DCM6-650/ DCM6-200

DC DIN rail mounted meter for EV charging stations

USER MANUAL

2025 V1.6

Content

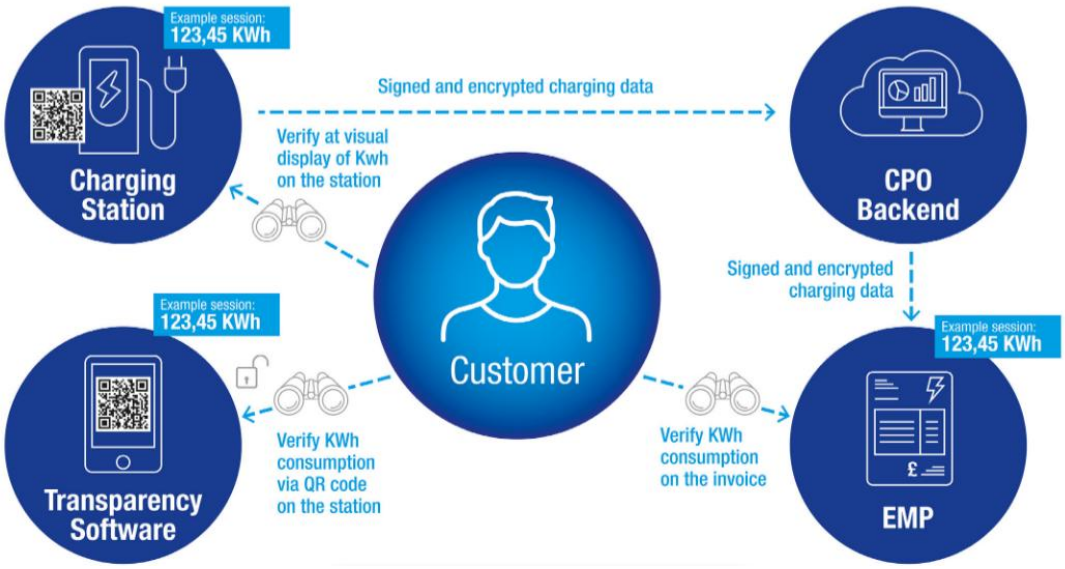
Version History

Version	Date	Changes
1.0	2023-11-1	Initial
1.1	2024-6-20	Add DCM6-200 technical data Add MID and Eichrecht approval info Firmware version updated to V01.03
1.2	2024-8-7	Add a drawing of DCM6-200
1.3	2024-8-30	1. Added modbus format description 2. Added the description about log storage
1.4	2024-10-14	1.Added line loss display description
1.5	2025-01-21	Added content of 4-wire line loss mode
1.6	2025-02-28	Add Fault code in protocol

1. Properties

1.1 Introduction

The DCM6-650/DCM6-200 is a DC meter for direct installation in EV charging stations. It provides the measurement data records with timestamp, loading process data and digital signature, thereby enabling charging processes to be billed in accordance with the legal requirements. Furthermore, all charging processes are persistently stored in the internal data storage of the meter.



(Figure 1)

According to Figure 1 the DCM6-650/-200 acquires meter data, stores meter data and acts as meter data signer as part of the “Messkapsel”. The connection between the main controller of the charging station and the DCM6-650/-200 is realized by a RS485 interface. All signed, OCMF-formatted datasets have to be forwarded unchanged by the station controller. Thereby signature and datasets are always transmitted together.The user authentication process should be performed according to the OCMF specification subsection 4.3.4 . After completing a charging session, the user has access to all session related data sets by the communication interfaces. By means of a transparency software application the signed data sets can be verified for billing purposes. All start and stop values of each individual charging session are persistently stored within the internal flash storage of the meter. All data sets obtained by the meter, contain a second index and a timestamp set by the charging station controller. The mentioned timestamp is a so called “Info-Uhr”. This excludes a time-based tariffing. Charge process data sets are visualized after the charging process on the display of the meter.
Through a transparency software application, the customer can check each charging processes invoiced individually. Furthermore, such an application visualizes the datasets of the charging processes during a billing period and shows the status of the signature verification and the amount of energy consumed.

1.2 Specifications

Type	DCM6-650	DCM6-200
Voltage		
Umax	1000 V	
Umin	150 V	
Current		
Starting current Ist	0.52 A (DCM6-650)	0.08A (DCM6-200)
Minimum current Imin	6.5 A (DCM6-650)	1A (DCM6-200)
Current Itr	13 A (DCM6-650)	4A (DCM6-200)
Normal current IRef	130 A (DCM6-650)	40A (DCM6-200)
Maximum current Imax	650 A (DCM6-650)	200A (DCM6-200)
Accuracy		
Class	Class B	
Measuring Active Energy		
Energy Direction	+A with -A	
Energy Register		
Total Mains Energy	+A / -A / total	
Total Device Energy		
Meter constant		
LED-Output	1000 Imp/kWh, Total Mains Energy	
Display		
LCD	Dot Matrix Display with 7+4 digits	
Life cycle	> 12 years	
RS485- Data Interface 1 and 2		
Connector	Port 1: terminal 7 and8 , Port 2: RJ12	
Parameter	4800~115200 bps (19200bps default), 8N1 (settable)	
RS485- Data Interface 3		
Connector	RJ12 port	
Parameter	4800~115200 bps (19200bps default), 8N1 (settable)	
Power Consumption		
Voltage circuit	< 0.5 W at Un	
Current circuit	< 0.12 W at Imax	
Auxiliary power supply	< 2 W	
Modbus communitcations		
Communication Address	1-247	
Transmission distance	1000m Maximum	
Parity	None(default),Odd,Evan	
Stop bits	1 or 2	

Table 1: Electrical and mechanical specifications.

Temperature Range		
Typical Operation		-40°C to +80°C
Storage		-40°C to +85°C
Humidity		
	max.98%, not condensing EN60068-2-30:1999	
Environmental conditions		
Mechanical environmental conditions		M1
Electromagnetic environmental conditions		E2
Housing		
Dimension	DIN-Rail	115 mm(L) x 103mm(W) x 64 mm(H)
Material		Polycarbonate UL94-V0
Storage		
Capacity for Start- and Stop-Charge Records		> 225000
Capacity of Logbook		> 3000

1.3 Technical Standard

[1] EN50470- 4:2023 “Electricity metering equipment (d.c.) – Part 4: Particular requirements – Static meters for DC active energy (class indexes A, B and C)”

[2] IEC62053-41:2021 "Electricity metering equipment (d.c.) - Particular requirements - Part 41: Static meters for DC energy (classes 0,5 and 1)"

[3] IEC62052-11:2020 "Electricity metering equipment (d.c.) - General requirements, tests and test conditions - Part 11: Metering equipment"

[4] EN-IEC 62052-11/A11:2022 “Electricity metering equipment (d.c.) – Part 11: general requirements, tests and test conditions – Metering equipment"

[5] VDE-AR-E 2418-3- 100: „Elektromobilität – Messsysteme für Versorgungseinrichtungen

[6] PTB-A 20.1: ”Messgeräte fürElektrizität: Elektrizitätszähler und deren Zusatzeinrichtungen”

[7] PTB-A 50.7: “Anforderungen an elektronische und softwaregesteuerte Messgeräte und Zusatzeinrichtungen fürElektrizität, Gas, Wasser und Wärme”

[8] OCMF1.2.0: “Open Charge Metering Format”

1.4 Additional Documents and Tools

[9] Transparenzsoftware of the S.A.F.E Initiative, Version 1.3.0
https://safe-ev.org/files/software/transparenzsoftware-1.3.0.jar

[10] EASTRON EV-METER DC TEST
https://www.eastrongroup.com/software/eastronev-meterdctest

2. Safety

2.1 Responsibility

The owner or provider is the person responsible for the proper use of the device. The installation, putting into operation and re-installation of the meter is only allowed to be done by qualified persons, which got knowledge about this manual.

2.2 Common safety instructions

For installation, setting, operation and uninstallation of the device the local requirements for safety requirements have to be observed.

Danger

Inappropriate use of parts under high voltage may lead to serious injuries and accidents, which may be fatal.

The conductors which are connected to the device have to be disconnected to the mains during assembling and installation. It also has to be used a prevention for being switched on accidentally. The device is not allowed to be used out of specifications.

2.3 Disposal (product end of life information)

This meter was designed and built by EASTRON to provide many years of service and is backed by our commitment to provide high quality support. When it eventually reaches the end of its serviceable life, it should be disposed of in accordance with local or national legislation.

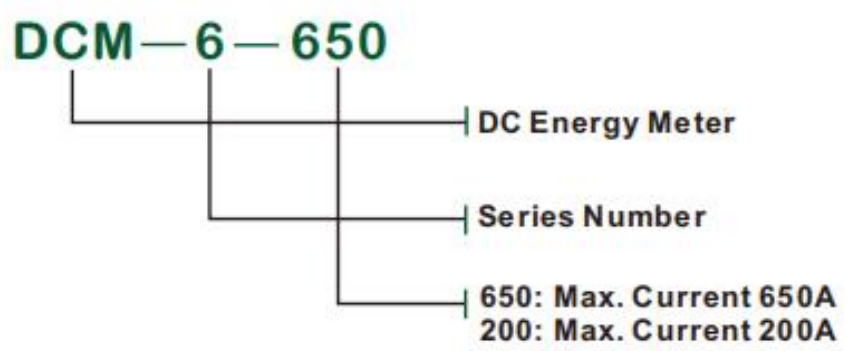
2.4 Environment

This meter is designed for indoor use or in a cabinet environment only (avoiding extreme weather conditions) in accordance with IEC 62052- 11 and IEC 62053-41, with the terminal cover fitted.

2.5 Service and warranty

This meter product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period EASTRON will at its option, either repair or replace products which prove to be defective. For warranty service or repair, this product has to be returned to a service facility designated by EASTRON. EASTRON does not warrant that the operation of the meter or firmware will be uninterrupted or error free. Damaged devices cannot be repaired. The warranty and liability will be terminated with opening the device. The same applies to damages caused by external influences. For the device, no servicing is required.

3. Type Code



4. Assembling and Installation

The DC meter can be used as a stand-alone meter without any additional equipment. This ensures a full range of functions with a compact design.

Overvoltage protection

The isolated DC EV (Electric Vehicle) charging station has to reduce overvoltage to the meter
, the tested peak impulse voltage of meter is 9.6 kV. The recommended impulse voltage from EV charging station to the meter shall be controlled less than 6KV.

Requirements for the connected charging station controller and the charging station as a whole

The public key and the Server ID of the DCM6-650/-200 have to be attached to the charging station so that it is visible from the outside for each charging point.

Requirements for the transparency software

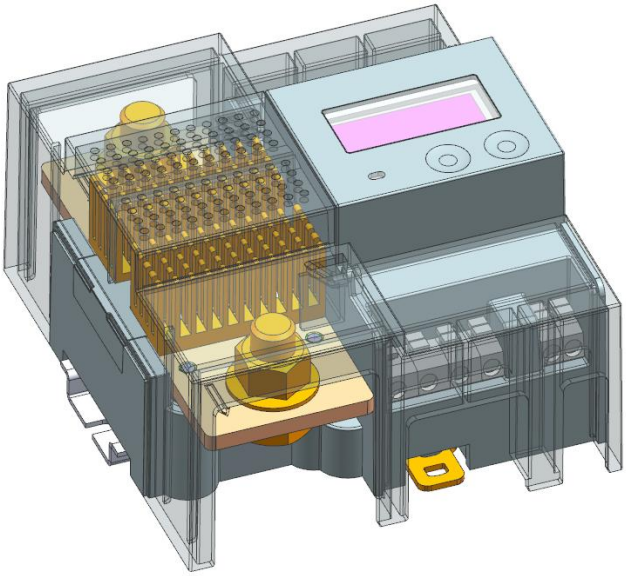
Transparency software has to be used to display the invoiced data in compliance with the legal requirements, which enables signature verification of the measurement data records for invoice control.

The transparency software is ready for download at:

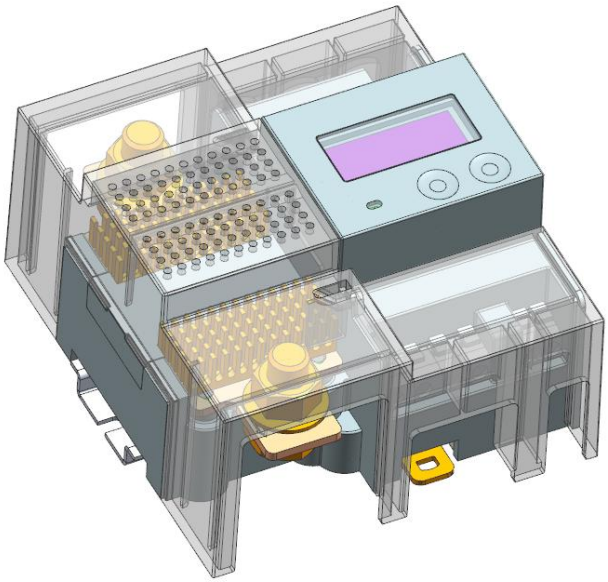
- https://www.safe-ev.de/de/transparenzsoftware.php

4.1 Housing

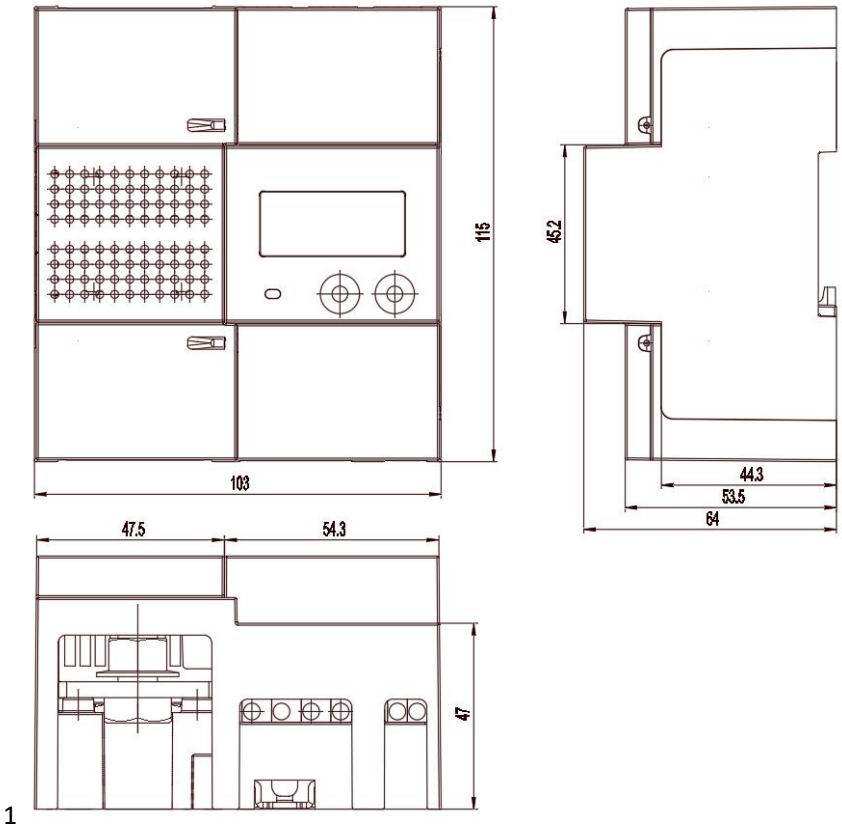
The meter is constructed for assembling on DIN-rail TH 35-7.5 according to IEC 60715.



3D printing of DCM6-650 (figure 2)



3D printing of DCM6-200 (figure 3)



1

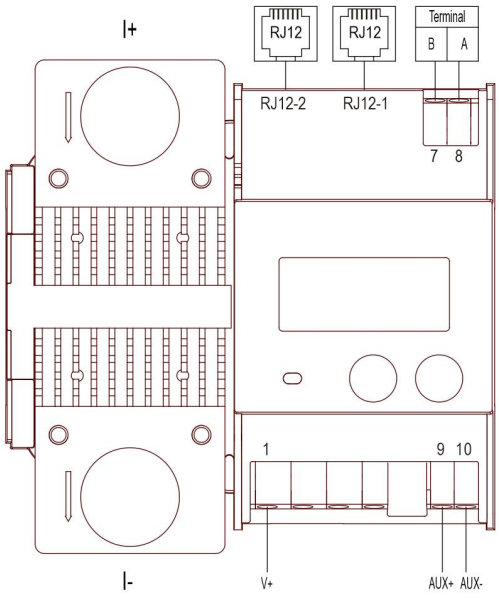
Figure 4 constructional drawing (Dimension in mm)

4.2 Installation and Safety

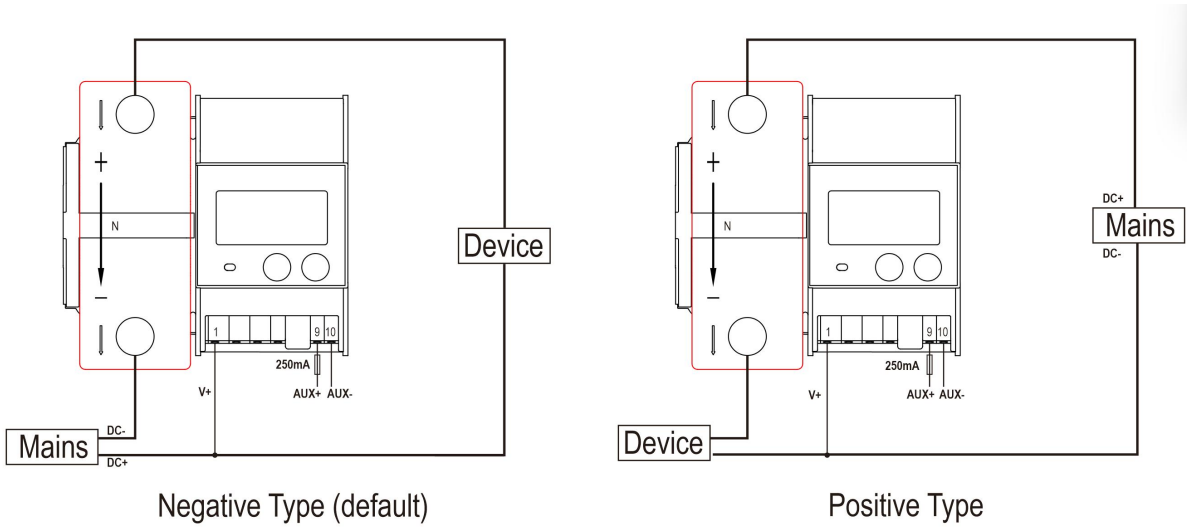
- The meter and all associated components may only be installed in compliance with all safety regulations. Ignoring these instructions may endanger life and the manufacturer will not take any responsibility.
- It is always mandatory to ensure the maximum peak voltage and maximum peak current of the desired application do not exceed the maximum peak values of the meter. Otherwise the meter gets damages due to over-voltage and or over-current. These peak values are 1000VDC (Max Voltage) and 650 A (Max Current) and 30xImax over-current margin.
- In order to ensure smooth operation of the meter, the manufacturer's seal of approval has to be obtained before installation. If this has expired or is missing, the meter has to be sent back to the manufacturer for a new test.
- The meter should be installed in dry and well-ventilated area. The meter should be installed on a top-hat rail away from flammable or vibrating components. During installation, the meter has to be ensured to operate properly. Possible damage to the meter has to be prevented by protective measures such as enclosures or protective caps.
- The connection has to be made according to Figure 5. The current-carrying lines are connected to the shunt of the meter using M10 nut screws. In order to prevent damage or corrosion due to a bad connection, a tightening torque of 20~25 Nm has to be applied.
- If additional modules are used in conjunction with the meter, a communication link between these

two devices can be established via one of the three RJ12 interfaces.

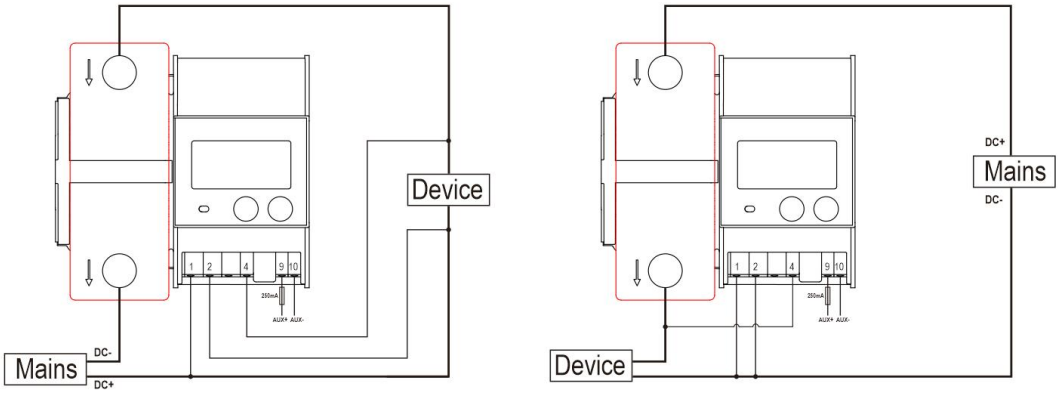
- After installation of the meter, it is mandatory to change the operating mode from assembling mode to user mode. The manufacturer is not responsible for any damage caused by disregarding this instruction.



Pin-out of the DCM6-650/-200 (figure 5)

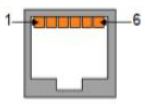


Wiring of the DCM6-650/-200 2-wire line loss mode (Figure6)



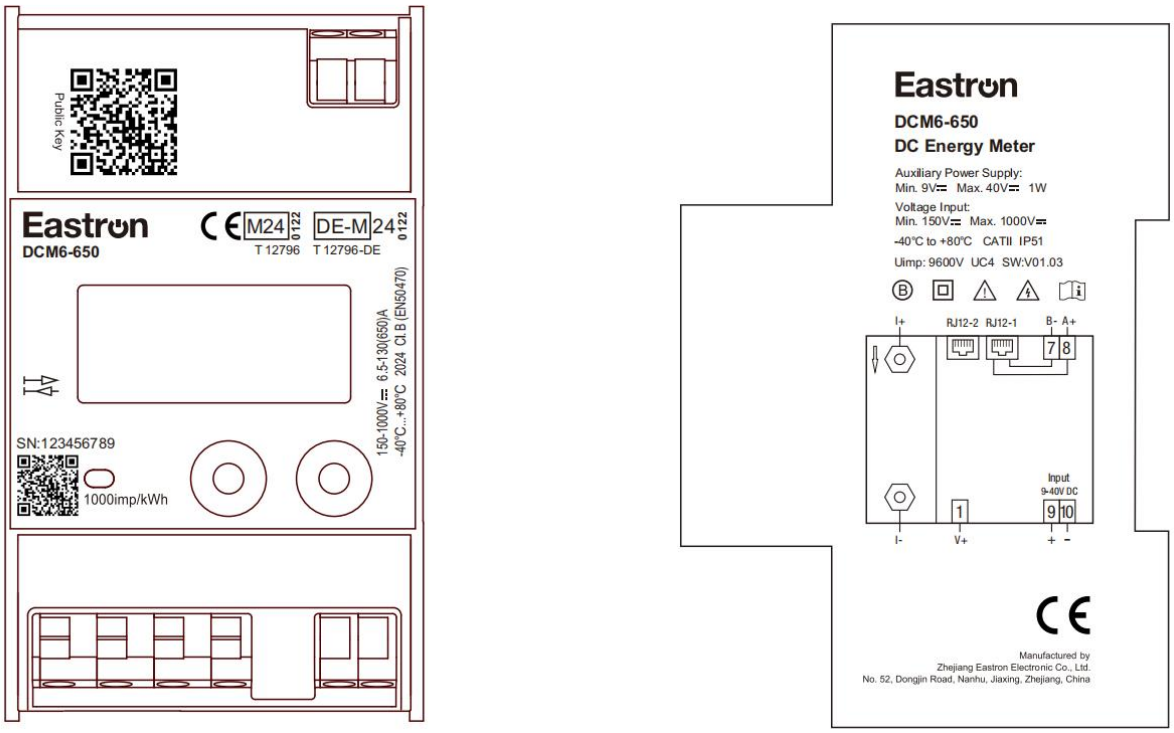
Negative Type(default) **Positive Type**

Wiring of the DCM6-650/-200 4-wire line loss mode (Figure7)

Item	Description	Notes
Current terminals	M10 screws	Terminals “+” and “- “on the Copper Shunt
Voltage terminals	#1: V+ AWG16-20	
DC Power supply terminals	#9 (+), #10(-): Terminal：WJ237/5.0	9~40V DC
Communication interfaces	RJ12- 1/ terminal 7-8: Communication interface for a charger station controller RJ12-2 : Communication interface for DCM-D	 1 RS485 Bus(-) 2 power supply input 12V/DC 3 GND 4 not used 5 not used 6 RS485 Bus(+)

Physical Interfaces of the DCM6-650/-200

5. Marking


Public Key
Eastron
DCM6-650
M24
T 12796
DE-M24
T 12796-DE
6.5-130(650)A
2024 Cl.B (EN50470)
150-1000V
-40°C...+80°C
SN:123456789
1000imp/kWh
Eastron
DCM6-650
DC Energy Meter
Auxiliary Power Supply:
Min. 9V Max. 40V 1W
Voltage Input:
Min. 150V Max. 1000V
-40°C to +80°C CATII IP51
Uimp: 9600V UC4 SW:V01.03
I+
RJ12-2 RJ12-1
B- A+
7 8
Input
9-40V DC
I-
V+
9 10
+ -
Manufactured by
Zhejiang Eastron Electronic Co., Ltd.
No. 52, Dongjin Road, Nanhu, Jiaxing, Zhejiang, China

(Figure 8)

6. Display

The LCD is dot matrix type with the format 37.5 mm × 17 mm.

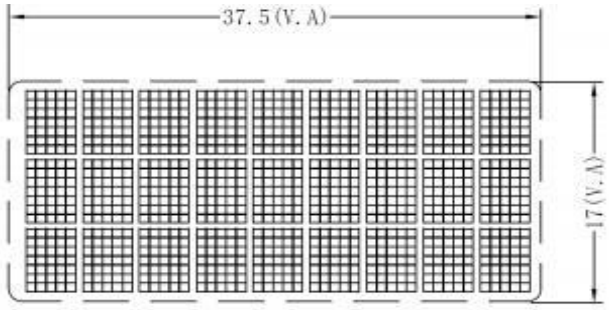
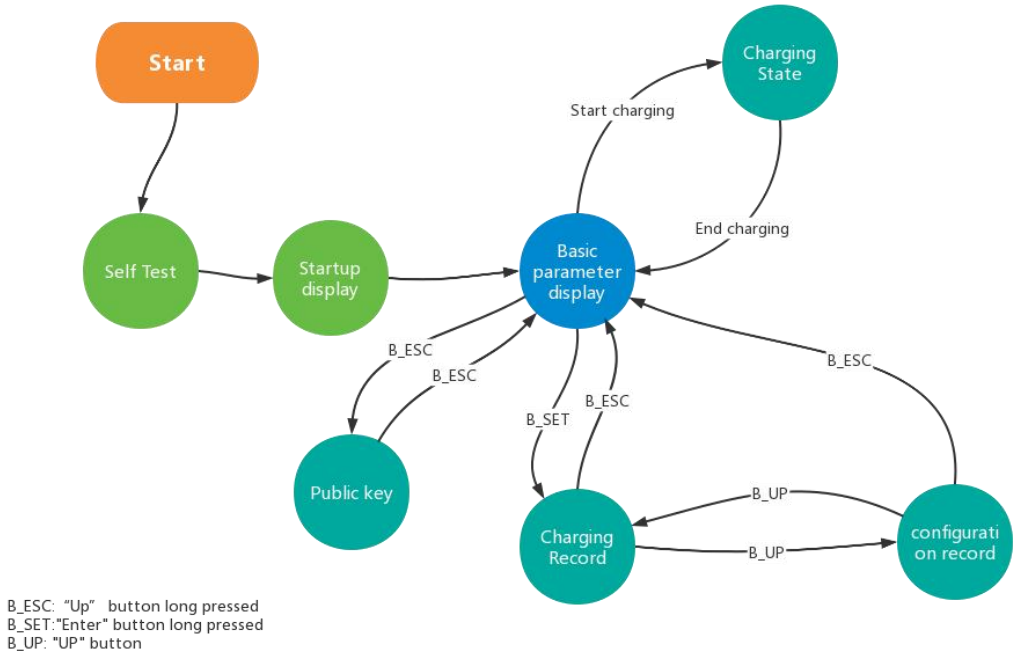


Figure 8: Schematic of the Dot Matrix LC Display (unit: mm)

6.1 Internal Display State Machine

The control of the internal display consists of a state machine which changes the current display state according to the present meter data.Figure 9 shows the complete display state machine with all transitions and their corresponding conditions.



Schematic of the internal display state machine (Figure 9)

6.2 Display Description

6.2.1 General State

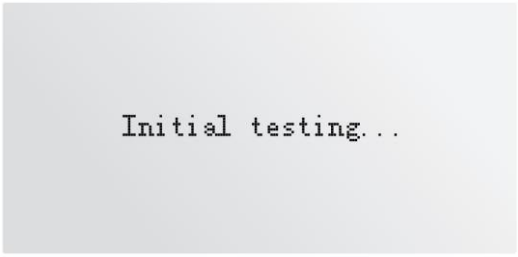
In the Display Self-test mode, the meter performs a self-testing on the display to ensure all pixels are fully functional. During this test sequence, the display will shows up all pixels for 3 seconds and turn off all pixels for another 3 seconds.

6.2.2 State Transition Conditions

The startup screen will switch automatically without pressing any button. The regular interfaces need to be triggered by bottons or switch automatically by enabling the wheel-display function.
If a fatal error occurs within this self-test state, the display and the entire meter will enter the Meter Fatal Error State.

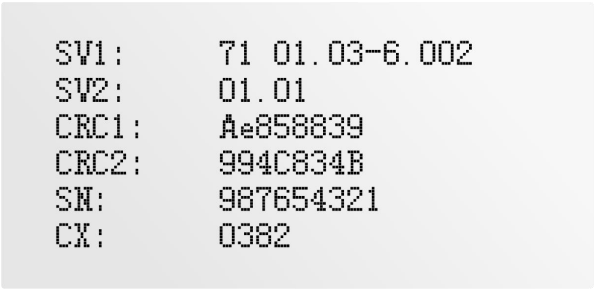
6.2.3 After Start-up Screen

1) After LCD pixels checking, the meter will enter into initial testing. If any error is detected, the display will shows coresponding error code.



Number	Error description	Display
1	Encryption chip error	ER ENI
2	measuring chip error	ER MEC
3	flash error	ER EFC
4	kWh error	ER EEI

2) After initial testing, the LCD will show basic info of the energy meter.



1. SV1:71 01.03-6.002[*1] : Measurement mode code + Firmware version +

encryption firmware version
2. SV2:01.01 Measuring chip firmware version
3. CRC1:AE858839 MCU firmware CRC
4. CRC2:994C834B Measuring chip firmware CRC
5. SN:987654321 Series number of the meter
6. CX:0382 Eastron Firmware code

*1: this info contains measurement mode code and firmware version and encryption chip's firmware version. The meter measurement mode can not be set by the user, but only available in assembly mode.

Type	Measurement mode code	Firmware version	Identification number (checksum)	Measurement mode
DCM6-650	71	01.03	AE858839	(import+ export)
	72	01.03	AE858839	(import only)
	73	01.03	AE858839	(export only)
DCM6-200	31	01.03	2E25D1E9	(import+ export)
	32	01.03	2E25D1E9	(import only)
	33	01.03	2E25D1E9	(export only)

6.2.4 Available Button Actions

Left button Short press :to perform the interface scrolling operation
Right button short press: no response
Left button long press: to show the basic info of the energy meter & the public key RQ code
Right button Long press :to enter the historical data interface.
to enter into setting in Assembling Mode
To enter into logbook in User Mode

6.2.5 Display Charging State

Screen	Description	2-wire system (Line loss function off)	2-wire system (Line loss function on)	4-wire system
Energy	Kwh display	Energy	Energy-M Energy-L	Energy-M Energy-L
D&T	Time display	Date Time	Date Time	Date Time
V&I	Current&Voltage display	Voltage Current	Voltage Current	Voltage-4 Voltage Current
Power	Power display	Power	Power-M Power-L	Power-M Power-L

Notes:

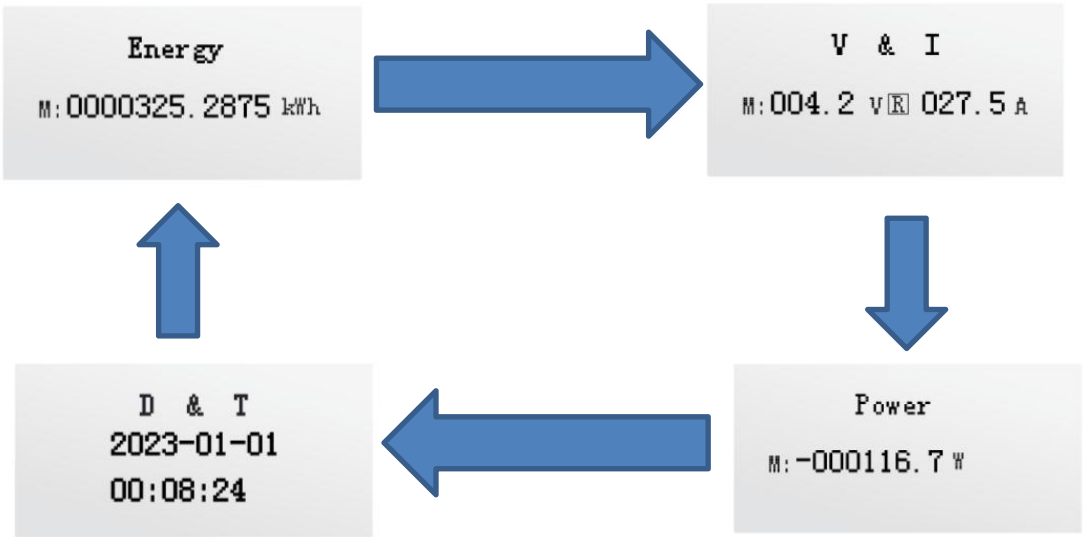
-M: energy measured by meter。

-L:energy loss。

-4:voltage of 4-wire end。

Whether the loss metering function is enabled or not, the M end is the actual sampling value of the meter.
If the actual charging value is needed, it can be obtained by subtracting L from M.
If it's charging, the value of energy ,displayed on the "Charging" intetface, is the one from which the loss has been removed .

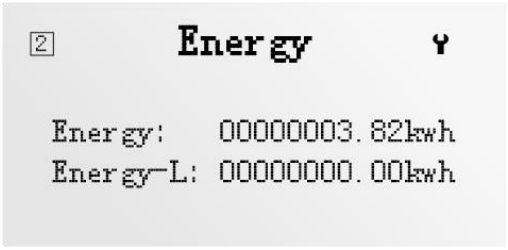
6.3 Display screen image



6.3.1 Display Charging Summary State

The charging summary status displayed is basically a summary of the charging process that was just executed. All instrument values required for the complete billing process should be displayed to the customer. So for DCM6-650/-200 series,during the charging process, there is only one difference between the normal display interface and the uncharged interface. After charging, the energy interface will not display the total battery level, but will display the current charging information.

6.3.2 Normal display

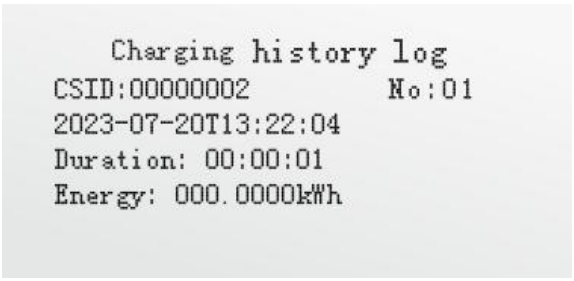


6.3.3 Charging display

CSID: Serial number of charging
Energy: The amount of electricity charged

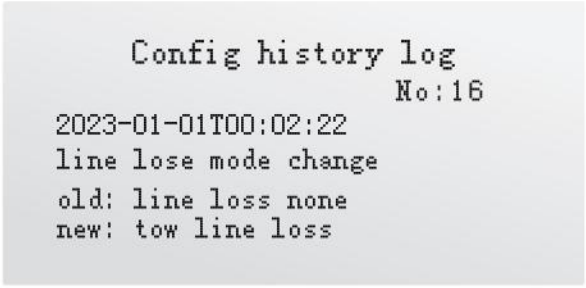
6.3.4 Historical data display

In User Mode, long press and hold the right button to enter **historical data mode**.
Charging history data, up to 99 recent data can be queried
Short press the left button to find more charging history log.



First line: Page number of charging ID and historical data
Second line: The time when the historical data occurred.
Third line: Charging duration
Fourth line: Charging Kwh

Configure historical data:



In the electricity history data interface, short press the ENTER button to enter the configuration history data screen.
Configure historical data to query up to 99 entries.
First line: Configuration data page number
Second line: The time when the historical data occurred.
Third line: Change type
Fourth line: Original mode
Fifth line: Updated mode

Configuration type：

Item	configuration type
1	line loss mode change
2	line resistance change
3	operating mode change
4	charging deification change
5	insufficient memory
6	firmware update

6.3.5 Public Key display

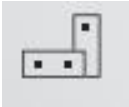
In the parameter display interface, long press and hold the NEXT button to enter the public key display interface.
The public key will be displayed in QR code format.

6.3.6 Symbols

Production mode symbol.

Figure below shows the symbol, which indicates the current active meter production mode. This mode is

only available during instrument production. As long as the production mode is active, the symbol remains visible.



Assembling mode symbol.

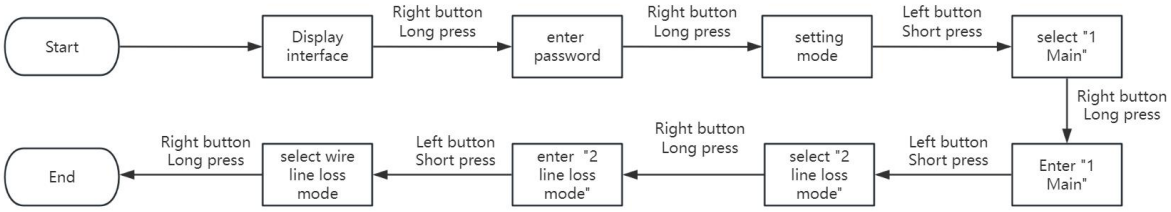
Figure below the symbol, which indicates a currently active assembling mode of the meter. This mode is only available during assembly of the charging point. The symbol remains visible as long as the assembling mode is active.

Line loss mode
DCM6 has two line loss modes, 4-wire and 2-wire, and the symbol is displayed in the upper left corner of the LCD. If no symbol is displayed, there is no line loss mode. Wire setting can only be set successfully in assembling mode .

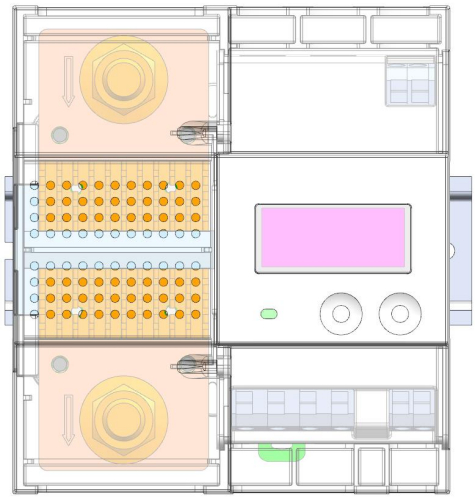
symbol	introduction
	**4-wire line loss mode**
	**2-wire line loss mode**
	No line loss mode

4-wire line loss mode
The 4- wire system means that there are two wires for power supply and two wires for signal. The power supply and the signal work separately.

difference
The four - wire system can sample the voltage value at the gun end in real - time, enabling more accurate calculation of the actual charging power and power loss.
Wiring line loss mode switching



7. USER BUTTONS



No.	Element	Function
1	Right Button	Depending on the press duration, tapping to the previous display item, or controlling the display backlight
2	Left Button	Depending on the press duration, tapping to the next display item, or changing the current display state

Button events of the DCM6-650/-200.

The buttons only control the display sequence. They do not influence the meteorological part of the meter.

8. Communication

8.1 RS485 Interfaces

There are three RS485 interfaces of type RJ12.

- RJ12- 1 and 2 used for future communication with SMGW (Smart Meter Gateway) modules.

The two jacks are connected internally and can be used for daisy-chain connection of several meters on a metrological network.

- terminal 7&8 is designed for the communication with the charge station.

8.2 Modbus Protocol

The MODBUS Protocol defines the format for the master's query and the slave's response.
The query contains the device (or broadcast) address, a function code defining the requested action, any data to be sent, and an error-checking field.
The response contains fields confirming the action taken, any data to be returned, and an error-checking field. If an error occurred in receipt of the message then the message is ignored, if the slave is unable to perform the requested action, then it will construct an error message and send it as its response. The MODBUS Protocol functions used by the Eastron Digital meters copy 16 bit register values between master and slaves. However, the data used by the Eastron Digital meter is in 32 bit IEEE 754 floating point format.

Thus each instrument parameter is conceptually held in two adjacent MODBUS Protocol registers. Query The following example illustrates a request for a single floating point parameter i.e. two 16-bit Modbus Protocol Registers.

First Byte Last Byte

Slave Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)

Slave Address: 8-bit value representing the slave being addressed (1 to 247), 0 is reserved for the broadcast address. The Eastron Digital meters do not support the broadcast address.
Function Code: 8-bit value telling the addressed slave what action is to be performed. (3, 4, 8 or 16 are valid for Eastron Digital meter)
Start Address (Hi): The top (most significant) eight bits of a 16-bit number specifying the start address of the data being requested.
Start Address (Lo): The bottom (least significant) eight bits of a 16-bit number specifying the start address of the data being requested. As registers are used in pairs and start at
zero, then this must be an even number.
Number of Points (Hi): The top (most significant) eight bits of a 16-bit number specifying the number of registers being requested.
Number of Points (Lo): The bottom (least significant) eight bits of a 16-bit number specifying the number of registers being requested. As registers are used in pairs, then this must be an
even number.
Error Check (Lo): The bottom (least significant) eight bits of a 16-bit number representing the error check value.
Error Check (Hi): The top (most significant) eight bits of a 16-bit number representing the error
check value.

Response
The example illustrates the normal response to a request for a single floating point parameter i.e. two 16-bit Modbus Protocol Registers.

First Byte Last Byte

Slave Address	Function Code	Byte Count	First Register (Hi)	First Register (Lo)	Second Register (Hi)	Second Register (Lo)	Error Check (Lo)	Error Check (Hi)

Slave Address: 8-bit value representing the address of slave that is responding.
Function Code: 8-bit value which, when a copy of the function code in the query, indicates that the slave recognised the query and has responded. (See also Exception Response).
Byte Count: 8-bit value indicating the number of data bytes contained within this response
First Register (Hi)*: The top (most significant) eight bits of a 16-bit number representing the first register requested in the query.
First Register (Lo)*: The bottom (least significant) eight bits of a 16-bit number representing the first register requested in the query.
Second Register (Hi)*: The top (most significant) eight bits of a 16-bit number representing the second register requested in the query.
Second Register (Lo)*: The bottom (least significant) eight bits of a 16-bit number representing the second register requested in the query.
Error Check (Lo): The bottom (least significant) eight bits of a 16-bit number representing the error check value.
Error Check (Hi): The top (most significant) eight bits of a 16-bit number representing the error check value.

The protocol format supported by the electricity meter is modbus, and detailed instructions can be found in the protocol description. The following are the charging and discharging processes:

Start charging:

Tx:00 10 17 A2 00 01 02 00 01 14 43

Rx: 01 10 17 A2 00 01 A5 9F

End charging:

Tx:00 10 17 A2 00 01 02 00 02 54 42

Rx: 01 10 17 A2 00 01 A5 9F

Read public key:

Tx:00 03 23 00 00 20 4E 47

Rx: 01 03 40 26 49 3C 90 97 D7 11 12 43 5D 19 4C 7E B5 CC 59 74 86 C5 3E 7F 2A CC 53 DD F9 E3 87 B2 63 02 C2 73 FA A4 83 95 46 67 BE B0 7E 64 90 FF AF AD B7 17 E5 13 C1 C0 C1 65 F4 64 CF AA 3A E3 DD EF 9E C4 D5

Input register

Input registers are used to indicate the present values of the measured and calculated electrical quantities. Each parameter is held in two consecutive16 bit register.The following table details the 3X register address, and the values of the address bytes within the message. A (*) in the column indicates that the parameter is valid for the particular wiring system. Any parameter with a cross(X) will return the value zero. Each parameter is held in the 3X registers. Modbus Protocol function code 04 is used to access all parameters.

For example, to request: Amps 1 Start address=0006
No. of registers =0002
Amps 2 Start address=0008
No. of registers=0002

Each request for data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a Modbus Protocol exception code to be returned.

Input register

Input registers are used to indicate the present values of the measured and calculated electrical quantities. Each parameter is held in two consecutive16 bit register.The following table details the 3X register address, and the values of the address bytes within the message. A (*) in the column indicates that the parameter is valid for the particular wiring system. Any parameter with a cross(X) will return the value zero. Each parameter is held in the 3X registers. Modbus Protocol function code 04 is used to access all parameters.

For example, to request: Amps 1 Start address=0006
No. of registers =0002
Amps 2 Start address=0008
No. of registers=0002

Each request for data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a Modbus Protocol exception code to be returned.

Integer register						
310001	Total import active energy .	8	Int64	Wh	27	10
310005	Total export active energy .	8	Int64	Wh	27	14
310021	Total active Energy	8	Int64	Wh	27	24
310251	Volts	4	Int32	0.1V	28	0A
310257	Current	4	Int32	0.001A	28	10
310263	power	4	Int32	0.1W	28	16
310309	Line Loss power	4	Int32	0.1W	28	44
310311	Positive line loss energy	8	Int64	Wh	28	46

DCM6 Input Registers

Address (Register)	**DCM6-650/-200 Input Register Parameter**				**Modbus Protocol Start Address Hex**	
	Description	**Length (bytes)**	**Data Format**	**Units**	**Hi Byte**	**Lo Byte**
30001	Volts	4	Float	V	00	00
30007	Current	4	Float	A	00	06
30013	Active power	4	Float	W	00	0C
30073	Import active energy	4	Float	kWh	00	48
30075	Export active energy	4	Float	kWh	00	4A
30343	Total active energy	4	Float	kWh	01	56
33329	Meter temperature value	4	Float	℃	0D	00
320005	Positive line loss energy	4	Float	kWh	4E	24
320007	Negative line loss energy	4	Float	kWh	4E	26
320009	Line Loss Power	4	Float	w	4E	28
320011	Line Loss Energy	4	Float	kWh	4E	2A
320013	Charging gun power	4	Float	w	4E	2C
320015	Positive charging gun energy	4	Float	kWh	4E	2E
320017	Negative charging gun energy	4	Float	kWh	4E	30

310315	Negative line loss energy	8	Int64	Wh	28	4a
310319	Line Loss energy	8	Int64	Wh	28	4E
310323	Charging gun power	4	Int32	0.1W	28	52
310325	Positive charging gun energy	8	Int64	Wh	28	54
310329	Negative charging gun energy	8	Int64	Wh	28	58
Floating-point continuous register						
316385	Volts	4	Float	V	40	00
316387	Current	4	Float	A	40	02
316389	Power	4	Float	W	40	04
316391	Line Loss Power	4	Float	w	40	06
316393	Charging gun power	4	Float	w	40	08
316397	Import active energy	4	Float	kWh	40	0C
316399	Export active energy	4	Float	kWH	40	0E
316401	Total active energy	4	Float	kwh	40	10
316403	Positive line loss energy	4	Float	kWh	40	12
316405	Negative line loss energy	4	Float	kWh	40	14
316407	Total line loss energy	4	Float	kWh	40	16
316409	Positive charging gun energy	4	Float	kWh	40	18
316411	Negative charging gun energy	4	Float	kWh	40	1a
316413	Total Charging gun energy	4	Float	kWh	40	1c
Integer continuous register						
320225	Total active Energy	8	Int64	Wh	4F	00
320229	Volts	4	Int32	0.1V	4F	04
320231	Current	4	Int32	0.001A	4F	06
320233	Power	4	Int32	0.1W	4F	08
320235	Total import active energy .	8	Int64	Wh	4F	0A
320239	Total export active energy .	8	Int64	Wh	4F	0E
320245	Line loss power	4	Int32	0.1W	4F	14
320247	Positive line loss energy	8	Int64	Wh	4F	16
320251	Negative line loss energy	8	Int64	Wh	4F	1A
320255	Line loss energy	8	Int64	Wh	4F	1E
320259	Charging gun power	4	Int32	0.1W	4F	22
320261	Positive charging gun energy	8	Int64	Wh	4F	24
320265	Negative charging gun energy	8	Int64	Wh	4F	28
320269	Total Charging gun energy	8	Int64	Wh	4F	2c

Holding Registers

Holding registers are used to store and display instrument configuration settings. All holding registers not listed in the table below should be considered as reserved for manufacturer use and no attempt should be made to modify their values.
The holding register parameters may be viewed or changed using the Modbus Protocol. Each parameter is held in two consecutive 4X registers. Modbus Protocol Function Code 03 is used to read the parameter

and Function Code 16 is used to write. Write to only one parameter per message.

DCM6 Protocol Holding Register Parameters

Address Register	Paramet-er	Modbus Protocol Start Address Hex		Valid range	Mode
		High Byte	Low Byte		
40015	Password Lock	00	OE	Write any value to password lock protected registers. Read password lock status: 0 = locked. 1 = unlocked. Reading will also reset the password timeout back to one minute. Length : 4 byte Data Format : Float	r/w
40019	Network Parity Stop	00	12	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity. 3 = Two stop bits and no parity. Requires a restart to become effective. Length : 4 byte Data Format : Float	r/w
40021	Network Node	00	14	Write the network port node address: 1 to 247 for MODBUS Protocol, default 1. Requires a restart to become effective. Length : 4 byte Data Format : Float	r/w
40025	Password	00	18	Write password for access to protected registers. Length : 4 byte Data Format : Float	r/w
40029	Network Baud Rate	00	1C	Write the network port baud rate for MODBUS Protocol, where: 0 = 2400 baud. 1 = 4800 baud. 2 = 9600 baud, default. 3 = 19200 baud. 4 = 38400 baud Length : 4 byte Data Format : Float	r/w

40059	Automatic Scroll Display Time	00	3A	Default: 0, Unit: s Range: 0~255，0 means no scroll Length : 4 byte Data Format : Float	r/w
40061	Backlight time	00	3C	Default: 60, unit: min Range:0~121 0 means the backlight will be always on. 121means the backlight will be always off. Length : 4byte Data Format : Float	r/w
401521	mode switching	05	F0	0x0002 ： Configuration Mode 0x0003 ： user mode Length : 2byte Data Format: Hex (KPPA is asked)	r/w
401536	Line loss mode of Charging station	06	00	0000：Do not use line loss mode (default) 0001：2-wire mode 0002： 4-wire mode Available in administrator mode Length : 2byte Data Format :Hex	r/w
401537	Line resistance of Charging station	06	01	Line resistance of Charging station (default 0) 0-99.99 milliohms Example: 0x0a=0.1 milliohms 0x10=0.16 milliohms Available in administrator mode Length : 2byte Data Format :Hex	r/w
401539	Total charging data	06	02	Charging quantity 1-300000 Length : 4byte Data Format :Hex	ro
401541	Search for charging data by charging ID	06	04	Charging ID：1~300000 Length : 4byte Data Format :Hex	r/w
401543	The length of charging data	06	06	Charging history data length 1~1024 Length : 2byte Data Format :Hex	ro
401545	Retrieved charging data	06	08	Length :1024byte Data Format :ASCII	ro
402056	Total log data	08	08	Total number of logs	ro

	volume			1~6000 Length : 4byte Data Format :Hex	
402058	Finding data by log ID	08	0A	Log ID 1~6000 Length : 4byte Data Format :Hex	r/w
402060	The length of log data to be obtained	08	0C	Log data length 1~200 Note: Please refer to Appendix 1 for the parsing format Length : 2byte Data Format :Hex	ro
402062	Found charging data	08	0E	Length :200byte Data Format :ASCII	ro
46001	Charging duration	17	70	Seconds Length : 4 byte Data Format : HEX	ro
46003	charging energy	17	72	total wh Length : 4 byte Data Format : UINT32	ro
46005	Start Timestamp	17	74	Length : 4 byte Data Format : Unix	ro
46007	Stop Timestamp	17	76	Length : 4 byte Data Format : Unix	ro
46050	Charging status	17	A1	0: idle 1: charge in progress 2: the system was powered off during charging session 3: the system was reset during charging session Length: 2 bytes Data Format: HEX	ro
46051	charge control	17	A2	0x01:Begin measurement (B) 0x02:End measurement(E) Length : 2 byte Data Format : HEX	r/w
46061	Signature status	17	AC	0x00:Not initialised 0x01:Idle 0x02:Signature in progress 0x03:Signature OK 0x04:Invalid date time 0x05:Invalid measurement 0x06: signature state error 0x07:Keypair generation Error 0x08:SHA failed	ro

				0x09:Public key error 0x10:Invalid message format 0x11:Invalid message size 0x12:Signature error 0x13:Undefined error Length:2 bytes Data Format: HEX	
47425	Signature Length	1D	00	Length: 2 bytes Data Format: HEX	ro
47426	Signature (raw)	1D	01	Data Format: HEX	ro
48449	Output Message Length (JSON)	21	00	Length: 2 bytes Data Format: HEX	ro
48450	Output Message (JSON)	21	01	Data Format: HEX	ro
48961	Public Key (raw)	23	00	Data Format: HEX	ro
49217	Output Message Length (OCMF)	24	00	Length: 2 bytes Data Format: HEX	ro
49218	Output Message (OCMF)	24	01	Data Format: HEX	ro
412307	Network Parity 2	30	12	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity. 3 = Two stop bits and no parity. Data Format：float（length：4 byte）	r/w
412317	Network Baud Rate 2	30	1C	Write the network port baud rate for MODBUS Protocol, where: 0 = 2400 bps 1 = 4800 bps. 2 = 9600 bps 3 = 19200 bps（ default）. 4 = 38400 baud 6 = 115200baud Data Format：float（length：4 byte）	r/w
461439	Zone	EF	FE	time zone Range: -12~12 Length: 4 bytes Data Format: float	r/w
461441	Time	F0	00	s-min-hour-week-Date-Month-Year-20	r/w

<table>
<tr><td></td><td></td><td></td><td></td><td>Length : 8 byte
Data Format:BCD</td><td></td></tr>
<tr><td>461445</td><td>Running time</td><td>F0</td><td>04</td><td>Day-hour-minute,
day = 2byte;
hour = 1byte;
minute=1byte
Length : 4 byte
Data Format:BCD
Explain:
04 23 21 57 Representative
Running time=423 days+21 hours+57 minutes
Write operation, only allowed to write 00 00 00 00,
representing clear continuous running time</td><td>r/w</td></tr>
<tr><td>463795</td><td>Load running time</td><td>F9</td><td>32</td><td>Load running time. The timing is only performed when the meter detects power.
Unit: Hour.
Length : 4 byte
Data Format : Float</td><td>r/w</td></tr>
<tr><td>464507</td><td>meter status code</td><td>FB</td><td>FA</td><td>Read the status code.<table><tr><td></td><td></td><td></td></tr><tr><td>Bit 0</td><td>time synchronization</td><td>0: RTC time not synchronized
1: RTC time synchronization</td></tr><tr><td>Bit 1</td><td>charging state</td><td>0：not charged
1：charging</td></tr><tr><td>Bit 2~3</td><td>Wire system</td><td>00：Wireless system
01：2-wire system
11：4-wire system</td></tr><tr><td>Bit4</td><td>work normally</td><td>0：can not
1：can</td></tr></table>Length : 4 byte
Data Format : hex</td><td>Ro</td></tr>
<tr><td>464511</td><td>Fault Code</td><td>FB</td><td>FE</td><td>Read Fault Code
Bit1 ENCRYPTIONG_IIC_FAULT
Bit 6 MEASURE_CHIP_FAULT
Bit 7 EXTERN_FLASH_CHIP_FAULT
Bit 10 EEPROM_IIC_FAULT EEprom
0X0002: ENCRYPTIONG_IIC_FAUL
Length : 4 byte
Data Format : Hex
Note: Only read</td><td>ro</td></tr>
<tr><td>464513</td><td>Serial number</td><td>FC</td><td>00</td><td>Serial number
Length: 4 byte
Data Format: unsigned int32
Note: Only read</td><td>ro</td></tr>
</table>

464515	Meter code	FC	02	Meter code 8000 Length : 2 byte Data Format : hex Note: Only read	r
464645	The version number of the LCD display	FC	84	The version number of the LCD display of the electricity meter is XX.YY Data format: The first byte represents XX, and the second byte represents YY Length : 2 byte Data Format : Hex Note: Only read	ro
464649	MUC program CRC verification	FC	88	Program CRC verification Length : 4 byte Data Format : Hex Note: Only read	ro
464651	Metrology program CRC calibration	FC	8A	Program CRC verification Length : 4 byte Data Format : Hex Note: Only read	ro

OCMF Holding Registers

46145	IS	18	00	General status for user assignment 0x0000：true 0x0001：false Length : 2 byte Data Format : HEX Note: Rewriting the overlay will not clear it
46147	IF	18	02	Detailed statements on user assignment BIT0:RFID_NONE BIT1:RFID_PLAIN BIT2:RFID_RELATED BIT3:RFID_PSK BIT4:OCPP_NONE BIT5:OCPP_RS BIT6:OCPP_AUTH BIT7:OCPP_RS_TLS BIT8:OCPP_AUTH_TLS BIT9:OCPP_CACHE BIT10:OCPP_WHITELIST BIT11:OCPP_CERTIFIED BIT12:ISO15118_NONE BIT13:ISO15118_PNC BIT14:PLMN_NONE

				BIT15:PLMN_RING BIT16:PLMN_SMS Length : 4 byte Data Format : HEX Note: Up to 4, rewrite overwrite, will not clear
46149	IT	18	04	Type of identification data 0x0000:NONE 0x0001:DENIED 0x0002:UNDEFINED 0x0003:ISO14443 0x0004:ISO15693 0x0005:EMAID 0x0006:EVCCID 0x0007:EVCOID 0x0008:ISO7812 0x0009:CARD_TXN_NR 0x000A:CENTRAL 0x000B:CENTRAL_1 0x000C:CENTRAL_2 0x000D:LOCAL 0x000E:LOCAL_1 0x000F:LOCAL_2 0x0010:PHONE_NUMBER 0x0011:KEY_CODE Length : 2 byte Data Format : HEX Note: Rewriting will overwrite and not clear
46150	ID	18	05	Identification data Length : 40 byte Data Format : ASCII Note: It needs to be rewritten before each charging. Not covering will display the last charging data.
46170	CT	18	19	Charge-Point-Identification-Type 0x0000:null 0X0001:EVSEID 0X0002:CBIDC Available in administrator mode Length : 2 byte Data Format : HEX Note: Rewriting will overwrite and not clear
46171	CI	18	1a	Identification data Length : 10byte Available in administrator mode

				Data Format :ASCII Note: Rewriting will overwrite and not clear
46177	TT	18	20	TarifText Length : 10byte Data Format :ASCII Note: It needs to be rewritten before each charging. Not covering will display the last charging data.

Appendix 1

Events like change in loss mode, changes in line resistance, changes in the operating mode/charging identification, a firmware upgrade and detection of inadequate memory is logged. If the logbook gets full, it will also be noted as the last event in the logbook. The meter then needs to be replaced because the events record can't be recorded.

Byte 0 ~byte 3	Unix time stamp
Byte 4	1：Change the line loss mode 2：Impedance change 3：Change of working mode 4：Change of charging identification point 5：Insufficient memory 6：Firmware update 7：Charging distribution point change
Byte 5	Current time zone
Byte 6~Byte 7	Current line resistance
Byte8	Charging identification point now
Byte9 ~ byte 18	Charging distribution point now
Byte 19 ~byte 34	Raw data
Byte 35 ~ byte 98	Signed data

8.3 Private / Public key read

This is one-time procedure made at production of energy meter. Generation of key pair is HW based with dedicated crypto chip. Private key is stored internally within the crypto chip and there is no way of reading it.
Public key is available to end user for verification of digital signature. Therefore, public key is readable through MODBUS communication. Public key is stored in 64 bytes raw format at MODBUS address 48961.
For Transparent Software check, public key header should be added with the following data:
3059301306072A8648CE3D020106082A8648CE3D03010703420004
For checking with ECDSA, public key header is: 04.

8.4 OCMF Dataset

The meter readings that are written to the OCMF load log are similar to the values displayed on the meter display. They depend on the configuration settings.

Note: All Energy Values of the following chapters are parsed into the OCMF file with 3 decimal counts. Internally the DCM6-650/-200 calculates all of these values with 4 decimal counts. Therefore the last decimal count of the parsed value can deviate from the calculated value.

List of all OCMF Start Reading.


```
OCMF|
{
"FV":"1.0",
"GI":"00000000",
"GS":"0",
"PG":"T8",
"MV":"EASTRON",
"MM":"SDM630",
"MS":"00000000",
"MF":"01.01",
"IS":false,
"IF":[],
"IT":"NONE",
"ID":"",
"CT":"",
"CI":"",
"RD":
[
{
"TM":"2023-01-01T00:00:10,000+0800 S",
"TX":"B",
"RV":0.000,
"RI":"1-b:1.8.0",
"RU":"kWh",
"RT":"DC",
"EF":"",
"ST":"G"
}
,
{
"TM":"2023-01-01T00:00:12,000+0800 S",
"TX":"E","RV":0.000,
"RI":"1-b:1.8.0",
"RU":"kWh",
"RT":"DC",
"EF":"",
"ST":"G"
}
]
}
|
{
"SA":"ECDSA-secp256r1-SHA256"
,
```

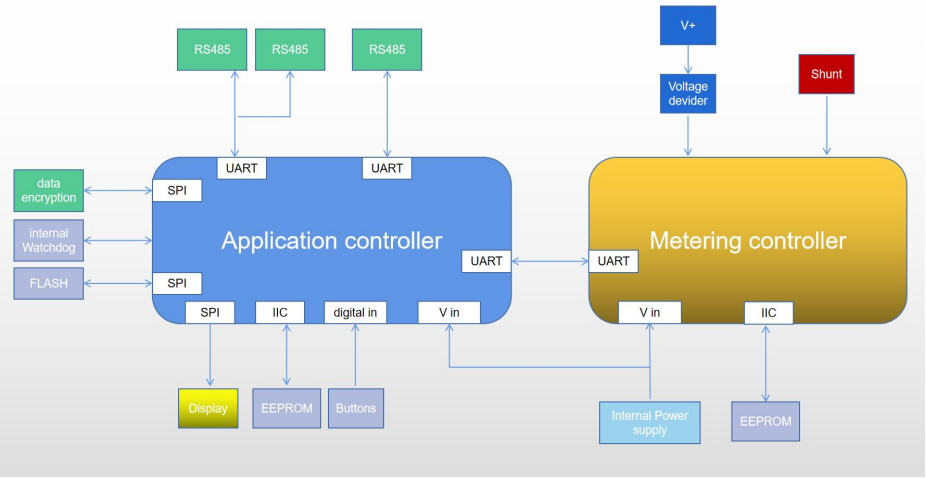
"SD":"3046022100bb1e83b32a0792dbaa8db595d8743f6db4288771dd6096177db4a62a94575aaf022100a429e6cd787060844ed3ab6c1ec718b7890e25f150fee5ecdcd8ef6d57419479"

9. System Architecture

9.1 System Overview

The meter consists of two independent components: A metering part and an application part. Both parts communicate via a non-reactive serial interface.

Simplified block diagram of the DCM6-650/-200



9.2 Measurement

The voltage sampling is implemented by a resistor divider network. Current sampling is implemented by a manganin shunt. The DC voltage is filtered by a RC-network. The metering chip integrates the voltage and current measurement in a SoC, to obtain power and other instantaneous value. Power and energy values are computed and stored inside the metering part.

9.3 Application

The application part is designed to control the local user interface – the buttons and the DOT Matrix Display – as well as the two serial communication interfaces. The RTC is integrated in the application part, the storage of charge process data and logbook is controlled by the application controller.

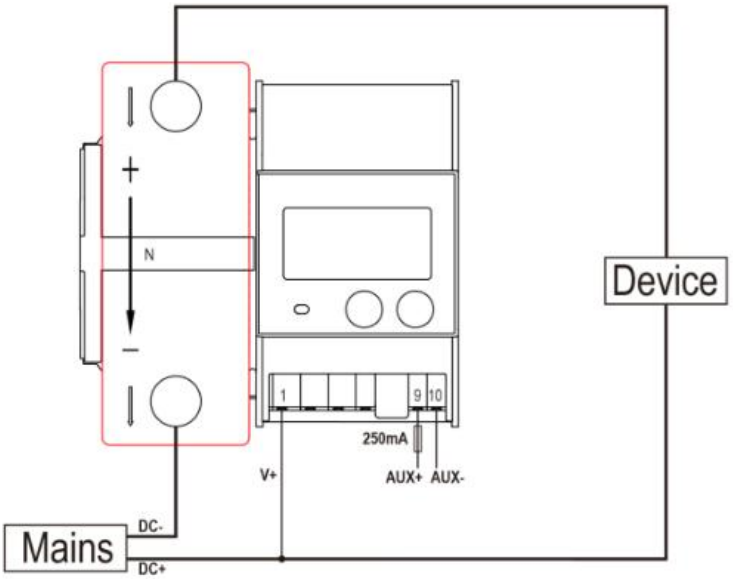
9.4 LCD

The meter has one pulse LED for active import mains energy with 1000 Imp/kWh. In idle state (no load) the LED is off.
The LED is controlled by the metering part.

10. Functional Description

10.1 About Line Loss

The DCM6-650/-200 can calculate the line loss energy. For that reason, the impedance (Rline) has to be configured. The impedance can only be changed in assembling mode. A change of the impedance is recorded in the logbook. The line loss power and its resulting energy are calculated by the metering controller. The line loss energy is counted in the line loss registers. If the impedance is set to 0, the line loss measurement is deactivated, the corresponding status flag is cleared, and the display symbol is switched off.



DCM6-650/-200 Wiring Illustration

As shown in Figure abovethe overall line loss impedance is a result of the impedance of the wire between the positive terminal of the Mains supply and the device itself Rline1 and of the impedance of the wire between the second terminal of the device to the positive terminal of the meters shunt Rline2. Therefore the overall line loss impedance can be calculated as sum of both wire impedance.
The calculation is described with the following:
Line Loss Impedance = RlineLoss = Rline1 + R line2
Remark: In this document the line loss impedance is mentioned several times. This refers to the overall line loss impedance. The same applies for the configurable line loss impedance.
In the two-wire line loss measurement mode, the line loss energy is calculated as:

Line Loss power = plineLoss(t) = $I_{shunt}^{2}(t) \cdot$ Rline

Line Loss Energy = $\int_{0}^{t} P_{lineLoss}(t)\,dt$

Note: The Value for Ishunt refreshes with a maximal period of 1500ms. The same value is applied for the integration constant for the line loss energy. The energy integration cycle is synchronized with the line loss power cycle.

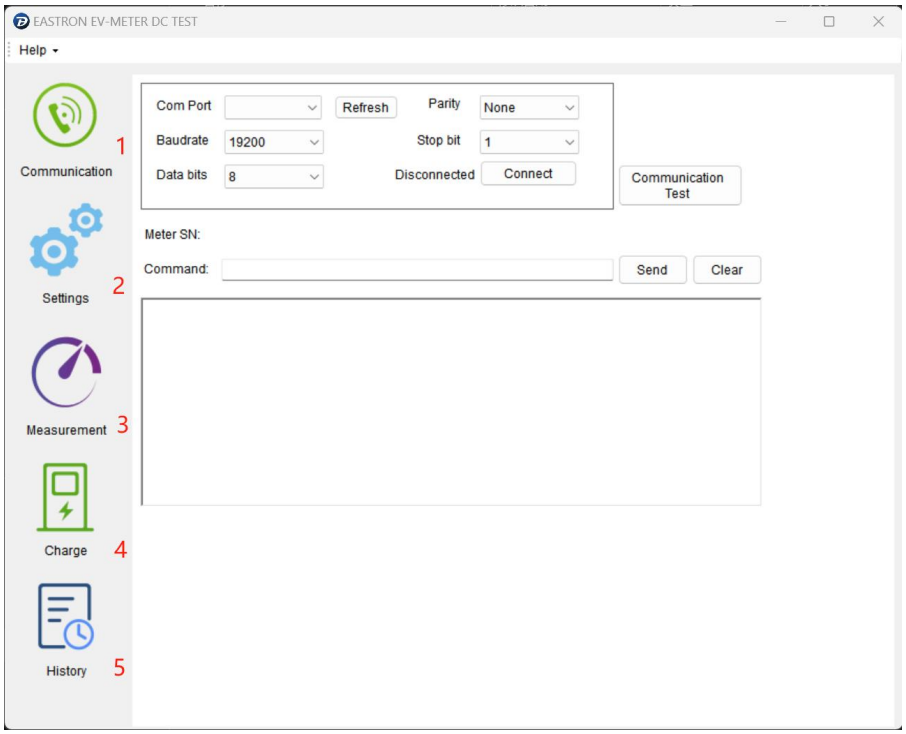
Import

For Import Energy Mode the register values for every point in time are given by:
Total Import Mains Energy = Total Import Device Energy + Total Import Line Loss Energy ,
with Rline = (Rline1 + Rline2) > 0, which is illustrated inFigure 28.
The exact calculation is given by:
Total Import Mains Power = PImportMains(t) = Ishunt(t) · uterminal(t)
Total Import Device Power = PImportDevice(t) = PImportMains(t) − PlineLoss(t)
Total Import Mains Energy = $\int_0^t$ PImportMains(t) dt.
Total Import Device Energy = $\int_0^t$ PImportDevice(t) dt.
As prior mentioned the refreshment cycle of the base values for the respective power calculation and integration cycle of the resulting energy are synchronized.

11. EASTRON EV-METER DC TEST

11.1 Introduction：

“EASTRON EV-METER DC TEST” is a software that simulates the operation of charging piles. The software can perform charge and discharge, signature verification and historical data reading functions. And with a debugging interface, you can view the communication data, which helps customers quickly develop management software.



1. Communication port link and communication test.
2. Meter settings.
3. Parameter measurement.
4. Simulate charging.
5. History parameter reading

11.2 Preparation：

1. Eastron DC meters DCM6 series.
2. USB to 485 converter, connect computer and meter.
3. A computer.

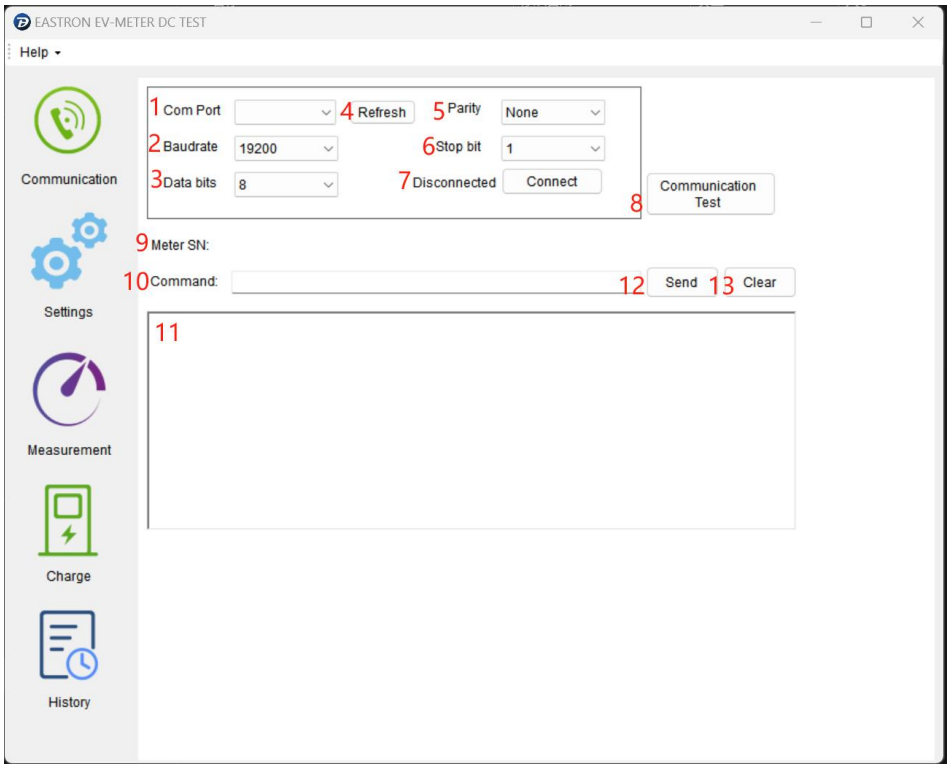
11.3 Operating environment:

1) The computer must support the .NET Framework 3.8
2) The minimum system version supports Windows 7 Service Pack 1

11.4 Operation

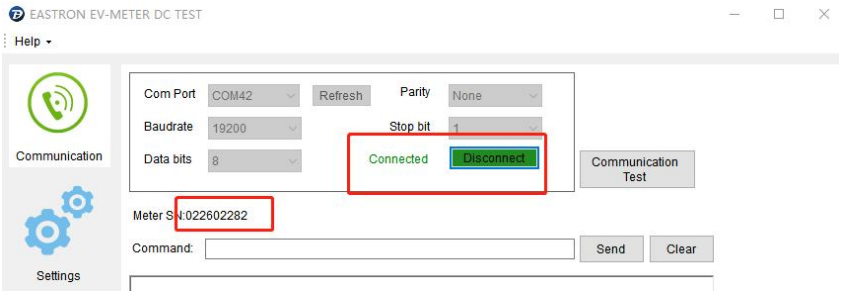
11.4.1 Communication connection

Screen :

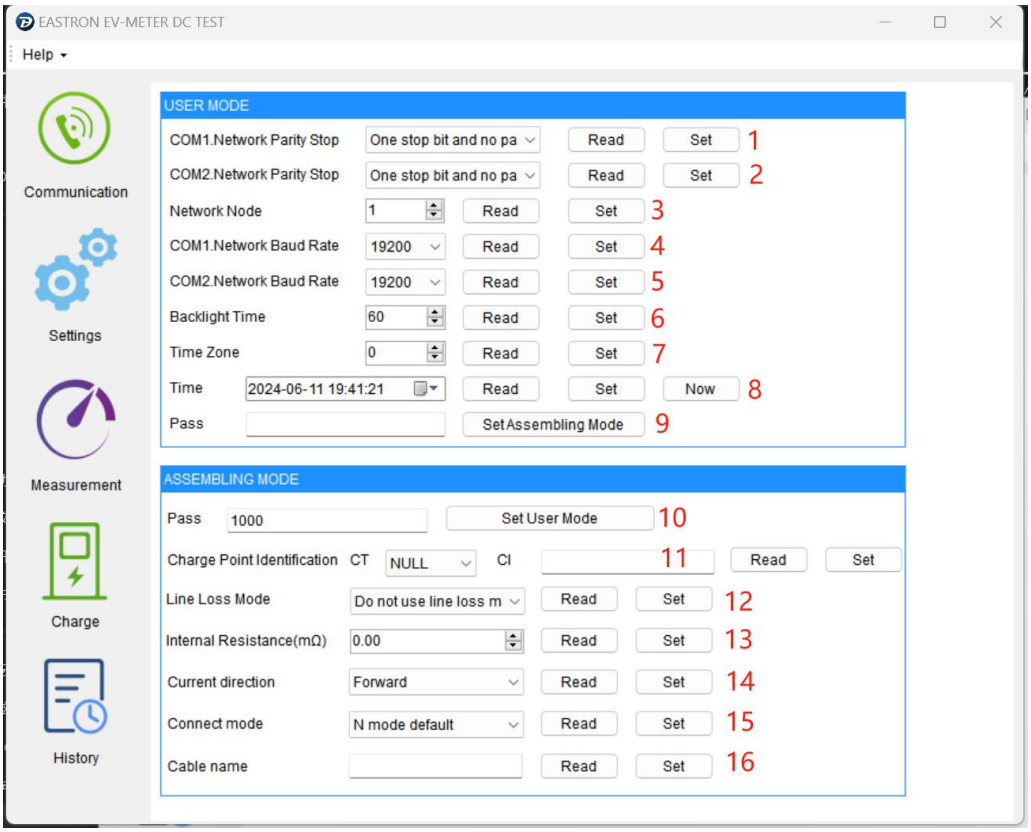


1. Communication port
2. Baud rate
3. Data bits
4. Refresh
5. Parity
6. Stop bit
7. Connection
8. Communication test button
9. SN: when connect successfully, SN will pop up
10. Command: column for command editing.
11. Data screen
12. Send command
13. Clear the data screen

Choose right communication parameter. （default : 19200，8，none，1），click the button “Connect”. when the SN pop up, it means the connection succeed.



11.4.2 Parameter Settings



1. Com 1 network parity stop
2. Com 2 network parity stop
3. Network Node: Modbus address
4. Com 1 baudrate
5. Com 2 baudrate
6. Backlight time
7. Time Zone
8. Time

9. Set Assembling Mode: change the meter into Assembly Mode by enter the password.
10. Set User Mode: change the meter into user mode by enter the password.
11. Set CT, CI
12. Format version: to read OCMF version
13. Line loss mode
14. Internal Resistance： Line loss value setting
15. Connect mode
16. Cable name

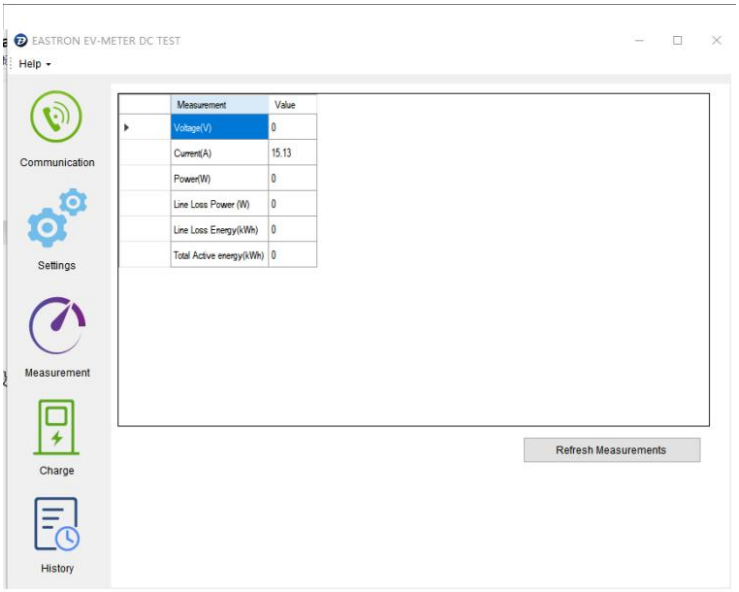
When using the meter for the first time, you need to make sure that the meter mode is in configuration mode or User Mode. It can be distinguished by the display interface of the meter.

When the wrench symbol  appears in the upper right corner of the LCD, it means that it is in configuration mode. The meter can do some assembly mode settings.
Switch from assembly mode to User Mode with the ability to enter a password to switch. The default password is 1000

Time setting

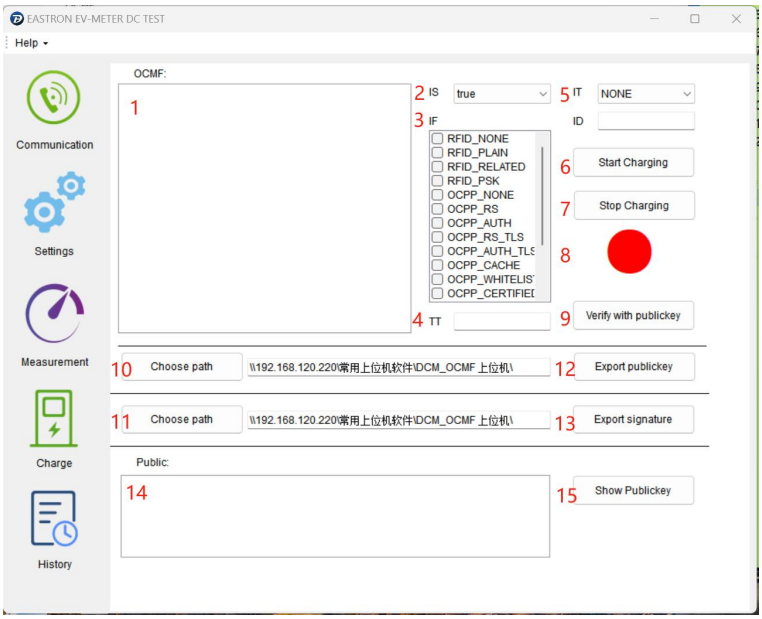
Note：
Charging and discharging is only working when it is in user mode, and the time needs to be reset for each power-up to function properly.

11.4.3 Measurement



When the meter is connected to the load, we can already read the measurement data through the meter, click the Refresh Measurements button, and refresh the measurement parameters.

11.4.4 Charge



1. OCMF display.
2. IS settings.
3. IF settings.
4. TT settings
5. IT, ID settings.

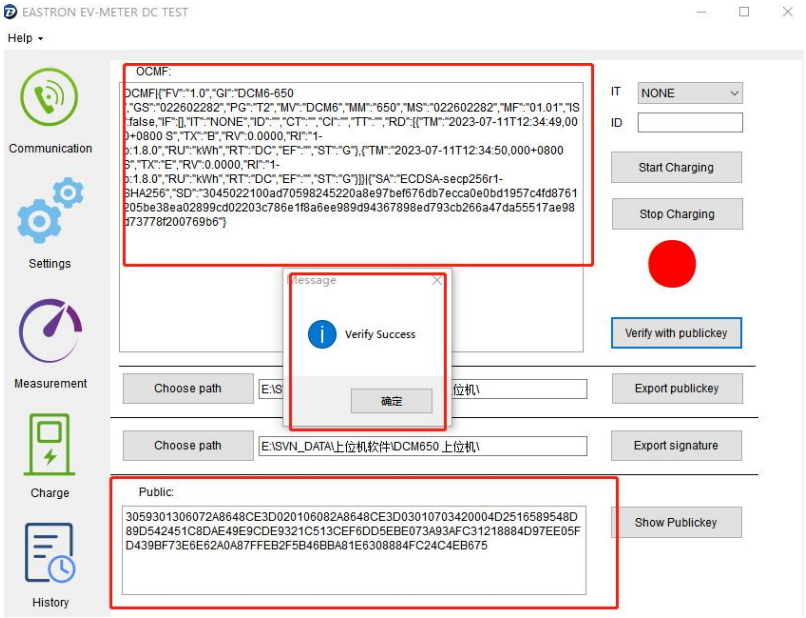
6. Start charging.
7. End charging.
8. Charging status display.
9. Verify OCMF data
10. Export public key address selection.
11. Export signature data address selection.
12. Export public key data.
13. Export signature data.
14. Public key display window.
15. show the public key button

Set IT, ID parameters (optional)

Tap the Start Charging button. At this point, the meter will start charging. If you can't start charging, check that the time setting is complete.

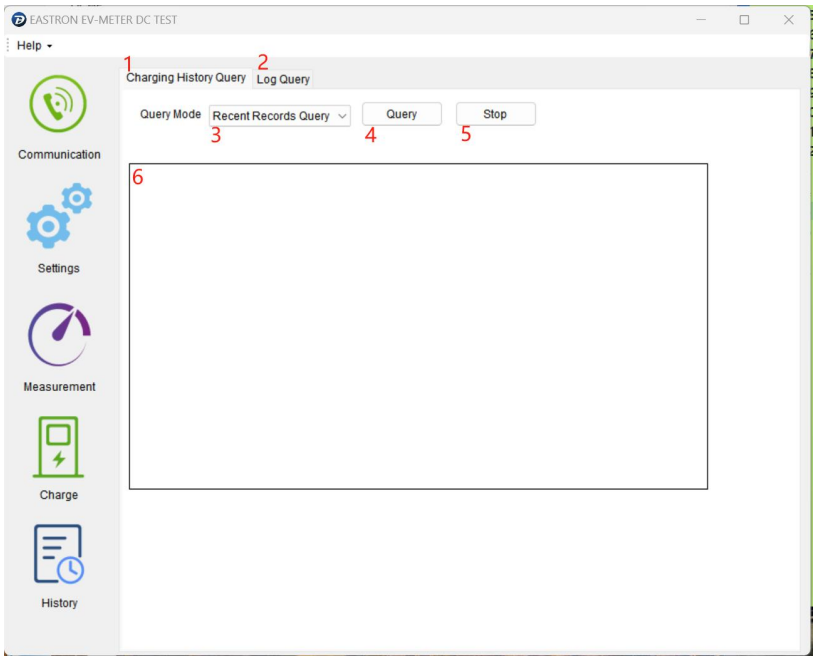
Click the End Charging button, at which point the meter will end charging.

Click Verify to verify the OCMF data (optional), and if the data passes, Verify Success is displayed.



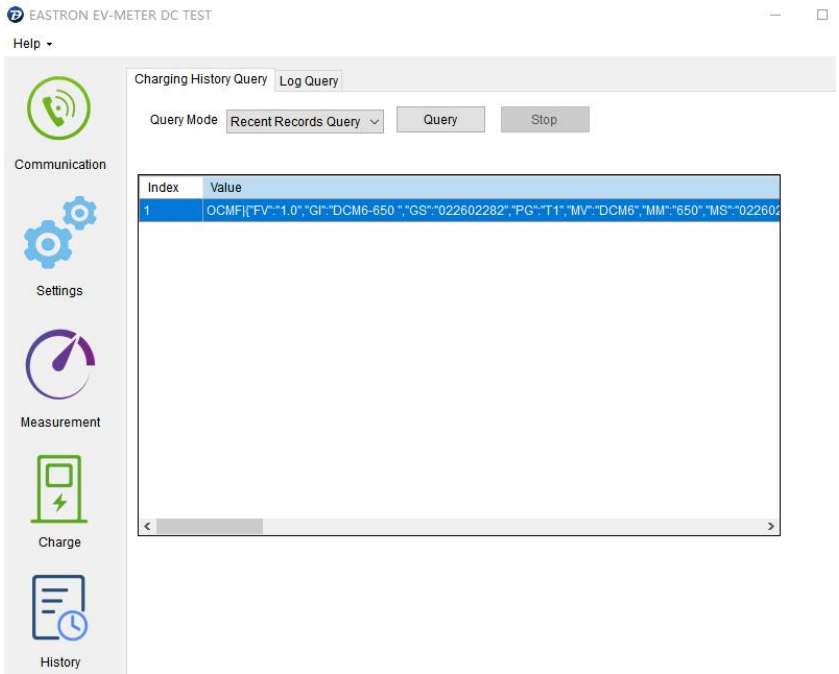
OCMF data and public key are also displayed

11.5 History



1. Read historical charging data labels.
2. Read historical configuration data labels.
3. Choose between reading all and reading a single ID.
4. Query
5. Stop
6. Data display window

Click the query button to query the historical charging data.



If you have any question, please feel free to contact our sales team.

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