Three Phase Four Wires RS485 Meter

EM513082~EM513084 series User Manual



Warnings

Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures.

Risk of Danger: These instructions contain important safety information. Read them before starting installation or servicing of the equipment.

Caution: Risk of Electric Shock

1. Product Introduction

EM513XXX series is 3 Phase din rail AC meter, it's a multi-function energy monitoring meter,functions as follow:

- Postpaid metering mode
- Max current 100A
- Support RS485 communication
- Multi-Tariff (Optional)
- Bi-directional Metering
- Meet RE test(See Appendix 1 for the test report)
- Comply with MID EN50470-1/3 Certificate

It suitable for home, commercial electricity distribution system,and PV metering system, such EV Charger and solar energy generation.

PN	EM513084	EM513083	EM513082
Software Version	V301	V301	V301
CRC	708A	5B61	2B60
Pulse Constant	1000imp/kWh 1000imp/kvarh	1000imp/kWh 1000imp/kvarh	1000imp/kWh 1000imp/kvarh
Communication	IR	IR,RS485 Modbus/DLT645	IR,RS485 Modbus/DLT645
Baud Rate	N/A	9600\19200\ 38400\115200	9600\19200\ 38400\115200
SO Output	SO1 is total active energy(default) or active/reactive forward energy(optional) Pulse constant can be set, and divided evenly by 96000	SO1 is total active energy(default) or active/reactive forward energy(optional) Pulse constant can be set, and divided evenly by 96000	SO1 is total active energy(default) or active/reactive forward energy(optional) Pulse constant can be set, and divided evenly by 96000
	SO2 is total reactive energy(default) or active/reactive reverse energy(optional) Pulse constant can be set, and divided evenly by 96000	SO2 is total reactive energy(default) or active/reactive reverse energy(optional) Pulse constant can be set, and divided evenly by 96000	SO2 is total reactive energy(default) or active/reactive reverse energy(optional) Pulse constant can be set, and divided evenly by 96000
Backlit Display	Blue	Blue	Blue
Lithium Battery	N/A	N/A	YES
Tariff	N/A	N/A	YES

Metering Mode	1.Total =forward 2.Total=reverse 3.Total =forward +reverse (default) 4.Total=Forward-Reverse		
Button	Touch Button	Touch Button	Touch Button
Button Function	Left Button:page turning, Right Button:page turning , display setting information		
Default Setting	1000imp/kWh 1000imp/kvarh	1000imp/kWh 1000imp/kvarh 9600/NONE/8/1	1000imp/kWh 1000imp/kvarh 9600/NONE/8/1
Metering Mode Setting	Button	RS485 or button	RS485 or button

2. Main Functions

- Measurable Instantaneous Parameter: Voltage, Current, active power, reactive power,apparent power, frequency, power factor, etc.
- Measurable Energy Parameter:Total active energy, Total reactive energy, Total forward active energy,Total reverse active energy, T1-T4 forward active energy, T1-T4 forward reactive energy, T1-T4 reverse active energy, T1-T4 reverse reactive energy, T1-T4 active energy, T1-T4 reactive energy, T1-T4 four-quadrant reactive energ, resettable active and reactive total energy,forward and reverse active and reactive energy demand and maximum demand, etc.
- LCD backlight display, data scrolling display, manual page turning through buttons
- Support RS485 communication, reading meter parameters.
- Stand din rail installation method.

3. Specification Parameter

3.1 Normal Specification

Voltage AC (Un)	3*230(400)V
Current	5(100)A
Start Current	0.4%Ib
Power Consumption	<12VA <1W
Accuracy	B
Frequency	50Hz
Pulse Output	1000imp/kWh(LED) 1000imp/kvarh(LED)

Display	LCD 6+2 = 999999.99kWh
Working Temperature	-40 ~ 70℃
Relative Humidity	≤75% (Non Condensing)
Protection Level	IP51 （Only for indoor use）
Reference Standard	EN50470-1/3

3.2 Communication

- Support RS485 communication, modbus protocol and DLT645-2007 protocol are compatible,meter can be used by RS485 communication to read and read meter parameters.
- Baud rate 9600\19200\38400\115200, it can be set,default 9600.
- Default setting 9600/NONE /8/1.

3.3 Accuracy

Voltage	1%
Current	1%
Frequency	1%
Active Power	1%
Reactive Power	2%
Active Energy	1%
Reactive Energy	2%

3.4 Environment

Working Temperature	-40 ~ 70℃
Storage/Transportation Temperature	-40 ~ 70℃
Referring Temperature	23 ± 2℃
Relative Humidity	≤75% (Non Condensing)
Preheating Time	10s
Vibration	10Hz to 50Hz,IEC 60068-2-6,2g

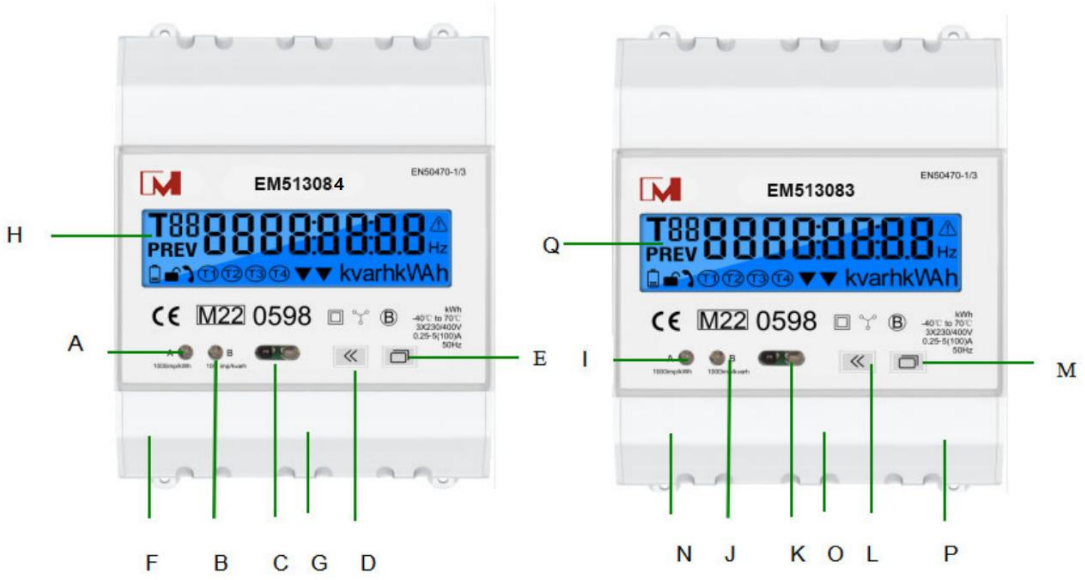
*Maximum operating and storage temperatures are in the context of typical daily and seasonal variataion.

3.6 Standard Measurement Conditions(Reference Conditions)

Environment Temperature	23 ± 2℃
Frequency	50Hz ± 5%

Current	100A
Voltage	230V ± 5%

4. Product Appearance



EM513084	EM513082/EM513083
A Active Energy Pulse Indicator Light	I Active Energy Pulse Indicator Light
B Reactive Energy Pulse Indicator Light	J Reactive Energy Pulse Indicator Light
C IR	K IR
D Parameter Viewing Button	L Parameter Viewing Button
E Parameter Setting Button	M Parameter Setting Button
F Active Energy SO1 Output(Default)	N Active Energy SO1 Output(Default)
G Reactive Energy SO2 Output(Default)	O Reactive Energy SO2 Output(Default)
H LCD Display	P RS485 Port
	Q LCD Display

5. LCD Display

5.1 Introduction of Full display



1	T=Total
2	Page
3	8 digit numerical display
4	External signal input detection display
5	Frequency unit
6	Metering unit
7	Split-Phase energy page display
8	Tariff Display
9	Communication Symbol Display
10	Display this symbol after entering setting page
11	/
12	/

5.2 Startup Page Introduction

LCD Display	Means
	After power on, the full display page can be displayed for 1 second, and then the page scroll display starts.

5.3 Button Function Introduction

(1) Turn pages by buttons (can be scroll , can be turned manually)

(2) Long press on the cyclic display interface for 3 seconds to enter the information interface. On the information interface and within the SETUP interface, long press the button for 3 seconds (enter the default password 0000) to enter the settings page.

(3) Quit(Long press to return to the scroll display page).

5.4 Introduction page by page

LCD Scroll Display				
Page	**Content**	**Unit**	**Data Format**	**Note**
1	Total active energy	kWh	6+2 000000.00	
2	Forward active energy	kWh	6+2 000000.00	
3	Reverse active energy	kWh	5+2 00000.00	Display “-”
4	T1 Total active energy	kWh	6+2 000000.00	
5	T1 Forward active energy	kWh	6+2 000000.00	
6	T1 Reverse active energy	kWh	5+2 00000.00	Display “-”
7	T2 Total active energy	kWh	6+2 000000.00	
8	T2 Forward active energy	kWh	6+2 000000.00	
9	T2 Reverse active energy	kWh	5+2 00000.00	Display “-”
10	T3 Total active energy	kWh	6+2 000000.00	
11	T3 Forward active energy	kWh	6+2 000000.00	
12	T3 Reverse active energy	kWh	5+2 00000.00	Display “-”

13	T4 Total active energy	kWh	6+2 000000.00	
14	T4 Forward active energy	kWh	6+2 000000.00	
15	T4 Reverse active energy	kWh	5+2 00000.00	Display “-”
16	Total reactive energy	kvarh	6+2 000000.00	
17	Forward reactive energy	kvarh	6+2 000000.00	
18	Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
19	First quadrant reactive energy	kvarh	6+2 000000.00	
20	Second quadrant reactive energy	kvarh	6+2 000000.00	
21	Third quadrant reactive energy	kvarh	6+2 000000.00	
22	Forth quadrant reactive energy	kvarh	6+2 000000.00	
23	T1 Total reactive energy	kvarh	6+2 000000.00	
24	T1 Forward reactive energy	kvarh	6+2 000000.00	
25	T1 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
26	T2 Total reactive energy	kvarh	6+2 000000.00	
27	T2 Forward reactive energy	kvarh	6+2 000000.00	
28	T2 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
29	T3 Total reactive energy	kvarh	6+2 000000.00	
30	T3 Forward reactive energy	kvarh	6+2 000000.00	
31	T3 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
32	T4 Total reactive energy	kvarh	6+2 000000.00	
33	T4 Forward reactive energy	kvarh	6+2 000000.00	
34	T4 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
35	Resettable active energy	kWh	6+2 000000.00	
36	Resettable forward active energy	kWh	6+2 000000.00	
37	Resettable reverse active energy	kWh	5+2 00000.00	Display “-”
38	Resettable reactive energy	kvarh	6+2 000000.00	
39	Resettable forward reactive energy	kvarh	6+2 000000.00	
40	Resettable reverse reactive energy	kvarh	5+2 00000.00	Display “-”
41	Max active demand	kW	2+3 00.000	
42	Max forward active demand	kW	2+3 00.000	
43	Max reverse active demand	kW	2+3 00.000	Display “-”
44	Max reactive demand	kvar	2+3 00.000	
45	Max forward reactive demand	kvar	2+3 00.000	
46	Max reverse reactive	kvar	2+3 00.000	Display “-”

	demand			
47	A-N Voltage	V	3+2 000.00	
48	B-N Voltage	V	3+2 000.00	
49	C-N Voltage	V	3+2 000.00	
50	A-B Voltage	V	3+2 000.00	
51	B-C Voltage	V	3+2 000.00	
52	C-A Voltage	V	3+2 000.00	
53	A Phase Current	A	3+3 000.000	When reverse, Display “-”
54	B Phase Current	A	3+3 000.000	When reverse, Display “-”
55	C Phase Current	A	3+3 000.000	When reverse, Display “-”
56	Total active power	kw	3+3 000.000	When reverse, Display “-”
57	A Phase active power	kw	2+3 00.000	When reverse, Display “-”
58	B Phase active power	kw	2+3 00.000	When reverse, Display “-”
59	C Phase active power	kw	2+3 00.000	When reverse, Display “-”
60	Total reactive power	kvar	2+3 00.000	When reverse, Display “-”
61	A Phase reactive power	kvar	2+3 00.000	When reverse, Display “-”
62	B Phase reactive power	kvar	2+3 00.000	When reverse, Display v“-”
63	B Phase reactive power	kvar	2+3 00.000	When reverse, Display “-”
64	Total apparent power	kva	2+3 00.000	
65	A Phase apparent power	kva	2+3 00.000	
66	B Phase apparent power	kva	2+3 00.000	
67	C Phase apparent power	kva	2+3 00.000	
68	Total Frequency	Hz	2+1 00.0	
69	A Phase frequency	Hz	2+1 00.0	
70	B Phase frequency	Hz	2+1 00.0	
71	C Phase frequency	Hz	2+1 00.0	
72	Total power factor		1+3 0.000	Displays capacitive 'C' and inductive 'L' with '-' (based on active power)
73	A Phase power factor		1+3 0.000	Displays capacitive 'C' and inductive 'L' with

				'-' (based on active power)
74	B Phase power factor		1+3 0.000	Displays capacitive 'C' and inductive 'L' with '-' (based on active power)
75	C Phase power factor		1+3 0.000	Displays capacitive 'C' and inductive 'L' with '-' (based on active power)
Press and hold the left button for 3 seconds to switch the display page: scroll display page -> A phase energy page -> B phase energy page -> C phase energy page -> Information page -> Scroll display page.				
A B C 3P Energy Display Page				
Page	**Content**	**Unit**	**Data Format**	**Note**
1	Total active energy	kWh	6+2 000000.00	
2	Forward active energy	kWh	6+2 000000.00	
3	Reverse active energy	kWh	5+2 00000.00	Display “-”
4	T1 Total active energy	kWh	6+2 000000.00	
5	T1 Forward active energy	kWh	6+2 000000.00	
6	T1 Reverse active energy	kWh	5+2 00000.00	Display “-”
7	T2 Total active energy	kWh	6+2 000000.00	
8	T2 Forward active energy	kWh	6+2 000000.00	
9	T2 Reverse active energy	kWh	5+2 00000.00	Display “-”
10	T3 Total active energy	kWh	6+2 000000.00	
11	T3 Forward active energy	kWh	6+2 000000.00	
12	T3 Reverse active energy	kWh	5+2 00000.00	Display “-”
13	T4 Total active energy	kWh	6+2 000000.00	
14	T4 Forward active energy	kWh	6+2 000000.00	
15	T4 Reverse active energy	kWh	5+2 00000.00	Display “-”
16	Total reactive energy	kvarh	6+2 000000.00	
17	Forward reactive energy	kvarh	6+2 000000.00	
18	Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
19	First quadrant reactive power	kvarh	6+2 000000.00	
20	Second quadrant reactive energy	kvarh	6+2 000000.00	
21	Third quadrant reactive energy	kvarh	6+2 000000.00	
22	Forth quadrant reactive energy	kvarh	6+2 000000.00	
23	T1 Total reactive energy	kvarh	6+2 000000.00	

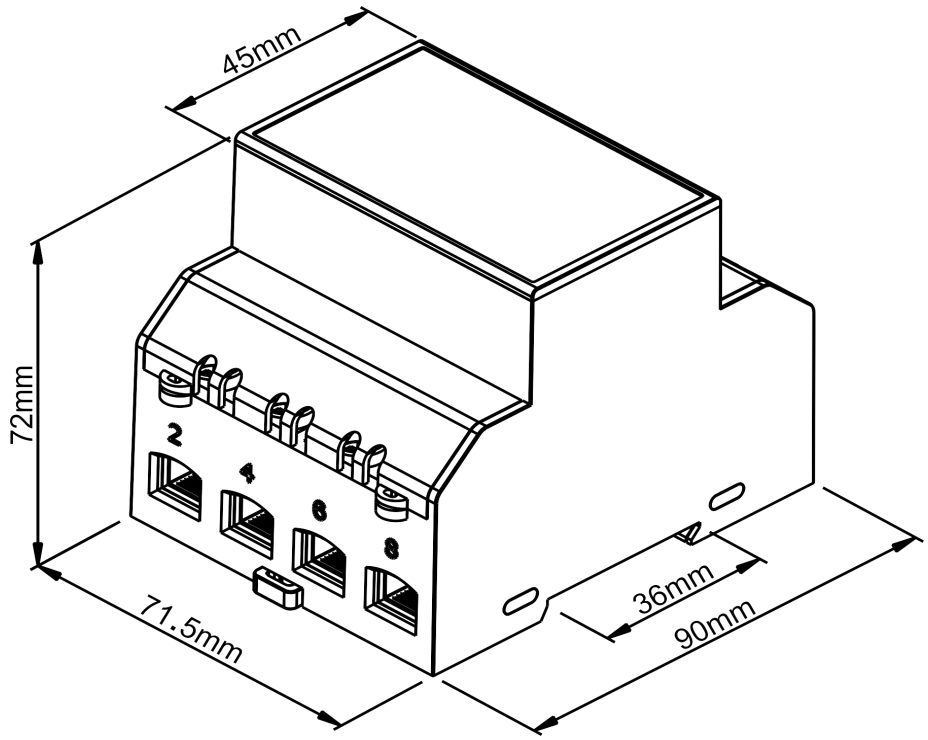
24	T1 Forward reactive energy	kvarh	6+2 000000.00	
25	T1 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
26	T2 Total reactive energy	kvarh	6+2 000000.00	
27	T2 Forward reactive energy	kvarh	6+2 000000.00	
28	T2 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
29	T3 Total reactive energy	kvarh	6+2 000000.00	
30	T3 Forward reactive energy	kvarh	6+2 000000.00	
31	T3 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
32	T4 Total reactive energy	kvarh	6+2 000000.00	
33	T4 Forward reactive energy	kvarh	6+2 000000.00	
34	T4 Reverse reactive energy	kvarh	5+2 00000.00	Display “-”
35	Resettable active energy	kWh	6+2 000000.00	
36	Resettable forward active energy	kWh	6+2 000000.00	
37	Resettable reverse active energy	kWh	5+2 00000.00	Display “-”
38	Resettable reactive energy	kvarh	6+2 000000.00	
39	Resettable forward reactive energy	kvarh	6+2 000000.00	
40	Resettable reverse reactive energy	kvarh	5+2 00000.00	Display “-”
41	Max active demand	kW	2+3 00.000	
42	Max forward active demand	kW	2+3 00.000	
43	Max reverse active demand	kW	2+3 00.000	Display “-”
44	Max reactive demand	kvar	2+3 00.000	
45	Max forward reactive demand	kvar	2+3 00.000	
46	Max reverse reactive demand	kvar	2+3 00.000	Display “-”
Press and hold the left button for 3 seconds to switch the display page: scroll display page -> A phase energy page -> B phase energy page -> C phase energy page -> Information page -> Scroll display page.				
Information Page				
Page	**Content**	**Unit**	**Data Format**	**Note**
1	Serial Number		000000000000,12 digit	As same as DLT 645 ID
2	Modbus ID		1-247	
3	Baud Rate		9600/19200/ 38400/115200	
4	Parity Check		Odd/Even/None	
5	Stop Bit Parity		1/2bit	
6	Scroll display time interval	S	5-99s, 0 means scrolling is	

			disabled	
7	Combined code		1=Total=Forward 2=Total=Reverse 3=Total=Forward +Reverse(default) 4=Total=Forward-Reverse	
8	Demand Type and Period		0=range 1=slip	Period: 1-30 minutes, default is 15 minutes
9	SO Output		For example: 800, 1000, 1600... greater than 100 and divisible by 96000	
10	Date		DDMMYY	
11	Time		HHMMSS	
12	Version Number		U101	
13	Checksum		XXXX	
Press and hold the right buttons for more than 3 seconds and then enter the correct password to enter the settings page.				
Setting Page				
Page	**Content**	**Unit**	**Data Format**	**Note**
1	Modbus ID		1-247	Press and hold the right button for more than 3 seconds and enter the correct password
2	Baud Rate		9600/19200/38400/115200	
3	Parity Check		Odd/Even/None	
4	Stop Bit		1/2bit	
5	Scroll display time interval		5-99 seconds, 0 disables scroll display	
6	Combined code	S	1=Total=Forward 2=Total=Reverse 3=Total=Forward +Reverse(default) 4=Total=Forward-Reverse	
7	Demand Type and Period		Type 0=range	

			1=slip Period 1-30min	
8	SO Output		800, 1000, 1600... >100 and divisible by 96000	
9	Date		DDMMYY	
10	Time		HHMMSS	
11	Resettable active energy		After long press, the total (total, forward and reverse) and each phase (total, forward and reverse) can be reset, and the corresponding data can be selected to reset	
12	Resettable reactive energy		After long press, the total (total, forward and reverse) and each phase (total, forward and reverse) can be reset, and the corresponding data can be selected to reset	
13	Resettable max active demand		After long press, the total (total, forward and reverse) and each phase (total, forward and reverse) can be reset, and the corresponding data can be selected to reset	
14	Resettable max reactive demand		After long press, the total (total, forward and reverse) and each	

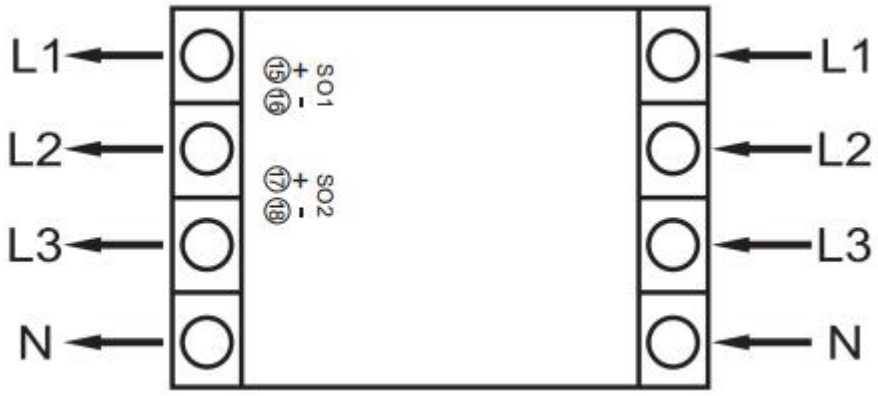
			phase (total, forward and reverse) can be reset, and the corresponding data can be selected to reset	
15	Password		4 bits	
16	Quit		Quit setting	

6. Overall Dimension



7. Wiring Diagram

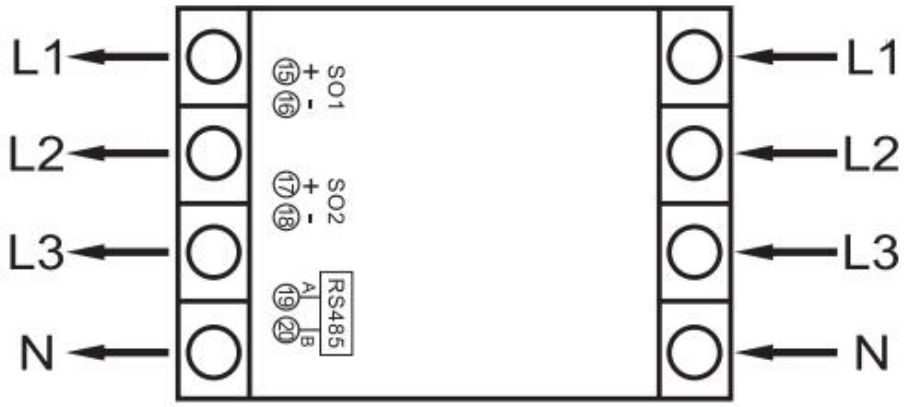
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Note: 15 16： SO1 can indicate total active energy or the forward active/reactive energy(optional).

17 18： SO2 can indicate total reactive energy or the reverse active/reactive energy (optional).

EM513082/EM513083



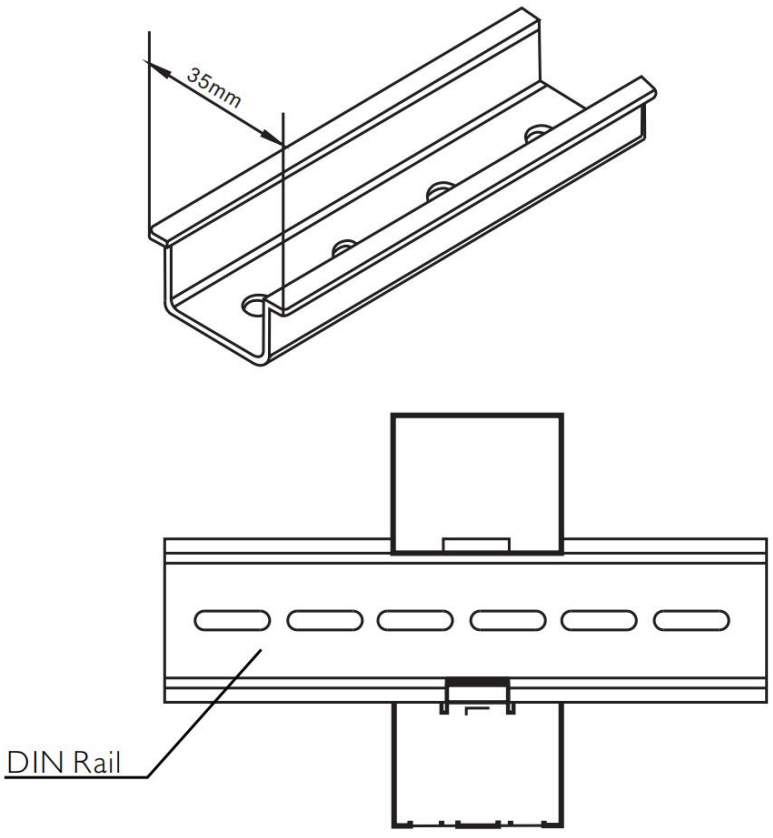
Note: 15 16： SO1 can indicate total active energy or the forward active/reactive energy (optional).

17 18：SO2 can indicate total reactive energy or the reverse active/reactive energy (optional).

19 20：RS485 port

8. Installation Instruction

- The casing is sealed. Do not open the meter casing. If the casing is opened, the warranty will be void.
- The meter should be installed in an indoor or outdoor meter box.
- According to Directive 2014/32/EU, the meter is intended to be installed in a mechanical environment 'M1' with low levels of shock and vibration.
- According to Directive 2014/32/EU, meters are intended for installation in electromagnetic environment 'E2'.
- Isolation safety information: The meter uses local power generation and needs to be disconnected from the main power supply before installation and removal. Improper operation may cause personal injury or equipment damage.
- This meter is a direct meter and can directly use the UC rated value, that is, UC2 (≤100A).



9. Safety Instructions

For your safety, please read the following information:
This manual does not contain all safety measures for the operation of this energy meter, as special operating conditions, local code requirements or local regulations may require further measures. However, for your personal safety and to avoid damage to the energy meter, this manual contains important information that is highlighted by a warning triangle with an exclamation point or lightning bolt, depending on the severity of the warning.



Warning

Before installing the meter, make sure the power supply has been cut off, otherwise it will be life-threatening. The circuit breaker should be disconnected and placed in a safe place to avoid accidental power-on.

Compliance Operator

The installation and operation of the meter described in this manual can only be performed by qualified personnel.
Only personnel who are authorized to install, connect and use this meter, have relevant knowledge of electrical equipment, circuit labels and grounding, and can operate in accordance with safety regulations and standards can be considered as qualified personnel as specified in this manual.

Exemption Liability

We have checked the contents of this manual and have made every effort to ensure that the description is as accurate as possible, but deviations of the product from the description cannot be completely excluded and avoided. Therefore, we do not assume any liability for any errors or omissions in the information provided. The data in this manuel will be checked regularly and the manuel version will be updated if necessary.

Other Clarifications

After unpacking the meter, make sure the meter is intact. If in doubt, do not use the meter immediately, and contact the relevant IVY technician.
If the meter malfunctions, disconnect the meter immediately. If repair is required,

please contact IVY technical support.
Failure to comply with the above may jeopardize the safety of the equipment.

10. Transportation & Storage

- The energy meter shall not be subject to severe impact during transportation and storage, and shall be transported and stoned in accordance with GB13384-2008.
- The energy meter should be kept in the original package, and the temperature range of the environment of the place where it is kept is -40~70℃, the relative humidity does not exceed 75%, and there is no corrosive gas in the air;
- The energy meters shall be stored in the warehouse and placed on the bench. The stacking height shall not exceed 10 boxes. After unpacking, the stacking height of single packaged energy meters shall not exceed 5 layers.

11. Quality Assurance

11.1Calculation method of warranty period:
Warranty is handled according to the commercial invoice issued by our company, and the time is 18 months from the date when the meter is shipped from the warehouse, minus the maintenance time and delivery time for no spare parts.

11.2 Warranty coverage
12.2.1 When the user fully follows up the transportation, storage, installation and application of the electric energy meter, and the company's conditions of sealing integrity (in the case of no printing and dis-assembly), the electric energy meter that does not meet the quality requirements and valid evidence (For example, desks, certificate photos, feedback documents from customers' local users, relevant government departments, documents, etc.) should be provided by the customer.

11.2.2 We will repair, replace or return the meter in the following cases:

- No demonstration and no prior explanation
- Does not meet the implementation standards indicated on the product or its packing;(If the standard on the product/package is required by the customer, but does not meet the company’s product implementation standard, the customer should make a corresponding responsibility commitment).
- Does not meet the quality status indicated by product instructions physical samples,etc.

Unqualified meters should be determined in consultation with the user. Generally, we will repair or replenish in the next order. Special circumstances shall be determined through consultation between the two parties.
Note: The quality guarantee is not applicable. If there is no valid invoice, the

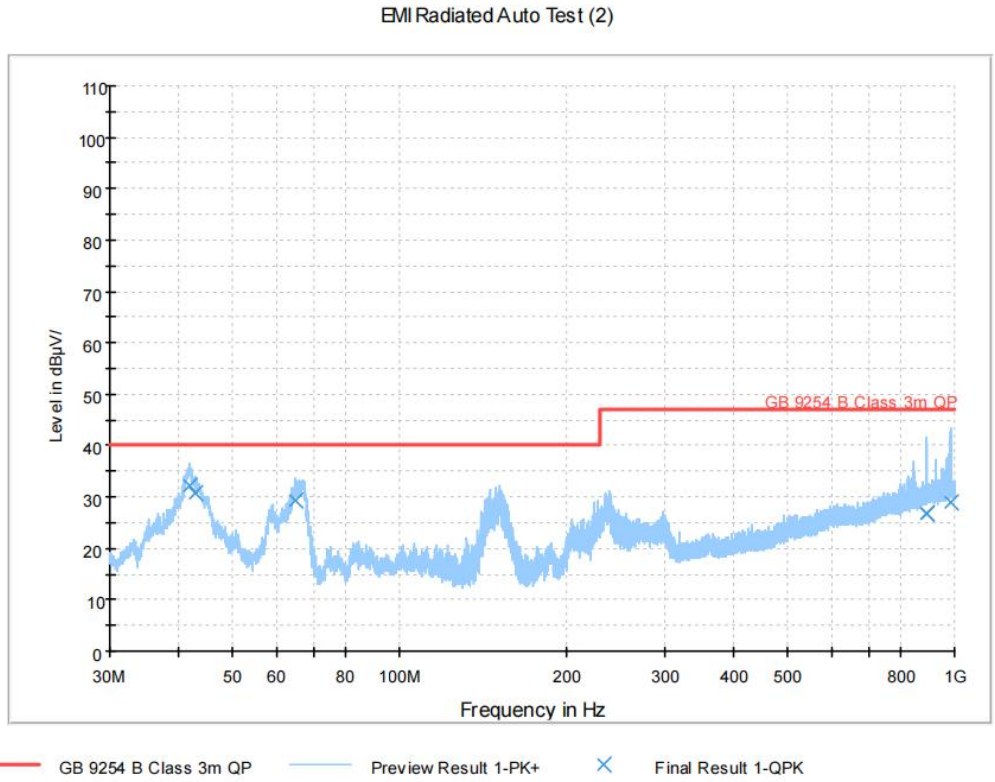
evidence corresponding to the quality problem of the order cannot be provided, and the damage caused by force majeure or the warranty beyond the validity period, but can be recovered for repair (transportation and other related costs need to be borne by the customer)

12. Technical Support

Users' manual is mainly used to guide users to better utilize this series of meter. If unclear please contact with us at any time, we will give you a satisfactory answer.

Sales Center & Technical Support:
Ivy metering Co.,Ltd
Add: Room 2012, Gold Source Center, No 28 Yuan'wen Road, Minhang District, Shanghai 201199 , China
Tel: +86 21 62209608
Email: info@ivy-metering.com

Appendix 1:



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)
41.760000	32.3	1000.0	120.000	100.0	V	90.0	13.6	7.7
42.640000	30.6	1000.0	120.000	100.0	V	0.0	13.9	9.4
64.680000	29.5	1000.0	120.000	100.0	V	0.0	10.8	10.5
892.160000	26.7	1000.0	120.000	100.0	V	180.0	26.7	20.3
892.840000	26.8	1000.0	120.000	100.0	V	180.0	26.7	20.2
986.960000	28.8	1000.0	120.000	100.0	V	0.0	27.6	18.2

(continuation of the "Final Result 1" table from column 9 ...)

Frequency (MHz)	Limit (dBµV/m)	Comment
41.760000	40.0	
42.640000	40.0	
64.680000	40.0	
892.160000	47.0	
892.840000	47.0	
986.960000	47.0	