ELECTROMAGNETIC
FLOWMETER HFM100

HFM100
ELECTROMAGNETIC FLOWMETER
USER MANUAL

HIGHJOIN
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CATALOGUE

HFM100 Electromagnetic Flowmeter

Overview

Instrument features and usage

- Measurement is not affected by changes in fluid density, viscosity, temperature, pressure and electrical rate.
- There are no flow-blocking parts in the measuring pipe, no pressure loss, low straight pipe section requirements, and unique adaptability to slurry measurement.
- Nominal diameter DN6-DN3000 covers a wide range, with multiple options for linings and electrodes, and can be applied to a variety of measurement media. Has good corrosion resistance and wear resistance.
- The converter uses programmable frequency low-frequency rectangular wave excitation, which improves the stability of flow measurement and reduces power loss.
- The converter uses a 32-bit embedded microprocessor with full digital processing, fast operation speed, strong anti-interference ability, reliable measurement, high accuracy, and the flow measurement range can reach 1500:1. The range can be modified online according to the actual needs of the user.
- High-definition backlit LCD display, Chinese and English menu operations are optional, easy to use, simple to operate, easy to learn and understand.
- With digital communication signal outputs such as RS485, RS232, Hart and Profibus (optional).
- With conductivity measurement function, it can determine whether the sensor is empty, and has self-test and self-diagnosis functions.
- Using SMD devices and surface mounting (SMT) technology, the circuit has high reliability.
- Infrared handheld communicator operation, 115KHZ communication rate, long-distance non-contact operation of all functions of the converter (optional).
- There are three internal meters that can respectively display the forward totalizer, reverse totalizer, and difference totalizer. clock, can record power-off time (optional).
- Explosion-proof optional, explosion-proof mark: Ex db ia q IIC T6 Gb / Ex tb IIIC T80℃ Db.

Application

Electromagnetic flowmeters can be used to measure the volume flow of conductive fluids in closed pipelines. They can also be used to measure the volume flow of corrosive liquids such as strong acids and alkalis, and uniform liquid-solid mixed liquids such as mud, mineral slurry, and paper pulp. It is widely used in flow measurement and control in industrial and agricultural production processes such as petrochemical industry, iron and steel metallurgy, water supply and drainage, water conservancy irrigation, water treatment, environmental sewage measurement and control, papermaking, medicine, food, etc.

Working principle

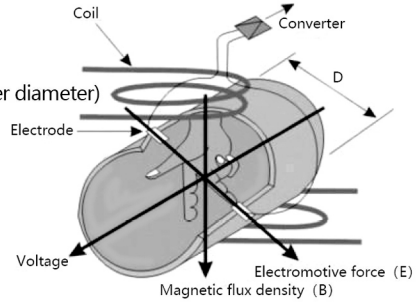
The working principle of the electromagnetic flowmeter is based on Faraday's law of electromagnetic induction, as shown in Figure 1. When a conductor moves in a magnetic field, an induced electromotive force (E) will be generated at both ends of the conductor in a direction perpendicular to the direction of the magnetic field and the direction of movement. This induced electromotive force is detected by two measuring electrodes, and its value depends on the flow rate and magnetic field. is proportional to the magnetic induction intensity, its value is: E= B.V.D.K

In the formula: K - coefficient related to magnetic field distribution and axial length

B-magnetic induction intensity

V-average flow rate of conductive liquid

D- electrode distance (measuring tube inner diameter)



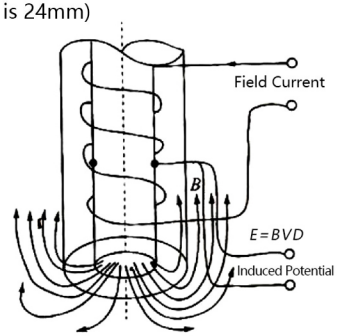
The working principle of the insertion electromagnetic flowmeter is the same as that of the pipeline electromagnetic flowmeter, which is also based on Faraday's law of electromagnetic induction, as shown in Figure 2. When the conductive liquid passes through two electrodes with L at an average flow velocity V and perpendicular to the direction of the magnetic field lines with a magnetic field strength of B, A corresponding induced electromotive force (E) is generated between the electrodes, and its formula is: E=B×L×V

In the formula: B: Magnetic induction intensity of excitation coil

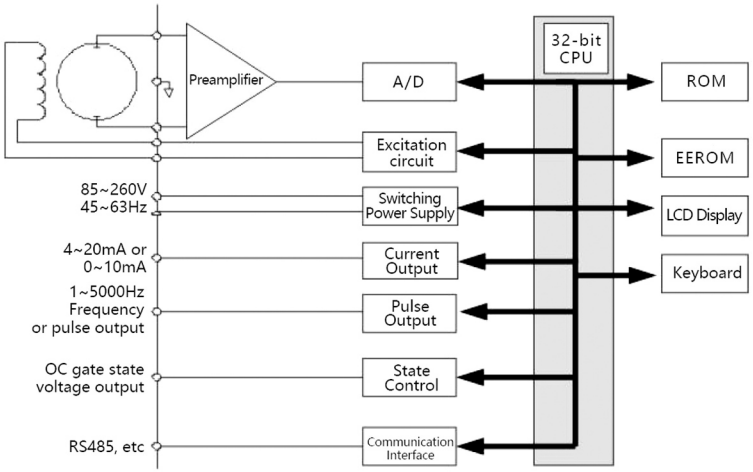
V: average flow velocity

L: distance between two electrodes (this machine is 24mm)

Qv: measured fluid volume flow rate



The electromagnetic flowmeter converter provides a stable excitation current to the electromagnetic flow sensor excitation coil. The preamplifier amplifies and converts the electromotive force induced by the sensor into a standard current signal or frequency signal to facilitate flow display, control, and adjustment. Figure below shows the converter circuit structure.



Technical Specifications

Sensor part technical parameters

- Measurement medium: water, acid, alkali, seawater, and other conductive liquids that are highly corrosive or contain impurities.
- Medium conductivity: ≥20uS/cm;
- Nominal diameter: DN6-DN3000mm
- Execution standards and calibration basis: JB/T9248-1999, JJG1033-2007
- Lining material: polychloroprene, polytetrafluoroethylene, silicone fluorine rubber, polyurethane rubber, F46, PFA
- Electrode materials: molybdenum-containing stainless steel, Hastelloy B, Hastelloy C, titanium, tantalum, platinum alloy, tungsten carbide
- Nominal pressure: 0.6MPa-32MPa
- Accuracy level: 0.5 G, 1.0 G.
- Flow velocity range: 0.1m/s-15m/s
- Ambient temperature: converter -10℃~+60℃
- Relative temperature: 5%-95%

Lining materials selection guide

Lining material	Main performance	Application
polychloroprene (CR)	1. It has excellent elasticity, high tearing force and good wear resistance. 2. Resistant to the corrosion of general low-concentration acid, alkali and salt media, but not resistant to the corrosion of oxidizing media.	1.<60℃ 2. General water, sewage, weak abrasive mud and mineral slurry
polyurethane rubber (PU)	1. Excellent wear resistance (equivalent to ten times that of natural rubber) 2. Poor acid and alkali resistance 3. Cannot be used in water mixed with organic solvents.	1.<80℃ 2. Neutral and strong abrasion slurry, coal slurry, mud, etc.
Silicone fluorine rubber (FPM)	1. It has excellent elasticity, high tearing force and good wear resistance. 2. Resistant to high temperature and non-corrosive media.	1.<180℃ 2. Hot water
Polytetrafluoroethylene (PTFE)	1. It is a material with the most stable chemical properties among plastics; it can withstand boiling hydrochloric acid, sulfuric acid, nitric acid and aqua regia, as well as concentrated alkali and various organic solvents. It is not resistant to chlorine trifluoride, high temperature oxygen trifluoride, and high flow rates. Corrosion by liquid fluorine, liquid oxygen, and ozone. 2. Poor wear resistance. 3. Poor ability to withstand negative pressure.	1.<120℃ 2. Strongly corrosive media such as concentrated acid and alkali 3. sanitary media
polyperfluoroethylenepropylene (F46)	1. chemical properties are equivalent to PTFE 2. the abrasion resistance of the wear resistant layer is better than that of PTFE 3. High pressure and negative pressure resistance	1.<180℃ 2. Corrosive acid and alkali salts 3. High pressure and negative pressure resistance
perfluoroalkene (PFA)	1. Chemical properties are equivalent to F46 2. Compressive and tensile strength better than F46	1.<180℃ 2. Corrosive acid and alkali salts 3. High pressure and negative pressure resistance

Electrode materials selection guide

Electrode	Material Corrosion resistance
Molybdenum-containing stainless steel (316L)	It is used for industrial water, domestic water, and sewage. It has weakly corrosive media and can be widely used in petroleum, chemical, urea, vinylon and other industries.
calcium carbide(WC)	Used for non-corrosive, highly abrasive media, such as paper pulp, mud, ore slurry, etc.
Hastelloy B(HB)	It has good corrosion resistance to hydrochloric acid of all concentrations below the boiling point, and is also resistant to corrosion by non-oxidizing acids, alkalis, and non-oxidizing salt liquids such as sulfuric acid, phosphoric acid, hydrofluoric acid, and organic acids.
Hastelloy C(HC)	It is resistant to corrosion by oxidizing acids, such as nitric acid, mixed acid or mixed media of chromic acid and sulfuric acid, and is also resistant to corrosion by oxidizing salts such as FE+++, CU++ or other oxidizing agents. Such as corrosion by hypochlorite solution and seawater above normal temperature.
Titanium (Ti)	It can withstand the corrosion of sea water, various chlorides and hypochlorites, oxidizing acids (including fuming nitric acid), organic acids, alkalis, etc., and is not resistant to the corrosion of relatively pure reducing acids (such as sulfuric acid and hydrochloric acid). However, if the acid contains oxidizing agents (such as nitric acid, FE+++, CU++), the corrosion resistance will not reduce.
Tantalum (Ta)	It has excellent corrosion resistance, very similar to glass. In addition to hydrofluoric acid, fuming sulfuric acid and alkali, it is resistant to corrosion by almost all chemical media (including hydrochloric acid, nitric acid, sulfuric acid and aqua regia)
Platinum-iridium alloy (Pt)	It is suitable for almost all chemicals except aqua regia and ammonium salts.

Measuring range

Flow rate and Flow Comparison Table

Flow m³/h / Flow rate m/s / Nominal diametersDN(mm)	0.1 (minimum)	1	2	3	4	5	15 (maximum)
6	0.01	0.1017	0.2034	0.3051	0.4068	0.5085	1.5255
10	0.028	0.2826	0.5652	0.8478	1.1304	1.413	4.239
15	0.064	0.6362	1.2723	1.9085	2.5447	3.1809	9.5426
20	0.113	1.1310	2.2619	3.3929	4.5239	5.6549	16.9646
25	0.177	1.7671	3.5343	5.3014	7.0686	8.8357	26.5072
32	0.2894	2.8938	5.7876	8.6814	11.5752	14.469	43.407
40	0.452	4.5239	9.0478	13.5717	18.0956	22.6195	67.8584
50	0.707	7.0686	14.1372	21.2058	28.2743	35.3429	106.0288
65	1.195	11.9459	23.8918	35.8377	47.7836	59.7295	179.1886
80	1.810	18.0956	36.1911	54.2867	72.3823	90.4779	271.4336
100	2.827	28.2743	56.5487	84.8230	113.0973	141.3717	424.1150
125	4.416	44.1563	88.3126	132.4689	176.6252	220.7815	662.3445
150	6.362	63.6173	127.2345	190.8518	254.4690	318.0863	954.2588
200	11.310	113.0973	226.1947	339.2920	452.3893	565.4867	1696.4600
250	17.671	176.7146	353.4292	530.1438	706.8583	883.5729	2650.7188
300	25.447	254.4690	508.9380	763.4070	1017.8760	1272.3450	3817.0351
350	34.636	346.3606	692.7212	1039.0818	1385.4424	1731.8030	5195.4089
400	45.239	452.3893	904.7787	1357.1680	1809.5574	2261.9467	6785.8401
450	57.256	572.5553	1145.1105	1717.6658	2290.2210	2962.7763	8588.3289
500	70.686	706.8583	1413.7167	2120.5750	2827.4334	3534.2917	10602.8752
600	101.788	1017.8760	2035.7520	3053.6281	4071.5041	5089.3801	15268.1403
700	138.544	1385.4424	2770.8847	4156.3271	5541.7694	6927.2118	20781.6354
800	180.956	1809.5574	3619.1147	5428.6721	7238.2295	9047.7868	27143.3605
900	229.022	2290.2210	4580.4421	6870.6631	9160.8842	11451.1052	34353.3157
1000	282.743	2827.4334	5654.8668	8482.3002	11309.7336	14137.1669	42411.5008
1200	407.150	4071.5041	8143.0082	12214.5122	16286.0163	20357.5204	61072.5612
1400	554.177	5541.7694	11083.5389	16625.3083	22167.0778	27708.8472	83126.5416
1600	723.823	7238.2295	14476.4589	21714.6884	28952.9179	36191.1474	108573.4421
1800	916.088	9160.8842	18321.7684	27482.6525	36643.5367	45804.4209	137413.2627
2000	1130.973	11309.7336	22619.4671	33929.2007	45238.9342	56548.6678	169646.0033

Remarks:

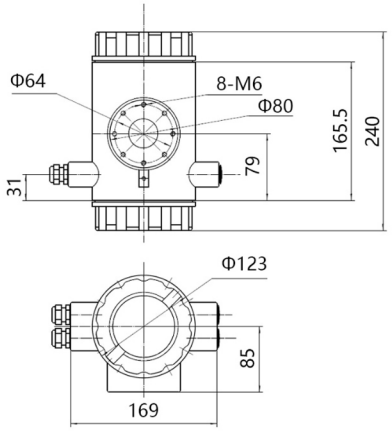
1) The flow rate range for level 0.5 guaranteed accuracy is 0.5~5m/s, and the range ratio of the corresponding flow range is 1:10

2) The above table lists the flow rates corresponding to several representative flow rates. The flow rate corresponding to any flow rate can also be calculated using this table: If the flow rate value Q (m3/h) is known, then find out from the table the flow value Q1 corresponding to the flow rate of 1m/s in the corresponding diameter, then for the flow rate V=Q/Q1 (m/s)

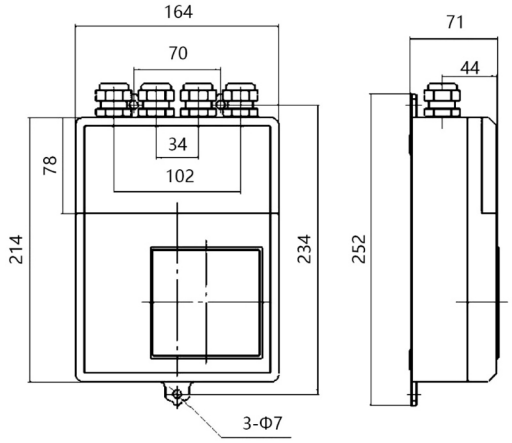
Product Dimensions and Installation Dimensions

Converter dimensions

Integrated type

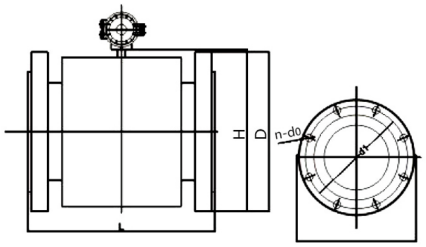


Split type



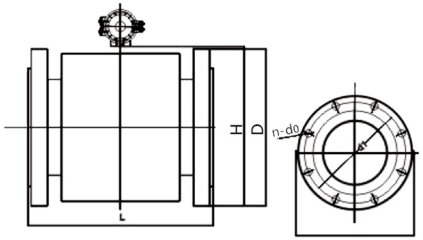
Sensor installation dimensions (reference flange standard JB/T81-1994)

◆ **DN15–DN150, 1.6, 2.5MPA sensor and integrated outline drawing**



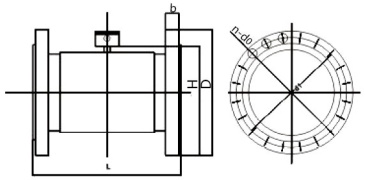
Nominal diameters DN	L	H	Nominal diameters DN	Pressure 1.6MPa					Pressure 2.5MPa				
				D	d1	d0	n	b	D	d1	d0	n	b
15	200	147	15	95	65	14	4	16	95	65	14	4	16
20	200	154	20	105	75	14	4	18	105	75	14	4	18
25	200	156	25	115	85	14	4	18	115	85	14	4	18
32	200	166	32	135	100	18	4	18	135	100	18	4	20
40	200	172	40	145	110	18	4	20	145	110	18	4	22
50	200	191	50	160	125	18	4	22	160	125	18	4	24
65	250	200	65	180	145	18	4	24	180	145	18	4	24
80	250	218	80	195	160	18	8	24	195	160	18	8	24
100	250	242	100	215	180	18	8	26	230	190	23	8	28
125	250	277	125	245	210	18	8	28	270	220	26	8	30
150	300	302	150	280	240	23	8	28	300	250	26	8	30

◆ **DN200~DN600, 1.0, 1.6MPA sensor and integrated outline drawing**



Nominal diameters DN	L	H	Nominal diameters DN	Pressure 1.6MPa					Pressure 1.0MPa				
				D	d1	d0	n	b	D	d1	d0	n	b
200	350	362	200	335	295	23	12	30	335	295	23	8	24
250	450	412	250	405	355	26	12	32	390	350	23	12	26
300	500	472	300	460	410	26	12	32	440	400	23	12	28
350	500	522	350	520	470	26	16	34	500	460	23	16	28
400	500	572	400	580	525	30	16	38	565	515	26	16	30
450	550	626	450	640	585	30	20	42	614	565	26	20	30
500	550	676	500	705	650	34	20	45	680	620	26	20	32
600	600	776	600	840	770	41	20	50	780	725	30	20	36

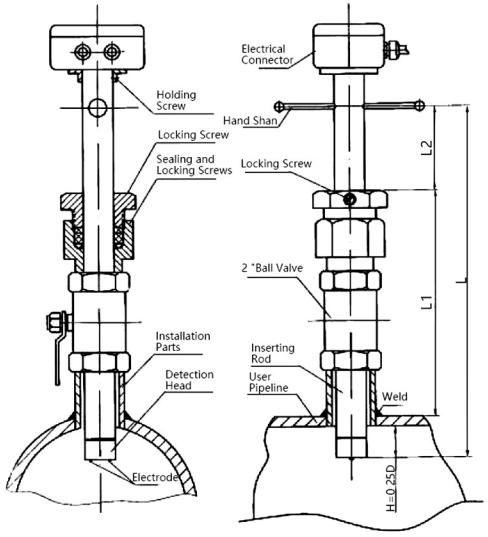
◆**DN700–DN2000, 0.6, 1.0MPA sensor outline drawing**



Nominal diameters DN	L	H
700	700	866
800	800	966
900	900	1076
1000	1000	1200
1200	1200	1406
1400	1400	1632
1600	1600	1832
1800	1800	2036
2000	2000	2236

Nominal diameters DN	Pressure(Mpa)	D	d1	d0	n	b
700	1.0	895	840	30	24	36
800		1010	950	34	24	38
900		1110	1050	34	28	42
1000		1220	1160	36	28	44
700	0.6	860	810	25	24	32
800		975	920	30	24	32
900		1075	1020	30	24	34
1000		1175	1121	30	28	36
1200		1400	1340	34	32	36
1400		1620	1560	34	36	40
1600		1820	1760	34	40	45
1800		2045	1970	41	44	45
2000		2265	2180	48	48	50

Plug-in electromagnetic part



The sensor consists of the following main parts or components:

- Detection head: including electrodes, excitation coil, iron core and leads, the shell is PVC or F4.
- Insertion rod: connects the detection head and converter, made of 304 or 316 stainless steels.
- Installation parts: (60×3) 304 or 316 stainless steel pipe, welded to the user's pipe during installation.
- Valve or (pin joint): 2" stainless steel ball valve or (pin joint), used to remove or install the sensor without flow interruption.
- Sealing and locking mechanism: including transition pieces, compression nuts, and special sealing rubber rings.
- Junction box (integrated type directly connected to the converter): The excitation current and signal of the sensor and converter are connected correspondingly here.

Installation:

1.First, open a 60-62mm hole directly above the pipe measurement point. The edges around the hole must be smooth and clean, without burrs or gas cutting scars. Unscrew the installation piece from the sensor and reliably weld it to the above hole. For the hole, requirements: As shown in figure above, make the lower end of the installation piece flush with the inner surface of the pipe; ensure there is no leakage.

2.Record the L2 size, loosen the three locking screws of the sensor, and pull out the detection rod and detection head for later installation. (Note: The user must not open the connection between the detection head and the insertion rod!)

3.Wrap raw tape on the upper thread of the installation piece and tighten the ball valve together with the sealing and locking mechanism on it.

4.Slowly insert the detection rod from above, tighten the lock nut slightly, press down the insertion rod and measure that L2 is the same size as the original recorded L2, and the installation is complete.

5.Insertion depth adjustment: When the selector electrode is inserted into the average flow velocity, the average flow velocity point is approximately 30 meters away from the pipe wall under turbulent flow conditions in the pipeline.

H=0.25D (D is the inner diameter of the pipe, that is, the insertion depth is 1/4 of the pipe diameter). After adjustment, tighten the lock nut firmly and tighten the three locking screws respectively.

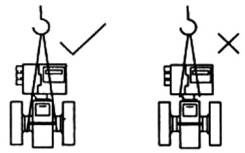
Tips and Notes: Since the pressure in the pipeline pushes the detection rod outward,

*For safety reasons, it is best to shut down the machine and install it under pressure-free conditions.

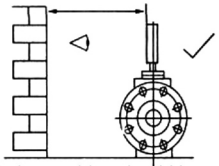
*If shutdown is not allowed, it is best to temporarily reduce the pipeline pressure to ≤0.2MPa during installation.

Product Installation

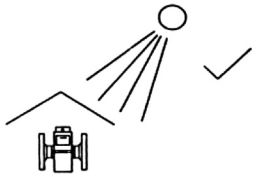
Precautions



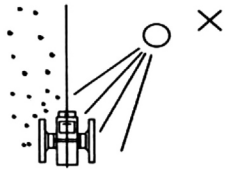
Correct hoisting



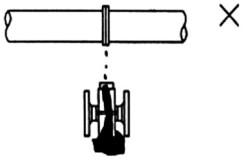
The installation position should be convenient for reading and operation.



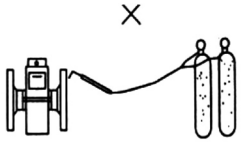
Prevent exposure to the sun



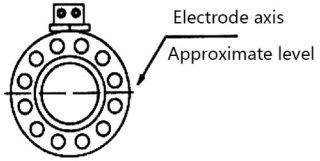
Avoid excessive temperature difference



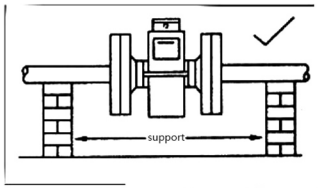
Prevent dripping



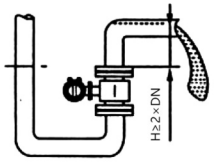
Stay away from the flames



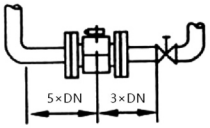
Horizontal installation



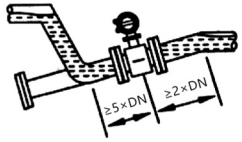
Reasonable support cannot be used as a load support point.



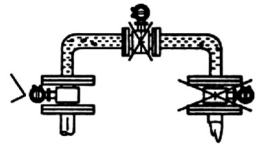
Make sure the pipe is full



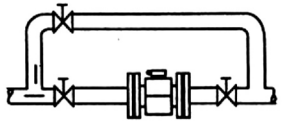
Ensure front and rear straight pipe sections



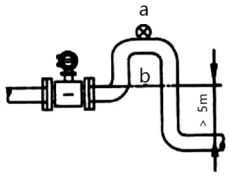
Easy sediment measurement



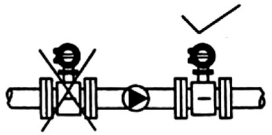
Avoid bubbles and openings downward



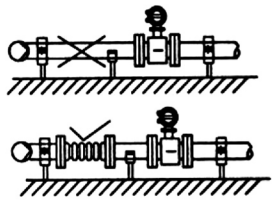
Easy to maintain and purge



Avoid negative pressure and insufficient pipes

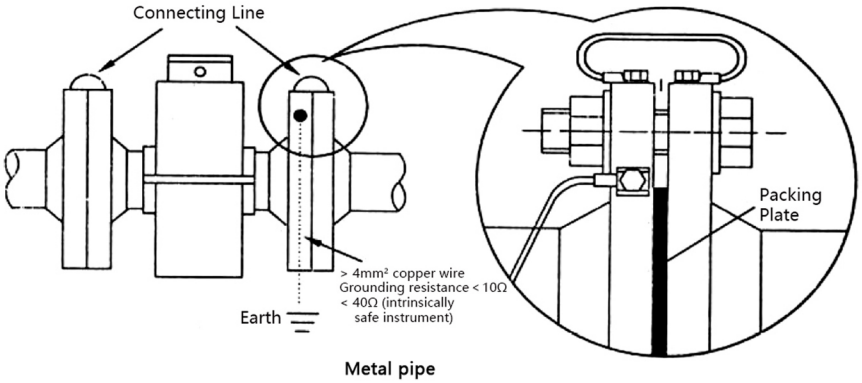


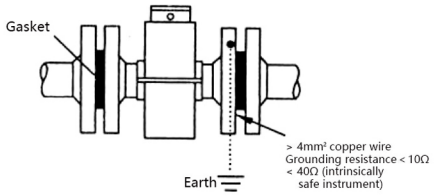
Avoid vibration



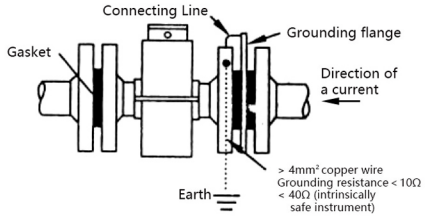
Avoid installation at the pump inlet

Grounding of flowmeter and pipeline

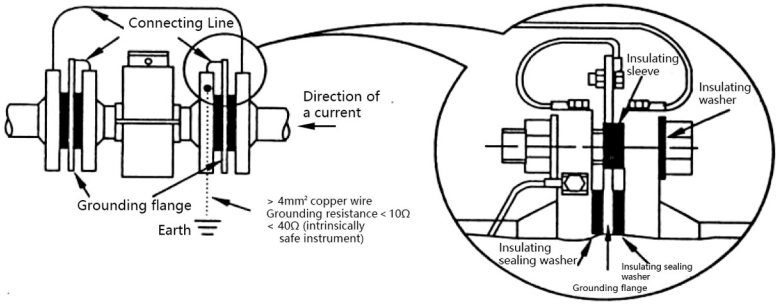




Non-metallic pipeline, sensor is equipped with grounding electrode.



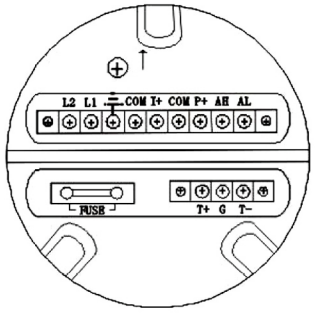
Non-metallic pipeline, sensor without grounding electrode



Pipeline with cathodic protection

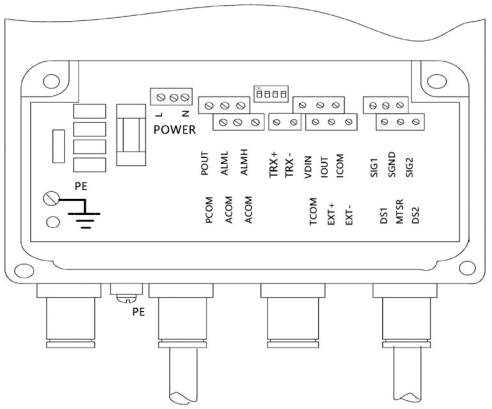
Electrical wiring

Integrated converter series terminal block description



I+:	Flow current output
COM:	Current output ground
P+:	Bidirectional flow frequency (pulse) output
COM:	Frequency (pulse) output ground
AL:	Lower limit alarm output
AH:	Lower limit alarm output
COM:	Alarm output, GND
FUSE:	Input power fuse
T+:	Communication input(RS485-A)
T-:	Communication input(RS485-B)
G:	RS232 communication GND
L1:	220V(24V) supply input
Lz:	220V(24V) supply input

Split converter series terminal block description

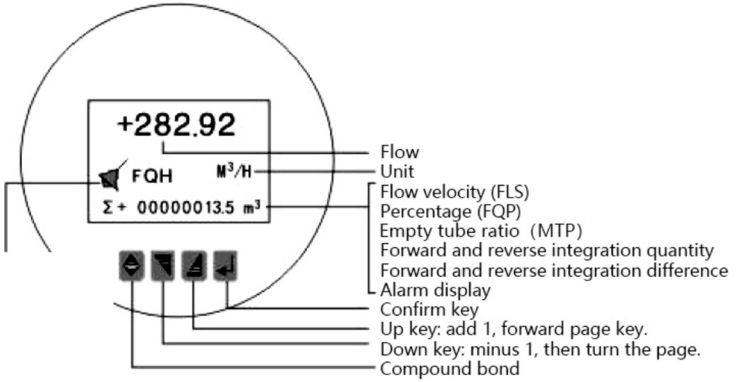


SIG 1	Signal 1	To connect sensor part of split flow meter
SGND	Signal GND	
SIG 2	Signal 2	
DS1	Incentive shielding 1	
DS2	Incentive shielding 2	
EXT +	Excitation current +	
EXT -	Excitation current -	
VDIN	24V power for 2-wire current output	Analog current output
IOUT	Analog current output	
ICOM	Analog current output GND	
POUT	Flow frequency (pulse) output	Flow frequency (pulse) output
PCOM	Flow frequency (pulse) output GND	
ALMH	Upper limit alarm output	Two way alarm output
ALML	Lower limit alarm output	
ACOM	limit alarm output GND	
TRX+	Communication (RS485-A)	Communication interface
TRX -	Communication (RS485-B)	
TCOM	RS232 commmunication GND	

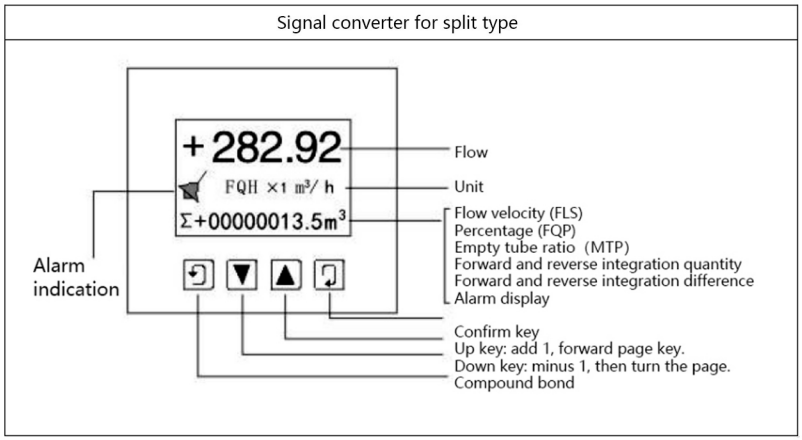
Convertor Menus and Settings

Display interface and button functions

Signal converter for compact type



Signal converter for split type



	Description	
Keys	The four keys are compound key, down key, up key and confirmation key from left to right.	
Functions	Parameters setting	Select this function to enter the parameter setting screen, which has a 5-level password. Press the compound key + confirm key at the same time to enter.
	Total amount cleared	Select this function to clear the total amount of the instrument. The password is 10000. Press the compound key + confirm key at the same time to clear the instrument.
	change record	Select this function to view the flow coefficient modification record
Password	Level 1 Password	00521:User can only view instrument parameters
	Level 2 Password	03210: User can change parameters with Password level ≤2
	Level 3 Password	06108: User can change parameters with Password level ≤3
	Level 4 Password	Please consult the manufactory
	Level 5 Password	Please consult the manufactory
Basic key funtions	Key functions in automatic measurement state	Up key: Cycle through the content displayed on the lower row of the screen
		compound key + confirm key: enter parameter setting state
		Confirm key: return to automatic measurement state
		Brightness adjustment: increase the brightness through "compound key + up key", and decrease brightness through "compound key + down key"
	Key functions in parameter setting state	Down key: Decrease the number at the cursor by 1
		Up key: Add 1 to the number at the cursor
		compound key + down key: move the cursor left
		compound key + up key: move the cursor to the right
		Confirm key: enter/exit the submenu; in any state, press and hold for a few seconds to return to the main measurement status page

Parameter setting method: To set or modify instrument parameters, the instrument must enter the parameter setting state from the measurement state. In the measurement state, press the "compound key + confirm key", the instrument will enter the function selection screen "Parameter Settings", then press the confirmation key to enter the password input state "00000", enter the password and press the " compound key + confirm key" enter the parameter setting screen.

Parameter setting menu list

Parameter number	Parameter Display	parameter content	Set method	Parameter range	Password level
1	Language	Language	Choice	Chinese, English	2
2	CommAddres	Instrument communication address	Set value	0 ~ 254	2
3	Baud Rate	Instrument communication speed	Choice	300 ~ 38400	2
4	Snsr Size	Measure pipe diameter	Choice	3 ~ 3000	2
5	Flow Unit	flow unit	Choice	L/h,L/m,L/s,m3/h,m3/m,m3/s, T/h,T/m,T/s	2
6	Flow Range	Instrument range setting	Set value	0 ~ 99999	2
7	Flow Rspns	Measure damping time	Choice	1 ~ 50	2
8	Flow Direct	Traffic direction selection	Choice	Forward / reverse	2
9	Flow Zero	Flow zero point correction	Set value	0~±9999	2
10	Flow Cutoff	small signal cutoff point	Set value	0~599.99%	2
11	Cutoff Ena	Allow cut display	Choice	Allow/Forbidden	2
12	Total Unit	Flow accumulation unit	Choice	0.001m³~1m³、0.001L~1L、0.001T~1T	2
13	Density	fluid density	Set value	0~3.999T/m³	2
14	SegmaN Ena	Reverse output allowed	Choice	Allow/Forbidden	2
15	Analog Type	Current output type	Choice	4 ~ 20mA/4mA	2
16	Pulse Type	Pulse output mode	Choice	frequency/pulse	2
17	Pulse Fact	Pulse unit equivalent	Choice	0.001m³~1m³、0.001L~1L、0.001T ~ 1T	2
18	Freque Max	Frequency output range	Choice	1 ~ 5999 Hz	2
19	Mtsnsr Ena	empty tube alarm allowed	Choice	Allow/Forbidden	2
20	MtsnsrTrip	Empty pipe alarm threshold	Set value	0~59999	2
21	Alm Hi Ena	Upper limit alarm allowed	Choice	Allow/Forbidden	2
22	Alm Hi Val	Upper limit alarm value	Set value	000.0~599.99 %	2
23	Alm Lo Ena	Lower limit alarm allowed	Choice	Allow/Forbidden	2
24	Alm Lo Val	Lower limit alarm value	Set value	000.0~599.99 %	2
25	Sys Alm Ena	Excitation alarm allowed	Choice	Allow/Forbidden	2
26	ClrSum Key	Total flow reset password	Set value	0-99999	3
27	Snsr Code1	Sensor code 1	user settings	Year and month of manufacture(0-99999)	4
28	Snsr Code2	Sensor code 2	user settings	Product number(0-99999)	4
29	Field Type	Excitation mode selection	Choice	Mode 1、2、3	4
30	Sensor Fact	Sensor factor value	Set value	0.0000 ~ 5.9999	4
31	Line Crc Ena	Traffic correction allowed	Choice	Allow/Forbidden	2
32	Lineary CRC1	Flow correction point 1	user settings	Set by flow rate	4
33	LinearyFact1	Flow correction number 1	user settings	0.0000 ~1.9999	4
34	Lineary CRC2	Flow correction point 2	user settings	Set by flow rate	4
35	LinearyFact2	Flow correction number 2	user settings	0.0000 ~ 1.9999	4
36	Lineary CRC3	Flow correction point 3	user settings	Set by flow rate	4
37	LinearyFact3	Flow correction number 3	user settings	0.0000 ~1.9999	4
38	Lineary CRC4	Flow correction point 4	user settings	Set by flow rate	4
39	LinearyFact4	Flow correction number 4	user settings	0.0000 ~ 1.9999	4
40	FwdTotalLo	Forward total low	Can be modified	00000 ~ 99999	5
41	FwdTotalHi	Forward total high level	Can be modified	0000 ~9999	5
42	RevTotalLo	Reverse total low	Can be modified	00000 ~99999	5
43	RevTotalHi	Reverse total high	Can be modified	0000 ~9999	5
44	PlsntLmtEna	Spike suppression allows	Choice	Allow/Forbidden	3
45	PlsntLmtVal	spike suppression coefficient	Choice	0.010 ~ 0.800m/s	3
46	Plsnt Delay	spike suppression time	Choice	400 ~ 2500ms	3
47	PassWord 1	Password Level 1	User can change	00000 ~99999	5
48	PassWord 2	Password Level 2	User can change	00000 ~ 99999	5
49	PassWord 3	Password Level 3	User can change	00000 ~ 99999	5
50	PassWord 4	Password Level 4	User can change	00000 ~ 99999	5
51	AnalogZero	Current zero point correction	Set value	0.0000 ~1.9999	5
52	Anlg Range	Current span point correction	Set value	0.0000 ~3.9999	5
53	Meter Fact	Factory calibration coefficient	Set value	0.0000 ~5.9999	5
54	MeterCode1	Convertor code 1	Factory settings	Year and month of manufacture(0-99999)	6
55	MeterCode2	Convertor code 2	Factory settings	Product number(0-99999)	6
56	Check Mode	Communication verification mode	Factory settings	No Parity Stop1、Odd Parity Stop1、Even Parity Stop1、No Parity Stop2、Odd Parity Stop2、Even Parity Stop2	2
57	MtsnsrZero	Empty pipe zero point correction	Factory settings	00000~19999	2
58	MtsnsrRange	Empty pipe range correction	Factory settings	00000~59999	2

Note: Instrument parameters determine the operating status, calculation method, output mode and status of the instrument. Correct selection and setting of instrument parameters can make the instrument runs in the best condition and obtains high measurement display accuracy and measurement output accuracy.

Detailed description of parameters

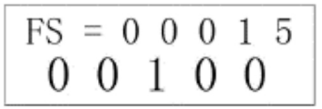
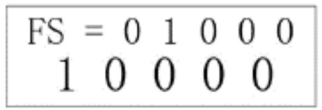
Parameter number	Parameter content	Parameter detail description
1	Language	Converter is available in Chinese and English, and users can choose to operate it by themselves.
2	Instrument communication address	Refers to the communication address of this watch when communicating with multiple machines. The optional range is: addresses 01 to 254. Address 0 is reserved.
3	Instrument communication speed	Instrument communication baud rate selection range: 300, 1200, 2400, 4800, 9600, 38400.
4	Measure pipe diameter	The sensor diameter range of the electromagnetic flowmeter converter is 3~3000 mm.
5	flow unit	Select the flow display unit in the parameters. The instrument flow display units are: L/s, L/m, L/h, m³/s, m³/m, m³/h, T/s, T/m, T/h User A suitable flow display unit can be selected according to process requirements and usage habits.
6	Instrument range setting	Instrument range setting refers to determining the upper limit flow value, and the lower limit flow value of the instrument is automatically set to "0". Therefore, the meter range setting determines the meter range, and also determines the meter percentage display, meter frequency output, meter voltage The corresponding relationship between stream output and traffic: Meter percentage display value = (flow value measurement value / meter range) * 100%; Instrument frequency output value = (flow value measurement value / instrument range range) * frequency full range value; Instrument current output value = (flow value measurement value / instrument range) * current full range value + base point; The instrument pulse output value is not affected by the instrument range setting;
7	Measure damping time	A long measurement filter time can improve the stability of the instrument flow display and the stability of the output signal and is suitable for total cumulative pulsating flow measurement. The short measurement filter time shows fast measurement response speed, which is suitable for production process control. The measurement filter time is set by selection.
8	Traffic direction selection	If the user thinks that the fluid direction during debugging is inconsistent with the design, the user does not need to change the excitation line or signal line connection but can use the flow direction setting parameters to change it.
9	Flow zero-point correction	When performing zero-point correction, ensure that the sensor tube is filled with fluid and the fluid is at rest. The flow zero point is expressed by flow velocity, and the unit is mm/s. The converter flow zero point correction is displayed as follows: FS = 0 0 0 0 0 ± 0 0 0 0 0 The small characters on the upper line display: FS represents the zero point measurement value of the instrument; The large characters on the bottom line display: flow velocity zero point correction value; When FS is not displayed as "0", the correction value should be adjusted to make FS=0. Note: If you change the downward correction value, the FS value will increase and needs to be changed. The positive and negative signs of the downward value enable FS to be corrected to zero. The correction value of the flow zero point is the matching constant value of the sensor, which should be recorded in the sensor's record sheet and sensor nameplate. The zero point value is the flow velocity value in mm/s with the opposite sign of the correction value.
10	small signal cutoff point	The small signal cutoff point setting is expressed as a percentage flow rate of the range. When cutting off small signals, the user can choose to cut off the display and signal output of flow rate, flow rate and percentage at the same time; or they can choose to cut off only the current output signal and frequency (pulse) output signal while maintaining the display of flow rate, flow rate and percentage.
12	Flow accumulation unit	The converter display is a 9-digit counter, and the maximum allowed count value is 999999999. The cumulative units used are L, m³,T (liter, cubic meter, ton). The flow accumulation equivalent is: 0.001L, 0.010L, 0.100L, 1.000L 0.001m³, 0.010m³, 0.100m³, 1.000m³ 0.001T, 0.010T, 0.100T, 1.000T;

13	fluid density	This menu works when the mass unit T/s, T/m, T/h is selected in "Fluid Unit".
14	Reverse output allowed	When the reverse output permission parameter is set to the "allow" state, as long as the fluid flows, the converter will output pulses and current according to the flow value. When the reverse output permission parameter is set to "disabled", if the fluid flows in the reverse direction, the converter output pulse is "0" and the current output is the signal "0" (4mA or 0mA).
15	Current output type	Users can select current output in the current output type.
16	Pulse output mode	There are two pulse output modes to choose from: frequency output and pulse output: Frequency output mode: The frequency output is a continuous square wave, and the frequency value corresponds to the flow rate percentage. Frequency output value = (flow value measurement value / instrument range) * frequency full range value; Pulse output mode: The pulse output is a rectangular wave pulse train. Each pulse represents a flow equivalent flowing through the pipeline. The pulse equivalent is given by Select the "Pulse Equivalent Unit" parameter below. The pulse output mode is mostly used for total accumulation and is generally connected through an integrating instrument. Frequency output and pulse output are generally in the form of OC gates. Therefore, an external DC power supply and load should be connected.
17	Pulse unit equivalent	The pulse unit equivalent refers to the flow value represented by one pulse. The instrument pulse equivalent selection range is as below table. Under the same flow rate, if the pulse equivalent is small, the frequency of output pulses will be high, and the cumulative flow error will be small.

Pulse equivalent	Flow	Pulse equivalent	Flow
1	0.001L/cp	7	0.1m3/cp
2	0.01L/cp	8	1.0m3/cp
3	0.1L/cp	9	0.001T/cp
4	1.0L/cp	10	0.01T/cp
5	0.001m3/cp	11	0.1T/cp
6	0.01m3/cp	12	1.0T/cp

18	Frequency output range	The frequency output range of the instrument corresponds to the upper limit of flow measurement, which is 100% of the percentage flow. The frequency output upper limit can be set arbitrarily within the range of 1~5000Hz.
19	empty tube alarm allowed	It has empty pipe detection function and does not require additional electrodes. If the user chooses to allow the empty pipe alarm, the instrument can detect an empty pipe status when the fluid in the pipe is lower than the measuring electrode. After the empty pipe status is detected, the analog output and digital output of the instrument are set to signal zero, and the flow rate of the instrument is displayed as zero.
20	Empty pipe alarm threshold	When the pipe is full of fluid (either with or without flow rate), the empty pipe alarm setting has been modified to make it more convenient for users. The upper line of the empty pipe alarm threshold parameter displays the measured conductivity, and the lower line sets the empty pipe alarm threshold. When setting the empty pipe alarm threshold, it can be set according to the measured conductivity, and it can be set to 3 to 5 times the measured conductivity.
21	Upper limit alarm allowed	User chooses to allow or disallow
22	Upper limit alarm value	The upper limit alarm value is calculated as a percentage of the range. This parameter adopts the numerical setting method. The user sets a value between 0% and 199.9%. If the alarm conditions are met during operation of the instrument, the instrument will output an alarm signal.
23	Lower limit alarm allowed	User chooses to allow or disallow
25	Excitation alarm allowed	Select Allow to enable the excitation alarm function, select Disable to cancel the excitation alarm function.
26	Total flow reset password	Users who use passwords of the 3rd level or above can set the password, and then set the password within the total reset.
27	Sensor code 1	Sensor coding can be used to mark the factory date and number of the matching sensor to coordinate the setting of the sensor coefficient.
28	Sensor code 2	

29	Excitation mode selection	The converter provides three excitation frequency options: 1/16 power frequency (mode 1), 1/20 power frequency (mode 2), 1/25 power frequency (mode 2) 3). The inductance of the small-diameter sensor excitation system is small, so 1/16 power frequency should be selected. The excitation system of large-diameter sensors has large inductance, and users can only choose 1/20 power frequency or 1/25 power frequency. During use, select excitation mode 1 first. If the zero point of the flow rate of the instrument is too high, select mode 2 or mode 3 in sequence. Note: In which excitation mode it is calibrated, it must be operated in which excitation mode.
30	Sensor Factor value	Sensor factor: that is, the calibration coefficient of the electromagnetic flowmeter. This coefficient is obtained from the actual standard and stamped on the sensor nameplate. The user must place this coefficient in the converter parameter table.
40	Forward total low	The total high and low bit settings can change the values of forward cumulative total and reverse cumulative total and are mainly used for instrument maintenance and instrument replacement. Users can use the level 5 password to enter and modify the forward accumulation amount (Σ+). Generally, the accumulated amount cannot exceed the maximum value calculated by the counter (999999999).
41	Forward total high level	
42	Reverse total low	Users can use the level 5 password to enter and modify the reverse accumulation amount (Σ-). Generally, the accumulation amount cannot exceed the maximum value calculated by the counter (999999999).
43	Reverse total high	
44	Spike suppression allows	For flow measurement of pulp, mud and other slurries, solid particles in the fluid rub or impact the measurement electrode, which will form "peak interference". To overcome such interference, the converter adopts a change rate suppression algorithm. The converter is designed with three parameters to select the change rate suppression characteristics. Set this parameter to "Allow" to start the change rate suppression algorithm. Set this parameter to "disabled" to turn off the change rate suppression algorithm.
45	spike suppression coefficient	This coefficient selects the rate of change to suppress sharp interference. Calculated according to the percentage of flow velocity, it is divided into 0.010m/s, 0.020m/s, 0030m/s, 0.050m/s, 0.080m/s, 0.100m/s, Among the levels of 0.200m/s, 0.300m/s, 0.500m/s, and 0.800m/s+, the smaller the level percentage, the higher the sensitivity of peak interference suppression. **Note:** in application, the selection should be made experimentally based on the actual situation. Higher sensitivity is not always the best.
46	spike suppression time	This parameter selects the time width to suppress peak interference, in milliseconds. Flow changes lasting less than the selected time are considered spikes by the converter. Flow changes lasting longer than the selected time are considered normal flow changes by the converter. This parameter should also be selected experimentally based on the actual situation.
47	Password Level 1	Users use level 5 password to enter and can modify these passwords
48	Password Level 2	
49	Password Level 3	
50	Password Level 4	
51	Current zero-point correction	The current output zero point of the converter is adjusted at the factory so that the current output is accurately 0mA or 4mA.
52	Current full point correction	The current output full point adjusted at the factory so that the current output is accurately 10mA or 20mA.
53	Factory calibration coefficient	This coefficient is a dedicated coefficient for the converter manufacturer. The converter manufacturer uses this coefficient to normalize the electromagnetic converter measurement circuit system to ensure that the interchangeability between all electromagnetic converters reaches 0.1%.
54	Convertor code 1	The converter code records the factory date and serial number of the converter.
55	Convertor code 2	

56	Communication verification mode	The converter comes standard with standard MODBUS communication 8-bit no parity mode (No Parity), and users can choose odd parity mode (Odd Parity) and even parity mode (Even Parity) as needed.
57	Empty pipe zero-point correction	When the on-site full pipe value is large, the user can perform empty pipe zero-point correction. When performing zero-point correction on an empty pipe, ensure that the sensor is filled with fluid. The empty pipe zero-point correction is displayed as follows:  The upper line displays: FS represents the empty pipe zero-point measurement value of the instrument. The lower line displays: Empty pipe zero-point correction value. First, according to the measured conductivity ratio MT value, adjust the correction value so that FS=5-10 (note: if the downward correction value is increased, the FS value will decrease)
58	Empty pipe range correction	When the empty pipe conductance measured by the instrument is smaller than the MT value, the user can correct the empty pipe range. When performing zero-point correction on an empty pipe, ensure that there is no fluid in the sensor pipe. The empty tube range correction is displayed as follows:  The upper line displays: FS represents the measured value of the empty pipe range of the instrument. The lower line displays: Empty pipe range correction value. Increasing the downward correction value increases the FS value. Decreasing the downward correction value reduces the FS value. Users can adjust FS to an appropriate value according to actual needs (it is recommended to adjust to FS=1000 or so), then the measured conductivity ratio when the pipe is empty is basically the actual corrected FS value.

Alarm information

The printed circuit board of the electromagnetic flow converter uses surface welding technology and is not repairable to the user. Therefore, the user CANNOT open the converter housing.
The 4-key intelligent converter has self-diagnosis function. Except for power supply and hardware circuit failures, alarm information can be correctly given for failures in general applications. This alarm information is prompted with " " on the left side of the display. In the measuring state, the instrument automatically displays the fault.
The content of the fault is as follows:
FQH---- Flow upper limit alarm; FQL---- Flow lower limit alarm.
FGP---- fluid empty pipe alarm; SYS---- system excitation alarm.

Troubleshooting

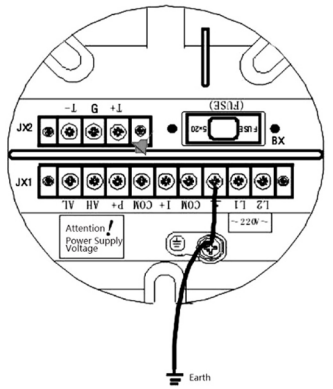
No.	Problem description	How to handle
1	The instrument has no display	*Check whether the power is on; *Check whether the power fuse is intact; *Check whether the power supply voltage meets the requirements;
2	Excitation alarm	*Whether the excitation wiring EX1 and EX2 are open circuit; *Whether the total resistance of the sensor excitation coil is less than 150Ω; *If both are normal, the converter is faulty.
3	Air traffic control alarm	*Check whether the fluid fills the sensor measuring tube; *Use wires to short-circuit the converter signal input terminals SIG1, SIG2 and SGND. If the "empty pipe" prompt is cleared currently, it means the converter is normal. It may be that the conductivity of the measured fluid is low or the empty pipe threshold is set incorrectly; *Check whether the signal connection is correct; *Check whether the sensor electrode is normal: Make the flow rate zero, and the observation shows that the conductance ratio should be less than 100%; When there is flow, the resistance of the measured terminals SIG1 and SIG2 to SGND should be less than 50kΩ (for the medium is water, it is best to use a pointer multimeter to measure, and you can see the charging and discharging phenomenon during the measurement process). Use a multimeter to measure the DC voltage between DS1 and DS2 and it should be less than 1V. Otherwise, it means that the sensor electrode is contaminated and should be cleaned.
4	Measured flow rate incorrect	*Whether the fluid fills the sensor measuring tube; *Whether the signal line connection is normal; *Check whether the sensor factor and sensor zero point are set according to the sensor label or factory calibration sheet;

Lightning protection function description

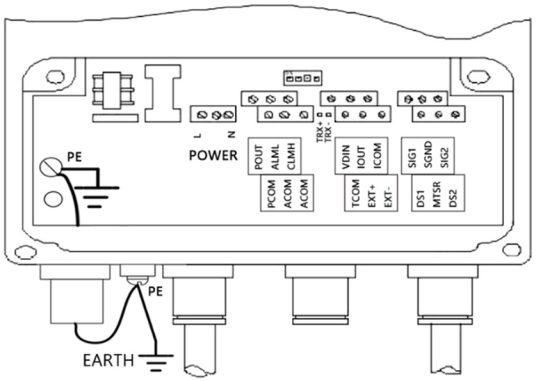
When installing, the user MUST connect the grounding point of the converter terminal to the shell and then reliably ground it, Because the lightning protection gas arrester guides lightning strikes into the earth through the casing.
If the shell is not reliably grounded, once someone operates the converter during a lightning strike, personal accidents may occur.

See the connection diagram for details:

Round header



Square header



Ordering Guide

Model No.	Type
HFM100	Electromagnetic Flowmeter

Code	Mounting method
S	Flange type
C	Plug-in type

Code	Convertor type
I	Integrated
D	Split

Code	Nominal diameter
6	DN6
10	DN10
...	
3000	DN3000

Code	Liner material
CR	Polychloroprene Rubber
PU	polyurethane rubber
FP	Silicone fluorine rubber
FE	PTFE
F46	Polyperfluoroethylene
PF	PFA

Code	Electrode material
S6	316L
HC	Hastelloy C
TI	titanium
TA	Tantalum
WC	Tungsten Carbide
PT	Platinum-Iridium Alloy

Code	Body material
TG	carbon steel
S4	304
S6	316L

Code	Rated pressure
6	6bar
10	10bar
16	16bar
25	25bar

Code	Output Signal
A	4 ~ 20mA
P	Pluse
R	RS485
H	HART

Code	Power Supply
0	220VAC
1	24VDC
2	Battery

Code	Others
Ex	Explosion-proof
QF	Factory report
	Other customization requirements

Eg:HFM100	S	I	50	FE	S6	TG	16	A P R	1	QF

Transportation and Storage

To prevent the instrument from being damaged during operation, please keep it in the same packaging state as it was shipped from the manufacturer before arriving at the installation site. During storage, the storage location should be indoors with the following conditions:

1.Rainproof and moisture-proof.

2.Mechanical vibration is small, and impact is avoided.

3.Temperature range -20~+60℃, humidity not greater than 80%.

Operation

Carry out the following inspections before putting the flowmeter into operation:

1.Whether the flow meter is damaged during transportation and installation.

2.Is the power supply voltage used consistent with the nameplate voltage?

3.The instrument is correctly wired.

After inspection, open the pipeline valve to fill the pipeline with liquid. Pay attention to eliminate leaks and residual gas in the system. Then turn on the power of the instrument. Generally, the flow meter can work normally after 10 minutes of preheating.

Guarantee and Repair

Dear users:

Thank you for using our products. To make our service more satisfying to you, please read this regulation carefully and properly.

Manage this service warranty card. The service warranty card must be provided under warranty.

1.Warranty Description:

①The warranty period of this product is one year, the specific warranty period published on the website shall prevail.

②Please consider carefully when you buy it. If there is no quality problem, we will not provide return or exchange service for you.

2.Under one of the following circumstances, no matter whether it is within the warranty period, there is no free warranty.

①The surface is corroded, cracked or concave and convex caused by human and damaged due to improper installation, use or maintenance.

②The delivery period of the product exceeds the warranty period.

③Those repaired by unauthorized service providers or technicians or disassembled and installed by users themselves.

3.The Company reserves the right to the final interpretation and change of the terms of Service.