ELECTRONIC THREE-PHASE WATT-HOUR METER WITH DIGITAL COMMUNICATION
LS31 type

APPLICATION
Multi-tariff three-phase watt-hour meters of LS31 type, with wireless readout, are digital instruments destined for the measurement of energy in 3-phase 4-wire power networks with the simultaneous display of measured quantities and digital transmission of their values. They can be applied for the settlement of accounts with power stations, supervision of industrial processes, settlement of accounts in dwelling houses with sub-occupiers, commercial and industry buildings, and as elements of energy managing systems.

They are resistant to the action of strong external magnetic fields. When they are submitted to a strong magnetic field, they ensure a correct measurement of electrical energy consumption and the recording of magnetic fields with the transmission of information through the wired or wireless interface. This series of new LS31 electronic energy watt-hour meters enables the elimination of the effect of magnet use to falsify watt-hour meter indications.

Watt-hour meters are equipped with the RS-485/MODBUS communication interface and radio transmitter, what gives the possibility of a continuous monitoring, data archiving, visualisation and report. Thanks to the load measurement in each of L1, L2, L3 phases, they enable the analyse of network load asymmetry.

The most important features of the Lumel-Control software are: full opening to data exchange with external systems and devices, service of popular data exchange protocols like: OPC, DDE, ODBC-SQL, MODBUS, LonWorks, GazModem, and data exchange with any data bases of SQL type.

Extra functions
- display of customer code,
- display of the current date and real time,
- calendar of holidays,
- storage of annual program of the day division into time zones, separately for day-offs with the possibility to introduce changes by means of the photo-electric coupling,
- automatic closing of account periods in the given day of the month at a defined time or on request, on the readout day (photo-electric coupling),
- recording of the external magnetic field presence,
- sequential display of measured quantities on the LCD display:
  - active energy in time zones and summary,
  - energy at the end of the account period in time zones and summary, date and time of the account period closing,
- 15 or 60 minutes’ maximal averaged power, with a time index,
- cumulated power.

ANTITHEFT PROTECTION
LS31 electronic 3-phase watt-hour meters are resistant to strong external magnetic fields of 640 kA/m intensity.
In watt-hour meters of LS31 series, a specially designed antitheft protection is applied in the mechanical design system, electronic system and in the software.

The specially designed LS31 watt-hour meter cover makes impossible its deflection in order to interfere in electronics. The cover is fixed by means of two screws, what gives a fast connection additionally protected by leaden seals. There is a rubber seal under the cover, protecting against water and dust infiltration. The watt-hour meter terminal shield is screwed by two screws to the terminal box which can be additionally sealed with lead. Moreover, the watt-hour meter has a sensor signaling any interaction by a strong magnetic field (e.g. a neodymium magnet). After such an interaction by an external magnetic field, the occurrence date and the interference duration are stored in the watt-hour memory. Any interference is signaled by a flickering symbol on the display.

LS31 watt-hour meters makes energy measurements also when leading wires has been exchanged.

ADVANTAGES AND FEATURES RESULTING FROM THE APPLICATION OF LS31 WATT-HOUR METERS
- accuracy class 1 or 2 and stability in a large range of loads and temperatures,
- internal clock to switch tariffs,
- change of tariff parameters by the button on the frontal cover or through the opto-coupling,
- ca 20 years working life,
- measurements and monitoring of energy consumption in different periods and parameter storage.
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kinds of network</strong></td>
<td>4 - wire</td>
</tr>
<tr>
<td><strong>Watt-hour meter connection way</strong></td>
<td>direct</td>
</tr>
<tr>
<td><strong>Reference voltage U_n</strong></td>
<td>3 x 230/400 V</td>
</tr>
<tr>
<td><strong>Basic current I_b</strong></td>
<td>5 or 10 A</td>
</tr>
<tr>
<td><strong>Maximal current I_max</strong></td>
<td>40, 60 or 100 A</td>
</tr>
<tr>
<td><strong>Accuracy class</strong></td>
<td>1 or 2</td>
</tr>
<tr>
<td><strong>Working temperature range</strong></td>
<td>-25...55°C</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-30...85°C</td>
</tr>
<tr>
<td><strong>Readout field</strong></td>
<td>special LCD display</td>
</tr>
</tbody>
</table>

**Communication couplings:**
- optical interfaces acc. to EN 62056-21
- RS-485, MODBUS protocol,
- RS-232, MODBUS protocol,
- radio: transmission frequency: 433.92 MHz
  - band width: 19.04 kHz
  - emission power: under 10 mW
  - baud rate: 10 bit/s
  - FSK modulation

**Output of energy impulses**
- output of OC type, passiv acc. to EN 62053-31

**Pulse constant of the OC type output**
- 1000 imp/kWh

**Pulse constant of the LED diode**
- 1000 imp/kWh

**Number of tariff zones**
- 1...

**Accessible tariffs**
- G11, G12, G12w, G13, C12a, C12b, C12w, C22a, C22b, User

**Power consumption:**
- in voltage circuit ≤ 3.3 VA/phase
- in current circuit ≤ 0.02 VA

**Starting current**
- 0.004 I_b

**Level of voltage presence detection**
- 0.9 U_n

**Fastness against constant external magnetic field**
- 640 kA/m

**Resistance against surge voltage**
- 4 kV

**Watt-hour meter reaction against phase decays:**
- storage of data and watt-hour meter state when a 3-phase decay occurs in the non-volatile memory FRAM,
- storage life: 15 years,
- work continuation without 1 or 2 phases.

**Battery life**
- min. 10 years

**Clock accuracy**
- ± 3 s/day

**Standards fulfilled by the watt-hour meter**
- EN 62052-11, EN 62053-2

**Approved by the Central Measurement Office**
- PLT 0648

**Protection degree ensured by the housing**
- IP 54

**Overall dimensions (H × W × D)**
- 328 × 176 × 65 mm

**Weight**
- ca 2.0 kg

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**ORDERING CODES**

<table>
<thead>
<tr>
<th>Watt-hour meter</th>
<th>LS31 - X X XX X X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic and maximal current:</td>
<td></td>
</tr>
<tr>
<td>5 (40) A</td>
<td>................................. 1</td>
</tr>
<tr>
<td>5 (60) A</td>
<td>................................. 2</td>
</tr>
<tr>
<td>10 (100) A</td>
<td>................................. 3</td>
</tr>
<tr>
<td>5 (100) A</td>
<td>................................. 4</td>
</tr>
<tr>
<td>on order</td>
<td>................................. X</td>
</tr>
</tbody>
</table>

**Input voltage:**
- 3 x 230/400 V ................................. 1
| on order | ......................................... X |

**Communication interface:**
- optical port ........................................... 00
- optical port + output of OC type .................. 01
- optical port + RS-485 MODBUS protocol ........... 02
- optical port + RS-232 MODBUS protocol .......... 04
- optical port + radio module .......................... 20
| on order | ......................................... XX |

**Accuracy class:**
- 1 .................................................................. 1
- 2 .................................................................. 2

**Acceptance tests:**
- without legalisation ........................................ 8
- with legalisation ............................................. 7
| acc. customer’s agreement | ......................................... X |

**ORDERING EXAMPLE**

LS31 3 1 02 1 7 means:
- a watt-hour meter of LS31 type
  - basic and maximal current: 10 (100) A
  - input voltage: 3 x 230/400 V
  - with an optical port + RS-485 MODBUS protocol
  - accuracy class: 1
  - with legalisation