EBCHQ OPERATION MANUAL OF POWER METER V15.1

Chapter 1. General introduction

Power meters are for measurement and display of single/three phase active/reactive power in circuit. They can be optional added the output functions such as switching value input DI, alarm(switching value output DO), analog transmitting and RS485 communication.

Chapter 2. Type and Designation

Function & shape / REF Number	Measure and Display	Size
	3-phase 4-wire power	Unit: mm
79670	●	96X96

Chapter 3 Technical Parameters

3.1 Input signal (can continued overload 1.2 times)

3.1.1 Rated input voltage: AC 100Vor 400V, input circuit consumption<0.5VA/phase

3.1.2 Rated input current: AC 1A or 5A, input impedance<20mΩ/phase

3.1.3 Input signal frequency: 45～65Hz sine wave

3.2 Accuracy rating: class 0.5

3.3 Sampling rate: 1.5 times/s

3.4 Display resolution: minimum of 1W/var,decimal point shifts automaticaly, units switch automaticaly.

3.5 Switching valut input DI: dry contact

3.6 Relay output: Contact capacity AC 250V/5A, DC 30V/5A, resistive load

3.7 Analog output: output linearity≤0.5%, load resistance of current output≤300Ω, load resistance of voltage output≥1kΩ. Electrical isolation with signal input and auxiliary power supply.

3.8 Communication interface: RS485 serial communication, applying MODBUS_RTU communication protocol.

3.9 Auxiliary power supply: AC/DC 85～264V 50/60Hz, consumption＜5VA

3.10 Operational environment: places free of gas corruption with temperature of -10~50℃, and relative humidity≤85%RH.

Chapter 4 Installation and wiring

4.1 Shape and hole cutout dimension

Unit: mm

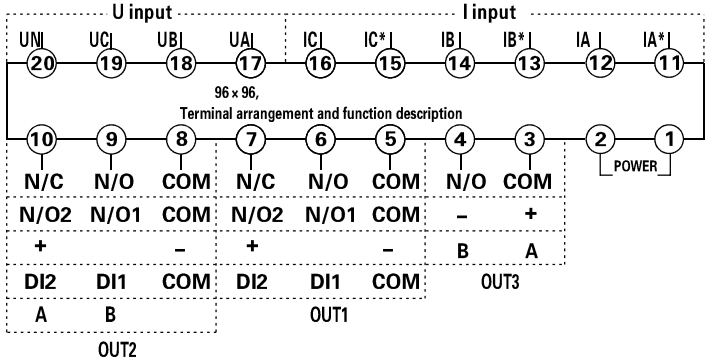
Instrument shape	Panel dimension		Case dimension			Hole cutout dimension	
	W	H	W	H	D	W	H
96x96	96	96	91	91	80	92	92

4.2 Method of installation

Choose the corresponding hole cutout dimension according to the instrument dimension from the table above, make a hole in the installation screen, insert the instruments into the hole, place the two clamping pieces into the clamping holder and push and tighten them by hand.

4.3 Description of Wiring and terminal

(Attention: If it is not the same with the wiring schema of the instrument case, please accord to the one of instrument case.)



Description of terminal lables:

POWER: Auxiliary power input port(AC/DC85～264V, 50/60Hz)

U input: A, B, C three-phase AC voltage signal input port

I input: A, B, C three-phase AC current signal input port, I* is current incoming line terminal

A, B: A, B ports of RS485 interface

+、-: the +, - ports of analog transmitting output

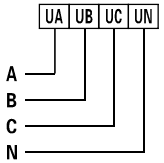
COM, N/O, N/C: the common port, normally open port, normally closed port of the single relay output

COM, N/O1,N/O2: the common port, the first channel normally open port, the second normally open port of the double relay output

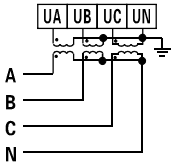
COM、DI1、DI2: the common port, the first channel input port and the second input port of the double channel switching input.

Note: Single phase power meter only needs to be input A phase voltage and A phase current.

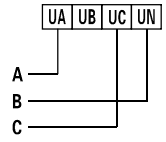
For three-phase three wire power meter, B phase voltage connect to UN (no zero line), and no B phase current



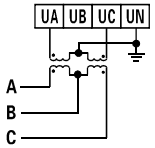
Voltage input directly (3-phase 4-wire)



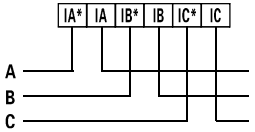
Voltage input via PT (3-phase 4-wire)



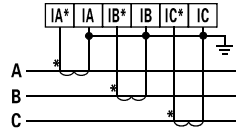
Voltage input directly (3-phase 3-wire)



Voltage input via PT (3-phase 3-wire)



Current input directly (3-phase 3-wire no need B-phase current)



Current input via CT (3-phase 3-wire no need B-phase current)

Chapter 5 Program and Usage

5.1 Key explanations

SET SET key: In the measuring display mode, it can enter the programming mode of main menu by pressing the SET key for 2s(enter directly only when codE=0(default)), otherwise need to enter the right password to enter the programming code.)
In the programming mode, pressing SET key once can switch to the next menu.
Pressing this key for 2s can quit the programming mode.

SHIFT key: In the measuring display mode, it can enter the programming mode of the output menu by pressing the SHIFT key for 2s(enter directly only when codE=0(default)), otherwise need to enter the right password to enter the programming code.)
In the programming mode, pressing SHIFT key once can move the cursor to the left one.

DOWN key: In the measuring display mode, it can see the software version by pressing the DOWN key for 2s.
In the programming mode, pressing DOWN key once will decrease the parameter values of menu.
When the meter is installed with 2 relays, pressing DOWN key for 2s can release the AL alarm.

UP key: In the programming mode, pressing UP key once will increase the parameter value of menu.
When the meter is installed with 1 relay, pressing UP key for 2s can release the alarm.
When the meter is installed with 2 relays, pressing UP key for 2s can release the AH alarm.
When the display is locked by the alarm, the meter will be reset and restart by pressing UP key for 2s.

Under the programming mode, it will automatically return to the measuring display mode if there is no key operation for more than 120s.

5.2 Menu explanations

Serial code	Parameter code	Parameter name	Setting range	Explanations
1	PT	Voltage transformer ratio Pt	1.0 ~ 3000.0	Pt=primary value of voltage transformer ÷ secondary value. For example,10kV/100V voltage transformer(Pt=100.0). When input directly(without PT), Pt=1.0.
2	CT	Current transformer ratio Ct	1 ~ 9999	Ct=primary value of current transformer ÷ secondary value. For example, 200A/5A current transformer(Ct= 40). When input directly(without CT), Ct=1.0.
3	bLt	Backlight time bLt	0 ~ 999	0 always light unit: minutes (without this menu if it is LED display)
4	Addr	Communication address Addr	1 ~ 247	
5	bAud	Communication baud rate bAud	1200 2400 4800 9600 19.2K	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps
6	PAr	Communication format PAr	n8.2 n8.1 o8.1 E8.1	0: n8.2, no parity, 8 data bits, 2 stop bits 1: n8.1, no parity, 8 data bits,1 stop bit 2: o8.1, odd parity, 8 data bits,1 stop bit 3: E8.1, even parity, 8 data bits,1 stop bit
7	codE	Programming password codE	0 ~ 9999	codE is used for setting the program code. If codE=0, in the measuring display mode, it can enter the corresponding programming mode directly by pressing SET or SHIFT key for 2s. Otherwise it can enter the programming code only upon the right password(please remember the password you changed).
The below are output menus(AH, AL, dFH, dFL, SdH, SdL are secondary side data, that is, Setting value=Expected value ÷ (PT x CT), unit: kW/kvar)				
8	AH.t AL.t	Alarm mode of AH AH.t Alarm mode of AL AL.t	oFF L H	AH.t is used to set the corresponding alarm mode of AH. AL.t is used to set the corresponding alarm mode of AL. 0: oFF close the alarm, the corresponding relay can be used for host computer remote control 1: L Lower limit alarm 2: H Higher limit alarm Meter with 1 relay: Set AH.t as H, AL.t as L, can output the higher and lower alarm from the same relay. Meter with 2 relays: AH.t and AL.t can realize double higher limit, double lower limit, higher and lower limit alarm, each alarm output from the independent relay.
9	AH AL	Alarm setting value of AH/AL AH/AL	-9.999 ~ 9.999 kW/kvar	AH and AL is the alarm setting value. The corresponding alarm mode is the higher limit alarm: when (display value ÷ (PT x CT)) ≥ alarm setting value, it will generate higher limit alarm. Setting it as 9.999 will close the higher limit alarm. The corresponding alarm mode is the lower limit alarm: When (display value ÷ (PT x CT)) ≤ alarm setting value, it will generate lower limit alarm. Setting it as -9.999 will close the lower limit alarm.
10	dFH dFL	Alarm return difference of AH/AL dFH/dFL	0.000 ~ 9.999 kW/kvar	dF is alarm return difference and with no use for generating alarm. The effect on releasing alarm is as following: Higher limit alarm: when (display value ÷ (PT x CT)) < (alarm setting value-alarm return difference), it will release the higher limit alarm. Lower limit alarm: when (display value ÷ (PT x CT)) > (alarm setting value+alarm return difference), it will release the lower limit alarm.
11	ontH ontL	Delay time of AH/AL generating alarm ontH/ontL (without menu ontL when with 1 relay)	0.0 ~ 3000.0s	(unit:second) Ont is the delay time of relay output when switching from "non alarm state" to "alarm state". When the alarm duration <ont, the switching process is ignored. If ont=0, the relay will immediately switch to the "alarm state" when the alarm is generated. When the alarm is closed, the ont is the "remote control" output pulse width of the relay, and ont=0 has no pulse width control.
12	oFtH oFtL	Delay time of AH/AL releasing alarm oFtH/oFtL (without menu oFtL when with 1 relay)	0.0 ~ 3000.0s	(unit:second) OFt is the delay time of relay output when switching from "alarm state" to "non alarm state". When the alarm duration <oFt, the switching process is ignored. If oFt=0, the relay will immediately switch to the "non alarm state" when the alarm is released.
13	ALEH ALEL	AH alarm extension settings ALEH AL alarm extension settings ALEL (it is without menu ALEL if there is only one relay)	0 ~ 9999	Thousands place of ALE: is used to switch between normally open and normally closed and set the alarm is controlled by DI or not. is 0: normally open is 1: normally closed is 2: normally closed+DI control(Need hardware support) is 3: normally open+DI control(Need hardware support) Normally open: after power on, when not alarming, terminals COM and N/C is closed, COM and N/O is open. When alarming, COM and N/C is open, COM and N/O is closed Normally closed: after power on, when not alarming, terminals COM and N/C is open, COM and N/O is closed. When alarming, COM and N/C is closed, COM and N/O is open. DI control: Only when the corresponding DI is on, the alarm will operate(Need hardware support : install two channels of switching value input modules DI). When 1 relay, DI1 control alarm operation. When 2 relays, DI1 control AH operation, DI2 control AL operation. Hundreds place of ALE: is 1, Start the alarm lock, lock the relay and alarm indicator status (how to unlock see 5.1 instructions). is 2, Start the alarm lock, lock the relay, alarm indicator status and measuring display value (unlock only when restart the meter). Alarm lock means after the alarm, even if the alarm conditions disappear, the object locked is no longer to be changed. Tens place of ALE: is 1, it will not alarm if display value is 0. is 2, it will not alarm if display value is 0 +Power on alarm suppression is 3, Power on alarm suppression Power on alarm suppression, means it will not alarm immediately even if it meets the alarm condition when power on. After the alarm condition is cancelled, the alarm output will be started if meeting the alarm condition again. The ones place of ALE 1 ~ 9: The display value change from 0 to non-0, the alarm will start running after the delay time which is set on ALE ones place. To use this function, please start the"not alarm when the display value is 0" at the same time. For example, the ones place of ALE is 5, when the display value change from 0 to non-0, the alarm will start after the delay time 5s.This function is used to shield the alarm from the shutdown or standby mode to the normal operating condition. For example, the power is 0 when the motor is not working, but the instant power of starting is big, you can set the ones place of ALE more than the starting time of motor.
14	SdH	Corresponding value of transmitting higher limit SdH	-9.999 ~ 9.999 kW/kvar	when the (display value ÷ (PT x CT) ≤ SdL, it will output the lower limit of Sdt. when the (display value ÷ (PT x CT) ≥ SdH, it will output the higher limit of Sdt. The middle display value is change according to the linear ratio.
15	SdL	Corresponding value of transmitting lower limit SdL		
16	Sc	Correction value of transmitting output Sc	-1.000 ~ 1.000	Correction value when outputs 20mA or 5V After correction=Before correction+Sc Unit: mA for current output, V for voltage output
17	Sdt	Transmitting output specification Sdt	current output: mA 0-20 4-20 20-0 20-4 voltage output: V 0-5 1-5 5-0 5-1	0: 0-20mA / 0-5V 1: 4-20mA V 2: 20-0mA V(Reverse transmission) 3: 20-4mA/ 5-1V(Reverse transmission)

Chapter 6. Communication information

The instrument is provided with RS485 communication interface, adopt MODBUS-RTU communication protocol. And the provided function codes are as following:

Function code (Hexadecimal)	Definition	Explanation
01H	read DO status	to get the ON/OFF status of internal relay
02H	read DI status	to get the ON/OFF status of external switch
03H/04H	read register	to get n (n≥1) continuous register data

05H	control DO	to change the ON/OFF status of one internal relay
06H	write single register	to change one register data
10H	write several continuous registers	to change n (n≥1) continuous register data

6.1 Menu parameter address area: 03H/04H read, 06H/10H write

Address (Hexadecimal)	Parameter name	Setting range	Data type	Attribute
00H	Voltage ratio Pt	10 ~ 30000	integer	R/W
01H	Current ratio Ct	1 ~ 9999	integer	R/W
02H	Backlight time bLt	0 ~ 999	integer	R/W
03H	Communication address Addr	1 ~ 247	integer	R/W
04H	Communication baud rate bAud	0 ~ 4	integer	R/W
05H	Communication data format PAr	0 ~ 3	integer	R/W
Address (Hexadecimal)	Parameter name	Setting range	Data type	Attribute
06H	Programming password codE	0 ~ 9999	integer	R/W
07H	Alarm mode of AH AH.t	0 ~ 2	integer	R/W
08H	Alarm mode of AL AL.t	0 ~ 2	integer	R/W
09H	Alarm setting value of AH AH	-9999 ~ 9999	integer	R/W
0AH	Alarm setting value of AL AL	-9999 ~ 9999	integer	R/W
0BH	Alarm return difference of AH dFH	0 ~ 9999	integer	R/W
0CH	Alarm return difference of AL dFL	0 ~ 9999	integer	R/W
0DH	Delay time of AH generating alarm ontH	0 ~ 30000	integer	R/W
0EH	Delay time of AL generating alarm ontL	0 ~ 30000	integer	R/W
0FH	Delay time of AH releasing alarm oFtH	0 ~ 30000	integer	R/W
10H	Delay time of AL releasing alarm oFtL	0 ~ 30000	integer	R/W
11H	AH Alarm extension settings ALEH	0 ~ 9999	integer	R/W
12H	AL Alarm extension settings ALEL	0 ~ 9999	integer	R/W
13H	Display value corresponding to transmitting higher limit SdH	-9999 ~ 9999	integer	R/W
14H	Display value corresponding to transmitting lower limit SdL	-9999 ~ 9999	integer	R/W
15H	Correction value of transmitting output Sc	-1000 ~ 1000	integer	R/W
16H	Transmitting output specification Sdt	0 ~ 3	integer	R/W

6.2 Extended interface address area: 03H/04H read, 06H/10H write

Address (Hexadecimal)	Parameter	Explanations	Data type	Attribute
17H	Extended interface	To read this register, it will return the software version no. (Version No.=communication value ÷ 10) write in 5100, the instrument will be reset and restarted write in 5171, it will release the alarm lock(1 relay) or AH lock(2 relays) write in 5172, it will release the AL lock(2 relays)	integer	R/W

6.3 Measuring value address area: 03H/04H read

Address (Hexadecimal)	Parameter	Explanations	Data type	Attribute
18H	Measuring value	The actual value = communication value × Pt × Ct Unit: W or var	integer	R

6.4 DI(External switch input)addredd area: 02H read

Address (Hexadecimal)	Object	Data range	Data type	Attribute
00H	DI1	0=OFF 1=ON	bit	R
01H	DI2		bit	R
02H	DI3		bit	R
03H	DI4		bit	R

6.5 DO(Internal relay output)address area: 01H read, 05H write

Address (Hexadecimal)	Object	Data range	Data type	Attribute
00H	DO1	0=OFF, 1=ON When the internal relay is used for PC control, the corresponding alarm mode(AH.t/DO1, AL.t/DO2) should be set as oFF.	bit	R/W
01H	DO2		bit	R/W

Chapter 7. Cautions

7.1 Please confirm if the power supply, input signal and each terminal wiring of the meter are correct and reliable before applying the power.

7.2 The instrument must be preheated for 15 minutes to guarantee the precision of measurement.

7.3 The instrument should not be rapped, knocked and vibrate excessively and its using environment should meet the technical requirements.

7.4 The meter has been calibrated according to the measuring range required by the customer upon order. The user should check again if the measuring range of the meter is fit with the specifications of the transformer or shunt and set the measuring range again if not.

7.5 Please enter the password "5643" if you forget the programming password.

Chapter 8. Packing and Storage

The instrument and accessories with packing should keep storage conditions cool and dry and free of wet and gas corruption with temperature not more than 70℃ and not less than -40℃ and relative humidity≤85%