EW9L Series 3 Phase Energy Meter Operation Manual

The energy meters are widely applied to control system, SCADA system and energy management system, transformer substation automation, distributing net automation, community electrical power monitor, industrial automation, intelligent construction, intelligent switchboard, switch cabinet, etc. It is esay to install and maintain, simple connection, filed programmable setting input parameters.

Features:
⊙Measurement Parameters: 3 phase Voltage/Current/Active power/Reactive power/Frequency/Power factor ect , 28 parameters.
⊙Four switch signal input, two switch signal output; isolation for input and output.
⊙Ture effective value measuring;
⊙With programmable analog output function , analog output for voltage/current/active power/reactive power/fequency/power factor.
⊙With RS485 connection and Modbus RTU communication protocol.
⊙With 2 loops active power/reactive power energy pulse output, 2 programmable alarm, display programmable setted parameters.
⊙With power failure function for display menu select/KWH/KvarH
⊙Optional tariff statistics function, with demand statistics function.
⊙Optional harmonic analysis funtion (including the total harmonic).
⊙ With neutrual line measurement function.

⚠ Warning: any operation not following the manual will cause accident and damage to the product.
Statement: Information provided in this manual can be modified without prior notice.
The company reserves the right of interpretation of the information.

■ Model

E W 9 L − □ □ − C/S/F/H

- C/S/F/H — Extensions: C: 4~20mA analog output S: two loops RS485 communication (If select this function, there would be two less DI connection) F: With Multi-tarrif rate function H: Harmonics measurement measurement
- □ — Measuring Range: A: 100V/5A Blank: 400V/5A (default range) C: custom range
- □ — Measurement type: W: 3 phase integrated measurement P: 3 phase voltage/ current/ active power S: 3 phase voltage/ current
- L — Display: L: LCD display T: TFT color LCD display
- 9 — Dimension: 9: 96H×96W×104.6L(mm)
- EW — EW Series 3 phase energy meter

■ Model Illustration

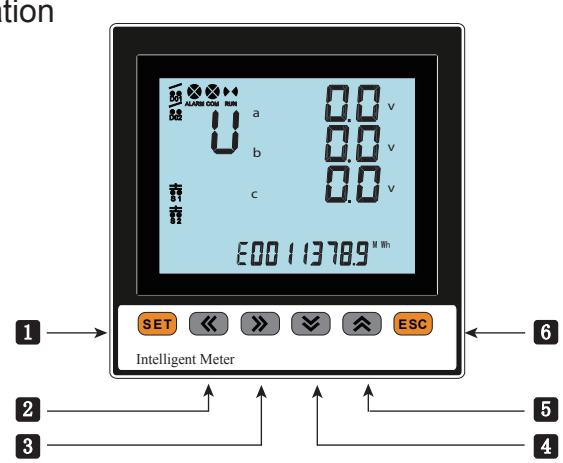
Model	Alarm	Transformed analog output	Communication	Harmonic	Tariff
EW9L-□-C	2	4 ~ 20mA	1 loop RS485	No	No
EW9L-□-S	2	No	2 loop RS485	No	No
EW9L-□-F	2	No	1 loop RS485	No	Yes
EW9L-□-H	2	No	1 loop RS485	Yes	No

■ Technical Parameters

Connection	3 phase 3 wires, 3 phase 4 wires
Voltage Range	AC 3x57.7V / 3X220V (note: Direct input volt: L-N: 0~600V, L-L: 0~1000V)
Voltage Overload	Continuous: 1.2 times Instantaneous: 2 times/10S
Voltage Consumption	<1VA (each phase)

Voltage impedance	≥300KΩ
Voltage Accuracy	RMS measurement , Accuracy : 0.5
Current Range	AC 0.025 ~ 5A
Current Overload	Continuous: 1.2 times Instantaneous: 10 times/10S
Current Consumption	<0.4VA (each phase)
Current impedance	<20mΩ
Current Accuracy	RMS measurement , Accuracy : 0.5
Frequency	30-500Hz , Accuracy: 0.1Hz
Power	Active power/Reactive power/Apparent power, accuracy: 0.5
Energy	Active power accuracy 0.5 / Reactive power accuracy 1.
Display	LCD Display (can select blue backlight, white backlight as default)
Power Supply	AC/DC 100 ~ 240V (85 ~ 265V)
Power Supply Consumption	≤7VA
Output Digit Interface	RS-485 Modbus-RTU Protocol
Pulse Output	2 energy pulse output (optical coupler relay) Normal Pulse constant: 9000imp/kwh
On/Off Input	4 On/Off input (connection without voltage or current signal)
Alarm Output	2 On/Off output, 250VAC/3A or 30V DC/5A
Analog Output	1 transformed analog output, 4-20mA DC Load<500Ω
Working Environment	Temperature: -10 ~ 50℃ , Humidity: <85% RH; no corrosive gas; altitude ≤ 2500m
Storage Environment	-25 ~ 70℃
Isolation & puncture	Input signal and power 1600V AC , Input and output 1600VAC , power and transformed analog output, RS485 connection , DI connection , Pulse output connection≥DC 2000V
Insulation	Input/output/power supply to Meter cover >5MΩ
Dimension	96W×96H×104.6L(mm)
Weight	0.6kg

■ Panel Indication

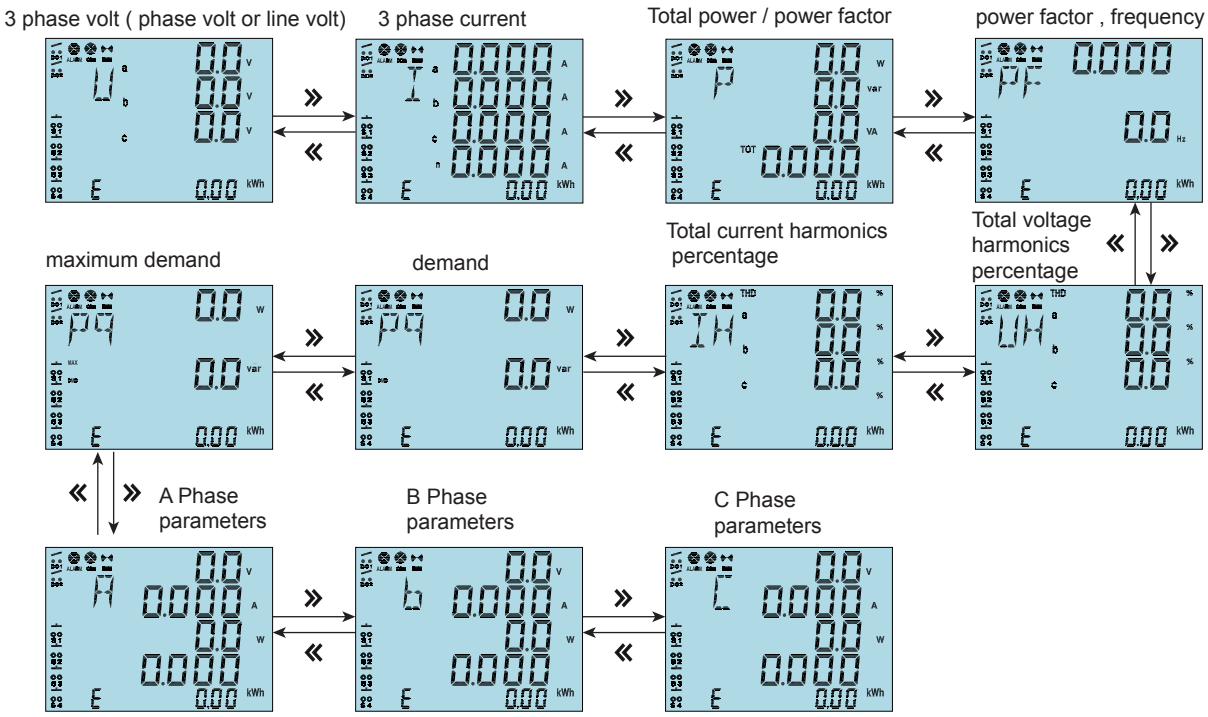


Symbol	Meaning
U	voltage
A	current
P	power
F	Frequency
E	Total kwh
EP	Forward kwh
EN	Inverse kwh
E	Total kvarh
EP	Forward kvarh
EN	Inverse kvarh

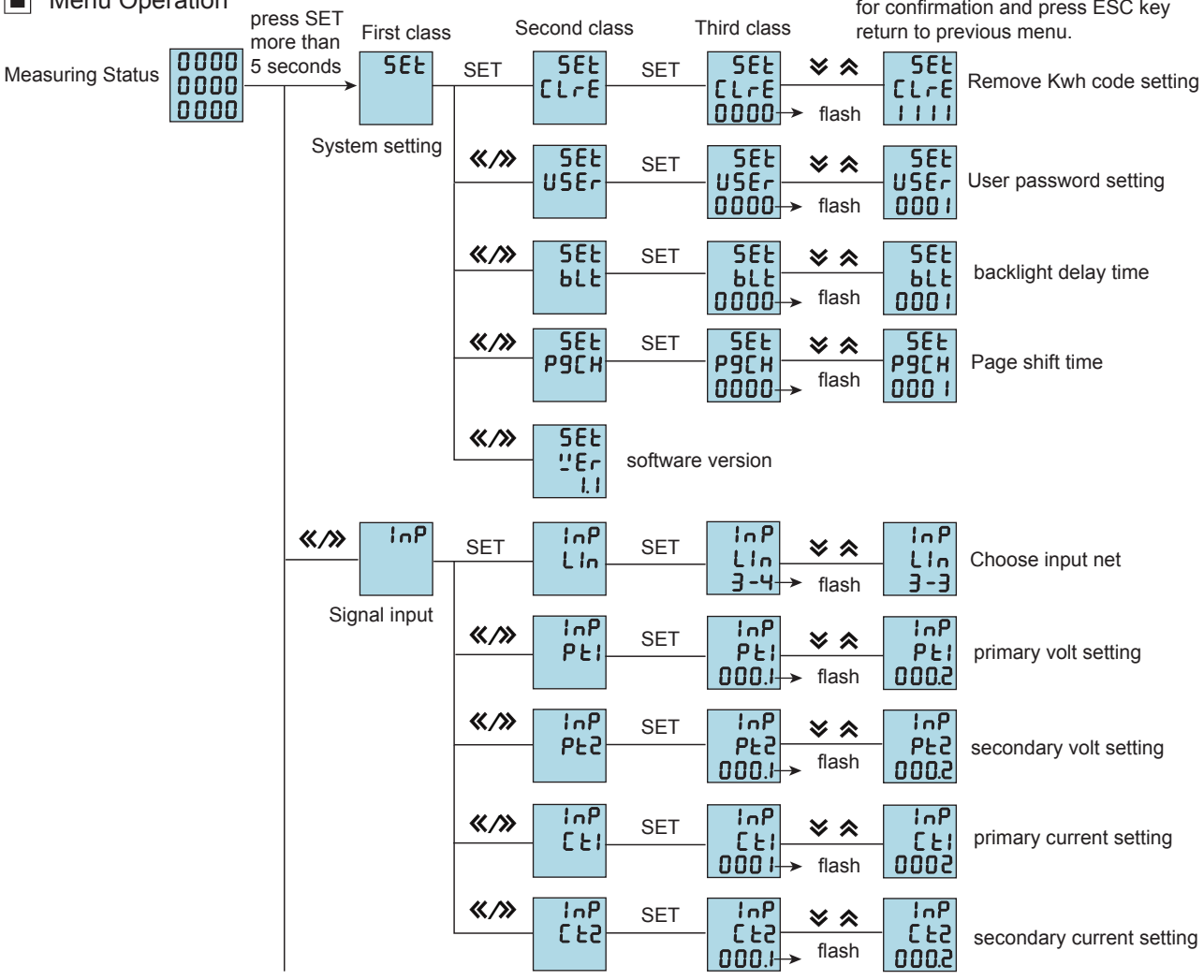
No.	symbol	Name	Function
1	SET	Set Key	Press this key more than 3 seconds to enter the menu Confirm the set value
2	«	Left Key	In menu operation, it can shift menu Change to display left page
3	»	Right Key	In menu operation, it can shift menu Change to display right page
4	⌄	Decrease Key	In menu operation, it is used to enter data setting Decrease value
5	⌃	Increase Key	In menu operation, it is used to enter data setting Increase value
6	ESC	Return Key	In menu operation, it is used to return to previous menu

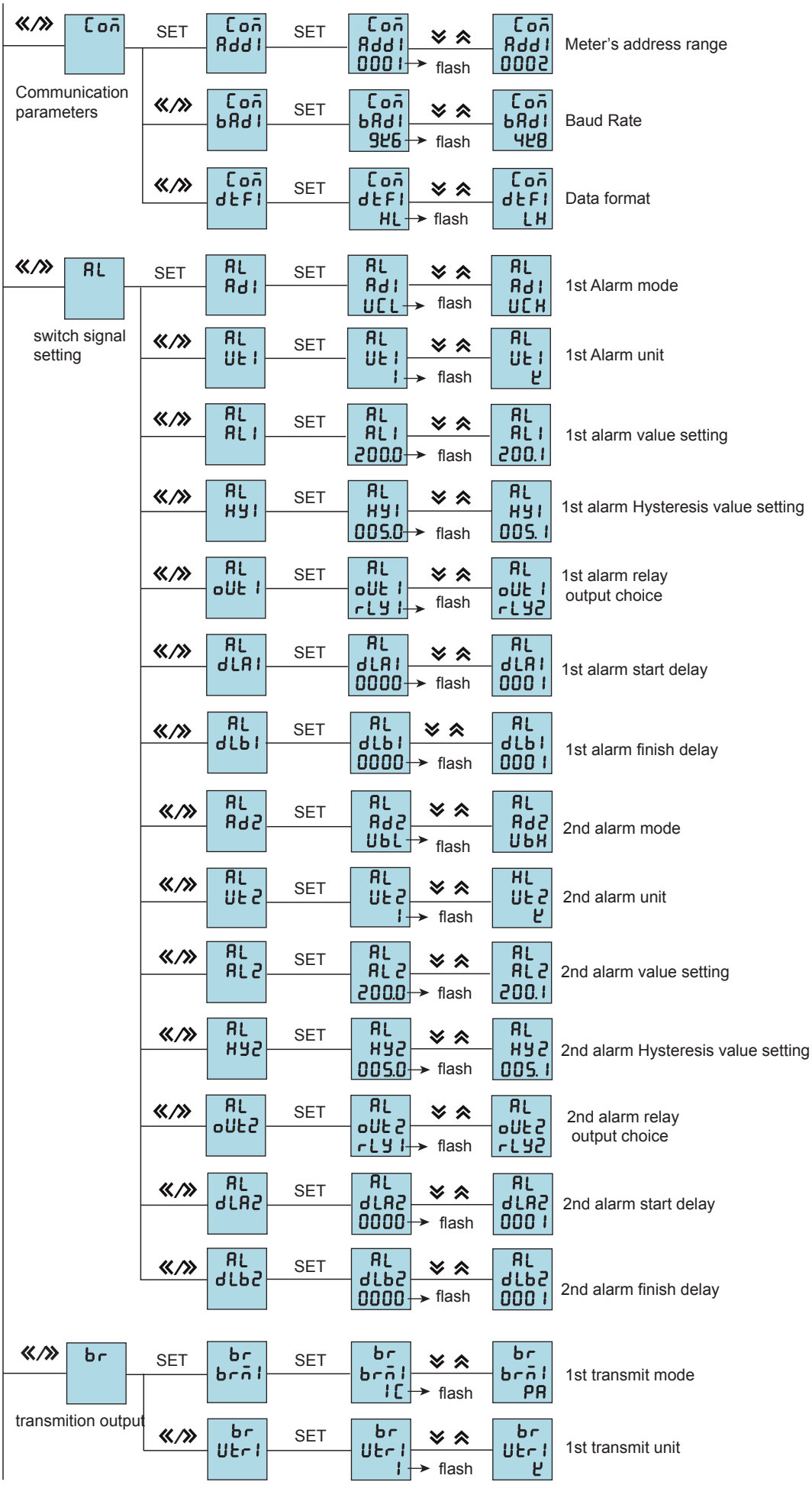
Check measuring value and working status indication:
1. Under measuring status , press « / » key to shift display of 3 phase voltage, 3 phase linear voltage, 3 phase current, total power, frequency, etc.
2. Press key ⌃ / ⌄ to shift display of Kwh and KvarH. (When second harmonic enable, use ESC to shift display of energy.)
3. Under alarm mode , DO1 and DO2 is used as alarm output status indication. Under ON/OFF remote control mode , DO1 and DO2 is used as ON/OFF output status indication.
4. S1, S2, S3, S4 indicate switch signal remote control input status.
5. Alarm flash means alarm output, COM flash means communicating, RUN move means the meter is under measuring status.
6. E (kwh) means total active energy, E (kvarh) means total reactive energy.

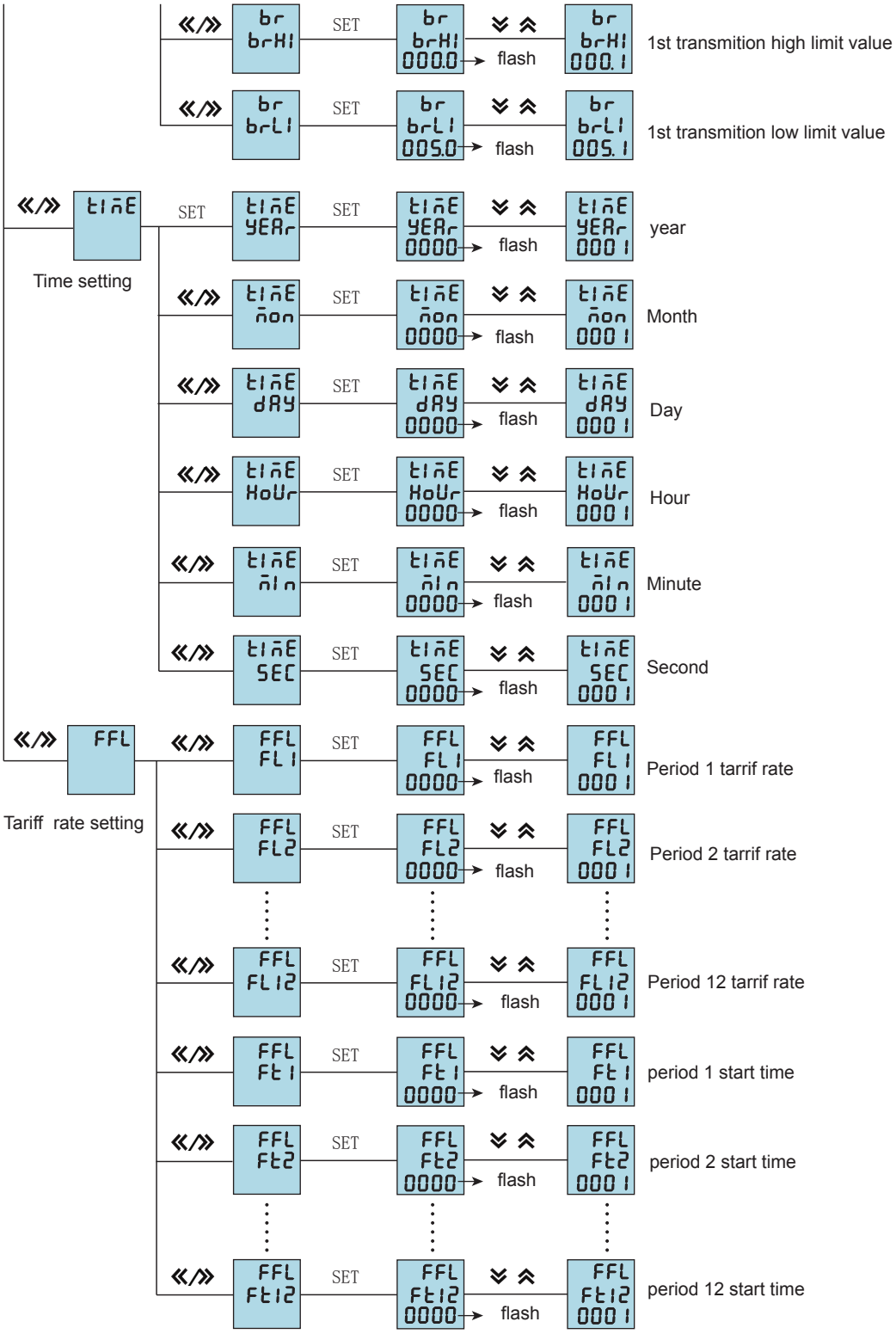
Shift measurement interface operation :



■ Menu Operation




Communication parameters
SET
Meter's address range
Baud Rate
Data format
switch signal setting
1st Alarm mode
1st Alarm unit
1st alarm value setting
1st alarm Hysteresis value setting
1st alarm relay output choice
1st alarm start delay
1st alarm finish delay
2nd alarm mode
2nd alarm unit
2nd alarm value setting
2nd alarm Hysteresis value setting
2nd alarm relay output choice
2nd alarm start delay
2nd alarm finish delay
transmition output
1st transmit mode
1st transmit unit
flash



note: 26 English letters display method on LED

letter	A	B	C	D	E	F	G	H	I	J	K	L	M
display method	A	b	C	d	E	F	9	H	I	J	K	L	n
letter	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
display method	n	o	P	q	r	S	t	U	U	U	U	y	=

▣ Menu Operation Illustration

Under user menu status

1. Press SET key more than 5 seconds to enter user menu; if the user password is set, it will pop up the password input box, enter the correct password to enter the user menu, and then set the parameters.
2. If the current display is the first class, press SET key to enter next class display. Press « » to change other parameters.
3. If the current display is second or third class , press ESC key to return to previous class display.
4. If the current display is third class , press » « key to flash digit, press key « to shift place. Keep pressing » « to change value . Press SET key to save value. If press ESC key, do not save the set value and return to second class.
5. After modifying the parameters , press SET key more than 5 seconds or press ESC key, to exit user menu, return to measuring status.

Menu Structure and Function Description

No.	class 1	class 2	class 3	description
1	SEt System Setting	Clear Energy CLrE	0000	Input " 1111" to clear energy. Input 2222 to clear maximum demand. input 1234 to reset to factory setting
		User password USEr	0000	Change user password
		backlight delay time bLt	0000	backlight delay time , unit is second . If set as 0 , mean keep on lighting all the time.
		page shift time PGCH	0000	measurement page shift delay time , unit is second . If set as 0, no page shift.
		software version VEr	1.1	software version
2	InP signal input	Input net Lin	3-3 / 3-4	Select the input network of the measured signal
		Volt transform Pt1	1-999.9	Primary coil voltage , unit kV
		Volt transform Pt2	10.0-999.9	Secondary coil voltage , unit V
		Current transform Ct1	1-9999	Primary coil current , unit A
		Current transform Ct2	1.0-999.9	Secondary coil current ,unit A
3	Con Communication parameter	Address Add1	1-247	meter address range
		baud rate bAd1	4.8 / 9.6	Baud rate: 4k8 means 4800, 9k6 means 9600
		Data sequence dtF1	HL / LH	Data sequence: high digit in front or low digit in front
4	AL Switch signal setting	Alarm mode Ad1	1-68	When the value is 0 , it is for remote control mode, otherwise it is for alarm mode. Please refer to table 1.
		Alarm unit Ut1	1 / K / M	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.
		Alarm value AL1	0-999.9	1st alarm value setting
		Alarm hysteresis value HY1	0-999.9	1st alarm hysteresis value setting
		alarm relay setting oUt1	rLY1/rLY2	1st alarm relay output setting
		alarm start delay dLA1	0-99	alarm start delay time , unit : second
		alarm finish delay dLb1	0-99	alarm finish delay time , unit : second
		Alarm mode Ad2	1-68	When the value is 0 , it is for remote control mode, otherwise it is for alarm mode. Please refer to table 1.
		Alarm unit Ut2	1 / K / M	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.
		Alarm value AL2	0-999.9	2nd alarm value setting
		Alarm hysteresis value HY2	0-999.9	2nd alarm hysteresis value setting
		alarm relay setting oUt2	rLY1/rLY2	2nd alarm relay output setting
		alarm start delay dLA2	0-99	alarm start delay time , unit : second
		alarm finish delay dLb2	0-99	alarm finish delay time , unit : second

5	br Analog output	transmit mode selection brn1	1-32	Please refer to table 1
		transmit value unit Utr1	1/E/n	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.
		transmit high limit brH1	0-999.9	Transmit output 20mA
		transmit low limit brL1	0-999.9	Transmit output 4mA
6	tIME Time setting	Year YEAr	0-99	Year
		Month non	1-12	Month
		Day dAY	1-31	Day
		Hour HoUr	0-23	Hour
		Minute nIn	0-59	Minute
		Second SEC	0-59	Second
7	FFL Tariff Setting	Period 1 tariff FL1	0-3	Period 1 tariff means Sharp tariff, Peak tariff, flat tariff, valley tariff
		Period 2 tariff FL2	0-3	Period 2 tariff means Sharp tariff, Peak tariff, flat tariff, valley tariff
		⋮	⋮	⋮
		Period 12 tariff FL12	0-3	Period 12 tariff means Sharp tariff, Peak tariff, middle tariff, valley tariff
		Period 1 start time Ft1	0-95	Period 1 start time Note
		Period 2 start time Ft2	0-95	Period 2 start time Note
		⋮	⋮	⋮
		Period 12 start time Ft12	0-95	Period 12 start time Note

Note Divide 24 hours a day into 96 segments, every 15 minutes as one segments. For example, the corresponding time for segment 0 is 0 o'clock, the corresponding time for segment 10 is 2:30. Please notice that, the setting of period 1 to period 12 should be from small to big.

▣ Output Function

1. Energy pulse
   EW9L provides the function of energy calculation, with 2 energy pluse output AP & RP, and RS485 interface for the transmit of energy data.
   The energy pulse of optical couple relay with open collector enables the long distance transmit of active energy AP & reactive energy RP. Remote PC terminal, PLC, DI On-Off output and collector module are applied to collect the pulse of energy meter to enable the energy cumulation calculation. Besides, this output mode is also the energy accuracy check way (National metrology regulations: Standard meter pulse tolerance comparison method)
   (1). Electrical characteristic: the output of optical couple relay with open collector , V≤ 48V, Iz≤ 50mA
   (2). Pulse constant: 9000imp/kwh. It means the impulse output No. is 9000 when the energy meter counts up to 1KWH.
   The piont should be emphasized is that the above 1kwh is for the 2nd coil energy. Supposed that PT and CT is connected , the primary coil energy that 9000 pulse refer to is equal to 1kwhX voltage transform PT X current transform CT.
2. Remote measure and remote control function: 4 loops S1-S4 are used to remote measure electric ON/OFF status. DO1 & DO2 function can be used to remote control electric devices. When using Do function, alarm mode should be setted as 0, otherwise DO1 and DO2 will be as AL1, AL2 output. DO1 DO2 function control value is writen via RS485 interface.
3. Communication function (please refer to the communication protocol)
4. Transform output(please refer to table 1)
5. Alarm function (please refer to table 1)

▣ Communication protocol

一、MODBUS serial communication protocol

EW9L series energy meter adopts Modbus RTU communication protocol RS485 half duplex communication , read function code 0x03, write function code 0x10 , adopts 16 digit CRC check, the energy meter does not feedback the check error.

Start bit	Data bit	Stop bit	Check bit
1	8	1	No

(1) All the RS485 communication should comply with host/slave method. Under this method, information and data is transmitted between one host and maximum 32 slaves (monitoring equipment);

(2) Host will initialize and control all information transmitted in RS485 communication circuit.

(3) In any case, communication can never be started from a slave.

(4) All the RS485 communication is sending by packet . One data packet is a simple string (every string has 8 bit). One packet include 128 byte at most. The bytes in the packet formed in standard asynchronous serial data , and transmitting in the mode of 8 data bits, 1 stop bit, no check bit.

(5) Host sending is called request, slave sending is called response.

(6) In any case, slave can only respond to one request of host.

2. Each MODBUS data packet is consisted several parts as below:

(1) Slave address; (2) Function code to be executed; (3) Register address (variate address); (4) Data; (5) CRC check;

(1) Slave address: address length is 1 byte, effective slave address range is 1-247, if slave receives a data packet, whose frame address information is consonant with its own address information , it will execute the order of data packet.

(2) Function code length in MODBUS data packet is one byte, used to inform the slave what kind of operation needs to be executed. The slave response data packet should have the same function code byte of the operation requested by host.

Please refer to below table for related function code:

Function code	Meaning	Function
0x03	Read register	Read one or more present register value
0x06	Write single-register	Write specified value into one internal register
0x10	Write multi-register	Write specified value into several internal registers (Factory default write single register)

(3) Register address variable: data area storage location when slave executes effective order. Different variable seizes differents numbers of register, some address variable seizes two register, 4 byte data, somevariable seizes one register, 2 byte data, please use according to actual situation.

(4) Data area: data area includes the data required by terminal to execute specified function or collected data when terminal respond to query. The content of the data could be numerical value, reference address or set value; for example: function code tells terminal to read a register, data area needs to indicate which register to started from and how much data to be read, embedded address and data will be different according to different content between type and slave; register numerical value send sequence : high byte in the front, low byte in the back.

(5) CRC check: MODBUS-RTU mode adopts 16 bit CRC check. Sending equipment should do CRC16 calculation for each data of packet, final result is stored in check area. Receiving equipment also make CRC16 calculation for each data of packet (except check area), and compare result area with check area; only the same packet can be accepted, for the specific CRC check algorithm please refer to appendix.

II. Network time consideration

Transmitting package in RS485 network should follow the time regulation as follows:

(1) When baud rate set as 9600, the delay time between two host request is recommended to be 300ms or more, lesser time may cause the loss of data packet.

(2) When the recommended baud rate is 9600, if use smaller baud rate, please enlarge delay time properly. For example, when baud rate is 2400, two request should be set as more than 500ms.

III. Abnormal communication processing

If host send a illegal data packet or host request a invalid data register, abnormal data response will happen. This abnormal data response is consisted of slave address, function code, error code and check area. When the high bit position of function code area is 1, it means the present data frame is abnormal response.

Below table illustrates the meaning of abnormal function code:

According to MODBUS communication requirement, abnormal response function code=request function code+0x80; when abnormal response, put 1 on the highest bit of function code. For example: if host request function code is 0x04, slave response function code is 0x84.

Error code type	Name	Contents illustration
0x01	Function code error	Meter received the unsupported function code
0x02	Variable address error	Data location designated by host exceeds range of meter, or receive illegal register operation.
0x03	Variable value error	Data value sent from host exceeds the corresponding data range of meter, or data structure is incomplete

IV. Communication frame format illustration

1. Read multi-register

For example, host reads UA (A phase voltage), suppose measured A phase voltage is 220.0V.

The address code of UA is 0x4000, because UA is fixed data (4 byte), seizes 2 data register, the hexadecimal data of 220.0V is 0x0000898 (2200).

Host request

Slave address	Read function code	Register address (variable)		Register quantity		CRC check code	
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high bit	Start address low bit	High bit	Low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x40	0x00	0x00	0x02	0xD1	0xCB

Slave normal answers (high bit is in front)

Slave address	Read function code	Byte number (2 times of register quantity)	Register data		Register data		CRC check code	
1	2	3	4	5	6	7	8	9
Meter address	Function code	Data byte length	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x04	0x00	0x00	0x08	0x98	0xFC	0x59

Slave normal answers (low bit is in front)

Slave address	Read function code	Byte number (2 times of register number)	Register data		Register data		CRC check code	
1	2	3	4	5	6	7	8	9
Meter address	Function code	Data byte length	Data 2 high bit	Data 2 low bit	Data 1 high bit	Data 1 low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x04	0x08	0x98	0x00	0x00	0x79	0xBC

Function code abnormal answer: (For example, host request function code is 0x04).

Slave abnormal answers (Read multi-register)				
1	2	3	8	9
Meter address	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x84	0x01	0x82	0xC0

For example: When present measured current value is: Ia=100 A, Ib=200 A, Ic=300 A, separately read three current value at a time. Host send read 01 address meter, read the current value data started from 400C (A phase current) register. Hexadecimal code of 100.000 is 000186A0; hexadecimal code of 200.000 is 00030D40; hexadecimal code of 300.000 is 000493E0; data adopts the 32-bit unsigned data representation, with three decimal point. For example, if data value is 12345, the actual value is 12.345.

Host send

Meter address	Function code	Address		Register quantity		CRC check code	
01	03	40	0C	00	06	10	0B

Meter return

Meter address	Function code	Read byte number	Data 1				Data 2				Data 3				CRC check code	
01	03	0C	00	01	86	A0	00	03	0D	40	00	04	93	E0	8F	1D

2. Write single-register

For example: Host writes fixed data, 1st alarm mode is AD1.

Suppose the address code of AD1 is 0x4900, because AD1 is fixed data, seizes 1 data register, decimalist code of 11 is 0X000B.

Host request (Write single-register)

Slave station address	Write function code	Register address (variable)		Register Data		CRC check code	
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high 8 bit	Start address low 8 bit	High bit	Low bit	CRC code low bit	CRC code high bit
0x01	0x06	0x49	0x00	0x00	0X0B	0XDE	0x51

Slave normal answer (Write single-register)

Slave address	Write function code	Register address (variable)		Register number		CRC check code	
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high 8 bit	Start address low 8 bit	High bit	Low bit	CRC code low bit	CRC code high bit
0x01	0x06	0x49	0x00	0x00	0x01	0x5E	0x56

3. Write multi-register

For example: Host writes fixed data, 1st alarm mode is AD1.

Suppose the address code of AD1 is 0x4900, because AD1 is fixed data, seizes 1 data register, decimalist code of 11 is 0X000B.

Host request (Write multi-register)										
1	2	3	4	5	6	7	8	9	10	11
Meter address	Function code	Start address high bit	Start address low bit	Data byte length high bit	Data byte length low bit	Data byte length	Data 1 high bit	Data 1 low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x49	0x00	0x00	0x01	0x02	0x00	0x0B	0x3F	0x53

Slave normal answer (Write multi-register)							
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high 8 bit	Start address low 8 bit	Data byte length high bit	Data byte length low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x49	0x00	0x00	0x01	0x17	0x95

Data position error answer:(For example, host request write address index is 0x0050).

Slave abnormal answer (Write multi-register)				
1	2	3	4	5
Meter address	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x90	0x02	0xCD	0xC1

EW9L parameter address reflection table
Note: address code is the index of variable array

No.	Address reflection	Variable name	Byte length	Date type	Read/Write	Remark
1	0x4000	Phase voltage A	2	long	R	0.1V Note⑦
2	0x4002	Phase voltage B	2	long	R	
3	0x4004	Phase voltage C	2	long	R	
4	0x4006	Line voltage AB	2	long	R	
5	0x4008	Line voltage BC	2	long	R	
6	0x400a	Line voltage CA	2	long	R	
7	0x400c	A phase current	2	long	R	0.001A Note⑦
8	0x400e	B phase current	2	long	R	
9	0x4010	C phase current	2	long	R	
10	0x4012	Active power A	2	long	R	0.0001KW Note⑦
11	0x4014	Active power B	2	long	R	
12	0x4016	Active power C	2	long	R	
13	0x4018	Total active power	2	long	R	
14	0x401a	Reactive power A	2	long	R	0.0001Kvar Note⑦
15	0x401c	Reactive power B	2	long	R	
16	0x401e	Reactive power C	2	long	R	
17	0x4020	Total reactive power	2	long	R	0.0001KVA Note⑦
18	0x4022	Apparent power A	2	long	R	
19	0x4024	Apparent power B	2	long	R	
20	0x4026	Apparent power C	2	long	R	
21	0x4028	Total apparent power	2	long	R	
22	0x402a	Power factor A	2	long	R	0.001 Note⑦
23	0x402c	Power factor B	2	long	R	
24	0x402e	Power factor C	2	long	R	
25	0x4030	Total power factor	2	long	R	
26	0x4032	Frequency	2	long	R	0.001HZ Note⑦
27	0x4034	Total Kwh	2	long	R	0.001kWh Note⑦
28	0x4036	Total Kvarh	2	long	R	
29	0x4038	Forward Kwh	2	long	R	
30	0x403a	Backward Kwh	2	long	R	
31	0x403c	Forward Kvarh	2	long	R	
32	0x403e	Backward Kvarh	2	long	R	
33	0x4046	active power demand	2	long	R	0.001

34	0x4048	active power maximum demand	2	long	R	0.001
35	0x404A	reactive power demand	2	long	R	
36	0x404C	reactive power maximum demand	2	long	R	
37	0x4052	A phase voltage harmonic content	2	long	R	0.1 Note ⑦
38	0x4054	B phase voltage harmonic content	2	long	R	
39	0x4056	C phase voltage harmonic content	2	long	R	
40	0x4058	A phase current harmonic content	2	long	R	
41	0x405a	B phase current harmonic content	2	long	R	
42	0x405c	C phase current harmonic content	2	long	R	
43	0x405E	netural line current	2	long	R	0.001
extend						
44	0x4100	Total kwh	2	long	R	0.001kWh Note ⑦
45	0x4102	Total Sharp tariff kwh	2	long	R	
46	0x4104	Total Peak tariff kwh	2	long	R	
47	0x4106	Total middle tariff kwh	2	long	R	
48	0x4108	Total valley tariff kwh	2	long	R	
49	0x410a	Total kwh this month	2	long	R	
50	0x410c	Sharp kWh this month	2	long	R	
51	0x410e	Peak kWh this month	2	long	R	
52	0x4110	flat kWh this month	2	long	R	
53	0x4112	valley kWh this month	2	long	R	
54	0x4114	Total kwh last month	2	long	R	
55	0x4116	Sharp kWh last month	2	long	R	
56	0x4118	Peak kWh last month	2	long	R	
57	0x411a	flat kWh last month	2	long	R	
58	0x411c	valley kWh last month	2	long	R	
59	0x411e	Total kwh last II month	2	long	R	
60	0x4120	Sharp kWh last II month	2	long	R	0.001kWh Note ⑦
61	0x4122	Peak kWh last II month	2	long	R	
62	0x4124	flat kWh last II month	2	long	R	
63	0x4126	valley kWh last II month	2	long	R	
extend						
64	0x4800	Primary coil voltage	2	long	R/W	0.001 Note ⑦
65	0x4802	secondary coil voltage	2	long	R/W	
66	0x4804	primary coil current	2	long	R/W	
67	0x4806	secondary coil current	2	long	R/W	
68	0x4808	1st Alarm value	2	long	R/W	
69	0x480a	1st Alarm hysteresis value	2	long	R/W	
70	0x480c	2nd Alarm value	2	long	R/W	
71	0x480e	2nd Alarm hysteresis value	2	long	R/W	
72	0x4818	Transmit 1 high limit value	2	long	R/W	
73	0x481a	Transmit 1 low limit value	2	long	R/W	
extend						
74	0x4900	1st Alarm mode (refer to table 1)	1	int	R/W	No decimal point
75	0x4901	1st Alarm unit Note ④	1	int	R/W	
76	0x4902	1st alarm start delay	1	int	R/W	
77	0x4903	1st alarm finish delay	1	int	R/W	
78	0x4904	2nd Alarm mode (refer to table 1)	1	int	R/W	
79	0x4905	2nd Alarm unit Note ④	1	int	R/W	
80	0x4906	2nd alarm start delay	1	int	R/W	
81	0x4907	2nd alarm finish delay	1	int	R/W	

extend						
82	0x4980	1st transmit mode (refer to table 1)	1	int	R/W	No decimal point
83	0x4981	1st transmit unit note④	1	int	R/W	
extend						
84	0x4a00	Link mode note①	1	int	R	No decimal point
85	0x4a01	Communication address	1	int	R	
86	0x4a02	Baud rate note ②	1	int	R	
87	0x4a03	Data format note ⑧	1	int	R	No decimal point
88	0x4a07	switch output note ③	1	int	R	
89	0x4a08	switch input note ⑤	1	int	R	
90	0x4a09	remote input note ⑥	1	int	R/W	
extend						
91	0x4a80	Tariff Rate 1 time	1	int	R/W	No decimal point
92	0x4a81	Tariff Rate 2 time	1	int	R/W	
93	0x4a82	Tariff Rate 3 time	1	int	R/W	
94	0x4a83	Tariff Rate 4 time	1	int	R/W	
95	0x4a84	Tariff Rate 5 time	1	int	R/W	
96	0x4a85	Tariff Rate 6 time	1	int	R/W	
97	0x4a86	Tariff Rate 7 time	1	int	R/W	
98	0x4a87	Tariff Rate 8 time	1	int	R/W	
99	0x4a88	Tariff Rate 9 time	1	int	R/W	
100	0x4a89	Tariff Rate 10 time	1	int	R/W	
101	0x4a8a	Tariff Rate 11 time	1	int	R/W	
102	0x4a8b	Tariff Rate 12 time	1	int	R/W	
103	0x4a8c	time period 1	1	int	R/W	
104	0x4a8d	time period 2	1	int	R/W	
105	0x4a8e	time period 3	1	int	R/W	
106	0x4a8f	time period 4	1	int	R/W	
107	0x4a90	time period 5	1	int	R/W	
108	0x4a91	time period 6	1	int	R/W	
109	0x4a92	time period 7	1	int	R/W	
110	0x4a93	time period 8	1	int	R/W	
111	0x4a94	time period 9	1	int	R/W	
112	0x4a95	time period 10	1	int	R/W	
113	0x4a96	time period 11	1	int	R/W	
114	0x4a97	time period 12	1	int	R/W	
115	0x4c00	demand happen time: year	1	int	R	
116	0x4c01	demand happen time: month	1	int	R	
117	0x4c02	demand happen time: day	1	int	R	
118	0x4c03	demand happen time: hour	1	int	R	
119	0x4c04	demand happen time: minute	1	int	R	
120	0x4c05	demand happen time: second	1	int	R	
121	0x4c06	active power maximum demand happen time: year	1	int	R	
122	0x4c07	active power maximum demand happen time: month	1	int	R	
123	0x4c08	active power maximum demand happen time: day	1	int	R	
124	0x4c09	active power maximum demand happen time: hour	1	int	R	
125	0x4c0A	active power maximum demand happen time: minute	1	int	R	
126	0x4c0B	active power maximum demand happen time: second	1	int	R	
127	0x4c0C	reactive power maxi demand happen time: year	1	int	R	
128	0x4c0D	reactive power maxi demand happen time: month	1	int	R	

129	0x4c0E	reactive power maxi demand happen time: day	1	int	R	no decimal point
131	0x4c0F	reactive power maxi demand happen time: hour	1	int	R	
132	0x4c10	reactive power maxi demand happen time:minute	1	int	R	
133	0x4c11	reactive power maxi demand happen time: second	1	int	R	

Reference table 1: Reference table for alarm output and transmit output

No.	Parameter	switch output code low alarm	switch output code high alarm	transmit output code 4-20mA
1	Ua (A phase voltage)	1 （UaL）	2 （UaH）	1 （Ua）
2	Ub (B phase voltage)	3 （UbL）	4 （UbH）	2 （Ub）
3	Uc (C phase voltage)	5 （UcL）	6 （UcH）	3 （Uc）
4	U (phase voltage of A, B or C)	7 （UL）	8 （UH）	4 （U）
5	Uab (AB line voltage)	9 （UabL）	10 （UabH）	5 （Uab）
6	Ubc (BC line voltage)	11 （UbcL）	12 （UbcH）	6 （Ubc）
7	Uca (CA line voltage)	13 （UcaL）	14 （UcaH）	7 （Uca）
8	UL (line voltage of AB, BC or CA)	15 （ULL）	16 （ULH）	8 （UL）
9	Ia (A line current)	17 （IaL）	18 （IaH）	9 （Ia）
10	Ib (B line current)	19 （IbL）	20 （IbH）	10 （Ib）
11	Ic (C line current)	21 （IcL）	22 （IcH）	11 （Ic）
12	I (line current of A, B or C)	23 （IL）	24 （IH）	12 （I）
13	Pa (A phase active power)	25 （PaL）	26 （PaH）	13 （Pa）
14	Pb (B phase active power)	27 （PbL）	28 （PbH）	14 （Pb）
15	Pc (C phase active power)	29 （PcL）	30 （PcH）	15 （Pc）
16	Ps (total active power)	31 （PL）	32 （PH）	16 （P）
17	Qa(A phase reactive power)	33 （QaL）	34 （QaH）	17 （Qa）
18	Qb(B phase reactive power)	35 （QbL）	36 （QbH）	18 （Qb）
19	Qc(C phase reactive power)	37 （QcL）	38 （QcH）	19 （Qc）
20	Qs (total reactive power)	39 （QL）	40 （QH）	20 （Q）
21	Sa (A phase apparent power)	41 （SaL）	42 （SaH）	21 （Sa）
22	Sb (B phase apparent power)	43 （SbL）	44 （SbH）	22 （Sb）
23	Sc (C phase apparent power)	45 （ScL）	46 （ScH）	23 （Sc）
24	Ss (Total apparent power)	47 （SL）	48 （SH）	24 （S）
25	PFa (A phase power factor)	49 （PFaL）	50 （PFaH）	25 （PFa）
26	PFb(B phase power factor)	51 （PFbL）	52 （PFbH）	26 （PFb）
27	PFc(C phase power factor)	53 （PFcL）	54 （PFcH）	27 （PFc）
28	PFs (Total power factor)	55 （PFLL）	56 （PFLH）	28 （PFL）
29	Frequency	57 （FL）	58 （FH）	29 （F）
30	EP (total kwh)	59 （EPL）	60 （EPH）	30 （EP）
31	EQ (total kvarh)	61 （EQL）	62 （EQH）	31 （EQ）
32	netural line current	63 （InL）	64 （InH）	32 （In）
33	unbalance	65 （UNNB）	66 （ULNB）	
34	unbalance	67 （INNB）	68 （PNNB）	

Note: 1. Connection mode

Communication value	0	1
Menu display	3-4	3-3

Note:2. Baud rate

Communication value	0	1
Menu display	4.8	9.6

Note: 4. Alarm/Analog Unit

Communication value	0	1	2
Menu display	1	K	M

Note ③ : Measure Satus Indication (switch output)

D7	D6	D5	D4	D3	D2	D1	D0

D1 → AL1 status 0: No alarm 1: Alarm

D0 → AL2 status 0: No alarm 1: Alarm

Note ⑤: measure status indication(switch input)

D7	D6	D5	D4	D3	D2	D1	D0

D1 → S1 status: 0:close 2: disconnect

D0 → S2 status: 0:close 2: disconnect

D3 → S3 status: 0:close 2: disconnect

D2 → S4 status: 0:close 2: disconnect

Note ⑥: Measure status indication（remote input , communication write 0x4a09）

D7	D6	D5	D4	D3	D2	D1	D0

D1 → remote status: 0: no action 1: action

D0 → remote status: 0: no action 1: action

note ⑧:dataformat

1	0
LH	HL

Note⑦: communication data reading value and corresponding actual value illustration:

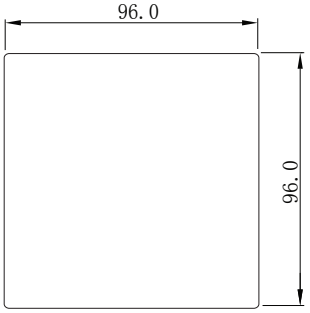
Communication data using hexadecimal format, is divided into long-form shape (32) and a short-form shape (16) . Read data multiplied the corresponding unit is the actual measurement data. Eg. RS485 reading A phase volt is 0X00038E28, voltage unit is 0.001V , then the actual vlaue is 23300 (0x00038e28)X0.001V=233.0V

The program of achieving 16 bit CRC check code:

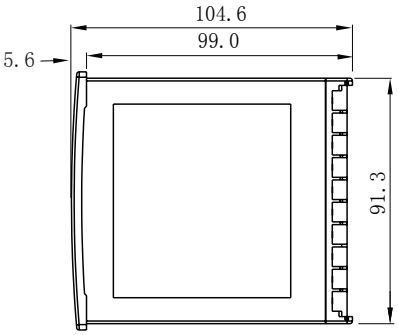
```
unsigned int Get_CRC (uchar*pBuf,uchar num)
{       unsigned i,j;
    unsigned int wCrc=0xFFFF;
    for(i=0;i＜num;i++)
       {
    wCrc^=(unsigned int)(pBuf[i]);
    for(j=0;j＜8;j++)
          {
    if(wCrc &1){wCrc＞＞=1;   wCrc^=0xA001;}
    else wCrc＞＞=1;
          }
       }
       return wCrc;
    }
```

▣ Dimension and Mounting Size

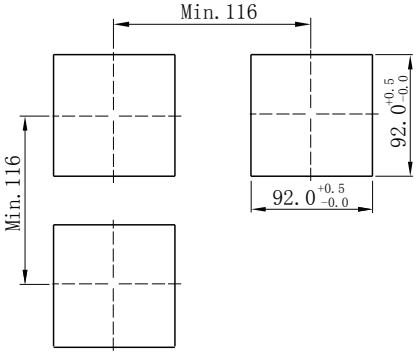
panel size



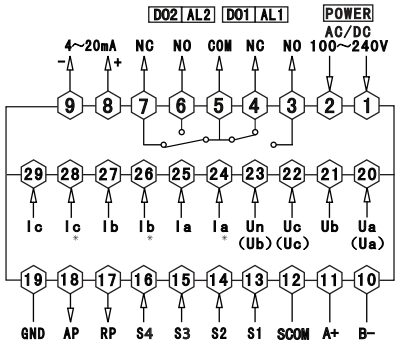
Side size



Hole size

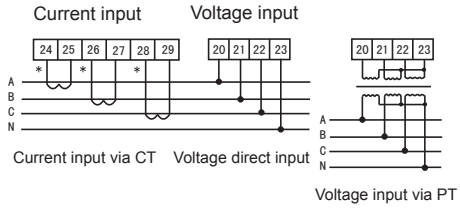


■ Wire Connection

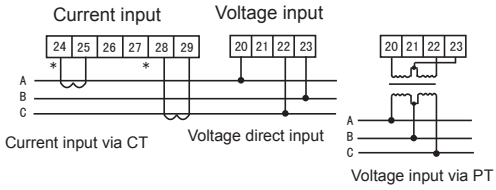


Note: 1. For voltage input connection terminal,bracket terminals (Ua) (Uc) (Ub) shows 3 phase 3 wire connection method,
2. Current input ＊ is current input terminal , all the inputs and outputs must be coherent

Model 1: (3pcs CT) 3 phase 4 wire working mode



Model 2: (2pcs CT): 3 phase 3 wire working mode



Explanation :
A. Voltage input: Input voltage should not be higher than the rated input voltage of meter, otherwise a PT should be used.
B. Current input: Standard rated input current is 5A. A CT should be used when the input current is bigger than 5A. If some other meters are connected with the same CT , the connection should be serial for all meters.
C. Please make sure that the input voltage is corresponding to the input current, they should have the same phase sequence and direction, otherwise data and sign error may occur (power and energy).
D. The connection mode of meter which is connected to power network should depend on the CT quantity. For 2pcs of CT, it should be 3 phase 3 wire connection. For 3pcs of CT, it shoud be 3 phase 4 wire connection.
E. Please pay high attention on the difference between 3 phase 3 wire and 3 phase 4 wire connection , becasue wrong connection may lead to incorrect calculation of power factor, power and energy .

Caution:
1. Power supply connection must be correct.
2. Pay attention on the phase sequence of voltage signal input.
3. Current signal input shoudl be connected as per the connection drawing.
4. Connection mode should accord to the setting of user menu link.
5. Energy pulse output is open collector output.
6. Isolation between power supply and circuit board, in case of leakage switch mis-action.