Multifunctional AC / DC Current Sensor

LC80

1. Product Introduction

1.1. Description

The module is mainly used to detect the current size in the AC circuit. The built-in function menu has a variety of functions, and customers can select the module function according to their own needs.

1.2. Features

- Versatility: has a variety of functions, such as data acquisition, signal amplification, filtering, etc. The response speed is fast.

- High-precision: The module adopts high-precision circuit design and component selection, which can realize high-precision current measurement.

- High reliability: The module adopts high quality components and strict production process, with high reliability and long life.

- Easy to use: the module has a good user interface and simple operation mode, convenient for users to use and debug.

- Strong flexibility: The module can be customized and expanded according to different application scenarios, with strong flexibility and adaptability.

1.3. Applications

- Power system monitoring: This module can be used to monitor and protect the power system, for example, in substations and power plants, through the use of current sensors to monitor and control the current, to ensure the stable and safe operation of the power system.

- Electric vehicle charging: electric vehicle charge the current in the battery pack to calculate the charging state of the battery.

- Smart home: Smart home devices also need to use current sensors, such as smart lamps, smart sockets, etc.

- Industrial automation: Industrial automation also needs to use current sensors, such as motor control, robot control, etc.

1.4. Technical Parameters

Working Voltage	DC10~28V
Power Consumption	<0.8W
Detect Range	AC range: 0-5A, 0-10A, 0-20A, 0-50A
	DC range: 0-6A, 0-15A, 0-25A, 0-50A
Detection Accuracy	±1%F*S
Function Selection	Select the required function through the keys on the module
Output Method	Switching value: relay output
	Analog signal:DC0-5V / 0-10V (self-selected)
	RS485:ModbusRTU-RS485
Installation	The C45 standard 35mm guide rail is installed

Remarks:

1:Please choose the detection range according to the actual situation. Not too big nor too small.

2:The analog signal output in the output mode and the RS485 signal cannot be used at the same time,

only one can be selected, and the switching quantity signal is not affected.

3: The analog output signal can be output from 0-10V,

Need to contact the customer service. The module power supply should be greater than 14V.

1.5. Selection Guide

| Product number	Measurement range	Hole diameter	Output signal
LC80A1	AC 0-5A	φ4mm	0-5V and Relay output
LC80A2	AC 0-10A	φ5mm	0-5V and Relay output
LC80A3	AC 0-20A	φ7mm	0-5V and Relay output
LC80A4	AC 0-50A	φ7mm	0-5V and Relay output
LC80A5	DC 0-6A	φ8mm	0-5V and Relay output
LC80A6	DC 0-15A	φ8mm	0-5V and Relay output
LC80A7	DC 0-25A	φ8mm	0-5V and Relay output
LC80A8	DC 0-50A	φ8mm	0-5V and Relay output
LC80B1	AC 0-5A	φ4mm	0-10V and Relay output
LC80B2	AC 0-10A	φ5mm	0-10V and Relay output
LC80B3	AC 0-20A	φ7mm	0-10V and Relay output
LC80B4	AC 0-50A	φ7mm	0-10V and Relay output
LC80B5	DC 0-6A	φ8mm	0-10V and Relay output
LC80B6	DC 0-15A	φ8mm	0-10V and Relay output
LC80B7	DC 0-25A	φ8mm	0-10V and Relay output
LC80B8	DC 0-50A	φ8mm	0-10V and Relay output
LC80C1	AC 0-5A	φ4mm	RS485 and Relay output
LC80C2	AC 0-10A	φ5mm	RS485 and Relay output
LC80C3	AC 0-20A	φ7mm	RS485 and Relay output
LC80C4	AC 0-50A	φ7mm	RS485 and Relay output
LC80C5	DC 0-6A	φ8mm	RS485 and Relay output
LC80C6	DC 0-15A	φ8mm	RS485 and Relay output
LC80C7	DC 0-25A	φ8mm	RS485 and Relay output
LC80C8	DC 0-50A	φ8mm	RS485 and Relay output

2. Product Installation

2.1. Product size

Product size: mm Error: ± 1mm
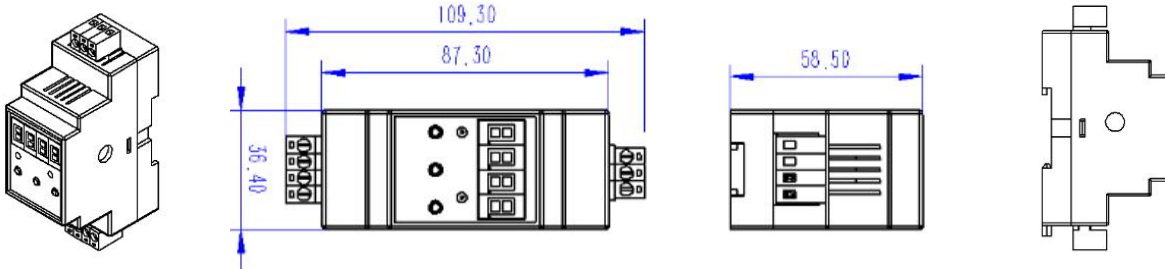
2.2. Mounting Diagrams

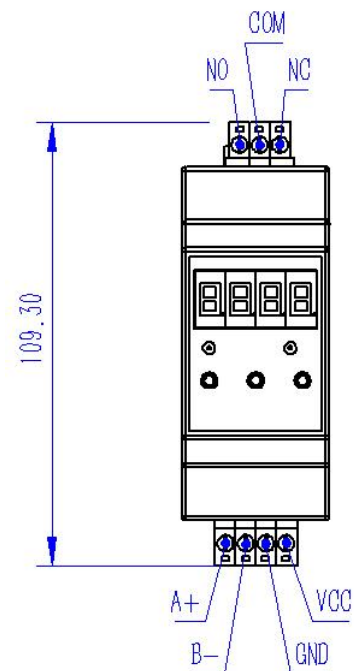The C45 standard 35mm guide rail is installed.
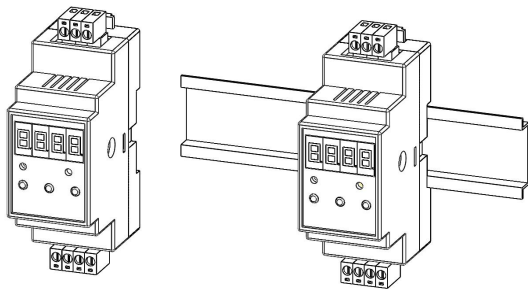
2.3. Wiring Diagram

Description of the wiring port:

Port label	Description of port label	
	Analog output type	The RS485 output type
VCC	DC10~28V	DC10~28V
GND	Power to	Power to
A/+	Analog signal output	RS485+/A
B/-	Simulation signal ground	RS485-/B
NO	Relay often begins	
COM	Relay public end	
NC	Relay often closed end	

2.4. Description of the Function Menu

Release the SET key for 3 seconds, and enter the function menu interface (F01-F10), switch the menu through the + keys and-keys. After selecting the menu, click the SET key to enter the setting state, and the last bit of the digital tube is flashing. You can switch flashing bits by long pressing + or-key, and click + and-keys to set the data. After setting, you can save the data by clicking the SET key and return to the current menu interface. When selecting the wrong function, you can return to the function menu selection interface by clicking the ESC key. Function menu interface details are shown in the following table:

Function menu number	Menu function description
F01	The upper limit of current is set: (range: lower limit to range), when the current limit function is closed, the range is:> 0 to range After the function sets the parameter, the relay on the module moves (suction). Note: If you do not need to use this function, set the parameter to the maximum range.
F02	Current lower limit setting: (range:> 0 to upper limit), when the upper limit function is off, the range is:> 0 to range After the function sets the parameter, the relay action (suction) on the module occurs when the detection current is lower than the parameter. Note: If this feature is not required, set the parameter to 000. Power power restart takes effect.
F03	Power-on delay time setting: (range: 0.1S~999.9S) Booon delay means that the module does not do any inspection during the delay time after the module is powered on. It is mainly used for the module and the tested equipment at the same time, to avoid the instantaneous current of the tested equipment, resulting in the relay action (suction). Note: If this feature is not required, set the parameter to 000.
F04	Delay protection time setting: (range: 0.1S~999.9S) Delay protection means that the module relay moves (suction) after the module detected current exceeds the current setting value and the duration exceeds the setting time. Note: If this feature is not required, set the parameter to 000.

F05	Delay recovery time setting: (range: 0.1S~999.9S) Delay recovery means that the current detected by the module exceeds the current set value. After the relay action (suction), the current returns to normal, the relay will not be released immediately, but will be absorbed and merged until the set time, and the relay is released. Note: If this feature is not required, set the parameter to 000.
F06	Relay recovery start setting: 1: on (default), 0: off. When the menu value is 1, the relay can recover by itself after the action. When the menu value is 0, after the relay action, press the ESC key in the interval. The relay can only return to the initial state.
F07	Relay action record: this item saves the current value of the last action on the module relay, which is only viewed and cannot be set
F08[1]	ID option: This feature is only used when the module is the RS485 output. You can query the module ID through this menu, or you can directly set the ID through the + key and-key in the menu interface. No connection to the computer.
F09[2]	Porter Rate Options: This function is only used when the module is output by RS485. You can query the current port rate of the module through the menu, or you can directly set the port rate through the + key and-key in the menu interface. No connection to the computer. Modification is complete and the power outage restart takes effect.
F10	Analog volume output options: 0: DC0-10V (default) 1: DC2-10V 2: DC0-5V

1: Module ID range: 1-249;

2: The corresponding range of the Porter rate: 0:1200,1:2400,2:4800,3:9600,4:19200,5:38400;

Note: Description of the additional key press function.

SET key	Long press 3S to enter the function menu interface. After selection, click this key to enter the setting interface. After entering the setting interface, click this key to change the cursor position. Set up is complete, long press 3S, data automatically save and exit.
+ key	Used after entering the function menu or the function setting interface
-key	Used after entering the function menu or the function setting interface
ESC key	After performing the error operation, click this key to immediately return to the superior menu, and the data is not saved. When the relay recovery is set to mode 0, after the relay action, press the ESC key in the interval. The relay can only return to the initial state.

3. Output Signal

3.1. Switching Output

Relay output (passive contact).

3.2. Analog Output

Calculation method: There is a linear relationship between range and simulation.

3.3. RS485 Modbus Communication Protocol

The protocol adopts the standard Modbus-RTU protocol, with only 03 and 06 function codes open, and all commands and replies are conducted in Hex (16 decimal) format. Factory ID default: 01 A001 or 8005 reverse order, see the attachment for the calculation code.

3.3.1. The communication setting format is as follows

Baud rate	Data bit	Check bit	Stop bit
9600 (by default)	Eight	None	One

3.3.2. Register declaration

Register	Explain						R/W
0x00	Current data register resolution: 1mA						R
0x64	ID register range: 1~247						R/W
0x65	Baud rate						R/W
	00	01	02	03	04	05	
	1200	2400	4800	9600	19200	38400	
0x66	Current upper limit range: lower limit ~ range, set to 0, close the upper limit alarm output function.						R/W
0x67	Current current range: 0 to upper limit, set to 0, close the lower limit alarm output function						R/W
0x68	Boot-on delay time range: 0~9999, corresponding to 999.9 seconds, resolution: 0.1S						R/W
0x69	Delay protection time range: 0~9999, corresponding to 999.9 seconds, resolution: 0.1S						R/W
0x6A	Delay recovery time range: 0~9999, corresponding to 999.9 seconds, resolution: 0.1S						R/W
0x6B	Relay recovery start setting: 1: on (default), 0: off.						R

0x6C	Relay action record: record the current value of the last action of the relay, only viewed, cannot be set	R

Note: For the specific function details of the above registers, please see the function menu description

3.3.3. Data read format

ID	FC	Register address	Number of registers	CRC verification
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes
1-247(Dec)	03	…….	0x0001	Low in the front

Example: Current data reading

ID	FC	Register address		Number of registers		CRC verification	
1 Bytes	1 Bytes	2 Bytes		2 Bytes		2 bytes (low in front)	
1-247(Dec)	03	00	00	00	01	CRC low-order	CRC high-order

3.3.4. The module response data format is as follows

ID	FC	DL	Current data		CRC verification
1 Bytes	1 Bytes	1 Bytes	2 Bytes		2 Bytes
1-247(Dec)	03	2	Data high	Data low	Low in the front

The calculation method is: (data high * 256 + data low) * 0.001 unit: A

Note: The ID range in the command is in Dec (10 decimal) format, please convert to Hex (16 decimal) format.

When the module ID is not known, you can directly view or modify the ID through the function menu F08. You can also query the ID by using the following command:

ID	FC	Register address	read-in data	CRC verification	
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes	
FA	03	0x0064	0x0001	D0	5E

The ID read command is limited to the single-machine state.

3.3.5. The data returned are as follows

ID	FC	DL	ID		CRC verification
1 Bytes	1 Bytes	1 Bytes	2 Bytes		2 Bytes
xx	03	2	00	xx	Low in the front

xx is module ID.

3.3.6. Porter rate modification

After the modification is completed, the module needs to restart, the set port rate can take effect.

ID	FC	Register address	Number of registers	CRC verification	
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes	
1-247(Dec)	06	0x0065	0x0000-1200	Low in the front	
			0x0001-2400	CRC low-order	CRC high-order
			0x0002-4800		
			0x0003-9600		
			0x0004-19200		
			0x0005-38400		

3.3.7. Current alarm setting

ID	FC	Register address	read-in data	CRC verification
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes
1-247（Dec）	06	0x0066 (current current alarm)	Xxxxx (Range: Lower to range)	Low in the front
		0x0067 (current current alarm)	Xxxxx (Range: 0 to upper limit)	

pour:

1: If the upper limit alarm is not used, write the maximum range in the upper limit register.

2: If the lower limit alarm is not used, write 0 in the lower limit register. After writing, the power outage needs to take effect.

3.3.8. Time Setting

ID	FC	Register address	read-in data	CRC verification
1 Bytes	1 Bytes	2 Bytes	2 Bytes	2 Bytes
1-247（Dec）	06	0x0068 (start-up time delay)	Xxxxx (range: 0-9999)	Low in the front
		0x0069 (Delay protection)	Xxxxx (range: 0-9999)	
		0x006A (Delay-recovery)	Xxxxx (range: 0-9999)	

Note: The range in the table: 0-9999 is 10 x x, and it needs to be converted to 16 x when writing.

The time resolution is: 0.1S, assuming that the time is set to 3 seconds, you need to write in the corresponding register: 1E.

3.3.9. The CRC calibration and calculation method

Attachment: CRC calibration code

```
/*************************************************************************

Function function: CRC check function to generate CRC

Parameter description: arr _ buff: the array set that needs to be checked

Len: Need to verify the length of the data

Return parameter: CRC is type unsigned int, high byte is the high and the low

*************************************************************************/
unsigned int CRC_Compute ( unsigned char *arr_buff, unsigned char len)
{
    unsigned int crc=0xFFFF;
    unsigned char i, j;
    for ( j=0; j <len;j++)
    {
        crc=crc ^*arr_buff++;
        for ( i=0; i<8; i++)
        {
            if( ( crc&0x0001) >0)
```

```
        {

            crc=crc>>1;

            crc=crc^ 0xa001;

        }

        else

            crc=crc>>1;

    }
}
return ( crc);
```

4. Matters need Attention

- The module has the function of anti-reverse connection, but the voltage polarity should be emphasized to avoid module damage caused by long time reverse connection. The module shall not withstand excessive impact or vibration.

- Pure resistance load is used for module factory calibration. There will be a deviation in measuring the tolerance and perceptual load. Self-calibration is required.

- When connecting the computer for debugging, please use USB to 485 module for debugging, do not use 232 to 485 module, otherwise it will cause data scrambling.

- AC detection is only limited for AC loop of AC220 and cannot be used for three-phase detection.

- The two-color light in the DC detection indicates that: the red light is the forward current. The green light is the reverse current.