User Manual

Preface

Thank you for purchasing our products!

This manual is about meter functions, settings, connection methods, operation flow, and methods to identify the faults. Please read this manual carefully before operating and using it correctly.

After reading it, please keep it properly in the place where you may read it any time for your reference.

Note

Modification of this manual contents will not be notified as a result of some factors, such as function upgrading.

We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.

Any reprint and copy of the manual content is strictly prohibited either in whole or in part.

Version

IMD14-EZ03　The first version June, 2016

Chapter 1   Safety Instructions

1.1   Manufacturer's Safety Instructions

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As for document contents including this disclaimer, the manufacturer reserves and has the right to modify at any time in any way for any reason without any notice in advance, and it will not bear the responsibility for the consequences coming out of any forms of change.

Product Liability and Warranty

The operator judges whether the flow meter serves the purpose, and bear the responsibility for it. The manufacturer does not assume the consequences caused by operator's misuse of meter. Wrong installation and operation of flow meter (system) will lead to deprive of warranty rights. In addition, the corresponding 'standard sales terms' applies as well, and the clause is the basis of purchase contract.

Document Details

In order to avoid harm or damage to the equipment when used improperly, please make sure reading the information in this document before using it. In addition, you must comply with national standards, safety regulations and accident prevention rules.

If you can't understand this document, please ask the manufacturer for help. The manufacturer will not take the responsibility for property loss or physical injuries due to misunderstanding of the information contained in the document.

This document will help you to establish favorable operating conditions so as to make sure that you use the equipment in a safe and effective way. In addition, something of particular attention and safety measures in the document are marked by the following marks.

Display Convention

The following symbols will make it easier for you to use this document.

Danger！

This symbol signifies related and important safety tips.

Warning！

Such warnings must be paid attention to. Slight negligence may lead to serious health threat, and may damage the equipment itself or the operating factory facilities.

Note！

Such warnings must be paid attention to. Any slight negligence may also lead to functional fault of the equipment itself.

Tips！

This symbol signifies related important information concerning operating instrument.

1.2   Safety Instructions for Operators

Warning！

Only corresponding personnel who got trained and authorized is allowed to install, use, operate and maintain the equipment. This document will help you to establish favorable operating conditions so as to make sure that you use the equipment in a safe and effective way.

Chapter 2   Equipment Introduction

2.1   Scope of Delivery

Tips！

Please check whether the boxes are damaged or not, and whether they have been handled roughly or not. Please report the damage to the deliverer and the manufacturer.

Note！

Please check the packing list to make sure that all the goods you received are integrated.

Note！

Please check the name plate of the equipment, and confirm whether the power supply is the same as your order. If incorrect, please contact manufacturer or supplier.

Separate Flow meter
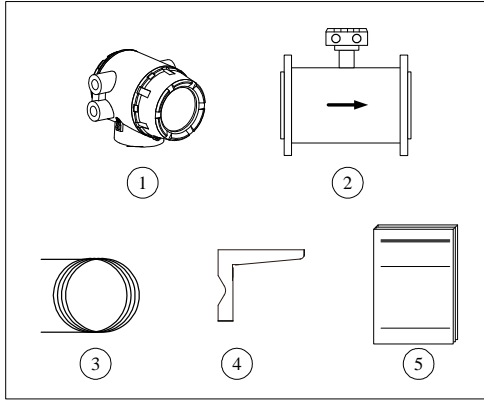
1.　　　Split Flow meter Signal Converter

2.　　　Flow meter Sensor

3.　　　10m Signal cable (optional)

4.　　　Split bracket

5.　　　Documents（User Manual）

Split Flow meter
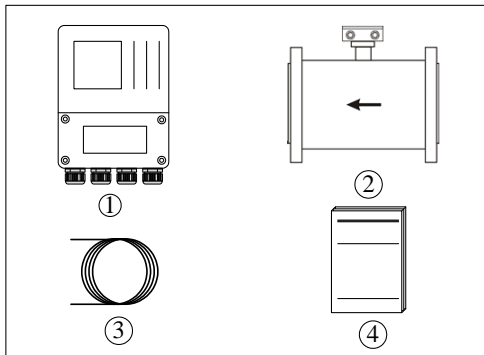
1.　　　Split Flow meter Signal Converter

2.　　　Flow meter Sensor

3.　　　10m Signal cable (optional)

4.　　　Documents（User Manual）

Integrative Flow meter
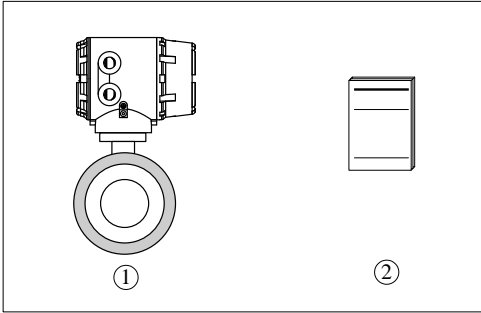
1.　　　　Integrative Flow meter

2.　　　　Documents（User Manual）

2.2 Split bracket instructions

For fixing bracket and wall

Waterproof for mounting bolts

Connection for a support and a converter
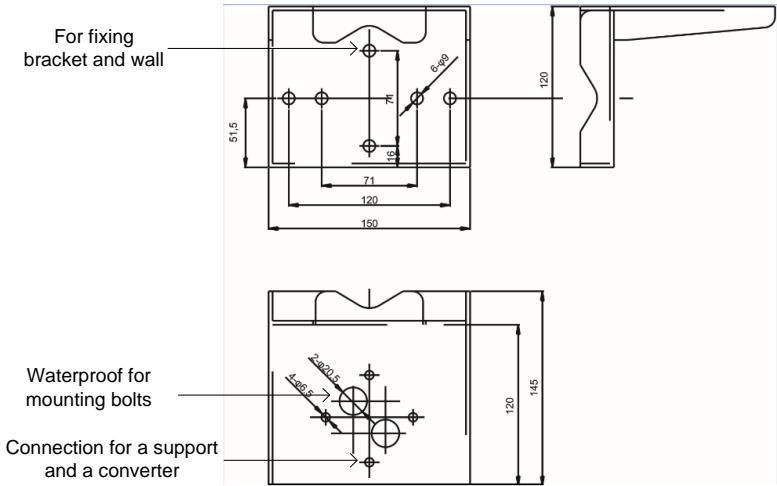
Example of use split brackets :
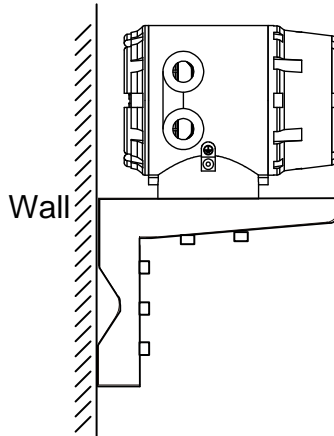
Wall

Instructions for use :

1, the converter and the split bracket can be fixed by the internal six angle bolt;

2. The split bracket is fixed on the wall with screws;

3. The split bracket is installed on the corresponding pipe with clamp.

2.3 Use environment description

Electromagnetic flowmeter applies only to measure the instantaneous flow rate of an electrically conductive liquid or liquid-solid two-phase flow, and has a flow accumulation function. Typically, the meter factory parameters will vary depending on the requirements of the order set in advance, the user does not need to set parameters before use, but requires the user to the nameplate on the pre-use check whether the parameters have been set up in advance, and with the actual working conditions do check.

Theoretically medium conductivity of not less than 5μS / cm can use ordinary type electromagnetic flowmeter cm, but the fact that ordinary electromagnetic flowmeter can measure the electrical conductivity higher than the theoretical value should be one to two orders of magnitude, at least more than 50μS / cm . Meanwhile conductivity measurement must be online measured conductivity prevail, there will be off-line measurement of air carbon dioxide, nitrogen dioxide dissolved into the media resulting in higher conductivity.

2.4   Terminal description

Separate type
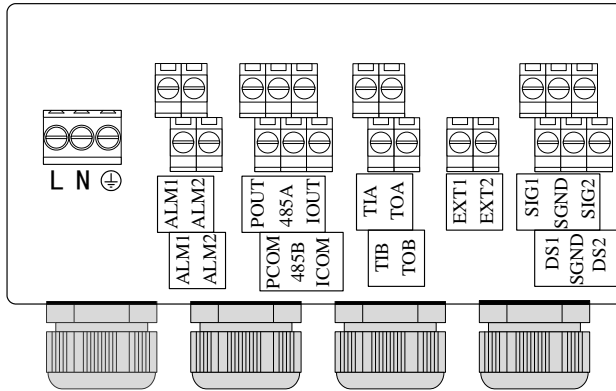
L , N :	220VAC power supply
⏚ :	Ground
ALM1 , ALM2 :	Alarm output
POUT , PCOM :	Pulse/Frequency output
485A , 485B :	485 serial communication
IOUT , ICOM :	4-20mA output
TIA , TIB :	Water supply Temperature（Pt1000）
TOA , TOB :	Return water temperature（Pt1000）
EXT1 , EXT2 :	Excitation signal
SIG1 , SIG2 , SGND :	Electrode signal
DS1 , DS2 :	Electrode shield

Separate type
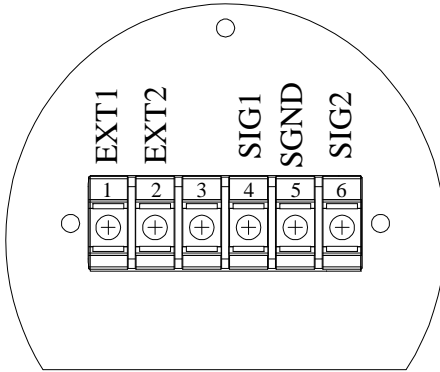
SIG1，SIG2 :   Positive signal， negative signal

SGND :   Signal ground

EXT1，EXT2 :   Excitation positive，Excitation negative

Excitation signal and sensor signals are connected via the signal line and split converter.

Integrative type
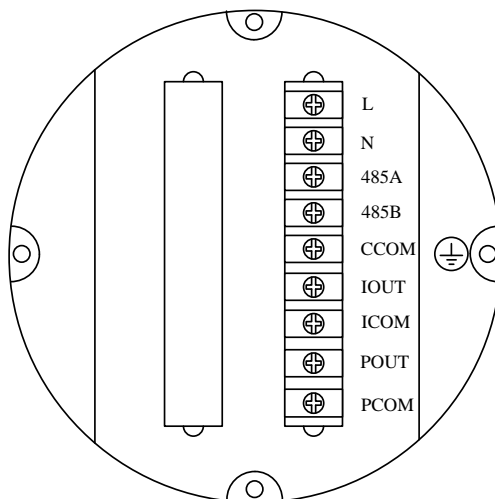
L, N:	220VAC power supply
IOUT+, ICOM- :	4-20mA output connection
POUT+, PCOM- :	Pulse/Frequency/Alarm output
485A,485B :	485 serial communication
CCOM :	485 serial communication ground
$\bigoplus$:	Converter instrument grounding protection

2.5　Name Plate

MAGNETIC FLOWMETER	
MODEL：	PLUS-OUT：
SUFFIX：	MATERIALS：
	ELECTRODES：
SIZE：	PRESSURE：
ACCURACY：	FLUID TEMP：
METER FACTOR：	AMB. TEMP.：
SUPPLY：	PROTECTION：
SCALE：	NO：
I-OUT：	2016-06-16

Chapter 3   Installation

3.1   Installation Tips

Note !

Please check carefully whether the boxes are damaged .

Note !

Please check the packing list to make sure the goods that you receive is complete.

Note !

Please check the instrument nameplate, and confirm the delivery item is same with your order. Check the nameplate voltage is correct. If not correct, please contact the manufacturer.

3.2   Storage

- The instrument should be stored in a dry and clean place.
- Avoid exposure in direct sunlight for long.
- Instrument should be stored in the original package.

3.3   Installation Requirements

Note !

In order to ensure the installation reliably , the following measures must be taken.

- Enough space should be spared by its side
- Converter shouldn't be suffered by violent vibration .

3.4 Installation

Note！

We don't supply installation materials and tools.Please use installation materials and tools that meet the occupational health standards and conform to safety regulations.

DN: 15-300mm   DN: ≥300mm

Good   Wrong
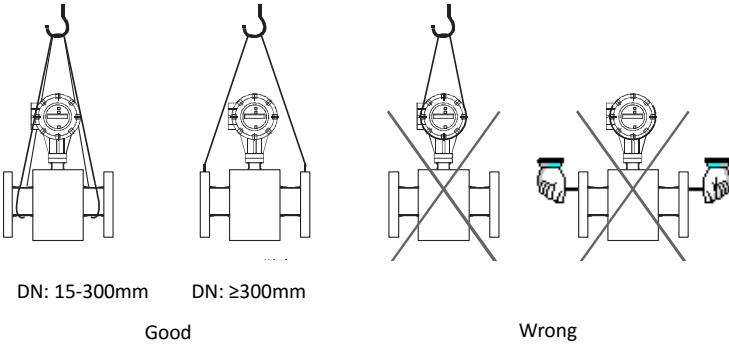
Straight pipe length requirements

≥5D   ≥3D
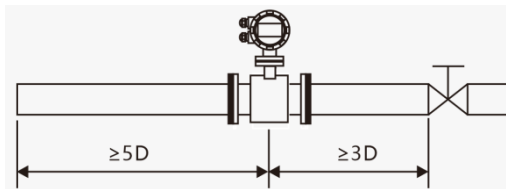
Installation whose valve is the downstream of sensor.

≥10D   ≥3D
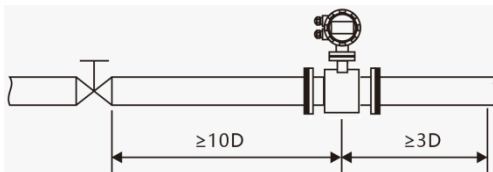
Installation whose valve is the upstream of sensor.

Recommended mounting position
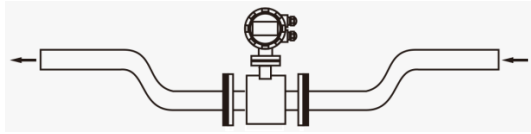
Installation that the sensor is below the pipes.
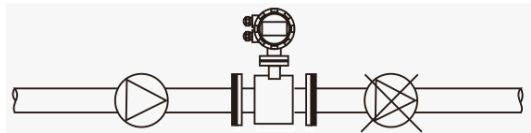
Electromagnetic flowmeters cannot be installed on the suction side of the pump to prevent the negative pressure produced by vacuum.
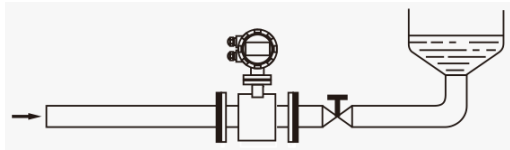
Installation that downstream of the sensor has the back pressure.
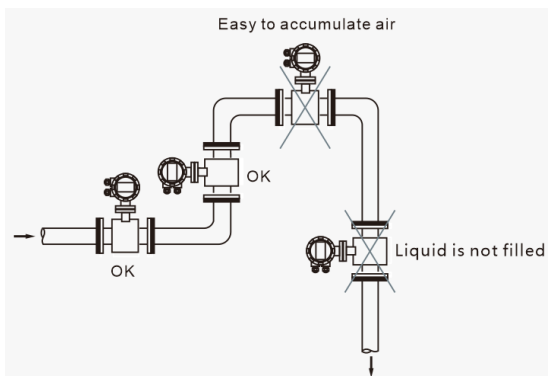
The connection which is easy to clean pipe.
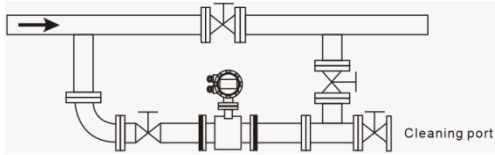
Situation where the pipe needs to be cleaned and the fluid conduit cannot stop, you must install a bypass pipe to be able to continue running during cleaning system.

3.5 Grounding

Electromagnetic Flowmeter sensor should be well grounded, the measuring accuracy of flowmeter depends on the grounding effect in a considerable extent.
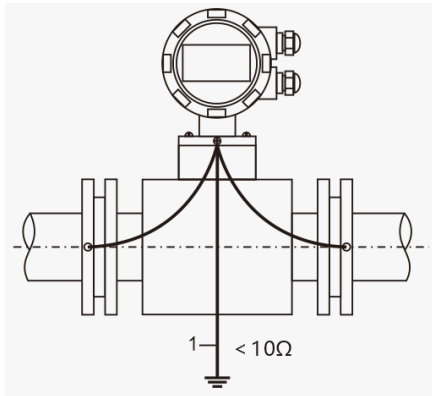
3.6 The overall and mounting dimension
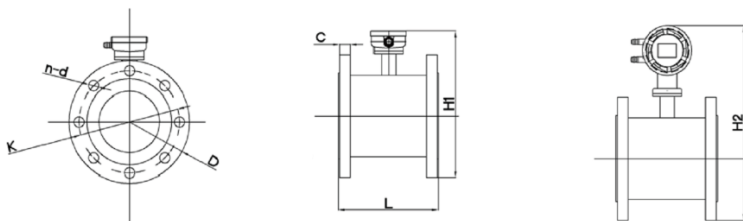
DN	PN	L	H1	H2	D	K	d	n	C
10	4.0	150	180	280	90	60	14	4	14
15	4.0	150	180	280	95	65	14	4	14
20	4.0	150	190	290	105	75	14	4	16
25	4.0	150	200	300	115	85	14	4	16
32	4.0	200	215	315	140	100	18	4	18
40	4.0	200	225	325	150	110	18	4	18
50	4.0	200	240	340	165	125	18	4	20
65	1.6	200	255	355	185	145	18	4	20
80	1.6	200	265	365	200	160	18	8	20
100	1.6	250	285	385	220	180	18	8	22
125	1.6	250	310	410	250	210	18	8	22
150	1.6	250	340	440	285	240	22	8	24
200	1.0	300	395	495	340	295	22	8	24
250	1.0	300	450	550	395	350	22	12	26
300	1.0	400	500	600	445	400	22	12	28
350	1.0	400	555	655	505	460	22	16	30
400	1.0	450	615	715	565	515	26	16	32
450	1.0	450	665	765	615	565	26	20	35
500	1.0	500	715	815	670	620	26	20	38
600	1.0	600	820	920	780	725	30	20	42
700	0.6	700	910	1010	860	810	26	24	40
800	0.6	800	1020	1120	975	920	30	24	44
900	0.6	900	1120	1220	1075	1020	30	24	48
1000	0.6	1000	1220	1320	1175	1120	30	28	52
1200	0.6	1200	1450	1450	1405	1340	33	32	60

Chapter 4　Electrical Connection

4.1　Safety Tips

Danger！

Only when power is switched off, can we do all the work about electrical connections. Please pay all attention to the power supply on the name plate!

Danger！

Please observe national installation regulations

Danger！

Please strictly observe local occupational health and safety regulations. Only those who have got properly trained are allowed to operate on the electrical equipment.

Tips！

Please check the name plate of the equipment, and confirm whether the supply is the same as your order.Check whether voltage and E-supply on the nameplate is correct. If incorrect, please contact manufacturers.

4.2　Connect Signal and Magnetic Field Current Cable

Danger！

Only when power is cut off can you connect signal and magnetic field current conductor.

Danger！

The equipment must be grounded in accordance with regulations so as to protect the operator from electrical shock.

Danger！

In case that equipment be used in explosion danger areas, special notes are given to explosion-proof instructions for safety tips.

Warning！

Please strictly observe local occupational health and safety regulations. Only those who have got properly trained are allowed to operate on the electrical equipment.

Separate type
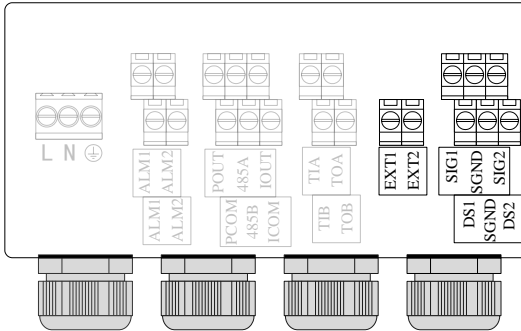
- EXT1，EXT2：Sensor excitation coils；

- SIG1，SIG2：Sensor electrode signal；

- SGND：Sensor signal ground；

- DS1，DS2：Respectively SIG1, SIG2 single-core shielded wire interface；

Separate type
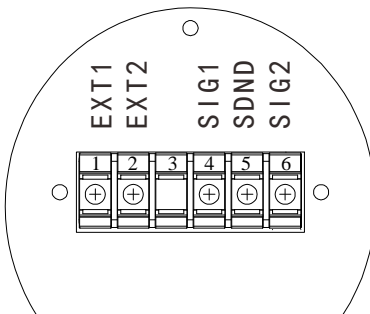
- EXT+, EXT-: Sensor excitation coils；

- SIG1, SIG2: Sensor electrode signal；

- SGND: Sensor signal ground；

Incorporate type
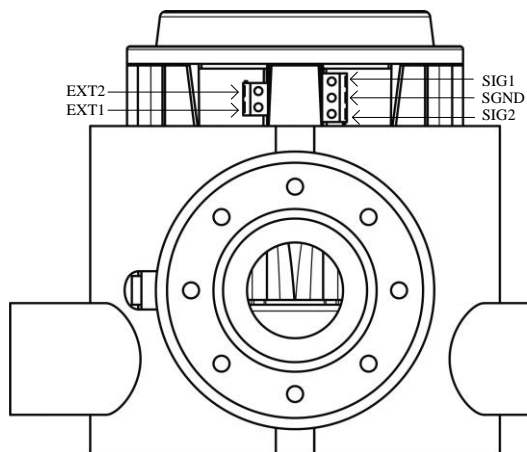
Connection illustration

- Excitation line：

    EXT1-- Sensor excitation coil positive terminal

    EXT2--Sensor excitation coil negative terminal

- Signal line

    SIG1--- The positive electrode sensor signal

    SIG2--- The negatve electrode sensor signal

- SGND-- Signal earth

4.3 Measurement Sensor Ground

Danger !

There allows no permission of potential difference between measurement sensor and housing or converter protection ground.

- Measurement sensor must be fully grounded
- Grounding conductor should not transfer any disturbing voltage.
- Grounding conductor is not allowed to be connected to other electrical equipment at the same time.

4.4   Connected to Power

Danger！

The equipment must be grounded in accordance with regulations so as to protect the operator from electrical shock.

220VAC Power Supply
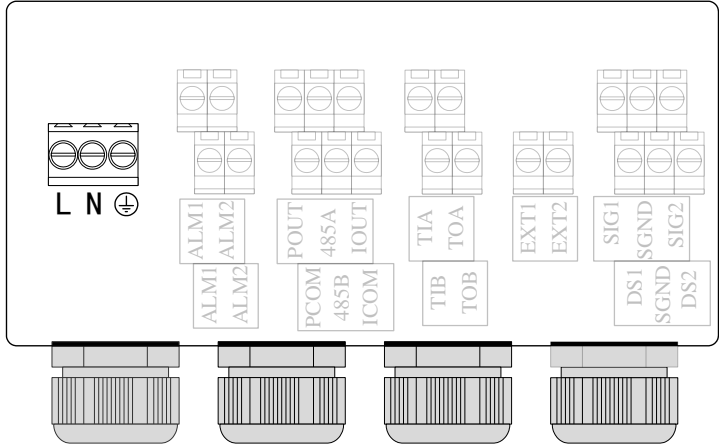
图 39

Tips！

Including allowed band: 100VAC -240VAC, 50Hz-60Hz

- L: AC phase line；

- N: AC neutral line；

- ⏚ : Connect ground wire to the ground screw.
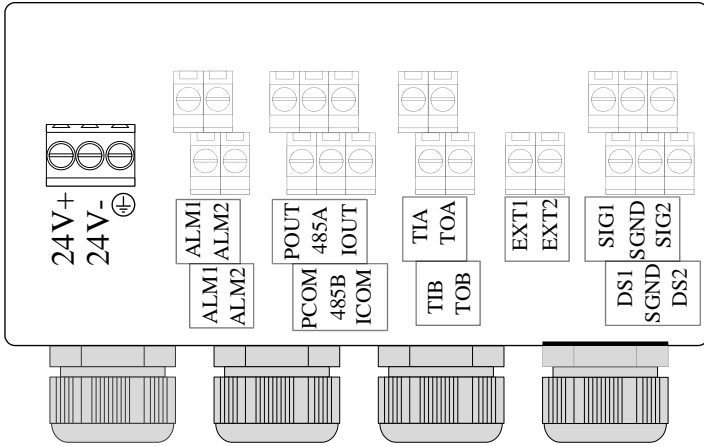
24VDC Power Supply

图 30

Tips !

Allowance range: 22VDC -26VDC

- 24+: Power supply positive pole；

- 24+: Power supply negative pole.

220VAC Power Supply
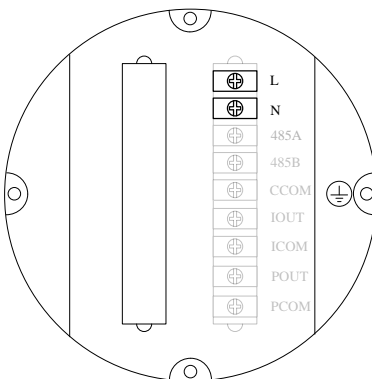
Tips！

Including allowed band: 100VAC -240VAC, 50Hz-60Hz

- L: AC phase line；

- N: AC neutral line；

- $\perp$: Connect ground wire to the ground screw.
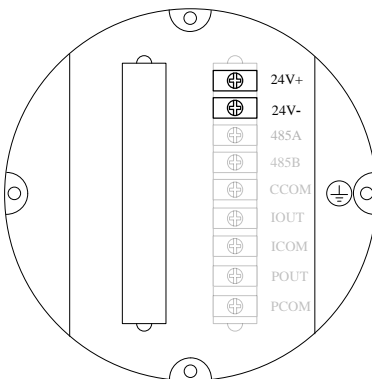
24VDC Power Supply

Tips！

Allowance range: 22VDC -26VDC

- 24+: Power supply positive pole；

- 24+: Power supply negative pole.

4.5　Output introduction

Separate type
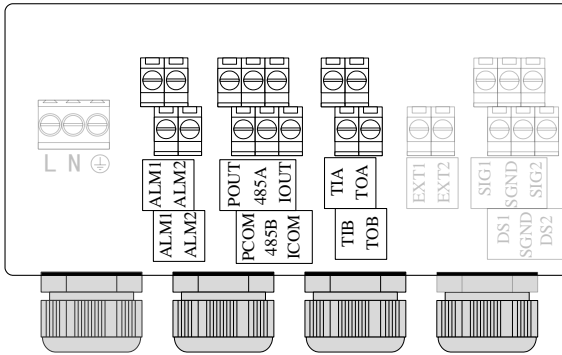
Current Output

- IOUT、ICOM: 4-20mA output

- Active mode: when load R_L ≤ 750Ω；I_{max} ≤ 22mA

- Current flow percent

Communication output

- 485A、485B: 485 Serial communication output；

- CCOM: 485 Serial communication ground；

- Agreement: ModBus-RTU。
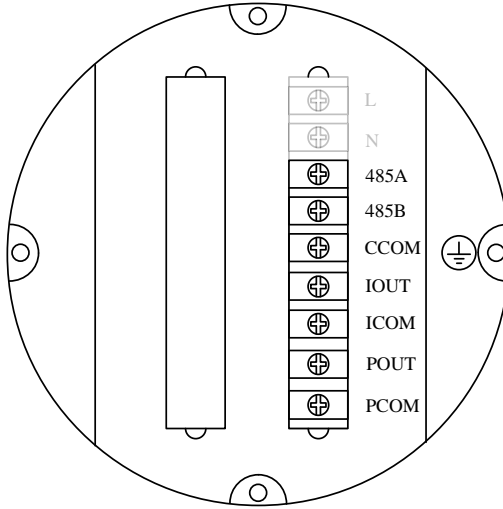
Current Output

- IOUT、ICOM: 4-20mA output

- Active mode: when load R_L ≤ 750Ω；I_{max} ≤ 22mA

- Current flow percent

Communication output

- 485A、485B: 485 Serial communication output；

- CCOM: 485 Serial communication ground；

- Agreement: ModBus-RTU。

Pulse, Frequency and Alarm output

- Corresponding terminal is POUT、PCOM

- Active mode: High 24V, 5mA drive current

- Output electrical isolation: photoelectric isolation, isolation voltage: > 1000VDC；

- Scale:

  Frequency output: Frequency 2KHz(configurable 0-5kHz) Corresponding to the upper limit of the flow range;

  Pulse output: corresponding flow rate volume of each pulse (configurable), output Pulse width: 0.1ms ~100ms, duty cycle 1:1, Fmax <= 5000 cp/s；

- Elementary diagram:
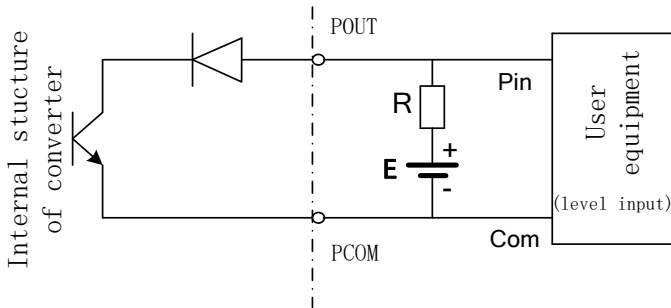
Additional remarks : pulse output for OC gate output, need external power supply. General counter all wear resistance, signal can be directly connected to the counter.

Manufacturer recommendations: upper pull resistance R is recommended to use 2 k, 0.5 W resistor, another power E recommended 24 v dc power supply.

Chapter 5   Startup

5.1   Power on

Please check whether the instrument installation is correct before power on .
including :

- The meter must be installed under safety compliance.

- Power supply connection must be performed in accordance with the regulation.

- Please check the electrical connection in the power supply is correct.

- Tighten the converter shell back cover.

5.2   Converter startup

Measuring instrument consists of measuring sensor and signal converter, the supply
has been already in a state of putting-in-service.

All the operation data and engineering contents have been set according to customer
order. It will have a self-check after turning on the power supply. After that, measuring
instrument will immediately begin to measure and display the current values.

Startup picture
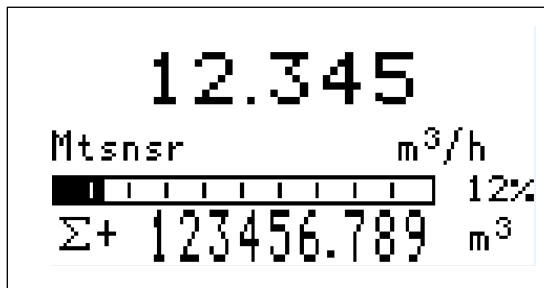
Chapter 6   Operation

6.1   Display and Operation Button
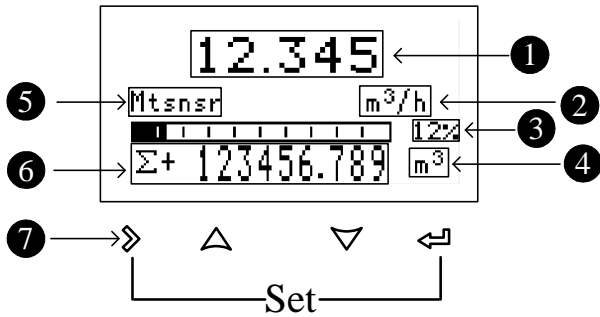
1.   Instantaneous flow rate

2.   Instantaneous flow unit

3.   Instantaneous flow in percent of flow

4.   Accumulation flow unit

5.   System alarm information

6.   Cumulative amount and so on

Display information[∑+": Positive flow accumulation, "∑-": Negative flow accumulation, "Σ": Net flow accumulation, "v": current flow rate, MT: Current conductivity]

7.   Operation keys: mechanical keys / photoelectric keys

Signal	Measuring Mode	Menu Mode	Function Mode	Data Mode
>	-	switch menu categories	-	Data right shift
↙	Switch accumulative amount	Switch menu subclass	confirmation	Confirm data
↑↓	-	-	selection	Change data
>+←	Enter menu	Exit menu	-	-

6.2   Infrared touch-key operation instructions(Optional)

Photoelectric key operation mode : a finger click on the icon for more than half a second and release ,that is to finish button operation for once.

Except key combination, it is forbidden to put other fingers on the other photoelectric keys when operating the touch-key .
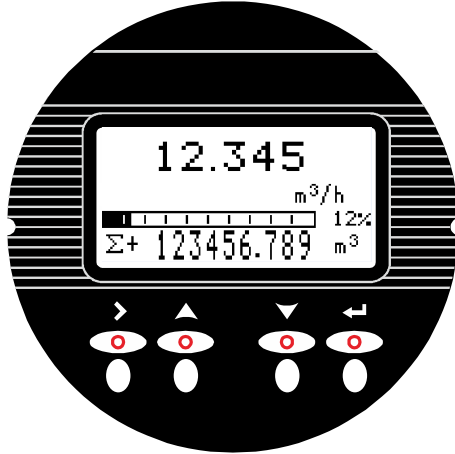
6.3   Perating instructions for mechanical keys

Please open the converter cover before handling mechanical keys.

Mechanical key to enter configuration mode operation as shown in the next section.
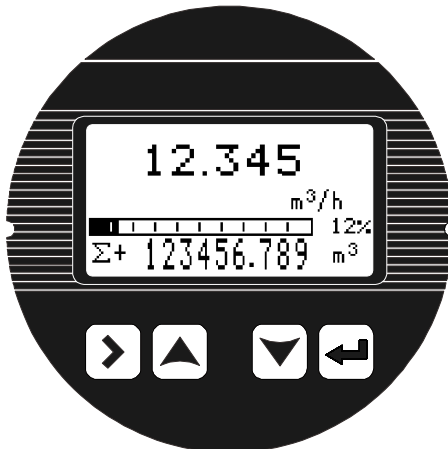
6.4 Quick setup menu

To help Manufacturer and users quickly set up the important parameters of instrument:

Press on ⟩ and ↵ at same time , Instrument parameter is set at the interface:

Password need to be input at this time .

Quickly set the password：300000（Used to modify the quick setup menu）

NO.	Parameter words	Setting mode	Parameter range	default
1	The sensor size	Option	3-2000	50
2	Flow range	Figure	0-99999	35.000
3	Sensor coefficient	Figure	0-99999	1.000
4	Zero correlation	Figure	0-99999	0.0
5	accumulation reset	Option	Y、N	N
6	Flow remove	Figure	0-99%	1%
7	time constant	Figure	0-99S	3s

6.5 Configuration details

NO.	Parameter	Setting mode	Password level	Parameter range	Default
1-Flow rate					
1-0	Flow range	Figure	User	0-99999	35.000
	Set the maximum flow limit value. Used to calculate the frequency, output current limit calculation; Alarm threshold calculation, etc				
1-1	Flow unit	Option	User	L、m^3、Kg、t /s、min、h	m^3/h
	Choose L, m3, such as volume unit, the density will not participate in calculation; Choose Kg, t, such as mass unit, need to cooperate with 1-2 density parameter.				
1-2	Fluid density	Figure	User	0.000-99.000	1.000
	Used to calculate the mass flow rate, $QM =\rho V_M$ when flow volume unit is volume unit t, this parameter will not be displayed. Density of the unit：g/cm^3				
1-3	Time constant	Figure	User	0-99S	2s
	Damping coefficient of the filter, select the parameters of the selected period of time as the average of the instantaneous flow				
1-4	Flow resection	Figure	User	0-10%	1%
	Flow volume is regarded as zero if it is below the setting value Zero means not remove				
1-5	Flow direction	Option	User	Positive,Negative	Positive
	Used to change the direction of flow, when the user signal lines negative pole and positive pole are reverse connection, or reverse sensor installation, use this feature				
1-6	Mode selection	Option	User	Positive,Negative Bidirection	positive
	Set the direction of the flow measurement, forward direction indicates only for forward direction measurement flow, reverse indicate only measure the reverse flow, two-way indicate two-way flow measurement				
1-7	spike suppressor permission	Option	User	Y、N	N
	Indicate whether to enable peak inhibition function, this function is applied to the operation condition of the larger jamming signal , is used to filter the jamming signal. When set to N doesn't show 1-8, 1-9 configuration screen When the range of the signal pulse is greater than 1-8 sets parameters and the time duration is less than 1-9 set time, the system will consider it an interference signal and will not display and measure .				

1-8	spike suppressor coefficient	Figure	User	0.01-0.8m/s	0.8
	The peak amplitude (it is not shown when peak inhibition allows configuration closing)				
1-9	spike suppressor time	Option	User	0-3s	1
	Peak duration time(it is not shown when peak inhibition allows configuration closing)				
1-10	Flow correction permission	Option	User	Y、N	N

Indicates whether start using flow nonlinear correction function.

In principle, used for small flow rate less than (0.5 m/s) linear adjustment

The functional design with 4 period of correction, is divided into four flow point and correction coefficient.

The corresponding velocity of correction point must meet：

Correction point 1 ≥ Correction point 2 ≥ Correction point 3 ≥ Correction point 4 ≥ 0。

Correction calculation is conducted on the original sensor flow coefficient curve correction, therefore, should be closed nonlinear correction function, mark sensor coefficient. Then allow the nonlinear correction function, according to the nonlinear of sensor, setting correction coefficient, piecewise corrected. If the coefficient is set right, no need to calibration.

The original velocity stand for the real standard velocity, the revised flow velocity is called modified velocity, the modified computation formula is as follows:

At the interval of the modified point 1 ＞ The original flow velocity ≥ The modified point 2

The modified flow velocity = Correction factor 1 × The original flow velocity

At the interval of the modified point 2 ＞ The original flow velocity ≥The modified point 3

The modified flow velocity = Correction factor 2 × The original flow velocity

At the interval of the modified point 3 ＞ The original flow velocity ≥ The modified point 4

The modified flow velocity = Correction factor 3× The original flow velocity

At the interval of the modified point 4 ＞ The original flow velocity ≥ 0

The modified flow velocity = Correction factor 4× The original flow velocity

Note: when set the modified point, should keep the following relationship

Modified point 1 ＞ Modified point 2 ＞ Modified point 3＞ Modified point 4＞0

The intermediate value of Correction coefficient is 1.0000, if the correction coefficient is greater than 1 , then increase the flow velocity ; if the correction coefficient is less than 1 , then decrease the flow velocity ;

	Flow correction point 1	Figure	Factory	0.0-99.999	0
1-11	Flow rate modified point 1, when The flow rate function shut down , this parameter does not display.				
	Flow correction coefficient 1	Figure	Factory	0.0-99.999	1.000
1-12	Flow rate correction factor 1, when The flow rate function shut down , this parameter does not display.				
	flow correction point 2	Figure	Factory	0.0-99.999	0
1-13	Flow rate modified point 2, when The flow rate function shut down , this parameter does not display.				
	Flow correction coefficient 2	Figure	Factory	0.0-99.999	1.000
1-14	Flow rate correction factor 2, when The flow rate function shut down , this parameter does not display.				
	Flow correction point 3	Figure	Factory	0.0-99.999	0
1-15	Flow rate modified point 3, when The flow rate function shut down , this parameter does not display.				
	Flow correction coefficient 3	Figure	Factory	0.0-99.999	1.000
1-16	Flow rate correction factor 3, when The flow rate function shut down , this parameter does not display.				
	Flow correction point 4	Figure	Factory	0.0-99.999	0
1-17	Flow rate modified point 4, when The flow rate function shut down , this parameter does not display.				
	Flow correction coefficient 4	Figure	Factory	0.0-99.999	1.000
1-18	Flow rate correction factor 4, when The flow rate function shut down , this parameter does not display.				

2-Current output					
NO.	Type	Option	Password level	Parameter range	Default
2-0	Reverse output permission	Option	User	Y , N	N
	When Flow rate is reverse ,whether 4-20 ma output is needed , pulse/frequency; Flow rate is forward , It cannot be shut down				
2-1	Adjust K	Figure	User	0-99999	1.000
	Used for adjusting the output current value , I = Kx + B				
2-2	Adjust B	Figure	User	0-99999	0.000
	Used for adjusting the output current value , I = Kx + B				
2-3	Output current	Display	User	4.00-20.00	--
	Display the current output of current value(mA)				
3- Pulse/frequency/alarm output					
3-0	Pulse output type	Option	User	Frequency、Pulse、Alarm（integrated）	Frequency
	Optional frequency ,pulse equivalent/alarm output				
3-1	Transistor state	Option	User	High/low level	High level
	Frequency output, no pulse equivalent output, no alarm output level of the output level state				
3-2	Max. frequency	Figure	User	0-5000	2000
	Set the corresponding value of the instantaneous flow upper limit ; when select for frequency output , this parameter display .				
3-3	Pulse value(L/P)	Option	User	0.001-999.999	1.0
	Set the the cumulant that each pulse stand for ; When selecting is the equivalent output, this parameter display.				
3-4	Pulse width	Option	User	10ms、20ms、50ms、100ms、200ms、50%	100ms
	Set Pulse width.				

4-Accumulation					
4-1	Accumulation clearance	Option	Factory	Y、N	N
	Clear accumulation amount				
4-2	Positive accumulation integer	Figure	Factory	0-999999999	0
	Set total positive integer part				
4-3	Positive accumulation decimal	Figure	Factory	0.0-0.999	0.0
	Set total positive decimal part				
4-4	Negative accumulation integer	Figure	Factory	0-999999999	0
	Set reverse total integer part				
4-5	Negative accumulation decimal	Figure	Factory	0.0-0.999	0.0
	Set reverse total decimal part				

5- Alarm contacts (3-0 set to show the configuration When alarm output)					
NO.	Type	Option	Password level	Parameter scope	Default
5-0	Alarm 1 transistor state	Option	User	High/Low lever	High level
	Touch spot output high and low level when being no alarm state .				
5-1	Alarm1 output permission	Option	User	Y/N	N
	Allow touch spot 1 output main switch , when set to N, the following parameters do not display.				
5-3	Allow alarm1 empty pipe	Option	User	Y/N	N
	Allow empty pipe alarm output switch, the system detects empty pipe, contact 1 output alarm signal automatically. When allowed alarm output configuration as N, this parameter does not display.				
5-4	Allow alarm1 max.	Option	User	Y/N	N
	Allow flow rate upper limit alarm output switch , when the instantaneous flow is greater than the flow rate lower limit value, touch spot 1 output alarm signal automatically. The instructions are specific Settings in 7-1. When allowed to alarm output configuration for N, this parameter is not displayed.				
5-5	Allow alarm1 min.	Option	User	Y/N	N
	Allow flow rate lower limit alarm output switch , when the instantaneous flow is less than the flow rate lower limit value, touch spot 1 output alarm signal automatically. The instructions are specific Settings in 7-2. When allowed to alarm output configuration for N, this parameter is not displayed.				

7-Alarm setup					
NO.	Type	Option	Password level	Parameter scope	Default value
7-0	Max. flow value alarm	Figure	User	0-999.9%	100%
	Set the upper limit alarm value, measuring range percentage				
7-1	Min. flow value alarm	Figure	User	0-999.9%	0%
	Set the lower limit alarm value, measuring range percentage				
7-2	Alarm hysteresis	Figure	User	0-99.9%	1%
	Used to eliminate the alarm when the disturbance Upper limit elimination conditions: instantaneous flow is less than the upper limit alarm value – return difference Lower limit elimination conditions: instantaneous flow is greater than the upper limit alarm value + return difference				
7-3	Display alarm permission	Option	User	Y/N	N
	Allows the alarm message display onto to the main picture switch				

8-System					
8-0	Language	Option	User	Chinese/ English	Chinese
	Set configuration display language				
8-1	Display accuracy	Figure	User	0-4	2
	The instantaneous volume of decimal digits				
8-2	Contrast	Figure	User	0-100%	50%
	Contrast ratio of Liquid crystal display				
8-3	Modbus address	Figure	User	1-247	8
	Communication agreement instrument address Based on the RS485 protocol Modbus RTU				
8-4	Baud rate	Option	User	1200、2400、 4800、9600、 19200、38400、 57600	9600
	Baud rate of serial communication verification mode				
8-5	Even-odd check	Option	User	NONE/ODD/ EVEN	NONE
	Serial communication verification mode of physical layer				
8-8	User password	Figure	User	00000-999999	000000
	Set user password.				
8-9	Factory password	Figure	Factory	00000-999999	000000
	Set factory password.				

9-Empty tube parameters					
9-0	Empty pipe threshold value	Figure	Factory	0-100%	50%
	Empty tube alarm judgement gate value				
9-1	Actual electrical conductivity	Display	Factory		
	Display the measured conductivity equivalent of the fluid. For general natural water: equivalent < 200 when tube is full, when empty tube > 200 (the equivalent is related to the fluid conductivity and the length of measuring line , it is recommended double shielded wire is used when the wiring distance is 20m , otherwise it will affect empty detection function .				
9-2	Empty pipe check permission	Option	Factory	Y , N	Y
	Set whether open empty detection function				
9-3	Empty pipe check max.	Figure	Factory	0-9999	1200
	Measured conductivity equivalent value when the tube is empty , default values can be used for general natural water . which need to observe the empty wipe for special fluid is 9-1 value , write in 9-3				
9-4	Empty pipe check min.	Figure	Factory	0-9999	200
	Measured conductivity equivalent value when the tube is full , default values can be used for general natural water . which need to observe the empty wipe for special fluid is 9-1 value , write in 9-4				

10-Sensor					
10-0	Sensor coding	Figure/symbol	Factory	16 digital	
	Used for dentify sensors				
10-1	Factory ID number	Figure	Factory	6 digital	
	Identification number				
10-2	Diameter	Option	Factory	3-2000	50
	Sensor size				
10-3	Zero adjustment	Option	Factory	-9.99-9.99mv	0.00mv
	Sensor code value under the condition of static and full pipe(mean value of 30 seconds) Under the circumstance of Sensor symmetry and wiring is good (good shiedling)and within the scope of code value + / - 0.1 , no need adjust .				
10-4	Sensor coefficient	Figure	Factory	0-99999	
	The flowmeter coefficient was calibrated according to the actual flow volume by sensor manufacture For details ,see sensor coefficient calibration section				
10-5	Cali coefficient	Figure	Factory		
	Unification calibration coefficient of converter as leave factory				
10-6	Zero correction	Figure	Factory	0-99.999	
	Sensor nonlinear correction when used For small flow (below 0.3 m/s) For details see sensor coefficient calibration section				
10-7	Excitation mode	Option	Factory	3.125Hz、 6.25 Hz、12.5 Hz、 25 Hz	6.25Hz
	The choice of excitation frequency 3.125Hz 、6.25Hz、12.5Hz、25 Hz				
10-9	Gain selection	Option	Factory	1/3/9	3
	Gain choice: adjust the gain can change the range of flow speed Gain adjustment : 1、3、9				

6.6   Operating instruction

Parameter selection and adjustment

Press $\gg$ and $\hookleftarrow$ together , enter into parameter setting interface .

Password need to be input by then

The initial users password: 200000   (used for modifying the user level parameter)

The initial manufacture password :100000 (used for modifying the manufacture level parameter)

The initial manufacture password :300000 (to set up parameter quickly)

After entering the configuration parameters , the parameters can be modified by the following operation :

User can conduct the switch operation in the menu by pressing the $\gg$ button , switch among the parameter item of menu by pressing the $\hookleftarrow$ button, and store a modified parameter value at the same time , adjust the parameter value by pressing the $\triangle$ and $\triangledown$ buttons.

Flow range +00000.0000	Press 【↑】 to enter edlting condition
Flow range █00050.0000	Press 【>】 to move the light cursor to the right
Flow range +█0050.0000	Press 【✓】 to save paemission
Flow range +00050.0000	

Flow unit mˆ3	Reverse output permission N
press 【✓】 to move the next parameter	【>】 to enter next menu group
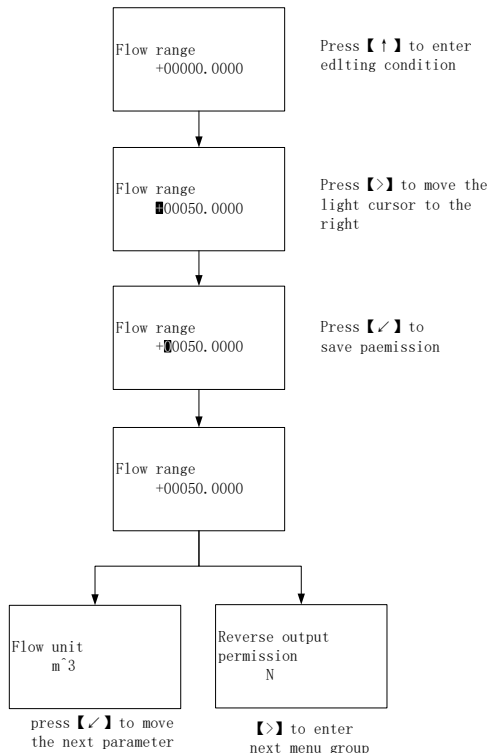
Measuring picture

This picture will display after startup

"∑+": Forward cumulant，"∑-": Reverse cumulant，"Σ":Net cumulant，

"v":Current flow velocity，"MT":Conductivity equivalent。
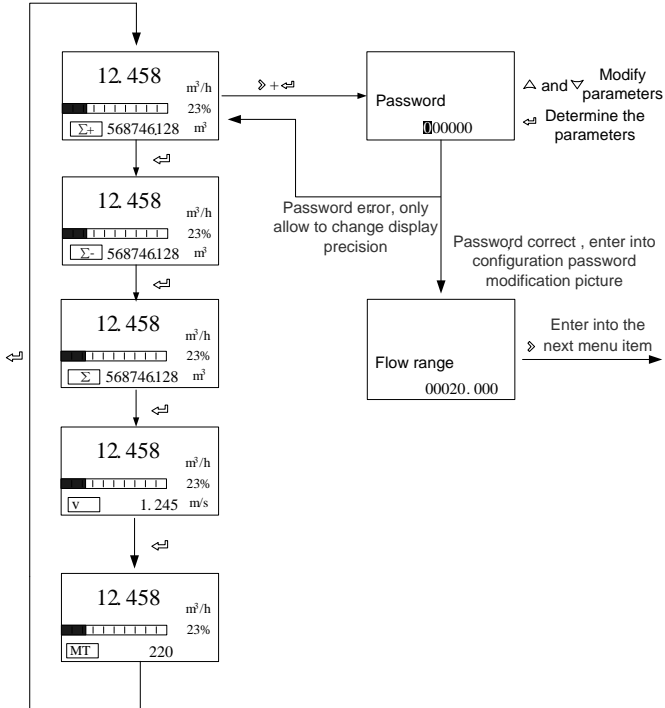
Flow setup and analog output menu

```
                                                    ≫                                    ┌──────────────┐    ≫
         ┌──────────────┐                                                                │Reverse output│
  ───────│  Flow range  │────────────────────────────────────────────────────────────▶ │  permission  │────▶
         └──────────────┘                                                                └──────────────┘
                │ ↵                                                                             │ ↵
         ┌──────────────┐                                                                ┌──────────────┐
         │  Flow unit   │                                                                │   Adjust K   │
         └──────────────┘                                                                └──────────────┘
                │ ↵                                                                             │ ↵
         ┌──────────────┐                                                                ┌──────────────┐
         │ Flow density │                                                                │   Adjust B   │
         └──────────────┘                                                                └──────────────┘
                │ ↵                                                                             │ ↵
         ┌──────────────┐           ┌──────────────┐                                     ┌──────────────┐
         │Time constant │        ┌─▶│Flow correction│                                   │   Output     │
         └──────────────┘        │  │ Point 1(m/s) │                                     │ current(mA)  │
                │ ↵              │  └──────────────┘                                     └──────────────┘
         ┌──────────────┐        │          │ ↵
         │Flow resection(%)│     │  ┌──────────────┐
         └──────────────┘        │  │Flow correction│
                │ ↵              │  │coefficient 1 │
         ┌──────────────┐        │  └──────────────┘
         │Flow direction│        │          │ ↵
         └──────────────┘        │  ┌──────────────┐
                │ ↵              │  │Flow correction│
         ┌──────────────┐        │  │ Point 2(m/s) │
         │Mode selection│        │  └──────────────┘
         └──────────────┘        │          │ ↵
                │ ↵              │  ┌──────────────┐
      N  ┌──────────────┐        │  │Flow correction│
  ◀──────│Spike suppressor│      │  │coefficient 2 │
         │  permission  │        │  └──────────────┘
         └──────────────┘        │          │ ↵
                │ Y              │  ┌──────────────┐
         ┌──────────────┐        │  │Flow correction│
         │Spike suppressor│      │  │ Point 3(m/s) │
         │coefficient(m/s)│      │  └──────────────┘
         └──────────────┘        │          │ ↵
                │ ↵              │  ┌──────────────┐
         ┌──────────────┐        │  │Flow correction│
         │Spike suppressor│      │  │coefficient 3 │
         │   time(s)    │        │  └──────────────┘
         └──────────────┘        │          │ ↵
                │ ↵              │  ┌──────────────┐
      N  ┌──────────────┐   Y    │  │Flow correction│
  ◀──────│Flow corrosion│────────┘  │ Point 4(m/s) │
         │  permission  │           └──────────────┘
         └──────────────┘                   │ ↵
                                    ┌──────────────┐
                                    │Flow correction│
                                    │coefficient 4 │
                                    └──────────────┘
                                            │ ↵
```

Note : it only display under the circumstance of manufacturer password

Pulse output and total set menu

```
                  ┌──────────────┐                                          ┌──────────────┐
     ──────────── │ Pulse output │ ─────────────── ≫               ┌──────→ │ Accumulation │ ──────── ≫ ──────→
              │   │     type     │                                 │        │   clearance  │
              │   └──────────────┘                                 │        └──────────────┘
              │          │ ↵                                       │               │ ↵
              │   ┌──────────────┐                                 │        ┌──────────────┐
              │   │  Transistor  │                                 │        │   Positive   │
              │   │     state    │──────────┐                      │        │ accumulation │
              │   └──────────────┘          │                      │        │    integer   │
              │          │ ↵  Frequency      │                      │        └──────────────┘
     ┌──┐     │   ┌──────────────┐          │ ↵                    │               │ ↵
     │↵ │─────┼──→│Max.frequency │          │ Pulse                │        ┌──────────────┐
     └──┘     │   └──────────────┘          │                      │        │   Positive   │
              │          │                  │                      │        │ accumulation │
     ┌──┐     │   ┌──────────────┐          │                      │        │    decimal   │
     │↵ │─────┼──→│ Pulse output │←─────────┘                      │        └──────────────┘
     └──┘     │   │     type     │                                 │               │ ↵
              │   └──────────────┘                                 │        ┌──────────────┐
              │                                                    │        │   Negative   │
                                                                   │        │ accumulation │
        ┌─────┐  Note：it only display under the                   │        │    integer   │
        │     │  circumstance of manufacturer                      │        └──────────────┘
        └─────┘  password                                          │               │ ↵
                                                               ┌──┐ │        ┌──────────────┐
                                                               │↵ │─┴────────│   Negative   │
                                                               └──┘          │ accumulation │
                                                                             │    decimal   │
                                                                             └──────────────┘
```

Alarm setup menu

```
                     ┌──────────────┐                            ┌──────────────┐
     ─────────────── │   Alarm 1    │ ──────── ≫        ┌───────→ │Max. flow value│ ──── ≫ ──────→
                │    │transistor state│                  │        │   alarm(%)    │
                │    └──────────────┘                    │        └──────────────┘
                │           │ ↵                          │               │ ↵
                │    ┌──────────────┐                    │        ┌──────────────┐
        N       │    │ Alarm 1 output│                   │        │Min. flow value│
     ←──────────┼────│  permission  │                    │        │   alarm(%)    │
                │    └──────────────┘                    │        └──────────────┘
                │        Y │ ↵                           │               │ ↵
                │    ┌──────────────┐                    │        ┌──────────────┐
                │    │ Allow alarm 1│                    │        │    Alarm     │
                │    │  empty pipe  │                    │        │ hysteresis(%)│
                │    └──────────────┘                    │        └──────────────┘
                │           │ ↵                          │               │ ↵
                │    ┌──────────────┐                    │        ┌──────────────┐
                │    │Allow alarm 1 max│            ┌──┐ │        │Display alarm │
                │    └──────────────┘              │↵ │─┴────────│  permission  │
                │           │ ↵                    └──┘          └──────────────┘
      ┌──┐      │    ┌──────────────┐
      │↵ │──────┴────│Allow alarm 1 min│
      └──┘           └──────────────┘
```

System function, empty pipe function , sensors function, test function setup menu

```
    ≫   ┌──────────┐      ≫   ┌──────────┐      ≫   ┌──────────┐      ≫   ┌──────────┐
──────▶│ Language │────────▶│Empty pipe│────────▶│ Sensor   │────────▶│Allow test│
    │   │          │      │   │threshold │      │   │ coding   │      │   │          │
    │   └────┬─────┘      │   │  value   │      │   └────┬─────┘      │   └────┬─────┘
    │       ↵│            │   └────┬─────┘      │       ↵│            │       ↵│
    │   ┌────▼─────┐      │       ↵│            │   ┌────▼─────┐      │   ┌────▼─────┐
    │   │ Display  │      │   ┌────▼─────┐      │   │Factory ID│      │   │Flow rate │
    │   │ accuracy │      │   │ Actual   │      │   │ number   │      │   │          │
    │   └────┬─────┘      │   │electrical│      │   └────┬─────┘      │   └────┬─────┘
    │       ↵│            │   │conductivity│    │       ↵│            │       ↵│
    │   ┌────▼─────┐      │   └────┬─────┘      │   ┌────▼─────┐      │   ┌────▼─────┐
    │   │ Contrast │      │       ↵│            │   │ Diameter │      │◀──│Source code│
    │   └────┬─────┘      │   ┌────▼─────┐      │   └────┬─────┘          └──────────┘
    │       ↵│            │   │Empty pipe│      │       ↵│
    │   ┌────▼─────┐      │   │  check   │      │   ┌────▼─────┐
    │   │ Modbus   │      │   │permission│      │   │  Zero    │
    │   │ address  │      │   └────┬─────┘      │   │adjustment│
    │   └────┬─────┘      │       ↵│            │   └────┬─────┘
    │       ↵│            │   ┌────▼─────┐      │       ↵│
    │   ┌────▼─────┐      │   │Empty pipe│      │   ┌────▼─────┐
    │   │Baud rate │      │   │check max.│      │   │ Sensor   │
    │   └────┬─────┘      │   └────┬─────┘      │   │coefficient│
    │       ↵│            │       ↵│            │   └────┬─────┘
    │   ┌────▼─────┐      │◀──┌────▼─────┐      │       ↵│
    │   │ Even-odd │      ◀───│Empty pipe│      │   ┌────▼─────┐
    │   │  check   │          │check min.│      │   │  Cali    │
    │   └────┬─────┘          └──────────┘      │   │coefficient│
    │       ↵│                                  │   └────┬─────┘
    │   ┌────▼─────┐                            │       ↵│
    │◀──│  User    │                            │   ┌────▼─────┐
    │   │ password │                            │   │  Zero    │
    │   └────┬─────┘                            │   │correction│
    │       ↵│                                  │   └────┬─────┘
    │   ┌────▼─────┐                            │       ↵│
    └───│ Factory  │                            │   ┌────▼─────┐
        │ password │                            │   │Encitation│
        └──────────┘                            │   │  mode    │
                                                │   └────┬─────┘
                                                │       ↵│
                                                │   ┌────▼─────┐
                                                ◀───│  Gain    │
                                                    │selection │
                                                    └──────────┘
```

Note：it only display under the circumstance of manufacturer password

6.7 Manufacture setting up operation

Sensor coefficient calibration

The following three calibrating methods are used for electromagnetic flowmeter on site.

1. Instantaneous flow calibration   1%

2. Frequency/current standard table method   0.5%
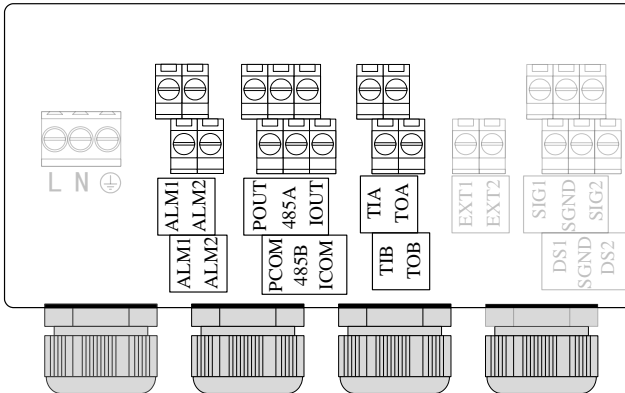
3. Weighing method calibration   0.3%

Verifying process flow

1) Connect sensor
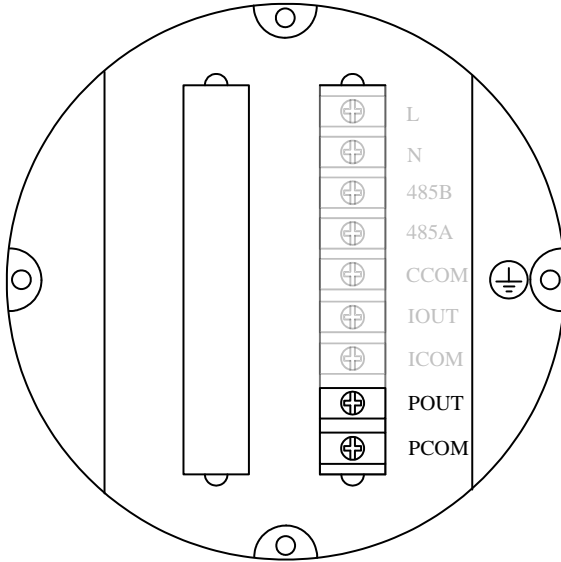
See more 4.2 Connect Signal and Magnetic Field Current Cable.

2) Connect the counting module(method of instantaneous ignore this step)
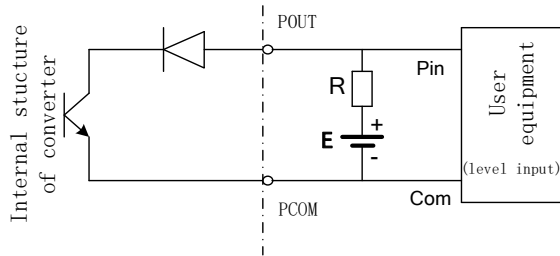
Separate type

- The corresponding terminal are POUT、PCOM；

- POUT: pulse signal、PCOM: signal earth。

Incorporate type

- The corresponding terminal are POUT、PCOM ;
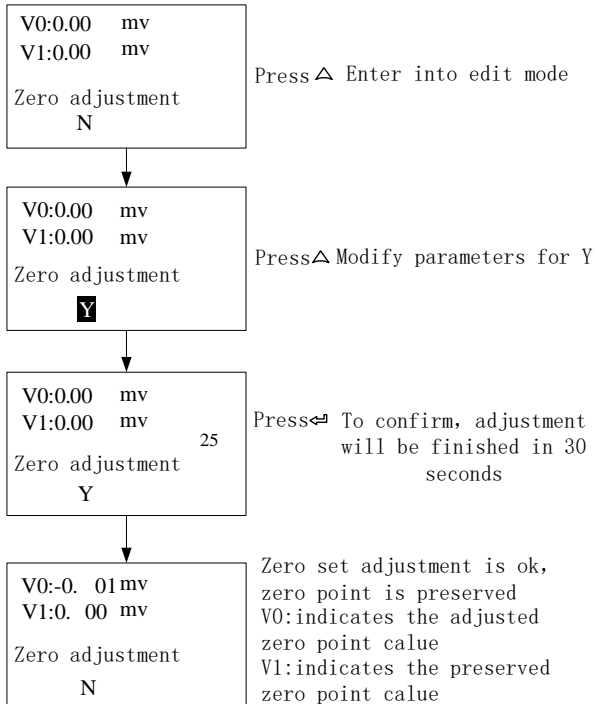- POUT: pulse signal、PCOM: signal earth。

Connection diagram:

Additional remarks : pulse output for OC gate output, need external power supply. General counter all wear resistance, signal can be directly connected to the counter.

Manufacturer recommendations: shown in figure , it is recommended that the pull-up resistor should be used with 2k , 0.5w ; and power supply should be used 24V DC .

3) Zero set (Sensor symmetry is good or flow rate is less than 0.5m/s , this step could be ignored if it is not required .

   a) Shut the valve, ensure the water in the sensor pipe is full and stationary state .

   b) Enter into the menu 10 after the condition is stable (or fast debugging menu), using 30 seconds automatic zero function.

   c) Observe Zero code value. zero value should be close to 0.1 mV in Steady-state, to verify whether the zero code value is correct by zero set again , Within + / - 0.1 mV fluctuations belong to normal condition.

   d) Zero set.

V0:0.00　mv V1:0.00　mv Zero adjustment 　　N	Press△ Enter into edit mode
V0:0.00　mv V1:0.00　mv Zero adjustment 　　**Y**	Press△ Modify parameters for Y
V0:0.00　mv V1:0.00　mv　　25 Zero adjustment 　　Y	Press⏎ To confirm, adjustment 　　　will be finished in 30 　　　　seconds
V0:-0.01mv V1:0.00 mv Zero adjustment 　　N	Zero set adjustment is ok, zero point is preserved V0:indicates the adjusted zero point calue V1:indicates the preserved zero point calue

4) **Sensor coefficient calculation**

- Adjust the flow rate to the common flow point (generally in the 50% measuring range, can also be a maximum flow point).

- After waiting for flow stability, record the comparison of number of pulses instantaneous flow rate (or schedule time)and standard table.

- Calculation of k value

$$K = Q_{standard\ table} / Q_{check\ table}$$

- Write the K calculated in the sensor coefficient of 10 sets menu or rapid debug menu.

Chapter 7   Functions

7.1   System information

Flow meter itself has the self-diagnosis function, in addition to the power supply and circuit board hardware failures, it can correctly provide the corresponding alarm message to the fault in general application .

Display position in measuring picture
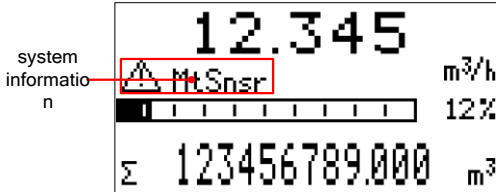
System information sheet

Display	Alarm content
Mtsnsr	Sensor empty pipe
Hi	The current instantaneous flow rate exceeds the setting flow limit
Lo	The current instantaneous flow rate is below the setting flow lower limit
Pls	The pulse output frequency exceeds the setting frequency upper limit
Coil	Abnormal situation of sensor excitation drive
AD_Hi	Sensor signal is greater than the AD sampling of the upper limit
Rng	The current instantaneous flow rate exceeds the setting flow limit
Rng_Hi	The current instantaneous flow rate exceeds system AD sampling limit
Pls_Hi	The range scope set by user exceeds the upper limit of pulse output .

7.2 Pulse/Frequency/Current output

Pulse equivalent output

It is mainly used for sensor manufacturer coefficient calibration and user measurement use. In the third way configuration parameter Settings:

Pulse equivalent corresponding cumulants, indicate each pulse corresponding to the relevant volume number .

For example：

Parameter setting as 0.1L/p

The current instantaneous flow $3.6m^3$/h

Number of pulses per second output is ： $3.6\times1000/3600/0.1 = 10$

Notes：

When the parameter is set to 0.4L/p

The current instantaneous flow is$3.6m^3$/h

Number of pulses per second output is： $3.6\times1000/3600/0.4 = 2.5$

Encounter the above situation, the decimal part of 2.5 pulse will automatically get into the next second output, data loss will not happen .

The pulse equivalent shouldn't be set too small when the pipe flow is small , otherwise it will cause pulse output exceeds the limit, then the main screen will appear Pls system alarm information. Users need to reset pulse equivalent parameters. Similarly, when the pipe flow is small the selected pulse equivalent cannot too big, otherwise it will cause the instrument to output a pulse for a long time, cause measurement error .

Pulse equivalent output is different from frequency output, pulse output will output a pulse when a pulse equivalent is accumulated enough , so the pulse output is uneven . Counter instrument should be used when measure pulse output , Frequency meter instrument shouldn't be used.

Frequency output

It is mainly used for manufacturer coefficient calibration and user measurement use. In the third group configuration parameters setting : frequency corresponding to instantaneous flow rate , upper frequency limit corresponding to max. flow rate .

Note: the maximum frequency set to 5000 hz.

Current output

Mainly used for transmitting output to other intelligent instruments, such as: digital display table, recorder, PLC, DCS, etc.

The current output type：4-20mA.

The current valve corresponding to Instantaneous flow rate , 20　mA corresponding to range limit, 4 mA corresponding to range limit.

Conversion relationship

$$I_{\text{real time}} = \frac{Q_{\text{real time}}}{Q_{\text{max}}} 16.00 + 4.00$$

Unit：mA

Notice：

$Q_{\text{real time}}$　　Indicate the instantaneous flow rate

Q_{MAX}　　　Indicate the current instrument range

$I_{\text{real time}}$　　Indicate Real time current value

7.3 Serial communication

This instrument provides a standard RS485 serial communication interface, using the international standard MODBUS-RTU communication protocol that supports 04 Read Holding Registers command.

Register address

Communication data and register address in the following table

Parameter	Type	Address	Explanation
Instantaneous flow rate	float	100	
Instantaneous flow velocity	float	102	
Flow percentage	float	104	50 stand for 50%
Electric conductivity	float	106	
Forward flow accumulation of integer	ulong	108	
Forward flow accumulation of decimal	ulong	110	The decimal part magnify 1000 times 123stand for 0.123
Reverse flow accumulation of integer	ulong	112	
Reverse flow accumulation of decimal	ulong	114	The decimal part magnify 1000 times 123stand for 0.123

Note:float/ulong/long type data, Communication transmission in byte order2-1-4-3; ushort type data Transmission in accordance with 2-1。

Communication configuration

Mailing address：1-247;

Default address：8;

Baud rate： 1200、2400、4800、9600、19200、38400、57600;

The default baud rate：9600;

Check: no check, odd parity, parity;

Default no check;

For 32-bit data (long plastic or floating point) arranged in the communication frame;

Example：Long integer 16909060(01020304H)： 03 04 01 02

Floating number 4.00(40800000H)： 00 00 40 80

Readout real-time quantity floating-point communications, example:

Real time Floating point Numbers readout

Send message：08 04 00 63 00 02 81 4C

Return message：08 04 04 22 6E 41 3F 79 61(Instantaneous flow rate：11.95)

Forward flow rate accumulate readout

Send message：08 04 00 6B 00 04 80 8C

Return message：08 04 08 00 6C 00 00 00 7B 00 00 D6 8E

 (The cumulative integer：108， Cumulative decimal：0.123，Accumulation：108.123)

Chapter 8   Technical parameters

8.1   Technical parameters

Measuring system

Measuring principle	Faraday's law of electromagnetic induction
Function	Instantaneous flow rate, flow velocity, mass flow (when the density is constant), real-time measurement and flow accumulation
Module configuration	Measurement system is made up of signal converter and measurement sensor.

Flow meter

Protection class	IP65 or IP68

Measurement sensor

Nominal Diameter	DN15-DN2000	
Flange	In line with GB / T9119-2000 standard carbon steel (Optional stainless steel flanges), other standard flange can be customized	
Pressure rating (High pressure can be customized)	DN15 - DN50, PN<4.0MPa	
	DN65 - DN150, PN<1.6MPa	
	DN200 – DN600, PN<1.0MPa	
	DN700 – DN2000, PN<0.6MPa	
Lining Material	Chloroprene rubber(CR), Silicon fluorine rubber(FVMQ) Polytetrafluoroethylene (PTFE/F4), Fluorinated ethylene propylene (FEP/F46), Teflon(PFA)	
Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	
Medium temperature	-20 – 180℃	-20 – 80℃
Buried depth	Less than 5 meters (only IP68 protection of split type sensor)	
Immersion depth	Less than 3 meters (only IP68 protection of split type sensor)	
Sensor cable	Only for the split, the standard 10m cable; other cables suggest custom no longer than 30 meters.	

communications

Serial communications	RS-485(Modbus-RTU)
Output	Current (4-20 ma) , Pulse , frequency , State switch
Function	ATC recognition, electrode contamination

Display user interface

Graphic display	Monochrome LCD, white backlight; Size: 128*64 pixels
Display function	2 measurement value pictures (measurements, condition, etc
Language	English, Chinese
Unit	You can configure the menu to select the unit, see "6.3 Configuration details" and "flow units 1-1" and "4-0 Accumulation Unit" section.
Operating unit	Mechanical key or photoelectric key

Measurement accuracy

Max measuring error	Measurement value±0.5% (low speed 0.5m/s) ; ±2.5mm/s (low speed < 0.5m/s)
Repetitiveness	< 0.15%

Operating environment

Temperature	
Environment	-10℃ - 55℃
Storage	-40℃ - 65℃
Conductivity	
Conductivity	> 30µS/cm

Material

Sensor housing	Carbon steel
Converter	Standard die cast aluminum

Electrical connections

Power supply	100-240VAC，50/60Hz
Power consumption	Max 15VA
Signal cable	Apply only to split type
Shielded cable	Signal section，wire：0.5mm^2 Cu /AWG20

Output

Current output		
function	Measurement of volume and quality (in the case of constant density)	
Setting	scope	4-20mA
	Max	20mA
	Min	4mA
Internal voltage	24VDC	
loading	≤750Ω	
Pulse and frequency output		
function	Set up Pulse and frequency output	
Pulse output	basis	Output pulse width: 0.25ms ~100ms Duty cycle: 50% (Pulse frequency ≥5H$_z$) F_{max} ≤ 5000 cp/s
	setting	0.001L – 1m^3
frequency	Max	F_{max} ≤ 5000H$_z$
	setting	0-5000H$_z$
passive	Outer ≤ 36VDC	
Status output		
function	Output as alarm	
passive	Outer ≤ 36VDC	

8.2 Flow Meter

Unit m/s and m³/h

	$Q_{100\%}$ Unit m³/h			
V[m/s]	0.3	1	3	7
DN[mm]	Min flow	Common flow		Max flow
2.5	0.01	0.02	0.05	0.14
4	0.01	0.05	0.14	0.35
6	0.03	0.10	0.31	0.70
10	0.08	0.28	0.85	1.96
20	0.34	1.13	3.39	7.91
25	0.53	1.77	5.30	12.39
32	0.87	2.90	8.69	20.27
40	1.36	4.52	13.57	31.67
50	2.12	7.07	21.21	49.48
65	3.58	11.95	35.84	83.62
80	5.43	18.10	54.29	126.67
100	8.48	28.27	84.82	197.92
125	13.25	44.18	132.54	309.25
150	19.09	63.62	190.85	445.32
200	33.93	113.10	339.30	791.70
250	53.01	176.71	530.13	1236.97
300	76.34	254.47	763.41	1781.29
350	103.91	346.36	1039.08	2424.52
400	135.72	452.39	1357.17	3166.73
500	212.06	706.86	2120.58	4948.02
600	305.37	1017.90	3053.70	7125.30
700	415.62	1385.40	4156.20	9697.80
800	542.88	1809.60	5428.80	12667.20
900	687.06	2290.20	6870.60	16031.40
1000	848.22	2827.40	8482.20	19791.80

8.3   Accuracy

Reference condition

- Medium: water

- Temperature: 20℃

- Pressure: 0.1MPa

- Input subsidiary conduit: ≥5DN
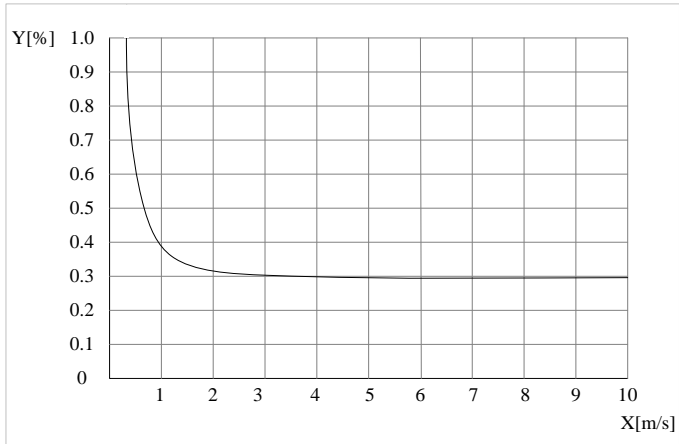
- X[m/s]: flow speed

- Y[%]: deviation of actual investigations   （mV）