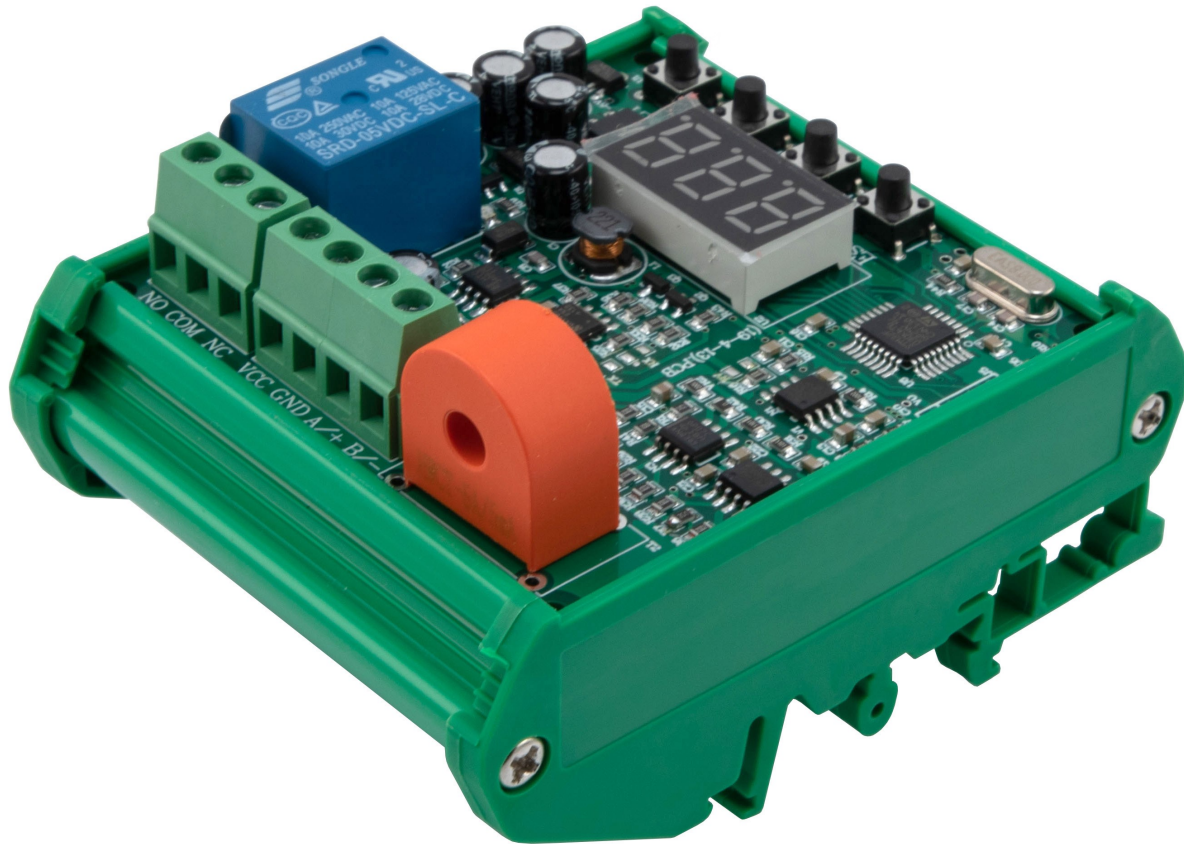# AC CURRENT SENSOR & OVER-CURRENT PROTECTOR

User Guide for SRCN-C710-3

Product Description »

This module is used to measure and monitor current consumption by utilizing current transformer technology. The module will collect voltage signal, convert and process it into a current value and output the current value with RS485 Modbus RTU protocol. If the current exceeds a preset value, the relay on the module is activated. Uses include building automation and facility management systems where acquiring information on energy usage can lead to increased efficiency. They can also detect equipment issues and help prevent damage by detecting over-current and/or short-circuit conditions.

Features »

- Multi-function menu
- Digital display
- CT technology
- RS485 and relay outputs
- Low power consumption
- 35mm DIN rail or panel mountable

Applications »

- Building and facilities management
- HVAC
- Electric fans
- Electric pumps
- Devices requiring over-current & short-circuit protection

Thank you for choosing L-com product. To ensure safe, accurate performance and product longevity, please take a moment to familiarize yourself with this manual before powering the device. Please keep it handy for future reference. In case of any questions regarding the installation or use of product, please call us at 800.341.5266.

Reach out to us at customerservice@l-com.com and visit our website at www.l-com.com

Technical Parameters ≫

Working voltage	10 – 28 VDC
Power consumption	< 0.8 W
Working temperature	0 – 70 °C
Working humidity	10% – 90% (No condensation)
Detection range	0 – 5 A
Function menu	Select required functions via keys on module
Output mode	MODBUS RTU – RS485
	Relay output
Installation mode	Pedestal	Mounting on 35mm DIN rail
	Module	Mounting with screws

Electrical Diagram ≫

| Terminal	Terminal Description
	RS485 output & Relay output
VCC	10 ~ 28 VDC
GND	Power ground wire
A/+	RS485 +/ A
B/-	RS485 -/ B
NO	Relays normally open
COM	Relay common end
NC	Relays normally closed
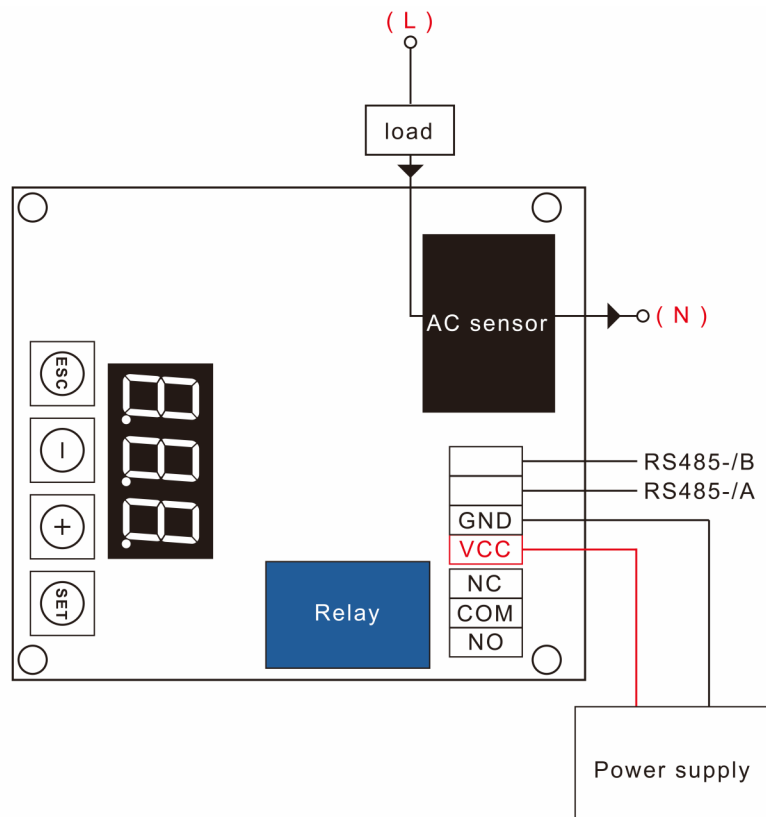
Mounting Diagram ≫

35mm DIN rail mounting: Mount the sensor module onto the DIN rail (dark black) as shown in the figure.
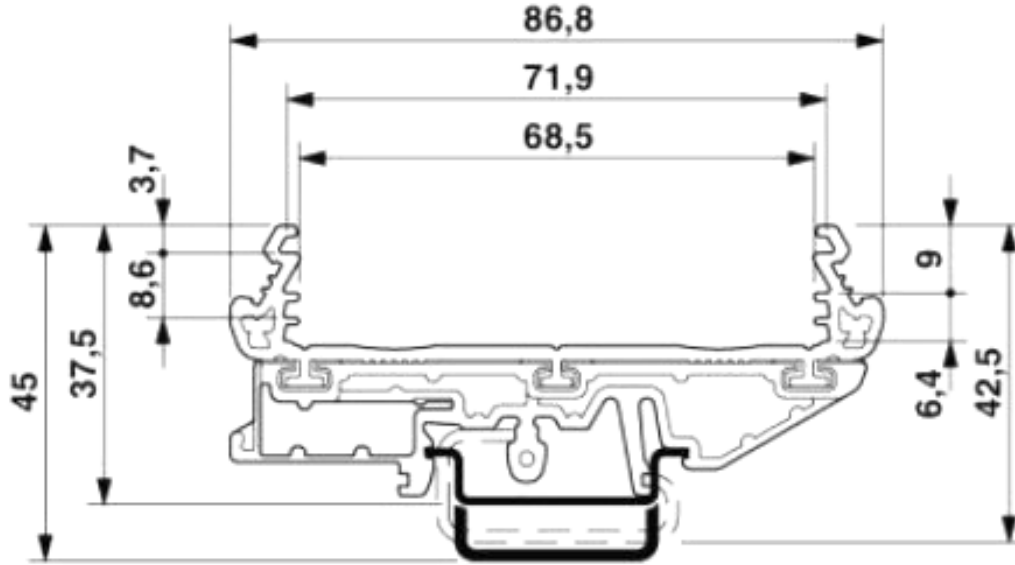
Board Mount ≫

Mount the PCB to the enclosure with screws. Mounting hole diameter is 3mm.
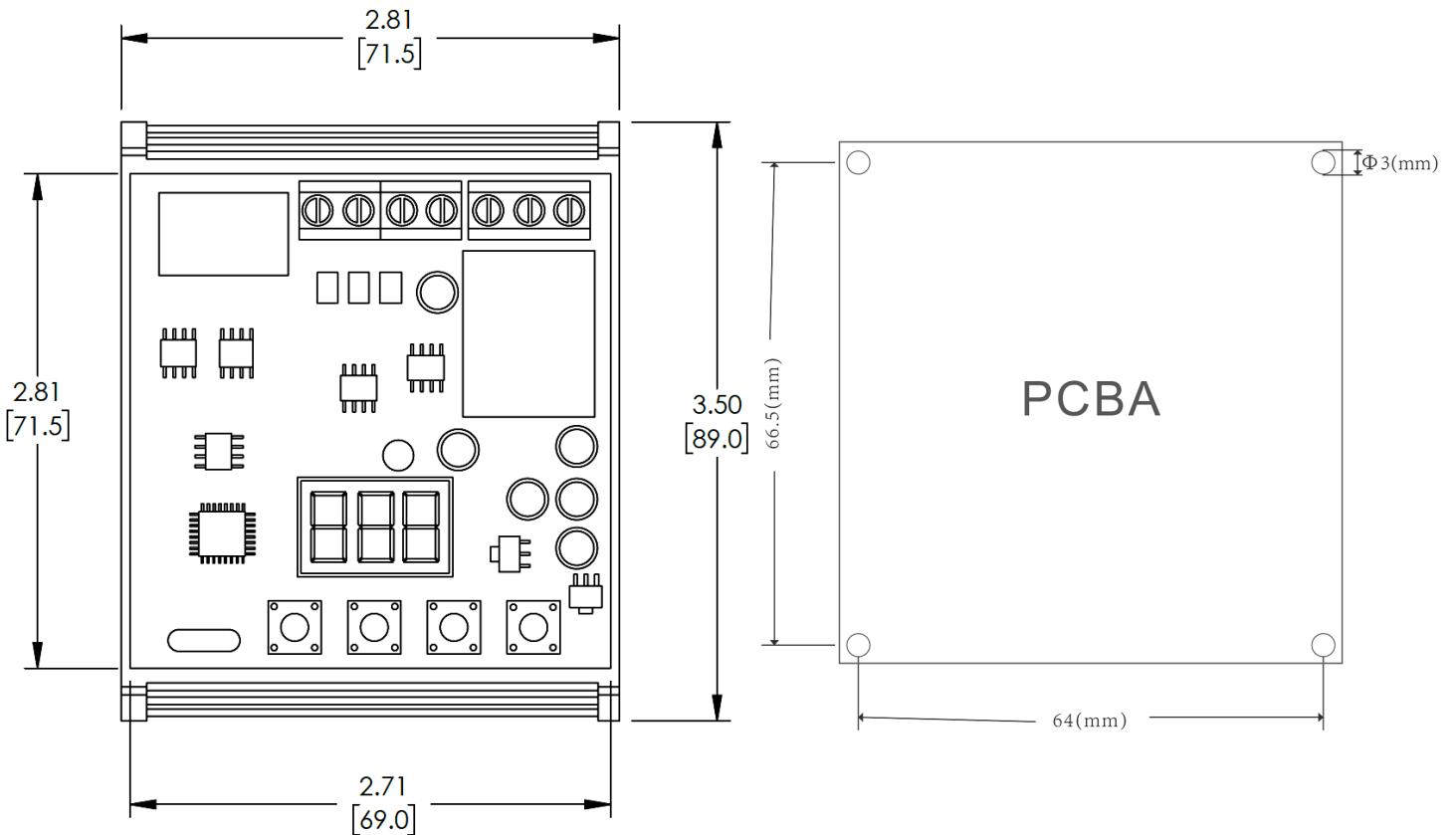
Notes ≫

1. The module has the function of anti-reverse connection. But it is still necessary to pay attention to the voltage polarity when the power is turned ON to avoid damage to the module.

2. The modules are tested with pure resistance loads when they leave the factory. If user uses inductive or capacitive loads, there can be deviation in the reading. Kindly contact the customer support team for assistant.

3. When the module is connected to the computer for debugging, please use the USB to 485 modules for debugging.

Function Menu Description »

Press and hold the SET button for 3 seconds and release it to enter the function menu interface (F01-F09). Press the + and - buttons to switch in between menus. Select the menu and click the SET button to enter the setting state. The display starts flashing. Set the data with + and - keys, long press the SET key to automatically save the data and exit. It will return to the original current interface. If the selected function is wrong, user can click the ESC key to return to the function menu selection interface to re-select.

For details of the function menu interface, see the following table:

Note: If user do not want to use a particular function, kindly set the parameter to 000 to close the particular function.

Function Menu Number	Menu Feature Description
F01	Current upper limit setting: (Range: lower limit ~ range): When the lower limit function is closed, the range is: > 0 ~ range.
	After setting the parameter, if the detected current exceeds the parameter, the relay on the module will act (pull in).
F02	Current lower limit setting: (Range: > 0 ~ upper limit): When the upper limit function is closed, the range is: > 0 ~ range.
	After setting the parameter, if the detected current is lower than the parameter, the relay on the module will act (pull in).
F03	Power-on delay time setting: (Range: 0.01S ~ 99.9S)
	Power-on delay means, after the module is powered ON, the module does not do any checks within the delay time. It is mainly used to avoid the instantaneous flow of current of the device when the module and the device under test are powered ON at the same time, causing the relay to act (pull-in).
F04	Delay protection time setting: (Range: 0.01S ~ 99.9S)
	Delay protection means that after the current detected by the module exceeds the set current value and the duration exceeds the set time, the module relay will act (pull in).
F05	Delay recovery time setting: (Range: 0.01S ~ 99.9S)
	Delay recovery means that the current detected by the module exceeds the set current value. After the relay acts (closes) and the current returns to normal, the relay does not releases immediately, but continues to attract until the set time and then the relay releases.
	An extended function is added to this function: When this time is set to OFF, after the relay acts, it will not recover by itself, and it needs to be recovered manually.
	OFF setting method: After entering the setting interface of this function menu, click the SET button to move the blinking cursor to the highest position, and keep pressing the + button until OFF is displayed. Press and hold the SET button to save and exit.
	When the relay on the module operates, regardless of the current, the relay does not releases automatically. The relay state can only be restored manually.
	OFF closing method: After entering the function menu setting interface, directly press the - key to display 99.9, and then use the SET key to change positions and +/- keys to set the required time.
	Manually restore the setting: When the detection current returns to normal, press and hold the ESC key. The relay can return to its initial state.
F06	Transformer winding turns setting: Default: 001
	In the actual use process, if the current line is passed through the transformer for 2 turns, the current of 1 A will be displayed as 2 A. At this time, when the parameter is set to 2, the display shows the actual current of 1 A.
	Note: This parameter can only be used when the transformer is threaded, the number of the parameter should be set the same with the number of the turns threaded.
F07	Range display: Used to display the maximum current range of the module.
	Note: This parameter cannot be changed by the user at will. Otherwise, it will cause test errors.
F08	Relay action record: This item saves the current value of the last action of the relay on the module. It is only for viewing and cannot be set.
F09	ID display: This function is only used when the module has RS485 output. User can check the module ID through this function or user can directly set the ID through the + and - keys on the function interface. No need to connect to a computer.

Key Function Description »

SET key	Press and hold 3S to enter the function menu interface. After selecting, click this key to enter the setting interface. After entering the setting interface, click this key to perform the cursor transposition operation. After the setting is completed, press and hold for 3S to automatically save the data and exit.
+ Key	Used after entering the function menu or function setting interface.
- Key	Used after entering the function menu or function setting interface.
ESC key	After performing the wrong operation, click this key to return to the previous menu immediately, and the data will not be saved. In the relay manual recovery mode: after the current returns to normal, long press this key to restore the initial state of the relay.

RS485 Modbus - RTU Protocol »

The protocol adopts the standard Modbus-RTU protocol, only open 03 and 06 function codes, all commands and replies are in Hex (hexadecimal) format. Factory ID default: 01

The CRC check is calculated in reverse order of A001 or 8005, and the calculation code is shown in the attachment.

The communication setting format is as follows:

Baud rate	Data bits	Check bits	Stop bits
9600 (default)	8 bits	None	1 bit

Register Description »

Note: For detailed functions of the below registers, please refer to the function menu description.

Register	Illustrate										R/W
0x00	Current data register, resolution: 1mA										R
0x01	Relay status register, display the status of relay operation										R/W
0x64	ID registers, range: 1 ~ 247										R/W
0x65	Baud rate										R/W
	00	01	02	03	04	05	06	07	08	09	
	1200	2400	4800	9600	19200	38400	76800	115200	128000	256000	
0x66	Current upper limit, range: lower limit ~ range, set to 0, turn off the upper limit alarm output function										R/W
0x67	Lower current limit, range: 0 ~ upper limit, set to 0, turn off the lower limit alarm output function										R/W
0x68	Power-on delay, range: 0 ~ 999, resolution: 0.1S										R/W
0x69	Delay protection time, range: 0 ~ 999, resolution: 0.1S										R/W
0x6A	Delay recovery time, range: 0 to 999, resolution: 0.1S When the value is written to ≥ 1000, it means that the relay is in manual recovery state. For details, see function menu F05.										R/W
0x6B	Transformer threading turns										R
0x6C	Module maximum range										R

Data Read Format »

ID	Function Code	Register Address	The Number of Registers	CRC Check
1 byte	1 byte	2 bytes	2 bytes	2 bytes
1-247 (Decimal)	03	—	0x0001	Low in front

Example: Current Data Read »

ID	Function Code	Register Address		The Number of Registers		CRC Check	
1 byte	1 byte	2 bytes		2 bytes		2 bytes	
1-247 (Decimal)	03	0x0000		0x0001		Low in front	
1-247 (Decimal)	03	00	00	00	01	84	0A

The module response data format is as follows:

ID	Function Code	Data Length	Current Data		CRC Check
1 byte	1 byte	1 byte	2 bytes		2 bytes
1-247 (Decimal)	03	2	The data is high	The data is low	Low in front

The calculation method is: (Data high order * 256 + Data low order) * 0.001 Unit: A

Relay Status Read »

ID	Function Code	Register Address		The Number of Registers		CRC Check	
1 byte	1 byte	2 bytes		2 bytes		2 bytes	
1-247 (Decimal)	03	0x0001		0x0001		Low in front	
1-247 (Decimal)	03	00	01	00	01	CRC low	CRC high

Module response data format: overcurrent means the relay is closed.

ID	Function Code	Data Length	Current Data		CRC Check
1byte	1 byte	1 byte	2 byte		2 byte
1-247 (Decimal)	03	02	0x0000	Non-overcurrent	Low in front
			0x00FF	Over current	

Data Write Format ≫

ID	Function Code	Register Address	Write Data	CRC Check
1 byte	1 byte	2 bytes	2 bytes	2 bytes
1-247 (Decimal)	06	—	—	Low in front

When the data returned by the module is consistent with the data sent, the relay is unlocked.

Tips: The ID range in the command is in decimal format, please convert it to Hex (hexadecimal) format when using it.

When user do not know the module ID, user can view or modify the ID directly through the function menu F09. User can also check the ID through the following commands:

ID	Function Code	Register Address	Write Data	CRC Check	
1 byte	1 byte	2 byte	2 byte	2 byte	
FA	03	0x0064	0x0001	D0	5E

This command can only be used in stand alone state.

The returned data is as follows:

ID	Function Code	Data Length	ID		CRC Check
1 byte	1 byte	1 byte	2 byte		2 byte
xx	03	2	00	xx	Low in front

"xx" is the ID of the module here.

Attachment: CRC check code

Function: CRC check function, generate CRC

Parameter description: arr_buff: array set to be verified

len: the length of the data to be checked

Return parameter: CRC is unsigned int type, High-order byte is high-order first, low-order last.

```
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);
```