LKM Series Electricity Meter Protocol to Modbus Protocol Gateways User Manual

1. About LKM Series Meter Protocol Gateways

LKM Series Modbus to IEC62056-21 and P1 Companion Standard Protocol Gateways are designed to be used with electricity meters that communicate in IEC62056-21 or P1 Companion Standard. The meters that support those protocols has read out tables that has several data such as import energy, export energy, phase voltages and currents. LKM Series Protocol Gateway automatically reads those values and maps to Modbus registers. Field devices or software systems can easily read data over Modbus RTU or TCP protocol so that energy meter reading can easily be integrated to field automation or monitoring systems without need of IEC6056-21 or P1 Companion Standard implementation.

LKM series Modbus RTU gateways can read meters with auto baud changes or fixed baud rates and supports up to 10 meters on RS485 bus.

LKM series Modbus TCP gateways can read meters with auto baud changes or fixed baud rates and supports up to 20 meters on RS485 and RS232 bus.

LKM614 is especially designed for EMH LZQJ-XC meters and it is direct replacement for Variomod XC modules.

2. Hardware Features

LKM Series Protocol Gateways has 2-way communication. One side connected directly or via optical probe to read electricity meter with IEC62056-21 protocol or P1 Companion Standard, other side can be connected to a field device such as PLC or RTU or serial device server connected to an automation software system that can read Modbus RTU or Modbus TCP devices.

There are standalone versions and also plug and play version for EMH LZQJ-XC meters.

Also there are Modbus RTU and Modbus TCP versions.

2.1 Features – Modbus RTU Standalone Versions

- Auto reads Electricity meters that communicates in IEC62056-21 or P1 Companion Standard and maps in predefined MODBUS register table
- Supports Up to 10 meters reading on RS485 Bus
- User defined initialization string can be sent before IEC62056-21 Mode C reading
- Configurable Modbus address via Modbus Commands
- Configurable Reading Period on IEC6056-21 or or P1 Companion Standard side via Modbus Commands
- Configurable Reading Table Number on IEC6056-21 side via Modbus Commands
- Wide range power input: 5V – 24V DC
- Wide operating temperature range from -40 to 85 °C
- Very Small form factor, only 2.1 x 4.2 x 4.4cm
- ABS, IP40 housing
- Customization of reading process and register tables based on client request
- Firmware upgradable over serial line

2.2 Features – Modbus RTU Plug and Play Versions

- Especially plug and play designed for EMH LXQJ-XC meters
- Direct replacement for Variomod XC modules for EMH meters
- Auto reads EMH meters and maps values in predefined MODBUS register table
- Configurable Modbus address via Modbus Commands
- Configurable Reading Period on IEC6056-21 side via Modbus Commands
- Configurable Reading Table Number on IEC6056-21 side via Modbus Commands
- Gets power directly from meter
- Serial interface directly connected to meter (with 15kV ESD protection)

- Wide operating temperature range from -40 to 85 °C
- Customization of reading process and register tables based on client request
- Firmware upgradable over serial line

3. Installation

LKM Series Modbus RTU to IEC62056-21 Protocol or or P1 Companion Standard Gateways has very small form factor.

Modbus RTU Standalone versions are only 2.1 x 4.2 x 4.4cm. Thus, it can be acted as part of cable and no need special mounting. Simply connect cables and use as a part of cable.
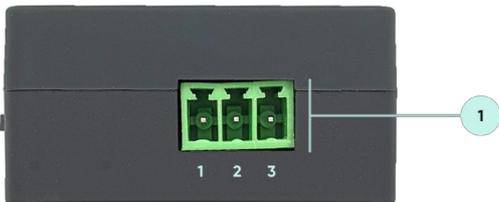

Modbus RTU Plug and Play version can directly fit into EMH LZQJ-XC meter. It is direct replacement for Variomod XC modules. Simply plug in LKM614 into meter.
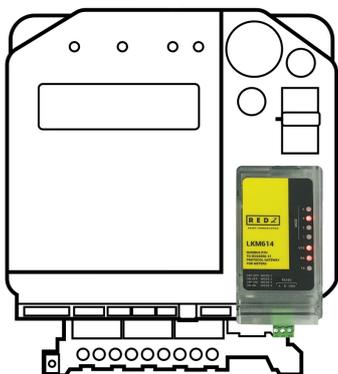
4. Panel Descriptions and Pin Mappings

4.1 Modem Side: LKM111

1. Terminal Connector for 3 wire RS232 connection.

Pin Number	Description
1	GND
2	Rx
3	Tx

4.2 Modem Side: LKM141

1. DB9 Male connector for RS232: Only Tx-Rx-GND for data transmission.

Pin Number	Description
1	Not Used
2	Rx
3	Tx

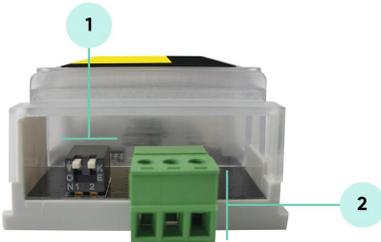|	
4	Not Used
5	GND
6	Not Used
7	Not Used
8	Not Used
9	Not Used

4.3 Modem Side: LKM114 & LKM124 & LKM144

1. Terminal Connector for 2 wire RS485 connection and GND.

Pin Number	Description
1	GND
2	A
3	B

4.4 Modem Side: LKM614

1. Operation Mode Selection Switch

Pin Positions (1-2)	LED Status	Modem Side Communication Data Type	Meter Side Communication
OFF–OFF	Mode 1 LED ON	19200 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
ON–OFF	Mode 2 LED ON	9600 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
OFF–ON	Mode 3 LED ON	19200 8N1	19200 7E1 Fixed
ON–ON	Mode 4 LED ON	9600 8N1	9600 7E1 Fixed

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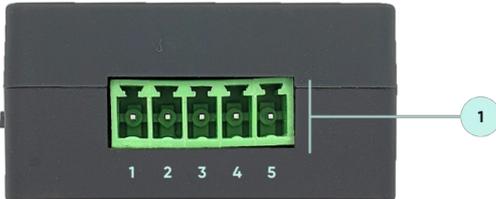NOTE: After changing operating mode of device, device must be repowered to apply new setting. Which means device must be plugged out of the device and plugged in back again.

2. Terminal Connector for 2 wire RS485 connection and GND.

Pin Number	Description
1	A
2	B
3	GND

4.5 Meter Side: LKM111 & LKM114
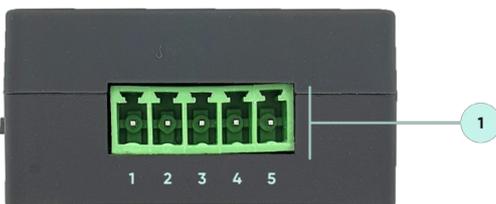

1. Terminal Connector for 3 wire RS485 connection. Terminal also has external power input pins.

Pin Number	Description
1	Input Power + (5V – 24V DC)
2	Input Power – GND
3	GND
4	Rx
5	Tx

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NOTE: Power Input has polarity protection. Yet again please check polarity when connecting multiple devices in same power source, otherwise device may burn due to worng connection of power.

4.6 Meter Side: LKM124

1. Terminal Connector for 3 wire P1 Companion Standard connection. Terminal also has external power input pins.

Pin Number	Description
1	Input Power + (5V – 24V DC)
2	Input Power – GND

3	GND
4	Rx (Data)
5	CTRL (Data Request)

User should arrange RJ12 cable needed to connect to meter in desired length.

Metering System
RJ12 female socket

OSM
RJ12 male connector

Pin Number	Description
1	+5V Power Supply
2	Data Request (CTRL)
3	Data GND
4	Not connected (NC)
5	Data (Rx)
6	Power GND

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NOTE: Power Input has polarity protection. Yet again please check polarity when connecting multiple devices in same power source, otherwise device may burn due to worng connection of power.
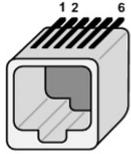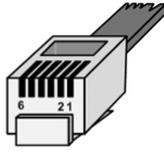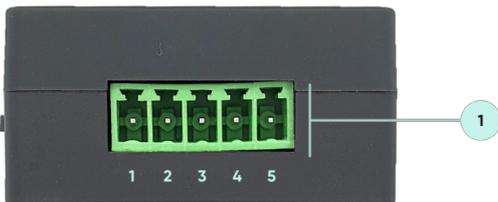
4.7 Meter Side: LKM141 & LKM144

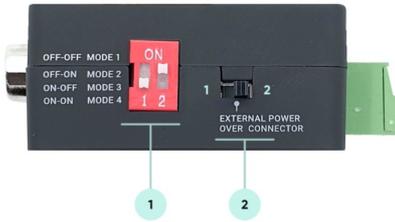

1. Terminal Connector for 2 wire RS485 connection and GND. Terminal also has external power input pins.

Pin Number	Description
1	Input Power + (5V – 24V DC)
2	Input Power – GND
3	GND
4	A
5	B

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4.8 Other Side: LKM141

| 1. Operation Mode Selection Switch

Pin Positions (1-2)	LED Status	Modem Side Communication Data Type	Meter Side Communication
OFF-OFF	Mode 1 LED ON	19200 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
OFF-ON	Mode 2 LED ON	9600 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
ON-OFF	Mode 3 LED ON	19200 8N1	19200 7E1 Fixed
ON-ON	Mode 4 LED ON	9600 8N1	9600 7E1 Fixed

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NOTE: After changing operating mode of device, device must be repowered to apply new setting.

| 2. Power ON/OFF Switch

Switch Position	Description
1	Power Off Device
2	Power On Device

4.9 Other Side: LKM111 & LKM114 & LKM144

| 1. Operation Mode Selection Switch

(can be different depending on customer specific firmware)

Pin Positions (1-2)	LED Status	Modem Side Communication Data Type	Meter Side Communication

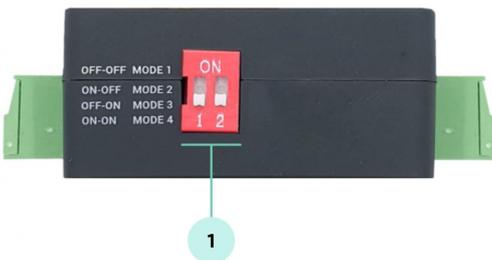|			
OFF-OFF	Mode 1 LED ON	19200 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
ON-OFF	Mode 2 LED ON	9600 8N1	Starts with 300 baud rate and changes during transmission to target baud rate based on IEC62056-21 protocol
OFF-ON	Mode 3 LED ON	19200 8N1	19200 7E1 Fixed
ON-ON	Mode 4 LED ON	9600 8N1	9600 7E1 Fixed

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NOTE: After changing operating mode of device, device must be repowered to apply new setting.

4.10 Other Side: LKM124
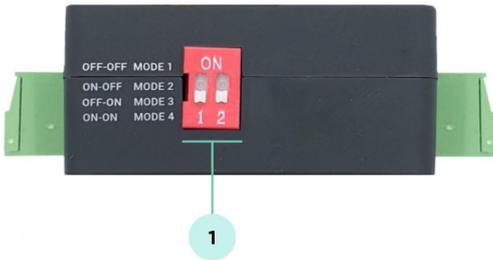
1. Operation Mode Selection Switch

(can be different depending on customer specific firmware)

Pin Positions (1-2)	LED Status	Modem Side Communication Data Type	Meter Side Communication
OFF-OFF	Mode 1 LED ON	9600 8N1	9600 8N1 Fixed
ON-OFF	Mode 2 LED ON	19200 8N1	19200 8N1 Fixed
OFF-ON	Mode 3 LED ON	57600 8N1	57600 8N1 Fixed
ON-ON	Mode 4 LED ON	115200 8N1	115200 8N1 Fixed

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NOTE: After changing operating mode of device, device must be repowered to apply new setting.

4.11 Top Side: LKM111 & LKM114 & LKM124 & LKM141 & LKM144

LED Number	Description
1	Mode 1 LED
2	Mode 2 LED
3	Mode 3 LED
4	Mode 4 LED
5	System LED: Blinks every second
6	Tx LED: Sending data from Modem Side to Meter Side
7	Rx LED: Receiving data from Meter Side to Modem Side

4.12 Top Side: LKM614

LED Number	Description
1	Mode 4 LED
2	Mode 3 LED
3	Mode 2 LED
4	Mode 1 LED
5	System LED: Blinks every second
6	Rx LED: Receiving data from Meter
7	Tx LED: Sending data to Meter

# 5. Usage Scenarios and Connection Diagrams

LKM Series Protocol Gateways can be used in different scenarios. Usages are not limited to that examples and user may create their own usage scenario.

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateways standalone versions support up to 10 meters reading on RS485 Bus.

LKM Series Modbus TCP to IEC62056-21 Protocol Gateways standalone versions support up to 20 meters reading on RS485 Bus and RS232.
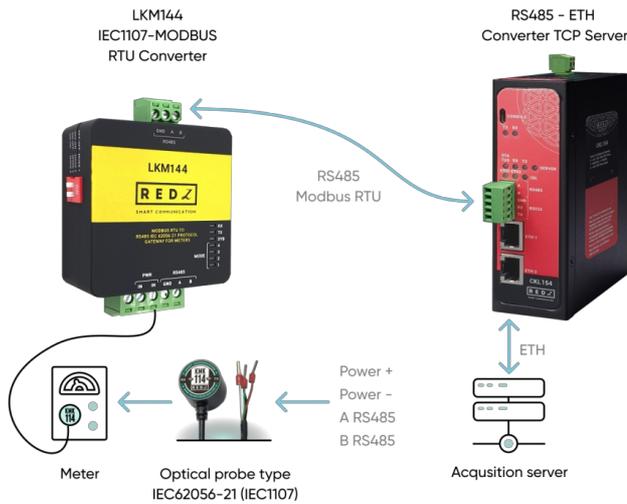
5.1 LKM Connected to Meter via Direct Cable and to Remote Server over TCP/IP

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateways can be connected to RS485 or P1 serial line of meter and can operate in fixed baud rate mode. Other side of device can be connected to remote Data Acquisition Server via TCP/IP device that can convert Modbus TCP to Modbus RTU.
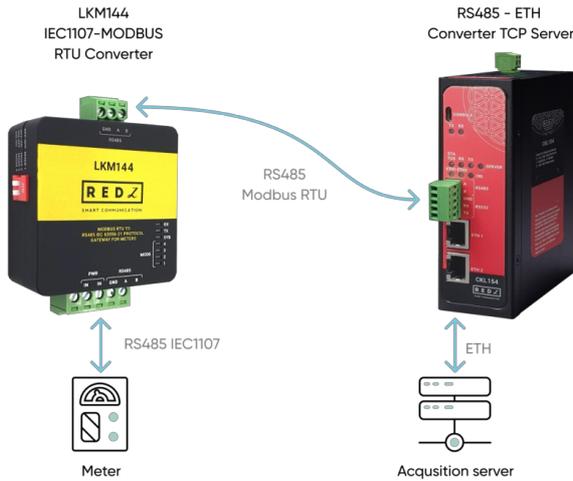
5.2 LKM Connected to Meter via Optical Probe and to Remote Server over TCP/IP

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway can be connected to optical probe of meter via REDZ KMK series optical probes and can operate in changing baud rate mode. Other side of device can be connected to remote Data Acquisition Server via TCP/IP device that can convert Modbus TCP to Modbus RTU.

5.3 LKM Connected to Meter via Direct Cable and to Remote Server over Direct Cable

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateways can be connected to RS485 or P1 serial line of meter and can operate in fixed baud rate mode. Other side of device can be connected to Data Acquisition Server via Cable connection as well and server can read data with Modbus RTU protocol.
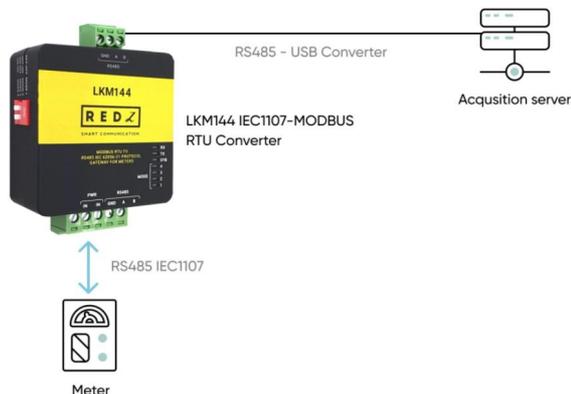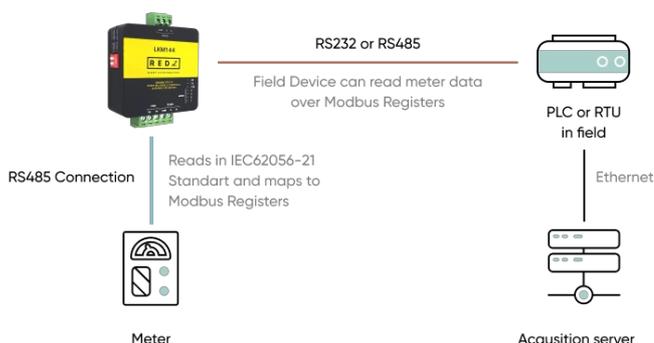
5.4 LKM Connected to Meter via Direct Cable and to Remote Server over Field Device

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateways can be connected to RS485 or P1 serial line of meter and can operate in fixed baud rate mode. Other side of device can be connected to a field device such as PLC or RTU and that device can read data with Modbus RTU protocol.

5.5 LKM614 Connected Directly to EMH LZQJ-XC Meter

LKM614 Modbus RTU to IEC62056-21 Protocol Gateway is especially designed for EMH LZQJ-XC meters and it is direct replacement for Variomod XC modules. LKM614 can be connected to EMH LZQJ-SC meter in fixed baud rate or auto baud rate mode based on meter settings. Other side of device can be connected to a field device such as PLC or RTU and that device can read data with Modbus RTU protocol. That device can also be connected to REDZ CKL series Modbus TCP – RTU Converter to read Modbus values over LAN or WAN.
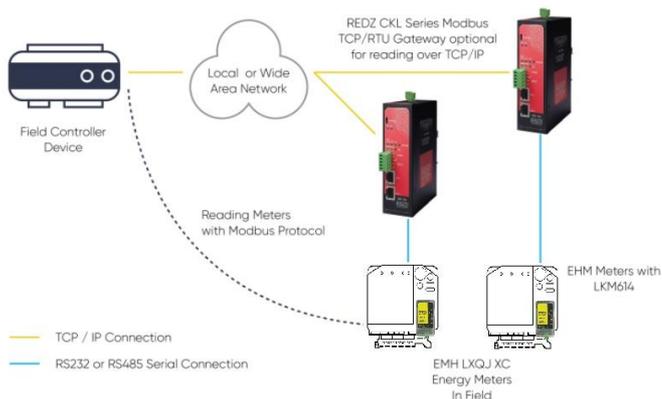
6. IEC62056-21 and MODBUS Definitions

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateway's one side should be connected directly or via optical probe to read electricity meter and other side should be connected to a field device such as PLC or RTU or serial device server connected to an automation software system that can read Modbus RTU devices.

6.1 Modbus Data Registers Table: Standard Version

LKM Series Modbus RTU to IEC62056-21 Protocol or P1 Companion Standard Gateways read the data table of electricity meters and maps the data in following Modbus Registers:

Register Number	OBIS Code	Search String	Register Name	Modbus Address (Dec)	Modbus Address (Hex)	Data Type

1	0.9.1	"0.9.1"	Time	1	0x01	Unsigned Long (UInt32)
2	0.9.2	"0.9.2"	Date	3	0x03	Unsigned Long (UInt32)
3	1.8.0	"1.8.0"	Total active energy import A+	5	0x05	Unsigned Long (UInt32)
4	2.8.0	"2.8.0"	Total active energy export A-	7	0x07	Unsigned Long (UInt32)
5	3.8.0	"3.8.0"	Total reactive energy R+	9	0x09	Unsigned Long (UInt32)
6	4.8.0	"4.8.0"	Total reactive energy R-	11	0x0B	Unsigned Long (UInt32)
7	5.8.0	"5.8.0"	Total reactive inductive energy import (Ri+) Q1	13	0x0D	Unsigned Long (UInt32)
8	6.8.0	"6.8.0"	Total reactive capacitive energy import (Rc+) Q2	15	0x0F	Unsigned Long (UInt32)
9	7.8.0	"7.8.0"	Total reactive inductive energy export (Ri-) Q3	17	0x11	Unsigned Long (UInt32)
10	8.8.0	"8.8.0"	Total reactive capacitive energy export (Rc-) Q4	19	0x13	Unsigned Long (UInt32)
11	1.6.0	"1.6.0"	Total maximal average import power P+max	21	0x15	Unsigned Long (UInt32)
12	2.6.0	"2.6.0"	Total maximal average export power P-max	23	0x17	Unsigned Long (UInt32)
13	1.5.0	"1.5.0"	Total average import power P+max (last period value)	25	0x19	Unsigned Long (UInt32)
14	1.7.0	"1.7.0"	Total instantaneous value power P+	27	0x1B	Unsigned Long (UInt32)
15	31.7.0	"31.7.0"	L1 Current ; instantaneous value	29	0x1D	Unsigned Long (UInt32)
16	51.7.0	"51.7.0"	L2 Current ; instantaneous value	31	0x1F	Unsigned Long (UInt32)
17	71.7.0	"71.7.0"	L3 Current ; instantaneous value	33	0x21	Unsigned Long (UInt32)
18	32.7.0	"32.7.0"	L1 Voltage; instantaneous value	35	0x23	Unsigned Long (UInt32)
19	52.7.0	"52.7.0"	L2 Voltage; instantaneous value	37	0x25	Unsigned Long (UInt32)
20	72.7.0	"72.7.0"	L3 Voltage; instantaneous value	39	0x27	Unsigned Long (UInt32)
21	13.7.0	"13.7.0"	Power factor	41	0x29	Unsigned Long (UInt32)
22	14.7.0	"14.7.0"	Frequency	43	0x2B	Unsigned Long (UInt32)
23	C.1.0	"C.1.0"	Meter number / meter ID	45	0x2D	Unsigned Long (UInt32)
24	16.7.0	"16.7.0"	Sum active instantaneous power (A+ - A-)	47	0x2F	Unsigned Long (UInt32)

The search strings are defined in firmware of device and can be customized based on customer's project. LKM Series Protocol Gateways read the read-out table (table number can be configured by user with Modbus command. See relevant section to configure) of IEC62056-21 or P1 Companion Standard meter and searches the strings and maps the values of first occurrence to Modbus register address. If the data is unavailable LKM Series Gateways store zero "0" as value.

6.2 Modbus Data Registers Table: Other versions

LKM Series Protocol Gateways alternatively reads the data table of IEC62056-21 or P1 Companion Standard meter and maps the data in following Modbus Registers:

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NOTE: Those are available alternatives and they are not limited to given examples.

OBIS name for firmware	Searched OBIS Codes
OBIS_EURO	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "1.5.0", "1.7.0", "31.7.0", "51.7.0", "71.7.0", "32.7.0", "52.7.0", "72.7.0", "13.7.0", "14.7.0", "C.1.0", "16.7.0"
OBIS_EURO_1	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "2.7.0", "1.7.0", "31.7", "51.7", "71.7", "32.7", "52.7", "72.7", "13.7", "14.7", "C.1.0", "C.7.0"
OBIS_EURO_2	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "32.25", "52.25", "72.25", "31.25", "51.25", "71.25", "1.25", "3.25", "13.25", "33.25", "53.25", "73.25", "9.25", "14.25"
OBIS_EURO_3	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "32.25", "52.25", "1.0.0", "1.7.0", "2.7.0", "3.7.0", "4.7.0", "32.7.0", "31.7.0", "33.25", "53.25", "73.25", "9.25", "14.25"

OBIS_EURO_4	"0.9.1","0.9.2", "1.8.0", "2.8.0", "3.8.0","4.8.0", "5.8.0", "6.8.0", "7.8.0","8.8.0", "1.6.1", "2.6.1", "1.6.1*","2.6.1*", "1.8.0*", "2.8.0*", "3.8.0*","4.8.0*", "5.8.0*", "6.8.0*", "7.8.0*","8.8.0*", "C.86.0", "C.7.0"
OBIS_EURO_5	"1.8.0", "2.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "9.8.0", "10.8.0", "1.7.0", "2.7.0", "3.7.0", "4.7.0", "31.7.0", "51.7.0", "71.7.0", "32.7.0", "52.7.0", "72.7.0", "1.8.1", "1.8.2", "5.8.1", "5.8.2", "8.8.1", "8.8.2"
OBIS_EURO_6	"0.9.1","0.9.2", "1.8.0", "2.8.0", "1.4.0","2.4.0", "5.8.0", "6.8.0", "7.8.0","8.8.0", "1.6.0", "2.6.0", "1.5.0", "2.5.0", "31.7.0", "51.7.0", "71.7.0","32.7.0", "52.7.0", "72.7.0", "13.7.0","14.7.0", "C.1.0", "16.7.0"
OBIS_EURO_7	"1.6.0", "0.0.0", "0.0.2", "1.8.0", "2.8.0", "0.9.1", "0.9.2", "21.25", "41.25", "61.25", "1.25", "31.25", "51.25", "71.25", "32.25", "52.25", "72.25", "33.25", "53.25", "73.25", "13.25", "14.25", "C.52.0", "C.86.0"
OBIS_EURO_8	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "1.9.1", "1.9.2", "1.9.3", "8.8.0", "1.6.1", "2.6.1", "1.7", "2.7", "31.7", "51.7", "71.7", "32.7", "52.7", "72.7", "13.7", "14.7", "3.7", "4.7"
OBIS_EURO_9	"1.25", "3.25", "9.25", "31.25", "51.25", "71.25", "32.25", "52.25", "72.25", "13.25", "14.25", "1.8.0", "1.8.1", "1.8.2", "2.8.0", "2.8.1", "2.8.2", "3.8.0", "3.8.1", "3.8.2", "4.8.0", "4.8.1", "4.8.2", "9.8.0"

OBIS_EURO_10	"0.9.1", "0.9.2", "1.25", "9.25", "31.25", "51.25", "71.25", "32.25", "52.25", "72.25", "81.7.40", "81.7.51", "81.7.62", "33.25", "53.25", "73.25", "13.25", "14.25", "1.8.0", "2.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0"
OBIS_EURO_11	"0.9.1*", "0.9.2*", "0.2.0*", "C.1.0*", "C.1.6*", "C.51.1*", "C.51.2*", "C.51.3*", "C.51.4*", "C.51.5*", "C.51.6*", "C.51.7*", "C.51.8*", "C.6.0*", "C.6.1*", "1.8.0*", "2.8.0*", "F.F.0*", "3.8.0*", "4.8.0*", "5.8.0*", "6.8.0*", "7.8.0*", "8.8.0*"
OBIS_EURO_12	"0.0.1", "C.1.0", "0.9.1", "0.9.2", "14.25", "1.25", "3.25", "9.25", "13.25", "21.25", "23.25", "29.25", "31.25", "32.25", "41.25", "43.25", "49.25", "51.25", "52.25", "61.25", "63.25", "69.25", "71.25", "72.25"
OBIS_EURO_13	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "1.5.0", "1.7.0", "1.8.1", "1.8.2", "1.8.3", "2.8.1", "2.8.2", "2.8.3", "13.7", "14.7", "C.1.0", "C.7.0"
OBIS_EURO_14	"1.8.0", "2.8.0", "9.8.0", "10.8.0", "3.8.0", "4.8.0", "32.7.0", "52.7.0", "72.7.0", "14.7", "13.7", "33.7", "53.7", "73.7", "16.7.0", "36.7.0", "56.7.0", "76.7.0", "131.7.0", "9.7.0", "29.7.0", "49.7.0", "69.7.0", "31.7.0"
OBIS_EURO_TRF	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "1.5.0", "1.7.0", "1.8.1", "1.8.2", "1.8.3", "2.8.1", "2.8.2", "2.8.3", "13.7","14.7", "C.1.0", "C.7.0"

OBIS_EURO_TRF_2	"F.F.0", "0.9.1", "0.9.2" , "0.0.0", "C.90.1", "C.1.0", "0.1.2", "0.1.3", "1.8.0", "1.8.1", "1.8.2", "1.8.3", "2.8.0", "2.8.1", "2.8.2", "2.8.3", "5.8.0", "5.8.1", "5.8.2", "5.8.3", "6.8.0", "6.8.1", "6.8.2", "6.8.3"

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NOTE: User can get readout table of its meter and share during order to have specific OBIS list for LKM series.

LKM series can read 24 registers of up to 10 meters in RS485 bus.

6.3 Modbus Data Registers Table: 64 Register Versions

LKM Series Protocol Gateway alternatively reads 64 registers from the data table of IEC62056-21 or P1 Companion Standard meter and maps the data in following Modbus Registers:

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NOTE: Those are available alternatives and they are not limited to given examples.

LKM series standard version can read 24 registers/meter of up to 10 meters on RS485 bus. LKM series can read 64 registers/meter of up to 4 meters in RS485 bus in this 64 register versions.

OBIS name for firmware	Searched OBIS Codes

OBIS_EURO_2	"1.8.0", "2.8.0", "3.8.0", "4.8.0",//4 "5.8.0", "6.8.0", "7.8.0", "8.8.0",//8 "1.6.0", "2.6.0", "3.6.0", "4.6.0",//12 "5.6.0", "6.6.0", "7.6.0", "8.6.0",//16 "1.4.0", "2.4.0", "3.4.0", "4.4.0",//20 "5.4.0", "6.4.0", "7.4.0", "8.4.0",//24 "1.5.0", "2.5.0", "3.5.0", "4.5.0",//28 "5.5.0", "6.5.0", "7.5.0", "8.5.0",//32 "1.7.0", "21.7.0", "41.7.0", "61.7.0",//36 "2.7.0", "22.7.0", "42.7.0", "62.7.0",//40 "16.7.0", "36.7.0", "56.7.0", "76.7.0",//44 "3.7.0", "23.7.0", "43.7.0", "63.7.0",//48 "4.7.0", "24.7.0", "44.7.0", "64.7.0",//52 "131.7.0", "151.7.0", "171.7.0", "191.7.0",//56 "11.7.0", "31.7.0", "51.7.0", "71.7.0",//60 "32.7.0", "52.7.0", "72.7.0", "5.38.0"//64
OBIS_EURO_3	"F.F", "0.9.1", "0.9.2", "0.0.0",//4 "131.7.0", "1.4.0", "2.4.0", "5.4.0",//8 "6.4.0","7.4.0", "8.4.0", "1.5.0",//12 "2.5.0", "5.5.0", "6.5.0", "7.5.0",//16 "8.5.0", "1.6.0", "2.6.0", "5.6.0",//20 "6.6.0", "7.6.0", "8.6.0", "1.8.1",//24 "1.8.2", "1.8.3", "2.8.1", "2.8.2",//28 "2.8.3", "5.8.1", "5.8.2", "5.8.3",//32 "6.8.1", "6.8.2", "6.8.3", "7.8.1",//36 "7.8.2", "7.8.3", "8.8.1", "8.8.2",//40 "8.8.3", "1.8.5", "1.8.0", "2.8.0",//44 "5.8.0", "6.8.0", "7.8.0", "8.8.0",//48 "9.8.0", "32.7.0", "52.7.0", "72.7.0",//52 "31.7.0", "51.7.0", "71.7.0", "91.7.0",//56 "14.7", "81.7.0", "81.7.1", "81.7.2",//60 "81.7.4", "81.7.5", "81.7.6", "16.7.0"//64

OBIS_EURO_4	"F.F.0", "0.9.1", "0.9.2" , "0.0.0", //4
	"C.90.1", "1.8.0", "2.8.0", "3.8.0", //8
	"4.8.0", "5.8.0", "6.8.0", "7.8.0", //12
	"8.8.0", "1.6.0", "2.6.0", "3.6.0", //16
	"4.6.0", "5.6.0", "6.6.0", "7.6.0", //20
	"8.6.0", "1.4.0", "2.4.0", "5.4.0", //24
	"6.4.0", "7.4.0", "8.4.0", "1.5.0", //28
	"2.5.0", "5.5.0", "6.5.0", "7.5.0", //32
	"8.5.0", "1.7.0", "21.7.0", "41.7.0", //36
	"61.7.0", "2.7.0", "22.7.0", "42.7.0", //40
	"62.7.0", "3.7.0", "4.7.0", "5.7.0", //44
	"6.7.0", "7.7.0", "8.7.0", "16.7.0", //48
	"36.7.0", "56.7.0", "76.7.0", "131.7.0", //52
	"151.7.0", "171.7.0", "191.7.0", "11.7.0", //56
	"31.7.0", "51.7.0", "71.7.0", "32.7.0", //60
	"52.7.0", "72.7.0", "5.38.0", "13.7.0" //64
OBIS_EURO_5	"0.9.1", "0.9.2", "0.1.2*", "96.6.6",//4
	"97.97.0", "97.98.1", "1.8.0", "2.8.0",//8
	"2.8.0*","5.8.0", "6.8.0", "7.8.0",//12
	"8.8.0", "1.7.0", "2.7.0", "5.7.0",//16
	"6.7.0", "7.7.0", "8.7.0", "32.7.0",//20
	"52.7.0", "72.7.0", "31.7.0", "51.7.0",//24
	"71.7.0", "14.7.0", "13.7.0", "33.7.0",//28
	"53.7.0", "73.7.0", "32.32.0", "52.32.0",//32
	"72.32.0", "1.8.0*", "5.8.0*", "6.8.0*",//36
	"7.8.0*", "8.8.0*", "21.8.0", "22.8.0",//40
	"25.8.0", "26.8.0", "27.8.0", "28.8.0",//44
	"41.8.0", "42.8.0", "45.8.0", "46.8.0",//48
	"47.8.0", "48.8.0", "61.8.0", "62.8.0",//52
	"65.8.0", "66.8.0", "67.8.0", "68.8.0",//56
	"1.9.0", "2.9.0", "5.9.0", "6.9.0",//60
	"7.9.0", "8.9.0", "1.6.0", "2.6.0"//64

OBIS_EURO_TRF	"F.F.0", "0.9.1", "0.9.2" , "0.0.0", //4 "C.90.1", "C.1.0", "0.1.2", "0.1.3", //8 "1.8.0", "1.8.1", "1.8.2", "1.8.3", //12 "2.8.0", "2.8.1", "2.8.2", "2.8.3", //16 "5.8.0", "5.8.1", "5.8.2", "5.8.3", //20 "6.8.0", "6.8.1", "6.8.2", "6.8.3", //24 "7.8.0", "7.8.1", "7.8.2", "7.8.3", //28 "8.8.0", "8.8.1", "8.8.2", "8.8.3", //32 "1.6.0", "2.6.0", "13.0.0", "1.4.0", //36 "2.4.0", "1.5.0", "2.5.0", "5.5.0", //40 "6.5.0", "7.5.0", "8.5.0", "1.7.0", //44 "2.7.0", "5.7.0", "6.7.0", "7.7.0", //48 "8.7.0", "16.7.0", "131.7.0", "11.7.0", //52 "31.7.0", "51.7.0", "71.7.0", "32.7.0", //56 "52.7.0", "72.7.0", "13.7.0", "14.7.1", //60 "1.0.0", "11.0.0", "12.0.0", "16.0.0" //64
OBIS_EURO_TRF_2	"F.F.0", "0.9.1", "0.9.2" , "0.0.0", //4 "C.90.1", "C.1.0", "0.1.2", "0.1.3", //8 "1.8.0", "1.8.1", "1.8.2", "1.8.3", //12 "2.8.0", "2.8.1", "2.8.2", "2.8.3", //16 "5.8.0", "5.8.1", "5.8.2", "5.8.3", //20 "6.8.0", "6.8.1", "6.8.2", "6.8.3", //24 "7.8.0", "7.8.1", "7.8.2", "7.8.3", //28 "8.8.0", "8.8.1", "8.8.2", "8.8.3", //32 "1.6.0", "2.6.0", "13.0.0", "1.4.0", //36 "2.4.0", "1.5.0", "2.5.0", "5.5.0", //40 "6.5.0", "7.5.0", "8.5.0", "1.7.0", //44 "2.7.0", "5.7.0", "6.7.0", "7.7.0", //48 "8.7.0", "16.7.0", "131.7.0", "11.7.0", //52 "31.7.0", "51.7.0", "71.7.0", "32.7.0", //56 "52.7.0", "72.7.0", "13.7.0", "14.7.0", //60 "0.8.0", "0.8.1", "0.8.2", "0.8.3" //64

☝

NOTE: User can get readout table of its meter and share during order to have specific OBIS list for LKM series.

LKM series can read 64 registers of up to 4 meters in RS485 bus.

6.4 Modbus Data Registers Table: Reading with Modbus Commands

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway meter data can be read by Holding Register command (Function Code 3). Values can be queried individually or as array.

Read Holding Registers (Function Code=3)

Request

This command is requesting the content of meter data holding registers # 40006 to 40013 from the LKM Series Modbus RTU to IEC62056-21 Protocol Gateway with address 1.

01 03 0005 0008 540D

01: The Slave Address (01 hex = address 1)

03: The Function Code 3 (read IEC62056-21 read-out mapped data)

0005: The Data Address of the first register requested.

(0005 hex = 5 , + 40001 offset = input #40006)

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NOTE: This example shows reading of 1 meter in RS485 bus. If there are more then 1 meter in bus (LKM can read up to 10 meters in same RS485 bus) then address will be simply incremented by decimal 256

same data address example for other meters:

2nd meter : 0105

3th meter : 0205

....

10th meter: 0905

All meters can be read by field Modbus RTU master device simultaneoulsy by different registers.

0008: The total number of registers requested. (read 8 registers for 4 values since each value is 32byte, 40005 to 40013)

540D: The CRC (cyclic redundancy check) for error checking.

Response

01 03 10 0000 0000 0000 0000 0000 0000 0000 0000 E459

01: The Slave Address (01 hex = address 1)

03: The Function Code 3 (read IEC62056-21 read-out mapped data)

10: The number of data bytes to follow (4 registers x 4 bytes each = 16 bytes)

0000 0000: The contents of register #40006

0000 0000: The contents of register #40008

0000 0000: The contents of register #40010

0000 0000: The contents of register #40012

E19A: The CRC (cyclic redundancy check).

Example 1

if read-out data has following line

1-1:1.8.0(000000.03*MWh)

Read out value is stored at address 0x05 as per Modbus Address Table:

1.8.0	"1.8.0"	Total active energy import A+	5	0x05	Unsigned Long (UInt32)

The read data will be "3" and user should implement the coefficient to show value properly with or without comma.

Example 2

if read-out data has following line

5.8.0(17.244*MVarh)

Read out value is stored at address 0x0D as per Modbus Address Table:

5.8.0	"5.8.0"	Total reactive inductive energy import (Ri+) Q1	13	0x0D	Unsigned Long (UInt32)

The read data will be "17244" and user should implement the coefficient to show value properly with or without comma.

6.5 Read Data Settings Table

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway reads the data table of IEC62056-21 meter and following settings can be read or altered:

Register Number	Definition	Explanation	Modbus Address (Decimal)	Modbus Address (Hexadecimal)	Data Type
1	Modbus Address	LKM Series Modbus RTU to IEC62056-21 Protocol Gateway Modbus Device Address for Communication. Default Address is 0x01	128	0x80	Unsigned Integer (UInt16)
2	Period (in seconds)	Defines duration in seconds after successfully reading of IEC62056-21 Meter. This duration is also valid for waiting after failed reading attempt. Default value is 10 seconds.	129	0x81	Unsigned Integer (UInt16)
3	Table Code (as Hex)	Different read-out tables can be read from meter and this code defines which table to read and which code should be submitted to meter during Acknowledgement/option select message Message of IEC62056-21 Standard Mode C or E: ACK / Protocol Control Character / Baud Rate Identification / TABLE CODE / CR / LF Default value is 0x30 means ASCII "0".	130	0x82	Unsigned Integer (UInt16)

| 4 | Meter Reading Method | Accepts 1 byte.

There are 2 methods available currently that defines the way data read from IEC62056-21 meter and parsed

1. Method 1: Hexadecimal 0x00 (OBSELETE, NOT SUGGESTED TO USE)

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway reads all data available in read-out table and stores in temporary memory which has capacity around 2,7kB. After that BCC control sequence started based on definitions of IEC62056-21 standard. If BCC control passes the reading is marked as successful and data search starts. The found values are mapped in Modbus registers and others are kept zero "0". This method is safest since it controls BCC but should be used in shorter tables such as service tables (shorter than 2kB)

2. Method 2: Hexadecimal 0x01

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway reads the read-out table and simultaneously checks each read line for the first occurrence of search strings. If a new match occurs than the found value is mapped in Modbus register as a new value. This is the default and fastest method to read for all kind of tables of IEC 62056-21 meters.

☝
WARNING: Method 1 fails in long tables which are over 2kB. It is a good idea to always try reading with Method 2 in the first implementation.

Default value is 0x01. | 131 | 0x83 | Unsigned Integer (UInt16) |
| 5 | Send Initialization String Quantity | This value defines how many times the initialization string will be sent before IEC62056-21 Mode C Request (first) message.

If this option is not used should be set to 0.

☝
WARNING: Initialization string is defined in different register. This option defines how many times it should be sent before communication start only. | 132 | 0x84 | Unsigned Integer (UInt16) |

| 6 | Read Meter Quantity | This value defines how many meters will be read in same RS485 connected to same LKM device.

Meter adress values defied in different register.

☝

WARNING: If there are more than 1 meter in same RS485 bus of LKM (LKM supports up to 10 meters) then IEC address of the meters must be entered. Adress values are entered in different registers. | 133 | 0x85 | Unsigned Integer (UInt16) |

6.6 Read Data Settings Table: Reading with Modbus Commands

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway read data settings table can be read by Holding Register command (Function Code 0x03). Values can be queried individually or as array as shown in Modbus Data Registers reading.

6.7 Read Data Settings Table: Altering with Modbus Commands

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway read data settings table values can be altered by Preset Single Register command (Function Code 6). Values can be altered one at a time only.

Register Number	Definition	Explanation	Modbus Address (Decimal)	Modbus Address (Hexadecimal)	Data Type
1	Modbus Address	Once the command sent the device will respond with old address. New communication continues with new address.	128	0x80	Unsigned Integer (UInt16)
2	Period (in seconds)	Accepts 1 byte. It can be between 1 and 255	129	0x81	Unsigned Integer (UInt16)
3	Table Code (as Hex)	Accepts 1 byte. Examples: 0x30 means ASCII '0' as table number 0x37 means ASCII '7' as table number	130	0x82	Unsigned Integer (UInt16)

4	Meter Reading Method	Accepts 1 byte. There are 2 methods available currently that defines the way data read from IEC62056-21 meter and parsed 1. Method 1: Read full table and check BCC and register data Hexadecimal 0x00 **(Method 1 is OBSELETE, NOT SUGGESTED TO USE)** 2. Method 2: Read each line of table and register data during reading Hexadecimal 0x01 ☝ WARNING: Method 1 fails in long tables which are over 2,7kB. It is a good idea to always try reading with Method 2 in the first implementation.	131	0x83	Unsigned Integer (UInt16)
5	Send Initialization String Quantity	Accepts 1 byte. It can be between 0 and 4	132	0x84	Unsigned Integer (UInt16)
6	Read Meter Quantity	Accepts 1 byte. It can be between 1 and 10 since the device supports up to 10 meters in same RS485 bus	133	0x85	Unsigned Integer (UInt16)

Preset Single Register (Function Code=06)

<u>Request</u>

This command changes read-out table code to '7', output holding registers # 40131 of the slave device with address 1.

01 06 0082 0037 6834

01: The Slave Address (01 hex = address1)

06: The Function Code 6 (Preset Single Register)

0082: The Data Address of the Table Code.

(0082 hex = 130, + 40001 offset = register #40131)

0037: The value to write to register 40131, (37 hex = "7" as ASCII code)

6834: The CRC (cyclic redundancy check) for error checking.

<u>Response</u>

01 06 0082 0037 6834

01: The Slave Address (01 hex = address1)

06: The Function Code 6 (Preset Single Register)

0082: The Data Address of the register. (# 40131 – 40001 = 130)

0037: The value written

6834: The CRC (cyclic redundancy check) for error checking.

<u>Example 1</u>

Following code changes reading method to method 2

Meter Reading Method	There are 2 methods available currently that defines the way data read from IEC62056-21 meter and parsed 1. Method 1: Hexadecimal 0x00 2. Method 2: Hexadecimal 0x01	131	0x83	Unsigned Integer (UInt16)

<u>Request</u>

01 06 0083 0001 B9E2

Response

01 06 0083 0001 B9E2

6.8 Device Monitoring Parameters Table

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway reads the data table of IEC62056-21 meter and following monitoring parameters can be read:

Register Number	Definition	Explanation	Modbus Address (Decimal)	Modbus Address (Hexadecimal)	Data Type
1	IEC Device Address for 1st Meter	IEC address of the meter. If it is '0', it means not used ☝ NOTE: IEC Meter Address values for all meters in RS485 bus can be altered with Preset Multiple Registers (Function Code =16) Command in this table	160	0xA0	Unsigned Long (UInt32)
2	IEC Read Counter	In Reading method 1 increments 1 after successfully check BCC character and confirm In Reading Method 2 increments 1 after reading the meter table and receiving ETX (End of Text) character of the table	162	0xA2	Unsigned Long (UInt32)
3	Second Counter	Increments 1 every second since the device is powered up. Device restarts after 24 hours (86400 seconds)	164	0xA4	Unsigned Long (UInt32)

4	FW Version Original	Gives device firmware info when the device is sold from stock. Includes version and build date 4 byte data example: 0x1237E301: 0x12: DAY = 18 0x3: MONTH = 3 0x7E3: YEAR = 2019 0x01: VERSION = 1	166	0xA6	Unsigned Long (UInt32)
5	FW Version Upgraded	Gives device firmware info and it differs from FW Original version if the device firmware changed in the field. Includes version and build date 0x1437E302: 0x12: DAY = 20 0x3: MONTH = 3 0x7E3: YEAR = 2019 0x02: VERSION = 2	168	0xA8	Unsigned Long (UInt32)
6	Initialization String	Some IEC meters may need "wake up" characters before communication starts. Initialization strings gives option to send those characters. It allows 4 bytes and with "Send Initialization String Quantity" register, up to 16 bytes can be send to meter before IEC Read Out. ☝ WARNING: "Send Initialization String Quantity" must be set to 1 or more in order to send Initialization Strings	170	0xAA	Unsigned Long (UInt32)
7	IEC Device Address for Meter Number 2	IEC address of the 2nd meter in same RS485 bus. It must be different then '0'	172	0xAC	Unsigned Long (UInt32)
8	IEC Device Address for Meter Number 3	IEC address of the 3th meter in same RS485 bus. It must be different then '0'	174	0xAE	Unsigned Long (UInt32)
9	IEC Device Address for Meter Number 4	IEC address of the 4th meter in same RS485 bus. It must be different then '0'	176	0xB0	Unsigned Long (UInt32)

10	IEC Device Address for Meter Number 5	IEC address of the 5th meter in same RS485 bus. It must be different then '0'	178	0xB2	Unsigned Long (UInt32)
11	IEC Device Address for Meter Number 6	IEC address of the 6th meter in same RS485 bus. It must be different then '0'	180	0xB4	Unsigned Long (UInt32)
12	IEC Device Address for Meter Number 7	IEC address of the 7th meter in same RS485 bus. It must be different then '0'	182	0xB6	Unsigned Long (UInt32)
13	IEC Device Address for Meter Number 8	IEC address of the 8th meter in same RS485 bus. It must be different then '0'	184	0xB8	Unsigned Long (UInt32)
14	IEC Device Address for Meter Number 9	IEC address of the 9th meter in same RS485 bus. It must be different then '0'	186	0xBA	Unsigned Long (UInt32)
15	IEC Device Address for Meter Number 10	IEC address of the 10th meter in same RS485 bus. It must be different then '0'	188	0xBC	Unsigned Long (UInt32)

6.9 Device Monitoring Parameters Table: Reading with Modbus Commands

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway device monitoring parameters table can be read by Holding Register command (Function Code 0x03). Values can be queried individually or as array as shown in Modbus Data Registers reading

Example 1

Following code read 5 registers of monitoring parameters

Request

01 03 00A0 000A C5EF

Response

01 03 14 0000 0000 0000 0000 0000 03AD 1557 E301 0137 E406 44AA

6.10 Device Monitoring Parameters Table: Change IEC Device Address with Modbus Commands

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway device monitoring parameters table has following parameters that can be altered by user by Preset Multiple Registers Command (Function Code 0x10).

- IEC Device Address for 1st Meter
- IEC Device Address for other meters on RS485 bus numbered from 2 to 9
- Initialization String before communication start

The meter IEC62056-21 data address can be entered to LKM device as following example and that value is usually same with meter serial number. It can be set to "0" (zero) if not needed to use and if there is only 1 meter in RS485 bus.

Preset Multiple Registers (Function Code=16)

Request

This command changes iec device addres to '5061905', output holding registers # 160 of the slave device with address 1.

01 10 00A0 0002 04 004D 3D11 B95C

01: The Slave Address (01 hex = address 1)

10 : The Function Code 10 (Preset Multiple Registers)

00A0 : The Register Address of the IEC Data Address

0002 : The number of registers to write

04 : The number of data bytes to follow (2 registers x 2 bytes each = 4 bytes)

004D 3D11: 5061905 in Decimal equals to 4D3D11

B95C: The CRC (cyclic redundancy check) for error checking.

<u>Response</u>

01 10 00A0 0002 41EA

01: The Slave Address (01 hex = address1):

10 : The Function Code 10 (Preset Multiple Registers)

00A0 : The Register Address of the IEC Data Address

0002 : The number of registers written

41EA: The CRC (cyclic redundancy check) for error checking.

6.11 ZTerminal Software

ZTerminal software can be used to read all parameters of LKM devices, alter parameters that are allowed to change and read all registers for all meters connected to LKM devices. This is unoffical software for LKM series of devices and it is an implementation of Modbus commands only.

It supports both Modbus RTU and Modbus TCP (LKMs connected behind CKL series Modbus TCP to RTU gateway for example) communication.

7. Firmware Change Procedure

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WARNING: Firmware upgrade is available from Modem side Serial Line only

RS232 on LKM111 & LKM141

RS485 on LKM114 & LKM124 & LKM144 & LKM614

Device and abcZ must be on same serial settings. Lets say if LKM is in Mode 4: 9600 8N1 mode, then abcZ should also be set same for firmware upgrade process.

LKM Series Protocol Gateways has capability to change firmware from serial line of Modem side. This way the user can get latest updates or change OBIS codes for device operation and also user may also ask for changes. Here are some examples:

- Firmware upgrade for specific meter model and protocol implementation

- Firmware upgrade to disable switches and work only in one mode

- Firmware upgrade to put any feature that user needs

Firmware upgrade procedure need specific firmware file prepared by our company and the firmware upgrade software abcZ software also developed by our company.
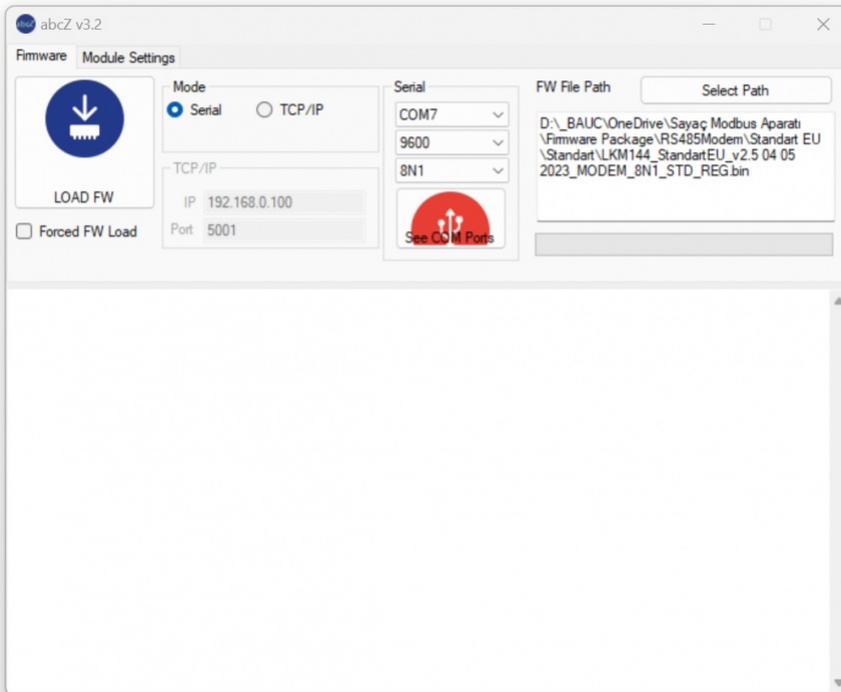
In order to use the software the specific firmware must be selected. After selecting the firmware path by clicking "Select Path" button the firmware can be loaded to device.

☝️

NOTE: The device has protection time window 10 seconds after the powered up so the process must be started within 10 seconds after the device powered up.

User can select the correct COM port and click "LOAD FW" button. Both the software and the device will show the percentage of process visually by process bar in software and by LEDs (work mode LEDs) on device (once %25 of process finished LED1 will be on and continue with LED2, LED3 and finish with LED4 after %100 finished). The process will take less than a minute and the device will be ready to use with new firmware after an automatic restart.
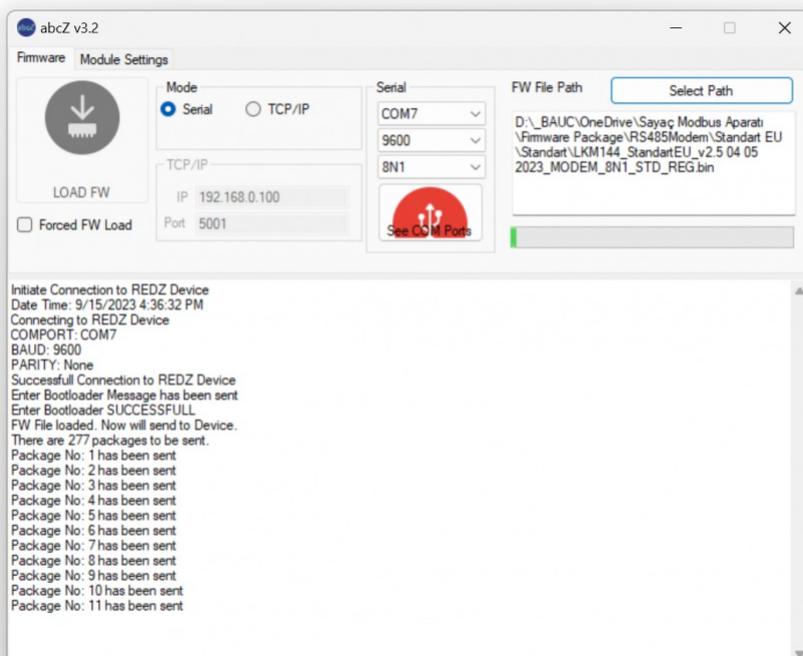
8. Modbus Query with Modbus Software Example

Configuration & Reading LKM via ZTerminal Software

In this example we are using:

- LKM144
  Mode 3: 19200 8N1 communication on Modbus Side, 19200 7E1 communication on Meter Side

  Obis codes: Standard EURO
  Reading of 24 registers as shown below

|	
OBIS_EURO	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "1.5.0", "1.7.0", "31.7.0", "51.7.0", "71.7.0", "32.7.0", "52.7.0", "72.7.0", "13.7.0", "14.7.0", "C.1.0", "16.7.0"

- IEC62056-21 Mode C Meter
  Communicates in 19200 7E1

  Meter has following read out table:

F.F(11111111)	1.8.2(7871.4117*kWh)	6.8.3(5553.8802*kvarh)	
0.9.2(22-09-14)	1.8.2*07(0871.0696*kWh)	6.8.3*07(0003.8495*kvarh)	2.8.0*06(0003.5753*kWh)
0.9.1(10:25:07)	1.8.2*06(0868.9837*kWh)	6.8.3*06(0003.6191*kvarh)	2.8.0*05(0003.5216*kWh)
0.1.0(55)	1.8.2*05(0858.9924*kWh)	6.8.3*05(0003.4521*kvarh)	2.8.0*04(0003.5216*kWh)
0.1.0*07(22-07-09 02:40)	1.8.2*04(0845.4907*kWh)	6.8.3*04(0003.4521*kvarh)	5.8.0(2130.1081*kvarh)
0.1.0*06(22-07-01 00:00)	1.8.3(4871.8240*kWh)	7.8.1(6666.6666*kvarh)	5.8.0*07(2127.7592*kvarh)
0.1.0*05(22-06-01 00:00)	1.8.3*07(4866.5860*kWh)	7.8.1*07(0000.0000*kvarh)	5.8.0*06(2121.1704*kvarh)
0.1.0*04(22-05-01 00:00)	1.8.3*06(4853.1543*kWh)	7.8.1*06(0000.0000*kvarh)	5.8.0*05(2087.4483*kvarh)
0.0.0(96130289)	1.8.3*05(4769.7803*kWh)	7.8.1*05(0000.0000*kvarh)	5.8.0*04(2048.2306*kvarh)
C.90.1(96130289)	1.8.3*04(4661.9428*kWh)	7.8.1*04(0000.0000*kvarh)	6.8.0(5554.7538*kvarh)
C.1.0(96130289)	2.8.1(7777.6678*kWh)	7.8.2(7777.7772*kvarh)	6.8.0*07(0004.7205*kvarh)
1.4.0(02)(3.3132*kW)	2.8.1*07(0000.6676*kWh)	7.8.2*07(0000.0002*kvarh)	6.8.0*06(0004.4862*kvarh)
2.4.0(02)(4.4444*kW)	2.8.1*06(0000.6665*kWh)	7.8.2*06(0000.0002*kvarh)	6.8.0*05(0004.3113*kvarh)
5.4.0(04)(5.5148*kvar)	2.8.1*05(0000.6654*kWh)	7.8.2*05(0000.0002*kvarh)	6.8.0*04(0004.3113*kvarh)
6.4.0(04)(6.6666*kvar)	2.8.1*04(0000.6654*kWh)	7.8.2*04(0000.0002*kvarh)	7.8.0(6666.6663*kvarh)
7.4.0(04)(7.7777*kvar)	2.8.2(8888.1034*kWh)	7.8.3(8888.8881*kvarh)	7.8.0*07(0000.0003*kvarh)
8.4.0(04)(8.8888*kvar)	2.8.2*07(0000.1034*kWh)	7.8.3*07(0000.0001*kvarh)	7.8.0*06(0000.0003*kvarh)
1.5.0(1.1923*kW)	2.8.2*06(0000.1034*kWh)	7.8.3*06(0000.0001*kvarh)	7.8.0*05(0000.0003*kvarh)
2.5.0(2.2222*kW)	2.8.2*05(0000.1032*kWh)	7.8.3*05(0000.0001*kvarh)	7.8.0*04(0000.0003*kvarh)
5.5.0(3.3522*kvar)	2.8.2*04(0000.1032*kWh)	7.8.3*04(0000.0001*kvarh)	8.8.0(7777.7725*kvarh)
6.5.0(4.4444*kvar)	2.8.3(9992.9146*kWh)	8.8.1(9999.9912*kvarh)	8.8.0*07(0000.0719*kvarh)
7.5.0(5.5555*kvar)	2.8.3*07(0002.9047*kWh)	8.8.1*07(0000.0012*kvarh)	8.8.0*06(0000.0693*kvarh)

8.5.0(6.6666*kvar)	2.8.3*06(0002.8053*kWh)	8.8.1*06(0000.0012*kvarh)	8.8.0*05(0000.0691*kvarh)
1.6.0(1.1781*kW)(22-07-11 16:00)	2.8.3*05(0002.7529*kWh)	8.8.1*05(0000.0012*kvarh)	8.8.0*04(0000.0691*kvarh)
1.6.0*07(0.6450*kW)(22-07-02 23:00)	2.8.3*04(0002.7529*kWh)	8.8.1*04(0000.0012*kvarh)	9.8.0(7788.3984*kVAh)
1.6.0*06(0.3220*kW)(22-06-08 12:15)	5.8.1(1370.6718*kvarh)	8.8.2(1111.1127*kvarh)	32.7.0(160.2*V)
1.6.0*05(0.3530*kW)(22-05-25 12:30)	5.8.1*07(0370.2462*kvarh)	8.8.2*07(0000.0027*kvarh)	52.7.0(160.7*V)
1.6.0*04(0.4110*kW)(22-04-11 11:00)	5.8.1*06(0369.0621*kvarh)	8.8.2*06(0000.0003*kvarh)	72.7.0(160.6*V)
2.6.0(0.0000*kW)(22-07-12 06:45)	5.8.1*05(0362.3924*kvarh)	8.8.2*05(0000.0003*kvarh)	1.7.0(10.72*A)
2.6.0*07(0.0360*kW)(22-07-04 04:30)	5.8.1*04(0355.0516*kvarh)	8.8.2*04(0000.0003*kvarh)	31.7.0(10.72*A)
2.6.0*06(0.0200*kW)(22-06-27 06:30)	5.8.2(2269.7377*kvarh)	8.8.3(2222.0685*kvarh)	51.7.0(10.72*A)
2.6.0*05(0.0000*kW)(00-00-00 00:00)	5.8.2*07(0269.6222*kvarh)	8.8.3*07(0000.0679*kvarh)	71.7.0(10.68*A)
2.6.0*04(0.0000*kW)(00-00-00 00:00)	5.8.2*06(0268.9545*kvarh)	8.8.3*06(0000.0677*kvarh)	91.7.0(10.07*A)
5.6.0(3.3642*kvar)(22-09-01 10:00)	5.8.2*05(0265.9975*kvarh)	8.8.3*05(0000.0676*kvarh)	14.7(50.01*Hz)
6.6.0(4.4133*kvar)(22-09-05 07:30)	5.8.2*04(0262.3601*kvarh)	8.8.3*04(0000.0676*kvarh)	81.7.0(110*Deg)
7.6.0(5.5555*kvar)(22-09-05 07:00)	5.8.3(1489.6986*kvarh)	1.8.5(3333.3333*kWh)	81.7.1(121*Deg)
8.6.0(6.6666*kvar)(22-09-01 09:45)	5.8.3*07(1487.8907*kvarh)	1.8.5*07(0000.0000*kWh)	81.7.2(240*Deg)
1.8.1(1151.9956*kWh)	5.8.3*06(1483.1537*kvarh)	1.8.5*06(0000.0000*kWh)	81.7.4(116*Deg)
1.8.1*07(1150.9763*kWh)	5.8.3*05(1459.0583*kvarh)	1.8.5*05(0000.0000*kWh)	81.7.5(140*Deg)
1.8.1*06(1147.6604*kWh)	5.8.3*04(1430.8188*kvarh)	1.8.5*04(0000.0000*kWh)	81.7.6(257*Deg)
1.8.1*05(1126.5102*kWh)	6.8.1(3333.7030*kvarh)	1.8.0(6895.2317*kWh)	16.7.0(-10000.114*kW)
1.8.1*04(1100.1469*kWh)	6.8.1*07(0000.7002*kvarh)	1.8.0*07(6888.6320*kWh)	131.7.0(22222.222*kvar)
	6.8.1*06(0000.6966*kvarh)	1.8.0*06(6869.7985*kWh)	13.7.0(-1.000)
	6.8.1*05(0000.6918*kvarh)	1.8.0*05(6755.2830*kWh)	14.7.0(-1.000)
	6.8.1*04(0000.6918*kvarh)	1.8.0*04(6607.5805*kWh)	0.2.2(B 23)
	6.8.2(4444.1706*kvarh)	2.8.0(4443.6859*kWh)	0.4.2(00000001)
	6.8.2*07(0000.1706*kvarh)	3.8.0(4443.6859*kWh)	0.4.3(00000001)
	6.8.2*06(0000.1704*kvarh)	4.8.0(4443.6859*kWh)	
	6.8.2*05(0000.1673*kvarh)	2.8.0*07(0003.6759*kWh)	
	6.8.2*04(0000.1673*kvarh)		

- ZTerminal Software on a PC

Open Zterminal software and enter communication parameters. In this example COM port is COM7, baud is set to 19200 and Device selected as "Modbus RTU"
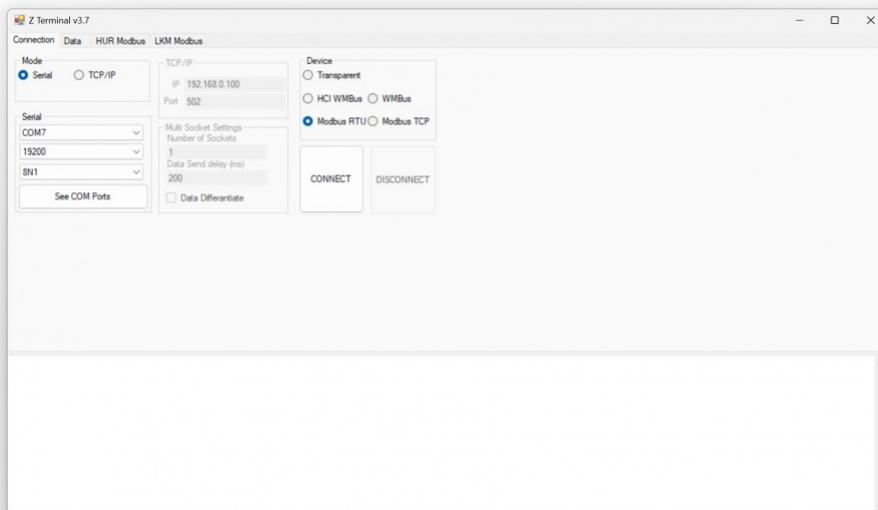
Go to LKM Modbus page and enter Modbus Address of LKM (default is 1) and click "Read Configured Values".

Page will show device configuration parameters. User can change

- Modbus Address of LKM (needed if more than 1 Modbus devices are on same RS485 bus)
- Reading period, default is 10 seconds which means LKM will try to read the meter in every 10 seconds (after successfull or failed read attempt)
- Reading Table Code, which is 40 in decimal by default and "0" as ASCII and 0x30 as decmial. Some meters have different tables such as "Service Table". If needed user can read that table as long as they know the table number (can be gathered from meter reading software from communication log).
  Lets say if service table is ASCII "7", then hex 0x37 which is 55 in decimal should be entered on this box.
- How many times Init String should be sent, default is 0. This is needed only if the meter requires a "wake up" sequence
- Read Meter quantity, default is 1. LKM series Modbus RTU versions can read up to 10 meters on same bus, so if needed user can get 24 registers from each meter (total 240 data)

☝

NOTE: LKM141, LKM144 supports reading up to 10 meters on RS485 bus and reads 24 registers from each.

LKM111, LKM114 has RS232 interface on meter side, so they support reading 1 meter

LKM124 has P1 Companion Standard interface on meter side, so it supports reading 1 meter

LKM614 directly fits in EMH LZQJ-XC series meters, so it supports reading 1 meter

☝

NOTE: LKM series has version to read 64 registers from up to 4 meters (LKM141 and LKM144 models can read more than 1 meters) as well. Users may order (or change firmware later in the field.) based on their need.
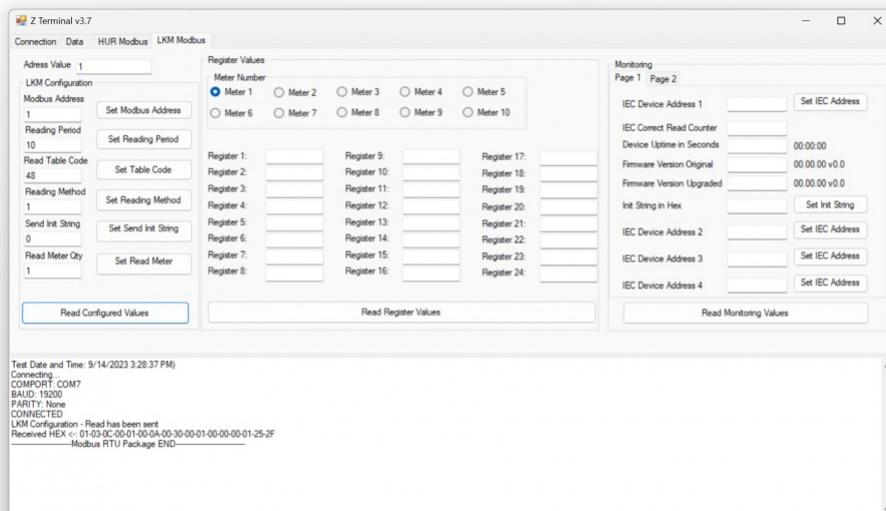
Click "Monitoring".

Page will show device monitoring parameters. User can also change read meter device address from this part.

- IEC device address from 1 to 10 is IEC address for meter number from 1 to 10. Used for LKM141 and LKM144 models only.

☝

NOTE: If there are more than 1 meters on RS485 bus, user MUST enter the physical addresses of meters to read teh correct meter.

- IEC read counter shows how many times the meter is read
- Device Up time is the seconds past since the device is powered up.
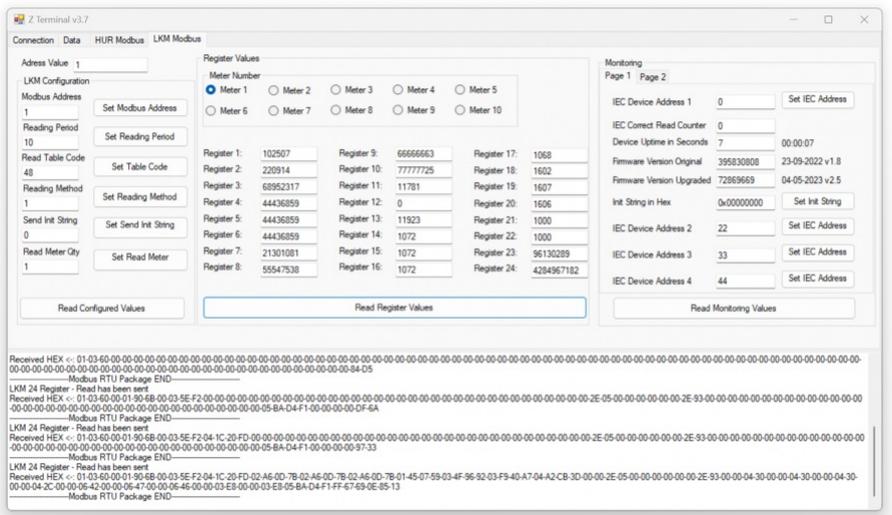
☝

NOTE: LKM restarts itself in every 24 hours automatically.

- Firmware versions shows the device firmware version
- User can also change initilization string value (in hex) from this part
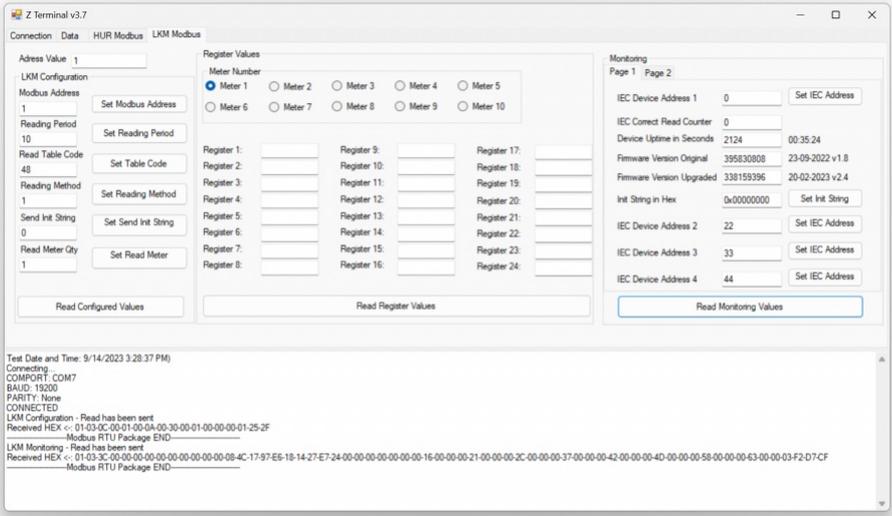
Click "Meter 1" to read values of 1st Meter.

System will show the read values (without notation)

Here is mapping based on our example and it perfectly matches with ZTerminal screen

Register Number	Obis Code	Found in
1	"0.9.1"	0.9.1(10:25:07)
2	"0.9.2"	0.9.2(22-09-14)
3	"1.8.0"	1.8.0(6895.2317*kWh)
4	"2.8.0"	2.8.0(4443.6859*kWh)
5	"3.8.0"	3.8.0(4443.6859*kWh)
6	"4.8.0"	4.8.0(4443.6859*kWh)
7	"5.8.0"	5.8.0(2130.1081*kvarh)
8	"6.8.0"	6.8.0(5554.7538*kvarh)

9	"7.8.0"	7.8.0(6666.6663*kvarh)
10	"8.8.0"	8.8.0(7777.7725*kvarh)
11	"1.6.0"	1.6.0(1.1781*kW)(22-07-11 16:00)
12	"2.6.0"	2.6.0(0.0000*kW)(22-07-12 06:45)
13	"1.5.0"	1.5.0(1.1923*kW)
14	"1.7.0"	1.7.0(10.72*A)
15	"31.7.0"	31.7.0(10.72*A)
16	"51.7.0"	51.7.0(10.72*A)
17	"71.7.0"	71.7.0(10.68*A)
18	"32.7.0"	32.7.0(160.2*V)
19	"52.7.0"	52.7.0(160.7*V)
20	"72.7.0"	72.7.0(160.6*V)
21	"13.7.0"	13.7.0(-1.000)
22	"14.7.0"	14.7.0(-1.000)
23	"C.1.0"	C.1.0(96130289)
24	"16.7.0"	16.7.0(-10000.114*kW)

👆

NOTE: This reading is done with a simulator software created by our company. Thus some values are artificial. Also Zterminal do not parse negative values (user modbus software can easly do it by changing data type)

Configuration & Reading LKM via ZTerminal Software : More than 1 Meter on RS485 bus

LKM141, LKM144 supports reading up to 10 meters on RS485 bus and reads 24 registers from each meters. They have also version for 64 registers of 4 meters.

If there are more than 1 meter on RS485 bus, user MUST enter the physicall addresses of meters to read the correct meter.

In "LKM Configuration" part set the number of meters needed to be read and click "Set Read Meter". In this example we have 2 meters on RS485 bus.

Adress Value	1	
LKM Configuration		
Modbus Address	1	Set Modbus Address
Reading Period	10	Set Reading Period
Read Table Code	48	Set Table Code
Reading Method	1	Set Reading Method
Send Init String	0	Set Send Init String
Read Meter Qty	2	Set Read Meter

In "Monitoring" part set the physical address for meter 1 and click "Set IEC Address". In this example we will set 67269821.

Again in same window set the physicall address for meter 1 and click "Set IEC Address". In this example we will set 12699119.

Monitoring

Page 1 Page 2

IEC Device Address 1	67269821	Set IEC Address
IEC Correct Read Counter	0	
Device Uptime in Seconds	11102	03:05:02
Firmware Version Original	395830808	23-09-2022 v1.8
Firmware Version Upgraded	72869669	04-05-2023 v2.5
Init String in Hex	0x00000000	Set Init String
IEC Device Address 2	12699119	Set IEC Address
IEC Device Address 3	33	Set IEC Address
IEC Device Address 4	44	Set IEC Address

Then LKM will read meters 1 by 1

In "Monitoring" part select "Meter 1" and click "Read Register Values", ZTerminal will show read values for Meter 1

Register Values

Meter Number

● Meter 1   ○ Meter 2   ○ Meter 3   ○ Meter 4   ○ Meter 5
○ Meter 6   ○ Meter 7   ○ Meter 8   ○ Meter 9   ○ Meter 10

Register 1:	195250	Register 9:	0	Register 17:	0
Register 2:	230915	Register 10:	11	Register 18:	0
Register 3:	4449	Register 11:	0	Register 19:	0
Register 4:	0	Register 12:	0	Register 20:	2295
Register 5:	0	Register 13:	0	Register 21:	0
Register 6:	0	Register 14:	0	Register 22:	0
Register 7:	7524	Register 15:	0	Register 23:	0
Register 8:	0	Register 16:	0	Register 24:	0

Read Register Values

In same way in "Monitoring" part select "Meter 2" and click "Read Register Values", ZTerminal will show read values for Meter 2

Reading LKM via Modbus Software

In this example we are using:

- LKM144
  Mode 3: 19200 8N1 communication on Modbus Side, 19200 7E1 communication on Meter Side

  Obis codes: Standard EURO
  Reading of 24 registers as shown below

| OBIS_EURO	"0.9.1", "0.9.2", "1.8.0", "2.8.0", "3.8.0", "4.8.0", "5.8.0", "6.8.0", "7.8.0", "8.8.0", "1.6.0", "2.6.0", "1.5.0", "1.7.0", "31.7.0", "51.7.0", "71.7.0", "32.7.0", "52.7.0", "72.7.0", "13.7.0", "14.7.0", "C.1.0", "16.7.0"

- IEC62056-21 Mode C Meter
  Communicates in 19200 7E1

  Meter has following read out table:

| F.F(11111111)			
0.9.2(22-09-14)			
0.9.1(10:25:07)			
0.1.0(55)		6.8.3(5553.8802*kvarh)	
0.1.0*07(22-07-09 02:40)		6.8.3*07(0003.8495*kvarh)	2.8.0*06(0003.5753*kWh)
0.1.0*06(22-07-01 00:00)		6.8.3*06(0003.6191*kvarh)	2.8.0*05(0003.5216*kWh)
0.1.0*05(22-06-01 00:00)	1.8.3(4871.8240*kWh)	6.8.3*05(0003.4521*kvarh)	2.8.0*04(0003.5216*kWh)
0.1.0*04(22-05-01 00:00)	1.8.3*07(4866.5860*kWh)	6.8.3*04(0003.4521*kvarh)	5.8.0(2130.1081*kvarh)
0.0.0(96130289)	1.8.3*06(4853.1543*kWh)	7.8.1(6666.6666*kvarh)	5.8.0*07(2127.7592*kvarh)
C.90.1(96130289)	1.8.3*05(4769.7803*kWh)	7.8.1*07(0000.0000*kvarh)	5.8.0*06(2121.1704*kvarh)
C.1.0(96130289)	1.8.3*04(4661.9428*kWh)	7.8.1*06(0000.0000*kvarh)	5.8.0*05(2087.4483*kvarh)
1.4.0(02)(3.3132*kW)	2.8.1(7777.6678*kWh)	7.8.1*05(0000.0000*kvarh)	5.8.0*04(2048.2306*kvarh)
2.4.0(02)(4.4444*kW)	2.8.1*07(0000.6676*kWh)	7.8.1*04(0000.0000*kvarh)	6.8.0(5554.7538*kvarh)
5.4.0(04)(5.5148*kvar)	2.8.1*06(0000.6665*kWh)	7.8.2(7777.7772*kvarh)	6.8.0*07(0004.7205*kvarh)
6.4.0(04)(6.6666*kvar)	2.8.1*05(0000.6654*kWh)	7.8.2*07(0000.0002*kvarh)	6.8.0*06(0004.4862*kvarh)
7.4.0(04)(7.7777*kvar)	2.8.1*04(0000.6654*kWh)	7.8.2*06(0000.0002*kvarh)	6.8.0*05(0004.3113*kvarh)
8.4.0(04)(8.8888*kvar)	2.8.2(8888.1034*kWh)	7.8.2*05(0000.0002*kvarh)	6.8.0*04(0004.3113*kvarh)
1.5.0(1.1923*kW)	2.8.2*07(0000.1034*kWh)	7.8.2*04(0000.0002*kvarh)	7.8.0(6666.6663*kvarh)
2.5.0(2.2222*kW)	2.8.2*06(0000.1034*kWh)	7.8.3(8888.8881*kvarh)	7.8.0*07(0000.0003*kvarh)
	2.8.2*05(0000.1032*kWh)	7.8.3*07(0000.0001*kvarh)	

5.5.0(3.3522*kvar)

6.5.0(4.4444*kvar)

7.5.0(5.5555*kvar)

8.5.0(6.6666*kvar)

1.6.0(1.1781*kW)(22-07-11 16:00)

1.6.0*07(0.6450*kW)(22-07-02 23:00)

1.6.0*06(0.3220*kW)(22-06-08 12:15)

1.6.0*05(0.3530*kW)(22-05-25 12:30)

1.6.0*04(0.4110*kW)(22-04-11 11:00)

2.6.0(0.0000*kW)(22-07-12 06:45)

2.6.0*07(0.0360*kW)(22-07-04 04:30)

2.6.0*06(0.0200*kW)(22-06-27 06:30)

2.6.0*05(0.0000*kW)(00-00-00 00:00)

2.6.0*04(0.0000*kW)(00-00-00 00:00)

5.6.0(3.3642*kvar)(22-09-01 10:00)

6.6.0(4.4133*kvar)(22-09-05 07:30)

7.6.0(5.5555*kvar)(22-09-05 07:00)

8.6.0(6.6666*kvar)(22-09-01 09:45)

1.8.1(1151.9956*kWh)

1.8.1*07(1150.9763*kWh)

1.8.1*06(1147.6604*kWh)

1.8.1*05(1126.5102*kWh)

1.8.1*04(1100.1469*kWh)

1.8.2(7871.4117*kWh)

1.8.2*07(0871.0696*kWh)

1.8.2*06(0868.9837*kWh)

1.8.2*05(0858.9924*kWh)

1.8.2*04(0845.4907*kWh)

2.8.2*04(0000.1032*kWh)

2.8.3(9992.9146*kWh)

2.8.3*07(0002.9047*kWh)

2.8.3*06(0002.8053*kWh)

2.8.3*05(0002.7529*kWh)

2.8.3*04(0002.7529*kWh)

5.8.1(1370.6718*kvarh)

5.8.1*07(0370.2462*kvarh)

5.8.1*06(0369.0621*kvarh)

5.8.1*05(0362.3924*kvarh)

5.8.1*04(0355.0516*kvarh)

5.8.2(2269.7377*kvarh)

5.8.2*07(0269.6222*kvarh)

5.8.2*06(0268.9545*kvarh)

5.8.2*05(0265.9975*kvarh)

5.8.2*04(0262.3601*kvarh)

5.8.3(1489.6986*kvarh)

5.8.3*07(1487.8907*kvarh)

5.8.3*06(1483.1537*kvarh)

5.8.3*05(1459.0583*kvarh)

5.8.3*04(1430.8188*kvarh)

6.8.1(3333.7030*kvarh)

6.8.1*07(0000.7002*kvarh)

6.8.1*06(0000.6966*kvarh)

6.8.1*05(0000.6918*kvarh)

6.8.1*04(0000.6918*kvarh)

6.8.2(4444.1706*kvarh)

6.8.2*07(0000.1706*kvarh)

6.8.2*06(0000.1704*kvarh)

6.8.2*05(0000.1673*kvarh)

6.8.2*04(0000.1673*kvarh)

7.8.3*06(0000.0001*kvarh)

7.8.3*05(0000.0001*kvarh)

7.8.3*04(0000.0001*kvarh)

8.8.1(9999.9912*kvarh)

8.8.1*07(0000.0012*kvarh)

8.8.1*06(0000.0012*kvarh)

8.8.1*05(0000.0012*kvarh)

8.8.1*04(0000.0012*kvarh)

8.8.2(1111.1127*kvarh)

8.8.2*07(0000.0027*kvarh)

8.8.2*06(0000.0003*kvarh)

8.8.2*05(0000.0003*kvarh)

8.8.2*04(0000.0003*kvarh)

8.8.3(2222.0685*kvarh)

8.8.3*07(0000.0679*kvarh)

8.8.3*06(0000.0677*kvarh)

8.8.3*05(0000.0676*kvarh)

8.8.3*04(0000.0676*kvarh)

1.8.5(3333.3333*kWh)

1.8.5*07(0000.0000*kWh)

1.8.5*06(0000.0000*kWh)

1.8.5*05(0000.0000*kWh)

1.8.5*04(0000.0000*kWh)

1.8.0(6895.2317*kWh)

1.8.0*07(6888.6320*kWh)

1.8.0*06(6869.7985*kWh)

1.8.0*05(6755.2830*kWh)

1.8.0*04(6607.5805*kWh)

2.8.0(4443.6859*kWh)

3.8.0(4443.6859*kWh)

4.8.0(4443.6859*kWh)

2.8.0*07(0003.6759*kWh)

7.8.0*06(0000.0003*kvarh)

7.8.0*05(0000.0003*kvarh)

7.8.0*04(0000.0003*kvarh)

8.8.0(7777.7725*kvarh)

8.8.0*07(0000.0719*kvarh)

8.8.0*06(0000.0693*kvarh)

8.8.0*05(0000.0691*kvarh)

8.8.0*04(0000.0691*kvarh)

9.8.0(7788.3984*kVAh)

32.7.0(160.2*V)

52.7.0(160.7*V)

72.7.0(160.6*V)

1.7.0(10.72*A)

31.7.0(10.72*A)

51.7.0(10.72*A)

71.7.0(10.68*A)

91.7.0(10.07*A)

14.7(50.01*Hz)

81.7.0(110*Deg)

81.7.1(121*Deg)

81.7.2(240*Deg)

81.7.4(116*Deg)

81.7.5(140*Deg)

81.7.6(257*Deg)

16.7.0(-10000.114*kW)

131.7.0(22222.222*kvar)

13.7.0(-1.000)

14.7.0(-1.000)

0.2.2(B 23)

0.4.2(00000001)

0.4.3(00000001)

- Modbus Poll Software on a PC

Open Modbus Poll Software and enter communication parameters under menu "Connection"-> "Connect".
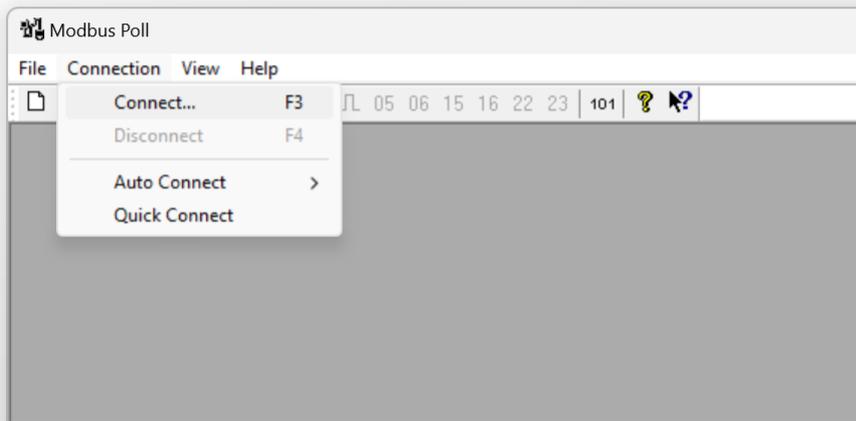
In this example COM port is COM7, baud is set to 19200 and data is 8 Data Bits, 1 Stop Bit and Parity is None.

Device will be connected over Serial Port (Modbus RTU). Click "OK" to save settings.
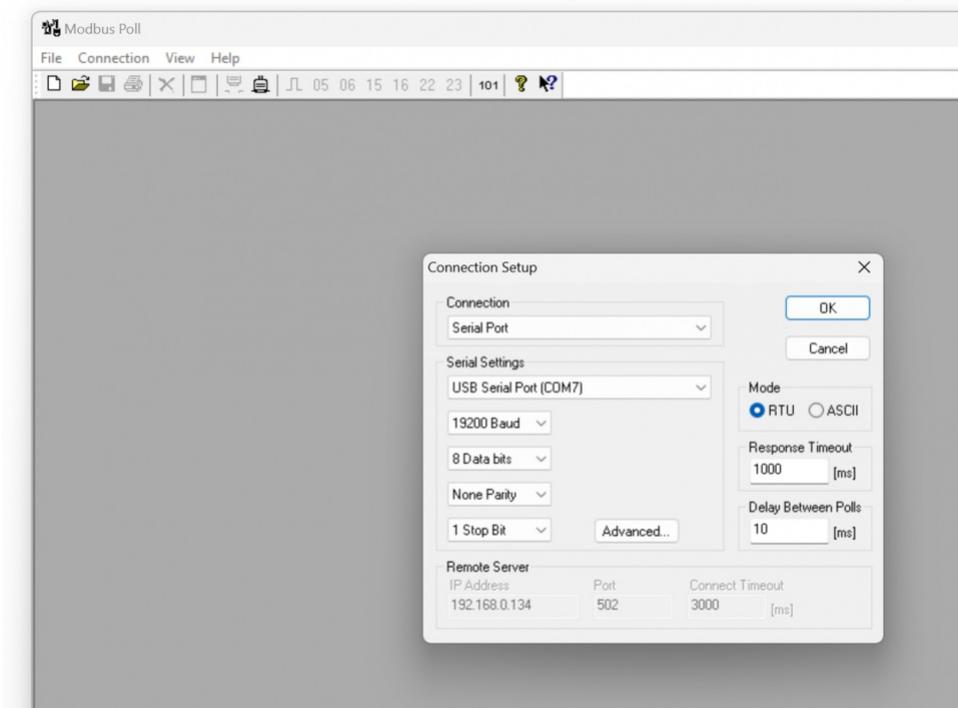
Click "File"->"New" to open a new reading window. Right click from mouse to newly opened window to select "Read/write Defitinion..."
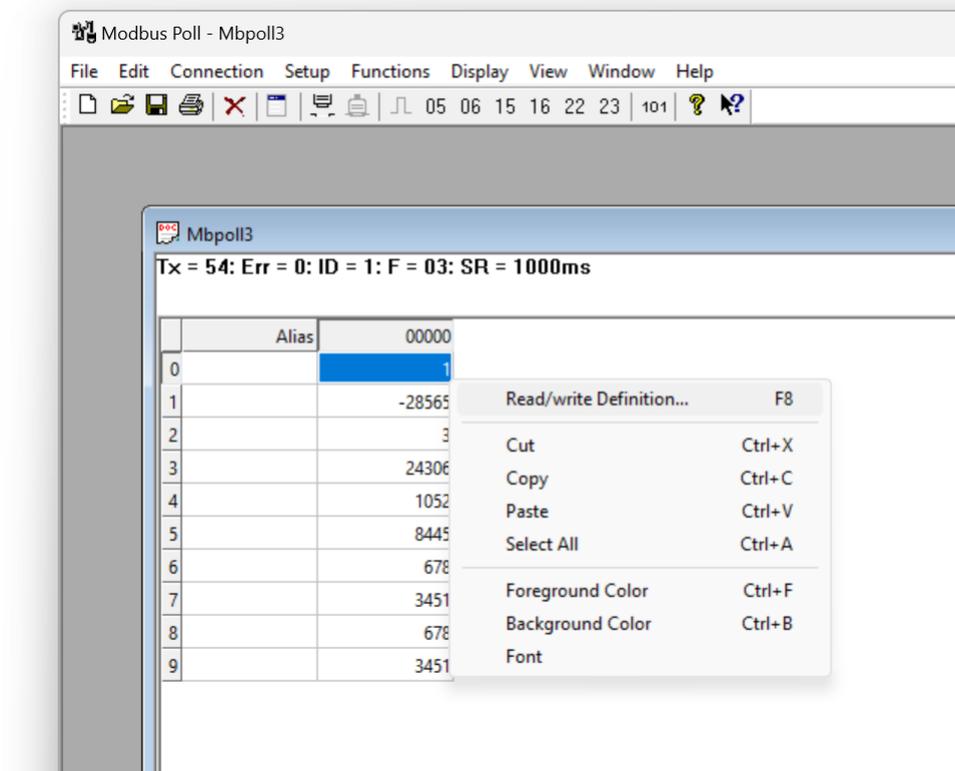
Modbus Address will be in this example. Function will be "03 Read Holding Register (4x).

Register start address will be 0 in this example

☝

NOTE: Register address for different number of meters (for LKM141 and LKM144 models) are will be as follows

Meter 1: Hex: 0x00 00, Decimal 0
Meter 2: Hex: 0x01 00, Decimal 256
Meter 3: Hex: 0x02 00, Decimal 512

...

Meter 10: Hex: 0x09 00, Decimal 2304

If there are more than 1 meters on RS485 bus, user MUST enter the physical addresses of meters to read the correct meter. It can be entered by using Modbus commands described in this manual or by using ZTerminal Software as described in previous part.
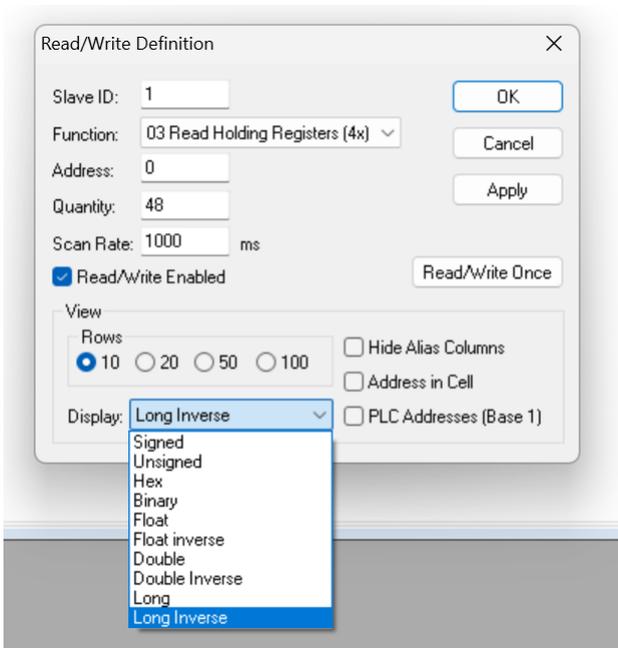

to read 24 long type registers we must query 48 values

☝

NOTE: If the device in 64 registers reading firmware , then to read 64 long type registers we must query 128 values. The software may not allow that big number, so user can open 2 windows and split quey in half

1st window: Query Register 0 – Qty 64

2nd window: Query Register 65 – Qty 64

Click "OK" when finished and software will read values
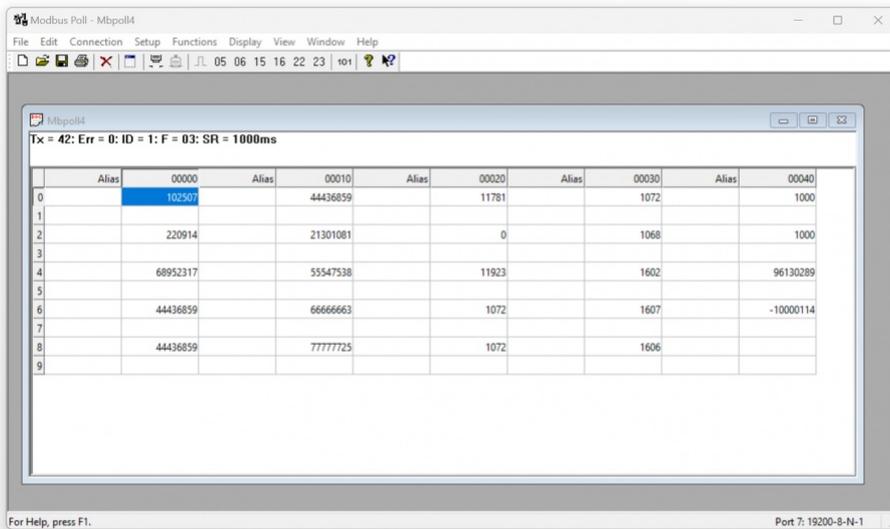
Here is mapping based on our example and it perfectly matches with Modbus reading screen

Register Number	Obis Code	Found in
1	"0.9.1"	0.9.1(10:25:07)
2	"0.9.2"	0.9.2(22-09-14)
3	"1.8.0"	1.8.0(6895.2317*kWh)
4	"2.8.0"	2.8.0(4443.6859*kWh)
5	"3.8.0"	3.8.0(4443.6859*kWh)
6	"4.8.0"	4.8.0(4443.6859*kWh)
7	"5.8.0"	5.8.0(2130.1081*kvarh)
8	"6.8.0"	6.8.0(5554.7538*kvarh)
9	"7.8.0"	7.8.0(6666.6663*kvarh)

10	"8.8.0"	8.8.0(7777.7725*kvarh)
11	"1.6.0"	1.6.0(1.1781*kW)(22-07-11 16:00)
12	"2.6.0"	2.6.0(0.0000*kW)(22-07-12 06:45)
13	"1.5.0"	1.5.0(1.1923*kW)
14	"1.7.0"	1.7.0(10.72*A)
15	"31.7.0"	31.7.0(10.72*A)
16	"51.7.0"	51.7.0(10.72*A)
17	"71.7.0"	71.7.0(10.68*A)
18	"32.7.0"	32.7.0(160.2*V)
19	"52.7.0"	52.7.0(160.7*V)
20	"72.7.0"	72.7.0(160.6*V)
21	"13.7.0"	13.7.0(-1.000)
22	"14.7.0"	14.7.0(-1.000)
23	"C.1.0"	C.1.0(96130289)
24	"16.7.0"	16.7.0(-10000.114*kW)

👌

NOTE: This reading is done with a simulator software created by our company. Thus some values are artificial.

9. LKM614 Montage and Modbus Reading Example

9.1 LKM614 Connected Directly to EMH LZQJ-XC Meter to read meter data

LKM614 Modbus RTU to IEC62056-21 Protocol Gateway is especially designed for EMH LZQJ-XC meters and it is direct replacement for Variomod XC modules. LKM614 can be connected to EMH LZQJ-SC meter in fixed baud rate or auto baud rate mode based on meter settings. Other side of device can be connected to a field device such as PLC or RTU and that device can read data with Modbus RTU protocol. That device can also be connected to REDZ CKL series Modbus TCP – RTU Converter to read Modbus values over LAN or WAN.
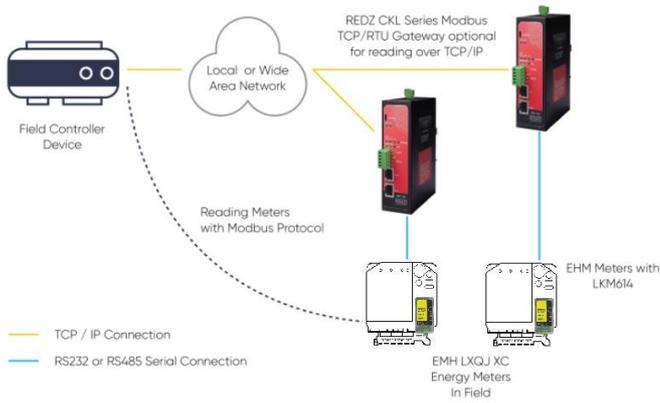
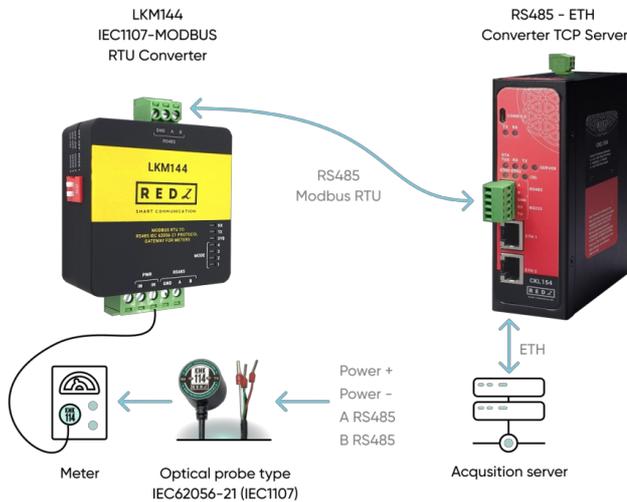## 9.2 Video Example with ZTerminal Software and LKM614

Here is an example for montage and meter data reading via Modbus software ZTerminal

Here is an example video reading over Modbus software ZTerminal

10. LKM144 Connected to IEC Meter over KMK Series Optical Probe and Modbus Reading Example

10.1 LKM Connected to Meter via Optical Probe and to Remote Server

LKM Series Modbus RTU to IEC62056-21 Protocol Gateway can be connected to optical probe of meter via REDZ KMK series optical probes and can operate in changing baud rate mode. Other side of device can be connected to remote Data Acquisition Server via Modbus RTU or via TCP/IP device that can convert Modbus TCP to Modbus RTU.

10.1 Video Example with ZTerminal Software and LKM144 – Modbus RTU Reading

Here is an example for meter data reading over KMK114 – RS485 Optical Probe and LKM144 via Modbus software ZTerminal

10.2 Video Example with ZTerminal Software and LKM144 – Modbus TCP Reading

Here is an example for meter data reading over KMK114 – RS485 Optical Probe and LKM144 via Modbus software ZTerminal and this time LKM is connected to CKL series to read data over TCP/IP.

11. Ordering Information

LKM111: Modem side RS232, Meter side RS232, Modbus RTU to IEC 62056-21 Protocol Meter gateway

LKM114: Modem side RS485, Meter side RS232, Modbus RTU to IEC 62056-21 Protocol Meter gateway

LKM124: Modem side RS485, Meter side P1 Interface, Modbus RTU to P1 Companion Standard Meter gateway

LKM141: Modem side RS232, Meter side RS485, Modbus RTU to IEC 62056-21 Protocol Meter gateway

LKM144: Modem side RS485, Meter side RS485, Modbus RTU to IEC 62056-21 Protocol Meter gateway

LKM614: Modbus RTU to IEC 62056-21 Protocol Meter gateway specially designed for EMH LZQJ-XC Meter with RS485 on Modem Side

12 Product Selection

Model	5-24V DC Power input	Plug into Meter and Play, No external Power Needed	Operating Mode Selections	Modem Side RS232 Connection	Modem Side RS485 Connection	Meter Side RS232 Connection	Meter Side RS485 Connection	Meter Side P1 Companion Standard	Firmware Upgrade Over Serial Line
LKM111	X		X	X		X			X
LKM114	X		X		X	X			X
LKM124	X		X		X			X	X
LKM141	X		X	X			X		X
LKM144	X		X		X		X		X
LKM614		X	X						X