User Manual
Revision 2.001
English

Smart energy meter

EM737 series

Shanghai fangqiu electric CO.,LTD.

Benefits and Main Features

- Three phase metering 7 DIN modules, Standard DIN rail Format (DIN43880)
- IEC62053-21/22 Class 1.0,0.5S
- Import &Export active energy
- Import &Export reactive energy
- Instant Volt, Amp, Power factor, Frequency, Active power, Reactive power, Apparent power
- Isolate pulse output (DIN43864)
- LCD display, 6 integer 2 decimal , meter display when power fails
- Large clear backlight display
- Internal transformer
- Direct metering up to 100A,transformer metering 1.5(6)A
- 27 CT rate can be selected
- Optional single-phase model
- RS485 communication port, modbus protocol
- IR port
- Program by button on the nameplate
- Memory back-up (EEprom)
- CE approval

Index:

1. Safety notice

The smart energy meter of EM737 series 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. Technical description

3.1 Survey of types/Ordering numbers

The EM737 series is labeled as follows:

EM737 . 1 . 1

- 1 → Communication type::
  - 1= pulse output:
  - 2 = Pulse output, IR &RS485
- 1 → Connect type:
  - 1= Directly connect
  - 2= Transformer connect

Ordering numbers	Connect type	Communication output
737.1.1	Directly connect	Pulse output
737.1.2	Directly connect	Pulse output, IR &RS485
737.2.1	Transformer connect	Pulse output
737.2.2	Transformer connect	Pulse output, IR &RS485

3.2 Performance criteria

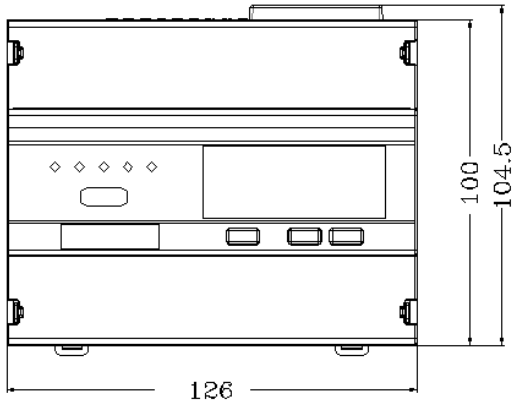
Operating humidity	≤ 75%
Storage humidity	≤ 95%
Operating temperature	-5°C - +45°C(3K5)
Storage temperature	-25°C - +55°C(3K6)
Humanity	75% yearly average,95% on 30 days/year
International standard	EN50470-3 &IEC62053-21

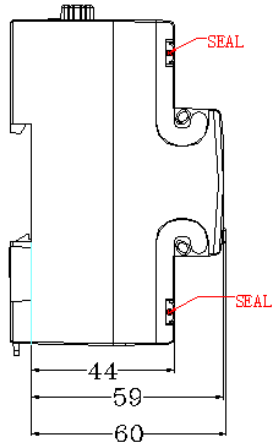
Accuracy class	CI.1
Protection against penetration of dust and water	IP51
Insulating encased meter protective class	☐
Connection area main terminals	
Current terminals flexible 1×mm^2	0-16mm^2
another terminal flexible 1×mm^2	0-2.5mm^2

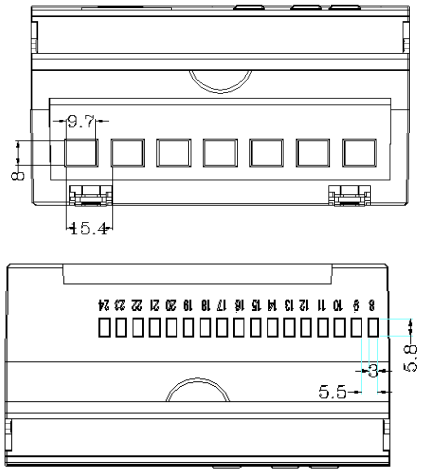
3.3 Meter specification

	Direct connected meters	**Transformer connected meter**
Voltage(v)	3×57.7/100V	3×57.7/100V
	3×220/380V	3×220/380V
	3×230/400V	3×230/400V
Operational voltage	±70%Un	±70%Un
Current(A)		
- Iref	10A	1.5
-Itr	1A	0.15A
-Imax	100A	6A
-Imin	0.5A	0.015A
-Ist	40mA	3mA
Power consumption of current circuits(VA)	< 0.01	< 0.01
Power consumption of voltage circuits(W)	< 1.3W	< 1.3W
General data		
Frequency (Hz)	50/60	50/60
	Direct connected meters	**Transformer connected meter**
Memory back-up	EEprom	EEprom
Environment resistance to heat and fire	Terminal 960℃ Cover 650℃	Terminal 960℃ Cover 650℃
Enclosure material		
upper	ABS+PC	ABS+PC
lower	ABS+PC	ABS+PC
Pulse output		
Pulse width(ms)	80	80
Pulse constant(imp/kWh)	400	1600
LED		
LED constant	400	1600
Dimension		
Width (mm)	126	126
Height (mm)	104.5	104.5
Depth (mm)	60	60

4. Dimensions and sealing points





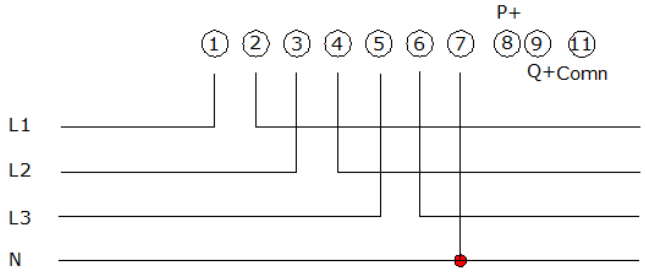


5. Wiring diagrams

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.

5.1 Direct connected meter

5.1.1 737.1.1 diagram



1/2 L1 in & out

3/4 L2 in & out

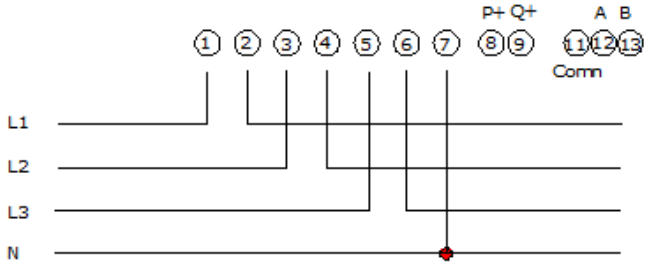
5/6 L3 in & out

7 Neutral

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

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

5.1.2 737.1.2 diagram



1/2 L1 in & out

3/4 L2 in & out

5/6 L3 in & out

7 Neutral

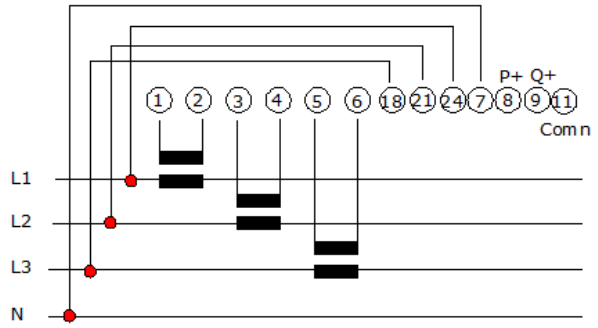
8 &11 Active test pulse output contact(11－,8+)

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

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

5.2 Transformer connected meter

5.2.1 737.2.1 diagram



1/2 L1 in & out

3/4 L2 in & out

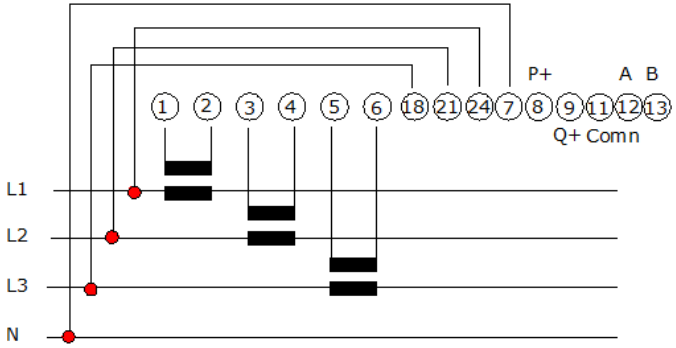
5/6 L3 in & out

24/21/18/7 UL1,UL2,UL3,N

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

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

5.2.2 737.2.2 diagram



1/2 L1 in & out

3/4 L2 in & out

5/6 L3 in & out

24/21/18/7 UL1,UL2,UL3,N

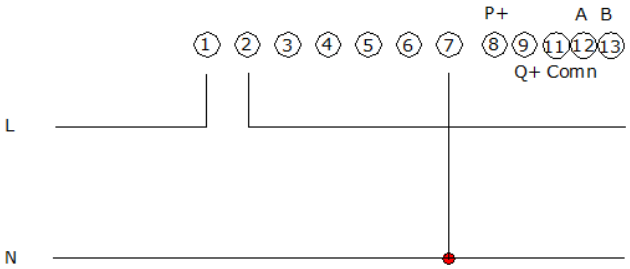
8 &11 Active test pulse output contact(11－,8+)

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

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

5.3 single-phase model

5.3.1 direct connected meters



1/2 Phase line IN/OUT

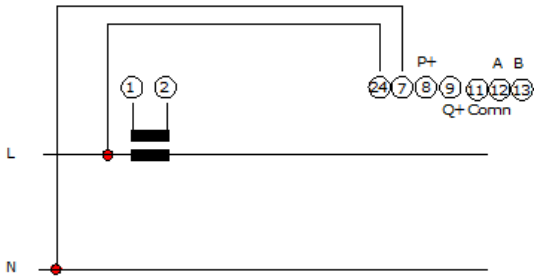
7 Neutral

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(+))

5.3.2 Transformer connected meter



1/2 Phase line IN/OUT

7 Neutral

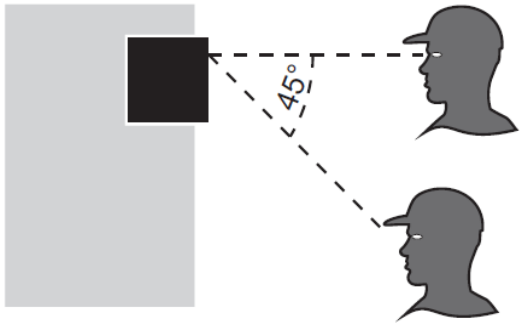
8 &11 Active test pulse output contact(11－,8+)

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

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

6. Meter reading

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



7. Main function

7.1 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.

7.2 Display function

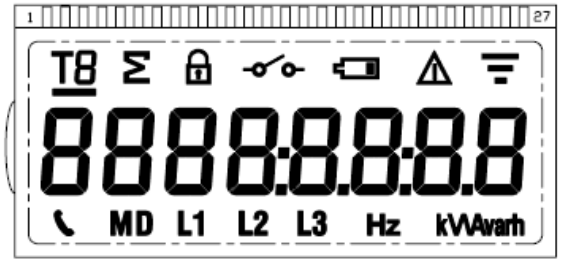
Smart meter have two status: cycle display status and button press display . When pressing the button, User can set according their request. Button press will Backlight the LCD. Display cycle can be set within 5~20 seconds, The default is 5 seconds. The display items as following:

Code	Display item	Code	Display item
0010	UL1	0096	ΣP
0012	UL2	00D0	SL1
0014	UL3	00D2	SL2
004E	Frequency	00D4	SL3
0050	IL1	00D6	ΣS
0052	IL2	0110	QL1
0054	IL3	0112	QL2
0056	In	0114	QL3
0090	PL1	0116	ΣQ
0092	PL2	0150	PFL1
0094	PL3	0152	PFL2

Code	Display item	Code	Display item
0154	PFL3	0A00	Import Reactive Energy
0156	ΣPF	0B00	Export Reactive Energy
0524	Modbus id	FF00	High byte of serial number
0525	RS485 Baud rate	FF01	Low byte of serial number
0700	Total Active energy	FF09	Meter's constant
0800	Import active energy	FF18	CT ratio
0900	Export active energy		

Lcd content

FF18



Description (

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

7.3 Electricity parameters measurement and monitoring

Measure record and display voltage, current, power and power factors. error is not more than ±1%.

Provide out of limit monitoring capability, Voltage, Current, Power factor can be setup the limit value and monitoring.

7.4 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 2400bps.

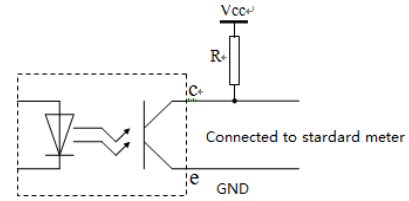
7.5 Alarm function

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.

7.6 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-)

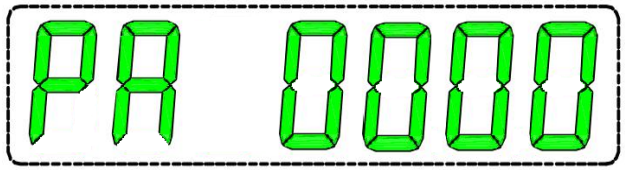
The test pulse output is a polarity dependant, passive transistor output requiring an external voltage source for correct operation. For this external voltage source, the voltage (Ui) should be 5-27V DC, and the maximum input current (Imax) should be 27mA DC. To connect the impulse output, connect 5-27V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



opto-coupler outpout into meter

8 Programming

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



8.1 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).

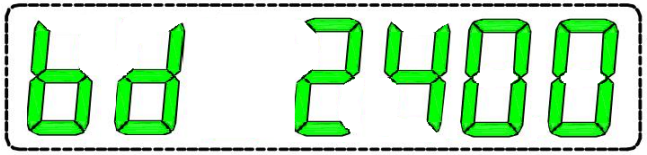
8.2 ID setting

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 Baudrate setup interface automatically. Press "SET" button to enter next interface if you do not need to change the baudrate.

Remark：Type 737.1.1&737.2.1 series meters without communication function do not have the setup interface

8.3 Baud rate setting

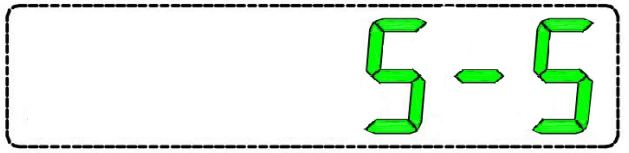


we can use press "Page Down" button to decrease the input value, and press "Page Up" to increase the input value ,press the "SET" button to switch the input digits, when the baudrate is correct, the meter will enter "program status" and display the "CT" program interface.

Remars：

1. **Type 737.1.2 &737.2.2 series meters , default baudrate will be 2400bps**
2. **1200/2400bps /4800bps/9600bps can be set**
3. **Type 735.1.1&735.2.1 series meters without communication function do not have the setup interface**

8.4 CT rate setting



Press "Page down" and "page up" buttons to select the CT transformation ratio press "SET" button to save the setup. the interface will enter Password setup.

CT rate	5:5	5:50	5:60	5:75	5:100	5:125	5:150	5:**160**	**5：200**
	5:250	5:300	5:400	5:500	5:600	5:750	5:800	5:1000	5：1200
	5：1250	5：1500	5：2000	5：2400	5：2500	5:3000	5:4000	5:5000	5：6000

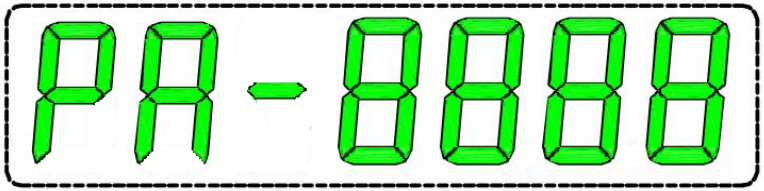
	5:7500								
Remark	**When CT ratio is lower than 200, there is 1digit decimals, when CT ratio is equal or higher 200, there is no decimal.**								

Remark:

1,if the meter is Direct connection type, it has no CT setup interface.

2,after the CT ratio setup, the energy consumption display will be reset to 0.

- Password setting:



The meter will display the current password after enter the password setup interface, press the "SET" to change the password. Use "page dow" 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.

9. Technical support

Any questions, please contact:

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Email: tianli0000@hotmail.com