EnergoM-4MC
Din-rail Power Meter

User Manual

Version: 1.11

Revision: 2024.11

Read me

When you use EnergoM-4MC three phase energy meter, be sure to read this user manual carefully, 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 of EnergoM-4MC three phase energy meter, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;

2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;

3. Communication terminal (RS232/RS485) is strictly prohibited to impose on high pressure;

4. Be sure the instrument wiring consistent with the internal system settings;

5. When communicating with the PC, instrument communication parameters must be consistent with the PC.

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

Directory

1. - SUMMARIZE

The three-phase din rail electric energy meter adopts a pen-segment LCD screen, which is a combined AC power measurement terminal. It is a highly integrated product for the application of AC parameter measurement. It has the optional functions of three-phase AC power measurement and calculation, energy accumulation, harmonic analysis, voltage and current imbalance analysis, multi-rate electric energy metering, maximum demand metering, 4-way switch input, 2-way relay output and others.

The EnergoM-4MC three-phase energy meter is a 4M width din rail energy meter, which uses an external CT to extend the current range up to 999A. EnergoM-4MC also provides a communication interface to connect with the computer monitoring system, supports RS485 interface MODBUS communication protocol, and can upload the data collected by measurement and equipment status. This three-phase digital energy meter is suitable for electric power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries, used to monitor the power consumption of AC equipment.

FEATURES

- Maximum 999A, 1A/5A, CT connection;
- Provide energy import and export measurement (IMP & EXP);
- With one port energy pulse output;
- RS485 Modbus communication (optional);
- Standard 35mm din rail mounting, width 4 Modules size;
- Detect voltage, current, active/reactive energy, power, frequency, max demand etc.

APPLICATIONS

- All power parameter measurement;
- Energy measurement and electrical fire monitor and control;
- Transformers, generators, capacitors and electric motors distributed detection;
- Medium and low pressure systems;
- SCADA, EMS, DCS integrators.

2. - TECHNICAL PARAMETERS

Parameter	Value
Auxiliary power	85-265Vac/dc
Voltage measurement	Rated 110V, 380V RMS value, Accuracy 0.2%,
Current measurement	Rated 5A, optional 1A, CT connection
Frequency	50/60Hz, Accuracy ±0.01Hz
Display	LCD with white backlit
Maximum display value	99,999,999MWh
Energy accuracy	Class 0.5, IEC 62053-21
Pulse constant	1 channel, 5000imp/kWh
I/O module	2DO, 2DI optional
Communication	RS-485 MODBUS-RTU
Withstand voltage	2.5KV 1min
Insulation	Input, output, power supply to Shell >5MΩ
Storage environment	-40~70°C
Working environment	-25~55°C Altitude ≤2500m, 0~95%RH, non-condensing, non-corrosive gas

3. - INSTALLATION AND START-UP

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

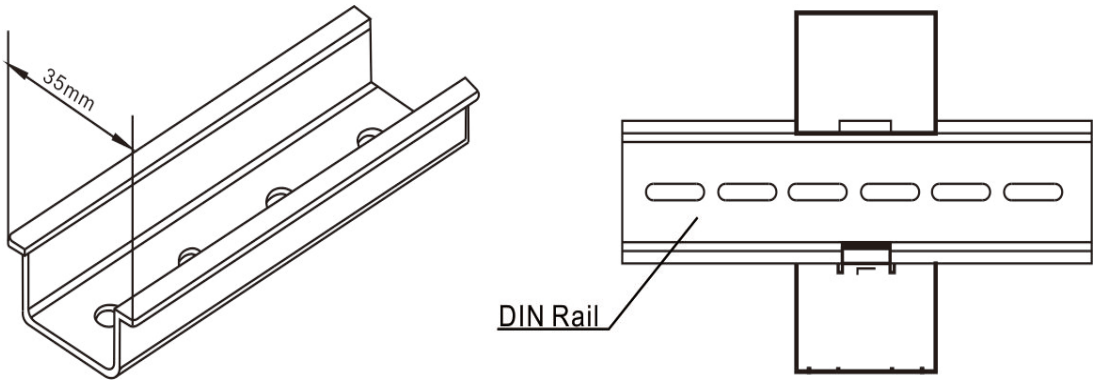
If the instrument is not used as manufacturer's specifications, the protection of the instrument will be damaged.

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.

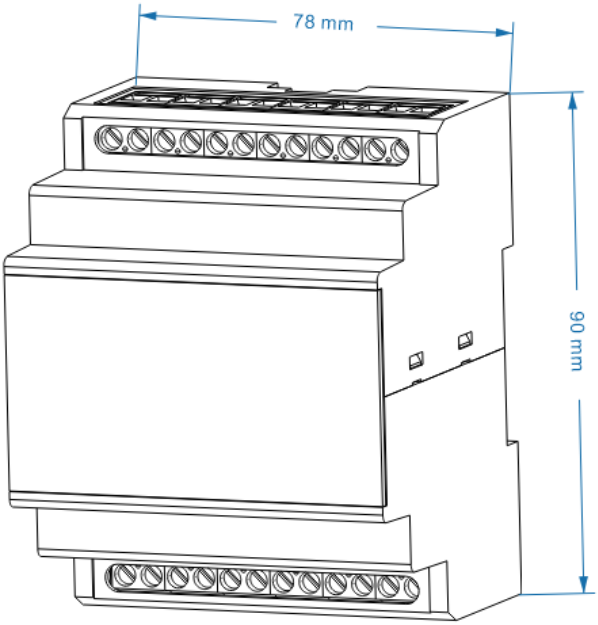
3.1.- Installation

Mounting

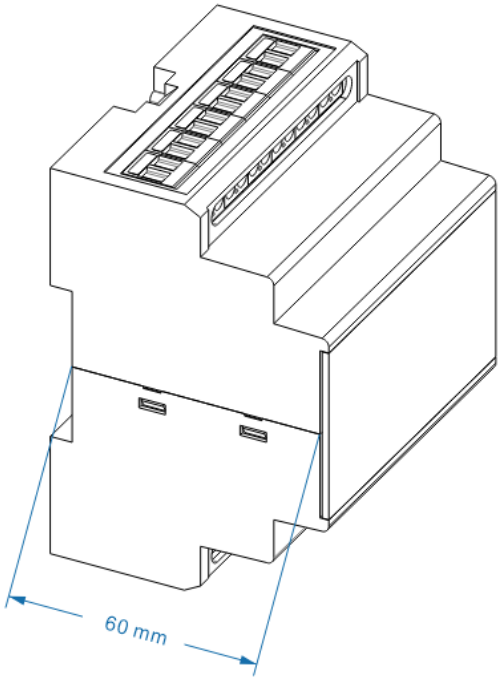
Instrument is to be mounted on 35mm Din-rail. Keep all connections into the cabinet. Please note that with the instrument powered on, the terminals could be dangerous to touch and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.



Dimension: 78*90*60 mm W*H*D



Front view



Side view

Notes:

Input signal: EnergoM-4MC using a separate acquisition calculate for each measurement channel, to ensure consistent in use, for different load forms, it's a variety of connection mode. Access wire shall be met the current is 2.5 square millimeters and the voltage is 1.5 square millimeters.

A. Voltage input

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

B. Current Input

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

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

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

C. Sequence of wire

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

Always observe the physical orientation of CT (P1 - P2) when installing on the feeder wire.
Always pay attention to wiring polarity and phasing when terminating the CT leads to the EnergoM-4MC. S1 connect to Ix*, S2 connect to Ix.

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

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

In three-phase 3 wire mode, measurement and shows the line voltage;
In three-phase 4 wire mode, measurement and shows the phase voltage and line voltage both.

D. Auxiliary power

EnergoM-4MC with universal (AC / DC) power input, if not for a special statement, we provide the 90-240AC/DC power interface for standard products, please ensure that the auxiliary power can match with meter to prevent unexpected damage.

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

3.2.- Connection Terminal

Upper terminal

No.	Marked	Notes
20	**DO1**	Digital output 1
19		
70	**DIC**	Digital input
71	**DI1**	
72	**DI2**	
48	**RP-**	Active energy pulse output -
47	**RP+**	Active energy pulse output +
-	**-**	-
59	**B**	RS485-
58	**A**	RS485+
2	**N**	AUX input 85-265Vac/dc
1	**L**	

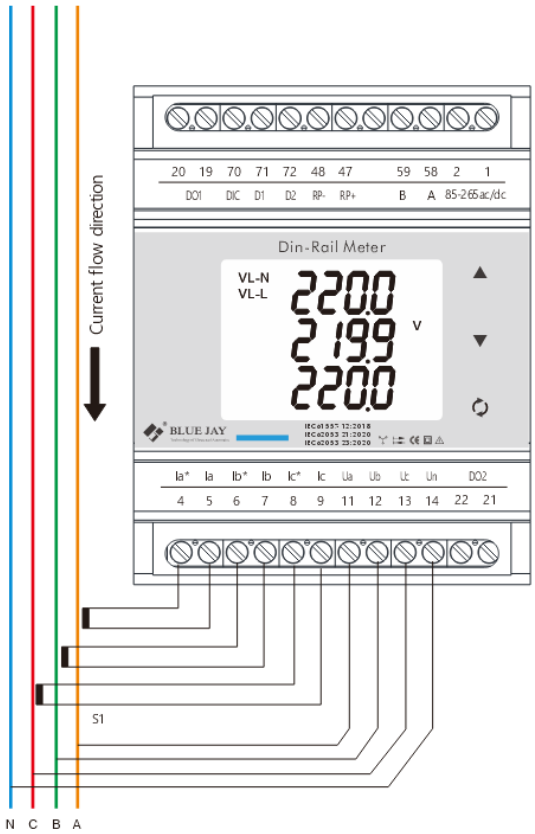
Lower terminal

No.	Marked	Notes
4	**IA***	Current A-phase - S1 input
5	**IA**	Current A-phase - S2 input
6	**IB***	Current B-phase - S1 input
7	**IB**	Current B-phase - S2 input
8	**IC***	Current C-phase - S1 input
9	**IC**	Current C-phase - S2 input
14	**Un**	Neutral voltage input
13	**Uc**	Voltage C-phase input
12	**Ub**	Voltage B-phase input
11	**Ua**	Voltage A-phase input
22	**DO2**	Digital output 2
21		

Note:

The terminal pin definition may change depends on customer order; please refer to the label on the meter!

3.3.- Typical Wiring



Note:

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

WARNINGS!

If power = -0.01 is shown for any of the phases and voltage and current are not zero for this phase, check out following points:

- Assure that A, B and C phases coincide in voltage and current.
- Correct polarity? Reverse the current transformer placed at this phase.

4.- SCREEN DISPLAY

4.1.- Button description

Button	In Monitor Screen	In Config Sub-menu	In Parameter Setup
	Move to previous or next page	Move cursor up and down to select function	Move setting cursor to left
	**Press and hold:** Call out password screen	Move cursor up and down to select function	Scroll selection number 0 ~ 9
	**Press and hold:** Display version information	Confirm the values & Entry or jump to down level menu	

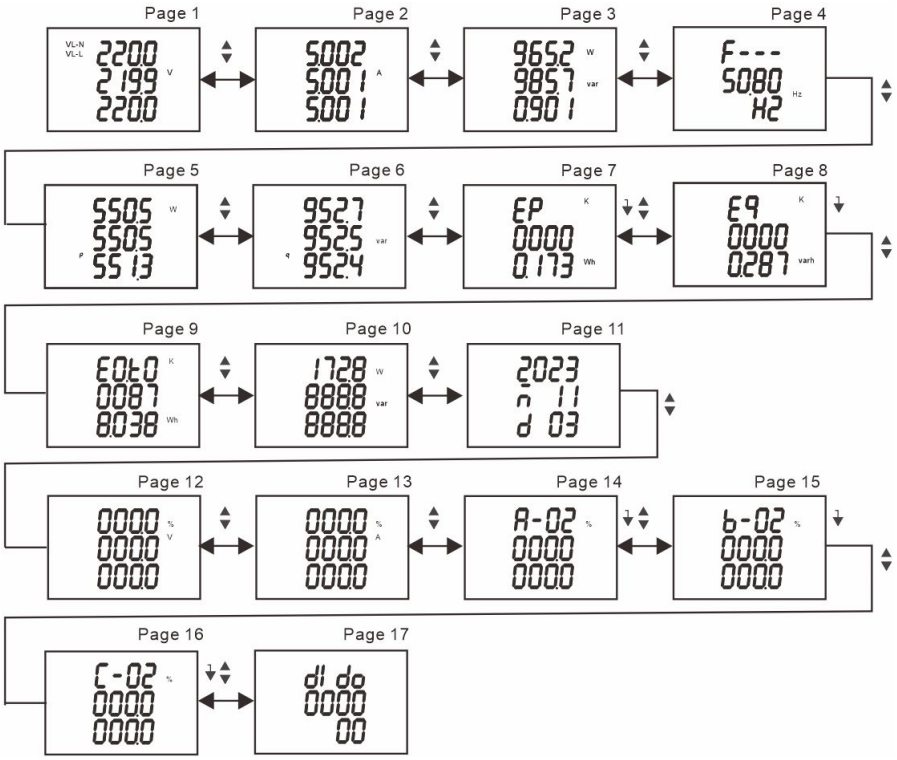
Note: In **Config.** menu, if change the setting value, press and hold  for exit menu, device will call out confirm screen ask “SAVE”.

Then press and hold  for *exit without saving;*

press and hold  for *save and exit.*

4.2.- Overall screen

Press the ▲ and ▼ on any display interface, the corresponding data will be displayed in the measurement data display area. Pages right side marked with ↴ indicate that this page has a sub-menu.



Page 1-8: Standard functions

Page No.	Description	Page No.	Description
Page 1	System voltage	Page 5	Split-phase active power
Page 2	Primary current	Page 6	Split-phase reactive power
Page 3	Total active/reactive power	Page 7	Positive active energy
Page 4	System frequency	Page 8	Inductive reactive energy

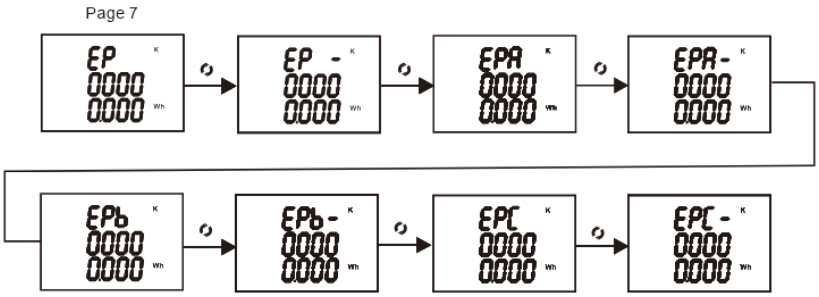
Page 9-17: Optional functions

Page No.	Description	Page No.	Description
Page 9	TOU (Multi-tariff) record	Page 14	A phase individual harmonic 2th-31th
Page 10	Max demand record	Page 15	B phase individual harmonic 2th-31th
Page 11	Real-time clock	Page 16	C phase individual harmonic 2th-31th
Page 12	Voltage total harmonic distortion	Page 17	DI/DO event record
Page 13	Current total harmonic distortion		

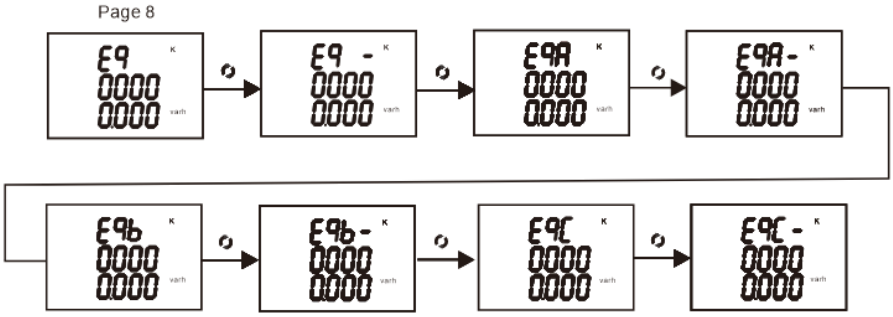
4.2.1.- Page 7,8 submenu details

In page 7-8 press will display the A, B, C split phase active energy and A, B, C split reactive energy, as follows:

Split-phase active energy:

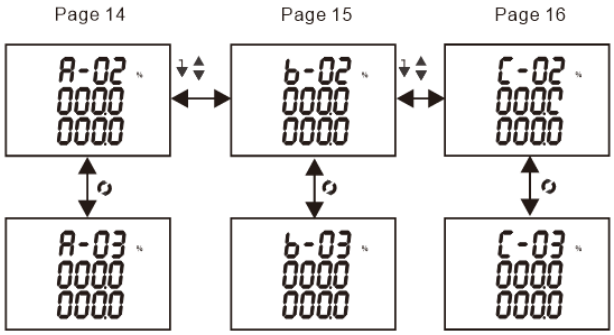


Split-phase reactive energy:



4.2.2.- Page 14,15,16 submenu details

In page 14-16 press will display the A, B, C phase individual harmonic 2th-31th, as follows:



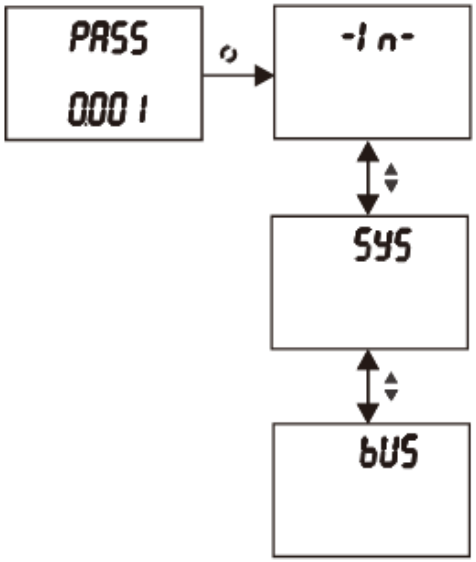
Notes：

Above picture shows the fully functional measurement screen pages. If not select certain function , you can ignore the corresponding screen.

5.- SETUP PROCEDURE

5.1.- Enter setup menu

In measuring screen, press and hold the ▼ button, and the prompt of "Password" will appear, and enter the password (default is **0001**), press ↻ button to enter the configuration menu,EnergoM-4MC provides three configure parameters items: system factory commissioning (SYS), input (-IN-), and communication (Bus). Adopt LCD display layered menu structure management.



Input signal setup

Refer to **chapter 5.2**

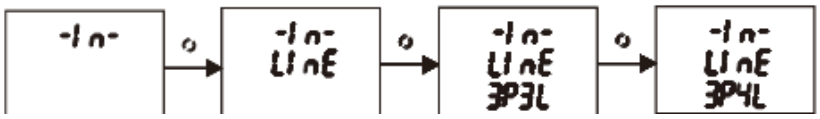
System parameter setup

Refer to **chapter 5.3**

Communication setup

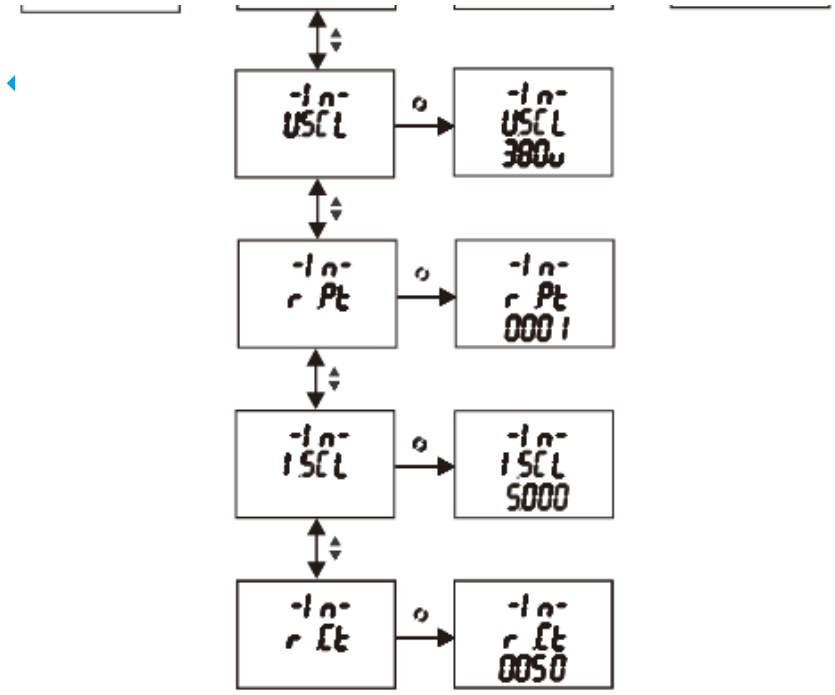
Refer to **chapter 5.4**

5.2.- Input signal setup



Power grid mode

Default **3P4L**



Rated voltage scale

Default **380V**

Voltage transformer ratio (1) *

Default **0001**

Secondary current

Current transformer ratio(1)*

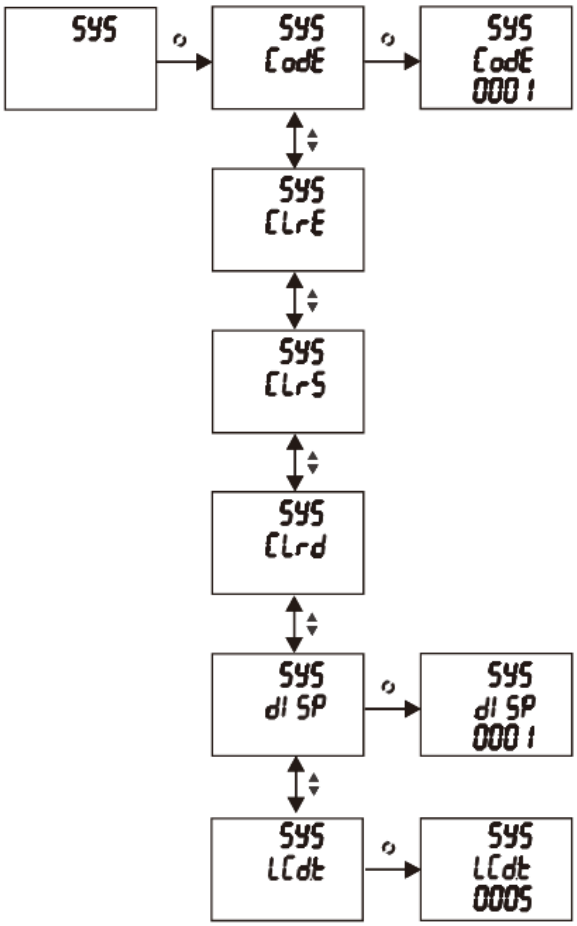
Notes:

(1) In medium or high voltage system, set this value can expand measuring range. Values represent the current transformer (primary side voltage) / (secondary side current). Must set **U.scl** in 100V or other specified VT secondary voltage.

(2) If order specified power grid is 3P3L, Energometrika will connect **Un** and **Ub** terminal internally. Screen only display phase to phase parameters.

(3) Energometrika calibrates meter under 380V range, and high-quality linearity performance ensures
that the meter can accurately measure in the lower voltage range. That can be compatible with 120V, 220V, 230V, 240V, 277V system.
If need to use in different voltage scale or different types CT, please contact our sales team for more details.

5.3.- System setup



Change password (1) *

Default: 0001

Reset energy counter record

Clear: can be write by RS485 command*

Reset SOE record

Reset demand record

Screen scroll interval, unit: **sec**

Default **0000**(2)*

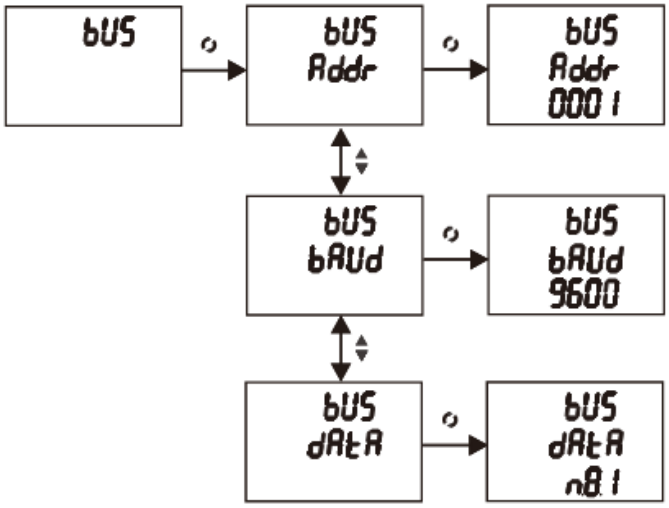
Duration of LCD backlight, unit: **Min**

Default **0005**

Notes:

(1) If change the password, please keep the password in safety, or only return to Energometrika for
reset new password!
(2) Set 0000 mean manually switch each monitor screen pages.

5.4.- Communication setup



Modbus address (1) *

Default **0001**

Comm. port baud ratio (2) *

Default **9600** (2)*

Comm. port data format

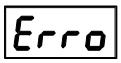
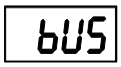
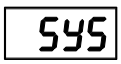
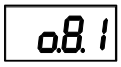
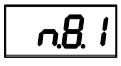
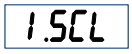
Default **n.8.1**, can select n.8.1 / E.8.1 / n.8.2

Note:

(1) Modbus address setup range 1-247.

(2) Baud ratio can select 1200 / 2400 / 4800/ 9600 / 19200, and regular meter equipped with communication port max baud ratio is 19200bps. If need higher speed, please contact Energometrika sales team.

5.5.- Description of menu characters

	(Password) User password
	(Error) Wrong input information
	(Input) User Display data settings menu
	(Bus) Communication settings menu
	(System) System settings menu (for factory debugging, not open yet)
	(Code) Modify password value
	(Data) Communication parameter setting
	(Address) Local communication address setting
	(Baud) Communication baud rate
	(o.8.1) Indicates 8 data bits, 1 stop bit, odd parity
	(e.8.1) Indicates 8 data bits, 1 stop bit, even parity
	(n.8.1) Indicates 8 data bits, 1 stop bit, no parity bit
	(U.scl) Select rated input voltage
	(I.scl) Select rated input current
	(R.ct) Set the current multiplier
	(R.pt) Set voltage ratio
	(System) System settings menu (for factory debugging, not open yet)
	(Type) What parameters to set
	(Para Corresponding parameter selection
	(Value) Set the corresponding alarm value

6.- PULSE OUTPUT (OPTIONAL)

EnergoM-4MC provides 1* pulse output for the active energy.

The host / PLC / DI module can cumulative the data of both the active and reactive power energy sent by the pulse from opt coupler relay.

1). Electrical specification: voltage VCC ≤ 48V, Iz ≤ 50mA.

2). Pulse constant: 5000 imp / kWh, pulse up to 80ms.
This means: When the device detects 1 kWh, the port will generate 5000 pulse

Note:

1 kWh energy is for ***secondary side energy data***, if there have PT and CT accessed; primary side energy data is “1 kWh ×PT ratio× CT ratio”.

Voltage (V)	Current (A)	Pulse constant (imp / kWh)
380 or 220	5	5000
	1	20000
100	5	20000
	1	80000

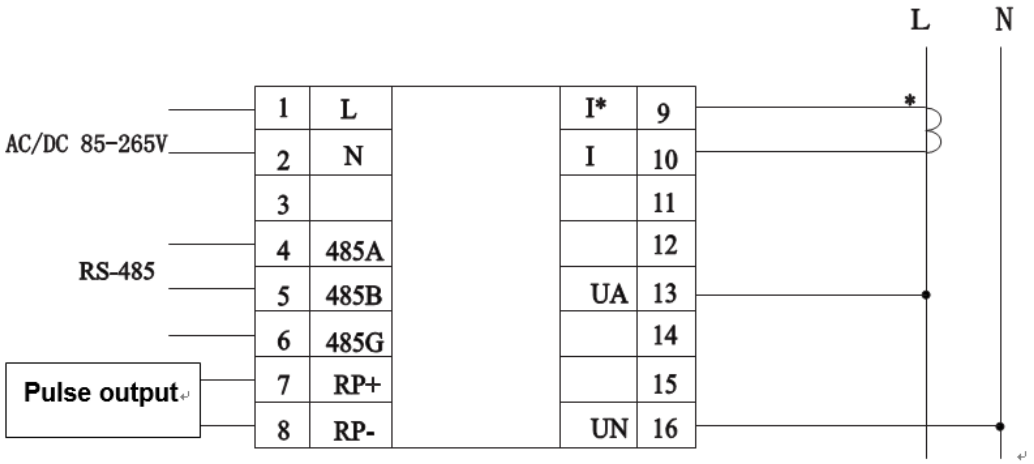
Example: In measure time “T”, the received total pulse is “N”,
Primary side input of voltage is 10Kv
Primary side input of current is 400A.
Secondary side measurement range is 100V and 5A.

In the time “T”, energy accumulated is: N / 20000 × 100 × 80

7.- COMMUNICATION INTERFACE

7.1.- Connection for 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 EnergoM-4MC… and the master unit. This Bus may connect a maximum of 32pcs.



Notes:

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

7.2.- MODBUS © Protocol

Modbus RTU Frame Format:

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

MODBUS FUNCTIONS:

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

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

7.3.- Register Map

7.3.1.- Basic power data -Primary Side

Register	Data	Byte		Instruction
0x00	Ua	float	2	Phase to line voltage, Unit: V
0x02	Ub	float	2	
0x04	Uc	float	2	
0x06	Uab	float	2	Phase to phase voltage, Unit: V
0x08	Ubc	float	2	
0x0a	Uca	float	2	
0x0c	Ia	float	2	Three phase current, Unit: A
0x0e	Ib	float	2	
0x10	Ic	float	2	
0x12	Pa	float	2	Active power, Unit: kW
0x14	Pb	float	2	
0x16	Pc	float	2	
0x18	P∑	float	2	
0x1a	Qa	float	2	Reactive power, Unit: kVar
0x1c	Qb	float	2	
0x1e	Qc	float	2	
0x20	Q∑	float	2	
0x22	Sa	float	2	Apparent power, Unit: kVA
0x24	Sb	float	2	
0x26	Sc	float	2	
0x28	S∑	float	2	
0x2a	PFa	float	2	Power factor, 0~1.000
0x2c	PFb	float	2	
0x2e	PFc	float	2	
0x30	PF∑	float	2	
0x32	FR	float	2	Frequency, Unit:0.01Hz
0x34	Ep+	float	2	Positive active energy, Unit: kWh
0x36	Ep-	float	2	Negative active energy, Unit: kWh
0x38	Eq+	float	2	Inductive reactive power, Unit: kVarh
0x3a	Eq-	float	2	Capacitive reactive power

0x3c	ES	float	2	Total apparent energy, unit: VAh
0x3e	EpA+	float	2	A phase positive active energy, unit: kWh
0x40	EpA-	float	2	A phase negative active energy
0x42	EqA+	float	2	A phase inductive reactive energy, unit: kVarh
0x44	EqA-	float	2	A phase capacitive reactive energy
0x46	ESA	float	2	A phase apparent energy, unit VAh
0x48	EpB+	float	2	B phase positive active energy, unit: kWh
0x4A	EpB-	float	2	B phase negative active energy
0x4C	EqB+	float	2	B phase inductive reactive energy, unit: kVarh
0x4E	EqB-	float	2	B phase capacitive reactive energy
0x50	ESB	float	2	B phase apparent energy, unit: VAh
0x52	EpC+	float	2	C phase positive active energy, unit: kWh
0x54	EpC-	float	2	C phase negative active energy
0x56	EqC+	float	2	C phase inductive reactive energy, unit: kVarh
0x58	EqC-	float	2	C phase capacitive reactive energy
0x5A	ESC	float	2	C phase apparent energy, unit: VAh
0x5C	Io	float	2	Real-time measurement zero-sequence current data, unit: A (Reserved function)

7.3.2.- Basic power data -Secondary Side

Register	Data	Byte		Instruction
0x100	Ua	int	1	Phase to line voltage, Unit: 0.1V
0x101	Ub	int	1	
0x102	Uc	int	1	
0x103	Uab	int	1	Phase to phase voltage, Unit: 0.1V
0x104	Ubc	int	1	
0x105	Uca	int	1	
0x106	Ia	int	1	Three phase Current, Unit: 0.001A
0x107	Ib	int	1	
0x108	Ic	int	1	
0x109	Pa	int	1	Active power, Unit: W
0x10a	Pb	int	1	
0x10b	Pc	int	1	
0x10c	P∑	int	1	
0x10d	Qa	int	1	Reactive power, Unit: Var
0x10e	Qb	int	1	
0x10f	Qc	int	1	
0x110	Q∑	int	1	
0x111	Sa	int	1	Apparent power, Unit: VA
0x112	Sb	int	1	
0x113	Sc	int	1	
0x114	S∑	int	1	
0x115	PFa	int	1	Power factor, 0~1.000
0x116	PFb	int	1	
0x117	PFc	int	1	
0x118	PF∑	int	1	
0x119	FR	int	1	Frequency, Unit:0.01Hz
0x11a	Ep+	Int 32	2	Positive active energy, Unit: Wh
0x11c	Ep-	Int 32	2	Negative active energy, Unit: Wh
0x11e	Eq+	Int 32	2	Inductive reactive power, Unit:Varh
0x120	Eq-	Int 32	2	Capacitive reactive power
0x122	ES	int	2	Total apparent energy, unit: VAh
0x124	EpA+	int	2	A phase positive active energy, unit: kWh

0x126	EpA-	int	2	A phase negative active energy
0x128	EqA+	int	2	A phase inductive reactive energy, unit: kVarh
0x12A	EqA-	int	2	A phase capacitive reactive energy
0x12C	ESA	int	2	A phase total apparent energy, unit VAh
0x12E	EpB+	int	2	B phase positive active energy, unit: kWh
0x130	EpB-	int	2	B phase negative active energy
0x132	EqB+	int	2	B phase inductive reactive energy, unit: kVarh
0x134	EqB-	int	2	B phase capacitive reactive energy
0x136	ESB	int	2	B phase total apparent energy, unit: VAh
0x138	EpC+	int	2	C phase positive active energy, unit: kWh
0x13A	EpC-	int	2	C phase negative active energy
0x13C	EqC+	int	2	C phase inductive reactive energy, unit: kVarh
0x13E	EqC-	int	2	C phase capacitive reactive energy
0x140	ESC	int	2	C phase total apparent energy, unit: VAh
0x142	Io	int	1	Real-time measurement zero-sequence current data, unit: 0.001A (Reserved function)
0x143	Ang_Ua	int	1	A phase voltage angle, unit: 0.1 degree
0x144	Ang_Ub	int	1	B phase voltage angle
0x145	Ang_Uc	int	1	C phase voltage angle
0x146	Ang_Ia	int	1	A phase current angle
0x147	Ang_Ib	int	1	B phase current angle
0x148	Ang_Ic	int	1	C phase current angle

7.3.3.- Meter status

Register	Data	Byte		Instruction
0x200	DO	int	1	Remote control relay output status Bit0~1: channel 1~2 output status
0x201	DI	int	1	DI information Bit0~3: channel 1~4 opening status
0x202	DZ	int	1	Setting value over-limit status Bit0~4: channels 1~5 setting value over-limit status
0x20A	TIME.year	int	1	Internal RTC real-time time: Year-Month-Day-Hour-Minute-Second-Week (integer, the last char is not used)
0x20B	TIME.month	int	1	
0x20C	TIME.date	int	1	
0x20D	TIME.hour	int	1	
0x20E	TIME.minute	int	1	
0x20F	TIME.second	int	1	
0x210	TIME.day	int	1	

7.4.- Configuration menu (Function 03 to Read &0 Function 06 to Write)

Register	Data	Byte mode		Instruction	
0x20A	TIME.year	Int	1	Internal RTC real-time time: Year-Month-Day-Hour-Minute-Second-Week (integer, the last char is not used)	
0x20B	TIME.month	Int	1		
0x20C	TIME.date	Int	1		
0x20D	TIME.hour	Int	1		
0x20E	TIME.minute	Int	1		
0x20F	TIME.second	Int	1		
0x210	TIME.day	Int	1		
0x900	Wiring mode	Int	1	0: 3P4W 1: 3P3W 2CT	2: 3P3W 3CT
0x901	Voltage range	Int	1	0: 100V	1: 380V
0x902	Current range	Int	1	0: 1A	1: 5A
0x903	PT ratio	Int	1	1-9999	
0x904	CT ratio	Int	1	1-9999	
0x905	RS485 address	Int	1	1-247	
0x906	Baud rate	Int	1	0: 2400 1: 4800	2: 9600 3: 19200
0x907	Data format	Int	1	0: n.8.1 1: o.8.1	2: e.8.1 3: n.8.2
0x908	Display control	Int	1	0-9sec, 0 for manual switch mode	
0x909	Password	Int	1	1-9999	
0x90a	Channel 2 communication address	Int	1	1-247	
0x90b	Channel 2 communication baud rate	Int	1	0: 2400 1: 4800	0: 2400 1: 4800
0x90c	Channel 2 communication data format	Int	1	0: n.8.1 1: o.8.1	0: n.8.1 1: o.8.1
0x90d	Voltage deviation secondary reference value	Int	1	Unit: 0.1V	
0x90e	Frequency deviation reference value	Int	1	Unit: 0.01HZ	

7.5.- Example

Host inquiry slave device

Addr.	Func.	Data Address high	Data Address low	Data Number high	Data number low	CRC16 low	CRC16 high
0CH	03H	00H	00H	00H	06H	C4H	D5H

PC user ask upload UA, UB, UC, IA, IB, IC

Slave device response

Addr.	Func.	Byte count	Data1 high	Data1 low	Data2 high	Data2 low	Data3 high	Data3 low
0CH	03H	0CH	03H	E8H	03H	E9H	03H	E8H
Data4 high	**Data4 low**	**Data5 high**	**Data5 low**	**Data6 high**	**Data6 low**	**CRC16 low**	**CRC16 high**	
13H	84H	13H	88H	13H	8AH	A6H	D6H	

Show the data:

UA=3E8H (100.0)
UB=3E9H (100.1)
UC=3E7H (99.9)
IA=1384H (4.996)
IB=1388H (5.000)
IC=138AH (5.002)

Notes:

1. Energometrika disable the 06 function in default setting, if Activated the write command, please check the host device program to avoid the meaningless write operation, that may reduce the reduce the register working life.

2. When the write is unsuccessful, no return data from the slave device. In this addition, please re-send write inquiry again.

8.- SAFETY CONSIDERATIONS

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

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

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

9.- MAINTENANCE

The EnergoM-4MC three phase energy meter does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument is 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.

10.- TECHNICAL SERVICE

FAQ's

1.- Once cabled and connected is seen to give a correct voltage and current reading, but shows negative values for active power (generation).

This is an error with the cabling for the current transformer secondary; the direction of the transformer current has to be respected as shown in the connection diagram. The current transformers have a two face primary; the current must pass from P1 to P2 giving the result in secondary (S1 and S2) of 5 amps.

The error stems from:

a). The current transformers have been incorrectly installed. As a result, it gives the direction of the current as passing from P2 to P1; to resolve this problem, the current transformer does not have to be dismantled and installed again, but the transformer secondary (S1 and S2) just has to be inverted.

b). The connection of the current secondary in the current transformers have been incorrectly connected; to resolve this problem just connect the S1 transformer secondary to the S1 on the meter and the S2 on the current transformer to the S2 on the meter.

2.- Once cabled and connected, is seen to give an incoherent Power factor and CosΦ reading (-0.01 or similar).

This is again a current transformer and voltage phase connection error phase A, must correspond to the current transformer installed in phase A; phase B, must correspond to the current transformer installed in phase B; and phase C, must correspond to the current transformer installed in phase C.

This connection terminal is clearly shown on the area side of the device.

3.- The measuring voltage and is displaying the secondary voltage (for example 110 volts). Ensure that the voltage Transformer ratio has been correctly set.

4.- Device does not correctly display the current reading. It shows values varying between 0 to 5 amps of current.
Ensure that the Current Transformer ratio has been correctly set.

Calculation formula of electrical parameter

Formula	Parameter
$U = \sqrt{\frac{1}{N}\sum_{n=0}^{N} u_n^2} \quad n = 0,1,2\ldots\ldots N$	Voltage RMS value
$I = \sqrt{\frac{1}{N}\sum_{n=0}^{N} i_n^2} \quad n = 0,1,2\ldots\ldots N$	Current RMS value
$P = \frac{1}{N}\sum_{n=1}^{N} (i_{an}u_{an} + i_{bn}u_{bn} + i_{cn}u_{cn})$	Total active power cycle average
$P_s = UI$	Single-phase apparent power cycle average
$\cos\theta = \frac{P_p}{P_S}$	Power factor
$P_q = \sqrt{P_S^2 - P_P^2}$	Reactive power (Pq is positive and the direction cannot be determined; P algorithm can be used to shift the voltage component by 90°)
$W = \int P*dt$	Electric energy

Note: In above formula, N for sampling points in one AC wave.