

EM415 MOD Series

Smart Energy Meter

KEY FEATURES

Single Phase Meter

- 4 din modules; Standard DIN rail Format (DIN43880)
- EN50470-3 Class B; MID approved
- Isolate pulse output (DIN43864)
- LCD display, 6 integer 1 decimal
- Internal transformer
- Direct metering up to 100A
- Smart communication port,
- Front panel programming
- Memory back-up (EEPROM)

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.



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1. SAFETY NOTICE

The smart energy meter of Em415 series does not require special mechanical or electrical tools for its installation. Mounting position (with any angle of tilt) has no effect on the measurement functions of the meter. Connection of the meter must be made according to applicable wiring diagram. Incorrect connection of the meter to the electricity network causes major display problem and can also causes serious damage to the meter. Before starting meter operation, it must be ensured the local conditions of the energy system are consistent with data on the nameplate of the meter. Preferably use for the connection of shielded cables. Make sure that connecting cables are not damaged during installation of the meter are not energized and free of non-mechanical stress. Repairs when removing the cover of the meter, which is also under tension can be made only by a qualified electrician who is familiar with the associated risks. Capacitors in the meter may still be charged even if the meter is disconnected from all energy sources.

2. PACKAGE CONTENTS

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

3. TECHNICAL DESCRIPTION

EM415-Mod • Direct Connection • Modbus • Pulse Output

3.1 PERFORMANCE CRITERIA

Operating humidity	≤ 75%
Storage humidity	≤ 95%
Operating temperature	-25°C to + 55°C
Storage temperature	-40°C to +70°C
Humidity	0 to 95%, non-condensing EN50470-3 & IEC62053-21
Accuracy class	B
Protection against penetration of dust and water	IP51
Insulating encased meter protective class	<input type="checkbox"/>
Connection area main terminals:	
Current terminals flexible 1×mm ²	0-16mm ²
another terminal flexible 1×mm ²	0 - 2.5mm ²

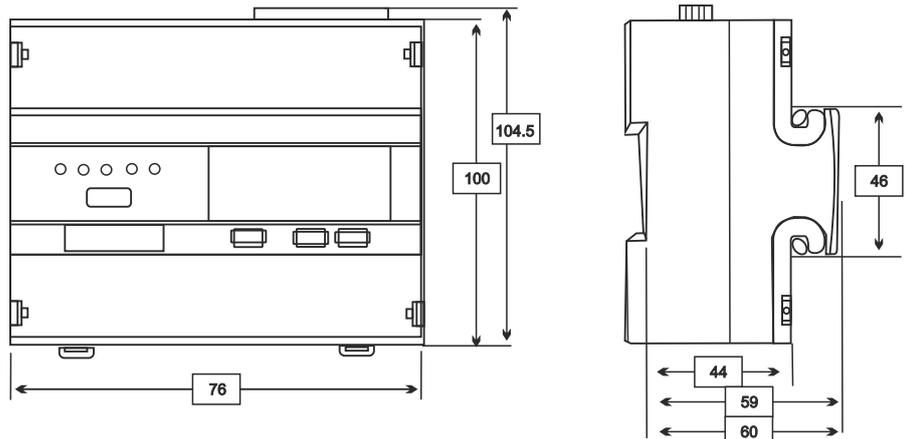
3.2 METER SPECIFICATION

Voltage(v)	230V
Operational voltage	70%-130%Un
- Iref	10A
- Itr	1A
- I _{max}	100A
- I _{min}	0.5A
- I _{st}	40mA
Power consumption of	
current circuits(VA)	< 0.01
voltage circuits(W)	< 1.3W
General data	
Frequency (Hz)	50
Memory back-up	EEprom
Environment resistance to heat and fire	Terminal 960? Cover 650?
upper	ABS+PC
lower	ABS+PC
Pulse output	
Pulse width(ms)	80
Pulse Value = 1kWh	1600 PULSES
LED constant	1600
WxHxD (mm)	76 x 104.5 x 60

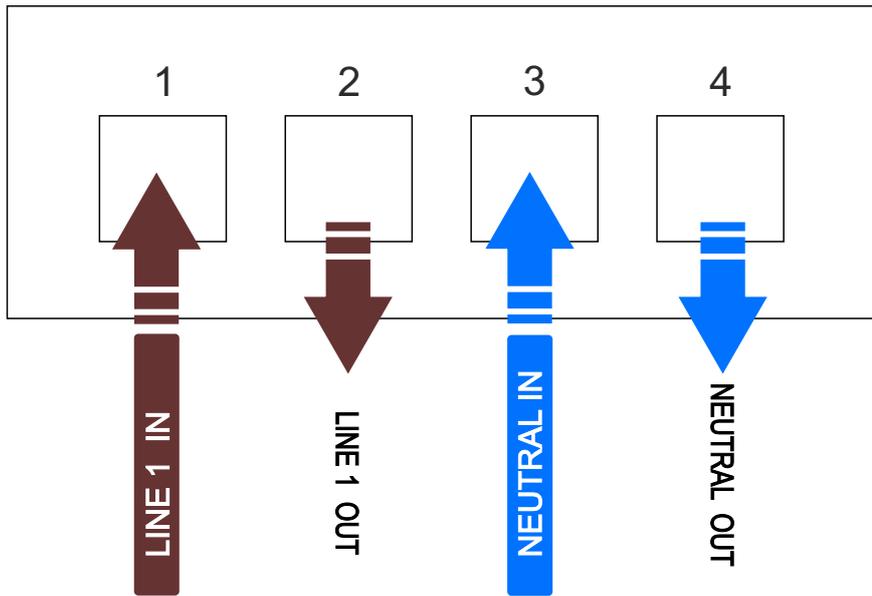
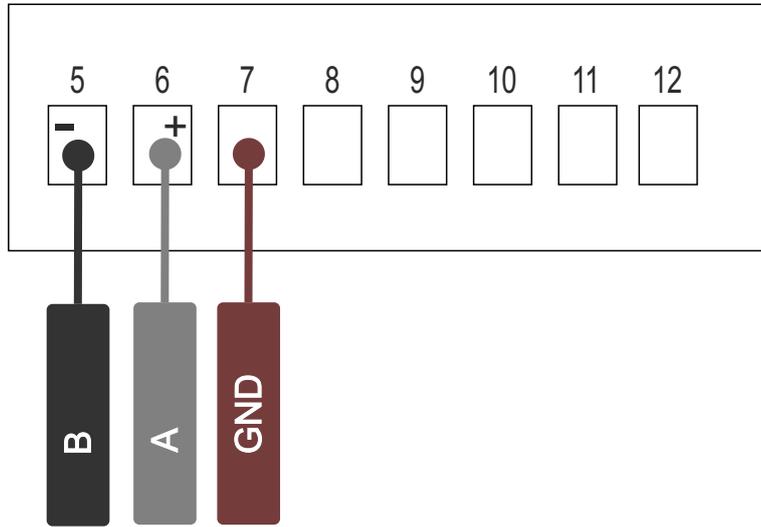
3.3 BASIC ERRORS

Value of current	Power factor	Errors	Test pulse number
I _{min}	1	±1.5%	4
I _{tr}	1	±1.0%	4
I _{tr}	0.5ind	±1.5%	4
I _{tr}	0.8cap	±1.5%	4
10I _{tr}	1	±1.0%	8
10 I _{tr}	0.5ind	±1.0%	8
10I _{tr}	0.8cap	±1.0%	8
I _{max}	1	±1.0%	12
I _{max}	0.5ind	±1.0%	12
I _{max}	0.8cap	±1.0%	12

4. DIMENSIONS



5. WIRING DIAGRAMS

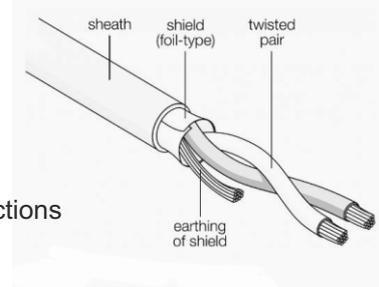


1 & 2 = Phase In & Out
 3 & 4 = Neutral In & Out
 5 & 6 = RS485 Communications Contact
 5 = TX/RX (-)
 6 = TX/RX (+)

7 = RS485 (⊥)
 11 & 12 = Test Pulse Output (12 - | 11 +)

5A. TYPE OF CABLE TO USE

The cable to be used is a shielded twisted pair (telephone type). AWG18 cable may be specified, but different types of cable with equivalent characteristics can be used. The twin cable consists of two conductors that are twisted together. This arrangement improves immunity to electromagnetic disturbances because the cable forms a series of successive coils, each of which faces in the opposite direction to the next one. In this manner any magnetic field in the environment traverses each pair of coils in opposite directions and its effect is therefore reduced.



5B. MODBUS BASICS

A Modbus RS485 connects a Master device to one or more Slave devices, which are measuring instruments with serial communication.

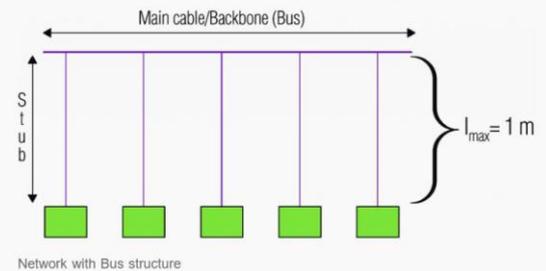
Each device has a communication port with two terminals, which can be marked A and B. In both terminals the communication cable is connected so that all the devices that form part of the communication are connected in parallel.

All the 'A' terminals must be connected together and all the 'B' terminals must be connected together, respectively.

Inverting the 'A' and 'B' connections of a device does not only prevent it from communicating but may also stop the entire communication system from working owing to incorrect direct (polarisation) voltage found on the terminals of the incorrectly connected device.

In order to avoid errors when many devices are connected, cables of the same colour should be used for all the connections to the terminals A and cables of the same colour should be used for all the connections to the terminals B of the various devices (e.g. white for A and blue for B).

Figure 1 shows an example of a correct Bus connection.



Network with Bus structure

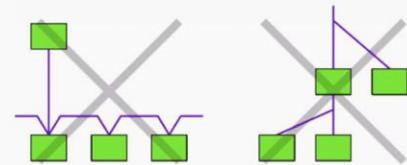


Figure 2 - Examples of incorrect Bus connections

5C. BAUD RATE & BIT RATES

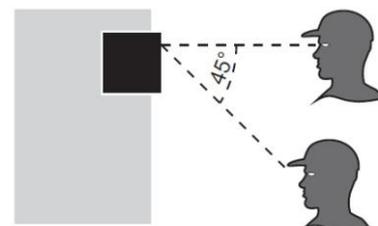
Bit rate is a measurement of the number of data bits (that's 0's and 1's) transmitted in one second. A figure of 2400 bits per sec means 2400 zeros or ones can be transmitted in one second, hence the abbreviation 'bps'. Baud rate by definition means the number of times a signal in a communications channel changes state.

One of the more common baud rates, especially for simple communication where speed is not critical, is 9600 bps. Other "standard" baud are 1200, 2400, 4800, 19200, 38400, 57600, and 115200. The higher a baud rate goes, the faster data is sent/received, but there are limits as to how fast data can be transferred.

Common Settings for Modbus - 9600 or 19200. Parity (Error Checking) is EVEN or NONE. ALL items MUST have the same settings otherwise they CANNOT communicate.

6. METER READING

The viewing angle Operator meter should be at 45°.



7. MAIN FEATURES

7.1 Front Panel

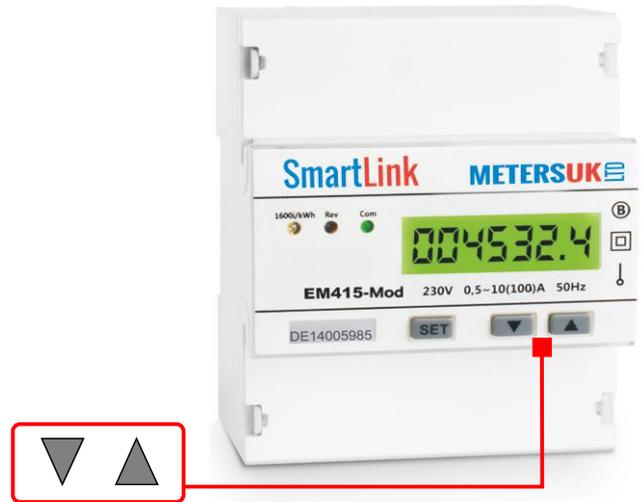
On the EM415'S front panel, there are three LED's: 1. Active energy 2. Reverse current 3. Communication light. The LCD display has 6 + 1 decimal points, which are used for recording consumption and cannot be reset to zero. The number system is based on units of 10 of which each unit is a kWh. The meter can also be read through Rs485 connection, PC software or a HHU (hand held unit).

FRONT PANEL BUTTONS:

Press the "up" and "down" buttons to display the various screens.

- Version number
- Total energy
- Modbus ID
- High 5 digit Serial number
- Low 7 digit serial number
- Baud rate
- Impulse constant.

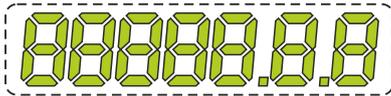
Without any operation, the meter will enter circle display automatically



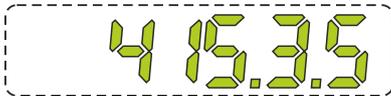
7.2 Display Function

When switched on the meter will run through all the current default settings. Each screen will display for 1 second.

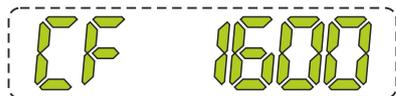
Screen 1: FULL SCREEN DISPLAY:



Version No. (Sc. 2):



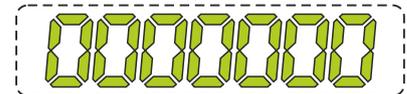
Impulse Constant (Sc.3):



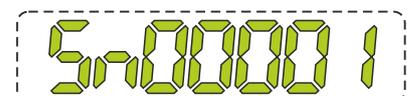
Baud rate (Sc 4):



Serial Number (low) (Sc. 5) : 0000000



Serial number (high) (Sc.6): 00001



Modbus ID (Sc 7):



7.3 Communication Function

RS485 Output

Protocol	Modbus RTU
Data format	8 data bit, Even, 1 stop bit
Baud rate	1200(default), 2400, 4800, 9600
Address range	1-256 User settable
Bus loading	64pcs
Cable	AWG18

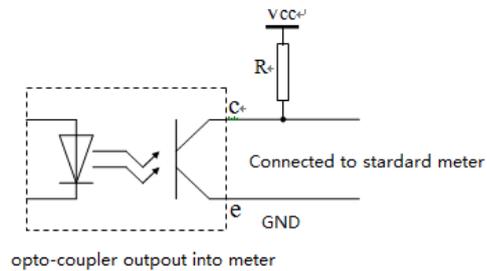
7.4 Pulse output

Smart din rail energy meter is equipped with a pulse output which is fully separated from the inside circuit. That generates pulses in proportion to the measured energy. They are test pulse output (pins 11 & 12). Usually, the test pulse output is used as testing accuracy or reading purpose in close quarters.

The test pulse output is a polarity dependant, passive transistor output requiring an external voltage source for correct operation.

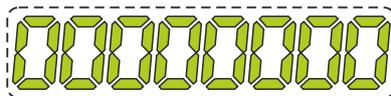
For this external voltage source, the voltage (U_i) should be 5-27V DC, and the maximum input current (I_{max}) should be 27mA DC. To connect the impulse output, connect 5-27V DC to connector 11 (anode), and the signal wire (S) to connector 12 (cathode).

The meter pulses are indicated on the front panel



Complete the wiring and switch the meter on.

Default screen will show

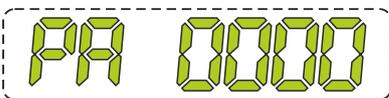


8. PROGRAMMING

Press and HOLD the “SET” key for 3 seconds. The meter will go into the programming mode.

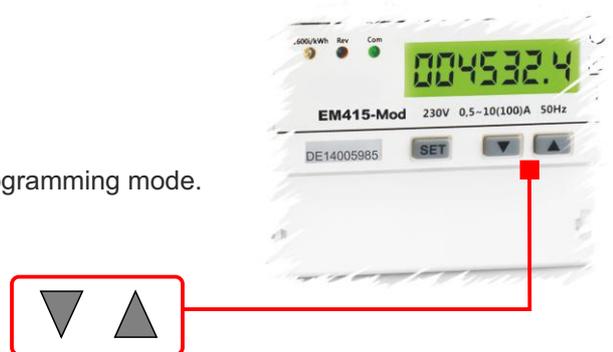
8.1 Password Verification

“PA” stands for “Password”, “0000” are the 4 digits of the Password.



Set the password by pressing the “Down” button to decrease the digit value, or “Up” to increase the value.

Password is 8888 Press the “▲” button eight times to get to the 8th digit, press “SET” button to move onto the next digit. The next digit should automatically go to 8, if not repeat the previous step, otherwise press the “SET” button **four** times to move onto the next setting.



8.2 ID Setting

After entering the password the meter will ask for the address range.

Example below "Id 00" shows that the current ID address is 01 (the ID address is in hex code)
Address should be between 1 - 250



Use "Down" button to decrease the digit or "Up" button to increase the digit value. Press the "SET" button to save digit move onto the next digit.

8.3 Baud Rate Setting

Press "SET" button to bypass entering the Baud rate.

Baud Rate = bits per second. This is the rate that devices exchange information online (on a RS485 network)

All devices MUST BE SET at the SAME rate otherwise they cannot communicate.

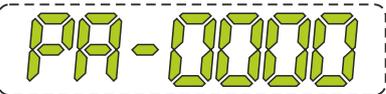
Common Baud rate settings for Modbus : 1200; 2400; 4800; 9600

Press "Down" and "Up" buttons to select the communication baud rate, press "SET" button to save the setup.
The interface will enter CT setup.

Note :
The default baud rate will be set at 1200bps.



PASSWORD SETTING :



The meter will display the current password.

You DO NOT have to change the current password (8888), however if you wish to change it use the "Up" and "Down" buttons to change each digit. Once happy with the chosen number press set to move to the next digit.

Once complete, the meter will automatically save the password after 30 seconds or when powered off..

PLEASE NOTE:

It is important to take a note of the new password as you cannot bypass the system. If the password is not crucial, leave the password as the default (8888)

9. TECHNICAL SUPPORT

Any questions, please contact: Meters UK 01524 555 929

OTHER :

Branches must be no longer than 1200m. Longer branches could cause signal reflections and generate disturbances and consequent errors in the reception data.

Max. distance of main cable: 1.2 km
Max number of devices: 64 including the master