



SMART COMMUNICATION

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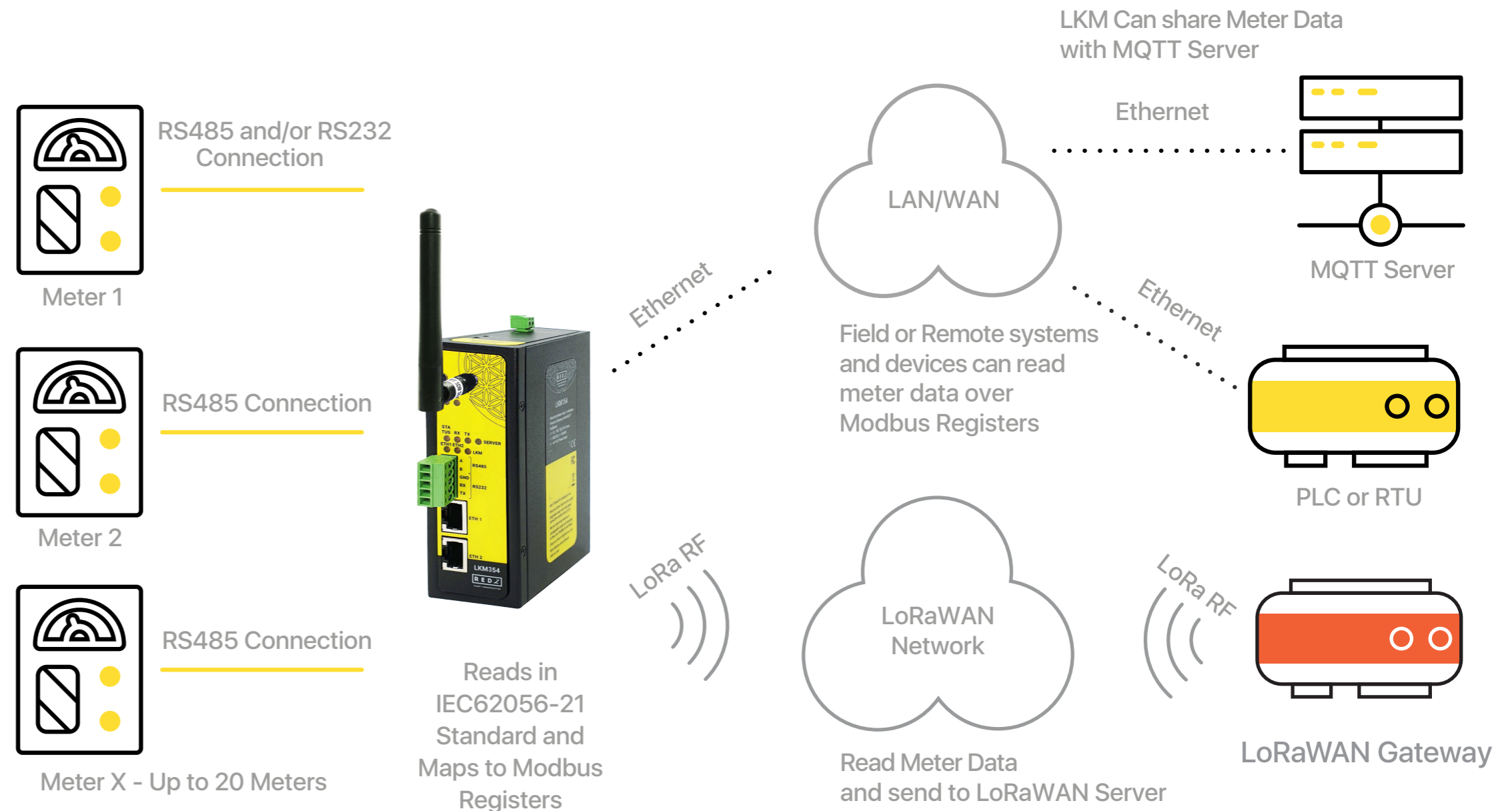
# LKM Series 868MHz LoRaWAN Meter Reader with MODBUS TCP to IEC62056-21 Protocol Meter Gateway

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



LKM Series 868MHz LoRaWAN Meter Reader with 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 868MHz LoRaWAN Meter Reader with 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 868MHz LoRaWAN Meter Reader with 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 LoraWAN Server and/or MQTT Server.

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 868MHz LoRaWAN Meter Reader with 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 will be sent to LoRaWAN Server through LoRaWAN Gateway in user defined periods. 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
- Radio Band Options:  
868MHz  
EU 868 MHz – Europe, LoRaWAN RF Communication
- LoRaWAN data send interval configurable
- 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 conversion
- 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
- Built in LoRaWAN Duty Cycle Check
- Built in LoRaWAN payload size check. User can read data in any interval. LKM will automatically split based on Maximum Payload size allowed and Duty Cycle Block Times

- Activation Over Air (OTAA) or Activation by Personalization (ABP) Selectable
- User defined LoRaWAN Port
- Adaptive Data Rate functionality
- Selectable Uplink Data Rate
- Selectable Power Level
- LoRaWAN Class C and Class A support
- Easy to follow Device Status on web interface
- Easy to follow LoRaWAN packages 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
- 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

## 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

# Technical Details

## Meter Reading Details

Up to 20 meters 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

## LoRa Technology

Based on	STM32L151CxU6Axx 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)
Typical Communication Distance Indoor/Urban	> 2 km
LoRaWAN Activation Options	Activation Over Air (OTAA) Activation by Personalization (ABP) User Selectable
LoRaWAN Port	User Selectable
Adaptive Data Rate	Available
LoraWAN Class	Class A Class C
Tx Power Level	0 to 16dBm Configurable

Uplink Data Rate	SF12 / 125 kHz / 250 bps SF11 / 125 kHz / 440 bps SF10 / 125 kHz / 980 bps SF9 / 125 kHz / 1760 bps SF8 / 125 kHz / 3125 bps SF7 / 125 kHz / 5470 bps SF7 / 250 kHz / 11000 bps FSK 50k / NA / 50000 bps
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## 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

# LoRaWAN Details

**Status Message Device Status** Message sent to LoRaWAN Port number 1 in every connection to LoRaWAN Server

1 Byte: Package Type (Upper 4 bits) and Package Number (Lower 4 bits). If Package Number is 1 or more that means the package splitted.

0x00 : means status package for device status and package is the first package

1 Byte: Gateway Operating Mode

0x00: Serial IEC Meter to Modbus TCP Gateway with MQTT Publisher

0x01: TCP/IP IEC Meter to Modbus RTU Gateway with MQTT Publisher

1 Byte: Number of Meters configured to be read

1 Byte: Number of OBIS Codes configured to be read

4 Bytes: LKM Device Id

1 Byte: LoRaWAN Port of the package

4 Bytes: RTC Time

3 Bytes: LKM Device firmware version

N Bytes (maximum 22): LKM Device name configured by user

**Status Message OBIS Details** Message sent to LoRaWAN Port number 1 in every connection to LoRaWAN Server if enabled by user

1 Byte: Package Type (Lower 4 bits) and Package Number (Upper 4 bits). If Package Number is 1 or more that means the package splitted.

0x01 : means status package for OBIS details and package is the first package

OBIS Frames are shared 1 by 1 in following format, qty is given in Device Status message

1 Byte: OBIS Code Number in same sequence configured from web interface

1 Byte: ASCII Character dash '-' which is 0x2D in hexadecimal

N Bytes (maximum 15): Configured OBIS Code itself like "1.8.0" each character in ASCII format

1 Byte: ASCII Character dash '-' which is 0x2D in hexadecimal

....Next Obis Frame that maximum payload size allows

## Meter Data Message

Message sent to LoRaWAN configured Port and minimum send interval can be configured by user

1 Byte: Package Type (Lower 4 bits) and Package Number (Upper 4 bits). If Package Number is 1 or more that means the package splitted.

0x02 : means meter data package and package is the first package

1 Byte: Read Meter number in same sequence configured from web interface

1 Byte: Data Starting OBIS Code Number in same sequence configured from web interface

1 Byte: Total Data Size in Payload

Meter Data Frames are shared 1 by 1 in following format, each data is 4 bytes

4 Bytes: Meter Data

....Next data that maximum payload size allows.

# MODBUS Characteristics

Up to 20 meters 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)

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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)

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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 format  OBIS Values as Modbus Frame: Send just like the response of Modbus query as hex data (smaller data size)

## WEB Monitoring Details

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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
LoRaWAN Status	User can see LoRaWAN Network Status (Joining or Active) LoRaWAN Tx and Rx Messages Latest sent data package details Number of LoRaWAN Messages sent, pending and lost Duty Cycle Block Time





## Connectors and Ports

SMA Antenna Connector for Lora	1 Standard SMA female interface, 50 ohm
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)
System Indicators	Status LED, Tx and Rx of data LEDs and Server LED  (LED ON: Server Operating Mode, LED OFF: Client Operating Mode)
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)





## 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

## 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

## 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

## 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

## Power – BPL Models

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

## Physical And Environmental Characteristics BPL Models

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



# Ordering Information

**LKM154:** Modbus to IEC62056-21 Protocol Meter Gateway,  
2x 10/100 T(x) ETH ports, 1 x RS232 & 1 x RS485, 5-48V (max. 60V) DC Power Input

**TLM254:** Modbus to IEC62056-21 Protocol Meter Gateway  
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:** Modbus to IEC62056-21 Protocol Meter Gateway,  
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:** 868MHz LoRaWAN Meter Reader with Modbus to IEC62056-21 Protocol Meter Gateway,  
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 with Modbus to IEC62056-21 Protocol Meter Gateway,  
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 with Modbus to IEC62056-21 Protocol Meter Gateway,,  
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

# Product Selection

Model	868MHZ LoRaWAN Meter Reader	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 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				●	●	●	●	●
LKM354	●	●			●	●	●	
LKM454	●		●		●	●	●	
LKM755	●			●	●	●	●	●

