



Mianyang Weibo Electronic Co.,Ltd

*Designing, Manufacturing and Supplying WB Series Electric Isolated Sensor and Digital
Electrical Transducer since 1989*

USER MANUAL

WB1856B05 harmonic analyzing module

RS485 MODBUS RTU



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ISO9001 ISO14000 ISO18000

Certified

Quality Warranty

Any quality problem found in WB series products, we offer

Three years free charge of repair the products, and six months guaranteed free charge of change and return the products.

WB1856B05 harmonic analyzing module

Safety claim

The information in the safety claim of the equipment documentation is intended to ensure that equipment is properly installed in order to maintain it in a condition.

It is assumed that everyone who would be associated with the equipment should be familiar with the contents of that safety section, or this safety guide.

When electrical equipment is in operation, dangerous voltages will be present in certain parts of the equipment (e.g. the input terminal). Failure to observe warning notices, incorrect use, or improper use may endanger personnel and equipment and cause personal injury or physical damage.

Before working in the terminal strip area, the equipment must be isolated.

Proper and safe operation of the equipment depends on appropriate shipping and handling, proper storage, installation and commissioning, and on careful operation, maintenance and servicing.

The operating manual for the equipment gives instructions for its installation, commissioning, and operation. However, the manual cannot cover all conceivable circumstances or include detailed information on all topics. In the event of questions or specific problem, do not take any action without proper authorization. Contact the appropriate WB technical sales office and request the necessary information.

Standard application

1. Accuracy

Accurate degree is conformed to IEC688:1992

2. Safety

2.1 Overload capability

Overload capability is conformed to IEC688:1992

2.2 Isolation voltage

Can be endured testing voltage is conformed to Q/72085584-0.1-2004

2.3 Insulation impedance

The insulation impedance is no less than 20M Ohm, is conformed to Q/72085584-0.1-2004

3. Electromagnetic Capability

3.1 Electromagnetic field immunity test according to IEC 61000-4-3:1993

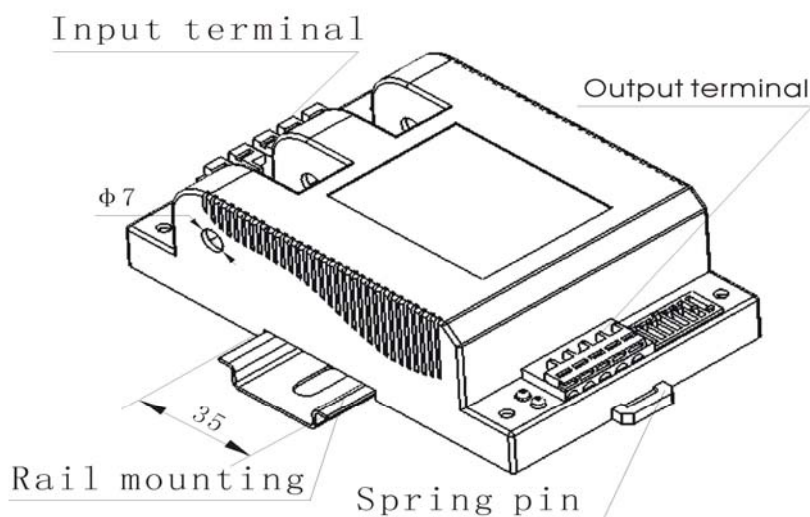
3.2 Power frequency magnetic field immunity test according to IEC 61000-4-8:1993

Product Description and Application

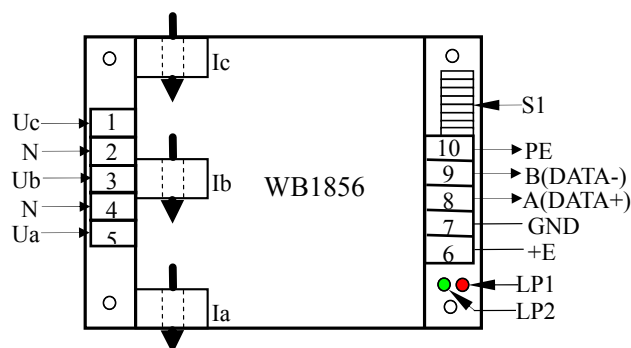
WB1856B05 has been adopted electromagnetic isolation principle, high speed DSP and professional MCU controller for isolate and measurement of full electric quantities from three-phase system. Measured electric parameters are three-phase voltage (RMS), three-phase current (RMS), active energy (signed) active/reactive power (signed), apparent power, power factor (signed), frequency, 1-19 times harmonic voltage/ current component, positive, negative

and zero sequence voltage/current etc. the output is RS485 communication port. The product has certain advantages of total galvanic isolation between input/output and auxiliary power, high accuracy, compact and small, low drifting by temperature, and wide temperature bearable range, and cost effective. The product is used for the protection system of electric motor, electric power supply and distribution system.

Product Dimensional Drawing (unit: mm)



Product Terminal Identification Drawing



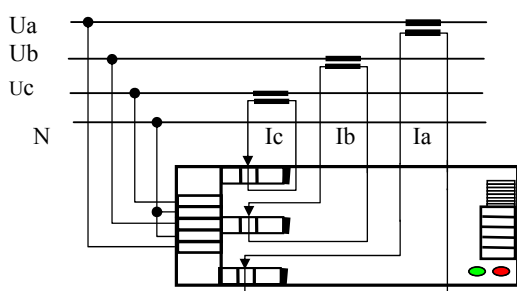
In the drawing:

- (1) AC voltage: U_c , U_b , U_a input wire connected by terminals; N—neutral; AC current I_c , I_b , I_a input connected by pass window;
- (2) +E—auxiliary power positive end; GND—ground for auxiliary power;
- (3) A (DATA+), B(DATA-)—terminals for RS485 communicate port;
- (4) LP1—power indicated LED, LP2—communication indicated led;
- (5) PE—ground for communication port, connected with control cabinet or earth;
- (6) S1— 8 bit DIP switches (k1,k2,k3,k4,k5,k6,k7,k8) ;

Terminal definition table

1	Uc	6	+E
2	N	7	GND
3	Ub	8	A(DATA+)
4	N	9	B(DATA-)
5	Ua	10	PE

Wiring



Key Technical Data:

1. Three-phase four wired system;
2. Input:
 - Current: 0-5A
 - Voltage: 0-270V
3. Accuracy : 0.5%
 - I,U,F, S (apparent power): 0.2%
 - P,Q,PF (COS ϕ): 0.5%
 - Positive, negative and zero sequence voltage/current: 0.2%
 - 1~13 times harmonic voltage/current: 0.5%;
 - 14~19 times harmonic voltage/current: 1%;
 - Active/reactive energy: 0.5%
4. Linear Range: Voltage :10%-120% of nominal input
 - Current: 1%-120% of nominal input
 - Base wave frequency for harmonic analysis: 10Hz~95Hz
 - Power, voltage, current measurement frequency range: 20Hz~4000Hz
5. Responding Time: 500ms (harmonic: 1S)
6. Over Load Capacity:
 - 2× of nominal input voltage, for 1 second, interval 10 seconds, can repeat about 10 times;
 - 20× of nominal input voltage, for 1 second, interval 300 seconds, can repeat about 5 times;
7. Bus Protection: can be endured 400W transient pulse voltage; automatic cut off under powered condition, and ESD protection;
8. Static current: 30mA
9. Auxiliary Power:+24V,dc

10. Isolation Voltage: Input/output, 2500Vdc, for 1 minute;
Input/auxiliary power, 2500Vdc, for 1 minute;
Auxiliary power/output, 2500Vdc, for 1 minute;
11. Means of communication: half-duplex;
12. Communication Protocol: RS485 MODBUS RTU;
13. Baud Rate : $\leq 19.2\text{KBPS}$ (default 9600BPS);
14. Communication Node and distance: 64 nodes, 1200m;
15. Means of Data Transmitting: start 1 bit, data 8 bit, stop 2 bit, non parity;
16. Drifting by Temperature: $2.0 \times 10^{-4}/^{\circ}\text{C}$
17. Ambient Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
18. Mounting : DIN Rail 35mm Mounting

Instruction of Installation and Use

1. The product has adopted structure compliance with EN50022; suitable for DIN rail mounting NS35/7.5, NS35/15. Installation steps are as following (please reference to dimensional drawing):

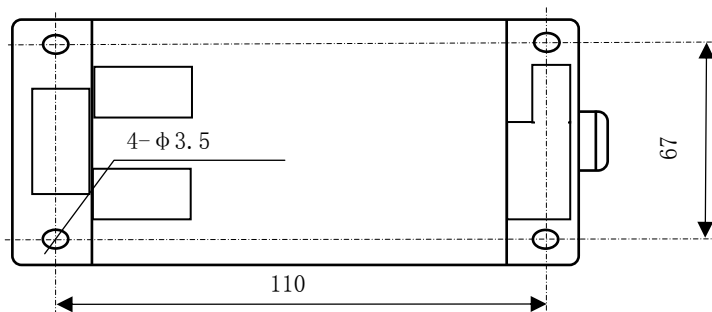
Step 1: Immobilize one side of product's mounting trough to the DIN mounting rail;

Step 2: Pull out the spring clasp;

Step 3: Place whole mounting trough to the DIN mounting rail properly;

Step 4: Release spring clasp to make sure the installation.

For M3 screw installation, follow the given gap size (mm) of the holes precisely;



2. DIP switches setting

K1, K2 for Baud Rate setting:

K1	K2	Baud Rate
ON	ON	2400BPS
ON	OFF	4800BPS
OFF	ON	9600BPS
OFF	OFF	19.2KBPS

K3,K4,K5,K6,K7,K8 for Communication Address setting:

K3	K4	K5	K6	K7	K8	Address
ON	ON	ON	ON	ON	ON	0
ON	ON	ON	ON	ON	OFF	1
ON	ON	ON	ON	OFF	ON	2
ON	ON	ON	ON	OFF	OFF	3
...
ON	OFF	OFF	OFF	OFF	OFF	31
OFF	OFF	OFF	OFF	OFF	OFF	63

- The product has calibrated before out of factory. After correctly wiring, it can be powered and used immediately.
- At the beginning of the BUS and end of BUS, user should add a 120Ω resistance for normal communication.
- LP1 (red)—power on; LP2 (red)—receiving data, LP2(green)—sending data;
- Real-Time data output sequence:

When the transducer has received Read Data Command from Master, output data sequences as follow:

Sequence Number	Register Address	Parameter Code	Parameter	Byte
1	0	Esum	total active energy	2
2	1	Rsum	Total reactive energy	2
3	2	Psum	Total active power	2
4	3	Qsum	Total reactive power	2
5	4	$\cos\varphi$	Total Power factor	2
6	5	F	Frequency	2
7	6	Ssum	total apparent power	2
8	7	Ua	Phase A voltage	2
9	8	Ub	Phase B voltage	2
10	9	Uc	Phase C voltage	2
11	10	Uca	Phase C to Phase A voltage	2
12	11	Uab	Phase A to Phase B voltage	2
13	12	Ubc	Phase B to Phase C voltage	2
14	13	Ia	Phase A current	2
15	14	Ib	Phase B current	2
16	15	Ic	Phase C current	2
17	16	Pa	Phase A active power	2
18	17	Pb	Phase B active power	2
19	18	Pc	Phase C active power	2
20	19	Qa	Phase A reactive power	2
21	20	Qb	Phase B reactive power	2
22	21	Qc	Phase C reactive power	2
23	22	$\cos\varphi_a$	Phase A power factor	2
24	23	$\cos\varphi_b$	Phase B powerfactor	2
25	24	$\cos\varphi_c$	Phase C power factor	2
26	25	Sa	Phase A apparent power	2

Sequence Number	Register Address	Parameter Code	Parameter	Byte
27	26	Sb	Phase B apparent power	2
28	27	Sc	Phase C apparent power	2
29	28	Ea	Phase A active energy	2
30	29	Eb	Phase B active energy	2
31	30	Ec	Phase C active energy	2
32	31	Ra	Phase A reactive energy	2
33	32	Rb	Phase B reactive energy	2
34	33	Rc	Phase C reactive energy	2
35	34	U+	Positive sequence voltage	2
36	35	U-	Negative sequence voltage	2
37	36	U0	Zero sequence voltage	2
38	37	I+	Positive sequence current	2
39	38	I-	Negative sequence current	2
40	39	I0	Zero sequence current	2
41	40	Ua1	1 st harmonic phase A voltage	2
42	41	Ua2	2 nd	2
43	42	Ua3	3 rd	2
44	43	Ua4	4 th	2
45	44	Ua5	5 th	2
46	45	Ua6	6 th	2
47	46	Ua7	7 th	2
48	47	Ua8	8 th	2
49	48	Ua9	9 th	2
50	49	Ua10	10 th	2
51	50	Ua11	11 th	2
52	51	Ua12	12 th	2

Sequence Number	Register Address	Parameter Code	Parameter	Byte
53	52	Ua13	13 th	2
54	53	Ua14	14 th	2
55	54	Ua15	15 th	2
56	55	Ua16	16 th	2
57	56	Ua17	17 th	2
58	57	Ua18	18 th	2
59	58	Ua19	19 th	2
60	59	Ub1	1 st harmonic phase B voltage	2
61	60	Ub2	2 nd	2
62	61	Ub3	3 rd	2
63	62	Ub4	4 th	2
64	63	Ub5	5 th	2
65	64	Ub6	6 th	2
66	65	Ub7	7 th	2
67	66	Ub8	8 th	2
68	67	Ub9	9 th	2

69	68	Ub10	10 th	2
70	69	Ub11	11 th	2
71	70	Ub12	12 th	2
72	71	Ub13	13 th	2
73	72	Ub14	14 th	2
74	73	Ub15	15 th	2
75	74	Ub16	16 th	2
76	75	Ub17	17 th	2
77	76	Ub18	18 th	2
78	77	Ub19	19 th	2

Sequence Number	Register Address	Parameter Code	Parameter	Byte
79	78	Uc1	1 st harmonic phase C voltage	2
80	79	Uc2	2 nd	2
81	80	Uc3	3 rd	2
82	81	Uc4	4 th	2
83	82	Uc5	5 th	2
84	83	Uc6	6 th	2
85	84	Uc7	7 th	2
86	85	Uc8	8 th	2
87	86	Uc9	9 th	2
88	87	Uc10	10 th	2
89	88	Uc11	11 th	2
90	89	Uc12	12 th	2
91	90	Uc13	13 th	2
92	91	Uc14	14 th	2
93	92	Uc15	15 th	2
94	93	Uc16	16 th	2
95	94	Uc17	17 th	2
96	95	Uc18	18 th	2
97	96	Uc19	19 th	2
98	97	Ia1	1 st harmonic phase A current	2
99	98	Ia2	2 nd	2
100	99	Ia3	3 rd	2
101	100	Ia4	4 th	2
102	101	Ia5	5 th	2
103	102	Ia6	6 th	2
104	103	Ia7	7 th	2

Sequence Number	Register Address	Parameter Code	Parameter	Byte
105	104	Ia8	8 th	2
106	105	Ia9	9 th	2
107	106	Ia10	10 th	2
108	107	Ia11	11 th	2
109	108	Ia12	12 th	2
110	109	Ia13	13 th	2
111	110	Ia14	14 th	2
112	111	Ia15	15 th	2
113	112	Ia16	16 th	2
114	113	Ia17	17 th	2
115	114	Ia18	18 th	2
116	115	Ia19	19 th	2
117	116	Ib1	1 st harmonic phase B current	2
118	117	Ib2	2 nd	2
119	118	Ib3	3 rd	2
120	119	Ib4	4 th	2
121	120	Ib5	5 th	2
122	121	Ib6	6 th	2
123	122	Ib7	7 th	2
124	123	Ib8	8 th	2
125	124	Ib9	9 th	2
126	125	Ib10	10 th	2
127	126	Ib11	11 th	2
128	127	Ib12	12 th	2
129	128	Ib13	13 th	2
130	129	Ib14	14 th	2

Sequence Number	Register Address	Parameter Code	Parameter	Byte
131	130	Ib15	15 th	2
132	131	Ib16	16 th	2
133	132	Ib17	17 th	2
134	133	Ib18	18 th	2
135	134	Ib19	19 th	2
136	135	Ic1	1 st harmonic phase C current	2
137	136	Ic2	2 nd	2
138	137	Ic3	3 rd	2
139	138	Ic4	4 th	2
140	139	Ic5	5 th	2
141	140	Ic6	6 th	2
142	141	Ic7	7 th	2
143	142	Ic8	8 th	2
144	143	Ic9	9 th	2
145	144	Ic10	10 th	2
146	145	Ic11	11 th	2
147	146	Ic12	12 th	2
148	147	Ic13	13 th	2
149	148	Ic14	14 th	2

150	149	Ic15	15 th	2
151	150	Ic16	16 th	2
152	151	Ic17	17 th	2
153	152	Ic18	18 th	2
154	153	Ic19	19 th	2

Note: (1) “ * “ content is identified by the requirement from user;

(2) The transducer’s output parameters can be determined by the user;

7. Data Calculation Method

Rx represents parameter value from register

Umax represents rated input voltage value

Imax represents rated input current value

Parameter Type	Calculation Method	Data Format	Parameter
voltage	$U=R_x \times U_{max} \times 0.0001$	unsigned integer	Ua,Ub,Uc,Uca,Ubc,Uab
current	$I=R_x \times I_{max} \times 0.0001$	unsigned integer	Ia,Ib,Ic
frequency	$F=R_x \times 0.01$	unsigned integer	F
Power factor	$\text{COS}\phi=R_x \times 0.0001$	integer	COSφa, COSφb COSφc
Active power	$P=R_x \times U_{max} \times I_{max} \times 0.0001$	integer	Pa,Pb,Pc
Reactive power	$Q=R_x \times U_{max} \times I_{max} \times 0.0001$	unsigned integer	Qa,Qb,Qc
Apparent power	$S=R_x \times U_{max} \times I_{max} \times 0.0001$	unsigned integer	Sa,Sb,Sc
Total active power	$P=R_x \times U_{max} \times I_{max} \times 3 \times 0.0001$	integer	Psum
Total reactive power	$Q=R_x \times U_{max} \times I_{max} \times 3 \times 0.0001$	unsigned integer	Qsum
Total apparent power	$S=R_x \times U_{max} \times I_{max} \times 3 \times 0.0001$	unsigned integer	Ssum

8. Default setting of the transducer: communication address: 01; baud rate:9600bps; the user may redefine the transducer’s communication address and baud rate base on the demand. Resetting process must be operated under power off condition.

Caution:

1. Pay attention to the auxiliary power information, especially the auxiliary power grade, and polarity, other wise will damage the product.
2. Pay attention to the wire connection; wrong terminal connection will cause malfunction of the product and even damage the product; wrong terminal connection of A,B terminal, will cause failure of communication. (Please see terminal identification drawing).
3. Don’t dismantle the product, and carry with care to avoiding bump and fall of the product;

4. If the product has been using under the environment with strong magnetic field interference, please pay attention to the shield of input wire, and the output signal wire should be as short as possible. For product intensive installation, the space between each product should not be smaller than 10mm.
5. Only use identified terminals.
6. There is no lightning strike prevention circuit design in this product. For out door and hazardous environment using, please add protective alternatives.
7. This product uses fire prevent ABS crust, its temperature withstand is only limited as +85°C, higher than this limitation will cause the product deformation. Please use and store carefully.

Warranty:

- (a) Product Warranty: Seller warrants that upon Delivery the Product to be supplied by Weibo shall be completely new and shall comply in all respects with the Technical Specification confirmed with Buyer.
- (b) Warranty Period: Three-year warranty of free charge of repairing the product , and any purchase made in six months, Weibo will provide free charge of change and return the product if damage and problem caused by product quality.

Note: Transportation fee of repaired and returned product will be borne by Buyer