

DCEM-96S DC Panel Meter

User Manual



Version: 1.10

Revision: 2024.5

Read me

When you use DCEM-96S DC Panel Meter, be sure to carefully read this user manual, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use DCEM-96S DC Panel Meter, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;
2. When installation, the current input terminal must non-open, voltage input terminals must
Non-short circuit;
3. Communication terminal (RS485 or Ethernet) is strictly prohibited to impose high pressure;
4. Be sure the instrument wiring consistent with the internal system settings;
5. When communicating with the PC, instrument communication parameters must be consistent with the PC.



- **Please read carefully before using this user manual**
- **Please save this document**

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1. - SUMMARIZE

DCEM-96S DC Panel Meter is used for DC power quality monitoring, factory automation and building automation, telecommunications, batteries, DC panels, electric vehicle charging piles, and other application areas.

These series can measure the power parameters in power grid: Current, Voltage, RMS power load, Energy consumption.

DCEM-96S has a variety of expandable modules, supports 4 digital output, 2 digital input, and supports RS485/Modbus RTU or Ethernet/Modbus TCP, IP, user can option according needs.

FEATURE

- Easy readable large backlit LCD screen;
- Real-time measurement P, U, I, and KWh;
- Various expandable I/O modules optional;
- RS485/ Modbus RTU communication;
- Flexible integration with busbars or cables.

APPLICATIONS

- Measure all power parameters;
- Monitor and control, energy measurement and electrical fire;
- Replace the three-phase power meter, three phase electricity transmitter;
- Transformers, generators, capacitors and electric motors distributed detection;
- Medium and low pressure systems;
- SCADA, EMS, DCS integrators.

2.- SPECIFICATIONS

- Power supply

AC /DC 85-265V

Maximum power consumption 3W

- Input

Voltage: Rated 300V, 0-1000V (Selectable as needs)

Current: Rated 75mVA (optional 50mV / 100mV or customized)

- Load

Voltage: <0.5VA / phase (rated 300V)

Current: <0.5VA / phase (rated 5A)

- Overload

Current: 1.2 times rated continuous; 10 seconds for 10 times the rated.

Voltage: 1.2 times the rated continuous; 10 seconds for 2 times.

- Accuracy standards

Voltage	0.2% F.S.
Current	0.5% F.S. (depends on shunt)
Power	0.5% F.S.
Energy	1.0% Class

- Reference standard

Basic electricity	GB/T13850-1998 (IEC688-1992)
Active power	GB/T17215-2002 (IEC61036:2000)
Reactive power	GB/T17882-1999 (IEC61268:1995)

- Dielectric strength

IEC 688 / IEC 255-3 (1989)

2kV AC RMS 1 minute, between input / output / case / power supply.

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- EMC test

Item	Standard	Test voltage
Electrostatic discharge immunity test:	IEC-61000-4-2 level 4	8Kv
Electrical fast transient burst immunity test	IEC61000-4-4 level 3	Input 1kV; Power supply 2kV
Surge (Shock) immunity test	IEC61000-4-5 level 4	Common mode test voltage 4kV

- Work environment

Temperature: -20°C ~ +60°C

Humidity: RH 20%~95% (No condensation)

- Protection

Panel: IP40

- Storage conditions

Temperature: -25°C ~+70°C

Humidity: RH 20% ~95%

3.- INSTALLATION AND START-UP



The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions. The instrument must not be powered and used until its definitive assembly on the cabinet's door.

Whether the instrument is not used as manufacturer's specifications, the protection of the instrument can be damaged.

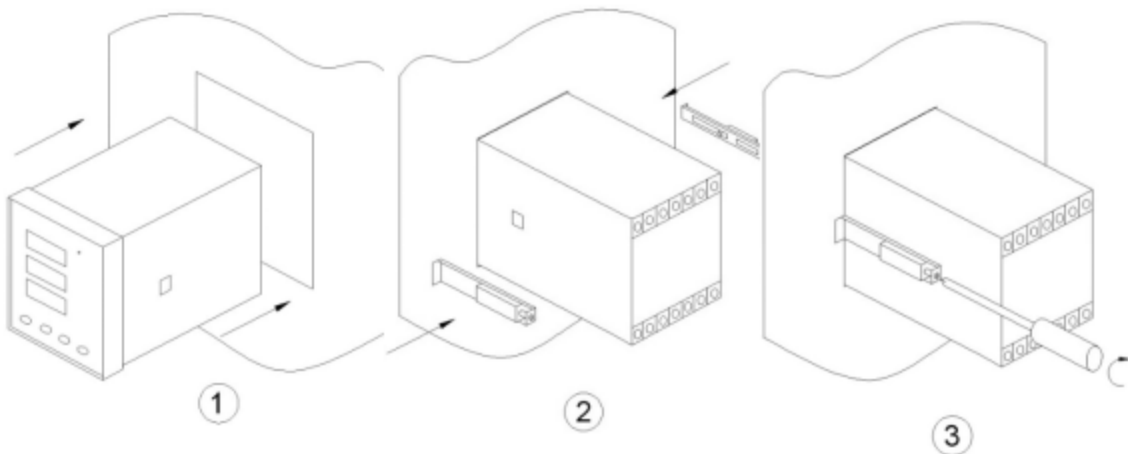
When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Installation

Mounting

Instrument is to be mounted on panel. All connections keep inside the cabinet.

Note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.



Notes:

Input signal: DCEM-96S using a separate acquisition calculate for each measurement channel, to ensure consistent in use, for different load forms, it's a variety of connection mode. Access wire shall be met 2.5 square mm.

A. Voltage input

Input voltage should not exceed the rated input voltage products 450V, Otherwise, you should use external VT. Suggest 1A fuse be installed in the voltage input side.

B. Current Input

Standard input current is 5A or 1A, if greater than 5A/1A should use external CT. When the CT is connected with other meters, make sure wiring methods be used in series.

Warning: Forbid to install a CT on the live feeder wire with open secondary leads. This can be extremely dangerous!

Before remove the current input connection, must be sure to disconnect the primary circuit or shorted secondary circuit of CT.

C. Sequence of wire

Warning: Please make sure that the input voltage and current corresponding to the same phase, sequence, and the same direction; Otherwise, the Values and symbols will be wrong! (Power and Energy)

Always observe the physical orientation of CT (P1 - P2) when installing on the feeder wire. Always pay attention to wiring polarity and phasing when terminating the CT leads to the DCEM-96S DC Panel Meter. S1 connect to Ix*, S2 connect to Ix.

The input network configuration of instrument depends on the CT number of the system: in the condition of 2 CT, select the three-phase, three-lines two components; in the condition of 3 CT, select the three-phase, four-lines three component mode.

Instrument connection mode, set of the instrument (programming input network NET) should be the same load wiring as measured wiring. Otherwise, the measurement instrument will lead to incorrect voltage or power.

In three-phase 3 wire mode, measurement and shows the line voltage;

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In three-phase 4 wire mode, measurement and shows phase voltage and line voltage both.

D. Auxiliary power

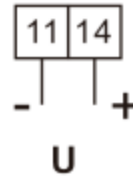
DCEM-96S DC Panel Meter with universal (AC / DC) power input, if not for a special statement, we provide the 90-240AC/DC power interface for standard products, please ensure that the auxiliary power can match with meter to prevent unexpected damage.

- A. Suggest install 1A fuse in the fire line side.
- B. For the areas with poor power quality, suggest install lightning surge suppressor and rapid burst suppressor to prevent lightning strikes.

3.2.- Connection terminal and drawing (details please see label on the rear part)

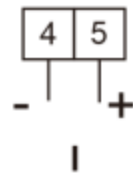
Terminal description

- 11. Positive of Voltage phase input
- 14. Negative of Voltage input



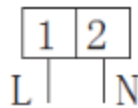
Terminal description

- 4. Shunt negative terminal
- 5. Shunt positive terminal

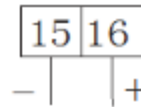


3.3.- Other terminals (optional function)

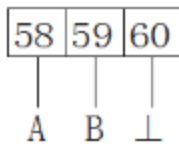
AUX



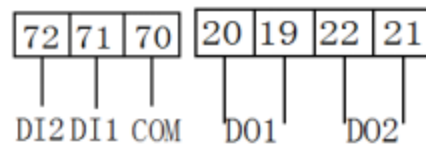
Analog output



RS485 port



Digital input
Digital output








Note:

This connection drawing is for reference only; the actual connecting terminal please refer to the label on the rear part.

4.- OPERATION MODE

When the device is powered on, the entire symbol will be on, and the meter starts to self-test. After few seconds, the meter is ready for operation and shows firmware, then automatic jump to The first screen.

Button	In Monitor Screen	In Config Sub-menu	In Parameter Setup
	Screen will move to previous or next page	Move cursor up and down to select function	Move setting cursor to left
			Scroll selection number 0 ~ 9
	Call out password screen	Exit & roll back to up level menu.	
	Call out sub-screen or version screen	Confirm the values & Entry or jump to down level menu	

Note: In Setup menu, if change the setting value, press  for exit menu, device will call out confirm screen ask "SAVE"

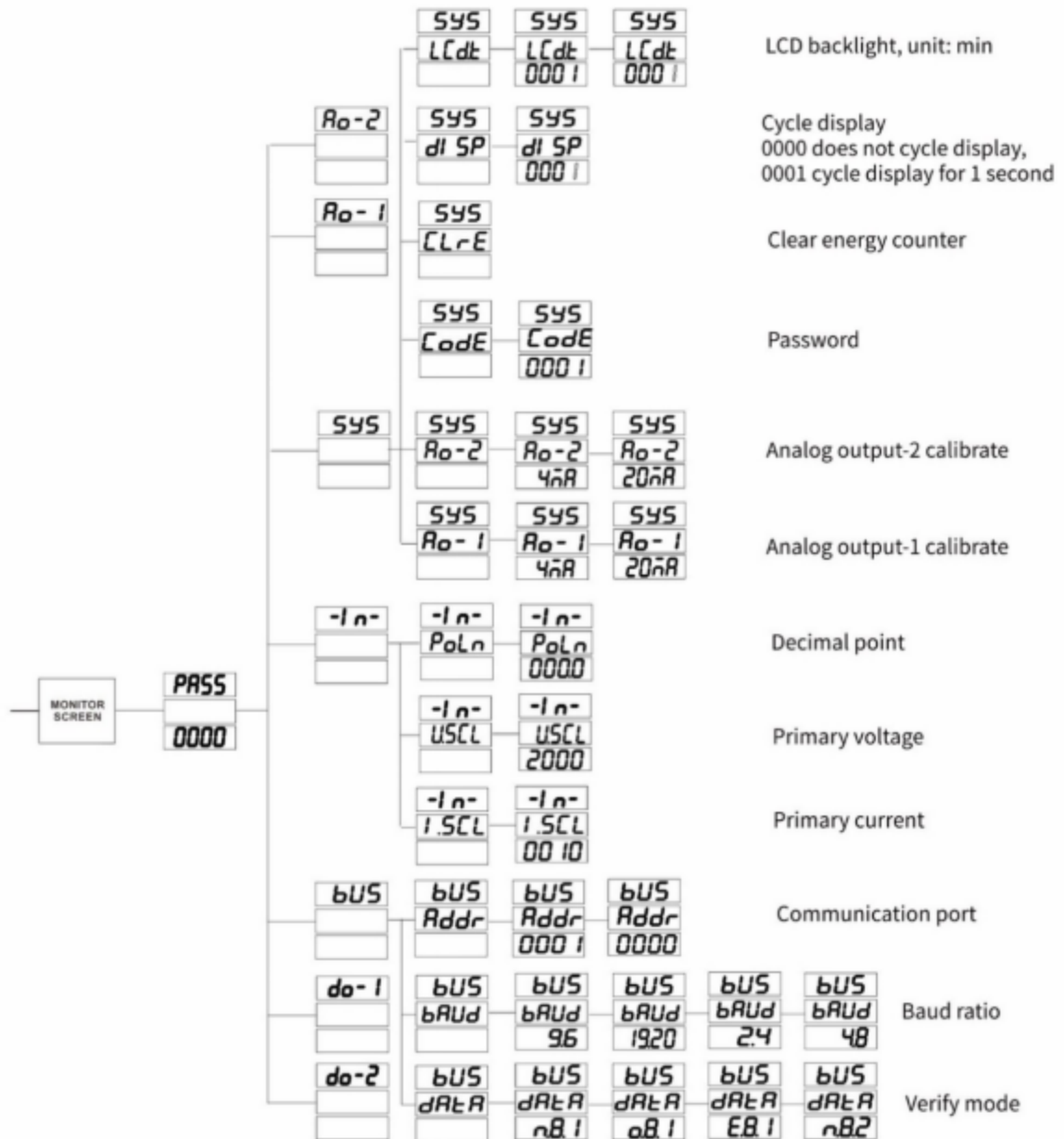
Then press  *exit without saving;*

press  *save and exit.*

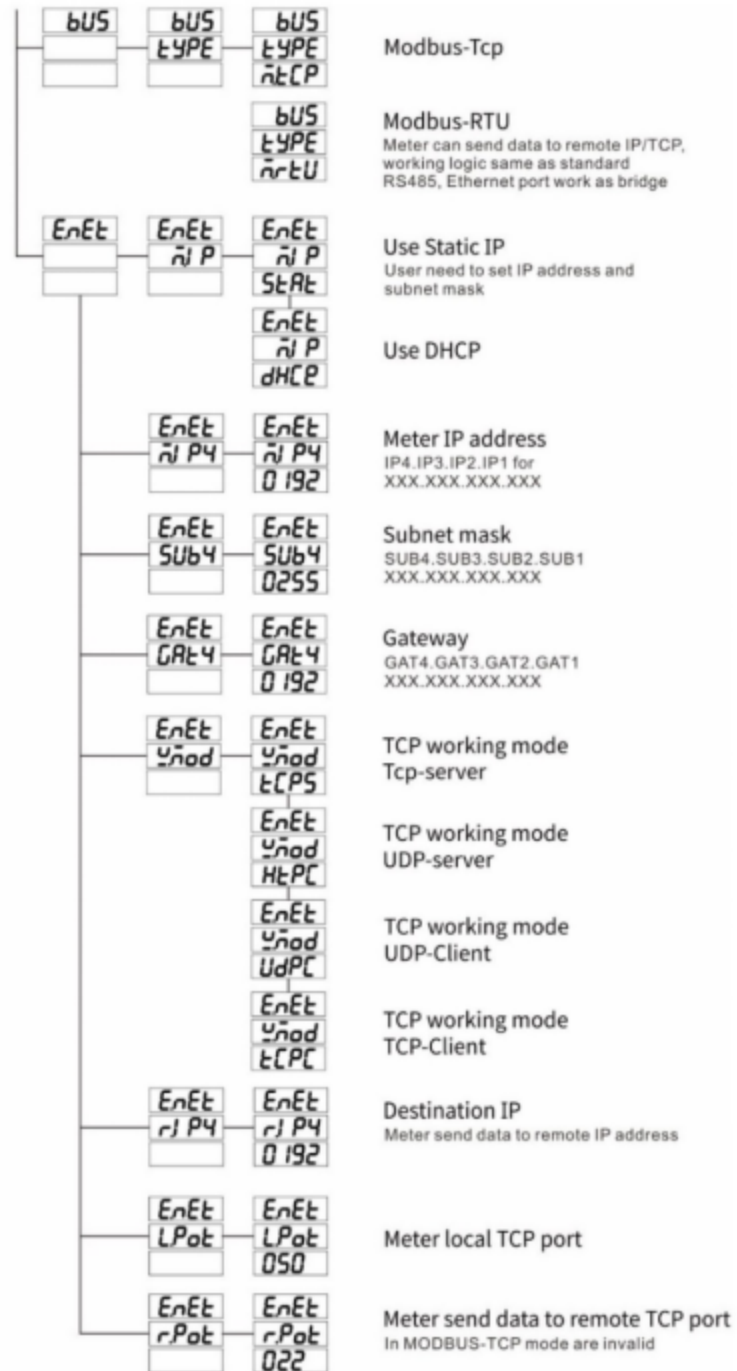
5.- SETUP PROCEDURE

The SETUP procedure of the DCEM-96S is performed by means of several SETUP options.

Once into the SETUP, use the keyboard to select different options and enter required variables:



If meter have Ethernet port, that configuration under “Bus” menu will change to following:



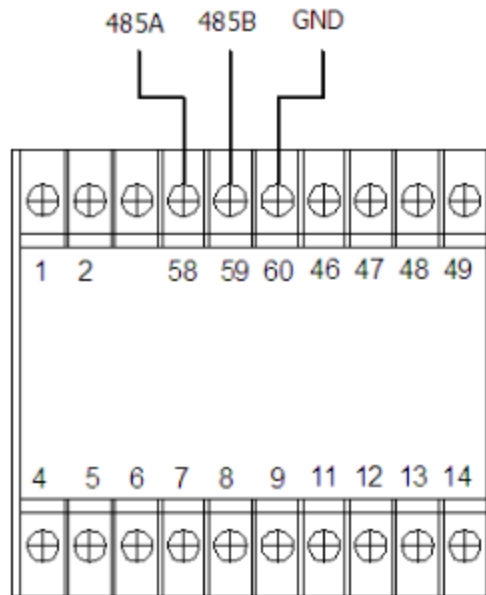
Note:

The procedure above is for reference, not all series have the step 3 (communication preference), please contact the Technical Service.

6.- COMMUNICATION INTERFACE

6.1.- Connection for the RS485 BUS

The composition of the RS-485 cabling must be carried out with a meshed screen cable (minimum 3 wire), diameter of not less than 0.5mm^2 , with a maximum distance of 1,200 m between the DCEM... and the master unit. This Bus may connect a maximum of 32pcs DCEM...



Notes:

- For communication with the master unit, user can choose RS-485 to RS-232 converter or RS485 to USB adapter to use.
- For expand the number of devices in the communication network, a signal repeater can be used.
- Full range of DCEM... meter RS485 PIN number is 58,59,60.
- Due to product modifications or special requirements, the interface pin place may be change. For details, please refer to product label on the rear side.

6.2.- MODBUS © Protocol

Modbus RTU Frame Format:

Address code	1 BYTE	<i>Slave device address 1-247</i>
Function code	1 BYTE	<i>Indicates the function codes like read coils / inputs</i>
Data code	4 BYTE	<i>Starting address, high byte Starting address, low byte Number of registers, high byte Number of registers, low byte</i>
Error Check code	2 BYTE	<i>Cyclical Redundancy Check (CRC)</i>

MODBUS FUNCTIONS:

Code	Meaning	Description
FUNCTION 01	Read Coil Status	<i>Only valid when equipped DO port</i>
FUNCTION 02	Read Input Status	<i>Only valid when equipped DI port</i>
FUNCTION 03	Reading of n Words	<i>This function permits to read all the electrical parameters Details see chart 6.4</i>
FUNCTION 05	Force Single coil	<i>When DO in remote control mode can work Disable in default</i>
FUNCTION 06	Preset Single register	<i>If need valid this code, please contact Blue Jay Sales Team before your order!</i>

Note: Float data follow **IEEE754**, float low bit first, high bit next. **(CD AB)**

6.3.- Register map

6.3.1.- Only read parameter, Functionx03 to read

Address	Data	Word byte	Description	
32bit int value				
0,1	U	Voltage	0,1,2,3	Unit 0.01V
2,3	I	Current	4,5,6,7	Unit 0.1A
4,5	P	Power	8,9,10,11	Unit 0.01W
6,7	E	Energy	12,13,14,15	Unit 0.001KWh
8,9	R	Resistance		Unit 0.01Ω R-U/I
14,15	AH+			Unit 0.001Ah If Current range= 1A, minimum step = 0.001Ah; If current range = 100A, minimum step = 0.1Ah
16,17	AH-			Unit 0.001Ah
18,19	AH_SUM			Unit 0.001Ah
20,21	RIN	Internal resistor		Unit 0.01Ω
22,23	E+	Positive energy		Unit 0.001KWh
24,25	E-	Negative energy		Unit 0.001KWh

Address	Data	Word byte	Description
32bit float value			
30,31	U float	Voltage	Unit V
32,33	I float	Current	Unit A
34,35	P float	Power	Unit W
36,37	E float	Energy	Unit KWh
38,39	R	Resistance	Unit Ω R-U/I
44,45	AH+		Unit Ah Current range= 1A, minimum step = 0.001Ah; Current range = 100A, minimum step = 0.1Ah
46,47	AH-		Unit Ah
48,49	Ah_Total		Unit Ah
50,51	RIN	Internal resistor	Unit Ω
52,53	E+	Positive energy	Unit KWh
54,55	E-	Negative energy	Unit KWh

Other				
60,61	DIDO	DO/DO status	56,57,58,59	BIT8-BIT14 for DI status BIT0-BIT7 for DO status 0 for opened, 1 for closed.

6.3.2.- Read and write parameters, Functionx03 to read and Functionx06 to write

Address	Data	Type	Byte	Description
1000	Voltage range	Int	1	1-9999V
1001	Current range	Int	1	1-9999A
1002	Decimal point position	Int	1	0-3
1003	MODBUS ID	Int	1	1-247
1004	Baud rate	Int	1	0:1200 1:2400 2:4800 3:9600 4:19200
1005	Data format	Int	1	0: n.8.1 1: o.8.1 2: e.8.1 3: n.8.2
1006	Password	Int	1	0-9999
1007	Screen display mode	Int	1	0-9999: 0 manual switching, Other numbers for seconds of automatic switching
1008	Backlight display time	Int	1	0-9999min
1009	Reserved	/	/	/

1010	DO1 Pickup time unit DO1_UTD.p	Int	1	0: sec 1: min 2: hour																																																		
1011	DO1 Pickup time	Int	1	0-999.9																																																		
1012	DO1 Drop out time unit DO1_UTD.d	Int	1	0: sec 1: min 2: hour																																																		
1013	DO1 Drop out time	Int	1	0-999.9																																																		
1014	DO1 Action logic selection	Int	1	1: A and B and C 2: A or B or C 3: A and B or C 4: A xor B xor C																																																		
1015	DO1 Element_A Hysteresis	Int	1	Range: 0-9999, Unit 1V, 1A, 0.1kW, 0.1AH, 0.1Ω																																																		
1016	DO1 Element_A Alarm parameter	Int	1	<table border="0"> <tr> <td>0: U upper limit</td> <td>23: U lower limit</td> </tr> <tr> <td>1: I upper limit</td> <td>24: I lower limit</td> </tr> <tr> <td>2: P upper limit</td> <td>25: P lower limit</td> </tr> <tr> <td>3: AH+ upper limit</td> <td>26: AH+ lower limit</td> </tr> <tr> <td>4: AH- upper limit</td> <td>27: AH- lower limit</td> </tr> <tr> <td>5: AH_SUM upper limit</td> <td>28: AH_SUM lower limit</td> </tr> <tr> <td>6: R upper limit</td> <td>29: R lower limit</td> </tr> <tr> <td>7: Reserved</td> <td>30: Reserved</td> </tr> <tr> <td>8: DI1 closed</td> <td>31: DI1 Opened</td> </tr> <tr> <td>9: DI2 closed</td> <td>32: DI2 Opened</td> </tr> <tr> <td>10: DI3 closed</td> <td>33: DI3 Opened</td> </tr> <tr> <td>11: DI4 closed</td> <td>34: DI4 Opened</td> </tr> <tr> <td>12: DI5 closed</td> <td>35: DI5 Opened</td> </tr> <tr> <td>13: DI6 closed</td> <td>36: DI6 Opened</td> </tr> <tr> <td>14: DI7 closed</td> <td>37: DI7 Opened</td> </tr> <tr> <td>15: DO1 closed</td> <td>38: DO1 Opened</td> </tr> <tr> <td>16: DO2 closed</td> <td>39: DO2 Opened</td> </tr> <tr> <td>17: DO3 closed</td> <td>40: DO3 Opened</td> </tr> <tr> <td>18: DO4 closed</td> <td>41: DO4 Opened</td> </tr> <tr> <td>19: DO5 closed</td> <td>42: DO5 Opened</td> </tr> <tr> <td>20: DO6 closed</td> <td>43: DO6 Opened</td> </tr> <tr> <td>21: DO7 closed</td> <td>44: DO7 Opened</td> </tr> <tr> <td>22: DO8 closed</td> <td>45: DO8 Opened</td> </tr> <tr> <td colspan="2">46: Always Closed</td> </tr> <tr> <td colspan="2">47: Always Opened</td> </tr> </table>	0: U upper limit	23: U lower limit	1: I upper limit	24: I lower limit	2: P upper limit	25: P lower limit	3: AH+ upper limit	26: AH+ lower limit	4: AH- upper limit	27: AH- lower limit	5: AH_SUM upper limit	28: AH_SUM lower limit	6: R upper limit	29: R lower limit	7: Reserved	30: Reserved	8: DI1 closed	31: DI1 Opened	9: DI2 closed	32: DI2 Opened	10: DI3 closed	33: DI3 Opened	11: DI4 closed	34: DI4 Opened	12: DI5 closed	35: DI5 Opened	13: DI6 closed	36: DI6 Opened	14: DI7 closed	37: DI7 Opened	15: DO1 closed	38: DO1 Opened	16: DO2 closed	39: DO2 Opened	17: DO3 closed	40: DO3 Opened	18: DO4 closed	41: DO4 Opened	19: DO5 closed	42: DO5 Opened	20: DO6 closed	43: DO6 Opened	21: DO7 closed	44: DO7 Opened	22: DO8 closed	45: DO8 Opened	46: Always Closed		47: Always Opened	
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1018	DO1 Element_B Hysteresis	Int	1	Range: 0-9999, Unit 1V, 1A, 0.1kW, 0.1AH
1019	DO1 Element_B Alarm parameter	Int	1	Refer to < DO1 Element_A Alarm parameter>
1020	DO1 Element_B Alarm value	Int	1	Range: 0-9999, Unit 1V, 1A, 0.1kW, 0.1AH
1021	DO1 Element_C Hysteresis	Int	1	Range: 0-9999, Unit 1V, 1A, 0.1kW, 0.1AH
1022	DO1 Element_C Alarm parameter	Int	1	Refer to < DO1 Element_A Alarm parameter >
1023	DO1 Element_C Alarm value	Int	1	Range: 0-9999, Unit 1V, 1A, 0.1kW, 0.1AH
1024	DO1 Mode	Int	1	0: OFF 1: Remote control pulse 2: Remote control Latching
1025	DO1 Pulse width	Int	1	Range: 0.1-999.9 sec
1026-1041	DO2 Setting	Int	1	Refer to DO-1 setting, reg[1010-1025]
1042-1056	DO3 Setting	Int	1	Refer to DO-1 setting, reg[1010-1025]
1058-1072	DO4 Setting	Int	1	Refer to DO-1 setting, reg[1010-1025]
2000	Reset energy counter (Unreadable)	Int	1	Write 0x0A0A,(2570 in Dec)
3000	Reset AH counter (Unreadable)	Int	1	Write 0x0A0A,(2570 in Dec)

7.- SAFETY CONSIDERATIONS



All installation specification described at the previous chapters named:
INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

- ◆ The device must have a professional installation and maintenance.
- ◆ Any operation of the device, you must cut off the input signal and power.

8.- MAINTENANCE

The DCEM-PUI does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

For any inquiry about the instrument performance or any failure, contact to Blue Jay's technical service.

Blue Jay - After-sales service

E-mail: tech@cqbluejay.com