User Manual

Version 2.11

DC System Monitor：FR-DCMG-MMPx

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1 Document Statenebt

This manual is applicable to products of model FR-DCMG-MMPx (MMPx includes MKPD, MKPD is an upgraded version of the appearance of the older MMPD), and the software version is A32A or above.

2 Safety Precautions

Symbol

The following signs may appear in this article, and their meanings are as follows.

Symbol	Illustration
Danger	It is used to warn of urgent dangerous situations. If not avoided, it may cause serious personal injury or death to people.
Warning	It is used to warn of potential dangerous situations that, if not avoided, may cause serious personal injury or death to personnel.
Attention	It is used to warn of potential dangerous situations that, if not avoided, may cause moderate or minor personal injury.
Note	It is used to convey safety warning information about equipment or the environment. If not avoided, it may lead to equipment damage, data loss, reduced equipment performance or other unpredictable results."Caution" without safety warning signs does not involve personal injury.
Illustration	Used to highlight important/key information, best practices and tips, etc.The "Instructions" are not safety warning messages and do not involve personal, equipment or environmental injuries.

Safety Precautions

Please carefully read the safety precautions in this user manual to avoid personal injury and property loss.

Personnel Requirements

- he installation operation of FR-DCMG-MMPx (including MKPD) must be carried out by professional electrical personnel.
- Operators should be fully familiar with the composition, working principle of the entire photovoltaic grid-connected power generation system, as well as the relevant standards of the country/region where the project is located.

System Installation

Danger

Electrical operations are strictly prohibited during the installation process. Ensure that both the DC side and AC side have been powered off before installation.

Note

Before installation, please carefully read this user manual. If the equipment is damaged due to installation not following this manual, our company has the right not to provide quality assurance.

- Before installation, make sure it has not been electrically connected or powered on.
- During the installation process, except for the terminal block inside the junction box, do not touch other internal parts.
- Before performing electrical connections, ensure that the positive and negative busbars of the combiner box are at 0V.

Electrical Connection

Danger

Before making electrical connections, ensure that the FR-DCMG-MMPx (including MKPD) is

undamaged and in a safe state; otherwise, it may cause electric shock.

- All electrical connections must meet the electrical standards of the country/region where it is located.
- The cables used in the photovoltaic combiner box must be securely connected, well insulated, and of appropriate specifications.

System Operation

FR-DCMG-MMPx (including MKPD) operates under high voltage during operation, which may lead to electric shock and can be fatal in severe cases. Please strictly follow the safety precautions listed in this user manual and other related documents when operating.

3 Product description

FR-DCMG DC monitor products are mainly used in DC transmission, power distribution and other occasions, such as photovoltaic combiner boxes, DC cabinets, telecommunication equipment rooms and communication base stations. Through RS485 or industrial wireless communication with the host computer, its main functions include real-time monitoring of the current of each branch in the DC system, bus voltage, box temperature, lightning protector status, and DC circuit breaker status. It can realize automatic alarm for abnormal conditions and real-time detection of whether there is a harmful arc in the DC circuit.

The main function

- Monitoring function: real-time monitoring of the generation current, voltage, temperature of the combiner box, lightning arrester status, DC circuit breaker status and DC arc fault status of each photovoltaic string in the combiner box, and communicate with the host computer through RS485.
- Display content: For the detected voltage, current, temperature, switch status, power

generation and other data, FR-DCMG-MMPU can display histogram interface through LCD, and read current and other data more intuitively.

- Alarm function: According to the actual needs of the site, the alarm can be configured to turn on or off, and the interface will pop up the alarm information when the alarm is triggered.
- Current calibration: Identify zero drift and improve the accuracy of current identification. (Default closed)
- Trip mode switching (only for models supporting trip function) : By default, the voltage for O+ and O- is 0V, and the output voltage during trip is 24V. It can also be set to the opposite application.

Product Parameter

The monitoring host body

Item	Specification				
Product Model	FR-DCMG-				
	MKPD①	MMPU	MMPP	MMPQ	MMPS
Maximum System Voltage	1000Vdc	1500Vdc		1700Vdc	1500Vdc
Power Supply Method	Busbar power supply (Startup voltage 450Vdc)				24Vdc power supply
	Voltage Measurement				
Voltage Resolution	1V				
Voltage Measurement Accuracy	0.50%FS				
Drift Offset	≤0.1V/℃				
	Shedding Function				
Support shedding or not	No support	No support	Support	No support	Support
Shedding Drive Voltage	24Vdc				
Shedding Drive Capability	80W * 10mS				
	Temperature Measurement②				
Temperature Resolution	0.1℃				
Sensor Type	NTC				
Number of Sensors	2 channels				
Measurement	-40℃ ~ 125℃				

Range	
Measurement Accuracy	±2℃
	Switching Quantity Status Monitoring
Number of Switching Quantity Inputs	4 channels
Input Type	Dry contact input
Input Voltage	DC 5V
	RS485 Communication
Communication Protocol	Modbus-RTU
Communication Speed	2400/4800/9600/19200/38400 bps
Byte Format	8N1,8O1,8E1（Default 8N1）
	Local Display and Operation
Local Display Content	Busbar voltage, branch current, alarm information, temperature, etc.
Display	Dot matrix LED display
Number of Operation Buttons	4
Button Content	Display and parameter setting of operating status
	Temperature and Humidity Environmental Requirements
Operating Temperature	-30℃ ~ +70℃
Storage Temperature	-40℃ ~ +85℃
Operating Humidity	0～95%
Note①	MKPD is an upgraded version of MMPD, and MMPD has been discontinued.
Note②	The temperature measurement function requires the selection of a temperature terminal accessory.

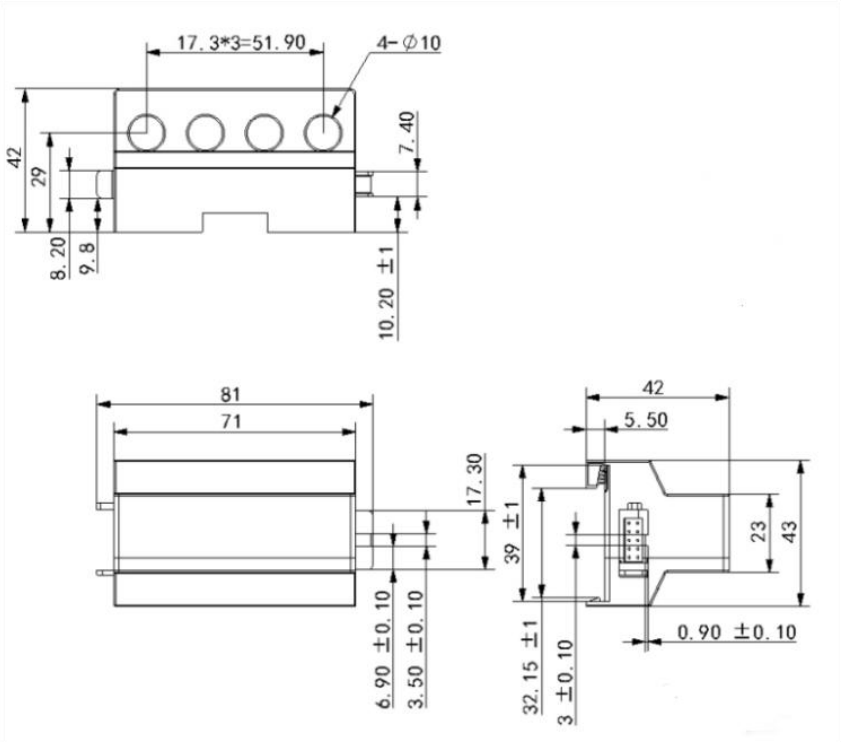
Hall module Module Parameters

Item	Specification					
Product Model	FR-DCMG-					
	AS4A	AS2A	HS4A	HS4P	HS4Q	HS4R
Current Measurement Range	±20A	±20A	±20A	±30A	±40A	±60A
Support arc detection or not	Support		No support			
Number of Detection	4	2	4			

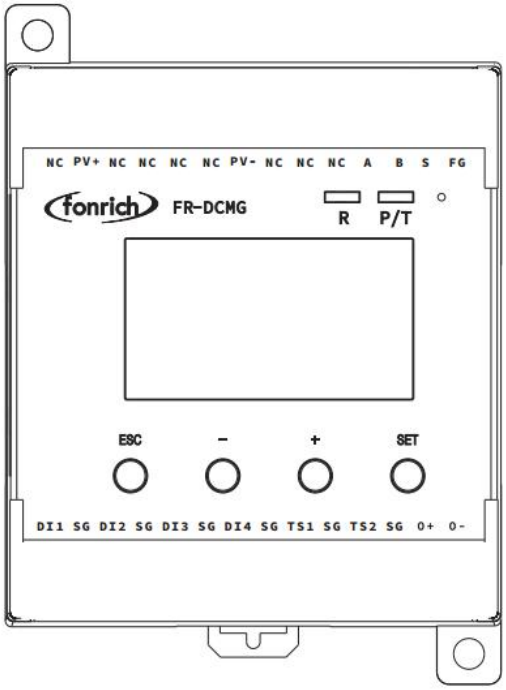
Channels			
Maximum Number of Modules in Series	6		
Drift	≤±0.1A	≤±0.2A	
Drift Offset	≤±0.01A/℃		
Linearity	≤1%FS		≤3%FS
Arc Detection Category	UL1699B(Type 1)	No arc detection function	

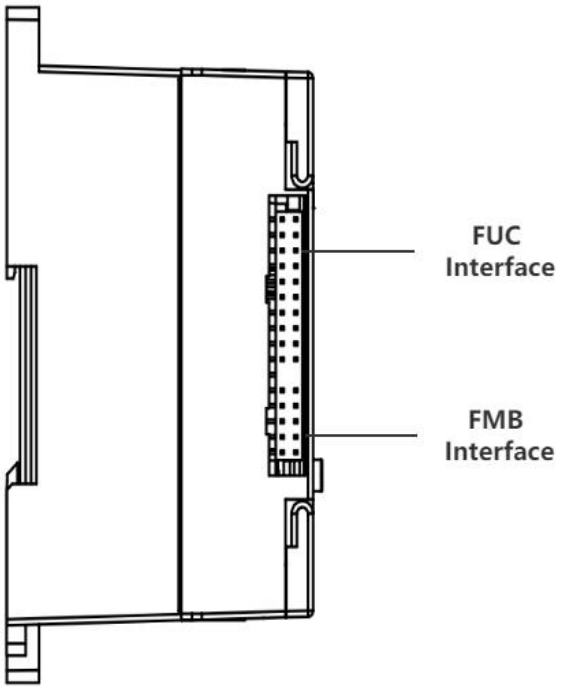
Host module size diagram

Hall module size diagram



Terminals Definition



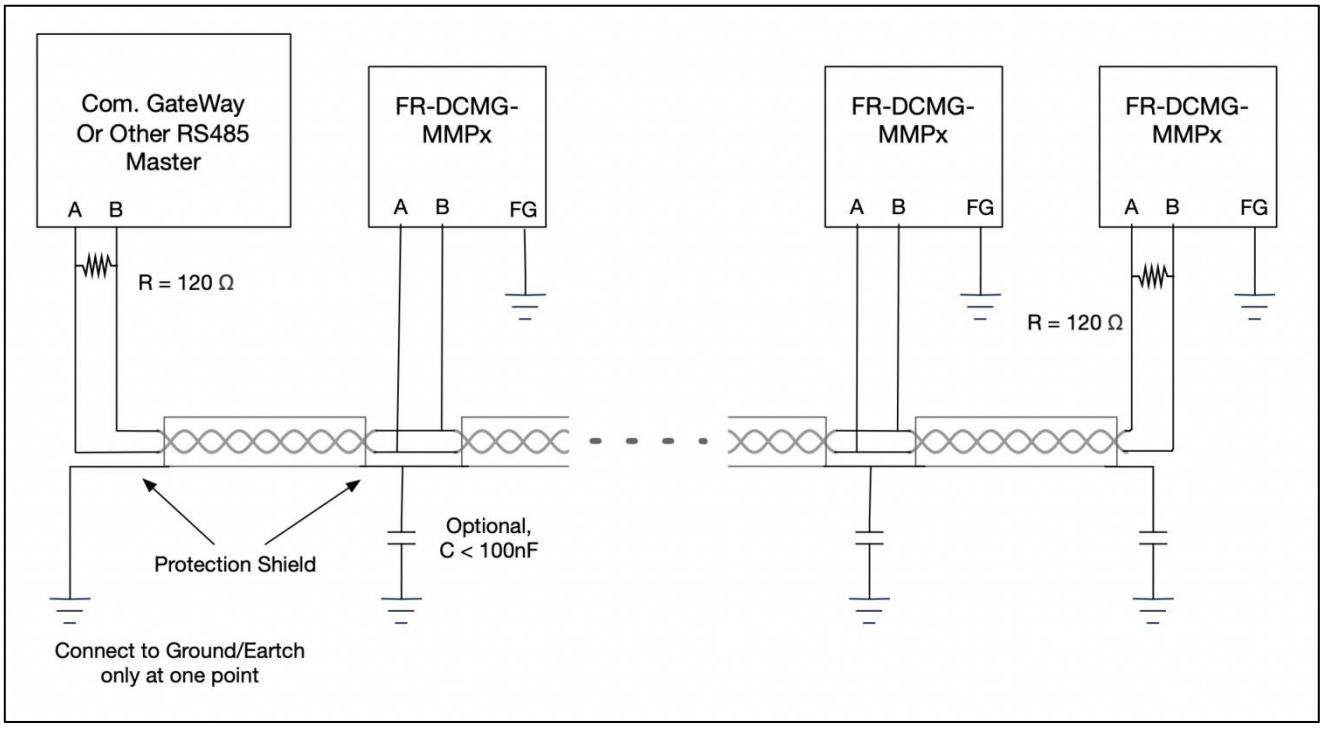


Symbol	Meaning
PV+/PV-	PV DC bus power supply terminal
NC	Not connecion
A/B	RS485 Communication terminal
FG	Fixed Ground terminal
TS1/TS2	Externally connected temperature sensor terminals
SG	Internal common-mode grounding terminal
DI1/DI2/DI3/DI4	4 switch input terminals
O+/O-	Connect the shunt trip unit
FUC	Can connect modules with FUC interface
FMB	Modules with an FMB interface can be connected, such as the FR-DCMG-AS4A DC Arc Detector.
O+/SG	DC 24V output terminal, maximum 100mA output, for emergency use only, not for long time use!

RS485 Cable Connection, Shielding, and Grounding

The FG terminal of the FR-DCMG must be grounded, otherwise communication will interfere and the reliability of the device will decrease. The grounding wire should be grounded nearby. The grounding wire should be no more than 15cm from the "FG" terminal to the bottom of the combiner box. It is recommended to be within 10cm. The shorter the better, the thicker the better. The bottom of the combiner box should be connected to the ground. The main control unit module is fixed on a standard guide rail with a width of 3.5 cm.

The wiring specifications for communication shielded wires are shown in the following figure (MMPx includes MKPD) :



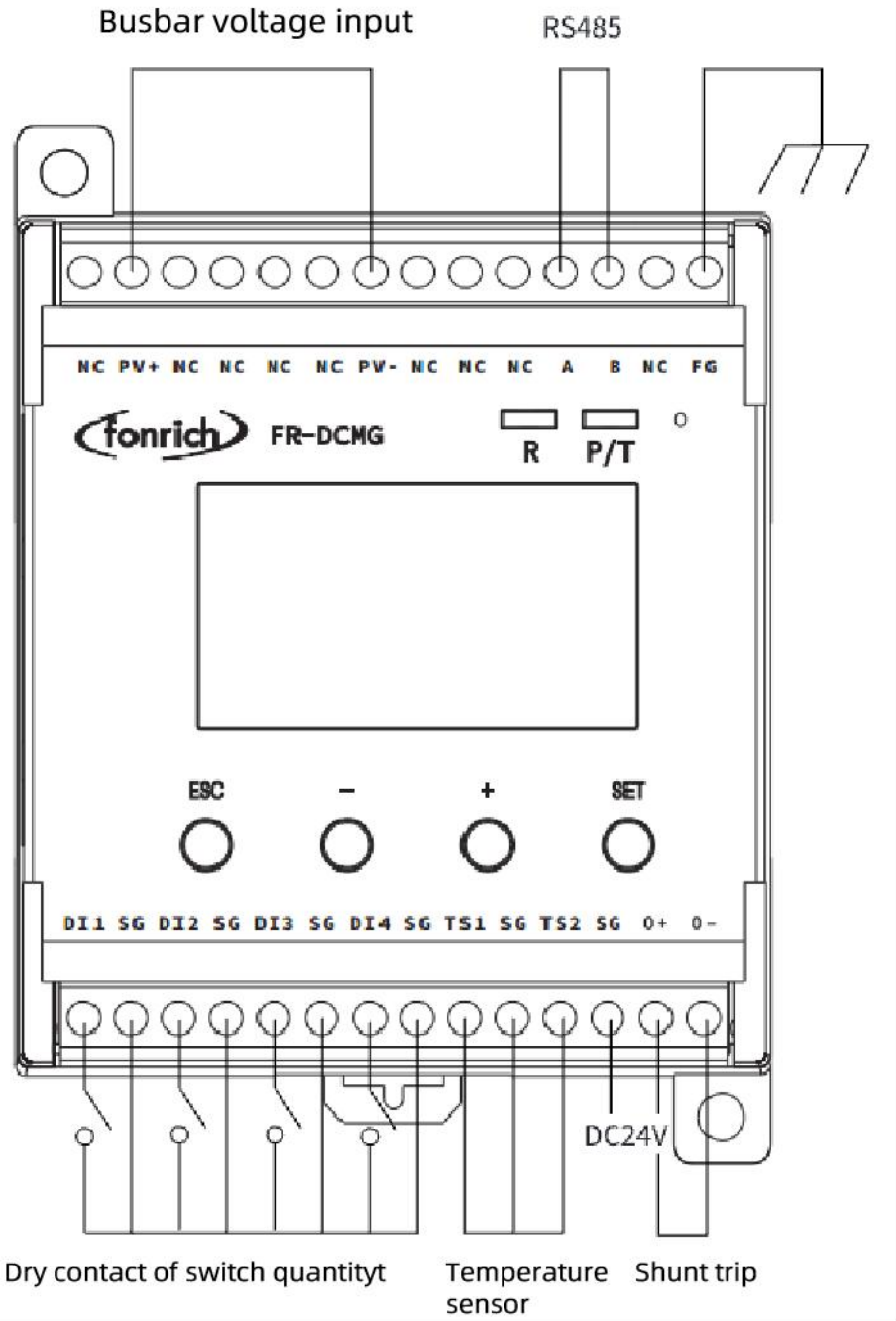
Note

The wiring of on-site communication lines requires that the communication shielding layer can only be grounded at a single point, and it is necessary to ground at a single point first and then connect the communication shielding layer hand in hand. Otherwise, there is a risk of lightning surge damage to all equipment on the entire communication line during a lightning strike.

In case of significant interference in the communication line that makes communication impossible, you can refer to the above figure and connect a high-voltage capacitor C < 100nF between the shielded wire and the grounding wire in each combiner box to filter out the

interference from the shielding layer.

4 Wiring diagram of the monitoring module



In particular, the FR-DCMG-MMPS is powered by a DC24V terminal (SG is 24V-, O+ is 24V+), while other models of the main unit can temporarily use the DC24V terminal for external discharge (SG is 24V-, O+ is 24V+), with a maximum current of 100mA.

5 Operation interface display

Button Key Operation

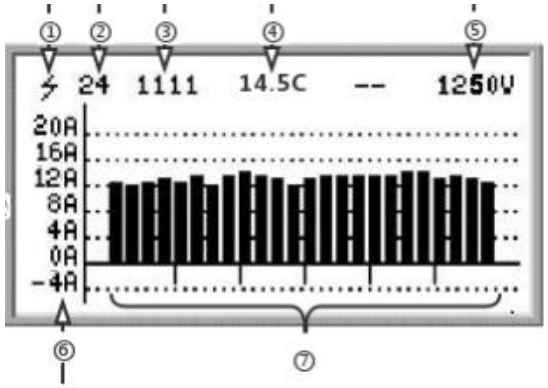
- FR-DCMG-MMPU has four keys “ESC”, “-”, “+”, and “SET”.
- “ESC” key is used to return to the default interface and cancel parameter setting;
- “SET” key is used to enter the parameter setting mode, select the parameter to be set and complete the setting of the parameter.
- The "+" and "-" keys are used to scroll the screen and adjust parameters.
- Press the "+" and "-" keys at the same time to display the software version interface.
- Press the "ESC" and "-" keys simultaneously to display the current calibration interface.
- If there is no key operation for 10 seconds, the interface will automatically jump to the default interface of the current mode, and the brightness will decrease after 5 seconds.

Boot screen

After the device is powered on, the following interface will be displayed:

Current Interface

After the startup interface, a bar chart interface will be displayed as shown in the figure below:



①Indicates that the connected Hall sensor has arc detection functionality; ordinary Hall sensors do not have this symbol.

②Number of online current channels, which varies based on the actual number of connected Hall sensors.

③Switching quantity input status: Real-time status of DI1, DI2, DI3, and DI4.

④Real-time temperature.

⑤Real-time voltage.

⑥Current bar chart: Default display range is -4A to 20A. Connecting high-range Hall sensors will automatically adjust the range, or you can expand the display range by setting register 0x0B16.

⑦Bar chart division: Due to the insertion of 6 Hall sensors, there are 6 divisions.

Detailed Data Interface for Channel Current and Power Generation

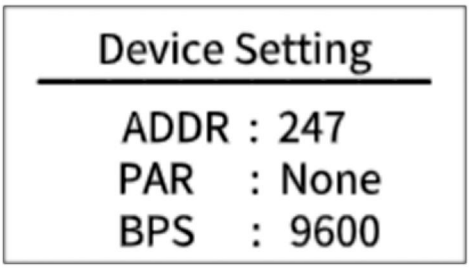
Under the current interface, pressing the "+" or "-" key allows you to enter the detailed data display interface for channel currents and power generation. The screen shows the current values and cumulative power generation for each channel. When you first press the "+" key, it

displays the numerical value of the current. When you first press the "-" key, it displays the numerical value of the cumulative power generation. To view the values of the current and cumulative power generation, you can continue pressing the "+" or "-" keys to flip through the screens. After the current display ends, continuing to press the "+" key will start displaying the cumulative power generation. In the left figure, "CH1:" indicates that the real-time monitored current value for channel 1 is "6.929A," and so on for subsequent channels.

The right figure shows the cumulative power generation display interface. In the figure, "CH1:" indicates that the cumulative power generation for channel 1 is "6.929kWh," and so on for subsequent channels.

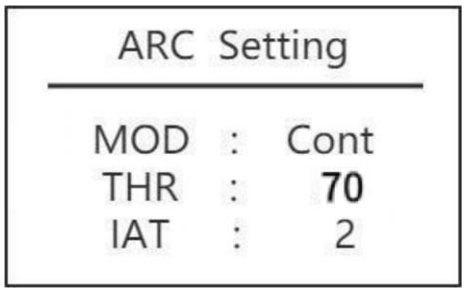
Parameter setting interface

In the histogram interface, press the "SET" key to enter the Modbus parameter setting interface. The Modbus parameter setting is as follows:



- ADDR: The communication address of the Modbus slave node, the range is 1 ~ 247 (default is 247).
- PAR: The data verification method of Modbus communication. The optional parity (None), odd parity (Odd), even parity (Even), and no parity by default.
- The right figure shows the cumulative power generation display interface. In the figure, "CH1:" indicates that the cumulative power generation for channel 1 is "6.929kWh," and so on for subsequent channels.

Press the "+" key to continue down the selection to the arc parameter setting interface1:

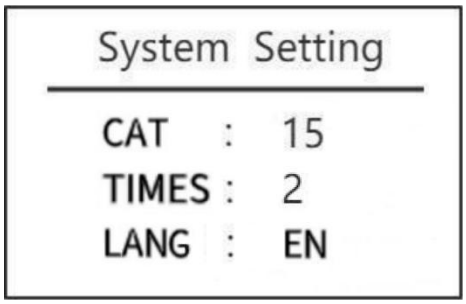


- MOD：Arc protection modes (Cont: Continuous Arc Alarm mode, Single: Instantaneous arc alarm Mode)

- THR：Arc threshold (default 70 for all models, and default 50 for FR-DCMG-MMPS)

- IAT：2 (Instantaneous arc time, default 2 seconds)

Press the "+" key to continue the selection downward to the arc parameter setting interface2:



- CAT：Continuous arc time (default 15 seconds)

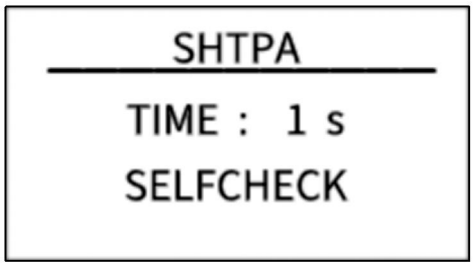
- TIMES：The number of times the arc is triggered within the continuous arc time is reached, and the trigger trip is triggered (default: 2 times).

- LANG：Language Settings (default: EN)

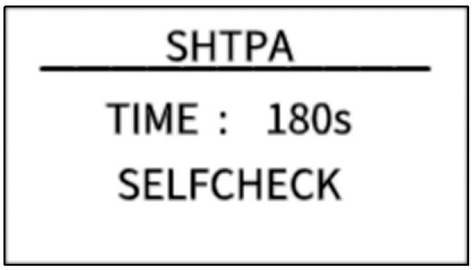
Shunt Trip Self-Check Setting Interface (Only applicable to models that support shunt trip)

Press the "ESC" and "+" keys simultaneously to enter the shunt trip setting interface.

(Factory default) Shunt trip mode (O+/O- DC voltage is 0V), as shown in the figure below:



(Special requirement) Relay mode (O+/O- DC voltage is 24V), as shown in the figure below:



In the shunt trip setting interface, you can set the enable time (TIME) for the shunt trip during arc fault alarms and perform a self-check of the shunt trip (SELFCHECK).

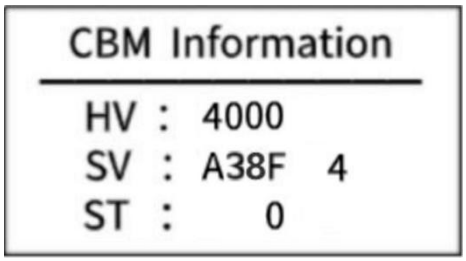
When the "" is flashing on the TIME line, press the "SET" key, then use +/- to modify the shunt trip enable time. When the "" is flashing on the SELFCHECK line, press the "SET" key to automatically perform a self-check of the shunt trip.

Specifically, when the set time is reached, the shunt trip will activate. After the enable time has passed, the shunt trip will reset.

The switch between relay mode and shunt trip mode can only be modified through communication commands (see register address 0x0B17); it cannot be directly switched via buttons.

System information display interface

In the histogram interface, press the "+" and "-" keys at the same time to enter the software version number display interface, as shown below:



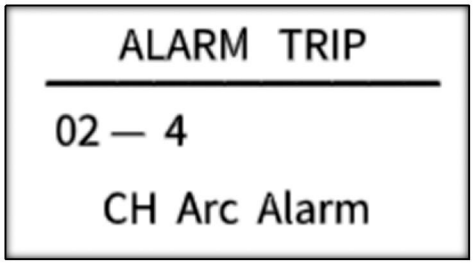
- HV：Keep
- SV：Software version number(The version information shown in the illustration is FR-DCMG-MMPP. The default version information of the other models is as follows: FR-DCMG-MMPS is A34F 1, and FR-DCMG-MKPD/MMPU/MMPQ is A32A.)
- ST：Keep

Alarm status display interface

Alarm messages can be cleared remotely and manually. Manual clearing requires long-pressing the host's "ESC" key for 2 seconds, remote clearing requires writing "1" to register 0x0079 to clear. If an arc alarm occurs, it must be cleared manually or remotely. Restarting the host will still display the alarm message.

Channel arc fault alarm interface

After the DC arc sensor detects the occurrence of a fault arc, the alarm information interface of the host is as shown below.



In the figure above: "02" means channel arc fault alarm, and "4" means that the fault arc alarm channel is 4.

Fault alarm clear interface

The host sends an alarm when it detects a fault, and the user can choose to handle it locally or remotely. By long-pressing the "ESC" key for about 2 seconds locally, the system jumps out of the interface as shown below, indicating that the alarm status has been cleared; remote processing needs to write "1" to 0x0079 to clear, and the interface shown below will be displayed after clearing successfully.

6 Alarm information management

Items That Can Generate Alarms Through Settings	Items That Can Cause Tripping Through Settings (Only Effective for Models Supporting Tripping)
Channel Arc	Channel Arc
High Voltage	High Voltage
Low Voltage	High Temperature
High Temperature	Channel Reverse Current
Channel Reverse Current	Total Reverse Current Excessive
Total Reverse Current Excessive	Total Current Excessive
Total Current Excessive	Channel No Current
Total Current Too Low	Channel Low Current
Channel No Current	Channel High Current
Channel Low Current	Channel Current Value Underflow
Channel High Current	Channel Current Value Overflow
Channel Current Value Underflow	Switching Quantity DI1 Status

Channel Current Value Overflow Switching Quantity DI1 Status Switching Quantity DI2 Status Switching Quantity DI3 Status Switching Quantity DI4 Status	Switching Quantity DI2 Status Switching Quantity DI3 Status Switching Quantity DI4 Status

Alarm Conditions

1. Current reversal, no current, undercurrent, overcurrent, low current, high current, etc., channel alarm judgment prerequisite conditions:

a. When the average value of the channel current is greater than the set current channel alarm start threshold, the above current-related item alarm function will be activated; otherwise, the alarm status will be forcibly cleared to 0.

b. Whether an alarm occurs also needs to meet its own alarm conditions (higher or lower than its own alarm threshold).

c. Confirm whether the corresponding alarm register is turned on; by default, only the channel arc alarm is enabled.

2. Current reversal, no current, undercurrent, overcurrent, low current, high current, etc., channel alarm and tripping judgment prerequisite conditions:

a. Need to meet their alarm conditions.

b. Only when the cumulative number of alarm channels exceeds the set tripping channel count will tripping occur.

c. Confirm whether the corresponding tripping register is turned on; by default, it is closed.

Alarm message

- Undercurrent alarm. After the channel average current value is subtracted from the overcurrent / undercurrent alarm threshold, the current value is still less than or equal to the current channel start alarm start threshold. The overcurrent / undercurrent alarm threshold will change as the average current changes.

- Over current alarm. After the channel average current value plus the over current / under current alarm threshold, the current value is still greater than or equal to the

current channel start alarm start threshold. The over current / under current alarm threshold will change as the average current changes.

- Low current alarm, when the current is less than or equal to the channel current low alarm threshold, an alarm occurs.
- High current alarm. When the current is greater than or equal to the channel current high alarm threshold, an alarm occurs.
- No current alarm, when the absolute value of the current is less than 250mA, an alarm occurs.

Arc Fault Alarm Strategy

The following arc fault strategies are all designed based on the latest UL1699B arc fault standard:

1. If the arc intensity of any channel exceeds the channel alarm threshold (the threshold can be set, default is 50), an arc fault alarm will be generated.
2. In shunt trip mode (O+/O- terminal DC voltage is 0V), if the arc of any channel exceeds the alarm threshold, an arc fault alarm will be triggered and the circuit breaker will trip. After tripping, manual or remote clearing of the alarm status on the alarm interface is required to reset the circuit breaker.
3. In relay mode (O+/O- terminal DC voltage is 24V), if the arc of any channel exceeds the alarm threshold, the O+/O- voltage will change to 0V and remain for 3 minutes (time can be set). After 3 minutes, the O+/O- voltage will return to 24V. If the same channel alarms 5 times (number of times can be set) and the O+/O- voltage does not recover, even a power restart cannot restore it. Manual or remote clearing of the alarm status on the alarm interface is required to return to normal operation.
4. The cumulative method for the number of arc faults: An arc fault count will only increase by 1 when the same channel continuously experiences an arc fault. For example, if Channel 1 has three consecutive arc faults and the fourth one is from Channel 2, the alarm count will reset and start counting again. If Channel 2 triggers another alarm, its alarm count will increase by 1. After reaching 5 alarms, manual clearing of the alarm interface is required.

Explanation of Arc Fault Alarm Terminology

Instantaneous Arc

An arc that lasts no longer than the instantaneous arc time (Instantaneous Arc Time, abbreviated as IAT) and does not occur again within the continuous arc time (Continuous Arc Time, abbreviated as CAT).

Continuous Arc

An arc that lasts longer than the instantaneous arc time (Instantaneous Arc Time, abbreviated as IAT), or an arc that lasts shorter than IAT but occurs again within the continuous arc time (Continuous Arc Time, abbreviated as CAT).

Combined Alarm Strategy (Default Off, Enable When Needed)

The alarm will only take effect when two or more alarm conditions are met simultaneously.

Example: When the voltage is below 800V and the total current is greater than 50A, the module will trigger an alarm and trip.

Steps:

1. Open bit 4 of 0x0B21 (2849) and 0x0B24 (2852).
2. Enable the low voltage (Bit2) and high total current (Bit9) functions of 0x0B26 (2854).
3. Enable the corresponding low voltage (Bit2) and high total current (Bit9) alarms of 0x0B20 (2848) and 0x0B23 (2851).
4. (Optional): Set the thresholds for low total current of 0x0B05 (2821), high total current of 0x0B06 (2822), and low voltage of 0x0B01 (2817) to values that meet the test conditions.

Explanation

- The register positions of the combined alarm status and other alarm statuses remain consistent
- The status 03 function code of the combined alarm is located at bit4 of registers 0x012B and 0x012E
- The position of the function code for the status 02 of the combined alarm is 0x0214 in the register

7 MODBUS Protocol definition

Communication format configuration

- Modbus communication mode: RTU mode
- Address of the slave device: range form 1 to 247 (default 247)
- Baud rate (bps): 2400, 4800, 9600 (default), 19200, 38400
- Byte check mode: odd check, even check, no check (default)

Data frame format description (refer to Modbus RTU standard)

The byte in the communication frame composed by 1 start bit, 8 bits data bit, 1 parity bit, 1 stop bit like the below table（Refer to standard modbus RTU protocol):

Table 1: Data frame format table

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

The address code is used to identify the slave that receives the data frame and the response frame sent by that slave. The function code indicates how the master requires the slave to respond and the slave responds to that function code. Data area The content can be the address value, the number of registers, the data from the slave response and the data sent by the master to the slave, etc., which can hold up to 252 bytes of data. The check area uses CRC cyclic redundancy to check whether a frame of data is wrong. The high byte of the data frame comes first, and the low byte comes after.

Data message example

Send: 01 03 01 04 00 01 C4 37

Device address | function code | Register address | Number of registers | Check digit (automatically generated)

Receive: 01 03 02 02 BC B8 95

Device address | Number of bytes | Check digit (automatically generated)

function code Number of registers

Message example analysis: The above sending message reads the value of slave address 1 and register address 0x0104 (voltage V), and the received message responds with voltage data 0x02BC, which is converted to decimal, which is 700V.

Function code description

Register reads and writes in bits

- Function code 01 used to read the contents of the bit register
- Function code 02 used to reads the contents of the bit register
- Function code 05 used to write single bit-type registers

The contents represented by the register in bits are: switch value, alarm information, etc.

Register read and write in word units

- Function codes 03、04 are used to read multiple word-type registers
- Function code 06 is used to write single word-type registers
- Function code 16 is used to multiple word-type registers

The content of the word-type registers can be voltage, current, generated energy, etc

BIT Register description

Register description in bit units (function code 02)

Bit address		Functional description	Remark
Hex	Decimal		
0x0200	512	Busbar Arc Fault Trip Status	When a busbar arc fault occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0201	513	Channel Arc Fault Trip Status	When a channel arc fault occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0203	515	Busbar High Voltage Trip Status	When a high voltage alarm on the busbar occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0204	516	Temperature Sensor 1 Over-Temperature Trip Status	When an over-temperature alarm from Temperature Sensor 1 occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0205	517	Temperature Sensor 2 Over-Temperature Trip Status	When an over-temperature alarm from Temperature Sensor 2 occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0206	518	Channel Reverse Current Trip Status	When a reverse current alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0207	519	Total Reverse Current Trip Status	When a total reverse current alarm occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0209	521	Total High Current Trip Status	When a high total current alarm occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x020A	522	Channel No Current Trip Status	When a no current alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x020B	523	Channel Undercurrent Trip Status	When an undercurrent alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the

			alarm is cleared.
0x020C	524	Channel Overcurrent Trip Status	When an overcurrent alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x020D	525	Channel Low Current Trip Status	When a low current alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x020E	526	Channel High Current Trip Status	When a high current alarm on a channel occurs and a trip action is executed, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0210	528	Switching Quantity 1 Trip Status DI1	When a trip action is executed by Switching Quantity 1, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0211	529	Switching Quantity 2 Trip Status DI2	When a trip action is executed by Switching Quantity 2, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0212	530	Switching Quantity 3 Trip Status DI3	When a trip action is executed by Switching Quantity 3, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0213	531	Switching Quantity 4 Trip Status DI4	When a trip action is executed by Switching Quantity 4, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0214	532	Combined Alarm Trip Status	Combined alarm trip action
.....	.....	.....	.....
0x021E	542	Remote Manual Trip Operation Status	When a remote manual control executes a trip action, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0230	560	Busbar Arc alarm status	When the busbar arc intensity exceeds the alarm threshold, this bit is set to 1. It is reset to 0 after the alarm is cleared.
0x0231	561	Channel arc alarm status	This bit is set when the channel arc strength is above the alarm threshold. Clear the alarm and set it to 0.
0x0232	562	Bus voltage too low alarm status	This bit is set when the bus voltage is below the alarm threshold. Cleared below the alarm release threshold
0x0233	563	Bus voltage to high alarm status	This bit is set when the bus voltage exceeds the alarm threshold. Cleared below the alarm release threshold
0x0234	564	Temperature sensor 1	This bit is set when the temperature sensor 1 temperature

		high temperature alarm status	exceeds the alarm threshold. Cleared below the alarm release threshold
0x0235	565	Temperature sensor 2 high temperature alarm status	This bit is set when the temperature sensor 2 temperature exceeds the alarm threshold. Cleared below the alarm release threshold
0x0236	566	Channel reverse current alarm status	When the reverse current is generated in the channel, the position is 1, and the alarm is cleared.
0x0237	567	Total reverse current alarm status	This bit is set when the total reverse current exceeds the alarm threshold. Cleared below the alarm release threshold
0x0238	568	Total current too low alarm state	This bit is set when the total current exceeds the alarm threshold. Cleared below the alarm release threshold
0x0239	569	Total current too high alarm state	This bit is set when the total current exceeds the alarm threshold. Cleared below the alarm release threshold
0x023A	570	Channel current value zero	The channel has no current alarm and this bit is set to 1.
0x023B	571	Channel current value undercurrent	Channel undercurrent alarm, this bit is set to 1
0x023C	572	Channel current value overcurrent	Channel overcurrent alarm, this bit is set to 1.
0x023D	573	Channel current value is too low	Channel current low alarm, this bit is set to 1
0x023E	574	Channel current value is too high	Channel current high alarm, this bit is set to 1
0x0240	576	Switch 1 alarm status	The state of the device's input switch DI1, 0: open, 1: closed
0x0241	577	Switch 2 alarm status	The state of the device's input switch DI2, 0: open, 1: closed
0x0242	578	Switch 3 alarm status	The state of the device's input switch DI3, 0: open, 1: closed
0x0243	579	Switch 4 alarm status	The state of the device's input switch DI4, 0: open, 1: closed
.....	.....	.....	.....
0x0260	608	Channel 1 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to

			0
0x0261	609	Channel 2 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0262	610	Channel 3 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0263	611	Channel 4 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0264	612	Channel 5 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0265	613	Channel 6 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0266	614	Channel 7 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0267	615	Channel 8 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0268	616	Channel 9 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0269	617	Channel 10 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x026A	618	Channel 11 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x026B	619	Channel 12 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0

0x026C	620	Channel 13 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x026D	621	Channel 14 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x026E	622	Channel 15 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x026F	623	Channel 16 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0270	624	Channel 17 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0271	625	Channel 18 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0272	626	Channel 19 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0273	627	Channel 20 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0274	628	Channel 21 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0275	629	Channel 22 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0276	630	Channel 23 arc alarm status	When the arc intensity of the channel is greater than the alarm threshold, this bit is set to 1; after clearing the alarm, it is set to 0
0x0277	631	Channel 24 arc alarm	When the arc intensity of the channel is greater than the alarm

		status	threshold, this bit is set to 1; after clearing the alarm, it is set to 0
.....	.....	.....	.....
0x0280	640	Channel 1 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0281	641	Channel 2 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0282	642	Channel 3 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0283	643	Channel 4 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0284	644	Channel 5 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0285	645	Channel 6 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0286	646	Channel 7 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0287	647	Channel 8 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0288	648	Channel 9 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0289	649	Channel 10 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x028A	650	Channel 11 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x028B	651	Channel 12 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x028C	652	Channel 13 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x028D	653	Channel 14 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.

0x028E	654	Channel 15 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x028F	655	Channel 16 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0290	656	Channel 17 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0291	657	Channel 18 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0292	658	Channel 19 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0293	659	Channel 20 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0294	660	Channel 21 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0295	661	Channel 22 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0296	662	Channel 23 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
0x0297	663	Channel 24 current reverse alarm status	This bit is set when the channel current is reversed and greater than the alarm threshold, otherwise cleared.
.....	.....	.....	.....
0x02A0	672	Channel 1 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A1	673	Channel 2 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A2	674	Channel 3 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A3	675	Channel 4 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A4	676	Channel 5 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.

0x02A5	677	Channel 6 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A6	678	Channel 7 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A7	679	Channel 8 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A8	680	Channel 9 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02A9	681	Channel 10 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AA	682	Channel 11 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AB	683	Channel 12 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AC	684	Channel 13 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AD	685	Channel 14 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AE	686	Channel 15 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02AF	687	Channel 16 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B0	688	Channel 17 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B1	689	Channel 18 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B2	690	Channel 19 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B3	691	Channel 20 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B4	692	Channel 21 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.

0x02B5	693	Channel 22 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B6	694	Channel 23 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
0x02B7	695	Channel 24 no current alarm status	This bit is set to 1 when there is no current in this channel, otherwise cleared.
.....	.....	.....	.....
0x02C0	704	Channel 1 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C1	705	Channel 2 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C2	706	Channel 3 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C3	707	Channel 4 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C4	708	Channel 5 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C5	709	Channel 6 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C6	710	Channel 7 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C7	711	Channel 8 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C8	712	Channel 9 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02C9	713	Channel 10 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02CC	714	Channel 11 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02CB	715	Channel 12 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.

0x02CC	716	Channel 13 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02CD	717	Channel 14 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02CE	718	Channel 15 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02CF	719	Channel 16 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D0	720	Channel 17 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D1	721	Channel 18 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D2	722	Channel 19 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D3	723	Channel 20 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D4	724	Channel 21 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D5	725	Channel 22 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D6	726	Channel 23 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
0x02D7	727	Channel 24 undercurrent alarm status	This bit is set to 1 when the channel is undercurrent, otherwise cleared.
.....	.....	.....	.....
0x02E0	736	Channel 1 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E1	737	Channel 2 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E2	738	Channel 3 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.

0x02E3	739	Channel 4 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E4	740	Channel 5 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E5	741	Channel 6 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E6	742	Channel 7 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E7	743	Channel 8 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E8	744	Channel 9 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02E9	745	Channel 10 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02EA	746	Channel 11 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02EB	747	Channel 12 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02EC	748	Channel 13 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02ED	749	Channel 14 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02EE	750	Channel 15 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02EF	751	Channel 16 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F0	752	Channel 17 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F1	753	Channel 18 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F2	754	Channel 19 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.

0x02F3	755	Channel 20 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F4	756	Channel 21 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F5	757	Channel 22 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F6	758	Channel 23 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
0x02F7	759	Channel 24 overcurrent alarm status	This bit is set to 1 when the channel is overcurrent, otherwise cleared.
.....	.....	.....	.....
0x0300	768	Channel 1 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0301	769	Channel 2 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0302	770	Channel 3 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0303	771	Channel 4 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0304	772	Channel 5 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0305	773	Channel 6 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0306	774	Channel 7 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0307	775	Channel 8 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0308	776	Channel 9 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0309	777	Channel 10 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.

0x030A	778	Channel 11 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x030B	779	Channel 12 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x030C	780	Channel 13 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x030D	781	Channel 14 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x030E	782	Channel 15 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x030F	783	Channel 16 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0310	784	Channel 17 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0311	785	Channel 18 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0312	786	Channel 19 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0313	787	Channel 20 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0314	788	Channel 21 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0315	789	Channel 22 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0316	790	Channel 23 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
0x0317	791	Channel 24 current low alarm state	This bit is set to 1 when the channel current is too low, otherwise cleared.
.....	.....	.....	.....
0x0320	800	Channel 1 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.

0x0321	801	Channel 2 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0322	802	Channel 3 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0323	803	Channel 4 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0324	804	Channel 5 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0325	805	Channel 6 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0326	806	Channel 7 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0327	807	Channel 8 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0328	808	Channel 9 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0329	809	Channel 10 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032A	810	Channel 11 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032B	811	Channel 12 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032C	812	Channel 13 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032D	813	Channel 14 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032E	814	Channel 15 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x032F	815	Channel 16 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0330	816	Channel 17 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.

0x0331	817	Channel 18 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0332	818	Channel 19 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0333	819	Channel 20 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0334	820	Channel 21 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0335	821	Channel 22 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0336	822	Channel 23 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.
0x0337	823	Channel 24 current too high alarm state	This bit is set to 1 when the channel current is too high, otherwise cleared.

WORD register declaration

Register description in word unit (function code 03 04 06)

Modbus address		Function description	Data Type	instruction	R/W
Hex	Decimal				
Address 0x0100 ~ 0x0158, a total of 89 consecutive addresses					
Address 0x0100 ~ 0x0123, a total of 36 consecutive addresses (data in this address supports data freeze)					
0x0104	260	bus voltage	Unsigned short	Unit V, default 0	R
0x0105	261	Temperature sensor 1	short	Unit: 0.1 ° C, default -424	R
0x0106	262	Temperature sensor 2	short	Unit: 0.1 ° C, default -424	R
0x0107	263	Switch input	Unsigned short	bit0: DI1, bit1: DI2, bit2: DI3, bit3: DI4 0: open, 1: closed, default 0	R
0x0108	264	Quantity of online Hall channels	Unsigned short	Shows the quantity of Hall channels currently connected. default 0	R
0x0109	265	Total reverse current	short	Unit is 10mA, default is 0	R
0x010A	266	Total current	Short	Unit is 10mA, default is 0,	R
0x010B	267	Average current	Short	Unit mA, default 0	
0x010C ~ 0x0123	268 ~ 291	Channel 1 to 24 current	Short	Unit mA, default 0	R
Address 0x012D ~ 0x0158, a total of 45 addresses (function code 04 read, but the data is not latched)					
0x012A	298	The tripping status of the trip unit 1	Unsigned short	Bit0Busbar Arc Fault, Trip Code 01) Bit1: Channel Arc Fault, Trip Code (02) Bit3: Overvoltage, Trip Code (04) Bit4: High Temperature 1, Trip Code (05) Bit5: High Temperature 2, Trip Code (06) Bit6: Channel Current Value Reversal, Trip Code (07) Bit7: Reverse Total Current High, Trip Code (08) Bit9: Total Current High, Trip Code (10) Bit10: Channel Current Value Zero, Trip Code (11) Bit11: Channel Current Value Underflow, Trip Code (12) Bit12: Channel Current Value Overflow,	

				Trip Code (13) Bit13: Channel Current Value Low, Trip Code (14) Bit14: Channel Current Value High, Trip Code (15) Bit15: Reserved, Trip Code (16) 0: No trip 1: Tripped, default is 0	
0x012B	299	The tripping status of the trip unit 2	Unsigned short	Bit0 DI1，(17) Bit1 DI2，(18) Bit2 DI3，(19) Bit3 DI4，(20) Bit4 Combined Alarm Bit14：Remotely Tripped, Trip Code (31) 0: No trip 1: Tripped, default is 0	
0x012C	300	The tripping status of the trip unit 3	Unsigned short	Bit15:Total Trip Status (Not Opened) 0: No trip 1: Tripped, default is 0	
0x012D	301	Alarm status 1	Unsigned short	Bit0 bus arc, bit1 channel arc, bit2 low voltage, bit3 high voltage, bit4 high temperature 1, bit5 high temperature 2, bit6 channel current value is reversed, bit7 reverse total current is high, bit8 total current is low, bit9 total current is high, bit10 channel current value is zero, bit11 channel current value undercurrent, bit12 channel current value overcurrent, bit13 channel current value is low, bit14 channel current value is high, 0: No alarm, 1: Alarm, default 0	R
0x012E	302	reserved	Unsigned short	Bit0 DI1 Bit1 DI2 Bit2 DI3 Bit3 DI4 Bit4 Combined alarm	

				0: No alarm, 1: Alarm, default 0	
0x012D	303	reserved			
0x0130	304	Channel 1 ~ 16 arc alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0131	305	Channel 17 ~ 24 arc alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0132	306	The quantity of Bus arc history alarm	Unsigned short	If the current channel alarms continuously, the value will increase by 1. If there are alarms on other channels, the count will restart.	R
0x0133 ~ 0x014A	307 ~ 330	The quantity of Channel 1~24 arc history alarm	Unsigned short	default 0 This value is incremented by 1 for each channel arc alarm.	R
0x014B	331	Channel 1 ~ 16 reverse current alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x014C	332	Channel 17 ~ 24 reverse current alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x014D	333	Channel 1 ~ 16 no current alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x014E	334	Channel 17 ~ 24 no current alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x014F	335	Channel 1 ~ 16 undercurrent alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0150	336	Channel 17 ~ 24 undercurrent alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0151	337	Channel 1 ~ 16 overcurrent alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0152	338	Channel 17 ~ 24 overcurrent alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0153	339	Channel 1 ~ 16 current low alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0154	340	Channel 17 ~ 24 current low alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0155	341	Channel 1 ~ 16 current high alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0156	342	Channel 17 ~ 24 current high alarm	Unsigned short	Default 0 0: No alarm, 1: Alarm	R
0x0157	343	Channel 1 ~ 16 arc channel self-check status	Unsigned short	default 0 0 means self-check passed, 1 means self-check failed	R
0x0158	344	Channel 17 ~ 24 arc	Unsigned	default 0 0 means self-check passed, 1	R

		channel self-check status	short	means self-check failed	
The address 0x0200 ~ 0x02FF, which has a total of 128 consecutive addresses. It is recommended to read in sections.					
Power information（0x0200-0x024b）					
0x0200	512	Total power	Unsigned short	Unit is 100W, default is 0	R
0x0201	513	Average power	Unsigned short	Unit W, default 0	R
0x0202 ~ 0x0219	514 ~ 537	Channel 1 ~ 24 power	Unsigned short	Unit W, default 0	R
0x021A	538	The higher 16bit of the total generated energy	Unsigned short	Unit Wh, default 0	R
0x021B	539	The lower 16bit of the total generated energy	Unsigned short	Unit Wh, default 0	R
0x021C	540	The higher 16bit of the generated energy of channel1	Unsigned short	Unit Wh, default 0	R
0x021D	541	The lower 16bit of the generated energy of channel1	Unsigned short	Unit Wh, default 0	R
……	……	……	……	……	……
0x024A	586	The higher 16bit of the generated energy of Channel 24	Unsigned short	Unit Wh, default 0	R
0x024B	587	The lower 16bit of the generated energy of Channel 24	Unsigned short	Unit Wh, default 0	R
Arc information (0x0250-0x0297)					
0x0250 ~ 0x0267	592 ~ 615	Channel 1~24 arc intensity real-time value	short	Unit 1, default 0	R
0x0268 ~ 0x027F	616 ~ 639	Channel 1~24 arc intensity history maximum	short	Unit 1, default 0	R
0x0280 ~ 0x0297	640 ~ 663	Channel 1 ~ 24 10 minutes arc intensity value	short	Unit 1, default 0	R
FR-DCMG-HS4Q Hall Special Register Large Range Current Power Information					

（0x0400-0x0434）					
0x0400	1024	Channel 1 current value	short	Unit 10mA, default 0	
0x0401	1025	Channel 2 current value	short	Unit 10mA, default 0	
.....	.....	.....	.....		....
0x0416	1046	Channel 23 current value	short	Unit 10mA, default 0	
0x0417	1047	Channel 24 current value	short	Unit 10mA, default 0	
0x0418	1048	Total reverse current	short	Unit 100mA, default 0	
0x0419	1049	Total current	short	Unit 100mA, default 0	
0x041A	1050	Average current	short	Unit 10mA, default 0	
0x041B	1051	Total power	short	Unit 1000W, default 0	
0x041C	1052	Average power	short	Unit 10W, default 0	
0x041D ~ 0x0434	1053 ~ 1076	Channel 1 ~ 24 power	short	Unit 10W, default 0	
FR-DCMG-HS4Q Hall special register Large-scale energy information （0x0500-0x0540）					
0x0500	1280	The higher 16bit of the total generated energy	Unsigned short	Unit 10Wh, default 0	
0x0501	1281	The lower 16bit of the total generated energy	Unsigned short	Unit 10Wh, default 0	
0x0502	1282	The higher 16bit of the generated energy of channel1	Unsigned short	Unit 10Wh, default 0	
0x0503	1283	The lower 16bit of the generated energy of channel1	Unsigned short	Unit 10Wh, default 0	
.....	.....	.....	.....		....
0x0539	1343	The higher 16bit of the generated energy of channel24	Unsigned short	Unit 10Wh， default 0	
0x0540	1344	The lower 16bit of the generated energy of	Unsigned short	Unit 10Wh， default 0	

		channel24			
System information configuration (0x0B00-0x0B24)					
0x0B00	2816	Alarm release	Unsigned Short	The percentage of the alarm threshold is used as the alarm release threshold. Unit %, default 2, setting range 0 to 100	W/R
0x0B01	2817	Bus voltage alarm low threshold	Unsigned short	Unit V, default 300	W/R
0x0B02	2818	Bus voltage alarm high threshold	Unsigned short	Unit V, default 1500	W/R
0x0B03	2819	Temperature sensor 1 alarm high threshold	short	Unit 0.1 ° C, default 800, setting range is greater than -400	W/R
0x0B04	2820	Temperature sensor 2 alarm high threshold	short	Unit 0.1 ° C, default 800, setting range is greater than -400	W/R
0x0B05	2821	Total current low alarm threshold	Unsigned Short	Unit 10mA, default 1600	W/R
0x0B06	2822	Total current too high alarm threshold	Unsigned Short	Unit 10mA, default 50000	W/R
0x0B07	2823	Current channel related alarm activation threshold	Unsigned Short	Unit mA, default 2000. The average current value is greater than this value; the total current is too high, too low, the channel is undercurrent, overcurrent, no current, high current, low current, otherwise these alarms will be forcibly turned off.	W/R
0x0B08	2824	Undercurrent, overcurrent alarm threshold	Unsigned short	Unit mA, default 2000. The average current is subtracted from this value as the undercurrent alarm threshold; the average current is added to this value as the overcurrent alarm threshold.	W/R
0x0B09	2825	Channel current low alarm threshold	Unsigned short	Unit mA, default 1000.	W/R
0x0B0A	2826	Channel current high alarm threshold	Unsigned short	Unit mA, default 20000.	W/R
0x0B0B	2827	Reverse total current too high threshold	short	Unit 10mA, default -600.	W/R
0x0B0C	2828	Channel reverse current too high threshold	short	Unit mA, default -2000.	W/R
0x0B0D	2839	-	-	-	
0x0B0E	2830	Channel arc intensity super	Short	The default is 70.Need to set according to	W/R

		high alarm threshold		the site conditions or customer requirements, you can call the company's technical staff	
0x0B0F	2831	reserved			
0x0B10	2832	reserved			
0x0B11	2833	Automatic current calibration setting	Bool	Write 1 to enable automatic current calibration, write 0 to disable, default is 0	W/R
0x0B12	2834	Manual current calibration setting	Bool	Write 1 to start current calibration, write 0 to turn off, default is 0 Note: Make sure the channel has no current when starting calibration.	W/R
0x0B13	2835	Channel 1~16 current channel switch setting	Unsigned short	bit0: Represents the switch setting for channel 1 bit15: Represents the switch setting for channel 16 0 means disabled, 1 means enabled Default 0xFFFF	W/R
0x0B14	2836	Channel 17~24 current channel switch setting	Unsigned short	bit0: Represents the switch setting for channel 7 bit7: Represents the switch setting for channel 24 0 means disabled, 1 means enabled Default 0xFFFF	W/R
0x0B15	2837	External power management time setting	Unsigned short	Unit M (min), default 120 minutes. When the photovoltaic power supply stops, the host can be powered by external 24 power sources, and the power supply time can be set.	W/R
0x0B16	2838	Current UI display, direction, reverse order control	Unsigned short	Bit Definitions for Current Range and Channel Settings Bit0 ~ Bit7: Current range displayed on the UI (in decimal representation) 0: Maximum current displayed on the UI is 10A 1: Maximum current displayed on the UI is 20A 2: Maximum current displayed on the UI is 30A 3: Maximum current displayed on the UI is 40A	W/R

				5: Maximum current displayed on the UI is 60A Bit8: Current Channel Order Setting (Forward or Reverse) 0: Forward order – Hall sensors near the host are arranged from Channel 1 to 24 1: Reverse order – Hall sensors near the host are calculated from Channel 24 to 1 Default: 0 Bit9: Channel Current Direction Setting 0: Direction is positive 1: Current direction is inverted (negated) Default: 0 Bit10: Auto Range Enable 0: Disabled 1: Enabled Default: 1 Default Register Value: 0x0401	
0x0B17	2839	Arc output mode Settings	Unsigned short	0：Trip mode 1：Relay mode Default value: 0	
0x0B18	2840	Arc detection mode	Unsigned short	0：Instantaneous arc 1：Continuous arc Default value: 1	
0x0B19	2841	Instantaneous arc time IAT	Unsigned short	2-5 Default value: 2	
0x0B1A	2842	Continuous arc time CAT	Unsigned short	15-60 Default value: 15	
0x0B20	2848	Alarm function management 1	Unsigned short	Bit0 Bus arc, bit1 Channel arc, bit2 Low pressure, bit3 Over pressure, bit4 High temperature 1, bit5 High temperature 2, bit6 Channel current value is reversed, bit7 Reverse total current is high, bit9 The total current is high, bit10 Channel current value is zero,	W/R

				bit11 Channel current value is undercurrent, bit12 Channel current value is overcurrent, bit13 The channel current value is low, bit14 The channel current value is high, 1: enable (open) alarm, 0: disable(close) alarm Default: 0x0002	
0x0B21	2849	Alarm function management 2	Unsigned short	Bit0 DI1 bit1 DI2 bit2 DI3 bit3 DI4 bit14: - bit15: General alarm switch, (function is forcibly turned on) 1: enable alarm, 0: disable alarm Default value: 0x800F	W/R
System information configuration 2 (0x0C00-0x0C06)					W/R
0x0C00	3072	Clear power generation history value record	Unsigned short	Write 1 reset energy history record, read always 0	W/R
0x0C01	3073	Clear channel arc and bus arc history alarms	Unsigned short	Write 1 reset channel arc and bus arc history alarm times record, read always 0	W/R
0x0C05	3077	Arc channel self-check operation	Unsigned short	Write 1 to start the arc channel self-check, 1S to end the self-check. read always 0	W/R
System settings (0xFE00-0xFE54)					
0xFE00	65024	Modbus address	Unsigned short	Set range 1 ~ 247, default 247. Set other values to restore the default values.	W/R
0xFE01	65025	Modbus Baud rate	Unsigned short	1: 2400, 2: 4800, 3: 9600, 4: 19200, 5: 38400 Default is 3	W/R
0xFE02	65026	Modbus Parity	Unsigned short	0: NONE, 1: ODD, 2: EVEN Default is 0	W/R
0xFE06	65030	System UI display settings	Unsigned short	Lower 8 bits: system language setting 0: Chinese; 1: English, default value 1 High eight bits: system logo settings Reserved, default 0	W/R

0xFFCC	65484	The number of self-recovery times for arc alarm	Short	The number of self-recovery times for arc alarm	W/R

8 Appendix

Document revision record

Revision	Time	Description
1.0	2020-03-12	Applicable to products of version A088 and above Updated: Description of digital input/output Terminal wiring definitions New configuration interface and alarm interface New Features Added: Arc intensity 10-minute value register Arc alarm strategy Trip mode high/low level switching function, UI interface and register mapping Communication shielded cable wiring specifications Current calibration function, UI interface and register settings PLC system diagram Parameter setting range Removed: Broadcast, battery panel registers, etc. Added: Common issues (troubleshooting screen flickering)
1.1	2020-04-28	Added: FR-DCMG-HS4Q Hall sensor registers DC 24V power supply wiring instructions
1.2	2020-07-03	Added: HS4Q large-range registers:0x0400、0x0500
1.3	2021-04-19	Added: Combined alarm strategy

		Combined alarm registers: 0x0B21, 0x0B24 Status of combined alarm (Function code 03): located at bit4 of registers 0x12B and 0x12E Status of combined alarm (Function code 02): located at register 0x214
1.4	2021-05-15	Added: Safety precautions Installation methods
1.5	2021-09-16	This manual is applicable to products of version A08E and above Additional UI Configuration Options: MOD, IAT, CAT parameter settings added in the UI interface Added: Combined alarm logic (default disabled) Glossary of arc alarms – explanation of Instantaneous Arc and Continuous Arc Example data message formats Register 0x0B18: Arc detection mode Register 0x0B19: Continuous arc IAT Register 0x0B1A: Continuous arc CAT Modified Registers: Default value of 0x0B20 changed to 0x0002 Default value of 0x0B23 changed to 0x0002 Default value of 0x0B0A changed to 20000 Default value of 0x0B02 changed to 1500 Default value of 0x0B06 changed to 50000 Default value of 0x0B16 changed to 0x0403 Removed: PLC function description – now covered in the FR-DCMG-MMPL manual Optimized: Alarm condition text descriptions

		Added: Register 0xFFCC
1.6	2024-10-14	Added: Updated logo Updated UI interface
2.0	2024-12-19	Integrated: Information for MKPD, MMPU, MMPP, MMPQ, MMPZ, MMPS, and Hall sensors
2.1	2025-2-14	Standardized: Fonts and logos across the document
2.11	2025-6-19	Modified: Current accuracy specification for model FR-DCMG-HS4R Layout optimization Updated description of register 0x0B16 for clarity

Contact us

If you have any questions about this product, please contact us. Please remember the following contact information:

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