LE-03MW

Electricity consumption meter

3-phase, bi-directional,

tariff-based

User manual

v. 1.0 (180409)

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1. Purpose

LE-03MW is an electronic bi-directional three-phase electricity meter, compliant with the MID Directive, designed for direct measurement. The built-in real-time clock allows the measurement of energy consumption divided into different tariff zones. Communication interfaces: RS-485 with Modbus RTU protocol and optical port according to EN62056 (IEC1107) enable remote reading and configuration of the meter.

2. Device characteristics

- ✓ 3-phase bi-directional energy meter;
- ✓ Direct measurement up to 80 A;
- ✓ Energy measurement in four tariff zones;
- ✓ Built-in real-time clock with battery backup for switching tariff zones;
- ✓ Total and tariff-divided consumption registration:
    - total active and reactive energy;
    - active and reactive energy divided into individual quadrants;
- ✓ 8 time schedules dividing the day into tariff zones;
- ✓ The possibility of settling the energy according to different schedules for working days and weekend;
- ✓ The possibility of dividing the year into 8 time periods. In each period the energy (for working days) can be settled according to a different schedule.
- ✓ Indication of network parameters (voltage, currents, active power, reactive power, apparent power, power factor, frequency);
- ✓ Calculation of power demand for individual tariffs;
- ✓ Additional, resettable energy consumption meter;
- ✓ MID compliance;
- ✓ RS-485 port, Modbus RTU protocol;
- ✓ Optical communication port in accordance with EN62056 (IEC1107);
- ✓ 2 SO pulse outputs with programmable number of pulses per kWh/kvarh;
- ✓ Multifunctional LCD display.

3. Measured values

✓ Active energy consumed and exported;

✓ Inductive and capacitive reactive energy;

✓ Phase voltages;

✓ Phase currents;

✓ Active power (absolute value);

✓ Reactive power (absolute value);

✓ Apparent power;

✓ Power factor (absolute value);

✓ Frequency.

4. Operator panel

Drawing of the front of the device with a screen (visible buttons)

4.1. Description of the display elements

Current tariff indicator

Symbol - indicates to which group of parameters the value displayed

in the numeric field is related. It may be a tariff (T1, T2, T3 T4)
or phase (L1, L2, L3) indicator.

Unit of the value shown in the numeric field of the display.

Symbols have the following meaning:

kW - active power

kWh - active energy

kvarh - passive energy

VA and kVA - apparent energy

V - voltage

A – current

The numeric field of the display indicates the value of the frequency.

Data exchange via the communication interface.

Low battery indicator for the internal clock battery.

4.2. Control elements

Control buttons for changing the displayed value.
The list of displayed parameters is shown in the following table.

4.3. Data displayed on the LCD

Page	Parameter	Unit	Symbol	Format
1	Date			XX-XX-XX
2	Time			XX-XX-XX
3	Total active energy consumption	kWh		6+2 000000.00
4	Tariff T1 - active energy	kWh	T01	6+2 000000.00
5	Tariff T2 - active energy	kWh	T02	6+2 000000.00
6	Tariff T3 - active energy	kWh	T03	6+2 000000.00
7	Tariff T4 - active energy	kWh	T04	6+2 000000.00
8	Total reactive energy consumption	kVarh		6+2 000000.00
9	Tariff T1 - reactive energy	kVarh	T11	6+2 000000.00
10	Tariff T2 - reactive energy	kVarh	T12	6+2 000000.00
11	Tariff T3 - reactive energy	kVarh	T13	6+2 000000.00
12	Tariff T4 - reactive energy	kVarh	T14	6+2 000000.00
13	L1 – Phase voltage	V	L1	3+1 000.0
14	L2 – Phase voltage;	V	L2	3+1 000.0
15	L3 Phase voltage;	V	L3	3+1 000.0
16	L1 – Phase current;	A	L1	4+2 0000.00
17	L2 – Phase current;	A	L2	4+2 0000.00
18	L3 – Phase current;	A	L3	4+2 0000.00
19	Total active power	kW		5+3 00000.000
20	L1 - active power	kW	L1	5+3 00000.000
21	L2 - active power	kW	L2	5+3 00000.000
22	L3 - active power	kW	L3	5+3 00000.000
23	Total apparent power	kVA		5+3 00000.000
24	L1 - apparent power	kVA	L1	5+3 00000.000
25	L2 - apparent power	kVA	L2	5+3 00000.000
26	L3 - apparent power	kVA	L3	5+3 00000.000
27	Total power factor			1+2 0.00
28	L1 - power factor		L1	1+2 0.00
29	L2 - power factor		L2	1+2 0.00
30	L3 - power factor		L3	1+2 0.00

Warning!
The meter records absolute values of power and power factor.

Page	Parameter	Unit	Symbol	Format
31	Frequency	Hz		2+2 00.00
32	Tariff T1 - power demand	kW	T-1	6+2 000000.00
33	Tariff T2 - power demand	kW	T-2	6+2 000000.00
34	Tariff T3 - power demand	kW	T-3	6+2 000000.00
35	Tariff T4 - power demand	kW	T-4	6+2 000000.00
36	Resettable energy consumption meter	kWh	The display can be reset by holding down any button (for approximately 10 s) at the time of displaying this parameter	000000.00
37			C11 XYZ XYZ shows the presence of voltage on the input lines. 0 - no voltage 1 - voltage X - phase L1 Y - phase L2 Z - phase L3	C 11 111
38	View display time		1-30 s The time can be changed using the control buttons. While the parameter is displayed, press any button for 10 seconds and then press the button to the left or right to set the desired value.	

39	Pulse output		1, 10, 100, 1000	S0 1000
40	Measuring mode of total energy consumption		**CodE 01** - total energy = energy consumed, **CodE 05** - total energy = energy consumed + energy exported **CodE 09** - total energy = energy consumed - energy exported	CodE 01
41	Meter IR address		0	12345678
42	MODBUS address		0	Id 255
43	Communication rate		1200, 2400, 4800, 9600	bd 9600
44	Software version			V 1.01

5. Technical Specifications

|	
reference voltage	3×230/400 V
minimum current/base current	0.25/5 A
maximum current	80 A
minimum detection current	0.04 A measured voltage
L-N	100÷289 V AC
L-L	173÷500 V AC
Rated frequency	50 Hz
accuracy of measurement	class B
installation	3-phase, 4-wire
overload capacity	30×lmax/10 ms
insulation	4 kV/1 min; 6 kV/1 µs
Own energy consumption of the meter	<10 VA; <2 W
counter display range	8 digits
pulse outputs	
number of pulse outputs	2
type of pulse outputs	OC (open collector)
maximum voltage	30 V DC
maximum current	27 mA
output 1 pulse constant	1, 10, 100, 1000 imp/kWh
output 2 pulse constant	1000 imp/kvar
communication	
port	RS-485
communication protocol	Modbus RTU
transmission rate	1200, 2400, 4800, 9600 bps
parity	EVEN
parity bits	2
reading signaling	2×LED
operating temperature	-25÷55°C
terminal	2.5 mm² screw terminals
dimensions	76×100×65 mm
	(4.5 of the DIN module)
installation	on TH-35 rail
ingress protection	IP51
insulation protection class	Class II
housing	self-extinguishing plastic UI94 V-0

6. Compliance and marking

Directive 2004/22 /EC.
Certificate number: SGS 0120/SGS0306.

The meter is marked with an individual serial number, which makes it possible to identify it unambiguously. The marking is indelible (laser engraving).

The meter has the option of sealing the input and output terminals, preventing the meter from being bypassed.
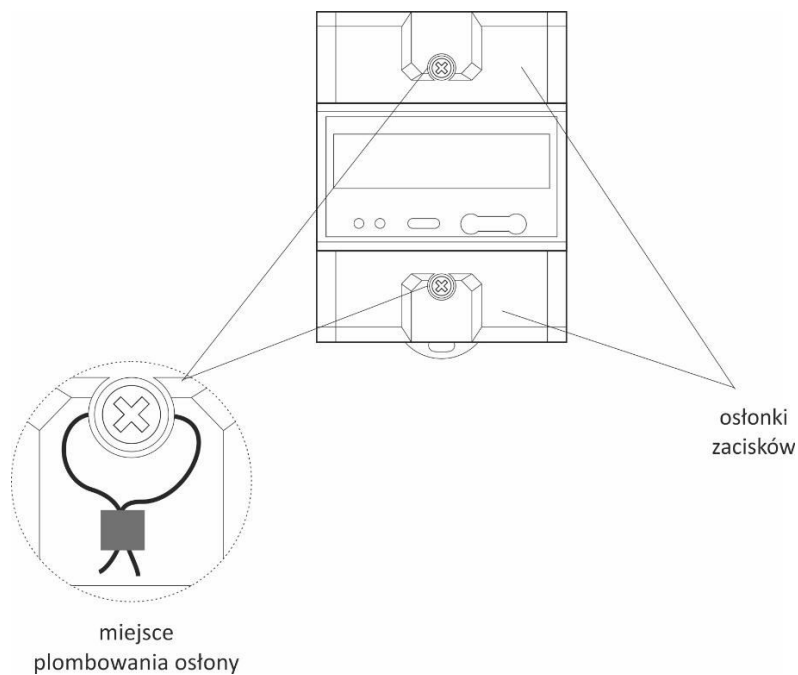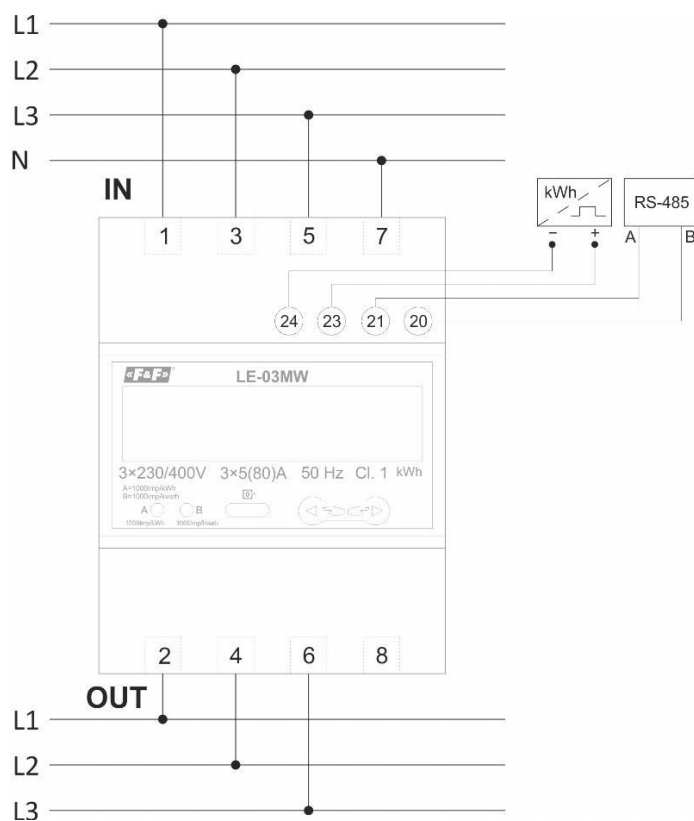

miejsce plombowania osłony - the place where the cover is sealed
osłonki zacisków - terminal covers

7. Dimensions
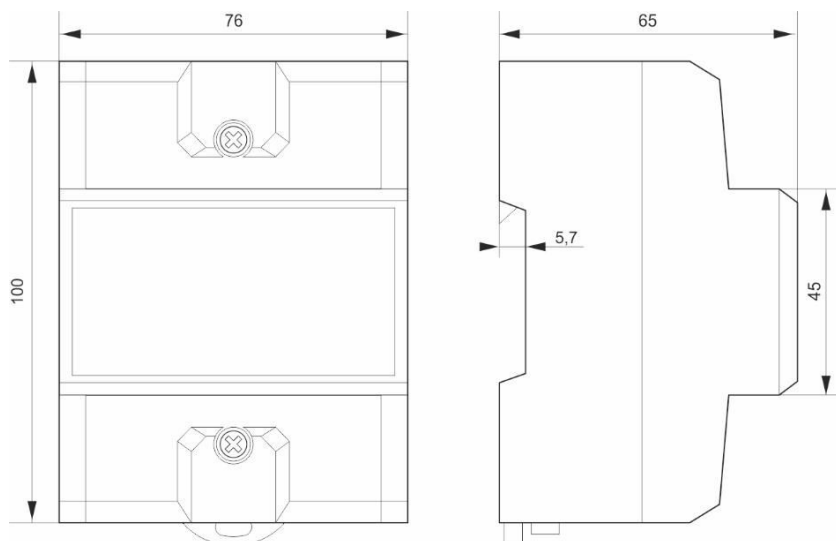
8. Connection

9. Communication protocol

The meter is equipped with an RS-485 interface that supports the Modbus RTU communication protocol.

Default communication parameters:

Modbus address	1
communication rate	9600 bps

The current communication parameters (Modbus address, baud rate) can be read from the LCD display.

9.1. List of registers

Legend:

Table column	Description
Register	The address of the registry that stores the parameter. Dec - address in decimal form Hex - address in hexadecimal form
Function	Parameter name
Type	Data recording format: U16 - 16-bit number without character U32 - 32-bit number without U32 character FLOAT - floating-point number stored in ieee 754 format
R/W	Read/write: R - read-only data W - write-only data R/W - read and write data
Quantity	Number of registers holding the parameter
Settings	Range of parameter settings

Register		Function	Type	R/W	Quantity	Settings
Dec	Hex					
0	0	Serial number	U32	R	2	
1	1	Modbus address of the meter	U16	R/W	1	1÷247
2	2	Transmission rate	U16	R/W	1	1200, 2400, 4800, 9600
3	3	Software version	Float	R	2	
6	6	Hardware version	Float	R	2	
9	9	Configuration of the pulse output	Float	R/W	2	1, 10, 100, 1000
11	B	Measuring mode of total energy consumption	U16	R/W	1	1 - total energy = consumed energy, 5 - total energy = consumed energy, + energy exported 9 - total energy = consumed energy - energy exported
13	D	View display time	U16	R/W	1	1÷30
14	E	L1 - Phase voltage;	Float	R	2	
16	10	L2 - Phase voltage;	Float	R	2	
18	12	L3 - Phase voltage;	Float	R	2	
20	14	Frequency	Float	R	2	
22	16	L1 – Phase current;	Float	R	2	
24	18	L2 – Phase current	Float	R	2	
26	1A	L3 – Phase current	Float	R	2	
28	1C	Total active power	Float	R	2	
30	1E	L1 phase - active power	Float	R	2	
32	20	L2 phase - active power	Float	R	2	
34	22	L3 phase - active power	Float	R	2	
36	24	Total reactive power	Float	R	2	
38	26	L1 phase - reactive power	Float	R	2	
40	28	L2 phase - reactive power	Float	R	2	
42	2A	L3 phase - reactive power	Float	R	2	
44	2C	Total apparent power	Float	R	2	

Register		Function	Type	R/W	Quantity	Settings
Dec	Hex					
46	2E	L1 phase - apparent power	Float	R	2	
48	30	L2 phase - apparent power	Float	R	2	
50	32	L3 phase - apparent power	Float	R	2	
52	34	Total power factor	Float	R	2	
54	36	L1 phase - power factor	Float	R	2	
56	38	L2 phase - power factor	Float	R	2	
58	3A	L3 phase - power factor	Float	R	2	
60	3C	Time	Float	R/W	2	
256	100	Total active energy	Float	R	2	
258	102	L1 phase - total active energy	Float	R	2	
260	104	L2 phase - total active power	Float	R	2	
262	106	L3 phase - total active power	Float	R	2	
264	108	Consumed active energy	Float	R	2	
266	10A	L1 phase - consumed active energy	Float	R	2	
268	10C	L2 phase - consumed active energy	Float	R	2	
270	10E	L3 phase - consumed active energy	Float	R	2	
272	110	Exported active energy	Float	R	2	
274	112	L1 phase - exported active energy	Float	R	2	
276	114	L2 phase - exported active energy	Float	R	2	
278	116	L3 phase - exported active energy	Float	R	2	
280	118	Total reactive energy	Float	R	2	
282	11A	L1 phase - reactive energy	Float	R	2	
284	11C	L2 phase - reactive energy	Float	R	2	
286	11E	L3 phase - reactive energy	Float	R	2	
288	120	Consumed reactive energy	Float	R	2	
290	122	L1 phase - consumed reactive energy	Float	R	2	
292	124	L2 phase - consumed reactive energy	Float	R	2	
294	126	L3 phase - consumed reactive energy	Float	R	2	
296	128	Exported reactive energy	Float	R	2	

Register		Function	Type	R/W	Quantity	Settings
Dec	Hex					
298	12A	L1 phase - exported reactive energy	Float	R	2	
300	12C	L2 phase - exported reactive energy	Float	R	2	
302	12E	L3 phase - exported reactive energy	Float	R	2	
304	130	T1 tariff - total active energy	Float	R	2	
305	132	T1 tariff - consumed active energy	Float	R	2	
308	134	T1 tariff - exported active energy	Float	R	2	
310	136	T1 tariff - total reactive energy	Float	R	2	
312	138	T1 tariff - consumed reactive energy	Float	R	2	
314	13A	T1 tariff - exported reactive energy	Float	R	2	
316	13C	T2 tariff - total active energy	Float	R	2	
318	13E	T2 tariff - consumed active energy	Float	R	2	
320	140	T2 tariff - exported active energy	Float	R	2	
322	142	T2 tariff - total reactive energy	Float	R	2	
324	144	T2 tariff - consumed reactive energy	Float	R	2	
326	146	T2 tariff - exported reactive energy	Float	R	2	
328	148	T3 tariff - total active energy	Float	R	2	
330	14A	T3 tariff - consumed active energy	Float	R	2	
332	14C	T3 tariff - exported active energy	Float	R	2	
334	14E	T3 tariff - total reactive energy	Float	R	2	
336	150	T3 tariff - consumed reactive energy	Float	R	2	
338	152	T3 tariff - exported reactive energy	Float	R	2	
340	154	T4 tariff - total active energy	Float	R	2	
342	156	T4 tariff - consumed active energy	Float	R	2	
344	158	T4 tariff - exported active energy	Float	R	2	
346	15A	T4 tariff - total reactive energy	Float	R	2	
348	15C	T4 tariff - consumed reactive energy	Float	R	2	
350	15E	T4 tariff - exported reactive energy	Float	R	2	

Warning!

For advanced configuration of the LE-03MW meter (tariff zones, holidays, etc.) we recommend the free configuration software LE Config Program available for download from the www.fif.com.pl website.

10. MANUFACTURER'S WARRANTY

Warning!

Do not make any changes to the unit yourself. Doing so can result in damage to or improper operation of the device, which in turn can lead to damage to the controlled device and pose a threat to people operating it. In such cases, the manufacturer is not responsible for the resulting events and may refuse the provided warranty in the event of a complaint.