

Digital Voltage/Ampere Meter Instruction Manual



Features:

- ⊙ True virtual value and average value measurement are available.
- ⊙ Free setting of voltage/ampere range ratio
- ⊙ 5 digits thumb switch, high/middle/low three group of relay control output, easy operation
- ⊙ Tracking and holding function
- ⊙ Isolated analog 4 ~ 20mA output
- ⊙ Widely used in electronic and machinery industries for auto-inspection.
- ⊙ RS485 communication
- ⊙ 400Hz middle frequency can be ordered

For your safety, please read following content carefully before the meter is used!

■ Safe Caution

* Please read the manual carefully before using the meter.

※ Please comply with the below important points.

△ Warning Accident may happens if the operation does not comply with the instruction.

△ Notice Operation that does not comply with the instruction may lead to product damage.

* The instruction of the symbol in the manual is as below.

△ Accident danger may happen in a special condition.

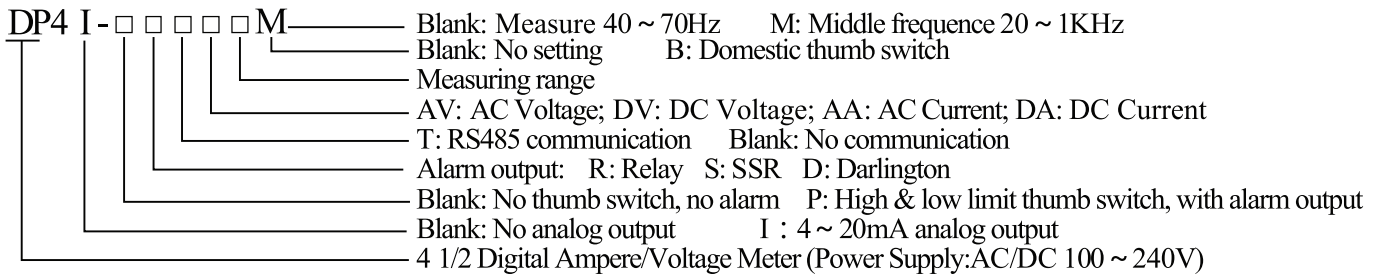
△ Warning

1. A safety protection equipment must be installed if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation, entertainment or safety device etc, or please contact us for the relative information. 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 terminals 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 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.
6. When use the high low limit alarm, first please wait until the meter is booted and stabilized, then connect to the input signal and set the high low limit hysteresis value, at last the meter can be connected to the controlled device.

△ Caution

1. This product cannot be used outdoor, 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 (0.5mm²) 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 shorten the lifespan of the meter and cause fire.
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 soft cloth with water or alcohol to clean the plastic cover.

I. Model



II. Model & Illustration

◆AC Digital Voltage Meter

Model	Range	Resolution	Input Impedance	PT	Accuracy	Max. Input
DP4(I)-AV20	20V	1mV	1.2M	Direct Input	±0.1%F.S±3Digits	200V
DP4(I)-AV200	200V	10mV	12M	Direct Input	±0.1%F.S±3Digits	1000V
DP4(I)-AV600	600V	100mV	12M	Direct Input	±0.2%F.S±3Digits	1000V
DP4(I)-AV3K	3KV	1V	12M	3KV/100V	±0.2%F.S±3Digits	1000V
DP4(I)-AV10K	10KV	1V	12M	10KV/100V	±0.2%F.S±3Digits	1000V

Note: "I" in the bracket means analog 4~20mA output, if the user do not need this function, please neglect it. For example: DP4I-PRTAV20B means that it is a 4 1/2 voltage meter with domestic high low limit thumb switch, relay output and communication function, with 4~20mA analog output, AC 20V input.

◆AC Digital Ampere Meter

Model	Range	Resolution	Input Impedance	PT	Accuracy	Max. Input
DP4(I)-AA0.2	200mA	10μA	0.8Ω	Direct Input	±0.1%F.S±3Digits	500mA
DP4(I)-AA2	2A	100μA	0.1Ω	Direct Input	±0.1%F.S±3Digits	3A
DP4(I)-AA□	Range can be set freely	Vary with range	0Ω	5A	±0.1%F.S±3Digits	5A

◆DC Digital Voltage Meter

Model	Range	Resolution	Input Impedance	Accuracy	Max. Input
DP4 (I)-DV0.02	20mV	1μV	1M	±0.1%F.S±3Digits	5V
DP4 (I)-DV0.2	200mV	10μV	1M	±0.1%F.S±3Digits	10V
DP4 (I)-DV2	2V	0.1mV	1.2M	±0.1%F.S±3Digits	20V
DP4 (I)-DV20	20V	1mV	12M	±0.1%F.S±3Digits	200V
DP4 (I)-DV200	200V	10mV	12M	±0.1%F.S±3Digits	300V
DP4 (I)-DV500	500V	100mV	12M	±0.2%F.S±3Digits	750V
DP4 (I)-DV□	User divider to ratio 100V and input to the meter	Vary with range	12M	±0.2%F.S±3Digits	200V

◆DC Digital Ampere Meter

Model	Range	Resolution	Input Impedance	PT	Accuracy	Max. Input
DP4(I)-DA0.0002	200uA	10nA	1.2K	Direct Input	±0.1%F.S±3Digits	10mA
DP4(I)-DA0.002	2mA	100nA	200Ω	Direct Input	±0.1%F.S±3Digits	100mA
DP4(I)-DA0.02	20mA	1μA	20Ω	Direct Input	±0.1%F.S±3Digits	500mA
DP4(I)-DA0.2	200mA	10μA	2Ω	Direct Input	±0.1%F.S±3Digits	1A
DP4(I)-DA2	2A	100μA	0.1Ω	Direct Input	±0.1%F.S±3Digits	5A
DP4(I)-DA□	User diverter to input, ratio set by user	Vary with range	1M	75mV	±0.1%F.S±3Digits	5V

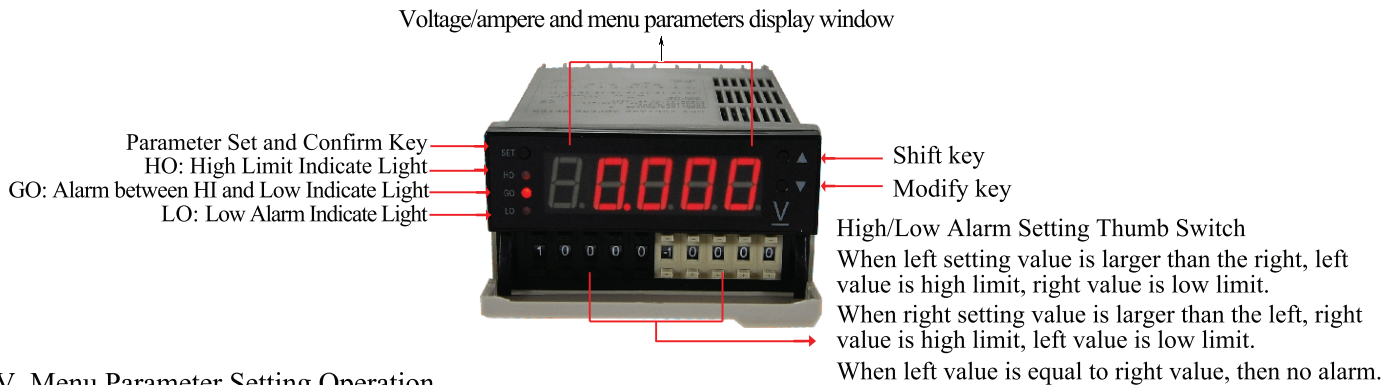
Illustration:

- Environment condition for Measuring Accuracy: Temperature: 25±5 °C R.H.:45-85%. The using environment temperature is 0-50 °C , R.H.:60%±15%.
- CT,PT,divider that are 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,....
- Rated Secondary Current for AC Current CT 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.
- PT setting please refer to 5.3 meter's parameter setting. Input impedance generally as for reference, please refer to the parameter on the meter!

III. Technical Specification:

- Measuring Range:0 ~ ±19999.
- With two sets of 5 digits thumb switch to set the high/low/intermediate alarm output, contact capacity AC 250V/1A, DC 30V/1A.
- Isolated 4 ~ 20mA analog output, load resistance≤600Ω.
- With RS485 communication and Modbus RTU protocol
- Sampling speed: 51.2us/time
- Measuring accuracy: according to above model illustration, 0.1%F.S≤basic accuracy≤0.2%F.S.
- Power supply: AC/DC 100 ~ 240V, power consumption:≤3VA

IV. Panel Instruction



V. Menu Parameter Setting Operation

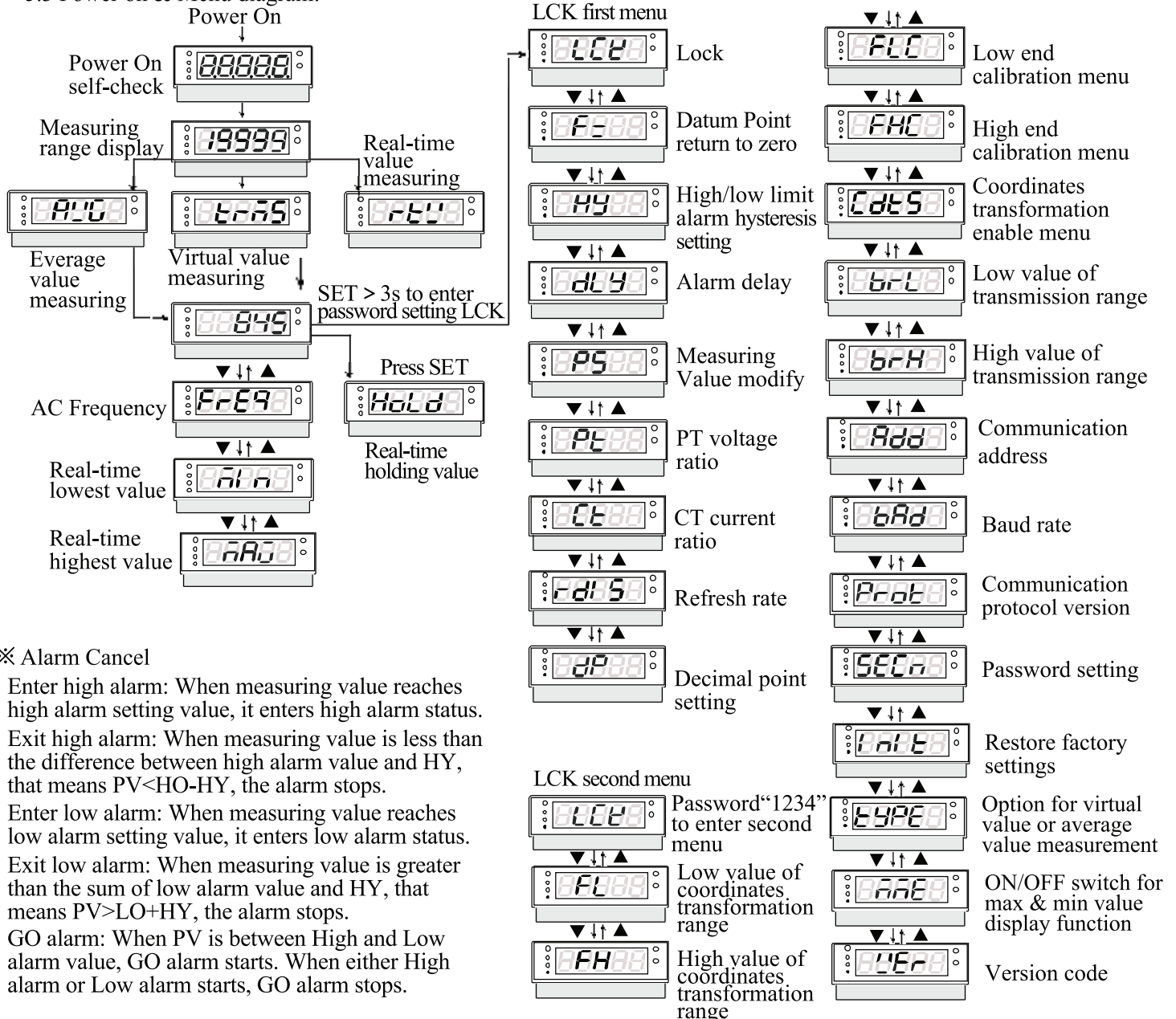
5.1 Key Function Illustration:

- A: SET: Parameter select & Mode setting Key
- B: ▼: Increase key
- C: ▲: Shift key

5.2 Parameter Modify Operation:

- A : Press SET > 3s to enter LCK menu, enter password 1234 and pres SET key to enter settig menu.
- B : Press “▲” “▼” to switch menu, if you want to check the set value, press SET key to enter and exit.
- C : After enter the set value checking status, press “▼” key to modify current value, press “▲” key to shift the digit.
- D : For the modification of menu value, press “▲” to shift digit, press “▼” to modify the value. After modification, press SET key to confirm and exit.
- E : After the parameter is modified, long press SET key to exit modification and enter measuring status.

5.3 Power on & Menu diagram:



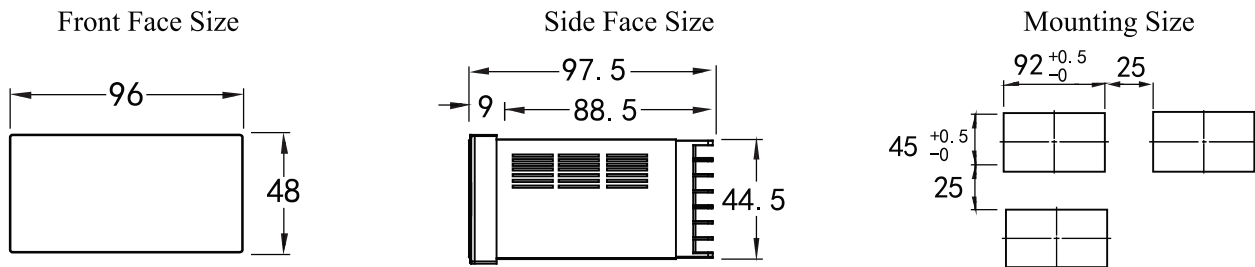
※ Alarm Cancel

Enter high alarm: When measuring value reaches high alarm setting value, it enters high alarm status.
 Exit high alarm: When measuring value is less than the difference between high alarm value and HY, that means $PV < HO - HY$, the alarm stops.
 Enter low alarm: When measuring value reaches low alarm setting value, it enters low alarm status.
 Exit low alarm: When measuring value is greater than the sum of low alarm value and HY, that means $PV > LO + HY$, the alarm stops.
 GO alarm: When PV is between High and Low alarm value, GO alarm starts. When either High alarm or Low alarm starts, GO alarm stops.

VI. Menu

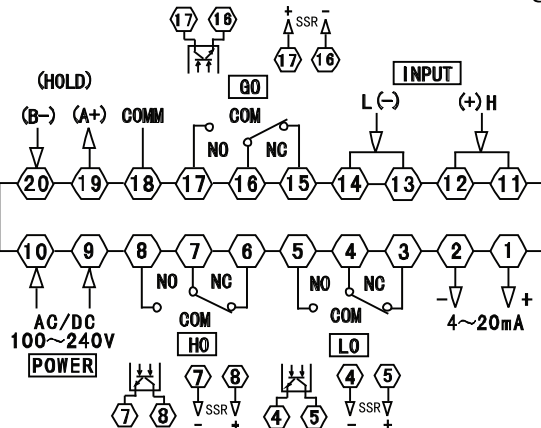
Name	Illustration	
rcv	Real-time value measurement, effective to DC meter.	
trms	This menu means current status is virtual value measurement. Factory default is virtual value measurement, effective to AC meter.	
AVG	This menu means current status is average value measurement. If need average value measurement, please enter setting menu TYPE to change the parameter to AVG, effective to AC meter.	
FREQ	AC frequency measurement menu. Measuring the real-time AC frequency, effective to AC meter.	
min	Real-time lowest value measurement menu. Press SET key to refresh; factory default is close; if need this function, please activate MME function on setting menu.	
max	Real-time highest value measurement menu. Press SET key to refresh; factory default is close; if need this function, please activate MME function on setting menu.	
Hold	Holding value display menu. Under measuring status, press SET key to enter real-time value holding status; if want to cancel this status, press SET key again.	
Note	Illustration (① and ②) mean LCK first menu and second menu respectively.)	Factory default
LCK ①	Set menu password lock.	
FC ①	Datum Point return to zero setting, range: datum point ± 99 character, this function can force the value within the range return to zero.	0
HY ①	High/low alarm hysteresis setting, if no thumb switch or alarm, this function will be invalid. (≤ 2000)	5
DLY ①	Alarm delay setting, setting range 0.01~60.00S	0
PS ①	Translation correction of measured value; it is correction value after ratio calculation; it is used to correct system deviation; PV display value=PV measured value + correction value, setting range ± 1000	0
PE ①	Voltage ratio menu, value correspond to input signal high end, valid for voltage meter (≤ 19999)	Follow fixed range
CE ①	Current ratio menu, value correspond to input signal high end, valid for ampere meter (≤ 19999)	Follow fixed range
rdi S ①	Display refreshing speed, set value stands for the refreshing times of measured value of per second, setting range 1-9	5
DP ①	Decimal point setting menu, DIS is automatic change decimal point, 0/1/2/3/4 means how many decimal to be set.	DIS
LCK ②	Set menu password as 1234 to enter second menu, the value can be modified on secn menu (0~99999)	1234
FL ②	Coordinates transformation low limit menu, display value corresponds to low signal value while calibrating FLC. (-19999~99999)	0
FH ②	Coordinates transformation high limit menu, display value corresponds to high signal value while calibrating FHC. (-19999~99999)	Full range
FLC ②	Low input calibration menu, operation method: press SET key, press shift key “▲” to flash, input low signal, and press SET key to confirm.	
FHC ②	High input calibration menu, operation method: press SET key, press shift key “▲” to flash, input high signal, and press SET key to confirm.	
Cdts ②	Coordinates transformation enable menu, if user needs this function, please set this menu as yes, then menus FL, FH, FLC, FHC will be effective; user can calibrate and modify FL, FH menu based on their usage.	no
brL ③ ②	Transmission range low limit value setting (-19999 ~ 99999)	0
brH ②	Transmission range high limit value setting (-19999 ~ 99999)	Full range
Add ②	Communication address setting, range 1~254.	1
baD ②	Baud rate setting, 9.6=9.6K bit/s , 4.8=4.8K bit/s; if choose high speed module, baud rate can reach 115K bit/s.	9.6K
Prot ②	Communication protocol data format. a & b are long integer data (long), a means high bit ahead, low bit behind; b means low bit ahead, high bit behind. c & d are floating point data; c means high bit ahead; d means low bit ahead.	b
SECr	Password setting menu. Can set the LCK password here (0~99999).	1234
init ②	Restore factory default setting. Press shift key “▲” to flash “sure”, press SET key to confirm and exit.	
TYPE ②	Option menu for virtual value or average value measurement; virtual value: trms, average value: avg.	trms
max ②	On/off menu for max/minvalue display function, no: close, yes: panel displays max/min value, rHmax: holding max value on back-end, rHmin: holding min value on back-end.	no
VER ②	Version code	

VII. Dimension (unit: mm)



VIII. Connection Drawing

Note: Can only choose either communication function or holding function.



IX. Communication Protocol

DP4 series adjustor follow 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 coulometer can not return error message.

Data Frame format:

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

Handling of abnormal communication:

If there is abnormal response, put 1 on the highest bit of function code. For example, the request function code from the host is 0x04, the return function code from the slave will be 0x84.

Error type code:

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

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

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

CRC check code error, do not return data.

1. Read multi registers

For example: host reads transmission range high limit value BRH (BRH=19999)

BRH address code is 0x4814, because BRH is (4 byte), seizes 2 data registers. The hexadecimal memory code of decimal number 19999 is 4EIF.

Request from host (Read multi registers)							
1	2	3	4	5	6	7	8
Meter address	Function code	Start address high bit	Start address low bit	Data byte length high bit	Data byte length low bit	CRC code low bit	CRC code high bit
0x01	0x03	0x48	0x14	0x00	0x02	0x93	0xAF

Slave normal answer(Read multi registers)								
1	2	3	4	5	6	7	8	9
Meter address	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	0x4E	0x1F	0x00	0x00	0xDC	0xDD

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

Slave abnormal answer(Read multi registers)				
1	2	3	8	9
Meter address	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x84	0x01	0x82	0xC0

2. Write Multiple Registers

For example: Host HY (Hysteresis of alarm value is 20)

The address code of HY is 0x480A, because HY is (4 byte), seizes 2 data registers. The hexadecimal memory code of decimal number 20 is 0x0014.

Host request (Write multi registers)												
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 low bit	CRC high bit
0x01	0x10	0x48	0x0A	0x00	0x02	0x04	0x00	0x14	0x00	0x00	0x65	0xD7

Slave normal answer(write multi registers)							
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	0x48	0x0A	0x00	0x02	0x76	0x6A

Data position error answer

Slave abnormal answer(Read multi registers)				
1	2	3	8	9
Meter address	Function code	Error code	CRC code low bit	CRC code high bit
0x01	0x90	0x02	0xCD	0xC1

DP4 Series reference address table

No.	Reference address	Name of Variable	Data Length	Value Range	Read / Write	Remark
0	0	Serial number	3		R	
1	0x4000	Voltage	2		R	
2	0x400C	Current	2		R	
3	0x4032	Frequency	2		R	
4	0x4800	Voltage ratio PT	2	Full range positive value (19999)	R/W	
5	0x4804	Current ratio CT	2	Full range positive value (19999)	R/W	
6	0x4808	Alarm high limit	2	Full range positive value	R	
7	0x480a	Alarm hysteresis HY	2	Full range value (≤2000)	R/W	
8	0x480c	Alarm low limit	2	Full range negative value	R	
9	0x4814	Transimission range high limit BRH	2	Full range positive value	R/W	
10	0x4816	Transimission range low limit BRL	2	Full range negative value	R/W	
11	0x4820	Voltage translation modification PS	2	-1000 ~ 1000	R/W	
12	0x4826	Current translation modification PS	2	-1000 ~ 1000	R/W	
13	0x4902	Alarm delay DLY	1	0 ~ 9	R/W	
14	0x4a01	Address ADD	1	1 ~ 254	R/W	
15	0x4a02	Baud rate BAD	1	0 ~ 6	R/W	0:2400, 1:4800, 2:9600, 3:19200, 4:38400, 5:57600, 6:115200
16	0x4a09	Protocol version TROT	1	A、 B、 C、 D	R/W	
17	0x4a0a	Refresh rate RDIS	1	1 ~ 9	R/W	
18	0x4a0b	Return to zero range FZ	1	0 ~ 9	R/W	
19	0x4a0c	Type(Average value, H virtual value) type	1	0 ~ 1	R/W	0: virtual value trms 1: average avg
20	0x4a0d	Max/min value enable MME	1	0 ~ 3	R/W	0:no 1:yes 2:rHmax 3:rHmin
21	0x4a0e	Coordinates transformation enable CDTS	1	0 ~ 1	R/W	0:no 1:yes
22	0x220e	Coordinates transformation range low limit FL	2	Full range	R/W	
23	0x2210	Coordinates transformation range high limit F	2	Full range	R/W	
24	0x4a0f	Decimal point position	1	0 ~ 5	R/W	

Procedure of float point number represented by 4 byte character code translating into decimal float point number

```
float Bytes ToFloat(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 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)
}
```

16 bits CRC

```
unsigned int Get_CRC(uchar *pBuf, uchar num)
```

```
{
    unsigned i,j;

    for(i=0; i < num; i++)
    {
        wCrc ^= (unsigned int)(pBuf[i]);

        for(j=0; j < 8; j++)
        {
            if(wCrc & 1)
            {
                wCrc >>= 1;

```

Check code achieving procedure $wCrc \wedge = 0xA001$;

```

            }
            else
            {
                unsigned int wCrc = 0xFFFF; wCrc >>= 1;
            }
        }
    }
    return wCrc;
}
```