

# DP5 Series Intelligent Digital Voltage & Ampere Meter

## User Manual



### Features:

- ⊙ Accuracy: DC: 0.2%F.S; AC: 0.3%F.S;
- ⊙ With Upper, Middle, Lower Alarm Output Function;
- ⊙ 4 digit and 5 digit display can be changeable;
- ⊙ With 4-20mA current analog output;
- ⊙ RS485 Communication, Modbus RTU protocol;

**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.
⚠	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.

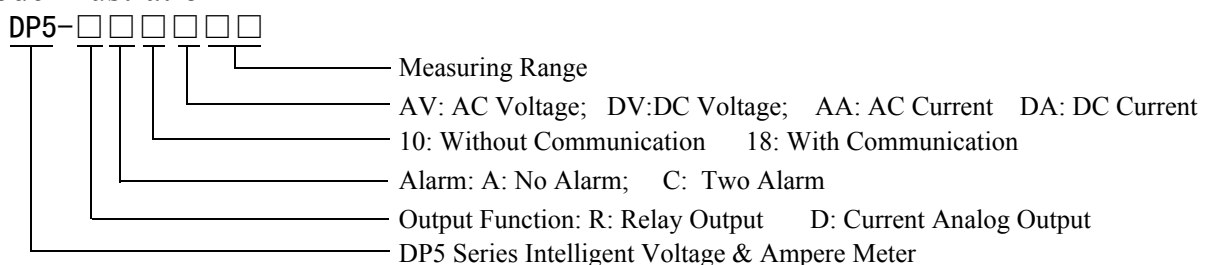
### ⚠ Warning

1. A safety 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 mm<sup>2</sup>) 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.

### 1. Code Illustration



## 2. Model & Illustration

### ◆ Intelligent Digital Voltage Meter

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	CT	Max. Input
DP5-A10AV/DV2	2V	0.1mV	>2MΩ	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V
DP5-A18AV/DV2	2V	0.1mV	>2MΩ	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V
DP5-RC10AV/DV2	2V	0.1mV	>2MΩ	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V
DP5-RC18AV/DV2	2V	0.1mV	>2MΩ	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V
DP5-DC10AV/DV2	2V	0.1mV	>2MΩ	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V
DP5-DC18AV/DV2	2V	0.1mV	>2MΩ	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3V

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	CT	Max. Input
DP5-A10AV/DV20	20V	1mV	>2MΩ	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V
DP5-A18AV/DV20	20V	1mV	>2MΩ	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V
DP5-RC10AV/DV20	20V	1mV	>2MΩ	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V
DP5-RC18AV/DV20	20V	1mV	>2MΩ	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V
DP5-DC10AV/DV20	20V	1mV	>2MΩ	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V
DP5-DC18AV/DV20	20V	1mV	>2MΩ	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	30V

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	CT	Max. Input
DP5-A10AV/DV200	200V	1mV	>2MΩ	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V
DP5-A18AV/DV200	200V	1mV	>2MΩ	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V
DP5-RC10AV/DV200	200V	1mV	>2MΩ	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V
DP5-RC18AV/DV200	200V	1mV	>2MΩ	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V
DP5-DC10AV/DV200	200V	1mV	>2MΩ	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V
DP5-DC18AV/DV200	200V	1mV	>2MΩ	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300V

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	CT	Max. Input
DP5-A10AV/DV600	600V	1mV	>5.1MΩ	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V
DP5-A18AV/DV600	600V	1mV	>5.1MΩ	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V
DP5-RC10AV/DV600	600V	1mV	>5.1MΩ	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V
DP5-RC18AV/DV600	600V	1mV	>5.1MΩ	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V
DP5-DC10AV/DV600	600V	1mV	>5.1MΩ	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V
DP5-DC18AV/DV600	600V	1mV	>5.1MΩ	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	700V

### ◆ Intelligent Digital Ampere Meter

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	PT	Max. Input
DP5-A10AA/DA0.2	200mA	10μA	1Ω	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA
DP5-A18AA/DA0.2	200mA	10μA	1Ω	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA
DP5-RC10AA/DA0.2	200mA	10μA	1Ω	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA
DP5-RC18AA/DA0.2	200mA	10μA	1Ω	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA
DP5-DC10AA/DA0.2	200mA	10μA	1Ω	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA
DP5-DC18AA/DA0.2	200mA	10μA	1Ω	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	300mA

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	PT	Max. Input
DP5-A10AA/DA2	2A	100μA	0.2Ω	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A
DP5-A18AA/DA2	2A	100μA	0.2Ω	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A
DP5-RC10AA/DA2	2A	100μA	0.2Ω	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A
DP5-RC18AA/DA2	2A	100μA	0.2Ω	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A
DP5-DC10AA/DA2	2A	100μA	0.2Ω	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A
DP5-DC18AA/DA2	2A	100μA	0.2Ω	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	3A

Model	Range	Resolution	Impedance	Analog	Communication	Alarm	Accuracy	PT	Max. Input
DP5-A10AA/DA5	5A	100μA	0.02Ω	No	No	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A
DP5-A18AA/DA5	5A	100μA	0.02Ω	No	YES	No	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A
DP5-RC10AA/DA5	5A	100μA	0.02Ω	No	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A
DP5-RC18AA/DA5	5A	100μA	0.02Ω	No	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A
DP5-DC10AA/DA5	5A	100μA	0.02Ω	YES	No	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A
DP5-DC18AA/DA5	5A	100μA	0.02Ω	YES	YES	YES	AC:±0.3%F.S±3Digit DC:±0.2%F.S±3Digit	Direct Input	5A

Note: 1. Environment condition for Measuring Accuracy: Temperature: 25±5℃ R.H.:45-85% R.H, Ambient temperature:0~50℃

2. CT/PT that be mentioned in the grid are normal models, we can also provide following models according to customers' needs: Rated Current AC: 10A,15A, 30A,75A,250A,1500A,...., Rated Current DC: 10A,15A,75A,300A,1500A,...., Rated Voltage AC:1KV,6KV,11KV,35KV,110KV,....

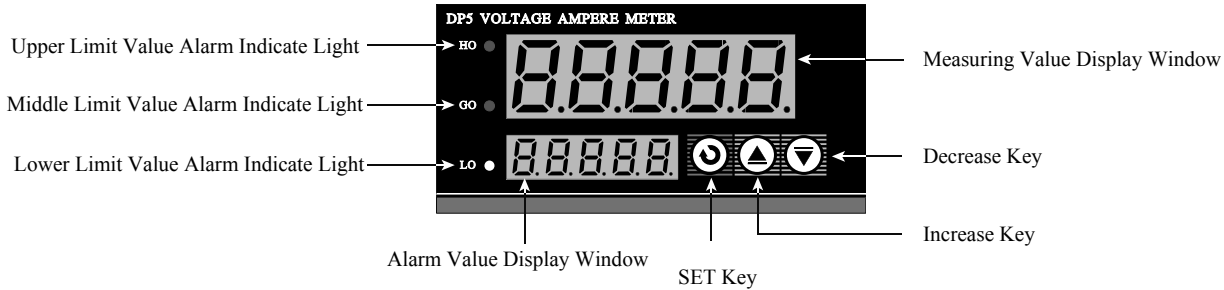
3. Rated Secondary Current for AC Current PT is 5A, Rated Secondary Voltage for AC Voltage Transformer is 100V, Rated Secondary Voltage for DC Current CT is 75mV, customers should specially indicate when their Rated Secondary Voltage and Ampere is different from that we showed.

4. CT setting please reference 4.3 meter's parameter reference procedure, the input resistance just for reference, if there is any change, please reference to our EX-factory meter.

### 3. Technical Specification

- 3.1 Measuring Range: 0~±99999;
- 3.2 With 5 digit programmable setting Upper, Middle, Lower alarm output, terminal capacity: AC: 250V/3A, DC: 30V/3A;
- 3.3 With 4~20mA current analog output, which can be set to 0~10mA or 0~20mA output, Load resistance ≤600Ω;
- 3.4 RS485 communication, Standard Modbus RTU Protocol;
- 3.5 Sampling Rate >2.5 times/S;
- 3.6 Measuring Accuracy: 0.1%F.S≤Basic Accuracy≤0.3%F.S;
- 3.7 Power Supply: 100~240V AC/DC, Consumption≤10VA;

### 4. Panel Instruction



### 5. Menu Parameter Setting Operation

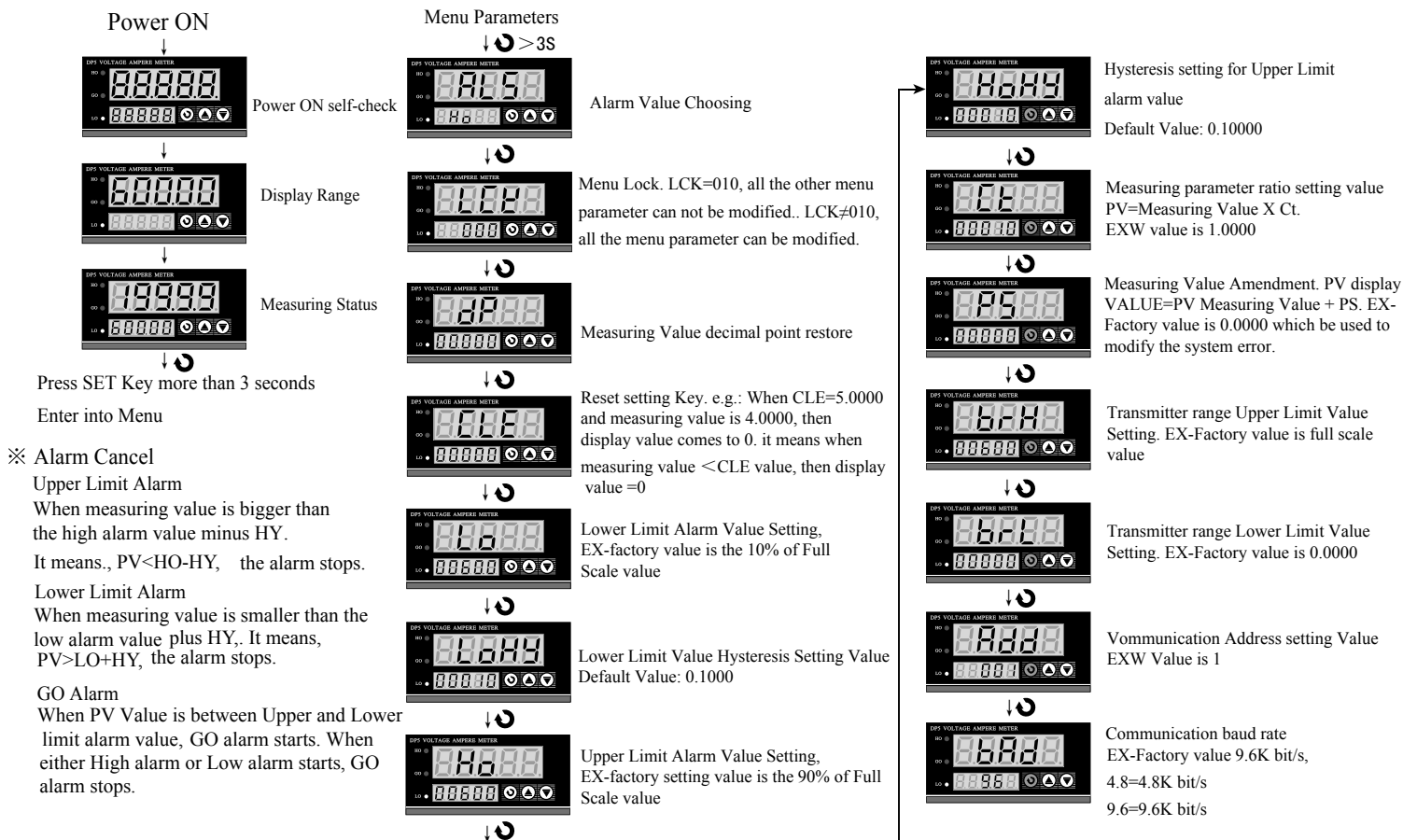
#### 5.1 Press Key Function Illustration

- “” : Parameter choosing or Mode setting Key
- “” : Parameter Increase/Decrease Key. Short press for slow modify; long time press for quick modify; press two key at the same time for moving decimal point.

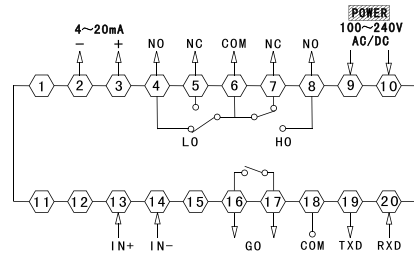
#### 5.2 Parameter modify operation

- A: Press Key more than 3S to enter into setting menu;
- B: Press Key to choose the parameter which need to be modified;
- C: Short press Key for slow modify, long time press for quick modify;
- D: Modify decimal point: Short press Key at the same time, move the decimal point to the place where you need;
- E: After each operation, press Key for confirmation, then turn to the next menu.

#### 5.3 Power On & Menu Procedure

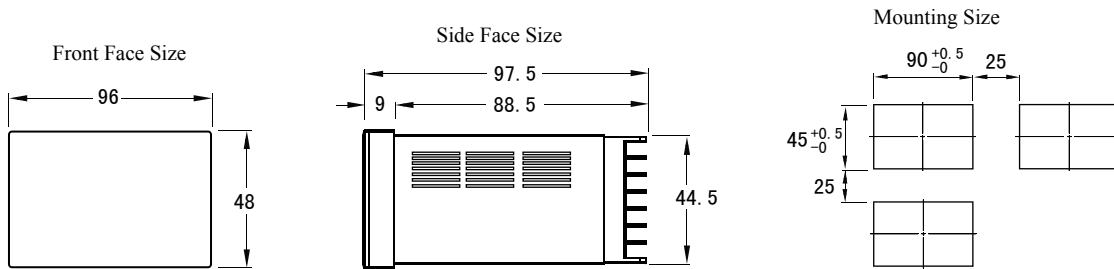


## 6. Connection Drawing



Note: If there is any change, please subject to the drawing on the meter!

## 7. Dimension



## 8. Communication

DP5 Series Voltage & Ampere meter using Modbus RTU communication protocol, and it can run RS485 half-duplex communication. Read function code is 0x03, write function code is 0x10, 16-bit CRC checking is applied. The meter can not return error message

**Data Frame flag:**

Start bit	Data bit	Stop bit	Check bit
1	8	2	None

Sign of communication failure :

When get the incorrect return, the value of function code Hi will be 1. For example, the request function code from the host computer is 0x04, the return function code from the meter will be 0x84.

Error type code:

0x01---Function code error: counter cannot support receipt function code.

0x02---Data location error: the request data location from host computer exceeds the range of the counter.

0x03---Data value error: the data value sent by host computer exceeds the data range of the counter.

### 1. Read Multiple Registers

For example: The host computer read the measuring range upper limit FH1 (FH1=200.00)

Address code of FH1 0x0006, for FH1 is float number (4 bits), it will occupy 2 data register.

Reference IEEE-754 standard hexadecimal 16 result of the decimal float number is 0x00004843.

Request from the host computer (Read Multiple registers)							
1	2	3	4	5	6	7	8
Unit Address	Function Code	Start Address High	Start Address Low	Data Length High	Data Length Low	CRC Code Low	CRC Code High
0x01	0x03	0x00	0x06	0x00	0x02	0x24	0x0A

Correct answer from slave unit (Read Multiple Registers)								
1	2	3	4	5	6	7	8	9
Unit Address	Function Code	Data Byte Number	Data 1 High Byte	Data 1 Low Byte	Data 2 High Byte	Data 2 Low Byte	CRC Code Low	CRC Code High
0x01	0x03	0x04	0x00	0x48	0x43	0x66	0x9E	0x7A

Function code abnormal answer:(For example, host request function code is 0x04)

Meter abnormal answer(Read multi-register)				
1	2	3	4	5
Meter address	Function code	Error code	CRC code Low bit	CRC code high bit
0x01	0x84	0x01	0x82	0xC0

## 2. Write multi-register

For example: Host reads float data HY1 (1st alarm hysteresis value 20.5). The address code of HY1 is 0x0001, because HY1 is float data (4 bytes),seizes 2 data registers. According to IEEE-754 standard, the hexadecimal memory code of decimalist float data 20.5 is 0x0000A441.

Host request (Write multi-register)												
1	2	3	4	5	6	7	8	9	10	11	12	13
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	Data 2 high bit	Data 2 low bit	CRC code Low bit	CRC code high bit
0x01	0x10	0x00	0x01	0x00	0x02	0x04	0x00	0x00	0xA4	0x41	0x88	0x93

Meter 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	0x00	0x01	0x00	0x02	0x10	0x08

Data position error answer:(For example, host request write address index is 0x0050)

Meter 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

## Table for DP5

Note: The address code is the reference of Variable

Code	Reference	Name of Variable	Length	Range	Read-W	Note
0	0x0000	Zero Point Hiden Value ALE	2	0~9999	R/W	
1	0x0001	Lower Alarm Value LO	2	-19999~99999	R/W	
2	0x0002	Lower Alarm Hysteresis Value LOHY	2	-19999~99999	R/W	
3	0x0003	Upper Alarm Value HO	2	-19999~99999	R/W	
4	0x0004	Ratio Setting CT	2	-19999~99999	R/W	
5	0x0005	Upper Alarm Hysteresis Value HOHY	2	-19999~99999	R/W	
6	0x0006	Deviation Modeify Value PS	2	-19999~99999	R/W	
7	0x0007	Transmit Upper Limit Value BRH	2	-19999~99999	R/W	
8	0x0008	Transmit Lower Limit Value BRL	2	-19999~99999	R/W	
9	0x0009	Full Scale FS	2	-19999~99999	R	
10	0x000A	Actual Measuring Value	2	-19999~99999	R	
Reserved						
20	0x0014	Alarm Parameter Setting ALS	2	0~2	R/W	
21	0x0015	Band Ratio bAd	2	0~1	R/W	
22	0x0016	Communication Address Setting ADD	2	0~255	R/W	
23	0x0017	Decimal Point Setting DP	2	0~4	R/W	
24	0x0018	Menu Lock LCK	2	0~255	R/W	
23	0x0019	Meter Status STATUS	2	0~255	R	Note ①
24	0x001A	Meter Name NAME	2	0xD5	R	
Reserved						

R/W---Read and Write R---Read Only

Note ①

Measuring Status Indicate

D7	D6	D5	D4	D3	D2	D1	D0
					G0	H0	L0

Procedure of 4-byte character code

points into a floating-point number expressed in decimal floating-point

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;
}
```

Procedure of decimal floating-point expressed in 4-byte character code

floating-point number according to IEEE-754 Standard

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);
}
```

16-bit checksum for CRC programs

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;
}
```