



日煬科技有限公司
JD Auspice Co., Ltd.

PV String Monitoring **stringMoni®** CM-4/8/12/16/20/24 V 5.1 User manual



note: subject to change without any notice, JDA pay no responsibility



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All the pictures and product specifications are only for reference, because of the update of products and technology. There are differences between products and manual. Please contact us if you want to get more information about the product.

ATTENTION



WARNING!

This symbol shows an attention or a warning to remind the dangerous and safety. The hardware will be damaged if the user operate in a worry way.



NOTE!

This symbol shows an attention to make the product word well.



SAFETY INSTRUCTIONS

Please read this manual carefully before installation. If the product is damage with a wrong installation, we would not provide quality assurance.



WARNING:

Please do all the operation and wiring professional with electrical technician or electrical engineer.



WARNING:

Please don't touch other parts of the box when you install except the terminal.



WARNING:

All operation and wiring must conform to the requirements of the relevant standards!



WARNING:

Please cover the PV panel with the opaque material when you install.

CATALOGUE

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1. Product introduction

CM-4/8/12/16/20/24, PV string monitor, is a product, which integrate the power supply, voltage acquisition, and the current of PV string into one product. And it has the characteristic of small volume, no fan, wide temperature operation and high anti-interference. About the power input, we can choose DC200-1500V or 5V.



2. Model description

CM- X



3. Introduction

- Acquire the current of PV string, include 4/8/12/16/20/24 string;
- Acquire the voltage of PV string;
- Acquire the temperate of PV string;
- Acquire the state of the lightning arrester
- Acquire the state of the circuit breaker
- Communication: RS485
- Communication protocol: MODBUS
- Communication baud rate: 2400,4800 9600
- Communication address:1~100

4. Features

- A wide input voltage rage, DC200~DC1500V
- A ABS flame-retardant shell
- Acquire the isolated analog quantity
- Acquire the isolated digital quantity
- A wide temperature operation: -35~70°C

5. Technical parameters

Technical parameter table

Input	
DC power input	DC200V~DC1500V
PV string current input	4/8/12/16/20/24 branches, 0~25A, 0.5%
Interface	
Communicate interface	RS485
Digital quantity input	2 ways, 2500V isolation
LED display	8 bits
Operating Environment	
Power	≤3W
Operating temperature	-35°C~+75°C
Storage temperature	-40°C~+85°C
Relative humidity	5°C~95°C (no condensation)
Shape size	
Length * width * height	Host unit:72mm*87mm*58mm
	Acquisition unit:72mm*42mm*35mm
Installaion mode	Host unit:DIN rail
	Acquisition unit: DIN rail

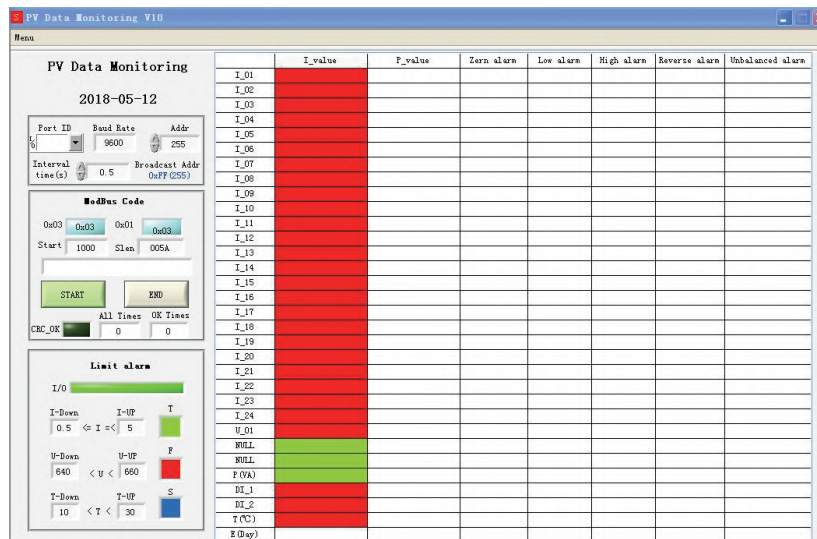
6. Configuration software

The configuration software includes the following functions:

- Modify the communication parameters of the product;
- Record and analysis of real-time data;
- Telesignalling alarm;
- Read or modify the version information of the product;
- Set the alarm value



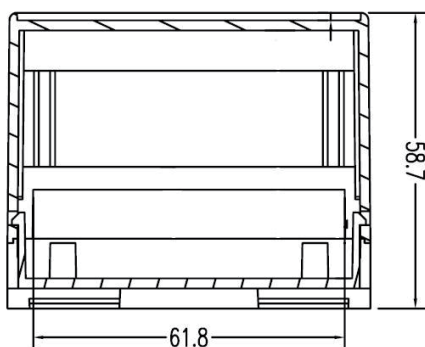
Parameter configuration interface :



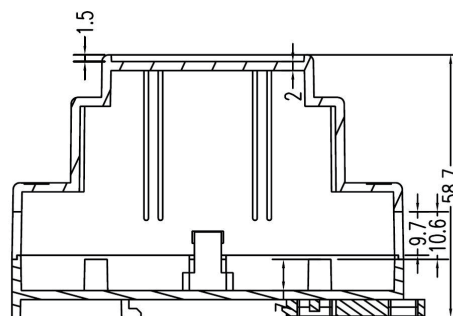
7. Shape Size

7.1 host unit

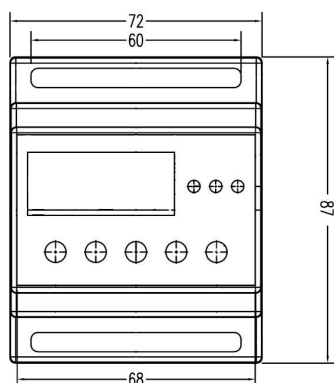
Main view: (unit : mm)



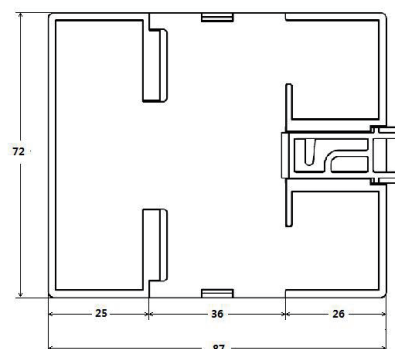
left view:



Top view:



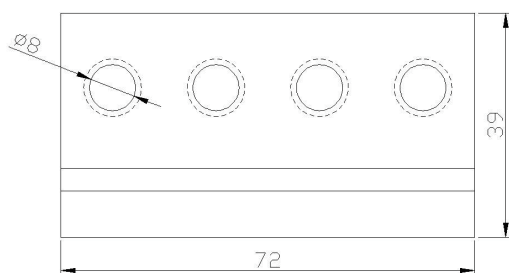
right view:



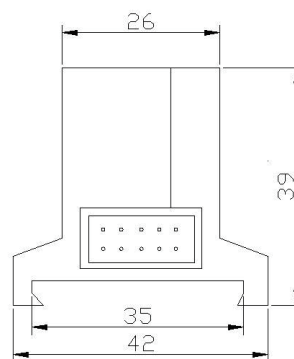


7.2 Acquisition unit

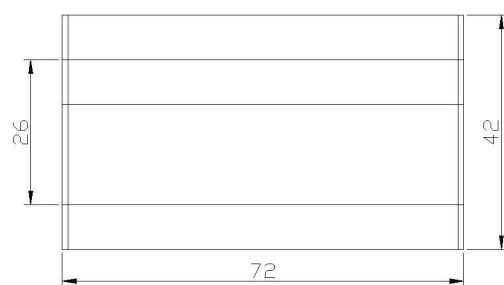
Main view: (unit : mm)



left view:



Top view:

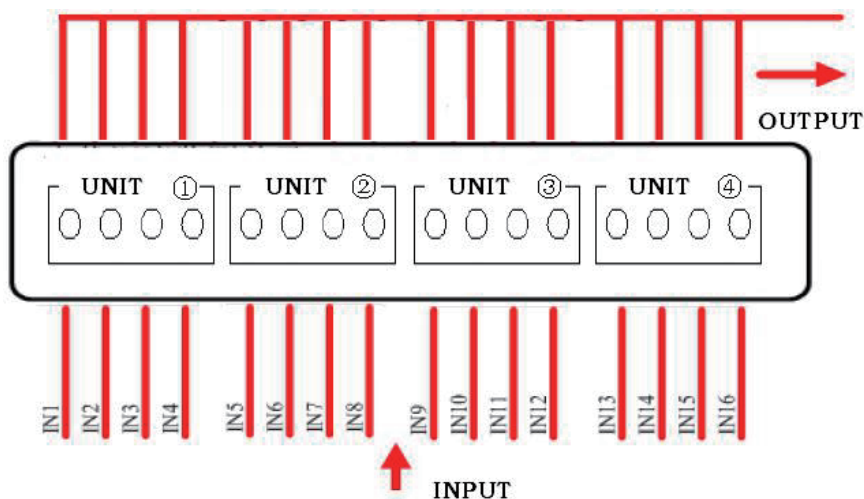


8. Interface Function

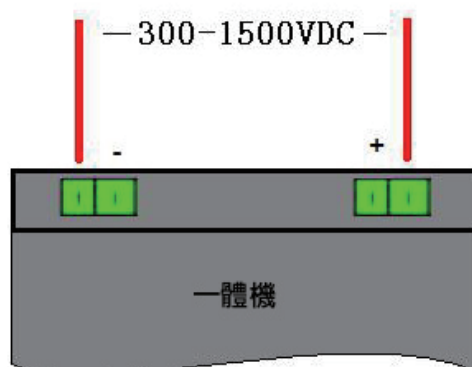
Number	Interface definition	Function
1	5V	5V +
2	G	5V -
3	G	RS485 G
4	D1	Switch acquisition 1
5	D2	Switch acquisition 2
6	A	RS485 A
7	B	RS485 B
8	G	RS485 G
9	B	RS485 B
10	A	RS485 A
11	V+	DC1000V +
12	V-	DC1000V -

9. Wiring description

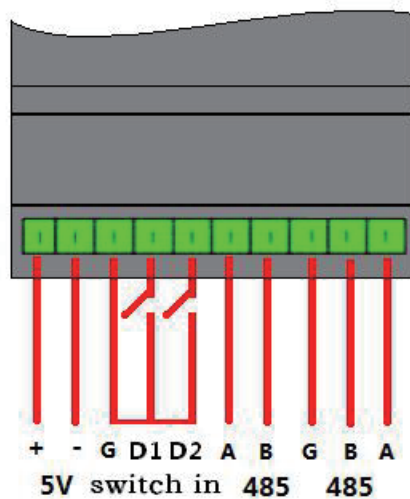
9.1 The current wire of the PV string



9.2 Power interface description

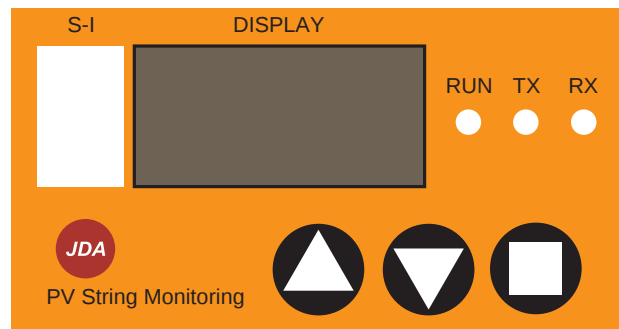


9.3 Function description



9.4 Operating description

The man-machine interface includes: LED display, 3 button, PV string current input, and indicator lights.



1) LED display and button :

The LED display include : The value of the current ,voltage, power, baud rate, address, temperature, etc.

The buttons include: up ,down and function key (F.K.).

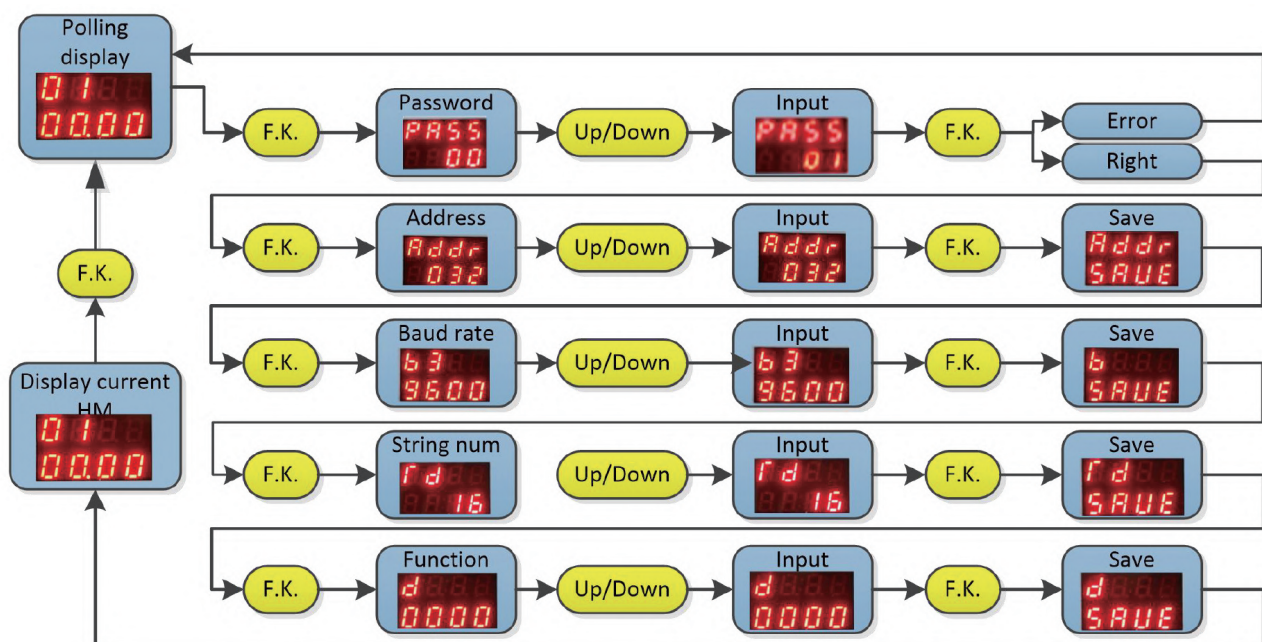
2) Indicator lights description:

RUN: when this light gleamed, the monitor is normal running.

RX: when this light is up, the monitor is receiving data.

TX: when this light is up, the monitor is transmitting data.

3) Button operating description:





The sequence of the button operation

0. Wake up the LED display

1. Enter a password: PASS 00

2. Confirm the password: PASS 01

3. Choose a address: Addr *032

4. Save the address: Addr SAVE

5. Choose a baud rate: b3** 9600

6. Save the baud rate: b3** SAVE

7. Choose a channel num: Td** **16

8. Save the channel num: Td** SAVE

9. Choose special function: d*** 0000

10. Save the special function: d*** SAVE

11. Display the value of channel current(If the password is error, display the value of bus. If the password is right, display the value of channel.)

Auto display: Value of current: 01*- 00.00

Value of power: P*00 0000

Value of state: S**0 0000

NOTE:The value of state correspond to the state of upper limit alarm, lower limit alarm, zero value alarm, reverse value alarm, unbalance alarm.

12. Press up and down: Value of current: 01*- 00.00

Value of power: P*00 0000

Value of state: S**0 0000

13. Display the voltage and state.

Auto display: Value of voltage: U**0 000.0

Value of state: S**0 0000

NOTE:The value of state correspond to the state of upper limit alarm and lower limit alarm.

14. Press up and down: Value of voltage: U**0 000.0

Value of state: S**0 0000

15. Display the total power: UI*0 0000

16. Display the electrical energy: E*00 0000

NOTE: The unit of the electrical energy is KWh.

17. Display the state of digital quantity 1.

18. Display the state of digital quantity 2.

19. Display the temperature: T*** +-00.1

20. Exit the fixed display, begin the auto display.

10. Communication protocol

The communication protocol is Modbus RTU. This protocol has a high data density, and a big throughput rate. The baud rate can choose to be 2400 、 4800 、 9600.

1) Communication set description

Format	Content
Mode	Modbus RTU
Baud rate	9600 (default)
Data bits	8 bits
Parity check bit	No
Stop bit	1 bit
Frame check	CRC16

2) MODBUS function code description

0x03 Read data command. Include channel current, voltage, and telecommunication.

0x01 Read telecommunication command. Read telecommunication only.

3) MODBUS message format description

0x03 function code description

Request code format:

Definition Address Function code

Definition	Address	Function code	Start address	word	CRC check
Data	ADDR	03H	sREG	nREG	CRC16
byte	1	1	2	2	2

Response request code format:

Definition	Address	Function code	Response number	Response data	CRC check
data	ADDR	03H	X	DATA	CRC16
byte	1	1	1	X	2

0x01 function code description

Request command code format:

Definition	Address	Function code	Start address	word	CRC check
data	ADDR	01H	sREG	nREG	CRC16
byte	1	1	2	2	2



Response request code format:

Definition	Address	Function code	Response number	Response data	CRC check
data	ADDR	01H	X	DATA	CRC16
byte	1	1	1	X	2

4) address map and data:

Word address	context	Word length	ratio
0x1000	PV string channel 1	1	0.01
0x1001	PV string channel 2	1	0.01
0x1002	PV string channel 3	1	0.01
0x1003	PV string channel 4	1	0.01
0x1004	PV string channel 5	1	0.01
0x1005	PV string channel 6	1	0.01
0x1006	PV string channel 7	1	0.01
0x1007	PV string channel 8	1	0.01
0x1008	PV string channel 9	1	0.01
0x1009	PV string channel 10	1	0.01
0x100A	PV string channel 11	1	0.01
0x100B	PV string channel 12	1	0.01
0x100C	PV string channel 13	1	0.01
0x100D	PV string channel 14	1	0.01
0x100E	PV string channel 15	1	0.01
0x100F	PV string channel 16	1	0.01
0x1010	PV string channel 17	1	0.01
0x1011	PV string channel 18	1	0.01
0x1012	PV string channel 19	1	0.01
0x1013	PV string channel 20	1	0.01
0x1015	PV string channel 21	1	0.01
0x1017	PV string channel 22	1	0.01
0x1019	PV string channel 23	1	0.01
0x101A	PV string channel 24	1	0.01
0x101B	Voltage	1	0.1
0x101D	Reserve	1	1
0x101F	Reserve	1	1



0x1021	Total power (high first)	2	1
0x1023	Channel power 1	2	1
0x1025	Channel power 2	2	1
0x1027	Channel power 3	2	1
0x1029	Channel power 4	2	1
0x102B	Channel power 5	2	1
0x102D	Channel power 6	2	1
0x102F	Channel power 7	2	1
0x1031	Channel power 8	2	1
0x1033	Channel power 9	2	1
0x1035	Channel power 10	2	1
0x1037	Channel power 11	2	1
0x1039	Channel power 12	2	1
0x103B	Channel power 13	2	1
0x103D	Channel power 14	2	1
0x103F	Channel power 15	2	1
0x1041	Channel power 16	2	1
0x1043	Channel power 16	2	1
0x1045	Channel power 16	2	1
0x1047	Channel power 16	2	1
0x1049	Channel power 16	2	1
0x104B	Channel power 16	2	1
0x104D	Channel power 16	2	1
0x104E	Channel power 16	2	1
0x104F	Channel power 16	2	1
0x1050	Telesignal 1	1	
0x1051	Telesignal 2	1	
0x1052	Telesignal 3	1	
0x1053	Telesignal 4	1	
0x1054	Telesignal 5	1	
0x1055	Telesignal 6	1	
0x1056	Temperature	1	0.1
0x1057	Total electric energy	2	1



NOTE!

About the current of channel, voltage, temperature:
The data format is 16 bits unsigned integer. (High bit first.)
The highest bit of the temperature: 0 is positive temperature,
1 is negative temperature.



NOTE!

About the power and electric energy :
The data format is 32bits unsigned integer. (High bit first).Unit
is KWh °



NOTE!

About the Switch state :
When the circuit breaker is work, the switch state is 0, when it is
trip, the switch status is 1. When the lightning arrester is work ,
the switch state is 0, when it is trip, the switch status is 1.

5) Telesignal address map:

Register address	Register content
0x0100	PV string channel 1 current Zero value state
0x0101	PV string channel 1 current low value state
0x0102	PV string channel 1 current high value state
0x0103	PV string channel 2 current Zero value state
0x0104	PV string channel 2 current low value state
0x0105	PV string channel 2 current high value state
0x0106	PV string channel 3 current Zero value state
0x0107	PV string channel 3 current low value state
0x0108	PV string channel 3 current high value state
0x0109	PV string channel 4 current Zero value state
0x010A	PV string channel 4 current low value state
0x010B	PV string channel 4 current high value state
0x010C	PV string channel 5 current Zero value state
0x010D	PV string channel 5 current low value state
0x010E	PV string channel 5 current high value state
0x010F	Reserve
0x0110	PV string channel 6 current Zero value state
0x0111	PV string channel 6 current low value state
0x0112	PV string channel 6 current high value state
0x0113	PV string channel 7 current Zero value state
0x0114	PV string channel 7 current low value state
0x0115	PV string channel 7 current high value state
0x0116	PV string channel 8 current Zero value state
0x0117	PV string channel 8 current low value state
0x0118	PV string channel 8 current high value state
0x0119	PV string channel 9 current Zero value state
0x011A	PV string channel 9 current low value state
0x011B	PV string channel 9 current high value state
0x011C	PV string channel 10 current Zero value state
0x011D	PV string channel 10 current low value state
0x011E	PV string channel 10 current high value state
0x011F	Reserve



0x0120	PV string channel 11 current Zero value state
0x0121	PV string channel 11 current low value state
0x0122	PV string channel 11 current high value state
0x0123	PV string channel 12 current Zero value state
0x0124	PV string channel 12 current low value state
0x0125	PV string channel 12 current high value state
0x0126	PV string channel 13 current Zero value state
0x0127	PV string channel 13 current low value state
0x0128	PV string channel 13 current high value state
0x0129	PV string channel 14 current Zero value state
0x012A	PV string channel 14 current low value state
0x012B	PV string G channel 14 current high value state
0x012C	PV string channel 15 current Zero value state
0x012D	PV string channel 15 current low value state
0x012E	PV string channel 15 current high value state
0x012F	Reserve
0x0130	PV string channel 16 current Zero value state
0x0131	PV string channel 16 current low value state
0x0132	PV string channel 16 current high value state
0x0133	PV string channel 17 current Zero value state
0x0134	PV string channel 17 current low value state
0x0135	PV string channel 17 current high value state
0x0136	PV string channel 18 current Zero value state
0x0137	PV string channel 18 current low value state
0x0138	PV string channel 18 current high value state
0x0139	PV string channel 19 current Zero value state
0x013A	PV string channel 19 current low value state
0x013B	PV string channel 19 current high value state
0x013C	PV string channel 20 current Zero value state
0x013D	PV string channel 20 current low value state
0x013E	PV string channel 20 current high value state
0x013F	Reserve
0x0140	PV string channel 21 current Zero value state



0x0141	PV string channel 21 current low value state
0x0142	PV string channel 21 current high value state
0x0143	PV string channel 22 current Zero value state
0x0144	PV string channel 22 current low value state
0x0145	PV string channel 22 current high value state
0x0146	PV string channel 23 current Zero value state
0x0147	PV string channel 23 current low value state
0x0148	PV string channel 23 current high value state
0x0149	PV string channel 24 current Zero value state
0x014A	PV string channel 24 current low value state
0x014B	PV string channel 24 current high value state
0x014C	Reserve
0x014D	Reserve
0x014E	Reserve
0x014F	Reserve
0x0150	Voltage low value/high value state
0x0151	Reserve
0x0152	Reserve
0x0153	Reserve
0x0154	Reserve
0x0155	Reserve
0x0156	Reserve
0x0157	Reserve
0x0158	Switch 1 state
0x0159	Switch 2 state
0x015A	Reserve
0x015B	Reserve
0x015C	Reserve
0x015D	Reserve
0x015E	Reserve
0x015F	Reserve
0x0160	PV string channel 24 current reverse alarm
0x0161	PV string channel 23 current reverse alarm



0x0162	PV string channel 22 current reverse alarm
0x0163	PV string channel 21 current reverse alarm
0x0164	PV string channel 20 current reverse alarm
0x0165	PV string channel 19 current reverse alarm
0x0166	PV string channel 18 current reverse alarm
0x0167	PV string channel 17 current reverse alarm
0x0168	PV string channel 16 current reverse alarm
0x0169	PV string channel 15 current reverse alarm
0x016A	PV string channel 14 current reverse alarm
0x016B	PV string channel 13 current reverse alarm
0x016C	PV string channel 12 current reverse alarm
0x016D	PV string channel 11 current reverse alarm
0x016E	PV string channel 10 current reverse alarm
0x016F	PV string channel 9 current reverse alarm
0x0170	PV string channel 8 current reverse alarm
0x0171	PV string channel 7 current reverse alarm
0x0172	PV string channel 6 current reverse alarm
0x0173	PV string channel 5 current reverse alarm
0x0174	PV string channel 4 current reverse alarm
0x0175	PV string channel 3 current reverse alarm
0x0176	PV string channel 2 current reverse alarm
0x0177	PV string channel 1 current reverse alarm
0x0178	Reserve
0x0179	Reserve
0x017A	Reserve
0x017B	Reserve
0x017C	Reserve
0x017D	Reserve
0x017E	Reserve
0x017F	Reserve
0x0180	PV string channel 24 current unbalance alarm
0x0181	PV string channel 23 current unbalance alarm
0x0182	PV string channel 22 current unbalance alarm



0x0183	PV string channel 21 current unbalance alarm
0x0184	PV string channel 20 current unbalance alarm
0x0185	PV string channel 19 current unbalance alarm
0x0186	PV string channel 18 current unbalance alarm
0x0187	PV string channel 17 current unbalance alarm
0x0188	PV string channel 16 current unbalance alarm
0x0189	PV string channel 15 current unbalance alarm
0x018A	PV string channel 14 current unbalance alarm
0x018B	PV string channel 13 current unbalance alarm
0x018C	PV string channel 12 current unbalance alarm
0x018D	PV string channel 11 current unbalance alarm
0x018E	PV string channel 10 current unbalance alarm
0x018F	PV string channel 9 current unbalance alarm
0x0190	PV string channel 8 current unbalance alarm
0x0191	PV string channel 7 current unbalance alarm
0x0192	PV string channel 6 current unbalance alarm
0x0193	PV string channel 5 current unbalance alarm
0x0194	PV string channel 4 current unbalance alarm
0x0195	PV string channel 3 current unbalance alarm
0x0196	PV string channel 2 current unbalance alarm
0x0197	PV string channel 1 current unbalance alarm
0x0198	Reserve
0x0199	Reserve
0x019A	Reserve
0x019B	Reserve
0x019C	Reserve
0x019D	Reserve
0x019E	Reserve
0x019F	Reserve



6) 0x104D definition :

Bit0 PV string channel 1 current Zero value state
Bit1 PV string channel 1 current low value state
Bit2 PV string channel 1 current high value state
Bit3 PV string channel 2 current Zero value state
Bit4 PV string channel 2 current low value state
Bit5 PV string channel 2 current high value state
Bit6 PV string channel 3 current Zero value state
Bit7 PV string channel 3 current low value state
Bit8 PV string channel 3 current high value state
Bit9 PV string channel 4 current Zero value state
Bit10 PV string channel 4 current low value state
Bit11 PV string channel 4 current high value state
Bit12 PV string channel 5 current Zero value state
Bit13 PV string channel 5 current low value state
Bit14 PV string channel 5 current high value state
Bit15 reserve

7) 0x104E definition :

Bit0 PV string channel 6 current Zero value state
Bit1 PV string channel 6 current low value state
Bit2 PV string channel 6 current high value state
Bit3 PV string channel 7 current Zero value state
Bit4 PV string channel 7 current low value state
Bit5 PV string channel 7 current high value state
Bit6 PV string channel 8 current Zero value state
Bit7 PV string channel 8 current low value state
Bit8 PV string channel 8 current high value state
Bit9 PV string channel 9 current Zero value state
Bit10 PV string channel 9 current low value state
Bit11 PV string channel 9 current high value state
Bit12 PV string channel 10 current Zero value state
Bit13 PV string channel 10 current low value state
Bit14 PV string channel 10 current high value state
Bit15 reserve



8) 0x104F definition :

Bit0 PV string channel 11 current Zero value state
Bit1 PV string channel 11 current low value state
Bit2 PV string channel 11 current high value state
Bit3 PV string channel 12 current Zero value state
Bit4 PV string channel 12 current low value state
Bit5 PV string channel 12 current high value state
Bit6 PV string channel 13 current Zero value state
Bit7 PV string channel 13 current low value state
Bit8 PV string channel 13 current high value state
Bit9 PV string channel 14 current Zero value state
Bit10 PV string channel 14 current low value state
Bit11 PV string channel 14 current high value state
Bit12 PV string channel 15 current Zero value state
Bit13 PV string channel 15 current low value state
Bit14 PV string channel 15 current high value state
Bit15 reserve

9) 0x1050 definition :

Bit0 PV string channel 16 current Zero value state
Bit1 PV string channel 16 current low value state
Bit2 PV string channel 16 current high value state
Bit3 PV string channel 17 current Zero value state
Bit4 PV string channel 17 current low value state
Bit5 PV string channel 17 current high value state
Bit6 PV string channel 18 current Zero value state
Bit7 PV string channel 18 current low value state
Bit8 PV string channel 18 current high value state
Bit9 PV string channel 19 current Zero value state
Bit10 PV string channel 19 current low value state
Bit11 PV string channel 19 current high value state
Bit12 PV string channel 20 current Zero value state
Bit13 PV string channel 20 current low value state
Bit14 PV string channel 20 current high value state
Bit15 reserve



10) 0x1051 definition :

Bit0 PV string channel 21 current Zero value state
Bit1 PV string channel 21 current low value state
Bit2 PV string channel 21 current high value state
Bit3 PV string channel 22 current Zero value state
Bit4 PV string channel 22 current low value state
Bit5 PV string channel 22 current high value state
Bit6 PV string channel 23 current Zero value state
Bit7 PV string channel 23 current low value state
Bit8 PV string channel 23 current high value state
Bit9 PV string channel 24 current Zero value state
Bit10 PV string channel 24 current low value state
Bit11 PV string channel 24 current high value state
Bit12 Reserve
Bit13 Reserve
Bit14 Reserve
Bit15 Reserve

11) 0x1052 definition :

Bit0 Voltage low value/high value state
Bit1 Reserve
Bit2 Reserve
Bit3 Reserve
Bit4 Reserve
Bit5 Reserve
Bit6 Reserve
Bit7 Reserve
Bit8 Switch 1 state
Bit9 Switch 2 state
Bit10 Reserve
Bit11 Reserve
Bit12 Reserve
Bit13 Reserve
Bit14 Reserve
Bit15 Reserve



12) 0x1053 definition :

Bit0 PV string channel 24 current reverse alarm
Bit1 PV string channel 23 current reverse alarm
Bit2 PV string channel 22 current reverse alarm
Bit3 PV string channel 21 current reverse alarm
Bit4 PV string channel 20 current reverse alarm
Bit5 PV string channel 19 current reverse alarm
Bit6 PV string channel 18 current reverse alarm
Bit7 PV string channel 17 current reverse alarm
Bit8 PV string channel 16 current reverse alarm
Bit9 PV string channel 15 current reverse alarm
Bit10 PV string channel 14 current reverse alarm
Bit11 PV string channel 13 current reverse alarm
Bit12 PV string channel 12 current reverse alarm
Bit13 PV string channel 11 current reverse alarm
Bit14 PV string channel 10 current reverse alarm
Bit15 PV string channel 9 current reverse alarm

13) 0x1054 definition :

Bit0 PV string channel 8 current reverse alarm
Bit1 PV string channel 7 current reverse alarm
Bit2 PV string channel 6 current reverse alarm
Bit3 PV string channel 5 current reverse alarm
Bit4 PV string channel 4 current reverse alarm
Bit5 PV string channel 3 current reverse alarm
Bit6 PV string channel 2 current reverse alarm
Bit7 PV string channel 1 current reverse alarm
Bit8 Reserve
Bit9 Reserve
Bit10 Reserve
Bit11 Reserve
Bit12 Reserve
Bit13 Reserve
Bit14 Reserve
Bit15 Reserve



14) 0x1055 definition :

Bit0 PV string channel 24 current unbalance alarm
Bit1 PV string channel 23 current unbalance alarm
Bit2 PV string channel 22 current unbalance alarm
Bit3 PV string channel 21 current unbalance alarm
Bit4 PV string channel 20 current unbalance alarm
Bit5 PV string channel 19 current unbalance alarm
Bit6 PV string channel 18 current unbalance alarm
Bit7 PV string channel 17 current unbalance alarm
Bit8 PV string channel 16 current unbalance alarm
Bit9 PV string channel 15 current unbalance alarm
Bit10 PV string channel 14 current unbalance alarm
Bit11 PV string channel 13 current unbalance alarm
Bit12 PV string channel 12 current unbalance alarm
Bit13 PV string channel 11 current unbalance alarm
Bit14 PV string channel 10 current unbalance alarm
Bit15 PV string channel 9 current unbalance alarm

15) 0x1056 definition :

Bit0 PV string channel 8 current unbalance alarm
Bit1 PV string channel 7 current unbalance alarm
Bit2 PV string channel 6 current unbalance alarm
Bit3 PV string channel 5 current unbalance alarm
Bit4 PV string channel 4 current unbalance alarm
Bit5 PV string channel 3 current unbalance alarm
Bit6 PV string channel 2 current unbalance alarm
Bit7 PV string channel 1 current unbalance alarm
Bit8 Reserve
Bit9 Reserve
Bit10 Reserve
Bit11 Reserve
Bit12 Reserve
Bit13 Reserve
Bit14 Reserve
Bit15 Reserve



11. Packaging and shipping

Packing: The product is packaged by carton. The content includes: a PV current combiner box monitor, a instructions, a certificate.

Transport: No severe vibration and impact in transportation.

Preservation: Place in a well ventilated place, and avoid high temperature. Avoid rain and snow invasion.

12. Quality Assurance

Warranty period:12 months.

Please take care of the invoice. It will be need in warranty period.

Quality guarantee note:

- We will repair or replace the product for free in the quality guarantee period.
- The substandard products should return to us after replace.
- The customer shall give us reasonable time to repair.

We have right to refuse quality assurance under the following situation:

- Damage in transport
- Incorrect installation
- Incorrect modification
- Incorrect use
- Harsh environment
- Use the product out of the rang or beyond the relevant standard
- Man-made destruction

13. Safety operation at the scene

Please operate follow this step before your inspection to ensure your safety.

1. turn-off the circuit breaker.
2. turn-off the fuse seat.

WARNING:



All the terminals of the DC circuit breaker are still charged when the circuit breaker is turned off. All the terminals of the fuse seats are still charged when the fuse seats are turned off. Make sure the circuit breaker and fuse seats are all turned off when you work !



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