Lmag_W801 Battery Powered Electromagnetic Converter

Operating Manual

JUNE 2021

Contents

1 Summery

Developed by my company, Lmag_W801 series battery powered electromagnetic converters are battery powered, capable of being used together with common electromagnetic flow meters, with the flow rate measurement accuracy up to 0.5 level and 0.2 level. That is to say, a new type of products — battery powered electromagnetic converter series will be developed simply by connecting a Lmag_W801 converter to a common electromagnetic flow meter.

The Lmag_W801 battery powered electromagnetic converter is equipped with a lithium battery as its standard configuration, which can work consecutively three to six years. If a high-capacity battery is equipped, the continuous working time will be much longer.

The Lmag_W801 battery powered electromagnetic converter may use a base-station type radio communication network system, with the communication base station built in the central area, and coverage radius designed as 1000M. Battery powered electromagnetic converter communicate with the base station within a closer distance (SRD mode), by use of an opened power frequency range — 928MHZ （American standard）. The base station, via GPRS or CDMA mobile communication network, realizes data communication with the supervisory computer. In addition, the Lmag_W801 battery powered electromagnetic converter may, via GPRS or CDMA mobile communication network, directly realize data communication with the supervisory computer. (Please see communication instructions for further information about GPRS communication).

2 Performance indexes

- Ambient temperature－２０℃—５０℃
- Ambient humidity≦９５％
- Level of protection for case: IP65
- Measuring range of flow rate:0--15m/s
- Medium conductivity: clean water＞ ２０ μs/cm
- Range of nominal diameters measurableDN3—DN800

■ Accuracy grade of sensors: Grade 0.5, grade 0.2

■ Measurable parameters: instantaneous flow rate, instantaneous flow velocity

■ Recordable parameters: accumulative total of flow, record of 32 events

Test alarm parameters: Fluid empty-tube test alarm Exciting current test alarm

Battery capacity test alarm

■ Calibrated output signal: Flow and impulse per unit volume

■ Radio communication mode: ＳＲＤ、ＧＰＲＳ、ＣＤＭＡ

■ Working hours of battery

Battery life corresponding measurement cycle time (type 1)

measurement cycle time	50mA excitation life	20mA excitation life
15s	50 months	70 months
14s	46 months	65 months
13s	43 months	60 months
12s	40 months	56 months
11s	36 months	51 months
10s	32 months	46 months
9s	29 months	42 months
8s	25 months	37 months
7s	21 months	32 months
6s	18 months	28 months
5s	14 months	23 months
4s	11 months	18 months
3s	10 months	14 months

Battery life coefficients corresponding exciting type

Exciting type	Type	Type	Type	Type	Type	Type6	Type	Type
Battery coefficient	1.0	0.85	0.75	0.60	0.50	0.42	0.37	0.30

3 Requirements for sensors matched

▲ For 20mA excitation, resistance of excitation coil of sensor: 90~110 ohm (two in series) (it is suggested)

▲ For 50mA excitation, resistance of excitation coil of sensor: 40~50 ohm (two in series)

▲ Signal intensity of flow of sensor: 50~100μv (1m/s flow rate)

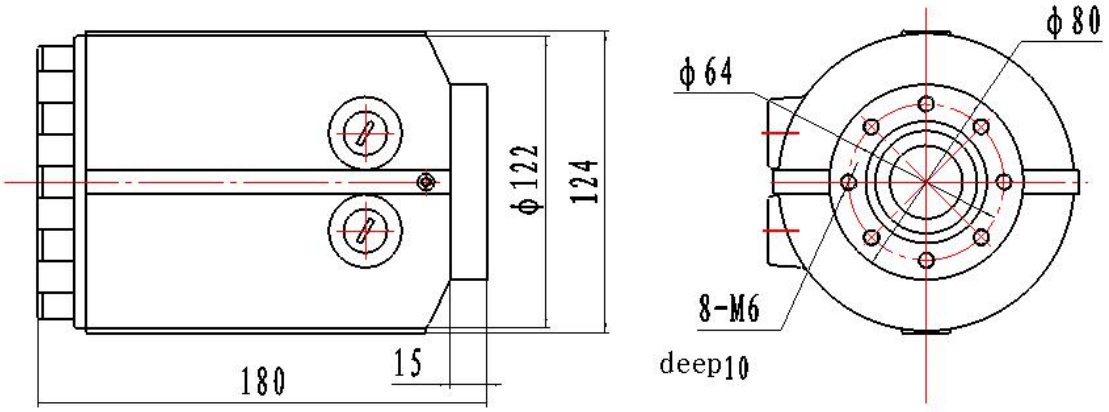
Note: it must be particularly stated for the parameters of excitation coil resistance when placing an order!

Instructions: When calibrating flow, if the sensor coefficient calibrated is close to 1.0000, which means the signal intensity of flow of sensor measures up to the requirement. A sensor coefficient greater than 1.0000 means low flow sensitivity, while a sensor coefficient smaller than 1.0000 means high flow sensitivity. Higher flow sensitivity is conducive to improving measurement stability and accuracy of flow meters.

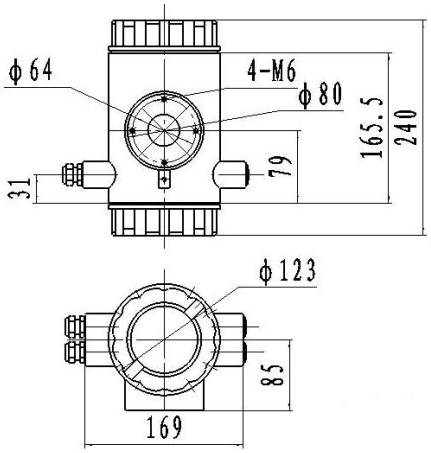
In principle, the Lmag_W801 250mA excitation converter can matches well with any common sensors of which the coefficient is calibrated below 1.0000.

4 Mounting drawing

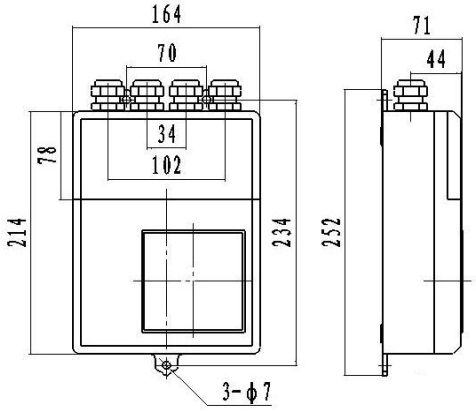
4.1 The Round and vertical type, integral structure



4.1 The Round and decumbent type, integral structure



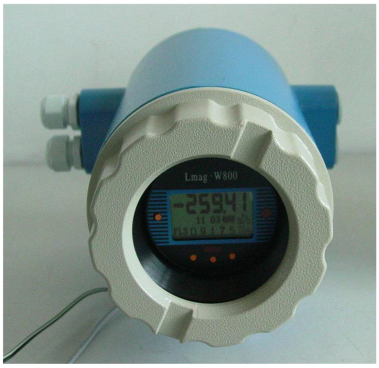
4.3 The square type, separate structure



5 Pictures of Converters

The square type, separate structure

The Round and vertical type, integral structure (with GPRS communication function)

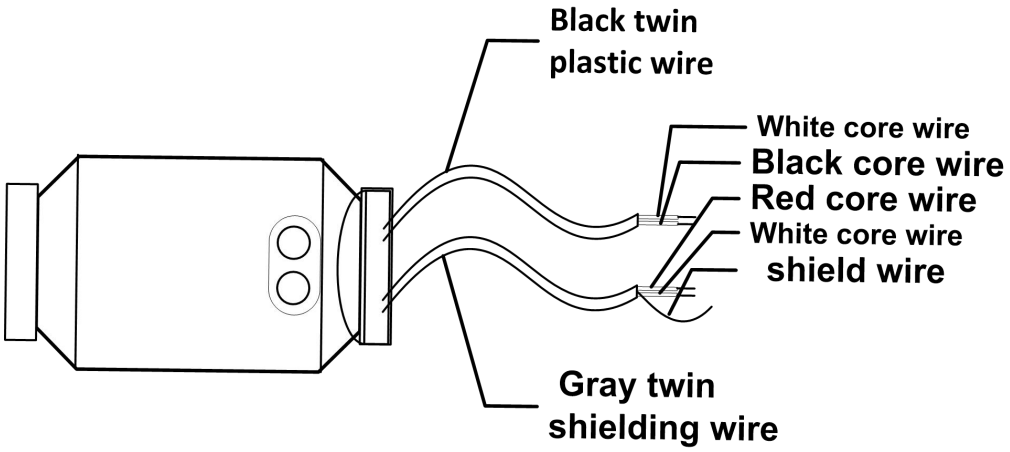


The Round and decumbent type, integral structure

6 Definition of signal line for converter

6.1 Terminal wiring and signs for round integral meters

The Lmag_W801 electronic integral water meter converter connects with sensor via two group of wiring terminals respectively, signal line group and excitation line group. When connection work is doing, make sure every connection is correct and check them carefully, to avoid any possible damage to meters for reason of incorrect connection.



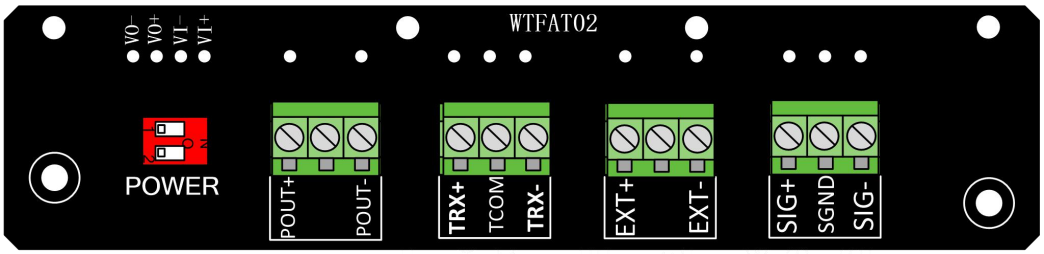
Schematic diagram of Lmag_W801 signal lines

Signal lines are signed as follows :

Black twin plastic wire: White core wire ⎫ For exciting current use
Black core wire ⎭

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”

6.2 Terminal wiring and signs for square separate meters



POUT	Flow Frequency (Pulse) Output	Impulse output
PCOM	Frequency (Pulse) Output Ground	
TRX+	Communication Input(RS485-A)	Communication Input
TCOM	Communication Ground	
TRX –	Communication Input(RS485-B)	
SIG 1	Signal 1	For Separate Sensor use
SGND	Signal Ground	
SIG 2	Signal 2	
EXT +	Exciting Current +	
EXT –	Exciting Current –	

The separate battery powered electromagnetic converter is applicable for submersible battery powered electromagnetic. In practical use, the battery powered electromagnetic sensor is extended down to the underground, while the battery powered electromagnetic converter is mounted on the ground surface. The special design allows the cable connection between the sensor and the converter as long as 10M, but no effect is exerted on the measurement accuracy of flow. The meter is first developed in China as a kind of battery-powered electromagnetic converter.

6.3The grounding requirements when installing convert

Contact area of copper Connector PE on Converter Cabinet for grounding should be larger than 1.6mm^2.Contact resistance should be less than 10Ω.

First, purple copper tube should be cut into 1700 mm long (the copper tube can be lengthened according to the need) to make the nail buried 1500 mm into the ground(Note : when burying nail, sprinkling a layer of broken charcoal at the top of nail, and then saline irrigation).

Then, 4mm2 purple copper wire should be welded to the nail. At last, connecting ground wire to convert's flange, ground ring and pipeline's flange. It is shown in figure 6.3

Note: Stainless steel must be used when fixing ground screws, spring washers and flat washers.

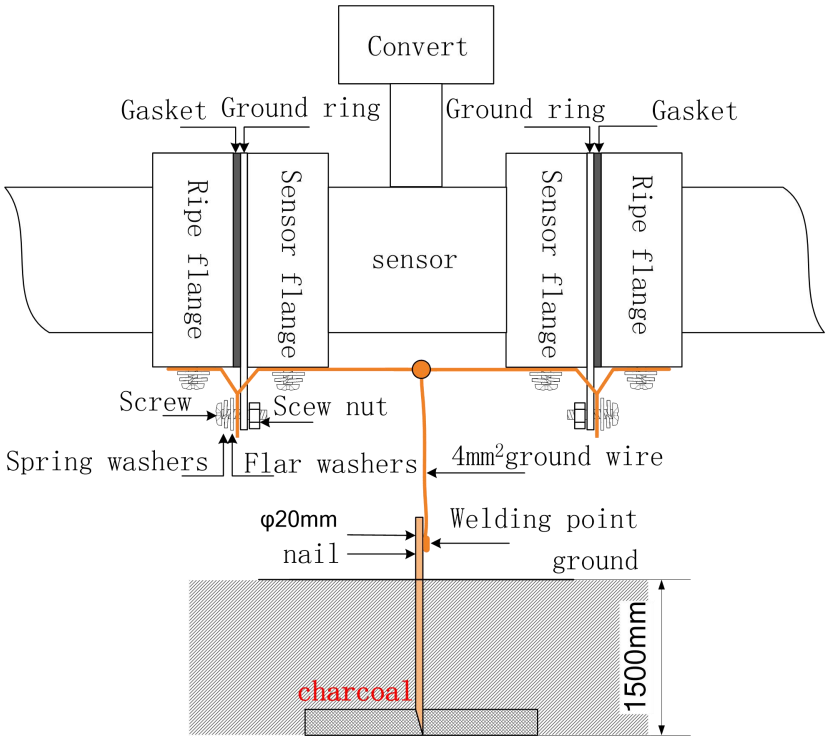


Fig6.3 Grounding

7 Flow verification

7.1 Impulse output signal line

For meeting the need of flow verification, Lmag_W801 is designed with impulse output signal and impulse output per unit volume. The impulse interface is of a collector open-circuit output (OC gate). Note: a non-electrical isolation is applied between the impulse output circuit and meter measurement circuit, with the maximum voltage bearable of 30V and the maximum current bearable of 20mA.

Working only under the flow verification mode, the impulse output signal is in the closing state under the measurement mode. Meter wiring connection is as shown in following figures:

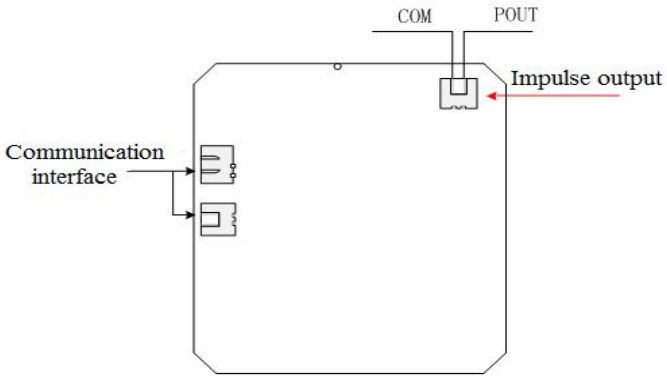


Figure Connection diagram for round converter's LCD backboard

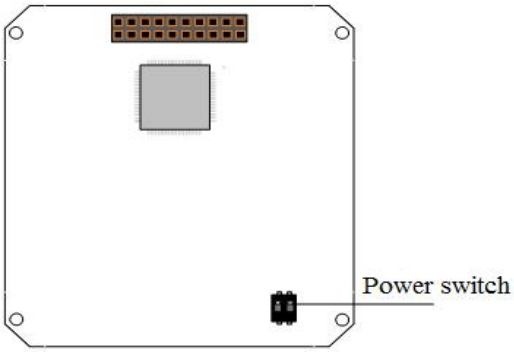


Figure Connection diagram for round converter's motherboard

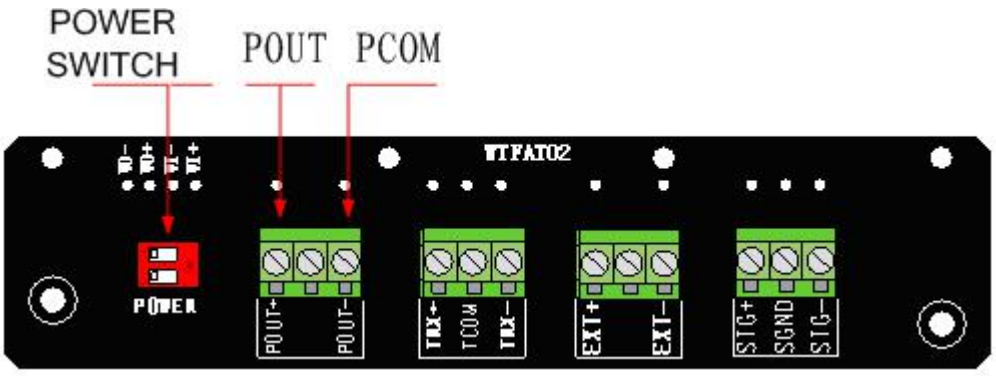


Figure Connection diagram for square converters

POUT ——— Output COM ——— Ground wire

7.2 Connection between impulse output and calibration system

7.2.1 Connection of digital quantity level output

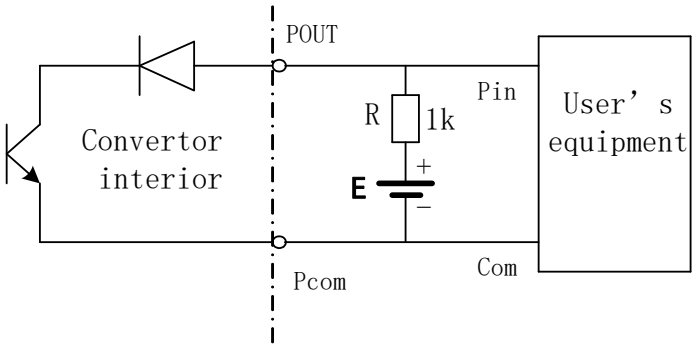


Figure: Connection of digital quantity level output

7.2.2 Connection between digital quantity output and optoelectronic coupler (for example,PLC,etc.)

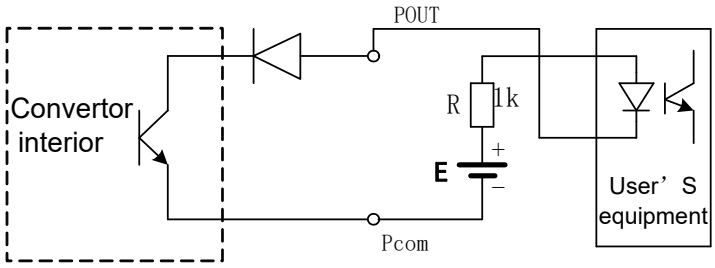


Figure: Connection between digital quantity output and optoelectronic coupler (for example, PLC, etc.)

7.3 Setting of impulse output parameters

▲ Through verification, the maximum impulse output speed is 400HZ, the impulse width is adjustable. When verifying a meter, the impulse output speed is worked out by setting the impulse output equivalent (refer to annex 3 to set impulse equivalent)

▲ For example, for a DN200 flow meter, when the flow rate is 10m/s and the flow is 314.16L/S, we can set the impulse equivalent as 1L, thus there are 314.16 impulses output per second.

▲ The impulse output speed must not be set too high, to guard against being close to the upper limit of output speed, which may cause a loss of output impulses, thus affecting the calibration accuracy of a meter.

▲ To avoid the counting error between the calibration system and the meter verified, the Lmag_W801 battery powered electromagnetic converter requires the counting time must be **more than 4 minutes** in each calibration.

7.4 Enter into the meter calibration mode

Referring to the meter display panel diagram, keep pressing the enter key on the left, then press the resetting key, thus the meter enters the verification mode, and the impulse output of the meter starts operation. If required to enter the measurement mode from the verification mode, just press the system resetting key.

After entering the meter calibration mode status, which can maintain for 3 hours, then the meter will exit from the calibration mode and turn to the measurement mode.

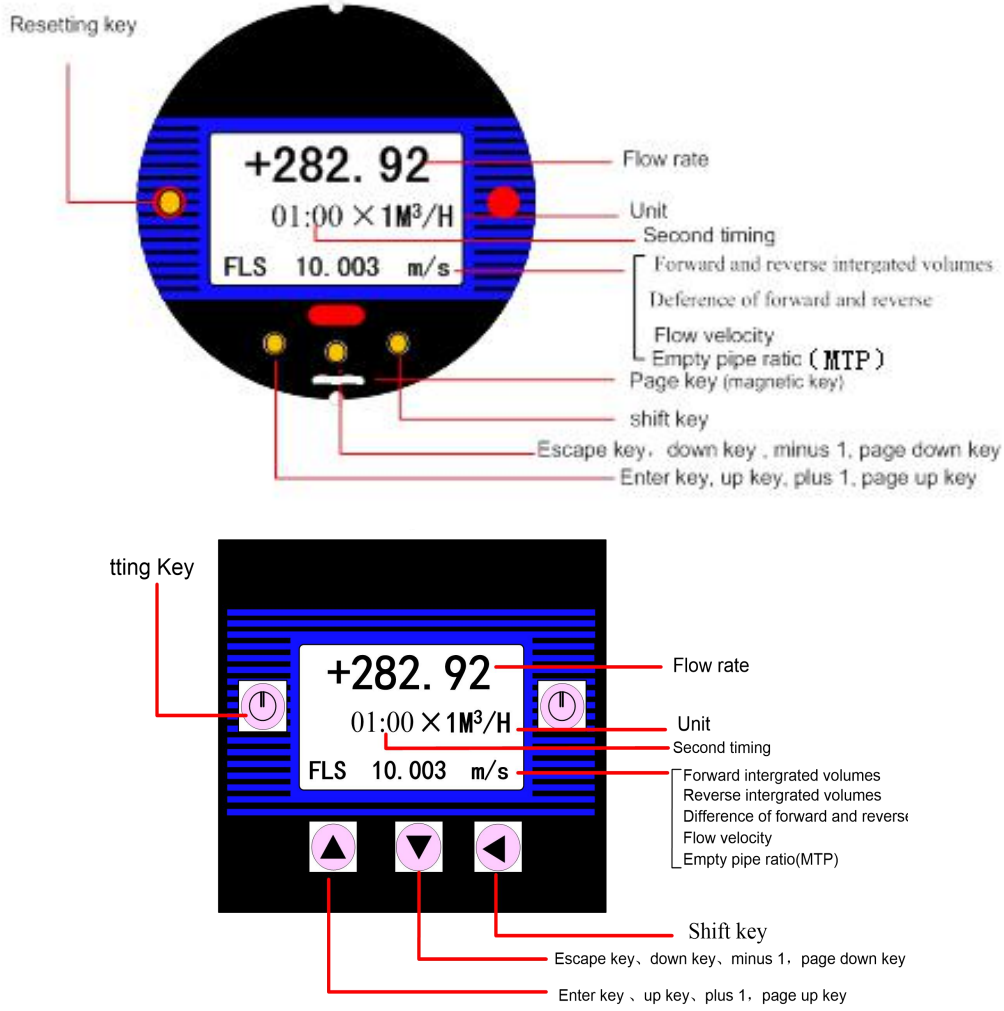


Figure Keyboard definition and LCD

Instructions: press the shift key on the right, the meter enters the “version number” menu. Press the shift key again, the meter enters the function selection menu “parameter setting”. Then press the shift key to move the cursor to the below of the “enter key”, press the “enter key” to enter the state of” password 00000”, then enter the password. Then press the shift key

to move the cursor to the below of the “enter key”, press the “enter key” to enter the operation selection menu to set parameters. If intended to return to the running state, move the cursor to the below of the “escape key” and press the “escape key”.

Note: upon normally powered, the meter will enter the measurement mode, in this case, accumulation is made by the second timer on a 15-second basis. Under the measurement mode, detection is made on a 15-second basis. If required to enter the calibration mode, keep pressing the enter key on the left, then press the resetting key, thus the meter will enter the calibration mode, with the impulse output function of the meter started up.

8 Setting of meter parameters

The Lmag_W801 battery powered electromagnetic converter is designed with 39 parameters in 6 classifications, including flow measurement, flow correction, state alarm, total accumulation, network communication, meter calibration and verification. The parameters of the converter are defined as follows:

8.1 Parameter menu

W801 Parameter-setting menu schedule

No.	Parameter description	Setting mode	Parameter range	Code grade
1	Language	Optional	Chinese, English	1
2	CommAddres	Optional	0～99	1
3	CommInterv	Preset	0～59999s	1
4	Snsr Size	Optional	3～800	1
5	Flow Unit	Optional	m^3/h、m^3/m、m^3/s	1
6	Meter range	Preset	0～59999	1
7	Flow Direct	Optional	FORWARD/REVERSE	1
8	Flow Zero	Preset	0～±9999	1
9	Flow Cutoff	Preset	Set according to flow cut-off	1
10	Damping time	Optional	4～30s	1
11	Total Unit	Optional	0.001～1 m^3、0.001～1 L	1
12	Rev flow measure	Optional	ENABLE/DISABLE	1
13	Pulse Fact	Optional	0 L～59.999 m^3	1
14	Pulse Width	Optional	0～98ms	1
15	MtsnsrTrip	Preset	0～59999	1
16	Sensor Fact	Preset	0.0000～2.9999	1
17	Excitation mode	Optional	TYPE1～TYPE8	1
18	Sensor Code	Preset	00000～59999	1

19	Line Crc Ena	Optional	ENABLE/DISABLE	1
20	Lineary CRC1	Preset	Setting according to flow	1
21	Lineary Fact1	Preset	0.0000～1.9999	1
22	Lineary CRC2	Preset	Setting according to flow	1
23	Lineary Fact2	Preset	0.0000～1.9999	1
24	Lineary CRC3	Preset	Setting according to flow	1
25	Lineary Fact3	Preset	0.0000～1.9999	1
26	Lineary CRC4	Preset	Setting according to flow	1
27	Lineary Fact4	Preset	0.0000～1.9999	1
28	Fwd Total Lo	Preset	00000～99999	1
29	Fwd Total Hi	Preset	0000～9999	1
30	Rev Total Lo	Preset	00000～99999	1
31	Rev Total Hi	Preset	0000～9999	1
32	Interval measurement mode	Optional	TYPE1/TYPE2	1
33	Interval measurement time	Optional	3～30s	1
34	Flow-power frequency threshold measurement	Preset	Setting according to flow velocity	1
35	Meter Fact	Preset	0.0000～1.9999	1
36	Meter Amend	Preset	0.0000～1.9999	1
37	Dormancy password	Preset	0000～59999	1
38	PassWord1	Preset	0000～59999	2
39	ClrSum Key	Preset	0000～59999	2

8.2 Detailed instructions for meter parameters

8.2.1 Language

The Lmag_W801 electromagnetic converter can be operated by using either Chinese or English language, which is optional for users.

8.2.2 CommAddres（Communication address of the meter）

It means the communication address of the meter under the condition of multi-computer communication. Range of selection: 01~99#, 0# address is reserved.

8.2.3 CommInterv (Communication interval)

Meter sends data to terminal communications according to this time when communicating. Range can be set from 01 to 59999s.

8.2.4 Snsr Size（Calibers of pipes measured）

Range of nominal diameters of sensors designed for battery-powered electromagnetic

flow meter converters: 3 ～ 800 mm.

8.2.5 Flow Unit（Flow rate units）

The unit of flowmeter is m^3/h.The others are unable use.

8.2.6 Meter range（Settings of meter range）

It means the determination of the maximum flow value. Minimum flow meter value is automatically set to zero.

8.2.7 Flow Direct（Adjustment of flow direction）

In case of a discrepancy between the fluid direction indication and the practical situation, users may adjust it by setting parameter using flow rate direction, but needless to change the means of connections of excitation lines or signal lines.

8.2.8 Flow Cutoff（Small signal cut-off points）

Small signal cut-off points are set by using flow rate. When small signals are being cut off, flow rate, accumulative amount and impulse output are simultaneously cut off.

8.2.9 Damping time (Damping time measurement)

Long measurement filter time can improve the stability of the meter's flow display and the output signals, so it is suitable for pulsating flow measurement of total cumulative. Short measurement filter time shows fast measuring response, so it is suitable for production process control. The setting of measurement filter time uses selection mode (filter time only works for test mode).

8.2.10 Total Unit（Flow totalizer units）

Lmag_W801 uses a 9-digit inventory counter, with a maximum permissible count value of 999999999.

Flow totalizer units:

0.001L、 0.010L、 0.100L、 1.000L

$0.001m^3$、 $0.010m^3$、 $0.100m^3$、 $1.000m^3$

8.2.11 Pulse Fact（Impulse unit equivalent ）

Output impulse units: 0.001L ～ 59.999L

$0.001m^3$ ～ $59.999m^3$

Under the condition of the same flow rate, the smaller the impulse equivalent, the higher

the impulse output power frequency will be, and the smaller the accumulative flow rate error will be. The Pulse Fact is the same with Total Unit ,.

8.2.12 Pulse Width（Impulse width）

The impulse output is of the low level effective, with an impulse width of 1mS.

In the measurement mode, the Pulse Fact is the same with Total Unit ,the width of pulse is 1 second, For example: In the measurement mode, when the measurement interval is 3s,the pulse output rate should be controlled below1220P/S .When the impulse width is 00ms,the pulse output function in the measurement mode is closed.

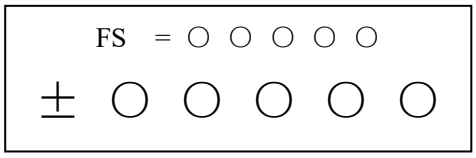
8.2.13 MtsnsrTrip（Empty pipe alarm threshold）

Lmag_W801 measures resistance between the two poles of the sensor to determine whether it is in the empty-pipe state. At the state of the pipe being filled up with fluid, observe the measured resistance value（MTP） of the fluid, then take the 1.5～2 times of the measured value as the empty pipe alarm threshold. An emptied pipe will cause an increase in the value of resistance between the two poles, and trigger the empty pipe alarm upon exceeding the threshold.

8.2.14 Flow Zero（Zero correction of flow rate）

When conducting a zero correction, make sure that the sensor is filled with fluid, which is in a stationary state. The zero point of flow rate is expressed by flow velocity, measured in mm/s.

Zero correction of converter flow rate is shown as follows:



The small words above display: FS represents the measured value of meter zero;

The big words below display: Zero correction of flow rate;

When the value of FS is not “0”, adjust the correction value to keep FS=0. Note: if changing the down-going correction value, the value of FS increases, in this case, the positive and negative signs need to be changed to enable FS to be corrected to zero.

As a constant of sensor, the zero correction value of flow rate should be entered in the

record sheet and the sensor nameplate. The zero value of sensor is entered as the flow rate value, measured in mm/s, with its sign opposite to the sign of correction value.

8.2.15 Sensor Code（Code for inventory zeroing ）

By using the high-grade code, users may set an inventory zeroing code, then enter the function selection menu, where, through pressing the page key, users may enter the inventory zeroing menu for a code setting, so as to realize an inventory zeroing.

8.2.16 Sensor Fact（Sensor coefficient value）

Sensor coefficient: it means the calibrated coefficient of the electromagnetic flow meter unit. This coefficient is obtained through practical calibration, and steel-marked on the sensor nameplate. Uses must list the coefficient in the table of parameters of the battery-powered converters.

8.2.17 Fwd Total Lo / Fwd Total Hi（High and low positions of positive-going inventory）

This parameter is used for setting accumulative inventory, mostly when electromagnetic converters are being maintained and replaced.

8.2.18 Meter Fact（Manufacturer's calibration coefficient）

Used for converter manufacturers only, this coefficient is designed to normalize the measurement circuit system of electromagnetic converters, to ensure the interchangeability between all Lmag_W801 converters up to 0.1%.

8.2.19 Selection of excitation mode

The Lmag_W801 electromagnetic converter offers eight excitation frequencies to select: namely, 1/6 power frequency (mode 1), 1/7 power frequency (mode 2), 1/8 power frequency (mode 3), 1/10 power frequency (mode 4), 1/12 power frequency (mode 5), 1/14 power frequency (mode 6), 1/16 power frequency (mode 7), 1/20 power frequency (mode 8). Because of the little inductance of the small calibers sensor excitation system, users should choose 1/6 power frequency. Users can choose 1/7 power frequency or 1/20 power frequency for the large inductance of the big calibers sensor excitation system. In the use of it, choose excitation mode 1 first, if the zero of meter' flow rate is over high or displays SYS, then choose mode 2 to mode 8 in turn. Note: which excitation mode the meter calibrated, which excitation mode the meter works. **8.2.20** Measurement interval mode

The meter offers two measurement modes. In mode 1, meter measures by fits according to the

“measurement interval time” set by users in the measurement mode. In mode 2, meter measures by fits if the flow rate is steady according to the “measurement interval time” set by users in the measurement mode, if the fluctuation value of flow rate is above to the value of “flow frequently measure limitation” parameter, then per 2s measure once until the fluctuation value of flow rate is low to the value of “flow frequently measure limit”, then measure by fits according to the “measurement interval time”.

8.2.21 Measurement interval time

The measurement cycle that is in the meters’ measurement mode.

8.2.22 Flow-power frequency threshold measurements

The fluctuations of flow rate that are in the meters’ measurement mode 2 (refer to the interval measurement mode).

In the interval measurement mode, in order to fast track and measure flow upheaval, meter verdicts the change of flow rate. If the change of flow rate is great to the flow frequently measure limitation, meter will start up fast track and measure function, measuring once per 2s. After continuously measuring 8 times, the meter returns to the normal interval measure mode.

9 Meter alarm display

Each meter is designed with four alarm displays: SYS for system alarm, MTP for empty pipe alarm, CUT for small signal cut-off alarm, BAK for battery lacking of power alarm.

SYS alarm is issued two possibilities due to broken converter’ excitation wiring or improper choice for converter’ excitation power frequency mode. After the battery power insufficiency alarm BAK is issued, the battery can continue to work for about 100 hours, but the measurement accuracy declines. In this case, users must replace battery.

Annex 1 Instructions for non-linear correction function

The non-linear correction function is basically used for linear adjustment of low flow rate below 0.5m/s. The function is designed with 4 sections of correction, including 4 flow rate points and 4 correction coefficients. The flow velocity corresponding to these correction points must meet: correction point 1 > correction point 2 > correction point 3 > correction point 4 > 0.

Correction computation is to conduct correction on the original sensor flow rate coefficient curve, therefore, the non-linear correction function must be firstly closed, and the sensor coefficient marked, then the non-linear correction function will be allowed, based on the marked non-linear of sensor, to set the correction coefficient and conduct correction section by section. It is not necessary to recalibrate if the coefficient is appropriately set.

In the formula, the original flow velocity means the calibrated flow rate, while the flow velocity corrected is known as corrected flow velocity, the formula for correction computation is as follows:

At the interval of "correction point 1 ＞ original flow velocity ≥correction point 2";

Corrected flow velocity= Correction coefficient 1×Original flow velocity

At the interval of "correction point 2 ＞ original flow velocity ≥correction point 3";

Corrected flow velocity= Correction coefficient 2×Original flow velocity

At the interval of "correction point 3＞ original flow velocity ≥correction point 4;

Corrected flow velocity= Correction coefficient 3×Original flow velocity

At the interval of "correction point 4＞ original flow velocity ≥ 0";

Corrected flow velocity= Correction coefficient 4×Original flow velocity

Note: when setting correction points, such a relation must be maintained:

Correction point 1 **>** Correction point 2 **>** Correction point 3 **>** Correction point 4 **> 0**

The intermediate value of correction coefficient is 1.0000. Correct the flow velocity up when the coefficient is above 1, likewise, correct the flow velocity down when the coefficient is below 1.

Annex 2 Instructions for battery replacement

1 Battery replacement method for the round and vertical type integral-structure converter

First step: Power off the meter, unscrew the two screws out of the meter core, as shown in figure 1.

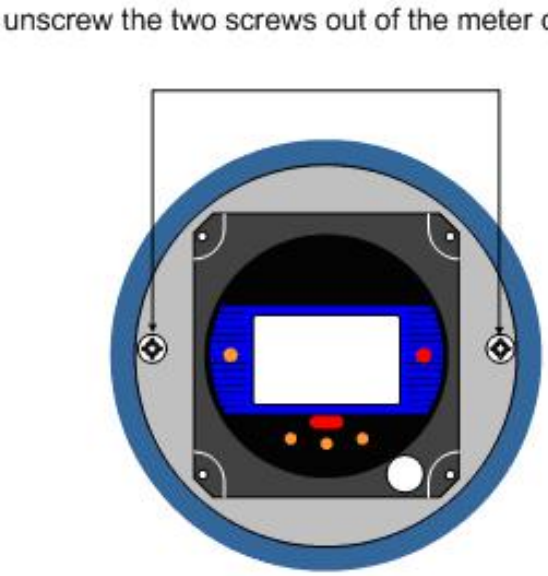


Figure 1

Second step: Pull out the core, as shown in figure 2.

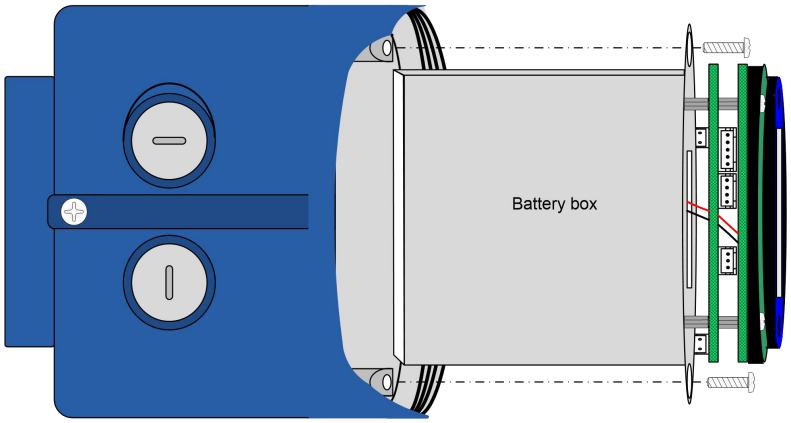


Figure2

Third step: Open the back cover of the battery box, as shown in figure 3

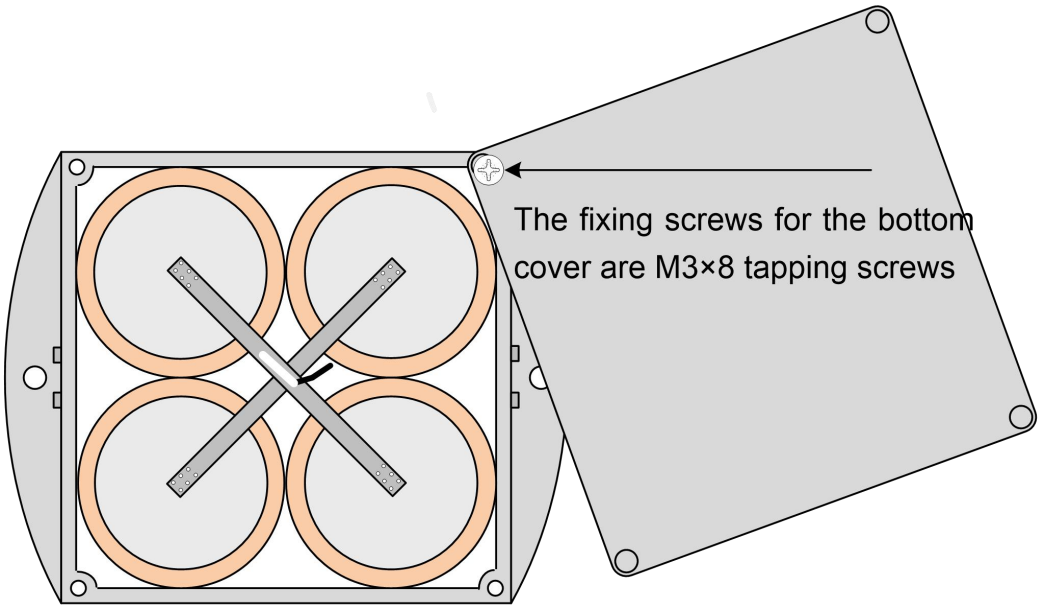


Figure 3

Fourth step: with battery connectors unconnected, take the battery out of the box; install a new one (obtainable at our company), making sure the positive terminal of the battery is upward.

Fifth step: reassemble the meter following the above disassembly steps.

2 Battery replacement method for the square and separate converter

First step: unscrew the four fixing screws out of the small cover as shown in figure 1.

Figure 1 Removal of screws from small cover

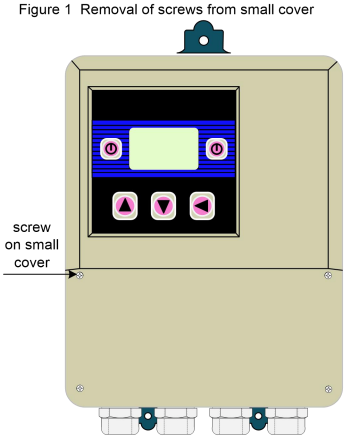
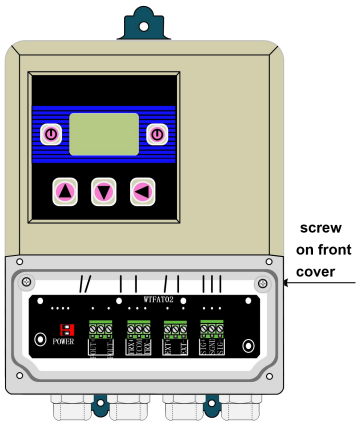


Figure 2 Removal of screws from front cover



Second step: unscrew the two fixing screws out of the front cover as shown figure 2.

Third step: unscrew the four screws out of the case as shown figure 3.

Figure 3 Removal of screws from case

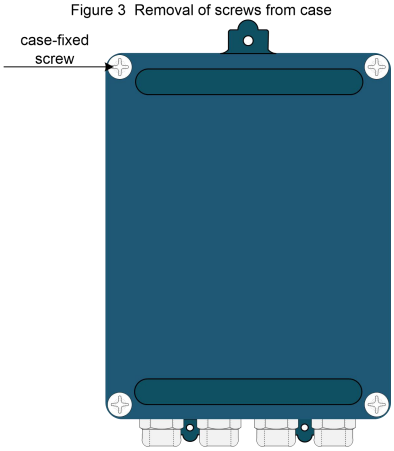
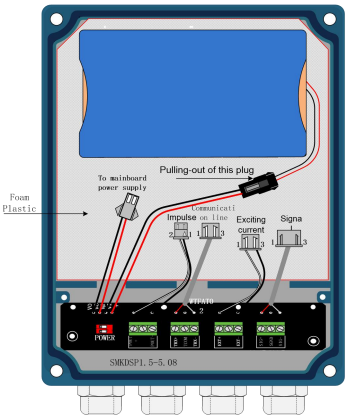


Figure 4 Unpluging



Fourth step: Removal of the front cover

Fifth step: Pulling-out of this plug, as shown in figure 4.

Sixth step: with the battery connectors unconnected, take the battery out of the battery box; install a new one (obtainable at our company);

Seventh step: reassemble the meter following the above disassembly steps.

Annex 3 Reference table for the setting of impulse equivalent at impulse width 1ms

Reference table for the setting of impulse equivalent of the electromagnetic flow convertor

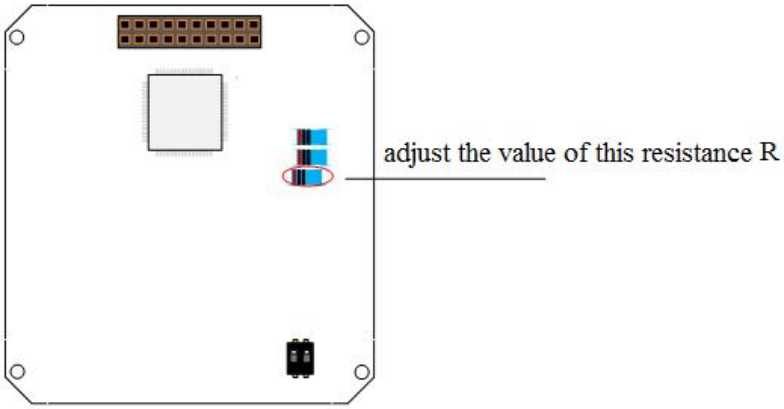
D-caliber (mm)	Impulse equivalent (Upper limit of flow velocity V =5m/s)	Impulse equivalent (Upper limit of flow velocity V =4m/s)	Impulse equivalent (Upper limit of flow velocity V =3m/s)	Impulse equivalent (Upper limit of flow velocity V =2m/s)	Impulse equivalent (Upper limit of flow velocity V =1m/s)
3	0.001L	0.001L	0.001L	0.001L	0.001L
6	0.001L	0.001L	0.001L	0.001L	0.001L
8	0.001L	0.001L	0.001L	0.001L	0.001L
10	0.001L	0.001L	0.001L	0.001L	0.001L
15	0.01L	0.01L	0.01L	0.001L	0.001L
20	0.01L	0.01L	0.01L	0.01L	0.001L
25	0.01L	0.01L	0.01L	0.01L	0.01L
32	0.1L	0.01L	0.01L	0.01L	0.01L
40	0.1L	0.1L	0.01L	0.01L	0.01L
50	0.1L	0.1L	0.1L	0.01L	0.01L
65	0.1L	0.1L	0.1L	0.1L	0.01L
80	0.1L	0.1L	0.1L	0.1L	0.1L
100	0.1L	0.1L	0.1L	0.1L	0.1L
125	1L/0.001m^3	1L/0.001m^3	0.1L	0.1L	0.1L
150	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	0.1L	0.1L
200	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	0.1L
250	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3
300	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3
350	0.01m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3
400	0.01m^3	0.01m^3	1L/0.001m^3	1L/0.001m^3	1L/0.001m^3
450	0.01m^3	0.01m^3	0.01m^3	1L/0.001m^3	1L/0.001m^3
500	0.01m^3	0.01m^3	0.01m^3	1L/0.001m^3	1L/0.001m^3
600	0.01m^3	0.01m^3	0.01m^3	0.01m^3	1L/0.001m^3

Remarks: Flow computing formula: ($Q=D^2 \times 0.0007854 \times V$, unit (L/S))

Impulse equivalent can be set by reference to the table above, the maximum speed of impulse equivalent is 400p/s.

Annex 4 Methods for W801 converters adjust exciting current

First step: take out the meter's LCD, reveal the meter's motherboard, as shown in the following figure.



The front figure of W801 battery powered converter's motherboard

Second step: adjust exciting current according to resistance of excitation coil.

1. 50mA exciting current, the value of R in the above figure is 2 ohm exact resistance, matching resistance of excitation coil is 30~50 ohm.

2. 40mA exciting current, the value of R in the above figure is 2.5 ohm exact resistance, matching resistance of excitation coil is 50~65 ohm.

3. 25mA exciting current, the value of R in the above figure is 4 ohm exact resistance, matching resistance of excitation coil is 65~100 ohm.

4. 20mA exciting current, the value of R in the above figure is 5 ohm exact resistance, matching resistance of excitation coil is 100~120 ohm.

Requirements for resistance accuracy of excitation modulation is 5‰, power is 1/6W, temperature coefficient is 20ppm.

Note: if the converter displays SYS alarm, check if the resistance of excitation coil match or not first. If the converter still displays SYS alarm after adjusting the exciting current properly, then adjust the meter parameter of "selection of excitation mode" gradually from mode 1 to mode 8.

Appendix 5 Instruction of dual battery powered meter

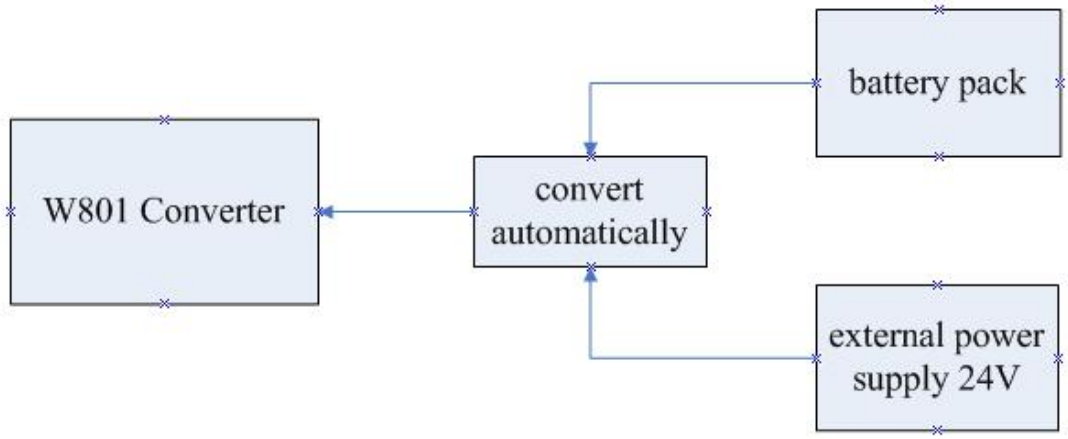
W801 can be configured to the mode of dual battery powered, and the inner of it can change power supply automatically. If the mains supply is normal, W801 will change to the mains. If the mains supply is power cut, W801 will change to battery powered.

Note: 1.the criterion power must be 24V DC.

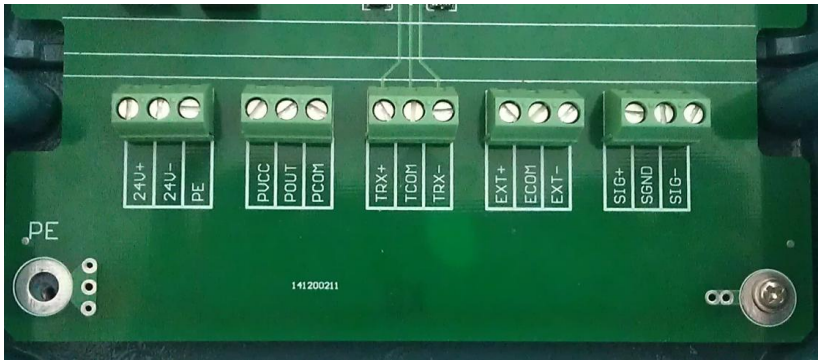
2. If the mains power is cut off, you should recover it as soon as possible. It's not very well to use battery powered long. (Because of the working current of the dual battery powered meter is large, the life span of battery will decrease rapidly if it is used long.)

3. MODBUS communication can be normal only under the circumstance of the mains power.

First: The schematic of W801 dual battery powered meter.



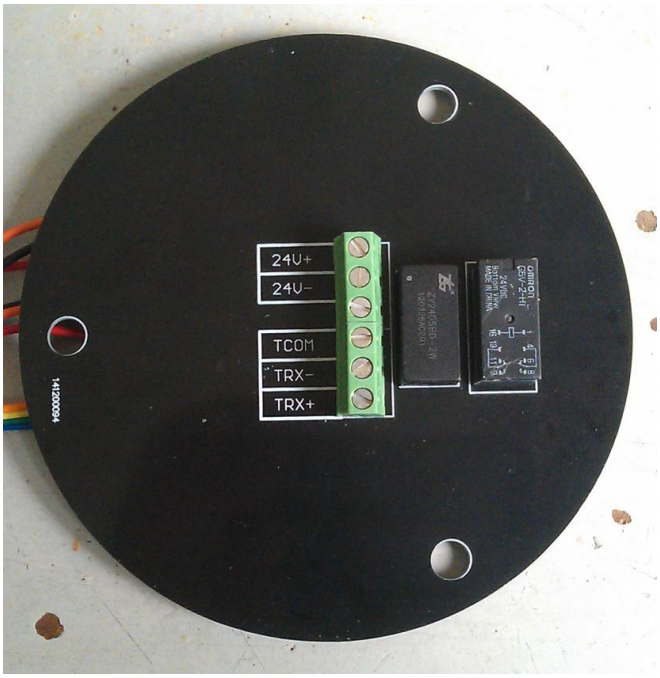
Second: The separated terminal wiring and labeling of square meter



SIG+	Signal 1	connect the separated size sensor
SGND	Signal GND	
SIG-	Signal 2	
EXT+	Excitation current positive	
EXT-	Excitation current negative	

POUT+	Pulse output positive	pulse output
POUT-	Pulse output GND	
24V+	External power supply positive	mains power supply input
24V-	External power supply negative	
TRX+	Communication input (485A)	communication input
TRX-	Communication input (485B)	

Third: The terminal wiring and labeling of round meter



24V+	External power supply positive	mains power supply input
24V-	External power supply negative	
TRX+	Communication input (485A)	communication input
TRX-	Communication input (485B)	