

User Manual Revision V1.01

English

Smart energy meter

EM418 Series



Benefits and Main Features

- Single phase metering 4 din modules. Standard DIN rail Format (DIN43880)
- EN50470-3 Class B
- Bi-directional active Import / Export, Bi-directional reactive measurement
- Records Maximum Demand and its current time for the latest 12 months
- Instant Volts, Amps, Power factor, Frequency, Active power, Reactive power, Apparent power.
- TOU (Time of Use) up to 4 tariffs, up to 12 time periods per day
- Summer time switch
- Clock time verification function
- Non-volatile memory, including 1-12 month's energy consumption, MD and MD's current time & historical time stamps
- Isolate pulse output and IR (DIN43864)
- LCD display, 6 integer 2 decimal,
- Meter displays when power fails (Battery Backup)
- Large clear display with backlight
- Internal transformer
- Direct metering up to 100A
- RS485 communication port, Modbus protocol
- IR port
- Program by button on the name plate
- Memory back-up (EEPROM)
- MID approved. Annex B & D

★ The meter is intended to be installed in a Mechanical Environment 'M1', with Shock and Vibrations of low significance, as per 2004/22/EC Directive and should be installed in Electromagnetic Environment 'E2', as per 2004/22/EC Directive.

Index:

1. Safety notice
2. Content of delivery
3. Declaration of Conformity
4. Technical description
 - 4.1 Performance criteria
 - 4.2 Meter specification
5. Dimensions and sealing points
6. Wiring diagrams
7. Meter reading
8. Main functions
 - 8.1 Measuring Function
 - 8.2 Demand function
 - 8.3 Data storage function
 - 8.4 TOU (Time of use) function
 - 8.5 Electricity parameters measurement
 - 8.6 Display function
 - 8.7 Switching on the display
 - 8.8 Summer/winter time switch permit/prohibition
 - 8.9 Communication
 - 8.10 Alarm
 - 8.11 Pulse output function
 - 8.11.1 Active/reactive pulse output
 - 8.11.2 Multi functions signal output
9. Programming
 - 9.1 Password verification
 - 9.2 Baud rate setting
 - 9.3 Address setting
 - 9.4 Password setting
10. Battery replacement
11. Technical support

1. Safety notice

PLEASE NOTE: WE SUPPLY THESE METERS ON THE ASSUMPTION THEY WILL BE INSTALLED BY A QUALIFIED ELECTRICIAN FAMILIAR WITH THE INSTALLATION OF METERING EQUIPMENT.

All meters must be installed according to applicable wiring diagram. Incorrect connections to the electricity network will cause major display problems and can cause serious damage to the meter. Before starting meter operation, it must be ensured local conditions of the energy system are consistent with the meter type and configuration. Make sure that cables (conductors) are not damaged during installation of the meter, not energized and are appropriate for the installation in question. Capacitors within the meter may still be charged even after disconnection from all energy sources.

2. Content of delivery

Single phase, electronic energy meter, instructions for assembly
ID setting
Baud rate setting
Password setting

3. Declaration of Conformity

4. Technical Description

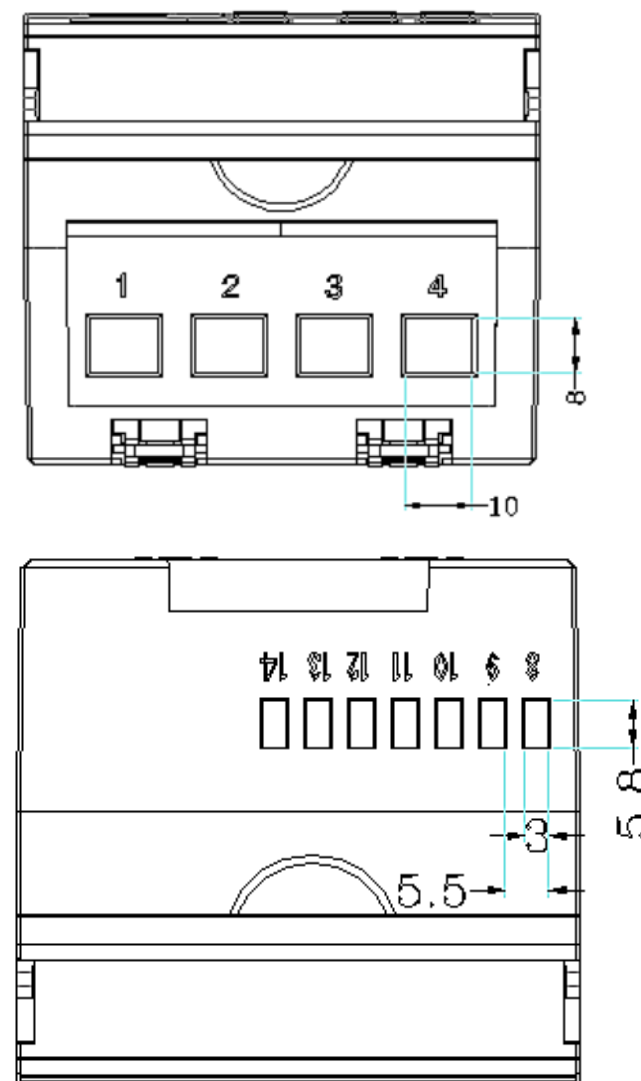
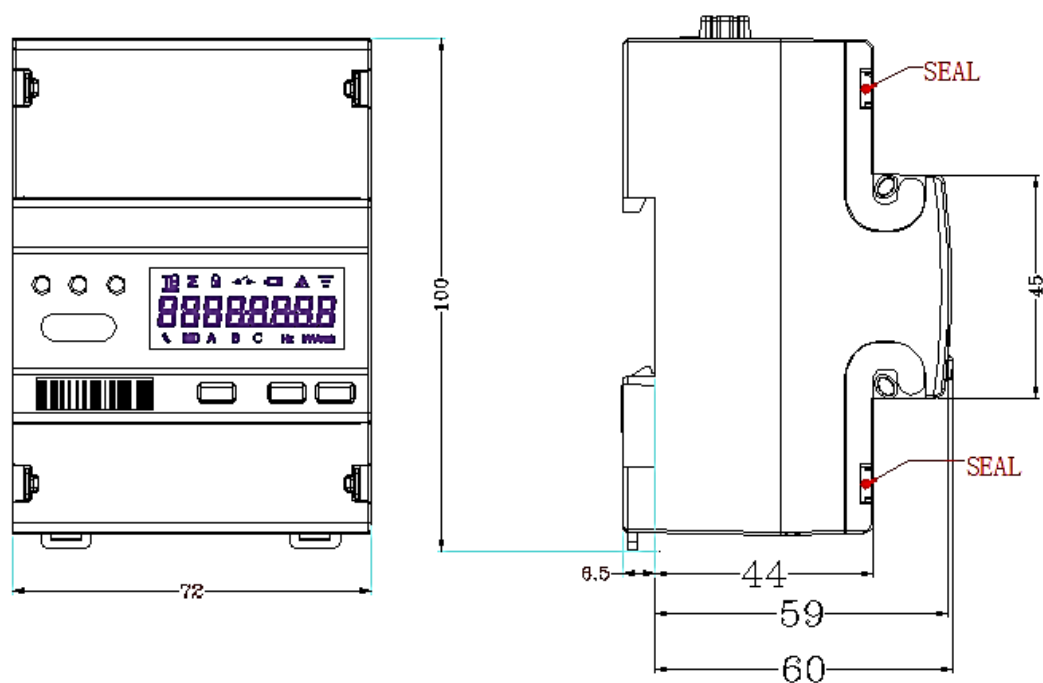
4.1 Performance criteria

Operating humidity	≤ 75%
Storage humidity	≤ 95%
Operating temperature	-25°C to +55°C Storage
Temperature	-40°C to +70°C
Humidity (Relative)	0 to 95%, non-condensing
International standard	EN50470-3 & IEC62053-21
Accuracy	Class B
Protection against penetration of dust and water	IP51
Insulating encased meter protective	Class II
Install place	Indoor Meter
Connection area main terminals	
Current terminals flexible	1× 0 - 25 mm ²
Other terminals flexible	1× 0 - 2.5 mm ²

4.2 Meter specification

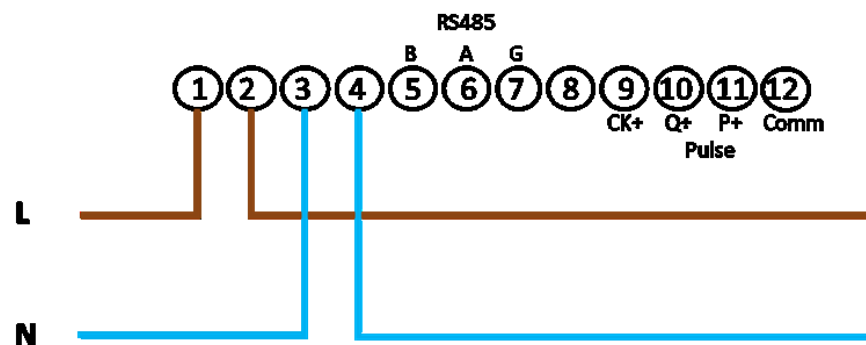
Voltage(v)	230V
Operational voltage	70% ~ 130% Un
-Iref	10A
-Itr	1A
-Imax	100A
-Imin	0.5A
-Ist	40mA
Power consumption of current circuits (VA)	< 0.01
Power consumption of voltage circuits(W)	< 1.3W
Frequency (Hz)	50
Memory back-up	EEPROM
Environment resistance to heat and fire	Terminal 960°C Cover 650°C
Time-keeping accuracy	<0.5s/day
Clock operating with battery	>15 years
Power off clock running time	>5 years
Upper	ABS+PC
Lower	ABS+PC
Pulse width (ms)	80
Pulse constant (imp/kWh)	1600
LED constant	1600
Width (mm)	72
Height (mm)	104.5
Depth (mm)	60

5. Dimensions and sealing points

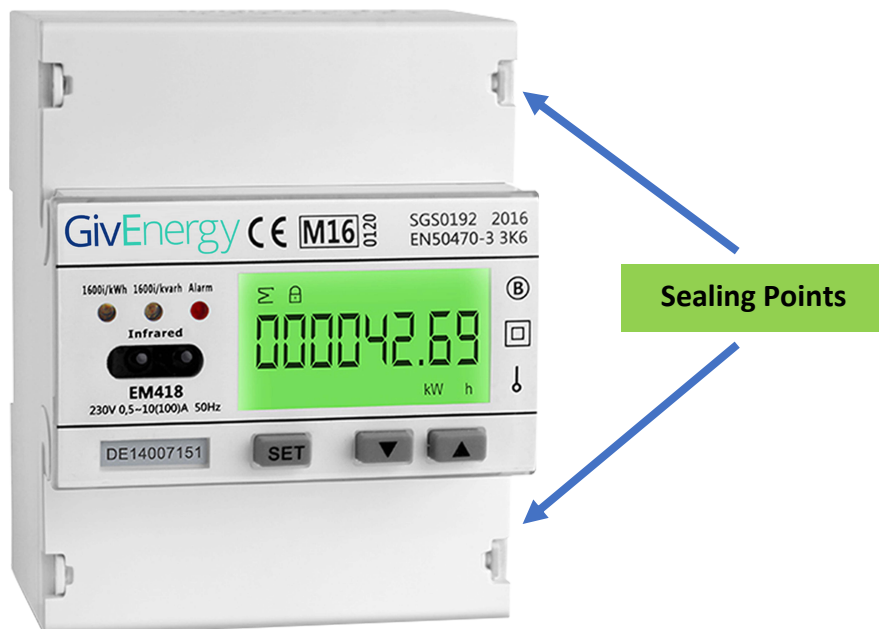


6. Wiring Diagram

Note: the following types of wiring diagrams show the energy meter terminals for pulsed output and the RS485 communication interface.

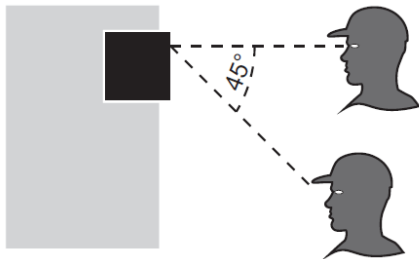


1/2	L1 in & Out		
3/4	Neutral in & Out		
5	RS485	B	TX/RX (-)
6	RS485	A	TX/RX (+)
7	RS485	GND	
8	Not Connected		
9/12	Clock test pulse output contact (12- , 9+)		
10/12	Reactive test pulse output contact (12- , 10+)		
11/12	Active test pulse output contact (12- , 11+)		



7. Meter reading

Operator viewing angle should be up to 45°



8. Main functions

8.1 Measuring Function

On the EM418'S front panel are three LED's, Active / Reactive energy pulse and current reverse indicator lights. The Meter can measure import active energy, export active energy & Bi-directional reactive energy. With time-division measurement functions, user can store or calculate active and reactive energy according to the time interval of 4 tariffs (Sharp, Peak, Even, Valley).

8.2 Demand function

The meter can calculate the forward and reverse active / reactive demand and the demand occurrence time for the last 12 months. Maximum demand can be set by with a Demand interval and slip frequency time (Parameters are programmable). Default: demand interval is 15 minutes, Slip Frequency is 1min. Can store maximum demand data for 12 periods.

8.3 Data Storage Function

The meter can store total active energy, Import / Export active total energy and TOU Tariffs
~ reactive Import / Export total energy including time-stamp, four-quadrant reactive total energy including time-stamp. Data point is at 0'clock at the end of a month or any day of a month on the hour.
The meter can store the current and previous 12 months data. When the meter has no power, all settlement related data will be saved for 10 years, other data is preserved for 3 years.

8.4 TOU (Time of Use) Function

The internal real time clock has automatic switch function. Calendar, clock and rates can be set or adjusted through RS485 or infrared interface (HHU). Up to 4 tariffs and 12 time intervals can be set within a natural day, minimum time interval is 15 minutes. Time interval can be set beyond Zero o'clock. The Meter also automatically accounts for leap-years.

8.5 Electricity Parameter Measurement

Measure and display voltage, current, active power, reactive power, apparent Power and power factors. Error is not more than $\pm 1\%$. The resolution of frequency is 0.01Hz.

8.6 Display Information

The EM418 meter has two cycle schemes:

Auto cycle display and manual button press.

When pressing the buttons, users can view parameters accordingly.

Button press will illuminate the LCD. Display cycle interval can be set @ 5~20 seconds, the default is 5 seconds.

The meter display schemes can be configured by IR and RS485.

The meter can display maximum 20 screens within auto cycle and 40 screens within the button press cycle.

Instantaneous values

NO	COMMENTS	READ	WRITE	BYTES	ADDRESS
1	VOLTAGE	Y	N	4	0010
2	FREQUENCY	Y	N	4	004E
3	CURRENT	Y	N	4	0052
4	ACTIVE POWER	Y	N	4	0092
5	APPARENT POWER	Y	N	4	00D2
6	REACTIVE POWER	Y	N	4	0112
7	POWER FACTOR	Y	N	4	0152

Total energy accumulator

NO	COMMENTS	READ	WRITE	BYTES	ADDRESS
8	ACTIVE ENERGY NET	Y	N	4	0700/0618
9	ACTIVE ENERGY IMPORT	Y	N	4	0800/0160
10	ACTIVE ENERGY EXPORT	Y	N	4	0900/0166
11	REACTIVE ENERGY IMPORT	Y	N	4	0A00/0162
12	REACTIVE ENERGY EXPORT	Y	N	4	0B00/0168

Energy accumulators divided into tariffs

NO	COMMENTS	READ	WRITE	BYTES	ADDRESS
13	ACTIVE NET TOTAL	Y	N	4	0700
14	ACTIVE NET TARIFF 1	Y	N	4	0702
15	ACTIVE NET TARIFF 2	Y	N	4	0704
16	ACTIVE NET TARIFF 3	Y	N	4	0706
17	ACTIVE NET TARIFF 4	Y	N	4	0708
18	ACTIVE IMPORT TOTAL	Y	N	4	0800
19	ACTIVE IMPORT TARIFF 1	Y	N	4	0802
20	ACTIVE IMPORT TARIFF 2	Y	N	4	0804
21	ACTIVE IMPORT TARIFF 3	Y	N	4	0806
22	ACTIVE IMPORT TARIFF 4	Y	N	4	0808
23	ACTIVE EXPORT TOTAL	Y	N	4	0900
24	ACTIVE EXPORT TARIFF 1	Y	N	4	0902
25	ACTIVE EXPORT TARIFF 2	Y	N	4	0904
26	ACTIVE EXPORT TARIFF 3	Y	N	4	0906
27	ACTIVE EXPORT TARIFF 4	Y	N	4	0908
28	REACTIVE IMPORT TOTAL	Y	N	4	0A00
29	REACTIVE IMPORT TARIFF 1	Y	N	4	0A02
30	REACTIVE IMPORT TARIFF 2	Y	N	4	0A04
31	REACTIVE IMPORT TARIFF 3	Y	N	4	0A06
32	REACTIVE IMPORT TARIFF 4	Y	N	4	0A08
33	REACTIVE EXPORT TOTAL	Y	N	4	0A00
34	REACTIVE EXPORT TARIFF 1	Y	N	4	0A02
35	REACTIVE EXPORT TARIFF 2	Y	N	4	0A04
36	REACTIVE EXPORT TARIFF 3	Y	N	4	0A06
37	REACTIVE EXPORT TARIFF 4	Y	N	4	0A08

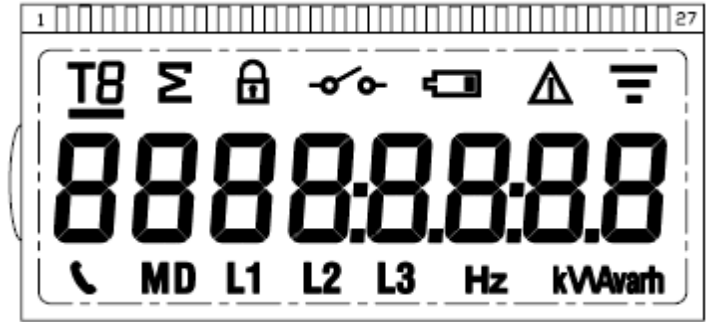
Production data and identification

No	COMMENTS	READ	WRITE	BYTES	ADDRESS
38	SERIAL NUMBER	Y	Y	4	FF00
39	MANUFACTURE CODE	Y	Y	4	FF02
40	TYPE CODE	Y	Y	2	FF04
41	HARDWARE VERSION	Y	Y	2	FF05
42	SOFTWARE VERSION	Y	Y	2	FF06

Settings

No	COMMENTS	READ	WRITE	BYTES	ADDRESS
43	DATE	Y	Y	4	FC00
44	TIME	Y	Y	2	FC02
45	MODBUS ID	Y	Y	2	0524
46	BAUD RATE	Y	Y	2	0525

LCD content



Description of LCD symbols displayed

	kWh - active energy kW - active power kvarh - reactive energy kvar - reactive power kVA—apparent power
	Total
	Unpermitted programming
	Battery status: 3.6V When the battery voltage is low flashes show (<3V)
	LCD alarm indicator
	Communication symbol
	Maximum demand
	Tariff: T1,T2,T3,T4
	Tariff of current time
	Last 1 Month Last 2 Months Last 3 Months

8.7 Switching on the Display

When the power is off, users can read the meter by pressing buttons on the panel.

The user can view readings which were displayed before power loss.

8.8 Summer Time Switch Enable/Disable

EM418 meter provides automatic summer/winter time switching at 02:00 on the last Sunday of March (forward 1 hour) and at 03:00 on the last Sunday of October (back 1 Hour). Summer time switch can be Enabled or Disabled by RS485 or IR port.

8.9 Communication

Infrared and RS485 Communication.

Physical layers are independent of each other and one communication channel cannot be affected by the other.

The meter can realize data acquisition, broadcast time settings, read, program and debug through hand-held terminals, data acquisition units, Ethernet, GSM/GPRS, test equipment and computers.


Communication protocols Modbus RTU standard.

RS485 circuit and energy meter internal circuit are electrically isolated with built in short protection.

RS485 communications transfer rates allow 1200bps, 2400bps, 4800 bps and 9600bps, default is 2400bps.

8.10 Alarm

Displays when the meters wiring is wrong.

Example: current reverse, the meter will display  and the ALARM led will be on.

8.11 Pulse output function

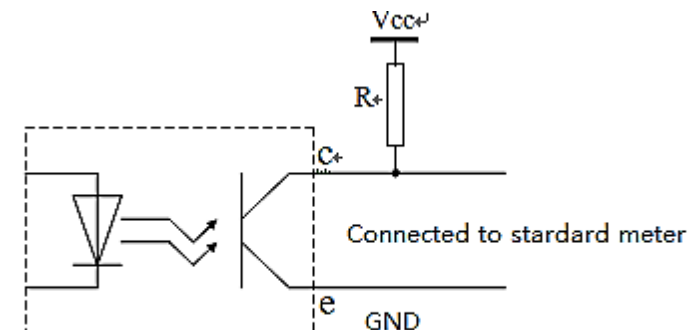
8.11.1 Active /reactive pulse output

EM418 smart meters are equipped with a pulse output which is fully separated from the live circuits. It generates pulses in proportion to the measured energy including the pulse output of active energy and reactive energy. 11 / 1 2

Test pulse output contact (P+ / P- 10 / 12)

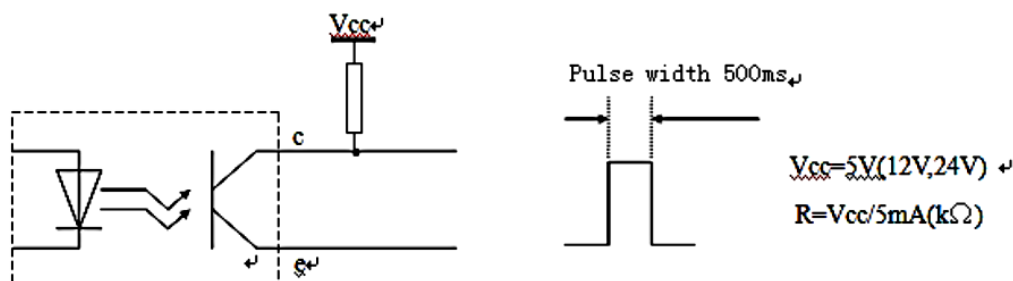
Test pulse output contact (Q+ / Q -)

The test pulse output is a polarity dependent, passive transistor output requiring an external voltage source for correct operation. This external voltage source, the voltage (U_i) should be 5-27v DC, and the maximum input current (I_{max}) should be 27mA DC. To connect the impulse output, connect 5-27v DC to connector 10 or 11 (anode), and the signal wire (S) to connector 12 (cathode). The meter pulses are indicated on the front panel.



8.11.2 Multi-function signal output

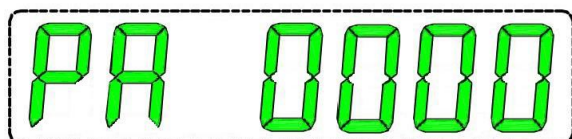
Terminal 9 with 12 is the Multi-function signal output port. The common status is 1Hz for meters clock accuracy testing. Testing diagram as below.



The terminals can be setup to switch to demand circle signal output and time output by RS485 and Infrared. When the meters power is off it will switch to 1Hz clock pulse output.

9. Programming

Holding the "SET" key pressed for at last 3 seconds starts menu programming mode. LCD shows:



9.1 Password Verify

PA followed by the currently memorized value.

"PA" means "Password", "0000" is the 4 digits to enter the Password. Press ▼ button to decrease the input value, and press ▲ to increase the input value. Press "SET" button to input digit and move to next digit. Once the correct password is entered, the meter will enter programming mode.

--- Please ensure to remember password if altered. ---

9.2 ID Setting

After the Password authentication, the meter will display the "ID XX" setup interface. As the following picture "Id 00" it means the current ID address is 00 (the ID slave address hex code)

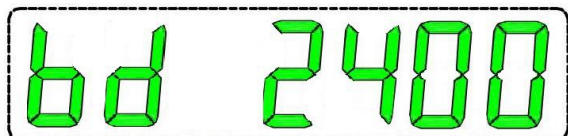


Press ▼ button to decrease the digits.

Press ▲ button to increase the digits.

press "SET" button to save the setup, the interface will switch to Baud rate setup automatically. Press "SET" to skip to next menu item if no changes are required.

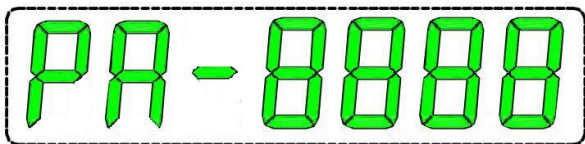
9.3 Baud rate setting



Press ▼ button to decrease the input value.
press ▲ button to increase the input value.
press the “SET” button to confirm.

1. Default Baud Rate is 9600.
2. 1200/ 2400bps / 4800bps/ 9600bps can be selected.

9.4 Password Setting




The meter will display the current password after entering the password setup menu, press the “SET” key to change the password. Use ▲ and ▼ button to input new password. After 30 seconds the meter will save the password you chose.

Remarks:

- 1 Do not forget the password that you have setup.
- 2 Press the buttons to check if setup is correct.
- 3 Password setup interface “-” symbol will blink.

10. Battery Replacement

When the battery symbol  on the display blinks. The battery is running low. Users can replace the battery as follows:

- ★ Open the meter top terminal cover.
- ★ Open the battery compartment cover.
- ★ Replace battery inside and connect positive pole with “+” & connect negative pole with “-”. Tighten the terminal screws.
- ★ Close both battery compartment and meter terminal covers.

11. Technical Support

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