

IMU-M8 Communication Protocol

A1 Modbus_RTU data format

IMU-M8 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.

A2 Register Address and Description

No.	Description	Format	Unit	Access Rule	Address	Note
Electrical data						
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:Over Frequency bit7:Under Frequency bit8:Unbalance bit9:I 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 bit18: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 bit26:Reserve
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	0.001A	R	0x0019~001A	
14	current Unbalance	DW	0.001A	R	0x001B~001C	
15	Maximum value of 3 phase current	DW	0.001A	R	0x001D~0x001E	
16	Internal temperature	WORD	0.1℃	R	0x001F	
17	A phase temperature	WORD	0.1℃	R	0x0020	
18	B phase temperature	WORD	0.1℃	R	0x0021	
19	C phase temperature	WORD	0.1℃	R	0x0022	
20	N phase temperature	WORD	0.1℃	R	0x0023	
Power Data						
21	Total Active power	DW	0.0001K wh	R	0x0030~0x0031	
22	A phase Active power	DW	0.0001K wh	R	0x0032~0x0033	
23	B phase Active power	DW	0.0001K wh	R	0x0034~0x0035	
24	C phase Active power	DW	0.0001K wh	R	0x0036~0x0037	
25	Total Reactive power	DW	0.0001K wh	R	0x0038~0x0039	
26	A phase Reactive power	DW	0.0001K wh	R	0x003A~0x003B	
27	B phase Reactive power	DW	0.0001K wh	R	0x003C~0x003D	
28	C phase Reactive power	DW	0.0001K wh	R	0x003E~0x003F	
29	Total Apparent power	DW	0.0001K wh	R	0x0040~0x0041	
30	A phase Apparent power	DW	0.0001K wh	R	0x0042~0x0043	
31	B phase Apparent power	DW	0.0001K wh	R	0x0044~0x0045	
32	C phase Apparent power	DW	0.0001K wh	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 Data						
37	A phase voltage THD	WORD	—	R	0x0050	
38	B phase voltage THD	WORD	—	R	0x0052	

39	C phase voltage THD	WORD	—	R	0x0054	
40	A phase current THD	WORD	—	R	0x0056	
41	B phase current THD	WORD	—	R	0x0058	
42	C phase current THD	WORD	—	R	0x005A	
Energy Data						
43	A phase Forward Active Energy	DW	0.0001K wh	R	0x0110~0x0111	
44	B phase Forward Active Energy	DW	0.0001K wh	R	0x0112~0x0113	
45	C phase Forward Active Energy	DW	0.0001K wh	R	0x0114~0x0115	
46	Total Forward Active Energy	DW	0.0001K wh	R	0x0116~0x0117	
47	A phase Reverse Active Energy	DW	0.0001K wh	R	0x0118~0x0119	
48	B phase Reverse Active Energy	DW	0.0001K wh	R	0x011A~0x011B	
49	C phase Reverse Active Energy	DW	0.0001K wh	R	0x011C~0x011D	
50	Total Reverse Active Energy	DW	0.0001K wh	R	0x011E~0x011F	
51	A phase Active Energy	DW	0.0001K wh	R	0x0120~0x0121	
52	B phase Active Energy	DW	0.0001K wh	R	0x0122~0x0123	
53	C phase Active Energy	DW	0.0001K wh	R	0x0124~0x0125	
54	Total Active Energy	DW	0.0001K wh	R	0x0126~0x0127	
55	A phase I Quadrant Reactive Energy	DW	0.0001K wh	R	0x0128~0x0129	
56	A phase II Quadrant Reactive Energy	DW	0.0001K wh	R	0x012A~0x012B	
57	A phase III Quadrant Reactive Energy	DW	0.0001K wh	R	0x012C~0x012D	
58	A phase IV Quadrant Reactive Energy	DW	0.0001K wh	R	0x012E~0x012F	
59	B phase I Quadrant Reactive Energy	DW	0.0001K wh	R	0x0130~0x0131	
60	B phase II Quadrant Reactive Energy	DW	0.0001K wh	R	0x0132~0x0133	
61	B phase III Quadrant Reactive Energy	DW	0.0001K wh	R	0x0134~0x0135	
62	B phase IV Quadrant Reactive Energy	DW	0.0001K wh	R	0x0136~0x0137	
63	C phase I Quadrant Reactive Energy	DW	0.0001K wh	R	0x0138~0x0139	

64	C phase II Quadrant Reactive Energy	DW	0.0001K wh	R	0x013A~0x013B	
65	C phase III Quadrant Reactive Energy	DW	0.0001K wh	R	0x013C~0x013D	
66	C phase IV Quadrant Reactive Energy	DW	0.0001K wh	R	0x013E~0x013F	
67	Total I Quadrant Reactive Energy	DW	0.0001K wh	R	0x0140~0x0141	
68	Total II Quadrant Reactive Energy	DW	0.0001K wh	R	0x0142~0x0143	
69	Total III Quadrant Reactive Energy	DW	0.0001K wh	R	0x0144~0x0145	
70	Total IV Quadrant Reactive Energy	DW	0.0001K wh	R	0x0146~0x0147	
71	A phase Reactive Energy	DW	0.0001K wh	R	0x0148~0x0149	
72	B phase Reactive Energy	DW	0.0001K wh	R	0x014A~0x014B	
73	C phase Reactive Energy	DW	0.0001K wh	R	0x014C~0x014D	
74	Total Reactive Energy1	DW	0.0001K wh	R	0x014E~0x014F	
75	A phase Reactive Energy	DW	0.0001K wh	R	0x0150~0x0151	
76	B phase Reactive Energy	DW	0.0001K wh	R	0x0152~0x0153	
77	C phase Reactive Energy	DW	0.0001K wh	R	0x0154~0x0155	
78	Total Reactive Energy2	DW	0.0001K wh	R	0x0156~0x0157	
79	A phase Apparent Energy	DW	0.0001K wh	R	0x0158~0x0159	
80	B phase Apparent Energy	DW	0.0001K wh	R	0x015A~0x015B	
81	C phase Apparent Energy	DW	0.0001K wh	R	0x015C~0x015D	
82	Total Apparent Energy	DW	0.0001K wh	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 broadcast address

87	Port Baud rate (Check bit)	WORD	—	R/W	0x0804	0:1200bps 1:2400bps 2:4800bps 3:9600bps 4:19200bps 5:115200bps
88	Check method (Check bit)	WORD	—	R/W	0x0805	0-No check 1-even parity check
Event Settings						
	Enable state(0:close)(2:alarm)(3:trip)					Default value
89	Set over voltage (Enable)	WORD	1	R/W	0xA000	1
90	Set over voltage (threshold)	WORD	1	R/W	0xA001	255V
91	Set over voltage (reset value)	WORD	1	R/W	0xA002	230V
92	Set over voltage (start time)	WORD	1	R/W	0xA003	10s
93	Set over voltage (reset time)	WORD	1	R/W	0xA004	20s
94	Set under voltage (Enable)	WORD	1	R/W	0xA005	1
95	Set under voltage (threshold)	WORD	1	R/W	0xA006	120V
96	Set under voltage (reset value)	WORD	1	R/W	0xA007	185V
97	Set under voltage (start time)	WORD	1	R/W	0xA008	10s
98	Set under voltage (reset time)	WORD	1	R/W	0xA009	20s
99	Set over frequency (Enable)	WORD	1	R/W	0xA00A	1
100	Set over frequency (threshold)	WORD	1	R/W	0xA00B	55Hz
101	Set over frequency (reset value)	WORD	1	R/W	0xA00C	50Hz
102	Set over frequency (start time)	WORD	1	R/W	0xA00D	10s
103	Set over frequency (reset time)	WORD	1	R/W	0xA00E	20s
104	Set under frequency (Enable)	WORD	1	R/W	0xA00F	1
105	Set under frequency (threshold)	WORD	1	R/W	0xA010	45Hz
106	Set under frequency (reset value)	WORD	1	R/W	0xA011	50Hz
107	Set under frequency (start time)	WORD	1	R/W	0xA012	10s
108	Set under frequency (reset time)	WORD	1	R/W	0xA013	20s

109	Set current Unbalance (Enable)	WORD	1	R/W	0xA014	1
110	Set current Unbalance (threshold)	WORD	1	R/W	0xA015	100%
111	Set current Unbalance (reset value)	WORD	1	R/W	0xA016	20%
112	Set current Unbalance (start time)	WORD	1	R/W	0xA017	10s
113	Set current Unbalance (reset time)	WORD	1	R/W	0xA018	20s
114	Set voltage Unbalance (Enable)	WORD	1	R/W	0xA019	1
115	Set voltage Unbalance (threshold)	WORD	1	R/W	0xA01A	100%
116	Set voltage Unbalance (reset value)	WORD	1	R/W	0xA01B	20%
117	Set voltage Unbalance (start time)	WORD	1	R/W	0xA01C	10s
118	Set voltage Unbalance (reset time)	WORD	1	R/W	0xA01D	20s
119	Set loss phase (Enable)	WORD	1	R/W	0xA01E	1
120	Set loss phase (threshold)	WORD	1	R/W	0xA01F	50v
121	Set loss phase (reset value)	WORD	1	R/W	0xA020	100v
122	Set loss phase (start time)	WORD	1	R/W	0xA021	10s
123	Set loss phase (reset time)	WORD	1	R/W	0xA022	20s
124	Set voltage THD over limit (Enable)	WORD	1	R/W	0xA023	1
125	Set voltage THD over limit (threshold)	WORD	1	R/W	0xA024	10%
126	Set voltage THD over limit (reset value)	WORD	1	R/W	0xA025	5%
127	Set voltage THD over limit (start time)	WORD	1	R/W	0xA026	10s
128	Set voltage THD over limit (reset time)	WORD	1	R/W	0xA027	20s
129	Set current THD over limit (Enable)	WORD	1	R/W	0xA028	1
130	Set current THD over limit (threshold)	WORD	1	R/W	0xA029	30%
131	Set current THD over limit (reset value)	WORD	1	R/W	0xA02A	20%
132	Set current THD over limit (start time)	WORD	1	R/W	0xA02B	10s
133	Set current THD over limit (reset time)	WORD	1	R/W	0xA02C	20s
134	Set power reverse (Enable)	WORD	1	R/W	0xA02D	1
135	Set power reverse (threshold)	WORD	1	R/W	0xA02E	10kw

136	Set power reverse (reset value)	WORD	1	R/W	0xA02F	5kw
137	Set power reverse (start time)	WORD	1	R/W	0xA030	10s
138	Set power reverse (reset time)	WORD	1	R/W	0xA031	20s
139	Set wrong phase sequence (Enable)	WORD	1	R/W	0xA032	1
140	Set wrong phase sequence (threshold)	WORD	1	R/W	0xA033	1
141	Set wrong phase sequence (reset value)	WORD	1	R/W	0xA034	0
142	Set wrong phase sequence (start time)	WORD	1	R/W	0xA035	10s
143	Set wrong phase sequence (reset time)	WORD	1	R/W	0xA036	20s
144	Set power factor under limit (Enable)	WORD	1	R/W	0xA037	1
145	Set power factor under limit (start)	WORD	0.001	R/W	0xA038	800(means 0.8)
146	Set power factor under limit (stop)	WORD	0.001	R/W	0xA039	950(means 0.95)
147	Set power factor under limit (start time)	WORD	1	R/W	0xA03A	10s
148	Set power factor under limit (reset time)	WORD	1	R/W	0xA03B	20s
149	Set over temperature (Enable)	WORD	1	R/W	0xA03C	1
150	Set over temperature (threshold)	WORD	1	R/W	0xA03D	100°
151	Set over temperature (reset value)	WORD	1	R/W	0xA03E	80°
152	Set over temperature (start time)	WORD	1	R/W	0xA03F	10s
153	Set over temperature (reset time)	WORD	1	R/W	0xA040	20s
Freeze Function Setting						
154	Instant freeze data Address	WORD	—	W	0x5000	AA55
155	Clear energy data	WORD	—	W	0x5001	AA55
156	Hardware version	WORD	—	R	0x0849	
157	Hardware version	WORD	—	R	0x084B	

A3 Communication Protocols : Event Log and Data Freeze

A3.1 Format of Read file

Address	Function code	Length	type	File number	Log number	Reserve	CRC
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0x03	0x14	0x06	0x06	0x0001	0x0001	0x0000	crcH crcL
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A3.2 Format of Alarm and Event

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	B phase current THD over threshold Event
18	A phase voltage THD over threshold Event
19	B phase voltage THD over threshold Event
20	C phase voltage THD over threshold Event
21	Power Reverse Event
22	Wrong phase sequence Event
23	Power factor under threshold Event
24	A phase Over temperature Event
25	B phase Over temperature Event
26	C phase Over temperature Event
27	N phase Over temperature Event

Format of send data :

03 14 07 06 00 01 00 01 00 00 CRCH CRCL

Format of receive data :

03 14 E2 E0 06 0A 00 00 00

Sequence Number, occurrence time, electrical data at occurrence of Event, energy data at occurrence of Event, end date, energy data at end of Event

Time format: year month day hour minute second

A3.3 Format of electrical data

1	A phase voltage	WORD	0.01V
2	B phase voltage	WORD	0.01V
3	C phase voltage	WORD	0.01V
4	A phase current	DW	0.001A
5	B phase current	DW	0.001A
6	C phase current	DW	0.001A
7	Total Active power	DW	0.0001Kw
8	A phase Active power	DW	0.0001Kw
9	B phase Active power	DW	0.0001Kw
10	C phase Active power	DW	0.0001Kw
11	Total Reactive power	DW	0.0001Kw
12	A phase Reactive power	DW	0.0001Kw
13	B phase Reactive power	DW	0.0001Kw
14	C phase Reactive power	DW	0.0001Kw
15	Total Apparent power	DW	0.0001Kw
16	A phase Apparent power	DW	0.0001Kw
17	B phase Apparent power	DW	0.0001Kw
18	C phase Apparent power	DW	0.0001Kw
19	Total power factor	WORD	0.001
20	A phase power factor	WORD	0.001
21	B phase power factor	WORD	0.001
22	C phase power factor	WORD	0.001

A3.4 Format of Energy data

1	A phase Forward Active Energy	DW	0.0001Kwh
2	B phase Forward Active Energy	DW	0.0001Kwh
3	C phase Forward Active Energy	DW	0.0001Kwh
4	Total Forward Active Energy	DW	0.0001Kwh
5	A phase Reverse Active Energy	DW	0.0001Kwh
6	B phase Reverse Active Energy	DW	0.0001Kwh
7	C phase Reverse Active Energy	DW	0.0001Kwh
8	Total Reverse Active Energy	DW	0.0001Kwh
9	A phase Active Energy	DW	0.0001Kwh
10	B phase Active Energy	DW	0.0001Kwh
11	C phase Active Energy	DW	0.0001Kwh
12	Total Active Energy	DW	0.0001Kwh
13	A phase I Quadrant Reactive Energy	DW	0.0001Kwh
14	A phase II Quadrant Reactive Energy	DW	0.0001Kwh
15	A phase III Quadrant Reactive Energy	DW	0.0001Kwh
16	A phase IV Quadrant Reactive Energy	DW	0.0001Kwh
17	B phase I Quadrant Reactive Energy	DW	0.0001Kwh
18	B phase II Quadrant Reactive Energy	DW	0.0001Kwh

19	B phase III Quadrant Reactive Energy	DW	0.0001Kwh
20	B phase IV Quadrant Reactive Energy	DW	0.0001Kwh
21	C phase I Quadrant Reactive Energy	DW	0.0001Kwh
22	C phase II Quadrant Reactive Energy	DW	0.0001Kwh
23	C phase III Quadrant Reactive Energy	DW	0.0001Kwh
24	C phase IV Quadrant Reactive Energy	DW	0.0001Kwh
25	Total I Quadrant Reactive Energy	DW	0.0001Kwh
26	Total II Quadrant Reactive Energy	DW	0.0001Kwh
27	Total III Quadrant Reactive Energy	DW	0.0001Kwh
28	Total IV Quadrant Reactive Energy	DW	0.0001Kwh
29	A phase Reactive Energy	DW	0.0001Kwh
30	B phase Reactive Energy	DW	0.0001Kwh
31	C phase Reactive Energy	DW	0.0001Kwh
32	Total Reactive Energy1	DW	0.0001Kwh
33	A phase Reactive Energy	DW	0.0001Kwh
34	B phase Reactive Energy	DW	0.0001Kwh
35	C phase Reactive Energy	DW	0.0001Kwh
36	Total Reactive Energy2	DW	0.0001Kwh
37	A phase Apparent Energy	DW	0.0001Kwh
38	B phase Apparent Energy	DW	0.0001Kwh
39	C phase Apparent Energy	DW	0.0001Kwh
40	Total Apparent Energy	DW	0.0001Kwh

A 3.5 Format of Read frozen data

File Number	Event Type
28	Day freeze
29	Month freeze
30	Instant freeze

Send data format:

03 14 07 06 00 01 00 01 00 00 CRCH CRCL

Receive data format:

03 14 E2 E0 06 0A 00 00 00

Freeze data format freeze data time

Time format: year month day hour minute second

Data format of Energy frozen functions

1	A phase Forward Active Energy	DW	0.0001Kwh
2	B phase Forward Active Energy	DW	0.0001Kwh
3	C phase Forward Active Energy	DW	0.0001Kwh
4	Total Forward Active Energy	DW	0.0001Kwh
5	A phase Reverse Active Energy	DW	0.0001Kwh
6	B phase Reverse Active Energy	DW	0.0001Kwh
7	C phase Reverse Active Energy	DW	0.0001Kwh
12	Total Active Energy	DW	0.0001Kwh
13	Total power factor	WORD	0.001
14	A phase power factor	WORD	0.001
15	B phase power factor	WORD	0.001

16	C phase power factor	WORD	0.001
17	A phase voltage	WORD	0.01V
18	B phase voltage	WORD	0.01V
19	C phase voltage	WORD	0.01V
20	UAB voltage	WORD	0.01V
21	UBC voltage	WORD	0.01V
22	UCA voltage	WORD	0.01V
23	A phase current	DW	0.001A
24	B phase current	DW	0.001A
25	C phase current	DW	0.001A
26	N phase current(In)	DW	0.001A
27	frequency	WORD	0.001A
28	Total Active power	DW	0.0001Kw
29	A phase Active power	DW	0.0001Kw
30	B phase Active power	DW	0.0001Kw
31	C phase Active power	DW	0.0001Kw
32	Total Reactive power	DW	0.0001Kw
33	A phase Reactive power	DW	0.0001Kw
34	B phase Reactive power	DW	0.0001Kw
35	C phase Reactive power	DW	0.0001Kw
36	I Quadrant Reactive Energy	DW	0.0001Kwh
37	II Quadrant Reactive Energy	DW	0.0001Kwh
38	III Quadrant Reactive Energy	DW	0.0001Kwh
39	IV Quadrant Reactive Energy	DW	0.0001Kwh
40	Forward Total Active Energy	DW	0.0001Kwh
37	Reverse Total Active Energy	DW	0.0001Kwh
38	Reactive Energy1	DW	0.0001Kwh
39	Reactive Energy2	DW	0.0001Kwh