# Dw Series Signal Phase Power Meter User Manual

FEATURES:

- ⊙Measuring accuracy:±0.5%FS
- ⊙Measuring parameters:voltage,current,power factor,active power, reactive power,appearant power,Kwh.
- ⊙Isolated input and output absolutely.
- ⊙Two up & down limit alarm can be set for voltage,current,power factor, active power,reactive power,appearant power and Kwh.
- ⊙It is 4-20mA analog output to voltage,current,power fator,active power, reactive power,appearant power.
- ⊙RS485 communication port, Modbus-RTU communication protocol.
- ⊙RMS meadure.
- ⊙Simple operation of menu,and with power fail protection of operation status and Kwh.

For your safety, please read following content carefully before you are using our meter!

## ▣ Safe Caution

| |
|---|
| ※ Please read the manual carefully before you use the temperature controller. |
| ※ Please comply with the below important points.<br>⚠ Warning An accident may happen if the operation does not comply with the instruction.<br>⚠ Notice An operation that does not comply with the instruction may lead to product damage. |
| ※ The instruction of the symbol in the manual is as below.<br>⚠ An accident danger may happen in a special condition. |

### ⚠ Warning

1. A safty protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

### ⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm2) screw tweaked to the connector is 0.74n.m - 0.9n.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

## I. Ordering Information

DW8-IRC18B E

- E: Version
- Input measure ranged: B:5A×450V D:other ranged
- Communication: 10:Single phase input without RS485 18:Single phase with RS485
- Alarm: C:Two alarm
- Output:R:Relay output A:No alarm
- Analog output:I: Analog output(4～20mA) Blank:No analog output function
- Dimension:8:96W×48H×100L 9:96W×96H×100L
- DW series single phase power meter





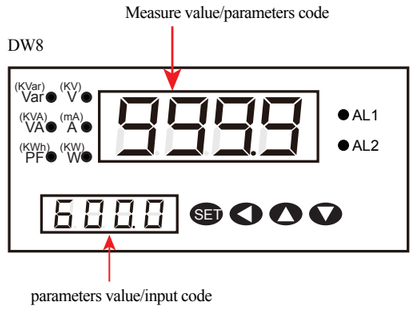
| Model | Alarm | Analog | Communication | Input range |
|---|---|---|---|---|
| DW□-A10B | No | No | No | B:5Ax450V<br>D:others |
| DW□-RC10B | Two alarm | No | No | |
| DW□-RC18B | Two alarm | No | RS485 | |
| DW□-IRC10B | Two alarm | 4～20mA | No | |
| DW□-IRC18B | Two alarm | 4～20mA | RS485 | |

## II. Specification

| | |
|---|---|
| Measure parameters | Voltage,current,power factor,Kwh,appearant power,reactive power,active power |
| Input impedance | Voltage input impedance:≥300KΩ(450V) Current input impedance:≤0.02Ω(Direct input 0～5A) |
| Measure range of Direct input | Voltage:AC 6～450V; CurrentAC 0.015～5A |
| Display | Dua line LED display |
| Current ratio | 1.0～1999,which can be freely setting |
| Measure accuracy | Voltage:±0.5%FS±2Digits Current:±0.5%FS±2Digits |
| Sampling rate | About 2times per second |
| Power supply | AC/DC 100～240V |
| Dielectric | AC 1500V/1min |
| Cmmunication | RS485 communication port, Modbus-RTU protocol |
| Analog output | DC4-20mA analog output; Accuracy:±0.5%FS; load ability≤600Ω |
| Insulating resistance | 100MΩ |
| Environment | 0～50℃,humidity≤85%RH |
| Dimension | 8:96W*48H*100L 9:96W*96H*100L |

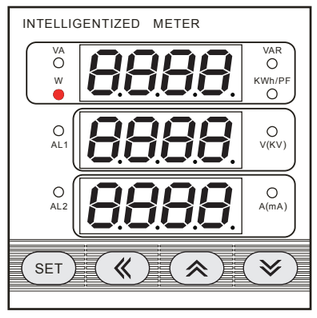
## III. Panel Illustration

DW8 panel illustration




| Panel indication | Description |
|---|---|
| AL1 | Alarm 1 #indicator lamp |
| AL2 | Alarm 2 #indicator lamp |
| KV、V | Voltage V indicator lamp(On light)/KV indicator lamp(Flash) |
| A、mA | Current A indicator lamp(On light)/mA indicator lamp(flash) |
| VAR、KVAR | Reactive power VAR indicator lamp(On light)/KVAR indicator lamp(flash) |
| KWh、PF | Power factor PF indicator lamp(On light)/Kwh value indicator lamp(flash) |
| W、KW | Active power W indicator lamp(On light)/KW indicator lamp(flash) |
| SET | Parameters selection/enter key |
| ◀ | Shift key |
| ▲ | Decrease key/parameter display |
| ▼ | Increase key/parameter display |

DW9

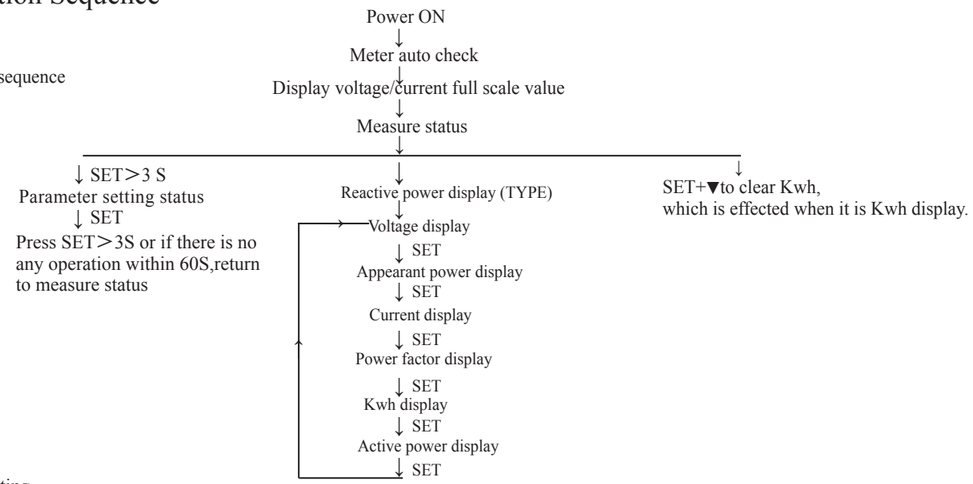



DW9 panel illustration

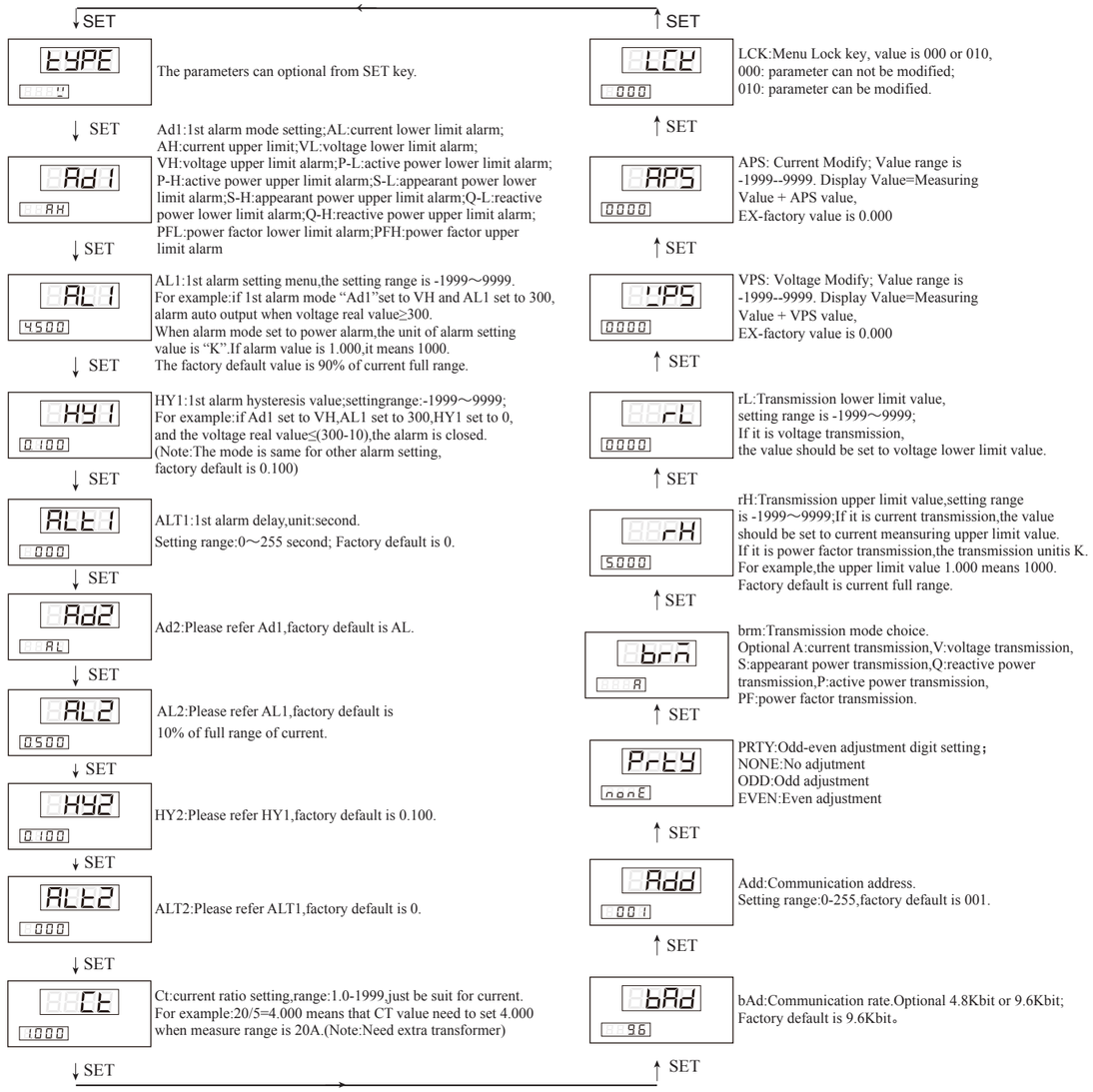
| Panel indication | Description |
|---|---|
| LED | Display measure value/Parameters setting |
| AL1 | Alarm 1 #indicator lamp |
| AL2 | Alarm 2 #indicator lamp |
| V（KV） | Voltage V indicator lamp(On light)/KV indicator lamp(flash) |
| A（mA） | Current A indicator lamp(On light)/mA indicator lamp(flash) |
| VA | Appearant power indicator lamp(On light)/It is KVA when flashing |
| VAR | Reactive power VAR indicator lamp(On light)/It is KVAR when flashing. |
| KWh、PF | Power factor PF indicator lamp(flashing)/Active Kwh value indicator lamp(On light) |
| W | Active power W indicator lamp(On light)/It is KW when flashing |
| SET | Parameters selection/Enter key |
| ≪ | Shift key |
| ⩓ | Decrease key |
| ⩔ | Increase key |

# IV. Operation Sequence

DW8 operation sequence

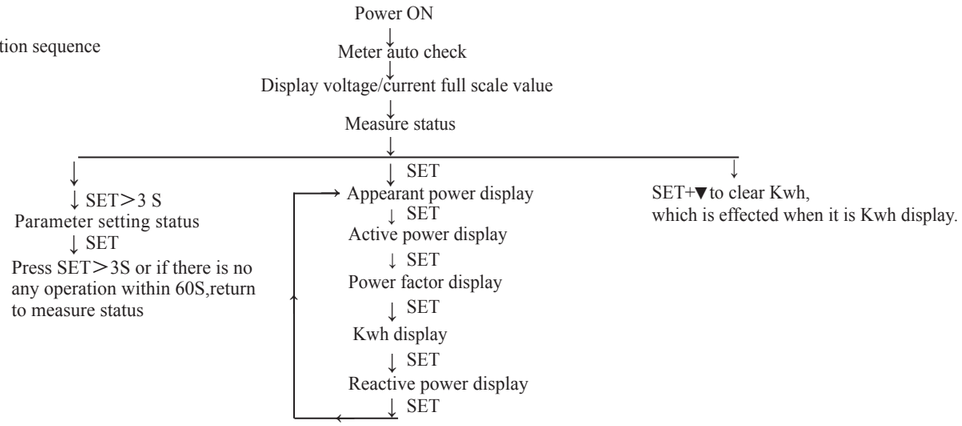



Alarm mode setting






DW9 operation sequence




Alarm mode setting

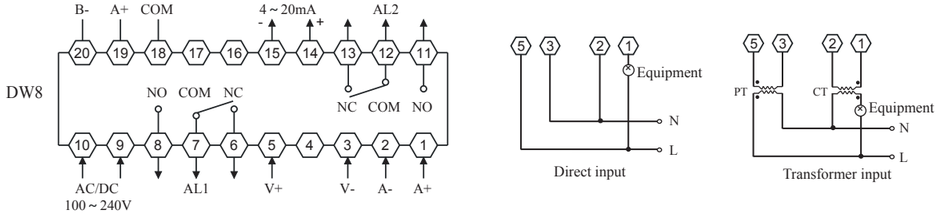
Operation Sequence and Setting Mode Illustration:

1. Press SET key for 3 seconds, enter into parameter setting menu.
2. Press SET key to choose the parameter which need to be modified, press◀ key to move the flash light to the value which need to be changed, then press ▼/▲ key to modify the value and press SET key for confirmation. Press◀ key and +▲ key at the same time can move decimal point. If just want to turn to the next parameter, just press SET key will be OK.
3. Under the state of modify and setting, press SET key more than 3 seconds, it can return back to the measuring status.
4. Kwh value delete method: In the status of showing Kwh on the main window, press SET key and +▲ key more than 3 seconds at the same time.

Parameter display reference table of each alarm mode

| NO | Display Parameter | Upper Limit Alarm | Lower Limit Alarm |
|---|---|---|---|
| 1 | Ampere | AH | AL |
| 2 | Voltage | UH | UL |
| 3 | Power Factor | PFH | PFL |
| 4 | Reacctive Power | q-H | q-L |
| 5 | Apparent Power | S-H | S-L |
| 6 | Active Power | P-H | P-L |
| 7 | Kwh | EyHH | EyHL |

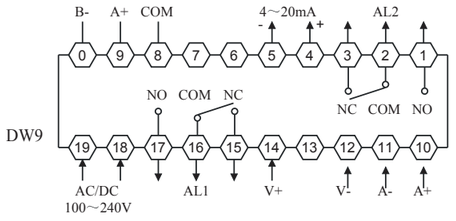
## V. Connections

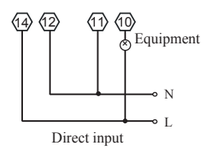


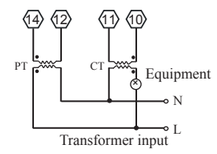






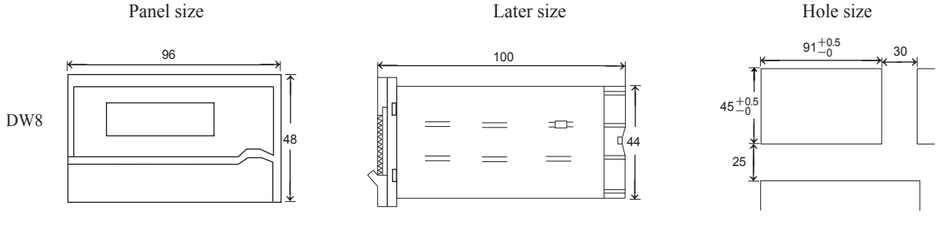



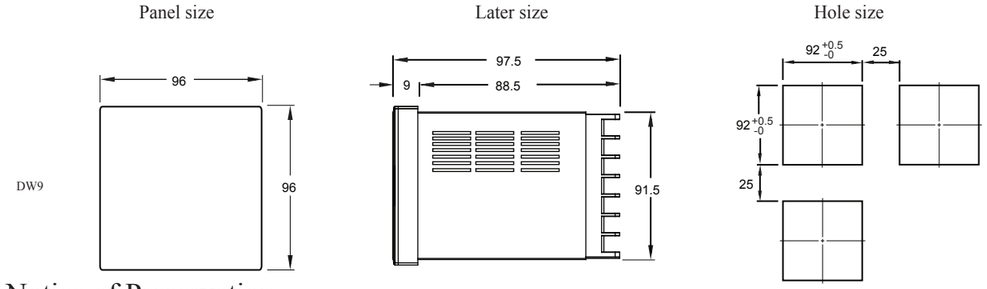




Note:Pls subject to the connection on meter if any difference here.

## VI. Dimensions






## VII. Notice of Preservation

1. Appropriate ambient temperature is 0～50 Degree, RH less than 85%
2. Each meter's Calibration interval is one year.
3. Attention to preventing from vibration and shock, keep away from such places:Excessive dust, Excess of harmful chemicals &Excessive harmful chemical gases.
4. Mak sure that the meter powered once every three months if the long-term storage at the end use, and each time's POI not less than 4 hours.
5. Long-term preservation should avoid direct light, the most comfortable storage place with temperature 0 to 50℃,humidity below 60% R.H. Keep away from organic solvent or oil-exposed .

## VIII. Communication Protocol

The 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.Communicaton data mode is 32bit integer data,positive number show by original code,negative number show by complemental code,data percentage is 0.001.It means that when host receive the meter data 5000,the data multiply by the percentage and then get the original data 5.000.

Data frame format:

| Start bit | Data bit | Check bit | Stop bit |
|---|---|---|---|
| 1 | 8 | Set on menu of PRTY | 1 |

Handling of communication exception:

If there is abnormal response， put the function ID on the top position 1.For example:Host request the function ID 0x03,and the function ID 0x83 will be back from host.

Type of error code:

0x02 --- Data position error:data position assigned by host is out of the range of meter.
0x03 --- Data value error:data value by host is out of the data range of meter.
CRC check error,function code error,not feedback to value.

1.Read multi-register

For example: The host computer read the float number AL1 (The value of Alarm 1 is 4.5)
The address code of AL1 is 0x0000， 32bit(4 bytes),it occupy 2 data register;16 decimal float of 4.500*1000=4500 is 0x00001194.

| Host request(Read multi-register) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Meter ADD | Function ID | Start ADD High bit | Start ADD Low bit | Data byte High bit | Data byte Low bit | CRC code Low bit | CRC code High bit |
| 0x01 | 0x03 | 0x00 | 0x00 | 0x00 | 0x02 | 0xC4 | 0x0B |

| Meter normal answer(Read multi-register) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Meter ADD | Function ID | Data byte number | Data 1 High | Data 1 Low | Data 2 High | Data 2 Low | CRC code Low | CRC code High |
| 0x01 | 0x03 | 0x04 | 0x00 | 0x00 | 0x11 | 0x94 | 0xF7 | 0xCC |

Function ID abnormal answer:(For example,host request function ID 0x03)

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

2、Write multi-register

For example: Host write float data AL1 (1st loop alarm value is 5.0)

The ADD code of AL1 is 0x0000,32bit (4 bytes),it occupy 2 data register.16 decimal float 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 ID | Start ADD high | Start ADD low | Data byte length high | Data byte length low | Data byte length | Data 1 high | Data 1 low | Data 2 high | Data 2 low | CRC low | CRC high |
| 0x01 | 0x03 | 0x00 | 0x00 | 0x00 | 0x02 | 0x04 | 0x00 | 0x00 | 0x13 | 0x88 | 0xFE | 0xF9 |

| Meter normal answer(Write multi-register) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Meter ADD | Function ID | Start ADD high 8 bits | Start ADD low 8 bits | Data byte length high | Data byte length low | CRC code low | CRC code high |
| 0x01 | 0x10 | 0x00 | 0x00 | 0x00 | 0x02 | 0x41 | 0xC8 |

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

## Parameters address reflection table

| No. | ADD reflection | Variable name | Byte length | Value range | Read write allowed | Remark |
|---|---|---|---|---|---|---|
| 0 | 0x0000 | 1st alarm value AL1 | 2 | -1999～9999 | R/W | |
| 1 | 0x0002 | 1st alarm hysteresis HY1 | 2 | -1999～9999 | R/W | |
| 2 | 0x0004 | 2nd alarm value AL2 | 2 | -1999～9999 | R/W | |
| 3 | 0x0006 | 2nd alarm hysteresis HY2 | 2 | -1999～9999 | R/W | |
| 4 | 0x0008 | Current rate CT | 2 | 0.000～9999 | R/W | |
| 5 | 0x000A | Analog high limit RH | 2 | -1999～9999 | R/W | |
| 6 | 0x000C | Analog low limit RL | 2 | -1999～9999 | R/W | |
| 7 | 0x000E | Voltage corrected value VPS | 2 | -1999～9999 | R/W | |
| 8 | 0x0010 | Current corrected value APS | 2 | -1999～9999 | R/W | |
| 9 | 0x0012 | Voltage span FSV | 2 | 0.000～9999 | R | |
| 10 | 0x0014 | Current span FSA | 2 | 0.000～9999 | R | |
| 11 | 0x0016 | Voltage value V | 2 | 0.000～9999 | R | |
| 12 | 0x0018 | Current value A | 2 | 0.000～9999 | R | |
| 13 | 0x001A | Power factor PF | 2 | -1.0～1.0 | R | |
| 14 | 0x001C | Active power W | 2 | 0.000～9999 | R | |
| 15 | 0x001E | Reactive power Q | 2 | 0.000～9999 | R | |
| 16 | 0x0020 | Apparent power S | 2 | 0.000～9999 | R | |
| 17 | 0x0022 | KWh | 2 | 0.000～9999 | R | |
| | DW8 | DW9 | Reserve | | | |
| 18 | 0x0028 | | 2nd line LED display | 1 | 0～6 | R/W | Note① |
| 19 | 0x0029 | 0x0028 | 1st alarm model Ad1 | 1 | 0～13 | R/W | Note② |
| 20 | 0x002A | 0x0029 | 2nd alarm mode Ad2 | 1 | 0～13 | R/W | Note② |
| 21 | 0x002B | 0x002A | 1st alarm delay ALT1 | 1 | 0～255 | R/W | |
| 22 | 0x002C | 0x002B | 2nd alarm delay ALT2 | 1 | 0～255 | R/W | |
| 23 | 0x002D | 0x002C | Analog mode brM | 1 | 0～5 | R/W | Note③ |
| 24 | 0x002E | 0x002D | Menu lock code LCK | 1 | 0～255 | R/W | |
| 25 | 0x002F | 0x002E | Boad rate bAd | 1 | 0～1 | R | Note④ |
| 26 | 0x0030 | 0x002F | Meter address Add | 1 | 0～2 | R | |
| 27 | 0x0031 | 0x0030 | Odd-even adjustment digit PRTY | 1 | 0～2 | R | |
| 28 | 0x0032 | 0x0031 | Measure indication | 1 | 0～255 | R | Note⑤ |
| 29 | 0x0033 | 0x0032 | Meter description | 1 | 0xD8 | R | |

R:Ready; R/W:Read and Write

Note①:2nd line parameters display

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| | W | KWh | PF | A | VA | V | var |

Note②:Alarm mode

| Upper limit alarm | Communication value | Lower limit alarm | Communication value | Alarm item |
|---|---|---|---|---|
| VH | 0 | VL | 1 | Voltage |
| AH | 2 | AL | 3 | Current |
| PFH | 4 | PFL | 5 | Power factor |
| P-H | 6 | P-L | 7 | Active power |
| Q-H | 8 | Q-L | 9 | Reactive power |
| S-H | 10 | S-L | 11 | Appearant power |
| KWhH | 12 | KWhL | 13 | Kwh |

Note③:Analog mode

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

Note④:Baud rate

| Communication value | 0 | 1 |
|---|---|---|
| Menu display | 4.8 | 9.6 |

Note⑤:Measure indication

| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|
| AL2 | AL1 | var | V | VA | A | PF(KWh) | W |

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;
}
```