ECC

Environmental Competency Consultancy

Electromagnetic Flowmeter with Remote Type Operational Manual

Address:
120, Jalan Bakawali 52,
Johor Jaya, 81100,
Johor Bahru, Johor.

Contact: 018-236 7662

Email address:
ecc17info@gmail.com

Website:
www.eccsb.com.my

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 to avoid unnecessary losses caused by false operation.

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's 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.

This product is prohibited to be used in explosive area.

Contents

Chapter 1 Safety Instructions

1.1   Manufacturer's Safety Instructions

1.1.1. Copyright and Data Protection

The content of this document has been checked carefully, but we do not guarantee that the contents are totally accurate and it is in accordance with the latest version.

The contents and works of this document are under China's copyright protection. Materials from the third party have been marked. Any copy, processing and transmission of it out of the scope of copyright, in any forms, must get the written permission of the authors or the manufacturer.

Manufacturers always try to respect the copyrights of others, and try to use their own works or works without authorization.

Personal data (such as name, address or E-mail address) used in manufacturer's documents, if possible, are conducted on a voluntary basis. Use of products and services, if possible, starts without having to provide personnel data. We remind you: data transmission on the Internet (such as communicating via email) may possibly meet security vulnerabilities. We can't give security guarantee that data will definitely not be obtained by a third party. Here, we are clearly against the third party using contact data, within the scope of copyright notice obligation, to send advertising materials without any requirement.

1.1.2. Exemption Clause

The manufacturer will not bear the responsibility for any forms of loss caused by using the product; these consequences include direct, indirect or accidental losses as well as these coming from punishment, but not limited to these consequences.

If the manufacturer has intentional behavior or gross negligence, the disclaimer is invalid. If it is not allowed to limit the product's self-assurance, nor is it allowed to waive or limit certain types of compensation, and these rights are suited for you as well as according to applicable

laws, in this case the above disclaimer or limitations may partially or completely not apply to you.

For every purchase of products, they are applicable to product documentation and manufacturer's sale terms.

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.

1.1.3. 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.

1.1.4. 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.

1.1.5. 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 Instruction for the 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 Instrument Introduction

2.1 Scope of Delivery

| i | 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. |

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

| i | 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. |
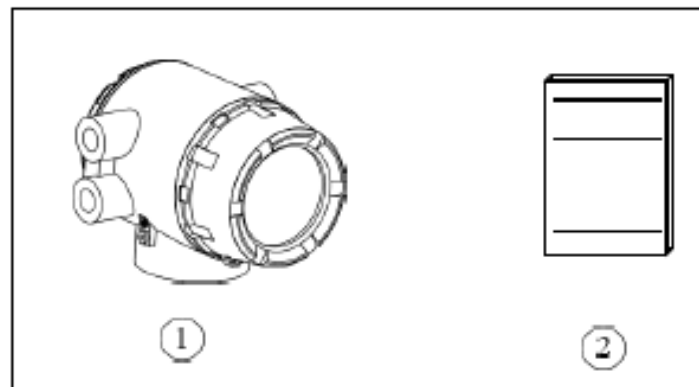
Figure 1

1. The electromagnetic flow transducer
2. Operating manual (optional)

2.2 Instruments Introduction

Electromagnetic flowmeter is only for measuring the flow rate of conductivity fluid. The equipment is set with the factory default state when it is supplied from factory, it can be used only by setting up the corresponding parameters by user.
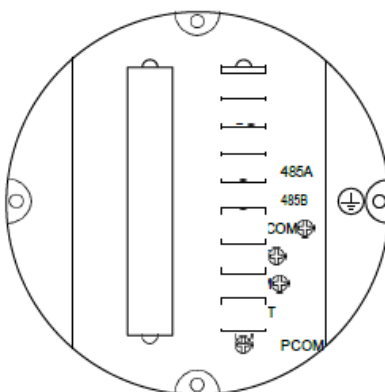
Figure 2

L，N: 220 V AC power supply IOUT

ICOM: 4-20mA output connections POUT

PCOM: Pulse/Frequency/Alarm output interface

485A，485B: 485 serial communication inter-faces

CCOM：   485 serial communication ground

⊕ :   Converter instrument grounding protection

2.3 Nameplate

Note !

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

Type	
Power Supply	
Serial Number	

Chapter 3 Installation

3.1 Installation Tips

i Note!
Please check carefully whether the boxes are damaged.

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

i 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

i 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 Clamp Installation

i Note !
Installation materials and tools do not belong to the scope of supply. Please use the installation materials and tools which are in compliance with occupational health and safety standards.
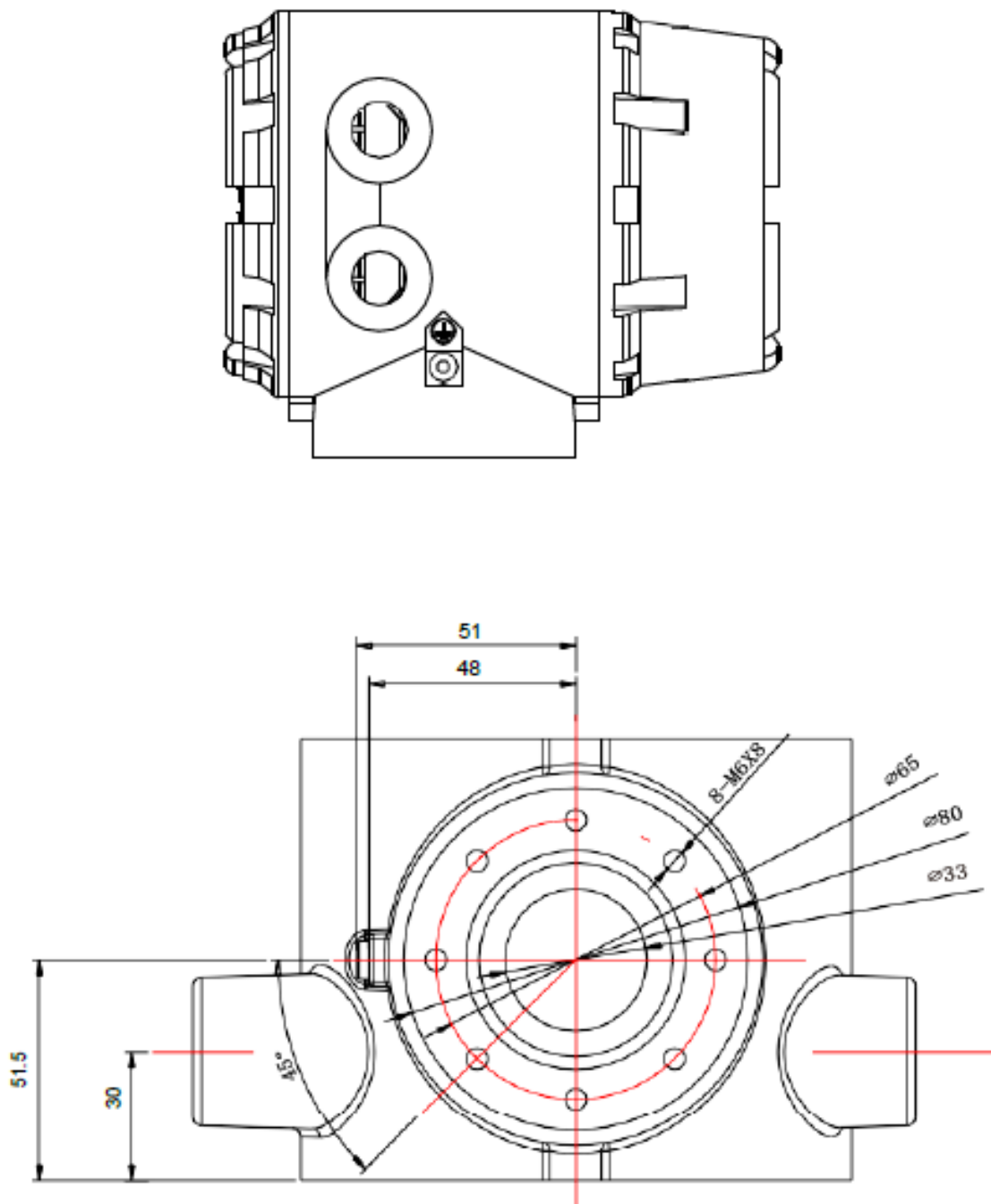
Unit: mm

Figure 3 Chuck Size Chart

3.5 Sensor and Converter Size for Electromagnetic Flowmeter

7
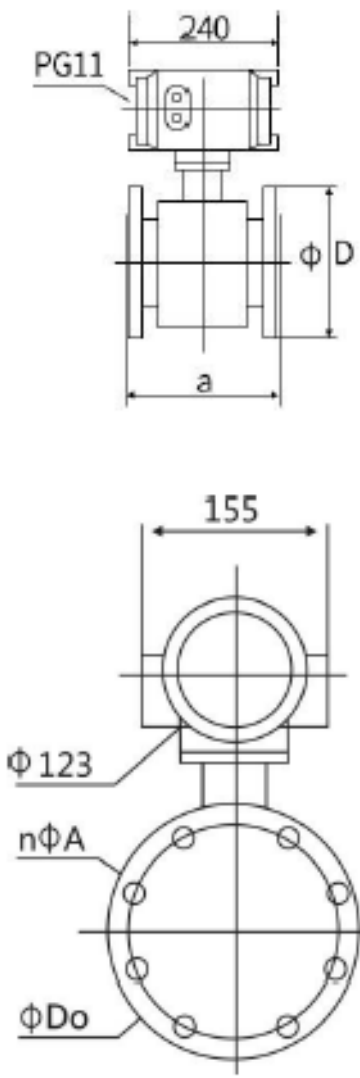
Figure 4

DN	a	D	Do	n*A	Pressure
10	200	90	60	4*14	
15	200	95	65	4*14	
20	200	105	75	4*14	
25	200	115	85	4*14	
32	200	140	100	4*18	
40	200	150	110	4*18	
50	200	165	125	4*18	1.6
65	200	185	145	8*18	Mpa
80	200	200	160	8*18	
100	250	220	180	8*18	
125	250	250	210	8*18	
150	300	285	240	8*22	
200	350	340	295	12*22	
250	450	405	355	12*22	
300	500	445	400	12*22	
350	550	505	460	16*22	
400	600	565	515	16*26	
450	600	615	565	20*26	
500	600	670	620	20*26	1
600	600	780	725	20*30	Mpa
700	700	895	840	24*30	
800	800	1015	950	24*34	
900	900	1115	1050	28*34	
1000	1000	1230	1160	28*34	
1200	1200	1405	1340	32*34	
1400	1400	1630	1560	34*36	
1600	1600	1830	1760	34*40	0.6
1800	1800	2045	1970	42*44	Mpa
2000	2000	2265	2180	48*48	
2200	2200	2405	2390	48*52	

Table 1

Chapter 4 Electrical Connection

4.1 Safety Reminder

Danger !
All the electrical connection work only be conducted in the case of the power supply cut off .Please note the voltage data on the nameplate!

Danger !
Please observe the installation regulation of the state!

Warning !
Please strictly abide by the local occupational health and safety laws and regulations. Only the trained and authorized personnel were allowed to operate the instrument.

Note!
Please check the instrument nameplate, and confirm whether the delivery items are same with your order. Check the nameplate voltage is correct. If not correct, please contact the manufacturer.

4.2 Connecting Signal Cable and Excitation Cable

Danger !
Signal cable and exciting current cable can only be connected in the case of power supply cut off .

Danger !
The instrument must be ground connection in accordance with the regulation, ensure the safety of the operation.

Danger !
For those instruments used in the region of explosion danger, need to pay attention to safety technology reminder from the special explosion-proof manual.

Occupational health and safety laws and regulations must be strictly observed. Only appropriate trained personnel were allowed to work on electrical equipment.

Converter connecting sensor:
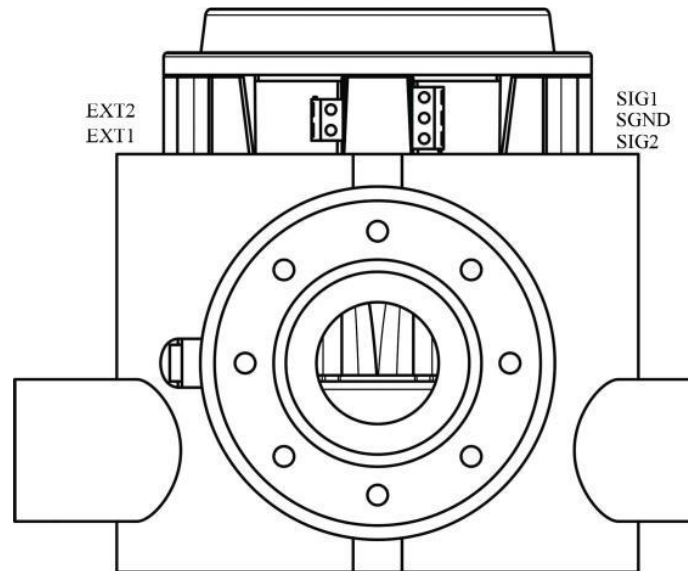
Figure 5

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 negative electrode sensor signal SGND-- Signal earth

4.3 Measurement Sensors Grounding

Danger !

Electric potential difference is not allowed to exist between measuring sensor and shells or converter protection grounding. Electromagnetic flowmeter must be ground connection separately when it is in use, if grounding together with other instruments or electrical devices, the leakage current in ground wire will produce series mode interference to the measurement signal, it could cause electromagnetic flowmeter cannot work .

- Measurement sensors must be properly grounded;
- Earth wire should not transmit any interference voltage;
- Grounding wires are not allowed to connect to other electrical equipments at the same time.

4.4 Converter Power Supply Connection

Danger !

The instrument must be ground connection to protect the operators from electric shock.

220VAC Power supply:
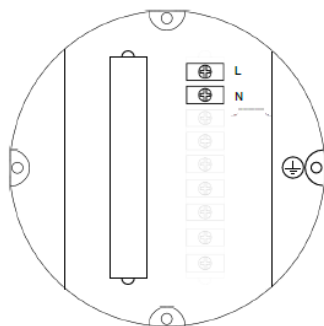
Figure 6

Note!

Allowance Range: 100VAC -240VAC，50Hz-60Hz

L： AC phase line

N： AC null line

24VDC Power supply:
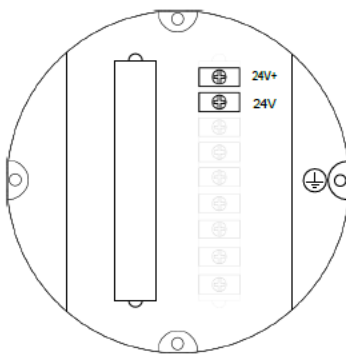
Figure 7

Attention !
Allowance range：22VDC -26VDC
24+：Power supply positive pole
24-：Power supply negative pole

4.5 Output Introduction

Warning !
Only the trained and authorized personnel were allowed to install, use, operate and maintain the instrument .This document will help you establish the operation conditions, this will ensure you use of this instrument with safety and effectiveness.
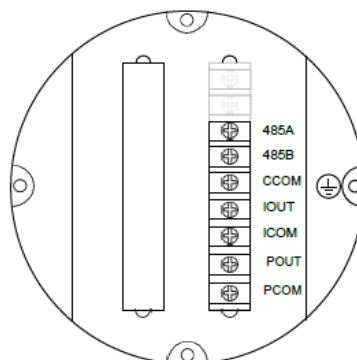
Figure 8

Current output
- IOUT 、 ICOM：4-20mA output
- Load RL ≤ 750Ω，I ≤ 22mA
- Current corresponding to flow rate percentage

Communication output
- 485A、485B：485 Serial communication output
- CCOM：485 Serial communication ground
- Agreement ：ModBus-RTU

Pulse, Frequency and Alarm output
- The corresponding terminals are POUT、PCOM
- Active mode: high level 24 v, drive current 5mA
- Output electrical isolation: photoelectric isolation, isolation voltage：> 1000VDC；
- Scale：frequency output: 5 KHZ frequency corresponding to flow rate measuring range upper limit

Pulse Output
Every pulse corresponding to volume flow rate (configuration), the output pulse width: 0.1ms to 100ms, duty ratio 1:1, F_{max} <= 5000 cp/s

- Elementary diagram
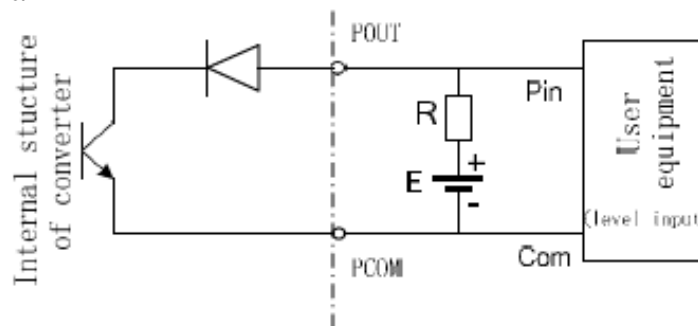
Figure 9

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 powers supplied.

Chapter 5 Start up

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 Start Up

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.

Start-up picture:
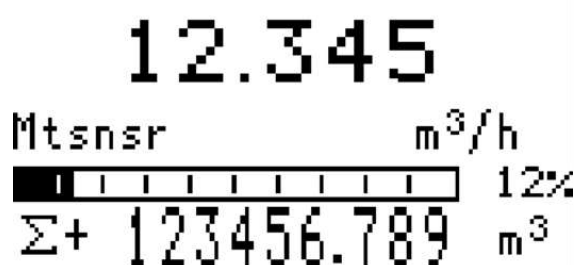
Figure 10

Chapter 6 Operation

6.1 Display and Operation Keys
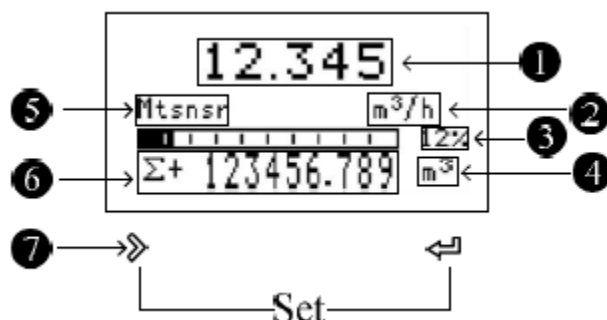
Figure 11

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

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

8. 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	-	-

Table 2

6.2 Infrared Touch-Key Operation Instructions

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.

Figure 12

6.3 Operating Instructions for Mechanical Keys

Please open the converter cover before handling mechanical keys.

Press mechanical key to enter configuration mode operation as shown in the next section.

Figure 13

6.4 Quick Set-up 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

Table 3

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、m³、Kg、t /s、min、h	m³/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=pVᴍ when flow volume unit is volume unitt, this parameter will not be displayed. Density of the unit: g/cm³				
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 .				

No.	Parameter	Type	Level	Range	Default
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.				

Cell for 1-10 description:

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 ;

No.	Parameter	Type	Level	Range	Default
1-11	Flow correction point 1	Figure	Factory	0.0-99.999	0
	Flow rate modified point 1, when The flow rate function shut down , this parameter does not display.				
1-12	Flow correction coefficient 1	Figure	Factory	0.0-99.999	1.000
	Flow rate correction factor 1, when The flow rate function shut down , this parameter does not display.				
1-13	flow correction point 2	Figure	Factory	0.0-99.999	0

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

Table 4

6.6 Operating Instruction

Parameter selection and adjustment

Press ⟫ and ↵ together, enter into parameter setting interface. Password need to be input by then
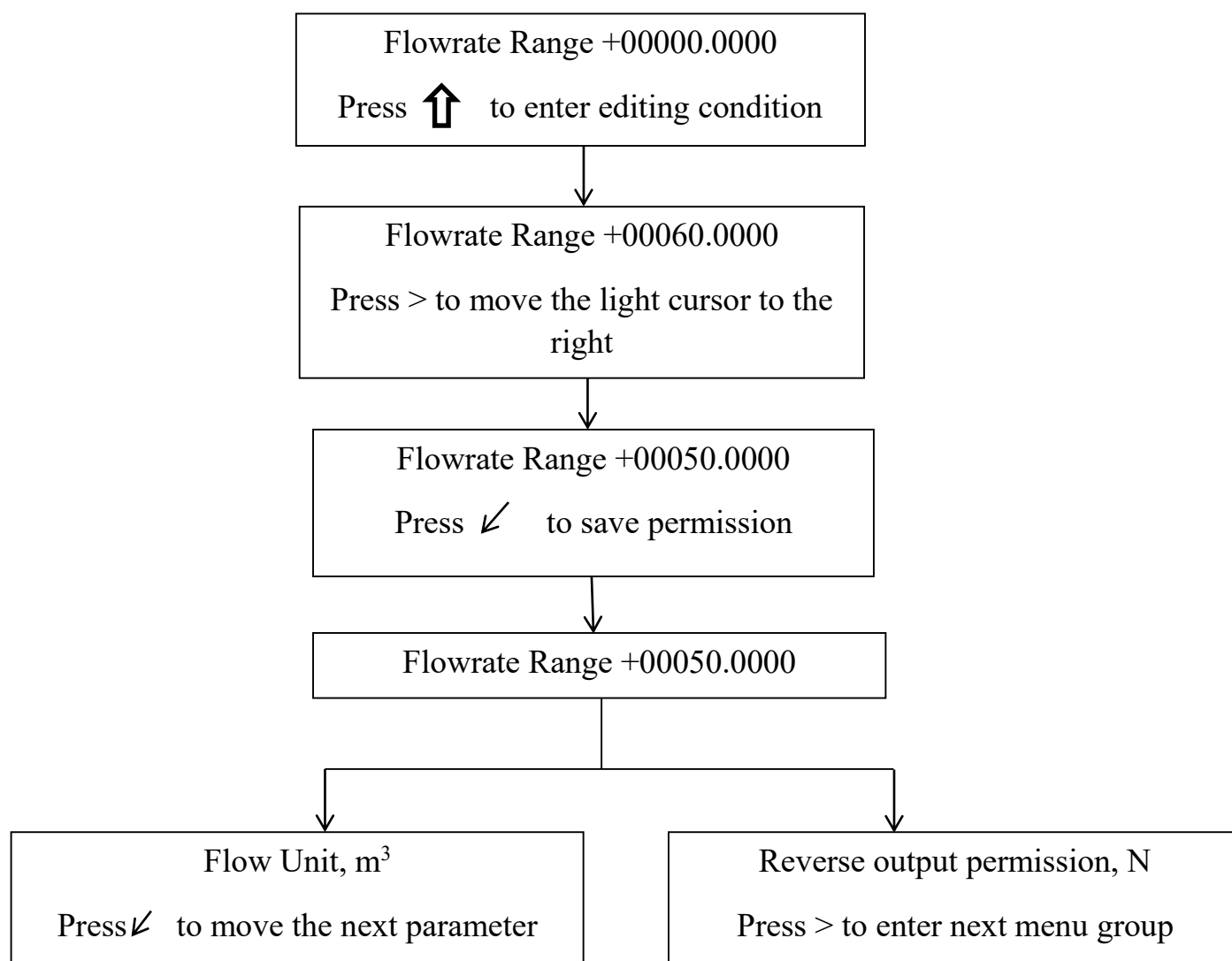
The initial user password: 200000 (used for modifying the user level parameter)

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 parameter, the parameters can be modified by the following operation:

User can conduct the switch operation in the menu by pressing the button , ⟫ switch among the parameter item of menu by pressing the button, and store a ↵ modified parameter value at the same time , adjust the parameter value by pressing the △ and ▽ buttons.

```
┌─────────────────────────────────────────┐
│      Flowrate Range +00000.0000          │
│                                          │
│    Press ⇧    to enter editing condition │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│      Flowrate Range +00060.0000          │
│                                          │
│   Press > to move the light cursor to the│
│                   right                  │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│      Flowrate Range +00050.0000          │
│                                          │
│      Press ↙    to save permission       │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│      Flowrate Range +00050.0000          │
└─────────────────────────────────────────┘
                    │
        ┌───────────┴───────────┐
        ▼                       ▼
┌──────────────────────┐  ┌──────────────────────────────┐
│   Flow Unit, m³       │  │  Reverse output permission, N │
│                      │  │                                │
│ Press ↙ to move the  │  │  Press > to enter next menu    │
│   next parameter     │  │          group                 │
└──────────────────────┘  └──────────────────────────────┘
```

Measuring Picture

This picture will display after start up

"Σ+": Forward cumulant，"Σ-": Reverse cumulant，"Σ":Net cumulant， "v": Current flow velocity，"MT": Conductivity equivalent.

Flow Setup and Analog Output Menu
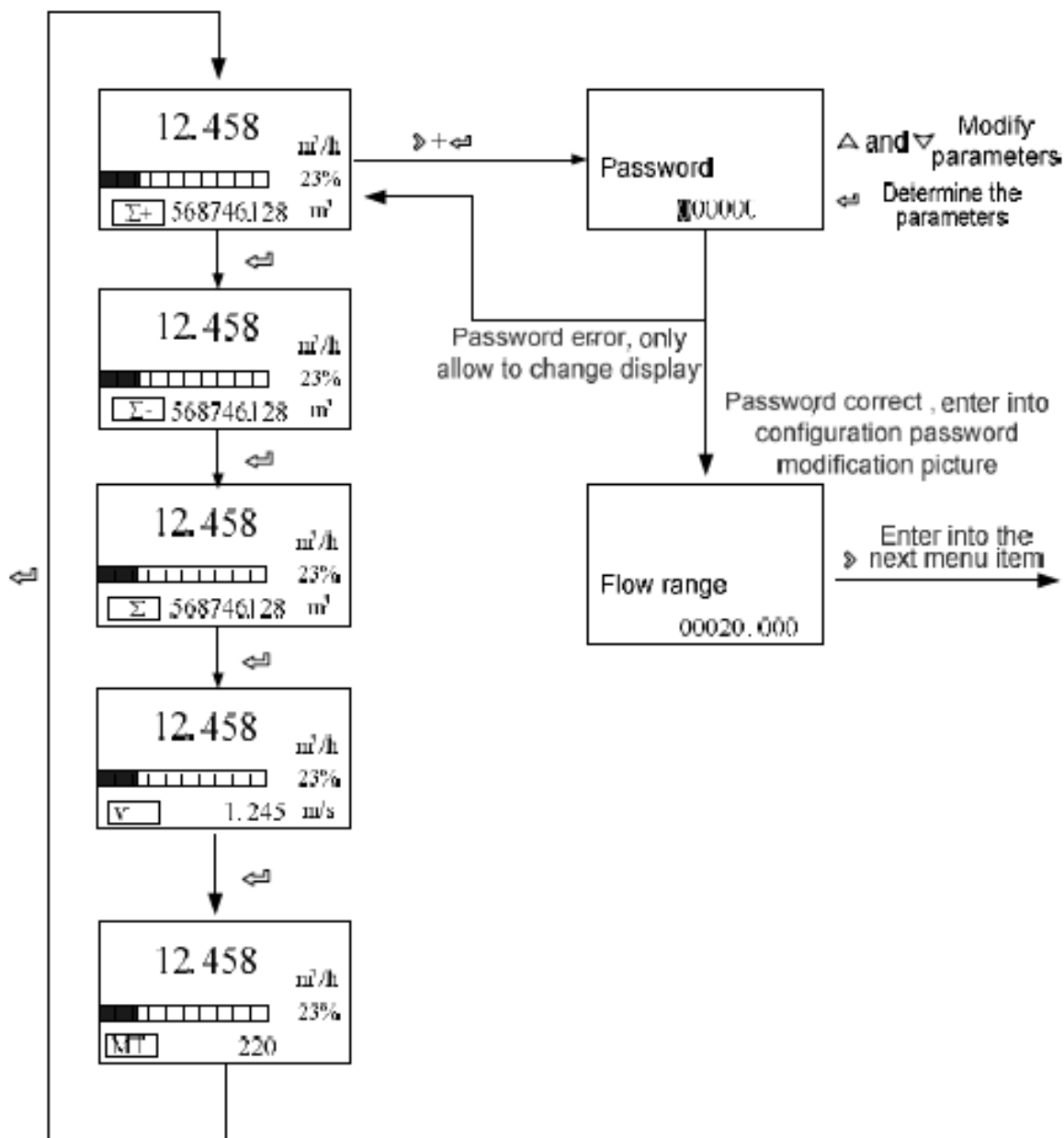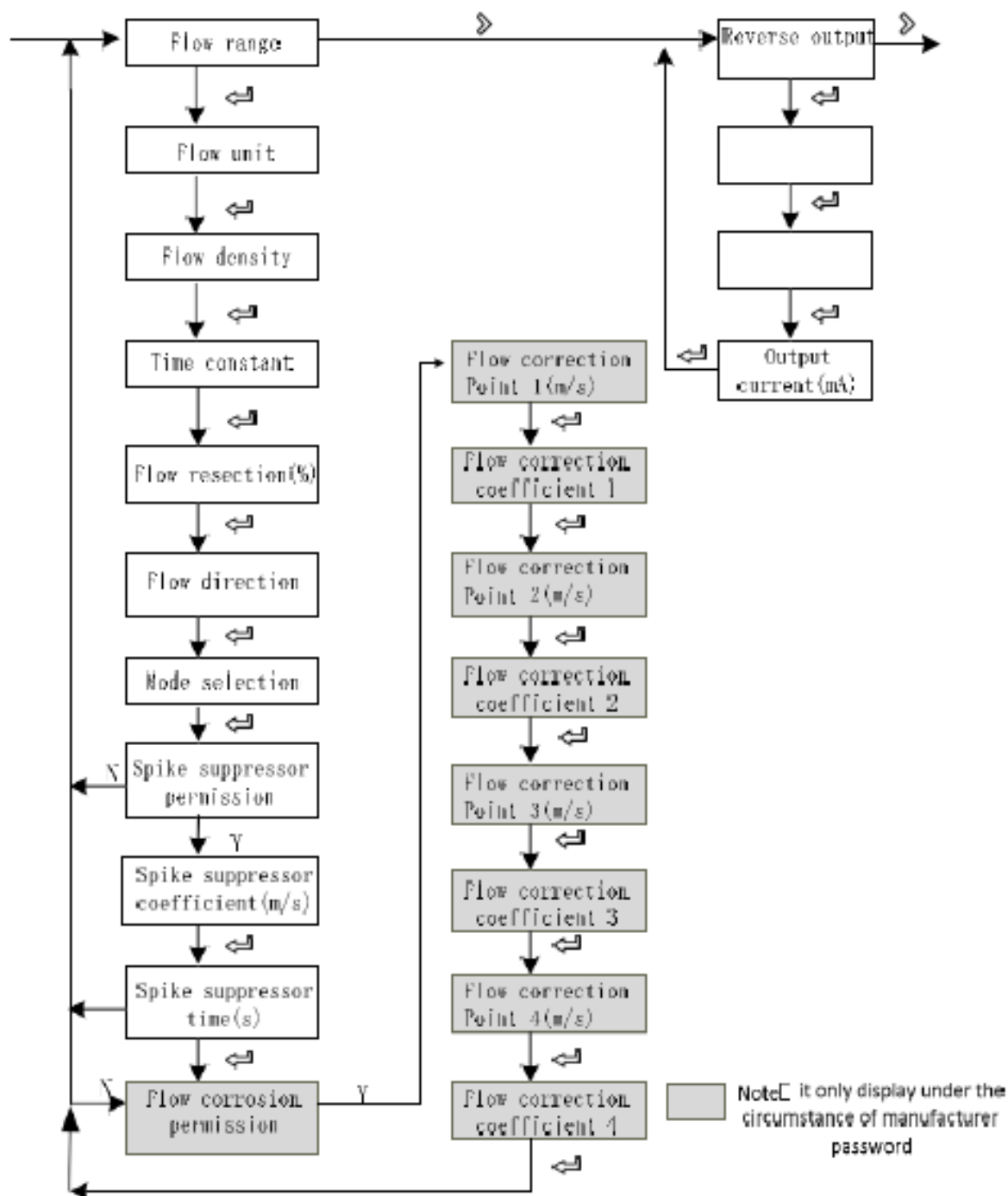
Pulse Output and Total Set Menu

Note: it only display under the circumstance of manufacturer password
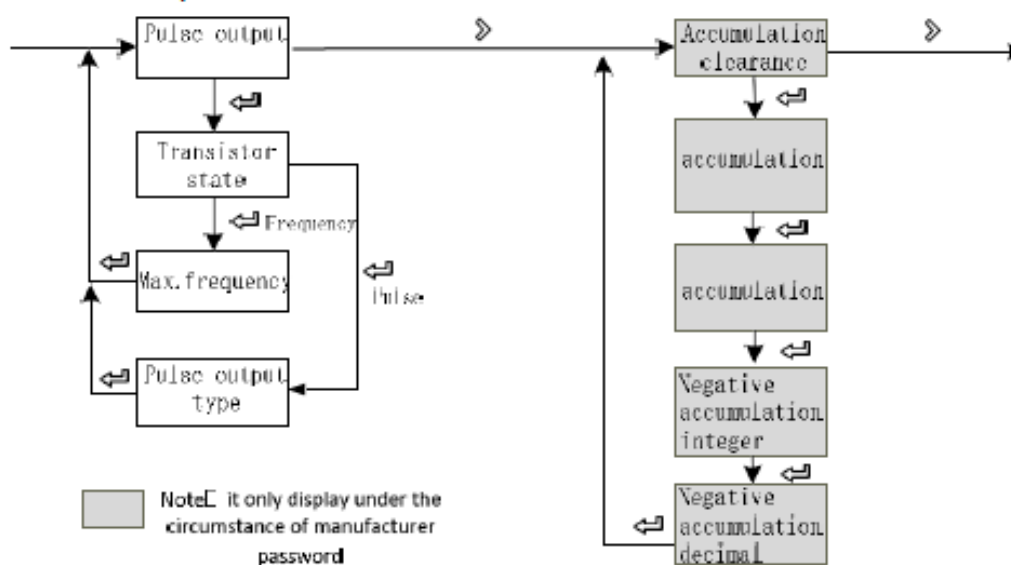
Alarm Setup Menu
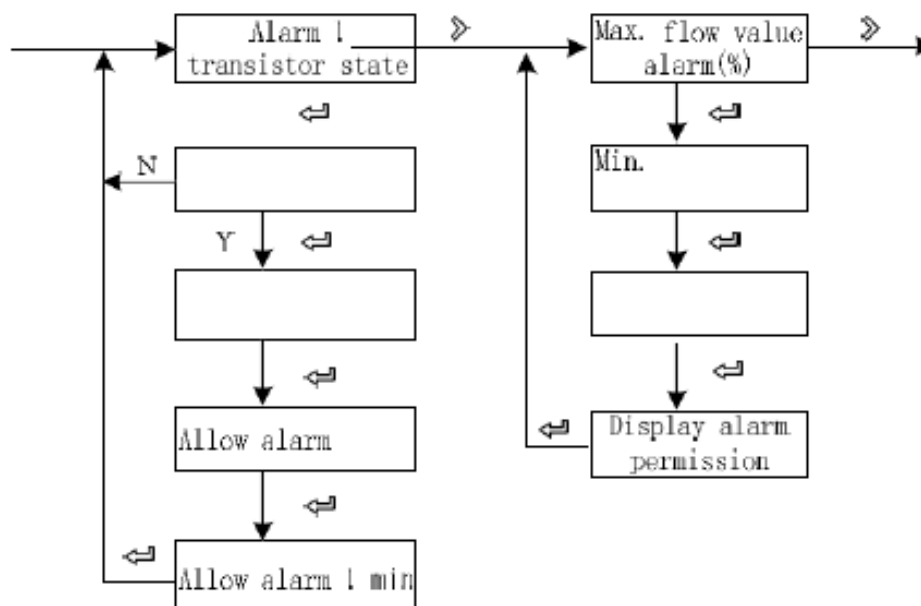
System Function, Empty Pipe Function, Sensors Function, Test Function Setup Menu

Note⬜ it only display under the circumstance of manufacturer password
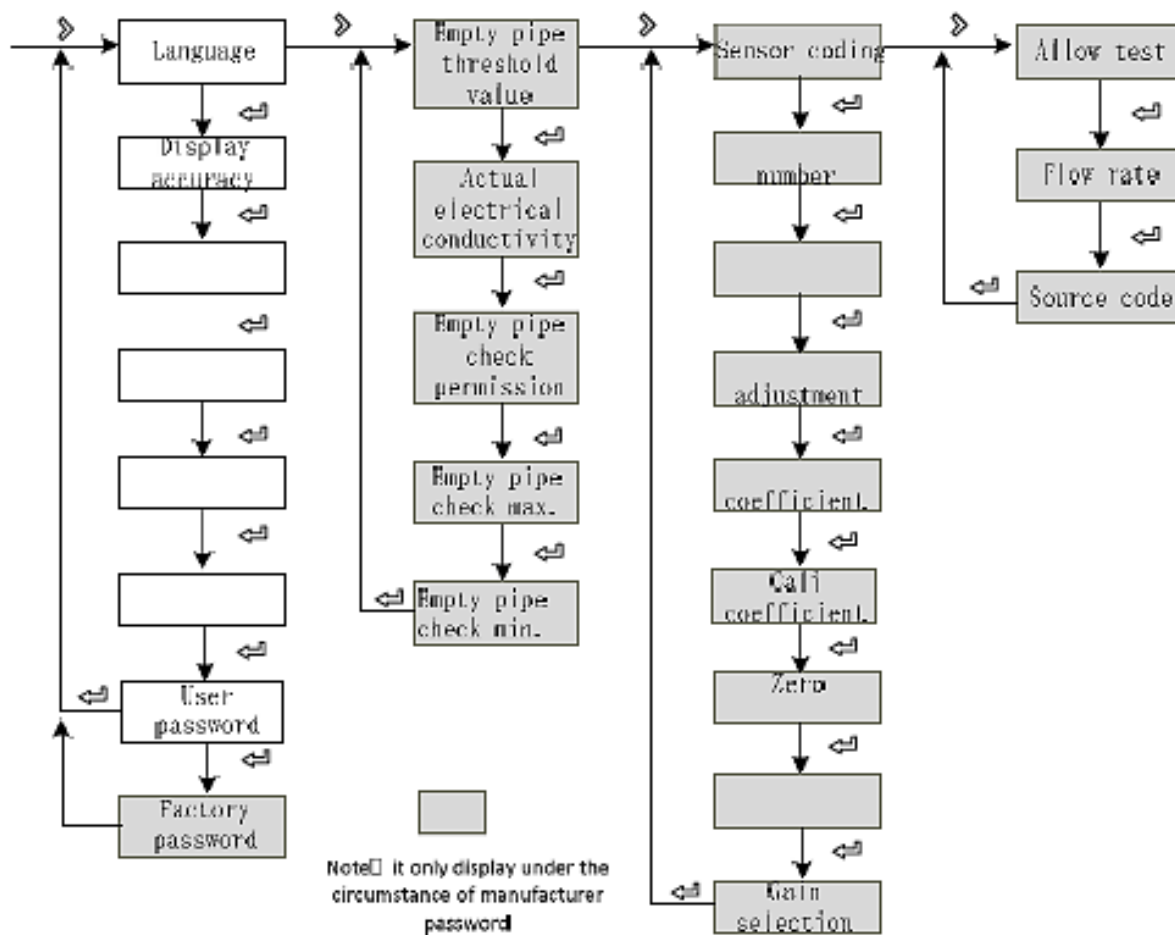
6.7 Manufacture Setting up Operation

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
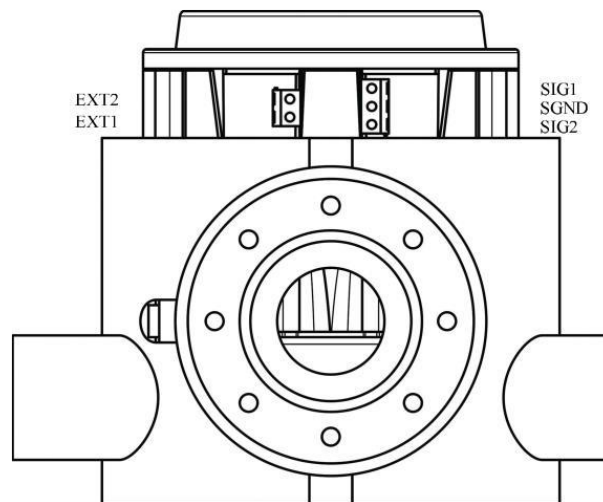
Figure 14

Wire Connection Instruction
- Excitation Line: EXT1--Sensor excitation coil positive end；
  - EXT2--Sensor excitation coil negative end
- Signal line：   SIG1---The positive electrode of sensor signal；
  - SIG2---Negative electrode of sensor signal；
  - SDGN—Signal earth

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

Figure 15

- The corresponding terminal are POUT, PCOM:
- POUT: pulse signal, PCOM: signal earth.

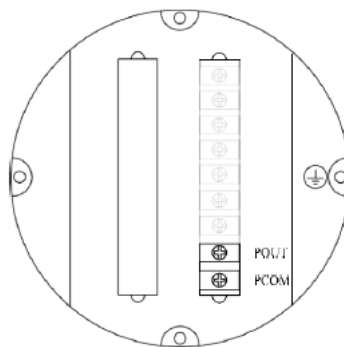Connection Diagram
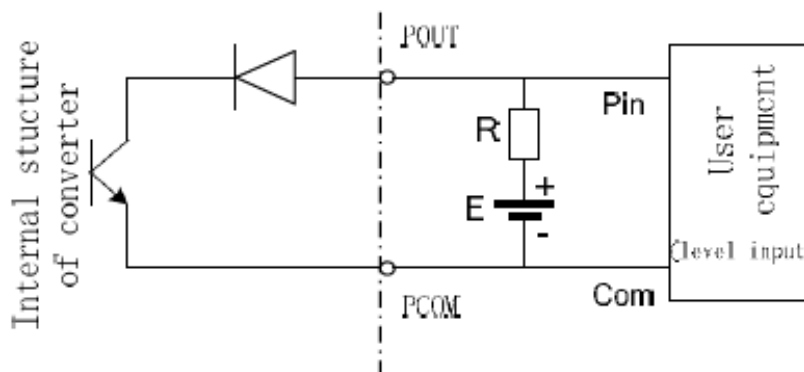
Figure 16

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 24VDC.

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 value, 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 0.1mV in steady state, to verify whether the zero code value is correct by zero set again, within +/- 0.1mV fluctuations belong to normal condition.

   d) Zero set

   ┌─────────────────────────────────┐
   │   V0: 0.00mv   │
   │   V1:0.00mv   │
   │   Zero adjust, N   │
   │ Press △   to enter into edit mode │
   └─────────────────────────────────┘
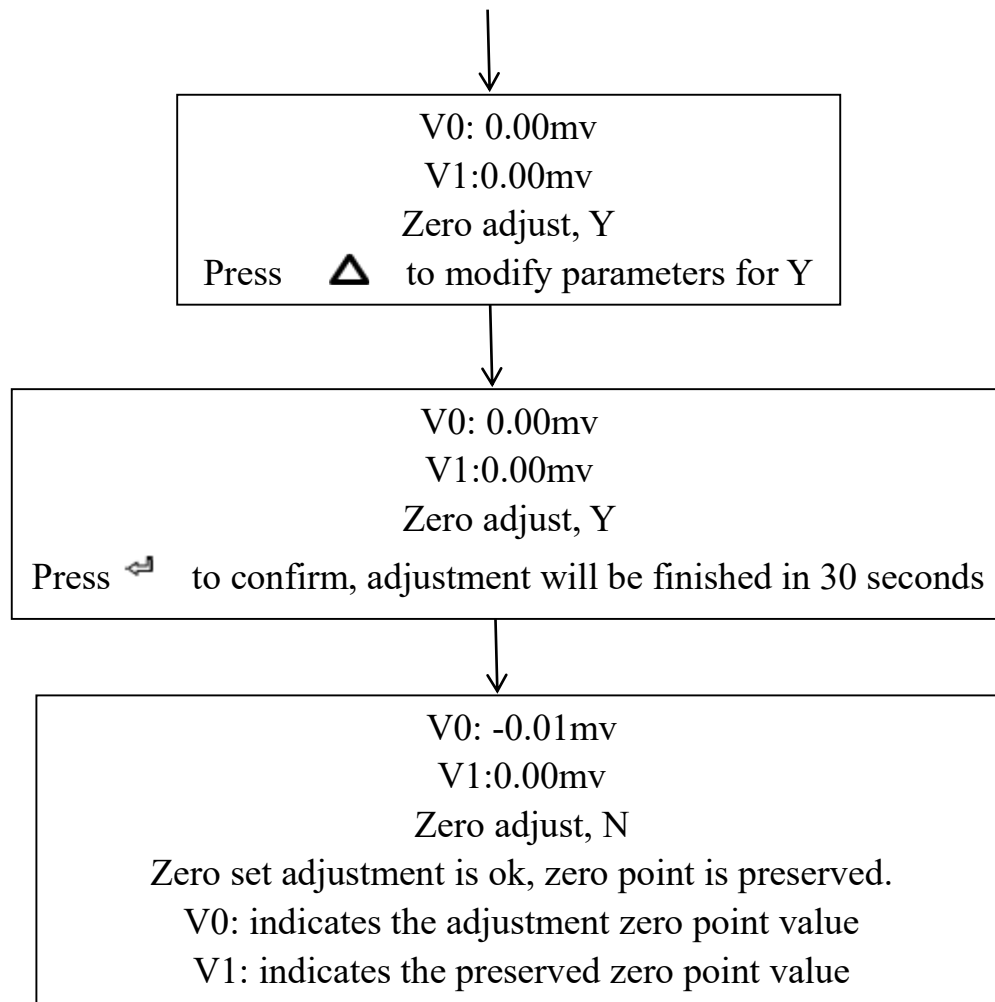
```
                        V0: 0.00mv
                        V1:0.00mv
                        Zero adjust, Y
        Press    △    to modify parameters for Y
```

```
                        V0: 0.00mv
                        V1:0.00mv
                        Zero adjust, Y
    Press ↵    to confirm, adjustment will be finished in 30 seconds
```

```
                        V0: -0.01mv
                        V1:0.00mv
                        Zero adjust, N
        Zero set adjustment is ok, zero point is preserved.
        V0: indicates the adjustment zero point value
        V1: indicates the preserved zero point value
```

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

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

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

5) 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

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

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

Chapter 7 Function

7.1 System Information

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

Display position in measuring picture
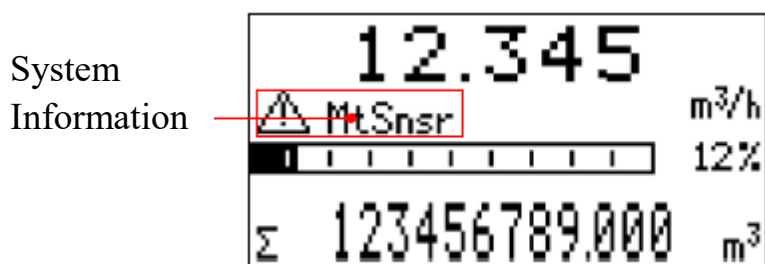
Figure 17

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

Table 5

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 3.6m3/h

    Number of pulses per second output is：3.6×1000/3600/0.1 = 10 Notes

    When the parameter is set to 0.4L/p

    The current instantaneous flow is3.6m3/h

    Number of pulses per second output is：3.6×1000/3600/0.4 = 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 Please review 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 out-put, 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 corresponds to instantaneous flow rate, 20mA corresponding to range limit, 4 mA corresponding to range limit.

Conversion relationship

$$I_{real\,time} = \frac{Q_{real\,time}}{Q_{max}} 16.00 + 4.00 \qquad \text{Unit: mA}$$

Notice: Q real time indicate the instantaneous flow rate
   Q_{max} indicate the current instrument range in 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	
Instantaneousflow velocity	float	102	
Flow percentage	float	104	50stand for 50%
Electric conductivity	float	106	
Forwardflow 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

Table 6

Note : float /u-long/long type data, communication transmission in byte order2-1-4-3;
    u-short 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 principle	Faraday's law of induction
Function	Instantaneous flow rate, flow velocity, mass flow (when the density is constant)
Modular structure	Measuring system is composed of a measuring sensor and a signal converter
Serial communication	RS485
Output	Current (4-20 ma), pulse frequency, mode switch value
Function	Empty pipe identification, electrode pollution

Display user interface	
Graphic display	Monochrome liquid crystal display, white backlight; Size: 128 * 64 pixels
Display function	2 measurements picture (measurements, status, etc.)
Language	English
Unit	Can choose units through configuration, see "6.4 configuration details" "1-1 flow rate unit".
Operation buttons	Four infrared touch key/mechanical

Table 7 Measuring System

Maximum measurement error	Measured values±0.3% (Flow velocity 1m/s) ; ±2mm/s (Flow velocity<1m/s)
Repeatability	<0.15%

Table 8 Measurement Accuracy

Temperature	
Environment temperature	-10℃ – 60℃
Storage temperature	-40℃ – 65℃
Electric conductivity	
Water	Min. 20μS/cm

Table 9 Operating Environment

Die-casting aluminum	Standard

Table 10 Material

Power voltage	100-240VAC，50/60Hz
Power Consumption	Max. 10W（20VA）
Signal cable	Only used for split type
Double shielded cable	Signal portion, the wire:0.5mm² Cu /AWG20
Shielded cable	Magnetic part, the wire:0.7mm² Cu

Table 11 Electrical Connection

Current output		
Function	Volume and quality of measurement (in the case of constant density)	
Setting	Scope	4-20mA
	Scope upper limit	20mA
	Scope lower limit	4mA
Internal voltage	24VDC	
Load	≤750Ω	
Pulse and frequency output		
Function	As a pulse output or output frequency can be set	

Pulse output	Basic	The output pulse width：0.1ms ~100ms Duty ratio：50% (Pulse frequency＞5Hz) F_{max}≤ 5000 cp/s
	Setting	0.001L – 1m³
Frequency	Measuringrange upper limit	F_{max} ≤ 5000Hz
	Setting	0-5000Hz
No power supply	$U_{external}$≤ 36VDC	
State output		
Function	Can be used as alarm state output	
No power supply	$U_{external}$≤ 36VDC	

Table 12 Output

8.2 Accuracy

Reference condition

- Medium: water
- Temperature: 20°C
- Pressure: 0.1MPa
- Input subsidiary conduit: ≥5DN
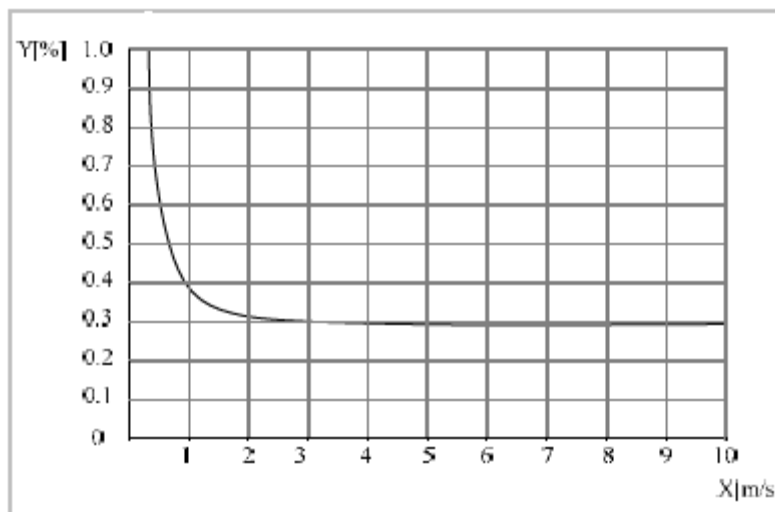
Figure 17

- X[m/s]: flow speed Y
- [%]: deviation of actual investigations（mV）

8.3 Dimensions and Weight
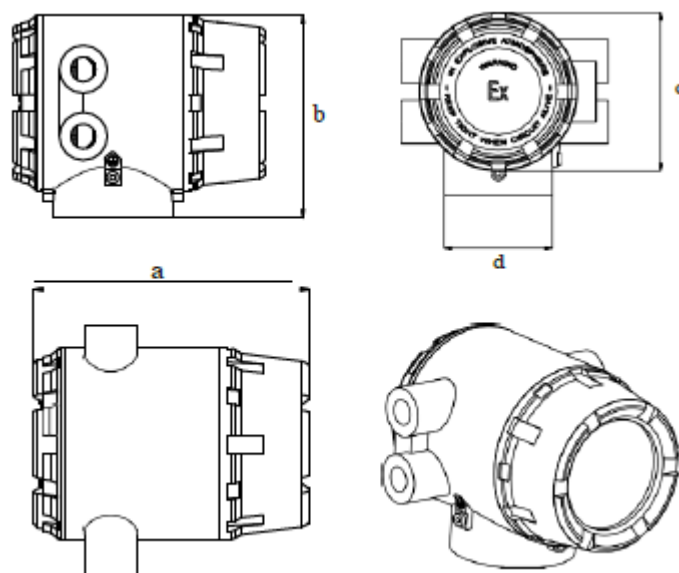
Figure 18

Size [mm]				Weight [Kg]
a	B	c	d	
184	148	128	87	2.50

Table 13

8.4 Flowmeter

Nominal Diameter (mm)	Flow range (m3/h)			Calibration range
10	0.02827-0.25	0.3-1.6	2.0-3.3924	0.15~1.5
15	0.0636-0.6	0.8-3.0	4.0-7.632	0.3~3
20	0.131-1.0	1.2-5.0	6.0-13.6	0.5~5
25	0.176-1.6	2.0-8.0	10-21	0.8~8

32	0.2895-2.5	3.0-12	16-35	1.5~15
40	0.4524-4.0	5.0-20	25-45	2.2~22
50	0.707-6.0	8.0-40	50-85	3.5~35
65	1.195-10	12-60	80-143	6~60
80	1.81-16	20-120	160-217	9~90
100	2.83-25	30-160	200-339	14~140
125	4.42-40	50-250	300-530	22~220
150	6.36-60	80-400	500-763	31.8~318
200	11.3-100	120-600	800-1357	56~560
250	17.7-160	200-800	1000-2120	88~880
300	25.45-250	300-1200	1600-3054	127~1270
350	34.6-300	400-1600	2000-4157	173.1~1731
400	45.2-400	500-2000	2500-5429	226.1~2261
450	57.3-500	600-2500	3000-6871	229~2290
500	70.7-600	800-3000	4000-8482	282.7~2827
600	102-800	1000-4000	5000-12216	407.1~4071
700	139-1200	1600-5000	6000-16620	554.1~5541
800	181-1600	2000-6000	8000-21720	723.8~7238
900	229-1600	2000-8000	10000-27480	916~9160
1000	283-2000	2500-10000	12000-33924	1130.9~11309
1200	407-2500	3000-12000	16000-48833	1628.6~16286

Table 14 Flowmeter

8.5 Flow and Velocity Parallel Table for Electromagnetic Flowmeter

Table 15

Velocity (m/s) / Flow (m³/h) / Nominal Diameter(mm)	0.1	0.2	0.4	0.5	1	5	10	12	15
DN10	0.02827	0.0565	0.1131	0.1414	0.2827	1.414	2.827	3.39	4.24

DN15	0.0636	0.127	0.25	0.318	0.636	3.18	6.362	7.632	9.54
DN20	0.131	0.226	0.45	0.566	1.131	5.66	11.31	13.572	16.965
DN25	0.176	0.35	0.71	0.8835	1.767	8.835	17.67	21.204	26.505
DN32	0.2895	0.58	1.16	1.448	2.895	14.48	28.95	34.74	43.425
DN40	0.4525	0.90	1.81	2.62	4.524	26.2	45.24	54.208	67.86
DN50	0.707	1.414	2.83	3.535	7.069	35.35	70.69	84.83	106
DN65	1.195	2.39	4.78	5.973	11.946	59.73	119.5	143.35	179.2
DN80	1.81	3.62	7.24	9.048	18.1	90.48	181	217.2	271.5
DN100	2.83	5.65	11.31	14.14	28.27	141.4	282.7	339.24	424.05
DN125	4.42	8.84	17.67	22.09	44.18	220.9	441.8	530.16	662.7
DN150	6.36	12.7	25.5	31.81	63.62	318.1	636.2	763.44	954.3
DN200	11.3	22.6	45.2	45.55	113.1	455.5	1131	1357.2	1696.5
DN250	17.7	35.4	70.7	88.36	176.7	883.6	1767	2110.4	2650.5
DN300	25.45	51	102	127.24	254.5	1272.4	2545	3054	3878.5
DN350	34.64	69	139	173.2	356.4	1732	3464	4156.8	5196
DN400	45.24	90	181	226.2	452.4	2262	4524	5428.8	6786
DN450	57.3	114	229	286.3	572.6	2863	5726	6871.2	8589
DN500	70.7	141	283	353.4	706.9	3534	7069	8484.8	10603.5
DN600	102	203	407	508.9	1018	5089	10179	12216	15270
DN700	139	277	554	692.7	1385	6927	13854	16620	20775
DN800	181.0	362	723	905	1810	9050	18096	21720	27150
DN900	229.0	458	916	1145	2290	11450	22902	27480	34350
DN1000	283	565	1131	1414	2827	14140	28274	33924	42405
DN1200	407	814	1628	2034.7	4069.4	20347	40694	48832.8	61041

Table 15