User Manual
Revision 2.003
English

Smart energy meter

EM737 0.5-10(100)A

Shanghai fangqiu electric CO.,LTD.

Benefits and Main Features

- MID approved with appendix "B" and "D" certification
- Three phase metering ,7 DIN modules
- Direct metering up to 100A
- Accuracy class B according to EN50470-3
- LCD display, 6 integer 2 decimal
- Large clear back light display
- Electrical measurements:

Volts	L1,L2,L3-N
Amps	L1,L2,L3, Σ ,Neutral
kW&kvar&kVA&PF	L1,L2,L3, Σ
Frequency	
kWh,kvarh	+, -, Σ
kW& kvar Demand	+, -, Σ

- Isolate pulse output and IR (DIN43864)
- Optional single-phase model
- RS485 communication port, modbus protocol
- IR port
- Program by button on the nameplate
- Memory back-up (EEprom)
- The meter is intended to be installed in a Mechanical Environment ‘M1’, with Shock and Vibrations of low significance, as per 2004/22/EC Directive and should be installed in Electromagnetic Environment ‘E2’, as per 2004/22/EC Directive.

Index:

1. Safety notice

The smart energy meter of EM737 does not require special mechanical or electrical tools for its installation. Mounting position (with any angle of tilt) has no effect on the measurement functions of the meter.

Connecting of the meter must be made according to applicable wiring diagram. Incorrect connection of the meter to the electricity network causes major display problem and can also causes serious damage to the meter. Before starting meter operation, it must be ensured the local conditions of the energy system are consistent with data on the nameplate of the meter. Preferably use for the connection of shielded cables. Make sure that connecting cables are not damaged during installation of the meter are not energized and free of non-mechanical stress.

Repairs when removing the cover of the meter, which is also under tension can be made only by a qualified electrician who is familiar with the associated risks. Capacitors in the meter may still be charged even if the meter is disconnected from all energy sources.

2. Content of delivery

Three phase, electronic energy meter, instructions for assembly

ID setting

Baud rate setting

CT rate setting

Password setting

3. EC Type Examination Certificate

SGS

EC Type Examination Certificate Number: **0120/SGS0117**

Shanghai Fangqiu Electric Co., Ltd

Room 1903
No 1958 North Zhongshan Road
Putuo District
Shanghai

Instrument Identification
EM737

Instrument Traceable Number
0120/SGS0117

Poly Phase, Active Import/ Export, Indoor, Electricity Meter

has been assessed and certified as meeting the requirements of

EC Directive 2004/22/EC

Measuring Instruments Annex B

It is certified that the manufacturer's technical design and specimen for the above instrument has been examined and, based on the evidence submitted, it is considered that the instrument conforms to the requirements of MI-003 of EC Directive 2004/22/EC

This certificate must be used in conjunction with a certificate covering the product verification as required in Annex D or Annex F.

This certificate is valid for 10 years from 6th June 2013 to 5th June 2023
Issue 1

Certification is based on report number(s) SHES13033000501001 dated 3rd June 2013

Authorised Signature

Jan Saunders

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EC Type Examination cert
SGSPAPER
11999760

4.Declaration of Conformity

Declaration of Conformity

We, Shanghai Fangqiu Electric Co., Ltd
Room1903, No1958 North Zhongshan RD
Putuo district Shanghai
China

Ensure and declare that apparatus:
EM737
With the measurement range
3 x 230/400V, 3 x 0.5-10(100)A, 50Hz, 400imp/kWh
Are in conformity with the type as described in the
EC-type examination certificate SGS0117
And satisfy the appropriate requirements of the Directive 2004/22/EC with the following standards:

EN 50470-1: 2006, Electricity metering equipment (AC) Part 1: General requirements, tests and test conditions. Metering equipment (class indexes A, B and C)
And
EN 50470-3: 2006, Electricity metering equipment (AC) Part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)

Company stamp and signature

5.Technical description

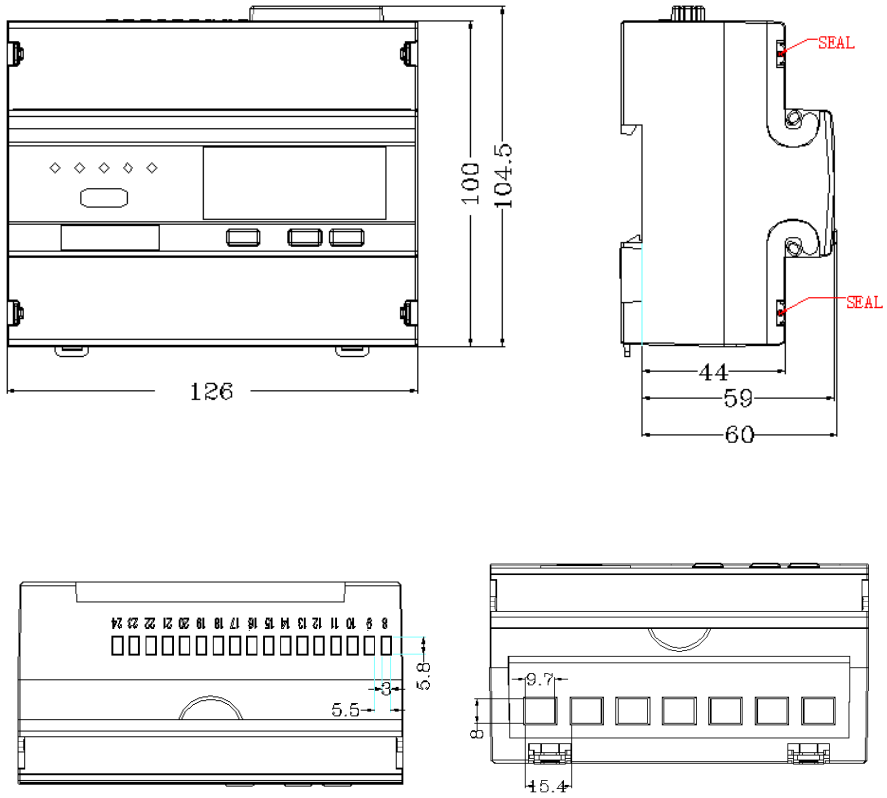
5.1 Performance criteria

Operating humidity	≤ 75%
Storage humidity	≤ 95%
Limit range of operating temperature	-25°C - +55°C(3K6)
Limit range for storage temperature	-25°C - +55°C(1K4)
Humanity	75% yearly average,95% on 30 days/year
International standard	EN50470-3 &IEC62053-21
Accuracy class	Class B
Protection against penetration of dust and water	IP51
Insulating encased meter protective class	⧈
Connection area main terminals (Indoor meter)	
Current terminals flexible 1×mm2	0-16mm2
Terminals flexible 1×mm^2	0-2.5mm^2
RS485 cable	AWG18

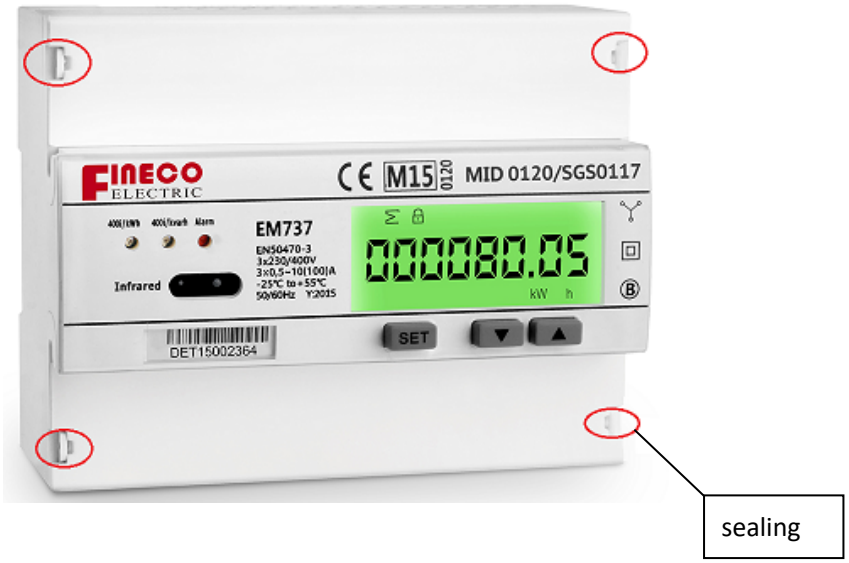
5.2 Meter specification

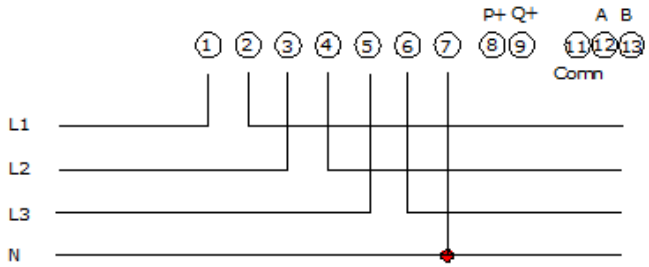
Voltage(v)	3×230/400V
Operational voltage	(70--130)%Un
Current(A)	
- Iref	10A
-Itr	1A
-Imax	100A
-Imin	0.5A
-Ist	40mA

Power consumption of current circuits(VA)	< 0.01
Power consumption of voltage circuits(W)	< 1.3W
General data	
Frequency (Hz)	50
Memory back-up	EEprom
Environment resistance to heat and fire	Terminal 960℃ Cover 650℃
upper	ABS+PC
lower	ABS+PC
Pulse output	
Pulse width(ms)	80
Pulse constant(imp/kWh)	400
LED constant	400
Width (mm)	126
Height (mm)	104.5
Depth (mm)	60



5.3 Dimensions and sealing points





1/2 L1 in & out

3/4 L2 in & out

5/6 L3 in & out

7 Neutral

8 &11 Active test pulse output contact(11－,8+)

9&11 Reactive test pulse output contact(11－,9+)

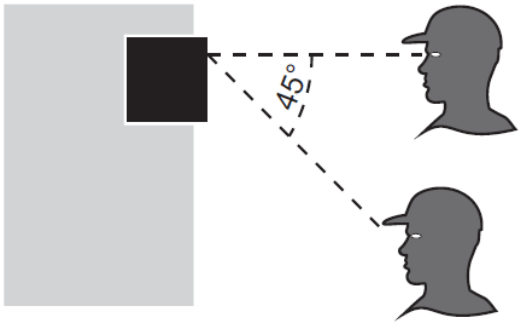
12&13 RS485 communication contact(13 TX/RX(-), 12 TX/RX(+))

6 Wiring diagrams

Note: the following types of wiring diagrams show the energy meter, include terminals for pulse output and the communication interface RS-485.However,depending on the ordering number of the energy meter only some terminals of the energy meters are involved.

7 Meter reading

the view angle Operator-meter should be up to 45^0



8 Main function

8.1 Measuring Function

On the EM737 'S front panel, there are three LED, active/reactive energy pulse light, and alarm indicator lights .

Meter can measure import & export active energy , import & export reactive energy. The measurement type can be set.

8.2 Display function

Smart meter have two status: cycle display status and button press display . When pressing the button, User can set according their request. Button press will Back light the LCD. Display cycle can be set within 5~20 seconds, The default is 5 seconds. The display items as following:

Instantaneous values

No	Comments	Read	Write	Bytes	Starting address
1	Voltage L1	Y	N	4	0010
2	Voltage L2	Y	N	4	0012
3	Voltage L3	Y	N	4	0014
4	Current L1	Y	N	4	0016/0050
5	Current L2	Y	N	4	0018/0052
6	Current L3	Y	N	4	001A/0054
7	Current N	Y	N	4	001C/0056
8	Total current	Y	N	4	001E/0058
9	Active power L1	Y	N	4	0020/0090
10	Active power L2	Y	N	4	0022/0092
11	Active power L3	Y	N	4	0024/0094
12	Total active power	Y	N	4	0026/0096
13	Reactive power L1	Y	N	4	0028/0110
14	Reactive power L2	Y	N	4	002A/0112
15	Reactive power L3	Y	N	4	002C/0114
16	Total reactive power	Y	N	4	002E/0116
17	Apparent power L1	Y	N	4	0030/00D0
18	Apparent power L2	Y	N	4	0032/00D2
19	Apparent power L3	Y	N	4	0034/00D4
20	Total apparent power	Y	N	4	0036/00D6
21	Power factor L1	Y	N	4	0038/0150
22	Power factor L2	Y	N	4	003A/0152
23	Power factor L3	Y	N	4	003C/0154
24	Total power factor	Y	N	4	003E/0156
25	Frequency	Y	N	4	0040/004E

Total energy accumulator

No	Comments	Read	Write	Bytes	Starting address
26	Active energy net	Y	N	4	0700/0618

27	Active energy import	Y	N	4	0800/0160
28	Active energy export	Y	N	4	0900/0166
29	Reactive energy import	Y	N	4	0A00/0162
30	Reactive Energy export	Y	N	4	0B00/0168

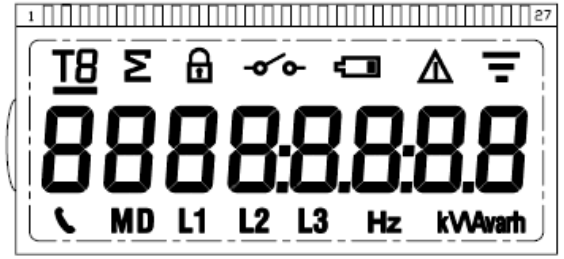
Production data and identification

No	Comments	Read	Write	Bytes	Starting address
31	Serial number	Y	Y	4	FF00
32	Manufacture code	Y	Y	4	FF02
33	Type code	Y	Y	2	FF04
34	Hardware version	Y	Y	2	FF05
35	Software version	Y	Y	2	FF06

Settings

No	Comments	Read	Write	Bytes	Starting address
36	Modbus id	Y	Y	2	0524
37	Baud rate	Y	Y	2	0525

Lcd content



Description of LCD symbols displayed

Symbol	Description
kVVArh	kWh—active energy kW—active power kvarh—reactive energy kvar—reactive power kVA—apparent power
Σ	Total
	Unpermitted programming
	LCD alarm indicator
	Communication symbols

8.3 Electricity parameters measurement and monitoring

Electrical measurements:

Volts	L1,L2,L3-N
Amps	L1,L2,L3, Σ,Neutral
kW&kvar&kVA&PF	L1,L2,L3, Σ
Frequency	
kWh,kvarh	+, -, Σ
kW& kvar Demand	+, -, Σ

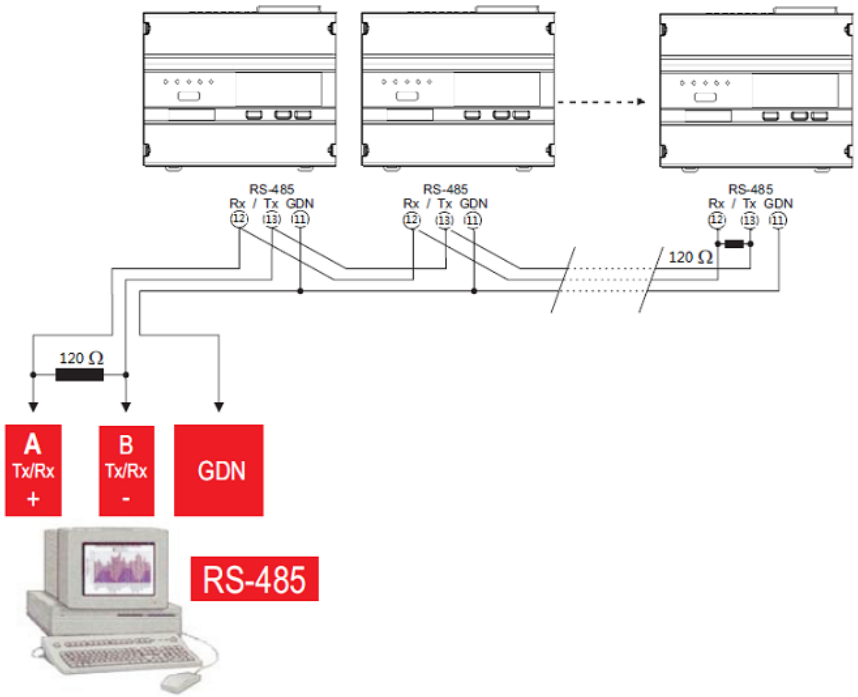
Also can display the direction of the current and power. The resolution of frequency is 0.01Hz. the accuracy of Voltage, current, active power,reactive power and apparent power is 1%.

8.4 Communication Function

With an infrared COM and a RS485 COM. Its physical layers are independent with each other. One communication channel will not be affected by the other one. The meter can realize data acquisition, broadcast time setting, read, program and manage through hand-held terminals, data acquisition terminal, test equipments and computers. Communication protocols fit Modbus RTU standard.

RS485 circuit and energy meter internal circuit can realize electrical isolation and failure protection of circuit.

RS485 communications transfer rates allow selected at 1200bps, 2400bps, 4800 bps and 9600bps, default is 9600bps.The max quantity of meters on one RS485 main bus is 64 Units, the longest communication distance is 1.2Km.



Note:

1. Use shielded twisted pair

2. Connect 120Ω resistances with communication equipment and Energy meters to preventing signal reflection and interference.

3. Communication circuit should keep distance with Large current circuit and shall not be parallel with it.

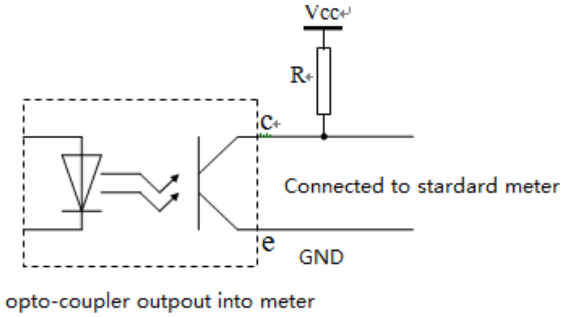
8.5 Alarm function

When the meter connect wire wrong example: current reverse, lost phase and reversed phase sequence , the meter will display ⚠ , the ALARM led will be on.

8.6 Pulse output function

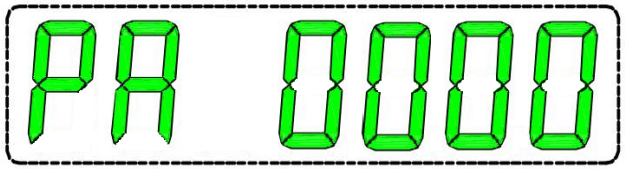
Smart meter is equipped with a pulse output which is fully separated from the inside circuit. That generates pulses in proportion to the measured energy .include the testing pulse output of active energy and reactive energy. 8/ 11 Test pulse output contact (P+/P-)，9/ 11 Test pulse output contact (Q+/Q-)

The test pulse output is a polarity defendant, passive transistor output requiring an external voltage source for correct operation. For this external voltage source, the voltage (Ui) should be 5-27V DC, and the maximum input current (Imax) should be 27mA DC. To connect the impulse output, connect 5-27V DC to connector 8&9 (anode), and the signal wire (S) to connector 11 (cathode). The meter pulses is indicated on the front panel.



9 Programming

By holding the keys “SET” pressed for at last 3 sec., starts menu programming mode.LCD will show:



9.1 password verify

On the smart meter display will appear : PA followed by the currently memorized value . “PA” means “Password”,”0000”means the 4 digits of the Password. we can use press “Page Down” button to decrease the input value, and press “Page Up” to increase the input value ,press the “SET” button to switch the input Password digits, when the Password is correct, the meter will enter “program status” and display the “ID” program interface.

Remarks:

Please remember well the Password, Password to default (8888).

9.2 ID setting

After the Password authentication , the meter will display the “ID XX” setup interface. As the following picture ”Id 00” it means the current ID address is 00 (the ID address is hex code)

Press “Page Down” button to decrease the digits. press ”Page Up” to increase the digits，press “SET” button to save the setup, the interface will switch to Baud rate setup interface automatically. Press “SET” button to enter next interface if you do not need to change the baud rate.

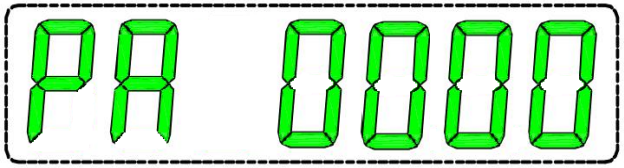
9.3 Baud rate setting

we can use press “Page Down” button to decrease the input value, and press “Page Up” to increase the input value ,press the “SET” button to switch the input digits, when the baud rate is correct, the meter will enter “program status” and display the “CT” program interface.

Remarks：

1. Default baud rate will be 9600bps
2. 1200/2400bps /4800bps/9600bps can be set

9.3 Password setting：



The meter will display the current password after enter the password setup interface, press the “SET” to change the password. Use “page down” and “page up” button to input password as you want. After 30 seconds the meter will save the password you changed.

Remarks:

1 Do not forget the password you setup.

2 Please press the button to check if every setup is correct after the program.

3 Password setup interface “-“ symbol will blink.