Electromagnetic Flow Meter

Battery Powered Transmitter
Operation Manual

CONTENT

1 Brief

Lmag_W803E is a kind of battery powered electromagnetic converter. This electromagnetic converter is capable of being used together with common electromagnetic flow meter sensor, with the flow rate measurement accuracy up to 0.5. A new type of battery powered meter will be developed by connecting the Lmag_W803E converter to a common electromagnetic flow meter.

The standard configuration of Lmag_W803E battery powered electromagnetic converter has a lithium battery, which is capable of working 3 to 6 years consecutively. If a high-capacity battery is applied, the converter will have longer working time.

Lmag_W803E battery powered electromagnetic converter has GPRS and CDMA wireless data transmission function, RS485modbus protocol (external power supply or battery-powered) communication function, and SRD mode wireless network communication system to realize date collection and management.

Stainless steel outer covering and infrared remote control is applied to Lmag_W803E battery powered electromagnetic converter to meet IP68-level seal protection requirement, which means the converter can be used in underground and other damp places.

2 Converter Picture

Fig2.1 Integrated W803E

Fig2.2 W803E with GPRS communication

3 Display and Operation

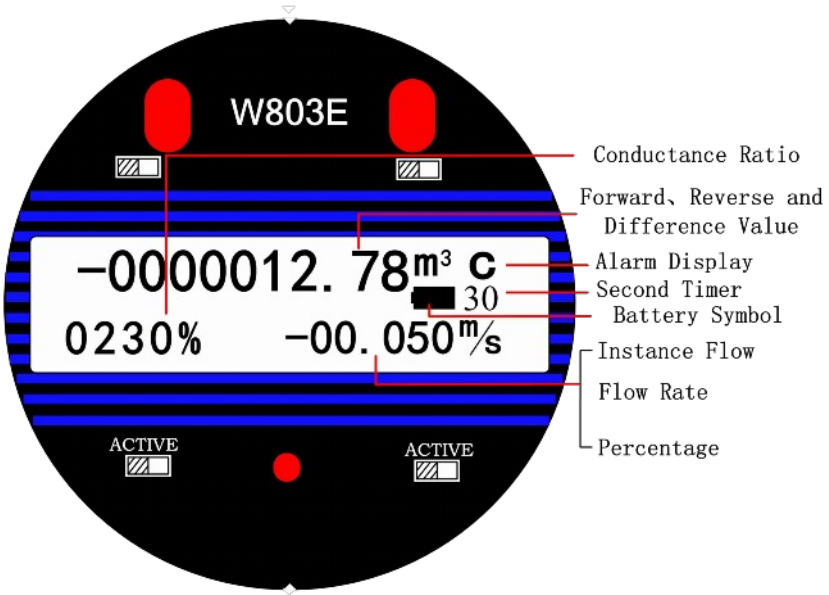


Fig3.1a W803E Converter LCD（Only Flow Mode）

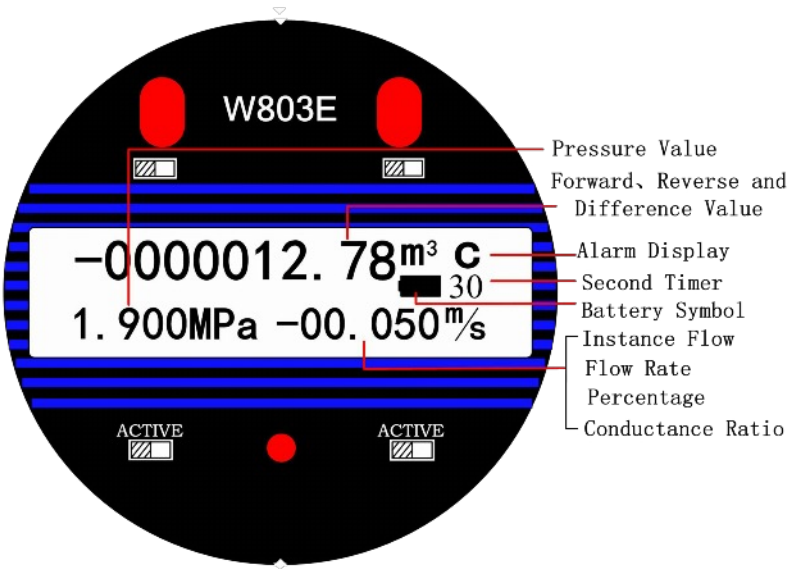


Fig 3.1b W803E Converter LCD（Flow+Pressure Mode）

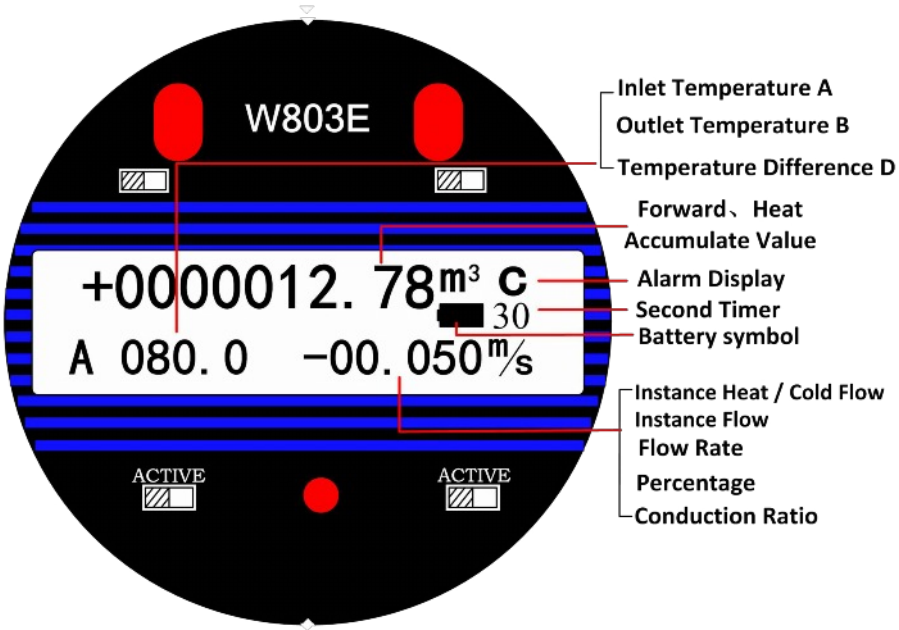


Fig3.1c W803E Converter LCD（Flow+Temperature Mode）

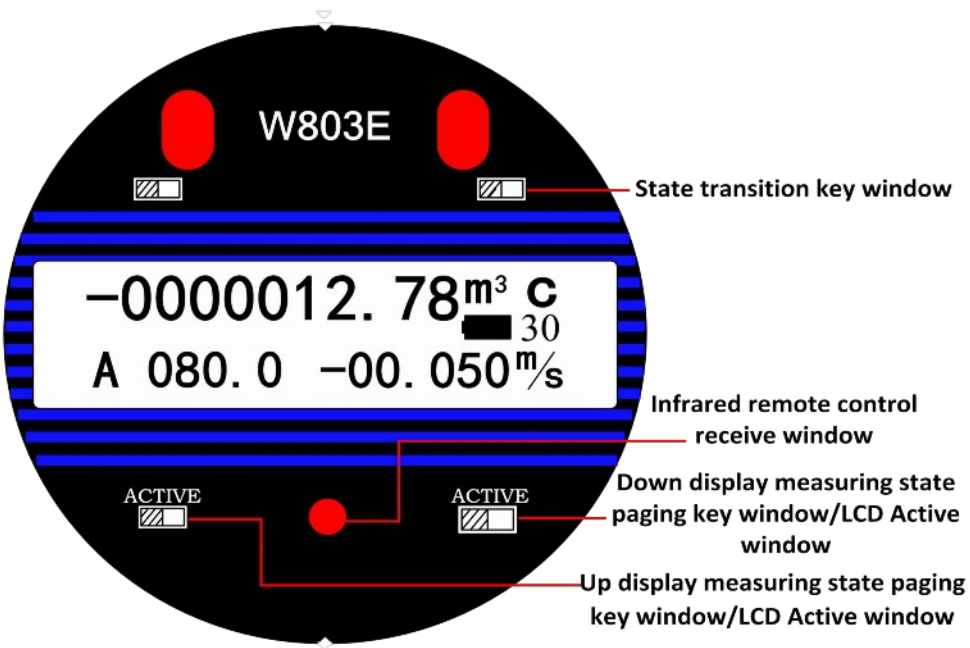
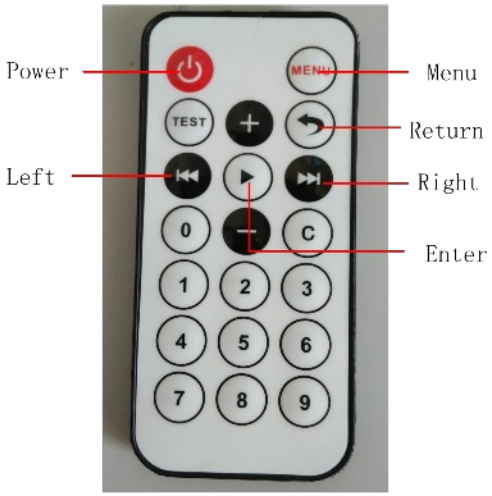


Fig. 3.2 W803E magnetic key operational position



Power -test mode to measurement mode
Menu -test mode to parameter settings
Enter -parameter settings to all levels of the menu
Return -parameter settings back to the next higher level menu
Left -cursor moves left
Right -cursor moves right

Pig 3.3 W803E infrared remote control display and operation

3.1 Meter Mode

Test mode: Converter to electricity, instrument into test mode (LCD middle row no battery symbol on the right side), the converter can output pulse signals to complete the machine calibration or change the converter parameters. After entering the meter calibration mode, without any operation, 3 minutes automatically transferred into the measurement model; If there are any operation, stop the operation to maintain after 3 hour examining mode, and then transferred into measuring instrument automatic mode.

Measurement mode: measurement mode is applied when the converter is in use(there is battery symbol on the right side of the LCD). Under measurement mode, converter can complete the measurement of flow, velocity and empty pipe parameter etc.It can also output pulse signal and RS485 or GRPR communication via infrared transmission.

Sleep mode: Because the meter is factory sealed, the converter is set sleep mode for power saving. The converter has no display, no output and little power consumption . So the users should wake up the converter as 3.2.

LCD shutdown mode: In order to reduce power consumption and prolong the life of the converter, the converter has LCD shutdown function. The default LCD shutdown function is allowed when the converter is out of the factory. When the converter works at 00:00, the LCD will automatically turn off without affecting the normal measurement and

communication functions of the converter. If you want to activate the LCD, you only need to trigger either of the two flip keys of the converter with the remote magnet, as shown in Figure 3.2. If the user does not want to use this function, the LCD closing function can be set to no use.

3.2 Meter Wake-up

When need to wake up the instrument, users can use our company special W803E infrared remote control (following abbreviation remote control).Set the converter sub menu "meter dormancy" in menu "Operate Mode"password to 00000 and then return back to the measurement mode (On the right,it has battery symbol on the right of the middle row on LCD) .

Note: The internal clock doesn't work when the meter dormant, after wake up the instrument, the user must reset the meter time parameter.

3.3 Sleep Mode Setting

If the user intends to set the meter into sleep mode, use the remote control to set the converter menu "Operate Mode" sub menu "meter dormancy"password to 23130 and go back to test mode (On the right,it has LCD battery symbol in middle row) .

3.4 Change between Measurement Mode and Test Mode

3.4.1 Measurement Mode into Test Mode

In the measure mode,use the magnet of the remote control to scan the state conversion window into the test mode(there is no battery symbol on LCD, and seconds timer accumulate once per second) .

3.4.2 Test Mode into Measurement Mode

When need to enter measurement mode under test mode,just need to aim at the "remote control window"and press"power"key(there is battery symbol in the middle of the LCD).

3.5 Parameter Setting

3.5.1 Parameters Setting and Remote Control Operation

If parameters setting or modify is applied, make sure the meter is under parameters setting

mode. In the test mode, press “Menu” to enter the password “00000”. After entering the password,press “Enter ” to enter “Parameters Set” function selection display, then press “Enter ” to enter the main operating menu. If intend to change the main menu, press “+” or “-”. Refer to the figure below:

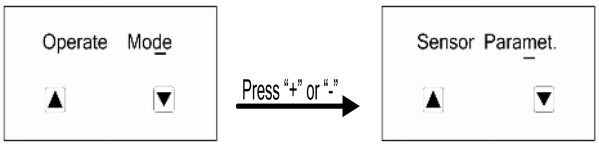


Fig. 3.4

If intends to set submenu parameter, move cursor to press “Enter” and enters submenu of the present main menu. If you want to return to the higher level menu or the calibration model, need to press the return key.

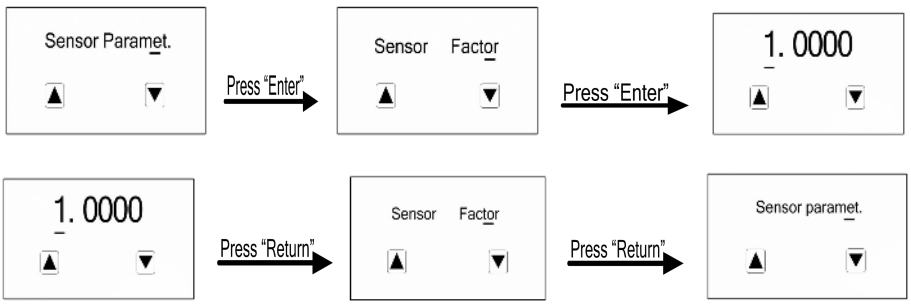


Fig. 3.5

3.5.2 Function Selection Display

Press “Menu” to enter the password “00000”. After enter the password, press “Enter ” to enter the function selection display, and press “+” to select. There are five functions to select:

Table 3.1

Parameter Number	Function	Comments
1	Parameters Set	Select the function to enter parameters setting
2	Clr Total Rec	Select the function to clear total record
3	Flow Total Re	Select the function to record flow total of 24 months. Record forward and reverse flow calculate separately.(It’s recorded by month, even in the first few years)
4	Heat Total Re	Select the function to record heat total of 24 months. (It’s recorded by month, even in the first few years)
5	Error Record	Select the function to record error record of 24 month in “Flow+Temperature” mode.

3.6 ClrTotal Record

Step 1: According to then method of “3.5 Parameter Setting” to set “Clear Total Key”and back to test mode.

Step 2: In the test mode, press “Menu”key. (Meter version will be displayed for 5s,and then “ Parameters Set” is displayed.)

Step 3: After enter the password,press “+”, “Clr Total Rec ” is displayed.

Step 4: Press”Enter”key ,input the “Clear Total Key” set in step 1 and press “Enter”key, the meter displays “00000”, Clear Total Record is done.

Step 5:Press “Return”, meter is back to test mode.

Remarks:

《Clr Total Rec》+1：The cumulative value of total heat / cooling capacity under current mode can be cleared.

《Clr Total Rec》+3： clear work time.

《Clr Total Rec》+4： clear 24 months flow and heat monthly record.

《Clr Total Rec》+7： clear 24 error record.

Note:

1. The factory set of the meter is sleep mode (the LCD is not lighted), users need to use remote control to wake up the meter for normal use (refer to 3.2); When using the meter, set the “Sleep Password” into other non-sleep password to avoid the affecting of the meter normal use.

2. When the meter is waked up, the meter is in test mode. Meter correction or parameters setting can be done in the test mode. Measurement or communication must be done under measurement mode.

4 Converter Wiring

4.1 Definition of Signal Line

Lmag_W803E battery powered converter has two groups of wiring: signal line group and excitation line group. Two groups are connected to different sensors separately. Pay attention to avoid any possible damage to meters because of incorrect wiring.

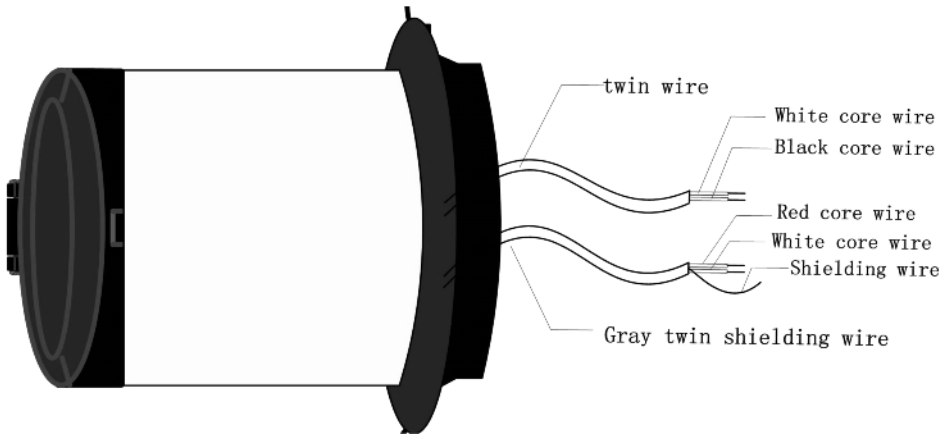


Fig. 4.1 Lmag_W803E Signal Line

Signal lines are signed as follows :

Black twin plastic wire: White core wire, Black core wire — Connect with exciting current

Gray twin shielding wire: Connect the red core wire to “signal 1”
Connect the white core wire to “signal 2”
Connect the shield wire to “signal ground”

4.2 Converter Waterproof Interface Definition and Wiring

4.2.1 Converter Waterproof Interface Definition

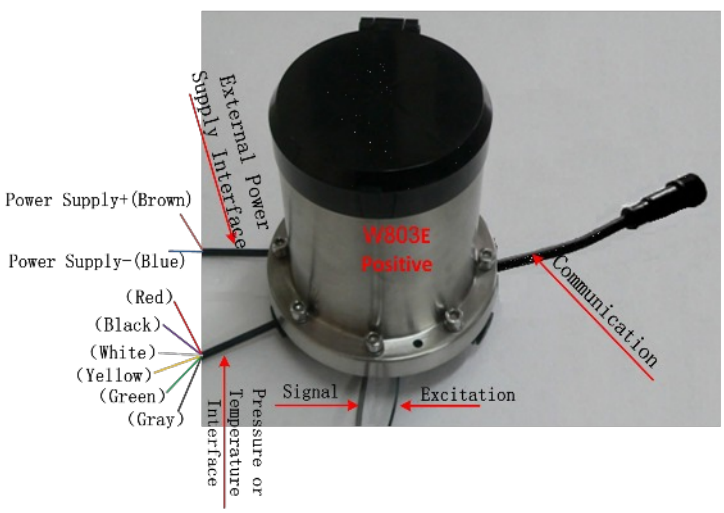


Fig. 4.2a Lmag_W803E Converter Waterproof Interface Definition

Communication Interface： This port is a standard reserved port. Users can connect different accessories to realize different functions such as RS485 communication, 4-20mA + current loop communication etc.

Pressure measurement Interface(six core wire):

Red Wire — Power Supply+

White、Black Wire — Suspension

Yellow Wire — Pressure signal+

Green Wire — Pressure signal-

Gray Wire — Power Supply-

Temperature measurement Interface(six core wire):

Red Wire — Inlet thermocouple negative

Black Wire— Inlet thermocouple negative

White Wire—（After shorting with the yellow wire）Inlet thermocouple positive

Yellow Wire—(After shorting with the white wire)Inlet thermocouple positive

Green Wire—Outlet thermocouple negative

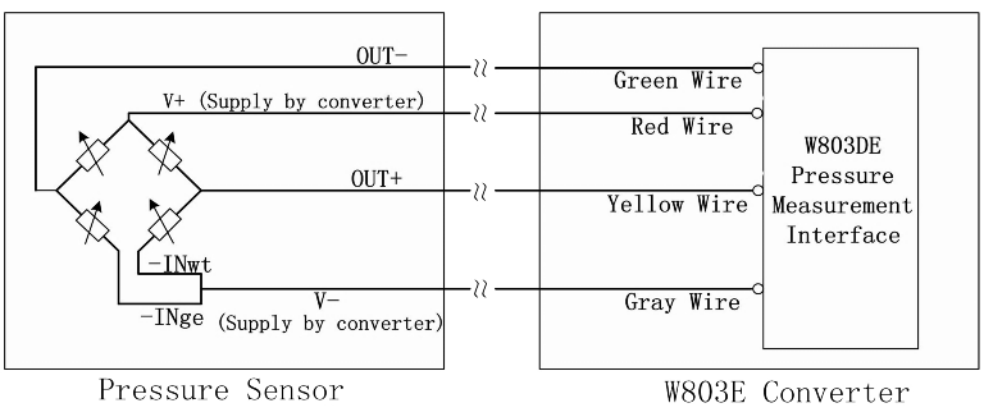
Gray Wire—Outlet thermocouple negative

Power Supply Interface (two core wire):

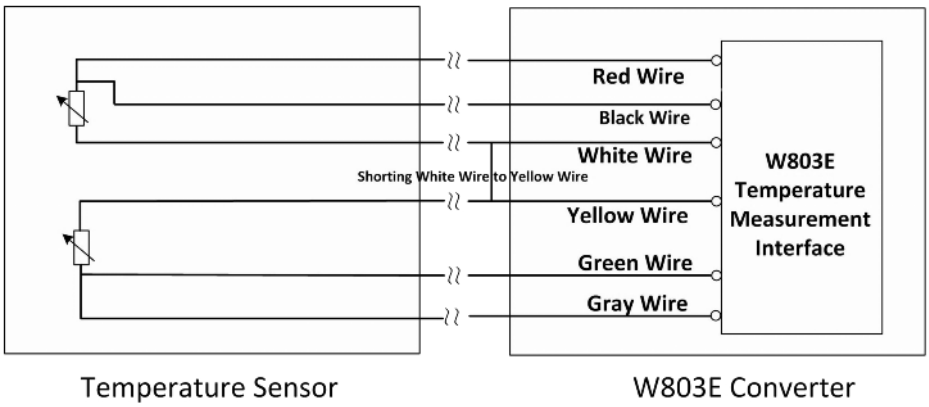
Brown Wire —External power supply+

Blue Wire—External power supply-

4.2.2 Converter Pressure Measurement Interface and Pressure Sensor Wiring



4.2.3 Converter Temperature Measurement Interface and Temperature Sensor Wiring



4.3 Converter Assembled Grounding Requirements

First, useΦ20 copper, cut to 1700mm long (can be extended if necessary) to make ground nail buried 1500mm (Note: When buried nails, nail tips in spreading a layer of wood chips carbon, then pour brine);

Second, solder 4mm^2 copper wire to the ground nail, and finally ground to the sensor flange, grounding rings, pipe flanges, refer to Fig. 4.3.

Note: stainless steel is required to fixed ground screw, spring washer, and flat washer.

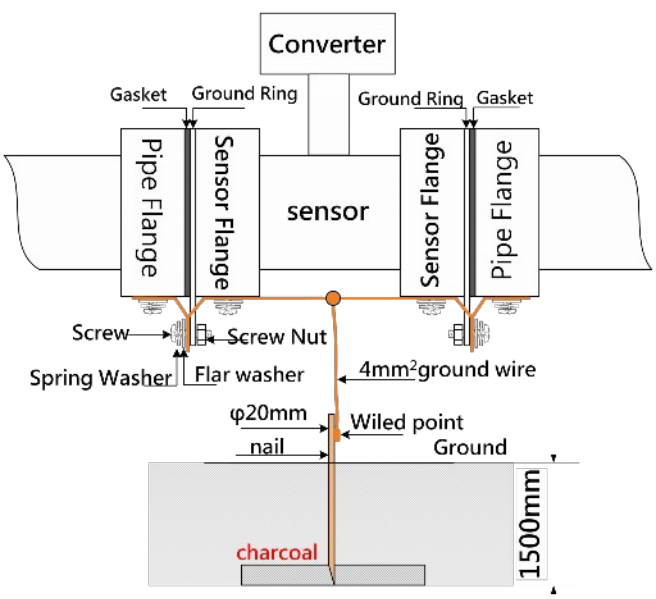


Fig. 4.3 Converter Grounding Schematic

4.4 Flow Test

4.4.1 Pulse Output Wiring

For need for the flow test, Lmag_W803E has pulse output signal to output pulse per unit volume. In order to ensure good seal, the pulse output interface is calibrated by infrared calibration box. When doing the user calibration, refer to the wiring diagram below.

Remarks: If the pulse output is disturbed by the frequency converter and other equipment, please connect the common ground wire (Blue line) of the calibration box to the earth.

Fig.4.4.1 Connection between pulse output and other devices in demarcate state

4.4.2 Pulse Output and Calibration System Connection

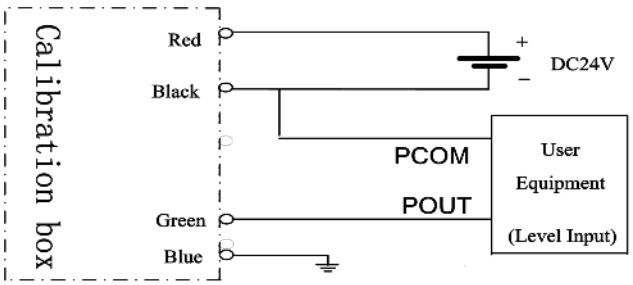


Fig. 4.4.2 Pulse Output and Calibration System Connection

4.4.3 Pulse Output Parameter Setting

- Users need to set pulse output rate in the submenu “Pulse Factor”when calibrate.And when the pulse width is 0.05mS,the maximum pulse is 10000,so the pulse rate need

low than the maximum pulse to result in calibration error.

For example: use DN100 flow meter, when the flow rate is 10m/s, the flow is 282.74m3/h. If the pulse output equivalent is 0.01L, there are 7854 pulses output per second.

- Pulse output rate should not be selected too high to avoid approaching the upper limit of the output rate, causing the output pulse loss and affecting the accuracy of the instrument calibration.
- To avoid counting synchronization error between calibration system and calibrated meter, Lmag_W803E battery powered converter requires calibration count each time is longer than 4 minutes.

5 Meter Parameter

The parameters of Lmag_W803E battery powered converter are: Operate Mode, Flow Parameters,Output Parameters, Sensor Parameter, Linearization, Temperature Parameters, Communication, Factory Adjust, Total parameter and Pressure Parameter. The definitions of the parameters are as below:

5.1 Operate Mode

5.1.1 Operate Mode

There are three kind of mode: Only Flow, Flow+pressure, Flow+Temperature. Users can choose according to needs.

5.1.2 Interval Time

In the measurement mode, meter measurement interval time can be set from 2 seconds to 30 seconds (If the setting is less than the 15S, working an hour later, meter setting will automatically become 15S).

5.1.3 Meter Dormancy

When the sleep password is “23130”, the instrument will start the sleep mode.

5.1.4 Measure Mode

It provide for temperature meter users with two modes of heat measurement and cold measurement.

5.1.5 LCD Sleep Enable

In order to reduce the power consumption of the instrument and prolong the service life of the instrument, the converter has the function of automatically closing the LCD when the measuring state works to 00:00. The LCD shutdown does not affect the normal measurement and communication function.

When the option is “Enable”, it has the function of LCD closing; when the selection is “DISABLE”, the LCD closing function is cancelled.

5.2 Flow Parameters

5.2.1 Sensor Size

Sensor size scope of W803E battery powered electromagnetic converter is 10 to2000 mm.
10,15,20,25,32,40,50,65,80,100,125,150,200,250,300,320,350,400,450,500,600,700,800,900,1000,1100,1200,1300,1400,1500,1600,1700,1800,1900,2000。

5.2.2 Flow Unit

Flow Units are L/s, L/m, L/h, m3/s, m3/m , m3/h. User can select the unit according to actual status.

5.2.3 Flow Range

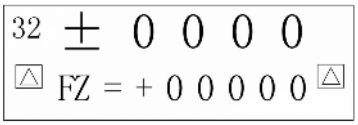
Flow range setting means upper limit flow value setting, and lower limit flow value is set “0” automatically.

5.2.4 Flow Direction

When doing debugging, if the flow direction is not consistent, users do not have to change the excitation line or signal line connection, and just reset the flow direction parameters.

5.2.5 Flow Zero CRC

Make sure the senior is full and the fluid is in stationary state when doing the flow zero-point correction. Flow zero-point is shown as velocity of flow, mm/s. Zero-point correction displayed as below:



Upper large characters: corrected flow zero-point.
Lower small characters: ZR means measured zero-point;
When ZR display is not “0”, do correction to make ZR display to “0”. Note: if correct upper line character and ZR increases, change the “+, -” in upper line to make sure ZR display to be zero.
The corrected flow zero-point is the compound value of sensor, and shall be recorded in sensor list and label. The unit is mm/s, and the sign is in opposite with corrected value.

5.2.6 Flow Cutoff

Small signal elimination point setting is showed by flow. When applied small signal elimination, the flow, gross, pulse output are also eliminated, only the velocity of flow is

displayed.

5.2.7 Flow Filer Time

Long measured damping time can enhance the stability of flow display and output digital, and is applicable for cumulative add up of pulse flow. Short measured damping time means quick respond to measurement, and always apply in production control. Measured damping time setting is by choosing. (Damping time can only be applied in test mode.)

5.2.8 Reverse Flow En

W803D converter has reverse flow output disable function, when "Forbidden", no output display of the flow, pulse and cumulated gross, only the flow rate display; When the "Allowance", converter works properly.

5.2.9 Starting Value

In the measurement state, in order to quickly track and measure the drastic change of flow, the instrument judges the change of flow velocity. When the change of flow velocity is greater than the threshold of flow frequency measurement, the instrument starts fast tracking measurement to ensure the accuracy of measurement. When the flow rate changes less than the flow frequency measurement threshold, the instrument is measured according to the interval measurement time interval.

5.2.10 Heat Display

This function is temporarily reserved.

5.3 Output Parameters

5.3.1 Pulse Out Enable

It works in the measurement state. If “Forbidden”, pulse output function is off. If “Allowance”, pulse output function is on.

5.3.2 Pulse Unit

There are two output pulse units: m3 , L.

5.3.3 Pulse Factor

Pulse factor is pulse equivalent, and the range is from0.$0001\sim5.9999$， Output pulse equivalent unit is in consistence with the selected pulse output type, and used to pulse output of test mode.

5.3.4 Pulse width

When the pulse output is low level effective. The scale of pulse width is from 0.05 ms to 12.5ms.The users set the parameters based on their needs.

Table 2

No.	Pulse-width(ms)	Num of the maximum pulse(p/s)
1	0.05	10000
2	1	500
3	10	50
4	12.5	40

5.4 Sensor Parameters

5.4.1 Sensor Factor

Sensor factor is electromagnetic flow meter calibration factor. The factor obtained from the actual calibration, and stenciled onto the sensor plate. Users shall input the factor factor into Lmag_W803E converter parameter table

5.4.2 Excitation Time

There are two excitation modes to select: TYPE1、TYPE2。Small diameter sensor excitation system exciting small caliber, TYPE1 should be selected. Large diameter sensor excitation system exciting large caliber, TYPE2 should be selected.In use, first select excitation TYPE1, if the meter displays flow rate zero is too high or SYS, then select TYPE2. Note: excitation mode shall be in consistent with calibration mode.

5.4.3 Sensor Coding

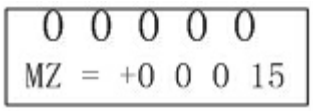
Sensor encoder is used by the factory to record the sensor.

5.4.4 Empty Pipe Value

Lmag_W803D measures the resistance between the two electrodes of the sensor to determine whether the pipe is empty. In the measurement mode, when the pipe is full, observe the fluid measured resistance value (R%), then take 1.5 to 2 times of the measured values to set the empty pipe alarm threshold . When the pipe is empty, the resistance between the electrodes increases, if the threshold is exceeded, empty pipe alarming is triggered.

5.4.5 Empty Zero CRC

User can do empty pipe zero-point correction. When doing the calibration, make sure the senior is full. Empty pipe zero-point correction displayed as below:



Upper large characters: calibrated empty pipe zero-point.

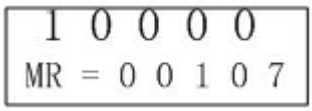
Lower small characters: MZ means measured zero-point;

According to the actual measured conductivity R%, do correction to make MZ=5 – 10.

Note: if increase upper line character and MZ decreases.

5.4.6 Empty Range CRC

User can do full pipe zero-point correction when the conductivity R% is small. When doing the calibration, make sure the senior is empty. Full pipe zero-point correction displayed as below:



Upper large characters: calibrated full pipe zero-point.
Lower small characters: MR means measured zero-point;
Increase upper line character and MR decreases. Decrease upper line character and MR increases. User can correct MR to proper value based on actual needs, the conductivity obtained in empty pipe is actual corrected MR.

5.4.7 Empty Range CRC

The converter has the function of system alarm prohibition. When "prohibited", the alarm function of the system is cancelled. When permitted, the instrument has the function of system alarm.

5.5 Linearization

5.5.1 Linearizati. Ena

The parameter is used to select whether meter linear correction will do. If “Forbidden”, correction will not do; if “Allowance”, correction will do.

5.5.2 Flow Correction Point 1-8, Finish point

Details refer to Annex 2.

5.6 Temperature Parameters

5.6.1 Heat Unit

There are four heat unit for users:GJ、MJ、KWH、MWH.

5.6.2 Sensor Position

There are four heat unit for users:GJ、MJ、KWH、MWH.

5.6.3 Temperature Filter

Long filtering time can improve the display stability of instrument temperature. short filtering time shows fast response speed and is suitable for production process control. The

choice of measuring time is chosen

5.6.4 Ent.T、Out.T Zero CRC,Ent.T、Out.T Range CRC

The connection method of Pt1000 thermal resistance is three wire bridge.See the Appendix 6 in detail.

5.6.5 Pressure Range

Battery power supply heat meter is set at 0.6MP and 1.6MP pressures according to the industry standard CJ128-2007 of the People's Republic of China.

5.6.6 Ent.Temperature calibrate、Out.Temperature calibrate

This coefficient is used to correct the difference between the temperature of a certain temperature point and the standard temperature. It does not affect the overall temperature linearity after correction. It is mainly used when there is an error in the field thermocouple indication. Only in the measurement state.

5.7 Communication

5.7.1 Comm Address

Communication address means address range when doing data communication. The address range is from 01 to 199 and address 0 is reserved.

5.7.2 Communicat.Gap

Communication Gap is used to send data to communication terminal, set range: 01～199S.The interval time is shorter, the greater the meter communication modules power consumption and the faster the data updates. The factory default time interval is 14S, users can change according to the actual needs.

5.7.3 Irda Port Enable

This function is temporarily reserved.

5.7.4 Communication Rate

The scale of communication rate is:1200、2400、4800、9600、14400.

5.7.5 Check mode

Converter marking communication mode is no parity of standard MODBUS check mode. Users can choose odd parity or even parity as needed.

5.8 Factory Adjust

5.8.1 Language

There are Chinese and English in Lmag_W803E converter for users.

5.8.2 Meter Factor

Factory calibration factor the special factor of sensor-made-factory and the factory use this factor to unite Lmag_W803E converters to make sure all the Meters can interchange by 0.1%.

5.8.3 Meter Correct

Used by the factory.

5.8.4 Enter Password

Users enter the password with high password. This password can be modified. This password can set up partial user parameters.

5.8.5 Meter Code 1-4

Converter coder records the time the converter leaves the factory and the number.

5.9 Total Parameter

5.9.1 Flow Total Unit

9 bit calculator is applied and the upper limit is 999999999.

Flow Integrating Units are: 0.001L, 0.010L, 0.100L, 1.000L

$0.001m^3$, $0.010m^3$, 0.100m3, 1.000m3

5.9.2 Heat Total Unit

9 bit calculator is applied and the upper limit is 999999999.
Heat Integrating Units are:

0.001GJ、 0.010GJ、 0.100GJ、 1.000GJ
0.001MJ、 0.010MJ、 0.100MJ、 1.000MJ
0.001KWH、 0.010KWH、 0.100KWH、 1.000KWH
0.001MWH、 0.010MWH、 0.100MWH、 1.000MWH

5.9.3 Clear Total Key

User can use upper level password to set total clearing password. Enter function selection menu, press the page key to enter into total clearing menu to set the total clearing password, and complete the total clearing.

5.9.4 Forward and Reverse Total High and Low

Total high and low bit setting can change the flow total value which is used in meter maintenance and replacement. User use high level password to change the flow total value and generally can't exceed the maximum value of counter (999999999).

5.9.5 Heat Total High and Low

Total high and low bit setting can change the heat total value which is used in meter maintenance and replacement. User use high level password to change the heat total value and generally can't exceed the maximum value of counter (999999999).

5.9.6 Total Display

User can choose the total display mode according needs.

Total Display are： Flow+、 Flow+,Flow-、
Flow+,Flow-,FD、 Heat Quantity、
Flow+,Heat、 Flow+,Flow-,LM、
F+,F-,FD,LM、 Flow+,Heat,LM、

5.10 Pressure Parameters

5.10.1 Pressure Unit

Pressure Units are：

0.001Kpa、 0.010Kpa、 0.100Kpa、1.000Kpa
0.001Mpa、 0.010Mpa、 0.100Mpa、1.000Mpa

5.10.2 P_Sensor Exit

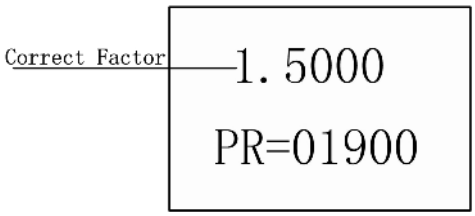
The user selects the maximum equivalent resistance value Rs according to the full range pressure of the pressure sensor.See the Appendix 5 in detail.

5.10.3 Pressure Gain

Measurement gain selection based on maximum output signal value of pressure sensor at full range pressure. See the Appendix 5 in detail.

5.10.4 Pressure Zero CRC and Pressure Gain CRC

Pressure correction method: First according to defined interface, connect pressure sensor with converter. Adjust pressure sensor to zero, correct pressure zero PZ to 0, and then adjust pressure sensor to the full-scale, correct pressure full-scale PR to full scale value.



6 Performance Indicators

- Environmental Temperature:-20℃-- 50℃
- Relative Humidity: ≦95％
- Outer Covering Protection Level: IP68
- Flow Speed Measurement Range :0-15m/s
- Conductivity: Clean water >20 μs/cm
- Measuring Diameter: DN10---DN2000
- Matching Accuracy Class: 0.5
- Measurement Parameter: instantaneous flow, instantaneous flow rate
- Record Parameter: accumulated total Flow
- Detection and Alarm Parameters: Fluid empty pipe detection alarm, excitation current detection alarm
- Test mode Output Signal: Unit volume flow pulse
- Communication Mode: RS485 (modbus protocol), GPRS
- Battery Working Time

Table 6.1.1 Corresponding Table of Battery life and Interval Measurement Time (Excitation Mode 2)

Cycle Measuring Time	50mA Excitation Use Time	20mA Excitation Use Time
30S	74months	103months
25S	62months	87months
20S	49months	69months
15S	37months	52months
14S	34months	48months
13S	32months	45months
12S	30months	42months
11S	27months	38months
10S	24months	34months
9S	21months	31months
8S	18months	27months
7S	15months	24months
6S	13months	21months
5S	10months	17months

3S	7months	10months

Table 6.1.2 Battery Life Factor Corresponding Excitation Mode

Excitation Mode	Mode 1	Mode 2	Mode 3
Battery Life Factor	1.24	1.0	0.83

When the sensor has large diameter, the corresponding excitation cycle is long (see excitation mode parameter), therefore there is more power consumption.

6.1 Sensor Matching Requirements

- For 20mA excitation, sensor excitation coil resistance: 75 to 100 Ω (two coils in series)
- For 25mA excitation, sensor excitation coil resistance: 50 to 70 Ω (two coils in series)
- For 35mA excitation, sensor excitation coil resistance: 35 to 45 Ω (two coils in series)
- Sensor flow signal strength: 50 to 100 μV (1m/s)

Note: Special note is necessary to order excitation coil resistance!

Explain: When doing the flow correction, if corrected sensor factor is around 1.0000, it is indicating that the flow sensor signal strength meets the requirements. If corrected sensor factor is greater than 1.0000, it is indicating that flow sensor is with low sensitivity. If corrected sensor factor is less than 1.0000, it is indicating that the flow sensor is with high sensitivity. If flow sensor with high sensitivity, stability and conducive of the flow meter measurement accuracy is better.

Generally, Lmag_W803E converter can achieve good matching if ordinary sensor of 250mA excitation converter produced by our company is equipped and correction factor is less than 1.0000.

6.2 Installation dimension diagram

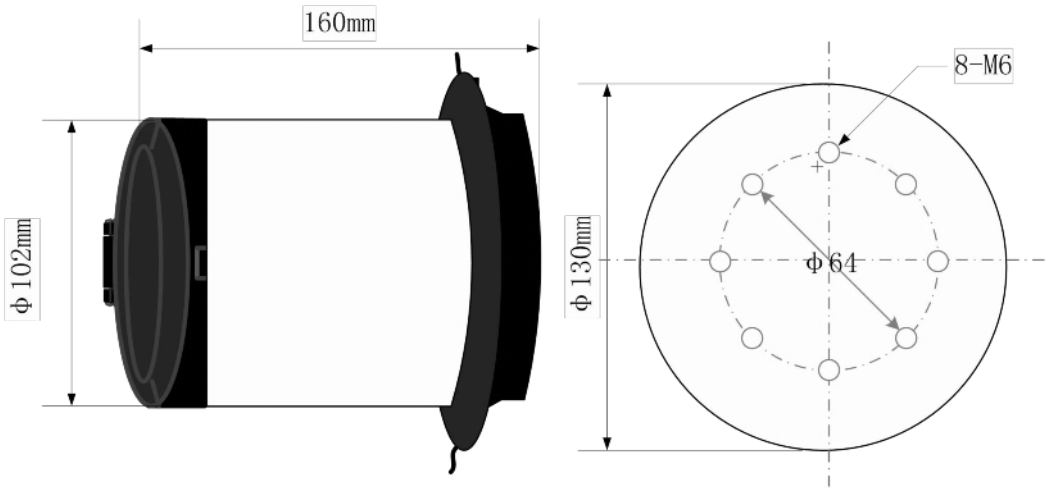


fig. 6.2.1 Mounting Drawing

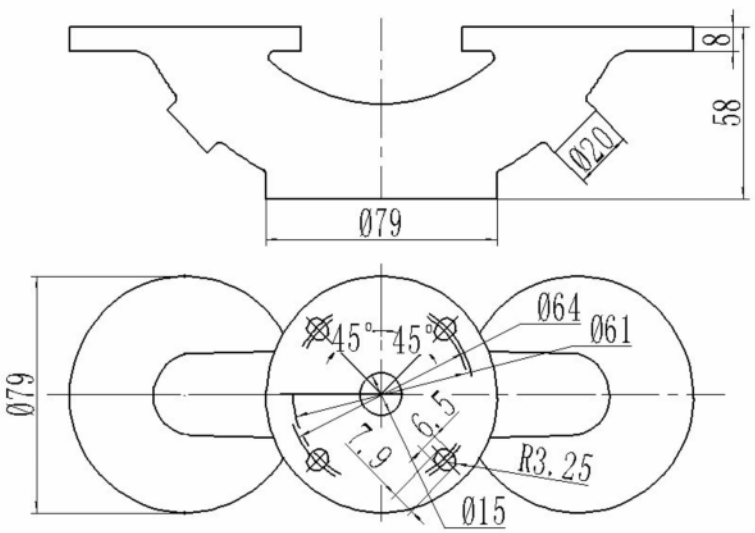


Fig.6.2.2 One flange installation size chart

7 Alarming Information

There are several kinds of alarming shown: S—system alarming, M—empty pipe alarming, C—small signal cut alarming, A/B-temperature break alarm. If S displays, it is possible that converter exciting breaks or converter excitation frequency mode selection inappropriate.

8 Error Disposition

8.1 No Display

* Check whether the power is on
* Check whether the power fuse is in good condition
* Check whether the power voltage meets the requirement

8.2 Excitation Mode Alarming

* Check whether excitation wiring EX1and EX2 is open circuit
* Check whether the total sensor excitation coil resistance is less than 150Ω
* If the items above are in normal, then the converter is malfunctioned

8.3 Empty Pipe Alarming

* Check whether the fluid is full of the senior pipe
* Connect SIG1, SIG2 and SIGGND to short circuit, if the empty pipe alarming “Empty Pipe” disappeared, the meter is in normal condition; otherwise, the error may caused by low fluid conductance, wrong setting of empty pipe threshold or range.
* Check whether the signal wiring is correct
* Check whether the senior pole is in normal condition

If the flow is zero, the displayed conductance ratio shall be less than 100%

If there is liquid in pipe, the resistance between SIG, SIG2 and SIGGND shall be less than 50kΩ.(If the medium is water, it is better to use pointer multi-meter to do the test and there is charge and discharge during the testing.)

* The DC voltage between DS1and DS2 shall be less than 1V, otherwise, it means the sensor pipe pole is polluted and cleaning is needed.

8.4 Flow Measurement Inaccurate

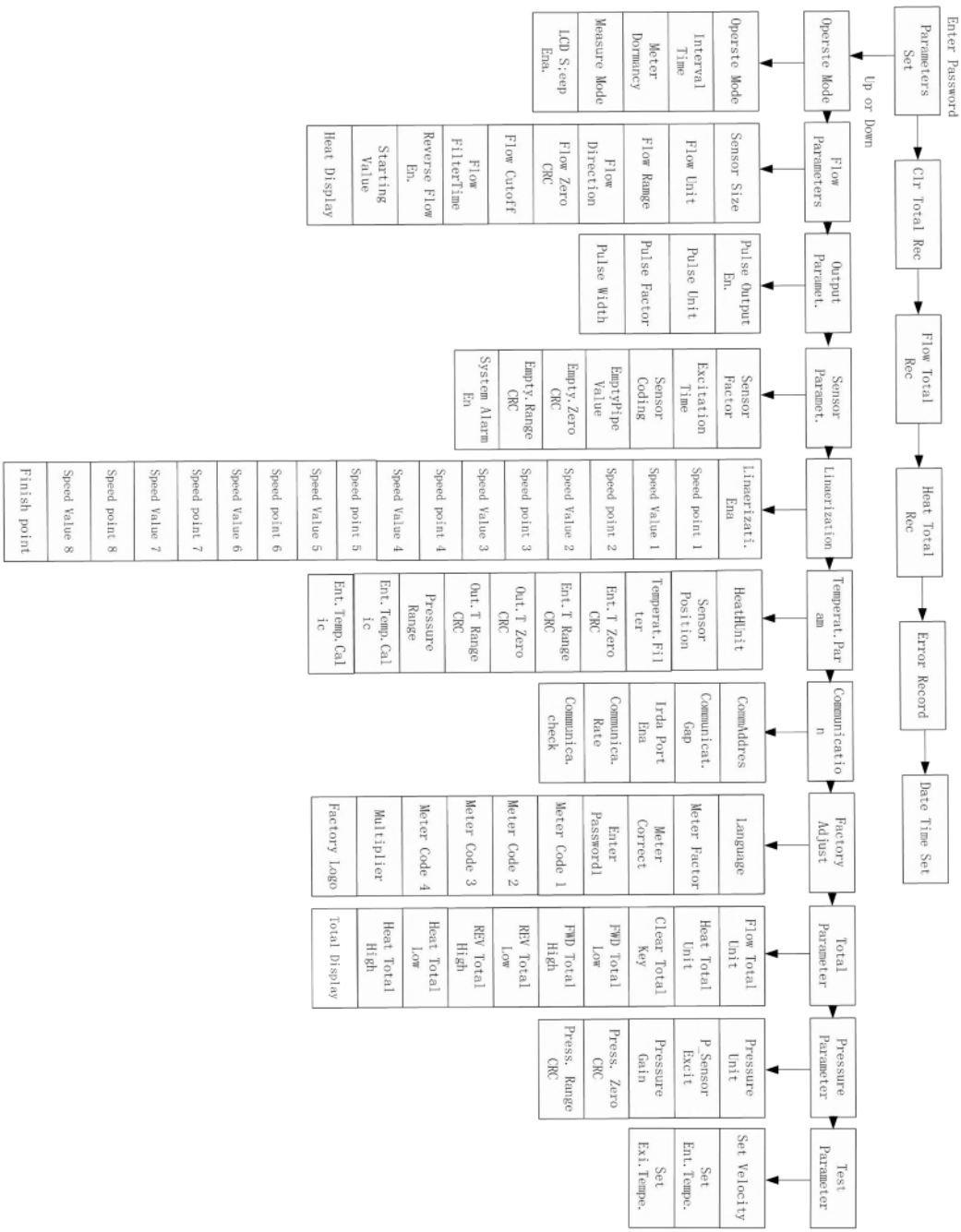
* Check whether the liquid is full of sensor pipe
* Check whether the signal cable is in normal condition
* Check the sensor parameter and zero-point is set by sensor label or factory calibration

8.5 Remote control Key Failure

If the buttons are unresponsive when aligned remote control to infrared tube, the power button battery insides the remote control may be low. The remote control can be detached to measure button battery voltage. If the value is lower than 2.7V, the remote control can't work properly. Then button battery needs to be replaced.

Solemnly declare: the manual is applied to common software and if the content is not in consistent with the converter, refer to the actual product.

Annex 1 Parameter Setting Overview



Menu List

Code	Parameters	Set	Content	Password Level
一	**Operate Mode**			
1	Operate Mode	Select	Only Flow、Flow+Pressure、Flow+Temperature	1
2	Interval Time	Select	2～30S	1
3	Meter Dormancy	Set Count	0～59999	1
4	Measure Mode	Select	Measure Heat、Measure Cold	1
5	LCD Sleep Ena.	Select	Enable、Disable	1
二	**Flow Parameter**			
1	Sensor Size	Select	10～2000mm	1
2	Flow Unit	Select	L/h、L/m、L/s、m^3/h、m^3/m、m^3/s	1
3	Flow Range	Set Count	0～59999	1
4	Flow Direction	Select	FORWARD、REVERSE	1
5	Flow Zero CRC	Set Count	0～±9999	1
6	Flow Cutoff	Set Count	according to flow	1
7	Flow FilterTime	Select	3～30S	1
8	Reverse Flow En.	Select	Enable、Disable	1
9	Starting Value	Set Count	0～59.999m/s	1
10	Heat Display	Select	Reserved	
三	**Output Parameters**			
1	Pulse Output En.	Select	Enable、Disable	1
2	Pulse Unit	Select	m^3 、Ltr	1
3	Pulse Factor	Set Count	0.0000～ 5.9999	1
4	Pulse Width	Select	0.05～12.5ms	1
四	**Sensor Paramet.**			
1	Sensor Factor	Set Count	0.0000～3.9999	1
2	Excitation Time	Select	TYPE1、TYPE2	1
3	Sensor Coding	User set	Factory YAER、MONTH（0～59999）	1
4	EmptyPipe Value	Set Count	0～59999	1
5	Empty.Zero CRC	Set Count	0～59999	1
6	Empty.Range CRC	Set Count	0～59999	1
7	System Alarm En.	Select	Enable、Disable	1
五	**Linearization**			

1	Linearizat. Ena	Select	Enable、Disable	1
2	Speed point 1	User set	According to Velocity	1
3	Speed Value 1	User set	According to Velocity	1
4	Speed point 2	User set	According to Velocity	1
5	Speed Value 2	User set	According to Velocity	1
6	Speed point 3	User set	According to Velocity	1
7	Speed Value 3	User set	According to Velocity	1
8	Speed point 4	User set	According to Velocity	1
9	Speed Value 4	User set	According to Velocity	1
10	Speed point 5	User set	According to Velocity	1
11	Speed Value 5	User set	According to Velocity	1
12	Speed point 6	User set	According to Velocity	1
13	Speed Value 6	User set	According to Velocity	1
14	Speed point 7	User set	According to Velocity	1
15	Speed Value 7	User set	According to Velocity	1
17	Speed point 8	User set	According to Velocity	1
18	Speed Value 8	User set	According to Velocity	1
19	Finish point	User set	According to Velocity	1
六	**Temperat. Param**			
1	Heat Unit	Select	GJ、MJ、KWH、MWH	1
2	Sensor Position	Select	Inlet/Export	1
2	Temperat. Filter	Select	06～63	1
3	Ent.T Zero CRC	Set Count	00000～ 59999	1
4	Ent.T Range CRC	Set Count	0.0000～1.9999	1
5	Out.T Zero CRC	Set Count	00000～ 59999	1
6	Out.T Range CRC	Set Count	0.0000～1.9999	1
7	Pressure Range	Select	0.6MPa/1.6MPa	1
8	Ent.Temp.Calic	Set Count	0.0000～1.9999	1
9	Out.Temp.Calic	Set Count	0.0000～1.9999	1
七	**Communication**			
1	CommAddres	Select	0～199	1
2	Communicat.Gap	Select	14～250S	1
3	Irda Port Ena	Select	Disable IrDA All、Enable Irda UP_P、Enable IrDA LowP	1
4	Communica.Rate	Select	1200～14400	1
5	Communica.check	Select	No Parity、Odd Parity、Even Parity	1
八	**Factory Adjust**			
1	Language	Select	简体中文、ENGLISH	1

2	Meter Factor	Set Count	0.0000～0.9999	1
3	Meter Correct	Set Count	0.0000～1.9999	1
4	Enter Password1	Set Count	0～59999	2
5	Meter Code 1-4	Factory set	Factory YAER、MONTH（0～59999）	2
6	Multiplier	Set Count	0.0000～3.9999	1
7	Factory Logo	Select	Enable、Disable	1
九	**Total Parameter**			
1	Flow Total Unit	Select	0.001m^3～1m^3、0.001L～1L	1
2	Heat Total Unit	Select	0.001GJ～1.000GJ、 0.001MJ～1.000MJ、 0.001KWH～1.000KWH、 0.001MWH～1.000MWH	
3	Clear Total Key	User set	0～59999	2
4	FWD Total Low	User set	0～99999	1
5	FWD Total High	User set	0～9999	1
6	REV Total Low	User set	0～99999	1
7	REV Total High	User set	0～9999	1
8	Heat Total Low	User set	0～99999	1
9	Heat Total High	User set	0～9999	1
10	Total Display	Select	Flow+ 、 Flow+,Flow- 、 Flow+,Flow-,FD、 Heat Quantity、 Flow+,Heat、 Flow+,Flow-,LM、 F+,F-,FD,LM、 Flow+,Heat,LM、	1
十	**Pressure Param.**			
1	Pressure Unit	Select	1.000KPa～ 1.000MPa	1
2	P_Sensor Excit	Select	ID=100uA for 20K、ID=250uA For 8K、 ID=500uA For 4K、ID=750uA For 2K5	1
3	Pressure Gain	Select	G=02 For 1000mV、G=04 For 500mV、 G=08 For 250mV、G=16 For 125mV、 G=32 For 62.5mV、G=64 For 31.25mV	1
4	Press. Zero CRC	Set Count	0～±9999	1
5	Press. Range CRC	Set Count	0.0000～ 5.9999	1

Annex 2 Function of Nonlinear Correction

The concept of the nonlinear-correction arithmetic is: in a range of flow rate, the instant value (fixed number) has been corrected into the value we desired.

The function has eight fixed points and one end number, so there are nine fixed intervals.

The flow-rate fixed points are: one, two, three, four, five, six, seven, eight, and the end.

The flow-rate fixed intervals are: zero-rate to one, one to two, two to three, three to four, four to five, five to six, six to seven, seven to eight, eight to the end.

The setting demand of flow rate must follow the principle which is from the little rate to the large rate. For instant, zero-rate <one <two < three < four< five< six< seven< eight <the end.

A flow-rate fixed point is corresponding with a flow-rate value: one point to one value, two point to two values, and so on.

Notice: All the flow-rate points and values are zero when the converters are product.

Example one: Setting with using all the fixed points.

Point No.	The instant flow-rate fixed points	The desired values	The interval used
1	0.100 m/s	0.110 m/s	Zero-rate--- 0.100 m/s
2	0.150 m/s	0.160 m/s	0.100 m/s -- 0.150 m/s
3	0.200 m/s	0.220 m/s	0.150 m/s -- 0.200 m/s
4	0.250 m/s	0.270 m/s	0.200 m/s -- 0.250 m/s
5	0.300 m/s	0.310 m/s	0.250 m/s -- 0.300 m/s
6	0.350 m/s	0.365 m/s	0.300 m/s -- 0.350 m/s
7	0.400 m/s	0.408 m/s	0.350 m/s -- 0.400 m/s
8	0.500 m/s	0.509 m/s	0.400 m/s -- 0.500 m/s
The end	0.600 m/s		0.500 m/s -- 0.600 m/s

Example two: Setting with using sectional the fixed points(four points).

Point No.	The instant flow-rate fixed points	The desired values	The interval used
1	0.100 m/s	0.120 m/s	Zero-rate--- 0.100 m/s
2	0.200 m/s	0.230 m/s	0.100 m/s -- 0.200 m/s
3	0.300 m/s	0.320 m/s	0.200 m/s -- 0.300 m/s

4	0.400 m/s	0.400 m/s	0.300 m/s -- 0.400 m/s
5	0.400 m/s	0.400 m/s	unused
6	0.400 m/s	0.400 m/s	unused
7	0.400 m/s	0.400 m/s	unused
8	0.400 m/s	0.400 m/s	unused
The end	0.400 m/s		unused

Notice: The point should be chosen one by one.

Example three: Setting with using sectional the fixed points(four points).

Point No.	The instant flow-rate fixed points	The desired values	The interval used
1	0.050 m/s	0.054 m/s	0.000 m/s -- 0.050 m/s
2	0.080 m/s	0.082 m/s	0.050 m/s -- 0.080 m/s
3	0.100 m/s	0.120 m/s	0.080 m/s -- 0.100 m/s
4	0.200 m/s	0.230 m/s	0.100 m/s -- 0.200 m/s
5	0.300 m/s	0.320 m/s	0.200 m/s -- 0.300 m/s
6	0.400 m/s	0.400 m/s	0.300 m/s -- 0.400 m/s
7	0.400 m/s	0.400 m/s	unused
8	0.400 m/s	0.400 m/s	unused
The end	0.400 m/s		unused

Notice: The point should be chosen one by one.

Flow correction formula

$$K = \frac{Q_{c1}}{Q_{p1}} + \frac{Q_X - Q_{P1}}{Q_{p2} - Q_{P1}} \times \left(\frac{Q_{c2}}{Q_{p2}} - \frac{Q_{c1}}{Q_{p1}} \right)$$

$$Qcx = K \times Qx$$

Qcx ---revised flow Qx ---revised before discharge K---intermediate variable

Annex 3 Information Record Function

W803C has data retention memory inside for record-keeping various types of data.

Date Recorded in W803E

Data	Data Format	Record Method	Record Length	Remark
Cumulated Total	9 bit decimal	permanent record	8 byte	
Monthly Total	Data + Total	cycle record	24 groups	record 24 months

Note: the information record function of W803E refers to Meter.

Cycle record:

New records overwrite the oldest records, record keeping N group. For example, 24 groups monthly total means a monthly total record of last month overwrites the record of 24 months ago (two and a half years of records are keeping).

Record View Method:

1, View the record on meter through remote control .

2, Through the RS485 function using PC W803E_485 reading month cumulative function view of the software.

Note:

1、The internal clock doesn't work when the meter dormant , if users need on the total product function, please don't set the instrument after setting up time sleep mode;.

2、After replacing the meter battery, it will automatically record a monthly total record and the date is January. 1, 2000. The cumulated value is the value of the point of battery replacement. This record is only used as a marker to replace the battery, and does not record the actual monthly gross.

Annex 4 Installing and connecting of pressure sensor

The picture Fig.f7.1 shows how to install the pressure sensor.

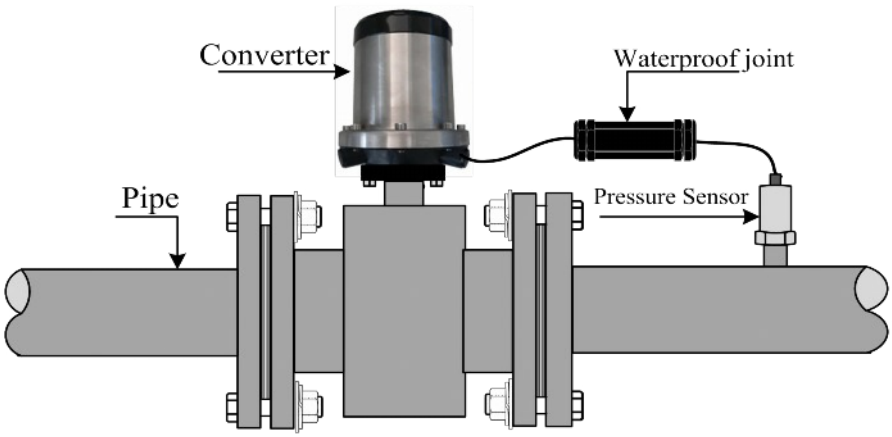


Fig.f7.1 The installing method of pressure sensor

The wire harness between the converter and pressure sensor has been shown on the picture Fig.f7.2.

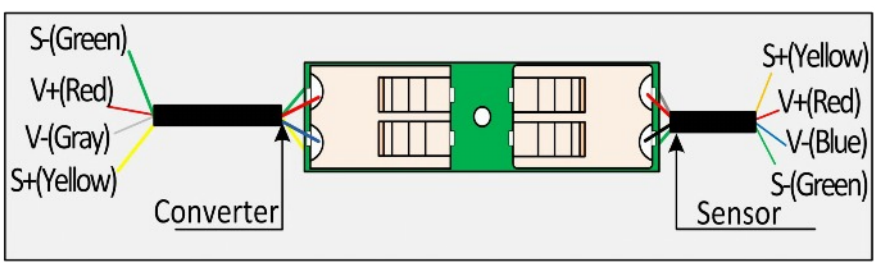


Fig.f7.2 The wiring order of the water-proof plinth

Note:The thread of pressure sensor is 1/2NPT(as shown on f7-3).

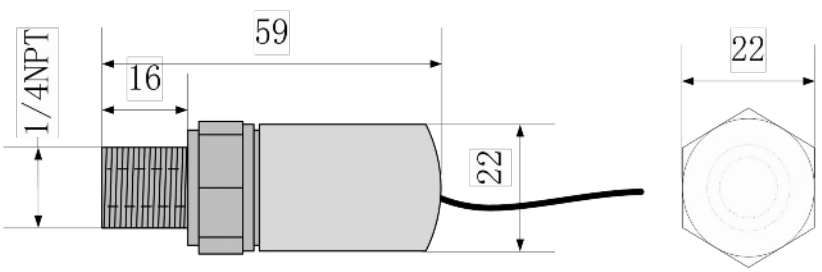


Fig f7-3 the thread of pressure sensor

Annex 5 The selection of P_Sensor Excit and Pressure Gain

If the user does not use the pressure sensor provided by our company, the P_Sensor Excitation and Pressure Gain should be properly selected before calibration.

The converter provide the voltage of Vmax=2V to pressure sensor. The pressure sensor feedback signal to the converter and the converter measure the pressure.

1. P_Sensor Excit is selected according to the maximum equivalent resistance Rs of the pressure sensor at full range pressure, as shown in the following table:

P_Sensor Excit Options	The maximum equivalent resistance of pressure sensor at full range of pressure is Rs
ID=750uA For 2K5、	2.5KΩ≤Rs＜3.25KΩ
ID=500uA For 4K	3.25KΩ＜Rs≤6KΩ
ID=250uA For 8K、	6KΩ＜Rs≤14KΩ
ID=100uA For 20K.	14KΩ＜Rs≤20KΩ

2、Pressure Gain is selected according to the maximum output signal value of the pressure sensor at full range pressure. Please calculate the gain according to the following formula and select according to the following table:

$$Vo' = \frac{ID \times Rs \times Vo}{Vi} \qquad A = \frac{2V \times Vi}{ID \times Rs \times Vo}$$

Formula Description：

Vo ': the maximum output signal of the pressure transducer which is adapted to the converter at full range of pressure after transformation.

A: Pressure Gain

Vi: Input Voltage of sensor;

ID: the selected P_Sensor Excit；

Rs: the maximum equivalent resistance for pressure sensor full range pressure;

Vo: maximum output signal voltage of pressure sensor at full range of pressure;

Pressure Gain Options	The maximum output signal of the pressure transducer which is adapted to the converter at full range of pressure after transformationVo’
G=02 For 1000mV	751 以上
G=04 For 500mV	376-750mV
G=08 For 250mV	187.6-375mV
G=16 For 125mV	93.76-187.5mV
G=32 For 62.5mV	46.88-93.75mV
G=64 For 31.25mV	0-46.87mV

For example：The parameters of the pressure sensors are as follows:

Input Voltage V_i is 3.3V，the range of the Output Voltage Vo is 0-100mV，the pressure measurement scale is 0-1.6MPa。

1、Select P_Sensor Excit:

Test the maximum equivalent resistance of the pressure sensor at full range pressure Rs=3.8KΩ

According to the resistance Rs, select the resistance higher than the "P_Sensor Excit" option, so select the pressure-excited current ID = 500uA For 4K.

2、Select Pressure Gain：

$$Vo' = \frac{ID \times Rs \times Vo}{Vi} = \frac{500uA \times 3.8K\Omega \times 100mV}{3.3V} = 57.58mA$$

$$A = \frac{2V \times Vi}{ID \times Rs \times Vo} = \frac{2V \times 3.3V}{500uA \times 3.8K\Omega \times 100mV} = 34.74$$

Formula Description：

Vo ': the maximum output signal of the pressure transducer which is adapted to the converter at full range of pressure after transformation.

A: Pressure Gain

Vi: Input Voltage of sensor; ID: the selected P_Sensor Excit；

Rs: the maximum equivalent resistance for pressure sensor full range pressure;

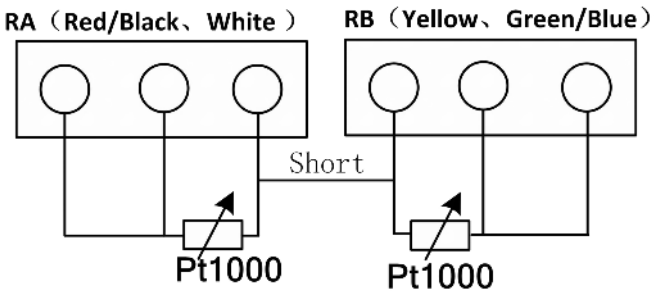
Vo: maximum output signal voltage of pressure sensor at full range of pressure;

So the pressure gain should be G=32 For 62.5mV

Annex 6 Heat Maesurement Instructions

1、Temperature calibration method:

The temperature measurement part of the heat meter is connected by the Pt1000 thermal resistance three wire bridge connection, wiring is as below:



Current zero-point calibration and range calibration should be applied in thermal resistance measurement circuit. The convertor has be calibrated in the factory and if calibration is still needed, follow the below steps:

A: use resistance box (connect according to three-wire bridge)

Step 1: Choose 1000Ω resistance and adjust zero-point value (generally 1010) in the entrance (outlet) temperature zero-point parameter until the upper line of the LCD shows “0”.

Step 2: Choose 1535.8Ω resistance and adjust zero-point value (generally 0.7100) in the entrance (outlet) temperature zero-point parameter until the upper line of the LCD shows “1400”.

B、use blackbody furnace (connect according to three-wire bridge)

Step 1: Put thermal resistance ice water immersion, adjust zero-point value (generally 1010) in the entrance (outlet) temperature zero-point parameter until the upper line of the LCD shows “±0”.

Step 2: Choose temperature 140℃ of blackbody furnace, put the thermal resistance into blackbody furnace, adjust zero-point value in the entrance (outlet) temperature zero-point parameter until the upper line of the LCD shows “1400”.

2 Heat calculation method

The heat calculation is done according to CJ128—2007.

Heat calculation:

When the water flows through the installed integrated heat meter or combined meter, the water signal is obtained based on the water flow and temperature from the sensor. The calculation is done based on the water signal and flow time to show the heat released or absorbed.

The format is:

$$Q = \int_{\tau 0}^{\tau 1} q_m \times \Delta h \times d\tau \quad = \int_{\tau 0}^{\tau 1} \rho \times q_v \times \Delta h \times d\tau$$

Q - Heat released or absorbed (J);

qm – Water flow (kg/h);

qv - Water volume flow (m3/h);

ρ – Water density (kg/m3);

Δh - Enthalpy difference between entrance water temperature and outlet water temperature(J/kg);

T – Time (h).

In the format, the destiny and enthalpy is in compliance with the Annex A requirement of CJ128-2007. If the temperature is not integer, the calibration is needed.

Remark: The measurement of the quantity of heat is calculated by using hot melting value of entrance and exit multiplying flow. So the calculated value relates to increment of one second of accumulative flow. That is to say, every time accumulative flow generates one increment, the quantity of heat should be calculated. So unit of accumulative flow should not be adjusted too much, avoiding that it takes long time to generate one accumulative flow increment. Accumulative flow is represented by 9 bits decimal numbers (999999999). Flow unit is 0.001 m3, 0.01m3, 0.1 m3, 1 m3. The choice of flow unit should meet the demand that it won't overflow in 2-3 years.

Annex 7 Waterproof connector wiring method

When the user needs to bring all kinds of output lines (such as pressure line, heat line, communication line, external power source) to the converter,

If it needs to be extended, it is suggested to use the 4 core waterproof connector of our company. In order to ensure the connection reliability of the connector inside the connector, the output line of our company has increased the cold pressure terminal of the tube type. It can directly connect to the terminal of the 4 core waterproof connector, and the suggestion of the client's wire rod will also increase the corresponding cold pressure according to the need. Terminal (see Figure 7-1).

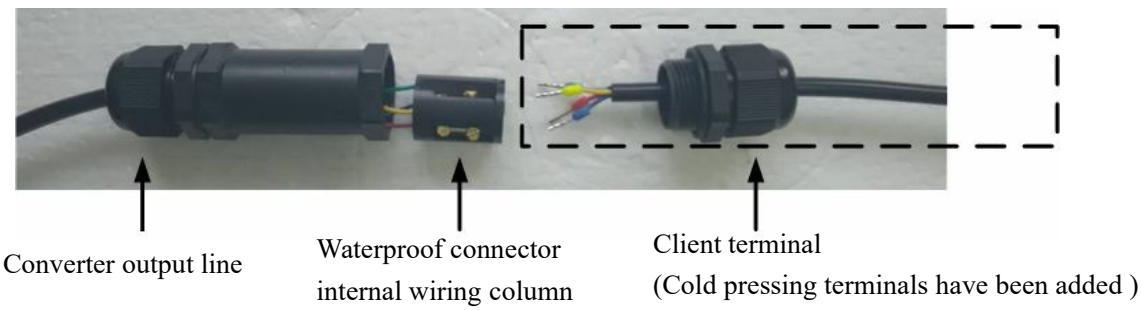


Fig F7-1 Converter elicited line lengthening

Installation method: Wires are passed through the connector in the order of 7-2 attached to the drawing and connected in the terminal post, then the terminal post is put into the connector, and finally the locking caps at both ends of the connector are tightened.

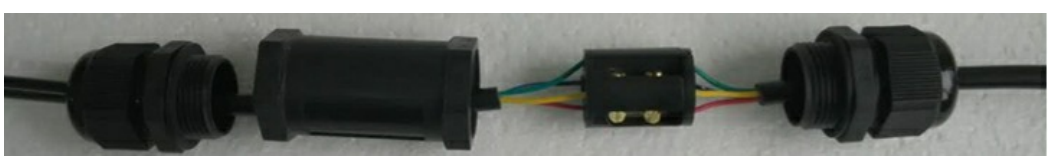
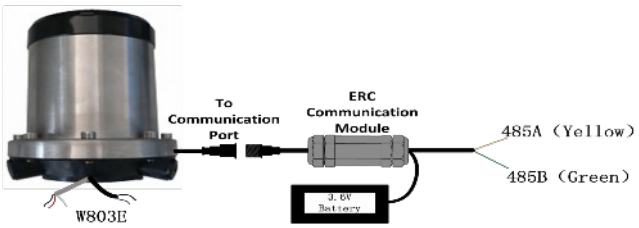


Fig F7-2 Connector wiring and installation sequence diagram

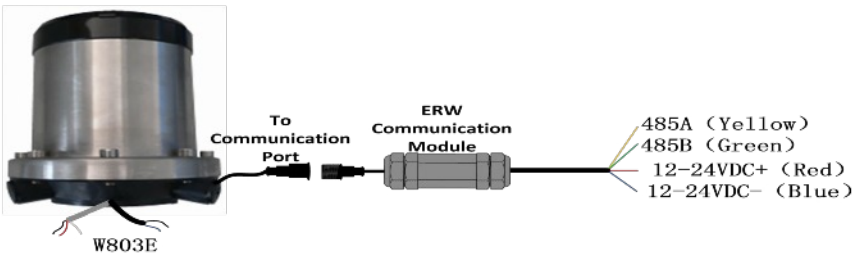
Fig F7-3 the picture of connector after wiring

Annex 8 MODBUS 485 Communication wiring method

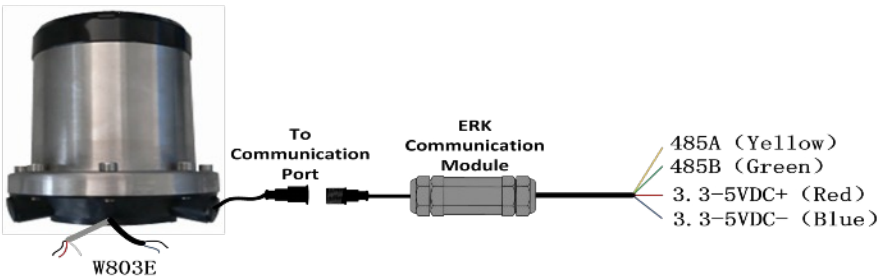
1、Connection diagram of 3.6V battery power supply(ERC)



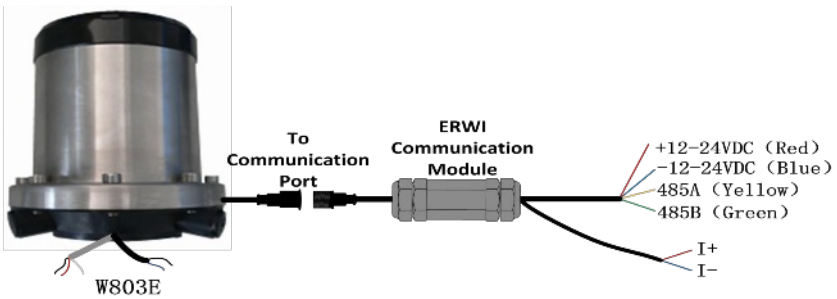
2、Connection diagram of 12-24V battery power supply(ERW)



3、Connection diagram of 3.3-5V battery power supply(ERK)



4、Connection diagram of 12-24V battery power supply(ERWI)



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