MICROWAVE PRECISION INSTRUMENTS

MXMAG SERIES ELECTROMAGNETIC FLOW TRANSMITTER

OPERATIONS MANUAL

Microwave Precision Instruments, Inc.

ISO9001-2000

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1. Operation Principle

The operation of a magnetic flowmeter or mag meter is based upon Faraday's Law, which states that the voltage induced across any conductor as it moves at right angles through a magnetic field is proportional to the velocity of that conductor.

Faraday's Formula:

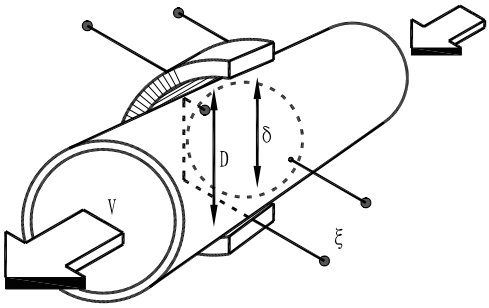
E is proportional to V x B x D where:

E = The voltage generated in a conductor

V = The velocity of the conductor

B = The magnetic field strength

D = The length of the conductor



functional diagram

To apply this principle to flow measurement with a magnetic flowmeter, it is necessary first to state that the fluid being measured must be electrically conductive for the Faraday principle to apply. As applied to the design of magnetic flowmeters, Faraday's Law indicates that signal voltage (E) is dependent on the average liquid velocity (V) the magnetic field strength (B) and the length of the conductor (D) (which in this instance is the distance between the electrodes).In the case of wafer-style magnetic flowmeters, a magnetic field is established throughout the entire cross-section of the flow tube (Figure 1). If this magnetic field is considered as the measuring element of the magnetic flowmeter, it can be seen that the measuring element is exposed to the hydraulic conditions throughout the entire cross-section of the flowmeter. With insertion-style flowmeters, the magnetic field radiates outward from the inserted probe (Figure 2).

2. Main Features and Applications

Electromagnetic flowmeter consists of two parts of the sensor and transmitter. MXMAG-type electromagnetic flowmeter for measuring a variety of acid, alkali, salt solution, paper pulp, slurry and other conductive liquid or liquid-solid two-phase medium volume flow. In the chemical, alloy, water supply and drainage, sewage treatment, food, sugar, paper making, environmental protection and other departments to be widely application.

Following characteristics of sensor:

(1) The whole welded structure,good sealing performance;

(2) Structure is simple and reliable,no moving parts inside;virtually no pressure loss

(3) low-frequency square wave excitation,anti-jamming performance,zero stability;

(4) The instrument measured medium has nothing to do with pressure, viscosity, temperature, density and other physical parameters of the impact of changes

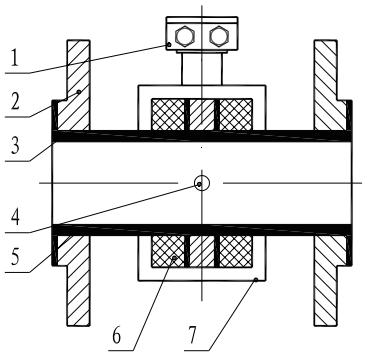
(5) The instrument reflects the sensitivity; the output signal has a linear relationship with flow. Width of measurement;

(6) As measured medium only measuring tube lining and electrode contact, easy to satisfy anti-corrosion, anti-wear requirements;

(7) Power consumption is small, complete set of instrument power consumption <10VA, has nothing to do with the size of the sensor aperture;

(8) To install, usage, and easy maintenance.

3.Structure:



Structure diagram

1.Junction box; 2.flange;

3.insulated liner; 4.electrode; 5.measuring tube;

6.excitation coil; 7.shell

Sensor structure shown in Figure 2, the following components:

(1) Measuring tube: Measuring tube flow measured medium, measuring tube by the non-magnetic stainless steel and welded flange, lined with insulation lining.

(2) Lining: the inside of the measuring tube and the flange sealing surface of a complete corrosion resistant electrical insulation material, to prevent the traffic signal is short-circuit.

(3) Excitation system: measurement of the outer tube from top to bottom with a group of coils to generate magnetic fields of work.

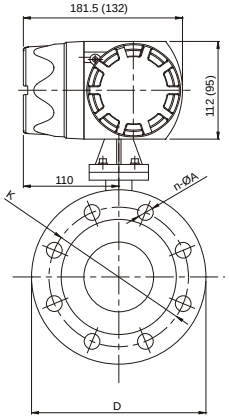
(4) Electrode: with the magnetic field lines perpendicular to the direction of the measurement pipe wall with a pair of electrodes to detect flow signals, the electrode materials can be corrosion testing medium selected.

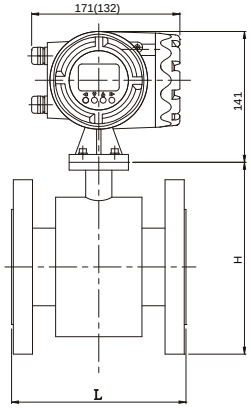
(5) Shell: protecting the instrument and steal up it.

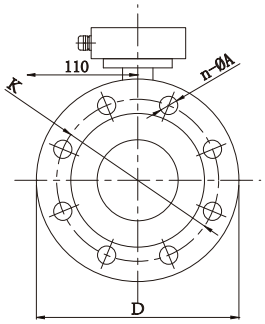
4.Appearance and install size

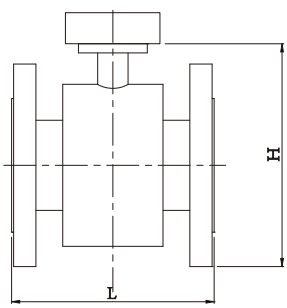
mm

DN (mm) (ANSI- inch)	Max Working pressure (psi)	L	D	K	n-øA	Compact type (kg)	Remote type (kg)
10 3/8"	580 psi	150	90	60	4-ø14	6	4
15 1/2"		150	95	65	4-ø14	6	4
20 3/4"		150	105	75	4-ø14	6	4
25 1"		150	115	85	4-ø14	7	5
32 1.25"		150	140	100	4-ø18	9	7
40 1.5"		150	150	110	4-ø18	10	8
50 2"		200	165	125	4-ø18	12	10
65 2.5"		200	185	145	8-ø18	17	15
80 3"		200	200	160	8-ø18	17	15
100 4"	250 psi	250	220	180	8-ø18	22	20
125 5"		250	250	210	8-ø18	24	22
150 6"		300	285	240	8-ø22	35	33
200 8"	150 psi	350	340	295	8-ø22	45	43
250 10"		400	395	350	12-ø22	84	82
300 12"		500	445	400	12-ø22	102	100
350 14"		500	505	460	16-ø22	123	121
400 16"		600	565	515	16-ø26	147	145
450 18"		600	615	565	20-ø26	212	207
500 20"		600	670	620	20-ø26	229	210
600 24"		600	780	725	20-ø30	252	250
700 28"		700	895	840	24-ø30	352	350
800 32"		800	1015	950	24-ø33	462	460
900 36"		900	1115	1050	28-ø33	558	550
1000 40"	90 psi	1000	1235	1120	28-ø36	690	680
1200 48"		1200	1405	1340	32-ø33	785	780
1400 55"		1400	1630	1560	36-ø36	1258	1250







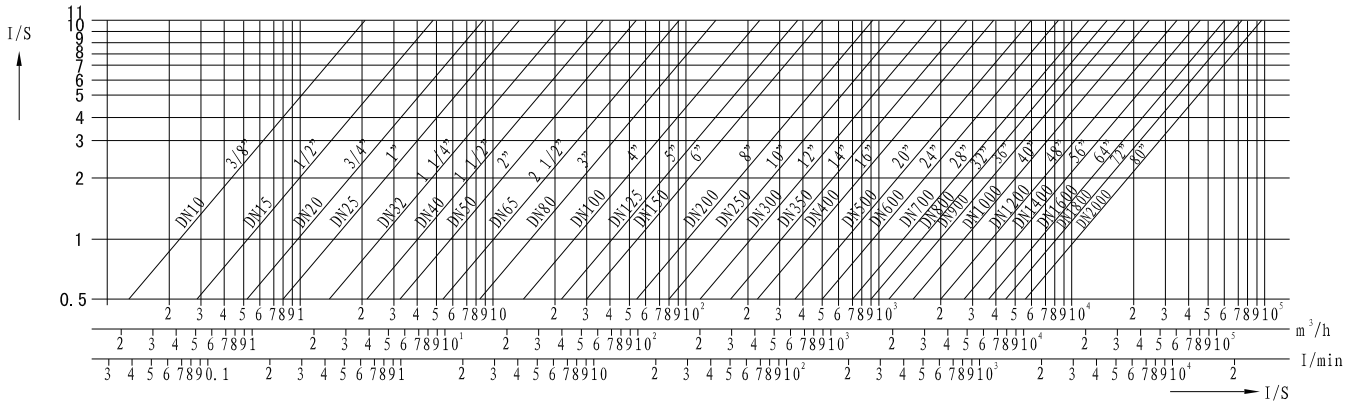


5. Specifications

1). Max flow range for EMF (Choice of reference map) :

ANSI	Common choice of full scale flow range m^3/h (Min/Max Flow in bbl/h)
3/8"	0.16, 0.2, 0.25, 0.3, 0.4,0.5,0.6,0.8,1.0,1.2,1.6,2.0,2.5 (1.0 bbl/h.....15.73 bbl/h)
1/2"	0.4,0.5,0.6,0.8,1.0,1.2,1.6,2.0,2.5,3.0,4.0,5.0,6.0 (2.5 bbl/h.....37.74 bbl/h)
3/4"	0.6,0.8,1.0,1.2,1.6,2.0,2.5,3.0,4.0,5.0,6.0,8.0,10.0,12.0 (3.77 bbl/h.....75.48 bbl/h)
1"	1.0,1.2,1.6,2.0,2.5,3.0,4.0,5.0,6.0,8.0,10.0,12.0,14.0,16.0 (6.29 bbl/h.....100.64 bbl/h)
1.25"	1.6,2.0,2.5,3.0,4.0,5.0,6.0,8.0,10.0,12.16,20,25 (10.06 bbl/h.....157.25 bbl/h)
1.5"	2.5, 3.0, 4.0, 5.0, 6.0, 8.0,10.0,12,16,20,25,30,40 (15.73 bbl/h.....251.60 bbl/h)
2"	4.0, 5.0, 6.0, 8.0, 10, 12,16,20,25,30,40,50,60,70 (25.16 bbl/h.....440.29 bbl/h)
2.5"	6.0,8.0,10,12,16,20,25,30,40,50,60,80,100,120 (37.75 bbl/h.....754.78 bbl/h)
3"	10,12,16,20,25,30,40,50,60,80,100,120,160 (62.90 bbl/h.....1,006.37 bbl/h)
4"	16,20,25,30,40,50,60,80,100,120,160,200,250 (100.64 bbl/h.....1,572.45 bbl/h)
5"	25,30,40,50,60,80,100,120,160,200,250,300,400 (157.25 bbl/h.....2,515.92 bbl/h)
6"	40,50,60,80,100,120,160,200,250,300,400,500,600 (251.59 bbl/h.....3,773.89 bbl/h)
8"	60,80,100,120,160,200,250,300,400,500,600,800,1000 (377.39 bbl/h.....6,289.81 bbl/h)
10"	100,120,160,200,250,300,400,500,600,800,1000,1200,1600 (628.98....10,063 bbl/h)
12"	160,200,250,300,400,500,600,800,1000,1200,1600,2000,2500 (1,006....15,725 bbl/h)
14"	200,250,300,400,500,600,800,1000,1200,1600,2000,2500,3000 (1,258....18,870 bbl/h)
16"	250,300,400,500,600,800,1000,1200,1600,2000,2500,3000,4000 (1,572....25,159 bbl/h)
18"	300,500,600,800,1000,1200,1600,2000,2500,3000,4000,5000 (1,887...31,450 bbl/h)
20"	400,600,800,1000,1200,1600,2000,2500,3000,4000,5000,6000 (2,515...37,740 bbl/h)
24"	600,1000,1200,1600,2000,2500,3000,4000,5000,6000,10000 (3,774...62,898 bbl/h)
28"	800,1200,1600,2000,2500,3000,4000,5000,6000,10000,12000 (5,032...75,478 bbl/h)
32"	1000,2000,2500,3000,4000,5000,6000,10000,12000,16000 (6,290...100,636 bbl/h)
36"	1200,2000,2500,3000,4000,5000,6000,8000,10000,12000,16000 (7,547...100,636 bbl/h)
40"	1600,2500,3000,4000,5000,6000,10000,12000,16000,20000 (10,064...125,796 bbl/h)
48"	2500,5000,6000,8000,10000,12000,16000,20000,25000,30000 (15,725...188,695 bbl/h)
55"	3000,8000,10000,12000,16000,20000,25000,30000,40000 (18,869...251,592 bbl/h)

2.) Flowmeter curve graph of the relationship between Diameter, flow rate and flow



6. Installation

Electromagnetic flow sensor if not installed properly, will significantly affect measurement accuracy, even lead instrument not working properly, so Before installation instructions carefully read the relevant sections.

1.) Installation ways

Sensor installation method for the flange connection. Criteria and process pipe welding flange screw holes in the inter-position, bolt can be passed smoothly to facilitate the integration between the sensor and process piping.

Installation must ensure that sensors Center and the process pipe center line, and then a good grounding line, otherwise it would cause measurement error.

2.) The choice of installation environment

According to the work of instrument characteristics and technical characteristics, the choice of instrument installation environment should pay attention to:

(1) The instrument should be installed at the ventilation to dry, avoid installing at the place easy accumulation water.

(2) The instrument should try to avoid just sun shine and rain. Open-air installation, should keep out rain in places;

(3) Installation of places as much as possible to avoid strong vibration;

(4) as far as possible to avoid a strong electromagnetic field equipment; such as large motors, large transformers.

(5) Select the ease of maintenance, activities, convenient place.

3 .) The choice of installation location

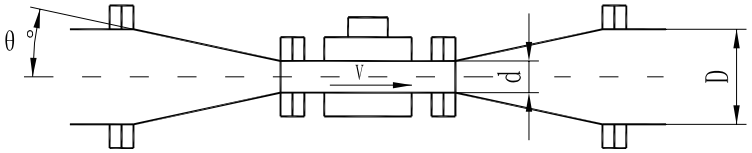
Installed on the sensor in the pipeline, we should note the following points

(1) sign the direction of the flow sensors and pipeline flows in the same direction within the medium;

(2) The need to ensure that sensor tube is full filled with the measured medium;

(3) The sensors should be five times the upstream straight pipe section D above, the sensor should be three times the downstream straight pipe section D above (available from the center of sensor , D to measure the pipe diameter);

4.) When the pipe diameter is inconsistent with the sensor, the sensor is installed at both ends tapered or gradually expanding tube, and then with the pipe connection. Gradually expanding, tapered conical tube should be no more than 15 degrees. When using 15 cone angle gradually expanding, tapered tube, the pressure loss resulting from the curve in Figure 4 :



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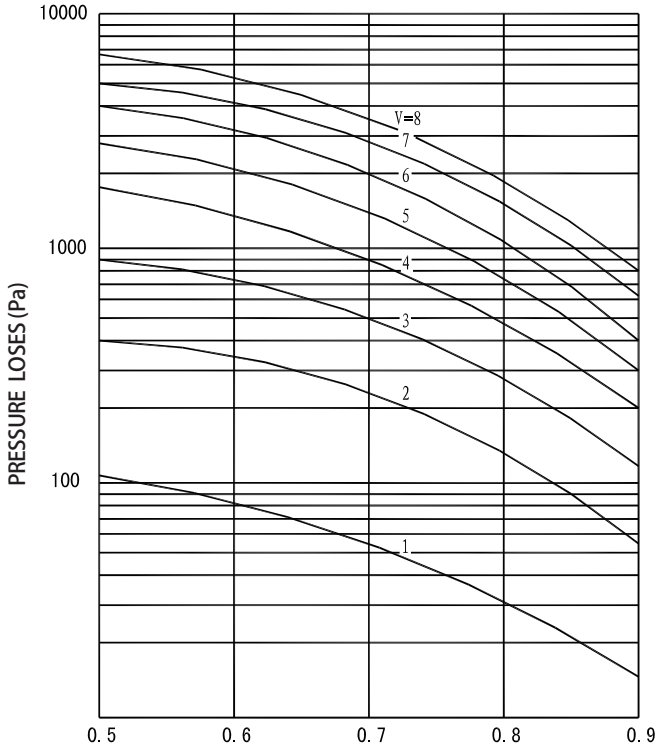
d.Sensor internal diameter; D.diameter, V.flow rate of sensor(m/s)



picture 4 Install reducing pipe or gradually expanding tub to effect pressure loss

5) sensor installation should be taken in the horizontal electrode as horizontal position, once the media containing bubbles or sediment, the bubbles will not be adsorbed on the electrode in the vicinity, resulting in conversion of the input terminal open circuit; sediment will not cover the electrode, caused by zero drift;

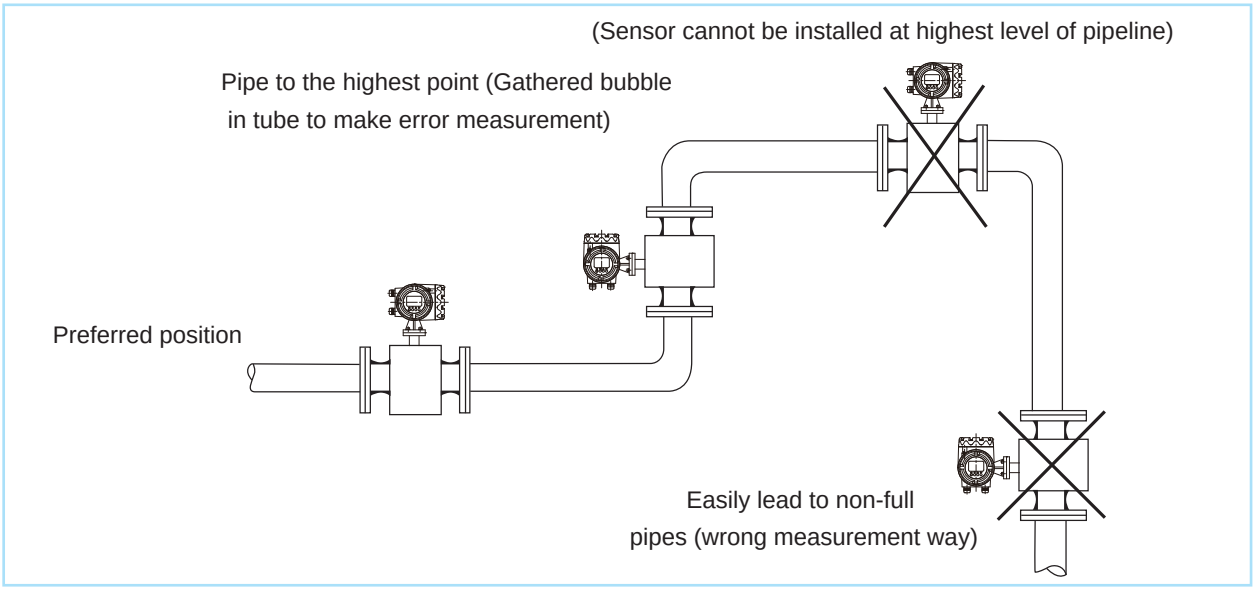
(6) liquid-solid two-phase medium, the vertical installation of a more favorable, a measured medium can prevent phase separation, two lining wear sensor allows more uniform. Vertical installation, the medium flow direction should be bottom-up, so as to ensure that the sensor tube is always filled with medium.

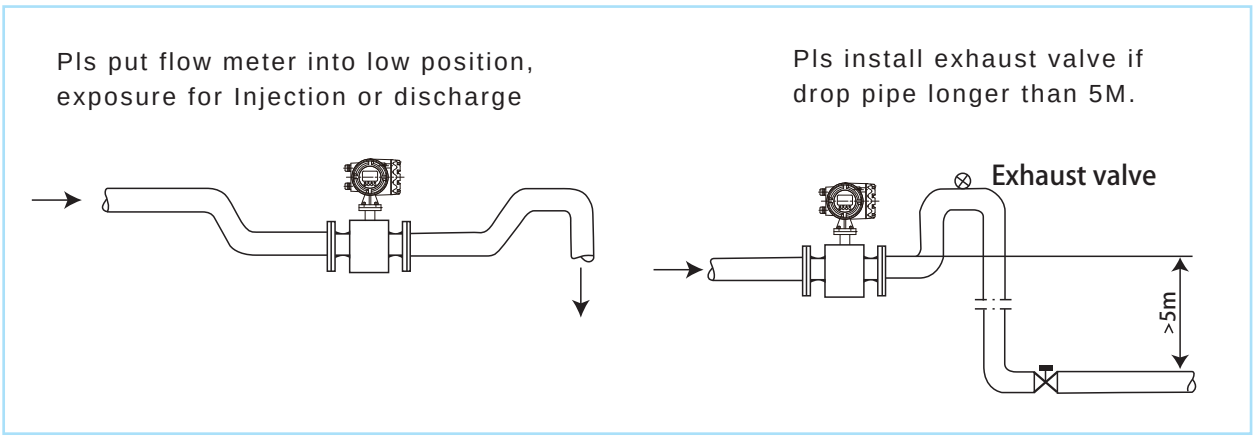
7. Installation position of sensor

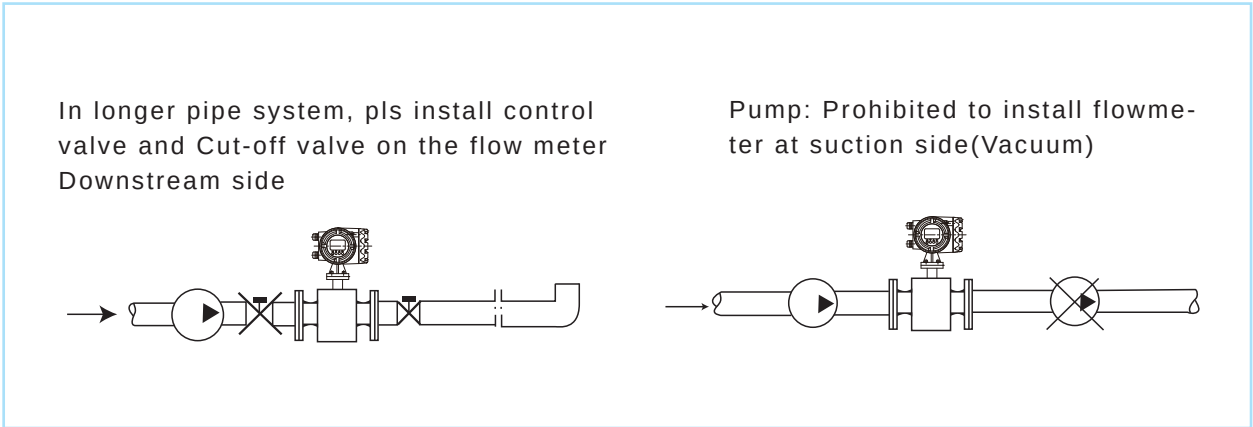
In order to enable reliable flow meter, Pls note the following installation requirements:

1. As far as possible to avoid ferromagnetic objects and equipment with strong magnetic fields (big electric machine, big transformer) is protecting of the magnetic field sensor.

2.Flow meter should be enough space around for easy installation and Maintenance.







picture 5 recommend installation

8. Connecting cable

BOM 1 -Connecting cable

Items	Name	specifications	Qua.	Remarks
1	Signal lines	PVC sheathed 2 core shielded cable 2X16/015 (SBWP) PVC sheathed 2 core shielded cable 2X80/015 RWP Ship sealed with rubber insulated cable 2X0.5	8 or 15m	Accessory kit
2	Excitation wire	Two core plastic cable 2X1.0mm^2（YHZ） Marine soft ethylene-propylene rubber insulated cable 2X1.0(CEFR-C)	8 or 15m	Accessory kit
3	Output signal lines	General Color plastic double-stranded copper wire	provided by users	

9. Grounding

The flow sensor generated signal by is very small, when in full-scale only a few mV, so the sensor should be well grounded, in a good grounding line access must be in accordance with the ninth Page shown

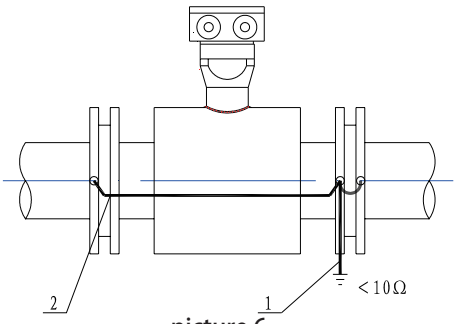
Grounding requirements of the electromagnetic flowmeter has two aspects:

1）From the working principle of electromagnetic flowmeter and flow sensor signals to the circuit analysis, sensors and ground-side converter must be consistent with the measured medium equipotential.

2）Grounding to the earth is zero potential to reduce outside interference. Under normal circumstances, industrial pipes are metal tubes and grounded in itself, which easily meet the requirements, but in a larger external electromagnetic field interference, the electromagnetic flowmeter grounding devices should be set up for other way, with grounding line is greater than the total cross-section 6mm 'multi-strand copper wire, the grounding line of sensors cannot be received in the motor or other equipment to the public online in order to avoid the effects of leakage current. Grounding resistance should be less than 10 ohms.

3）Sensor is installed in the plastic pipe lines or in the pipe insulation, the sensor should be installed at both ends of the grounding ring or grounding flange, or with a ground electrode a short tube, shown in figure 7.

4）Sensor be installed on the Catholic protection of pipelines, it must be installed two ends of grounding ring (or grounding flange) on the sensors.Figure 8

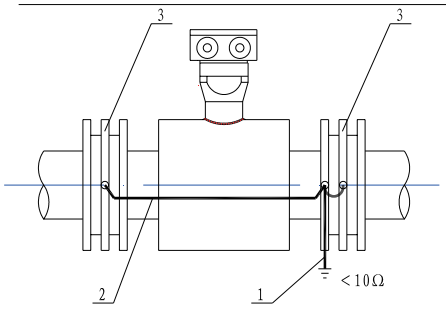


picture 6

Sensors installed in the metal pipe of grounding diagram

1, grounding line (outside interference device larger installation)

2, Flowmeter grounding line (with factory)



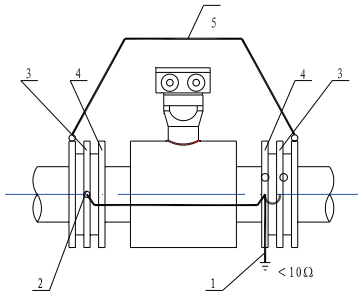
picture 7

Plastic pipe or pipe insulation lining grounding diagram

1, grounding line (outside interference device larger installation)

2, Flowmeter grounding line (with factory)

3, grounding or earthing ring flange



picture 8

Pipeline cathodic protection installed for the grounding diagram

1, grounding device line (outside interference larger installation)

2, flowmeter grounding line (with the factory);

3, grounding or earthing ring flange must be consistent with the flange connecting pipe insulation

4, bolts (installed with the flange should be mutual insulation)

5, connecting wire, copper cross-sectional area of 16mm. So that piping and cathodic protection isolate between the sensor.

10. The preparation of pre-operational

Important Note: the whole instrumentation (including sensors and Transmitter) to run a rigorous adjustment and flow calibration in the factory, one by one after passing the test

In Plants. To the end user, So, it can be put into operation without any adjustments. Therefore, the initial operation of the problems encountered, should be in accordance with the specifications Reference points one by one inspection, a careful analysis, troubleshooting. Avoid Blindly tamper to make a good set of adjustments to the original instrument to confuse or even damage.

Instrument can be put into operation the following steps:

1) First open upstream and downstream the valve with Sensor, so that sensors measuring tube filled with test medium;

2.) Power for one minute, Transmitter showed an immediate increase to a certain numerical value, pls wiring is correct or not, when the flow direction is wrong,pls

Check the direction of the sensor installation is correct.

3) zero Trim , instrument through the media 15 minutes after the first sensor tightly closed valve downstream side, and then shut down the upstream side of the valve, so that tube

Stop the flow of fluid and no leakage, the flow shows zero. Zero if too high or too low, Pls do Zero Trim on the Transmitter.

Specific operations see Transmitter Manual p. 27

11. Common failures and how to deal with

Electromagnetic flow sensors generally do not require regular maintenance, but medium of measured is easily adhesion in the electrode or dielectric tube wall measurements or scaling of the occasion, the need for regular cleaning pipe wall of measurement and electrodes, attention do not damage liner, electrode.

Failure to deal with reference to Table

Regular failure and obviate method

Troubles	Possible Causes	Check the troubleshooting
Liquid flow through the meter without measurement	1.Moisture sensor or signal-to-ground short-circuit resulting in damage	Use a multimeter to check insulator of signal line whether good or not
	2.Signal circuit break	Use a multimeter to check signal good or not
	3.Open-loop excitation	Use a multimeter to check sensor loop is good or not
	4.Transmitter failure	According transimitter manual inspection, troubleshooting
Changes in the flow showed that full-scale on transmitter	1.A signal-to-ground short-circuit or open circuit	Check signal line to ground resistance to use a multimeter measuring electrode-to-ground resistance, generally from thousands of OM to some 10k om
	2.medium in tube not full	Use a multimeter to check signal lines open or not and to improve the installation method
	3.Imperfect earth	Check the signal shielding layer and then place resistors, re-installation of grounding devices
Measurement inconsistent with the actual flow	1.Change the zero point to make measurement error	Grounding bad or electrode dirty, Zero Trim after inspections
	2.Transmitter configure be modified	Adjusted in accordance with the parameters set, and then zero trim
	3.Medium in tube not full	Inspection process to improve the installation method
	4.Electrode or wall scaling	Clear scaling
	5.error in actual determination to check with Flowmeter	Carried out using standard flow meter to compare

12. Open box and product sets

Check packing box, and check the sensor model, the contract specifications in line with the order randomized complete documents

packing list	1 pcs
KF700 series EMF manual instructions	1 pcs
certification	1 pcs
CD	1 pcs

13. Quality Assurance

Instruments and accessories from the factory from the date of 12 months, when a user products in full compliance with the technical requirements and installation instructions provided in the transport, installation and use of the provisions of instruments and accessories have found products that do not meet technical standards, the instrument may be returned factory, this factory is responsible for free repair.

14. Transport and storage

Instruments to prevent damage in transit, on arrival at the scene after the installation, please keep the state at the time of factory shipment, storage location of the indoor conditions on the follow:
a) ventilation, rain, moisture, indoor air should not contain the harmful effects of corrosive substances;
b) a small mechanical vibrations and to avoid the impact;
c) temperature range in -20°C~ +60°C
d) do not dry 90% humidity

15. Order Information

Orders must be measured in accordance with specific targets and measuring conditions of access to the Company on the selection of technical information and ordering the right choice. E. According to the actual situation, the order should be determined:
1) the scope of the model and flow measurement. Order to determine, based on sensor diameter models. Full-scale instrumentation (ie, range) should not be less than the actual measured flow of the largest pipeline, and the normal flow of more than 50% of the selected range in order to obtain high precision.
2) pressure meter, temperature must meet the test medium pressure and temperature.
3) come into contact with the measured medium liner, electrode corrosion media should be capability measured. Therefore, users must be ordered according to their own experience of anti-corrosion,
Refer to the company's existing varieties of lining and electrode materials (see 12th page), the correct selection of materials.
4) the need for installation with matching flanges, please specify when ordering.

16. Instrument serial number and model matching

(1) sensor ID

(2) sensor coefficient

(3) Converter Model

(4)other

17. Common electrode materials corrosion performance

Material	Corrosion performance
Acid-resistant steel 1Cr18Ni9Ti	To nitric acid, phosphoric acid and other cold inorganic acid,a variety of salt and alkali solutions, organic acids, water-resistant for a good corrosion resistance. Formic acid of boiling, Oxalic acid , industrial acid-ming, as well as sodium carbonate and chlorine, bromine, iodine, such as poor chemical stability of medium, not corrosion.
Stainless steel containing molybde-num 0Cr18Ni12Mo2Ti 0Cr18Ni12Mo3Ti	In the reductive medium (such as hydrochloric acid) compare with 1Crl8N 9Ti have stronger corrosion resistance.Less than 50% of the nitric acid, at room temperature less than 50% of sulfuric acid and 20% of the hydrochloric acid, alkali solution, boiling phosphoric acid, formic acid, under pressure from a certain sub-sulfuric acid, water, acetic acid and other media have a strong corrosion resistance , can be widely used in petrochemical, urea, vinylon industry.Intolerant of hydrofluoric acid, chlorine, bromine, iodine and other medium.
HastelloyB	Below Boiling point of all of the following concentrations of hydrochloric acid with good corrosion resistance, is also resistant to sulfuric acid, phosphoric acid, hydro-fluoric acid, organic acids and other non-oxidizing acids, alkalis, salt solution of non-oxidative corrosion.
HastelloyC	Oxidation of acid-resistant, such as nitric acid, mixed acid or chromic acid and sulfuric acid corrosion of mixed medium, but also resistant to oxidation of the salts such as Fe ", Cu +2 corrosion or other oxidants. Such as higher than normal temperature of the hypochlorite solution. Seawater corrosion resistance is very good
Ti	Medium resistance of oxygen and nitric acid, chloride, hypochlorite and chlorine the corrosion resistance of a good medium.

18. Common properties of lining materials and application.

Lining material	The main performance	Application temperature	The main performance
PTFE	It is the most stable plastic material. Ability to boiling Of hydrochloric acid, sulfuric acid, nitric acid and aqua regia, but also strong capability Alkali, organic agent. Molten alkali metals and intoler-ance， Its ammonia solution, abrasion resistance and poor bonding	-80～250°C	Has an excellent wear resistance, which is equivalent to the pressure of natural rubber pipe measurement acids, alkalis,Like salt, strong corrosive medium or medium health category.
Chloroprene rubber	Have good flexibility, high tensile strength, abrasion resistance, good impact resistance. Acid, alkali, salt and other corrosive media. Intolerance oxidative corrosion media	0～80°C	A non-oxidizing acids, alkalis, salt solution.
Polyurethane Rubber	Has an excellent wear resistance, which is equivalent to ten times that of natural rubber.	0～60°C	Oil drilling, slurry, mud, Mortar serious occasions, such as wear and tear

Transmitter's configuration in accordance with the contract requirements, run the data set in accordance with contract requirements. Users can check the meter nameplate to confirm that the instrument provided by the model and instrument operating parameters set. It can be put into use after connect power. In order to ensure your system run on normal operation, make sure that the sensor measurement is full of medium channels

Our company electromagnetic flowmeter is dedicated to conductive fluid (conductivity ≥ 5μS/cm, water ≥ 20μS / cm) the volume of flow measurement.
Flowmeter installation and usage should be in strict accordance with the specification, and to comply with the relevant national standards, safety requirements and accident prevention requirements.
MF7200 electromagnetic flow converter directly connected with the electromagnetic flow sensor compact into one body

Ⅰ. Installation

1. Working condition

1.) The working conditions of the reference test:

a) operating temperature:20°C±2°C

b) relative humidity:45%～85%

c) the supply voltage:220VAC±2%

d) Power frequency:50Hz±5%

e) harmonic content:<5%

f) warm-up time:>15min

2) The working conditions::

a) ambient temperature:-20°C～55°C

b) relative humidity: 5% -90%

c) power supply

AC Power Supply:85VAC～265VAC，50Hz

DC Power Supply:18VDC～36VDC Rated Power:<10VA（includes sensor）

2. Installation Notes

1.) Environment temperature

It should avoid large temperature changes. If the meter installed by the thermal radiation Plateau, please provide the thermal isolation or ventilation. Instrumentation installed in the switch box, there should be appropriate measures of net and ventilation are examples such as the fan. Compact structure flow meter should give full consideration to the transmitter working environment temperature.

2.) Installation environment

It should avoid in a strong corrosive atmospheric environment. Installation location should have adequate ventilation. Protective properties of instruments should be maintained to prevent the corrosive gases and moisture into the instrument cavity. It Should avoid direct sunlight, especially the liquid crystal display part. Strong vibration should be avoided.

3.) Installation methods

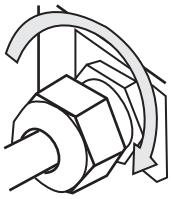
A compact body flowmeter transmitter and Sensor two parts is connected to the end before out of factory, the user can be installed directly. Sub-constructer flowmeter for Transmitter and sensors to be in two parts at field by the user through a dedicated cable (factory annex) to connect. Part of the sensors installed on both glycosides, Transmitter are usually installed in the indoor or meter box. The distance is shorter for better.

Ⅱ.Power line connecting

Instrumentation and electrical installation work must be connected by a certain qualified staff to implement. Be sure to operate before reading this operation manual carefully to avoid wrong operation caused by solid work instrument error or damage. Converter must have a good grounding in order to protect their personal safety. Use in hazardous area must be provided by columns according to special "EX" in the operating manual instructions. Instrument should be in the electrical connection before power run.

Operation principle and requirements:

1.The lid of Instrument just open in the wiring, once opening the lid of instrument will affect protection performance. It should be back to the factory sealed lid state after the wiring finished.
2, In order to ensure the insulation of instrument performance, to prevent the instrument as a result of wet insulation caused by poor rains ,in the outdoor wiring should be avoided.
3, with a threading instrument connectors, cable connectors must be approved by threading into the instrument cavity (see circle). After the wiring , waterproof joints should be tightened to ensure that moisture and corrosive gases do not enter the electronic part.



4, Input and output lines recommend the use of the installation of conduit, conduit tube be recommended thick solid brass or soft metal pipes Road. Conduit should be noted that the order to prevent flood water flowing into the conduit or conduit into the internal instrumentation. Input power line and signal lines should be separated through their respective special perforated cavity into the instrument, prohibited parallel and banding together.
5, The choice of input and output cables to reference the following description:
Excitation, a dedicated flow meter signal cable is provided by our company.
Power Line: owned by the user, customer can option YH Z-2xlmm2 two soft-core rubber insulated cable, cable length should concern voltage drop.
Output line: owned by the user, customer can option RVVP2X16 / 0 15 PVC insulated sheathed wire shielding, cable length will affect the load characteristics.

1. Instrument Power supply

This series of transmitter have the following power supply types.

1) AC Power supply range

85VAC-265VAC, 50Hz power ~ 10VA (including sensors)

2) DC power supply range

18VDC 36VDC; power ≤ 10W (including sensors)

Before connecting the power supply, please see the nameplate and part of the electrical terminals and the types of instructions ,in order to avoid misoperation to make instrument error or damage

2. Power line connecting

Operation steps:

1, open the rear cover of the transmitter
2, a dedicated power supply input line threading through the hole (Waterproof connector) into the instrument cavity.
3, the grounding wire connected to the transmitter side of the ground.
4, AC (AC) power lines L and N lines were connected to the converter side of the L and N-side.
Direct current (DC) power supply to power + lines and - receiving line side converter, respectively, the + terminal and - terminal.
5, water-proof connector threading screw instrumentation and to return to the status of the factory sealed.

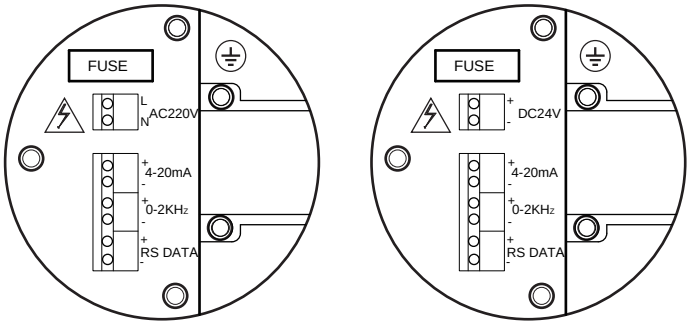


Diagram of output signal terminal

Terminal Description

Identifier	Functional	Description
L	220VAC Power, L terminal	Power range: 85 VAC-265VAC、50Hz
N	220VAC Power, Nterminal	
+	24 VDC Power, positive terminal	Power range: 18 VDC -36VDC
-	24 VDC Power, negative terminal	
⏚	Power Ground terminal	Grounding resistance <= 10 Ω

Description:

Pay attention to the following questions on connect the power supply :

1, the power cable of inside the sensor will not wound.

2, the power input line should separated with other input and output lines , threading through the holes into their own dedicated instrument cavity.

3, noted that the positive and negative polarity DC power supply, if the reverse then the instrument does not work.

4, power supply should have a good grounding in order to protect the operator's personal safety.

3. Output signal

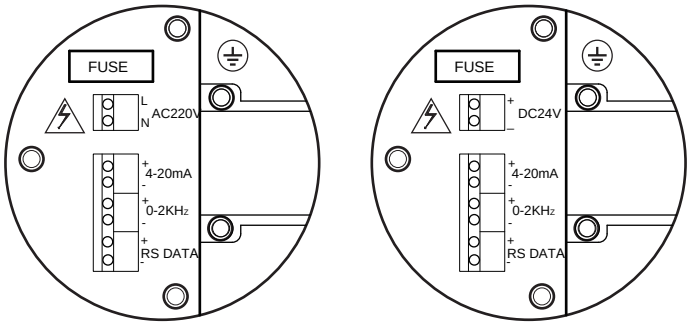


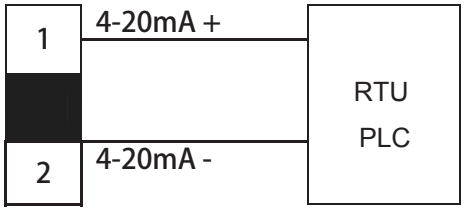
Diagram of output signal terminal

Terminal Description

Terminal description

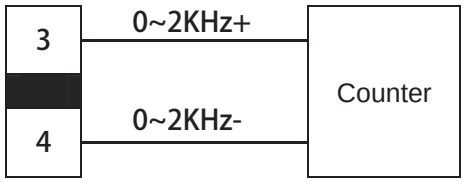
Items	Lable	Function Instructions	Remarks
1	4-20mA +	4-20mA Output positive terminal	1, Load resistance:750ohms (with link) 2, Hart Communications external 24VDC power supply Active Output Mode
2	4-20mA -	4-20mA Output negative terminal	
3	0~2KHz+	Frequency/pulse output positive terminal	The output amplitude of 24V load current <=50mA
4	0~2KHz-	Frequency/pulse output negative terminal	
5	RS485data+	RS485 Communication positiveterminal	RS485 communication function (n just for transmitter has this function
6	RS485data -	RS485 Communication negativeterminal	

1.) Electric current output



The converter current output electrical isolation has been achieved. Output to take an active approach. Current output mode 4-20mA, 20mA current output value from the corresponding traffic parameter item "scale flow of value" is determined (reference to factory nameplate on the instrument measuring range a value). The maximum current output load resistance of 750Q, the load resistance includes the cables used to connect the resistance. Current output cable is recommended RWP2x16/015 PVC insulated sheathed cable shield. 2.

2.) Pulse, frequency output



The Transmitter frequency, pulse output has been achieved electrical isolation, the output for the active mode (see above chart). Transmitter frequency, pulse output with transistor output mode. Maximum pulse output frequency 5KHZ, the output pulse amplitude of 24V. Active mode the maximum load current 50mA, passive mode the maximum load current 0.2A. As the frequency and pulse output terminals are shared, it is not to choice two output modes. Users can set the parameter "frequency output" to select the work. Frequency output upper limit corresponding to the measured flow value by the parameter item "scale flow value" decision (reference instruments to measure the scope of a factory nameplate values). Pulse output equivalent by the parameter 'pulse equivalent L / P "decision.

3.) Function of communication

Transmitter communication with RS485, MODBUSASC, MODBUSRTU communications capabilities (requires a user specified when ordering). Available through the "485 output communication protocol" parameter is set to specify. Instrument Communication Interface specific technical note on "protocol."

Ⅲ. Instrument statement

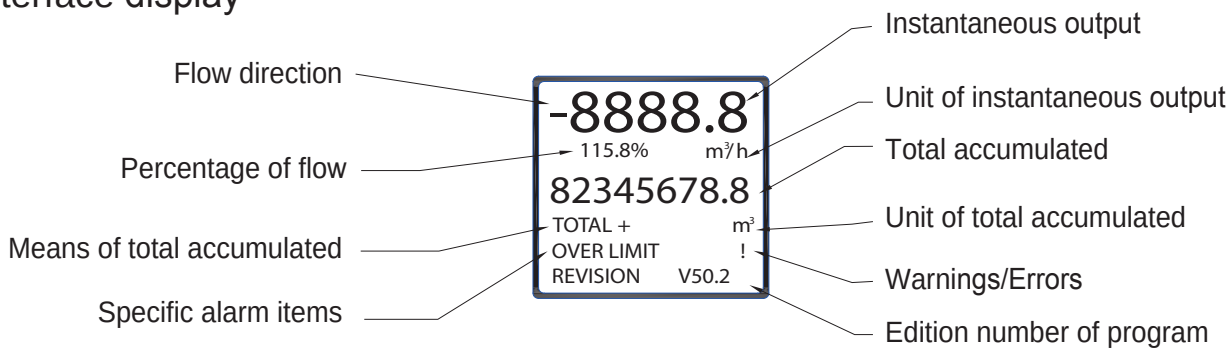
> ⚠ Before connect power, follow the manual of the first part of the note 1,2 and sensor part of the installation manual to verify whether the system is properly installed and connections. End customer can directly run instrument, the reason is including sensors and signal transmitter of two parts, all of the data have been based on user requirements and technical specifications of the company's manufacturing process in the factory setting.

1 .Working instrument showing

After complete correct electric connection, run power on instrument. Instrument transmitter first implementation of the initialization; display the company logo (see below). Wait 3 seconds after the instrument into the own measurement mode, immediately began to flow measurement and displays the current flow measurement value or other self-assemblies off information. If there is no meter to power after the show (display without backlight), then the power supply and connectivity in identifying ways to meet the requirements, may view the instrument power supply fuse is intact (you can see the 8 common faults and processing).

If there is no meter to power after the show (display without backlight), then the power supply and connectivity in identifying ways to meet the requirements, may view the instrument power supply fuse is intact (you can see the 8 common faults and processing).

2 . Interface display



Instructions:

Instrument Display Interface

1. The first line shows an instantaneous flow rate, flow rate display units can be in the 'flow unit' function key to choose;
2. The second line shows the percentage of traffic and flow units
3 .The third line shows the cumulative total amount
4 .The fourth line shows the total cumulative and cumulative units
5.fifth line shows the warning prompt and projects
6.sixth line shows the program version number

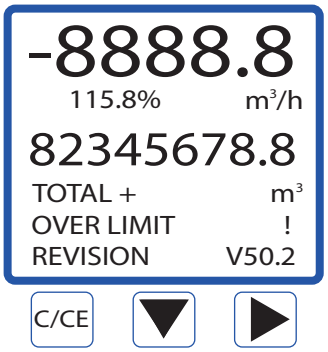
3. Power Supply Fuse Replacement

⚠ Replace the fuse should have a certain professional competence of people to perform. If replacing the meter fuse still does not correct issue, then please contact the manufacturer. Must replace with same rated fuse.

Ⅳ. Operations

1 . Panel layout and key definition

1.) MF7200 series



2.) Function instructions

C/CE parameter confirmation and withdraw from subprogram

▼ Set item (the key of downward and decrease of data variable)

▶ set item (the key of move to right)

short key and multiple key

▼ & ▶ system for short set “ZERO”, press ▼ and then press ▶

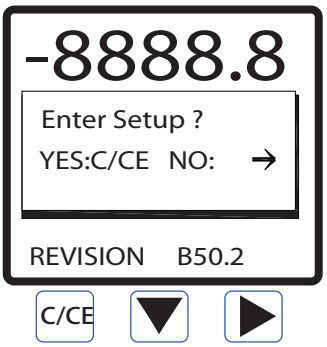
▶ & ▼ multiple press ▶ can short choose “instantaneous delivery uint”,“direction of accumulated”and “unit total of accumulated”, then press ▼ to change parameter and then press “C/CE” to save it

2. menu construction

Mode of Measure Press c/ce →	Configuration Menu press → →	Parameter item Press → →	Secondary Parameter item
	1. BASIC SETUP	1.1 Damping（0.1~99.9 s）	
		1.2 PV Decimal (1 ,2,3)	
		1.3 Total Decimal (1 ,2,3)	
		1.4 LCD rotate (0、+90、180、-90)	
	2. SYSTEM SETUP	2.1 Signal	2.1.1 Qmax(m^3/h) 2.1.2 Low Cutoff % 2.1.3 Max Limit % 2.1.4 Limit Time(S) 2.1.5 Direction 2.1.6 Indication
		2.2 Pulse Output	2.2.1 Freq Max(Hz) 2.2.2 Liter/pulse 2.2.3 Pulsewidth(ms)
		2.3 MODBUS Output	2.3.1Protocol 2.3.2 Baudrate 2.3.3 Parity 2.3.4 Dev Address
		2.4 Clear Total	
		2.5 Load Settings	
	3. TRANSMITTER TRIM	3.1 Tube Trim	3.1.1 Empty Trim 3.1.2 Full Trim 3.1.3 TubeRegion%
		3.2 Loop Trin	3.2.1 4mA Trim 3.2.2 20mA Trim
		3.3 Zero Trim	
		3.4 K Character	
		3.5 Total preset	
		3.6 Manual Adjust	3.6.1 Actual Zero(mV) 3.6.2 Empty Freq(Hz) 3.6.3 Full Freq(Hz)
	4. OUTPUT CHECK	4.1 Loop Test	
		4.2 Pulse Test	
mode of measure ← press C/CE	configuration menu press C/CE ←	parameter item press C/CE ←	secondary parameter item Press C/CE

3. Select menu item Measurement mode

Enter the parameter setting Press "C / CE “bond. Appears in Figure interface, select" C / CE "will enter the menu:



（BAS）Basic Configuration

（SYS ）System Configuration

（TRIM） Instrument Calibration

（CHK） Instrument Test

Click”→” to quit menu

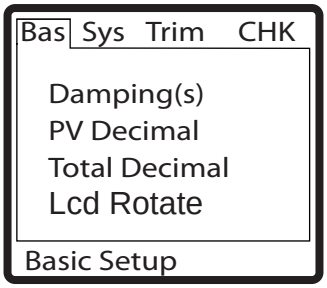
(BAS)Basic Configuration

Damping (s) （0.1~99.1）

PV Decimal (1、2、3)

Total Decimal （1、2、3） Lcd

Rotate (0、+90、180、-90）



(SYS)System Configuration

Signal

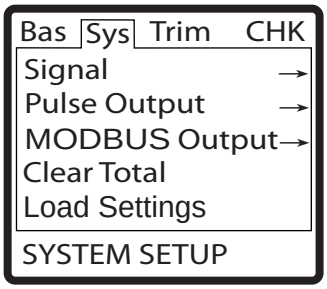
Pulse Output

MODBUS Output

HART Address

Clear Total

Load Settings



(TRIM) Instrument Calibration

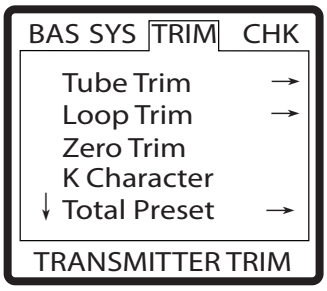
Tube Trim

Loop Trin

Zero Trim

K Character

Manual Adjust



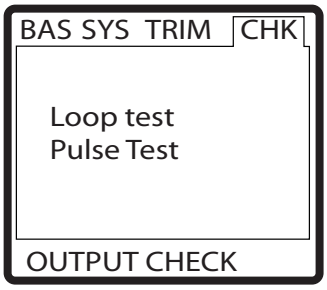
(CHK)Instrument Test

Loop Test

4-20mA test

Pulse Test

Check frequency output



4. Operation Guide for regular function of Transmitter

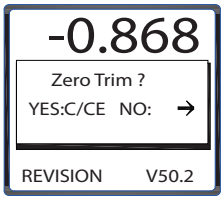
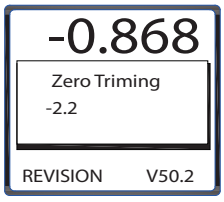
1.) Zero Trim

In order to obtain accurate measurement results, the electromagnetic Flowmeter should be zero Trim before re-installation. This series of transmitter has two calibration methods, the user can choose one way to Zero calibration.

> ⚠ Before Zero Trim the instrument; flowmeter measuring tube filled with medium, and in a quiescent state. Flowmeter must have good ground (see page 9). Meter Warm-up time of not less than 15 minutes.

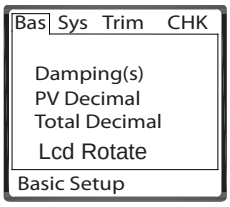
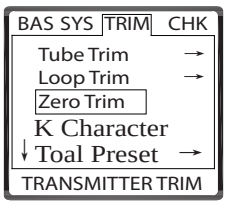
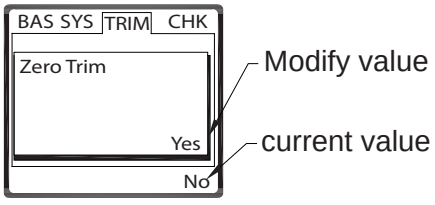
Method 1: Fast Zero calibration

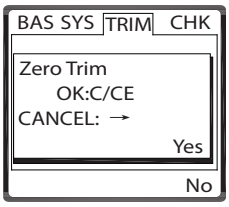
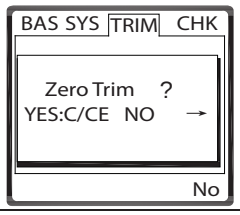
Fast calibration method, the user can follow the steps in instrument "Measurement mode 'state directly into the instrument calibration status of zero. Steps are as follows

Steps	Operation instructions	Interface show
1	In measurement mode, click "↓" and "→" on same time into "zero trim" interface menu	
2	Click "C/CE" to option yes, Transmitter kick off zero trim. (if you want to cancel trim, click "→" option No to give up Trim	
3	When complete to Zero trim, the transmitter will back to flow measurement display stage	

Method 2 : in the "Instrument calibration" menu to zero calibration

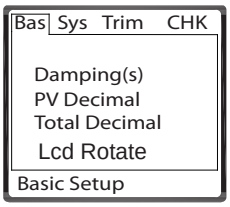
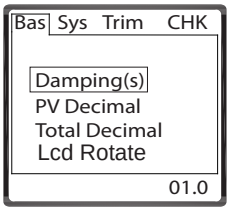
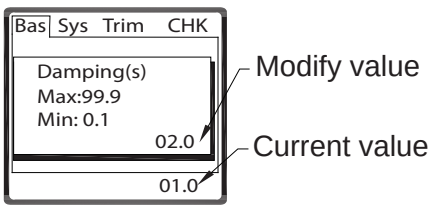
Choose this method, first of all need to enter "Instrument Calibration" under the main menu of the "Zero Trim" sub-menu, and then zero calibration. Steps are as follows:

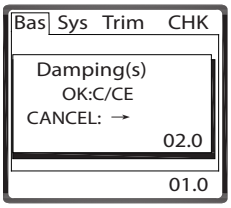
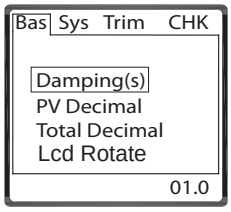
Steps	Operation instructions	Interface show
1	In measurement mode, click two times "C/CE" into Basic menu interface	
2	Click "→" key, pls move Cursor to "TRIM" side, after click "↓" key to move cursor to " Zero Trim" side	
3	Click "→" key into zero trim menu, after click "→" or "↓" again, to option Yes on "zero trim" menu	

Steps	Operation instructions	Interface show
4	Click “C/CE” to show confirm menu	
5	Click “C/CE” again into “zero trim” confirm menu, if click “→”, quit “zero trim” stage	
6	Click “C/CE” again to run “zero trim”, if click “→”, quit “zero trim” stage	
7	Pls waiting “Zero trim” finish and automatically return Trim menu. Click “C/CE” two times back to measurement mode	

2.) Damping time

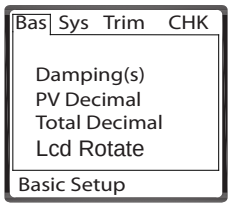
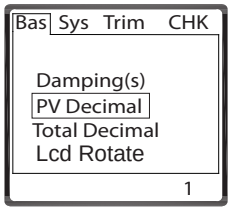
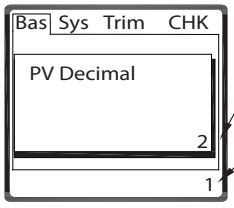
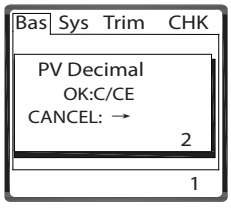
Damping time on the meter display and output. Set range o 1-99 9S (unit is "seconds"). Set as follows:

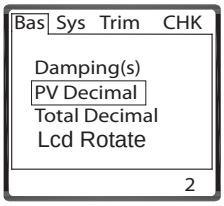
Steps	Operation instructions	Interface show
1	In measurement mode, click “C/CE” two times into configuration menu	
2	Click “↓” to choice Damping(s).	
3	Click “→” into “damping time” setup menu, “→” and “↓” key to set Damping times	

Steps	Operation instructions	Interface show
4	Click “C/CE” key to quit setup menu, LCD show confirm menu	
5	Click “C/CE” key to confirm and return configuration menu(click”→” give up modify	
6	Click “C/CE” two times from configuration menu to measurement menu, also you can continue other operation.	

3.) Instantaneous flow Resolution

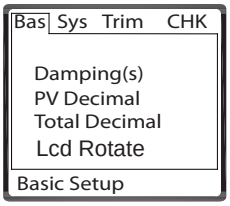
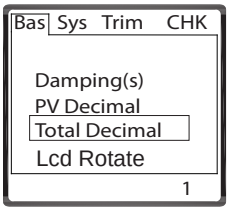
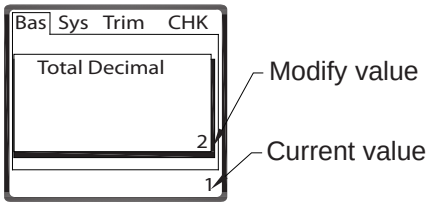
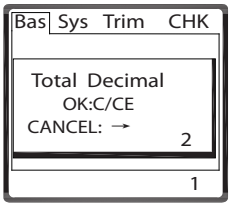
Adjust the instantaneous flow of small points indicate the medium, set the range of 1-3 decimal places

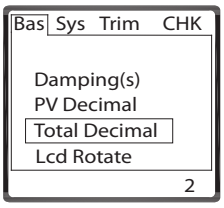
Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “↓” to choice total decimal	
3	Click “→” into “ PV decimal” menu. Click “→” and “↓” to setup digits after the decimal point.	
4	Click “C/CE ” quit setup menu. LCD show confirm menu	

Steps	Operation instructions	Interface show
5	Click"C/CE" to choice confirm and return Basic configuration menu (click "→" to give up modify.	
6	Click"C/CE" two times from BAS configuration menu to measurement menu, you also can continue other operation	

4.) Cumulative total flow resolution

Adjusted cumulative flow dots show the median, set the range of 1-3 decimal places

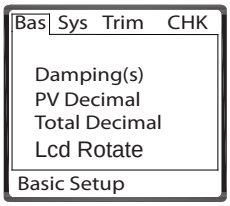
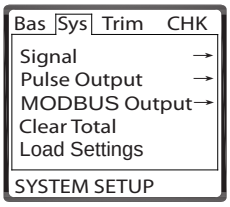
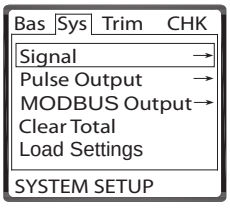
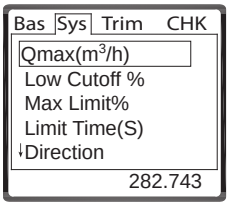
Steps	Operation instructions	Interface show
1	Click "C/CE" two times from measurement mode into configuration menu	
2	Click "↓" to choice PV Decimal	
3	Click "→" into " Total decimal" menu. Click "→" and "↓" to setup digits after the decimal point.	
4	Click "C/CE " quit setup menu. LCD show confirm menu	

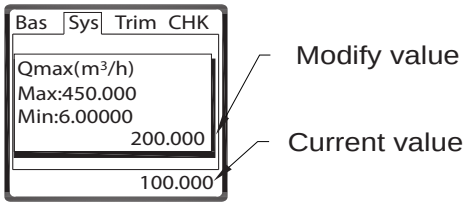
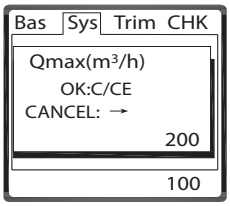
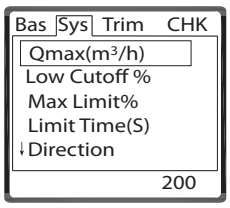
Steps	Operation instructions	Interface show
5	Click"C/CE" to choice confirm and return Basic configuration menu (click "→" to give up modify.	
6	Click"C/CE" two times from BAS configuration menu to measurement menu, you also can continue other operation	

5.) Scale flow m^3/h

Meter-scale flow (QMAX) range depending on the caliber meter (DN, unit :mm). Scale flow units: m^3/h.
Omin=DN2/3540(the equivalent of the current caliber(0.1m/s velocity)
Qmax = DN2/ 29.5 (equivalent diameter 12m/s velocity)
The scale value of the flow meter relate output and frequency output :
Current output Iout : Instruments measured value / scale flow settings x16 +4
Frequency output Fout: Instruments measured value / scale flow settings values x the frequency maximum rate settings

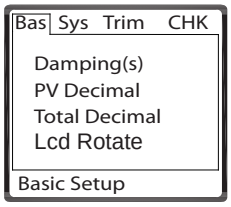
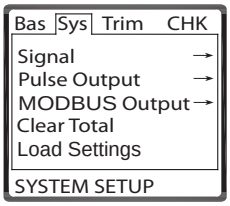
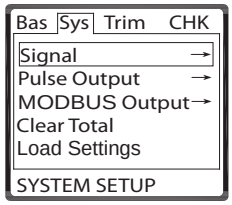
To change the parameter will lead to the meter output value mutation, if posterior instrumentation, then modify this parameter should be considered before install posterior instrumentation(if needed).
Posterior instrumentation-related operational requirement

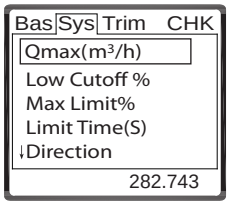
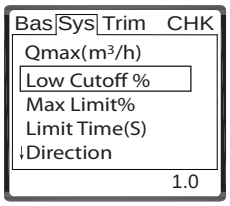
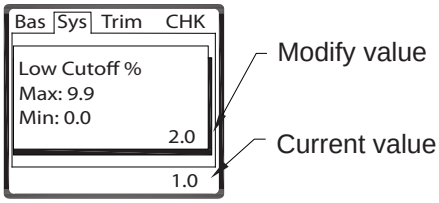
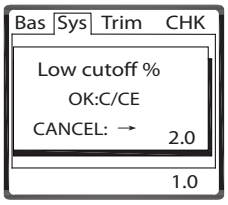
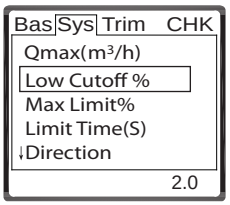
Steps	Operation instructions	Interface show
1	Click "C/CE" two times from measurement mode into configuration menu	
2	Click"→"to choice sys menu	
3	Click "↓" to choice signal item	
4	Click "→" into signal menu	

Steps	Operation instructions	Interface show
5	Click “→” into QMAX menu to setup Max Flow by “→” and” ↓” key	
6	Click “C/CE” to quit setup menu ,LCD show confirm menu	
7	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
8	Click “C/CE” three times to back measurement mode, you also can continue other operation.	

6.) Low flow Cut off %(low %)

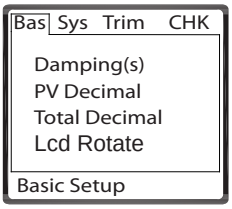
The parameters on the display and output are valid. When the traffic signal to terminate below the low flow rate (unit%) of the settings to set the value of the signal will be removed, display and output to zero. The termination of the small percentage is relative to the scale in terms of flow rate settings. Set As follows

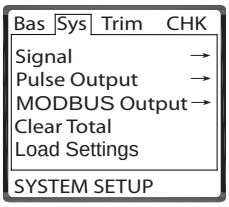
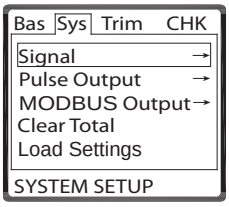
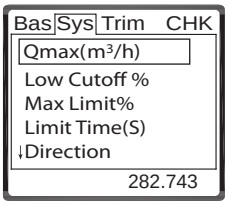
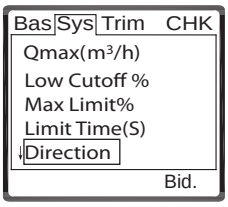
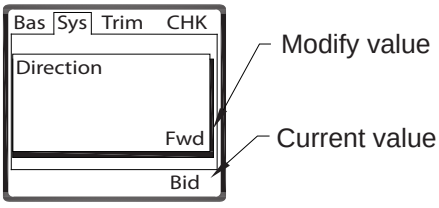
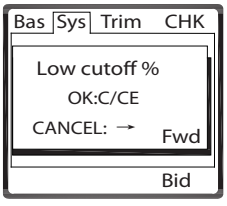
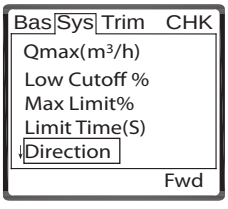
Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “sys” item	
3	Click “↓” to choice “Signal” item	

Steps	Operation instructions	Interface show
4	Click "→" into signal handle menu	
5	Click "↓" to choice Low Cutoff % item	
6	Click "→" into Low cutoff% menu, click "→" and" ↓" to setup value of Low cutoff%	
7	Click "C/CE" quit setup menu , LCD show confirm menu	
8	Click "C/CE" ,confirm and save configure ,after return configure option menu,(click "→" to give up modify.)	
9	Click "C/CE" three times to back measurement mode, you also can continue other operation.	

7.) FLOW DIRECTION

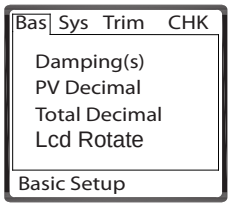
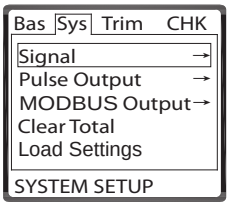
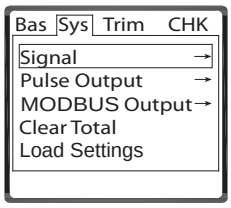
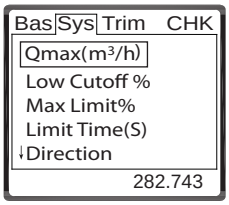
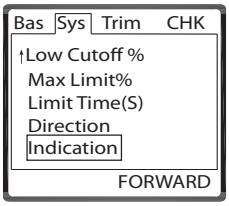
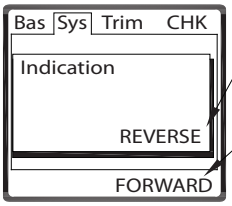
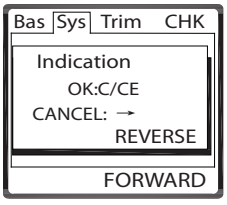
Flow sign "Bid" indicated that the flow of positive and negative. If sign show "Fwd" , the flow were measured and showed that the flow of positive, the flow of symbols" Rev" said that only the reverse flow is measured and displayed

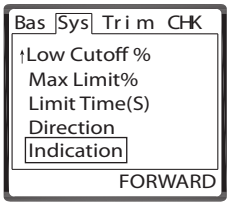
Steps	Operation instructions	Interface show
1	Click "C/CE" two times from measurement mode into configuration menu	

Steps	Operation instructions	Interface show
2	Click “→” to choice “sys” item	
3	Click “↓” to choice “Signal” item	
4	Click “→” into signal handle menu	
5	Click “↓” to choice Direction item	
6	Click“→”enter direction , press use “↓”to set direction	
7	Click “C/CE” quit setup menu , LCD show confirm menu	
8	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
9	Click “C/CE” three times to back measurement mode, you also can continue other operation.	

8.) The flow of indication

FORWARD, said flow direction in the same direction with the sign factory settings; REVESRSE, flow direction in the opposite direction with the factory settings. When the meter on-site installation direction inconsistent with the direction of the factory (arrow sign on sensor), the instantaneous flow rate is displayed as "-" .Through the settings to change the flow direction measurement symbols. To change the sign of the value of flow measurement devices will affect the cumulative values.

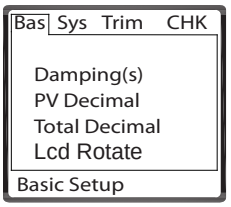
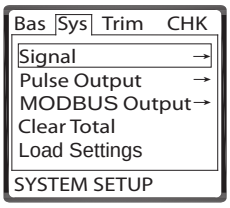
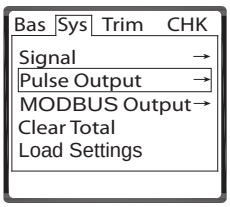
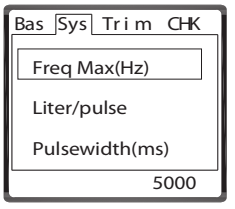
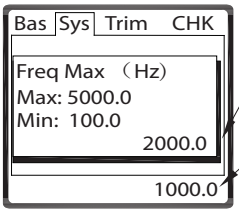
Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “sys” item	
3	Click “↓” to choice “Signal” item	
4	Click “→” into signal handle menu	
5	Click “↓” to choice Indication item	
6	Click “→” into Indication menu, click “↓” to setup flow direction	
7	Click “C/CE” quit setup menu , LCD show confirm menu	

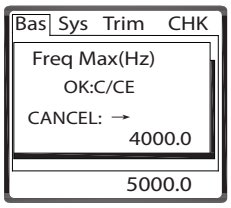
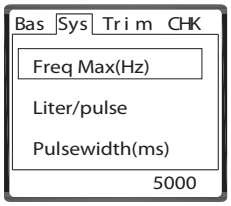
Steps	Operation instructions	Interface show
8	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.	
9	Click “C/CE” three times from configuration menu to measurement menu, also you can continue other operation.	

9.) Frequency upper limit Hz (output frequency range of the instrument 100-5000Hz)

Scale corresponding to the current flow of output frequency

Output frequency (Hz)=(the current flow rate (m3/h) /scale flow rate (m3/h)) XFrequency limit(Hz)

Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “sys” item	
3	Click “↓” to choice “Pulse Output” item	
4	Click “→” into “Pulse output” menu	
5	Click “→” into Freq Max menu, click “→” and“ ↓” to setup output frequency	

Steps	Operation Instructions	Interface Show
6	Click “C/CE” quit setup menu , LCD show confirm menu	
7	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
8	Click “C/CE” three times from configuration menu to measurement menu, also you can continue other operation.	

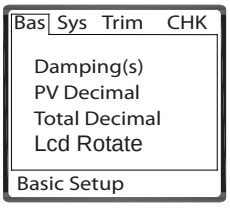
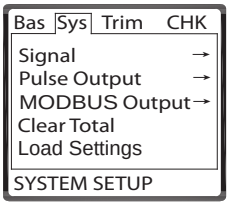
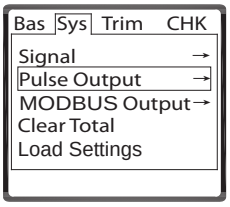
When the Liter/ pulse = 0.0, the case "frequency cap Hz" setting determines the frequency of the output

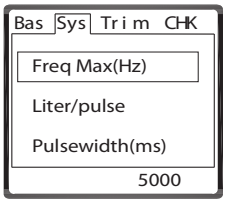
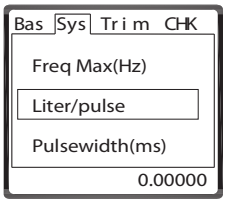
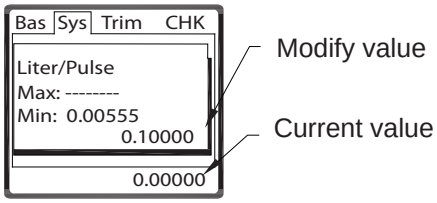
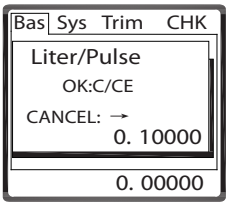
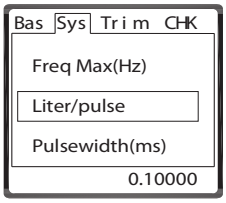
When the Liter/pulse >0.0, the setting of L/P determines the frequency output

10.) Liter/pulse(L/P)

Scale corresponding to the current flow of output frequency

$$\text{Output Frq (Hz)} = \frac{\text{Current Flow(m3/h) /3.6}}{\text{Liter/pulse(L/P)}} \qquad \frac{\text{Current Flow(L/s)}}{\text{Liter/pulse(L/P)}}$$

Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “sys” item	
3	Click “↓” to choice “Pulse Output” item	

Steps	Operation Instructions	Interface Show
4	Click “→” into “Pulse output” menu	
5	Click “↓” choice Liter/Pulse item	
6	Click “→” into Liter/Pulse menu, click “→” and“↓” to setup value of Liter/Pulse	
7	Click “C/CE” quit setup menu , LCD show confirm menu	
8	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
9	Click “C/CE” three times to back measurement mode, you also can continue other operation.	

When the Liter/ pulse = 0.0, the case "frequency cap Hz" setting determines the frequency of the output

When the Liter/pulse >0.0, the setting of L/P determines the frequency output

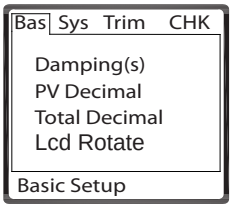
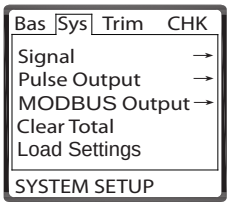
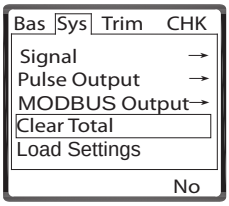
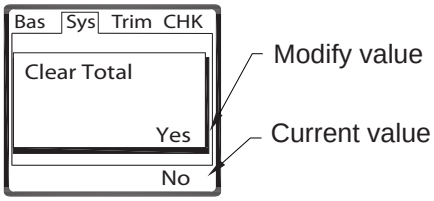
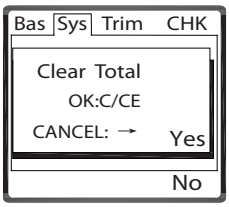
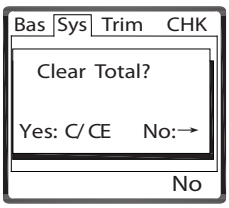
11 .) Cumulate (Totalizer) Clear

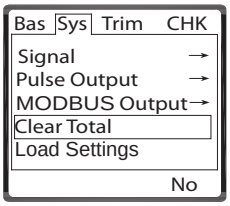
Two ways of the total cumulative flow, its meaning is as follows

1 Σ +, means symbol "+ 'cumulative value of the flow

2 Σ- ,means symbol ' - " cumulative value of the flow

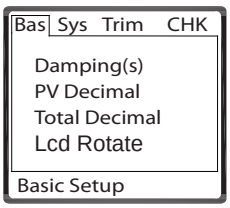
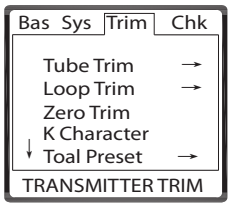
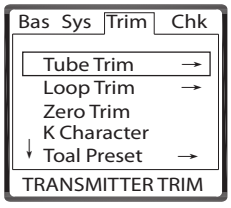
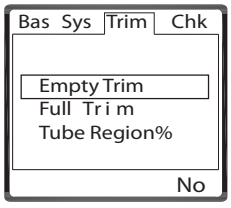
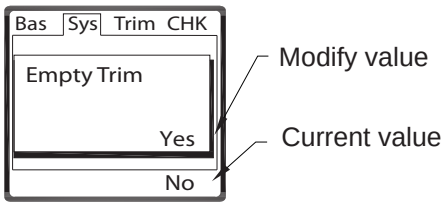
Select cumulate cleared, the total amount of the above two are forced to zero, cannot be recovered if don't save before. Clear cumulate as follows

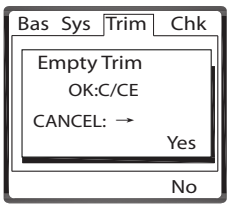
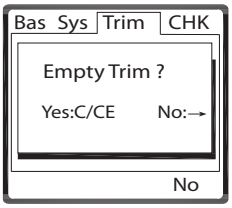
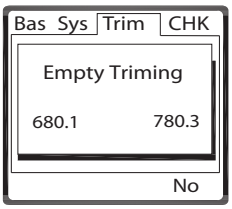
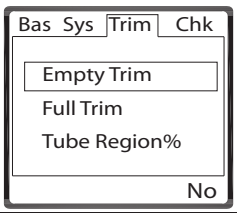
Steps	Operation instructions	Interface show
1	Click "C/CE" two times from measurement mode into BAS configuration menu	
2	Click "→" to choice "sys" item	
3	Click "↓" to choice "Clear Total" item	
4	Click "→" into Clear Total menu, click "↓" to setup value of clear total	
5	Click "C/CE" quit setup menu , LCD show confirm menu	
6	Click "C/CE" again into "Clear total " confirm menu, if click "→", quit "Clear total" stage	

Steps	Operation Instructions	Interface Show
7	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
8	Click “C/CE” three times to back measurement mode, you also can continue other operation.	

12.) Empty Trim

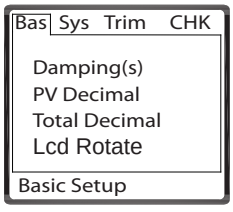
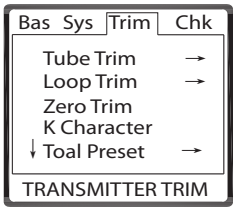
> Before Empty Trim must verify that the installation the connection is accurate, reliable and good grounding! And also ensure that there is no flow medium in meter sensor tube.

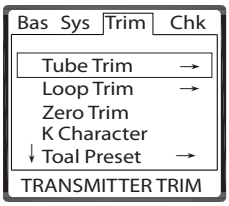
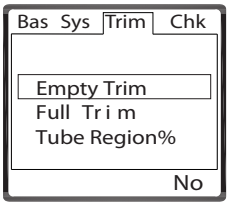
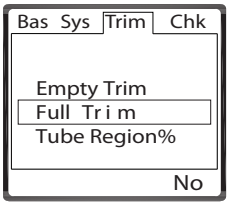
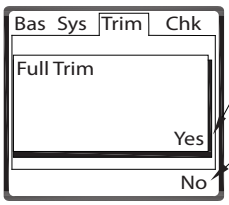
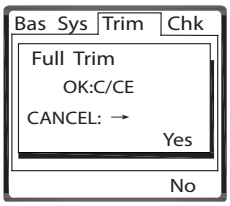
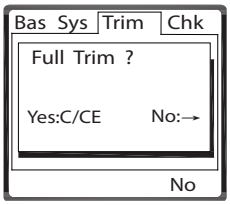
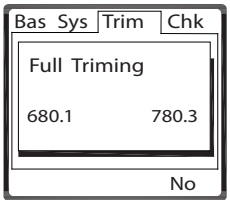
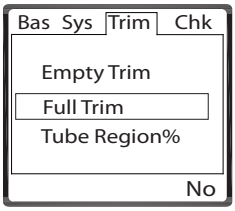
Steps	Operation instructions	Interface show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “Trim” item	
3	Click “↓” to choice “Tube Trim” item	
4	Click “→” into “Tube Trim” menu	
5	Click “→ ” into “Empty trim” menu, click“ ↓” to setup value of Empty trim.	

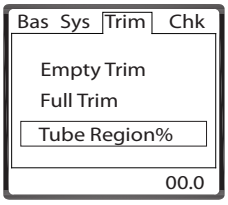
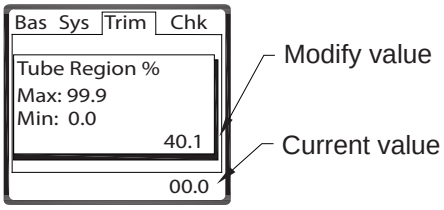
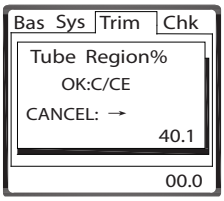
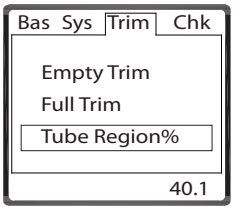
Steps	Operation instructions	Interface show
6	Click “C/CE” quit setup menu , LCD show confirm menu	
7	Click “C/CE” quit confirm menu, LCD show confirm again menu	
8	Click “C/CE” ,confirm and save configure ,after return configure option menu,(click “→” to give up modify.)	
9	When Trim finish, the LCD will automatically back Trim menu	
10	Click “C/CE” three times from configuration menu to measurement menu, also you can continue other operation.	

13.) Full Trim And Tube Region%

Before Full Trim must verify that the installation the connection is accurate, reliable and good grounding! And also ensure that there is full flow medium in meter sensor tube.

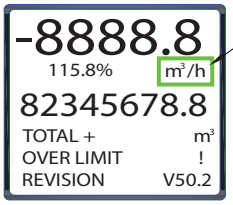
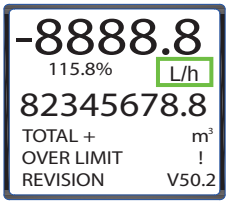
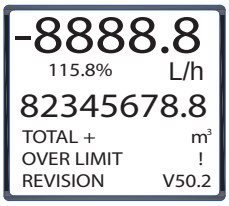
Steps	Operation Instructions	Interface Show
1	Click “C/CE” two times from measurement mode into configuration menu	
2	Click “→” to choice “Trim” item	

Steps	Operation instructions	Interface show
3	Click "↓" to choice "Tube Trim" item	
4	Click "→" into "Tube Trim" menu	
5	Click "↓" choice "Full Trim" item	
6	Click "→" into "Full trim" menu, click "→" to setup value of Full trim.	
7	Click "C/CE" quit setup menu , LCD show confirm menu	
8	Click "C/CE" quit confirm menu, LCD show confirm again menu	
9	Click "C/CE" to Full trim, after return configure option menu,(click "→" to give up modify.)	
10	When Trim finish, the LCD will automatically back Trim menu	

Steps	Operation instructions	Interface show
11	Click to choice Tube Region% Item, Click “C/CE” three times to back measurement mode.	
12	Click “→” into Trim Region% menu, Click “→” and “↓” to setup value of Trim region%, The value high means Region high, regular to setup 40%-60%	
13	Click “C/CE” quit setup menu , LCD show confirm menu	
14	Click “C/CE” to confirm data, after return Trim menu,	
15	Click “C/CE” three times from configuration menu to measurement menu, also you can continue other operation.	

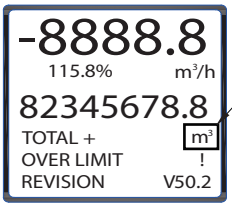
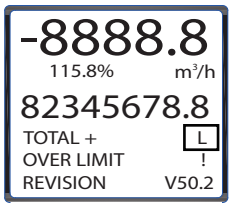
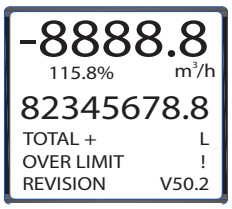
14.) Unit of flow

Adjust instant flow’s unit, the setting range L/S,L/min,L/h,m3/S,m3/m,m3/h,gal/S,gal/m,gal/h, bbl/s, bbl/m, bbl/h, bbl/d

Steps	Operation instructions	Interface show
1	In the measurement mode, click “→” to choice flow unit	
2	Click “↓” to modify flow unit	
3	Click “C/CE” to confirm flow unit	

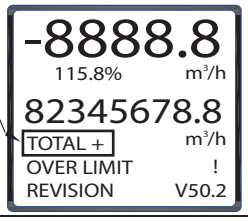
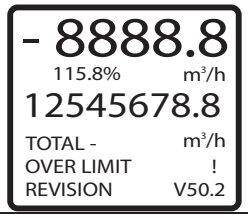
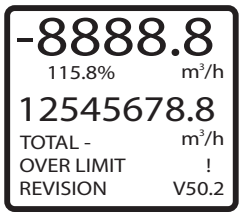
15.) Unit of Total

Adjust Total unit, setting range L, m3, G, BBL

Steps	Operation instructions	Interface show
1	In the measurement mode, click "→" to choice Total unit	 Use "→" to select
2	click "↓" to modify Total unit	
3	click "C/CE" to confirm Total unit	

16.) Direction of Total

Adjust Total direction, setting range is positive or negative

Steps	Operation instructions	Interface show
1	In the measurement mode, click "→ " to choice Total direction	Use "→" to select 
2	Click "↓" to modify Total direction	
3	Click "C/CE" to confirm Total direction	

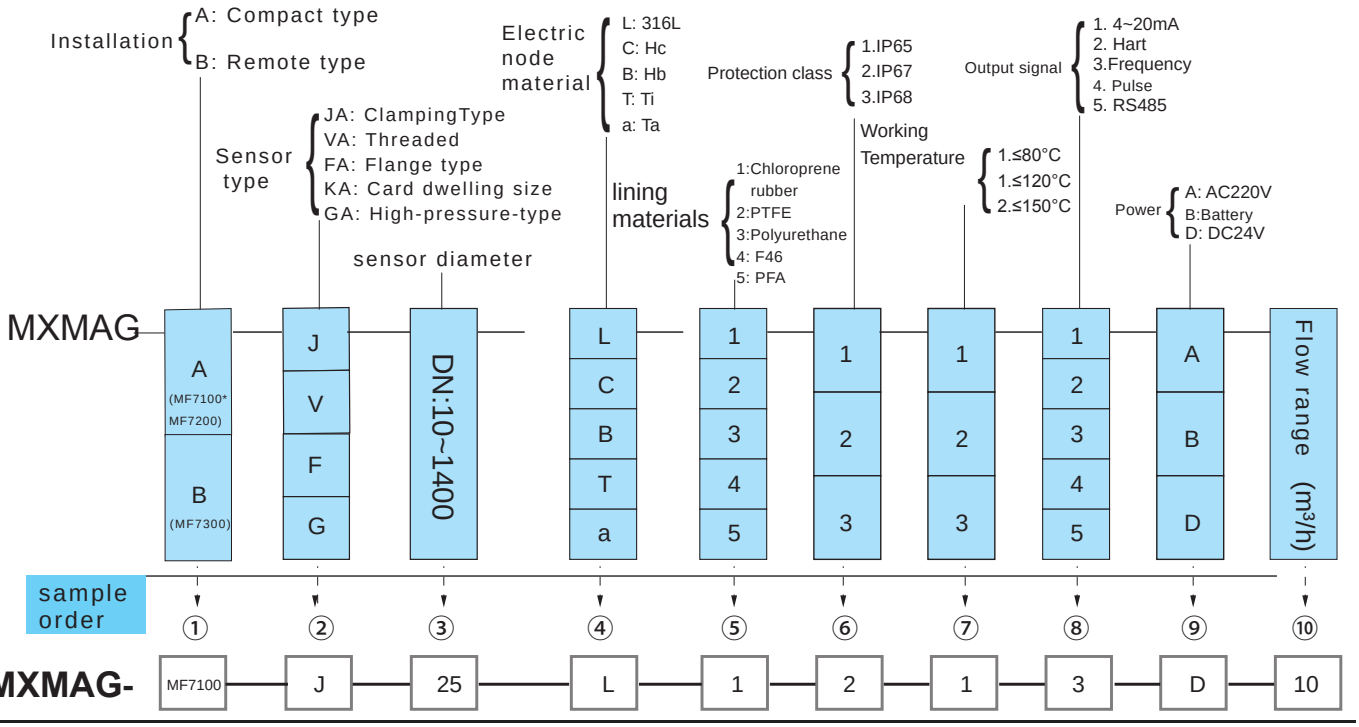
Note:

This section provides users with some common features of this converter operational guidance. Users need to reference 4.2 functional menu structure and description of 4.3 to select menu items to use other functions requested.

Ⅴ、Technical data

Sensors range	DN10 – DN3000 , 1/2" ANSI- 120" ANSI
Measurement Flow range	0.03m/s -12m/s（0.098 f/s-32 f/s）
Measurement Accuracy (relative with sensor diameter)	0.1 f/s-32 f/s：+0.2%
Repeatability	0.1%
Environment Temperature	-30°F-140°F
Power supply	AC:85-265V,45-62Hz;DC：18-36V
Power rating	AC: 10 VA; DC: 10W
Grade of Protection	IP65 IP67
Output	1 power output : 4-20mA load is less than 750Ω 2 frequency output 0 5KHz (active or passive), maximum amplitude of 24V, load current 50 3 Pulse Output: can be set equivalent pulse, pulse frequency of 0.006Hz-5KHz (active or passive), Load current o.2
Communication	RS485 Modbus RTU or HART
Display	Display indicates instantaneous flow rate, positive cumulative volume, the reverse cumulative amount of net accumulated Volume, flow rate percentage, velocity and various self-diagnostic information Current output self-calibration;
Control methods	Three push button keys
Low cut off %	0.0%~9.9% adjusts (for Display or output)
Damping time	0.1s~99.9s adjusts (for Display or output)
Auto Trim	Current output self-calibration; Empty/full Trim; Zero Trim
Self-test function	Current frequency output self-test
self-diagnostic function	Excitation loop detection; Zero ,Empty and flow signal detection
Explosion proofing	Explosion proofing symbol Ex[ia]ia IICT5, CSA

Ⅵ、Type selection

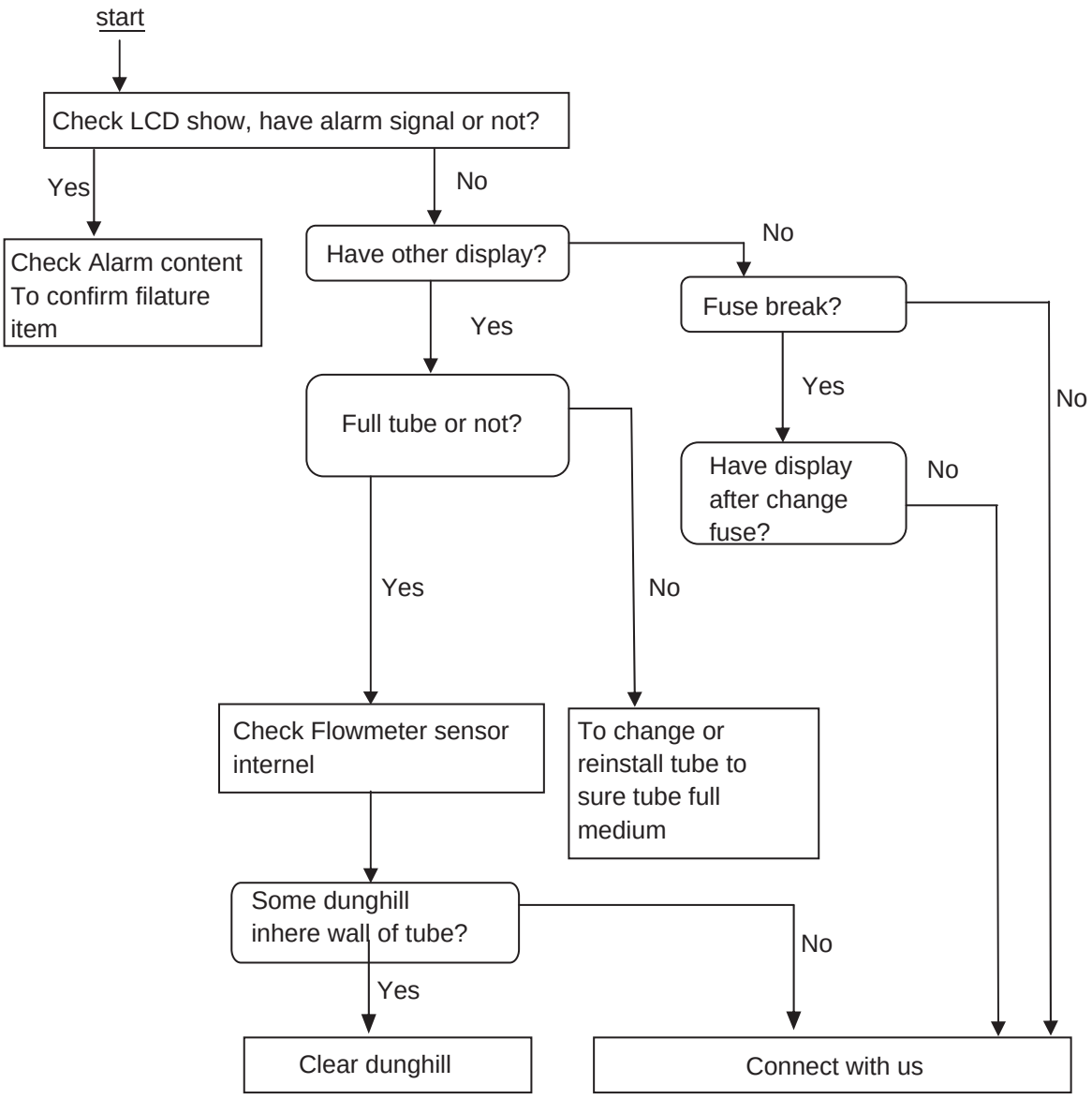


Ⅶ、Error information

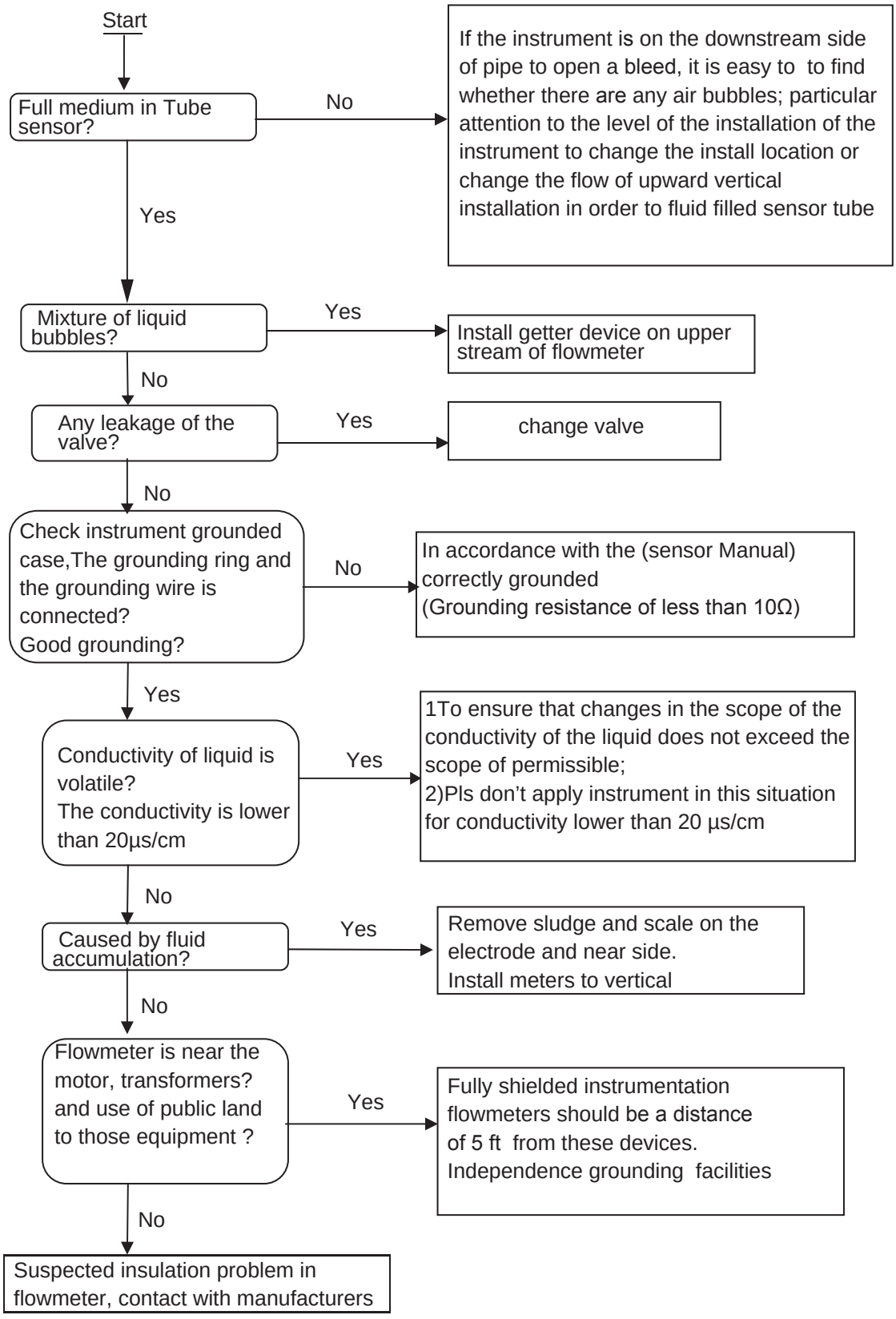
Error	Contents	Reason
Upper limit	Flow measurement value over than the upper limit value alarm	Limit alarm set value is lower than the flow measurement, modify the upper limit alarm settings
Lower limit	Flow measurement value lower than the lower limit value alarm	Limit alarm set value is over than the flow measurement, modify the lower limit alarm Settings
Excitation	Excitation circuit is not working correctly	A) check cables terminal and electrical excitation of the terminal connection is good or not B)check the sensor excitation circuit don't existence of open or short circuit C excitation coil temperature is too high D excitation frequency set too high
Empty tube	Empty tube stage is show zero or random data.	A)flow meter sensor is not full of medium B) electrode surface was completely covered by insulating layer C) signal lines to connect the signal is incorrect or open loop D)measuring low conductivity medium E)empty and full trim is not correct, or tube region % is high sensitivity settings
Zero point	Zero point value too High on zero trim	A) on the zero trim time, the flowmeter sensor medium in a state of non-full pipes B)on the zero trim time, the sensor tube in a non-static state media C) flowmeter grounding is incorrect or unreliable and technical requirements of re-grounding
Over range	Instant value exceeds instrument declare value	Over the instruments max allow the value, pls re-select the more Large diameter of the flowmeter

Ⅷ、Common failures and how to deal with

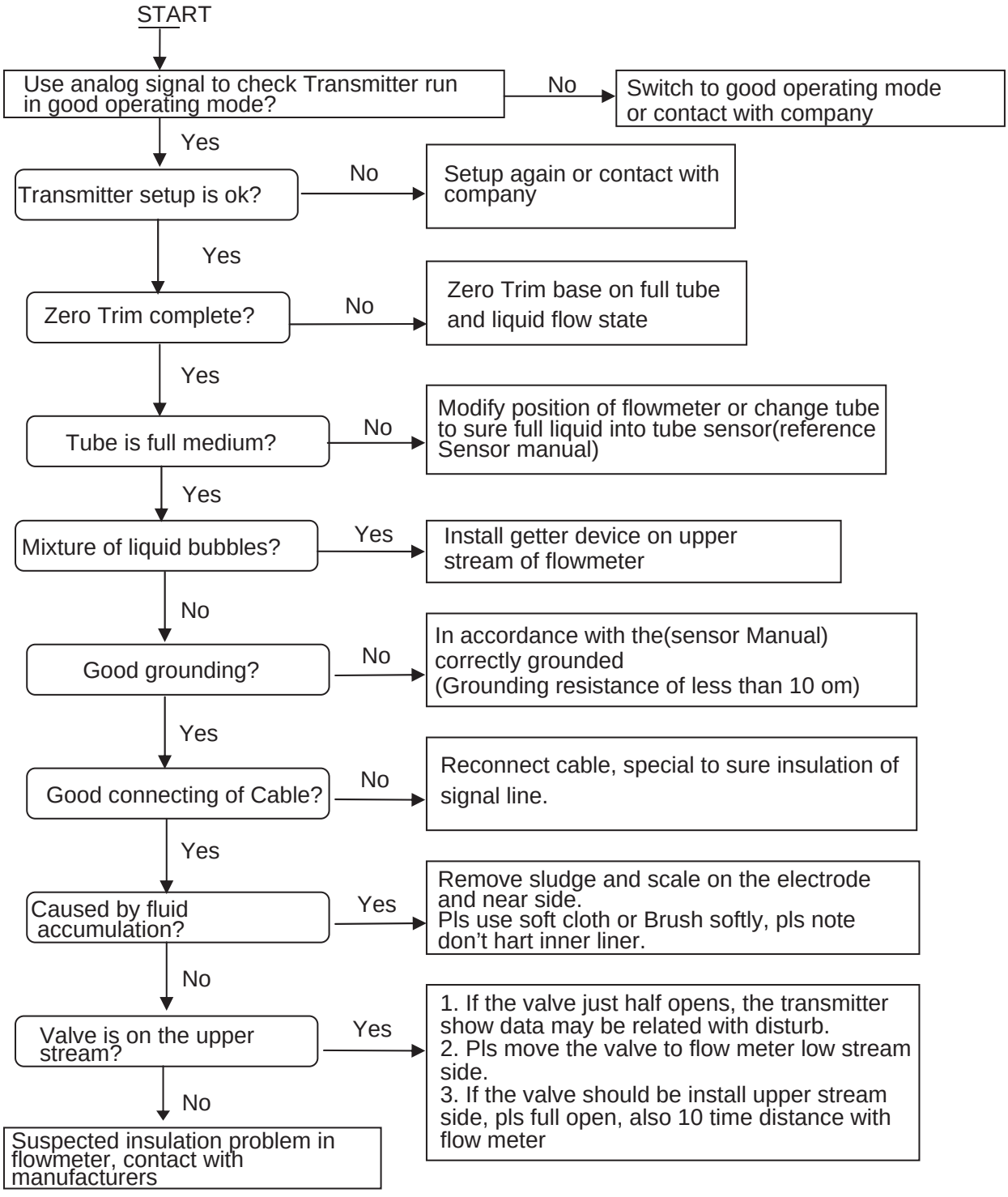
1、No flow data show on LCD



2、Zero point instability



3、Instrument show data inconsistent with the actual flow



9. Transportation, storage

In order to avoid transport and storage of the occurrence of unnecessary damage, in the process of transport and storage of the following items should be noted that

1) In order to prevent the functioning of the process of instrument in damage and lost, before arrival at the installation site, please keep the packaging when the company shipped state.

2) To be handled carefully during transportation to avoid brutal to loading and unloading.

3) Arrived at the scene should be carefully unloaded, in accordance with the contents of each item packing list check, if missing or not in conformity for those issues, pls contact with the company.

4) Instrument storage sites must meet the following requirements for indoor

a) drying, ventilation and avoid erosion of corrosive gas

b) a small mechanical vibration to avoid the impact to flowmeter.

c) Environment temperature range. -30 ~ 140°F

d) The humidity should be small than 80%;

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