ELECTRICITY CONDUMPTION METERS
three-phases

LE-03MP

Do not dispose of this device to a garbage bin with other unsorted waste! In accordance with the Waste Electrical and Electronic Equipment Act any household electro-waste can be turned in free of charge and in any quantity to a collection point established for this purpose, as well as to the store in the event of purchasing new equipment (as per the old for new rule, regardless of brand). Electro-waste thrown in the garbage bin or abandoned in the bosom of nature pose a threat to the environment and human health.

Purpose

LE-03MP is a static (electronic) calibrated electricity meter of three-phase alternating current in a direct system. It is used for reading and recording of consumed electric energy and mains parameters with remote readout via a wired RS-485 network.

Measured values

Active power - AE + [kWh]
Reactive power - RE+ [kvarh]
Phase voltage - U1, U2, U3 [V]
Phase currents - I1, I2, I3 [A]
Power factor cosφ L1, L2, L3 (20 parameters)

Active powers of L1, L2, L3 phases - P1, P2, P3 [kW]
Active power of L1+L2+L3 system - P [kW]
Reactive powers of L1, L2, L3 phases - Q1, Q2, Q3 [kvar]
Reactive power of L1+L2+L3 system - Q [kvar]
Frequency - F [Hz]

Features

* Internal relay switching L1, L2, L3 phase circuits.
* Remote control of ON/OFF relay.
* Overcurrent protection - setting the load threshold.
* Prepaid power (prepayment) - active power value at which the meter disconnects the internal relay.
* Automatic mode - activation of overcurrent protection and prepaid mode.
* Status - current status of the relay [on/off].

Operation

Under the influence of flowing current and applied voltage, the LE meter accurately measures the amount of consumed electricity. Energy consumption is indicated by flashing LEDs: "800 pulses/kWh" for active power and "800 pulses/kvar" for reactive power. In addition, the device measures the mains parameters. The values are displayed cyclically on LCD display. Parameter changes every 3 seconds. You can manually switch between successive parameters by pressing a key on the front-end of the meter. The display is active only with meter power supply on.

The meter has an internal relay that switches L1, L2 and L3 circuits. The (ON/OFF) relay can be also operated manually.

The meter has a program overcurrent protection. If the load threshold is exceeded, the internal relay opens for 5 minutes.
After that time the relay closes and the measurement is repeated.

Prepaid power (prepayment feature) is the set increment value of available active power beyond which the internal relay is disconnected by the meter.
Automatic operation is the mode with two active functions: automatic relay disconnection if the set overcurrent threshold is exceeded and switching on the prepaid mode.
Current state of relay (ON/OFF) is indicated on the LCD display as the corresponding Modbus register value.

Readout of all measured values and parameter setting functions is done via the Modbus RTU protocol.

Communication with the meter working as a SLAVE is performed in accordance with Modbus RTU standard via RS-485 serial port. Converted registers values give results consistent with the indications on the meter display.
Each indicator is identified by a unique address assigned by the user.

IrDA (infrared data transmission ⌷ꭡ) feature is inactive in the current version of the software.

MODBUS RTU protocol parameters

Communication parameters	
Protocol	MODBUS RTU
Operation mode	SLAVE
Port settings	bits/s: 9600 data bits: 8 Parity: NONE Starts bits: 1 Stop bits: 2
Range of network addresses (factory setting)	1÷247 (1)
Command codes	3: Register values reading (0×03 - Read holding Register) 6: Single register value setting (0×06) - Write Single Register)
Maximum frequency of queries	15Hz

Registers parameters

address	description	command	type	atr
0	Meter address - range 1-255	03/06	int	read/write
1	L1 voltage [V] (×0,01)	03	int	read
2	L2 voltage [V] (×0,01)	03	int	read
3	L3 voltage [V] (×0,01)	03	int	read
4	L1 current intensity [A] (×0,01)	03	int	read
5	L1 current intensity [A] (×0,01)	03	int	read
6	L1 current intensity [A] (×0,01)	03	int	read
7	L1 active power [kW] (×0,001)	03	int	read
8	L2 active power [kW] (×0,001)	03	int	read
9	L3 active power [kW] (×0,001)	03	int	read
10	L1+L2+L3 active power [kW] (×0,001)	03	int	read
11	protection current [A] (×0,01)	03/06	int	read/write

address	description	command	type	atr
12	AUTOMATIC operation mode (0:OFF/1:ON) [1]	03/06	int	read/write
13	current state of relay (0:OFF/1:ON)	03	int	read
14	manual relay control (0:OFF/1:ON)	03/06	int	read/write
15	frequency [Hz] (×0,01)	03	int	read
18	Prepaid - value of active power top up [kWh] (×0,01)	03/06	int	read/write
19				
20	Consumed active power [kWh] (×0,01) (R20×256²+R21)/100	03	int	read
21				
22	Consumed reactive power [kvarh] (×0,01) (R23×256²+R24)/100	03	int	read
23				
24	L1 reactive power [kvar] (×0,001)	03	int	read
25	L2 reactive power [kvar] (×0,001)	03	int	read
26	L3 reactive power [kv] (×0,001)	03	int	read
27	L1+L2+L3 reactive power [kvar] (×0,001)	03	int	read
30	cosφ L1 (R1×0,001)	03	int	read
31	cosφ L2 (R1×0,001)	03	int	read
32	cosφ L3 (R1×0,001)	03	int	read
36	Prepaid - the remaining power [kWh] (×0,01) (R36×256²+R37)/100	03	int	read
37				

[1] Automatic operation is the mode with two active functions: automatic relay disconnection if the set overcurrent threshold is exceeded and switching on the prepaid mode.

Meter number

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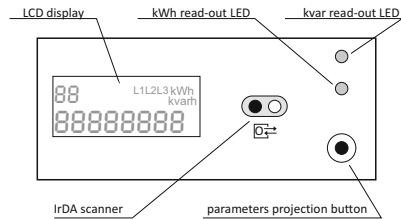

sealing spot

mounting screw

terminal cover

meter number

FF12345
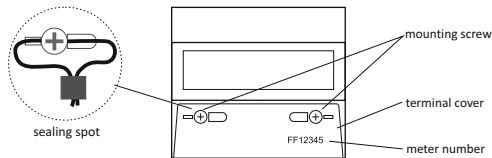
Sealing

The meter has sealable input and output terminal cover to prevent any attempts to bypass the meter.
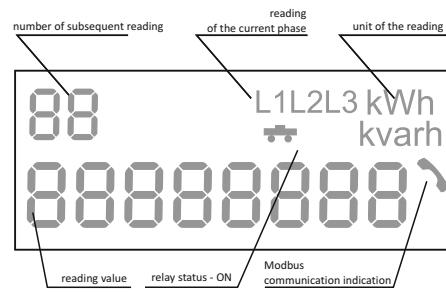
Meter address

Change of meter address 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.

Front panel

LCD display

kWh read-out LED

kvar read-out LED

IrDA scanner

parameters projection button

Display description

number of subsequent reading

reading of the current phase

unit of the reading

reading value

relay status - ON

Modbus communication indication

Measured values display order

1. Total active energy: 000000.00 kWh
2. Total reactive energy: 000000.00 kvarh
3. L1 phase voltage: 000.00 V
4. L2 phase voltage: 000.00 V
5. L3 phase voltage: 000.00 V
6. L1 phase current: 00.00 A
7. L2 phase current: 00.00 A
8. L3 phase current: 00.00 A
9. L1 phase active power: 00.000 kW
10. L2 phase active power: 00.000 kW
11. L3 phase active power: 00.000 kW
12. Total active power: 00.000 kW
13. L1 phase reactive power: 00.000 kvar
14. L2 phase reactive power: 00.000 kvar
15. L3 phase reactive power: 00.000 kvar
16. Moc bierna całkowita: 00.000 kvar
17. L1 phase Cosφ: 0.000
18. L2 phase Cosφ: 0.000
19. L3 phase Cosφ: 0.000
20. Prepaid - remaining value 000000.00 kWh
21. Mains voltage frequency 00.00 Hz

Connection diagram
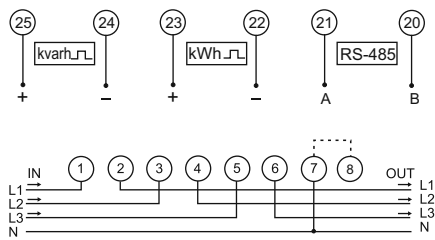
Installation

1. Remove the screws that secure the terminal. Remove the cover.
2. Disconnect the connection box power.
3. Mount the meter on the TH rail in the connection box.
4. Connect the power to terminal 1 (L1 IN), terminal 3 (L2 IN), terminal 5 (L3 IN).
5. Connect a measured circuit or a single receiver to terminal 2 (L1 OUT), terminal 4 (L2 OUT), terminal 6 (L3 OUT).
6. Connect N wire to terminal 7/8. Terminals 7 and 8 are linked with internal jumper and represent a single point.
7. Optionally connect the RS-485 network wires to terminals 21(A+) - 20(-).
8. Additional pulse receivers connect optionally to terminals:
   23(+) - 22(-) for active energy and 25(+) - 24(-) for passive energy.
9. Put back the cover and secure it with screws.

Technical data

reference voltage	3×230/400V+N
base current	5A
maximum current	60A
minimum current	0,02A
accuracy class (in accordance with IEC61036)	1st class
own power consumption	<10VA; <1,5W
indication range	0÷999999,99kWh
kWh meter constant	(1,25Wh/pulse) 800pulses/kWh
kvar meter constant	(1,25varh/pulse) 800pulses/kvarh
read-out indication	2× red LED
kWh/kvarh pulse output	open collector
kWh/kvarh connection voltage	<30V DC
kWh/kvarh connection current	<27mA
kWh/kvarh constant	(1,25Wh/pulse) 800pulses/kWh
kWh/kvarh pulse time	10ms
port	RS-485
communication protocol	MODBUS RTU
working temperature	-20÷55°C
terminal	screw terminals 16mm²
dimensions	7 modules (122mm)
mounting	on TH-35 rail
ingress protection	IP20

Service application

Application for PCs with Window is available for download on the fif.com.pl website (in the LE-03MP meter section). With it you can check meter status and adjust its parameters.

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