DW9E Series 3 Phase Power Meter User Manual

Features:

⊙Measurement Parameters: 3 phase Voltage/Current/ Active power/Reactive power/Frequency/Power facto ect , 28 parameters.
⊙4loop DI and 2loop DO,isolated input/output with remote and telecommand functions.
⊙True RMS measurement
⊙Function of programmable analog output,It convert output for voltage/current/active power/reactive power/ Hz/power factor.
⊙RS485 communication port and Modbus RTU communication procotol.
⊙2loop energy pulse output
⊙2loop programmable alarm output
⊙Display the parameters of programmable setting
⊙With power failure protection function for display menu select/KWH/KvarH
⊙Optional tariff statistics function.
⊙Optional harmonic analysis funtion
⊙With zero phase current measure function

The series meter are used for controlled system,SCADA system and energy management system、substation automation,distribution automation, area power monitor industrial automation,intelligent building,intelligent distributor and swich box.It is easy to install and maintain,sample connection and feild programmable settinginput parameters.

⚠ Warming:The accident may happen nad the product may be damaged if the coulometer is not operated according to the user manual.
The energy measuring function of this product can only be used as a reference for energy consumption， and it cannot be used for trade settlement.

Ⅰ Model Illustration

DW9□ -□ □ □□ - C/S/F/H

Extended function：C：4~20mA analog output S：2nd RS485 communication
F：multi-rate function H：harmonic measurement
Input measure range：B:5A×400V D:others
Input：30:3phase 3wire/3phase 3wire input 38：3phase 3wire/3phase 4wire with RS485
Alamr: C:two alarm
Output：R:No analog output D:Analog output(4-20mA) 2D:2loop analog output(4-20mA)
Model：E：energy disaply
Dimension(mm)：9:96W×96H×104.6L
DW series 3 phase power meter

Ⅱ Ordering Information

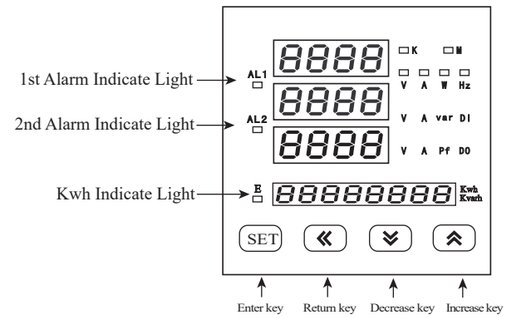
Model	DI	DO	Analog	Communication	Harmonic	Multi-rate
DW9E-DC38B	4	2	1	1	No	No
DW9E-2DC30B	No	2	2	No	No	No
DW9E-DC38B-F	4	2	1	1	No	Yes
DW9E-DC38B-FH	4	2	1	1	Yes	Yes

Ⅲ Specification

Connection	3phase 3wire / 3phase 4wire
Range of volt measure	AC 3x57.7/3x220V
Voltage overload	Continuous:1.2times Instantaneous:2times/10S
Voltage consumption	<1VA (each phase)
Voltage impedance	≥300KΩ
Voltage accuracy	RMS measure,accuracy:0.5 measure range:Phase voltage 0~400V,line voltage 0~600V
Current range	AC 1A or 5A
Current overload	Continuous: 1.2 times Instantaneous: 10 times/10S
Current consumption	<0.4VA (each phase)
Current impedance	<20mΩ
Current accuracy	RMS measure,accuracy:0.5 Measure range:0~5A
Frequency	Accuracy 0.1Hz Measure range:10~500Hz
Power	Active power/Reactive power/Apparent power, accuracy: 0.5
Energy	Active power accuracy 0.5 / Reactive power accuracy 1.

Display	LED
Power supply	AC/DC 100～240V
Power Supply Consumption	≤5VA
Output Digit Interface	RS-485、MODBUS-RTU protocol
Pulse Output	2loop energy pulse output (optical coupler relay)
On/Off Input	4loop DI（Dry contact）
Alarm	2loop DO, 250VAC/3A or 30VDC/5A
Analog output	1loop analog output, 4-20mA DC(The RS485 communication can be changed to 2nd analog output)
Working environment	Temperature:-10～55℃ Humidity: ＜85% RH
Storage environment	-20～75℃
Isolation & puncture	Input signal and power 1600V AC , Input and output 1600VAC,power and output 1600VAC
Insulation	Input/output/power supply to Meter cover >5MΩ
Dimension(mm)	96W×96H×104.6L
Weight	0.6kg

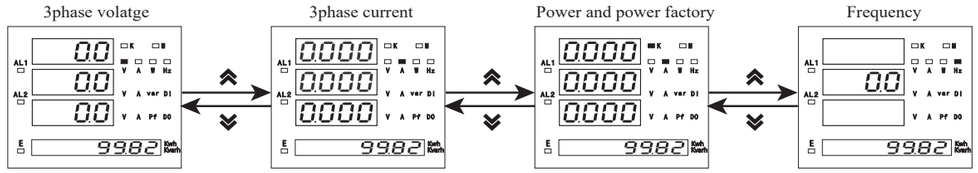
Ⅳ Panel Indication



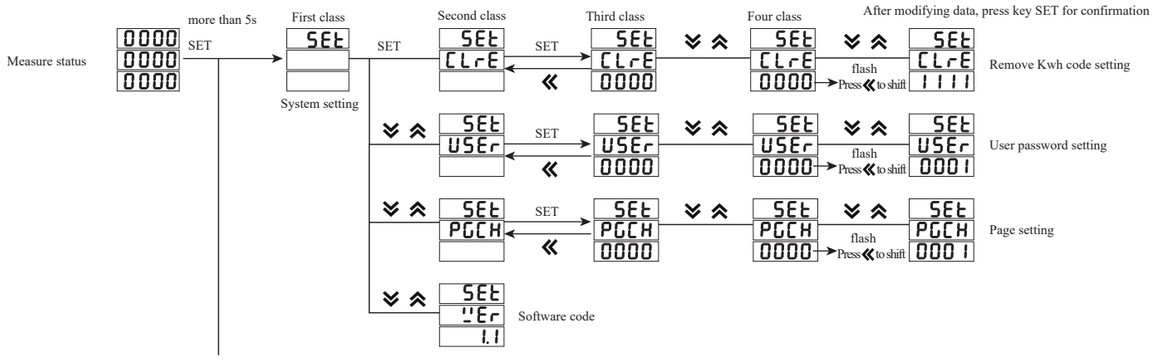
K：Kilo Unit
M：Million Unit
V：Voltage Unit
Hz：Frequency
A：Current Unit
W：Active Power Unit
Var：Reactive Power Unit
Pf：Power Factor

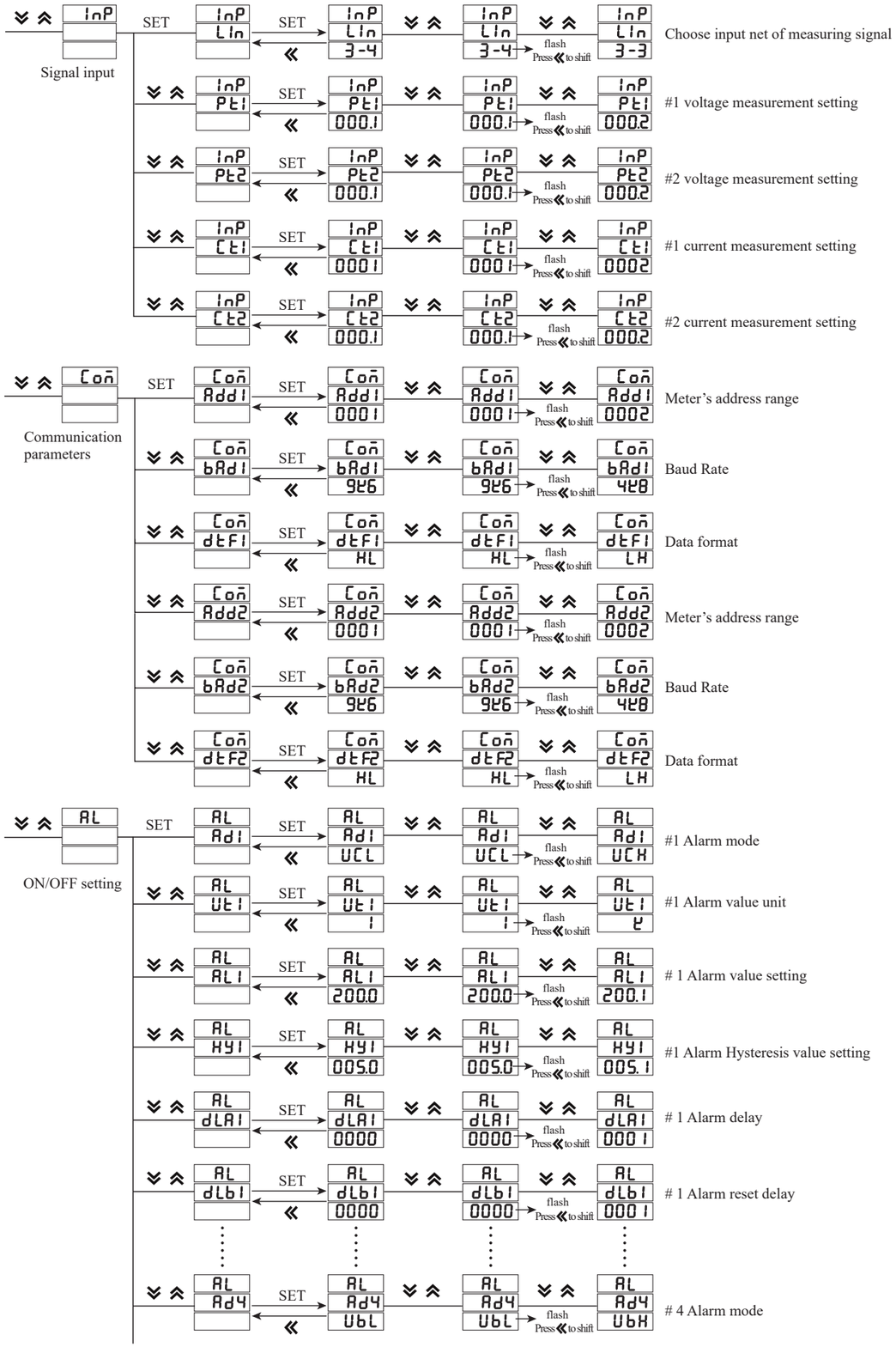
6 different parameter for display:voltage:Ua、Ub、Uc;current:Ia、Ib、Ic;power and power factory:W、Var、Pf;frequency:Hz;KWH:KWh;KVaih:KVarh;
Note:Under the measuring status,press“ ⌄⌄ ” or “ ⌃⌃ ”key can finish display exchange;LED display value should relative to the indicate light and measuring Unit on the right. Press “ ⌃⌃ ”key can finish display exchange of active power and reactive power,“E” means indicate light on and the active power value display;if the ligh off,means reactive power value display.

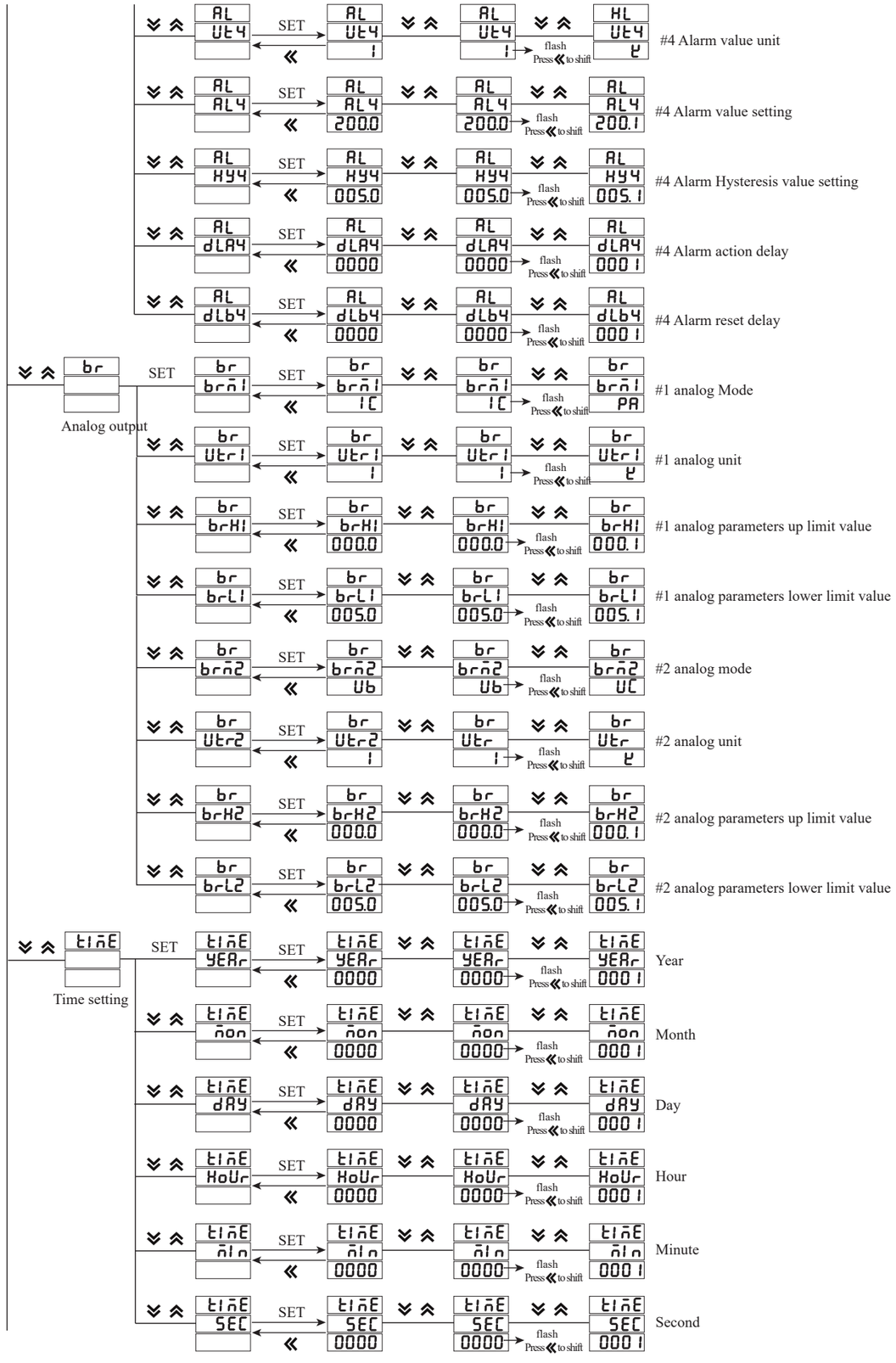
Operration sequence of measure：

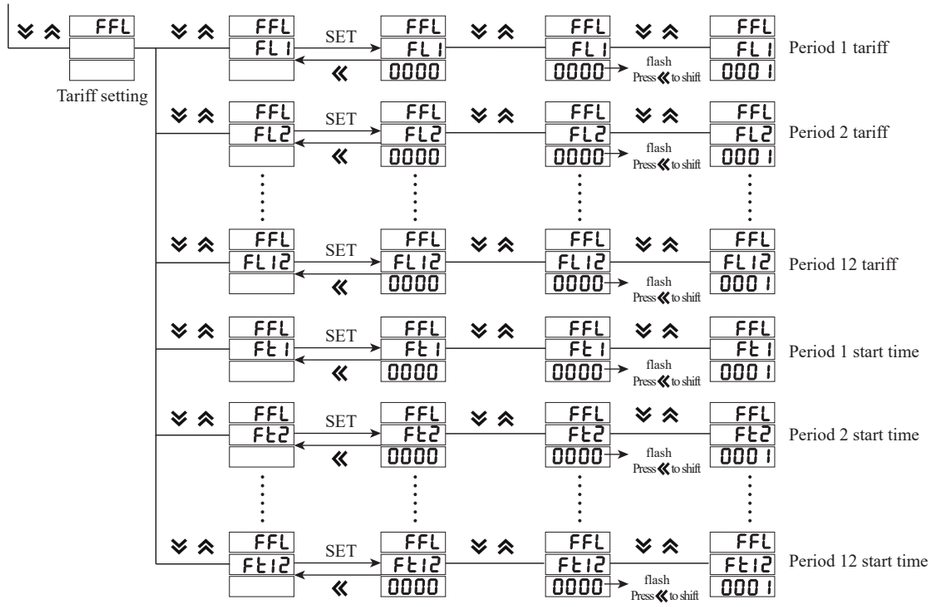


Ⅴ Menu Operation




Signal input
SET
Choose input net of measuring signal
#1 voltage measurement setting
#2 voltage measurement setting
#1 current measurement setting
#2 current measurement setting
Communication parameters
Meter's address range
Baud Rate
Data format
Meter's address range
Baud Rate
Data format
ON/OFF setting
#1 Alarm mode
#1 Alarm value unit
1 Alarm value setting
#1 Alarm Hysteresis value setting
1 Alarm delay
1 Alarm reset delay
4 Alarm mode
flash
Press « to shift


#4 Alarm value unit
#4 Alarm value setting
#4 Alarm Hysteresis value setting
#4 Alarm action delay
#4 Alarm reset delay
Analog output
#1 analog Mode
#1 analog unit
#1 analog parameters up limit value
#1 analog parameters lower limit value
#2 analog mode
#2 analog unit
#2 analog parameters up limit value
#2 analog parameters lower limit value
Time setting
Year
Month
Day
Hour
Minute
Second
SET
flash
Press « to shift



Unit code table

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

VI Menu Operation Illustration

Under user menu status:

1.Press " ⌄⌄ "or" ⌃⌃ "key to exchange 3phase voltage,3phase current,3phase active and reactive power and signal frequency.

2.Press enter key "SET" to exchange the voltage value between phase voltage and wire voltage.Press" « "key to exchange KWh and KVarh. "E" indicate light ON means KWh,"E" indicate light OFF means KVarh.

3.Press enter key"SET"more than 5 seconds to enter user menu (Please refer following menu structure)

Uder setting menu status

1.If current menu is 1st or 2nd level,Press enter key"SET"to enter next level.Press" ⌄⌄ "," ⌃⌃ "to change menu or sub-menu.

2.If current menu is 2nd or 3rd level,press" « "key to return last level.

3.If current menu is 3rd level,press" ⌄⌄ "," ⌃⌃ ",the value start flash,and press" ⌄⌄ "," ⌃⌃ "to change,press" « "to flash and shift. Press enter key"SET"to save the setting.

4.After setting,press enter key"SET"more than 5s to enter measure status,or press" « "to back to menu.

Menu Structure

No.	Level 1	Level 2	Level 3	Indication	Remark
1	SEt System setting	Clear energy CLrE	0000	Input"1111"to clear energy;input"1234"to reset factory default	
		Password USEr	0000	Alter user password	
		Page time PGCH	0000	Page turn time of measure display,unit:"s"	
		Software code VEr	1.1	Software code	
2	InP Signal input	Network Lin	3-3 / 3-4	Select the input network of the measured signal	
		Voltage transform Pt1	1-9999	Primary coil voltage,unit:kV	
		Voltage transform Pt2	10.0-999.9	Secondary coil voltage,unit:V	

No.	Level 1	Level 2	Level 3	Indication	Remark
	Signal input	Current transform Ct1	1-9999	Primary coil current,unit 1A	
		Current transform Ct2	1.0-999.9	Secondary coil current,unit 1A	
3	Con Communication parameters	Add Add1	1-247	Energy meter address range	
		Baud rate bAd1	4t8 / 9t6	Baud rate: 4k8 means 4800, 9k6 means 9600	
		Data sequence dtF1	HL / LH	Data sequence: high digit in front or low digit in front	
		Add Add2	1-247	Energy meter address range	Backup
		Baud rate bAd2	4t8 / 9t6	Baud rate: 4k8 means 4800, 9k6 means 9600	
		Data sequence dtF2	HL / LH	Data sequence: high digit in front or low digit in front	
4	AL ON/OFF setting	Alarm mode Ad1	1-68	When the value is 0 , it is for DO1 function , otherwise it is for alarm mode. Please refer to table 1.	
		Alarm value unit Ut1	1/ t/ n	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	
		delay time dLA1	0-99	Alarm delay time, unit: second	
		Alarm end time dLb1	0-99	Alarm reset time, unit: second	
		⋮	⋮	⋮	
		Alarm mode Ad4	1-68	When the value is 0 , it is for DO2 function , otherwise it is for alarm mode. Please refer to table 1.	
		Alarm value unit Ut4	1/ t/ n	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.	
		Alarm value AL4	0-999.9	4th alarm value setting	Backup
		Alarm hysteresis value HY4	0-999.9	4th alarm hysteresis value setting	
		delay time dLA4	0-99	4th delay time, unit: second	
		Alarm end time dLb4	0-99	4th reset time, unit: second	
5	br Analog output	Analog mode selection brn1	1-32	Refer table 1	
		Analog value unit Utr1	1/ t/ n	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.	
		Analog upper limit brH1	0-999.9	Analog output 20mA	
		Analog low limit brL1	0-999.9	Analog output 4mA	
		Analog mode selection brn2	1-32	Refer table 1	
		Analog value unit Utr2	1/ t/ n	1: means international standard unit, K: means 1000 times of international standard unit, M: means1000000 times of international standard unit.	Back up
		Analog upper limit brH2	0-999.9	Analog output 20mA	
		Analog low limit brL2	0-999.9	Analog output 4mA	
6	tInE Time setting	Year YEAr	0-99	Year	
		Month non	1-12	Month	
		Day dAY	1-31	Day	

No.	Level 1	Level 2	Level 3	Indication	Remark
6	tIME Time setting	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, Off-Peak tariff, Shoulder tariff	
		Period 2 tariff FL2	0-3	Period 2 tariff means Sharp tariff, Peak tariff, Off-Peak tariff, Shoulder tariff	
		⋮	⋮	⋮	
		Period 12 tariff FL12	0-3	Period 12 tariff means Sharp tariff, Peak tariff, Off-Peak tariff, Shoulder 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 two thirty. Please be noticed, from period 1 to period 12, the setting should be raised from small to big.

Ⅶ Output Function

1. Energy pulse

EW9E provides the function of energy calculation, with 2 energy pluse output 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 DI 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,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)

Ⅷ Communication protocol

1. MODBUS serial communication protocol basic rules

EW9E 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 of the RS485 communication should comply with host/slave method. Under this kind of method, information and data is transmitted between one host and maximum 32 slave (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 communication is RS485 circuit happen by being packed. One data package is a simple character string (every character string has 8 bit), maximum 128 byte in one package. The byte construction standard of this package is asynchronous serial data, and it is transmitted in 8 data bits, 1 stop bit, no check bit.

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

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

2. Each MODBUS data package is consisted of five parts as below:

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

(1) Slave address: address length is 1 byte, effective slave address range is 1-247, if slave receives a frame of data package whose address information is the same as its own address, it will execute the order included in the data package.

(2) Function code length in MODBUS data package is one byte, used to inform the slave what kind of operation needs to be executed. The slave response data package 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 current 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 variate: the position where the data area is stocked when slave executes effective order. Different variate seizes differents numbers of register, some address variate seizes two register, 4 byte data, some variate seizes one register, 2 byte data, please use according to actual situation.

(4) Data area: data area includes the data needed by terminal to execute specified function or collected data when terminal respond to inquiry. The content of this 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 be started from and how many data to be read,embedded address and data will be different according to different content between type and slave; register numerical value sending sequence is: high bit byte in the front, low bit byte in the back.

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

1. Procedure to generate a CRC: (Please refer to below program example)

(1). Preset a 16 digit register as 0FFFFH (all 1), call it CRC register.

(2). Use 8 bit of the first byte of data frame and the low byte of CRC register to do xor operation, result will be stored at CRC register.

(3). Shift CRC register one bit to the right, the highest bit should be filled with 0, and the lowest bit will be shifted out and checked.

(4). If the lowest bit is 0, repeat the 3rd step (next shift); if the lowest bit is 1, use CRC register and a preset fixed value(0A001H) to do the xor operation.

(5). Repeat the 3rd and 4th steps until shift for 8 times. This can finish processing a complete 8 digit.

(6). Repeat 2nd to 5th steps to process the next 8 digit until all bytes are processed.

(7). At last, the value of CRC register is the value of CRC. In addition, there is another way to calculate CRC with the use of preset sheet. Its main feature is fast calculate speed, but the sheet requires bigger storage space, this way will not be illustrated here, please refere to relevant information.

2. Network time consideration

Packet transportation on RS485 network needs to follow below rules about time:

(1) When baud rate is set as 9600, the recommended delay between two host request is 300ms, using a smaller delay may cause package lost.

(2) When use smaller baud rate, please enlarge delay time properly. For example, if baud rate is set as 4800, the delay between two request should be set as 500ms or more.

3. Communication abnormal solution:

If host send a illegal data packet or host request a invalid data register, abnormal data answer will be generated. This abnormal data response consists of slaver address, function code, error code and check code. When function code high bit is 1, it means that the 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; if abnormal answer, the highest bit of function will be set as 1. For example: if host request function is 0x04, the function code replied from slaver is 0x84.

Error type code	Name	Illustration
0x01	Function code error	Meter does not support the function code it receives
0x02	Variable position error	The data position assigned by host is out of the range of meter, or the meter receives illegal register operation
0x03	Variable data value error	The data value sent from host is out of the range of meter, or incomplete data structure.

4. Communication frame format illustration

(1). Read multi-register

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

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

Host request

Slaver address	Read 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 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

Slaver normal answer (high bit in the front)

Slaver address	Read function code	Byte number (twice 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 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

Slaver normal answer (low bit in the front)

Slaver address	Read function code	Byte number (twice 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).

Slaver abnormal answer (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 current measured current value is Ia=100 A, Ib=200 A, Ic=300 A, read three respective current value at the same time. Host send read 01 address meter, read the current value data that starts from 400C (A phase current) register. 100.000 hexadecimal code is 000186A0; 200.000 hexadecimal code is 00030D40; 300.000 hexadecimal code is 000493E0. Data is represented by 32 bit unsigned data, with 3 decimal places.
For example, if data value is 12345, the actual value is 12.345.
Host send

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

Meter reply

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 point number of 1st Alarm mode AD1.
If AD1 address code is 0x4900, because AD1 is fixed point number, seizes 1 data register, 11 decimalist code is 0X000B.
Host request (write single register)

Slaver address	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

Slaver normal answer (write single register)

Slaver address	Function oode	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

(3). Write multi-register
For example: Host write fixed point number of 1st alarm mode AD1.
If AD1 address code is 0x4900, because AD1 is fixed point number, seizes 1 data register, 11 decimalist code 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 high bit	Data byte 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

Slaver 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 high bit	Data byte low bit	CRC code low bit	CRC code high bit
0x01	0x10	0x49	0x00	0x00	0x01	0x17	0x95

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

Slaver Abnormal Answer(write multi-register)				
1	2	3	4	5
Meter address	Function Code	Error code	CRC code low bit	CRC code hight bit
0x01	0x90	0x02	0xCD	0xC1

DW9A/E parameter address reflection table Note: Address code index

No.	Address reflection	Variable name	Byte length	Value range	Read/Write	Remark
1	0x4000	Phase voltage A	2	long	R	0.001V Note ⑦
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	Phase current A	2	long	R	0.001A Note ⑦
8	0x400e	Phase current B	2	long	R	
9	0x4010	Phase current C	2	long	R	

No.	Address reflection	Variable name	Byte length	Value range	Read/Write	Remark
10	0x4012	Active power A	2	long	R	0.001KW 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	0.001Kvar 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	0.001KVA 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	Inverse kWh	2	long	R	
31	0x403c	Forward kvarh	2	long	R	
32	0x403e	Inverse kvarh	2	long	R	
33	0x4046	Current active power demand	2	long	R	0.001
34	0x4048	Max active power demand	2	long	R	0.001
35	0x404a	Current reactive power demand	2	long	R	
36	0x404c	Max reactive power demand	2	long	R	
37	0x4052	A phase voltage harmonic content	2	long	R	0.1 Note⑦
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	Zero phase current	2	long	R	0.001
Reserve						
44	0x4100	Total tariff energy	2	long	R	0.001kWh Note⑦
45	0x4102	Total Sharp tariff energy	2	long	R	
46	0x4104	Total Peak tariff energy	2	long	R	
47	0x4106	Total off-peak tariff energy	2	long	R	
48	0x4108	Total shoulder tariff energy	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	Off-peak kWh thismonth	2	long	R	
53	0x4112	Shoulder 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	

No.	Address reflection	Variable name	Byte length	Value range	Read/Write	Remark
57	0x411a	Off-peak kWh last month	2	long	R	
58	0x411c	Shoulder 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 Note⑦
61	0x4122	Peak kWh last II month	2	long	R	
62	0x4124	Off-peak kWh last II month	2	long	R	
63	0x4126	Shoulder kWh last II month	2	long	R	
Reserve						
64	0x4800	Voltage transform PT1	2	long	R/W	0.001 Note⑦
65	0x4802	Voltage transform PT2	2	long	R/W	
66	0x4804	Current transform CT1	2	long	R/W	
67	0x4806	Current transform CT2	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	0x4810	3rd Alarm value	2	long	R/W	
73	0x4812	3rd Alarm hysteresis value	2	long	R/W	
74	0x4814	4th Alarm value	2	long	R/W	
75	0x4816	4th Alarm hysteresis value	2	long	R/W	
76	0x4818	Analog 1 high limit	2	long	R/W	
77	0x481a	Analog 1 low limit	2	long	R/W	
78	0x481c	Analog 2 high limit	2	long	R/W	
79	0x481e	Analog 2 low limit	2	long	R/W	
80	0x4820	Analog 3 high limit	2	long	R/W	
81	0x4822	Analog 3 low limit	2	long	R/W	
Reserve						
82	0x4900	1st Alarm mode(refer table 1)	1	int	R/W	No decimal point
83	0x4901	1st Alarm unit note④	1	int	R/W	
84	0x4902	1st alarm delay	1	int	R/W	
85	0x4903	1st removal of delay	1	int	R/W	
86	0x4904	2nd Alarm mode(refer table 1)	1	int	R/W	
87	0x4905	2nd Alarm unit note④	1	int	R/W	
88	0x4906	2nd alarm delay	1	int	R/W	
89	0x4907	2nd removal of delay	1	int	R/W	
90	0x4908	3rd Alarm mode(refer table 1)	1	int	R/W	
91	0x4909	3rd Alarm unit note④	1	int	R/W	
92	0x490a	3rd alarm delay	1	int	R/W	
93	0x490b	3rd removal of delay	1	int	R/W	
94	0x490c	4th Alarm mode(refer table 1)	1	int	R/W	
95	0x490d	4th Alarm unit note④	1	int	R/W	
96	0x490e	4th alarm delay	1	int	R/W	
97	0x490f	4th removal of delay	1	int	R/W	
Reserve						
98	0x4980	1st analog mode(refer table 1)	1	int	R/W	No decimal point
99	0x4981	1st analog value unit note④	1	int	R/W	
100	0x4982	2nd analog mode(refer table 1)	1	int	R/W	
101	0X4983	2nd analog value unit note④	1	int	R/W	
102	0x4984	3rd analog mode(refer table 1)	1	int	R/W	
103	0x4985	3rd analog value unit note④	1	int	R/W	

No.	Address reflection	Variable name	Byte length	Value range	Read/Write	Remark
Reserve						
104	0x4a00	Connection note①	1	int	R	No decimal point
105	0x4a01	Communication add	1	int	R	
106	0x4a02	Baud rate note②	1	int	R	
107	0x4a03	Data format note⑧	1	int	R	No decimal point
108	0x4a07	DO note③	1	int	R	
109	0x4a08	DI note⑤	1	int	R	
110	0x4a09	Remote control input note⑥	1	int	R/W	
Reserve						
111	0x4a80	Tariff Rate 1	1	int	R/W	No decimal point
112	0x4a81	Tariff Rate 2	1	int	R/W	
113	0x4a82	Tariff Rate 3	1	int	R/W	
114	0x4a83	Tariff Rate 4	1	int	R/W	
115	0x4a84	Tariff Rate 5	1	int	R/W	
116	0x4a85	Tariff Rate 6	1	int	R/W	
117	0x4a86	Tariff Rate 7	1	int	R/W	
118	0x4a87	Tariff Rate 8	1	int	R/W	
119	0x4a88	Tariff Rate 9	1	int	R/W	
120	0x4a89	Tariff Rate 10	1	int	R/W	
121	0x4a8a	Tariff Rate 11	1	int	R/W	
122	0x4a8b	Tariff Rate 12	1	int	R/W	
123	0x4a8c	Period 1times	1	int	R/W	
124	0x4a8d	Period 2times	1	int	R/W	
125	0x4a8e	Period 3times	1	int	R/W	
126	0x4a8f	Period 4times	1	int	R/W	
127	0x4a90	Period 5times	1	int	R/W	
128	0x4a91	Period 6times	1	int	R/W	
129	0x4a97	Period 7times	1	int	R/W	
Reserve						
130	0x4c00	Time of current demand:Year	1	int	R	No decimal point
131	0x4c01	Time of current demand:Month	1	int	R	
132	0x4c02	Time of current demand:Day	1	int	R	
133	0x4c03	Time of current demand:Hour	1	int	R	
134	0x4c04	Time of current demand:Minute	1	int	R	
135	0x4c05	Time of current demand:Second	1	int	R	
136	0x4c06	Time of max active power demand:Year	1	int	R	
137	0x4c07	Time of max active power demand:Month	1	int	R	
138	0x4c08	Time of max active power demand:Day	1	int	R	
139	0x4c09	Time of max active power demand:Hour	1	int	R	
140	0x4c0A	Time of max active power demand:Minute	1	int	R	
141	0x4c0B	Time of max active power demand:Second	1	int	R	
142	0x4c0C	Time of max reactive power demand:Year	1	int	R	
143	0x4c0D	Time of max active power demand:Month	1	int	R	
144	0x4c0E	Time of max active power demand:Day	1	int	R	
145	0x4c0F	Time of max active power demand:Hour	1	int	R	
146	0x4c10	Time of max active power demand:Minute	1	int	R	
147	0x4c11	Time of max active power demand:Second	1	int	R	

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

No.	Parameter	DO code(low alarm)	DO code(high alarm)	Analog 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/C)	7 (UL)	8 (UH)	4 (U)
5	Uab(AB line phase)	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/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(Phase current of A/B/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	P(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 active power)	35 (QbL)	36 (QbH)	18 (Qb)
19	Qc(C phase active power)	37 (QcL)	38 (QcH)	19 (Qc)
20	Q(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	S(Total apparent power)	47 (SL)	48 (SH)	24 (S)
25	PFa(A phase power factory)	49 (PFaL)	50 (PFaH)	25 (PFa)
26	PFb(B phase power factory)	51 (PFbL)	52 (PFbH)	26 (PFb)
27	PFc(C phase power factory)	53 (PFcL)	54 (PFcH)	27 (PFc)
28	PF(Total power factory)	55 (PFLL)	56 (PFLH)	28 (PFL)
29	F Frequency	57 (FL)	58 (FH)	29 (F)
30	EP (Total active energy)	59 (EPL)	60 (EPH)	30 (EP)
31	EQ (Total reactive energy)	61 (EQL)	62 (EQH)	31 (EQ)
32	Zero line current	63 (InL)	64 (InH)	32 (In)
33	Unbalance	65 (UNNB)	66 (ULNB)	
34	Unbalance	67 (INNB)	68 (PNNB)	

Note①:connection

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

Note②:Baud rate

Communication value	0	1
Menu display	4.8	9.6

Note④:alarm/analog unit

Communication value	0	1	2
Menu display	1	K	M

Note③:indication under the measure status(DO)

D7	D6	D5	D4	D3	D2	D1	D0

D0 → AL1 status 0:No alarm 1:alarm

D1 → AL2 status 0:No alarm 1:alarm

Note⑤:phase power factory(DI,communication add is 0x4a08)

D7	D6	D5	D4	D3	D2	D1	D0

D0 → S1 status 0:OFF 1:ON

D1 → S2 status 0:OFF 1:ON

D2 → S3 status 0:OFF 1:ON

D3 → S4 status 0:OFF 1:ON

Note⑥:Indication under measure status(remote control,communication write 0x4a09)

D7	D6	D5	D4	D3	D2	D1	D0

D0 → Remote control： 0:No action 1:action

D1 → Remote control： 0:No action 1:action

Note⑦:The indication of actual value after communication read:

Communication data adopt hexadecimal format,including 32 bit and 16 bit.
The actual measure data is reading data multiplied by corresponsive unit.
For example,RS485 read the data of A phase voltage 0X00038E28,and voltage unit is 0.001V,
then the actual value is 233000（0X00038E28）x0.001V=233.0V。

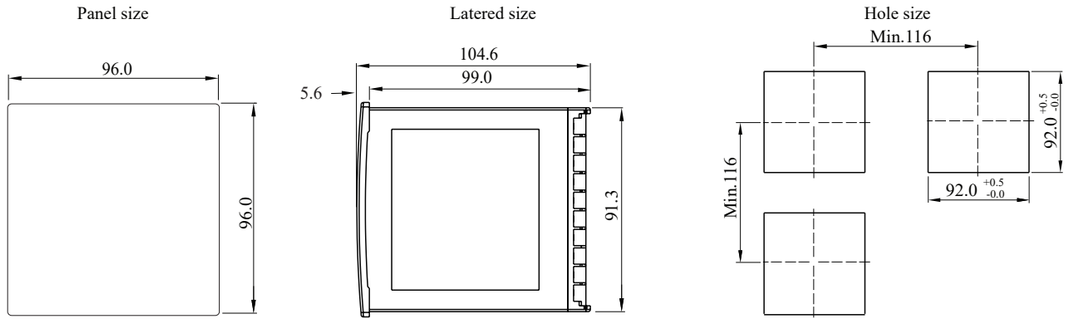
The program of achieving 16 bit CRC check code

```
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;
}
```

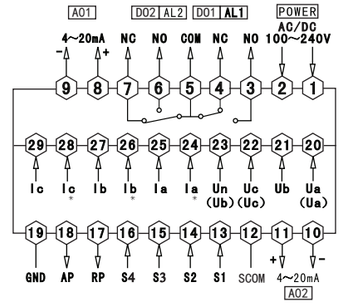
Note⑧:Data format：

1	0
LH	HL

Dimention

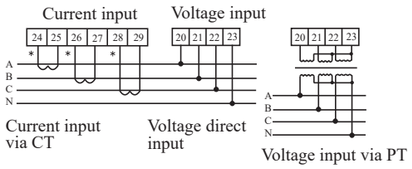


Connection

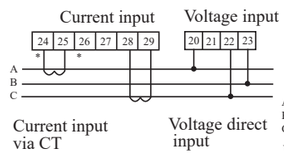


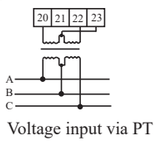
Note: Voltage input connection terminal,bracket terminals shows 3 phase 3 wire connection method,
if there is any change, please turn to the correct diagram on the meter.

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.