REDZ
SMART COMMUNICATION

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LKM Series Electricity Meter Protocol to Modbus Gateways

- **Reads up to 32 meters with IEC 62056-21 (Mode C) and DLMS/COSEM**
- **Meter data as Modbus TCP or Modbus RTU registers and MQTT messages**

2 x 10/100Base-T(X) ports, 1 x RS232 and 1 x RS485 serial ports, option for BPL (Broadband Power Line) link

The LKM Series Electricity Meter Protocol to Modbus Protocol Gateways read electricity meters with the IEC 62056-21 (Mode C) and DLMS/COSEM protocols and convert the meter data to Modbus registers. The meter data can also be sent to an MQTT broker at the same time. Typical applications: automated meter reading, telemetry, energy management.

Two Device Functions

1 **Serial Electricity Meter to Modbus TCP Gateway (and MQTT Publisher):**
meters on the RS232 or RS485 port; the meter data is given out as Modbus TCP (and MQTT).

2 **TCP/IP Electricity Meter to Modbus RTU Gateway (and MQTT Publisher):**
meters on the network (IP address and TCP port of each meter); the meter data is given out as Modbus RTU on the RS232 or RS485 port (and MQTT).

LKM615 and LKM616 offer only the first function.

Key Figures

32 / 10 / 1
meter rows: standard / Lite / LKM615

48 OBIS codes
per meter profile, 6 profiles, set by the user

IEC 62056-21 + DLMS/COSEM
meter protocols, Mode C; also DLMS/COSEM with IEC 62056-21 opening

10 Modbus TCP clients
at the same time; or Modbus RTU up to 460800 baud

MQTT
publisher, two data formats, next to Modbus

~20 / s, 0.5 s average
Measured 22.2 h at full load on a LoRaWAN model, MQTT on: Modbus TCP, 10 clients - requests answered per second; 10 timeouts in 1.6 M (power cut)

Main Features

Meter reading

- Reads electricity meters with IEC 62056-21 (Mode C), DLMS/COSEM, and DLMS/COSEM with IEC 62056-21 opening.
- Meter rows: 32 on the standard models, 10 on the Lite models, 1 on the direct connection models.
- Up to 48 OBIS codes per meter profile, 6 profiles (IEC 62056-21, Landis+Gyr DLMS, Actaris/Itron, Iskra DLMS, Cewe DLMS, Generic DLMS), all set from the web interface.
- Start baud rate selectable from 300 to 115200 baud for each meter.
- Several IEC meters on one RS485 line: a read-out that comes from another meter than the one asked is not stored.
- Negative meter values keep their sign; a value too large for the 32-bit register gives a fixed limit value.

Modbus TCP and Modbus RTU

- Function code 03 (Read Holding Registers); every value is 32 bits = 2 registers, 48 values per meter row.
- Modbus TCP server with up to 10 clients at the same time.
- Modbus RTU baud rate selectable from 300 to 460800 baud.
- White list or black list IP filter with up to 20 IP addresses (in the Modbus TCP function).

MQTT

- MQTT publisher with two data formats: OBIS VALUES AS OBJECTS and OBIS VALUES AS MODBUS FRAME.
- In both device functions, at the same time as Modbus; one message per meter row after a successful reading.
- MQTT 3.1.1 over plain TCP (no TLS encryption), QoS 0.

Web interface and management

- Embedded web interface: meter reading, Modbus communication and OBIS-to-Modbus mapping status, meter read-out data.
- Device Status overview cards for the meters, Modbus and MQTT, each with a green, amber, red or grey dot.
- Firmware update over the web interface; 2 firmware banks in the device (1 active), the previous firmware can be started again.
- An update carries the settings over only when the first two numbers of the version are the same.
- DHCP server; configuration backup and restore as a file.

Extra Features of the LKM655 (BPL)

- 2 x 10/100Base-T(X) ports + 1 x BPL link; wide range 3 phase AC input.
- Up to 30 Mbps PHY rate on BPL with up to 10 hops and 1000 nodes.
- Up to 432 sub-carriers from 2 to 28 MHz analog bandwidth; LDPC-C FEC with 128-bit AES core.
- Plug and play; master or node selected on the web interface.
- Power and data: the AC power supply uses L1-N only; phase 2-3 connections are used for BPL signal transmission.
- Three versions: -PN-AC and -PP-AC with three-phase AC power (phase to neutral or phase to phase BPL data connection), -PP-DC with 9 - 36 V DC power (phase to phase).

LKM154-Lite Differences

- 1 x 10/100 Ethernet port; 1 x RS485 port, no RS232 for the meters and for the Modbus RTU output.
- 9-36V DC (max 40V) power input.
- No console connection for logs; the log goes to a UDP server.
- Up to 10 meters (IEC 62056-21 and DLMS/COSEM), data converted to Modbus TCP or Modbus RTU.

LKM615 - Direct Connection to the Meter



- Plug and play design for EMH LZQJ-XC meters; direct replacement for Variomod XC modules.
- 1 x 10/100 Ethernet port; ABS housing, IP51, 105 x 45 x 27 mm (h x w x d).
- Gets power directly from the meter (isolated, isolation voltage up to 1500 VDC).
- Serial interface directly connected to the meter (isolated, up to 5000 VRMS isolation rating, up to 10 kVPK surge capability, overload and short-circuit protection, thermal shutdown).
- Reads 1 meter; Modbus TCP function only; only the IEC 62056-21 and Generic DLMS OBIS profiles.

Technical Data

	LKM154 DC	LKM254 AC	LKM655 BPL	LKM154-Lite Lite DC	LKM615 Direct to meter
Ethernet	2 x 10/100Base-T(X)	2 x 10/100Base-T(X)	2 x 10/100Base-T(X) + 1 x BPL link	1 x 10/100	1 x 10/100
Serial	1 x RS232 + 1 x RS485, up to 115200 baud	1 x RS232 + 1 x RS485, up to 115200 baud	1 x RS232 + 1 x RS485, up to 115200 baud	1 x RS485	Directly connected to the meter, isolated
Console port	Micro USB or USB Type-C, log, 115200 baud	Micro USB or USB Type-C, log, 115200 baud	Micro USB or USB Type-C, log, 115200 baud	None (UDP log)	None (log to a UDP server)
Power input	5-48V DC (allows up to 60 V DC)	100 - 240V AC (120 - 370V DC), 50 Hz to 60 Hz	3 phase, 110 - 240 V, 50 - 60 Hz (-PN-AC, -PP-AC); 9 - 36 V DC (-PP-DC)	9-36V DC (allows up to 40 V DC)	From the meter
Protection	Reverse polarity; thermal shutdown and current limit	Isolation > 4200 Vrms, 5 mA, 1 min; insulation class II	Protection class II	Reverse polarity; insulation 1500 V DC for 1 minute, leakage < 1 mA	Insulation 1500 V DC for 1 minute, leakage < 1 mA
Enclosure	Metal, IP 40	Metal, IP 40	Metal, IP 40	Metal, IP 40	ABS, IP 51
Mounting	DIN rail	DIN rail	DIN rail	DIN rail	In place of a Variomod XC module
Dimensions	43 x 95 x 124 mm (w x d x h)	43 x 95 x 124 mm (w x d x h)	43 x 95 x 124 mm (w x d x h)	43 x 95 x 124 mm (w x d x h)	105 x 45 x 27 mm (h x w x d)
Weight	approx. 400 g	approx. 400 g	approx. 400 g	approx. 400 g	approx. 200 g
Operating temperature	-40 to 85 C	-25 to 70 C	-25 to 70 C (AC versions), -40 to 85 C (DC version)	-40 to 85 C	-40 to 85 C
Storage temperature	-65 to 150 C	-40 to 85 C	-65 to 150 C	-55 to 125 C	-55 to 125 C
Operating humidity	5% to 95%, non-condensing	10% to 95%, non-condensing	10% to 95%, non-condensing	5% to 95%, non-condensing	5% to 95%, non-condensing

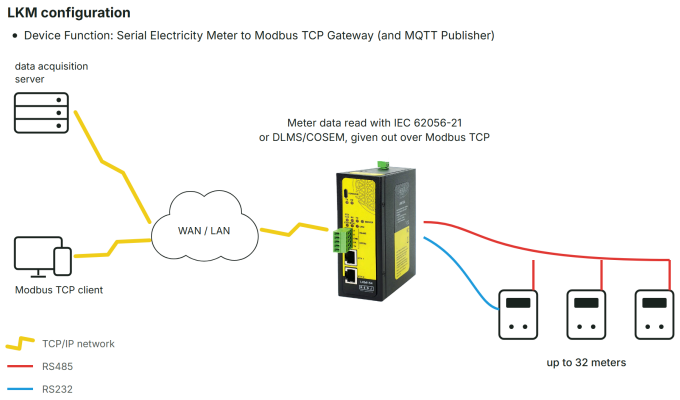
Modbus Registers (all 5 models)

Function code	03 Read Holding Registers only
Register size	Every value is 32 bits = 2 registers; 48 values per meter row
Meter rows	32 (standard models), 10 (Lite model), 1 (direct connection model)
Unit ID / slave address	Gateway Modbus Address, 1 to 247 (factory 1)
Byte order	Big-endian inside each register; word order set by Modbus Word (Register) Swap
Modbus TCP	Port 502 (factory); 1 to 10 simultaneous masters (factory 2)
Modbus RTU	RS232 and / or RS485; baud rate 300 to 460800 (factory RS485, 115200, 8_NONE_1)
Exception responses	None - a request that cannot be served gets no answer

Conformity

- All models (LKM154, LKM254, LKM655, LKM154-Lite, LKM615): compliance with the EMC Directive 2014/30/EU verified by SGS.
- EMC: EN 55032 (class B), EN 55035, EN IEC 61000-3-2, EN 61000-3-3.
- USA: 47 CFR Part 15, Subpart B, class B (ANSI C63.4) - compliance verified by SGS.
- Safety: EN 62368-1, tested by SGS.
- Protection against electric shock: Class II (LKM254, LKM655), Class III (LKM154).

Typical Application



Typical application - Serial Electricity Meter to Modbus TCP Gateway (and MQTT Publisher): meters on RS485 / RS232, meter data read over Modbus TCP.

Product Comparison

	LKM154	LKM254	LKM655	LKM154-Lite	LKM615
Reads up to 32 meters	●	●	●		
Reads up to 10 meters				●	
Reads 1 meter (direct connection)					●
5 - 48 V DC power input (60 V maximum)	●				
100 - 240 V AC, 50 - 60 Hz (120 - 370 V DC) power input		●			
Three-phase AC power input, 110 - 240 V, 50 - 60 Hz			●*		
9 - 36 V DC power input			●*	●	
Gets power from meter (isolated)					●
BPL (Broadband Power Line) link			●		
OBIS codes set by user	●	●	●	●	●
Web interface for status	●	●	●	●	●

* The LKM655 is made in three versions: LKM655-PN-AC and LKM655-PP-AC with three-phase AC power input (phase to neutral or phase to phase BPL data connection), and LKM655-PP-DC with 9 - 36 V DC power input (phase to phase).
All models convert the meter data to Modbus and can send it to an MQTT broker.

Ordering Information

LKM154: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 2 x 10/100Base-T(X) Ethernet ports, 1 x RS232 and 1 x RS485, 5 - 48 V DC power input (60 V maximum)

LKM254: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 2 x 10/100Base-T(X) Ethernet ports, 1 x RS232 and 1 x RS485, 100 - 240 V AC, 50 Hz to 60 Hz (120 - 370 V DC) power input

LKM655-PN-AC: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 2 x 10/100Base-T(X) Ethernet ports and 1 x BPL (Broadband Power Line) link, 1 x RS232 and 1 x RS485, three-phase AC power input, 110 - 240 V, 50 - 60 Hz, phase to neutral (PN) data connection

LKM655-PP-AC: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 2 x 10/100Base-T(X) Ethernet ports and 1 x BPL (Broadband Power Line) link, 1 x RS232 and 1 x RS485, three-phase AC power input, 110 - 240 V, 50 - 60 Hz, phase to phase (PP) data connection

LKM655-PP-DC: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 2 x 10/100Base-T(X) Ethernet ports and 1 x BPL (Broadband Power Line) link, 1 x RS232 and 1 x RS485, 9 - 36 V DC power input, phase to phase (PP) data connection

LKM154-Lite: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 1 x 10/100Base-T(X) Ethernet port, 1 x RS485, 9 - 36 V DC power input (40 V maximum)

LKM615: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 1 x 10/100Base-T(X) Ethernet port, direct connection to the meter, powered from the meter interface