



F&F Filipowski sp.j.
Konstantynowska 79/81
95-200 Pabianice, Poland
Phone/fax (+48) 42 215 23 83, 227 09 71
e-mail: biuro@fif.com.pl

LE-01MB

Electric energy meter

1-phase

Bidirectional with network parameters analysis



User manual
v. 4.4 (170203)



www.fif.com.pl

CONTENTS

1. PURPOSE.....	5
2. UNIT CHARACTERISTICS.....	5
2.1. Measured value.....	5
2.2. M-Bus protocol and communication port	5
2.3. Pulse output.....	5
3. OPERATOR PANEL	6
3.1. LCD description.....	6
3.2. Start-up screen	6
3.3. Buttons features.....	7
3.4. Meter indication.....	8
4. SETUP.....	10
4.1. Setup entry methods	10
4.2. Number entry procedure	10
4.3. Configuration menu	11
4.3.1. M-Bus configuration.....	11
4.3.2. Pulse output	12
4.3.3. DIT - Demand Integration Time	12
4.3.4. Automatic scrolling parameters indication.....	12
4.3.5. Password changing.....	12
5. TECHNICAL SPECIFICATION	13
5.1. Measuring system	13
5.2. Measured parameters	13
5.3. Terminal	13
5.4. Accuracy.....	13
5.5. Pulse outputs.....	14
5.6. M-Bus output	14
5.7. Reference conditions of influence quantities	14

5.8. Environment	15
5.9. Structure.....	15
5.10. Compliance and sealing	15
6. DIMENSIONS.....	16
7. WIRING DIAGRAM	16
8. M-BUS PROTOCOLE	17
8.1. Initialization Slave	17
8.1.1. How to initialize a meter which you don't know the address	17
8.1.2. Remove the secondary address matching symbol of all the meters on Bus	17
8.1.3. How to initialize all meters on the bus line by using FF as broadcast address	17
8.1.4. How to initialize a Slave with specific address	17
8.2. How to set baud rate	18
8.2.1. Point to point baud-rate setting command format	18
8.2.2. How to use broadcast command to set baud rate.....	18
8.3. How to set primary address	19
8.3.1. How to set the address of a Slave to 01	19
8.3.2. How to use broadcast command to set primary address to 01	19
8.3.3. How to change address from 01 to 02	19
8.3.4. How to set primary address to 01 by using secondary address	20
8.4. Set the complete identification of the Slave	20
8.5. How to read out of energy information	20
8.5.1. Use primary address 01 to read energy information	20
8.5.2. How to read out a meter's energy information by using broadcast address 254 (FE)	21
8.5.3. How to read out the meter's energy information by using secondary address	21
8.6. Read out of instantaneous electrical information	24
8.6.1. How to read instantaneous electrical information by using primary address	24
8.6.2. How to use secondary address to read out the instantaneous electrical information	24
8.7. How to read password.....	30
8.7.1. Change to a new password	30
8.8. How to reset all resettable energy data	30
8.9. Set demand interval, slide time, display time, LED time	30
8.10. Read demand interval, slide time, display time, LED time	31

8.11. Read the measurement mode	32
8.12. Set up the measurement mode	32
8.13. Read the output mode of pulse 1	32
8.14. Set up the output mode of pulse 1	33
8.15. Read the constant of pulse 1.....	33
8.16. Set up the constant of pulse 1.....	33
9. MANUFACTURER'S WARRANTY	34

1. Purpose

LE-01MB is a static (electronic), calibrated electricity meter of single-phase alternating current in direct system. It is used for reading and recording of imported electricity and parameters of the power supply with the ability of remote reading through a wired M-Bus network. Configuration of the meter is done through the configuration menu accessible from the front panel and through the communication port according to the software features of the M-Bus.

2. Unit characteristics

2.1. Measured value

The unit can measure and display:

- ✓ voltage
- ✓ frequency
- ✓ current
- ✓ power, maximum power demand and power factor
- ✓ active energy imported and exported
- ✓ reactive energy imported and exported

2.2. M-Bus protocole and communication port

Meter has a port with support for M-Bus protocol.

The M-Bus communication port allows you to combine the counters in the remote reading network.

2.3. Pulse output

The meter has two pulse outputs for mapping the counting of active and reactive energy.

Output 1 - terminals 6/5 - programmable, can be set to work for active or reactive energy and parameters: impulsing and pulse length.

Output 2 - terminals 4/5 - for active energy, impulsing is 1000 pulse/kWh.

3. Operator panel

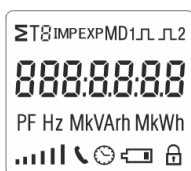
3.1. LCD description



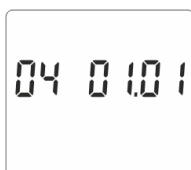
No.	Description
1	7 digits used to display measured values or RTC
2	Total value
3	Tariff information
4	Energy: imported / exported
5	Maximum power or current demand
6	Pulse outputs 1 and pulse outputs 2
7	Measurement units
8	PF - power factor
9	Power indicator
10	Communication indicator
11	Low battery warning
12	Lock symbol

3.2. Start-up screen

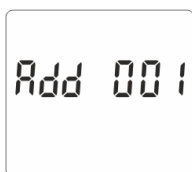
After turning on the power, the meter performed a series of automatic indications:



All display segments light up, display check.



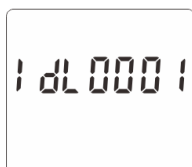
Software version (please check the real software version on the product as the final).



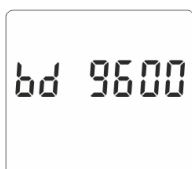
M-bus primary address



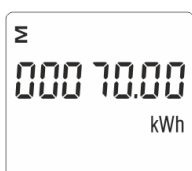
M-bus secondary address (High)



M-bus secondary address (Low)



Baud rate



Total kWh

3.3. Buttons features




- toggles between subsequent meter indications and meter configuration menu items

- entering digits 0-9

- long press to exit the settings menu and proceed to indications of the meter

- long press in the indications panel to enter the settings menu

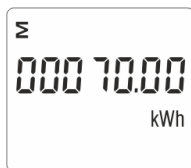
- short press in the indications panel toggles on/off the Modbus communication lock  for configuration parameters



- short press in the settings menu to switch to the next digit of the configured parameter

- long press in the settings menu to enter the setting of a given parameter and to accept it

3.4. Meter indication



Total active energy [kWh]



Import (input) active energy [kWh]



Export (output) active energy [kWh]



Total reactive energy [kVarh]



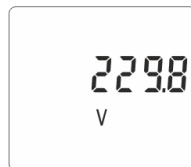
Import reactive energy [kVarh]



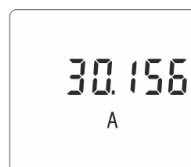
Export reactive energy [kVarh]



Max power demand



Voltage



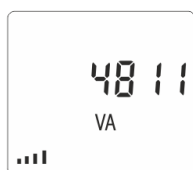
Current



Active power [W]



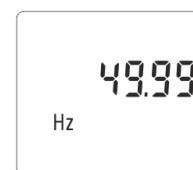
Reactive power [Var]



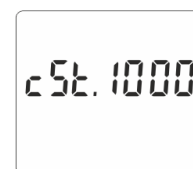
Apparent power [VA]



Power factor



Frequency



Pulse 2 constant



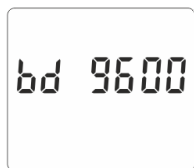
M-bus primary address



M-bus secondary address (High)



M-bus secondary address (Low)

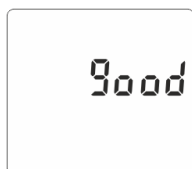


Baud rate

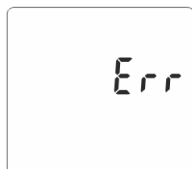
4. Setup

4.1. Setup entry methods

Some menu items, such as password, require a four-digit number entry while others, such as supply system, require selection from a number of menu options. After confirming the settings the meter confirms the adoption of a new parameter by displaying for a moment the word "good".







The error is signaled by the word "Err".




4.2. Number entry procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the setting up section, a password must be entered. Digits are set individually, from left to right.

The procedure is as follows:

1. The current digit to be set flashes and is set using the  button.
2. Press  button, to confirm each digit setting.
3. After setting the last digit, press  button, to exit the numer setting routine press  button.

4.3. Configuration menu

To enter setup mode, pressing the  button for 2 seconds, until the password screen appears.




Setting up is password-protected so you must enter the correct password (default "1000") before processing

Press the  button for 2 seconds.



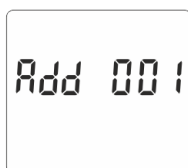
If an incorrect password is entered, the display will show:

PASS Err

To exit setting-up mode, press  button repeatedly until the measurement screen is restored.

4.3.1. M-Bus communication

Setting the communication port parameters.



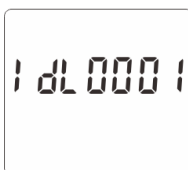
Address: M-bus ID

Default: 001

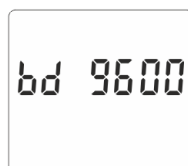
Range: 001÷250



M-bus address extended (High)



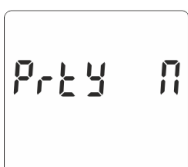
M-bus address extended (Low)



Baud rate

Default value: 2400 kbps;

Values: 300, 600, 1200, 2400, 4800, 9600 kbps



Parity

Default: EVEN

Options: NONE, ODD, EVEN

4.3.2. Pulse output

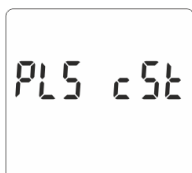
Pulse output 1 configuration



Energy type

Default: kWh

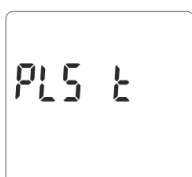
Options: kWh / kWh / kVarh / Imp. kWh / Exp. kWh / Imp.kVarh / Exp.kVarh



Pulse constant

Default: 1000 pulse

Options: 1000 / 100 / 10 / 1 pulse



Pulse time

Default: 100 msec

Options: 200 / 100 / 60 msec

4.3.3. DIT - Demand Integration Time



Default: 15 minutes

Options: OFF (0) / 5 / 10 / 15 / 30 / 60 minutes

4.3.4. Automatic scrolling parameters indication



Default: 0 sec

Range: 0÷30 sec

Value 0 – No automatic scrolling

4.3.5. Password changing



Default: 1000

Range: 0000÷9999

5. Technical specification

5.1. Measuring system

1P2W – 1-phase 2-wire system (230V+N)

5.2. Measured parameters

Reference voltage:	230V AC
Frequency:	50 Hz
Base current I_b :	5A
Maximum current I_{max} :	100A
Minimum current measured I_{min} :	0.25A
Starting current:	0.4% of I_b/I_{ref}
Overload:	$30 \times I_{max}/10\text{msec}$
Voltage measuring range:	176÷276 V AC
AC surge voltage:	4 KV per 1 minute
Pulse surge voltage:	6 KV-1.2 μs
Power:	<2W/10VA

5.3. Terminal

Measuring inputs	16 mm ² screw terminals
Measuring outputs M-	1.5 mm ² screw terminals
Bus port	1.5 mm ² screw terminals

5.4. Accuracy

Measurement class	B
Voltage	0.5% of range maximum
Current	0.5% of nominal
Frequency	0.2% of mid-frequency
Power factor	1% of unity (0.01)
Active power (W)	±1% of range maximum
Reactive power (VAr)	±1% of range maximum
Apparent power (VA)	±1% of range maximum
Active energy (Wh)	±1% 1 IEC 62053-21
Reactive energy (VArh)	±1% of range maximum

5.5. Pulse outputs

Output type: OC (open collector); 27V DC/27 mA

Pulse:

Pulse output 1 is configurable: for kWh or kVAh.

Value set kWh/kVAh per 1 pulse:

1 = 1 kWh/kVAh

10 = 10 kWh/kVAh

100 = 100 kWh/kVAh

1000 = 1000 kWh/kVAh.

Pulse output 2 is non-configurable for kWh: 3200 pulse/kWh

Pulse width:

Output 1 - configurable: 200 / 100 / 60 msec

Output 2 - non-configurable: 200 msec

5.6. M-Bus output

Baud rate: 300, 600, 1200, 2400 (default), 4800, 9600 bps;

Parity: NONE - ODD / EVEN - default;

Stop bits: 1 / 2

Network address: 1÷250

5.7. Reference conditions of influence quantities

Influence quantities are variables that effect measurement errors to a minor degree.

Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

Ambient temperature	23°C ±1°C
Input frequency	50 or 60 Hz ±2%
Input waveform	sinusoidal (distortion factor <0.005)
Auxiliary supply voltage	nominal ±1%
Auxiliary supply frequency	nominal ±1%
Auxiliary supply waveform (if AC)	sinusoidal (distortion factor <0.05)
Magnetic field of external origin	terrestrial flux

5.8. Environment

Operating temperature	-25÷55°C
Storage temperature	-40÷70°C
Relative humidity	0÷95%, without condensation
Installation category	CAT II
Mechanical environment	M1
Degree of pollution	E2

5.9. Structure

Mounting	on DIN rail
Cover	UI94 V-0 self-extinguishing material
Protection level	IP51 (inside)

5.10. Compliance and sealing

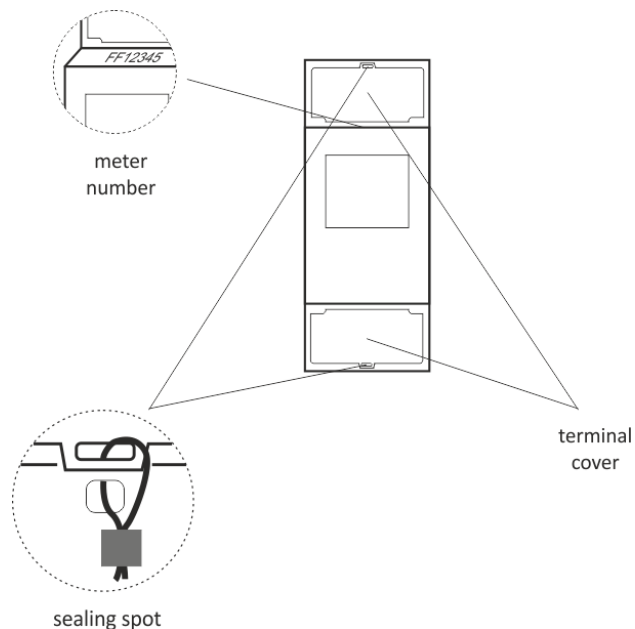
2004/22/EC Directive

Certificate number: 0120/SGS0214

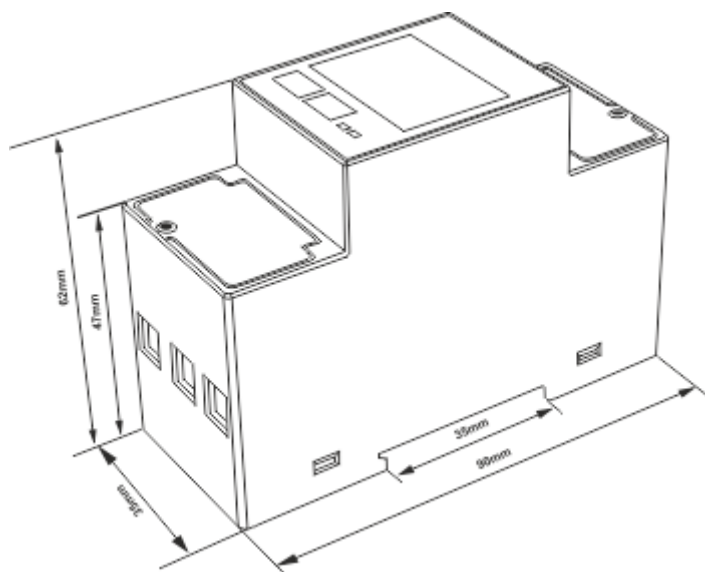
The meter is marked with individual serial number allowing its explicit identification.

The marking is laser engraved and cannot be removed.

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

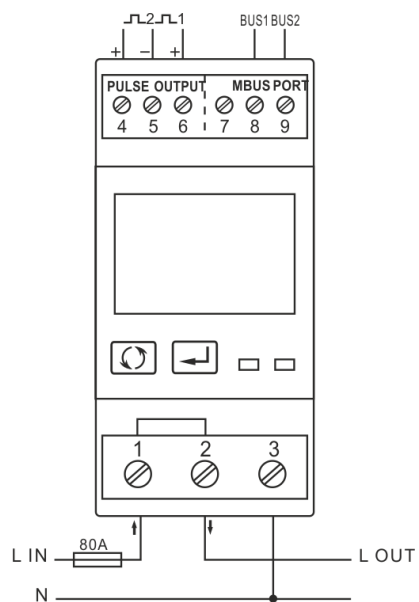


6. Dimensions



7. Wiring diagram

Single-phase 2-wire system



8. M-Bus protocole

8.1. Initialization Slave

Format:

Start	C field	A field	Check sum	Stop
10	40	XX	CS	16

XX=1 to FF

The address field serves to address the recipient in the calling direction, and to identify the sender of information in the receiving direction. The size of this field is one byte, and can therefore take values from 0 to 255. The addresses 1 to 250 can be allocated to the individual slaves, up to a maximum of 250. Unconfigured slaves are given the address 0 at manufacture, and as a rule are allocated one of these addresses when connected to the M-Bus. The addresses 254 (FE) and 255 (FF) are used to transmit information to all participants (Broadcast). With address 255 none of the slaves reply, and with address 254 all slaves reply with their own addresses. The latter case naturally results in collisions when two or more slaves are connected, and should only be used for test purposes. The address 253 (FD) indicates that the addressing has been performed in the Network Layer instead of Data Link Layer, the FD used when using the second level address. The remaining addresses 251 and 252 have been kept for future applications.

8.1.1. How to initialize a meter which you don't know the address

Master to Slave: 10 40 FE 3E 16

Slave to Master: E5 (success)

8.1.2. Remove the secondary address matching symbol of all the meters on Bus

Master to Slave: 10 40 FD 3D 16

Slave: No answer

8.1.3. How to initialize all meters on the bus line by using FF as broadcast address

Master to Slave: 10 40 FF 3F 16

Slave: No answer

8.1.4. How to initialize a Slave with specific address

Example: address 01

Master to Slave: 10 40 01 41 16

Slave to Master: E5

8.2. How to set baud rate

8.2.1. Point to point baud-rate setting command format (Control frame)

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68H	03	03	68H	53/73	FE	B8-BD	CS	16

L field - Byte length
 C field - Control field, function field
 A field - Address field
 CI field - Control information field
 Check sum - The Check sum is calculated from the arithmetical sum of the data mentioned above, without taking carry digits into account.

B8-----300
 B9-----600
 BA-----1200
 BB-----2400
 BC-----4800
 BD-----9600

Example:

(1) How to change baud rate to 2400 bps.

Master to Slave: 68 03 03 68 53 FE BB 0C 16 E5

Slave to Master:

(2) How to change baud rate to 9600 bps.

Master to Slave: 68 03 03 68 53 FE BD 0C 16

Slave to Master: E5

8.2.2. How to use broadcast command to set baud rate

Format:

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68H	03	03	68H	53/73	FF	B8-BD	CS	16

Slave to Master: No answer

B8-----300
 B9-----600
 BA-----1200
 BB-----2400
 BC-----4800
 BD-----9600

Example:

Change all the meter's baud rate to 2400 bps.

Master to Slave: 68 03 03 68 53 **FF** BB 0D 16

Slave to Master: No answer

8.3. How to set primary address

8.3.1. How to set the address of a Slave to 01

Format:

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF	Address data	Check sum	Stop
68H	06	06	68H	53/73	FE	51	01	7A	XX	CS	16

Example:

Master to Slave: 68 06 06 68 53 FE 51 01 7A **01** 1E 16

Slave to Master: E5

8.3.2. How to use broadcast command to set primary address to 01

Format:

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF	Address data	Check sum	Stop
68H	06	06	68H	53/73	FF	51	01	7A	XX	CS	16

Example:

Master to Slave: 68 06 06 68 53 **FF** 51 01 7A **01** 1F 16

Slave: No answer

8.3.3. How to change address from 01 to 02

Format:

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF	Address data	Check sum	Stop
68H	06	06	68H	53/73	XX	51	01	7A	YY	CS	16

XX - current primary address

YY - new primary address

Master to Slave: 68 06 06 68 73 **01** 51 01 7A **02** 42 16

Slave to Master: E5

8.3.4. How to set primary address to 01 by using secondary address

Example: secondary address: 12345678

Step 1

Initialize the Slave

Master to Slave: 10 40 FE 3E 16

Slave to Master: E5

Step 2

Check the secondary address.

After receiving the command, the Slave will check if the secondary address in the command is same with its secondary address or not.

Master to Slave: 68 0B 68 73 FD 52 78 56 34 12 FF FF FF FF D2 16

FD --- the primary address used when you use secondary address to read data. 78 56 34 12 - the meter's secondary address is 12 34 56 78

Master to Slave: E5 (success)

Step 3

Change the primary address to 01

Master to Slave: 68 06 06 68 73 FD 51 01 7A 01 3D

01 --- new primary address

Slave to Master: E5

8.4. Set the complete identification of the Slave

(ID=12345678, Man=4024h (PAD), Gen=1, Med=02 (energy))

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF
68H	0D	0D	68H	53/73	FE	51	07	79

Identification No	Manufacturer ID	Generation	Medium	Check sum	Stop
4 bytes	2 bytes	1 byte	1 byte	CS	16

Master to Slave: 68 0D 0D 68 53 FE 51 07 79 78 56 34 12 24 40 01 02 9D 16

Slave to Master: E5

8.5. How to read out of energy information

8.5.1. Use primary address 01 to read energy information

Format:

Master to Slave: 10 7B/5B adr CS 16

Slave to Master: Variable data structure

Example: 10 7B 01 7C 16

8.5.2. How to read out a meter's energy information by using broadcast address 254 (FE)

Master to Slave: 10 7B/5B FE CS 16
 Slave to Master: Variable data structure
 Example: 10 5B FE 59 16

8.5.3. How to read out the meter's energy information by using secondary address

Example:
 Secondary address: 12 34 56 78

Step 1

Initialize the Slave

Master to Slave: 10 40 FF 3F 16
 Slave to Master: No answer

Step 2

Check the secondary address.

After receiving the command, the slave will check if the secondary address in the command is same with its secondary address or not.

Master to Slave: 68 0B 68 73 FD 52 78 56 34 12 FF FF FF FF D2 16 E5
 Slave to Master:

Step 3

Read the energy information

Master to Slave: 10 7B FD 78 16
 Slave to Master: DIF===== Coding of the Data Information Field
 VIF===== Codes for Value Information Field

Bytes	Parameters	Data structure	Notice
4	Header telegram	68 5D 5D 68	Header of RSP_UD telegram
3		08 A 72	C field=08 address A CI field 72
4		78 65 34 21	Identification number = 12345678
2		24 40	Manufacturer ID 4024
1		01	Generation 1
1		02	Energy meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	Current total active energy	0C	DIF: 8 digit BCD, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh
7	Current import active energy	0C	DIF: 8 digit BCDFIE, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh
7	Current export active energy	0C	DIF: 8 digit BCDFIE, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh
6	Current resettable total active energy	0C	DIF: 8 digit BCD, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh
7	Current resettable import active energy	0C	DIF: 8 digit BCDFIE, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh
7	Current resettable export active energy	0C	DIF: 8 digit BCDFIE, current value
		04	VIF: 10 W (0.01 kW)
		78 56 34 12	123456.78 kWh

Bytes	Parameters	Data structure	Notice
7	Current total reactive energy	0C	DIF: 8 digit BCD, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVarh
8	Current import reactive energy	0C	DIF: 8 digit BCDFIE, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVarh
8	Current export reactive energy	8C	DIF: 8 digit BCDFIE, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVarh
7	Current total resettable reactive energy	0C	DIF: 8 digit BCD, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVarh
8	Current resettable import reactive energy	0C	DIF: 8 digit BCDFIE, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVar
8	Current resettable export reactive energy	0C	DIF: 8 digit BCDFIE, current value
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		78 56 34 12	123456.78 kVar
1	CHECK SUM	CS	
1	End	16	

8.6. Read out of instantaneous electrical information

The instantaneous electrical information includes:

V, I, P, Q, S, PF, Hz ect. MD

8.6.1. How to read instantaneous electrical information by using primary address

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68H	3	3	68	53/73	XX	B1	CS	16

Master to Slave: 68 03 03 68 53 **XX** B1 05 16

Slave to Master: Variable data structure (instantaneous electrical information)

If the primary address is 01, then XX=01

8.6.2. How to use secondary address to read out the instantaneous electrical information

Step 1

Initialize the Slave

Master to Slave: 10 40 FF 3F 16

Slave to Master: No answer

Step 2

Check the secondary address.

After receiving the command, the slave will check if the secondary address in the command is same with its secondary address or not.

Master to Slave: 68 0B 68 73 FD 52 78 56 34 12 FF FF FF FF D2 16 E5

Slave to Master:

Step 3

Use secondary address to read out the instantaneous electrical information.

Master to Slave: 68 03 03 68 53 **FD** B1 01 16

Slave to Master: Variable data structure

Bytes	Parameters	Data structure	Notice
4	Header telegram	68 90 90 68	Header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field 72
4		78 65 34 21	Identification number = 12345678
2		24 40	Manufacturer ID 4024
1		01	Generation 1
1		02	Energy meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
6	L1 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V
6	L2 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V
6	L3 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V
6	L1 - L2 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V

Bytes	Parameters	Data structure	Notice
6	L2 - L3 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V
6	L2 - L3 voltage	0B	DIF: 6 digit BCD
		FD	VIF: FD
		47	VIFE: 0.01 V
		56 34 12	1234.56 V
6	L1 current	0B	DIF: 6 digit BCD
		FD	VIF: FD
		59	VIFE: 1 mA (xxx.xxx A)
		56 34 12	123456 mA (123.456 A))
6	L2 current	0B	DIF: 6 digit BCD
		FD	VIF: FD
		59	VIFE: 1 mA (xxx.xxx A)
		56 34 12	123456 mA (123.456 A)
6	L3 current	0B	DIF: 6 digit BCD
		FD	VIF: FD
		59	VIFE: 1 mA (xxx.xxx A)
		56 34 12	123456 mA (123.456 A)
6	N current	0B	DIF: 6 digit BCD
		FD	VIF: FD
		59	VIFE: 1 mA (xxx.xxx A)
		56 34 12	123456mA (123.456A)
5	Total active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW))
		56 34 12	12345.6 W (12.3456 kW)

Bytes	Parameters	Data structure	Notice
5	L1 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW))
		56 34 12	12345.6 W (12.3456 kW)
5	L2 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW))
		56 34 12	12345.6 W (12.3456 kW)
5	L3 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW))
		56 34 12	12345.6 W (12.3456 kW)
6	Total reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L1 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L2 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L3 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)

Bytes	Parameters	Data structure	Notice
5	L1 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW)
		56 34 12	12345.6 W (12.3456 kW)
5	L2 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW)
		56 34 12	12345.6 W (12.3456 kW)
5	L3 active power	0B	DIF: 6 digit BCD
		2A	VIF: 0.1 W (xx.xxxx kW)
		56 34 12	12345.6 W (12.3456 kW)
6	Total reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L1 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L2 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)
6	L3 reactive power	0B	DIF: 6 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		56 34 12	12345.6 W (12.3456 kW)

Bytes	Parameters	Data structure	Notice
5	Total power factor	0a	DIF: 4 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		00 05	0.500
5	A power factor	0A	DIF: 4 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		00 05	0.500
5	B power factor	0A	DIF: 4 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		00 05	0.500
5	C power factor	0A	DIF: 4 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		00 05	0.500
5	Frequency	0A	DIF: 4 digit BCD
		FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		00 50	50.00 Hz
1	End	CS	
1		16	

8.7. How to read password

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68	3	3	68	11	addr	03	CS	16

Master to Slave: 68 03 03 68 11 address 03 CS 16

Slave to Master: 68 05 05 68 11 address 03 passwordH passwordL CS 16

8.7.1. Change to a new password

Start	L field	L field	Start	C field	A field	CI field	Data		Check sum	Stop
68	5	5	68	11	addr	04	password H	password L	CS	16

Master to Slave: 68 05 05 68 11 address 04 paswordH passwordL CS 16

Slave to Master: E5

8.8. How to reset all resettable energy data

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68	3	3	68	11	addr	0D	CS	16

Example: addr: 01

Master to Slave: 68 03 03 68 11 01 0D 1F 16

Slave to Master: E5

8.9. Set demand interval, slide time, display time, LED time

Send: 68 09 09 68 53 FE 51 30 01 60 01 05 06 3F 16

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF	Check sum	Stop
68H	09	09	68H	53/73	FE	51	30	01	CS	16

Example: (Meter address is 01)

Master to Slave: 68 09 09 68 53 FE 51 30 01 60 01 05 06 3F 16

Slave to Master: E5

Demand interval, slide time, display time, LED time

Display time=0: the display not scroll automatically.

LED time=0: Backlight always on min-min-s-min 4 Bytes

8.10. Read demand interval, slide time, display time, LED time

Start	L field	L field	Start	C field	A field	CI field	DIF	VIF	Check sum	Stop
68H	05	05	68H	53/73	FE	51	30	81	CS	16

Example: (Meter address is 01)
 Master to Slave: 68 05 05 68 53 FE 51 30 81 53 16
 Slave to Master: E5

Bytes	Parameters	Data structure	Notice
4	Header telegram	68 16 16 68	Header of RSP_UD telegram
3		08 A 72	C field =08 address A CI field72
4		78 65 34 21	Identification number = 12345678
2		24 40	Manufacturer ID 4024
1		01	Generation 1
1		02	Energy meter
1		55	ACCESS NO
1		00	STATUS
2		00 00	Signature
7		0A	DIF: 30 digit BCD
	Demand interval, slide time, display time, LED time	FD	VIF: FD
		3A	VIFE: dimensionless / no VIF
		15010610	Demand interval: 15 min. Slide time: 01 min. Display time: 06 sec LED time: 10 sec
1	Check sum	CS	
1	Koniec	16	

8.11. Read the measurement mode

Start	L field	L field	Start	C field	A field	CI field	Data	Check sum	Stop
68	03	03	68	11	addr	0A	01/02/03	CS	16

Example: (Meter address is 01)

Master to Slave: 68 03 03 68 11 01 09 1B 16

Slave to Master: 68 04 04 68 11 01 09 01 1C 16

The red-lighted **01** represents the measurement mode:

01: means active energy

02: means active energy + reactive energy

03: means active energy - reactive energy

8.12. Set up the measurement mode

Start	L field	L field	Start	C field	A field	CI field	Data	Check sum	Stop
68	04	04	68	11	addr	0A	01/02/03	CS	16

Example: (Meter address is 01)

Master to Slave: 68 04 04 68 11 01 0A 01 1C 16

Slave to Master: E5

The red-lighted **01** represents the measurement mode:

01: means active energy

02: means active energy + reactive energy

03: means active energy - reactive energy

8.13. Read the output mode of pulse 1

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68	03	03	68	11	addr	10	CS	16

Example: (Meter address is 01)

Master to Slave: 68 03 03 68 11 01 10 22 16

Slave to Master: 68 04 04 68 11 01 10 01 23 16

The red-lighted **01** represents the output mode of pulse 1:

01: Import active energy

02: Import + export active energy

04: Export active energy (default)

05: Import reactive energy

06: Import + export reactive energy

08: Export reactive energy

8.14. Set up the output mode of pulse 1

Start	L field	L field	Start	C field	A field	CI field	Data	Check sum	Stop
68	08	08	68	11	addr	11	01/02/04/05/06/08	CS	16

Example: (Meter address is 01)

Master to Slave: 68 04 04 68 11 01 11 **01** 24 16

Slave to Master: E5

The red-lighted **01** represents the output mode of Pulse1:

01: Import active energy

02: Import + export active energy

04: Export active energy (default)

05: Import reactive energy

06: Import + export reactive energy

08: Export reactive energy

8.15. Read the constant of pulse 1

Start	L field	L field	Start	C field	A field	CI field	Check sum	Stop
68	03	03	68	11	addr	12	CS	16

Example: (Meter address is 01)

Master to Slave: 68 03 03 68 11 01 12 24 16

Slave to Master: 68 04 04 68 11 01 10 **00** 22 16

The red-lighted **00** represents the constant of pulse 1:

00: 0.0025 kWh (kVarh)/pulse (default)

01: 0.01 kWh (kVarh)/pulse

02: 0.1 kWh (kVarh)/pulse

03: 1 kWh (kVarh)/pulse

04: 10 kWh (kVarh)/pulse

05: 100 kWh (kVarh)/pulse

8.16. Set up the constant of pulse 1

Start	L field	L field	Start	C field	A field	CI field	Data	Check sum	Stop
68	08	08	68	11	addr	11	00/01/02/03/04/05	CS	16

Example: (Meter address is 01)

Master to Slave: 68 04 04 68 11 01 13 **00** 25 16

Slave to Master: E5

The red-lighted **00** represents the constant of pulse 1:

00: 0.0025 kWh (kVarh)/pulse (default)

01: 0.01 kWh (kVarh)/pulse

02: 0.1 kWh (kVarh)/pulse
03: 1 kWh (kVarh)/pulse
04: 10 kWh (kVarh)/pulse
05: 100 kWh (kVarh)/pulse

9. Manufacturer's warranty

1. The product is covered by 24 month warranty from the date of purchase.
2. The warranty is valid only with a proof of purchase.
3. The notification of the complaint must be made at the place of purchase or directly at the manufacturer:
(phone: +48 (42) 227 09 71; e-mail: reklamacje@fif.com.pl)
4. During the warranty period in the case of a justified complaint the manufacturer commits in accordance with the provisions of the consumer rights to repair the product, replace it with a new one or refund.
5. The complaint will be processed within 14 days from the date of delivering the product to the service point.
6. Warranty does not cover:
 - mechanical and chemical damages;
 - damages resulting from improper use or from the use inconsistent with the user manual;
 - damages incurred after the sale as a result of accidents or other events for which nor the producer, nor the place of sale are responsible, for example damages in transit, etc.
7. Warranty does not cover actions that user should perform in accordance with the user manual, for example installing multi-meter, building electrical installation, installing other required electrical protection, checking, etc.

Warning!

Do not make any changes in the device by yourself. This may cause damage or improper operation of the device, which can lead to damage to the controlled device and may pose a danger to the operators. In such cases, the manufacturer is not liable for consequential events and may refuse the guarantee in case of complaint.