

# LEM012SD DIGITAL DISPLAY KWH METER LEM012SS ANALOG DISPLAY KWH METER 230V | 5-40A | 50Hz | class 1

DIN rail single phase two wire energy meter

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## User manual



## 1.1 Safety instructions

### Information for Your Own Safety

This manual does not contain all of the safety measures for operation of the LEM012SD/LEM012SS, because special operating conditions, local code requirements or local, national or international regulations may necessary to take further measures. It does contain information which must be adhered to in the interests of your own personal safety and to avoid material damages.



#### Warning

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



#### Caution

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

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### Qualified personnel

Commissioning and operation of the equipment (module, device) described in this manual may only be performed by qualified personnel. Qualified personnel in the sense of the safety information contained in this manual are persons who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and regulatory standards.

### Use for the intended purpose

The single phase energy meter may only be used for the application cases specified in the catalog and the user manual and only in connection with devices and components recommended and approved by SEP Europe.

### Proper handling

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

- Use only isolated tools.
- Do not connect while circuit is live (hot).
- Do not connect the meter to a 3 phase - 400VAC – network.
- Place the meter only in dry surroundings.
- Do not mount the meter in an explosive area or exposed to dust, mildew and insects.
- Make sure the used wires are suitable for the maximum current of this meter.
- Make sure the AC wires are connected correctly before activating the current/voltage to the meter.
- Do not touch the meter connecting clamps directly with your bare hands, with metal, blank wire or other material as you will have the chance of an electric shock and a possible chance for health damage.
- Make sure the protection cover is placed after installation.
- Installation, maintenance and repair should only be done by qualified personnel.
- Never break the seals and open the front cover as this might influence the

- functionality of the meter, and will be avoid any warranty.
- Do not drop, or allow physical impact to the meter as there are high precision components inside that may break or render the meter measure accurately.

### **Exclusion of liability**

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 or omissions contained in the information given. The data in this manual are checked regularly and the necessary corrections are included in subsequent editions. We are grateful for any improvements that you care to suggest.

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## **1.2 Foreword**

Thank you for purchasing the SEP LEM012SD or LEM012SS DIN rail single phase two wire energy meter. The SEP LEM012SD and the LEM012SS energy meter is an advanced type electronic energy meter. With the SEP product range we have introduced a large scale of energy meters on the market suitable for 110VAC to 400VAC (50 or 60Hz)

Although we produce the SEP LEM012SD and the LEM012SS meter according to IEC 62053-21 and our accurate quality inspection there might always be a possibility that your product shows a fault or failure for which we do apologize. Under normal conditions your product should give you years of benefit and pleasure. In case there is a problem with the energy meter you should contact your dealer immediately. All energy meters are sealed with a special seal. Once this seal is broken there is no possibility to claim (for) warranty. Therefore NEVER open an energy meter or break the seal of the energy meter. The warranty time is 12 months, after purchase, and only valid for construction faults.

### 1.3 Performance criteria:

Operating humidity	$\leq 75\%$
Storage humidity	$\leq 95\%$
Operating temperature	$-10^{\circ}\text{C} - +50^{\circ}\text{C}$
Storage temperature	$-30^{\circ}\text{C} - +70^{\circ}\text{C}$
International standard	IEC 62053-21
Accuracy class	1
Protection against penetration of dust and water	IP51
Insulating encased meter of protective class	II

### 1.4 Specifications:

Nominal voltage (Un)	230V AC
Operational voltage	161 - 300V AC
Insulation capabilities:	
- AC voltage withstand	2KV for 1 minute
- Impulse voltage withstand	6KV - 1.2 $\mu$ S waveform
Basic current (Ib)	5 A
Maximum rated current (Imax)	32 A
Operational current range	0.25A - 32A
Over current withstand	960A for 0.01s
Operational frequency range	50Hz $\pm 10\%$
Internal power consumption	$\leq 2\text{W} / 10\text{VA}$
Test output flash rate (Red LED)	2000 pulses per kWh (0.5Wh/imp)
Pulse output rate (pins 20 & 21)	2000 pulses per kWh (0.5Wh/imp)
Pulse supply current	Ui max=27V Ii max 27mA
Power supply indicator (Green LED)	Meter is connected and working OK
Consumption indicator (Red LED)	Flashing at load running
Data display mode	7+1 digits for LCD display (for the LEM012SS 5 +1digits for mechanical display 5 integer 1 decimal.
Data save	The data can be stored more than 20 years when power cut.
Wire connection	Up to 10mm <sup>2</sup> stranded copper wire

### 1.5 Intrinsic errors:

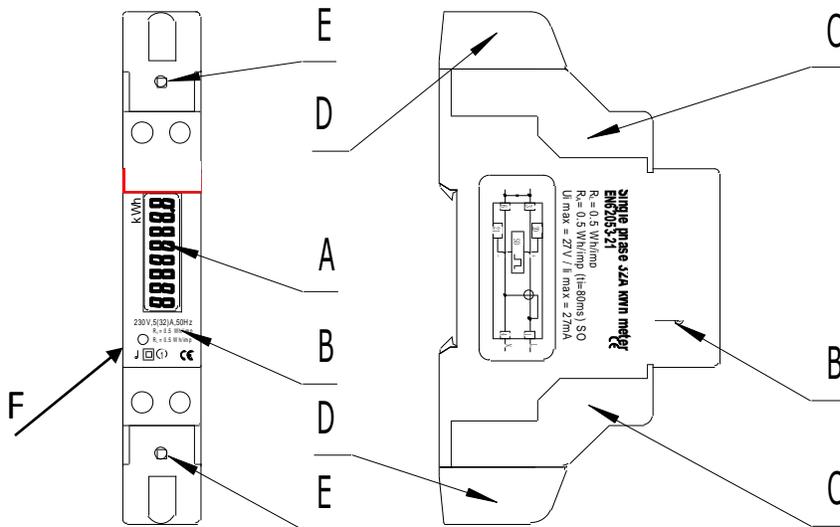
0.05Ib	Cos $\phi$ = 1	$\pm 1.5\%$
0.1Ib	Cos $\phi$ = 0.5L	$\pm 1.5\%$
	Cos $\phi$ = 0.8C	$\pm 1.5\%$
0.1Ib - Imax	Cos $\phi$ = 1	$\pm 1.0\%$
0.2Ib - Imax	Cos $\phi$ = 0.5L	$\pm 1.0\%$
	Cos $\phi$ = 0.8C	$\pm 1.0\%$
1.Ib - Imax	Cos $\phi$ = 1	$\leq 1\%$

## 1.6 Description

A	Register (LCD display)
B	Meter cover
C	Terminal block
D	Protection cover
E	Security hasp
F	Indicator Light

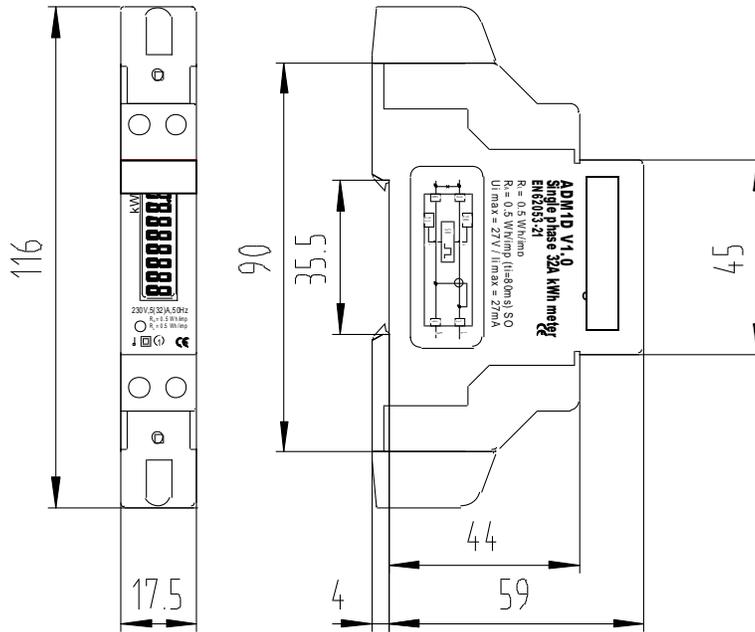
## Material

Window of register	PC inflammable retarding
Case	PA inflammable retarding
Terminal block	PA inflammable retarding
Protection cover	PA inflammable retarding



## 1.7 Dimensions

Height	116 mm
Width	17.5 mm
Depth	59 mm
Weight	0.12 Kg (net)



## 1.8 Installation



### CAUTION

- Turn off and lock out all power supplying the energy meter and the equipment to which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that power is off.



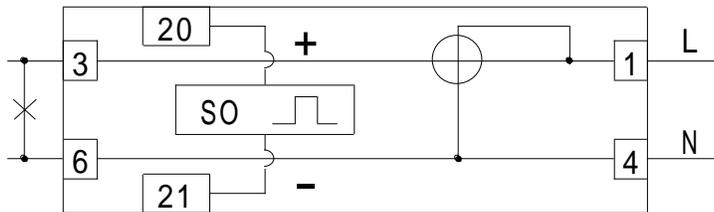
### WARNING

- Installation should be performed by qualified personnel familiar with applicable codes and regulations.
- Use isolated tools to install the meter.
- Fuse or thermal cut-off or single-pole circuit breaker can't be fitted on the supply line and not the neutral line.
- Case is sealed, failure to observe this instruction can result in damage for meter.
- No warranty if case is opened or removed seal or damaged.

- We recommend that the connecting wire which is used to connect the meter to outside circuit should be sized according to local codes and regulations for the ampacity of the circuit breaker or overcurrent device used in the circuit.
- An external switch or a circuit-breaker should be installed on the inlet wire, which will be used as a disconnection device for the meter. And it is recommended that the switch or circuit-breaker is near the meter. The switch or circuit-breaker should comply with the specifications of the building electrical design and all local regulations.
- An external fuse or thermal cut-off which used as a overcurrent protection

device for the meter must be installed on the supply side, and it is recommended that the overcurrent protection device is near the meter so that it is convenient for the operator. The overcurrent protection device should comply with the specifications of the building electrical design and all local regulations.

- This meter can be installed indoor directly, or in a waterproof meter-box outdoor, in compliance with the local codes and regulations.
- The meter has to be installed in a good ventilated and dry place.
- The meter has to be installed in a protection box in dangerous or dusty environment.
- The meter can be installed and used after being tested in accordance with the specifications of the building.
- The meter can be installed on a 35mm DIN rail.
- The best way to install in an available height so that it is easy to read.
- When the meter is installed in an area with frequent surges due to e.g. thunderstorms, welding machines, inverters etc, protect the meter with applicable Surge Protection Devices.
- After finishing installation, the meter must be sealed to prevent tampering.
- Connection of the wires should be done in accordance with the underneath connection diagram.



- |           |                       |
|-----------|-----------------------|
| 1         | Inlet phase line      |
| 4         | Inlet neutral line    |
| 3         | Outgoing phase line   |
| 6         | Outgoing neutral line |
| 20 and 21 | Pulse output contact  |

## 1.9 Operating

### Working indication

There is a white LED which has two colors (green and red) while burning in the front panel of LEM012SD and LEM012SS. When the meter works normally, this LED will display green. When meter is going wrong or no power supply, the LED will turn off.

### Consumption indication

There is a white LED which has two colors (green and red) while burning in the front panel of LEM012SD or LEM012SS. When consumption happens, the LED will flash and display red. The more quickly LED flash, the more consumption there is. For this LED, the flash rate is 2000 impulses per kWh (0.5Wh/imp).

### Reading the meter

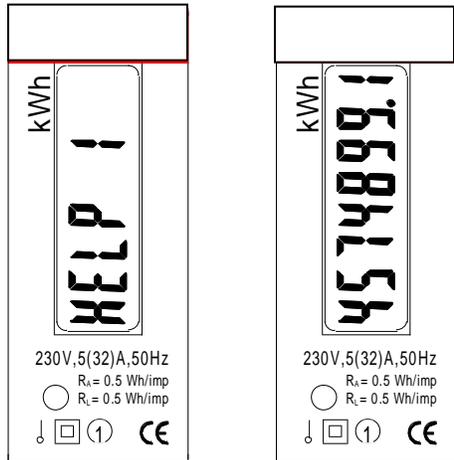
LEM012SD / LEM012SS is equipped with a white backlight LCD display. During the normal working hours, the meter will be burning this white backlight all the time. The display will show the following energy data and indication message.

**a) Current total energy**

When the meter is in normal working, it will display only 7 +1 energy data with. The unit is kWh. These data cannot be reset to zero by the user. Example: Total energy is 4574899.1 kWh.

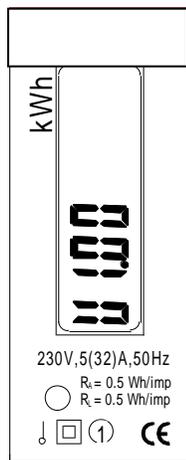
**b) Indication for reverse use**

When the meter is wrong connected with the incoming line and the outgoing line reversed. Every 3 seconds the LCD display will show HELP 1.



**c) Meter version**

When the meter is switched on (the power), it will display the meter version for 3 seconds.



**Pulse output**

The LED on the front of the meter is pulsing 2000 p kWh (0,5 wh/1mp). The LEM012SD and the LEM012SS DIN rail energy meter is equipped with an pulse output which is fully separated from the inside circuit. The generates pulses in proportion to the measured

energy for remote reading purposes and accuracy testing. The 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 ( $I_{max}$ ) is 27mA DC. To connect the impulse output, connect 5-27V DC to connector 20 (anode), and the signal wire (S) to connector 21 (cathode). The meter pulses 2000 per kWh (0.5Wh/imp).

## 1.10 Troubleshooting



### CAUTION

- During repair and maintenance, do not touch the meter connecting clamps directly with your bare hands, with metal, blank wire or other material as you will have the chance of an electricity shock and a possible chance for health damage.
- Turn off and lock out all power supplying the energy meter and the equipment to which it is installed before opening the protection cover to prevent the hazard of electric shock.



### WARNING

- Maintenance or repair should be performed by qualified personnel familiar with applicable codes and regulations.
- Use insulated tools to maintain or repair the meter.
- Make sure the protection cover is in place after maintenance or repair.
- Case is sealed, failure to observe this instruction can result in damage for meter.

Problem	Check	Solution
No light for the Power supply indicator.	Is AC power supply connected to the meter ?	Check switch or circuit-breaker and fuse or thermal cut-off.
	Is the 1 and 4 connecting correct ?	Reinstall terminal screws on the 1 and 4. Make sure all screws are fixed. Then there should be a 230V 50Hz AC voltage between the terminal screws on the 1 and 4 when power supply is input.
	Maybe there is a fault in the inside circuit.	Contact a qualified technician. When necessary replace the meter.

Continue

<b>Problem</b>	<b>Check</b>	<b>Solution</b>
No light for the consumption indicator.	<p>Is the load running?</p> <p>Is the operating power too low?</p> <p>Maybe there is a fault in the inside circuit.</p>	<p>Only when load is running, this LED will flash.</p> <p>If the operating power is too low, the spacing interval of flashing will be prolonged so that people is under the delusion that LED isn't burning.</p> <p>Please connect with technical support to replace this meter.</p>
The register can't run.	<p>Is there a power supply inside the meter?</p> <p>Is the operating power too low?</p> <p>Maybe there is a fault in the inside circuit.</p>	<p>Check that the power supply indicator is burning.</p> <p>If the operating power is too low, the spacing interval of running will be prolonged so that people is under the delusion that register can't run.</p> <p>Contact a qualified technician. When necessary replace the meter</p>
LCD backlight can't lit.	<p>Is there power supplied to the meter?</p> <p>Maybe there is a fault in the inside circuit.</p>	<p>Check that the power supply indicator is burning.</p> <p>Please connect with technical support to replace this meter.</p>
No pulse output.	<p>Is DC power supply connected to the meter?</p> <p>Is the connecting correct?</p> <p>Maybe there is a fault in the inside circuit.</p>	<p>Check the external voltage source (Ui) is 5-27V DC.</p> <p>Check correct connecting: connect 5-27V DC to connector 20 (anode), and the signal wire (S) to connector 21 (cathode).</p> <p>Contact a qualified technician. When necessary replace the meter.</p>
Pulse output rate wrong.	<p>Maybe there is a fault in the inside circuit.</p>	<p>Please connect with technical support to replace this meter.</p>

## 1.11 Technical support

For questions about our products please contact:

- SEP dealer in your in your region
- Your local SEP distributor
- Email: mail@sep-europe.nl

**[www.sep-europe.nl](http://www.sep-europe.nl)**

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