FR-DCMG-AS4A DC Arc-Fault Detector user manual

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FR-DCMG-AS4A_UM_CN_V1.7

内容目录

# 一、 Product Description

FR-DCMG-AS4A DC arc monitoring sensor products are mainly used in DC transmission, power distribution and other occasions, such as PV combiner box, DC cabinet, telecommunications room, communication base station, etc., real-time detection of fault arc in DC circuit, once fault arc occurs Immediately issue an alarm signal to inform the inverter or other actuators to cut off the fault circuit and effectively prevent fire hazards
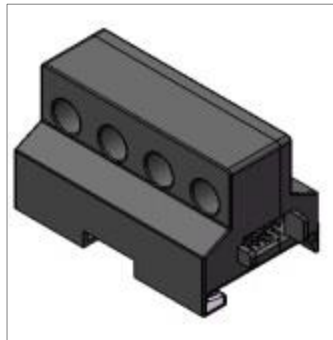

such as fires caused by arcs.

DC arc monitoring sensor model diagram

Main Feature

- Modular design, each module can support 4 channels at the same time;；

- Independent arc detection for each channel, arc alarm threshold can be set；

- Integrated current measurement；

- Modbus interface with standard protocol to indicate faulty arc channels；

- Support module cascading, the number of cascading can support up to 8 and a total of 32 channels；

- Channel maximum current ± 15A；

- The alarm signal is open-drain output, which can be used directly to adapt to various alarm levels.；

- Modular design for seamless connection to the fonrich's combiner box monitors, allowing local data to be uploaded via the RS-485 bus without adding external

wiring and equipment；

- Sensor and PCB have housing and protection for higher reliability；

- Rail mounted for easy and reliable installation；

- Compliance with UL1699B (Type 1)；
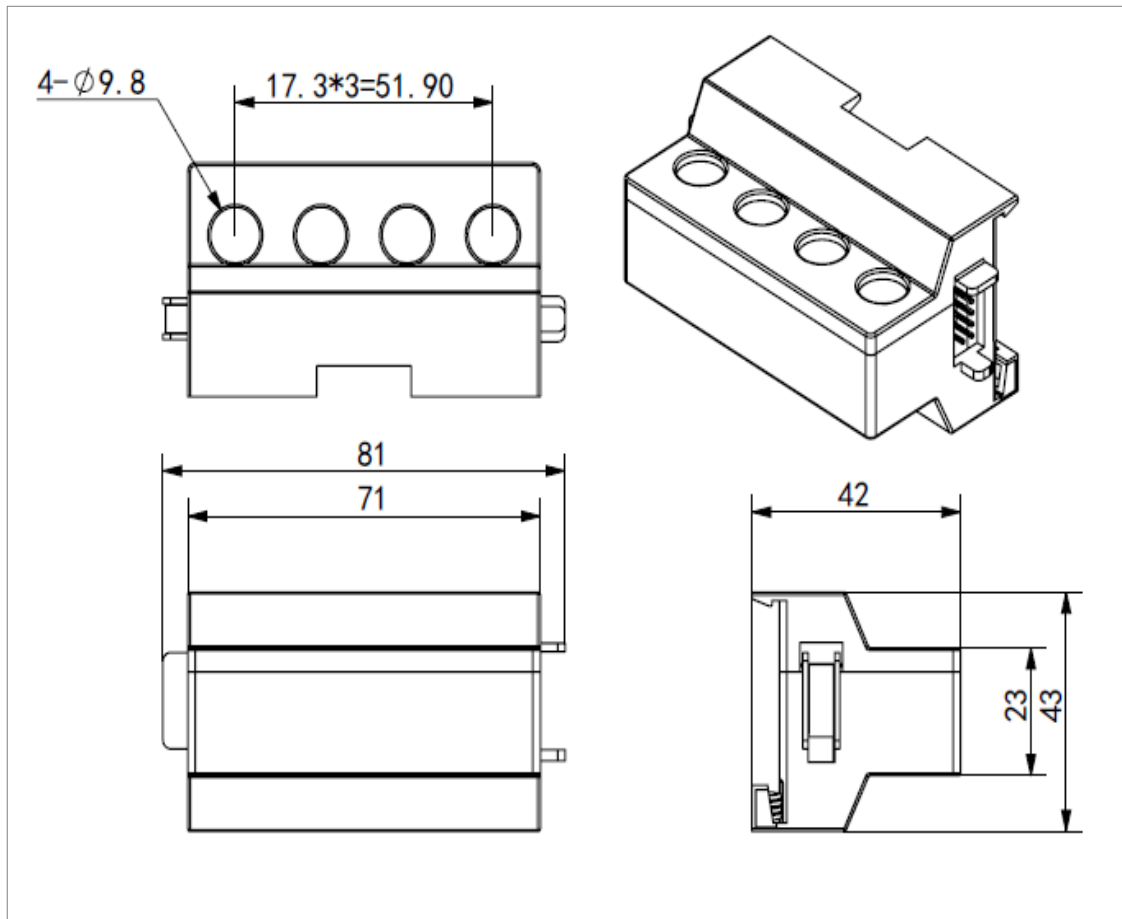
Dimensional drawing

DC arc monitoring sensor outline drawing

Terminal definition and description
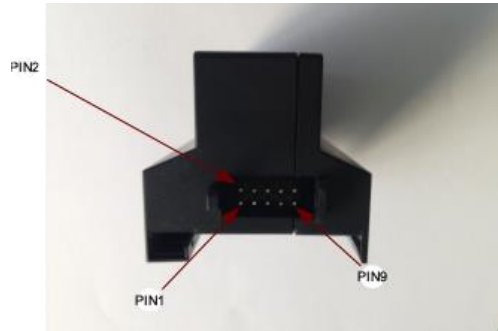
Figure: Terminal definition and description

Signal pin	Pin Definition	Description	Signal Level
1,2	GND	5V power ground	5V
3,4	Modbus	Single line Modbus	5V
5,6	Address	Internal use, address cascading for multiple modules	5V
7,8	Alm_out	Arc alarm signal open collector output (external pull-up resistor is required for use, or direct drive relay output), output low level when there is arc alarm	5~30V
9,10	VCC	5V power supply	5V

DC Arc Monitoring Sensor Module Cascade Diagram

The FR-DCMG-AS4A is cascaded and supports 4 to 32 channels of DC arc monitoring. Refer to Figure 2 for the specific connection method and description (take the 2 module as an example):

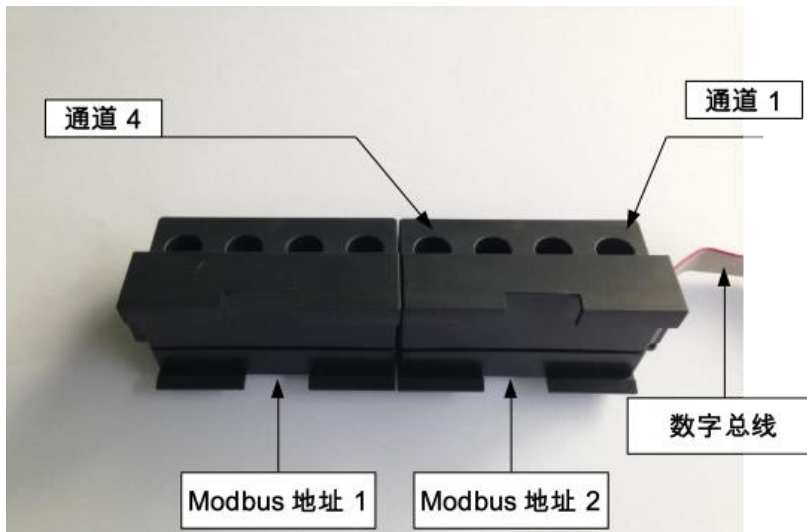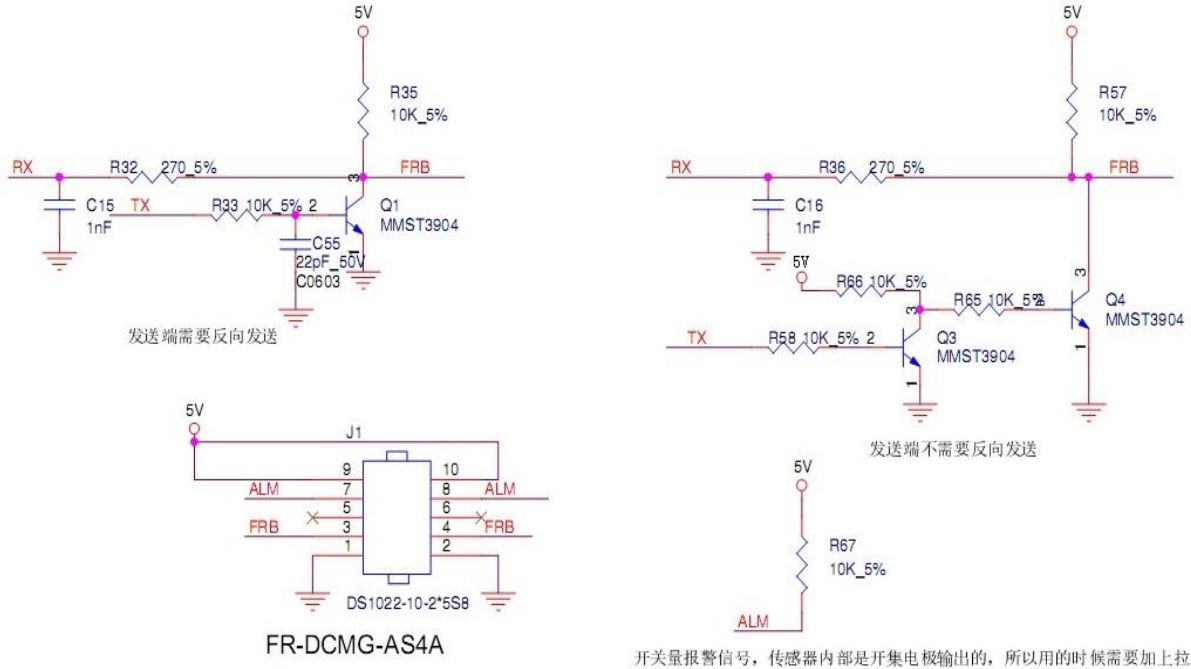Figure: FR-DCMG-AS4A connection diagram

二、 **Interface Reference Circuit**

If you want to connect to this sensor, please use the following reference circuit:

FR-DCMG-AS4A

注：1.RX,TX为UART信号，如果控制器管脚能兼容5V电平就可以直接使用，否则请加电平转换器
　　2.传感器供电范围4.8~5.2V。
　　3.连接排线的红线对应端子J1上的PIN1，J1是传感器上的插针侧连接器
　　4.通道编号规则，插针位置代表该传感器的第一通道，依次至第四通道
　　5.传感器模块串接时地址分配规则，地址1为最末端的传感器模块，如有N个传感器模块，排线侧的模块地址为N。

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三、 Modbus Protocol Definition

The FR-DCMG-AS4A external communication interface protocol supports Modbus-RTU. When multiple modules are cascaded, the Modbus address can be automatically identified. After the module is cascaded, the Modbus address of the FR-DCMG-AS4A at the end of the cascade is 1, and the front-end Modbus address of the cascade is the total number of cascaded sensors. (Refer to Figure 2 for details). Refer to Figure 4 for the Modbus output terminals.

Modbus Configuration

- Modbus communication mode: RTU mode

- Slave address value: 1~7 (when there is only one module, its address is 1)

- Baud rate: 9600bps

- Byte check format: no parity

Data frame format description (refer to Modbus RTU standard)

The composition of the data frame is as follows:

Address Code	Function Code	Data Area	Check Zone
1 byte	1 byte	N*1byte	2 bytes

The address code is used to identify the slave that receives the data frame and the response frame that is sent by that slave. The function code indicates how the master requests the slave. The response and slave are responses to that type of function code. The contents of the data area can be the address value, the number of registers, and the data that the slave responds to and the data that the host sends to the slave. The check area uses CRC cyclic redundancy to check whether one frame of data is in error.

Function code description

FR-DCMG-AS4A supports Modbus function codes 03, 04 for single or multiple register reads (up to 15 consecutive address read operations), and function code 06 for writing to a single register.

Register address description

Adress	Content	Type of Data	Description	Read/write
Status and control information				
0x0000	Channel 1 current value	Short	Channel 1 real-time current, in mA	R
0x0001	Channel 2 current value	Short	Channel 2 real-time current, in mA	R
0x0002	Channel 3 current value	Short	Channel 3 real-time current, in mA	R
0x0003	Channel 4 current value	Short	Channel 4 real-time current, in mA	R
0x0004	Arc alarm information	Unsigned int	Real-time monitoring of 4 channel arc occurrence states Bit0 represents channel 1, bit1 represents channel 2, Bit 2 represents channel 3 and bit 3 represents channel 4. 0 means normal, 1 means there is an alarm.	R
0x0005	Channel 1 arc strength	Short	The real-time arc intensity monitored by the first channel is a signed number between -128 and 127. The larger the value, the greater the likelihood of an arc occurring. 0 means uncertainty, the larger the positive value, the greater the possibility of arcing, and the larger the negative value, the less likely it is the arc.	R
0x0006	Channel 2 arc strength	Short		R
0x0007	Channel 3 arc strength	Short		R
0x0008	Channel 4 arc strength	Short		R
0x0009	Arc self-test result	Unsigned short	Bit0 indicates the self-test result of channel 1, bit1 indicates the self-test result of channel 2, bit2 indicates the self-test result of channel 3, and bit3 indicates the self-test result of channel 4. 1 indicates that the self-test failed (or no self-test), and 0 indicates that the self-test was successful.	R
0x000A	Arc self-test command	Unsigned short	Writing 1 means starting the self-test (self-checking all channels). It is automatically cleared after the end of the self-test.	R/W

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0x000B	Arc alarm threshold	Short	Settable arc alarm threshold (all channels)	R/W
0x000C	Channel 1 arc intensity history value	Short	Record the historical maximum value of the detected arc intensity after power-on, and automatically clear after power-off	R
0x000D	Channel 2 arc intensity history value	Short		R
0x000E	Channel 3 arc intensity history value	Short		R
0x000F	Channel 4 arc intensity history value	Short		R
0x0020	ACS software version number	Unsigned short	Product running software version	R
0x0021	ACS hardware version number	Unsigned short	Product running hardware version	R
0x0022	ACS hardware serial number	Unsigned short	Product run serial number	R

Document revision record

Revision	Description	Time
V1.1	Initial version	2015-04-14
V1.2	Modify the interface diagram	2015-4-17
V1.3	Modify the interface signal definition	2015-5-14
V1.4	Add interface usage diagram and reference design	2015-6-23
V1.5	1. Modify the alarm output interface to act when alarming 2. Output signal hold time when adding alarm 3. Open arc acquisition data register definition	2015-8-10
V1.6	Modify the content of the arc self-test results	2017-8-23
V1.7	Open more Modbus registers: - Arc strength - Arc alarm threshold setting - Arc history maximum	2019-02-26

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