DCM230-2 MID Series

DC Energy Meter

User Manual

2024 V2.1

Statements

Eastron reserves the right to amend the product specifications in this manual without prior notice. Before placing an order, please contact our company or local agent to get the latest specifications.

CONTENT

Version History

Version	Date	Changes
2.0	2024-11-22	
2.1	2025-06-10	Add line loss explanation

Risk Reduction

Information for Your Own Safety

This manual does not contain all of the safety measures operating the equipment (module, device) for different conditions and requirements. However, it does contain information which you must know for your own safety and to avoid damages. These information are highlighted by a warning triangle indicating the degree of potential danger.

Warning

This means that failure to observe the instruction can result in death, serious injury or considerable material damage.

Caution

This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

Qualified personnel

Operation of the equipment (module, device) described in this manual may only be performed by qualified personnel. Qualified personnel in this manual means person who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and Regulatory standards.

Proper handling

The prerequisites for perfect, reliable operation of the product are proper transport, proper storage, installation and proper operation and maintenance. When operating electrical equipment, parts of this equipment automatically carry dangerous voltages. Improper handling can therefore result in serious injuries or material damage.

- ✧ Use only insulating tools.
- ✧ Do not connect while circuit is live (hot).
- ✧ Do not connect the meter to a AC network.
- ✧ Place the meter only in dry surroundings.
- ✧ Do not mount the meter in an explosive area or expose the meter to dust, mildew and insects.
- ✧ Make sure the wires are suitable for the maximum current of this meter.
- ✧ Make sure the DC wires are connected correctly before activating the current/voltage to the meter.
- ✧ Do not touch the meter connecting clamps directly with metal, blank wire and your bare hands as you may get electrical shock.
- ✧ Make sure the protection cover is placed after installation.
- ✧ Installation, maintenance and reparation should only be done by qualified personnel.
- ✧ Never break the seals and open the front cover as this might influence the function of the meter, and will cause no warranty.
- ✧ Do not drop, or allow strong physical impact on the meter as the high precisely components inside may be damaged.
- ✧ Designed to be mounted inside of switchboards or cabinet on DIN RAIL

- ✧ This device must have a suitable sized Circuit Breaker feeding the Multi Function Energy Meter so it does not exceed the maximum rated current.
- ✧ The supply wiring of this device shall be suitable sized cable to match the installed circuit breaker.
- ✧ A Disconnection Device (Circuit Breaker) should be installed close to the Multi Function Energy Meter.
- ✧ The Disconnection Device shall be marked as the Disconnection Device for the Multi Function Energy Meter

Disclaimer

We have checked the contents of this publication and every effort has been made to ensure that the descriptions are as accurate as possible.

However, deviations from the description cannot be completely ruled out, so that no liability can be accepted for any errors contained in the information given. The data in this manual is checked regularly and the necessary corrections are included in subsequent editions. We are grateful for any improvements that you suggest.

Chapter 1. Introduction

1.1 Product Introduction

Eastron DCM230-2 series DC energy meters are designed for measuring and monitoring in DC systems. The din rail DC energy meters can measure of important DC parameters: Voltage, current, power and energy etc. It also support bi-directional measurement with pulse output.All data in the meter are accessible via RS485 using Modbus RTU. The meter works with DC power supply. Input voltage range up to 1000V DC, and current inputs are flexible with DC shunt.
Non-mains-circuits.

1.2 Model list

Model	Shunt	Voltage Range	Current Range	Pulse Constant(Default)
DCM230-2-150	150A/75mv	100V-1000V	1.5-30（150）A	100 imp/kwh
DCM230-2-200	200A/75mv		2.0-40（200）A	100 imp/kwh
DCM230-2-300	300A/75mv		2.5-50（300）A	10 imp/kwh
DCM230-2-400	400A/75mv		2.5-50（400）A	10 imp/kwh
DCM230-2-600	600A/75mv		2.5-50（600）A	10 imp/kwh

Model	Shunt	Voltage Range	Current Range	Pulse Constant(Default)
DCM230-3-150	150A/75mv	100V-1000V	1.5-30（150）A	100 imp/kwh
DCM230-3-200	200A/75mv		2.0-40（200）A	100 imp/kwh
DCM230-3-300	300A/75mv		2.5-50（300）A	10 imp/kwh
DCM230-3-400	400A/75mv		2.5-50（400）A	10 imp/kwh
DCM230-3-600	600A/75mv		2.5-50（600）A	10 imp/kwh

1.3 Product Differents

The internal hardware of the DCM230-2 and DCM230-3 is identical; The difference in the shell is limited to the difference in the surface of the upper shell.
The difference between the DCM230-2 series /DCM230-3 series is only that the shunt is not the same.

1.4 Unit Characteristics

The Unit can measure and display:

- voltage
- Currents
- Power
- Active energy imported and exported

Pulse output indicates real-time energy measurement. An RS485 output allows remote monitoring from another display or a computer.

Chapter 2. Technical Parameters

2.1 Technical parameters

Voltage DC Input	Min.100V DC, Max. 1000V DC

Auxiliary Supply	Min. 9V DC, Max. 40V DC
DC Shunt Input	75mV (default)
Current Range	1.5-30(150)A/2-40(200)A/2.5-50(300)A/2.5-50(400)A/2.5-50(600)A
Voltage loop power consumption	≤ 0.5W
Current loop power consumption	≤ 72W / 48W / 36W / 24W / 18W
Auxiliary loop power consumption	≤ 2W
AC voltage withstand	6.2KV DC
Impulse voltage withstand	9.6kV - 1.2 / 50μS waveform
Pulse output	150A&200A-100imp/kWh 300A&400A&600A-10imp/kWh
Pulse duration	60, 100 (default), 200mS
Pulse output indicate	Total kWh/ import kWh/ export kWh
Display	LCD with backlit
Max. Reading	999999.9999kWh
Weight	220g
Standard	GB/T 33708-2017/ IEC62053-41
Accuracy	Reactive energy ： Class B EN50470-4 (MID version only)

2.2 Communication

RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:

Baud rate 1200,2400, 4800, 9600,19200 bps
Parity none (default)/odd/even
Stop bits 1 or 2
RS485 network address *nnn* – 3-digit number, 001 to 247
Modbus™ Word order Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the set-up menu.

Set-up screens are provided for setting up the RS485 port.

Pulse output

The unit provides a pulse output. The constant can be configured to below:
1000 imp/kwh
100 imp/kWh
10 imp/kWh
1 imp/kWh
Pulse width: 200/100(default)/60 ms.

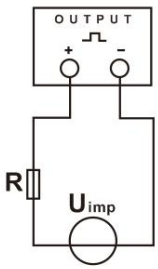
Note: the relationship between pulse constant and CT1

CT1 setting	Default pulse constant	Settable pulse constant
1 – 20	1000 imp/kWh	1000,100,10,1 imp/kWh
21 – 200	100 imp/kWh	100,10,1 imp/kWh
201 – 2000	10 imp/kWh	10,1 imp/kWh

*when the CT setting on meter is 2000A, the default pulse constant is 10 imp/kWh and it can be set to 10 imp/kWh or 1 imp/kWh.
*Over-current alarm: Alarm will happened when the current is over the CT1 value set on the meter. The Alarm LED will stay solid and the corresponding register value will be changed. The user can read this register through communication to determine whether an overcurrent alarm has occurred.

The pulse outputs can be set to generate pulses to represent Import kWh/ Export kWh/ total kWh.

The pulse output is passive type, complies with IEC62053-31 Class A.

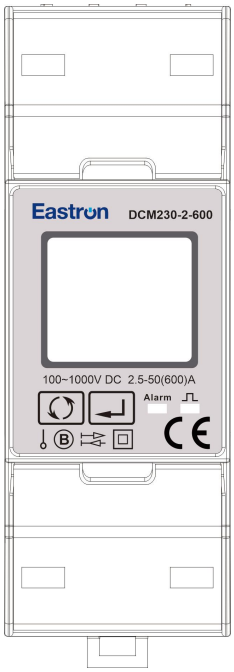


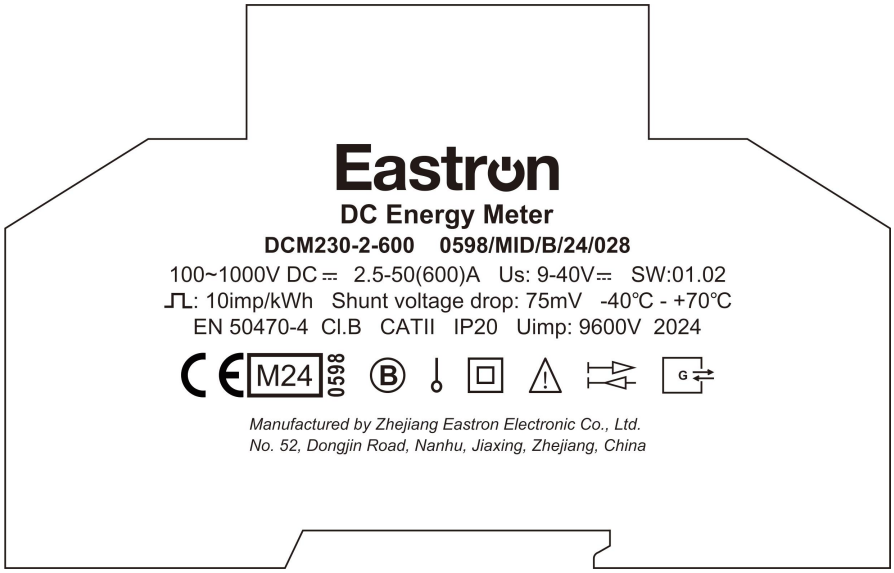
ATTENTION: Pulse output must be fed as shown in the wiring diagram below. Scrupulously respect polarities and the connection mode. Opto-coupler with potential-free SPST-NO Contact. Contact range:5~27VDC Max. current Input:27mA DC.

2.3 Performance criteria

Operating temperature	-40℃ to + 70℃
Storage and transportation temperature	-40℃ to + 80℃
Reference temperature	23℃±2℃
Relative humidity	0 to 95%, non-condensing
Altitude	up to 2000m
measuring category	CATII
Mechanical Environment	M1
Electromagnetic environment	E2
Degree of pollution	2
Protective Class	II
Warm up time	3S
Din rail dimensions	36x100x63 (WxHxD) DIN 43880
Mounting	DIN rail 35mm
Ingress Protection	IP20（Installed in an electrical cabinet with IP51 rating）
Material	Self-extinguishing UL94V-0
Installation environment	Dry environment

2.4 Marking and Symbols





NO.	Symbol	Reference	Description
1	⎓	IEC60417-5031(2002-10)	Direct current
2	~	IEC60417-5032(2002-10)	Alternating current
3	⧈	IEC60417-5172(2003-02)	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
4	⚡		Caution, possibility of electric shock
5	⚠	ISO 7000-0434b(2004-01)	Caution*

2.5 Dimension and Installation

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install “HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH“

• The assembly and installation of electrical connections must be carried out by a person authorized to install electrical equipment.

• Apply appropriate personal protective equipment and follow safe electrical work practices applicable to local standards.

• Turn off all power supplying this device and the equipment in which it is installed before working on it.

• Always use a properly rated voltage sensing device to confirm that all power is off.

• Do not exceed the device’s ratings for maximum limits.

• Do not use this device for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

• Once installed, the enclosure can only touch the upper surface.

• Do not allow the total additive current flowing through the device to exceed maximum continuous current rating. Failure to follow these instructions will result in death or serious injury.

2.6 Line loss

Define: 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) = $I_{shunt}^2(t) \cdot R_{line}$

Line Loss Energy = $\int_0^t P_{lineLoss}(t)\,dt$

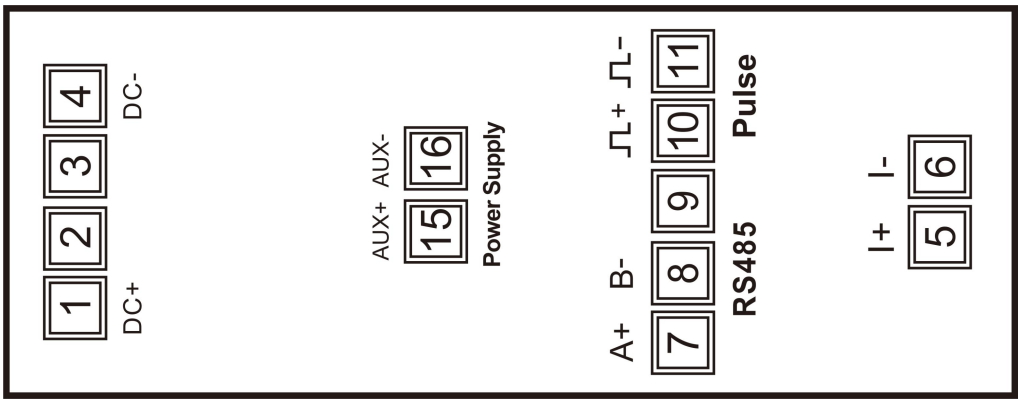
Note: The Value for Ishunt refreshes with a maximal period of 1500ms. The same value is applied for the integration constant for the line loss energy. The energy integration cycle is synchronized with the line loss power cycle.

Import

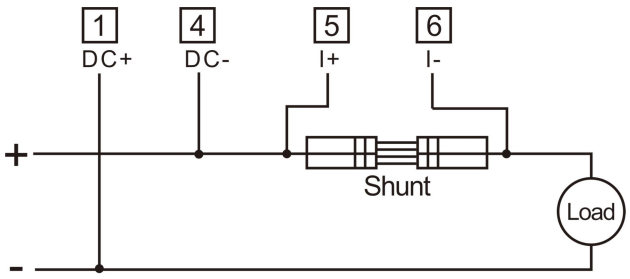
For Import Energy Mode the register values for every point in time are given by:
Total Import Mains Energy = Total Import Device Energy + Total Import Line Loss Energy ,
with Rline = (Rline1 + Rline2) > 0, which is illustrated inFigure 28.
The exact calculation is given by:
Total Import Mains Power = PImportMains(t) = $I_{shunt}(t) \cdot u_{terminal}(t)$
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.

2.7 Wiring

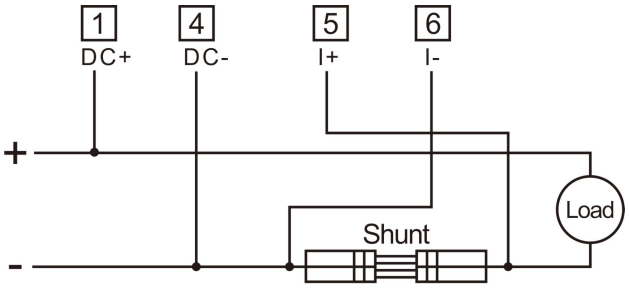
Terminal Connection



Shunt Connection



Shunt Connection: Positive Type



Shunt Connection: Negative Type

****Remarks： If the customer needs to add a circuit breaker, it cannot be added between the signal lines of the DC- and shunt lines.**

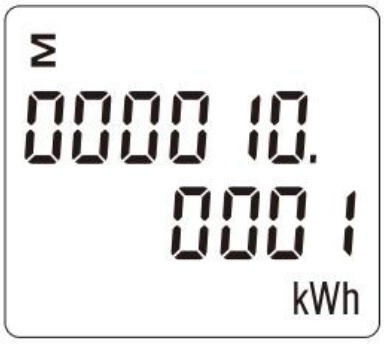
Terminals	Strip Length	Wire Range	Torque	Model	Rated Voltage	Operating temperatur
Aux./RS485/Pulse/DC±/I±	26-14 mm	0.5-1.5mm²	0.4Nm	WJ127-5.08-XXP-1YY-01A	300V	-40℃~+105℃
shunt	2000±20mm	2.1±0.1mm²		DCM230-2	1000V	-40℃~+105℃

Chapter 3. Operation

3.1 Installation display

When it is powered on, the meter will initialize and do self-checking.

	Full Screen (stay 2s)
	Software Version (stay 2s) (This information is for reference only, in kind pervail.)
	Program number

	Self-checking interface
	Total active energy(kWh) Total=Import+ Export Max read: 999999.9999 kWh

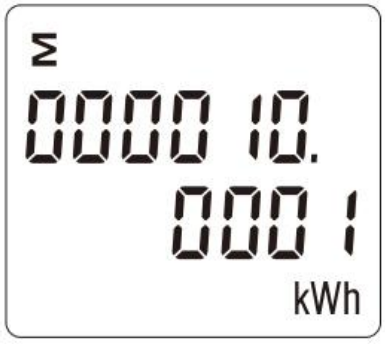
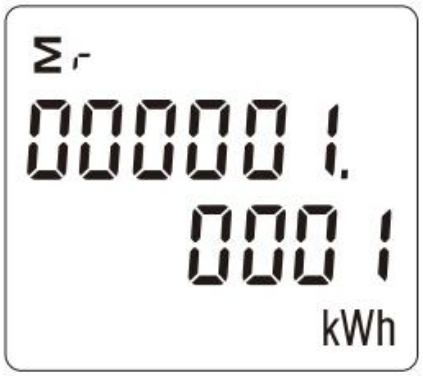
3.2 Button Functions:

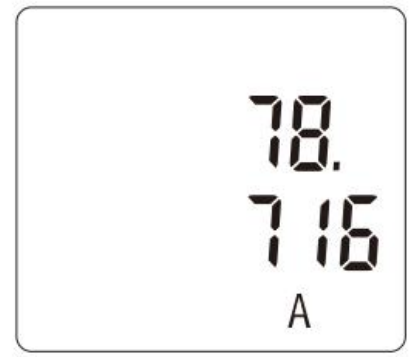
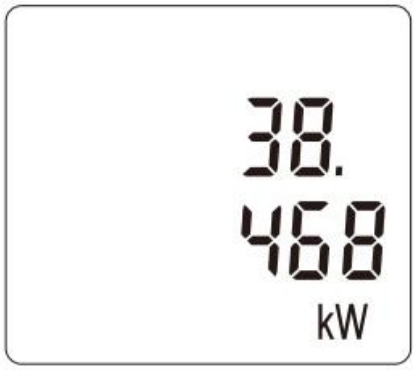
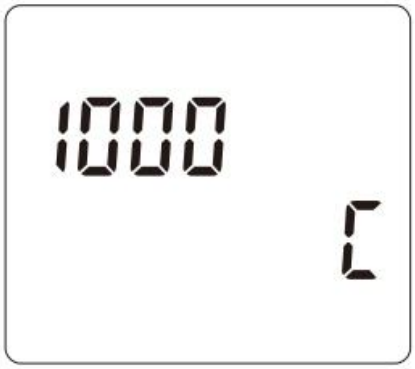
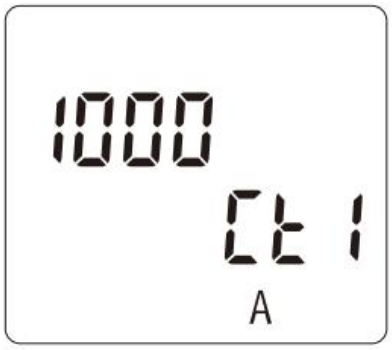
There are two buttons on the front panel.

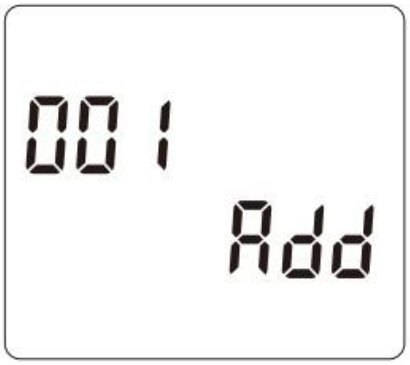
	>Scroll the display for data checking. >Changing option at Set-up mode >Exit the Set-up mode
	>Set-up mode entry >Confirmation

3.3 Scroll display

After initialization and self-checking program, the meter displays the measured values. The default page is total kWh. If the user wants to check other information, please press the scroll button  on the front panel.

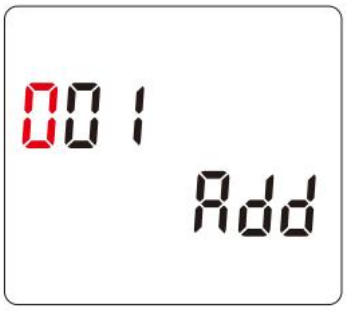
	Total active energy(kWh) Total=Import+ Export Display format: 6+4 999999.9999 -> 000000.0000
	Partial resettable active energy Display format: 6+4 999999.9999 -> 000000.0000
	Voltage

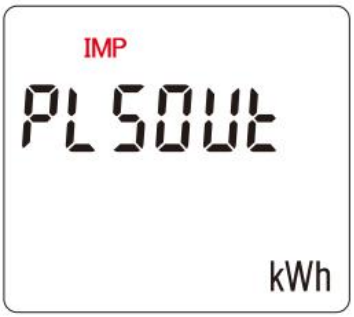
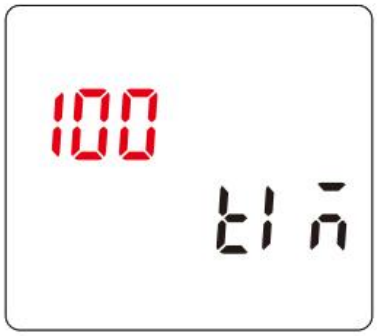
	Current
	Power Display format: <1000 W: XXX W <1000kW: XXX.XXX kW For other value: XXXX.XX kW
	Pulse constant
	CT1 Primary current

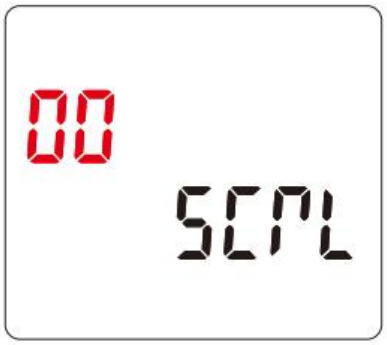
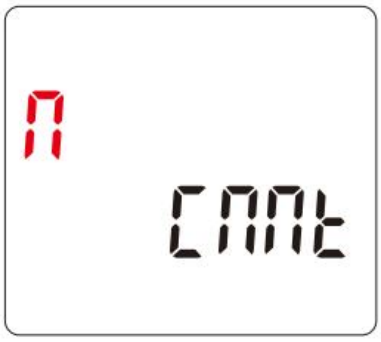
	Meter address
	Baud rate
	Parity
	Software Version

3.4 Setup Mode

To get into Set-up Mode, the user need press the “Enter” button  for 3 second.

Page	Display	Descriptions
1		**Password** To get into Set-up mode, it asks a password confirmation. Default password: 1000 Use  and  to enter correct password.
2		Keep pressing  for 3 second, the current selection will flash, use  and  to change the Modbus address. Options: 1~247 Keep press  for 3s to confirm the selection.
3		Keep pressing  for 3 second, the current selection will flash, use  and  to change the Baud rate. Options: 1.2k, 2.4k,4.8k,9.6k (default),19.2k Keep press  for 3s to confirm the selection.

4		Keep pressing for 3 second, the current selection will flash, use and to change the Parity. Options: EVEN,ODD,NONE (default)
5		Keep pressing for 3 second, the current selection will flash, use and to change the type of Pulse Output. Options: total kWh, IMP kWh, EXP kWh
6		Keep pressing for 3 second, the current selection will flash, use and to change the pulse width. Options: 60, 100, 200, unit: ms
7		Keep pressing for 3 second, the current selection will flash, use and to change the DIT(Demand Integration Time). Options: 0,5,8,10,15,20,30,60(default)

8		Use to select the scroll display time option. Keep pressing for 3 second, the current selection will flash, use and to enter the options: 0~60s. Default: 0 s, represent do not scroll display
9		Use to select the backlit time option. Keep pressing for 3 second, the current selection will flash, use and to enter the options: 0,5,10,20,30,60 minutes. 0 means the light is always on. Default: 60 minutes
10		Use to select the Password option. Keep pressing for 3 second, the current selection will flash, use and to enter the new password. The range is from 0001 to 9999. Default: 1000
11		Shunt wiring Use to select the shunt connection option. Keep pressing for 3 second, the current selection will flash, use to choose the connection way. Option: N, P N: Negative type (default) P: Positive type

Keep pressing button to exit the set-up mold.

Chapter 4. Modbus Protocol

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.

Address (Register)	DCM230 Input Register Parameter				Modbus Protocol Start Address Hex	
	Description	Length (bytes)	Data Format	Units	Hi Byte	Lo Byte
30001	Line to neutral 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
30085	Total system power demand	4	Float	W	00	54
30087	Maximum total system power demand	4	Float	W	00	56
30343	Total active energy	4	Float	kWh	01	56
30385	Resettable partial kWh	4	Float	kWh	01	80
316385	Line to neutral volts.	4	Float	V	40	00
316387	Current.	4	Float	A	40	02
316389	Active power.	4	Float	W	40	04
316391	Import active energy	4	Float	W	40	06
316393	Emport active energy	4	Float	W	40	08
316395	Total system power demand	4	Float	kWh	40	0A
316397	Maximum total system power demand	4	Float	kWh	40	0C
316399	Total active energy	4	Float	kWh	40	0E
316401	Current resettable total active energy	4	Float	kWh	40	10
316403	Current overload alarm 00 00 means no alarm 00 01 means Current overload alarm	2	Hex	None	40	12

Note:

(1): The method of power demand calculation is: Import- Export. When the import and export powers appear in the demand period, the import power subtract the export power during data processing.

(2) The red marked are commonly used registers which allow users to read continuously at one time.

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 10 is used to write. Write to only one parameter per message.

Address Register	**Parameter**	**Modbus Protocol Start Address Hex**		**Valid range**	**Mode**
		High Byte	Low Byte		
40003	Demand Period	00	02	Write demand period: 0~60 minutes, default 60. Setting the period to 0 will cause the demand to show the current parameter value, and demand max to show the maximum parameter value since last demand reset. **Length : 4 byte** **Data Format : Float**	r/w
40005	Slide time	00	04	Default 1, min. Range ： 1 ~ (Demand Period -1). **Length : 4 byte** **Data Format : Float**	r/w
40013	Pulse Width	00	0C	Write pulse1 on period in Milliseconds: 60, 100 or 200, default 100. **Length : 4 byte** **Data Format: float**	r/w
40019	Network Parity and Stop	00	12	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = 1 stop bit and none parity, default. 1 = 1 stop bit and even parity. 2 = 1 stop bit and odd parity. 3 = 2 stop bit and none parity. Requires a restart to become effective. **Length : 4 byte** **Data Format : Float**	r/w
40021	Modbus address	00	14	Write the Modbus address Address: 1 to 247 for MODBUS Protocol, default 1.	r/w

				Requires a restart to become effective. **Length : 4 byte** **Data Format : Float**	
40023	Pulse constant	00	16	Options： 0 means 1000 imp/kWh 1 means 100 imp/kWh 2 means 10 imp/kWh 3 means 1 imp/kWh 4 means 10K imp/kWh **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**	ro
40029	Baud Rate	00	1C	Options： 0 means 2400 bps 1 means 4800 bps 2 means 9600 bps 3 means 19200 bps 5 means 1200 bps Default：2 **Length : 4 byte** **Data Format: float**	r/w
40051	CT1	00	32	**CT1 range 1-9999A** **Length : 4 byte** **Data Format : Float**	R/w
40059	Auto-scroll display time	00	3A	Range: 0~60s. 0 means no scroll Default:0 **Length : 4 byte** **Data Format : Float**	r/w
40061	Backlit time	00	3C	Options:0,5,10,20,30,60 minutes 0 means the backlit always on Default：60 **Length : 4byte** **Data Format : Float**	r/w
40087	Pulse output type	00	56	Options： 1 means Import active energy 2 means total active energy 4 means Export active energy Default：2 **Length : 4 byte** **Data Format: float**	r/w

48193	Connection method of shunt	20	00	Setting on shunt connection. Option: 00 4E means Negative type (default) 00 50 means Positive type **Length: 2 byte** **Data Format: Hex**	r/w
461457	Reset	F0	10	00 00：Reset Maximum Demand 00 03：Reset Partial Energy **Length : 2 byte** **Data Format:Hex**	wo
463777	Energy Measurement model	F9	20	Options： 00 01：Total=Import 00 02：Total=Import+Export 00 03：Total=Export **Length : 2 byte** **Data Format: Hex**	r/w
464513	Serial number	FC	00	**Serial number** **Length: 4 byte** **Data Format: unsigned int32** **Note: Only read**	ro
464515	Meter code	FC	02	**Length : 2 byte** **Data Format : hex** **Note: Only read**	ro
464641	Software version	FC	80	**Length : 2 byte** **Data Format : Hex**	ro
464643	Hardware version	FC	82	**Length : 2 byte** **Data Format : Hex**	ro
464645	Display version	FC	84	**Length : 2 byte** **Data Format : Hex**	ro
464647	Program number	FC	86	**Length : 2 byte** **Data Format : Hex**	ro
464649	CRC code	FC	88	**Length : 4 byte** **Data Format : Hex**	ro
464651	Serial2 number	FC	90	**Length : 20 byte** **Data Format : ascii**	ro

Eg:

1. read CT1

Tx: 01 03 00 32 00 02 crc crc

Rx:01 03 04 43 48 00 00 crc crc

Tx explanation:

01:Meter Addr

03:Function code

00 32:modbus protocol start address

00 02:Length/2

Rx explanation:

01:Meter Addr

03:Function code

04:Length

43 48 00 00:CT1 value (need to convert float :200)

2. Write CT1

Tx: 01 10 00 32 00 02 04 43 48 00 00 crc crc

Rx:01 10 00 32 00 02 crc crc

Tx explanation:

01:Meter Addr

10:Function code

00 32:modbus protocol start address

00 02:Length/2

04 :Length

43 48 00 00:(CT=200 is float need to convert hex:43 48 00 00)

Rx explanation:

01:Meter Addr

10:Function code

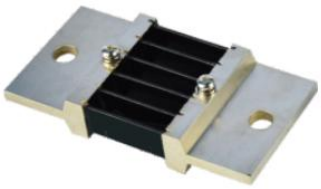
00 32:modbus protocol start address

00 02:Length/2

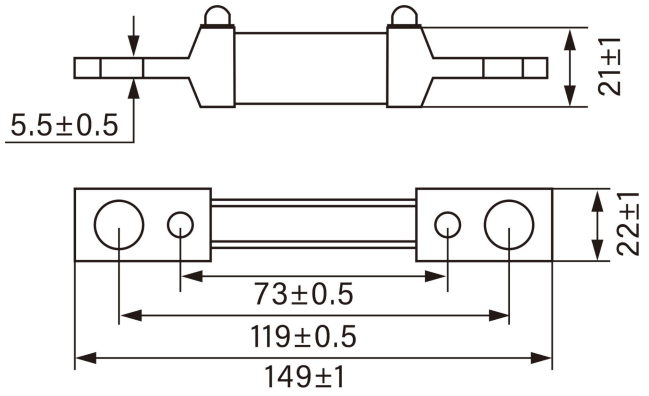
Chapter 5. Maintenance and Cleaning

In normal use, little maintenance is needed. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present. The front of the case should be wiped with a dry cloth only. Use minimal pressure, especially over the viewing window area. If necessary wipe the rear case with a dry cloth. If a cleaning agent is necessary, isopropyl alcohol is the only recommended agent and should be used sparingly. Water should not be used. If the rear case exterior or terminals should be contaminated accidentally with water, the unit must be returned to EASTRON for inspection and testing.
Check whether the cable of the diverter is loose periodically.
Check the interior of the box regularly to check the wiring status.
Our shunt is matched, if there is a problem, do not replace without permission, please contact us.

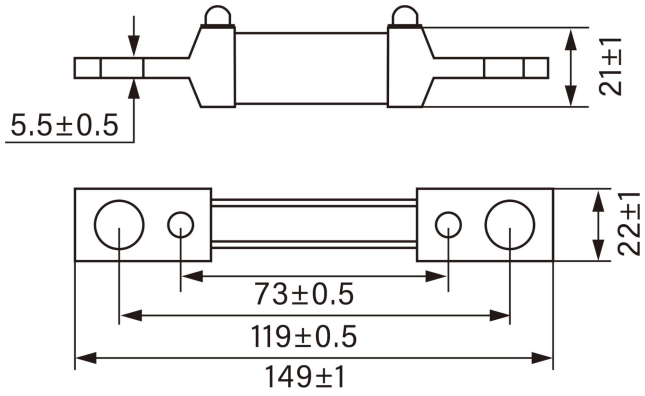
Chapter 6. Shunt



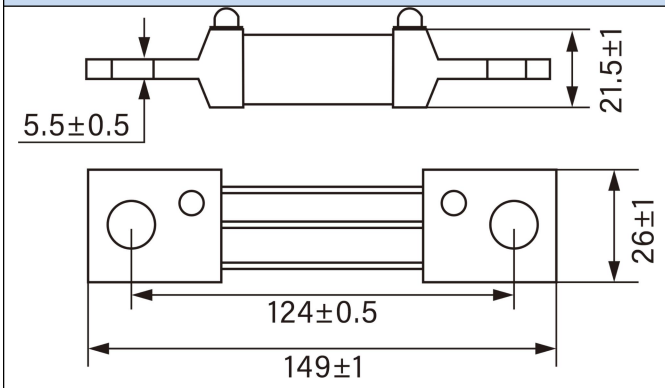
FL-2 Series				
Primary Input	Rated Voltage Output	Accuracy	Dimension(mm)	Dimension(shell)(mm)
150 A	75 mV	0.2%	22x149x21	83.12X175.52X48.5
200 A	75 mV	0.2%	22x149x21	83.12X175.52X48.5
300 A	75 mV	0.2%	26x149x21.5	83.12X175.52X48.5
400 A	75 mV	0.2%	38x149x21.5	83.12X175.52X48.5
600 A	75 mV	0.2%	62x149x21.5	83.12X175.52X48.5



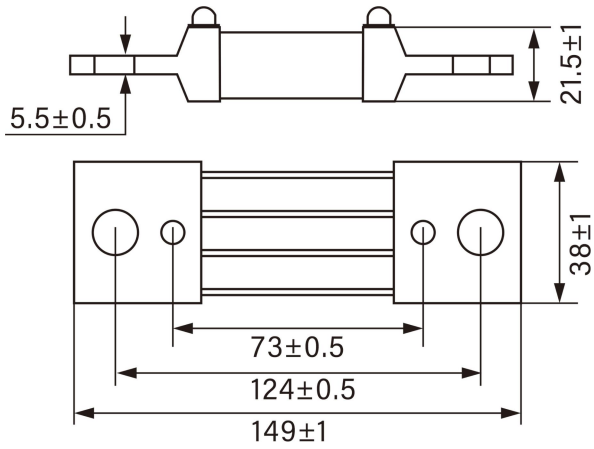
ESFL-2-150



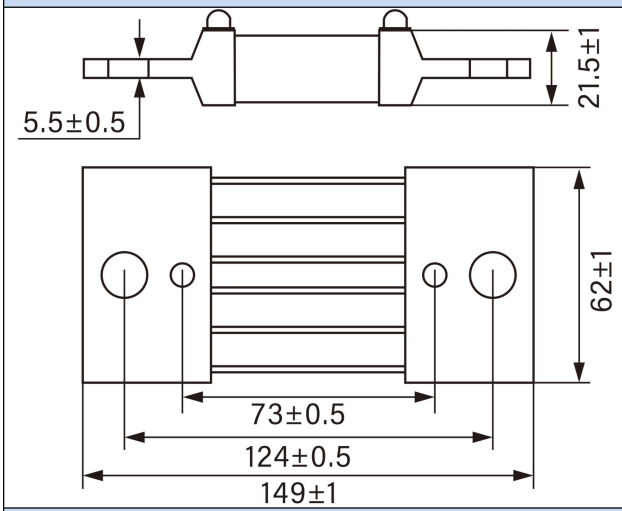
ESFL-2-200



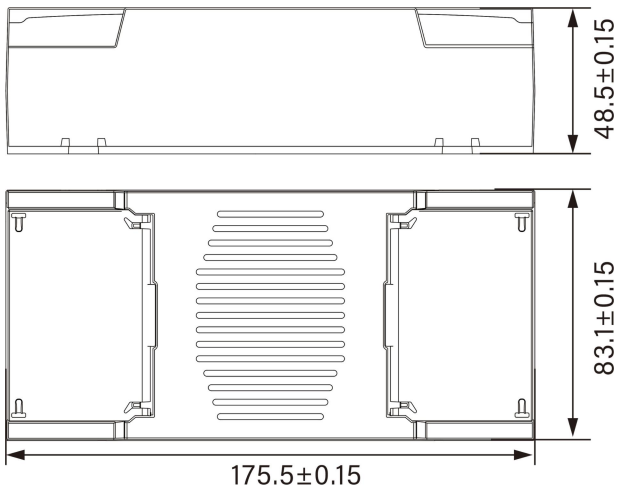
ESFL-2-300



ESFL-2-400



ESFL-2-600



Shunt enclosure

Chapter 7. Declaration of Conformity

We Zhejiang Eastron Electronic Co., Ltd.
Declares under our sole responsibility as the manufacturer that the single phase multifunction electrical energy meter DCM230-2/DCM230-3 series correspond to the production model described in the EU-type examination certificate and the requirements of the Directive 2014/32/EU. Type examination certificate number 0598/MID/B/24/028.
Identification number of the Notified Body: 0598.

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

Eastron Electronic Co., Ltd.

No. 52, Dongjin Road, Nanhu, Jiaxing, Zhejiang, China
Tel: +86-573-83698881 Fax: +86-573-83698883
Email: sales@eastrongroup.com
www.eastrongroup.com