

EN8 Series Intelligent Digital Voltage/Ampere Meter User's Manual



Features

- ⊙ Accuracy:DC 0.2%F.S;AC 0.3%F.S
- ⊙ Two High/Low limit setting alarm output
- ⊙ With 4 digits/5 digits settable display function
- ⊙ With Analog output 4-20mA
- ⊙ RS485 communication interface, Modbus RTU protocol

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

■ Safe Caution

※ Please read the manual carefully before you use the meter!

Please comply with the below important points:

- ⚠ Warning An accident may happen if the operation does not comply with the instruction.
- ⚠ 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:

- ⚠ An accident danger may happen in a special condition.

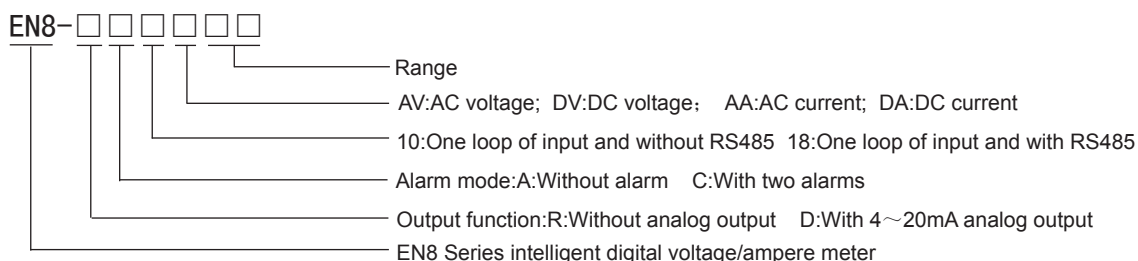
⚠ Warning

- 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, entertainment or safty 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 fire after the working life of the product becomes shorter.
- 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.

1.Code Illustration



2. Ordering Code

2.1 Intelligent digital voltage meter

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AV/DV2	2V	0.1mV	>2MΩ	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V
EN8-A18AV/DV2	2V	0.1mV	>2MΩ	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V
EN8-RC10AV/DV2	2V	0.1mV	>2MΩ	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V
EN8-RC18AV/DV2	2V	0.1mV	>2MΩ	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V
EN8-DC10AV/DV2	2V	0.1mV	>2MΩ	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V
EN8-DC18AV/DV2	2V	0.1mV	>2MΩ	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3V	3V

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AV/DV20	20V	1mV	>2MΩ	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V
EN8-A18AV/DV20	20V	1mV	>2MΩ	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V
EN8-RC10AV/DV20	20V	1mV	>2MΩ	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V
EN8-RC18AV/DV20	20V	1mV	>2MΩ	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V
EN8-DC10AV/DV20	20V	1mV	>2MΩ	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V
EN8-DC18AV/DV20	20V	1mV	>2MΩ	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	30V	30V

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AV/DV200	200V	1mV	>2MΩ	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V
EN8-A18AV/DV200	200V	1mV	>2MΩ	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V
EN8-RC10AV/DV200	200V	1mV	>2MΩ	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V
EN8-RC18AV/DV200	200V	1mV	>2MΩ	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V
EN8-DC10AV/DV200	200V	1mV	>2MΩ	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V
EN8-DC18AV/DV200	200V	1mV	>2MΩ	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300V	300V

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AV/DV600	600V	1mV	>4.5MΩ	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V
EN8-A18AV/DV600	600V	1mV	>4.5MΩ	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V
EN8-RC10AV/DV600	600V	1mV	>4.5MΩ	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V
EN8-RC18AV/DV600	600V	1mV	>4.5MΩ	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V
EN8-DC10AV/DV600	600V	1mV	>4.5MΩ	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V
EN8-DC18AV/DV600	600V	1mV	>4.5MΩ	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	700V	700V

2.2 Intelligent digital amepre meter

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AA/DA0.2	200mA	10μA	1Ω	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA
EN8-A18AA/DA0.2	200mA	10μA	1Ω	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA
EN8-RC10AA/DA0.2	200mA	10μA	1Ω	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA
EN8-RC18AA/DA0.2	200mA	10μA	1Ω	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA
EN8-DC10AA/DA0.2	200mA	10μA	1Ω	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA
EN8-DC18AA/DA0.2	200mA	10μA	1Ω	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	300mA	300mA

Code	Range	Resolution	Input impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AA/DA2	2A	100μA	0.2Ω	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A
EN8-A18AA/DA2	2A	100μA	0.2Ω	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A
EN8-RC10AA/DA2	2A	100μA	0.2Ω	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A
EN8-RC18AA/DA2	2A	100μA	0.2Ω	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A
EN8-DC10AA/DA2	2A	100μA	0.2Ω	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A
EN8-DC18AA/DA2	2A	100μA	0.2Ω	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	3A	3A

Code	Range	Resolution	AC impedance	Analog	Communication	Alarm	AC accuracy	DC accuracy	AC max input	DC max input
EN8-A10AA/DA5	5A	100μA	0.02Ω	without	without	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV
EN8-A18AA/DA5	5A	100μA	0.02Ω	without	with	without	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV
EN8-RC10AA/DA5	5A	100μA	0.02Ω	without	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV
EN8-RC18AA/DA5	5A	100μA	0.02Ω	without	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV
EN8-DC10AA/DA5	5A	100μA	0.02Ω	with	without	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV
EN8-DC18AA/DA5	5A	100μA	0.02Ω	with	with	with	±0.3%F.S±3Digits	±0.2%F.S±3Digits	5A	75mV

Illustration: (1) Ambient for accuracy testing: temperature 25±5℃,relative humidity:45~85%RH;Temperature for using ambient:0~50℃.

(2) As the above tables exemplified ,current transformer、potential transformer、current divider, all of their modes are ordinary . other range should be ordered ,such as the primary rated current:10A、15A、30A、75A、250A、1500A.....,DC primary rated current :10A、15A、75A、300A、1500A.....,AC primary rated voltage:1KV、6KV、11KV、35KV、110KV.....

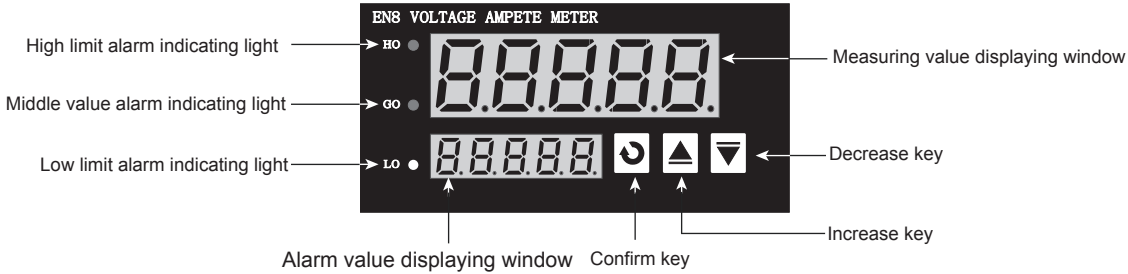
(3) If be equipped with AC current transformer ,the secondary rated current is 5A;equipped with AC voltage transformer,the secondary rated voltage is 100V;equipped with DC current divider ,the secondary rated voltage is 75mV , others should be ordered.

(4) Setting for CT ,please refer to the setting sequence of parameters .Input impedance is a referring value , actual details should be according to the factory register table .

3. Technic parameter

- 3.1、 Displaying range -19999~+99999.
- 3.2、 High/low limit alarm be settable , middle value alarm can also be set .Contact capacity is :AC 250V/3A, DC 30V/3A
- 3.3、 One loop of isolated analog output :DC 4~20mA, loading capacity ≤600Ω
- 3.4、 RS485 communication,adopt Modbus RTU protocol
- 3.5、 Sampling speed>2.5 times/s
- 3.6、 Accuracy level: 0.2/0.3
- 3.7、 Power supply: 100~240V AC/DC, power consume ≤10VA

4. Panel indication



5. Parameter Setting Operation

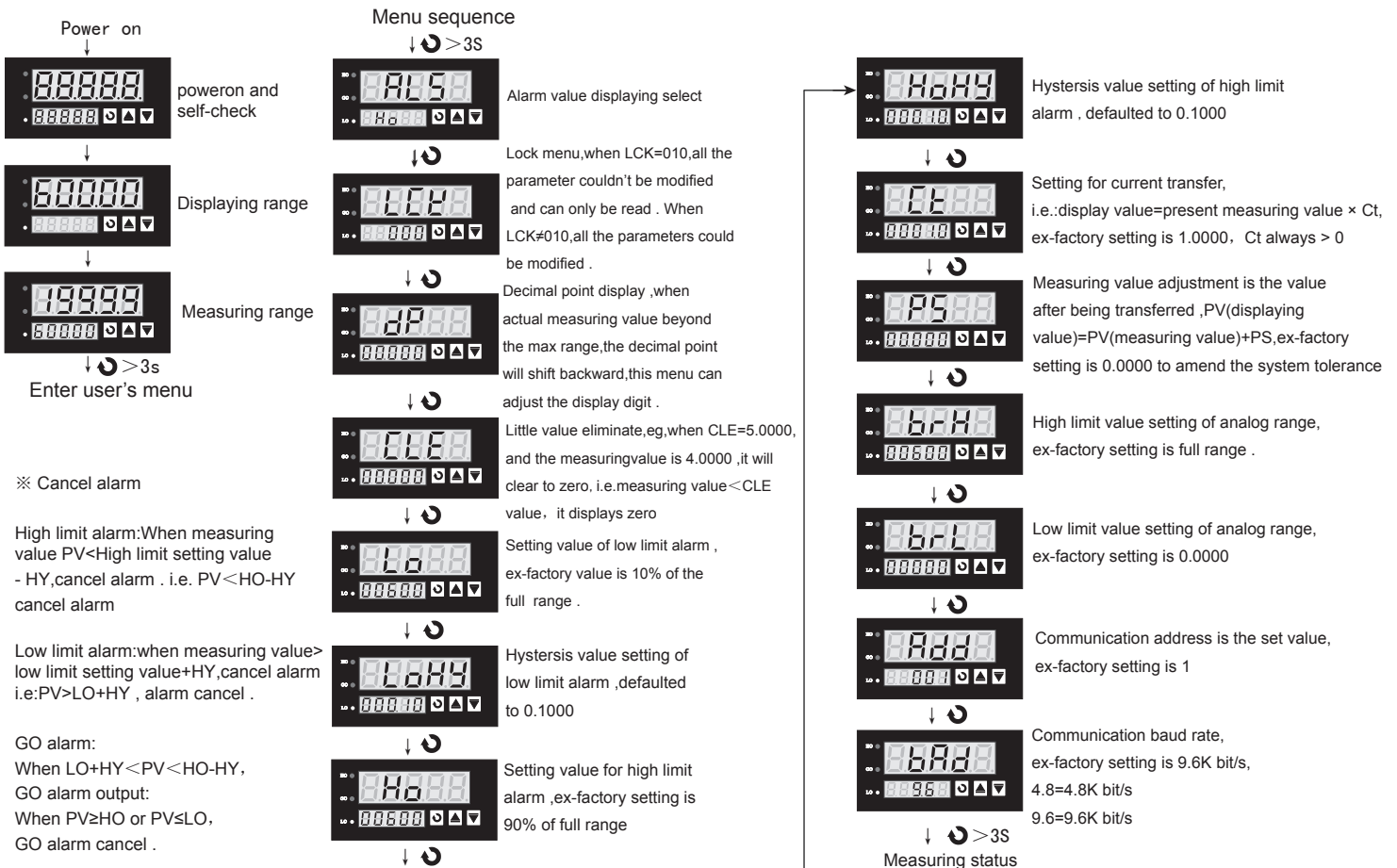
5.1、 Key function illustration

- “**⏻**” : Menu select or parameter confirm key .
- “**▲/▼**” : Parameter modifying key .Short press the key to modify the parameter value discontinuously; long press is to modify the parameter value continuously and short press can shift the decimal point .

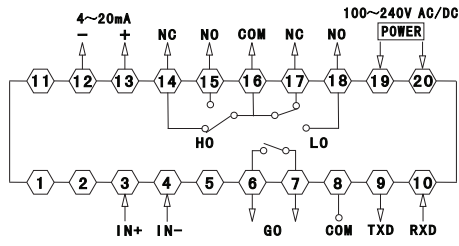
5.2、 Parameter modifying operation:

- A: Press **⏻** >3s to enter the main menu .
- B: Press **⏻** to select the need modified menu .
- C: Short press **▲/▼** to modify the value discontinuously , long press is to modify continuously ,then modify the needed parameter.
- D: Shift the decimal point :short prese **▼▲** at the same time to shift the decimal point to the needed position .
- E: After parameter value modifying completed ,press **⏻** to confirm ,and enter next menu .

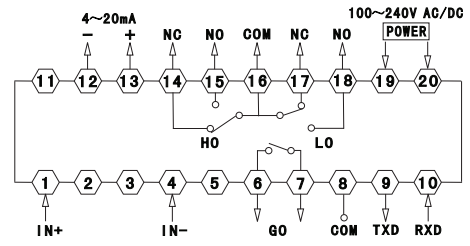
5.3、 On power status of the meter and menu sequence :



6.Connecting Drawing



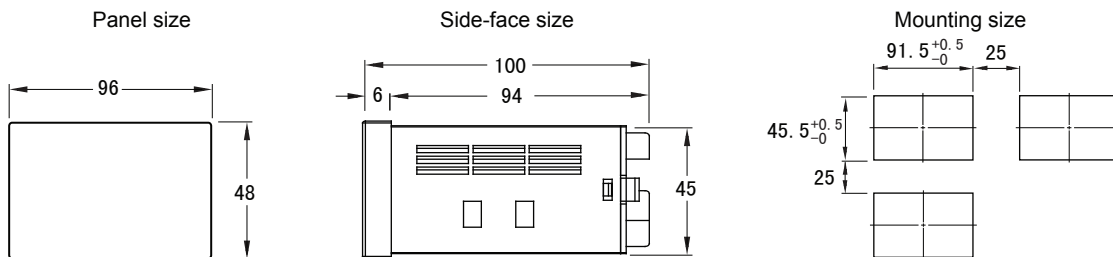
AC/DC Voltage/Ampere meter connecting drawing



AC currentt beyond 5A ampere meter connecting drawing

Note:please connect the wire subjecting to the diagram on the actual product if any changes.

7.Dimension (unit:mm)



8.Communication Parameter

EN8 series voltage/ampere meter adopts Modbus RTU communication protocol , conducting RS485 half-duplex commuication , read function code 0x03, write function code 0x10, adopt 16 bits CRC checking , it won't feedback when check error .

Data frame format :

start bit	data bit	end bit	check bit
1	8	1	without

Communication abnormality handling :

When answers abnormally ,set the highest bit of function code to 1 .eg:If the request function code from the host computer is 0x03,returned function code from the slave machine is 0x83.

Error type code:

0x01---Function code error: Meter does not support the function code it receives.

0x02---Data position error: The data position assigned by host is out of the range of the meter

0x03---Data value error: The data value sent from host is out of the range of the meter

CRC check code error , it won't feedback any data.

8.1. Read multi-register

For example: The master unit reads high limit of the measuring range FS (FS=200.00)

The address code of FS is 0x0009, because FS is floating data (4 bytes), it covers 2 data registers. According to IEEE-754 standard, the hexadecimal memory code of decimalist float 200.00 is 0x00004843

Master Unit request (Write multi-register)							
1	2	3	4	5	6	7	8
Meter address	Function code	High bit of start address	Low bit of start address	High bit of data byte length	Low bit of data byte length	Low bit of CRC code	High bit of CRC code
0x01	0x03	0x00	0x06	0x00	0x02	0x24	0x0A

Slave Unit normal answer (read multi-register)								
1	2	3	4	5	6	7	8	9
Meter address	Function code	Data byte length	High bit of data 1	Low bit of data 1	High bit of data 2	Low bit of data 2	Low bit of CRC code	High bit of CRC code
0x01	0x03	0x04	0x000	0x48	0x43	0x66	0x9E	0x7A

Function code abnormal answer:(eg:Master Unit requests function code is 0x04)

Slave Unit abnormal answer(read multi-register)				
1	2	3	8	9
Meter address	Function code	Error code	Low bit of CRC code	High bit of CRC code
0x01	0x04	0x01	0x82	0xC0

8.2. Write multi-register

For example: Master Unit writes float data LO (Alarm value 20.5). The address code of LO is 0x0001, because LO is float decimal data (4 bytes), covers 2 data registers. According to IEEE-754 standard, the hexadecimal memory code of decimalist float data 20.5 is 0x0000A441.

Mater Unit request (Write multi-register)												
1	2	3	4	5	6	7	8	9	10	11	12	13
Meter address	Function code	High bit of start address	Low bit of start address	High bit of data byte length	Low bit of data byte length	Data byte length	High bit of data 1	Low bit of data 1	High bit of data 2	Low bit of data 2	Low bit of CRC code	High bit of CRC code
0x01	0x10	0x00	0x01	0x00	0x02	0x04	0x00	0x00	0xA4	0x41	0x88	0x93

Slave Unit normal answer (Write multi-register)							
1	2	3	4	5	6	7	8
Meter address	Function code	High 8 bits of start address	Low 8 bits of start address	High bit of data byte length	Low bit of data byte length	Low bit of CRC code	High bit of CRC code
0x01	0x10	0x00	0x01	0x00	0x02	0x10	0x08

Data position error answer

Meter abnormal answer (Read multi-register)				
1	2	3	8	9
Meter address	Function code	Error code	Low bit of CRC code	High bit of CRC code
0x01	0x90	0x02	0xCD	0xC1

EN8parameter address reflection table

No.	Address code	Variable name	Byte length	Value range	Read/Write allow	Remark
0	0x0000	Zero point shielding value CLE	2	0~9999	R/W	
1	0x0001	Low limit alarm value LO	2	-19999~99999	R/W	
2	0x0002	Low limit alarm hysteresis LOHY	2	-19999~99999	R/W	
3	0x0003	High limit alarm value HO	2	-19999~99999	R/W	
4	0x0004	Coefficient setting CT	2	-19999~99999	R/W	
5	0x0005	High limit alarm hysteresis HOHY	2	-19999~99999	R/W	
6	0x0006	Amendment value PS	2	-19999~99999	R/W	
7	0x0007	High limit value of analog BRH	2	-19999~99999	R/W	
8	0x0008	Low limit value of analog BRL	2	-19999~99999	R/W	
9	0x0009	Full measuring range FS	2	-19999~99999	R	
10	0x000A	Actual measuring range	2	-19999~99999	R	
Reservation						
20	0x0014	Alarm parameter display setting ALS	1	0~2	R/W	
21	0x0015	Baud rate bAd	1	0~1	R/W	
22	0x0016	Communication address setting ADD	1	0~255	R/W	
23	0x0017	Decimal point setting DP	1	0~4	R/W	
24	0x0018	Menu locking LCK	1	0~255	R/W	
23	0x0019	Status of the meter STATUS	1	0~255	R	Note①
24	0x001A	Name of the meter NAME	1	0xD5	R	
Reservation						

Remark: Address code is the index of variable array

R/W---Read and Write R---Read only

Note①

Measuring status indication

D7	D6	D5	D4	D3	D2	D1	D0
					G0	H0	L0

The program of 4 byte character code float data converts to decimalist float data

```
float BytesToFloat(unsigned char *pch)
{
    float result;
    unsigned char *p;
    p=(unsigned char *)&result;
    *p=*pch; *(p+1)=*(pch+1); *(p+2)=*(pch+2); *(p+3)=*(pch+3);
    return result;
}
```

The program of decimalist float data converts to 4 byte character code as IEEE-754 standards .

```
void FloatToChar(float Fvalue, unsigned char *pch)
{
    unsigned char *p;
    p=(unsigned char *)&Fvalue;
    *pch=*p; *(pch+1)=*(p+1); *(pch+2)=*(p+2); *(pch+3)=*(p+3);
}
```

Program of obtaining 16 digits CRC checking 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;
}
```