CYK TECHNOLOGY

FLUID MEASUREMENT

ELECTROMAGNETIC FLOWMETER

User's Manual

FLEM

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

Version

- FLEM

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.

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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 flowmeter (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

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.

Figure 1: Scope of Delivery

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.

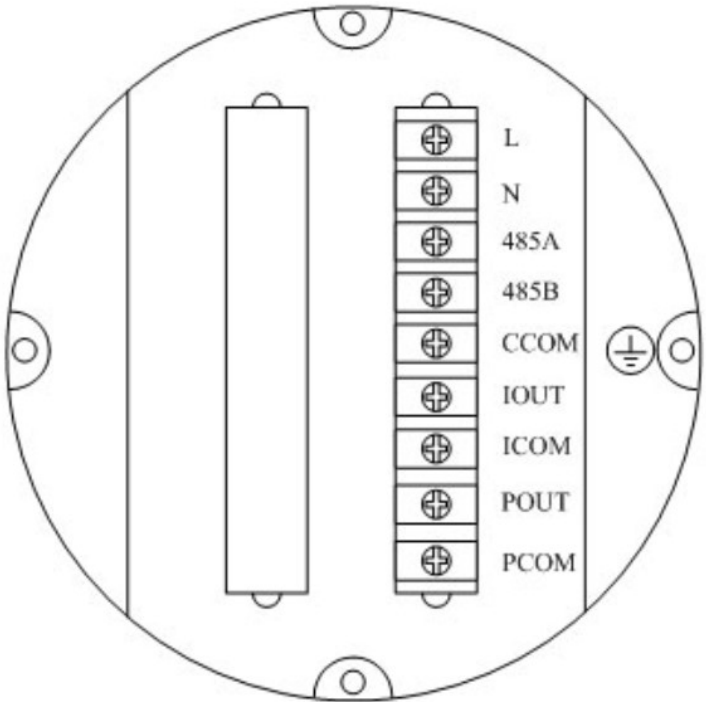


Figure 2: Instruments Instruction

L, N	: 220 V AC power supply
IOUT, ICOM	: 4-20mA output connection
POUT, PCOM	: Pulse / Frequency / Alarm output interface
485A, 485B	: 485 serial communication interface
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.

Electromagnetic Flowmeter			
Model No	: FLEM-CD015-05SRDLFC		
Factor	: 1.1216	Size	: DN15
Liner	: P46	Power Supply	: 24VDC
Electrode	: SS316	Pressure	: 10132KPa
Serial No	: K21030003	Working Temp.	: 80°C
www.CeYeKo.com			

Figure 3: Nameplate

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 Clamp Installation

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.

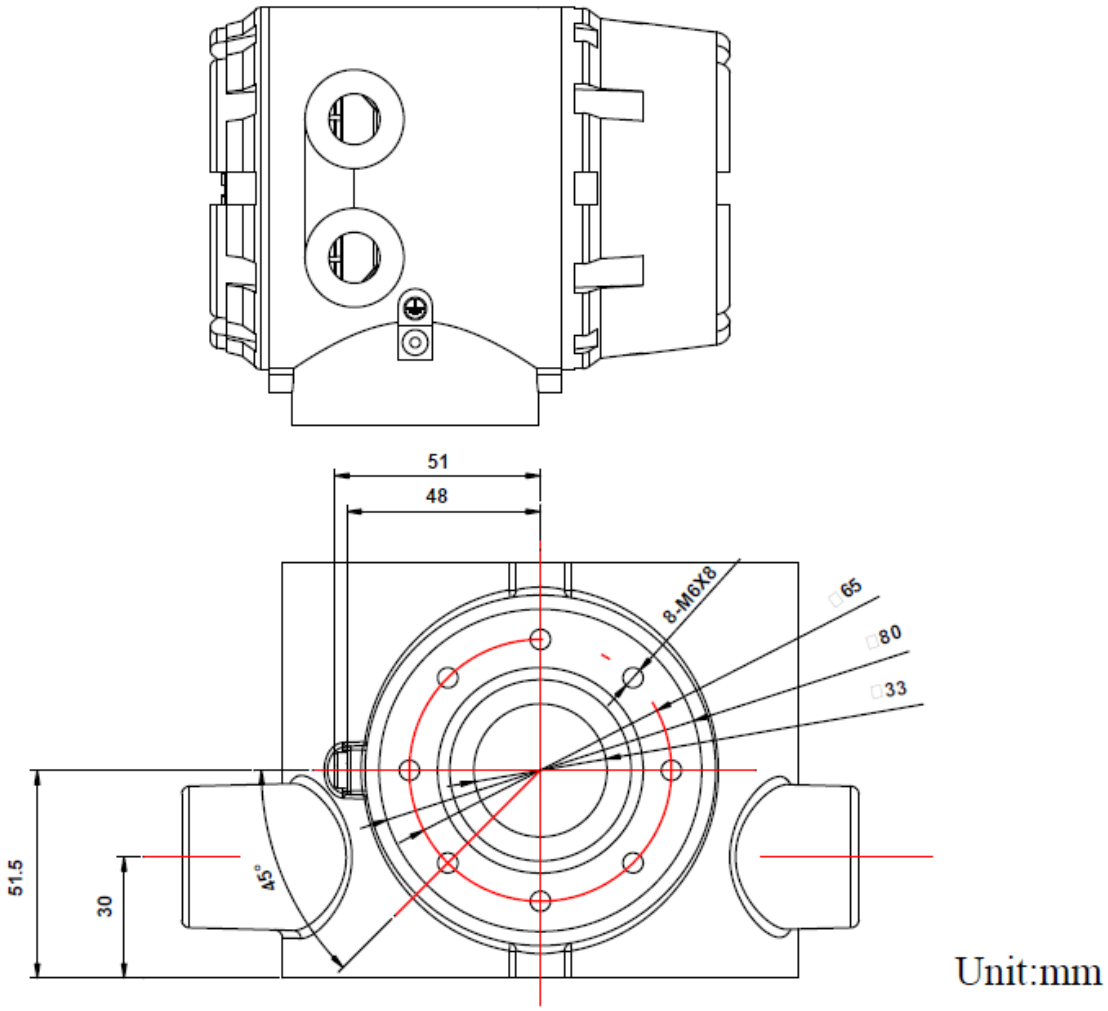


Figure 4: Chuck Size Chart

3.5 Sensor and Converter Size for Flowmeter

Table 1:

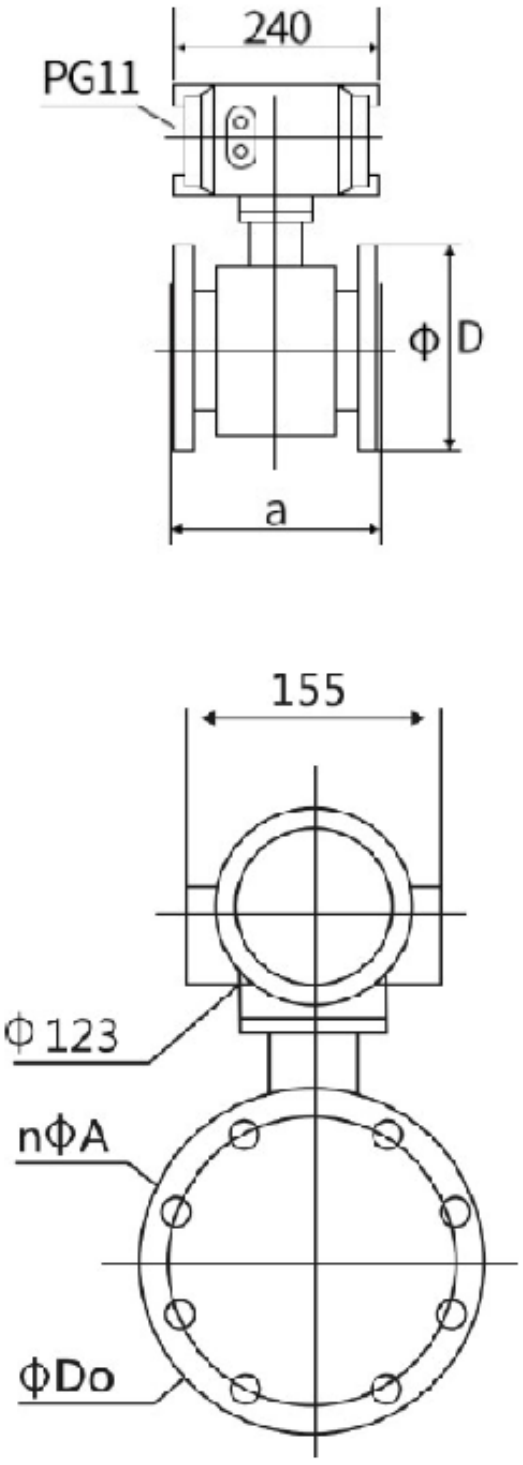


Figure 5:

Size	a	D	Do	n*A	Pressure
DN10	200	90	60	4*14	1.6 Mpa
DN15	200	95	65	4*14	
DN20	200	105	75	4*14	
DN25	200	115	85	4*14	
DN32	200	140	100	4*18	
DN40	200	150	110	4*18	
DN50	200	165	125	4*18	
DN65	200	185	145	8*18	
DN80	200	200	160	8*18	
DN100	250	220	180	8*18	
DN125	250	250	210	8*18	
DN150	300	285	240	8*22	
DN200	350	340	295	12*22	
DN250	450	405	355	12*22	
DN300	500	445	400	12*22	1.0 Mpa
DN350	550	505	460	16*22	
DN400	600	565	515	16*26	
DN450	600	615	565	20*26	
DN500	600	670	620	20*26	
DN600	600	780	725	20*30	
DN700	700	895	840	24*30	
DN800	800	1015	950	24*34	
DN900	900	1115	1050	28*34	
DN1000	1000	1230	1160	28*34	
DN1200	1200	1405	1340	32*34	0.6 Mpa
DN1400	1400	1630	1560	34*36	
DN1600	1600	1830	1760	34*40	
DN1800	1800	2045	1970	42*44	
DN2000	2000	2265	2180	48*48	
DN2200	2200	2405	2390	48*52	

3.6 General Conditions of Installation

- The measuring pipe must always be full.
- The flow direction must match the identification marking
- Install the devices without any mechanical tension (torsion, bending).
- Use a flange seal made from a material that is compatible with the medium and the medium temperature.
- Seals should not extend into the flow area, since any turbulence affects the device accuracy.
- The pipeline must not exert any inadmissible forces or torque on the device.
- Install remote mount transmitters at a location that is largely free of vibration.
- Do not expose the transmitter to direct sunlight; provide sun protection if necessary.

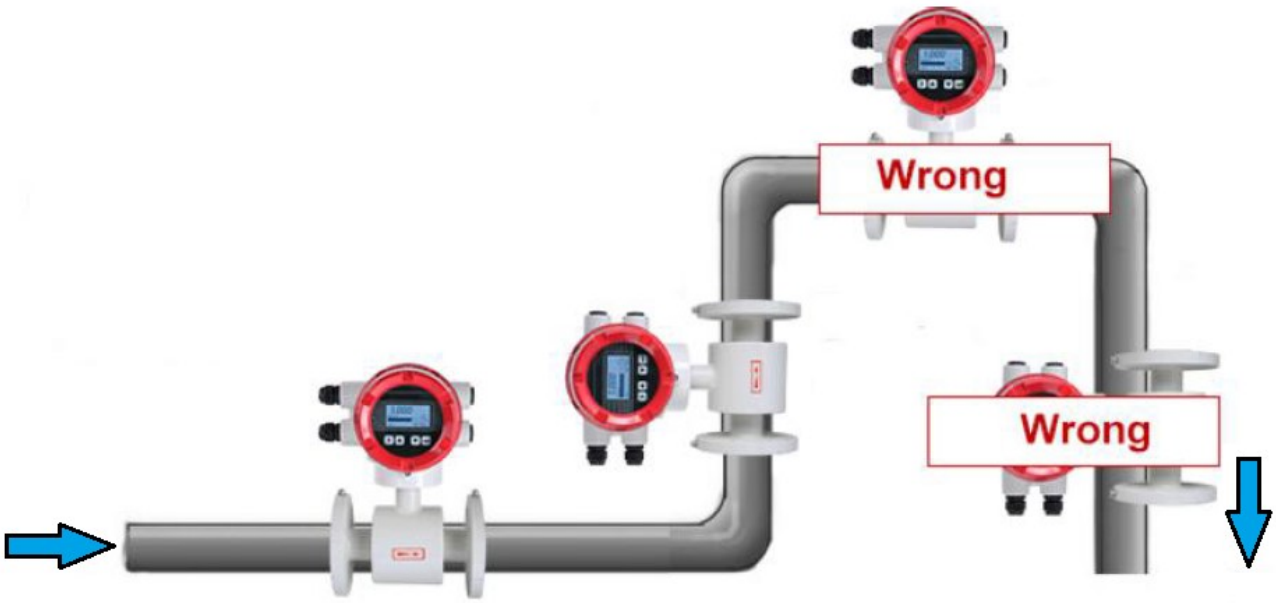


Figure 6: Correct ve Wrong Installation Samples

Chapter 4: Electrical Connection

4.1 Safety Remainder

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.

Warning !
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

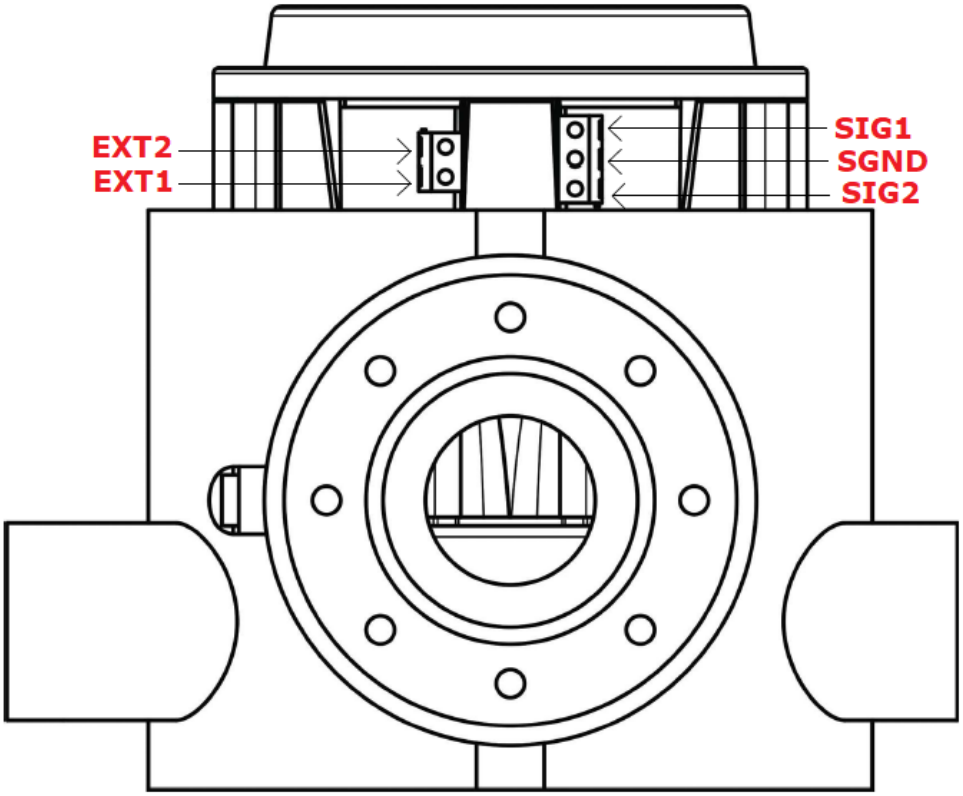


Figure 7: Converter Connecting Sensor

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 Sensors Grounding

Danger !

Electric potential difference is not allowed to exsit 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 may will produce series mode interference to the measurement signal, it could cause electromagnetic flowmeter cannot work.

- Measurement sensors must be properly grounded;
- Earthing 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

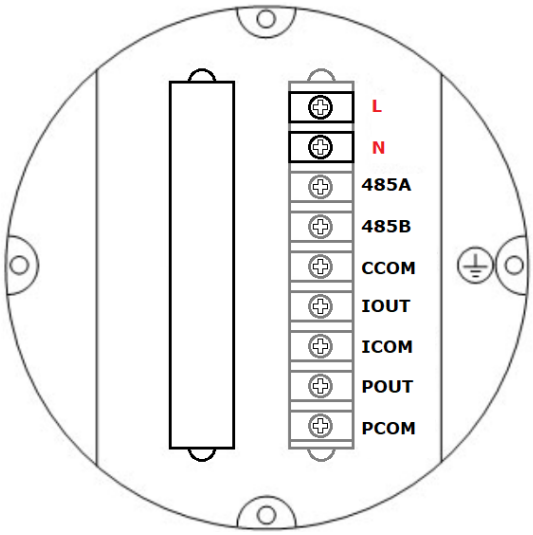


Figure 8: 220VAC Power Supply Terminals

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

- L : AC phase line
- N : AC Neutral line

24VDC Power Supply

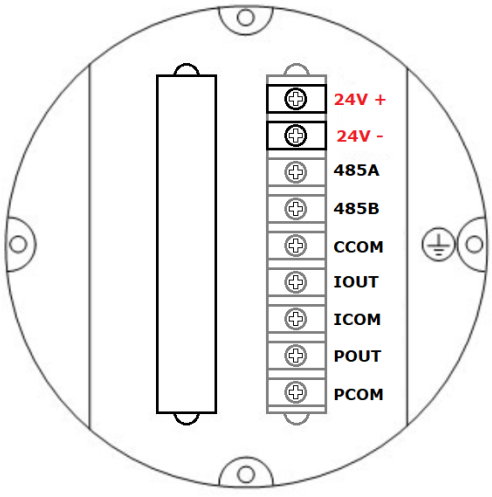


Figure 9: 24VDC Power Supply Terminals

Note!
Allowance Range : 22VDC—26VDC

- 24V+ : Power Supply Positive Pole
- 24V- : 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.

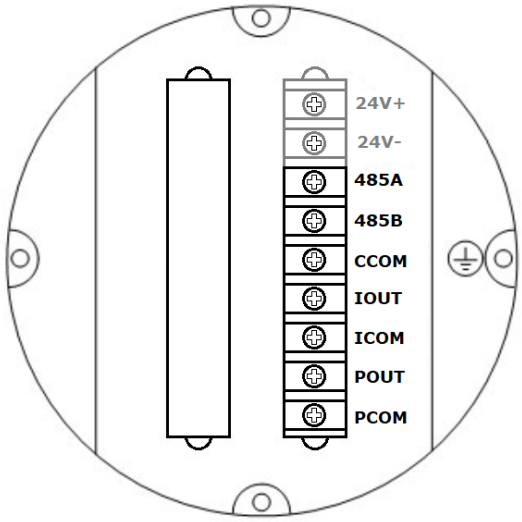


Figure 10: Output Terminals

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 24V, 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 ~100ms, duty ratio 1:1; Fmax<= 5000 cp/s;

4.6 Remote Type Electrical Connections

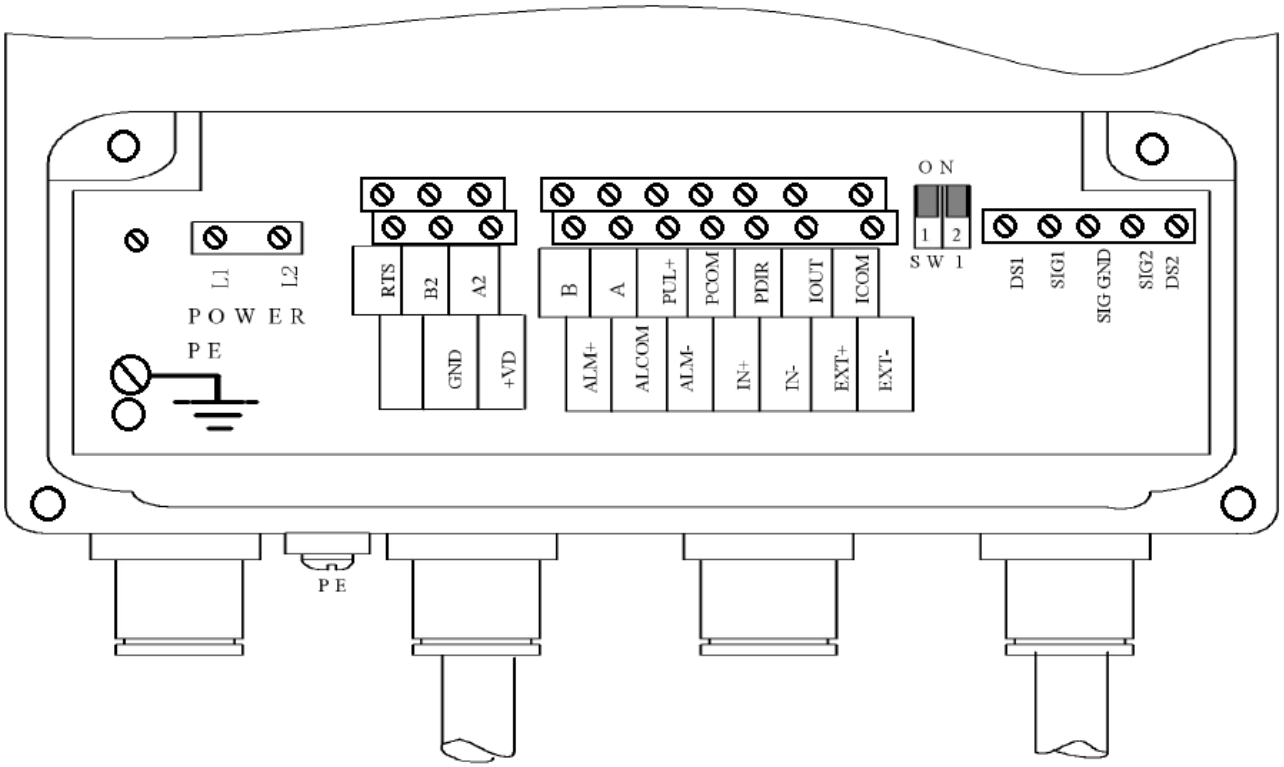


Figure 11: Remote Type Terminal Bloks and Marks

DS1	:	Shield drive 1
SIG1	:	Signal input 1
SIG GND	:	Signal Ground
SIG2	:	Signal input 2
DS2	:	Shield drive 2
EXT+	:	Coil excitation +
EXT-	:	Coil excitation -
IOUT	:	Current output +
ICOM	:	Current output -
PUL+	:	Frequency/pulse output +
PCOM	:	Frequency/pulse output -
PDIR	:	Flow direction indicator +
ALM-	:	Low alarm output +
ALM+	:	High alarm output +
ALCOM	:	Alarm output -
A	:	RS485 communication A
B	:	RS485 communication B
IN+	:	Input contact +
IN-	:	Input contact -
L1(+)	:	220V(24V +) input
L2(-)	:	220V(24V -) input

- Elementary Diagram

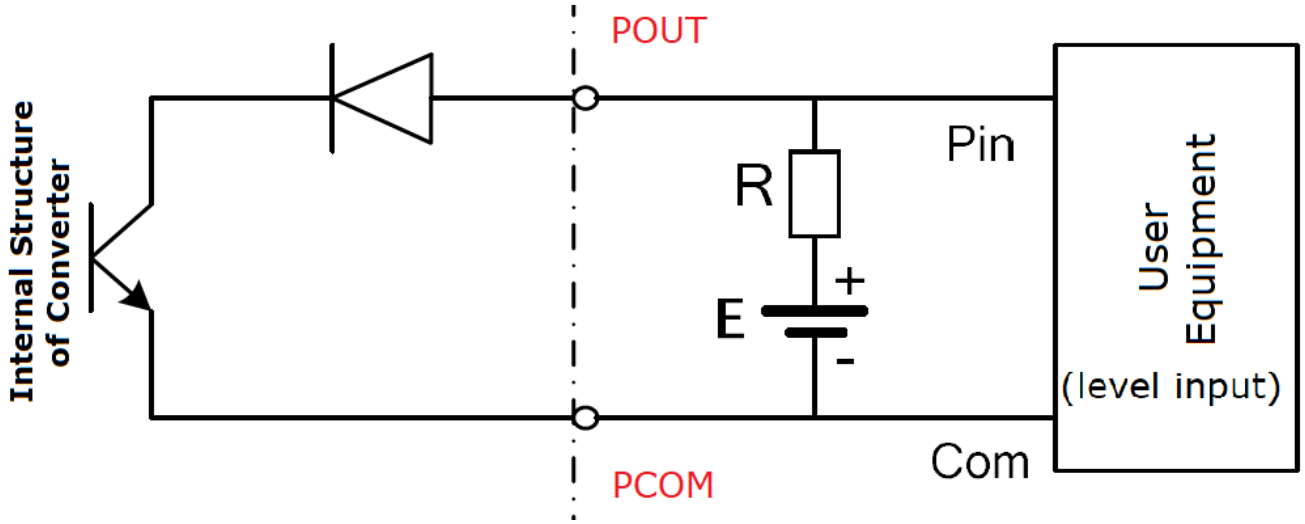


Figure 12: Elementary Diagram

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 24VDC 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.

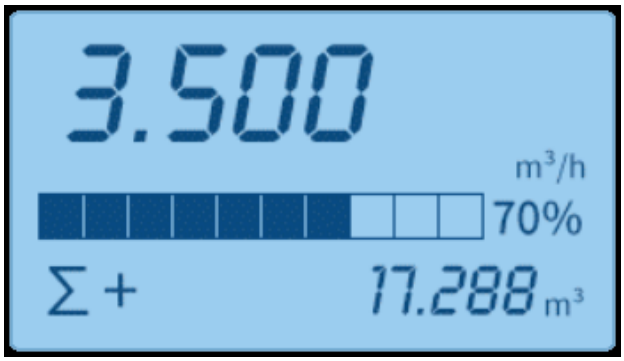


Figure 13: Startup

Chapter 6: Operation

6.1 Compact Type Display and Operation Keys

Figure 14: Compact Type Converter Keys and Display

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 informations

- Σ+ : Positive flow accumulation,
- Σ- : 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 Catagories	-	Data Right Shift
↙	Switch Accumulative Amount	Switch Menu Subclass	Confirmation	Confirm Data
↑↓	-	-	Selection	Change Data
>+←	Enter Menu	Exit Menu	-	-

Table 2: Keys & Functions

6.2 Remote Type Display and Operation Keys

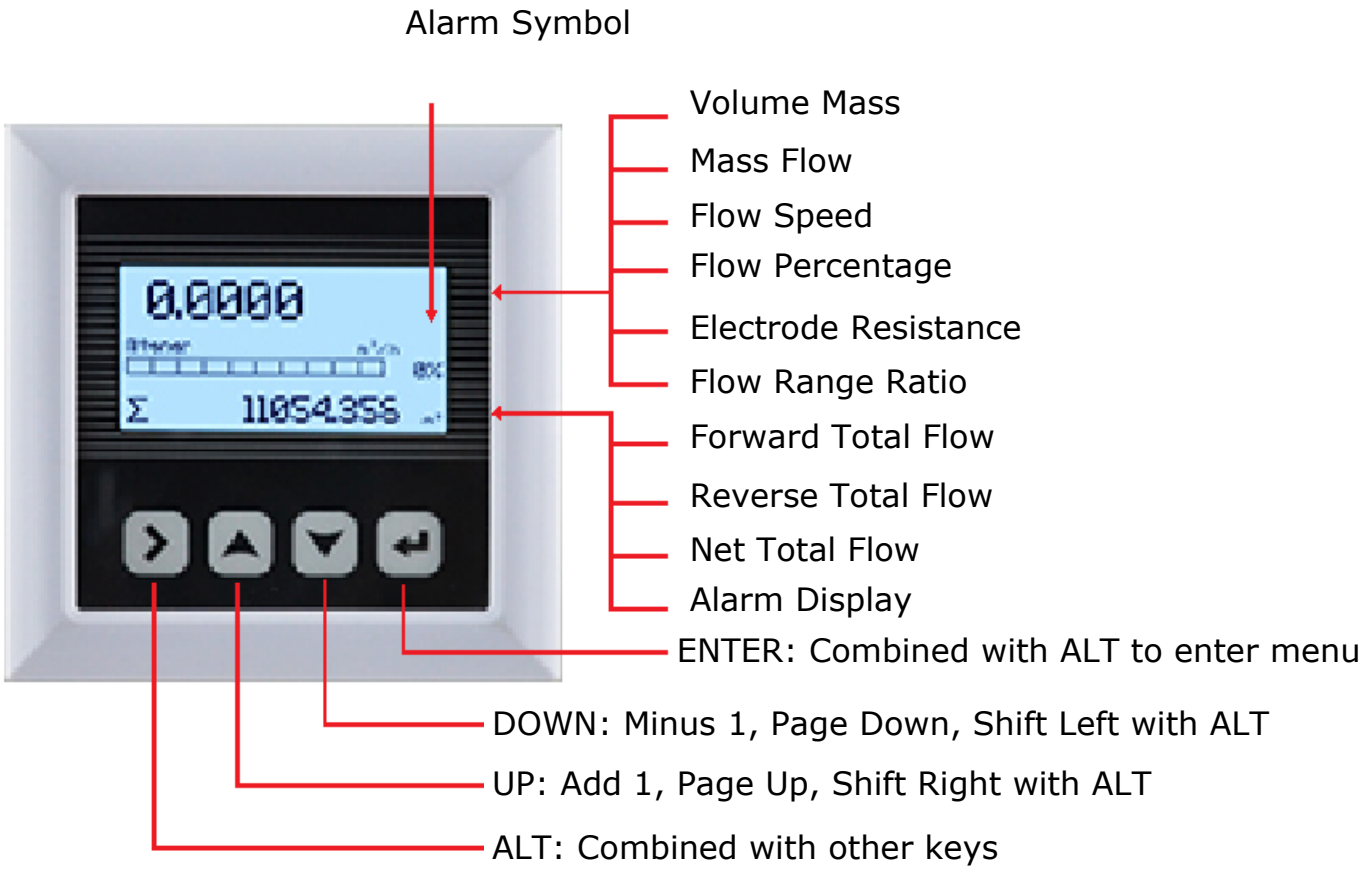


Figure 15: Remote Type Converter Keys and Display

6.3 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 16: Touch Keys

6.4 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.

Figure 17: Touch Keys

6.5 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)

Table 3: 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

6.6 Configuration Details

Table 4: Configurations Details

NO.	Parameter Words	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, m^3, 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 =ρVM 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				

NO.	Parameter Words	Setting Mode	Password Level	Parameter Range	Default
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	0.8m/s
	The peak amplitude (it is not shown when peak inhibition allows configuration closing)				
1-9	Spike Suppressor Time	Option	User	0-3s	1s
	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 ;				

NO.	Parameter Words	Setting Mode	Password Level	Parameter 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 shut down, 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 shut down, this parameter does not display.				
2-Current Output					
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
	Used for adjusting the output current value, I = Kx + B				
2-3	Output Current	Display	User	4.00-20.00mA	---
	Display the current output of current value(mA)				

NO.	Parameter Words	Setting Mode	Password Level	Parameter Range	Default
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	2.000
	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 Decimal	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				

NO.	Parameter Words	Setting Mode	Password Level	Parameter Range	Default
5- Alarm Contacts (3-0 set to show the configuration When alarm output)					
5-0	Alarm 1 Transistor State	Option	User	High/Low Level	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					
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				

NO.	Parameter Words	Setting Mode	Password Level	Parameter Range	Default
8- System					
8-0	Language	Option	User	Chinese/ English	English
	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 Max.	Figure	Factory	0-10000	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				

NO.	Parameter Words	Setting Mode	Password Level	Parameter Range	Default
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	3-2200	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, 12.5Hz, 25 Hz	6.25Hz
	The choice of excitation frequency				
10-9	Gain Selection	Option	Factory	1 / 3 / 9	3%
	Gain choice: adjust the gain can change the range of flow speed				

6.7 Operating Instruction

6.7.1 Parameter Selection and Adjustment

Press  and  together , enter into parameter setting interface .

Password need to be input by then

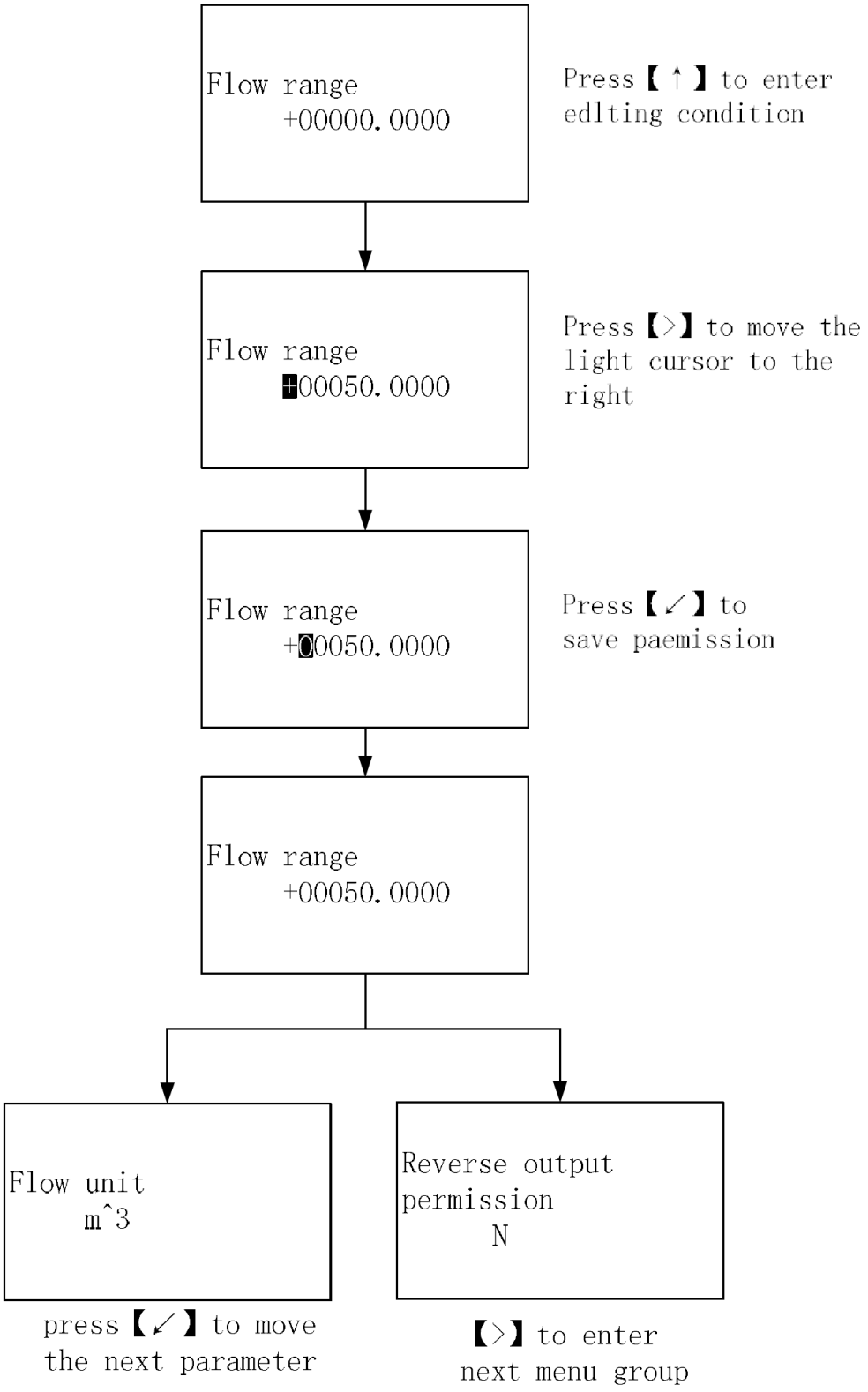
The initial users password: 200000 (used for modifying the user level parameter)

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  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.



6.7.2 Measuring Picture:

This picture will display after startup

"Σ+" : Forward cumulant,

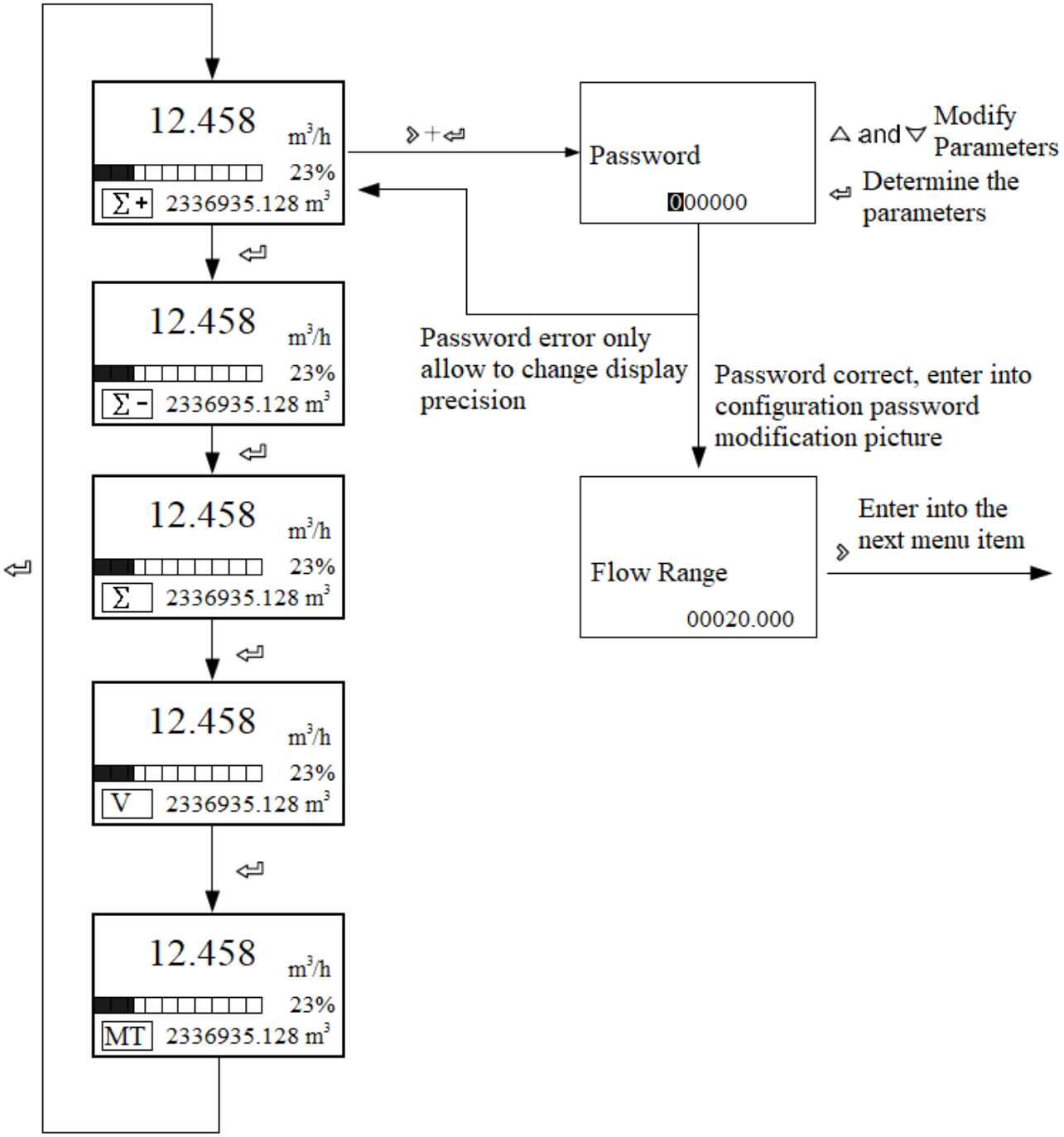
"Σ-" : Reverse cumulant,

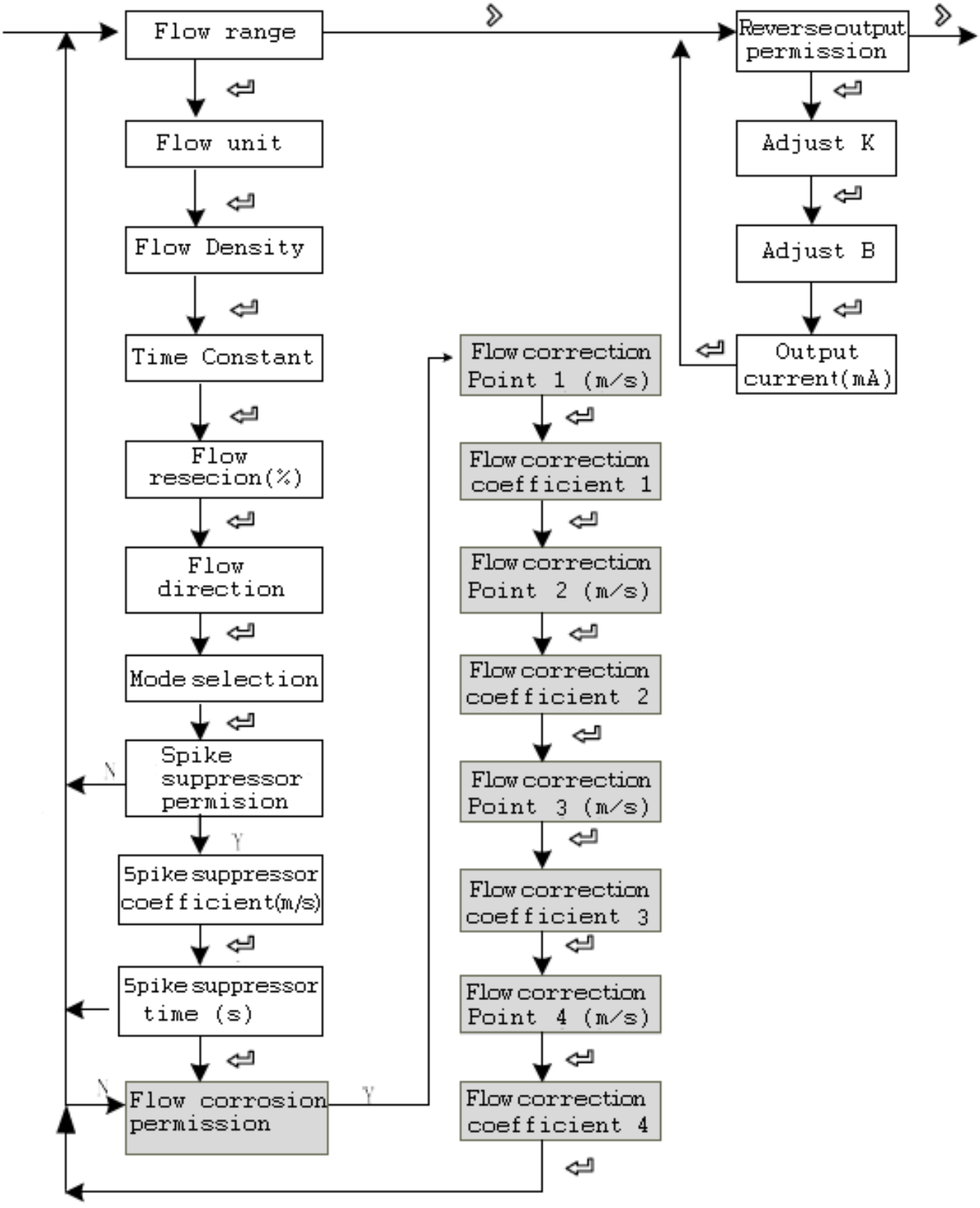
"Σ" : Net cumulant,

"v" : Current flow velocity,

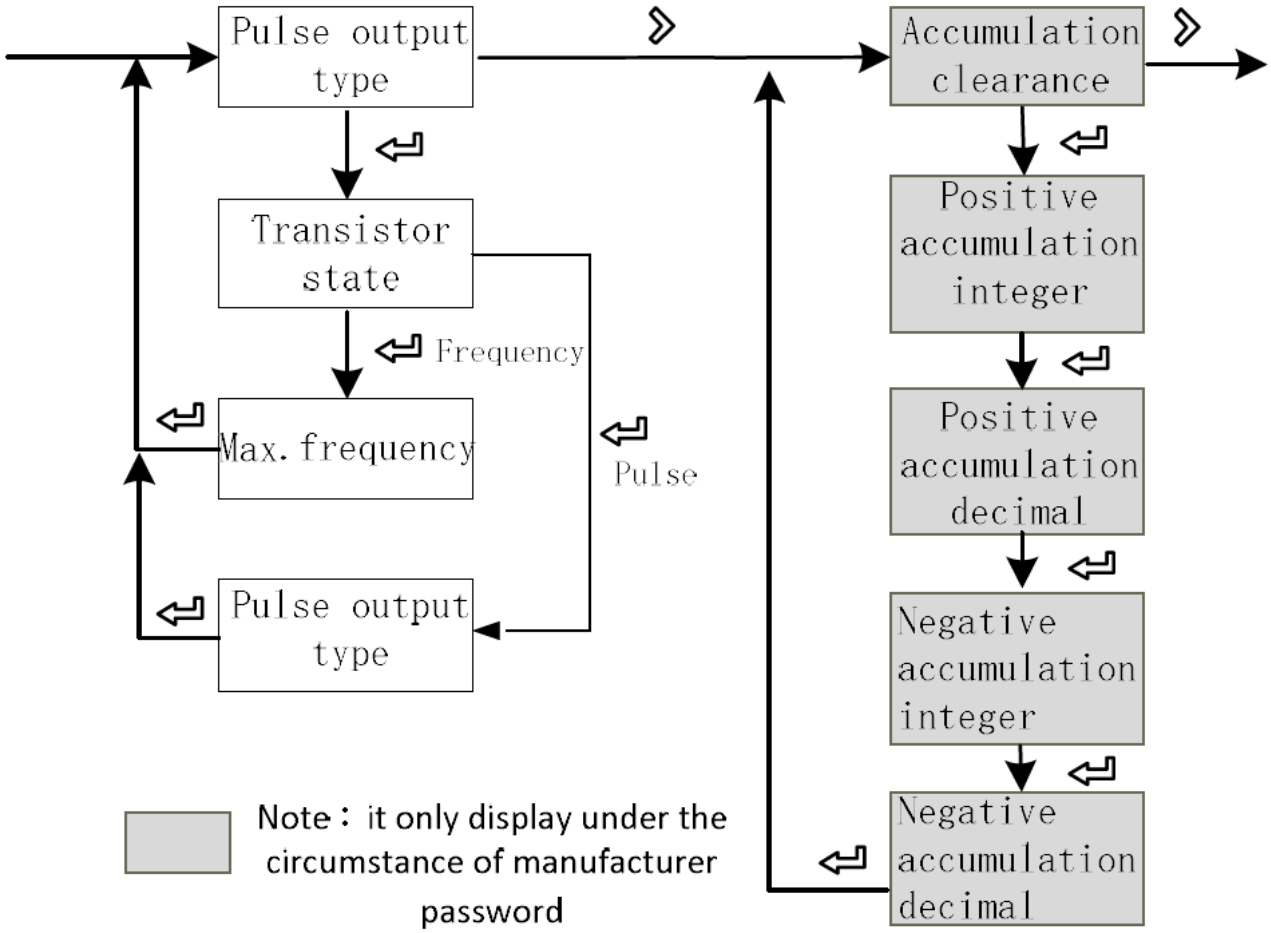
"MT" : Conductivity equivalent.

6.7.3 Flow setup and analog output menu

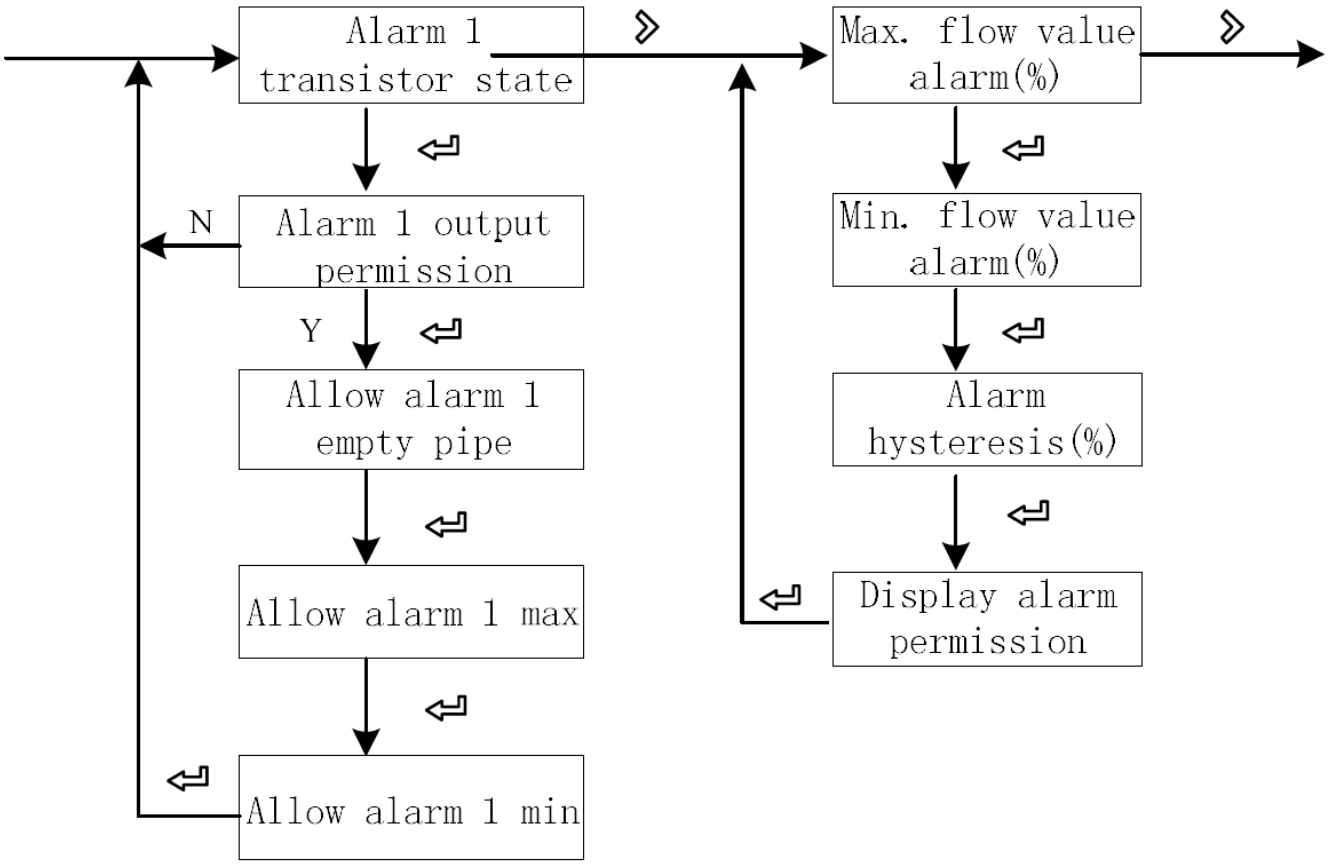



Flow range
Flow unit
Flow Density
Time Constant
Flow resecion(%)
Flow direction
Mode selection
Spike suppressor permision
Spike suppressor coefficient(m/s)
Spike suppressor time (s)
Flow corrosion permission
Flow correction Point 1 (m/s)
Flow correction coefficient 1
Flow correction Point 2 (m/s)
Flow correction coefficient 2
Flow correction Point 3 (m/s)
Flow correction coefficient 3
Flow correction Point 4 (m/s)
Flow correction coefficient 4
Reverse output permission
Adjust K
Adjust B
Output current(mA)
Note: It only dispaly under the circumstance of manufacturer password

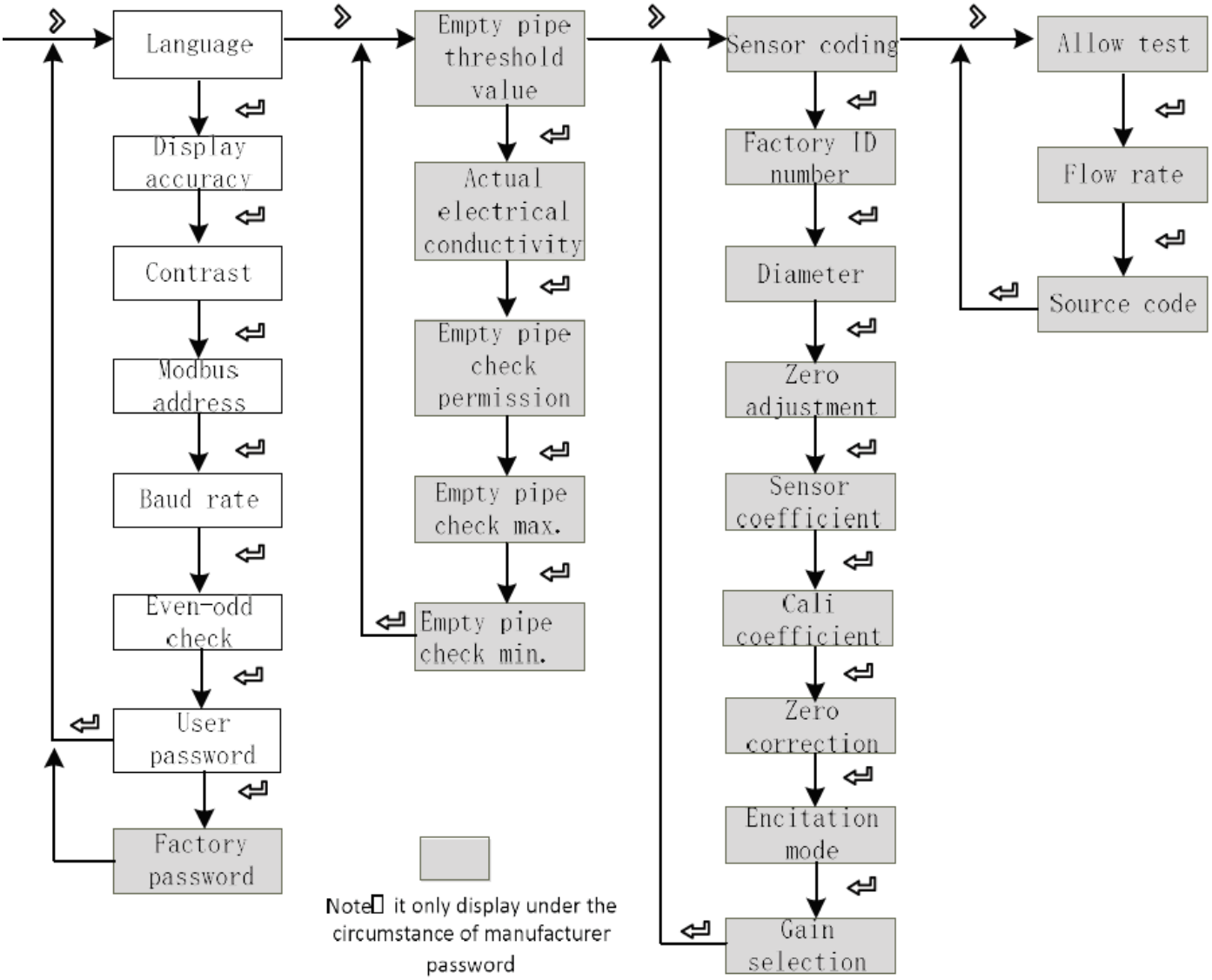
6.7.4 Pulse output and total set menu:



6.7.5 Alarm setup menu:



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



6.8 Manufacture Setting up Operation

Sensor coefficient calibration

The following three calibrating methods are used for electromagneticflowmeter on site.

1. Instantaneous flow calibration 1.0%
2. Frequency/current standard table method 0.5%
3. Weighing method calibration 0.3%

6.8.1 Verifying Process Flow:

1) Connect Sensor

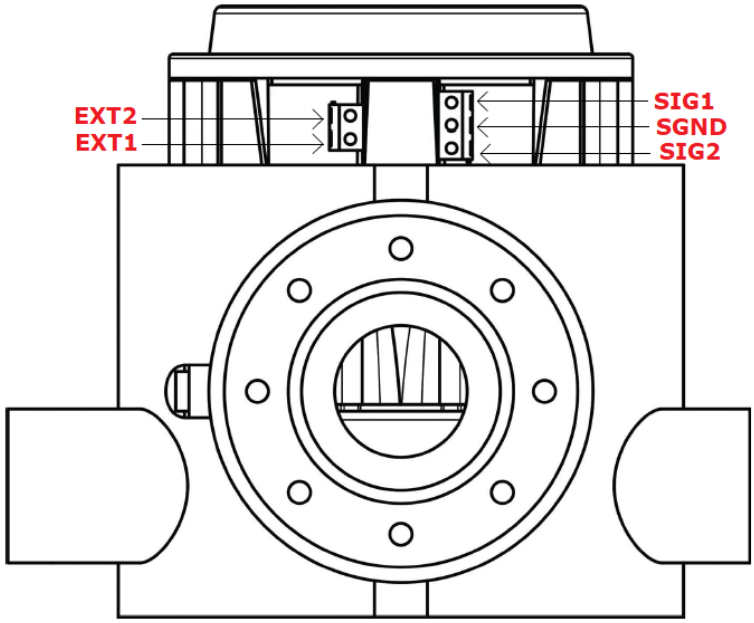


Figure 18: Connecting Sensor

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;
  SGND : Signal earth

2) Connect the Counting Module (method of instantaneous ignore this step)

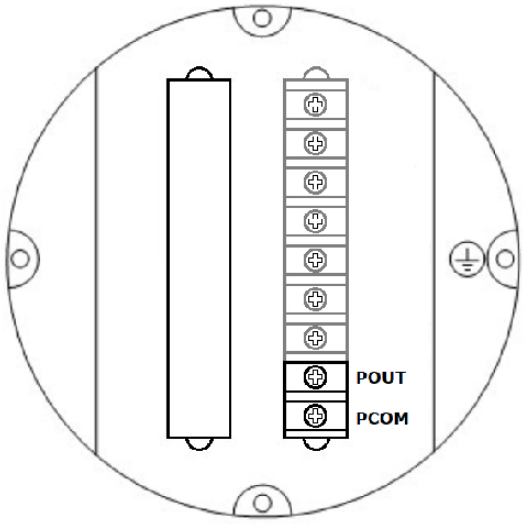


Figure 19: Counting Module Output

The corresponding terminal are POUT, PCOM;

- POUT : Pulse signal
- PCOM : Signal earth

- Connection Diagram

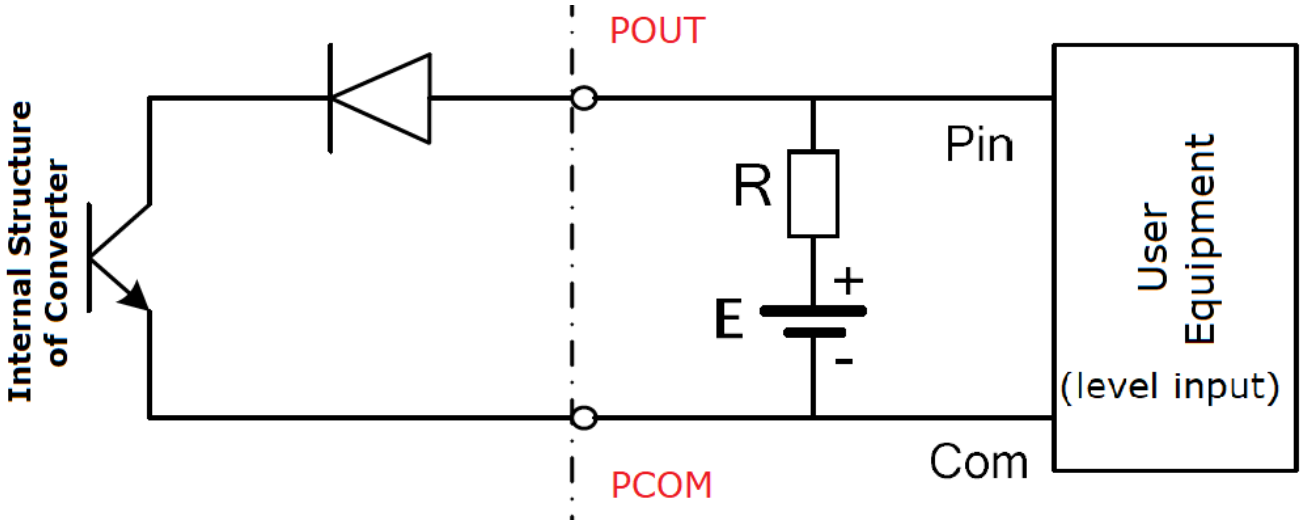


Figure 20: Conncetion Daigram

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.

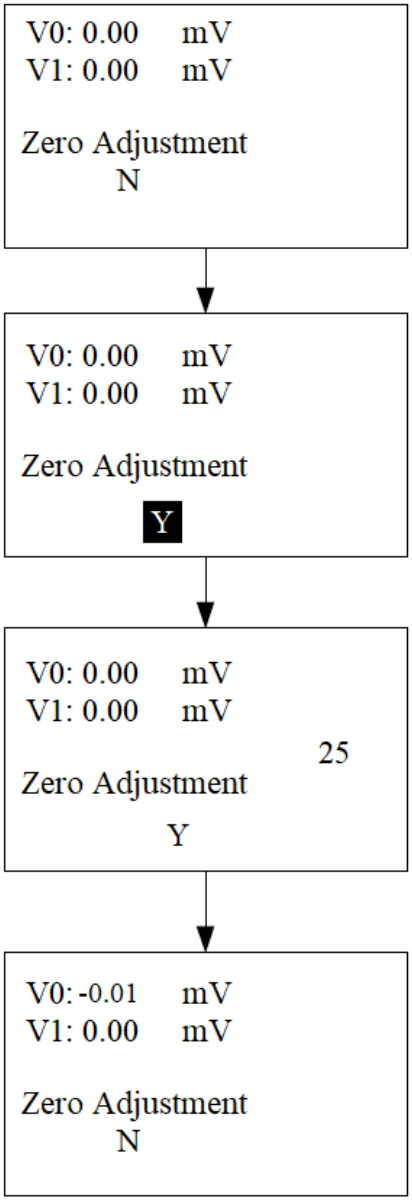
3) Zero Set (Sensor symmetry) is good or flow rate is less than 0.5m/s, this step could be ignored if it is not required.

a) Shut the 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.



Press △ Enter into edit mode

Press △ Modify parameters for Y

Press ⏎ To confirm, adjustment will be finished in 30 seconds

Zero set adjustment is OK, zero point is preserved.

V0: Indicates the adjusted 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

  $K = Q_{standard\ table} / Q_{check\ table}$
- Write the K calculated 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 failures, it can correctly provide the corresponding alarm message to the fault in general application.

Display position in measuring picture:

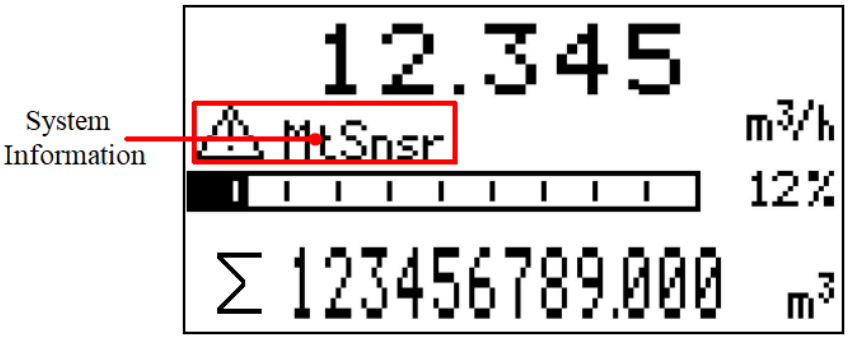


Figure 21: System Information

Table 5: Alarm Contents

Display	Alarm Content
Mtsnsr	Sensor empty pipe
Hi	The current instantaneous flow rate exceeds the setting flow higher 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

7.2.1 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 : 3.6 m^3/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 is : 3.6m^3/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 Pls system alarm information. Users need to reset pulse equivalent parameters. Similarly, when the pipe flow is small the selected pulse equivalent can not 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.

7.2.2 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.

7.2.3 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 value corresponding to Instantaneous flow rate, 20mA corresponding to high range limit, 4 mA corresponding to low range limit.

Conversion relationship

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

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

Table 6: Serial Communication

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	
Forwardflow accumulation of integer	ulong	108	
Forward flow accumulation of decimal	ulong	110	The decimal part magnify 1000 times 123 stand for 0.123
Reverse flow accumulation of integer	ulong	112	
Reverse flow accumulation of decimal	ulong	114	The decimal part magnify 1000 times 123 stand for 0.123

Note: Float / Ulong / Long type data, Communication transmission in byte order 2-1-4-3; 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;
Default : 9600;
Check : No Check, Odd Parity, Parity;
Default : No Check;

For 32-bit data (long integer 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

Table 7: Measuring System

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 8: Measurement Accuracy	
Maximum Measurement Error	Measured values±0.3% (Flow Velocity > 1m/s): ±2mm/s (Flow Velocity < 1m/s)
Repeatability	<0.15%

Table 9: Operating Environment	
Temperature	
Environment Temperature	-10°C / 60°C
Storage Temperature	-40°C / 65°C
Electric Conductivity	
Water	Min. 20μS/cm

Table 10: Material	
Die-casting Aluminum	Standard
Table 11: Electrical Connection	
Power Voltage	100-240VAC, 50/60Hz—24VDC
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 12: Output		
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) Fmax≤ 5000 cp/s
	Setting	0.001L – 1m³
Frequency	Measuring Range Upper Limit	Fmax ≤ 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	

8.2 Accuracy

Reference condition

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

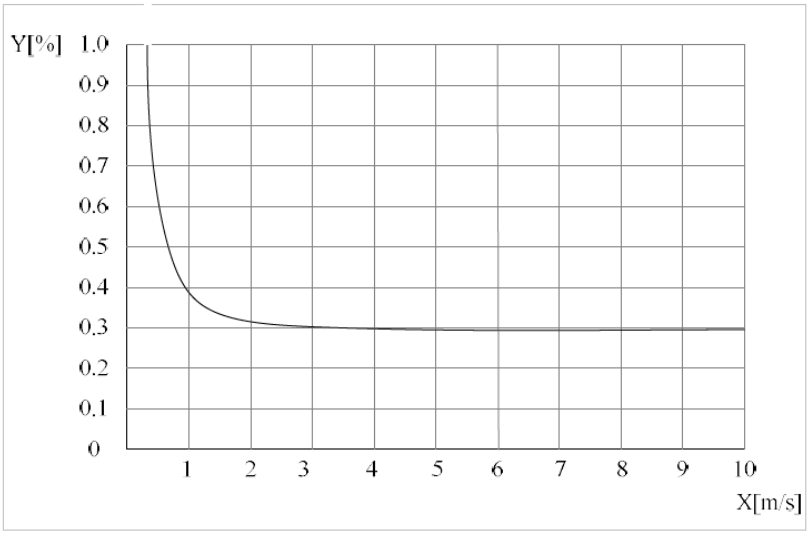


Figure 22: Accuracy

- X [m/s] : Flow Speed
- Y [%] : Deviation of actual investigations (mV)

8.3 Dimensions and Weight

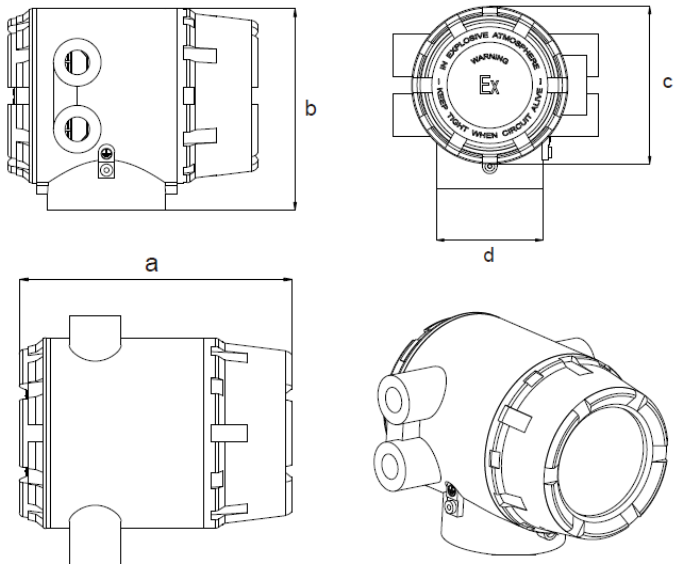


Figure 23: Dimensions of Compact Converter

Table 13 : Dimensions of Compact Converter

Dimensions [mm]				Weight [Kg]
a	b	c	d	
184	148	128	87	2.50

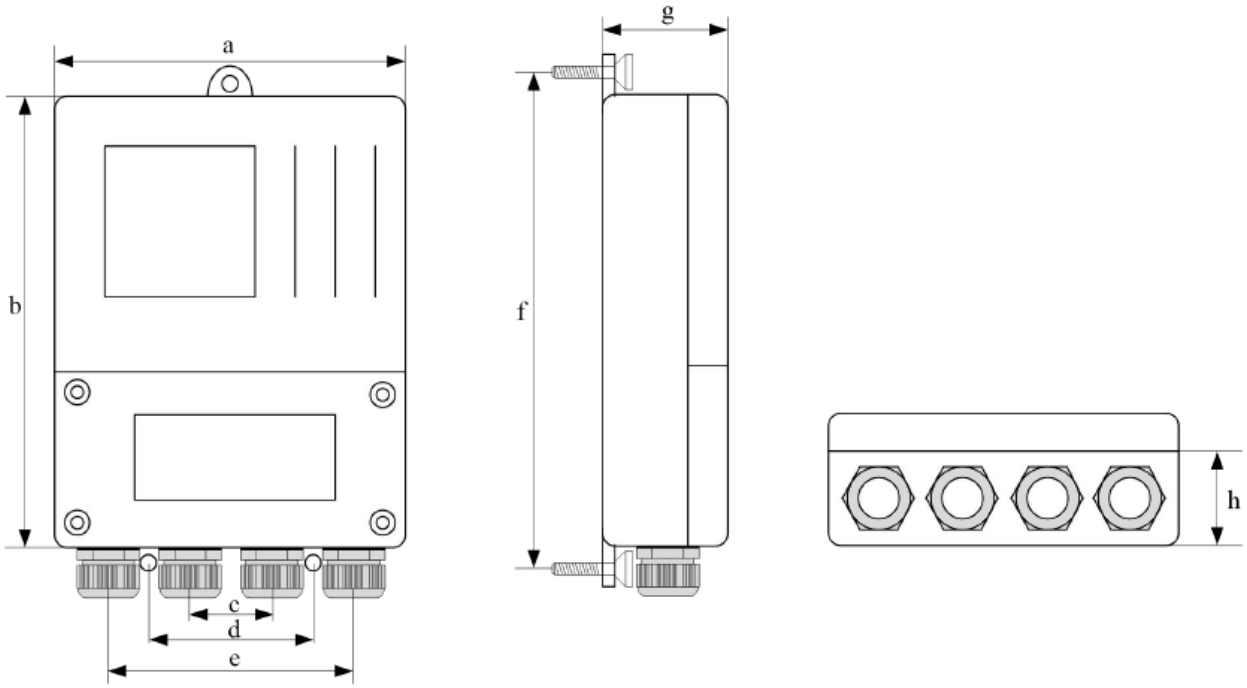


Figure 24: Dimensions of Remote Converter

Table 14 : Dimensions of Remote Converter

Dimensions [mm]								Weight [Kg]
a	b	c	d	e	f	g	h	
164	124.5	37	70	102	233.5	69.7	45.7	0.60

8.4 Flow Chart

Table 15: Flow Chart

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	800-1,357	56 ~ 560
250	17.7-160	200-800	1,000-2,120	88 ~ 880
300	25.45-250	300-1,200	1,600-3,054	127 ~ 1,270
350	34.6-300	400-1,600	2,000-4,157	173.1 ~ 1,731
400	45.2-400	500-2,000	2,500-5,429	226.1 ~ 2,261
450	57.3-500	600-2,500	3,000-6,871	229 ~ 2,290
500	70.7-600	800-3,000	4,000-8,482	282.7 ~ 2,827
600	102-800	1,000-4,000	5,000-12,216	407.1 ~ 4,071
700	139-1,200	1,600-5,000	6,000-16,620	554.1 ~ 5,541
800	181-1,600	2,000-6,000	8,000-21,720	723.8 ~ 7,238
900	229-1,600	2,000-8,000	10,000-27,480	916 ~ 9,160
1000	283-2,000	2,500-10,000	12,000-33,924	1,130.9 ~ 11,309
1200	407-2,500	3,000-12,000	16,000-48,833	1,628.6 ~ 16,286

8.5 Flow and Velocity Parallel Table for Flowmeter

Velocity (m/s) / Flow (m³/h) / Nominal Diameter (mm)	0.1	0.2	0.4	0.5	1	5	10	12	15
DN10	0.0283	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	1,131	1,357.2	1,696.5
DN250	17.7	35.4	70.7	88.36	176.7	883.6	1,767	2,110.4	2,650.5
DN300	25.45	51	102	127.24	254.5	1,272.4	2,545	3,054	3,878.5
DN350	34.64	69	139	173.2	356.4	1,732	3,464	4,156.8	5,196
DN400	45.24	90	181	226.2	452.4	2,262	4,524	5,428.8	6,786
DN450	57.3	114	229	286.3	572.6	2,863	5,726	6,871.2	8,589
DN500	70.7	141	283	353.4	706.9	3,534	7,069	8,484.8	10,604
DN600	102	203	407	508.9	1,018	5,089	10,179	12,216	15,270
DN700	139	277	554	692.7	1,385	6,927	13,854	16,620	20,775
DN800	181	362	723	905	1,810	9,050	18,096	21,720	27,150
DN900	229	458	916	1,145	2,290	11,450	22,902	27,480	34,350
DN1000	283	565	1,131	1,414	2,827	14,140	28,274	33,924	42,405
DN1200	407	814	1,628	2,034.7	4,069.4	20,347	40,694	48,833	61,041

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