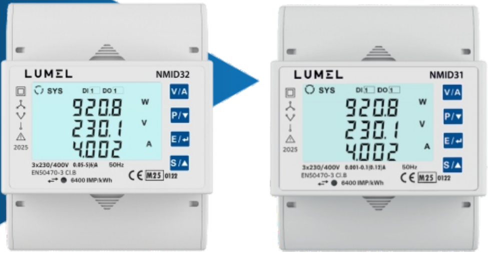
LUMEL

DIN RAIL MOUNT
SINGLE AND THREE PHASE ENERGY METER

NMID32 / NMID31



INTERFACE MANUAL

CE

DIGITAL ENERGY METER

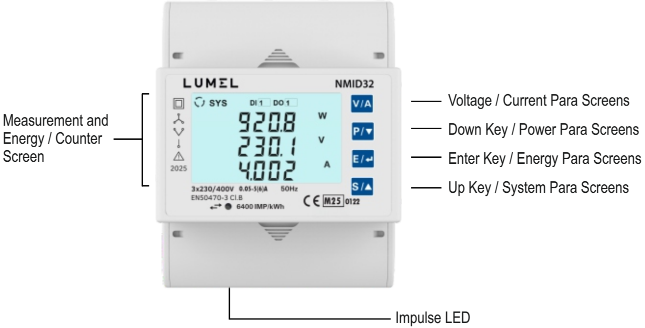
Installation & Operating Instructions

Section **Contents**

1. INTRODUCTION

The Energy Meter is a DIN Rail mounted Quadratic Digital Meter, which measures important electrical parameters in 3 ph 4 wire / 3 wire / 1ph Network and replaces the multiple analog panel meters. It measures electrical parameters like AC voltage, Current, Frequency, Power, Energy (Active / Reactive / Apparent), Power Factor.

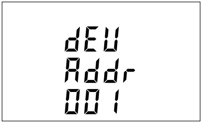
The PT Primary, PT Secondary, CT Primary, CT Secondary and System Type can be configured & Programmed at the site only in first 15 minutes after entering into setup menu and get locked as per MID standard.
The front panel has four push buttons using which the user can scroll through different screens & configure the product. The front panel also has Impulse red led, flashing at rate proportional to measured power.



Operation via standard RS485 is also possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For modbus service, it is essential that device address, baud rate and parity should be configured properly.
This document specifies only the interface between a Master device and Meter for electrical variable through MODBUS over RS485.

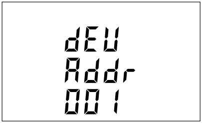
2. Communication Parameter Selection Screen

2.1 Address Setting



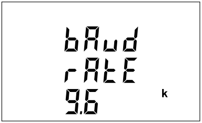
This screen applies to the RS-485 output only. This screen allows the user to set RS-485 address for the meter.
The allowable range of addresses is 1 to 247.

Press " ▲ " key to advance to "RS-485 Baud Rate" screen (see Section 2.2)



Press " ↵ " to enter into edit mode, prompt for first digit. (Flashing digit indicates cursor position).
Press the " ▲ " and " ▼ " keys to scroll the value of the first digit. Press the " ↵ " key to advance to next digit.
Similarly, enter second and third digits of address. After entering third digit, pressing " ↵ " key confirms the selection and shows "Address Setting" screen (see Section 2.1).

2.2 RS 485 Baud Rate



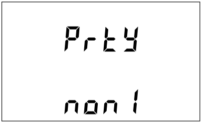
This screen allows the user to set Baud Rate of RS-485 port. The values displayed on screen are in kbaud.

Pressing " ▲ " key accepts the present value and advance to the "RS-485 Parity Selection" screen (see Section 2.3) and pressing the " ▼ " key accepts the present value and advance to the "Address Setting" screen(see Section 2.1).
Pressing the " ↵ " key advances to the "Baud Rate Edit" mode and " ▲ " & " ▼ " keys scrolls the value through **4.8, 9.6, 19.2, 38.4 and 57.6** kbaud.

Pressing the " ↵ " key sets the value and shows the " RS-485 Baud Rate" screen (see Section 2.2).

2.3 RS 485 Parity

This screen allows the user to set Parity & number of stop bits of RS-485 port.



pressing "▼ " key accepts the present value and advances to "RS-485 Baud Rate" screen (see section 2.2).

Pressing the "↵ " key advances to the "Parity & Stop bit Edit" mode & keys "▲" and "▼" scrolls the value through:

non1 : no parity with one stop bit **non2** : no parity with two stop bit
EVEn : even parity with one stop bit **odd** : odd parity with one stop bit

Pressing " ↵" key sets the value and advances to "RS-485 Parity Selection" screen (see Section 2.3).

3. RS 485 (ModBus) Output:

The Energy Meter supports MODBUS (RS-485) RTU protocol (2-wire).

Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. The screens should also be connected to the "Gnd" terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS-485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS-485 network. The permissible address range for The Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

After sending any query through software (of the Master), it must allow 300ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 300 ms, Master can ignore the previous query and can issue fresh query to the slave.

Each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 4800,9600,19200,38400,57600 bps.

Function code:

03 (HEX)	Read Holding Registers	Read content of read /write location (4X)
04 (HEX)	Read input Registers	Read content of read only location (3X)
10 (HEX)	Presets Multiple Registers	Set the content of read / write locations (4X)

Exception Cases : An exception code will be generated when Meter receives ModBus query with valid parity & error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be "Function Code" ORed with HEX (80H). The exception codes are listed below:

01	Illegal function	The function code is not supported by Meter
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal DataValue	Attempt to set a floating point variable to an invalid value

3.1 Accessing 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1** for the addresses of 3X and 4X registers used for parameters measured by the instrument. Each parameter is held in the 3X as well as 4X registers. Modbus Code 04 and 03 are used to access all parameters in 3X and 4X registers respectively.

Example:

To read parameter,
Voltage2 from 3X: Start address= 00 02 Number of registers = 02
Watt2 from 4X: Start address= 00 0E Number of registers = 02

Note: Number of registers = Number of parameters x 2

Each query for reading the data must be restricted to 20 parameters or less. Exceeding the 20 parameter limit will cause a ModBus exception code to be returned.

Query for 3X read:

01 (Hex)	04 (Hex)	00 (Hex)	02(Hex)	00 (Hex)	02(Hex)	D0(Hex)	0B (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

3X Response: Voltage 2 (219.254V)

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	5B (Hex)	41 (Hex)	06 (Hex)	2F (Hex)	81 (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count : Total number of data bytes received.

Query for 4X read:

01 (Hex)	03 (Hex)	00 (Hex)	0E(Hex)	00 (Hex)	02(Hex)	A5(Hex)	C8(Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

4X Response: Watt2 (2000 W)

01 (Hex)	03 (Hex)	04 (Hex)	44 (Hex)	FA (Hex)	00 (Hex)	00 (Hex)	CE (Hex)	F2 (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte count : No. of Bytes Demanded by user in query.
Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High BytE: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

TABLE 1: 3 X and 4 X register addresses for measured parameters

TABLE 1.1: 3 X and 4 X register addresses for Regular Parameters

Address (3X)	Address (4X)	Parameter Number	Parameters	Units	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
30001	40001	1	Voltage L1 (Voltage L12 for 3P3W)	Volts	00	00	00	00
30003	40003	2	Voltage L2 (Voltage L23 for 3P3W)	Volts	00	02	00	02
30005	40005	3	Voltage L3 (Voltage L31 for 3P3W)	Volts	00	04	00	04
30007	40007	4	Current L1	Amp	00	06	00	06
30009	40009	5	Current L2	Amp	00	08	00	08
30011	40011	6	Current L3	Amp	00	0A	00	0A
30013	40013	7	Watt L1	Watt	00	0C	00	0C
30015	40015	8	Watt L2	Watt	00	0E	00	0E
30017	40017	9	Watt L3	Watt	00	10	00	10
30019	40019	10	VA L1	VA	00	12	00	12
30021	40021	11	VA L2	VA	00	14	00	14
30023	40023	12	VA L3	VA	00	16	00	16
30025	40025	13	VAR L1	VAr	00	18	00	18
30027	40027	14	VAR L2	VAr	00	1A	00	1A
30029	40029	15	VAR L3	VAr	00	1C	00	1C
30031	40031	16	Power Factor L1	-	00	1E	00	1E
30033	40033	17	Power Factor L2	-	00	20	00	20
30035	40035	18	Power Factor L3	-	00	22	00	22
30037	40037	19	Phase Angle L1	Deg	00	24	00	24
30039	40039	20	Phase Angle L2	Deg	00	26	00	26
30041	40041	21	Phase Angle L3	Deg	00	28	00	28
30043	40043	22	Voltage Avg	Volts	00	2A	00	2A
30045	40045	23	Voltage Sum	Volts	00	2C	00	2C
30047	40047	24	Current Avg	Amp	00	2E	00	2E
30049	40049	25	Current Sum	Amp	00	30	00	30
30051	40051	26	Watt Avg	00	00	32	00	32
30053	40053	27	Watt Sum	Watt	00	34	00	34
30055	40055	28	VA Avg	VA	00	36	00	36
30057	40057	29	VA Sum	VA	00	38	00	38

TABLE 1.1 Continued...

Address (3X)	Address (4X)	Parameter Number	Parameters	UnitsParameters	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
30059	40059	30	VAR Avg	VAr	00	3A	00	3A
30061	40061	31	VAr Sum	VAr	00	3C	00	3C
30063	40063	32	PF Avg	-	00	3E	00	3E
30065	40065	33	PF Sum	-	00	40	00	40
30067	40067	34	Phase Angle Avg	Deg	00	42	00	42
30069	40069	35	Phase Angle Sum	Deg	00	44	00	44
30071	40071	36	Freq	Hz	00	46	00	46
30073	40073	37	Wh import	kWh	00	48	00	48
30075	40075	38	Wh export	kWh	00	4A	00	4A
30077	40077	39	VArh import	kVArh	00	4C	00	4C
30079	40079	40	VArh export	kVAh	00	4E	00	4E
30081	40081	41	VAh	kVAh	00	50	00	50
30085	40085	43	W imp demand	W	00	54	00	54
30087	40087	44	Max W imp demand	W	00	56	00	56
30089	40089	45	W exp demand	W	00	58	00	58
30091	40091	46	Max W exp demand	W	00	5A	00	5A
30093	40093	47	VAr Imp. demand	VAr	00	5C	00	5C
30095	40095	48	max kVAr Imp. demand	VAr	00	5E	00	5E
30097	40097	49	VAr Exp. demand	VAr	00	60	00	60
30099	40099	50	Max VAr Exp. demand	VAr	00	62	00	62
30101	40101	51	VA demand	VA	00	64	00	64
30103	40103	52	max VA demand	VA	00	66	00	66
30105	40105	53	current demand	Amp	00	68	00	68
30107	40107	54	Max current demand	Amp	00	6A	00	6A
30111	40111	56	Wh Import	kWh	00	6E	00	6E
30115	40115	58	Wh export	kWh	00	72	00	72
30119	40119	60	VArh Import	kVArh	00	76	00	76

TABLE 1.1 Continued...

Address (3X)	Address (4X)	Para. No.	Parameters	Units	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
30123	40123	62	VARh Export	kVArh	00	7A	00	7A
30127	40127	64	VAh	kVAh	00	7E	00	7E
30133	40133	67	System Voltage Max	Volts	00	84	00	84
30135	40135	68	System Voltage Min	Volts	00	86	00	86
30139	40139	70	Impulse Rate	-	00	8A	00	8A
30141	40141	71	System Current Max	Amp	00	8C	00	8C
30143	40143	72	System Current Min	Amp	00	8E	00	8E
30145	40145	73	Wh Import Resetable	kWh	00	90	00	90
30147	40147	74	Wh export Resetable	kWh	00	92	00	92
30149	40149	75	VARh import Resetable	kVArh	00	94	00	94
30151	40151	76	VARh export Resetable	kVArh	00	96	00	96
30153	40153	77	Wh Total Resetable	kWh	00	.98	00	.98
30155	40155	78	VArh Total Resetable	kVArh	00	9A	00	9A
30201	40201	84	V12	Volts	00	C8	00	C8
30203	40203	85	V23	Volts	00	CA	00	CA
30205	40205	86	V31	Volts	00	CC	00	CC
30207	40207	87	VTHD-R	%THD	00	CE	00	CE
30209	40209	88	VTHD-Y	%THD	00	D0	00	D0
30211	40211	89	VTHD-B	%THD	00	D2	00	D2
30213	40213	90	I THD-R	%THD	00	D4	00	D4
30215	40215	91	I THD-Y	%THD	00	D6	00	D6
30217	40217	92	I THD -B	%THD	00	D8	00	D8
30219	40219	93	System V-THD	%THD	00	DA	00	DA

Note: Resetable energy is partial energy.

TABLE 1.1 Continued...

Address (3X)	Address (4X)	Parameter Number	Parameters	Units	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
30221	40221	94	System I-THD	%THD	00	DC	00	DC
30225	40225	95	Neutral Current (3P4W only)	Amp	00	E0	00	E0
30227	40227	96	Run hour	Hr	00	E2	00	E2
30229	40229	97	On Hour	Hr	00	E4	00	E4
30231	40231	98	No. of interrupts	-	00	E6	00	E6

TABLE 1.2: 3 X and 4 X register addresses for Energies

Address (3X)	Address (4X)	Para No.	Parameters	Units	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
31801	41801	1	Sys Active Energy Import	kWh	07	08	07	08
31803	41803	2	Sys Active Energy Export	kWh	07	0A	07	0A
31805	41805	3	Sys Reactive Energy Import	kVArh	07	0C	07	0C
31807	41807	4	Sys Reactive Energy Export	kVArh	07	0E	07	0E
31809	41809	5	Sys Apparent Energy	kVAh	07	10	07	10
31849	41849	13	Sys Total Active Energy	kWh	07	38	07	38
31851	41851	14	Sys Total Reactive Energy	kVArh	07	3A	07	3A
31853	41853	15	Sys Total Apparent Energy	kVAh	07	3C	07	3C
31873	41873	19	Active Energy Import L1	kWh	07	44	07	44
31875	41875	27	Active Energy Import L2	kWh	07	52	07	52
31877	41877	28	Active Energy Import L3	kWh	07	54	07	54
31879	41879	29	Active Energy Export L1	kWh	07	56	07	56
31881	41881	30	Active Energy Export L2	kWh	07	58	07	58
31883	41883	31	Active Energy Export L3	kWh	07	5A	07	5A
31885	41885	32	Reactive Energy Import L1	kVArh	07	5C	07	5C
31887	41887	33	Reactive Energy Import L2	kVArh	07	5E	07	5E
31889	41889	34	Reactive Energy Import L3	kVArh	07	60	07	60

TABLE 1.2 Continued...

Address (3X)	Address (4X)	Para No.	Parameters	Parameter	Start Address Hex3X		Start Address Hex4X	
					High Byte	Low Byte	High Byte	Low byte
31891	41891	35	Reactive Energy ExportL1	kVArh	07	62	07	62
31893	41893	36	Reactive Energy ExportL2	kVArh	07	64	07	64
31895	41895	37	Reactive Energy Export L3	kVArh	07	66	07	66
31897	41897	38	Apparent Energy L1	kVAh	07	68	07	68
31899	41899	39	Apparent Energy L2	kVAh	07	6A	07	6A
31901	41901	40	Apparent Energy L3	kVAh	07	6C	07	6C
31909	41909	41	Total Active Energy L1	kWh	07	74	07	74
31911	41911	42	Total Active Energy L2	kWh	07	76	07	76
31913	41913	43	Total Active Energy L3	kWh	07	78	07	78
31915	41915	44	Total Reactive Energy L1	kVArh	07	7A	07	7A
31917	41917	45	Total Reactive Energy L2	kVArh	07	7C	07	7C
31919	41919	46	Total Reactive Energy L3	kVArh	07	7E	07	7E
31921	41921	47	Total Apparent Energy L1	kVAh	07	80	07	80
31923	41923	48	Total Apparent Energy L2	kVAh	07	82	07	82
31925	41925	49	Total Apparent Energy L3	kVAh	07	84	07	84

TABLE 1.3: 3 X and 4 X register addresses for Tariff Energies

Address (3X)	Address (4X)	Parameter Number	Parametrs	Units	Start Address Hex 3X		Start Address Hex 4X	
					High Byte	Low Byte	High Byte	Low Byte
34001	44001	1	Tariff 1 Total KWh Energy	Kwh	0F	A0	0F	A0
34003	44003	2	Tarif 1 Import KWh Energy	Kwh	0F	A2	0F	A2
34005	44005	3	Tariff 1 Export KWh Energy	Kwh	0F	A4	0F	A4
34007	44007	4	Tariff 1 Total KVArh Energy	KVArh	0F	A6	0F	A6
34009	44009	5	Tariff 1 Import KVArh Energy	KVArh	0F	A8	0F	A8
34011	44011	6	Tariff 1 Export KVArh Energy	KVArh	0F	AA	0F	AA
34025	44025	13	Tariff 2 Total KWh Energy	Kwh	0F	B8	0F	B8
34027	44027	14	Tariff 2 Import KWh Energy	Kwh	0F	BA	0F	BA
34029	44029	15	Tariff 2 Export KWh Energy	Kwh	0F	BC	0F	BC
34031	44031	16	Tariff 2 Total KVAr Energy	KVAr	0F	BE	0F	BE
34033	44033	17	Tariff 2 Import KVAr Energy	KVAr	0F	C0	0F	C0
34035	44035	18	Tariff 2 Export KVAr Energy	KVAr	0F	C2	0F	C2

TABLE 2: 3X and 4X register addresses for 32-bit Integer Energy

Address (3X)	Address (4X)	Para No.	Parametrs	Units	Start Address Hex 3X		Start Address Hex 4X	
					Hi Byte	Lo Byte	Hi Byte	Lo Byte
30801	40801	1	Sys Active Energy Import	kWh	03	20	03	20
30803	40803	2	Sys Active Energy Export	kWh	03	22	03	22
30805	40805	3	Sys Reactive Energy Export	kVArh	03	24	03	24
30807	40807	4	Sys Reactive Energy Import	kVArh	03	26	03	26
30809	40809	5	Sys Apparent Energy	kVAh	03	28	03	28
30825	40825	14	Sys Active Energy Import Resettable	kWh	03	38	03	38
.30827	40827	15	Sys Active Energy Export Resettable	kWh	03	3A	03	3A
30829	40829	16	Sys Reactive Energy Import Resettable	kVArh	03	3C	03	3C
30831	40831	17	Sys Reactive Energy Export Resettable	kVArh	03	3E	03	3E
30833	40833	19	Sys Apparent Energy Resettable	kVAh	03	40	03	40
30835	40835	20	Sys Apparent Energy Resettable	kVAh	03	42	03	42
30849	40849	26	Sys Total Active Energy	kWh	03	50	03	50
30851	40851	27	Sys Total Reactive Energy	kVArh	03	52	03	52
30853	40853	28	Sys Total Apparent Energy	kVArh	03	54	03	54
30861	40861	32	Sys Total Active Energy Resettable	kWh	03	5C	03	5C
30863	30863	33	Sys Total Reactive Energy Resettable	kVArh	03	5E	03	5E
30865	30865	34	Sys Total Apparent Energy Resettable	kVAh	03	60	03	60
30873	40873	38	Active Energy Import L1	kWh	03	68	03	68
30875	40875	39	Active Energy Import L2	kWh	03	6A	03	6A
30877	40877	40	Active Energy Import L3	kWh	03	6C	03	6C
30879	40879	41	Active Energy Export L1	kWh	03	6E	03	6E
30881	40881	42	Active Energy Export L2	kWh	03	70	03	70
30883	40883	43	Active Energy Export L3	kWh	03	72	03	72
30885	40885	44	Reactive Energy Import L1	kVArh	03	74	03	74
30887	40887	45	Reactive Energy Import L2	kVArh	03	76	03	76
30889	40889	46	Reactive Energy Import L3	kVArh	03	78	03	78
30891	40891	47	Reactive Energy ExportL1	kVArh	03	7A	03	7A
30893	40893	48	Reactive Energy ExportL2	kVArh	03	7C	03	7C
30895	40895	49	Reactive Energy ExportL3	kVArh	03	7E	03	7E
30897	40897	50	Apparent Energy L1	kVAh	03	80	03	80

TABLE 2 Continued...

Address (3X)	Address (4X)	Para No.	Parametrs	Units	Start Address Hex 3X		Start Address Hex 4X	
					Hi Byte	Lo Byte	Hi Byte	Lo Byte
30899	40899	51	Apparent Energy L2	kVAh	03	82	03	82
30901	40901	52	Apparent Energy L3	kVAh	03	84	03	84
30909	40909	53	Total Active Energy L1	kWh	03	8C	03	8C
30911	40911	54	Total Active Energy L2	kWh	03	8E	03	8E
30913	40913	55	Total Active Energy L3	kWh	03	90	03	90
30915	40915	56	Total Reactive Energy L1	kVArh	03	92	03	92
30917	40917	57	Total Reactive Energy L2	kVArh	03	94	03	94
30919	40919	58	Total Reactive Energy L3	kVArh	03	96	03	96
30921	40921	59	Total Apparent Energy L1	kVAh	03	98	03	98
30923	40923	60	Total Apparent Energy L2	kVAh	03	9A	03	9A
30925	40925	61	Total Apparent Energy L3	kVAh	03	9C	03	9C
31105	41105	86	Run Hour	Hr	04	50	04	50
31107	41107	87	On Hour	Hr	04	52	04	52
31113	41113	88	No of Interruption	-	04	54	04	54

TABLE 2.1... 3X and 4X register addresses for 32-bit Integer Tariff Energy

Address (3X)	Address (4X)	Para No.	Parametrs	Units	Start Address Hex 3X		Start Address Hex	
					Hi Byte	Lo Byte	Hi Byte	Lo Byte
33001	41301	1	Tariff1 Total KWh Energy	Kwh	0B	B8	0B	B8
33003	41303	2	Tariff1 Imp KWh Energy	KWh	0B	BA	0B	BA
33005	41305	3	Tariff1 Exp KWh Energy	KWh	0B	BC	0B	BC
33007	41307	4	Tariff1 Total KVAr Energy	KVAr	0B	BE	0B	BE
33009	41309	5	Tariff1 Imp KVAr Energy	KVAr	0B	C0	0B	C0
33011	41311	6	Tariff1 Exp KVAr Energy	KVAr	0B	C2	0B	C2
34025	41343	13	Tariff2 Total KWh Energy	KWh	0B	D0	0B	D0
34027	41345	14	Tariff2 Imp KWh Energy	KWh	0B	D2	0B	D2
34029	41347	15	Tariff2 Exp KWh Energy	KWh	0B	D4	0B	D4
34031	41349	16	Tariff2 Total KVAr Energy	KVAr	0B	D6	0B	D6
34033	41351	17	Tariff2 Imp KVAr Energy	KVAr	0B	D8	0B	D8
34035	41353	18	Tariff2 Exp KVAr Energy	KVAr	0B	DA	0B	DA

3.2 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 3** for 4X Register addresses.

Example: Reading Demand Integration Time

Demand integration time: Start address = 1782 (Hex)
Number of registers = 02
Note: Number of registers = Number of Parameters x 2

Query:

Device Address	01 (Hex)
Function Code	03 (Hex)
Start Address High	17 (Hex)
Start Address Low	82 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	61 (Hex)
CRC High	97 (Hex)

Start Address High: Most significant 8 bits of starting address of the parameter requested.

Start Address Low: Least significant 8 bits of starting address of the parameter requested.

Number of register High: Most significant 8 bits of Number of registers requested.

Number of register Low: Least significant 8 bits of Number of registers requested.

(Note: Two consecutive 16 bit register represent one parameter.)

Response: Demand Integration Time (8 Minutes)

Device Address	01 (Hex)
Function Code	03 (Hex)
Byte Count	04 (Hex)
Data Register- 1 High Byte	41 (Hex)
Data Register- 1 Low Byte	00 (Hex)
Data Register- 2 High Byte	00 (Hex)
Data Register- 2 Low Byte	00 (Hex)
CRC Low	EE (Hex)
CRC High	0F (Hex)

Byte Count: Total number of data bytes received.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Example: Writing Demand Integration Time

Demand Integration Time : Start address = 1782 (Hex)
Number of registers = 02
Note: Number of registers = Number of Parameters x 2

Query: (Change Demand Integration Time = 7 Minutes)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address High	17 (Hex)
Starting Address Low	82 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
Byte Count	04 (Hex)
Data Register- 1 High Byte	40 (Hex)
Data Register- 1 Low Byte	E0 (Hex)
Data Register- 2 High Byte	00 (Hex)
Data Register- 2 Low Byte	00 (Hex)
CRC Low	85 (Hex)
CRC High	D0 (Hex)

Byte Count: Total number of data bytes received.

Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.

(Note: Two consecutive 16 bit register represent one parameter)

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	17 (Hex)
Start Address Low	82 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	E4 (Hex)
CRC High	54(Hex)

Start Address High: Most significant 8 bits of starting address of the parameter requested.

Start Address Low: Least significant 8 bits of starting address of the parameter requested.

Number of register High: Most significant 8 bits of Number of registers requested.

Number of register Low : Least significant 8 bits of Number of registers requested.

(Note: Two consecutive 16 bit register represent one parameter)

TABLE 3: 4 X register addresses

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46003	1	System Type	Read	17	72	3
46005	2	PT Primary	Read	17	74	400
46007	3	CT Primary	Read	17	76	5
46009	4	PT Secondary	Read	17	78	400
46011	5	CT Secondary	Read	17	7A	5
46019	6	Demand Integration Time	R/Wp	17	7C	8
46031	7	Impulse Rate	Read	17	82	-
46037	8	Reset Parameters	R/Wp	17	84	0
46039	9	Password	R/Wp	17	86	0
46047	10	Auto Scroll	R/Wp	17	8A	0
46051	11	Node Address	R/Wp	17	8C	1
46053	12	RS485 Setup Code	R/Wp	17	8E	4
46055	13	Register Order/Word Order	R/Wp	17	90	0
46057	14	Pulse Width	R/Wp	17	92	100
46059	15	Pulse Divisor	R/Wp	17	94	1
46063	16	Pulse Output 1 Parameter Select	R/Wp	17	96	0
46105	17	Pulse Output 2 Parameter Select	R/Wp	17	98	0
46357	18	Version No	R/Wp	18	D4	-
46365	19	Backlit	R/Wp	18	DC	5
46696	20	CRC High byte	Read	1A	27	-
46697	21	CRC Low Byte	Read	1A	28	-
46698	22	Error Status	Read	1A	29	-

Explanation for 4 X register:

NOTE: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.

Address	Parameter	Description
46003	System Type	This address is used to Read the System type. Read one of the following value to this address. **1** : 1 Phase 2 Wire **2** : 3 Phase 3 Wire **3** : 3 Phase 4 Wire**.**
46005	PT Primary	This address allows the user to Read PT Primary value (in terms of VL-L). The range is **100 VL-L** to **1200 kVL-L** for all system types & also depends on the per phase 1250MVA Restriction of power combined with CT primary.
46007	CT Primary	This address allows the user to Read CT Primary value. The range is **1** to **9999**. It also depends on the per phase 1250 MVA Restriction of power combined with PT primary.
46009	PT Secondary	This address is used to read the PT secondary value. The Readable range is **100-500VLL**.
46011	CT Secondary	This address is used to read the CT secondary value. Read one of the following values to this address for 1A/5A Model **1:** 1A CT secondary **5:** 5A CT secondary **Note** : For RJ12 Model, CT Secondary is not applicable.
46019	Demand Integration Time	Demand Period Represents Demand time in Minutes.The Applicable values are ranging from 1 to 60
46031	Impulse Rate	This address allows the user to read the impulse rate
46037	Reset Parameters	This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Following are the values to reset various data. **1:** Partial Energy Reset **2:** Demand Reset **3:** System Min Values Reset **4:** System Max Values Reset **5:** Run hour & On hour Reset **6:** No of Interruptions Reset **7:** Reset All data

.

Address	Parameter	Description
46047	Auto Scroll	This address is used to activate or de-activate the auto scrolling. Write **0:** Deactivate **1:** Activate
46051	Node Address	This register address is used to set Device address between **1 to 247**.
46053	RS-485 Setup Code	This address is used to set the baud rate, Parity and Number of stop bits. Refer to **TABLE 4** for details.
46055	Word Order	Word Order controls the order in which Multifunction Meter receives or sends floating - point numbers:- normal or reversed register order. In normal mode, the two registers that make up a floating point numbers are sent most significant bytes first. In reversed register mode, the two registers that make up a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register-the instrument will detect the order used to send this value & set that order for all ModBus transaction involving floating point numbers.
46039	Password	This address is used to set & reset the password. Valid Range of Password can be set is **0000 - 9999**. 1) If password lock is present & if this location is read it will return **zero**. 2) If password lock is absent & if this location is read it will return **one**. 3) If password lock is present & to disable this lock first send valid password to this location then write "**0000**" to this location 4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification. 5) If for in any of the above case invalid password is send then meter will return exceptional error 2.
46057	Pulse width	This address is used to set pulse width of the Pulse output. Write one of the following values to this address: **60** : 60 ms **100** : 100 ms **200** : 200 ms
46059	Pulse Divisor	This address is used to Read / Write pulse divisor of the Pulse output. Write one of the following values to this address : 1,10,100,1000

Address	Parameter	Description
46063	Pulse Output 1 Parameter Select	This address is used to assign the Parameter to Digital Output as per **TABLE 5**.
46105	Pulse Output 2 Parameter Select	This address is used to assign the Parameter to Digital Output.as per **TABLE 5**
46365	Backlit	This Address is used to set off-delay time in Minutes **Default & Lowest Value is 5 Minutes It can set From 5,10,30,60,120 Minutes**
46696	HCRC	This address is read-only and displays the CRC High Byte
46697	LCRC	This address is read-only and displays the CRC Low Byte
46698	Error Status	This address is read-only and displays the Error Status

TABLE 3.1: The bit-wise allocation of Error field is as below:

Bit 0	Code CRC Error
Bit 1	Cal CRC Err
Bit 2	EEPROM Full
Bit 3	EEPROM CRC error or Corruption

TABLE 4: RS-485 Set-up Code

Baud Rate	Parity	Stop Bit	Decimal value
4800	NONE	1	0
4800	NONE	2	1
4800	EVEN	1	2
4800	ODD	1	3
9600	NONE	1	4
9600	NONE	2	5
9600	EVEN	1	6
9600	ODD	1	7
19200	NONE	1	8
19200	NONE	2	9
19200	EVEN	1	10
19200	ODD	1	11
38400	NONE	1	12
38400	NONE	2	13
38400	EVEN	1	14
38400	ODD	1	15
57600	NONE	1	16
57600	NONE	2	17
57600	EVEN	1	18
57600	ODD	1	19

NOTE: Codes not listed in the **TABLE 4** may **give rise to** unpredictable results including loss of **communication.** Exercise caution when attempting to **change mode via** direct Modbus writes.

TABLE 5: Parameters for Pulse Output

Parameter Number	Parameter	3P4W	3P 3W	1P 2W
0	Sys Wh import	✓	✓	✓
1	Sys Wh export	✓	✓	✓
2	Sys VARh import	✓	✓	✓
3	Sys VARh export	✓	✓	✓
24	Total Sys Active Energy	✓	✓	✓
25	Total Sys Reactive Energy	✓	✓	✓

TABLE 6: Measurement & Energy/Counter Screens

TABLE 6.1 System Parameters Screens:

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	System Active Power/ Voltage/ Current	✓	✓	✓	✓	✓	✓
2	System Watt-VAr-VA	✓	✓	✓	✓	✓	✓
3	System-Power Factor-Frequency	✓	✓	✓	✓	✓	✓
4	System Frequency	✓	✓	✓	✓	✓	✓
5	System %THD Voltage-Current	✓	✓	✓	✓	✓	✓
6	System Max VA-A Demand	✓	✓	✓	✓	✓	✓
7	System Max Import -Export VAr Demand	✓	✓	✓	✓	✓	✓
8	System Max Import Watt Demand	✓	✓	✓	✓	✓	✓
9	System Max Export Watt Demand	✓	✓	✓	✓	✓	✓
10	System VA-A Demand	✓	✓	✓	✓	✓	✓
11	System Import-Export VAr Demand	✓	✓	✓	✓	✓	✓
12	System Import Watt Demand	✓	✓	✓	✓	✓	✓
13	System Export Watt Demand	✓	✓	✓	✓	✓	✓

NOTE: The Display screens of TABLE 6.1 can be scrolled through **UP Key**

TABLE 6.2 Energy Parameters Screens:

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	System Active Energy Import	✓	✓	✓	✓	✓	✓
2	System Active Energy Export	✓	✓	✓	✓	✓	✓
3	System Reactive Export energy	✓	✓	✓	✓	✓	✓
4	System Reactive Import energy	✓	✓	✓	✓	✓	✓
5	System Apparent energy	✓	✓	✓	✓	✓	✓
6	L1-L2-L3 Active Energy Import	✓	✗	✗	✓	✗	✗
7	L1-L2-L3 Active Energy Export	✓	✗	✗	✓	✗	✗
8	L1-L2-L3 Reactive Export energy	✓	✗	✗	✓	✗	✗
9	L1-L2-L3 Reactive Import energy	✓	✗	✗	✓	✗	✗
10	L1-L2-L3 Apparent energy	✓	✗	✗	✓	✗	✗
11	L1-L2-L3 Total Active Energy	✓	✗	✗	✓	✗	✗
12	L1-L2-L3 Total Reactive Energy	✓	✗	✗	✓	✗	✗
13	System -Total Active Energy	✓	✓	✓	✓	✓	✓
14	System Total Reactive Energy	✓	✓	✓	✓	✓	✓
15	On Hour	✓	✓	✓	✓	✓	✓
16	Run Hour	✓	✓	✓	✓	✓	✓
17	No of Interrupts	✓	✓	✓	✓	✓	✓
18	Tariff 1 Total KWh Energy	✓	✓	✓	✓	✓	✓
19	Tariff 1 Import KWh Energy	✓	✓	✓	✓	✓	✓
20	Tariff 1 Export KWh Energy	✓	✓	✓	✓	✓	✓
21	Tariff 1 Total KVAr Energy	✓	✓	✓	✓	✓	✓
22	Tariff 1 Import KVAr Energy	✓	✓	✓	✓	✓	✓
23	Tariff 1 Export KVAr Energy	✓	✓	✓	✓	✓	✓
24	Tariff 2 Total KWh Energy	✓	✓	✓	✓	✓	✓
25	Tariff 2 Import KWh Energy	✓	✓	✓	✓	✓	✓
26	Tariff 2 Export KWh Energy	✓	✓	✓	✓	✓	✓
27	Tariff 2 Total KVAr Energy	✓	✓	✓	✓	✓	✓
28	Tariff 2 Import KVAr Energy	✓	✓	✓	✓	✓	✓
29	Tariff 2 Export KVAr Energy	✓	✓	✓	✓	✓	✓

NOTE: The Display screens of TABLE 6.2 can be scrolled through **E Key**

TABLE 6.3 Power Parameters Screens:

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	L1 Watt-VAr-VA	✓	✗	✗	✓	✗	✗
2	L2 Watt-VAr-VA	✓	✗	✗	✓	✗	✗
3	L3 Watt-VAr-VA	✓	✗	✗	✓	✗	✗
4	L1-L2-L3 Power Factor	✓	✗	✗	✓	✗	✗

NOTE: The Display screens of TABLE 6.3 can be scrolled through **Down Key.**

TABLE 6.4 Voltage/Current Parameters Screens:

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	L1-L2-L3 Voltage	✓	✗	✗	✓	✗	✗
2	L12-L23-L31 Voltage	✓	✓	✗	✓	✓	✗
3	L1-L2-L3 Current	✓	✓	✗	✓	✓	✗
4	Neutral Current	✓	✗	✗	✓	✗	✗
5	L1-L2-L3 Voltage %THD	✓	✓	✗	✓	✓	✗
6	L1-L2-L3 Current %THD	✓	✓	✗	✓	✓	✗
7	Current Reversal	✓	✗	✓	✓	✗	✓

NOTE: The Display screens of TABLE 6.4 can be scrolled through **V/A Key**

3.3 User Assignable Modbus Registers:

The Multifunction Instrument contains 20 user assignable registers in the address range of 0x1450 (35201) to 0x1476 (35239) for 3X registers (**see TABLE** 7) and address range of 0x1450 (45201) to 0x1476 (45239) for 4X registers (**see TABLE** 7).

Any of the parameter addresses (3X register addresses and 4X register addresses of **TABLE 1**) accessible in the instrument can be mapped to these 20 user assignable registers.

Parameters (3X and 4X registers addresses) that reside in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.

The actual address of the parameters (3X and 4X registers addresses) which are to be accessed via address 0x1450 to 0x1476 are specified in 4X Register 0x2710 to 0x2723 (**see TABLE 8**).

TABLE 7: User Assignable 3X Data Registers

Address (3X)	Address (4X)	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
35201	45201	Assignable Register 1	14	50
35203	45203	Assignable Register 2	14	52
35205	45205	Assignable Register 3	14	54
35207	45207	Assignable Register 4	14	56
35209	45209	Assignable Register 5	14	58
35211	45211	Assignable Register 6	14	5A
35213	45213	Assignable Register 7	14	5C
35215	45215	Assignable Register 8	14	5E
35217	45217	Assignable Register 9	14	60
35219	45219	Assignable Register 10	14	62
35221	45221	Assignable Register 11	14	64
35223	45223	Assignable Register 12	14	66
35225	45225	Assignable Register 13	14	68
35227	45227	Assignable Register 14	14	6A
35229	45229	Assignable Register 15	14	6C
35231	45231	Assignable Register 16	14	6E
35233	45233	Assignable Register 17	14	70
35235	45235	Assignable Register 18	14	72
35237	45237	Assignable Register 19	14	74
35239	45239	Assignable Register 20	14	76

TABLE 8: User Assignable mapping register (4X registers)

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
410001	Map Address for Assignable Register 1	27	10
410002	Map Address for Assignable Register 2	27	11
410003	Map Address for Assignable Register 3	27	12
410004	Map Address for Assignable Register 4	27	13
410005	Map Address for Assignable Register 5	27	14
410006	Map Address for Assignable Register 6	27	15
410007	Map Address for Assignable Register 7	27	16
410008	Map Address for Assignable Register 8	27	17
410009	Map Address for Assignable Register 9	27	18
410010	Map Address for Assignable Register 10	27	19
410011	Map Address for Assignable Register 11	27	1A
410012	Map Address for Assignable Register 12	27	1B
410013	Map Address for Assignable Register 13	27	1C
410014	Map Address for Assignable Register 14	27	1D
410015	Map Address for Assignable Register 15	27	1E
410016	Map Address for Assignable Register 16	27	1F
410017	Map Address for Assignable Register 17	27	20
410018	Map Address for Assignable Register 18	27	21
410019	Map Address for Assignable Register 19	27	22
410020	Map Address for Assignable Register 20	27	23

Assigning parameter to User Assignable Registers:

To access the Voltage2 (3X address 0x0002) and Power Factor1 (3X address 0x001E) through user assignable register assign these addresses to 4x register (**TABLE 8**) 0x2710 and 0x2711 respectively.

Assigning Query:

Device Address	01 (Hex)	
Function Code	10 (Hex)	
Start Address High	27 (Hex)	
Start Address Low	10 (Hex)	
Number of Registers High	00 (Hex)	
Number of Registers Low	02 (Hex)	
Byte Count	04 (Hex)	
Data Register- 1 High Byte	00 (Hex)	Voltage
Data Register- 1 Low Byte	02 (Hex)	2 * (3X Address 0x0002)
Data Register- 2 High Byte	00 (Hex)	Power Factor
Data Register- 2 Low Byte	1E (Hex)	1 * (3X Address 0x001E)
CRC Low	6C (Hex)	
CRC High	9A (Hex)	

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	27 (Hex)
Start Address Low	10 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	4A (Hex)
CRC High	B9 (Hex)

*Note: Upto 6 parameters can be assigned at a time but these parameters should be assigned in Multiple of two i.e. 2, 4 or 6.

Reading Parameter data through User Assignable Registers:
In assigning query, Voltage 2 & Power Factor 1 parameters were assigned to 0x2710 & 0x2711 (**TABLE 8**) which will point to user assignable 3x registers 0x1450 and 0x1452 (**TABLE 7**). So to read Voltage2 and Power Factor1 data reading query should be as below.

Query:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	14 (Hex)
Start Address Low	50 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex)
CRC Low	F4 (Hex)
CRC High	28 (Hex)

Start Address High: Most significant 8 bits of starting address of Userassignable register.
Start Address low: Least significant 8 bits of starting address of User assignable register.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register L: Least significant 8 bits of Number of registers requested.

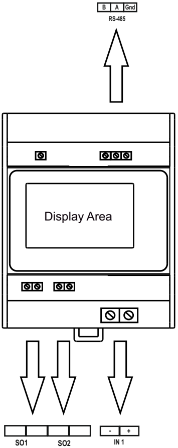
***Note: Two consecutive 16 bit register represent one parameter. Since two parameters are requested four registers are required**

Response: (Volt2 = 219.30 / Power Factor1 = 1.0)

Device Address	01 (Hex)	
Function Code	04 (Hex)	
Byte Count	08 (Hex)	
Data Register- 1 High Byte	43 (Hex)	Voltage 2 Data
Data Register- 1 Low Byte	5B (Hex)	Voltage 2 Data
Data Register- 2 High Byte	4C (Hex)	Voltage 2 Data
Data Register- 2 Low Byte	CD (Hex)	Voltage 2 Data
Data Register- 3 High Byte	3F (Hex)	Power Factor 1 Data
Data Register- 3 Low Byte	80 (Hex)	Power Factor 1 Data
Data Register- 4 High Byte	00 (Hex)	Power Factor 1 Data
Data Register- 4 Low Byte	00 (Hex)	Power Factor 1 Data
CRC Low	A4 (Hex)	
CRC High	CD (Hex)	

4. Connection for Optional Pulse Output / Tariff Input / RS-485

Location of Modbus, 2 Tariff Outputs, 1 Input



The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, ‘manufacturer’ has no control over the field conditions which influence product installation.
It is the user’s responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are those in ‘manufacturer’ standard Conditions of Sale for this product and in no case will ‘manufacturer’ be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.

LUMEL S.A.

ul. Słubicka 4, 65-127 Zielona Góra, Poland
tel.: +48 68 45 75 100
www.lumel.com.pl

Technical Support & Export Department:
tel.: +48 68 45 75 146, (WhatsApp) +48 536 550 007
+48 68 45 75 130, (WhatsApp) +48 733 393 603
e-mail: export@lumel.com.pl

Calibration & Attestation:
e-mail: laboratorium@lumel.com.pl