F&F Filipowski L.P.
Konstantynowska 79/81, 95-200 Pabianice, POLAND
phone/fax (+48 42) 215 23 83 / (+48 42) 227 09 71
www.fif.com.pl; e-mail: biuro@fif.com.pl

LE-03M CT

Electric energy meter,
3-phase

5 908312 595786

Do not dispose of this device in the trash along with other waste!
According to the Law on Waste, electro coming from households free of charge and can give any amount to up to that end point of collection, as well as to store the occasion of the purchase of new equipment (in accordance with the principle of old-for-new, regardless of brand). Electro thrown in the trash or abandoned in nature, pose a threat to the environment and human health.

Purpose

The LE-03M CT is a static (electronic) calibrated electricity meter of three-phase alternating current in a semi-direct system.
Indicator is designed to work with current transformers for primary current Ip from 5÷6000 A and secondary current 5 A. The maximum current measured value of the system is determined by the primary current Ip applied CT (current transformer).
The user has the ability to set the index value used gear ratio, which allows you to indicate the actual value taken by the electricity system.
Serial RS-485 and implemented Modbus RTU communication protocol allows the indicator used in networks for remote reading of data.

Functioning

A special electronic system under the influence of current flow and applied voltage in each phase generates pulses in proportion to the electricity consumed in this phase.

Phase energy consumption is indicated by flashing the corresponding LED (L1, L2, L3). The sum of the three phases of pulses indicated by a flashing LED is converted to energy taken in the entire three-phase system, and its value is determined by the segment LCD display.

The values of primary currents Ip of the transformers that can be used are stored in the memory of the meter. The selection of appropriate value, which corresponds to the values of the connected transformers results in automatic setting of appropriate coefficient, according to which the actual value of consumed electric energy of the system is calculated. This value is indicated on the LCD in a format that depends on the transformer selected.

Values of Ip currents of transformers inscribed in memory of the indicator: 5, 20, 30, 40, 50, 60, 75, 80, 100, 120, 125, 150, 200, 250, 300, 400, 500, 600, 750, 800, 1000, 1200, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 6000.

Measured values

Active energy consumed	AE+	[kWh]

Pulse output

The meter is equipped with pulse output open collector (OC type). This allows you to connect another pulse device (SO) that reads pulses generated by the meter.
No additional connected equipment is required for proper operation of the meter.
Constant pulse counter is 12000 pulses/kWh for maximum input current meter, or the secondary current transformer (5 A). When using a dedicated transformer the number of pulses per 1 kWh is calculated from the formula:

$$(12000 \times 5)/Ip,$$

where:
Ip – primary current of the transformers used.

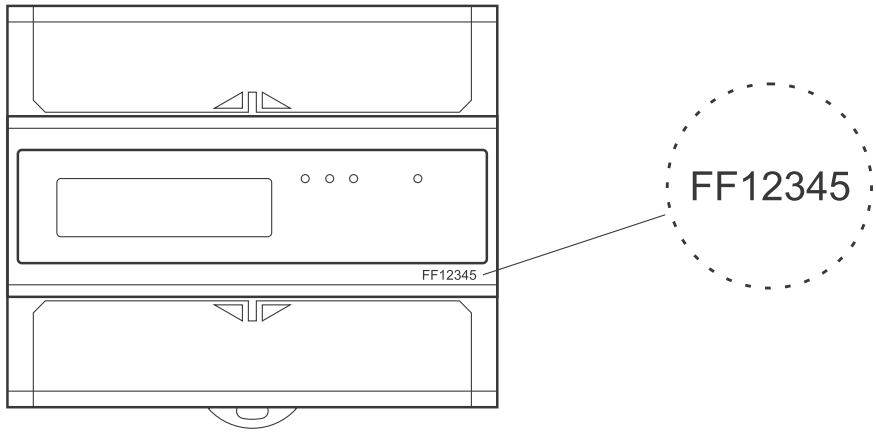
Example:
for 5/5A transformer (Ip=5): (12000×5)/5=12000 pulses/kWh
for 100/5A transformer (Ip=100): (12000×5)/100=600 pulses/kWh.

Meter address

Change of meter address and Ip current is done via the RS-485 port using the Modbus RTU protocol command to set the desired value in the meter register.
The default meter address: 1
Default setting of the Ip current value: 5.

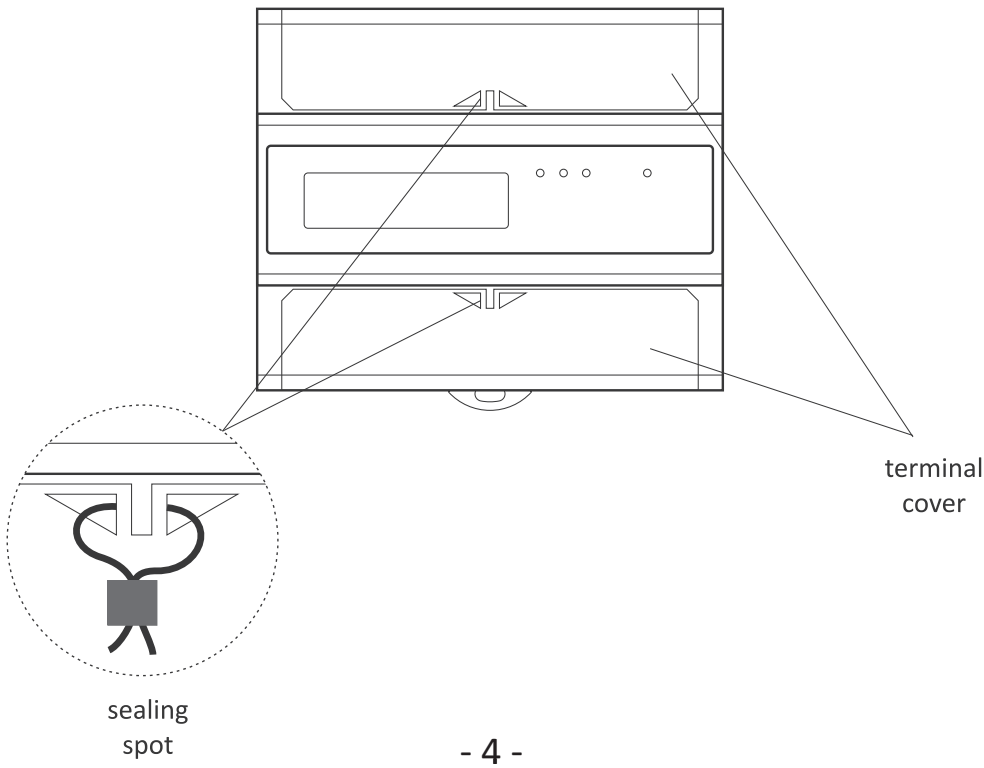
Meter number

The meter is marked with individual serial number allowing its unambiguous identification. The marking is laser engraved and cannot be removed).

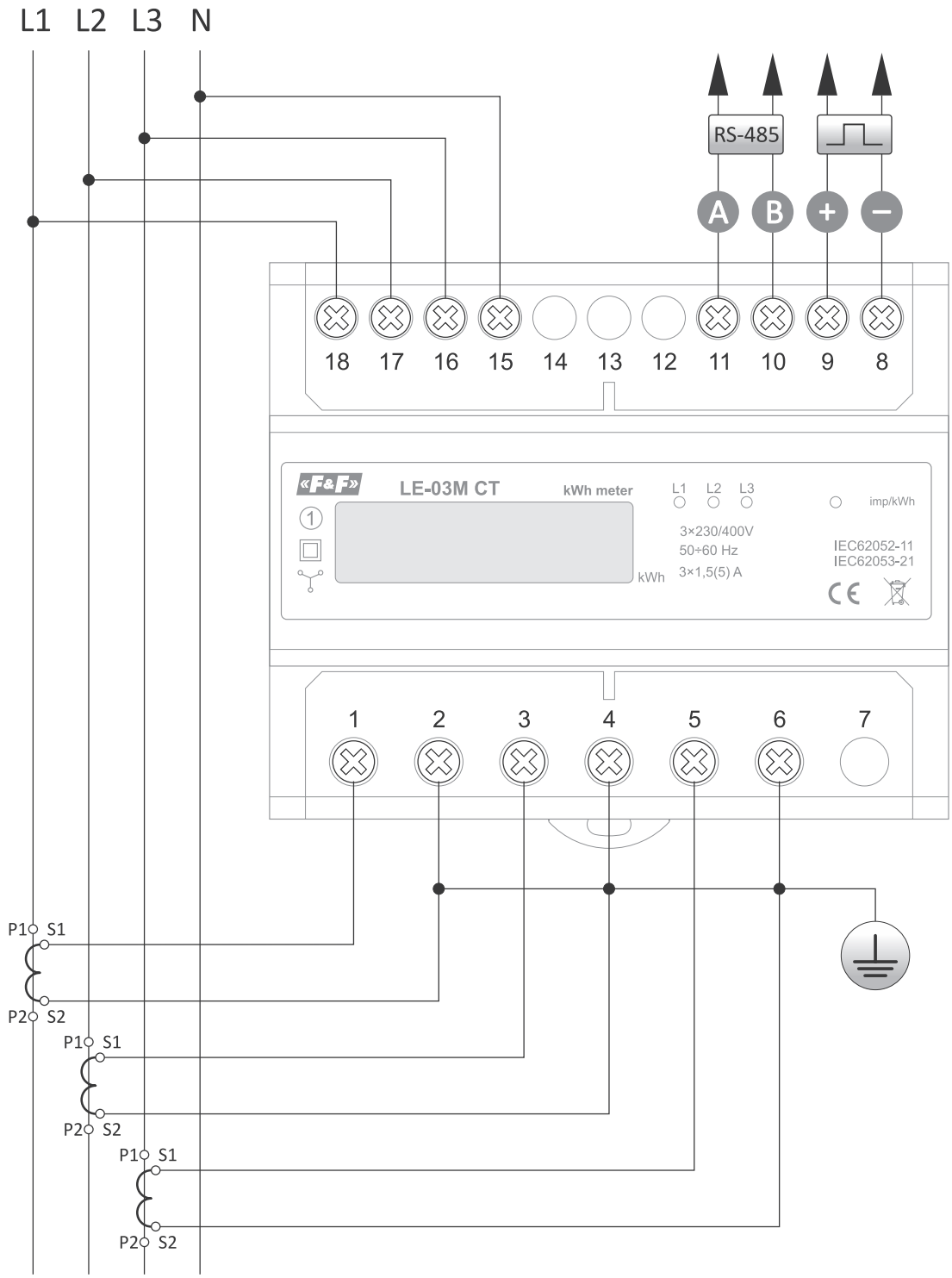


Sealing

The meter has sealable input and output terminal covers to prevent any attempts to bypass the meter.



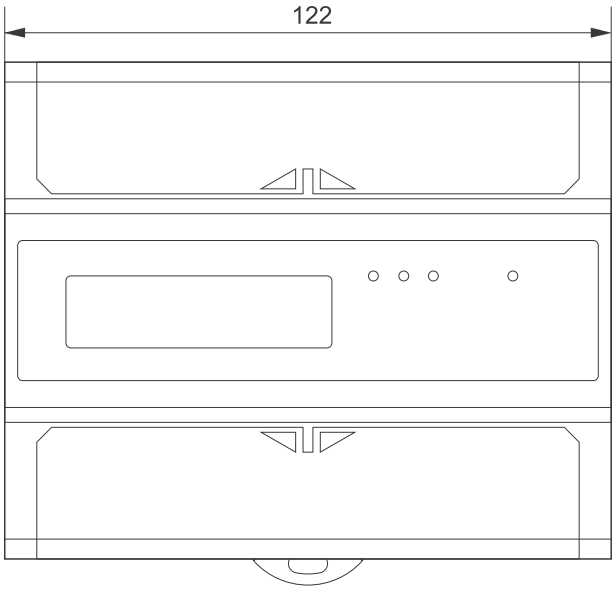
Wiring diagram

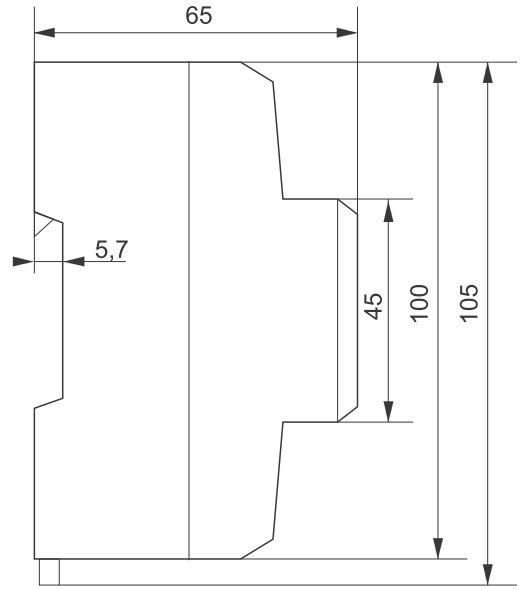


Description of terminals

1-6 – current terminals
8 – pulse output (–)
9 – pulse output (+)
10 – RS-485 output (B)
11 – RS-485 output (A)
15-18 – voltage terminals

Dimensions





Mounting

1. Disconnect the power supply.
2. The indicator mounted on a rail in the distribution box.
3. Connect the power in accordance with the markings to the terminals 18 (L1), 17 (L2), 16 (L3).
4. N-wire connect to terminal 15.
5. Transformers fasten on the phase conductors and secondary outputs connected in accordance with the indications to the terminals: 1-2 (L1), 3-4 (L2), 5-6 (L3).

If the secondary circuit of the transformer is opened during operation, there is a risk of high voltage on the secondary winding. In order to protect personnel operating the device, it is recommended to ground one end of the secondary winding of each transformer.

Do not tighten the terminals without an inserted wire. This may damage the clamping mechanism or the plastic cover of the terminal.

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6. Connect the RS-485 network cables to the terminals 10 (B) - 11 (A).
7. Additional pulse receiver connected to terminals 9 (+) - 8 (–).

Additional pulse receiver is not required.

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8. Put the meter terminals covers.
9. If required, the casings should be sealed.

Modbus RTU protocol parameters

Communication parameters	
Protocol	Modbus RTU
Operation mode	Slave
Port settings	Baud rate: 9600 bps Parity: NONE Stop bits: 1
Address range networks (factory settings)	1÷245 (1)
Command codes	3: Register values reading (0×03 – Read Holding Register) 6: Single register value setting (0×06) – Write Single Register)

Registry parameters			
address	**description**	**type**	**atr**
0	Reading the value of register 1 (R0)	int	R
1	Reading the value of register 2 (R1)	int	R
2	Reading the value of register 3 (R2)	int	R
3	Reading the value of register 4 (R3)	int	R
4	Reading the current number Ip	int	R
6	Setting the counter number	int	W
8	Setting the current number Ip	int	W

Legend:
R – read, W – write.

Register values are stored as integers.
To get a reading, the three received registers values should be transform algebraically in accordance with the following formula:

$$(R0 \times 256^3 + R1 \times 256^2 + R2 \times 256 + R3) / x,$$

where:
R0 – register number 0;
R1 – register number 1;
R2 – register number 2;
R3 – register number 3.
x – factor depending on Ip current setting

The value of "x" in the Ip current ranges:

5÷75	100
80÷750	10
800÷6000	1

To set the value of the Ip current number, one must give a specific number for the Ip value, e.g. value 8 for a 100/5 transformer. (see table of projection numbers and formats for Ip currents).

Table of projection numbers and format for Ip currents

Ip current	Ip current value number	Format LCD projection
5	0	99999.99
20	1	99999.99
30	2	99999.99
40	3	99999.99
50	4	99999.99
60	5	99999.99
75	6	99999.99
80	7	999999.9
100	8	999999.9
120	9	999999.9
125	29	999999.9
150	10	999999.9
200	11	999999.9
250	12	999999.9
300	13	999999.9
400	14	999999.9
500	15	999999.9

Table of projection numbers and format... cont.

Ip current	Ip current value number	Format LCD projection
600	16	999999.9
750	17	999999.9
800	18	9999999
1000	19	9999999
1200	20	9999999
1250	21	9999999
1500	22	9999999
2000	23	9999999
2500	24	9999999
3000	25	9999999
4000	26	9999999
5000	27	9999999
6000	28	9999999

Technical data

installation	4-wire
rated voltage	3×230/400 V
minimum measured current	0.04 A
base current	3×1.5 A
maximum current	3×5 A
transformer secondary current	5 A
voltage measuring range	160÷265 V
measurement accuracy	IEC62052-11, IEC62053-21
rated frequency	50 Hz
insulation protection class	II
housing	PC+ABS material
own power consumption	<10 VA; <2 W
load capacity of current inputs	0.4 VA
indication range	depends on the gear*
constant	depends on the gear
signalling current consumption A, B, C phases	3×red LED
read-out signalling	red LED
communication	
port	RS-485
communication protocol	Modbus RTU
transmission parameters	9600 bps
parity	NONE
stop bits	1
pulse output	
type	open collector
maximum voltage	27 V DC
maximum current	27 mA
pulse constant	depends on the gear
pulse time	35 ms

** see the LCD projection format table, page 10-11*

working temperature	-25÷55°C
terminal	25 mm² screw terminals
dimensions	7 module (122 mm)
mounting	on TH-35 rail
ingress protection	IP20

LE Config service programm

Program for test reading of the counted energy value and for basic settings of the meter parameters.
Available at www.fif.com.pl (on the device's subpage).
For communication of the meter with the computer, the USB CN-USB-485 converter or any RS-485/USB standard is required.

Warranty

F&F products are covered by a 24-month warranty from the date of purchase. The warranty is only valid with proof of purchase. Contact your dealer or contact us directly.

CE declaration

F&F Filipowski L.P. declares that the device is in conformity with the essential requirements of the Low Voltage Directive (LVD) 2014/35/EU and the Electromagnetic Compatibility (EMC) Directive 2014/30/UE.
The CE Declaration of Conformity, along with the references to the standards in relation to which conformity is declared, can be found www.fif.com.pl on the product subpage.

General work safety conditions

» Please read the instructions carefully before installation.
» The device should be installed and operated by qualified personnel who are familiar with its design, operation, and associated risks.
» Do not install a meter that is damaged or incomplete.
» The user is responsible for proper grounding of the system, proper selection, installation, and efficiency of other devices connected to the meter, including safety devices such as overcurrent, residual current and overvoltage circuit breakers.
» Before connecting the power supply, make sure that all cables are connected correctly.
» It is essential to observe the operating conditions of the meter (supply voltage, humidity, temperature).
» To avoid electric shock or damage to the meter, turn off the power supply whenever the connection is changed.
» 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 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.


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