

DWY8 Series Single-phase Power Meter Operation Manual

Apply to DWY8-A series



Features:

- Wide range switching power supply
- Effective value measurement of AC voltage (RMS) and AC current (RMS)
- With the measurement and display of active power, power factor, reactive power, apparent power and active electric energy
- The sampling speed can be freely set 1-10 times per second
- Relay alarm output, 4-20mA analog output, RS485 communication and Modbus RTU communication can be selection
- The display parameters can be freely set and switched, and the operation is simple

National High-tech Enterprise/ National Standard Drafting Unit
 Hotline:400-0760-168 Version code:KKDWY8-A01CT01-A/0-202110329

The instruction explain instrument settings, connections,name and etc, please read carefully before you use the temperature controller. Please keep it properly for necessary reference.

I. Safe Caution

- When the failure or abnormal of products lead to a system of major accidents, please set the proper protection circuit in the external.
- Please don't plug in before completing all the wire. Otherwise it may lead to electric shock, fire, and fault.
- Not allow to use outside the scope of product specification, otherwise it may lead to fire, fault.
- Not allow to use in the place where is inflammable and explosive gas.
- Do not touch power terminal and other high voltage part when the power on, otherwise you may get an electric-shock.
- Do not remove, repair and modify this product, otherwise it may lead to electric shock, fire, fault.

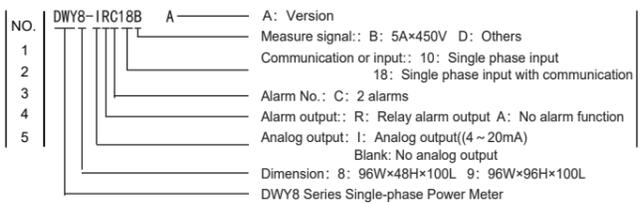
Caution

- The product should not be used in a nuclear facility and human life associated medical equipment.
- The product may occur radio interference when it used at home. You should take adequate countermeasures.
- The product get an electric shock protection through reinforced Insulation. When the product is embedded in the devices and wiring, please subject to the specification of embedded devices.
- In order to prevent surge occurs, when using this product in the place of over 30m indoor wiring and wiring in outdoor, you need to set the proper surge suppression circuitry.
- The product is produced based on mounting on the disk. In order to avoid to touch the wire connectors, please take the necessary measures on the product.
- Be sure to observe the precautions in this manual, otherwise there is a risk of a major injury or accident.
- When wiring, please observe the local regulation.
- To prevent to damage the machine and prevent to machine failure, the product is connected with power lines or large capacity input and output lines and other methods please install proper capacity fuse or other methods of protection circuit.
- Please don't put metal and wire clastic mixed with this product, otherwise it may lead to electric shock, fire, fault.
- Please tighten screw torque according to the rules. If not, it may lead to electric shock and fire.
- In order not to interfere with this products to dissipate heat, please don't plug casing around the cooling vent hole and equipment.
- Please don't connect any unused terminal.
- Please do the cleaning after power off, and use the dry cleaning cloth to wipe away the dirt. Please don't use desiccant, otherwise, it may casue the deformation or discoloration of the product.
- Please don't knock or rub the panel with rigid thing.
- The readers of this manual should have basic knowledge of electrical, control, computer and communications.
- The illustration, example of data and screen in this manual is convenient to understand, instead of guaranteeing the result of the operation.
- In order to use this product with safety for long-term, regular maintenance is necessary. The life of some parts of the equipments are by some restrictions, but the performance of some will change for using many years.
- Without prior notice, the contents of this manual will be change. We hope these is no any loopholes, if you have questions or objections, please contact us.

Caution of Install & Connection

- Installation
 - This product is used in the following environmental standards. (IEC61010-1) [Overvoltage category II, class of pollution 2]
 - This product is used in the following scope: environment, temperature, humidity and environmental conditions. Temperature: 0~50°C; humidity: 45~85%RH; Environment condition: Indoor warranty. The altitude is less than 2000m.
 - Please avoid using in the following places:
 - The place will be dew for changing temperature; with corrosive gases and flammable gas; with vibration and impact; with water, oil, chemicals, smoke and steam facilities with Dust, salt, metal powder; and with clutter interference, static electric and magnetic fields, noise; where has air conditioning or heating of air blowing directly to the site; where will be illuminated directly by sunlight; where accumulation of heat will happen caused by radiation.
 - On the occasion of the installation, please consider the following before installation. In order to protect heat saturated, please ensure adequate ventilation space. Please consider connections and environment, and ensure that the products below for more than 50mm space. Please avoid to installed over the machine of the calorific value (Such as heaters, transformer, semiconductor operations, the bulk resistance). When the surrounding is more than 50, please using the force fan or cooling fans. But don't let cold air blowing directly to the product. In order to improve the anti-interference performance and security, please try to stay away from high pressure machines, power machines to install. Don't install on the same plate with high pressure machine and the product. The distance should be more than 200mm between the product and power line. Please install the power machine as far away as possible.
- Cable caution:
 - This product only provides single-phase circuit electrical parameter measurement, and can not be used for separate measurement of different phases voltage and current; Otherwise, the instrument may be damaged, resulting in fire, etc.
 - The instrument shall be supplied with standard and qualified power supply for normal operation. It is forbidden to use high-frequency power supply such as frequency converter output for power supply. The power circuit and measurement input circuit shall be wired separately if necessary. If the measured input circuit voltage and current exceeds the maximum rated value of the instrument, it shall be input into the instrument after passing the standard PT or CT transformation ratio; Necessary fuses shall be installed in the front-end circuit of the instrument input, including voltage open circuit, open circuit, current short circuit and open circuit contacts.
 - The voltage difference between the instrument measurement input circuit and other lines such as power supply shall not exceed the instrument isolation withstand voltage; Otherwise, the instrument will be damaged, resulting in fire, electric shock, etc.
 - In order to reduce the power cables and the load power cables on the effect of this product, please use noise filter in the place where easy to effect. You must install it on the grounding of the disk if you use the noise filter, and make the wiring to be shortest between noise filter output side and power connectors. Don't install fuse and switch on the wiring of noise filter output side, otherwise it will reduce the effect of noise filter.
 - It takes 5s from input power to output. If there is a place with interlocking actions circuit signal, please use timer relay.
 - Please use twisted pair with a shield for analog output line, can also connect the common-mode coil to the front-end of the signal receiving device to suppress line interference if necessary, to ensure the reliability of signal.
 - Please use twisted pair with a shield for remote RS485 communication cable, and deal with the shield on the host side earth, to ensure the reliability of signal.
 - This product don't have the fuse; please set according to rated voltage 250V, rated current 1A if you need; fuse type: relay fuse.
 - Please use suitable screw force and suitable crimping terminal Terminal screw size: M3x8 (with 6.8x6.8 square seat) Recommended terminal tightening torque: 0.4N.m Recommended tightening torque of fixing frame: 0.2N.m Suitable wire: 0.25 ~ 1.65mm single wire or multi-core flexible wire
 - Please don't put the Crimp terminal or bare wire part contact with adjacent connector.

II. Ordering information



III. Models

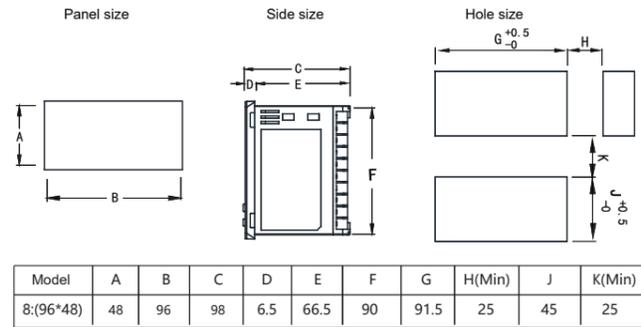
Model	Alarm	Analog output	Communication	Input range
DWY□-A10B	No	No	No	B: 5A*450V
DWY□-RC10B	2	No	No	
DWY□-RC18B	2	No	RS485	D: Other models need to be customized
DWY□-IRC10B	2	4~20mA	No	
DWY□-IRC18B	2	4~20mA	RS485	

IV. Specifications

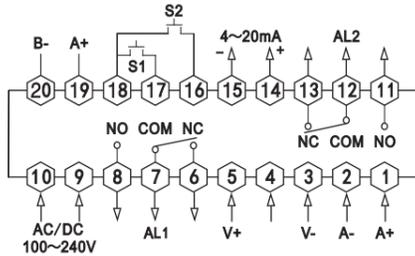
1. Electrical parameters:

Measure parameters	Voltage, current, power factor, Kwh, apparent power, reactive power, active power
Input impedance	Voltage input impedance: ≥300KΩ(450V) Current input impedance: ≤0.02Ω (direct input 0~5A)
Direct input range	Voltage: AC 6~450V Current: AC 0.015~5A
Display	Dual row LED display
Current ratio	1.0~1999 can be 1999 free setting
Accuracy	Voltage: ±0.5%FS±2Digits Current: ±0.5%FS±2Digits
Sampling rate	1~10 times/s
Power supply	AC/DC 100~240V 50/60Hz
Power consumption	7VA
Pressure resistance	AC 2500V/1min
Communication	RS485 communication port, Modbus-RTU protocol
Analog output	DC4-20mA analog output, accuracy: ±0.5%FS Load capacity: ≤600Ω
Insulation resistance	100MΩ
Working environment	0~50°C, relative humidity: ≤85%RH

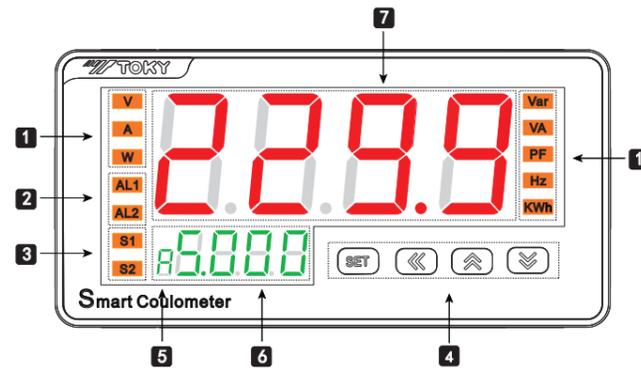
V. Dimension and installation size unit: mm



VI. Connections

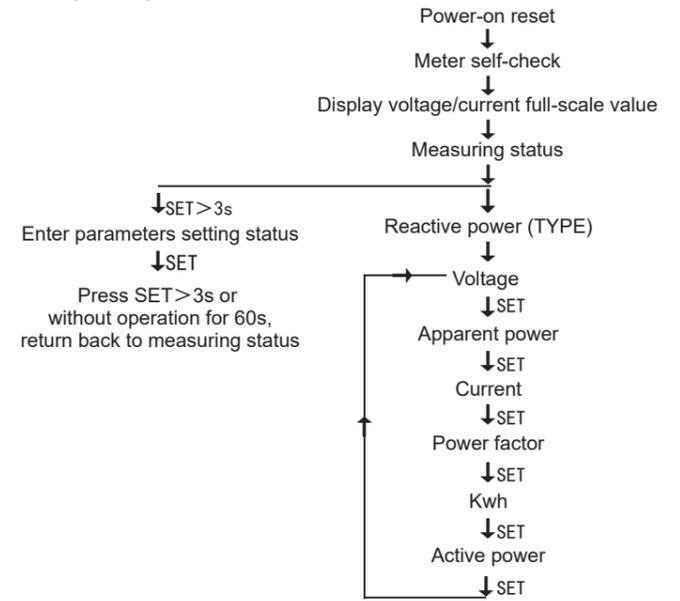


VII. Panel Name



NO.	Symbol	Name	Function
1	V	Unit	Voltage: V indicator (always on)
	A		Current: A indicator (always on)
	W		Active power: W indicator (always on)
	Var		Reactive power: VAR indicator (always on)
	VA		Apparent power: VA indicator (always on)
	PF		Power factor: PF indicator (always on)
	Hz		Frequency: Hz indicator (always on)
2	AL1	Alarm output indicator	1st alarm output indicator, lights on when alarm output, lights off when no alarm output.
	AL2		2nd alarm output indicator, lights on when alarm output, lights off when no alarm output.
3	S1	Switch input	Switch input 1# indicator, there is input when it is on, and no input when it is off
	S2		Switch input 2# indicator, there is input when it is on, and no input when it is off
4	SET	SET Function key	Menu key/Enter key, to enter or exit the parameter modification mode, or to confirm and save the modified parameters
	←	Shift key	Activate key/ shift key
	→	Increase key	Increase key, view menu in reverse order
5	↵	Decrease key	Decrease key, view menu in normal order
	Low row display the measurement parameter code		V: Voltage R: A Current P: P Active power Q: Q Reactive power C: C Power factor S: S Apparent power E: E Active energy F: F Frequency (reserved)
6	Low row display		Display measurement parameter value/set parameter value
7	High row display		Display measurement parameter value/set parameter code

VIII. Operation process and menu illustration



- After power on and under normal measure control mode, short press "SET" key to switch and view the measurement parameters in sequence, long press "SET" key more than 3s to enter the menu parameters checking mode.
- In the menu viewing mode, short press the "ENT" key to cycle through the menus; short press "←" can flash the current menu parameters to enter the parameter modify mode, and every short press can move one position to the left in cycle.
- In the parameter modifying mode, press "↑" or "↓" key once to add or reduce one of flashing data. Press the "←" + "→" keys at the same time to move the decimal point position; after confirming the modified parameters, short press the "SET" key to save the modified parameters.
- In the parameter modifying mode, long press "SET" to save the modified parameter, and press more than 3s or without operation for 60s, it will automatically exit and return back to measuring mode.

IX. Menu Illustration

- No matter what model, what control mode it is, it will always display these parameters.
- According to different model, control mode, these parameters will be hidden.

No.	Symbol	Name	Illustration	Setting range	Factory setting
1	P.V.S	PVS	Select any parameter measured by the instrument as the fixed parameter of the upper row digital tubes to display.	0~6	
2	R.A.D	AD1	The first alarm mode setting: AL: Current low limit alarm AH: Current high limit alarm, VL: Voltage low limit alarm VH: Voltage high limit alarm, P-L: Active power low limit alarm, P-H: Active power high limit alarm, S-L: Apparent power low limit Alarm, S-H: Apparent power high limit alarm, Q-L: Reactive power low limit alarm, Q-H: Reactive power high limit alarm, PFL: Power factor low limit alarm, PFFH: Power factor high limit alarm (see the corresponding table for the actual display symbols).	0~28	AH
3	R.V.A	AL1	The first alarm value setting menu: For example: if the first alarm mode Ad1 is set to VH (voltage high limit alarm), and the alarm AL1 is set to 300, when the actual measured voltage value ≥ 300, the meter will automatically output.	-1999~9999	Current 90% of full scale
4	H.Y.1	HY1	1st alarm hysteresis setting For example, if the alarm mode Ad1 is still set to VH voltage high limit alarm, and when the alarm AL1 is set to 300, HY1 is set to 10, and the actual measured voltage value is ≤ (300-10), then the instrument turns off the alarm output. Note: the setting and function realization of other alarm modes are the same as the example above.	0~9999	0.100
5	R.L.1	ALT1	Delay of the first alarm, unit: s.	0~9999	0
6	R.A.D	AD2	Refer to AD1	0~28	AL
7	R.V.A	AL2	Refer to AL1	-1999~9999	Current 10% of full scale
8	H.Y.2	HY2	Refer to HY1	0~9999	0.100
9	R.L.2	ALT2	Refer to ALT1	0~9999	0
10	C.T	CT	Current transformation ratio setting: The settable value range is (1.0-1999), which is only applicable to current channels. For example: 20 / 5 = 4,000, that is, when the instrument needs to measure 20A current, the CT value needs to be set to 4,000. Note: external transformer is required.	1.0-1999	1.000
11	R.P.P	PDP	Power display retains decimal places	0~3	2
12	B.R.M	BRM	Analog mode selection; A: current transmission, V: voltage transmission, S: apparent power transmission, Q: reactive power transmission, P: active power transmission, PF: power factor transmission can be selected arbitrarily.	0~5	A
13	R.H	RH	Transmission high limit setting value; If the transmission mode is set to current transmission, this value is set as the high limit value of current measurement.	-1999~9999	Current full scale
14	R.L	RL	Transmission low limit setting value; If the transmission mode is set to voltage transmission, this value is set as the low limit value of voltage measurement.	-1999~9999	0
15	V.P.S	VPS	Voltage correction value: Voltage measurement translation correction, display value = measured value + VPS value, factory value is 0.000.	-1999~9999	0
16	R.P.S	RPS	Current correction value: Current measurement translation correction, display value = measured value + APS value, factory value is 0.000.	-1999~9999	0
17	L.C.K	LCK	Password lock; 0000: no function; 0010: manual menu modification is prohibited 0033: enter the Advanced menu; 1111: clear the electrical value 1234: restore factory settings	0~9999	0

2. Advanced menu illustration

No.	Symbol	Name	Illustration	Setting range	Factory setting
18	采样	MPS	Sampling period Unit 0.1 second	1 ~ 10	10
19	地址	ADD	Communication address	1 ~ 247	1
20	波特率	BAD	Communication rate; The communication rate is 4.8, 9.6, 19.2, 38.4 and 57.6	0 ~ 4	9.6
21	奇偶校验	PRTY	PRTY: parity bit setting; NONE: no check ODD: odd check EVEN: even check	0 ~ 2	NONE
22	数据交换	DATC	Communication data transmission sequence 0000, 0010 byte sequence exchange		0
23	扩展	S1E	S1 switching value input expansion function		
24	版本	VER	Software version.		

3. Display symbol for different parameters

No.	Parameters	High limit alarm	Low limit alarm	External deviation alarm	Internal deviation alarm
1	Voltage	UH	UL	Uo	Ui
2	Current	AH	AL	AO	AI
3	Power factor	PFH	PFL	PO	PI
4	Active power	P-H	P-L	P-o	P-i
5	Reactive power	Q-H	Q-L	Q-o	Q-i
6	Apparent power	S-H	S-L	S-o	S-i
7	Kwh	PEH	PEL	PEo	PEi

X. Communication protocol

The meter uses Modbus RTU communication protocol, carries out RS485 half-duplex communication, read function code 0x03, write function code 0x10 or 0x06, uses 16-bit CRC check, the meter does not return error check.

Data frame format:

Start bit	Data bit	Stop bit	Check bit
1	8	1	Set in Menu PRTY

Handling of abnormal communication:

When abnormal response, put 1 on the highest bit of function code.

For example: Host request function code 0x03, then slave response function code should be 0x83.

Error code:

0x01--- Illegal function: the function code sent from host is not supported by meter.

0x02--- Illegal address: the register address designated by host beyond the address range of meter.

0x03--- Illegal data: Date value sent from host exceeds the corresponding data range of meter.

Communication cycle:

Communication cycle is the time from host data request to slave data response, i.e.: communication cycle = host request data sending time + slave preparation time + response delay time + response return time

Eg: 9600 baud rate: communication cycle of single measured data ≥250ms.

1. Read Multiple Registers

For example: Host read integer AL1 (alarm value 4.5)

The address code of AL1 is 0x0000, 32 bit (4 bytes), occupying 2 data registers;

The hexadecimal internal code of 4.500 * 1000 = 4500 is 0x00001194.

Host request (read multi-register)							
1	2	3	4	5	6	7	8
Meter Add	Function Code	Start Add High bit	Start ADD Low bit	Data byte Length high bit	Data byte Length low bit	CRC Code Low bit	CRC Code High bit
0x01	0x03	0x00	0x00	0x00	0x02	0xC4	0x0B

Slave normal answer(Read multi-register)								
1	2	3	4	5	6	7	8	9
Meter Add	Function Code	Data byte number	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	0x11	0x94	0xF7	0xCC

Abnormal answer: (For example: host request function code 0x03)

Slave abnormal answer(Read multi-register)				
1	2	3	4	5
Meter Add	Function Code	Error code	CRC Code Low bit	CRC Code High bit
0x01	0x83	0x02	0xC2	0xC1

2. Write multi-register

For example: Host read AL1 (1st alarm value 5.0)

ADD code of AL1 is 0x0000, 32bit (4 byte), seizes 2 data registers; hexadecimal memory code of 5.0*1000=5000 is 0x00001388.

Host request (write multi-register)												
1	2	3	4	5	6	7	8	9	10	11	12	13
Meter Add	Function Code	Start ADD High Bit	Start ADD Low Bit	Data byte length high bit	Data byte length low bit	Data1 high bit	Data1 low bit	Data2 high bit	Data2 low bit	CRC code low bit	CRC code high bit	
0x01	0x10	0x00	0x00	0x00	0x02	0x04	0x00	0x00	0x13	0x88	0xFE	0xF9

Slave normal answer (write multi-register)							
1	2	3	4	5	6	7	8
Meter Add	Function Code	Start ADD high 8 bit	Start ADD low 8 bit	Data byte Length high bit	Data byte Length low bit	CRC Code Low bit	CRC Code High bit
0x01	0x10	0x00	0x00	0x00	0x02	0x41	0xC8

The host writes ALTY with 0x06 function (Example:Value=150)

Host request (write single register)							
1	2	3	4	5	6	7	8
Meter Add	Function Code	Start Add High bit	Start ADD Low bit	Data high bit	Data low bit	※CRC Code Low bit	※CRC Code High bit
0x01	0x06	0x00	0x2B	0x00	0x96	0x79	0xAC

Slave normal answer (write single register)							
1	2	3	4	5	6	7	8
Meter Add	Function Code	Start Add High bit	Start ADD Low bit	Data high bit	Data low bit	※CRC Code Low bit	※CRC Code High bit
0x01	0x06	0x00	0x2B	0x00	0x96	0x79	0xAC

Data location error response: (For example:Host request the ADD index is 0x0050)

Slave abnormal answer (read multi-register)				
1	2	3	4	5
Meter Add	Function Code	Error code	CRC Code Low bit	CRC Code High bit
0x01	0x90	0x02	0xCD	0xC1

Address Mapping Table of Meter Parameters

No.	ADD Mapping	Variable Name	Byte length	Range	Magnification	Read/write	Remark
0	0x0000	1st alarm value AL1	2	-1999 ~ 9999	0.001	R/W	
1	0x0002	1st alarm hysteresis HY1	2	-1999 ~ 9999	0.001	R/W	
2	0x0004	2nd alarm value AL2	2	-1999 ~ 9999	0.001	R/W	
3	0x0006	2nd alarm hysteresis HY2	2	-1999 ~ 9999	0.001	R/W	
4	0x0008	Current coefficient CT	2	0.000 ~ 9999	0.001	R/W	
5	0x000A	Analog output high limit value RH	2	-1999 ~ 9999	0.001	R/W	
6	0x000C	Analog output low limit value RL	2	-1999 ~ 9999	0.001	R/W	
7	0x000E	Voltage amendment value VPS	2	-1999 ~ 9999	0.001	R/W	
8	0x0010	Current amendment value APS	2	-1999 ~ 9999	0.001	R/W	
9	0x0012	Voltage full scale FSV	2	0.000 ~ 9999	0.001	R	
10	0x0014	Current full scale FSA	2	0.000 ~ 9999	0.001	R	
11	0x0016	Voltage RMS V	2	0.000 ~ 9999	0.001	R	
12	0x0018	Current RMS A	2	0.000 ~ 9999	0.001	R	
13	0x001A	Power factor PF	2	-1.0 ~ 1.0	0.001	R	
14	0x001C	Active power W	2	-1999 ~ 9999	0.001	R	
15	0x001E	Reactive power Q	2	-1999 ~ 9999	0.001	R	
16	0x0020	Apparent power S	2	0.000 ~ 9999	0.001	R	
17	0x0022	Electrical value kWh	2	-1999 ~ 9999	0.001	R	
Reserve							
18	0x0028	High row LED display parameters	1	0 ~ 6	1	R/W	Note①
19	0x0029	1st alarm mode Ad1	1	0 ~ 28	1	R/W	Note②
20	0x002A	2nd alarm mode Ad2	1	0 ~ 28	1	R/W	Note②
21	0x002B	1st alarm delay ALT1	1	0 ~ 9999	1	R/W	
22	0x002C	2nd alarm delay ALT2	1	0 ~ 9999	1	R/W	
23	0x002D	Analog output mode brM	1	0 ~ 5	1	R/W	Note③
24	0x002E	Menu lock LCK	1	0 ~ 9999	1	R/W	
25	0x002F	Baud rate bAd	1	0 ~ 1	1	R	Note④
26	0x0030	Meter address Add	1	0 ~ 2	1	R	
27	0x0031	Parity check bit PRTY	1	0 ~ 2	1	R	
28	0x0032	MPS sampling period	1	0 ~ 10	1	R	
29	0x0033	PDP power display decimal places	1	0 ~ 3	1	R	
30	0x0034	Measuring status indication	1	0 ~ 9999	1	R	Note⑤
31	0x0035	Meter name	1	0xD8	1	R	

Note ①: High row display parameter

7	6	5	4	3	2	1	0
	E(kWh)	S(VA)	Q(Var)	P(W)	PF	A	V

Note ②: Alarm mode

High limit alarm	Communication value	Low limit alarm	Communication value	External deviation alarm	Communication value	Internal Deviation alarm	Communication value	Alarm parameter
VH	1	VL	2	VO	3	VI	4	Voltage
AH	5	AL	6	AO	7	AI	8	Current
PFH	9	PFL	10	PFO	11	PFI	12	Power factor
P-H	13	P-L	14	P-0	15	P-I	16	Active power
Q-H	17	Q-L	18	Q-O	19	Q-I	20	Reactive power
S-H	21	S-L	22	S-O	23	S-I	24	Apparent power
PEH	25	PEL	26	PEO	27	PEI	28	Kwh

Note ③: analog output mode

Communication value	0	1	2	3	4	5
Menu display	V	A	PF	P(KW)	Q(KVAR)	S(KVA)
Analog parameters	Voltage value	Current value	Power factor	Active power	Reactive power	Apparent power

Note ④: baud rate

Communication value	0	1	2	3	4
Menu display	4.8	9.6	19.2	38.4	57.6

Note ⑤: measuring status indication

D7	D6	D5	D4	D3	D2	D1	D0
Var	S2	S1	AI2	AI1	W	A	W
D15	D14	D13	D12	D11	D10	D9	D8
				kWh	Hz	PF	VA

16 digits CRC check code acquisition program

```

unsigned int Get_CRC(uchar *pBuf, uchar num)
{
    unsigned int 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;
}
    
```

XII. Version and Revision History

Date	Version	Revision content
2021.03.29	A/0 Version	1st edition