DS9L Series 3 Phase Inteligent Coulometer User Manual

This series meters are widely applied to control system, SCADA system and energy management system, transformer substation automation, distributing net automation, small district electrical power monitor, industrial automation, intelligent construction, intelligent switchboard, switch cabinet, etc. It is easy to install and maintain, simple connection, field programmable setting input parameters.

Features:
⊙Measuring Items: 3 phase power network Voltage/Current/Active Power/Reactive Power/Frequency/Power Factor etc, totally 28 parameters
⊙Two ON/OFF input and two ON/OFF output (optional four ON/OFF input)
⊙True effective value measurement
⊙With RS485 interface，Modbus RTU communication protocol
⊙One active energy pulse output
⊙With Power fail memory function for Kwh / KvarH

⚠ Warning Declaration: An accident may happen and product may be damaged if the operation does not comply with the instruction.
The information provided in this manual can be revised without prior notice.
We reserve the interpretation right to the provided information.
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.

■ Model

DS9L－□□□

- Input signal: 38: 3 phase with communication 30: 3 phase without communication
- Alarm output: C: 2 alarms A: no alarm
- Analog output: R: No D: one analog output 4-20mA
- Display: L: segment LCD display T: TFT colour LCD display
- Dimension: 9: 96H x 96W x 61.5L (mm)
- DS series 3 phase coulometer

■ Model Indication

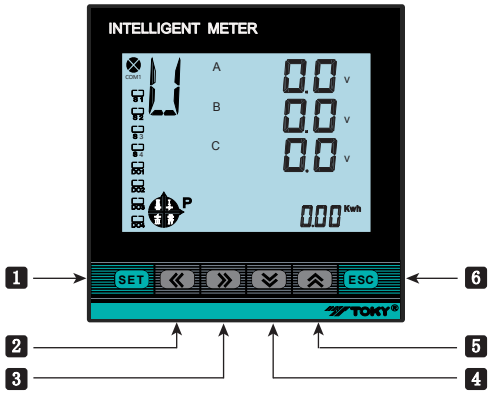
Model	Alarm or remote control	Communication	ON/OFF input or telecommand
DS9L-RC38	2	RS485	2 (optional 4 input)

■ Main Technical Parameters

Connection	3 Phase 3 Wires, 3 Phase 4 Wires
Rated voltage	AC 3×220V/380V (3×57.7V/100V)
Voltage measuring range	AC 10~480V（L-L）
Voltage overload	Continuous: 1.2 times Instantaneous: 2 times/10S
Voltage consumption	<1VA (each phase)
Voltage impedance	≥300KΩ
Voltage accuracy	RMS measurement, accuracy class 1.0
Rated current	AC 3×5（6）A
Current measuring 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 class 1.0
Freqency	45~60Hz, accuracy 0.01Hz
Power	Active / Reactive / Apparent power, accuracy 1.0 class
Energy	Active Energy 1 class, Reactive Energy 2 class
Display	LCD display (optional blue backlight, default white backlight)
Power supply working range	AC/DC 100~240V (85~265V)
Power supply consumption	≤5VA
Output digital interface	RS-485, MODBUS-RTU Protocol
Pulse output	1 energy pulse output（The light coupling output of open-collector） Pulse constant 3200imp/kWh
ON/OFF input	2 ON/OFF input (Connection without voltage or current signal)
Alarm output	2 ON/OFF output, 250VAC/3A or 30VDC/5A (optional, please ask our sales)
Working environment	Temperature: -10~50℃ Humidity:<85% RH; Non-corrosive Gas; altitude ≤2500m
Storage environment	-40~70℃
Withstand voltage	Power supply and 485 interface, DI interface, pulse output interface≥DC 2000V
Isolation	Input/ Output/ Power supply to meter cover>5MΩ
Dimension	96W×96H×61.5L(mm)
Weight	0.6kg

■ Panel Indication



Item	Symbol	Name	Function	
1	SET	Set Key	△Press this key for 5s enter the menu	△To confirm the modified menu value
2	«	Left Key	△Change menu and shift data in menu operation	△To shift measure page outside of the menu
3	»	Right Key	△Change menu and shift data in menu operation	△To shift measure page outside of the menu
4	⌄⌄	Decrease Key	△Enter data modification in menu operation	△To shift energy page outside of the menu
5	⌃⌃	Increase Key	△Enter data modification in menu operation	△To shift energy page outside of the menu
6	ESC	Return Key	△For rollback in menu operation	△Back to previous menu

Indication of checking the measure value and meter working status:

1. Under Measuring Status, Press " « / » " key to switch display 3 phase phase voltage, 3 phase line voltage, 3 phase current, 3 phase active power, 3 phase reactive power, 3 phase power factor, total power, frequency, etc.
2. Press " ⌃⌃ / ⌄⌄ " key to switch display total Kwh (algebraic sum), forward Kwh, backward Kwh, total Kvarh (algebraic sum), forward Kvarh, backward Kvarh.
3. DO1, DO2
   a. Under Alarm Mode: as alarm output status indicate;
   b. Under ON/OFF remote control model: as ON/OFF output status indicate;
4. S1, S2, S3, S4 as ON/OFF remote control input status indicate; default 2 ON/OFF input.
5. COM flash means communicating.
6. P(Kwh) means measuring Total Active Energy (algebraic sum of forward active energy and backward active energy); Q(Kvarh) means Total Reactive Energy (algebraic sum of forward reactive energy and backward reactive energy).

Illustration for measure interface switch procedure:

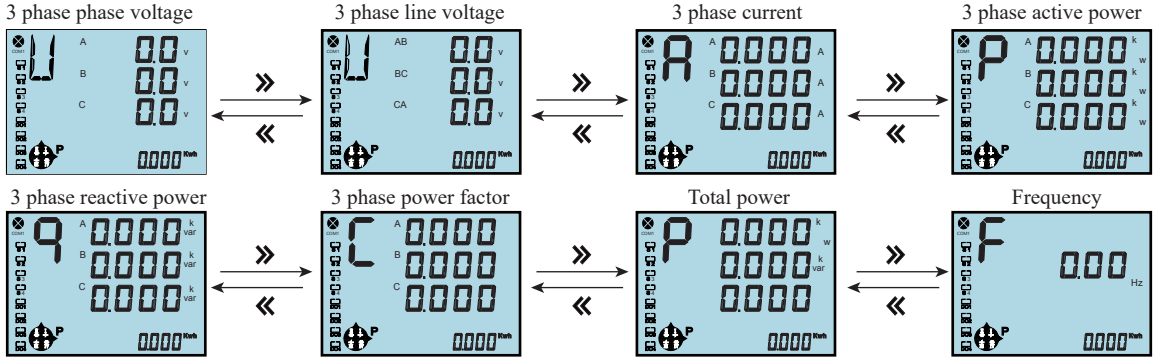
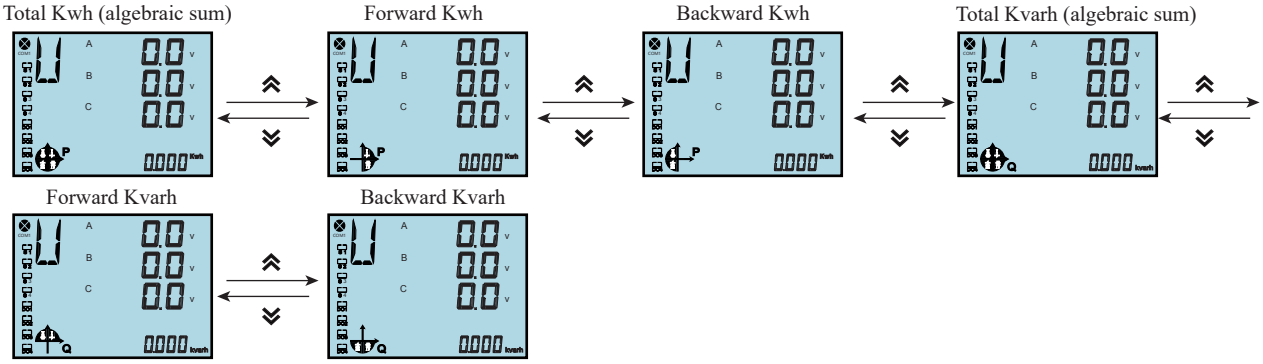
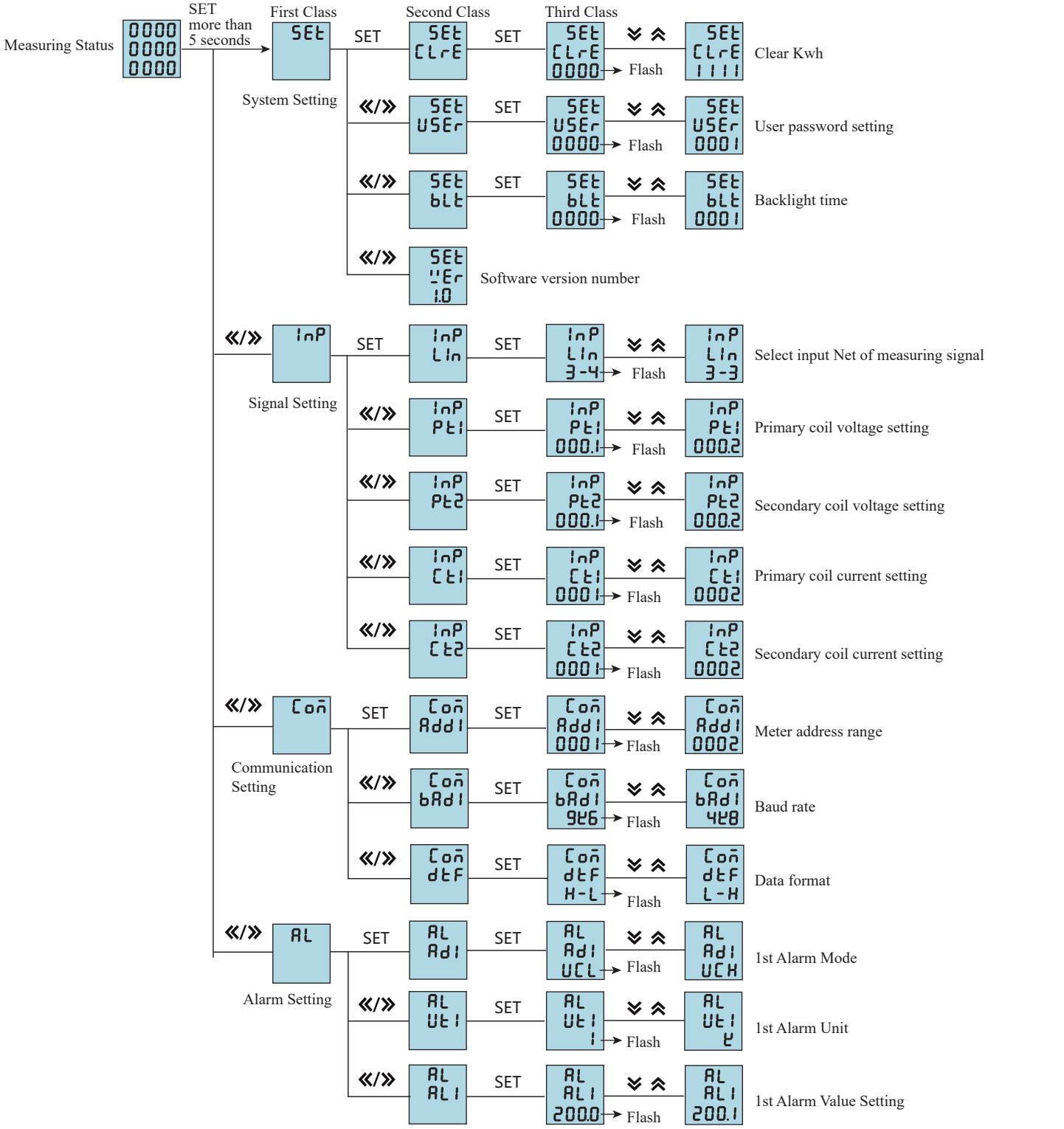


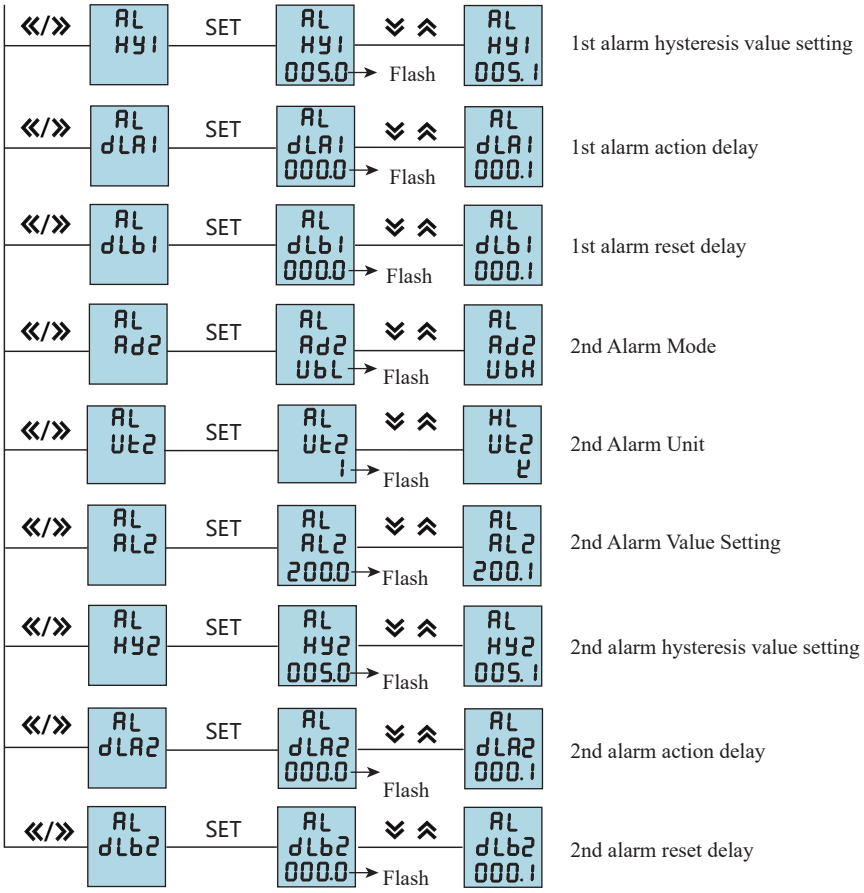
Illustration for measure interface switch procedure:



■ Operation Sequence

After modifing data, press SET to confirm or press ESC to return to previous menu





■ Menu Modification Illustration

Under Customer Menu Status

1. Press SET Key more than 5 seconds, if the user pass word is set, it will pop up an input field, input the correct password to enter into user menu, to modify parameter.
2. If the current display is First Class, press SET Key, enter into next class display, press"«", "»" key, change menu subitems.
3. If the current display is Second Class or Third Class, press ESC Key, return to previous display.
4. If it is Third Class display, press "»", "«" Key flash the number, press"«", "»" to shift, press"»", "«" Key to modify value; press SET Key to save set value when it flash; if press ESC Key, the set value will not be saved and return to the Second Class display.
5. After modifying the parameters, press SET Key more than 5 seconds or press ESC Key to exit user menu and enter into measuring status.

Menu Structure and Function Description

No	Level 1	Level 2	Level 3	Description
1	SEt System setting	Clear Energy CLrE	0000	When input 1111, energy can be cleared; When input 1234, menu will be resumed to factory default setting.
		User Password USEr	0000	Change user password, "0000" as factory default, no password
		Backlight time bLt	0000	Time of backlight go out delay, unit "second". When value is "0", backlight won't go out.
		Software Version UEr	1.0	Software version number, read only
2	InP Signal Setting	Network Lin	3-3 / 3-4	To select the input network of the measured signal, 3 phase 3 wire or 3 phase 4 wire
		Voltage transform Pt1	0.1-500.0	Primary rated voltage, unit KV
		Voltage transform Pt2	0.1-500.0	Secondary rated voltage, unit KV
		Current transform Ct1	1-9999	Primary rated current, unit A
		Current transform Ct2	1-9999	Secondary rated current, unit A
3	Con Communication Setting	Address Add1	1-247	Meter address range
		Baud rate brd1	1k2/2k4/ 4k8/9k6	Baud Rate 1k2 means 1200, 2k4 means 2400, 4k8 means 4800, 9k6 means 9600
		Data sequence dtF1	H-L / L-H	Data sequence: high register in front or low register in front

Menu Structure and Function Description

No	Level 1	Level 2	Level 3	Description
4	AL Alarm setting	Alarm mode Ad1	1-62	When value is DO, it is remote control mode, otherwise it is alarm mode, please refer to “Table 1”
		Alarm value unit Ut1	1/K/M	1: means international standard unit, K: 1000 times of international standard unit, M: 1000000 times of international standard unit.
		Alarm operation value AL1	0-999.9	1st alarm value setting (the unit is standard display unit)
		Alarm hysteresis value HY1	0-999.9	1st alarm hysteresis value setting (the unit is standard display unit)
		Operation delay dLA1	0-9.9	Operation delay time, unit: second
		Alarm end time dLb1	0-9.9	Operation reset time, unit: second
		Alarm mode Ad2	1-62	When value is DO, it is remote control mode, otherwise it is alarm mode, please refer to “Table 1”
		Alarm value unit Ut2	1/K/M	1: means international standard unit, K: 1000 times of international standard unit, M: 1000000 times of international standard unit.
		Alarm operation value AL2	0-999.9	2nd alarm value setting (the unit is standard display unit)
		Alarm hysteresis value HY2	0-999.9	2nd alarm hysteresis value setting (the unit is standard display unit)
		Operation delay dLA2	0-9.9	Operation delay time, unit: second
		Alarm end time dLb2	0-9.9	Operation delay time, unit: second

■ Output function

1. Energy pulse

DS9L provides the function of energy calculation, with 1 loop of AP active energy pulse output function and RS485 digital interface for transmit of energy data. Between AP and GND, the energy pulse of optical couple relay wth open collector enables the long distance transmit of active & reactive energy. Remote PC terminal, PLC, DI On-Off collector module are applied to collect the pulse of coulometer 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： 3200imp/KWh. It means: The impulse output no. is 3200 when the coulometer counts up to 1KWH.

The point 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 7200 pulse refers to is equal to 1kWh X voltage transform PT X current transform CT.

2. Remote control function: 2 way S1-S4 be used to remote control Electric ON/OFF status. 2 DO1, DO2 function be used to control electric devices; when using this function, alarm mode should be setted as “0”, otherwise, DO1, DO2 will be as AL1, AL2 output; DO1, DO2 function control value is writen via RS485 interface.
3. Communication function (please refer to Communication protocol)
4. Alarm fnction, after the meter is powered on and run steady more than 5 seconds, alarm begin to work. (Please refer to table 1)

■ Communication protocol

I. MODBUS serial communication protocol basic rules

1. The meter adpots Modbus RTU communication protocol,RS485 half duplex communication,read function code 0x03, write function code 0x10, adpots 16 digit CRC check,the coulometer does not feedback check error.

Data frame 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.

2. Each MODBUS data package is consisted of five 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 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.

II. Network time consideration

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

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

(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 package 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 current 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 receive the unsupported function code
0x02	Variate address error	Data position designated by host exceeds range of meter, or receive illegal register operation.
0x03	Variate data 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 the current 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 (variate)		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

Slave normal answers (high bit 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 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 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 number		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 0x49901, because AD1 is fixed data, seizes 1 data register, decimalist code of 11 is 0X000B.

Host request (Write single-register)

Slave address	Write function code	Register address (variate)		Register number		Byte number (2 times 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

Slave normal answer (Write single-register)

Slave address	Write function code	Register address (variate)		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

2. Write multi-register

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

Suppose the address code of AD1 is 0x4800, 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

DS9L parameter address reflection table
Note: address code is the index of variable array

No.	Address reflection	Variable name	Register number	Data type	Read / Write	Data conversion illustration
1	0x4000	Phase voltage A	2	long	R	0.1V Note ⑥
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 ⑥
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 Note ⑥
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	
17	0x4020	Total reactive power	2	long	R	0.001KVA Note ⑥
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 Note ⑥
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 Note ⑥
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	Backward Kwh	2	long	R	0.001kvarh Note ⑥
31	0x403c	Forward Kvarh	2	long	R	
32	0x403e	Backward Kvarh	2	long	R	
33	0x4800	Voltage transform PT1	2	long	R/W	0.001 Note ⑥
34	0x4802	Voltage transform PT2	2	long	R/W	
35	0x4804	Current transform CT1	2	long	R/W	
36	0x4806	Current transform CT2	2	long	R/W	
37	0x4808	1st alarm value	2	long	R/W	
38	0x480a	1st hysteresis value	2	long	R/W	
39	0x480c	2nd alarm value	2	long	R/W	
40	0x480e	2nd hysteresis value	2	long	R/W	

No	Address reflection	Variable name	Register number	Data type	Read/Write	Data conversion illustration
Reserve						
41	0x4900	1st alarm mode value (Please refer to table 1)	1	int	R/W	No decimal point
42	0x4901	1st alarm unit Note③	1	int	R/W	
43	0x4902	1st alarm operation delay	1	int	R/W	
44	0x4903	1st alarm cutting delay	1	int	R/W	
45	0x4904	2nd alarm mode value (Please refer to table 1)	1	int	R/W	
46	0x4905	2nd alarm unit Note③	1	int	R/W	
47	0x4906	2nd alarm operation delay	1	int	R/W	
48	0x4907	2nd alarm cutting delay	1	int	R/W	
Reserve						
49	0x4a00	Connection mode 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	ON/OFF output (Available under alarm status)Note④	1	int	R	
54	0x4a08	ON/OFF output 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 electric parameters

No.	Item	ON/OFF output (low alarm) code		ON/OFF output (high alarm) code	
1	Ua(A phase voltage)	1	(UaL)	2	(UaH)
2	Ub(B phase voltage)	3	(UbL)	4	(UbH)
3	Uc(C phase voltage)	5	(UcL)	6	(UcH)
4	U(A/ B/ C phase voltage)	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(AB/ BC/ CA line voltage)	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(A/ B/ C line current)	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)	49	(PFaL)	50	(PFaH)
26	PFb(B phase power factor)	51	(PFbL)	52	(PFbH)
27	PFc(C phase power factor)	53	(PFcL)	54	(PFcH)

No.	Item	ON/OFF output (low alarm) code	ON/OFF output (high alarm) code
28	PF (Total power factor)	55 (PFLL)	56 (PFLH)
29	F frequency	57 (FL)	58 (FH)
30	EP (Total active energy)	59 (EPL)	60 (EPH)
31	EQ (Total reactive energy)	61 (EQL)	62 (EQH)

Note①: Connection mode

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

Note②: Baud rate

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

Note③: Alarm/Analog Unit

Communication value	0	1	2
Menu display	1	K	M

Note④: Alarm status indication

D7	D6	D5	D4	D3	D2	D1	D0

D1: AL1 status 0: No alarm 1: Alarm

D0: AL2 status 0: No alarm 1: Alarm

Note⑤: ON/OFF input status indication

D7	D6	D5	D4	D3	D2	D1	D0

D1: S1 status 0: Not close 1: Close

D0: S2 status 0: Not close 1: Close

D3: S3 status 0: Not close 1: Close

D2: S4 status 0: Not close 1: Close

Note⑥: Read out or write in actual value

Read out or write in actual value=communication read out value x unit
For example: Read out A phase phase voltage, if read out value is 0x00000898,
corresponding decimal location: 2200, because voltage unit is 0.1V, the actual A phase voltage value is 2200x0.1V=220.0V

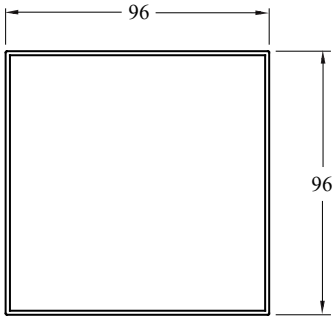
The process of generating a CRC: (Can refer to program example as below)

1. Preset a 16 bit register as 0FFFFH(All 1), call it CRC register.
2. Xor the 8 bit of data frame's first byte with the low byte of CRC register, stock the result back to CRC register.
3. Move the decimal point one bit to the right, fill the highest bit with 0, remove and check the lowest bit.
4. If the lowest bit is 0, repeat the third step(next move); if the lowest bit is 1, xor CRC register with a preset fixed value(0A001H).
5. Repeat the third and fourth step till the eighth move. A complete 8 bit has been processed in this way.
6. Repeat the second to fifth step to process the next 8 bit, till all bytes are precessed.
7. Finally the value of CRC register is the value of CRC. Besides, there is another way using the preset form to calculate CRC, its main feather is fast calculating speed, but form needs large storage space. The process of this way please refer to relative material.

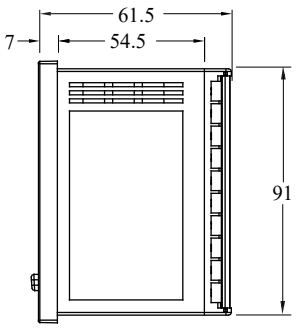
The program of achieving 16 bit CRC check code

```
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;
    }
```

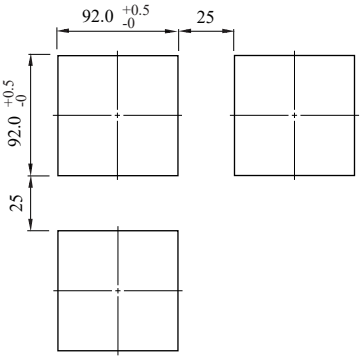
■ Dimension and Mounting Size



Panel Size

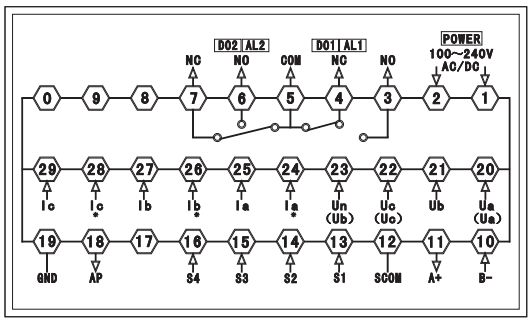


Side-face Size



Mounting Size

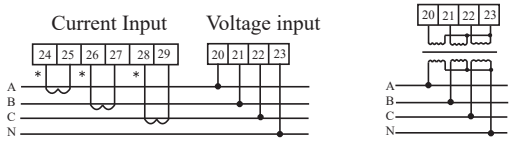
■ Connection Drawing



The correct diagram on the Meter shall prevail

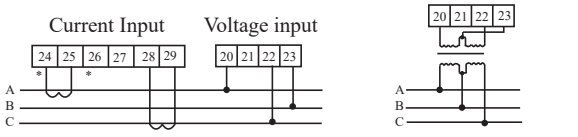
Note: Voltage input connection terminal, labels in bracket show 3 phase 3 wire connection method; if there is any change, please turn to the correct diagram on the Meter!

Mode 1 (3 pcs CT): 3 phase 4 wire connection mode



Current input via CT Voltage direct input Voltage input via PT

Mode 2 (2 pcs CT): 3 phase 3 wire connection mode



Current input via CT Voltage direct input Voltage input via PT

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 3 pcs of CT, it should be 3 phase 4 wire connection.
Meter wire connection, the input network Link setting in the software menu should accord to the connection mode of the measured load. Otherwise, the measured voltage or power is incorrect.
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 should be connected as per the connection drawing.
4.Connection mode should accord to the setting of user menu “LIN”.
5.Energy pulse output is open collector output.
6. Isolation between power supply and circuid board, in cause of leakage switch mis-action