REDZ
SMART COMMUNICATION

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LKM Series 868 MHz LoRaWAN Meter Reader and Meter to Modbus Gateways



- **Reads up to 32 meters with IEC 62056-21 (Mode C) and DLMS/COSEM**
- **Meter data to a LoRaWAN network server, as Modbus registers and as 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 868 MHz LoRaWAN Meter Reader models read electricity meters with the IEC 62056-21 (Mode C) and DLMS/COSEM protocols, convert the meter data to Modbus registers and can send it to an MQTT broker at the same time. In addition, they send the meter data to a LoRaWAN network server through a LoRaWAN gateway; the LoRaWAN settings are added to the same Modbus and MQTT settings.

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

LoRaWAN EU 868 MHz
OTAA or ABP, Class A or Class C

Up to 15 km
radio range, line of sight (radio module value)

32 / 10 / 1
meter rows: standard / Lite / LKM616, up to 48 OBIS codes per meter profile

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

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

Modbus TCP / RTU + MQTT
up to 10 Modbus TCP clients at the same time; MQTT next to Modbus

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.

LoRaWAN

- Radio band EU 868 MHz (Europe); the send interval is set by the user.
- Built-in duty cycle check and payload size check: the device splits the data by the maximum payload size and the duty cycle block times, so the meters can be read at any interval.
- Activation over the air (OTAA) or by personalization (ABP); Class A or Class C.
- Adaptive Data Rate, selectable uplink data rate and Tx power level, user defined LoRaWAN port, with or without ACK.
- Device and LoRaWAN status on the LoRa Status page, including the latest LoRaWAN messages.

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, MQTT and LoRaWAN, 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 LKM755 (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).

LKM354-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.

LKM616 - 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.

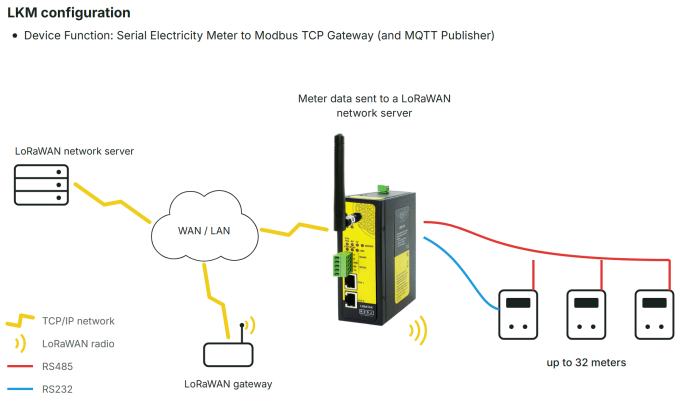
Technical Data

	LKM354 DC	LKM454 AC	LKM755 BPL	LKM354-Lite Lite DC	LKM616 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)
LoRa antenna	SMA female, 50 ohm	SMA female, 50 ohm	SMA female, 50 ohm	SMA female, 50 ohm	SMA
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	-	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

LoRaWAN Radio (all 5 models)

Band	EU 868 MHz (Europe)
Radio module	Pre-certified according to EN 300 220
Sensitivity	Down to -138 dBm
Link budget	Up to 156 dB
Communication distance	Up to 15 km (line of sight)
Tx power level (EIRP)	0 to 16 dBm
Uplink data rate	SF12 / 125 kHz / 250 bps to SF7 / 125 kHz / 5470 bps
Activation, class	OTAA or ABP; Class A or Class C

Typical Application



Typical application - LoRaWAN Meter Reader: the meter data is sent through a LoRaWAN gateway to a LoRaWAN network server.

Product Comparison

	LKM354	LKM454	LKM755	LKM354-Lite	LKM616
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			●		
868 MHz LoRaWAN Meter Reader	●	●	●	●	●
OBIS codes set by user	●	●	●	●	●
Web interface for status	●	●	●	●	●

* The LKM755 is made in three versions: LKM755-PN-AC and LKM755-PP-AC with three-phase AC power input (phase to neutral or phase to phase BPL data connection), and LKM755-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

LKM354: 868 MHz LoRaWAN Meter Reader and 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)

LKM454: 868 MHz LoRaWAN Meter Reader and 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

LKM755-PN-AC: 868 MHz LoRaWAN Meter Reader and 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

LKM755-PP-AC: 868 MHz LoRaWAN Meter Reader and 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

LKM755-PP-DC: 868 MHz LoRaWAN Meter Reader and 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

LKM354-Lite: 868 MHz LoRaWAN Meter Reader and 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)

LKM616: 868 MHz LoRaWAN Meter Reader and 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