

LE-03MW CT

Electricity consumption meter

3-phase, 2-way tariff



User manual
v. 1.4 (240420)

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1. Purpose

LE-03MW CT is an electronic, 2-way three-phase electricity meter, designed for measurement in a semi-indirect system. A built-in real-time clock allows energy consumption to be measured by different tariff zones. RS-485 with Modbus RTU protocol and optical port compliant with EN62056 (IEC1107) provide remote reading and configuration of the meter.

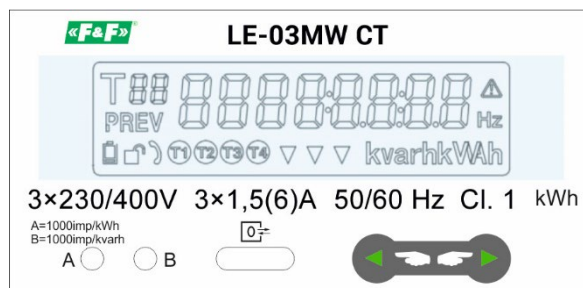
2. Device characteristics

- ✓ 3-phase, 2-way energy meter;
- ✓ Semi-indirect current measurement (direct measurement up to 6 A);
- ✓ Energy measurement in four tariff zones;
- ✓ Built-in real-time clock with battery backup for switching tariff zones;
- ✓ Registration of total and tariff-divided consumption of:
 - total active and reactive energy;
 - active and reactive energy divided into individual quadrants;
- ✓ 8 time schedules that divide the day into tariff zones;
- ✓ Possibility of billing energy according to different weekday and weekend schedules;
- ✓ Ability to divide the year into 8 time periods. In each period the energy (for working days) can be billed 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;
- ✓ RS-485 port, Modbus RTU protocol;
- ✓ Optical communication port compliant 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



Front view of the device with display (buttons visible)

4.1. Description of the display elements



Current tariff indicator.



Symbol – indicates which parameter group the value displayed in the numeric field is associated with. 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 – reactive 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.

A 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	T1 tariff – active energy consumption	kWh	T01	6+2 000000.00
5	T2 tariff – active energy consumption	kWh	T02	6+2 000000.00
6	T3 tariff – active energy consumption	kWh	T03	6+2 000000.00
7	T4 tariff – active energy consumption	kWh	T04	6+2 000000.00
8	Total reactive energy consumption	kVarh		6+2 000000.00
9	T1 tariff – reactive energy consumption	kVarh	T11	6+2 000000.00
10	T2 tariff – reactive energy consumption	kVarh	T12	6+2 000000.00
11	T3 tariff – reactive energy consumption	kVarh	T13	6+2 000000.00
12	T4 tariff – reactive energy consumption	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	T1 tariff – power demand	kW	T-1	6+2 000000.00
33	T2 tariff – power demand	kW	T-2	6+2 000000.00
34	T3 tariff – power demand	kW	T-3	6+2 000000.00
35	T4 tariff – power demand	kW	T-4	6+2 000000.00
36	Resettable energy consumption meter	kWh	The indication can be reset by holding down any button (for approximately 10 s) while this parameter is displayed.	000000.00
37			C11 XYZ XYZ show 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. When a parameter is displayed, hold down any button for 10 s and then set the desired value by pressing the button to the left or right.	Lcd-t 05
39	Pulse output		12000, 1200, 120, 12	S0 12000
40	Parameter calculation option: - Total active energy - Total reactive energy		CodE 01 – total energy = energy consumed CodE 05 – total energy = energy consumed + energy exported	CodE 01

			CodE 09 – total energy = energy consumed – energy exported	
41	Meter IR address		0	12345678
42	MODBUS address		0	Id 255
43	Baud rate		1200, 2400, 4800, 9600	bd 9600
44	Software version			V 1.01

5. Technical Specifications

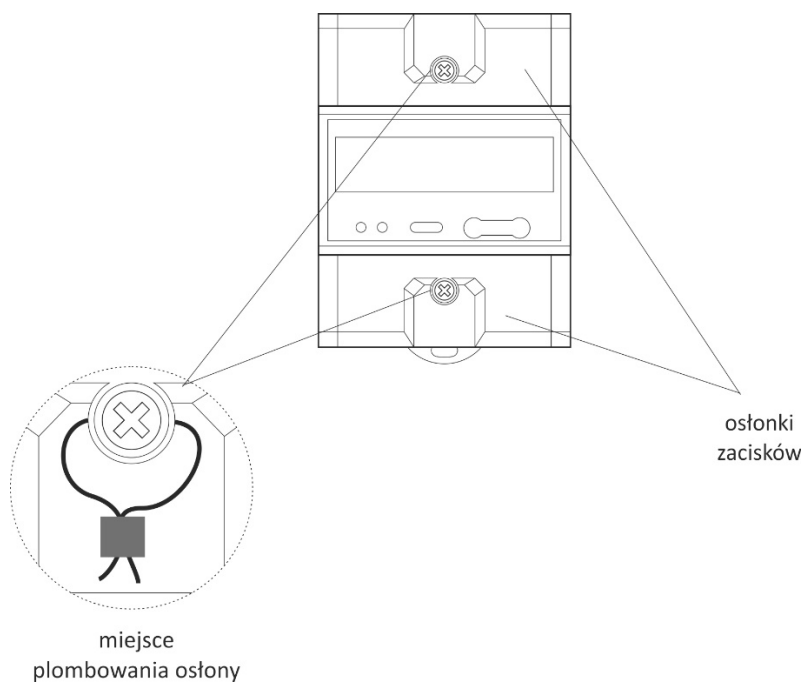
reference voltage	3×230/400 V
minimum current / base current	0.25 / 1.5 A
maximum current	6 A
minimum detection current	0.003 A
measured voltage	
L-N	100÷289 V AC
L- L	173÷500 V AC
rated frequency	50 Hz
measurement accuracy	Class B
installation	3-phase, 4-wire
overload capacity	30×I _{max} / 10 ms
insulation	4 kV/1 min.; 6 kV/1 μs
meter power consumption	<10 VA; <2 W
meter 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
pulse constant of output 1	12000, 1200, 120, 12 imp/kWh
pulse constant of output 2	12000 imp/kVar
communication	
port	RS-485
communication protocol	Modbus RTU
baud rate	1200, 2400, 4800, 9600 bps
parity	EVEN
stop bits	1

reading indication	2×LED
operating temperature	-25÷55°C
terminal	2.5 mm ² screw terminals
dimensions	76×100×65 mm (4.5 of the DIN module)
installation	on TH-35 mm rail
ingress protection	IP51
Insulation protection class	Class II
housing	self-extinguishing plastic UI94 V-0

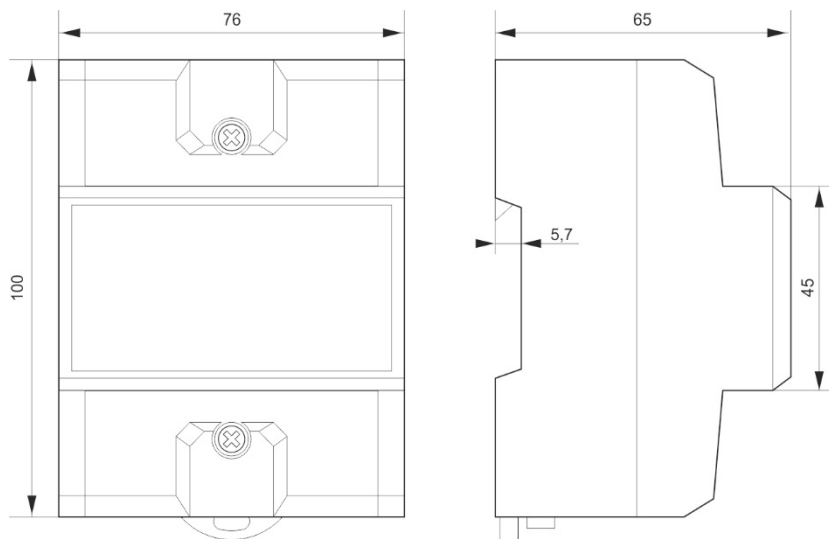
6. Compliance and marking

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

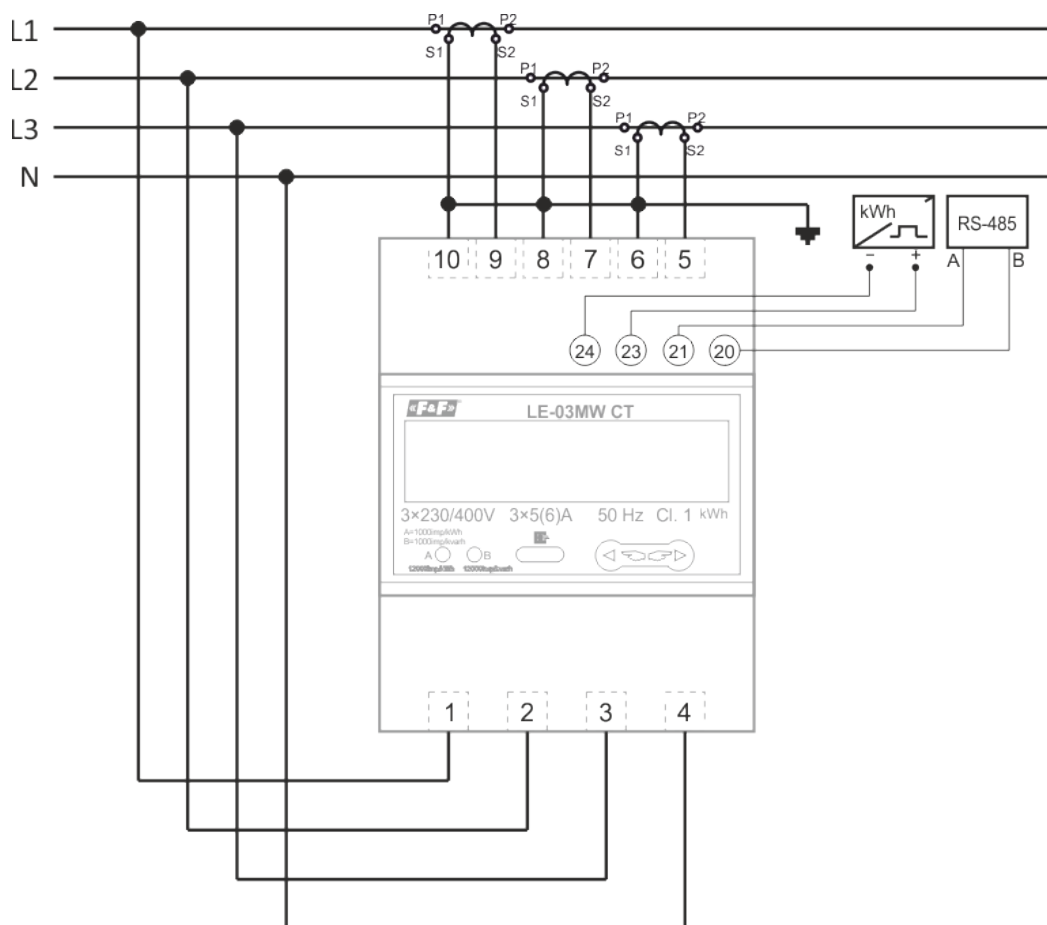
The meter has the option of sealing the input and output terminals, preventing the meter from being bypassed.



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 views on 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
Feature	Parameter name
Type	Data recording format: U16 – 16-bit unsigned integer U32 – 32-bit unsigned integer 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		Feature	Type	R/W	Quantity	Settings
Dec	Hex					
0	0	Serial number	U32	R	2	
2	2	Meter Modbus address	U16	R/W	1	1÷247
3	3	Baud rate	U16	R/W	1	1200, 2400, 4800, 9600
4	4	Software version	Float	R	2	
6	6	Hardware version	Float	R	2	
8	8	Current transformer CT	U16	R/W	1	List of setting codes in the table below
9	9	Configuration of the pulse output	Float	R/W	2	12000, 1200, 120, 12
11	B	Parameter calculation option: - Total active energy - Total reactive energy	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	2 A	L3 phase – reactive power	Float	R	2	
44	2C	Total apparent power	Float	R	2	

Register		Feature	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	3 A	L3 phase – power factor	Float	R	2	
60	3C	Time	Float	R/W	2	
256	100	Total active energy	Float	R	2	Value dependent on the set calculation option (see register 11)
258	102	L1 phase – total active energy	Float	R	2	
260	104	L2 phase – total active energy	Float	R	2	
262	106	L3 phase – total active energy	Float	R	2	
264	108	Consumed active energy	Float	R	2	
266	10 A	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	Value dependent on the set calculation option (see register 11)
282	11 A	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		Feature	Type	R/W	Quantity	Settings
Dec	Hex					
298	12 A	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	Value dependent on the set calculation option (see register 11)
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	Value dependent on the set calculation option (see register 11)
312	138	T1 tariff – consumed reactive energy	Float	R	2	
314	13 A	T1 tariff – exported reactive energy	Float	R	2	
316	13C	T2 tariff – total active energy	Float	R	2	Value dependent on the set calculation option (see register 11)
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	Value dependent on the set calculation option

						(see register 11)
330	14 A	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	Value dependent on the calculation option set (see register 11)
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	Value dependent on the set calculation option (see register 11)
342	156	T4 tariff – consumed active energy	Float	R	2	
344	158	T4 tariff – exported active energy	Float	R	2	
346	15 A	T4 tariff – total reactive energy	Float	R	2	Value dependent on the set calculation option (see register 11)
348	15C	T4 tariff – consumed reactive energy	Float	R	2	
350	15E	T4 tariff – exported reactive energy	Float	R	2	

9.2 Current transformer

The current transformer ratio of the meter can be set remotely via the Modbus RTU interface or locally using the PROG button.

To set it manually:

- 1) switch off and on the power supply of the meter;
- 2) press and hold down the PROG button;
- 3) release the PROG button after about 15 seconds;
- 4) the display will show a blinking CT value (for example 0005-5); the table of available settings is shown below;
- 5) set the desired value of the current transformer ratio by pressing the button to the left or right;
- 6) wait until the transformer value disappears from the display.

Setting the transformer ratio via the RS485 interface requires the code value corresponding to the selected current transformer to be written to register number 8.

Please note: The code designation of the transformer is created by writing the value of the transformer primary current as a BCD number.

Transformer	Code designation	
	Hexadecimal	Decimal
5/5	0x0005	5
30/ 5(*)	0x0030	48
40/5	0x0040	64
50/5	0x0050	80
60/5	0x0060	96
75/5	0x0075	117
80/ 5(*)	0x0080	128
100/5	0x0100	256
125/5	0x0125	293
150/5	0x0150	336
200/5	0x0200	512
250/5	0x0250	592
300/5	0x0300	768
400/5	0x0400	1024
500/5	0x0500	1280
600/5	0x0600	1536
750/ 5(*)	0x0750	1872
800/5	0x0800	2048
1000/5	0x1000	4096

Transformer	Code designation	
	Hexadecimal	Decimal
1250/5	0x1250	4688
1500/5	0x1500	5376
2000/5	0x2000	8192
2500/5	0x2500	9472
3000/5	0x3000	12288
4000/5	0x4000	16384
5000/5	0x5000	20480
6000/5	0x6000	24576
7500/5	0x7500	29952

(*) Transformer ratios 30/5, 80/5, 750/5 can only be set via the Modbus RTU interface.

Warning!

For advanced configuration of the LE-03MW CT 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 warranty

1. The meter is covered by a 24-month warranty from the date of purchase.
2. The warranty valid only with proof of purchase.
3. A warranty claim should be submitted at the point of purchase or directly to the manufacturer:
(phone (42) 22709 71; e-mail: reklamacje@fif.com.pl)
4. During the warranty period, in the event of a justified complaint, the manufacturer undertakes, in accordance with consumer rights legislation, to repair the device, replace it with a new one or refund the payment.
5. Warranty claims will be processed within 14 days of delivery to the service centre.
6. The warranty does not cover:
 - mechanical and chemical damage;
 - damage caused by improper use or use not in accordance with the user manual instructions;
 - post-sale damage resulting from accidents or other events for which the manufacturer, or the point of sale is not responsible, such as damage during transport. etc.
7. The warranty does not cover activities that according to the instructions should be carried out by the user, such as installation of the meter, electrical installation, installation of other required electrical protection, checking etc.

Warning!

Do not make any changes to the unit by 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.