
ЭНЕРГОМЕТРИКА
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Multi-channel DC Meter

User Manual

Version: 1.0

Read me

When you use Multi-channel DC 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 this DC 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. Be sure the instrument wiring consistent with the internal system settings;
4. When communicating with the PC, instrument communication parameters must be consistent with the PC



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

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1. - SUMMARIZE

Meter is an advanced solution for multi-channel metering in DC system. It provides 8 channels, full isolated for collect voltage, current, power data and energy generate & consumption data. With RS485 communication interface, can be connected to the monitoring center or on-site host. It is a high-performance automatic metering device suitable for solar plant and Telecom server room, BMS application in UPS system etc.

2. - SPECIFICATIONS

1.- Reference standard:

Basic electricity: IEC 61557-12:2007

Active energy: IEC 62053-21:2003

2.- Accuracy standards

Parameter	Accuracy
Current	0.2%fs (depends on CT)
Voltage	0.2%fs
Active power	0.5%fs
Energy	0.5%fs

3.- Input signal

Current	1mA, 20mA, 100mA, 1A, 5A, 10ADC direct access Over 10A use hall CT or Shunt
Voltage	75mV, 1V, 5V, 10V, 50V, 100V, 250V, 400V, 500VDC
Frequency response	0-1000Hz
Sampling ratio	20ms, 40ms, 60ms, 80ms, 100ms, 400ms, 1000ms adjustment, default 100ms

Notes: please refer to sticker on the meter body for detail signal input

4.- Load Resistance

Current: <0.15V / channel

Voltage: >2Kohm/V

5.- Overload

Current: 1.2 times rated continuous; 50ms for 5 times the rated

Voltage: 1.5 times rated continuous;

6.- Dielectric strength

IEC/EN 61010-1:2010

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

Lightning surge: 2KV

7.- Work environment

Temperature: -20C~ +70C

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

8.- Protection

Panel: IP40

9.- Storage Conditions

Temperature: -25□~+70□

Humidity: RH 20%~95%

10.- Power Supply

DC 9-30V

Maximum power consumption 1.5W

11. - Dimensions

L × H × D =120X110X50mm (with wiring terminal)

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 is on the cabinet's door.

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

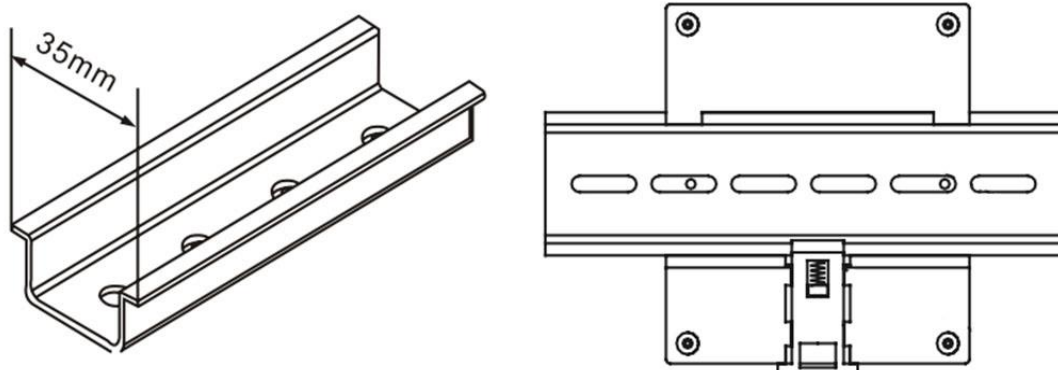
When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Installation

Mounting

Instrument is to be mounted on 35mm Din-rail. Keep all connections inside the cabinet.

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

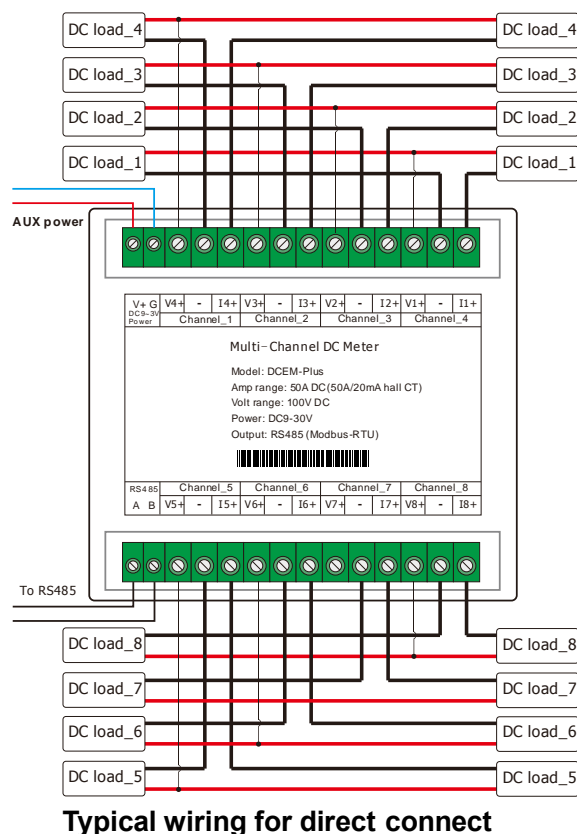
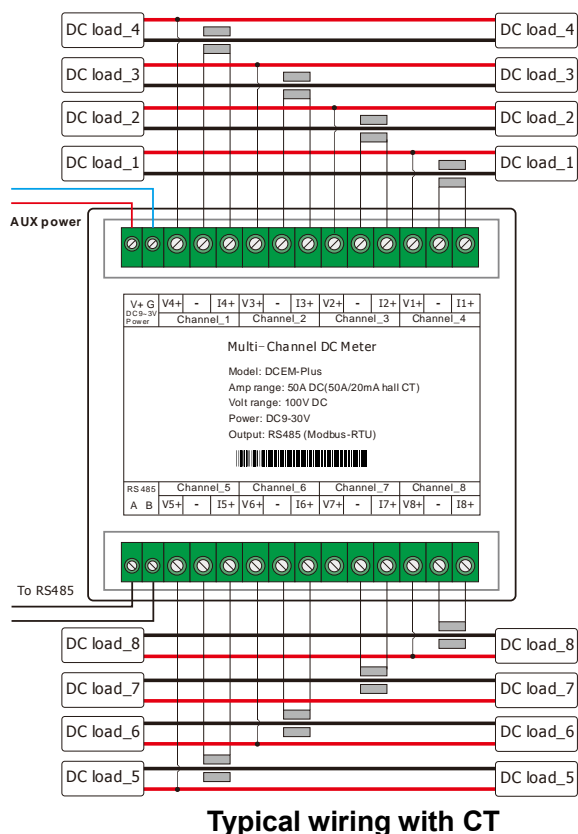


Notes:

Auxiliary power:

Meter with AUX power input, if not for a special statement, we provide the 9-30VDC power interface for standard products. Please ensure that the auxiliary power match meter access to prevent damage to the product.

3.2. - Connection terminal and drawing

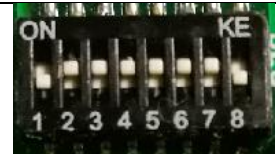


Notes: Wiring diagram may be changed due to the special requirements of customer's order, please refer the label on the rear part. If you are or sure or signs unclear, please contact:

3.2. – RS485 configuration by hardware access

There is an 8-bit DIP switch on inside PCB for RS485 address and Baud ratio setting. If forgot RS485 setting, can use this switch to recover RS485 port.

Bit 1-6 for simulate BIN code to related RS485 address, "bit 1" for lowest bit, value from 1~63
 Bit 7-8 for simulate BIN code to related Baud ratio, "bit 7" for low bit
 0 for 115200bps, 1 for 9600bps, 2 for 19200bps, 3 for 38400bps

Demo photo	BIN code	Dec value	Parameter be set
	000001	1	Addr. 01
	10	2	Baud: 19200

Notes: When use this PID switch to operate RS485 port, need to short jumper DZ01, default setting are from register operate, please refer to next Chapter.

4. - COMMUNICATION PROTOCOL

4.1. - 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 0.5mm², with a maximum distance of 1,200 m between the BJ194... and the master unit. This Bus may connect a maximum

4.2. - 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 03H	Reading of n Words	<i>This function permits to read all the electrical parameters of the BJ...series.</i>
FUNCTION 06H	Write single Register	<i>Write value in to the relevant register</i>
FUNCTION 10H	Preset Multiple Registers	<i>Write value in to the relevant register</i>

4.3. - Register Address Table

4.3.1- Basic Power Data

Address	Data	Byte mode	Instruction
0x00	U_1	Int	2
0x01	U_2	Int	2
0x02	U_3	Int	2
0x03	U_4	Int	2
0x04	U_5	Int	2
0x05	U_6	Int	2
0x06	U_7	Int	2
0x07	U_8	Int	2
Voltage value from Channel_1 to Channel_8			
Unsigned value in register, unit V			
Real Voltage data calculate formula: [Value] / [10000] * [Volt range]			
0x08	I_1	Int	2
0x09	I_2	Int	2
0x0A	I_3	Int	2
0x0B	I_4	Int	2
0x0C	I_5	Int	2
0x0D	I_6	Int	2
0x0E	I_7	Int	2
0x0F	I_8	Int	2
Current value from Channel_1 to Channel_8			
Unsigned value in register, unit A			
Real Current data calculate formula: [Value] / [10000] * [Amp range]			
0x10	P_1	Int	2
0x11	P_2	Int	2
0x12	P_3	Int	2
0x13	P_4	Int	2
0x14	P_5	Int	2
0x15	P_6	Int	2
0x16	P_7	Int	2
0x17	P_8	Int	2
Power value from Channel_1 to Channel_8			
Unsigned value in register, unit W			
Real Power data calculate formula: [Value] / [10000] * [Volt range] * [Amp range]			
0x18-19	E_1+	Long	4
0x1A-1B	E_2+	Long	4
0x1C-1D	E_3+	Long	4
0x1E-1F	E_4+	Long	4
0x20-21	E_5+	Long	4
0x22-23	E_6+	Long	4
0x24-25	E_7+	Long	4
0x26-27	E_8+	Long	4
Energy Consumption value from Channel_1 to Channel_8			
Unsigned value in register, unit kWh			
Real Power data calculate formula: [Value] / [10000] * [Volt range] * [Amp range] / [1000*3600]			
0x28-29	E_1-	Long	4
0x2A-2B	E_2-	Long	4
0x2C-2D	E_3-	Long	4
0x2E-2F	E_4-	Long	4
0x30-31	E_5-	Long	4
0x32-33	E_6-	Long	4
0x34-35	E_7-	Long	4
0x36-37	E_8-	Long	4
Energy generate value from Channel_1 to Channel_8			
Unsigned value in register, unit kWh			
Real Power data calculate formula: [Value] / [10000] * [Volt range] * [Amp range] / [1000*3600]			

4.3.2- Supplementary data, negative value

Address	Data	Byte mode		Instruction
0x38	U_1-	Int	2	Voltage value from Channel_1 to Channel_8 Signed value in register, Negative, unit V Real Voltage data calculate formula: [Value] / [10000] * [Volt range]
0x39	U_2-	Int	2	
0x3A	U_3-	Int	2	
0x3B	U_4-	Int	2	
0x3C	U_5-	Int	2	
0x3D	U_6-	Int	2	
0x3E	U_7-	Int	2	
0x3F	U_8-	Int	2	
0x40	I_1-	Int	2	Current value from Channel_1 to Channel_8 Signed value in register, Negative, unit A Real Current data calculate formula: [Value] / [10000] * [Amp range]
0x41	I_2-	Int	2	
0x42	I_3-	Int	2	
0x43	I_4-	Int	2	
0x44	I_5-	Int	2	
0x45	I_6-	Int	2	
0x46	I_7-	Int	2	
0x47	I_8-	Int	2	

Notes: high bit first, low bit next. (AB CD)

Amp range and Volt range please refer to the meter front sticker

4.3.2- Meter status data [Write & Read]

Address	Data	Byte mode		Instruction
0x4F	Response time	int	2	0: 100ms; 1: 80ms; 2: 60ms; 3: 40ms; 4: 20ms; 5: 400ms; 6: 1000ms
0x50	Meter Addr.	int	2	1-255
0x51	Baud ratio	int	2	03: 38000bps 04: 2400bps 05: 4800bps 06: 9600bps 07: 19200bps 08: 38400bps 09: 57600bps 0A: 115200bps
0x52	Check	int	2	0: No parity; 1: Odd check; 2: Even parity 3: 2 stop bit, flag bit; 4: 2 stop bit, space bit;
0x53	Volt range	int	2	Just for indicate, default are 1
0x54	Amp range	int	2	

0x55-57	Device name	int	6	High bit first, user can re-write this for distinguish use
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4.3.3 - Energy record counter reset, [Write only]

Address	Data	Byte mode		Instruction
0xE0	/	int	2	Write 0 to reset all energy counter
0xE1	/	int	2	Write 0 to reset energy consumption counter
0xE2	/	int	2	Write 0 to reset energy generate counter

4.4. – Demo of RS485 reading/write

4.4.1 – Read channel_2 voltage

Host send: 01 03 00 01 00 01 D5 CA

Meter response: 01 03 02 27 08 A2 72

Mean voltage value 2708H=9992D

Volt range value = 220

So Real channel_2 Voltage = $9992/220*10000=219.824V$

4.4.2 – Set meter address

Host send: 01 10 00 50 00 01 02 00 02 2B C1

Meter response: 01 10 00 50 00 01 01 D8

Mean set meter address to 2

4.4.3 – Reset all energy counter

Host send: 01 06 00 E0 00 00 88 3C

Meter response: 01 06 00 E0 00 00 88 3C

5. - SAFETY CONSIDERATIONS



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

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.

6. - MAINTENANCE

The DCEM-Plus 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.

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