

Cabinet Power Monitoring Module






CN037

User manual

IM19H48-E

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Symbol Definition	
	WARNING: Indicates information that a potentially hazardous situation which, if not avoided, could result in serious injury or death.
	RISK OF ELECTRICAL SHOCK: Indicates information that Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.
	ESD HAZARD: Indicates information that Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user.

Security& Caution Symbols

The following table lists Security& Caution symbols used on equipments.














No.	Symbol	Description
1		Direct current (DC)
2		Alternating current (AC)
3		Ground (Earth) terminal
4		Protective earth (ground) terminal
5		Reference ground (Earth) terminal
6		Frame or chassis
7		Equipotentiality
8		On (power)
9		Off (power)
10		Caution, risk of electric shock
11		Caution, hot surface
12		Caution, risk of danger
13		Electrostatic sensitive devices (ESD)

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CN037

Section 1 Overview

The cabinet power monitoring module is a smart device for monitoring the redundant power quality of the DCS control system cabinet. It has the following features:

- Dual voltage measurement
- Dual current measurement (current sensors are required)
- Dual power supplier output balance monitoring
- 4-channel DI input
- Temperature measurement
- RS-485 communication (based on Modbus RTU protocol, as a slave device)

Section 2 Performance Specification

Table 2-1 Performance Specification

Parameter	Description	
Model	CN037	
Input Voltage	24V DC, (22 ~ 28) VDC	
Maximum Power	40mA@ 24V DC	
Voltage Monitoring Range	(22 ~ 28) V DC, $\pm 0.5\%$	
Voltage Difference Monitoring Range	(-0.5 ~ 0.5) V, $\pm 0.5\%$	
Current Monitoring Range	HAS1030-S2:	(0 ~ 20) A, $\pm 2\%$
	HKS2010-S16:	(0 ~ 40) A, $\pm 2\%$
Measuring Range of the Cabinet Temperature	(-20~85) °C, $\pm 3^{\circ}\text{C}$	
DI signal input	4 channel dry contact	
Temperature	Working temperature	(-20 ~ 70)°C
	Storage temperature	(-40 ~ 70)°C
Humidity	Working humidity	10%RH ~ 90%RH, no condensation
	Storage humidity	5%RH ~ 95%RH, no condensation

Section 3 Use Instructions

3.1 Structure Diagram

Module dimensions (length × width × height): 110mm × 55mm × 62mm

The dimensions of the module's appearance are shown in Figure 3-1.

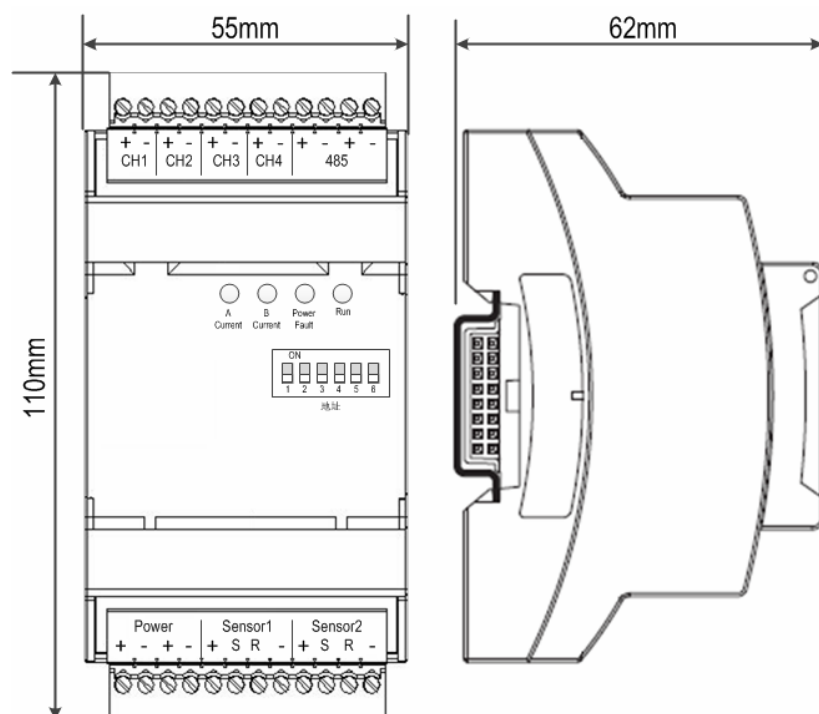


Figure 3-1 Dimensions of modules

3.2 Illustrations for Light Indicators

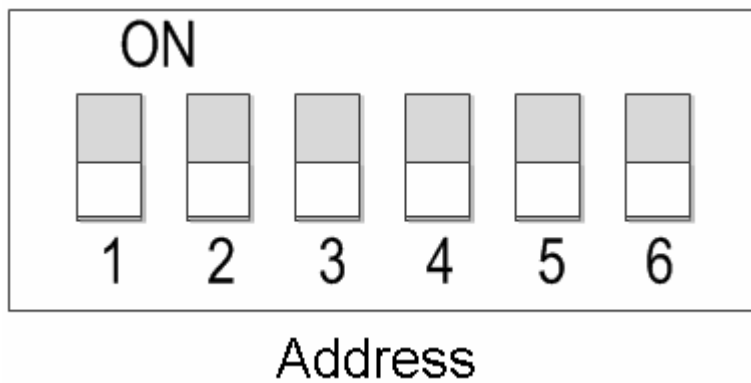
There is a set of LED indicators on the front of the module. The status description is shown in Table 3-1.

Table 3-1 Illustrations for Module Light Indicators

Marker	Description
Run	Green represents the module is working and running at 1Hz.
Power Fault	Red means the input power supplier of any channel is less than 22V.
A Current	It is red when A channel power supplier is slightly less (when $I_A+I_B>2A$ and $I_A<0.5I_B$ are satisfied, A channel power supplier is slightly less).
B Current	It is red when B channel power supplier is slightly less (when $I_A+I_B>2A$ and $I_B<0.5I_A$ are satisfied, B channel power supplier is slightly less).

3.3 Illustrations for Address DIP Switch

The intelligent alarm module communicates with the controller via the Modbus RTU, and its address is set by a DIP switch. The DIP switch is located on the front panel of the module. There are 6 digits in total, 1 is the high digit and 6 is the low and its style is shown below.

**Figure 3-2 DIP Switch**

Pulling up the DIP switch means ON and pulling down means OFF. The correspondence between the code and the address is shown in the following table.

Table 3-2 The correspondence between the code and the address

1	2	3	4	5	6	Address
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
.....						
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OFF	62
ON	ON	ON	ON	ON	ON	63

3.4 Illustrations for Terminals

The module has two rows of terminals, respectively lying on the upper and lower side of the module and the wiring identification is shown in the figure below. After A and B channels of power connecting to modules, they first go through diodes and PPTC(Polymer Positive Temperature Coefficient) (650mA) prior to going into other circuits.

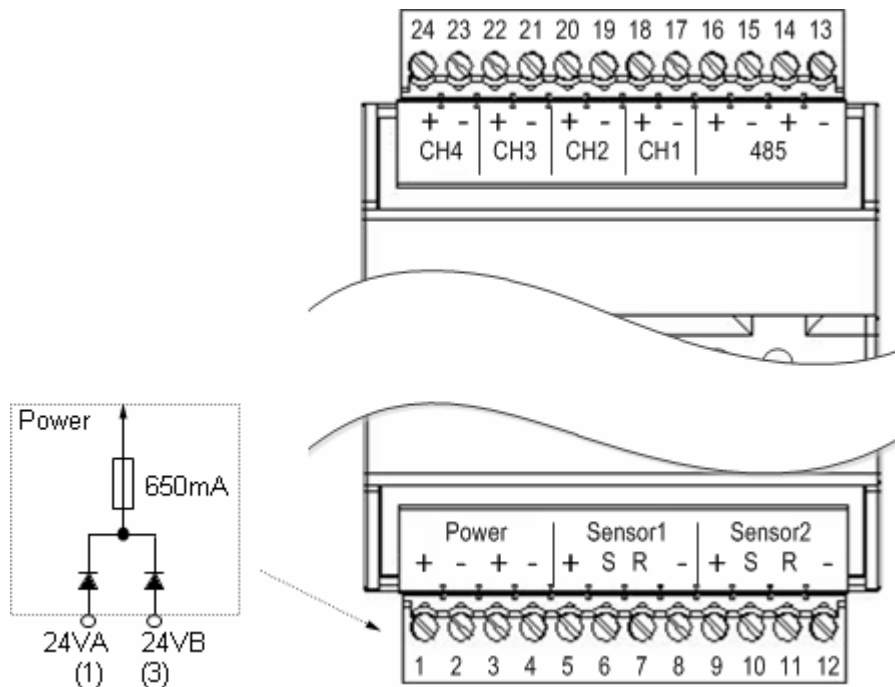


Figure 3-3 Wiring terminal layout and identifications

The terminal wiring instructions are shown in Table 3-3.

Table 3-3 Wiring Illustrations for Terminals

Terminal Marker	Description	Terminal Number
POWER	+	Positive input terminal of A channel power supplier
	-	Negative input terminal of A channel power supplier
	+	Positive input terminal of B channel power supplier
	-	Negative input terminal of B channel power supplier
SENSOR1	+	Power supplier terminal of sensors
	S	Signal terminal of sensors
	R	Reference terminal of sensors

Terminal Marker		Description	Terminal Number
	-	Ground terminal of sensors	8
SENSOR2	+	Power supplier terminal of sensors	9
	S	Signal terminal of sensors	10
	R	Reference terminal of sensors	11
	-	Ground terminal of sensors	12
485	-	Negative signal terminal of MODBUS	13
	+	Positive signal terminal of MODBUS	14
	-	Negative signal terminal of MODBUS	15
	+	Positive signal terminal of MODBUS	16
CH1	-	Negative signal terminal of DI channel 1	17
	+	Positive signal terminal of DI channel 1	18
CH2	-	Negative signal terminal of DI channel 2	19
	+	Positive signal terminal of DI channel 2	20
CH3	-	Negative signal terminal of DI channel 3	21
	+	Positive signal terminal of DI channel 3	22
CH4	-	Negative signal terminal of DI channel 4	23
	+	Positive signal terminal of DI channel 4	24

3.5 Illustrations for Sensors

3.5.1 Model Selection

This module is compatible with 2 sensor models. Each channel of detection circuit requires 1 sensor. So, this module requires 2 sensors at most.

- HAS1030-S2: the rated input current is 20A.
- HKS2010-S16: the rated input current is 40A.

3.5.2 Wiring

Due to the polarity feature of sensors, you shall make sure that the arrow direction is the same as the current direction during installation. The cables at the end of the power supply anodes that have been detected in the same channel, should go through the hole of the same sensor.

Pins of CN037 and the sensor are shown in the table below.

Table 3-4 Wiring Illustrations for Sensors

Sensor Cable Color	Description	Sensor Terminals on CN037
Red	Positive input of Power supplier	+
Black	Negative input of power supplier	-
Yellow	Signal output	S
White	Reference voltage output	R

3.6 Installation and Uninstallation of Modules



Shock Danger:

You shall cut off the power before executing uninstallation.

The module is mounted on standard DIN rails and the installation and removal steps are described below.

The installation steps are as follows:

- 1) Insert any side of the module into the rail as shown in the 1st step in Figure 3-4.
- 2) Rotate the module so that the other side is also stuck to the rail as shown in the 2nd step in Figure 3-4. Then the installation is completed.
- 3) Wiring and cable management.

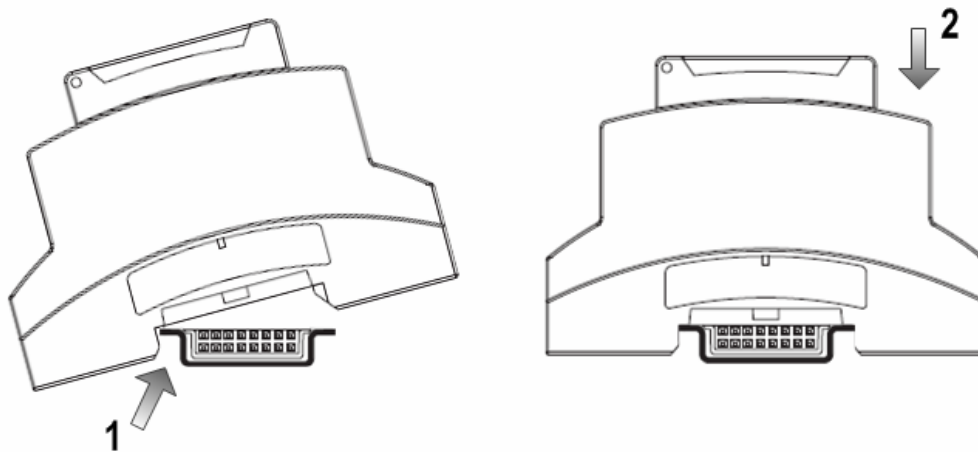


Figure 3-4 Installation Diagram of Modules

The removal steps are as follows:

- 1) Cut off power supplier and remove the cable.
- 2) Use a flat-blade screwdriver (medium or small) to lift the buckle on either side as shown in the 1st step in Figure 3-5.
- 3) Then rotate the module as the 2nd step shown in Figure 3-5.
- 4) Remove the module from the rail as shown in the 3rd step shown in Figure 3-5 and removal is completed.

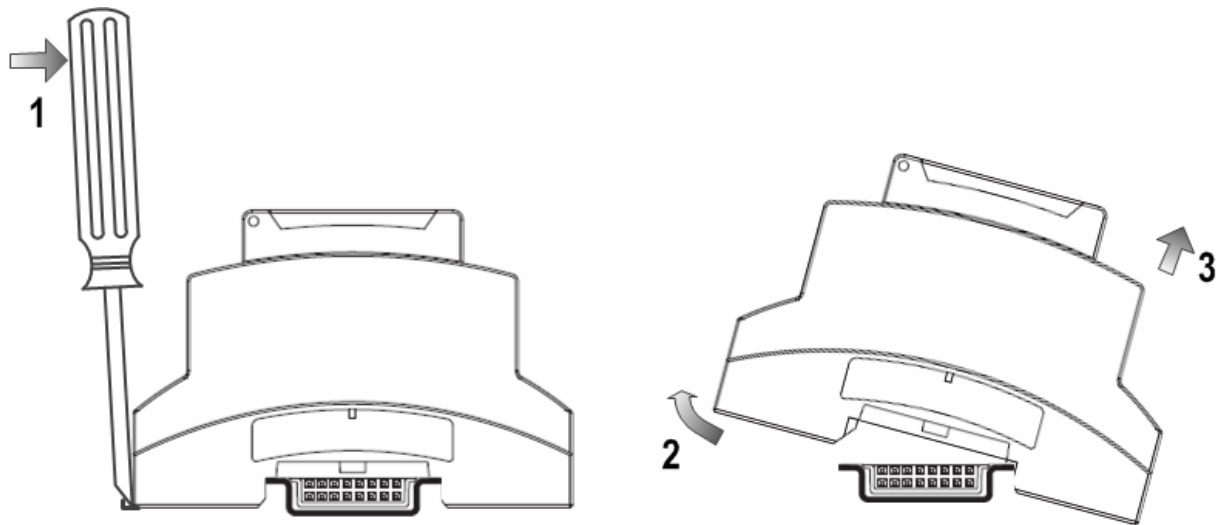


Figure 3-5 Removal Diagram of Modules

3.7 Maintenance

When the cabinet power monitoring module is being used, it needs to be checked periodically to observe whether or not the status indicator is normal.

When the DCS system is shutdown for maintenance, check whether or not the connections of the input and output interface are loose, or whether or not the power supplier of fan is normal, or whether or not the alarm output is normal.

Section 4 Communication Illustrations

The communication parameters of the module are as follows. When the module acts as a slave device, it needs to be configured for communication at the master station:

- Baud rate: 9600
- Data digit: 8 bits
- Stop digit: 1 bit
- Verification: no verification

The module uploads measurement data via RS485 and supports MODBUS standard commands.

- Read DI (status) (function code: 02). It has a total of 4 channels, and 4-bit data is uploaded.

Table 4-1 Illustrations for reading DI commands and uploading data

Parameter	Description
CH1	ON represents CH1 has DI input and OFF represents CH1 is in open circuit.
CH2	ON represents CH2 has DI input and OFF represents CH2 is in open circuit.
CH3	ON represents CH3 has DI input and OFF represents CH3 is in open circuit.
CH4	ON represents CH4 has DI input and OFF represents CH4 is in open circuit.

- Read AI (input register) (function code: 04), and it has a total of 7 data.

Table 4-2 Illustrations for reading AI commands and uploading data

Number	Parameter	Description	Cases
1	VA (unit:V)	A channel voltage, the last 2 numbers are decimal places.	2411 represents 24.11V
2	VB (unit:V)	A channel voltage, the last 2 numbers are decimal places.	Ibid
3	IA (unit:A)	A channel current, the last 2 numbers are decimal places.	301 represents 3.01A, if HKS2010-S16 is used and this current should be multiplied by 2
4	IB (unit:A)	B channel current, the last 2 numbers are decimal places.	Ibid
5	VA-VB (Unit mV)	Unit is mV and doesn't include a decimal point.	35 represents 35mV
6	Temperature (Unit °C)	Temperature and the last 2 numbers are decimal places.	2013 represents 20.13°C
7	Reserved	Reserved	

Section 5 Illustrations for Engineering Applications

5.1 Notes

- Before the module is powered on, check whether or not the cable is correctly connected and the sensors are properly used.
- Before removing the module, please cut off the power supply and other wirings in order to ensure the personal safety.

5.2 Troubleshooting

- The Run light is off, which means the module cannot work properly. Please check the power supply or replace the module.
- When the MODBUS communication fails, please check whether or not the wiring is correct or secure and whether or not the communication parameters are configured correctly.
- If the current is abnormal, please check the wiring and sensor direction.

Section 6 Revision

Table 6-1 Retrofit list of the version

Document Version	Applicable Product Version	Remarks
V1.0 (20191021)	CN037 V10.11.00	First Issue
V1.1 (20220303)	CN037 V10.11.00	Add information of 40A current sensors Add the information of PPTC
V1.2 (20230210)	CN037 V10.11.00	Modified the specifications of 40A sensor and related descriptions