REDZ
SMART COMMUNICATION

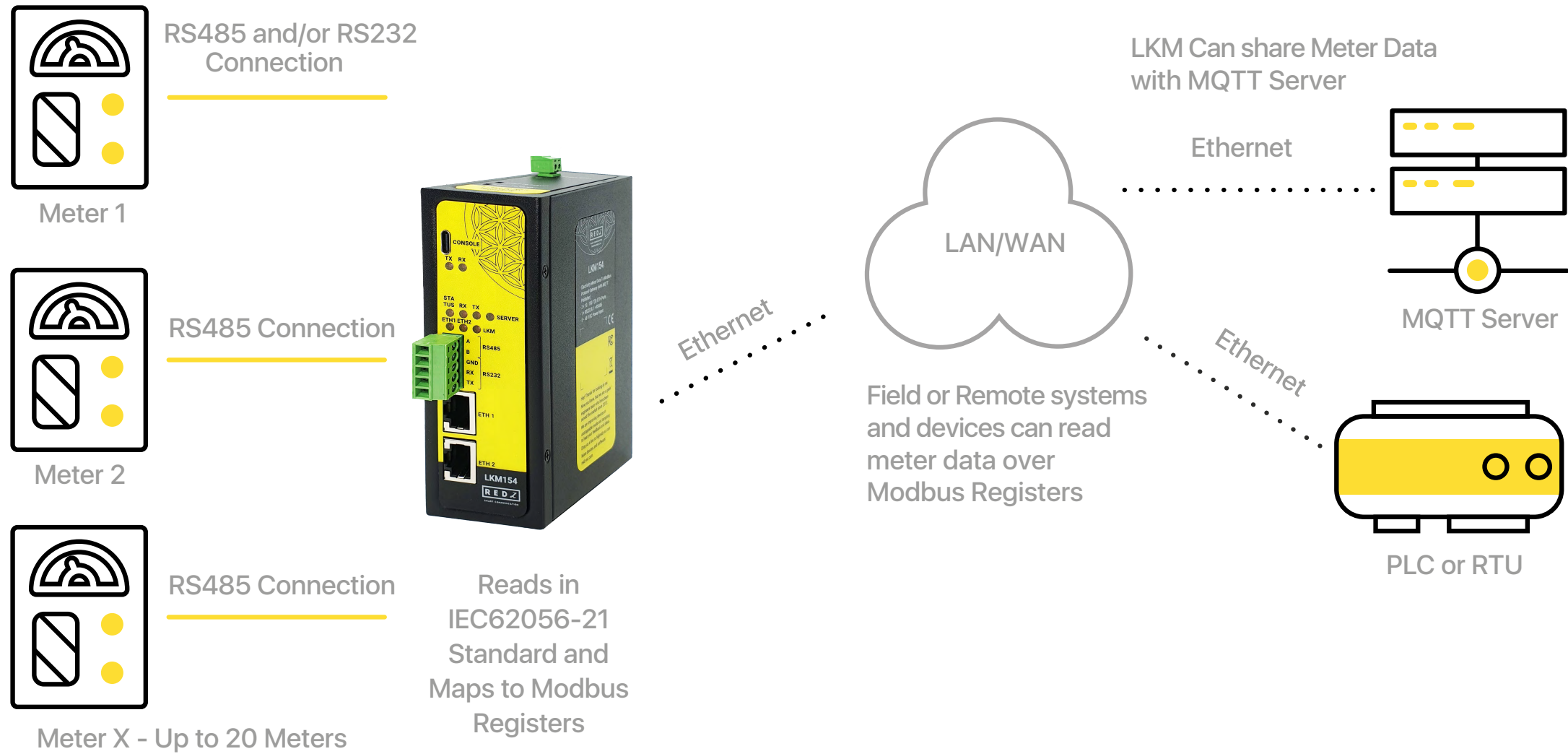redz-sc.com   hi@redz-sc.com

LKM Series Electricity Meter Protocol to Modbus Protocol Gateways with MQTT

**2 x 10/100Base-T(x) Ports,
1 x RS232 and 1 x RS485 Serial Ports
and option for BPL (Broadband Power Line Link)**

LKM Series Electricity Meter Protocol to Modbus Protocol Gateways are designed for industrial-grade communication with Energy Meters and particularly for facilities of rugged industry and infrastructure. LKM Series Electricity Meter Protocol to Modbus Protocol Gateways are tailored to perform various features such as wide temperature range, wide power input range and several connectivity ports. Thus, LKM Series Electricity Meter Protocol to Modbus Protocol Gateways are the best choice for all applications that require reading IEC62056-21 Meters and convert its data to Modbus Protocol as well as sending data meter data to MQTT Server.

Meter 1 — RS485 and/or RS232 Connection

Meter 2 — RS485 Connection

Meter X - Up to 20 Meters — RS485 Connection

Reads in IEC62056-21 Standard and Maps to Modbus Registers

Ethernet

LAN/WAN

LKM Can share Meter Data with MQTT Server

Ethernet

MQTT Server

Field or Remote systems and devices can read meter data over Modbus Registers

Ethernet

PLC or RTU

REDZ Broadband Power Line (BPL) link allows device to communicate with full transparent TCP/IP standard over Low Voltage power lines and allows easy connection between TCP/IP based terminals without use of extra cables.

LKM Series Electricity Meter Protocol to Modbus Protocol Gateways can read IEC62056-21 Energy Meters and convert its data to Modbus Registers so that field devices or remote applications can meter data via Modbus TCP. Meter data can also be sent to MQTT Server simultaneously. OBIS codes of read meters are fully definable by end user.

Typical applications: Automated Meter reading, Telemetry, Energy Management...

Main Features

- Supports 2 x 10/100Base-T(X) ports
- Supports Full/Half-Duplex, auto MDI/MDI-X on each port
- Supports 1 x RS232 and 1 x RS485 Serial Connection up to 115200 Baud
- Embedded web interface for ease of use
- 2 different Gateway Operating Modes:
  Serial IEC Meter to Modbus TCP Gateway with MQTT Publisher
  TCP/IP IEC Meter to Modbus RTU Gateway with MQTT Publisher
- Up to 20 IEC Meter reading and conversion of their data to Modbus TCP or RTU
- Reading up to 48 OBIS Registers and all user configurable from web interface
- MQTT Publisher with different data transfer options
  OBIS Values as Data Objects
  OBIS Values as Modbus Frame
- Easy to follow Device Status on web interface
- Easy to follow Meter Reading and Modbus Communication status from web interface
- Easy to follow OBIS to Modbus mapping status from web interface
- Easy to follow Meter Read Out Data from web interface

Extra Features for Models with BPL (Broadband Powerline)

- Supports 2 x 10/100Base-T(X) ports + 1 x BPL link
- Wide range 3 phase AC input
- Supports up to 30Mbps PHY rate on BPL with Up to 10 hops and 1000 nodes
- Up to 432 sub-carriers from 2 to 28MHz analog bandwidth
- Support LDPC-C FEC with 128-bit AES core
- Plug and play with Master/Slave selection via web interface

- White List or Black List based IP filter up to 20 IP Addresses
- Firmware Upgrade over Web
- 2 firmware storage capability on same device (1 active only)
- Wide operating temperature range from -25 to 70 °C AC and -40 to 85 °C DC power input versions
- Rugged Metal IP-40 housing design
- DIN-Rail mounting

LKM - Lite Model Differences

- 1 x 10/100 Ethernet Port
- 1 x RS485 Port
- 9-36V DC (max 40V) Power Input
- Console Connection for Logs is not available (UDP Log still available)
- Up to 10 IEC Meter reading and conversion of their data to Modbus TCP or RTU

Technical Details

Meter Reading Details

Up to 20 meters (up to 10 meters for Lite Models) can be read and mapped to Modbus Registers

Serial Interface	Freely selectable serial interface for each meter in list RS232 RS485
Baud Rate	Freely selectable start baud rate for each meter in list 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Table Code	Freely selectable reading table code for each meter in list
Init String Count and String Itself	Freely definable init string for each meter in list If meter needs an init string to "wake up", user can define the string itself and number of times that it will be sent
Query Interval	Freely selectable query interval for each meter in list That depends on meter reading list, since each meter will be read 1 by 1 over RS485 bus (or directly from RS232), reading interval depends on number of meters in list and read out reading time for each meter (based on its read out list)
Time Out	Freely selectable time out value for each meter in list LKM will continue with next meter in list in case there is no response from meter in predefined time out duration
OBIS Codes	Up to 48 OBIS codes can be defined and enabled to be read from all meters in list User can open 2 web pages side by side and check readout list from meter and simply add OBIS codes to LKM as per need

Ethernet Switch Technology

Ethernet Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-T(X) IEEE 802.3x Flow Control
Mac Table	1K MAC address entry
Processing	Store-and-Forward
Memory	448K bits packet buffer memory

BPL (Broadband Powerline) Technology for BPL Models

PHY Data Rate	Up to 240 MHz
MAC Layer Protocol	CSMA/CA
Modulation Technology	OFDM-432
VLAN	IEEE802.1q/ IEEE802.1p/ IEEE802.3d

MODBUS Characteristics

Up to 20 meters (up to 10 meters for Lite Models) can be read and mapped to Modbus Registers

Up to 48 OBIS values can be mapped into Modbus Registers

Gateway Modbus Address	Default value is 1 User can change from web interface
Modbus Data and Addresses	Data can be read via Function Code 3 Read Holding Registers (4x) all registers are "long" data

Adress of 1st Meter Data:

Hex: 0x00 00
Decimal: 0
Quantity: 96 (only available if 48 registers are enabled,
it changes based on enabled regsiters quantity)

Adress of 2nd Meter Data:

Hex: 0x01 00
Decimal: 256
Quantity: 96 (only available if 48 registers are enabled,
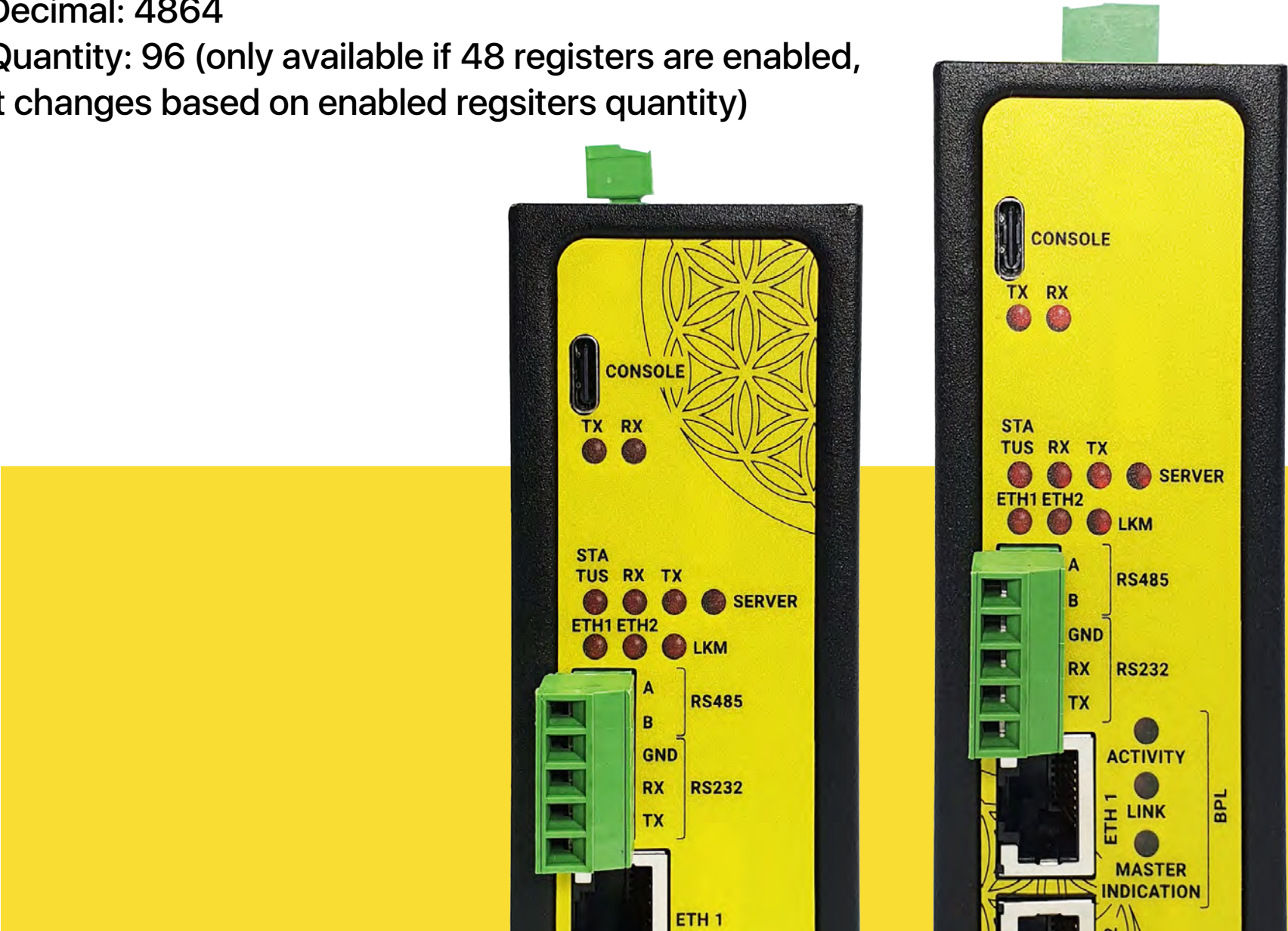it changes based on enabled regsiters quantity)

Adress of 3th Meter Data:

Hex: 0x02 00
Decimal: 512
Quantity: 96 (only available if 48 registers are enabled,
it changes based on enabled regsiters quantity)

.....

Adress of 20th Meter Data:

Hex: 0x13 00
Decimal: 4864
Quantity: 96 (only available if 48 registers are enabled,
it changes based on enabled regsiters quantity)

MQTT Details

MQTT Publisher can be enabled and can be used in parallel with Modbus conversion (or stand alone)

MQTT Connection	Broker IP and Port can be entered Client ID , User name and Password can be set Publish Topic and Subscribe Topic can be defined from web interface
Data Send Interval	User can send Data send interval in seconds Default is 60 seconds and LKM will send meter data to MQTT server in that interval
NTP Server	NTP server time will be added to each MQTT message
Data Format	There are 2 predefined formats OBIS Values As Objects: Sends OBIS values and then mapped values in ASCII readable fromat OBIS Values as Modbus Frame: Send just like the response of Modbus query as hex data (smaller data size)

WEB Monitoring Details

Meter Communication Status	User can see reading status of each meter in reading list Last Query Time and Last Serial Package also available in this list
Modbus Communication Status	User can see reading status of each Modbus client connected Last Query Time and Last Received and Sent Packages also available in this list
Meter Reading to Modbus Mapping (Gateway) Status	User can see modbus mapping status of each meter in reading list Data can be checked in realtime or status can be set for any specific meter in list Ex: Show mapping status of Meter Number 2 in meter reading list only
Meter Reading Status	User can see IEC reading details in real time This data can help to select desired OBIS codes

Connectors and Ports

Console Port	Micro USB or USB Type-C connection for LOG in 115200 baud
10/100T(X) RJ45 Ports	Ethernet Connection on 2 ports
Serial Ports	5 pin wired Terminal Connection Tx, Rx, GND for RS232 A and B for RS485
Reset Buttons	Reset to Client and Reset to Server Operating modes buttons

LED Indicators

Power indicator	Power LED
10/100T(X) Indicators	Activity LEDs: ETH1, ETH2 and LKM (Activity of device itself)
Console Indicators	Tx and Rx of data LEDs
BPL LEDS (For BPL Models)	BPL Activity BPL Link Master Indication (LED ON: Master, LED OFF: Slave)

System Indicators	Status LED, Tx and Rx of data LEDs and Server LED (LED ON: Server Operating Mode, LED OFF: Client Operating Mode)

Physical & Environmental Characteristics – DC Models

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-65 to 150 °C
Operating Temperature	-40 to 85 °C
Operating Humidity	5% to 95% Non-condensing

Physical And Environmental Characteristics – AC Models

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-40 to 85 °C
Operating Temperature	-30 to 70 °C
Operating Humidity	10% to 95% Non-condensing

Physical And Environmental Characteristics – BPL Models

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-65 to 150 °C
Operating Temperature	-40 to 85 °C
Operating Humidity	10% to 95% Non-condensing

Power – BPL Models

Input Range	3 Phase Input, 110V–240V 50Hz to 60Hz AC input
Power and Data	AC Power supply use L1-N only. Phase 2-3 connections are used for BPL signal transmission.

BPL Models can be purchased in 2 versions:
1. P-N Model: Phase to neutral model (Standart Model). That version gets power from terminal pins 1 and 2 from phase and neutral. It can also transmit data from that pins and other pins usage is optional (Ex: Master can be connected to all phases and slaves can be connected to relevant phases)

2. P-P Model: Phase to phase model. That version also gets power from terminal pins 1 and 2 from phase and neutral. Data transmission only done through terminal pins 3 and 4. Phase to phase connection can be done to data transmission pins for better performance. If phase to phase connection is not avilable then phase and neutral can still be connected for data transmission for terminal pins 3 and 4.

BPL Models can be purchased in DC model as well:
This model will be same as "P-P Model" (Phase to phase model) on data connection and gets 9-36V DC power from terminal pins 1 and 2 to power up device itself. Data transmission only done through terminal pins 3 and 4.

Power – DC Models

Input Range	5-48V DC wide range Power Input (Allows up to 60 V DC)
Reverse Polarity Protection	Available
Thermal Shutdown and Current Limit Protection	Available

Power – AC Models

Input Range	100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC input
Isolation	Fully Isolated >4200Vrms, 5mA 1 Min
Insulation	Clas II

LKM – Lite

Power - Lite DC Model

Input Range	9-36V DC wide range Power Input (Allows up to 40 V DC)
Reverse Polarity Protection	Available
Insulation Voltage	1500VDC for 1 minute with leakage current <1mA.

Physical And Environmental Characteristics Lite DC Model

Enclosure	Metal, IP 40
Dimensions	43 x 95 x 124 (w x d x h) mm
Weight	~400gr
Storage Temperature	-55 to 125 °C
Operating Temperature	-40 to 85 °C
Operating Humidity	5% to 95% Non-condensing

LKM Lite Models are cost effective solution for Electricity Meter Protocol to Modbus Protocol Gateway needs.

LKM - Lite model hardware difference:
- 1 x 10/100 Ethernet Port
- 1 x RS485 Port
- 9-36V DC (max 40V) Power Input
- Console Connection for Logs is not available (UDP Log still available)

LKM - Lite model functional difference:
- Up to 10 IEC Meter reading and conversion of their data to Modbus TCP or RTU

Ordering Information

LKM154: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V (max. 60V) DC Power Input

TLM254: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

TLM655: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input,
110V–240V/50-60Hz

LKM154 - Lite: Electricity Meter Protocol to Modbus Protocol Gateway with MQTT, 1x 10/100 T(x) ETH port and 1 x RS485,
5-48V (max. 60V) DC Power Input

TLM354: 868MHz LoRaWAN Meter Reader and Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V (max. 60V) DC Power Input

TLM454: 868MHz LoRaWAN Meter Reader and Electricity Meter Protocol to Modbus Protocol Gateway with MQTT
2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 100 - 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input

TLM755: 868MHz LoRaWAN Meter Reader and Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
2x 10/100 T(x) ETH ports + 1 x BPL (Broadband Power Line) Link, 1 x RS232 & 1 x RS485, 3 Phase AC Power Input,
110V–240V/50-60Hz

TLM354 - Lite: 868MHz LoRaWAN Meter Reader and Electricity Meter Protocol to Modbus Protocol Gateway with MQTT,
1x 10/100 T(x) ETH port and 1 x RS485, 5-48V (max. 60V) DC Power Input

Product Selection

Model	868MHZ LoRaWAN Meter Reader	9-36V (max. 40V) DC Power Input	5-48V (max. 60V) DC Power Input	100 – 240V AC (120 – 370V DC), 50Hz to 60Hz AC Power Input	3 Phase AC Power input, 110 V – 240 V / 50 – 60 Hz AC Power Input	Read Up to 10 Meters and Convert Data to Modbus and/or Send to MQTT	Read Up to 20 Meters and Convert Data to Modbus and/or Send to MQTT	OBIS Codes to look for can be changed by user	Web Interface for monitoring meter reading status and much more	BPL (Broadband Power Line) Link
LKM154			●				●	●	●	
LKM254				●			●	●	●	
LKM655					●		●	●	●	●
LKM154 - Lite		●				●		●	●	
LKM354	●		●				●	●	●	
LKM454	●			●	●		●	●	●	
LKM755	●						●	●	●	●
LKM354 - Lite	●	●				●		●	●	