D311A Series

3 Phase Intelligent Power Meter User 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 DI and two DO,isolated input and output
⊙TRMS measure
⊙With RS485 connection and Modbus RTU communication protocol.
⊙It has the function of recording positive and negative active electrical
energy, which can respectively record the consumed and emitted electrical energy

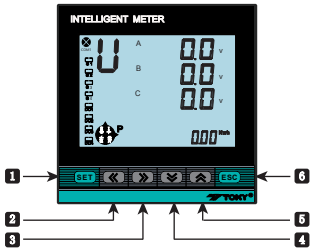
⚠Warning:

1、Any operation not following the manual will cause accident and damage to the product.
2、Statement: Information provided in this manual can be modified without prior notice
3、The company reserves the right of interpretation of the information.
4、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.

KKD311A9-A01E-A/1-20250606

Working environment	Temperature: -10～50℃; Humidity＜85% RH; No corrosive gas; Altitude≤2500m
Storage environment	-40～70℃
Isolation withstand voltage	Power and RS485connection, DI connection , Pulse output connection ≥ DC 2000V
Insulation	Input / output / power supply to meter shell＞5MΩ
Dimension	96W×96H×61.5L（mm）
Weight	0.5kg

IV. Panel Indication



No.	Symbol	Key	Function
1	SET	Enter key	Press this key more than 3 seconds to enter the menu and confirm the set value
2	«	Left key	In menu operation, it can shift menu and change to display left page
3	»	Right key	In menu operation, it can shift menu and change to display right page
4	⌄⌄	Decrease key	In menu operation, it is used to enter data setting and decrease value
5	⌃⌃	Increase key	In menu operation, it is used to enter data setting and 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, 3 phase active power, 3 phase reactive power, 3 phase power factor, total power, frequency, etc.
2. Press key ⌃⌃ / ⌄⌄ to shift display of total active energy (algebraic sum), forward active energy, reverse active energy, total reactive energy (algebraic sum), forward reactive energy, and backward reactive 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 ON/OFF remote control input status.
5. COM flash means communicating.
6. P (kWh) represents the total active energy (the algebraic sum of forward active energy and backward active energy); Q (kvarh) represents the total reactive energy (the algebraic sum of forward reactive energy and backward reactive energy).

I. Model Illustration

D311A-9□-3WR2S28B

- Input signal range：B:10～480V(L-L),0.025～5A
- Communication：Blank: no communication 8:RS485 communication
- Event input: Blank: No input S2: Two input
- Alarm/DO Output：Blank: no alarm R2 : two alarm
- Measurement function: W: three-phase full parameter measurement
  V: Three phase voltage measurement
  A: Three phase current measurement
- Input/Phase：3：Three phase three wire/Three phase four wire
- Power supply：Blank：AC/DC 100～240V
- Dimension：9：96H×96W×91L（mm）
- Model：D311A series 3 phase power meter

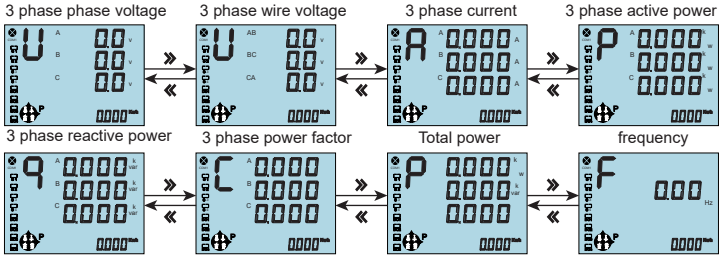
II.Ordering Information

Model	Alarm/DO	Communication	Switching input /DI	Input
D311A-9-3AS28B	NO	RS485	2	0.025～5A
D311A-9-3VS28B	NO	RS485	2	10～480V(L-L)
D311A-9-3AR2S28B	2	RS485	2	0.025～5A
D311A-9-3VR2S28B	2	RS485	2	10～480V(L-L)
D311A-9-3WR2S28B	2	RS485	2	10～480V(L-L) 0.025～5A

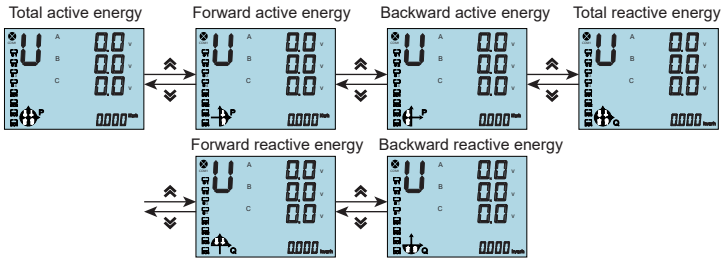
III.Specification

Connection	3 phase 3wire, 3phase 4wire
Range of Volt meaure	AC 10～480V(L-L)
Voltage overload	Continuous: 1.2times Instantaneous: 2times/10S
Voltage consumption	<1VA (each phase)
Voltage impedance	≥300KΩ
Voltage accuracy	RMS measure, Accuracy: 0.5S
Current range	AC 0.025～5A
Current overload	Continuous: 1.2times Instantaneous: 10times/2S
Current consumption	<0.4VA (each phase)
Current impedance	<20mΩ
Current accuracy	RMS measure, Accuracy: 0.5S
Frequency range	45～60Hz、 Accuracy: 0.01Hz
Power	Active power/ reactive power/ apparent power, accuracy: 0.5S
Energy	Active energy accuracy: 1S, reactive energy accuracy: 2S
Display	LCD display (Optional blue backlight or white backlight)
Power supply	AC/DC 100～240V (85～265V)
Power consumption	≤5VA
Output digit interface	RS-485 with MODBUS-RTU protocol
DI	2 loop DI (dry contact)
Alarm output	2loop DO, 250VAC/3A or 0VDC/5A, support remote control function

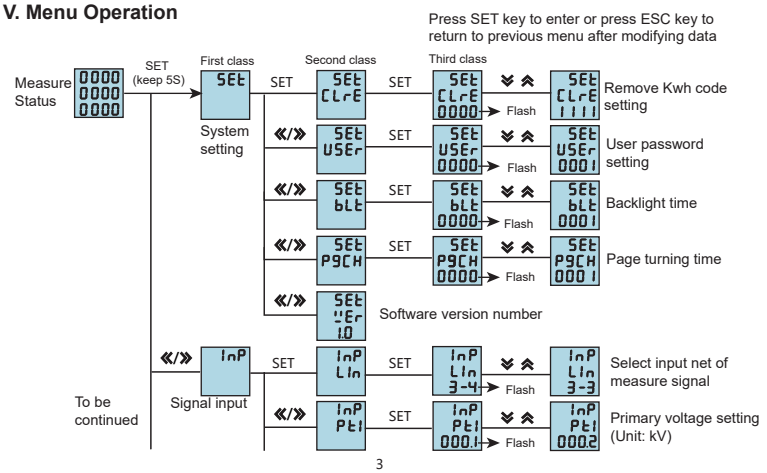
Switching Operation of Measure Interface:

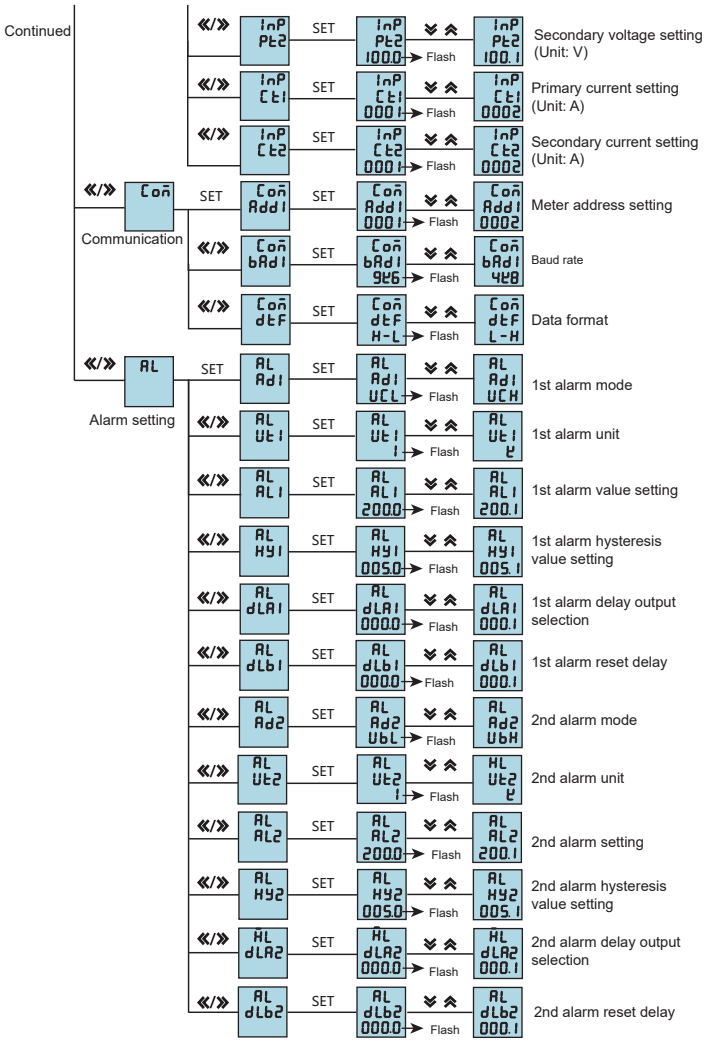


Switching Operation of Energy Interface:



V. Menu Operation





Press “SET”to save the setting.;If press “ESC” key,it doesn`t save the setting and return to class 2 menu.

5. After modifiation,press “SET”more than 5second or press “ESC”directly to back to user menu

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 “1234” to reset factory default.
		User password	USEr	0000	User password modifiation, factory default “0000”, no password
		Backlight time	bLt	0000	Time of backlight delay to put out (unit:sec). It keeps light if the value is 0.
		Page turning time	PGCH	0000	Time of measure page turning (unit: sec). It keeps the same page if the value is 0.
		Software version	VEr	1.1	Software version, can’t be modified
2	InP Signal input	Network	Lin	3-3 / 3-4	Select the input net of measure signal, 3 phase 3 wires or 3 phase 4 wires
		Voltage ratio	Pt1	0.1-500.0	Primary voltage,unit: KV, for example 10KV/100V is set to 10.0, and low voltage 220/380V does not need to be set.
		Voltage ratio	Pt2	0.1-999.9	Secondary voltage, unit: V,for example 10KV/100V is set to 100.0, and low voltage 220/380V does not need to be set
		Current ratio	Ct1	1-9999	Primary current, unit: A,for example 200/5A is set to 200
		Current ratio	Ct2	0.1-999.9	Secondary current, unit: A For example, if 200/5A, it is set to 5.0; If 200/1A, it is set to 1.0,
3	Con Commu-nication setting	Address	Add1	1-247	Meter address range
		Baud rate	brd1	1t2/2t4/4t8 9t6/19t2	Baud rate: 1k2=1200,2k4=2400, 4k8=4800, 9k6=9600,19k2=19200
		Data sequence	dtF1	H-L / L-H	Data sequence: high digit in front or low digit in front
4	AL ON/OFF setting	Alarm mode	Ad1	1-62	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: international standard unit; K:1000 times of international standard unit; M: 1000000 times of international standard unit.
		Alarm value	AL1	0-999.9	1st alarm value setting（Unit is the standard display unit）
		Alarm hysteresis value	HY1	0-999.9	1st alarm hysteresis value setting （Unit is the standard display unit）
		Alarm delay time	dLA1	0-9.9	Alarm delay time, unit: second
		Alarm end time	dLb1	0-9.9	Alarm reset time, unit: second
		Alarm mode	Ad2	1-62	When the value is 0 , it is remote control mode, otherwise it is for alarm mode. Please refer to table 1.
		Alarm value unit	Ut2	1/t/n	1: international standard unit, K:1000 times of international standard unit, M: 1000000 times of international standard unit.
		Alarm value	AL2	0-999.9	2nd alarm value setting （Unit is the standard display unit）
		Alarm hysteresis value	HY2	0-999.9	2nd alarm hysteresis value setting （Unit is the standard display unit）
		Alarm delay time	dLA2	0-9.9	Action delay time (unit: second)
		Alarm end time	dLb2	0-9.9	Action reset time (unit: second)

VI. Menu Operation Illustration

Under the user menu status:

1. Press “SET ”more than 5 seconds. There is a pop-up input frame of password if request here, and then enter the menu to set the parameters.
2. If it is class 1 display, press “SET” to enter next menu,and press “ ” “ ”to change the menu items.
3. If it is class 2 or class 3 display,press “ESC”to return last menu.
4. If it is class 3 display, press “ ” “ ”and digit flash,and press “ ” “ ” to shift the digit and Press “ ” “ ” to set the value.

VII.Output Function

1. 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.
2. Communication function (please refer to the communication protocol)
3. Alarm function. After power on, and runs stably for more than 5 seconds, the alarm starts to operate. (please refer to table 1)

VIII. Communication Protocol

1. MODBUS serial communication protocol basic rules:

1.1 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.

Data format:

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.

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

(1) Slave address; (2) The function code to be executed; (3) Register address (variable 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 frame of data package whose address information is the sameas 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	Definition	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.

2. Network time consideration

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

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

2.2 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
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

4.1 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

Slave 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)

Slave 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)

Slave 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	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. The hexadecimal number corresponding to 100.000 is 000186A0; the hexadecimal number corresponding to 200.000 is 00030D40; the hexadecimal number corresponding to 300.000 is 000493E0; the data is represented by 32-bit unsigned data with 3 decimal points. For example, if the 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

4.2 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)

Slave address	Function code	Register address variable		Register number		Byte number (twice of register number)	Register data		CRC check code	
1	2	3	4	5	6	7	8	9	10	11
Meter address	Function code	Start address high bit	Start address low bit	High bit	Low bit	Data byte length	Data 1 high bit	Data 1 low bit	Data 2 high bit	Data 2 low bit
0x01	0x06	0x49	0x00	0x00	0x01	0x02	0x00	0x0B	0xBE	0x75

Slaver normal answer (write single register)

Slave address	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

4.3 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

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 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

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	0.1V Note⑥
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 Note⑥
8	0x400e	Phase current B	2	long	R	
9	0x4010	Phase current C	2	long	R	
10	0x4012	Active power A	2	long	R	0.001KW Note⑥
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
15	0x401c	Reactive power B	2	long	R	
16	0x401e	Reactive power C	2	long	R	

No.	Address reflection	Variable name	Byte length	Value range	Read/Write	Remark
17	0x4020	Total reactive power	2	long	R	0.001KVA Note⑥
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 Note⑥
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	0.01Hz Note⑥
27	0x4034	Total kWh	2	long	R	0.001kWh
28	0x4036	Total kvarh	2	long	R	
29	0x4038	Forward kWh	2	long	R	
30	0x403a	Inverse kWh	2	long	R	0.001kvarh Note⑥
31	0x403c	Forward kvarh	2	long	R	
32	0x403e	Inverse kvarh	2	long	R	
33	0x4800	Voltage ratio PT1	2	long	R/W	0.001 Note⑥
34	0x4802	Voltage ratio PT2	2	long	R/W	
35	0x4804	Current ratio CT1	2	long	R/W	
36	0x4806	Current ratio CT2	2	long	R/W	
37	0x4808	1st Alarm value	2	long	R/W	
38	0x480a	1st Alarm hysteresis value	2	long	R/W	
39	0x480c	2nd Alarm value	2	long	R/W	
40	0x480e	2nd Alarm hysteresis value	2	long	R/W	
Reserve						
41	0x4900	1st Alarm mode(refer table 1)	1	int	R/W	No decimal point
42	0x4901	1st Alarm unit Note③	1	int	R/W	
43	0x4902	1st alarm delay	1	int	R/W	0.1
44	0x4903	1st removal of delay	1	int	R/W	0.1
45	0x4904	2nd Alarm mode(refer table 1)	1	int	R/W	No decimal point
46	0x4905	2nd Alarm unit Note③	1	int	R/W	
47	0x4906	2nd alarm delay	1	int	R/W	0.1
48	0x4907	2nd removal of delay	1	int	R/W	0.1
Reserve						
49	0x4a00	Connection Note①	1	int	R	No decimal point
50	0x4a01	Communication address	1	int	R	
51	0x4a02	Baud rate Note②	1	int	R	
52	0x4a03	Data format	1	int	R	
53	0x4a07	DO Note④	1	int	R	
54	0x4a08	DI Note⑤	1	int	R	
55	0x4a09	Remote control input	1	int	R/W	
56	0x4a0a	Backlight time	1	int	R/W	

Reference table 1: Reference table for alarm output

No.	Parameter		DO code(low alarm)	DO code(high alarm)
1	Ua(A phase voltage)		1 (UAL)	2 (UAH)
2	Ub(B phase volatge)		3 (UbL)	4 (UbH)
3	Uc(C phase voltage)		5 (UCL)	6 (UCH)
4	U(Phase voltage of A,B,C)		7 (UL)	8 (UH)
5	Uab(AB line voltage)		9 (UAbL)	10 (UAbH)
6	Ubc(BC line voltage)		11 (UbCL)	12 (UbCH)
7	Uca(CA line voltage)		13 (UCAL)	14 (UCAH)
8	UL(Line voltage of AB,BC,CA)		15 (ULL)	16 (ULH)
9	Ia(A line current)		17 (IAL)	18 (IAH)
10	Ib(B line current)		19 (IbL)	20 (IbH)
11	Ic(C line current)		21 (ICL)	22 (ICH)
12	I(phase current of A,B,C)		23 (IL)	24 (IH)
13	Pa(A phase active power)		25 (PAL)	26 (PAH)
14	Pb(B phase active power)		27 (PbL)	28 (PbH)
15	Pc(C phase active power)		29 (PCL)	30 (PCH)
16	P(Total active power)		31 (PL)	32 (PH)
17	Qa(A phase reactive power)		33 (qAL)	34 (qAH)
18	Qb(B phase reactive power)		35 (qbL)	36 (qbH)
19	Qc(C phase reactive power)		37 (qCL)	38 (qCH)
20	Q(Total reactive power)		39 (qL)	40 (qH)
21	Sa(A phase apparent power)		41 (SAL)	42 (SAH)
22	Sb(B phase apparent power)		43 (SbL)	44 (SbH)
23	Sc(C phase apparent power)		45 (SCL)	46 (SCH)
24	S(Total apparent power)		47 (SL)	48 (SH)
25	PFa(A phase power factor)	※ The power factor alarm value is 1000 times the actual value. If the power factor is 500, an alarm will be triggered when the actual power factor is 0.5 .	49 (PFAL)	50 (PFAH)
26	PFb(B phase power factor)		51 (PFbL)	52 (PFbH)
27	PFc(C phase power factor)		53 (PFCL)	54 (PFCH)
28	PF(Total power factor)		55 (PFL)	56 (PFH)
29	F (Frequency)		57 (FL)	58 (FH)
30	EP (Total Kwh)		59 (EPL)	60 (EPH)
31	EQ (Total Kvarh)		61 (EqL)	62 (EqH)
32	Unbalance		63 (UnnB)	64 (ULnB)
33	Unbalance		65 (InnB)	66 (PnnB)

Note①:Connection

Communication	0	1
Menu display	3-4	3-3

Note②:Baud rate

Communication	0	1	2	3
Menu display	1K2	2K4	4K8	9K6

Note③:Alarm / analog value unit

Communication	0	1	2
Menu display	1	K	M

Note ④: Alarm status indication

D7	D6	D5	D4	D3	D2	D1	D0

AL1 0: No alarm 1: Alarm

AL2 0: No alarm 1: Alarm

Note⑤:Indication of measure (DI)

D7	D6	D5	D4	D3	D2	D1	D0

S1 0:ON 1:OFF

S2 0:ON 1:OFF

S3 0:ON 1:OFF

S4 0:ON 1:OFF

Note⑥:The indication of actual value after communication read:

The actual measure data is reading data multiplied by corresponsive unit.
For example,RS485 read the data of A phase voltage 0X00000898,and voltage unit is 0.1V, corresponding decimal is 2200, then the actual value is 2200x0.1V=220.0V

The process of generating a CRC is as follows: (You can refer to the following program examples)
1. Preset a 16 bit register to 0FFFFH (all 1), which is called a CRC register.
2. XOR the 8 bits of the first byte in the data frame with the low byte in the CRC register, and store the
result back in the CRC register.
3. Move the CRC register one bit to the right, fill the highest bit with 0, and move the lowest bit out and detect.
4. If the lowest bit is 0, repeat the third step (next shift); If the lowest bit is 1, XOR the CRC register with
a preset fixed value (0A001H).
5. Repeat steps three and four until 8 shifts. This completes a complete eight digit process.
6. Repeat steps 2 to 5 to process the next eight bits until all byte processing is complete.
7. The final CRC register value is the CRC value. In addition, there is another method of calculating CRC using preset tables, which is mainly characterized by fast calculation speed,
However, the table requires a large storage space, and this method will not be repeated here.
Please refer to relevant materials.

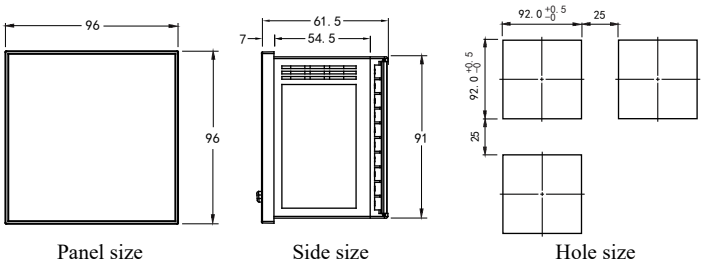
The program of achieving 16 bit CRC check code

```
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;
    }
```


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 CT, it should be 3 phase 3 wire connection. For 3pcs 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.

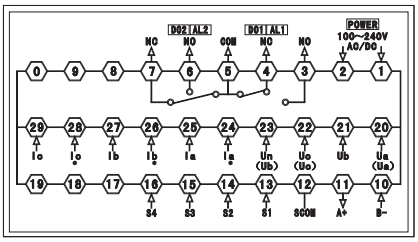
Caution:
1. Power supply connection must be correct.
2. Pay attention on the phase sequence of voltage signal input.
3. Current signal input shoudl be connected as per the connection drawing.
4. Connection mode should accord to the setting of user menu link.
5. Isolation between power supply and circuit board, in case of leakage switch mis-action.
6. The electric energy measure adopts a secondary measuring method. When calculating the electric energy, please multiply it by the corresponding PT and CT values.

IX. Dimension



Panel size Side size Hole size

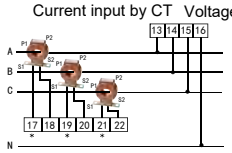
X. Connection

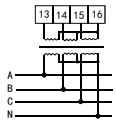


Note: Voltage input connection terminal,bracket terminals shows 3 phase 3 wire connection method. If there is any change, please turn to the correct diagram on the meter.

Mode 1(3 CT):Connection of 3 phase 4 wire

Current input by CT Voltage input

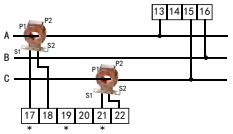


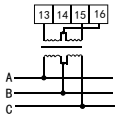


Voltage input by PT

Mode 2(2 CT):Connection of 3 phase 3 wire, only for energy measure

Current input by CT Voltage input





Voltage input by PT