when adjusting instrument zero
- Make sure the oxidation velum of sensor electrode generate steadily (keep the electrode and fluid contacting continuously for 48 hours).

The instrument has two running status: Automatic measuring status
Parameter setting status

When the instrument is power on it enters into measuring status automatically. Under automatic measuring status instrument automatically finishes all measuring functions and display corresponding measuring data. Under parameter setting status, user uses four panel keys to complete instrument parameter setting.

8.1 Keys Function

a) Keys Function under Automatic Measuring Status

"Down" Key: circularly choose the content displayed on down line of screen

"Up" Key: circularly choose the content displayed on up line of screen

"Compound" Key +"Enter" Key: enter parameter setting status

"Enter" Key: return to automatic measuring status

Under measuring status, by pressing "Compound" Key + "Up" Key or "Compound" Key + "Down" Key to adjust CONTRAST of LCD indicator.

b) Keys Function under Parameter Setting Status

"Down" Key: decrease 1 from the number where cursor stops

"Up" Key: add 1 to the number where cursor stops

"Compound" Key + "Down" Key: left shift the cursor

"Compound" Key + "Up" Key: right shift the cursor

"Enter" Key: enter/exit submenu

"Enter" Key: under any status, push down for 2 seconds continuously to return to automatic measuring status.

Note: (1) When using "Compound" key, firstly press "Compound" key, then press "Up" key or "Down" key together.

(2) Under parameter setting status, if no operation within 3 seconds then the instrument will automatically return to measuring status.

(3) For flow direction selection of flowrate zero amendment, shift the cursor to "+" or "-"on the left, switch it with "Up" key or "Down" key to make it reverse to practical flow direction.

8.2 Operation of Parameter Setting Function Key

In order to set or revise instrument parameters, you must change the instrument from measuring status into parameter setting status. In measuring status, press "Compound" Key + "Enter" Key, instrument enters functions selection frame "Parameter Setting", then press "Enter" key to enter password input

status, “00000” status, input password to enter; press “Compound” Key + “Enter” Key to enter parameter setting frame.

Total Flow Zero: in measuring status, press “Compound” Key + “Enter” Key to indicate “Parameter Setting” function, then press “Up” Key to turn to “Total Flow Zero”; input password of total flow zero, press “Compound” Key + “Enter” Key, when password of total flow zero automatically becomes “00000”, instrument finishes zero clearing, at this time total flow inside instrument is zero.

The instrument is designed to have six –grade passwords, among which four grades users can set the password by themselves; the highest two grades are fixed password value. The six grades passwords are respectively applied to operators of different security classification.

8.3 Parameter Setting Menu

Transducer (converter) has altogether 52 parameters. Users should set parameters according to specific conditions when using instrument. Parameters of transducer are as follows:

Parameters Setting Sheet

Code	Parameter Script	Setting Mode	PW Grades	Parameter Range
1	Language	Select	2	Chinese/English
2	Com Addres	Set count	2	0～99
3	Baud Rate	Select	2	600～14400
4	Com Protocol	Select	2	Type 1/Type 2
5	Sensor Size	Select	2	3～3000
6	Flow Range	Set count	2	0～99999
7	Flow Rspns	Select	2	0～100
8	Flow Direct	Select	2	Forward/ Reverse
9	Flow Zero	Set count	2	±0.000~±9.999
10	Flow Cutoff	Set count	2	0～99%
11	Cut Disp Ena	Select	2	Enable/Disable
12	Total Unit	Select	2	0.001L～m^3
13	Segma_N Ena	Select	2	Enable/Disable
14	Analog Type	Select	2	0～10mA /4～20mA
15	Pulse Type	Select	2	Freque / Pulse
16	Pulse Unit	Select	2	0.001L～1m^3
17	Frequen Max	Select	2	1～ 5000 HZ
18	Mtsensor Ena	Select	2	Enable/Disable
19	Mtsnsr Trip	Set count	2	999.9 %
20	Mtsensor Crc	Set count	2	0.0000～3.9999
21	Alm High Ena	Select	2	Enable/Disable
22	Alm High Val	Set count	2	000.0～ 199.9 %
23	Alm Low Ena	Select	2	Enable/Disable
24	Alm Low Val	Set count	2	000.0～199.9 %
25	Clr Total Rec	Password	3	000000～399999
26	ClrSum Key	Set count	4	000000～399999
27	Sensor Code1	User set	5	Finished date Y M
28	Sensor Code2	User set	5	Product Serial No.
29	Sensor Fact	Set count	5	0.0000～3.9999
30	Field Type	Select	5	Mode 1,2,3,4
31	Flow Factor	Set count	5	0.0000～3.9999
32	Mult Factor	Set count	5	0.0000～3.9999
33	Analog Zero	Set count	5	0.0000～1.9999
34	Analog Range	Set count	5	0.0000～3.9999
35	Meter Factor	Set count	5	0.0000～3.9999
36	MeterCode 1	Factory set	5	Finished date Y M
37	MeterCode 2	Factory set	5	Product Serial No
38	FwdTotal Lo	Correctable	5	00000～99999
39	FwdTotal Hi	Correctable	5	00000～39999
40	RevTotal Lo	Correctable	5	00000～99999
41	RevTotal Hi	Correctable	5	00000～39999
42	Year	User correct	5	00～99
43	Month	User correct	5	00～99
44	Day	User correct	5	00～99
45	Hour	User correct	5	00～99
46	Minute	User correct	5	00～99
47	Second	User correct	5	00～99
48	Pass Word 1	User correct	5	0000～9999
49	Pass Word 2	User correct	5	0000～9999
50	Pass Word 3	User correct	5	0000～9999
51	Pass Word 4	User correct	5	0000～9999
52	Load Preset	Factory set	6	Initialized password

Note: Please don't use code 4 and 13 at drop time; codes 43 to 47 are power-off time recording functions; the transducer without power-off function doesn't have this parameter item.

8.4 Instructions of Instrument Parameters

Instrument parameters determine instrument running status, calculation method, output ways and status. Correctly select and set instrument parameter can make instrument run at the best status and get higher measuring display accuracy and measuring output accuracy.

Parameter setting functions of instrument are designed to have six-grade passwords among which 1 to 5 are users' passwords while the sixth grade is manufacturer's password. Users may use the 5^{th} grade password to reset grades 1 to 4.

No matter which grade password to use, user can check instrument parameters. But if users want to change instrument parameter they need to use different grade password.

First Grade Password (set by manufacturer as 00521): User may only observe instrument parameters;

Second Grade Password (set by manufacturer as 03210): User may change instrument parameters from 1 ~ 24;

Third Grade Password (set by manufacturer as 06108): User may change instrument parameters from 1 ~ 25;

Fourth Grade Password (set by manufacturer as 07206): User may change instrument from 1 ~ 26;

Fifth Grade Password (fixed value): User may change instrument parameter from 1 ~ 51.

……

Password Grade 5 can be set by skilled users. Grade 4 is mainly used for setting total flow zero; Grades 1~3 can be set by any one chosen by users.

8.4.1 Language

Transducer has two languages----Chinese & English. Users may choose operation by themselves.

8.4.2 Instrument Communication Address

When communicating with multi-machines different communication address can be set.

8.4.3. Instrument Communication Velocity

Baud Rate selection range: 600, 1200, 2400, 4800, 9600, 14400

8.4.4 Instrument Communication Ways

Communication type 1 is 485 communication signal output; type 2 is MODBUS communication signal output.

8.4.5 Pipe Size

Sensor size from 3 to 3000 mm.

8.4.6 Flow Unit

Select the following flow display unit from parameters: L/s, L/min, L/h, m^3/s, m^3/min, m^3/h, UKG, USG. Users may select the one generally used.

8.4.7 Setting of Flow Range

Flow range setting refers to determining upper limit flow value (full span) while lower-limit flow value automatically set to “0”. So, instrument flow range setting determines instrument flow range, also determines the corresponding relationship between instrument percentage display, frequency output or current output and flow:

Percentage Display Value = (Flow Measuring Value /Instrument Flow Range) * 100 %;

Frequency Output Value= (Flow Measuring Value /Instrument Flow Range) * Full Span of Frequency

Current Output = (Flow Measuring Value /Instrument Flow Range) * FS of Current + Base Point;

Pulse output value is not affected by instrument flow range setting.

Notice: Instrument displays flow rate with 5 effective figures. Flow rate unit is displayed after the last value. If the selected flow rate unit is improper the microprocessor will show the operator “overflow” or “underflow” caused by wrong setting. For example, select L/h as flow display unit for 200 mm diameter; when flow rate at 1 m/s is 113097 L/h, exceeds 5 figures, causing “overflow”, you should select flow unit m3/s, m3/min and m3/h.

8.4.8 Measuring Filtration Time (Damping Time)

Long measuring filtration time may improve the stability of instrument flow display and output signal, fit for accumulated pulsating movement flow measuring. Short measuring filtration time has fast response speed, fit for control in production process. Setting of measuring filtration time uses selection mode, that is, user selects one filtration time.

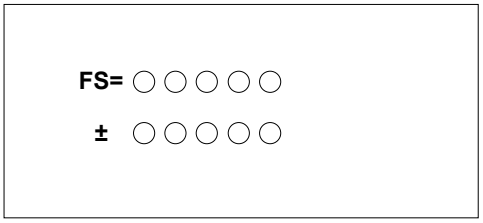
8.4.9 Selection of Flow Direction

If users think that flow direction at debugging is different from designed one, users don’t need to change connection of excitation line or signal line but to set parameter change for flow direction.

8.4.10 Flow Zero Amendment

Measuring pipe of sensor should be filled with fluid and fluid in static status. Flow zero is expressed by flow velocity, unit mm/s.

Flow rate zero amendment is as follows



Up line small words display: FS stands for zero measuring value

Down line big words display: amendment value of zero

When FS display not “0”, amend FS = 0.

Note: if change down line amendment value, FS increases, need to change positive sign and negative sign of down line value to make FS amend to be zero.

Amendment value of flow zero is a constant value, should be registered into record sheet of sensor and naming plate. Zero value is a flow velocity value, making mm/s as unit, its sign is in contrary to that of amendment value.

8.4.11 Small Signal Cutoff (Flow Cutoff)

Setting of small signal cutoff point is expressed by percentage flow of span. When doing small signal cutoff users may choose to cut off flow rate, flow velocity and percentage display and signal output at the same time; or choose to only cut off current output signal and frequency (pulse) output signal while keep flow rate, flow velocity and percentage display.

8.4.12 Total Flow Unit

Indicator of transducer is 9-bit counter, max allowed value is 999999999.

Total flow unit: L, m3, UKG and USG

Total flow equivalent: 0.001L, 0.010L, 0.100L, 1.000L

0.001m^3, 0.010m^3, 0.100m^3, 1.000m^3;

8.4.13 Reverse Output Permission Function (Segma_N Ena)

If reverse output permission parameter is set at “Enable” status and fluid flows reversely, transducer outputs pulse and current as per reverse flow rate and reverse total flow accumulates. If reverse output permission parameter is set at “Disable” and fluid flows reversely then output pulse of transducer is “0” (4mA or 0 mA), but total flow still accumulates.

8.4.14 Current Output

Users may choose 0 to 10mA or 4 to 20mA current output.

8.4.15 Pulse Output

Frequency output and pulse output for option

Frequency output: frequency output is continuous square wave; frequency value is in corresponding with flow percentage.

Frequency Output value = (Flow Measuring Value / Instrument Flow Range) * FS of Frequency

Pulse Output: pulse output is rectangular wave pulse string; each pulse expresses one flow equivalent flows through pipeline; pulse equivalent is selected from “pulse equivalent unit”. Pulse output mode is mainly used for flow totalization, connected with totalizer.

Frequency output and pulse output are generally in the form of OC door. Therefore, external direct current power and load should be connected.

8.4.16 Pulse Equivalent Unit

Pulse unit equivalent refers to flow rate represented by one pulse; selection range of instrument pulse equivalent:

Pulse Equivalent	Flow Rate	Pulse Equivalent	Flow Rate
1	0.001L/cp	5	0.001m^3/cp
2	0.01L/cp	6	0.01m^3/cp
3	0.1L/cp	7	0.1m^3/cp
4	1.0L/cp	8	1.0m^3/cp

Under the same flow rate, if pulse equivalent is small then frequency of output pulse is high and error is total flow is small.

8.4.17 Pulse Output Time

Pulse output time can be selected between 4 to 400 ms; in case of high frequency, automatically change to square wave.

8.4.18 Frequency Output Range

Frequency output range is in corresponding with upper limit of flow measuring, i.e. 100% of percentage flow; upper limit value of frequency output can be set from 1 to 5000 Hz.

Empty Pipe Alarm Permission (Mtsensor Ena)

Instrument has empty pipe testing function, and no need for extra electrode. If users choose to allow empty pipe alarm then when fluid in pipeline is lower than measuring electrode, instrument will test an empty pipe status. After testing this status, analog output and digital output of instrument set to be zero, meanwhile, instrument flow rate displays zero.

8.4.19 Empty Pipe Alarm Threshold Values (Mtsnsr Trip)

In case the pipeline is filled with fluid (no matter whether there's flow velocity), revise setting of empty pipe alarm to make convenient use. Up line of empty pipe alarm threshold value displays practical conductivity while down line displays set empty pipe alarm threshold value; you may set empty pipe alarm threshold value according to practical conductivity, 3 to 5 times of that.

8.4.20 Upper Limit Alarm Permission (Alm High Ena)

Users choose "Enable" or "Disable".

8.4.21 Upper Limit Alarm Value

Upper limit alarm value is calculated by span percentage; this value is in the form of value setting, users set one value between 0% and 199.9%. In the process of running, if alarm requirements are met, instrument will output alarm signal.

8.4.22 Lower Limit Alarm

Same as that of upper limit alarm

8.4.23 Excitation Alarm

Select "Enable", with excitation alarm function; select "Disable", cancel excitation alarm function.

8.4.24 Code of Sensor

Sensor code may be used to mark production date and serial no of go-with sensor to help set sensor factor.

8.4.25 Sensor Factor

Sensor factor: calibration factor of electromagnetic flowmeter. This factor is got by calibration and printed on naming plate of sensor. Users are required to set this factor in the transducer parameters. (generally, the factory will set it before dispatch)

8.4.26 Excitation Mode Selection

Transducer provides three excitation frequency for option: 1/10 power frequency (mode 1), 1/16 power frequency (mode 2), 1/25 power frequency (mode 3). For small diameter sensor excitation system inductance is small, should select 1/10 power frequency; for big diameter sensor excitation system inductance is large, users can only select 1/16 power frequency or 1/25 power frequency. In the process of use, firstly select excitation mode 1, if flow velocity zero is too high then select mode2 or mode3 in turn.

Note: The flowmeter should work in the same excitation mode as in which the flowmeter is calibrated.

8.4.27 High Level / Low Level of Forward Total Flow

Setting of high or low level total flow can change the value of forward total flow and reverse total flow; mainly used for instrument maintenance and replacement.

Users use 5-grade password to enter, may revise forward total flow（Σ+）. Generally, the set total flow cannot exceed the max value (999999999) counted by counter.

8.4.28 Time – Year, Month, Day, Hour, Minute, Second (with clock function)

Users use five-grade passwords to enter, may revise time – year, month, day, hour, minute and second.

8.4.29 Peak Restriction Permission

For serum like paper pulp and slurry, solid particle in the liquid may rub or attack measuring electrode and cause “Tip Shape Interference”; to overcome this kind of interference, our transducer uses algorithm of change rate restriction; transducer is designed to have 3 parameters to select change rate restriction characteristics.

Set this parameter to “Enable” to start change rate restriction algorithm; set this parameter to “Disable” to close change rate restriction algorithm.

8.4.30 Peak Restriction Factor

This factor selects the change rate to restrict Tip Shape Interference, calculate as per percentage of flow velocity, divided into 10 grades: 0.010m/s, 0.020m/s, 0030m/s, 0.050m/s, 0.080m/s, 0.100m/s, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s. The smaller the percentage, the higher the sensitivity of Tip Shape Interference Restriction. Please note, in application, it is not necessary that the higher the sensitivity the better, but try to choose according to practical conditions.

8.4.31 Peak Restriction Time

This parameter selects the time width to restrict Tip Shape Interference, take millisecond as unit.

If flow change in lasting time less than that in selected time then transducer thinks it is Tip Shape Interference; if flow change in lasting time is larger than that in selected time then transducer thinks it is normal flow change. You may try to select this parameter according to practical conditions.

8.4.32 Users Password 1 to 4

Users use 5-grade password to enter, may revise this password.

8.4.33 Current Zero Amendment

Zero adjustment of current output before leaving factory makes current output accurately to be 0 mA or 4 mA.

8.4.34 Current Full Span Amendment

Full span adjustment of current output before leaving factory makes current output accurately to be 10mA or 20mA.

8.4.35 Factory Calibration Factor

The manufacturer of transducer uses this factor to make measuring circuit system of transducer normalization to ensure exchangeability among all transducers upto 0.1%.

8.4.36 Instrument Code 1 & 2

Transducer codes record factory date and serial no of transducer.

8.4.37 Password for Total Flow Zero

Users may use third-grade password to set this password, under Total Flow Zero.

9. Alarm Information

Because print circuit board of transducer uses surface welding technology, for users, it is unrepairable. Therefore, users cannot open the shell of transducer.

The transducer has self-diagnosis function. Except for trouble in power supply and hardware circuit, it can accurately give alarm information for trouble appeared in general application. These information indicate "  " at the left of indicator. Under measuring status, instrument automatically displays trouble content as follows:

FQH ---- Flowrate Upper Limit Alarm; FQL ---- Flowrate Lower Limit Alarm;

FGP ---- Fluid Empty Pipe Alarm; SYS ---- System Excitation Alarm;

UPPER ALARM ---- Flowrate Upper Limit Alarm LOWER ALARM ---- Flowrate Lower Limit Alarm

LIQUID ALARM ---- Fluid Empty Pipe Alarm SYSTEM ALARM ---- System Excitation Alarm

10. Troubleshooting

10.1 No Display

* Check whether power is on.
* Check whether main fuse is in good condition
* Check whether power supply meets the requirement.

10.2 Excitation Alarm

* Check whether excitation connection EX1 and EX2 are open circuit

* Check whether total resistance of sensor excitation coil is less than 150 Ω

* If the former two items are normal then transducer has trouble.

10.3 Empty Pipe Alarm

* Check whether sensor measuring pipe is filled with fluid

* Short circuit transducer signal input terminal SIG1, SIG2 and SIGGND with lead wire; meanwhile, if prompt“Empty Pipe”cancels then it shows transducer is normal; it’s possible that the conductivity of measured fluid is low or settings of empty pipe threshold value and empty pipe range are wrong.

* Check whether signal lines are connected correctly

* Check whether electrodes of sensor are correct.

Make flow rate zero, indicated conductance ratio should be less than 100%

When there are flow flowing through, respectively test the resistance of terminal SIG1 and SIG2 to SIGGND, should be less than 50 kΩ (for measuring value of fluid water, it’s better to measure with pointer multimeter; charge-discharge phenomenon will be seen in measuring process).

* Test direct current voltage between DS1 & DS2 with multimeter, it should be less than 1V, otherwise it indicates that sensor electrodes are polluted, and should be cleaned.

10.4 Flow Measurement Not Accurate

* Whether measuring pipe is full of fluid

* Whether signal lines are connected normally

* Check whether sensor factor and sensor zero are set according to naming plate or calibration certificate.

11. Transportation & Storage

To prevent the instrument from being damaged in running, before reaching mounting site, please keep the original state. In storage, storage site should be indoor meets the following conditions:

a) Rain proof, damp proof

b) Slight mechanical vibration, avoid impact

c) Temperature range: -20 to 60 ℃

d) Humidity: no more than 80%

12. Points for Attention in Order

Please specify the following items when ordering:

Model, specification and additional codes

Fluid name

Temperature range

Pressure range

Flow range