

MX Measuring Unit

Instruction Manual



Danger, installation by electricians only.



1. Product Overview and Scope of Application

- Rated working voltage(U_e): 400Vac $\pm$ 20%
- Frequency: 50/60Hz
- Frame current: 250A/400A/630A
- Pollution degree: 3
- IP degree: IP20
- Standard: IEC 61557-12 / IEC 61326-1 / IEC 61010-1 / ETSI EN 300 328
- Certification: CE

1.1 Normal Service Conditions

- The ambient air temperature is - 5°C ~ + 40°C, and the average temperature within 24h shall not exceed + 35°C.

Notice: The ultimate working temperature is -40°C ~ 70°C product life and accuracy could be affected if working long time under ultimate temperature;

- When the maximum temperature is + 40°C, the relative humidity of the air shall not exceed 50%. Higher relative humidity can be allowed at lower temperature (such as 90% at + 20°C). Special measures shall be taken for the occasional condensation due to temperature change;
- The altitude of the installation site shall not exceed 2000m.
- Pollution degree: III.

1.2 Installation Conditions

Under the conditions of Safety Alert, it shall be installed in the place with rain and snow proof equipment, not filled with water vapor, no significant shaking, impact and vibration;

The inclination between the mounting surface and the vertical surface shall not be greater than $\pm 5^\circ$;

Installation Class III.

1.3 Transportation and storage Conditions

The applicable temperature range for transportation & storage is from -25°C to +55°C, and can reach +70°C in a short time (24h). The storage place shall be ventilated and dry, and shall not be attacked by rain, snow and shall not be exposed to direct sunlight.

2. Main Technical Parameter

2.1 Measurement Function

Current	Phase current: I_a, I_b, I_c
	Neutral current(4P): I_n
	Ground fault current(4P): I_g
	Current unbalance: ϵ_i, I_{ur}
	Maximum phase current and neutral current
Voltage	Line voltage: U_{ab}, U_{bc}, U_{ac}
	Phase voltage: U_{an}, U_{bn}, U_{cn}
	Voltage unbalance: $\epsilon_u, U_{ur}, U_{nr}$
Power	Active power(kW): P , threephase and per phase
	Reactive power(kVAR): Q , threephase and per phase
	Apparent power(kVA): S , threephase and per phase
Energy	Active energy(kWh): threephase and per phase
	Reactive energy(kVARh): threephase and per phase
	Apparent energy(KVAh): threephase and per phase
Power Factor	PF and $\cos\phi$ (per Phase) threephase and per Phase
Frequency	F
Harmonic	Total harmonic distortion measurement THDi, THDu
Temperature	Measure the temperature at the outlet connection between the Module and the Module case.

2.2 Power Freezing Function

Daily Electric Energy Freezing:

When pass zero'o clock every day, freeze the current positive active power, reverse active power, positive reactive power, reverse reactive power, total electric energy and record the current time identification (Month, Day, Hour and Minute).

Monthly Electric Energy Freezing:

When pass zero'o clock at the end of each month, freeze the current positive active power, reverse active power, positive reactive power, reverse reactive power, total electric energy and record the current time identification (Month, Day, Hour and Minute).

Instant Electric Energy Freezing:

Send the Freezing command, and the Energy Meter can freeze the positive active power, reverse active power, positive reactive power, reverse reactive power, total electric energy at that time and record the current time identification (Month, Day, Hour and Minute).

2.3 Event Alarm

Alarm and Event Recording Functions (Setting parameters through communication):

A-phase overvoltage/B-phase overvoltage/C-phase overvoltage/A-phase undervoltage/B-phase undervoltage/C-phase undervoltage/Overfrequency/Underfrequency/Power factor exceeding the lower limit/Current imbalance/ Voltage imbalance/A-phase missing/B-phase missing/C-phase missing/Reverse power/Phase-sequence error/A-phase overtemperature/B-phase overtemperature/C-phase overtemperature/Voltage harmonic exceeding the limit/Current harmonic exceeding the limit/ Power on after power loss (Only record without alarm).

When an event alarm occurs, the event and timestamp will be stored in the internal memory and can be read through the communication protocol. See Annex (Communication Protocol).

2.4 Advanced Protection Function

Advanced Protection Function (Setting parameters through communication):

With switching function, can be set to OFF, When A-phase overvoltage/ B-phase overvoltage/C-phase overvoltage/A-phase undervoltage/B-phase undervoltage/C-phase undervoltage/Overfrequency/Underfrequency/ Power factor exceeding the lower limit/Current imbalance/Voltage imbalance/A-phase missing/B-phase missing/Cphase missing/Power reversed/ Phase-sequenceerror/A-phase overtemperature/B-phase overtemperature /C-phase overtemperature/Voltage harmonic exceeding the limit/ Current harmonic exceeding the limit, when any protection function is triggered, the Output PWM Level will trigger the magnetic flux to the molded case shunt to realize the protection function.

When the advanced protection function occurs, the event and timestamp will be stored in the Internal memory and can be read through the communication protocol. See Annex (Communication Protocol)

2.5 Basic Communication Parameters

RS485 Communication: baud rate: 1200bps、2400bps、4800bps、9600bps、19200bps; The default value is 9600bps.

Data Bit: 8;

Parity Bit: No Parity or Even Parity; The default value is Evem Parity. Stop Bit: 1;

2.6 Impulse withstand voltage description

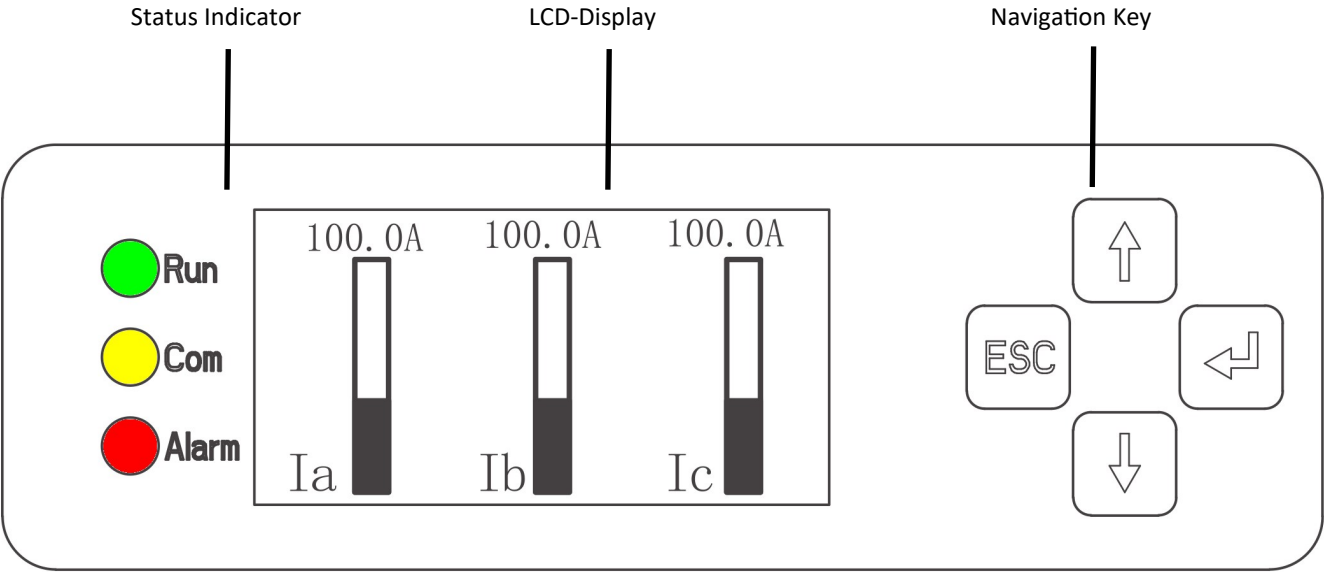
Impulse with-stand voltage Uimp (kV)	Test voltage and corresponding altitude					Note
	U1,2/50kV					
	Altitude	200m	500m	1000m	2000m	
6	7.3	7.2	7	6.7	6	Please pull out controller module before conducting dielectric test.
8	9.8	9.6	9.3	9	8	Please pull out controller module and disconnect voltage supply cable before conducting dielectric test.

2.7 Accuracy

		Measurment Range	Accuracy
Current	I1, I2, I3, IN	$0.01 \leq I < 0.05 I_n$	±1%
		$0.05 I_n \leq I < 1.2 I_n$	±0,5%
Voltage	Phase voltage: V1N, V2N, V3N	$0.7 U_n \leq U \leq 1.3 U_n$	±0,5%
	Line voltage: U12, U23, U13		
Power	Active power	$0.05 I_n \leq I < 0.1 I_n (1L)$	±3%
		$0.1 I_n \leq I < 1.2 I_n (1L; 0.5L; 0.8C)$	±2%
Energy	Total and quadrant reactive energy(forward and reverse)		Class 2
	Total and quadrant active energy(forward and reverse)		Class 0,5S
Power Factor	cosφ	0.5~1	±10%
Frequency	f	45-65HZ	±0.1Hz
Temperature	T1 T2 T3 TN	-25°C~140°C	±2°C

Note: The accuracy above are test under room temperature.

3 Controller Introduction



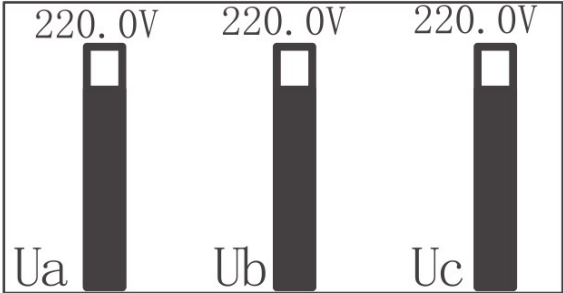
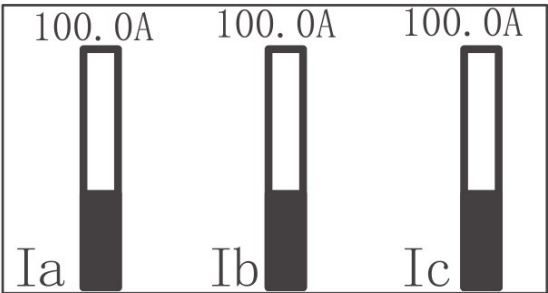
RUN: Operation Status Indicator(Green). In working status, the Green Indicator keeps flashing.

COM: Communication Status indicator(Yellow). When receiving data, the Yellow Indicator keeps flashing.

ALARM: Alarm Statur Inidicator(Red). When over-voltage and under-voltage faults occur, the Red Alarm Indicator is ON. After the fault is eliminated, the Indicator is OFF.

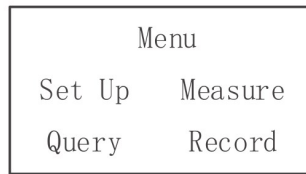
Navigation Keys		
		"Dierection " Key
		Press the key of PageUp/PageDown to set parameter value to increase or decrease.
		"OK" Key
		Enter the Parameter Interface and confirm the modified value or status. Long press the key (3 sec.) to start the Wireless pairing function.
		"ESC" Key
		Cancel or return to the the previous menu
		"Pair" Wireless Pairing key
		Long press the key (3 sec.) to start the Wireless pairing function.

3.1 Current voltage cxcle display interface

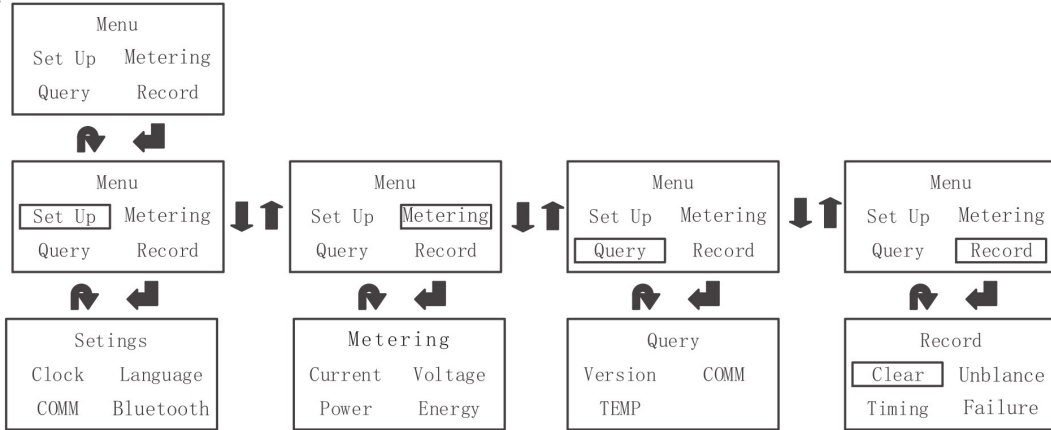


If there is no operation on the display interface within 1min., screen turned off automatically. Press the OK key in the standby interface to enter the main menu interface.

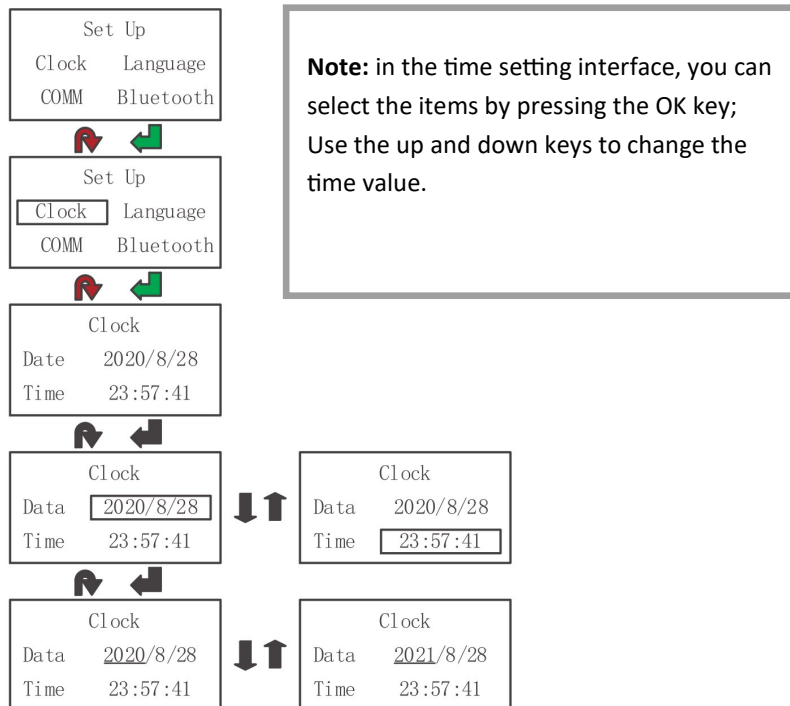
3.2 Operation instructions



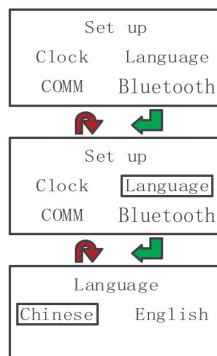
Menu flow chart:



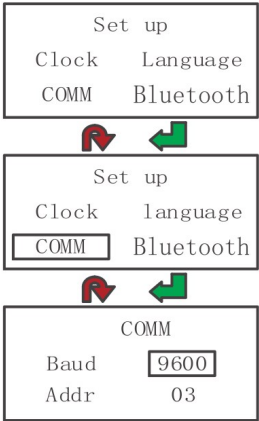
Time setting:



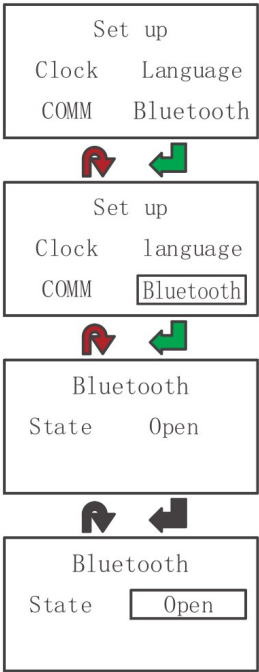
Language settings:



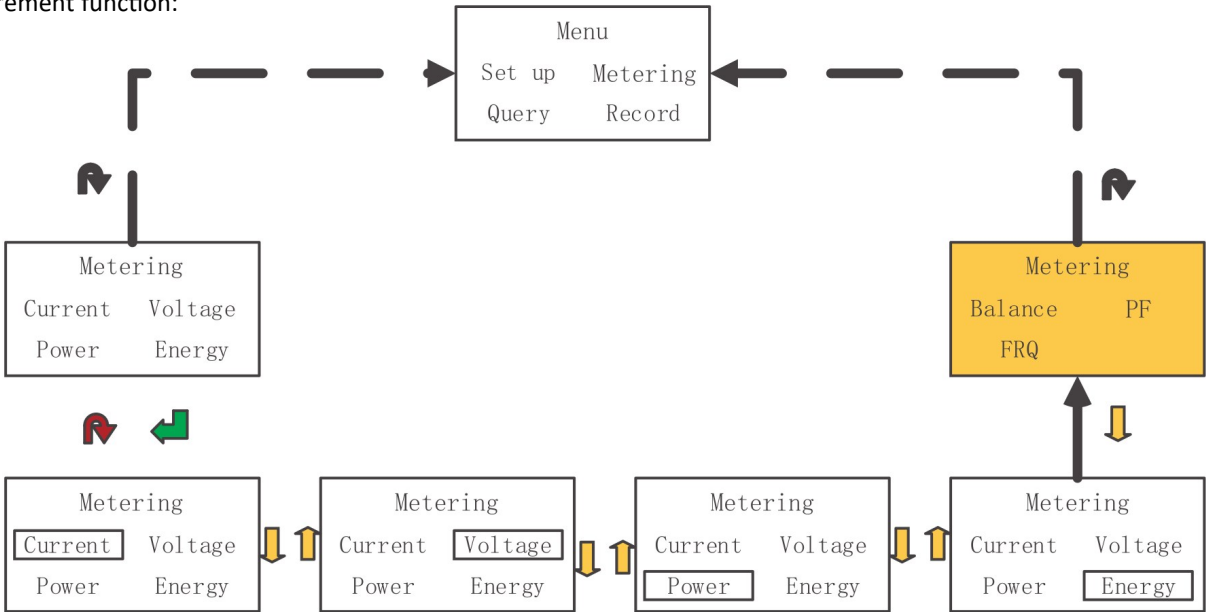
Communication settings:



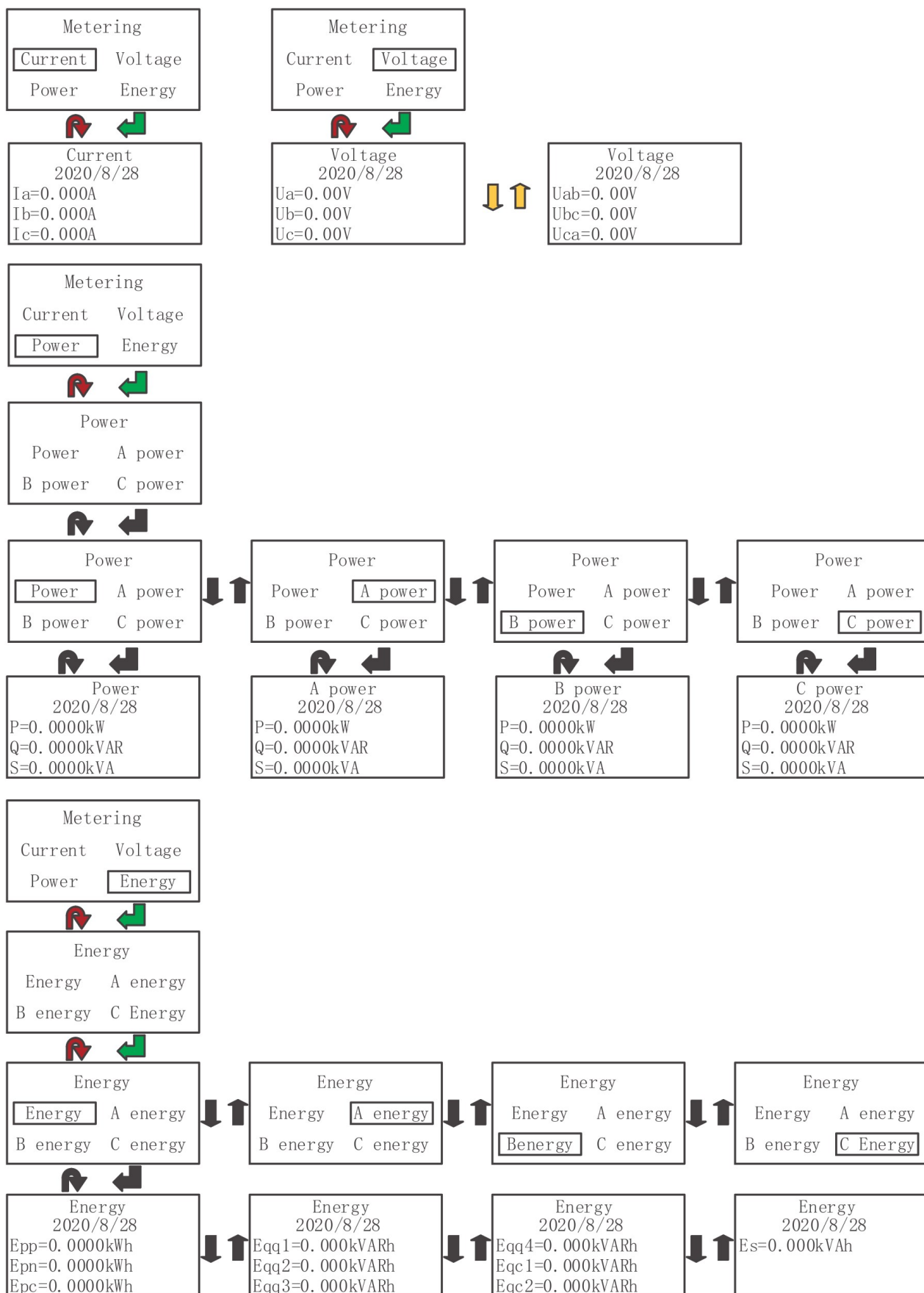
Bluetooth settings:



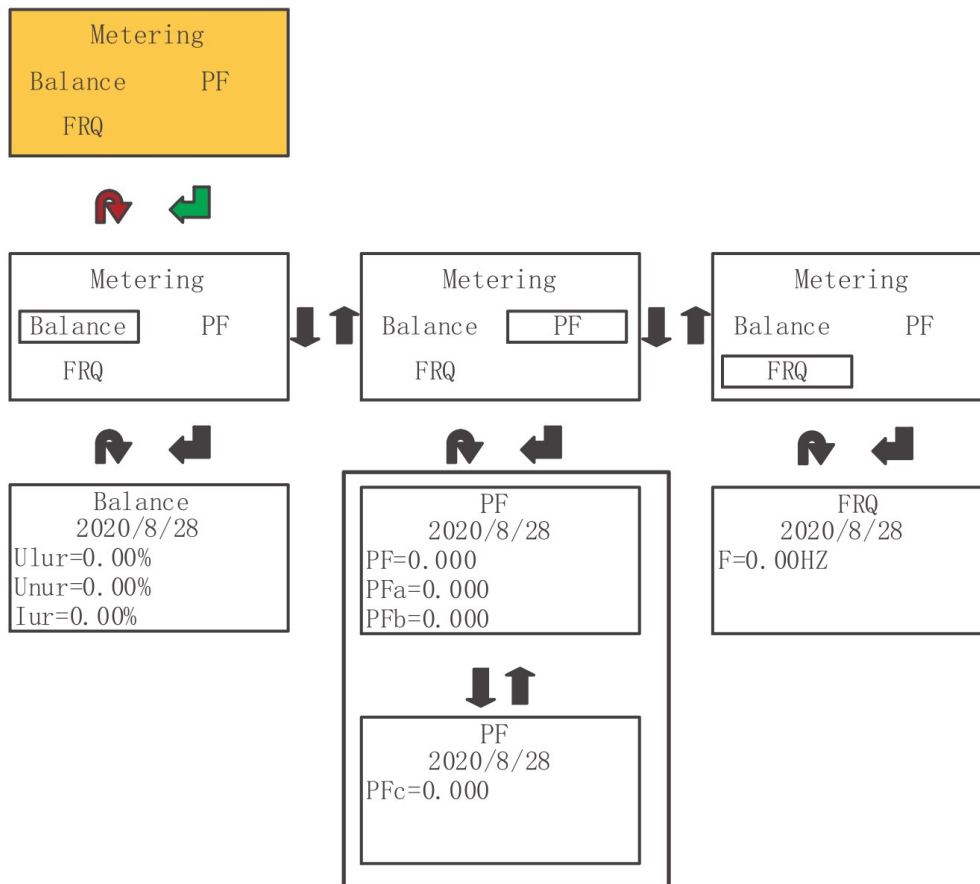
Measurement function:



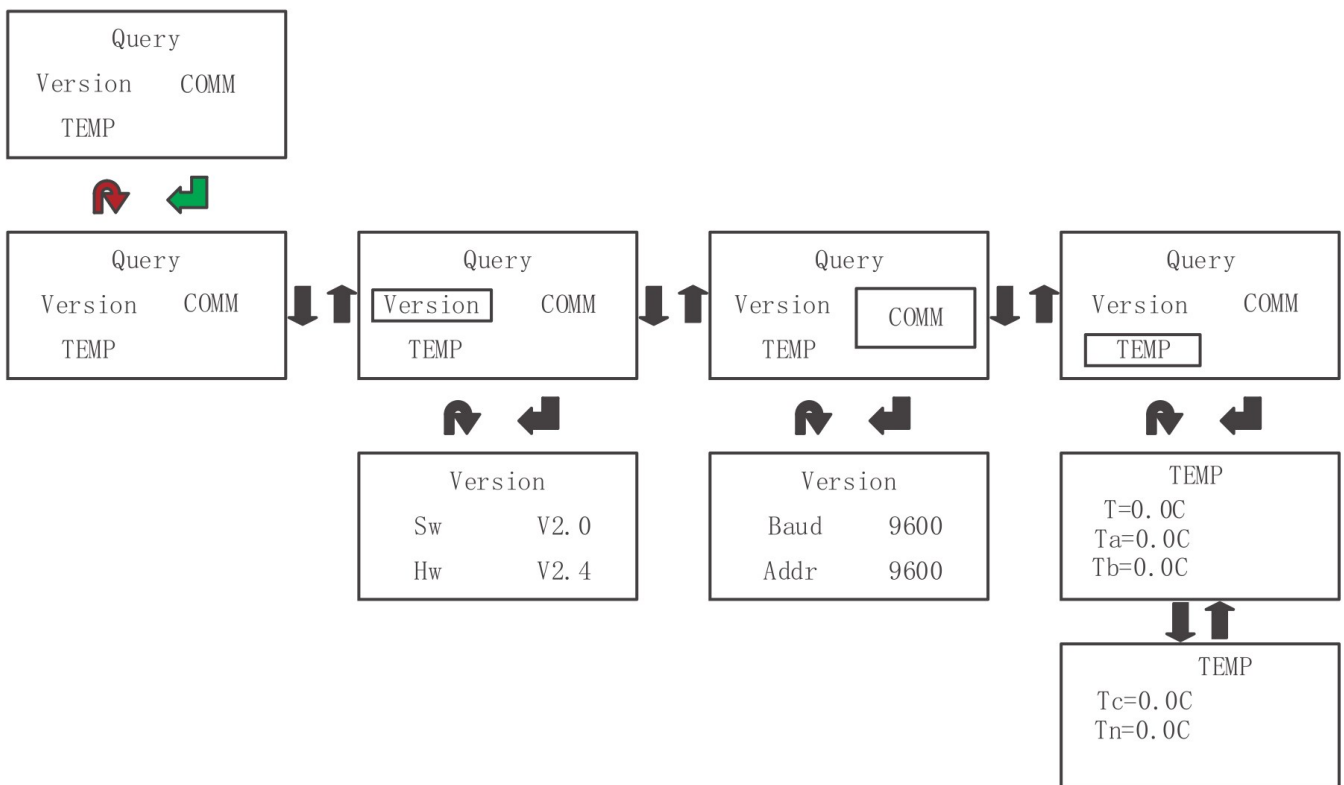
Current/Voltage/Power/Electric energy:



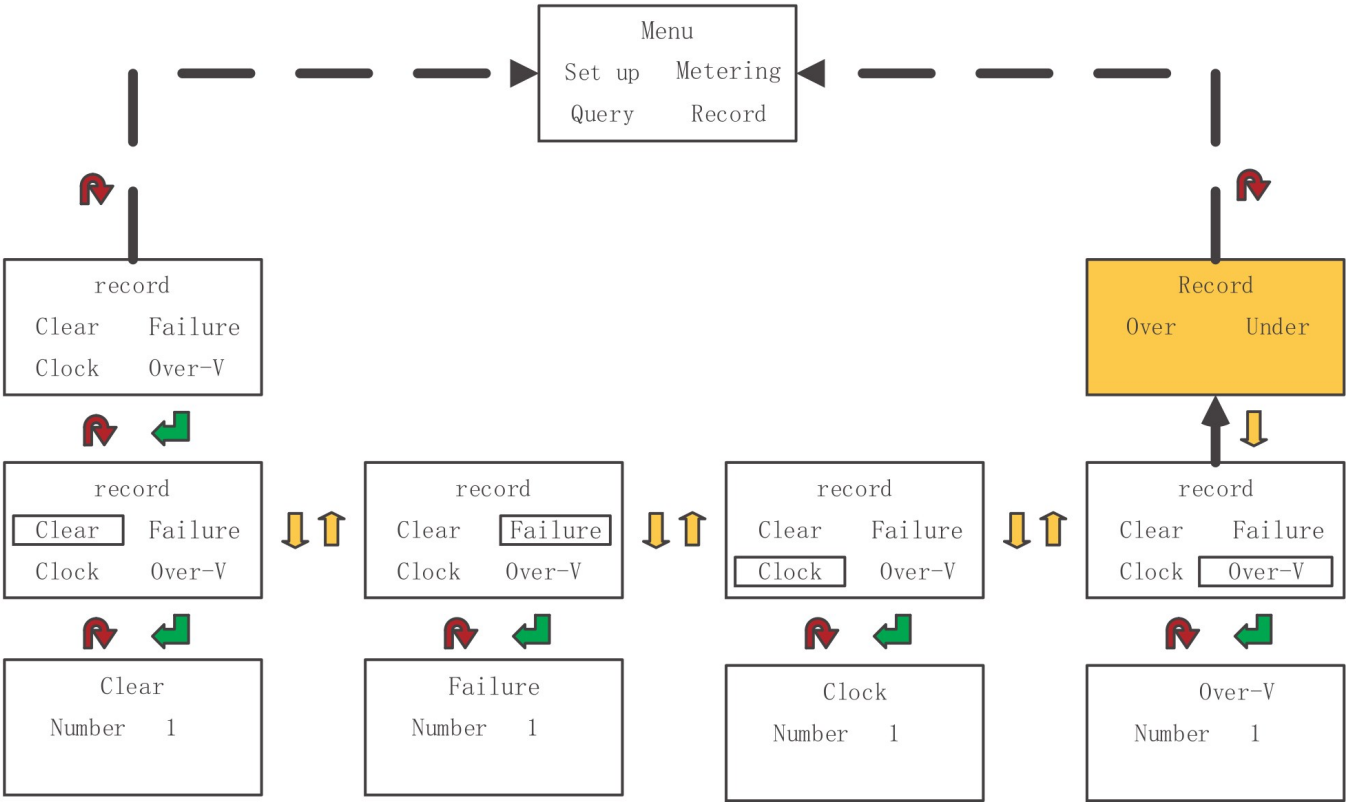
Voltage current imbalance/Power factor/Frequency:



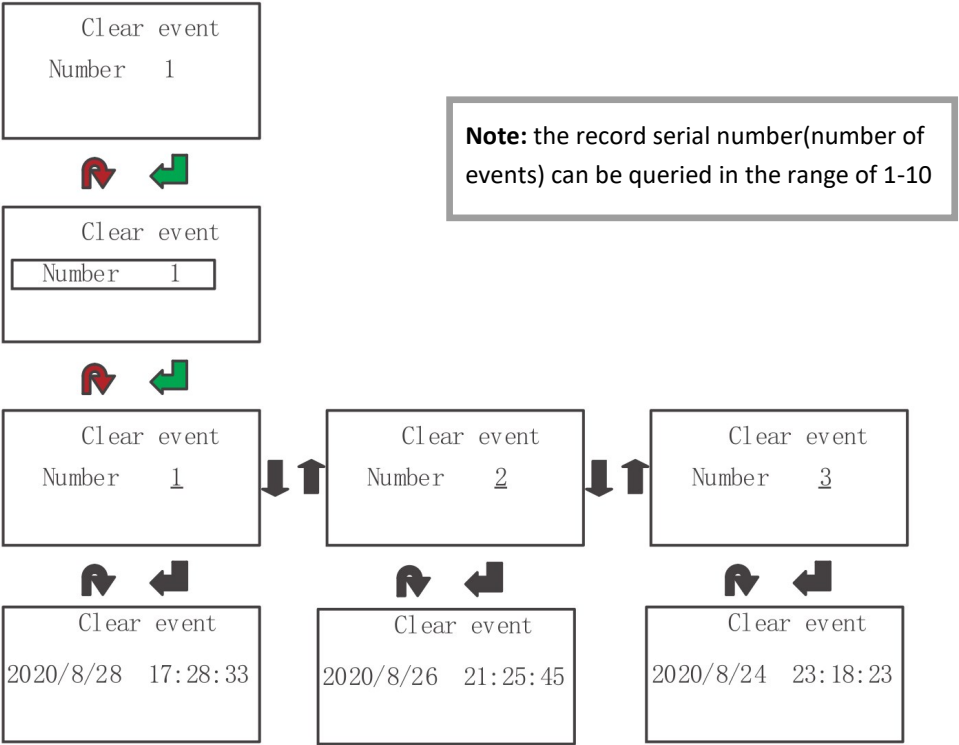
Query function:



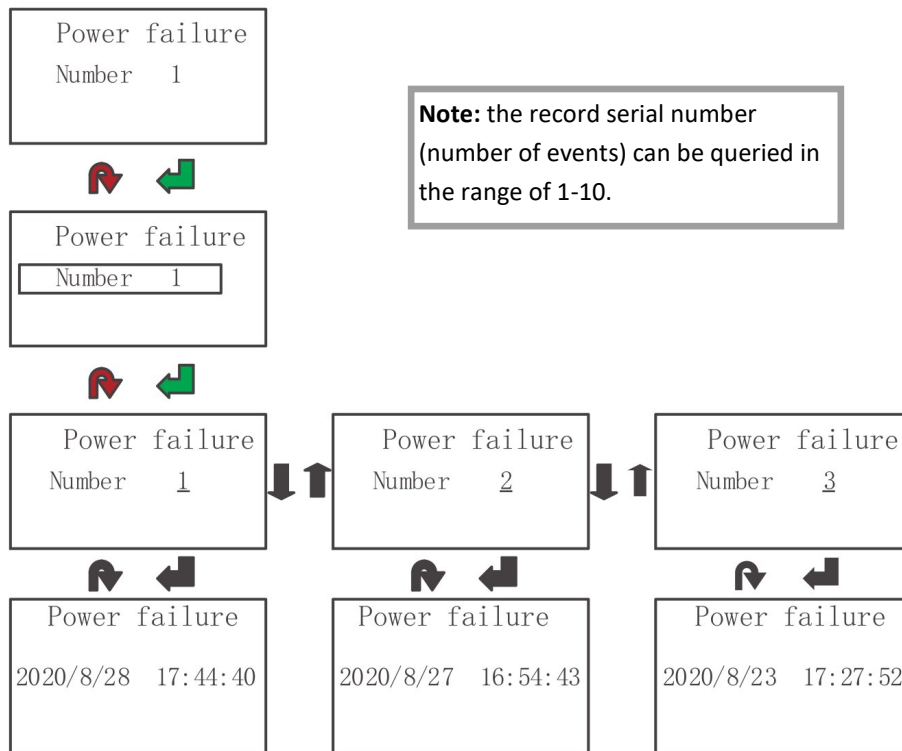
Event query:



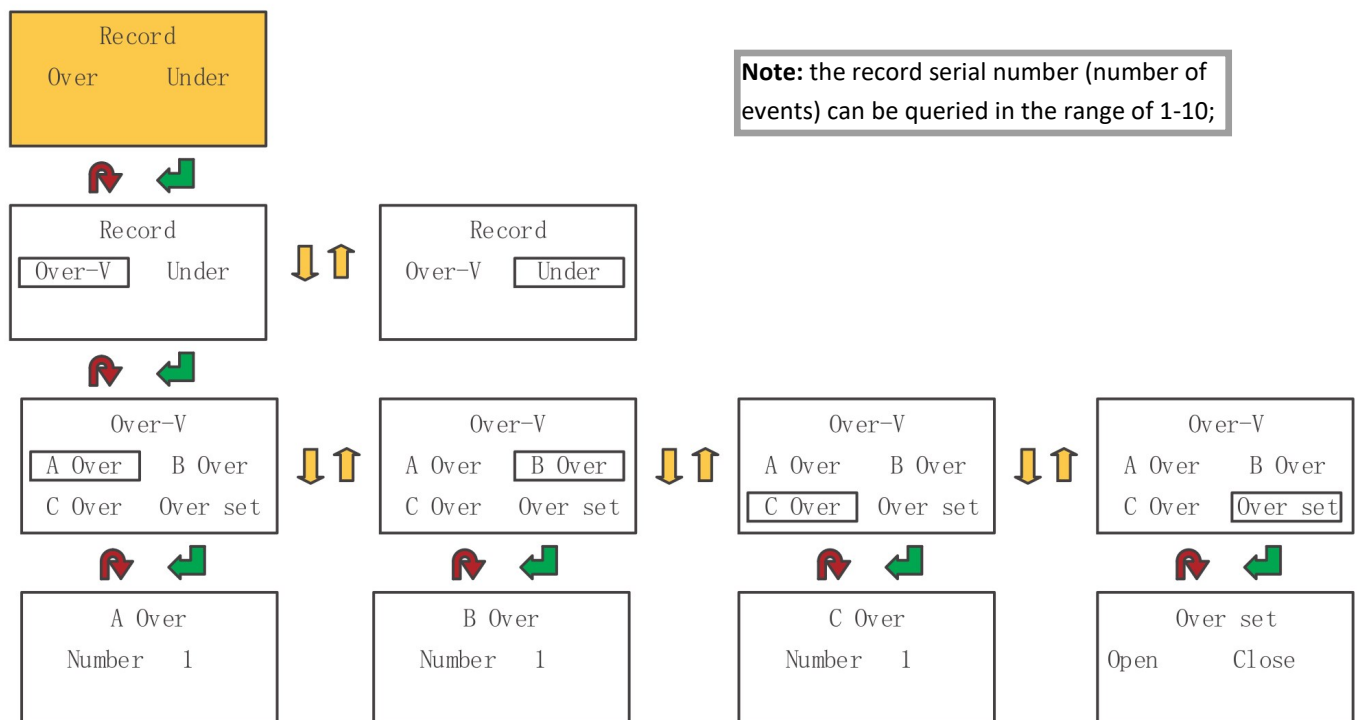
Query reset event:



Query Power failure events:



Overvoltage and undervoltage events:



A Over
Number 1



A Over
Number 1



A Over
Number 1



A Over
Number 2



A Over
Start time:
2020/8/28 17:46:40
End time:
2020/8/28 17:54:49



A Over
Voltage 278.0V

Note:

1. The range of record sequence number (number of events) can be queried from 1 to 10
2. The interface of other record serial numbers is generally the same as the interface of recording 1 serial numbers and will not be described in detail
3. A, B and C phase overvoltage interface is similar, will not be repeated

Record function query:

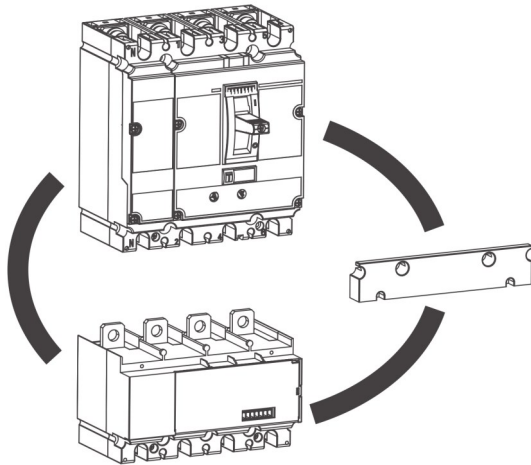
The recording function is divided into: fault record, and alarm record. Each record has 10 records by default.

The types in the record interface are the causes of such records, mainly including:

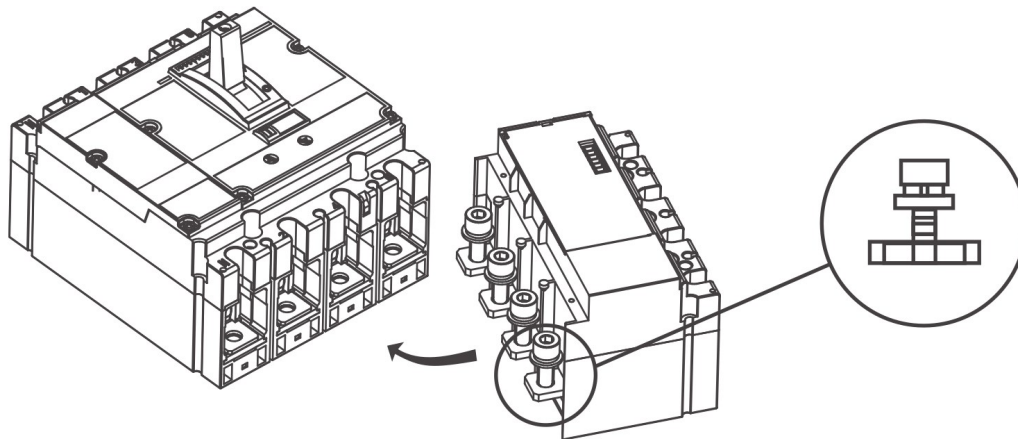
A-phase over voltage / B-phase over voltage / C-phase overvoltage / A-phase undervoltage / B-phase undervoltage / C-phase undervoltage / overfrequency / Underfrequency / power factor exceeding the lower limit / current imbalance / voltage imbalance / A-phase missing phase / B-phase missing phase / C-phase missing phase / reverse power / phase staggering sequence / A-phase overtemperature / B-phase overtemperature / C-phase overtemperature / voltage harmonic overrun / current harmonic overrun / power failure (only record without alarm).

4 Installation

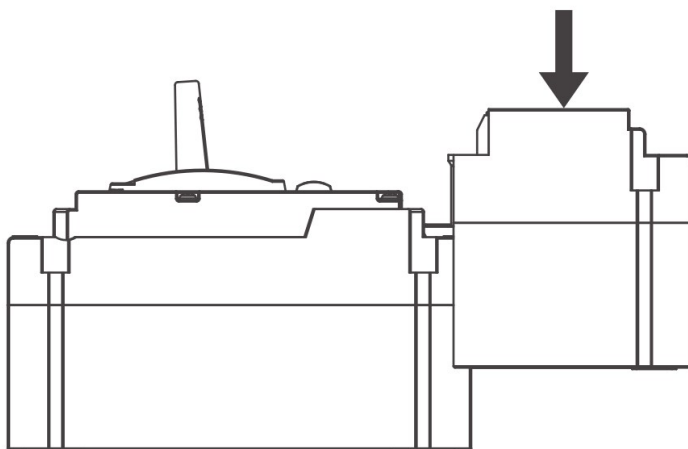
4.1 General structure chart



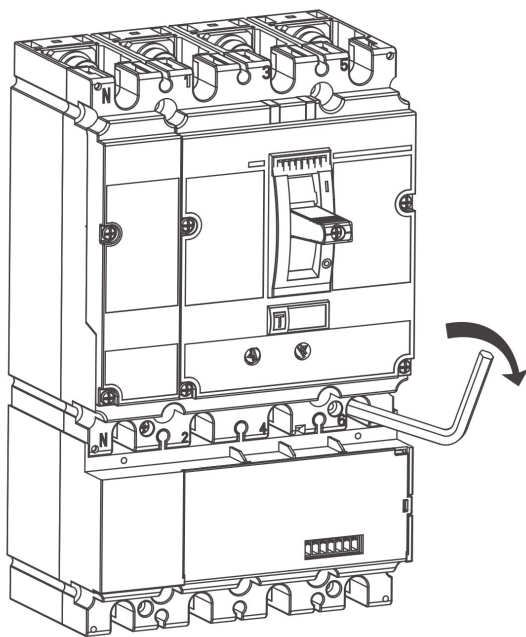
4.2 Connecting installation



4.3 Staggered installation

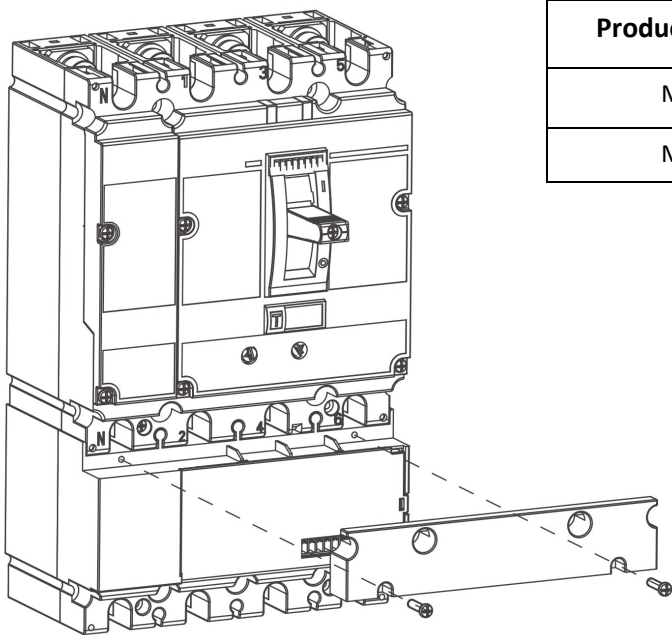


4.4 Screw fastening



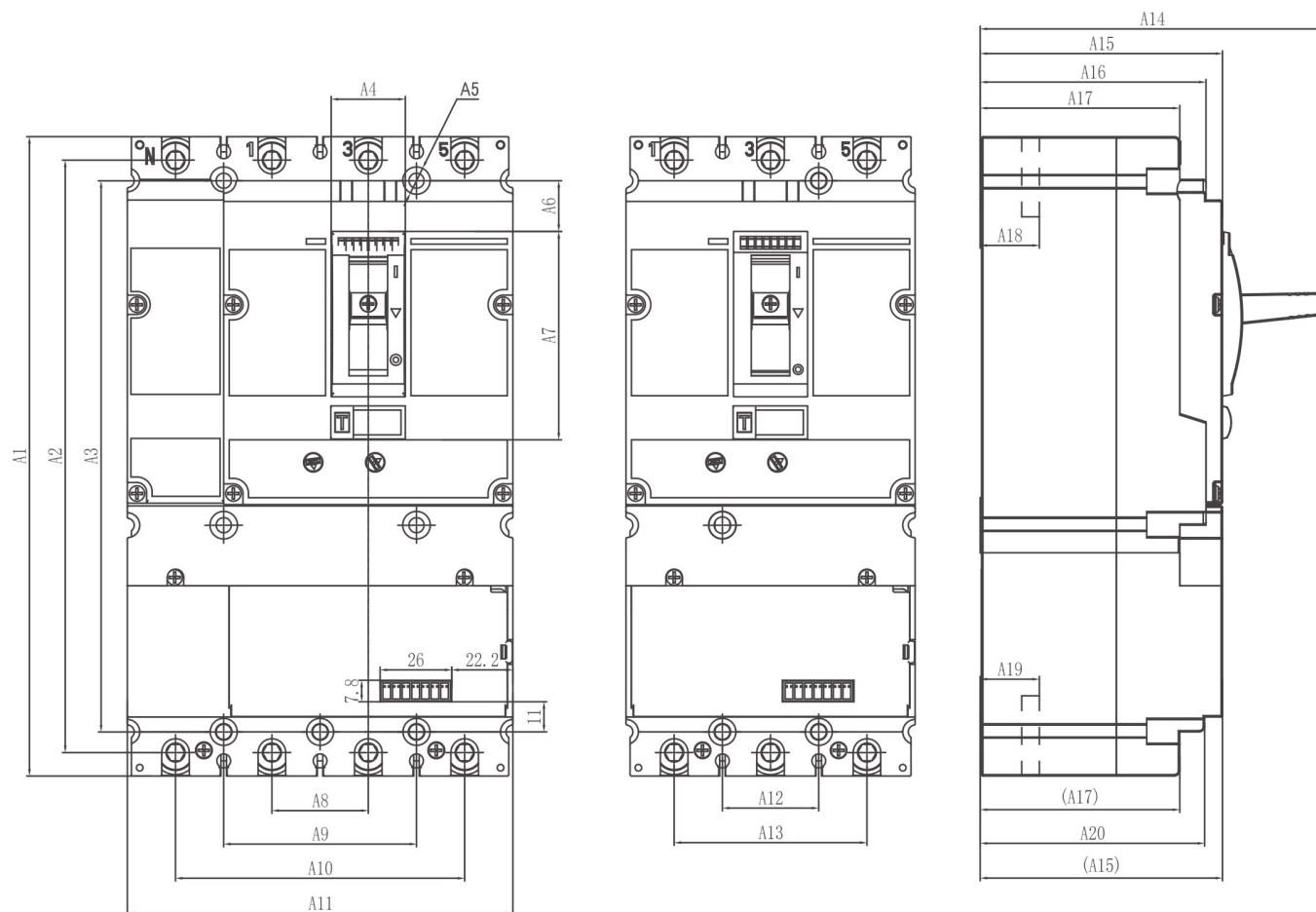
Product model	Screw specification	Torque (N.m)
MX2	M8x20	11
MX3	M10x30	25

4.5 Cover plate installation



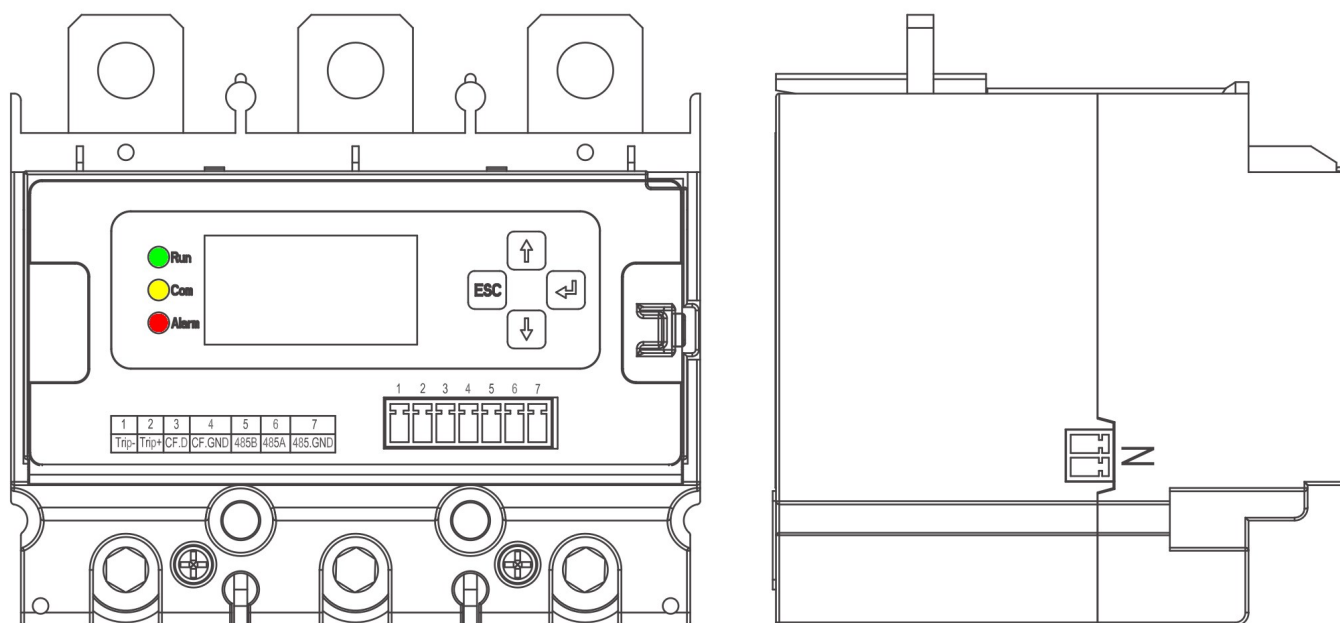
Product model	Screw specification	Torque (N.m)
MX2	ST2.9x19	1.5
MX3	ST2.9x16	1.5

5 Overall and installation dimension



	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
MX2/3P	232	215	200	27	4xφ5.5	18.80	75.3	-	-	-
MX2/4P					7xφ5.5			35	70	105
MX3/3P	335	327	301	51.8	6xφ5.5	27.5	114	-	-	-
MX3/4P					9xφ5.5			45	90	135
	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
MX2/3P	105	35	70	125	88	82	72.5	22.5	22.5	81.5
MX2/4P	140	-	-	-						
MX3/3P	140	45	90	171	113	108	96	27	27	106
MX3/4P	185	-	-	-						

6 Introduction of terminal



The left side 2PIN terminals (either pin, interval distance is 3.5mm) are N pole of TT or TN system, and the IT system has no terminal interface.

The interval of 7 PIN at front side is 3.5mm.

Terminal No.	Terminal Code	Terminal Function
1	Trip-	Flux negative
2	Trip+	Flux positive
3	CF.D	Active energy pulse
4	CF.GND	Active energy pulse GND
5	485B	Communication interface: 485B
6	485A	Communication interface: 485A
7	485.GND	Communication interface: GND

Remarks:

1. The MX Measurement unit is applied to the power grid with 50Hz and rated voltage of 415V and below.
2. For TT or TN system, the N line on the secondary terminal of 3P product must be connected to work normally.

7 Fault Analysis and Troubleshooting

Fault Phenomenon	Cause Analysis	Truables shooting Method
Operation Indicator (Green) does not flash	If is the connected Circuit Breaker closed?	Circuit Breaker closing
Communication Indicator (Yellow) is OFF.	RS485 communication line is connected reversely or has poor contact.	Reconnect the RS485 cable
The Fault Indicator (Red) is ON.	Read the fault status information and trouble-shoot.	Troubleshooting

8 Communication Protocol

A1 Modbus_RTU data format

MX Measuring unit data format comply with GB/T 19582.

A1.1 Description of the data format

BIN-binary, WORD- word, DW- double words, VW- multi words.

The actual value is register value multiply by coefficient, the null default coefficient is 1.

"R" means data is readable only; "W" means data is writable only; "R / W" means data is readable and writable

On following pages up to P.27

A2 Register Address and Description

No.	Description	Format	Unit	Access Rule	Address	Note
1	Fault code	WORD	-	R	0x0005-0006	bit0: Overvoltage A
						bit1: Overvoltage B
						bit2: Overvoltage C
						bit3: Undervoltage A
						bit4: Undervoltage B
						bit5: Undervoltage C
						bit6: Overfrequency
						bit7: Underfrequency
						bit8: I Unbalance
						bit9: U Unbalance
						bit10: Loss A Phase
						bit11: Loss B Phase
						bit12: Loss C Phase
						bit13: Ua over THD
						bit14: Ub over THD
						bit15: Uc over THD
						bit16: Ia over THD
						bit17: Ib over THD
						bit18: Ic over THD
						bit19: Power Reserve
						bit20: Wrong Phase Sequence
						bit21: Low PFt
						bit22: over Tmp Ia
						bit23: over Tmp Ib
						bit24: over Tmp Ic
						bit25: over Tmp In
2	A phase voltage	WORD	0.01V	R	0x0007	
3	B phase voltage	WORD	0.01V	R	0x0008	
4	C phase voltage	WORD	0.01V	R	0x0009	
5	UAB voltage	WORD	0.01V	R	0x000A	
6	UBC voltage	WORD	0.01V	R	0x000B	
7	UCA voltage	WORD	0.01V	R	0x000C	
8	A phase current	DW	0.001A	R	0x000D~000E	
9	B phase current	DW	0.001A	R	0x000F~0010	
10	C phase current	DW	0.001A	R	0x0011~0012	

11	N phase current (In)	DW	0.001A	R	0x0013~0014	
12	Frequency	WORD	0.001A	R	0x0018	
13	Voltage Unbalance	DW	0.01%	R	0x0019~001A	
14	Current Unbalance	DW	0.01%	R	0x001B~001C	
15	Maximum value of 3 phase current	DW	0.001A	R	0x001D~0x001E	
16	Internal temperature	WORD	0.1°C	R	0x001F	
17	A phase temperature	WORD	0.1°C	R	0x0020	
18	B phase temperature	WORD	0.1°C	R	0x0021	
19	C phase temperature	WORD	0.1°C	R	0x0022	
20	N phase temperature	WORD	0.1°C	R	0x0023	
Power						
21	Total Active power	DW	0.0001kWh	R	0x0030~0x0031	
22	A phase Active power	DW	0.0001kWh	R	0x0032~0x0033	
23	B phase Active power	DW	0.0001kWh	R	0x0034~0x0035	
24	C phase Active power	DW	0.0001kWh	R	0x0036~0x0037	
25	Total Reactive power	DW	0.0001kvar	R	0x0038~0x0039	
26	A phase Reactive power	DW	0.0001var	R	0x003A~0x003B	
27	B phase Reactive power	DW	0.0001kvar	R	0x003C~0x003D	
28	C phase Reactive power	DW	0.0001kvar	R	0x003E~0x003F	

29	Total Apparent power	DW	0.0001kVA	R	0x0040~0x0041	
30	A phase Apparent power	DW	0.0001kVA	R	0x0042~0x0043	
31	B phase Apparent power	DW	0.0001kVA	R	0x0044~0x0045	
32	C phase Apparent power	DW	0.0001kVA	R	0x0046~0x0047	
33	Total power factor	WORD	0.001	R	0x0048	
34	A phase power factor	WORD	0.001	R	0x0049	
35	B phase power factor	WORD	0.001	R	0x004A	
36	C phase power factor	WORD	0.001	R	0x004B	
Harmonics						
37	A phase voltage THD	WORD	0.01%	R	0x0050	
38	B phase voltage THD	WORD	0.01%	R	0x0052	
39	C phase voltage THD	WORD	0.01%	R	0x0054	
40	A phase current THD	WORD	0.01%	R	0x0056	
41	B phase current THD	WORD	0.01%	R	0x0058	
42	C phase current THD	WORD	0.01%	R	0x005A	
Energy						
43	A phase Forward Active Energy	DW	0.001kWh	R	0x0110~0x0111	
44	B phase Forward Active Energy	DW	0.001kWh	R	0x0112~0x0113	
45	C phase Forward Active Energy	DW	0.001kWh	R	0x0114~0x0115	
46	Total Forward Active Energy	DW	0.001kWh	R	0x0116~0x0117	

47	A phase Reverse Active Energy	DW	0.001kWh	R	0x0118~0x0119	
48	B phase Reverse Active Energy	DW	0.001kWh	R	0x011A~0x011B	
49	C phase Reverse Active Energy	DW	0.001kWh	R	0x011C~0x011D	
50	Total Reverse Active Energy	DW	0.001kWh	R	0x011E~0x011F	
51	A phase Active Energy	DW	0.001kVah	R	0x0120~0x0121	
52	B phase Active Energy	DW	0.001kVah	R	0x0122~0x0123	
53	C phase Active Energy	DW	0.001kVah	R	0x0124~0x0125	
54	Total Active Energy	DW	0.001kVah	R	0x0126~0x0127	
55	A phase I Quadrant Reactive Energy	DW	0.001kVarh	R	0x0128~0x0129	
56	A phase II Quadrant Reactive Energy	DW	0.001kVarh	R	0x012A~0x012B	
57	A phase III Quadrant Reactive Energy	DW	0.001kVarh	R	0x012C~0x012D	
58	A phase IV Quadrant Reactive Energy	DW	0.001kVarh	R	0x012E~0x012F	
59	B phase I Quadrant Reactive Energy	DW	0.001kVarh	R	0x0130~0x0131	
60	B phase II Quadrant Reactive Energy	DW	0.001kVarh	R	0x0132~0x0133	
61	B phase III Quadrant Reactive Energy	DW	0.001kVarh	R	0x0134~0x0135	
62	B phase IV Quadrant Reactive Energy	DW	0.001kVarh	R	0x0136~0x0137	
63	C phase I Quadrant Reactive Energy	DW	0.001kVarh	R	0x0138~0x0139	
64	C phase II Quadrant Reactive Energy	DW	0.001kVarh	R	0x013A~0x013B	
65	C phase III Quadrant Reactive Energy	DW	0.001kVarh	R	0x013C~0x013D	
66	C phase IV Quadrant Reactive Energy	DW	0.001kVarh	R	0x013E~0x013F	
67	Total I Quadrant Reactive Energy	DW	0.001kVarh	R	0x0140~0x0141	
68	Total II Quadrant Reactive Energy	DW	0.001kVarh	R	0x0142~0x0143	
69	Total III Quadrant Reactive Energy	DW	0.001kVarh	R	0x0144~0x0145	

70	Total IV Quadrant Reactive Energy	DW	0.001kVarh	R	0x0146~0x0147	
71	A phase Reactive Energy	DW	0.001kVarh	R	0x0148~0x0149	
72	B phase Reactive Energy	DW	0.001kVarh	R	0x014A~0x014B	
73	C phase Reactive Energy	DW	0.001kVarh	R	0x014C~0x014D	
74	Total Reactive Energy 1	DW	0.001kVarh	R	0x014E~0x014F	
75	A phase Reactive Energy	DW	0.001kVarh	R	0x0150~0x0151	
76	B phase Reactive Energy	DW	0.001kVarh	R	0x0152~0x0153	
77	C phase Reactive Energy	DW	0.001kVarh	R	0x0154~0x0155	
78	Total Reactive Energy2	DW	0.001kVarh	R	0x0156~0x0157	
79	A phase Apparent Energy	DW	0.001kVah	R	0x0158~0x0159	
80	B phase Apparent Energy	DW	0.001kVah	R	0x015A~0x015B	
81	C phase Apparent Energy	DW	0.001kVah	R	0x015C~0x015D	
82	Total Apparent Energy	DW	0.001kVah	R	0x015E~0x015F	
RTC Settings						
83	Read/Write Year and Month	WORD	--	R/W	0x0800	Year and Month
84	Read/Write Day and Hour	WORD	--	R/W	0x0801	Day and Hour
85	Read/Write minute and seconds	WORD	--	R/W	0x0802	Minute and seconds
Serial Port						
86	ModBus Address	WORD	--	R/W	0x0803	1-250; 251 is the broadcast address
87	Port Baud rate(Check bit)	WORD	--	R/W	0x0804	1200bps(0x0000)
						2400bps(0x0001)
						4800bps(0x0002)
						9600bps(0x0003)
						19200bps(0x0004)
88	Check method (Check bit)	WORD	--	R/W	0x0805	0— No check
						1— even parity check

Event Settings						
Enable state						Default value
(0: close)(2: Alarm)(3: trip)						
89	Set over voltage(Enable)	WORD	-	R/W	0xA000	0
90	Set over voltage(threshold)	WORD	1V	R/W	0xA001	(TT) 276(0x0114) (IT)480V(0x01E0)
91	Set over voltage(reset value)	WORD	1V	R/W	0xA002	(TT)253V(0x00FD) (IT)440V(0x01B8)
92	Set over voltage(start time)	WORD	1 sec.	R/W	0xA003	3sec. (0x0003)
93	Set over voltage(reset time)	WORD	1 sec.	R/W	0xA004	3sec. (0x0003)
94	Set under voltage(Enable)	WORD	-	R/W	0xA005	0
95	Set under voltage(threshold)	WORD	1V	R/W	0xA006	(TT)161V(0x00A1) (IT)280V(0x0118)
96	Set under voltage(reset value)	WORD	1V	R/W	0xA007	(TT)207V(0x00CF) (IT)360V(0x0168)
97	Set under voltage(start time)	WORD	1 sec.	R/W	0xA008	3 sec. (0x0003)
98	Set under voltage(reset time)	WORD	1 sec.	R/W	0xA009	3 sec. (0x0003)
99	Set over frequency(Enable)	WORD	-	R/W	0xA00A	0
100	Set over frequency(threshold)	WORD	1Hz	R/W	0xA00B	52Hz(0x0034)
101	Set over frequency(reset value)	WORD	1Hz	R/W	0xA00C	50Hz(0x0032)
102	Set over frequency(start time)	WORD	1 sec.	R/W	0xA00D	3 sec. (0x0003)
103	Set over frequency(reset time)	WORD	1 sec.	R/W	0xA00E	3 sec. (0x0003)
104	Set under frequency(Enable)	WORD	-	R/W	0xA00F	0
105	Set under frequency(threshold)	WORD	1Hz	R/W	0xA010	48Hz(0x0030)
106	Set under frequency(reset value)	WORD	1Hz	R/W	0xA011	50Hz(0x0032)
107	Set under frequency(start time)	WORD	1 sec.	R/W	0xA012	3 sec. (0x0003)
108	Set under frequency(rest time)	WORD	1 sec.	R/W	0xA013	3 sec. (0x0003)
109	Set current Unbalance(Enable)	WORD	-	R/W	0xA014	0

110	Set current Unbalance(threshold)	WORD	1%	R/W	0xA015	20%(0x0014)
111	Set current Unbalance(reset value)	WORD	1%	R/W	0xA016	10%(0x000A)
112	Set current Unbalance(start time)	WORD	1 sec.	R/W	0xA017	30 sec. (0x001E)
113	Set current Unbalance(reset time)	WORD	1 sec.	R/W	0xA018	30 sec. (0x001E)
114	Set voltage Unbalance(enable)	WORD	-	R/W	0xA019	0
115	Set voltage Unbalance(threshold)	WORD	1%	R/W	0xA01A	20% (0x0014)
116	Set voltage Unbalance(reset value)	WORD	1%	R/W	0xA01B	5%(0x0005)
117	Set voltage Unbalance (start time)	WORD	1 sec.	R/W	0xA01C	30 sec. (0x001E)
118	Set voltage Unbalance(reset time)	WORD	1 sec.	R/W	0xA01D	30 sec. (0x001E)
119	Set loss phase(Enable)	WORD	-	R/W	0xA01E	0
120	Set loss phase(threshold)	WORD	1V	R/W	0xA01F	50V (0x0032)
121	Set loss phase(reset value)	WORD	1V	R/W	0xA020	100V (0x0064)
122	Set loss phase(start time)	WORD	1 sec.	R/W	0xA021	30 sec. (0x001E)
123	Set loss phase(reset time)	WORD	1 sec.	R/W	0xA022	30 sec. (0x001E)
124	Set voltage THD over limit(Enable)	WORD	-	R/W	0xA023	0
125	Set voltage THD over limit (threshold)	WORD	1%	R/W	0xA024	15%(0x000F)
126	Set voltage THD over limit(reset	WORD	1%	R/W	0xA025	5%(0x0005)
127	Set voltage THD over limit(start ti- me)	WORD	1 sec.	R/W	0xA026	30 sec. (0x001E)
128	Set voltage THD over limit(reset	WORD	1 sec.	R/W	0xA027	30 sec. (0x001E)
129	Set current THD over limit(Enable)	WORD	-	R/W	0xA028	0
130	Set current THD over limit (threshold)	WORD	1%	R/W	0xA029	15% (0x000F)
131	Set current THD over limit(reset value)	WORD	1%	R/W	0xA02A	5% (0x0005)
132	Set current THD over limit(start ti- me)	WORD	1 sec.	R/W	0xA02B	30 sec. (0x001E)
133	Set current THD over limit(reset time)	WORD	1 sec.	R/W	0xA02C	30 sec. (0x001E)
134	Set power reverse(Enable)	WORD	-	R/W	0xA02D	0

135	Set power reverse (threshold)	WORD	W	R/W	0xA02E	-(0.3A)
136	Set power reverse (reset value)	WORD	W	R/W	0xA02F	0
137	Set power reverse (start time)	WORD	1 sec.	R/W	0xA030	30 sec. (0x001E)
138	Set power reverse (reset time)	WORD	1 sec.	R/W	0xA031	30 sec. (0x001E)
139	Set wrong power sequence (Enable)	WORD	-	R/W	0xA032	0
140	Set wrong power sequence (threshold)	WORD	-	R/W	0xA033	1
141	Set wrong power sequence (reset value)	WORD	-	R/W	0xA034	0
142	Set wrong power sequence (start time)	WORD	1 sec.	R/W	0xA035	30 sec. (0x001E)
143	Set wrong power sequence (reset time)	WORD	1 sec.	R/W	0xA036	30 sec. (0x001E)
144	Set power factor under limit (Enable)	WORD	1	R/W	0xA037	0
145	Set power factor under limit (start)	WORD	0,001	R/W	0xA038	800 (power factor 0,8) (0x0320)
146	Set power factor under limit (stop)	WORD	0,001	R/W	0xA039	950 (power factor 0,95) (0x03B6)
147	Set power factor under limit (start time)	WORD	1 sec.	R/W	0xA03A	30 sec. (0x001E)
148	Set power factor under limit (reset time)	WORD	1 sec.	R/W	0xA03B	30 sec. (0x001E)
149	Set over temperature (Enable)	WORD	-	R/W	0xA03C	0
150	Set over temperature (threshold)	WORD	1°C	R/W	0xA03D	100°C(0x0064)
151	Set over temperature (reset value)	WORD	1°C	R/W	0xA03E	80°C(0x0050)
152	Set over temperature (start value)	WORD	1 sec.	R/W	0xA03F	30 sec. (0x001E)
153	Set over temperature (reset time)	WORD	1 sec.	R/W	0xA040	30 sec. (0x001E)

Freeze function setting						
154	Instant freeze data Address	WORD	-	W	0x5000	0xAA55
155	Reset (include data of energy, event and freeze)	WORD	-	W	0x5001	0xAA55
156	Restore factory protection settings	WORD	-	W	0x5002	0xAA55
157	Bluetooth Switch	WORD	-	W	0x5003	0: close 1: open
158	Hardware version	WORD	-	R	0x0848~0x0849	
159	Software version	WORD	-	R	0x084A~0x084B	
160	Mac Adresse	WORD	-	R	0x084C~0x084E	6bytes(Read)

A2.2 Format of Read file

Address	Function code	Length	type	File number	Log number	Reserve	CRC
0x03	0x14	0x07	0x06	0x0001	0x0001	0x0000	crcH crcL

Send format: 03 14 07 06 00 01 00 01 00 00 00 34 EE

Address:03

Function code:0x14

Length:0x07(fixed)

Type:0x06(fixed)

File number: refer table 1.2 below on page 28 for file number description

Record number: sequence(1-10)

Reserve:00 00

CRC:34 EE

Table 1.2

File number	Event type
0	Clear Event
1	Power loss Event
2	A phase overvoltage Event
3	B phase overvoltage Event
4	C phase overvoltage Event
5	A phase undervoltage Event
6	B phase undervoltage Event
7	C phase undervoltage Event
8	Over frequency Event
9	Under frequency Event
10	Current Unbalance Event
11	Voltage Unbalance Event
12	Loss A phase Event
13	Loss B phase Event
14	Loss C phase Event
15	A phase current THD over threshold Event
16	B phase current THD over threshold Event
17	C phase current THD over threshold Event
18	A phase current THD under threshold Event
19	B phase current THD under threshold Event
20	C phase current THD under threshold Event
21	Power Reverse Event
22	Wrong phase sequence Event
23	Power factor under threshold
24	A phase Over temperature Event
25	B phase Over temperature Event
26	C phase Over temperature Event
27	N phase Over temperature Event

Table 1.3

Serial No.	Items	Content	Byte length	Coefficient	Unit
1	Fixed	03 14 E2 E0 06	5byte		
6	Event number	0A 00 00 00	4byte		
10	Event occurrence time	Year Month Day Hour Minute	6byte		
16	A phase voltage		WORD	0.01	V
18	B phase voltage		WORD	0.01	V
20	C phase voltage		WORD	0.01	V
22	A phase current		DW	0.001	A
26	B phase current		DW	0.001	A
30	C phase current		DW	0.001	A
34	Total active power		DW	0.0001	kW
38	A phase active power		DW	0.0001	kW
42	B phase active power		DW	0.0001	kW
46	C phase active power		DW	0.0001	kW

50	Total reactive power		DW	0.0001	kVar
54	A phase power		DW	0.0001	kVar
58	B phase power		DW	0.0001	kVar
62	C phase power		DW	0.0001	kVar
66	Total reactive power		DW	0.0001	kVA
70	A phase reactive power		DW	0.0001	kVA
74	B phase reactive power		DW	0.0001	kVA
78	C phase reactive power		DW	0.0001	kVA
82	Total power factor		WORD	0.001	-
84	A phase power factor		WORD	0.001	-
86	B phase power factor		WORD	0.001	-
88	C phase power factor		WORD	0.001	-
90	Three phase forward active energy		DW	0.001	kWh
94	Three phase reverse active energy		DW	0.001	kWh
98	A phase forward active energy		DW	0.001	kWh
102	A phase reverse active energy		DW	0.001	kWh
106	B phase forward active energy		DW	0.001	kWh
110	B phase reverse active energy		DW	0.001	kWh
114	C phase forward active energy		DW	0.001	kWh
118	C phase reverse active energy		DW	0.001	kWh
122	Event end time	Year Month Day Hour Minute Second	6byte		
128	Three phase forward active energy		DW	0.001	kWh
132	Three phase reverse active energy		DW	0.001	kWh
136	A phase forward active energy		DW	0.001	kWh
140	A phase reverse active energy		DW	0.001	kWh
144	B phase forward active energy		DW	0.001	kWh
148	B phase reverse active energy		DW	0.001	kWh
152	C phase forward active energy		DW	0.001	kWh
156	C phase reverse active energy		DW	0.001	kWh
158	CRCH CRCL		DW	-	-

A.2.3 Read freeze data format

File No.	Event
28	Day freeze (sequence no. 1– 365)
29	Month freeze (sequence no. 1-12)
30	Instant freeze (sequence no. 1-3)

Send data format:

03 14 07 06 00 1e 00 01 00 00 a1 2c

Recevie data format:

Table 1.4

Serial No.	Items	Content	Byte length	Coefficient	Unit
1	Fixed	03 14 E2 E0 06	5byte		
6	Number of freeze items	0A 00 00 00	4byte		
10	A phase forward active energy		DW	0.001	kWh
14	B phase forward active energy		DW	0.001	kWh
18	C phase forward active energy		DW	0.001	kWh
22	Total forward active energy		DW	0.001	kWh
26	A phase reverse active energy		DW	0.001	kWh
30	B phase reverse active energy		DW	0.001	kWh
34	C phase reverse active energy		DW	0.001	kWh
38	Total reverse active energy		DW	0.001	kWh
42	Quadrant I reactive total energy		DW	0.001	kVarh
46	Quadrant II reactive total energy		DW	0.001	kVarh
50	Quadrant III reactive total energy		DW	0.001	kVarh
54	Quadrant IV reactive total energy		DW	0.001	kVarh
58	A phase voltage		WORD	0.01	V
60	B phase voltage		WORD	0.01	V
62	C phase voltage		WORD	0.01	V
64	A phase current		DW	0.001	A
68	B phase current		DW	0.001	A
72	C phase current		DW	0.001	A
76	N phase current (In)		DW	0.001	A
80	Frequency		WORD	0.01	Hz
82	Total active power		DW	0.0001	kW
86	A phase active power		DW	0.0001	kW
90	B phase active power		DW	0.0001	kW
94	C phase active power		DW	0.0001	kW
98	Total reactive power		DW	0.0001	kvar
102	A phase reactive power		DW	0.0001	kvar
106	B phase reactive power		DW	0.0001	kvar
110	C phase reactive power		DW	0.0001	kvar
114	Total power factor		WORD	0.001	-
116	A phase power factor		WORD	0.001	-
118	B phase power factor		WORD	0.001	-
120	C phase power factor		WORD	0.001	-
122	Year; Month; Day; Hour; Minute; Second		6byte		-
128	CRCH CRCL		DW		-

No.	Event type	Trigger conditions		Default value
1	Over voltage	Any phase(ABC) is higher than: Duration is over:	(IT)1,05~1,25Ue 2~5sec. (TT)1,05~1,25Un 2~5sec.	1,2Ue 3sec. Ue=400V 1,2Ue 3sec. Un=230V
2	Under voltage	Any phase(ABC) is higher than: Duration is over:	(IT)0,3~0,9Ue 2~5sec. (TT)0,3~0,9Un 2~5sec.	0,7Ue 3sec. Ue=400V 0,7Un 3sec. Un=230V
3	Over frequency	Any phase(ABC) is higher than: Duration is over:	45Hz~65Hz 2~5sec.	52Hz 3sec.
4	Under frequency	Any phase(ABC) is higher than: Duration is over:	45Hz~65Hz 2~5sec.	48Hz 3sec.
5	PF pass lower limit	Any phase(ABC) is higher than: Duration is over:	0,5~0,95 2~60sec.	0,8 30sec.
6	Current unbalance	Any phase(ABC) is higher than: Duration is over:	5%~60% 2~60sec.	20% 3sec.
7	Phase loss	Any phase(ABC) is higher than: Duration is over:	50V~100V 2~60sec.	50V 30sec.
8	Wrong phase sequence	Any phase(ABC) is higher than: Duration is over:	2%~30% 2~60sec.	10% 3sec.
9	Power reverse	Any phase(ABC) is higher than: Duration is over:	0.5A, 2~60sec.	30sec.
10	Temperature	Any phase(ABC) is higher than: Duration is over:	80~12°C 2~60sec.	100°C 30sec.
11	THD over upper limit	Any phase(ABC) is higher than: Duration is over:	5%~20% 2~60sec.	5% 30sec.