



LDG ELECTROMAGNETIC FLOWMETER

INSTRUCTION MANUAL



ISO9001:2008

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CHANGZHOU CHENGFENG FLOWMETER CO.,LTD

No.15,Qinglong Tongjia Industrial Park,Changzhou,Jiangsu Prov.,China

Tel:86-519-85327611,

Fax:86-519-85505269

Email:sales@qf-meter.com,

Http://www.qf-meter.com

[Caution]

Before using an instrument, please read this instruction manual with caution in order to properly operate it with a better understanding, and also for the purpose of read easily and accurately.

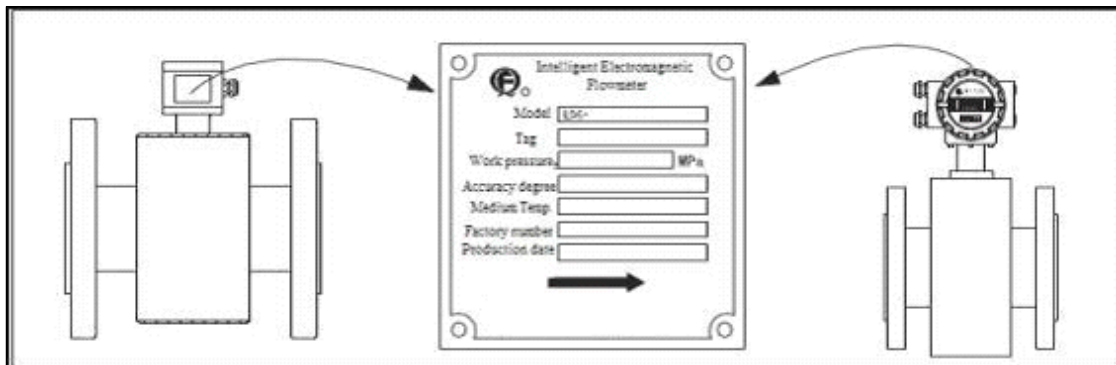
[Packing List]

Before installation, check the products you received.

- Sensor 1pcs
- Converter 1pcs (If choose the integrated type, it will connection with sensor)
- Instruction manual 1pcs
- Inspection sheet 1pcs
- Certificate of conformity 1pcs
- Cables (only for separated type)
- Spares for special orders

[Check Model and Specification]

You can check the model and specification out of the flowmeter nameplates and delivery inspection sheet, please check the model and specification you received can be fulfill the order or not.



[Storage Precautions]

Before reaching to the installation location, please confirm the packing sound as delivery and in order to prevent from damage that might be caused during the transport.

During the storage process, the place shall have the conditions as following:

- Rainproof, Moistureproof;
- Be full careful of the impact shock;
- Do not open the junction box cover of sensor;
- Temp. range 20 +60
- Humidity under 80%.

[Features and Usage]

1. Features

The electromagnetic flowmeter is a kind of measuring instrument based on Faraday law of electromagnetic induction, which can measure the volume flow of electrically conductive

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[Working Principle and Product Forms]

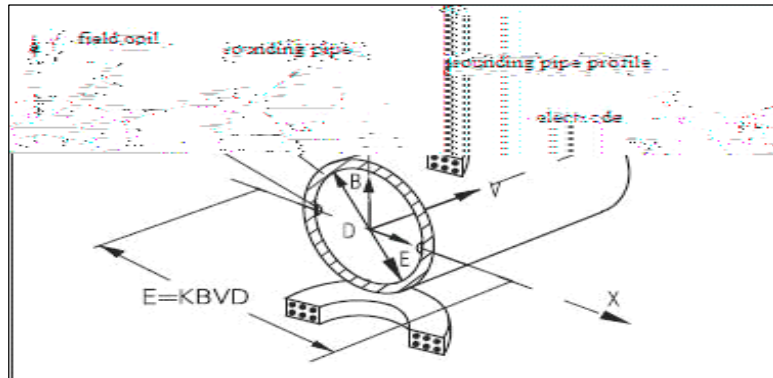
1. Working principle

The electromagnetic flowmeter is based on Faraday law of electromagnetic induction. Fix a pair of electrode on the pipe wall that is vertical with axis of measuring tube and line of magnetic force, when the conducting liquid is flowing through the axis of measuring pipe with movement of cutting magnetic force line, it will produce induced electromotive force, which can be checked out by electrode. Numerical value as following:

$$E=KBVD$$

Note:

E measure induced electromotive force of the fluid flow;
 K sensor meter factor;
 B magnetic field intensity;
 V average flow velocity;
 D measuring tube diameter.

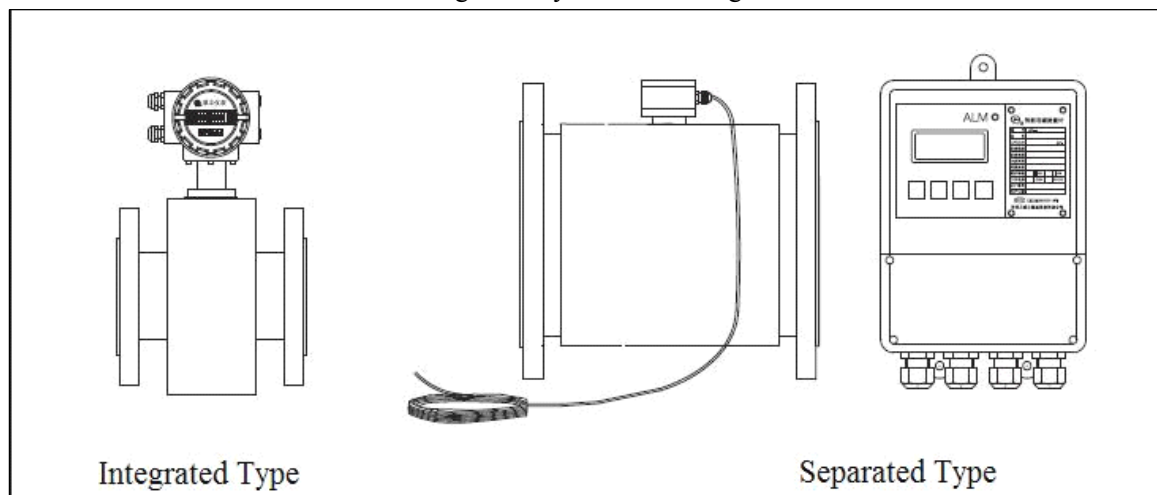


Induction electromotive force namely flow signal, which is checked out by the electrode and transfer through cable to converter, the signal will be amplified and then display instantaneous flowrate and gross, also can output signal of pulse and analog current.

2. Formation

Install the converter and sensor separately named as separated flowmeter;

Install the converter and sensor integratedally named as integrated flowmeter.



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[Technical Parameter]

1		
Carried Standard	JB/T9248-1999	
DN	3.6.10.15.20.25.32.40.50.65.80.100.125.150.200.250.300.350.400.450.500. 600.700.800.900.1000.1200.1400.1600.1800.2000.2200.2400.2600.2800.3000	
Max.Flow Velocity	15m/s	
Measuring Range	Uper limit range 0.3m/s 15m/s,low limit rang 1% of uper value	
Accuracy	0.5% of indicating value(flow velocity 0.8m/s); 4mm/s(flow velocity 0.8m/s)	
Lining Material	PTFE,Poly neoprene,Polyurethane,F46,PFA with net	
Electrode Material	Stainless steel 0Cr18Ni9Ti,HastelloyB,HastelloyC,Ti,Ta,Platinum-iridium alloy	
Flange Material	Carbon steel, stainless steel(please indicate in order)	
Lining protective flange material	Stainless steel 1Cr18Ni9Ti 20# alloy steel(If use strong corrosive fluid, please indicate in contract.)	
Grounding ring material	Stainless steel 1Cr18Ni9Ti	
Entry protective flange material	Stainless steel 1Cr18Ni9Ti	
Enclosure protection	ND15 DN3000 separated sensor with rubber or PU lining	IP65 or IP68
	Integrated(rounded converter)	IP65
	Other sensors and separated converter	IP65
	Explosion proof sensor and converter	IP65
Spacing(separated type)	Normally the separation distance between converter and sensor is less than 100m,if more please order specially.(Note: our company provide 10m length standardly,if need more, please indicate the length in order, and the cost will be add more)	
Output of analog current	0 10mA	load resistance 0 1.5
	4 20mA	load resistance 0 750
Frenquency output	1 5000Hz	
Pulse output	Separated type output by two way: forward and reverse flow; integrated type output one way	
	Frenquency range:0 5KHz,uper limit 1 5 optionally	
	Square wave or pulse with 25ms pulse width	
	Transistor switch output with isolation protection,can absorb 250mA current and withstanding 35V voltage	
Two-path alarm output	Alarmable(programable)high/low flow,blank pipe,fault condition,forward and reverse flow,simulation volume exceeds range,pulse volume exceeds range,disconnect pulse small signal	
	Transistor switch output with isolation protection,can absorb 250mA current and withstanding 35V voltage(Not isolated with pulse output)	
Digital communications	RS232,RS485,HART(add specially)	
Explosion proof mark	Integration Exdeia CT4	
	Separated Exd[ia]	CT4(converter) Exdeia CT4(sensor)

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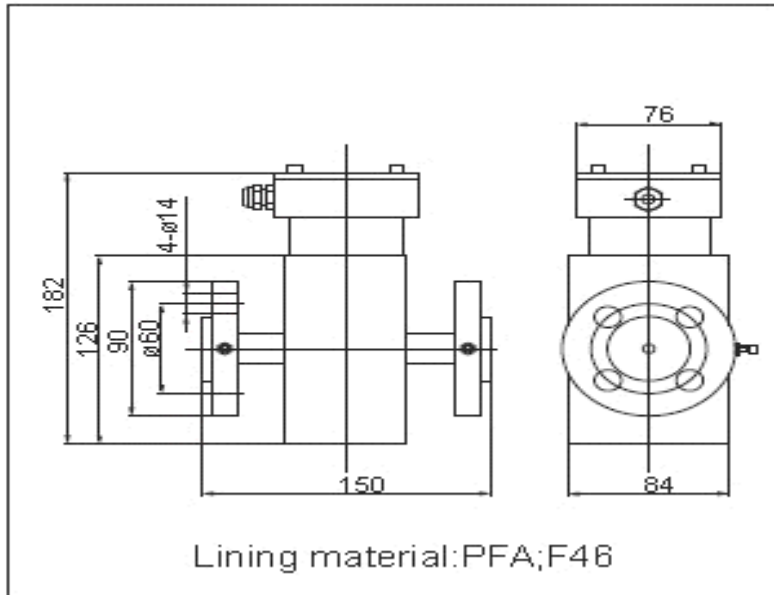
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[Installation]

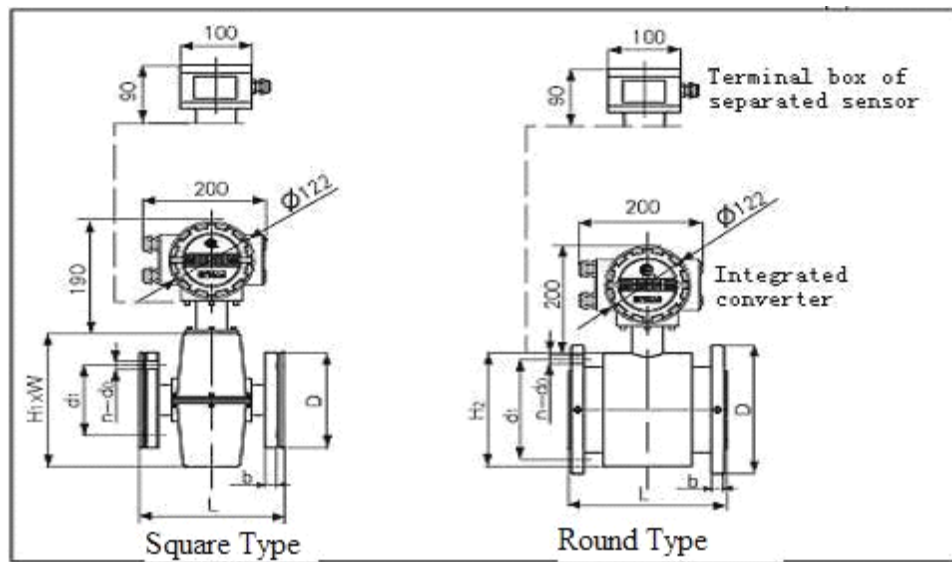
Profile drawing of DN4,6,10 sensor

Unit: mm



Profile drawing and flange size of DN15~DN150

Unit: mm



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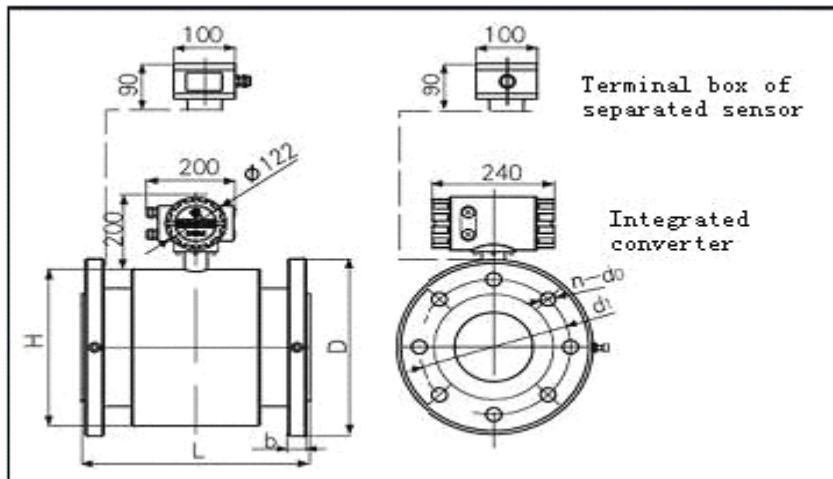
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Overall dimension and weight							Flange size (Standard: GB/T9119)									
DN	L	H ₁	W	H ₂	Reference weight(Kg)		PN1.6MPa					PN4.0MPa				
					Integrated	sensor	D	d ₁	d ₀	n	b	D	d ₁	d ₀	n	b
15	200	174	140	112	10	7	95	65	14	4	16	95	65	14	4	16
20	200	174	140	112	12	9	105	75	14	4	18	105	75	14	4	18
25	200	174	140	116	14	11	115	85	14	4	18	115	85	14	4	18
32	200	210	168	116	15	12	140	100	18	4	18	140	100	18	4	18
40	200	210	176	142	16	13	150	110	18	4	20	150	110	18	4	20
50	200	210	176	144	17	14	165	125	18	4	20	165	125	18	4	20
65	200	250	214	157	25	22	185	145	18	4	20	185	145	18	8	22
80	200	250	214	175	29	26	200	160	18	8	20	200	160	18	8	24
100	250	312	230	200	31	28	220	180	18	8	22	235	190	22	8	26
125	250	370	281	226	36	33	250	210	18	8	22	270	220	26	8	26
150	300	370	281	254	41	38	285	240	22	8	24	300	250	26	8	28

Profile drawing of DN200~DN600



Dimension of DN200~DN600

Overall size and weight				Flange size (Standard: GB/T9119)										
DN	L	H	Reference weight(Kg)	PN1.6MPa					PN1.0MPa					
				D	d ₁	d ₀	n	b	D	d ₁	d ₀	n	b	
220	350	310	45	340	295	22	12	26	340	295	22	8	24	
250	450	358	50	405	355	26	12	28	395	350	22	12	26	
300	500	410	60	460	410	26	12	32	445	400	22	12	28	
350	550	465	145	520	470	26	16	35	505	460	22	16	30	
400	600	515	180	580	525	30	16	38	565	515	26	16	32	
450	600	564	215	640	585	30	20	42	615	565	26	20	35	
500	600	614	245	715	650	33	20	46	670	620	26	20	38	
600	600	722	335	840	770	36	20	52	780	725	30	20	42	

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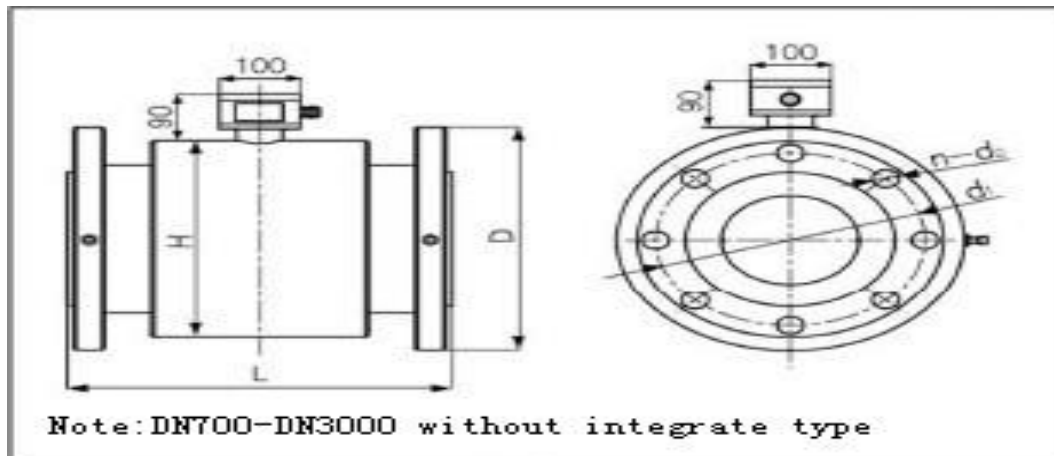
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Sensor profile and flange size of DN700~DN3000



Unit: mm

Unit: mm

Overall size and weight			
DN	L	H	Reference weight(Kg)
700	700	836	435
800	800	936	545
900	900	1036	655
1000	1000	1136	810
1200	1200	1336	875
1400	1400	1536	1235
1600	1600	1736	1555
1800	1800	1960	2085
2000	2000	2160	2610
2200	2200	2364	3210
2400	2400	2564	3910
2600	2600	2764	4280
2800	2800	2960	5000
3000	3000	3160	5000

Flange size (Standard: GB/T9119)						
DN	PN(MPa)	D	d ₁	d ₀	n	b
700	1.0	895	840	30	24	30
800		1015	950	33	24	32
900		1115	1050	33	28	34
1000		1230	1160	36	28	35
700		0.6	860	810	26	24
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
2800	3115		3020	48	64	48
3000	3315		3220	48	68	50

[Profile of converter and cable]

The signal transmission cable between separated converter and sensor together with the excitation coil cable are all make use of the two of the core cable with PVC sheathed wire mesh. Model: RWP2 32/0.15, the use length is less than 100m, in particular case can use STT-3200 private cable.

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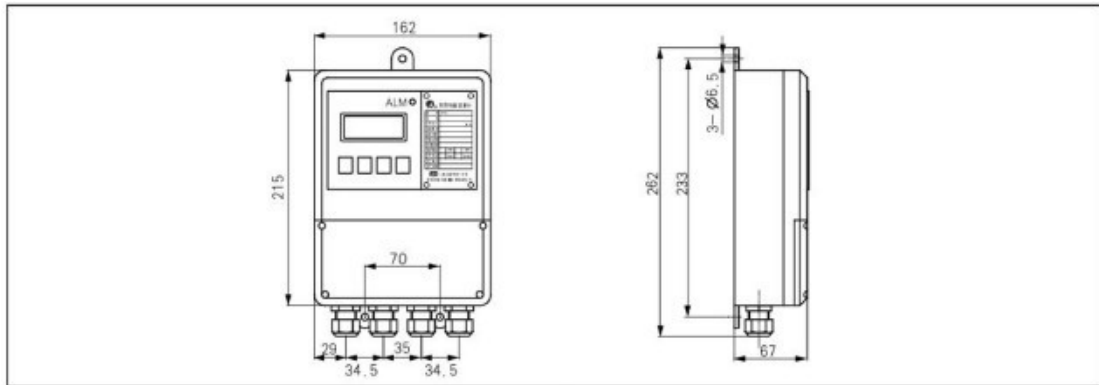
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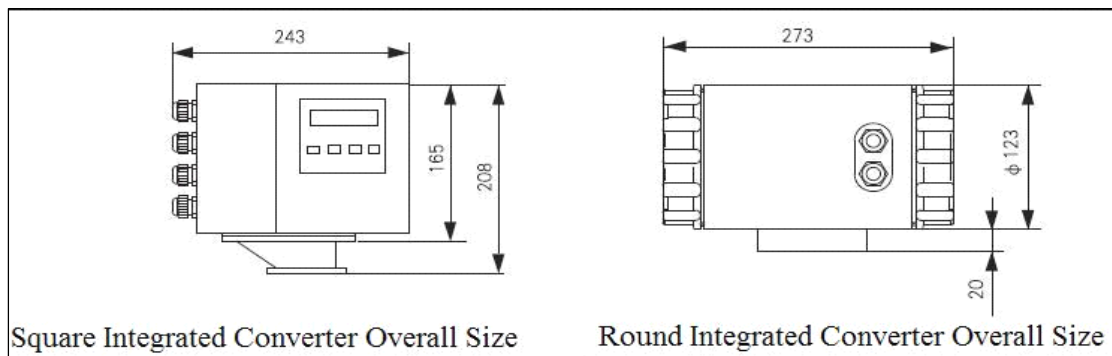
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Profile Drawing of Separated Converter

Unit: mm



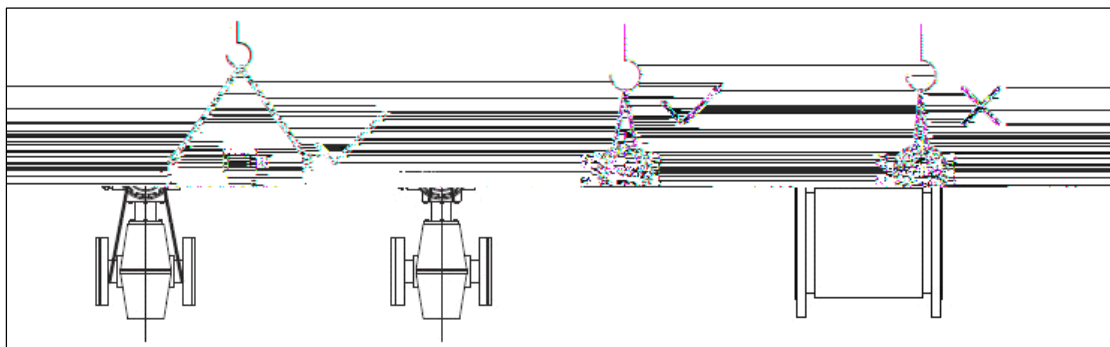
Profile Drawing of Integrated Converter



[Lifting Assembly]

The safety load and protective measures of lifting equipment shall be in according with relevant provisions.

Girth hitch in converter box (integrated flowmeter) or junction box to hoist meter is forbidding.



[Installation Location]

If the installation location is vulnerable to the sun, you shall provide shadow measures. Flowmeter shall avoid impacting shock and excessive change of temperature, meanwhile you shall avoid meter damage from corrosive liquid leaking. The magnetic field intensity of the installation location shall less than 400A/m.

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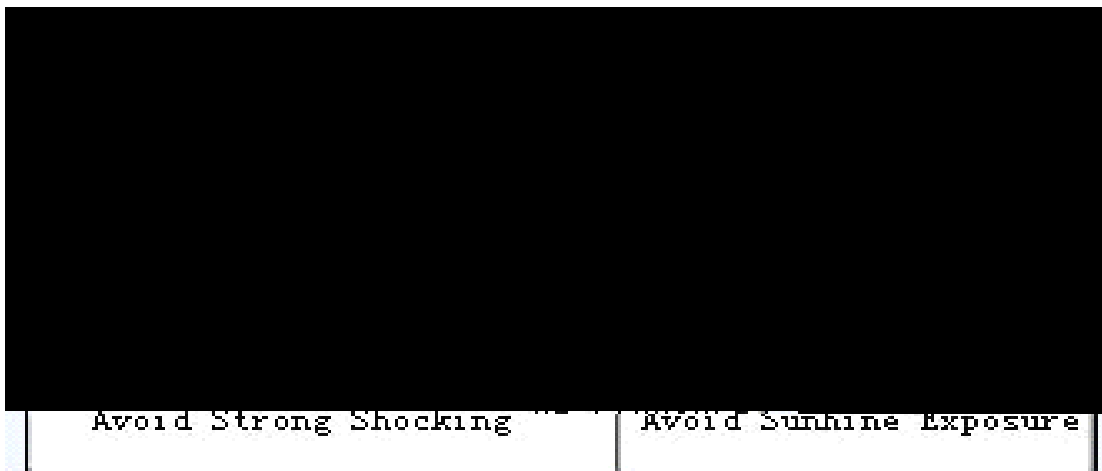
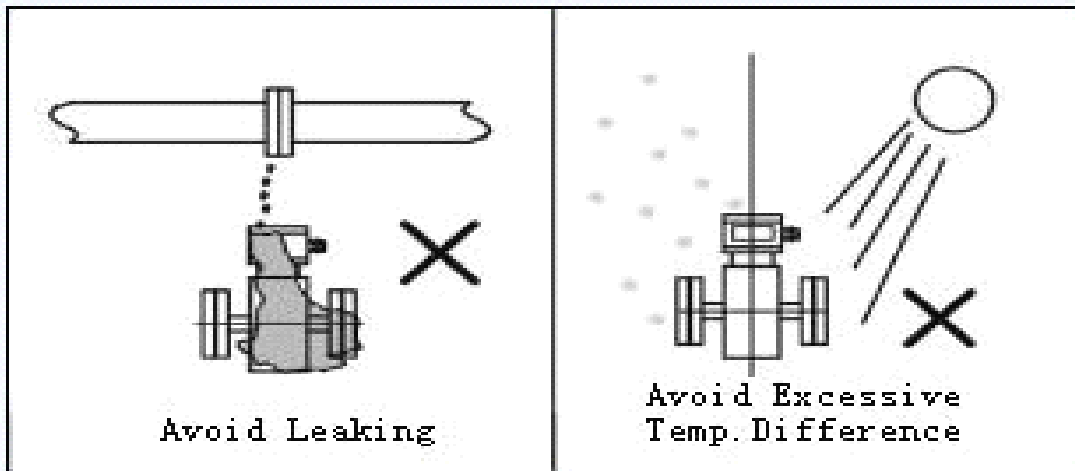
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[Installation Flowmeter In Pipeline]

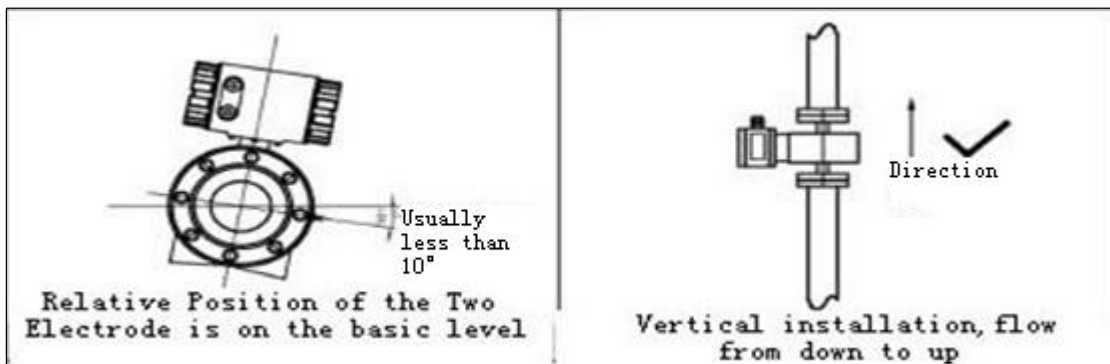
 **Notes:**

Firstly note the sensor can't be used as the load support point, it can't support the adjacent pipe, which shall be bearing by the clamping pipe (see chart below).

When fix the sensor, be full careful of avoid the strong draw-in stress to it, shall consider remove stress effect of the adjacent pipeline thermal expansion.

Please ensure measuring tube and process pipe are coaxial. Sensor of DN 50, the deviated axis length is less than 1.5mm.

If the measuring tube shake, shall have fixed support in the two sides of flowmeter.



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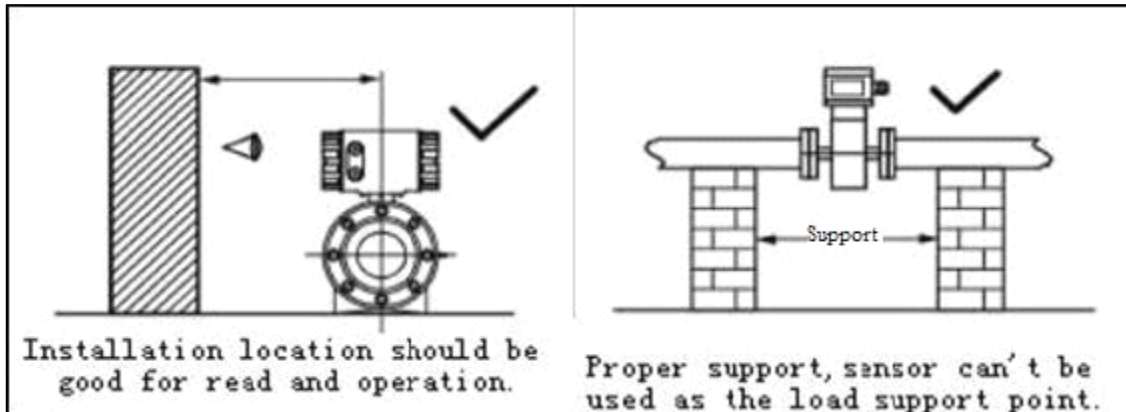
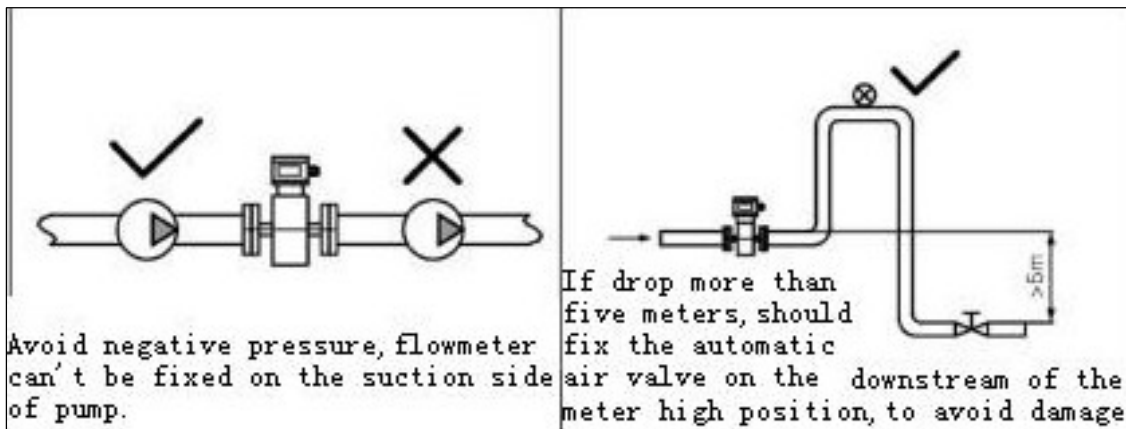
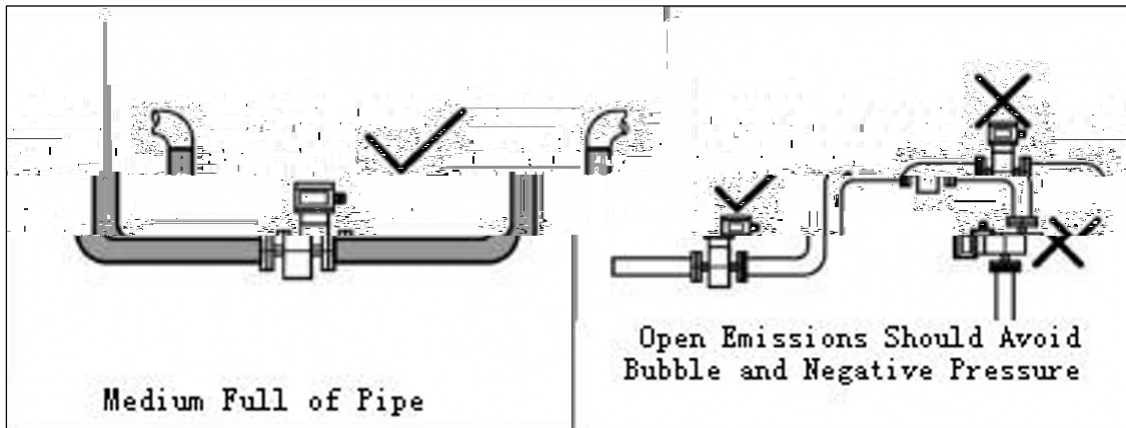
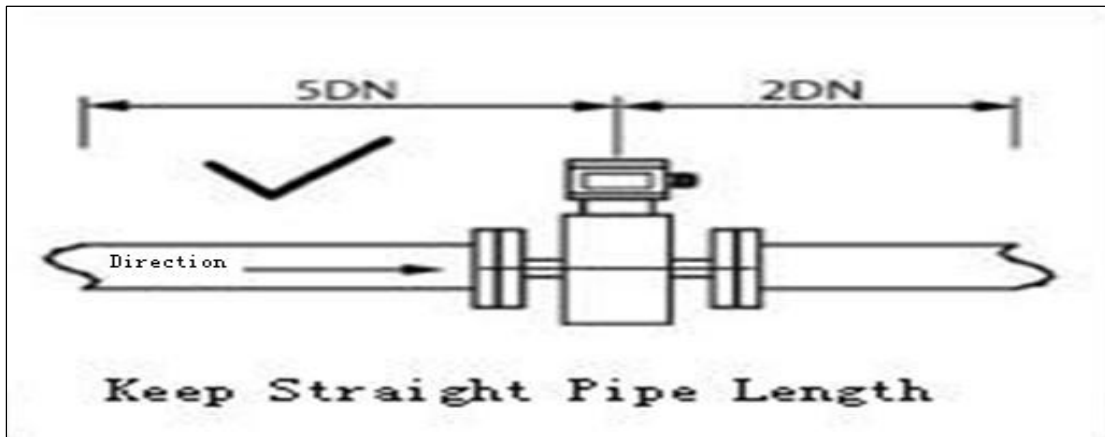
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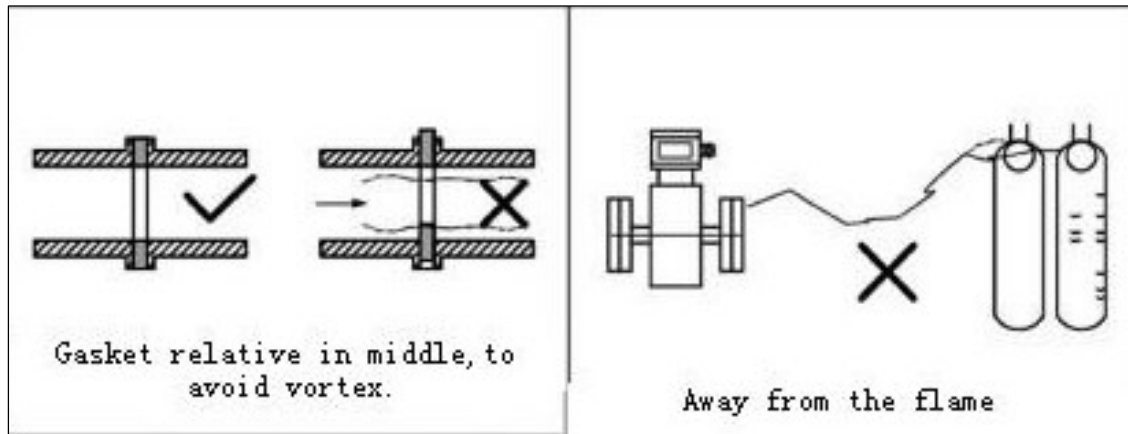
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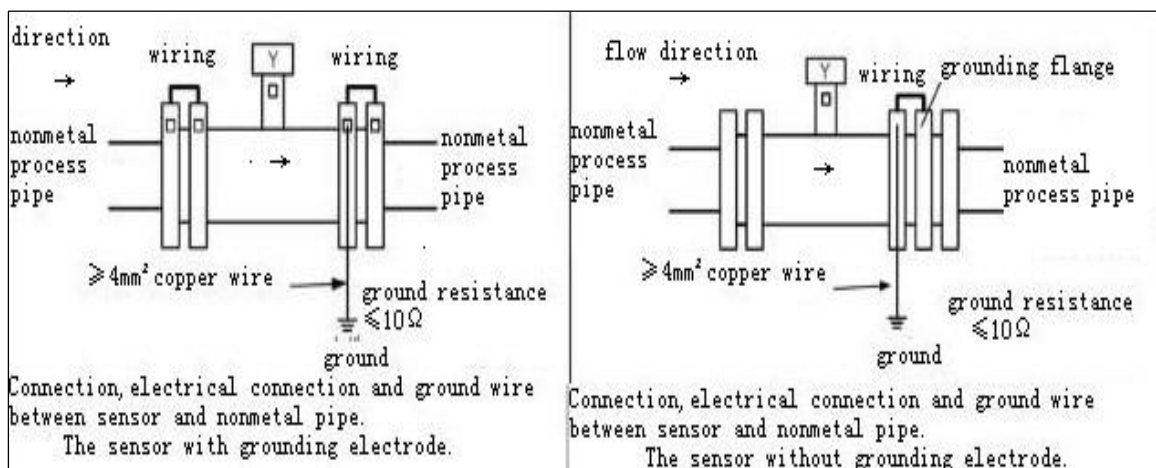
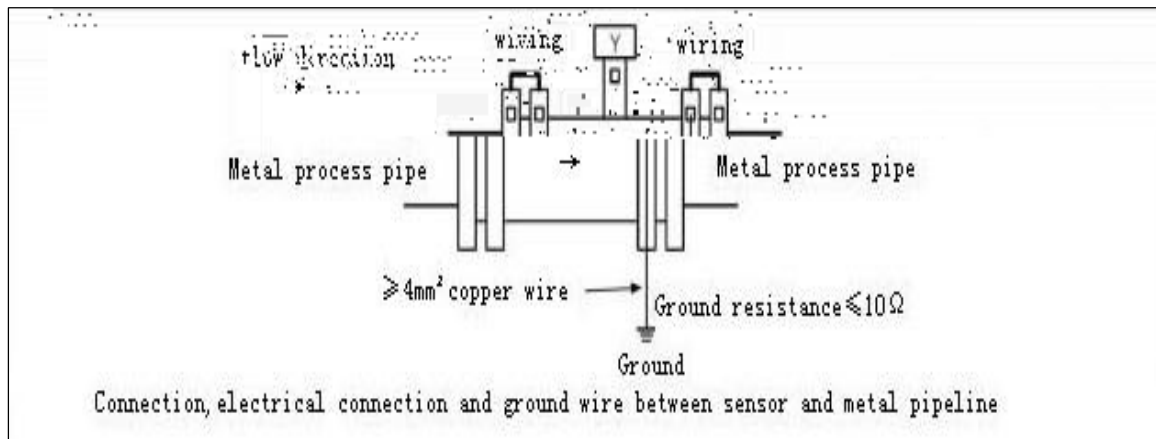


[Flowmeter Wiring]

There are three parts of wiring:

1. Connection, wiring and ground wire between sensor (contains integrated type) and pipeline;
2. Wiring between separated sensor and converter;
3. Wiring between power supply and output/input signal.

Grounding wire



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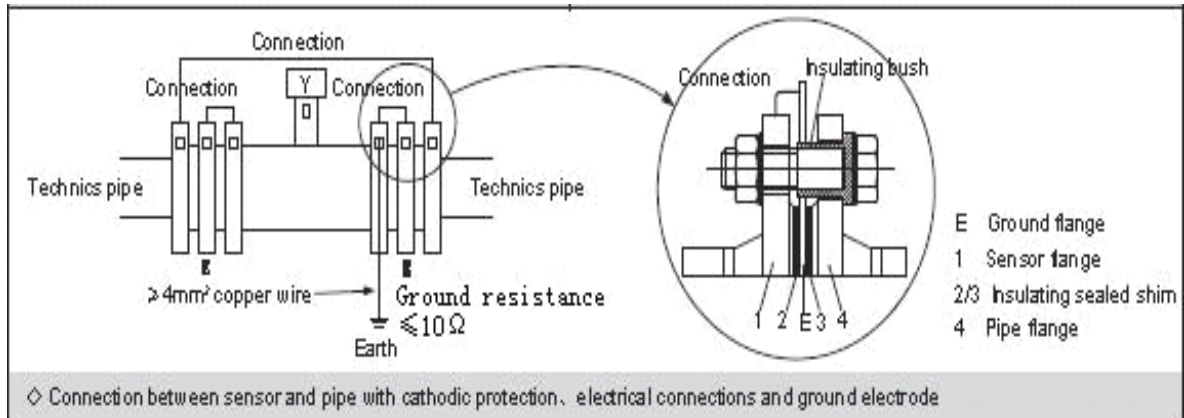
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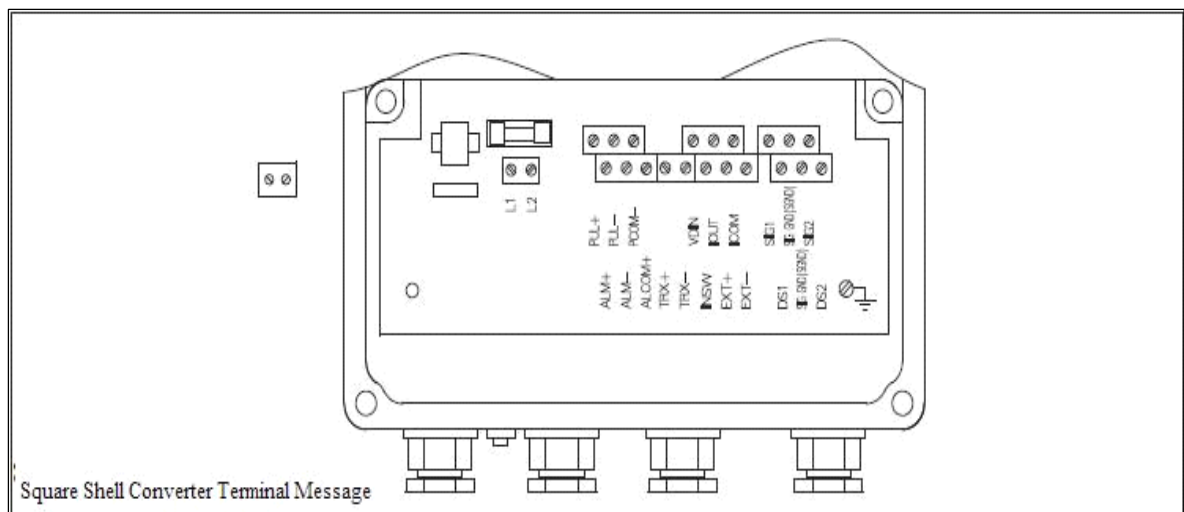
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⚠ Notes:



[Converter Terminal Indication]



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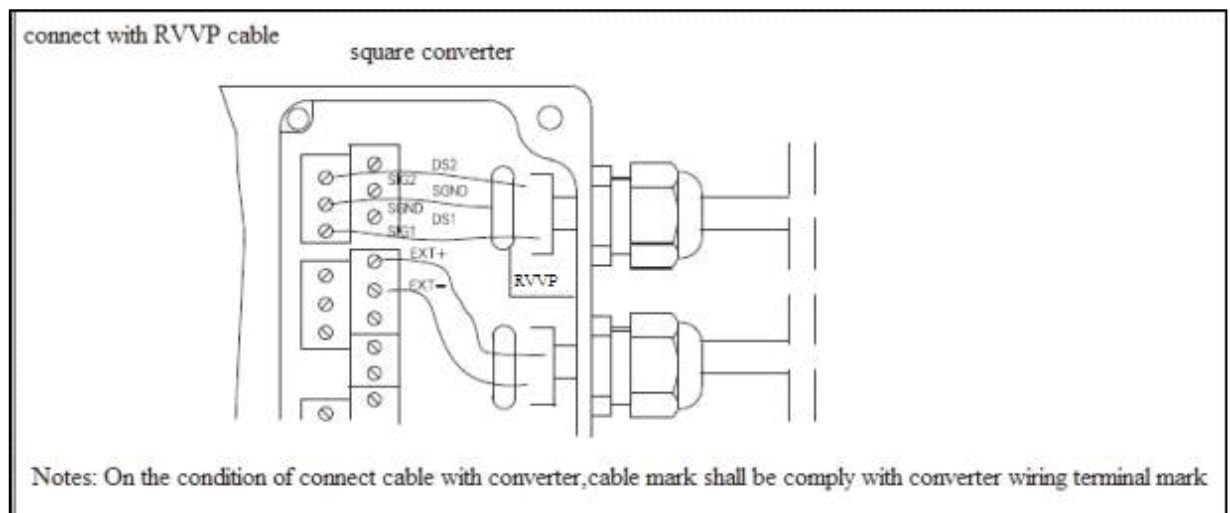
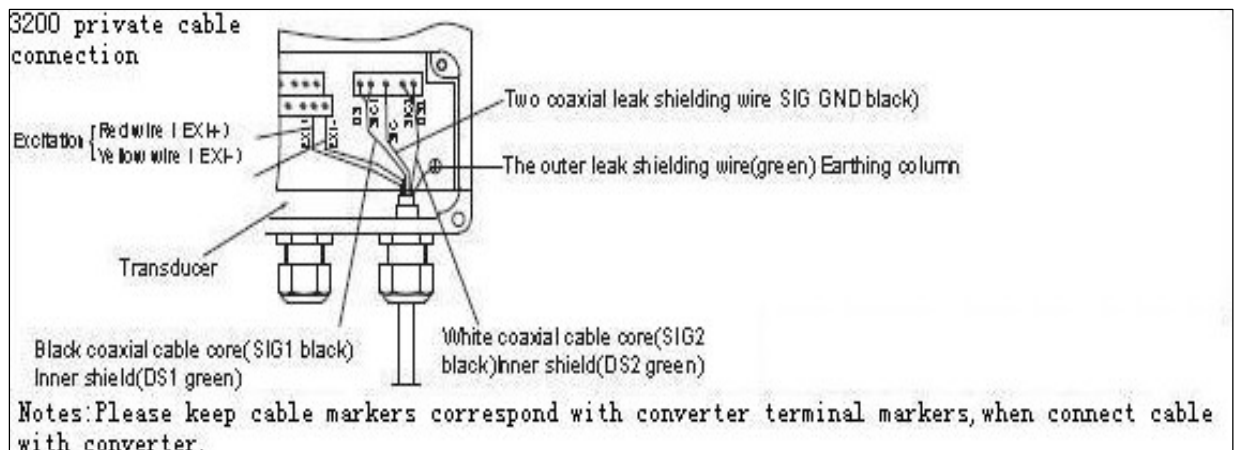
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Converter Connecting Terminal Indication

SIG1	Signal1	Connect separated sensor	PUL	Positive flow frequency (pulse) output	Two-way, bidirectional frequency or pulse output
SIG	SGND		PUL	Reverse flow frequency (pulse) output	
GND(SGND)	signal2		P COM	Frequency(pulse)output	
SIG2	Incentive shielding1				
DS1	Incentive shielding2				
DS2	Field current				
EXT	Field current				
EXT					
IC	Positive flow current output	Output positive and reverse flow current respectively	ALM1	Floor alarm output	Two-way alarm output
IC	Reverse flow current output		STETR	Upper alarm output	
I COM	Current output		ALM2	Blankpipe, excitation disconnection state alarm output	
			AL COM	Alarm output	
			TRX	Communicating junction	
			TRX	Communicating junction	

[Wiring between Separated Sensor and Converter]



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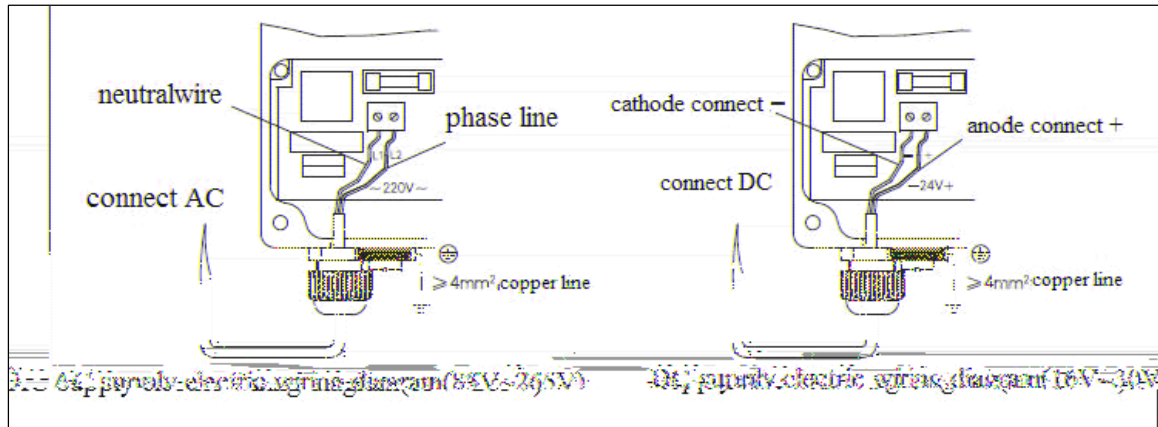
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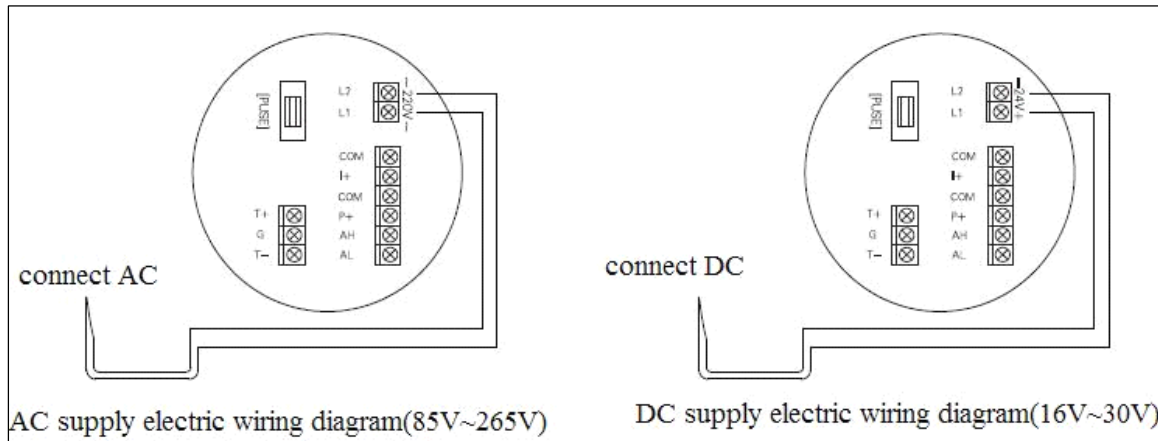
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[Output Connection]

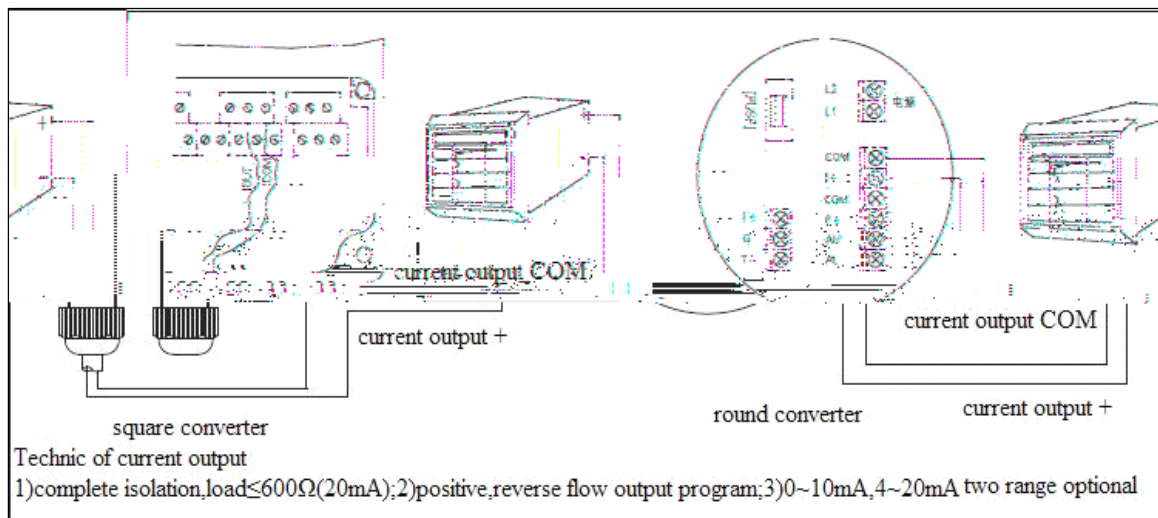
Square converter power and ground wiring



Round converter power and ground wiring



Current Output Wiring



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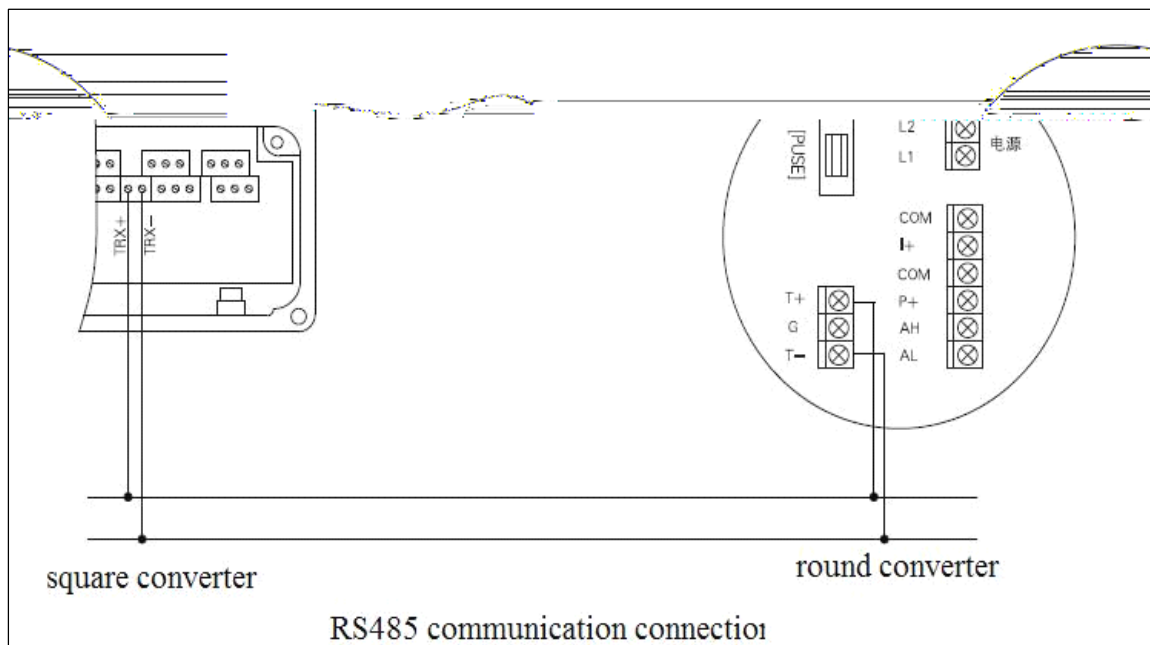
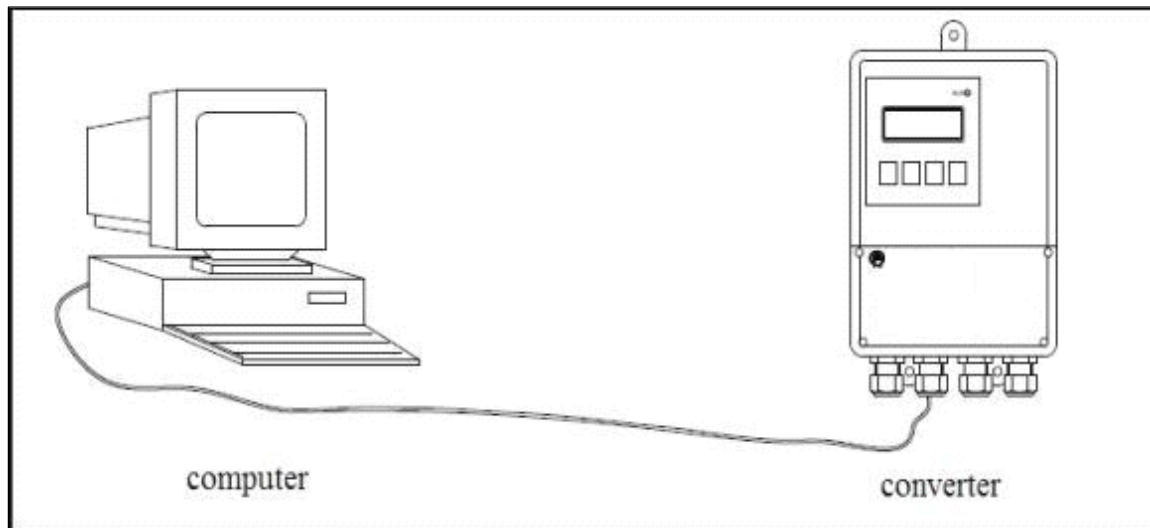
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RS232 Communication Junction



Pulse Output Connection

Connect with electronic meter of outside supply DC power:

- 1).When the accept meter need voltage pulse input(input resistance larger),R can select 5K 10K ,pulse amplitude is approach to outside supply

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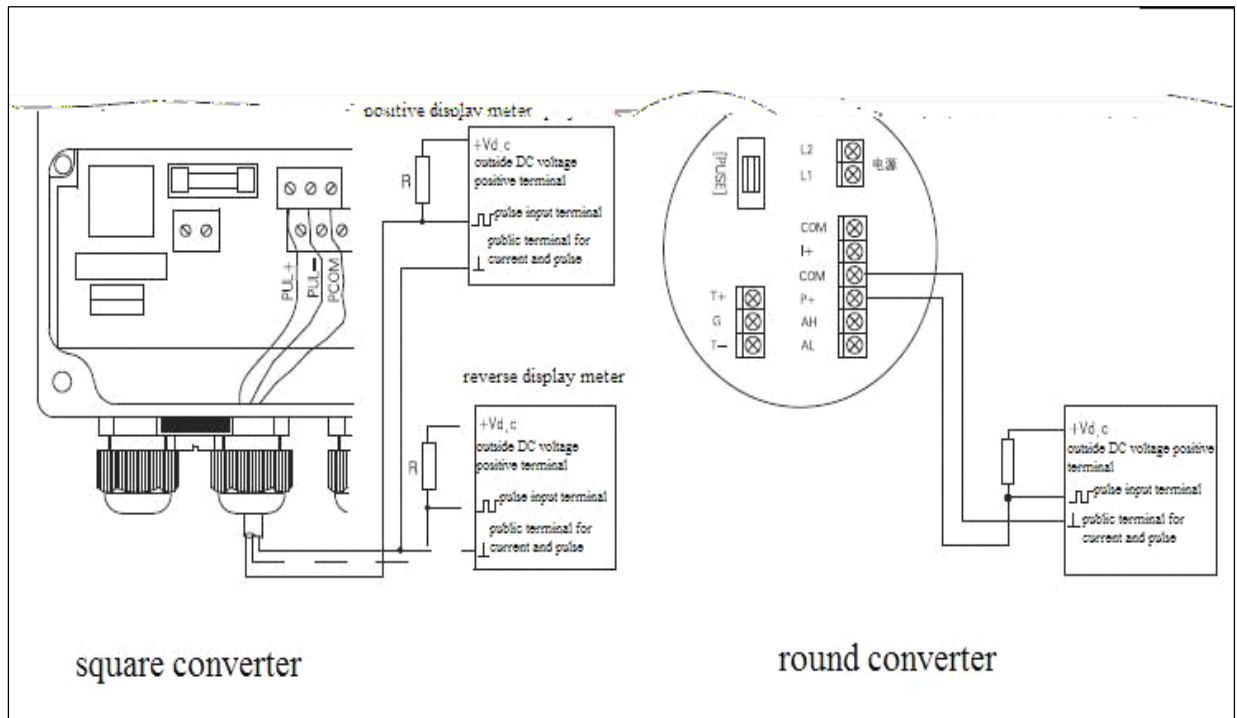
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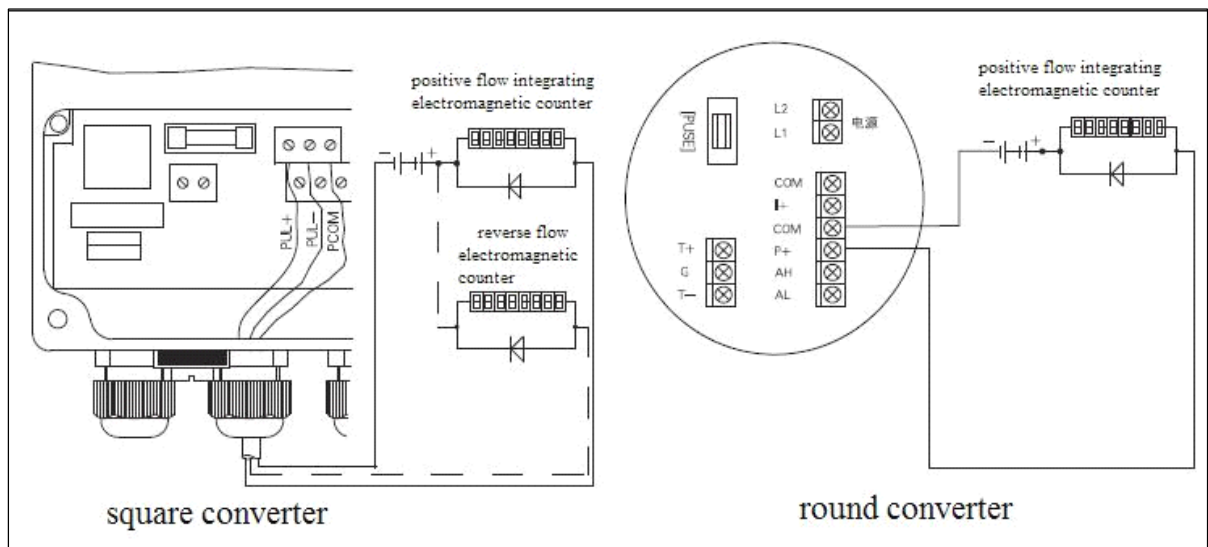
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Connection of Electromagnetic Counter

Pulse output technical parameter

- 1) Photocoupling and transistor switch output isolatedly, which can absorb the max. current is 250mA and the max pressure resistance is 35V.
- 2) Output of two-way is correspond with positive flow and reverse flow, frequency 0-5000Hz, the limit among 1-5000Hz selectable, 1Hz per unit.
- 3) Square wave or selected pulse width, selected pulse width 10-2.5s optional.



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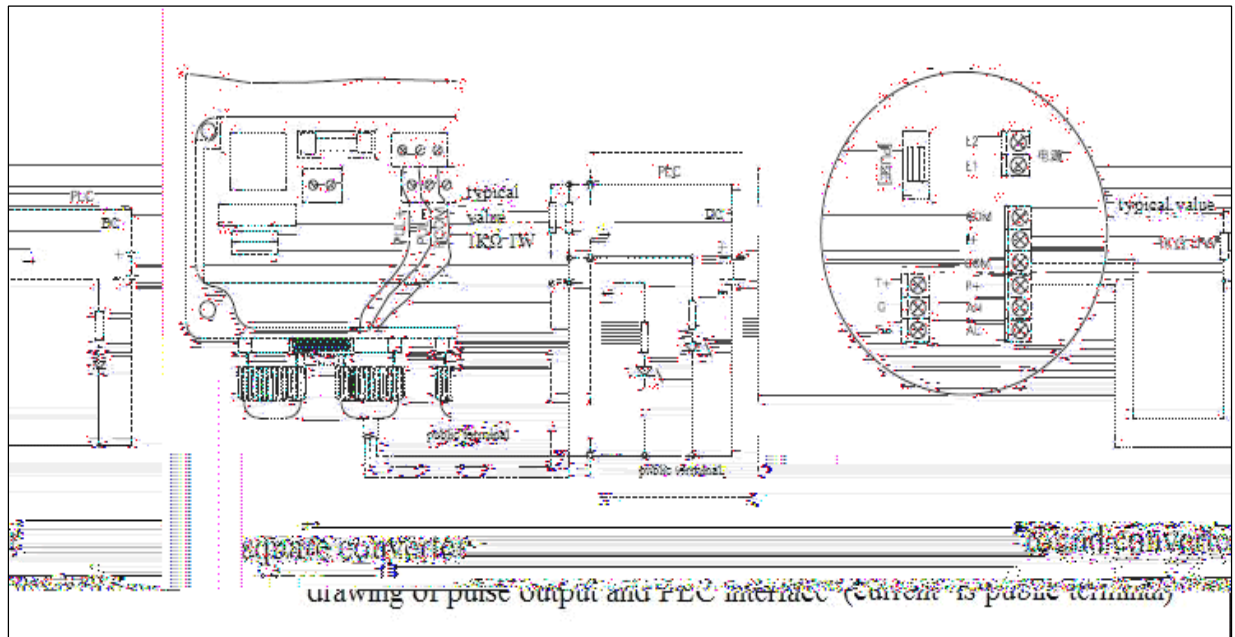
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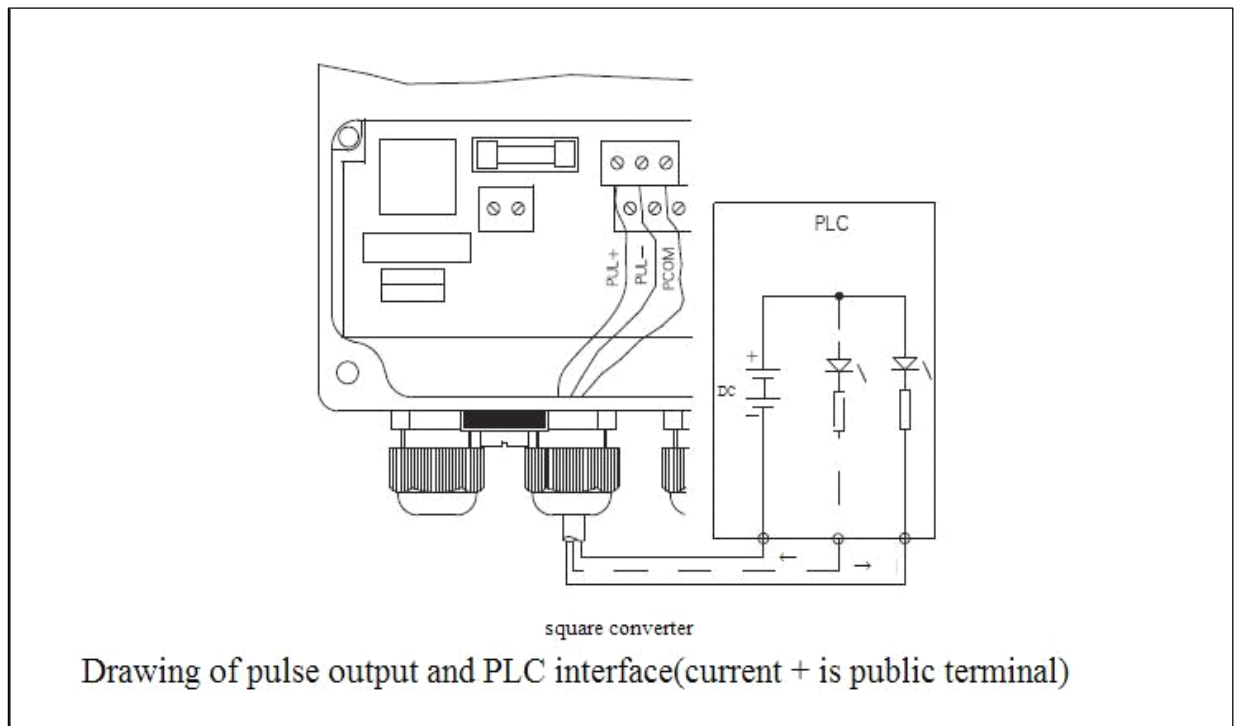
Connection between pulse output and PLC(light-coupler input)

Pulse output technical parameter

- 1) Photocoupling and transistor switch output isolatedly, which can absorb the max. current is 250mA and the max pressure resistance is 35V.
- 2) Output of two-way is correspond with positive flow and reverse flow, frequency 0-5000Hz, the limit among 1-5000Hz selectable, 1Hz per unit.
- 3) Square wave or selected pulse width, standard pulse width is 50ms.



Drawing of pulse output and PLC interface (current + is public terminal)



Drawing of pulse output and PLC interface (current + is public terminal)

CHANGZHOU CHENGFENG FLOWMETER CO.,LTD

No.15,Qinglong Tongjia Industrial Park,Changzhou,Jiangsu Prov.,China

Tel:86-519-85327611,

Fax:86-519-85505269

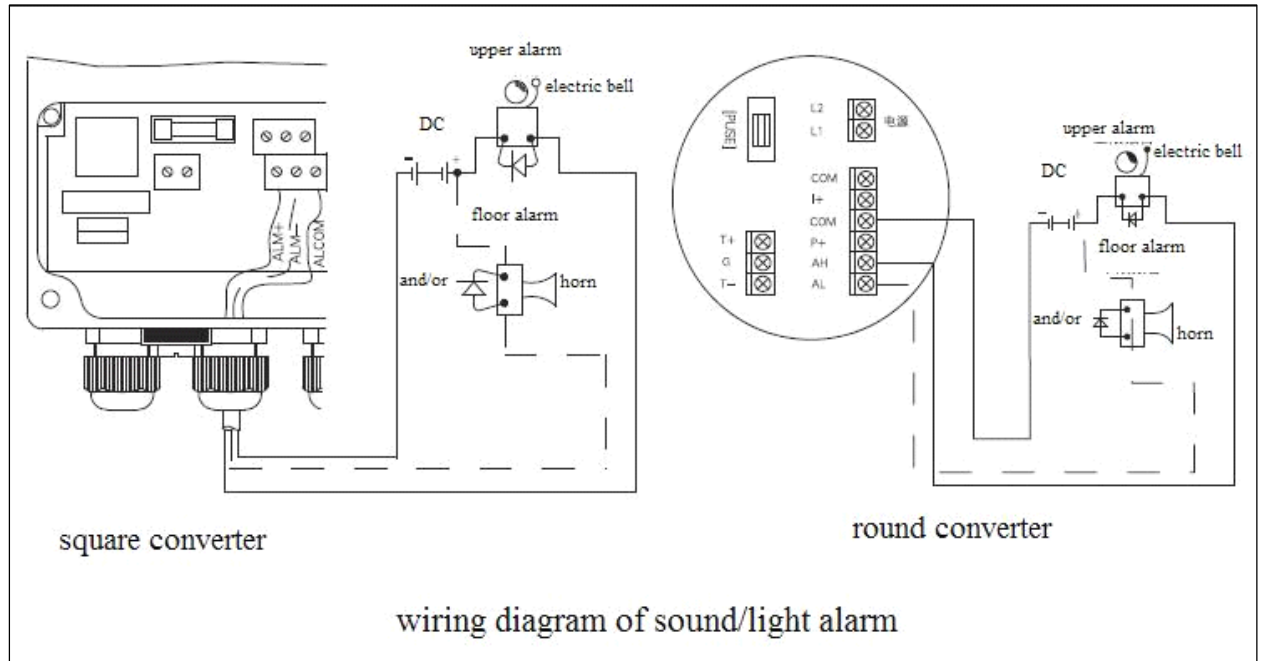
Email:sales@qf-meter.com,

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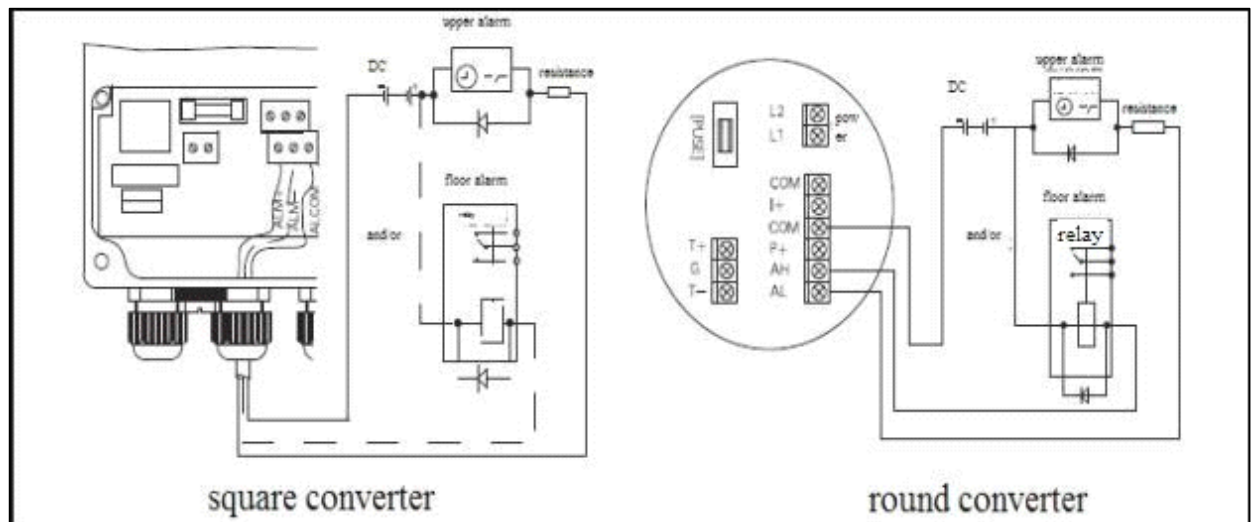
Connection of alarm output

Alarm output technical parameter

- 1) Two way photoelectric coupling and transistor switch isolating passive output, maximum can absorb 250mA current, highest pressure is 35V.
- 2) System failure, positive/reverse flow, cutting of pulse small signal, blank pipe, ceiling and floor limit, simulation over range and pulse over range are all can be alarmed in two-way(PLC).



Connection diagram of timing device and relay



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Tel:86-519-85327611,

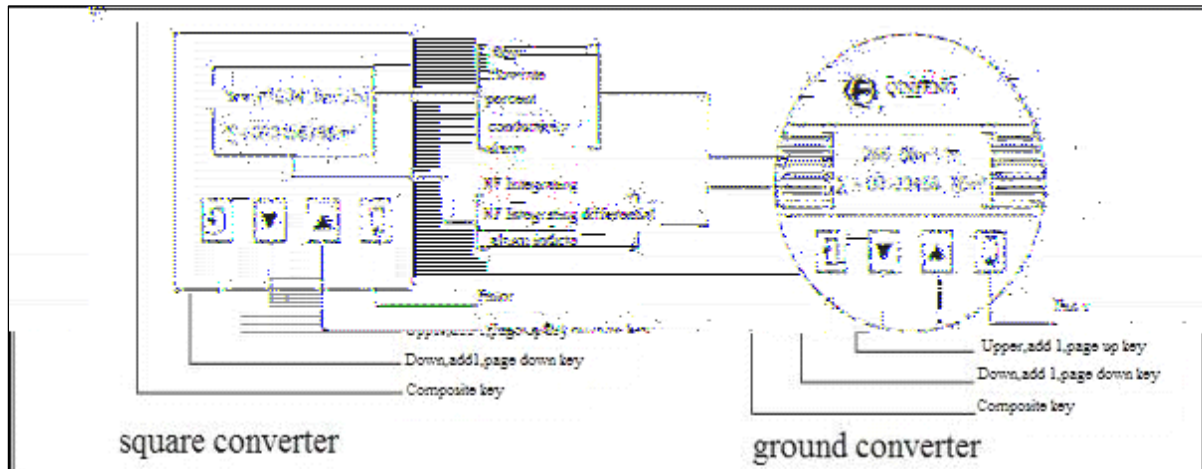
Email:sales@qf-meter.com,

Fax:86-519-85505269

Http://www.qf-meter.com

[Converter Operation]

Panel display and operating key



There are two operating status of meter: automatic measurement and preferences.

After electrify, the meter enters automatic measurement. During the automatic measurement, it can finish all of the measuring function automatically and show the metrical data. During parameter setting, the user can finish meter parameter setting by four operation keys in the panel.

Converter Setting

1) Function of automatic measurement key:

- Up key : cycle selection uplink content display on screen;
- Down key : cycle selection downlink content display on screen;
- Composite key OK key: enter parameter setting.

2 Key function of parameter setting:

- Up key : cursor numeric plus one;
- Down key : cursor numeric minus one;
- Composite key up key : cursor right;
- Composite key down key : cursor left;
- OK key: enter/exit submenu;

OK key: continuously press several seconds in any state will back to automatic measurement.



Notes: When using a composite key, press the composite key first, then press the up key or down key.

In the condition of parameter setting without any press for three minutes, the meter returns to measurement automatically.

Must be in the condition of parameter setting to set or modify parameters. Press the composite key OK key in the condition of measurement; it will appear the state of input password. According to different classes, set passwords. Input passwords use the composite key together with the OK key:

- One class password is 0521, only for read without changing;
- Two class password is 3210, can modify language numeric of lower limit alarm;
- Three class password is 6108, can modify language integrated amount reset;

CHANGZHOU CHENGFENG FLOWMETER CO., LTD

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Tel: 86-519-85327611,

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Email: sales@qf-meter.com,

Http://www.qf-meter.com

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Four class password is 7206,can modify language clear password of integrating
Then press composite key OK key again will entry to the setting menu in your
demand.The description of menu see next page.When appear required setting menu
press OK key will display the content of modify,after setting press OK key back to
menu.

Alarm

In the condition of measurement turn page through left down key,display as following:

Flow normally
Fluid normally
Excitation alarm
Blankpipe alarm

Advise that

CHANGZHOU CHENGFENG FLOWMETER CO.,LTD

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environment shall be less than 130 .

9. In the installing field shall without the harmful gas that have corrode action to the aluminum alloy material.
10. The user shall be comply with relevant stipulations of GB3836.13-1997 the thirteen part of ambient electric equipment of explosive gases that equipment examination of ambient electric equipment of explosive gases GB3836.15-2000 the fifteen part of ambient electric equipment of explosive gases:electric installation in dangerous field(except coal mine) GB3836.16-2006 the sixteen part of ambient electric equipment of explosive gases:inspect and maintenance of electric device(except coal mine) and G8 50257-1996 Electric equipment installation engineering Code for construction and acceptance of electric device within explosion and fire hazard atmospheres .

[Fault Treatment]

Automatic inspect if there are damage for electric connect and the meter can operation proper,if the meter operate abnormally,please examine as following procedure:

- 1) Check out if the valve in pipeline completely open,the pipe fulfill of the liquid,the flowmeter work among the upper limit range of flowmeter.
- 2) Check out if the power supply switch fuse of meter work normally;inspect the fault in cables or in receive meter.
- 3) Please check out the code of converter and meter factor are correct with sensor;
- 4) Inspect if the DN and measure range is correct;
- 5) Check out the flowmeter output connection correct or not,also the grounding is good;
- 6) Please inspect converter according to the prescribed content.

a. Warning information

The printed circuit board of flowmeter converter adopt to the surface welding technology,which can t be repaired by the user,so the converter shell shall not be open by the users.Intelligent converter with self-diagnosing function,all of the fault in general use can alarm correctly except the faults of power supply and hardware circuit.Alarm prompt lower in the display with ! (or the LED in the top right of display ALM will light).

Upper alarm

Floor alarm

Blankpipe alarm

Excitation alarm

b. Fault treatment

- . Meter no display
 - a)check if the power supply is connect or not; b)check if the electric fuse is good or not;
 - c)check if the electric voltage is good enough for use.
- . Excitation alarm
 - a)If the excitation wiring EXT+ and EXT- is open circuit; b)The field coil gross electric resistance of converter shall be less than 60 ;c)If the above two are okay,the converter maybe fault.
- . Blankpipe alarm
 - a) Check if the pipe is fulfill of the fluid or not; b)The signal input terminal of converter

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SIG1,SIG2,SIG GND(SGND) will be disconnect by guide lines,if the prompt of blankpipe alarm and electrode abnormal revocation,the converter is normal,maybe caused by the lower conductive of fluid or electrode gas covered; c)Check if the signal connection is correct or not;if the sensor electrode is normal or abnormal;without flow,to see the conductance ratio shall be less than 100%;with flow,the resistance of measuring terminal SIG1 and SIG2 to SIG GND(SGND) separately shall among K to dozens of K

(Measure with the point multimeter and will see the process with charge-discharge phenomenon).The difference value of two electrodes wavering is not more than 20%,if not it will show that the electrode is polluted and covered.

The direct voltage between DS1 and DS2 measured by multimeter shall be less than 1V,the direct voltage difference value between two electrodes shall be less than 50mV,otherwise the converter electrode is polarized.

. Measurement of the flow is not accuracy

- a) If the fluid is fulfill of the measuring tube; b)If the signal connection is normal; c)Please check the sensor factor and null point is setting comply with the sensor nameplates or Ex-factory checking sheet; d)Working condition is correct or not.

. Upper alarm

The upper alarm can indicate output current and frequency(or pulse) is overranging.Change the measuring range larger will revoke upper alarm.

. Floor alarm

The floor alarm can indicate output current and frequency(or pulse) is overranging.Change the measuring range larger will revoke floor alarm.

.System self-check alarm please contact with the manufacturers maintenance into the converter.

CHANGZHOU CHENGFENG FLOWMETER CO.,LTD

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Fax:86-519-85505269

Email:sales@qf-meter.com,

Http://www.qf-meter.com

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[Preferences]

L-mag have twenty-six parameters,when use meters,the users shall according to the specific conditions to set each parameter.

L-mag parameters listed as following:

Code	Parameterliteral	Setting mode	Parameter range	Password level
1	Language	Option	Chinese/English	2
2	Meter communication address	Setting number	0 99	2
3	Meter communication speed	Option	600 14400	2
4	Meter communication mode	Option	Model/mode2	2
5	Measuring tube size	Option	3 3000	2
6	Measuring range setting	Setting number	0 99999	2
7	Measurement damping time	Option	0 100	2
8	Flow direction option	Option	Positive/reverse	2
9	Flow zero correction	Setting number	0.000 9.999	2
10	Small signal excision point	Setting number	0 99.9%	2
11	Allow excision display	Option	Allow/forbid	2
12	Flow integrating unit	Option	0.001L 1m	2
13	Reverse measurement allow	Option	Allow/forbid	2
14	Current output type	Option	0 10A/4 20mA	2
15	Pulse output type	Option	Frequency/pulse	2
16	Pulse unit equivalent	Option	0.001L 1m	2
17	Frequency output range	Option	1 5000Hz	2
18	Blankpipe alarm allow	Option	Allow/forbid	2
19	Blankpipe alarm threshold	Setting number	999.9%	2
20	Blankpipe range correction	Setting number	0.0000 3.9999	2
21	Floor alarm allow	Option	Allow/forbid	2
22	Floor alarm numerical	Setting number	000.0 199.9%	2
23	Floor alarm allow	Option	Allow/forbid	2
24	Floor alarm numerical	Setting number	000.0 199.9%	2
25	Integrating gross reset	Password	000000 399999	3
26	Integrating reset password	Setting number	000000 399999	4

CHANGZHOU CHENGFENG FLOWMETER CO.,LTD

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[Type Selection]

LD _ _ _ _ _

<p>a. Connect type</p> <p>A Flange connection B Clamping connection</p>	<p style="text-align: right;">e. electrode material</p> <p>1.SS316L 2.HastelloyB 3.HastelloyC 4.Titanium 5.Platinum-iridium alloy 6.Tantalum</p>																																																																								
<p>b. Nominal bore(mm)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Code</th> <th>DN</th> <th>Code</th> <th>DN</th> <th>Code</th> <th>DN</th> </tr> </thead> <tbody> <tr><td>015</td><td>15</td><td>250</td><td>250</td><td>10A</td><td>1000</td></tr> <tr><td>020</td><td>20</td><td>300</td><td>300</td><td>12A</td><td>1200</td></tr> <tr><td>025</td><td>25</td><td>350</td><td>350</td><td>14A</td><td>1400</td></tr> <tr><td>040</td><td>40</td><td>400</td><td>400</td><td>16A</td><td>1600</td></tr> <tr><td>050</td><td>50</td><td>450</td><td>450</td><td>18A</td><td>1800</td></tr> <tr><td>065</td><td>65</td><td>500</td><td>500</td><td>20A</td><td>2000</td></tr> <tr><td>100</td><td>100</td><td>600</td><td>600</td><td>22A</td><td>2200</td></tr> <tr><td>150</td><td>150</td><td>700</td><td>700</td><td>24A</td><td>2400</td></tr> <tr><td>200</td><td>200</td><td>800</td><td>800</td><td>26A</td><td>2600</td></tr> <tr><td></td><td></td><td>900</td><td>900</td><td>28A</td><td>2800</td></tr> <tr><td></td><td></td><td></td><td></td><td>30A</td><td>3000</td></tr> </tbody> </table>	Code	DN	Code	DN	Code	DN	015	15	250	250	10A	1000	020	20	300	300	12A	1200	025	25	350	350	14A	1400	040	40	400	400	16A	1600	050	50	450	450	18A	1800	065	65	500	500	20A	2000	100	100	600	600	22A	2200	150	150	700	700	24A	2400	200	200	800	800	26A	2600			900	900	28A	2800					30A	3000	<p style="text-align: right;">f. Shell protection</p> <p>1.IP65 2.IP68+IP65(IP68sensor+IP65converter)(c only can select 2,3;g only select 0;i only select CR;K only select 01,02) 3.IP67(c only select 2,3;g only select 0;i only select CH; k only select 02)</p>
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<p>d. lining material</p> <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>1.FTFF(F4)</td><td>(DN15 DN1000)</td></tr> <tr><td>2.Polychloroprene</td><td>(DN15 DN3000)</td></tr> <tr><td>3.Polyurethane</td><td>(DN15 DN600)</td></tr> <tr><td>4.FEP(F46)</td><td>(DN15 DN250)</td></tr> <tr><td>5.screened PFA</td><td>(DN50 DN250)</td></tr> </tbody> </table>	1.FTFF(F4)	(DN15 DN1000)	2.Polychloroprene	(DN15 DN3000)	3.Polyurethane	(DN15 DN600)	4.FEP(F46)	(DN15 DN250)	5.screened PFA	(DN50 DN250)	<p style="text-align: right;">h. Accessory</p> <p>0.Nothing 1.Grounding electrode(DN25 DN3000) 2.Grounding ring(DN15 DN3000) 3.Electrode scraper structure(DN80 DN3000)</p>																																																														
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	<p style="text-align: right;">k. Converter type</p> <p>01.Square separated type/single current/dipluse/double knock 02.Round separated type/single current/dipluse/double knock 03.Round integrated type/single current/single pulse/double knock 04.Square integrated type/single current/single pulse/double knock Notes: 1. Communication protocol: RS232,RS485.HART optional 2.Batch control function optional 3.GPRS remote monitoring function optional</p>																																																																								

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