DL Series

DL8A/DL9A Voltage/Ampere Meter User Manual

Features:

⊙Accuracy: 0.5%F.S.
⊙AC/DC universal (for AC signal it measures true value).
⊙Different input channel has different range, wide measuring range.
⊙Two Hi/Lo setting alarm output.
⊙With analog output 4-20mA.
⊙RS485 communication interface, Modbus RTU protocol.

KKDL8A-C01E-A/1-20190723

For your safe, please read the below content carefully before you use 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 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) 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. Code Illustration

DL□□A- □ □ □ □ □ □□ C
- C: Version code
- □□: Range
- □: A : AC/DC current V : AC/DC voltage; 10 : No RS485 18 : With RS485
- □: B : One alarm C : Two alarms; A : No alarm R : Relay alarm
- □: Blank: No analogue output; I : 4~20mA analogue output
- □: 8: 48H*96W*100L 9: 96H*96W*100L
- DL8A: DL8A series voltage/ampere meter

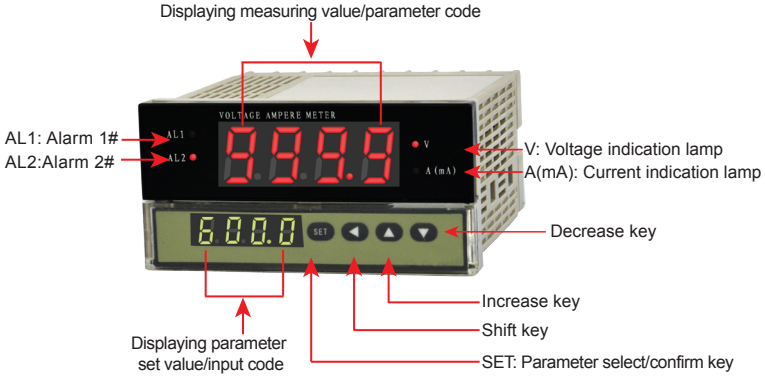
Model	Input channel and Range	Alarm	Analog output	Commu-nication	Default channel and range
DL□A-RC10V600	IN1：0～10V；IN2：0～100V；IN3：0～600V	2 alarm	NO	NO	IN3:600V
DL□A-IRC10V600	IN1：0～10V；IN2：0～100V；IN3：0～600V	2 alarm	4-20mA	NO	
DL□A-IRC18V600	IN1：0～10V；IN2：0～100V；IN3：0～600V	2 alarm	4-20mA	RS485	
DL□A-RC10A1000	IN1：AC 0～5A IN2:DC 0～75mV	2 alarm	NO	NO	IN1:5A
DL□A-IRC10A1000	IN1：AC 0～5A IN2:DC 0～75mV	2 alarm	4-20mA	NO	
DL□A-IRC18A1000	IN1：AC 0～5A IN2:DC 0～75mV	2 alarm	4-20mA	RS485	
DL□A-RC10A1	IN1:0～100mA、0～10mA IN2:0～1000mA	2 alarm	NO	NO	IN2:1000mA
DL□A-IRC10A1	IN1:0～100mA、0～10mA IN2:0～1000mA	2 alarm	4-20mA	NO	
DL□A-IRC18A1	IN1:0～100mA、0～10mA IN2:0～1000mA	2 alarm	4-20mA	RS485	

⚠ ①When you use the meter, please pay attention that input channel should correspond to range, otherwise, the meter will be malfunction. ②Input signal < 1.2 times of range. ③When measuring AC signal, aviliable for 0～200Hz. When frequency is higher than 100Hz, the measuring accuracy is ±1%FS.

II. Technical Specification

Power Supply	AC/DC 100～240V 50Hz/60Hz DC 24V(Need to be ordered)
Display range	0.001-9999 float decimal point display
Accuracy	±0.5%F.S ±2digits(For AC signal frequency under 100Hz)
Analog output	4～20mA load capacity≤600Ω, accuracy:±0.5%F.S
Communication	RS485 communication interface,Modbus RTU Protocol
Relay capacity	AC 250V/3A or DC 30V/5A
Dielectric Strength	Between power supply connector and other connectors, relay output connectors and other connectors, AC 1800V leakage current 0.5mA, 60S; Between input signal connectors and low voltage signal output connectors, DC 600V leakage current 0.5mA,60S
Insulation Impedance	≥100MΩ/500V DC
Working environment	Temperature：0-50℃ Humidity：≤85%RH
Sampling rate	5 times/S

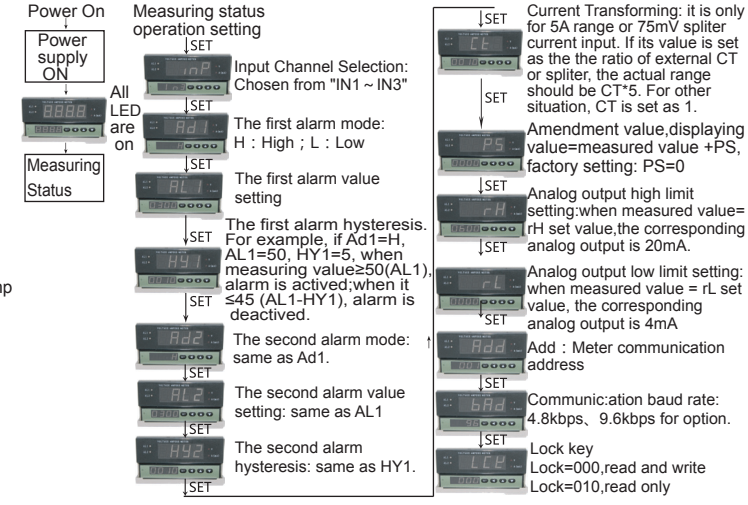
III. Panel Illustration



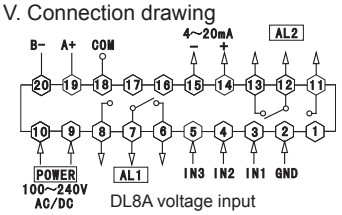
V. Operations

① The second row LED is defaulted to display range and input channel alternately after power on, press (◁) to display range only, press (◁) to returns to default display
② In the measuring status, press SET >3S to enter setting menu.
③ When modifying setting value, press △/ ▽to change value; press (◁) key to shift decimal point; after modifying, press SET key to confirm and enter next menu. After setting,press SET key more than 3S to exit menu; if there is no operation for a long time, it will exit automatically.

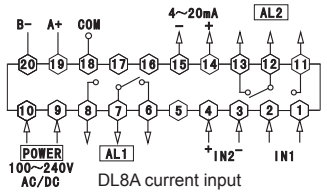
No.	Paremeter code	Setting range	Factory value	Indication
1	INP	IN1～IN3	For range A1000, the default one is IN1; for range A1, the default one is IN2 ; for range V600 , the default one is IN3	AL,HY,Ct,PS, rH,rL have the sameunit as the Range.
2	Ad1	H or L	H	
3	AL1	-1999～9999	90% of measuring range	
4	Hy1	-1999～9999	1.000	
5	Ad2	H or L	L	
6	AL2	-1999～9999	10% of measuring range	
7	Hy2	-1999～9999	1.000	
8	Ct	0～9999	1.000	
9	PS	-1999～9999	0.000	
10	rH	-1999～9999	maximum of the range	
11	rL	-1999～9999	minimum of the range	
12	Add	0～255	001	
13	bAd	4.8 or 9.6	9.6	
14	LCK	0～255	000	



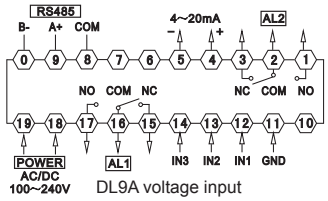
V. Connection drawing



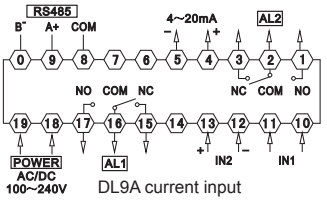
DL8A voltage input



DL8A current input



DL9A voltage input



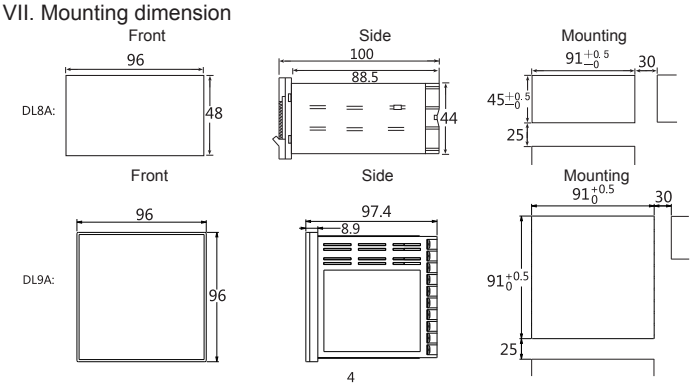
DL9A current input

Note:please subject to the diagram on the product if any changes.

VI. Notice for use and storage

1、It is suggested that the meter gets on power for 15 minutes before measuring.
2、Working environment is 0～50℃，humidity below 85%RH.
3、The calibration interval for this meter is one year.
4、Please keep the meter from shaking and shocking. Don't place the meter in the environment full of excess dust and hazard chemicals and gas.
5、If the meter is not used for long time, please get on power every 3 months, each time not less than 4 hours.
6、To be stored in the environment at 0～50℃, humidity below 60%RH, no direct sunshine. The meter should not contact with organic solvent or oil.

VII. Mounting dimension



VIII. Communication

This 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 don't feedback error message. The communication data type is 32 bit integer data, true code stands for positive number, complemental code stands for negative number, data rate is 0.001；for example, if the meter data received by host is 5000, then meter data * rate = original data (5000*0.001=5.000). Therefore, when host writes meter, the data should multiply by rate 1000 before it is sent to the meter.

Data Frame format：

Start bit	Data bit	Stop bit	Check bit
1	8	1	NO

Handling of abnormal communication：
If there is abnormal response put the function code on the top position 1. For example: Host request the function code 0x03,and the response function code from slave should be 0x83.
Error type code：
0x02---Data location error：the request data location from host computer exceeds the range of the meter.
0x03---Data value error：the data value sent by host computer exceeds the data range of the meter.
CRC check error, function code error, don't return value.

1. Read Multiple Registers
For example: The host computer read AL1（1st alarm value 5.0）
Address code of AL1 is 0x0000，32bit（4 byte），seizes 2 data registers; hexadecimal memory code of 5.0*1000=5000 is 0x00001388.

Host request（read multi-register）							
1	2	3	4	5	6	7	8
Meter Add	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	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	0x13	0x88	0xF7	0x65

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 write HY1 (1st alarm value hysteresis 1.0)
ADD code of HY1 is 0x0001， because HY1（4 byte），seizes 2 data registers. The hexadecimal memory code of decimal floating point number 1.0 *1000=1000 is 0x000003E8.

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	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	0x03	0xE8	0x32	0xDD
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	0x01	0x00	0x02	0x10	0x08					

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

Slave abnormal answer (write 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	Data Length	Range	Rate	Read/ write	Remark
0	0x0000	1st loop alarm value AL1	2	-1999~9999	0.001	R/W	
2	0x0002	1st loop alarm hysteresis HY1	2	-1999~9999	0.001	R/W	
4	0x0004	2nd loop alarm value AL2	2	-1999~9999	0.001	R/W	
6	0x0006	2nd loop alarm hysteresis HY2	2	-1999~9999	0.001	R/W	
8	0x0008	Coefficient Ct	2	0~9999	0.001	R/W	
10	0x000A	Analog output high limit value rH	2	-1999~9999	0.001	R/W	
12	0x000C	Analog output low limit value rL	2	-1999~9999	0.001	R/W	
14	0x000E	Amendment value PS	2	-1999~9999	0.001	R/W	
16	0x0010	Read measured value	2	0~9999	0.001	R	
Reserve							

30	0x001E	1st loop alarm type Ad1	1	0~1	1	R/W	Note ①
31	0x001F	2nd loop alarm type Ad2	1	0~1	1	R/W	Note ①
32	0x0020	Alarm status indication	1	0~3	1	R	Note ③
33	0x0021	Baud rate	1	0~1	1	R	Note ②
34	0x0022	Meter address Add	1	0x255	1	R	
35	0x0023	Meter name	1	0xD1	1	R	
Reserve							

R: read only; R/W: read/write.
Note ①：alarm type

High limit alarm	Communication value	Low limit alarm	Communication value
H	1	L	0

Note ②: baud rate

Communication value	0	1
Menu display	4.8	9.6

Note ③: alarm status indiction

D7	D6	D5	D4	D3	D2	D1	D0
						AL2	AL1

16 digits CRC check code acquisition program

```
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;
}
```