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MB-3U-1

Voltage measurement
transducer,
with Modbus RTU output



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 MB-3U-1 transducer is designed for voltage measurement and data exchange via the RS-485 port in accordance with the Modbus RTU protocol.

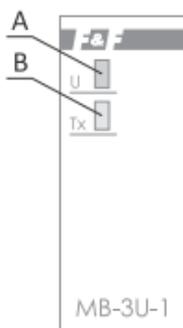
Functioning

The module continuously measures the value of the input AC or DC voltage (3-phase AC voltage or DC voltage circuits). Readout of the measured voltage value and setting of all communication parameters are all carried out through RS-485 port using the Modbus RTU communication protocol. Power up is indicated by a green LED U light.

Valid data exchange between the module and the second device is indicated by a yellow LED Tx light.

The transducer measures the effective value of TrueRMS voltage, which ensures high accuracy even with distorted flow.

Signalling elements



- A – power supply
- B – Modbus RTU data exchange

Terminals description



transducer's power supply

- 4, 7, 9 – measuring inputs (L/+)
- 6 – neutral wire (N/-)

RS-485

- 11' – serial port (A)
- 11 – serial port (B)

module power supply

- 10 – power supply (+)
- 12 – power supply (-)



For alternating voltage, the measurement is made in relation to the neutral conductor N. For direct voltage, the measurement is made in relation to a common supply point or GND. **Do not measure AC and DC voltages at the same time.**



Measurement channels are galvanically separated from the converter power input and the RS-485 communication port. RS-485 is not separated from the power supply.

Mounting



Use of surge protectors and interference filters is recommended (e.g. OP-230 F&F).



Use of shielded twisted wires is recommended for connecting the unit to another device.



If using shielded cables, ground the shield on one side only and as close to the device as possible.



The ends of the signal line must be completed with termination modules LT-04 (F&F).

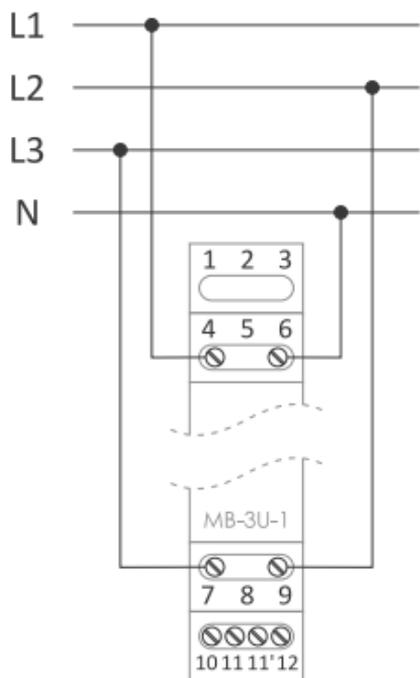


Do not lead signal cables parallel and in direct proximity to high- and medium-voltage line.

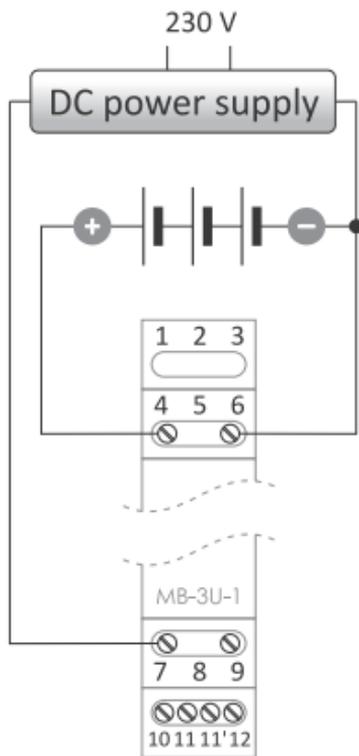


Don't install the unit in direct proximity to high power receivers, electromagnetic measuring devices, appliances with phase power adjustment and any other devices that can create interferences.

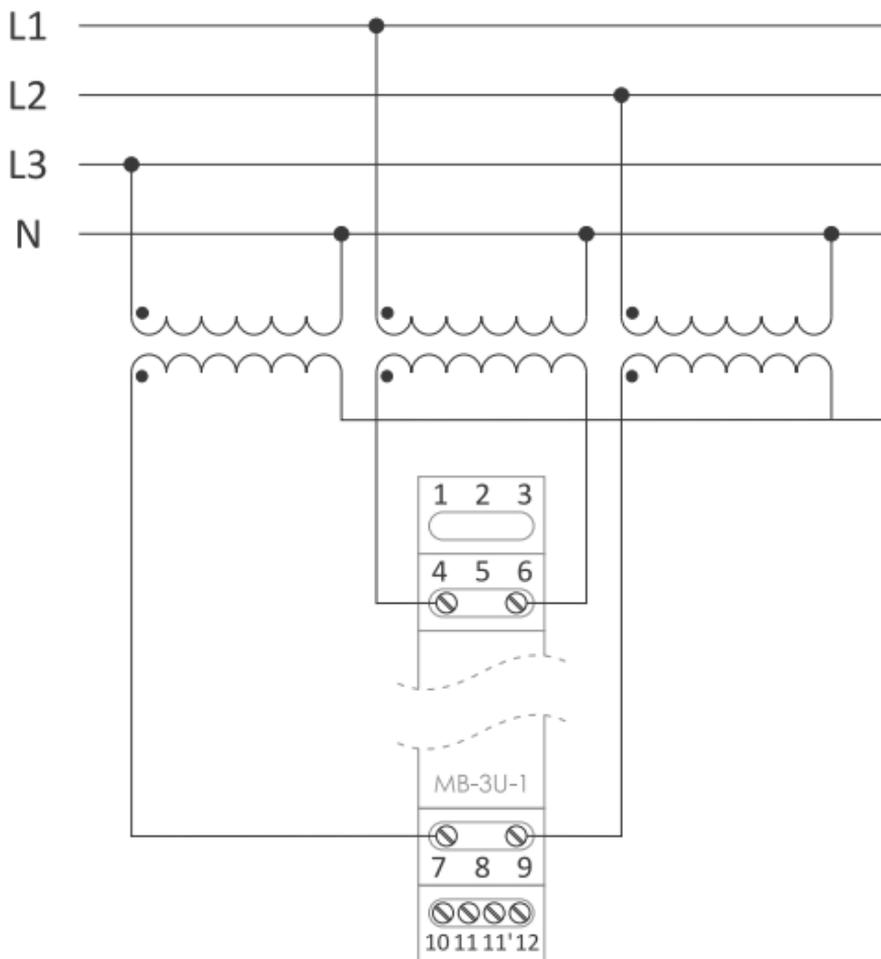
1. Before module installation set the network address and the communication parameters.
2. Disconnect the power.
3. Install the unit on the rail.
4. Connect the unit power supply to terminals 10-12 as indicated.
5. Connect signal output (port RS-485) 11(B)-11'(A) to the Master output of another device.
6. Connect the measurement circuit to the corresponding inputs of the transducer (as in a given example).



Direct measurement of
3-phase network voltage

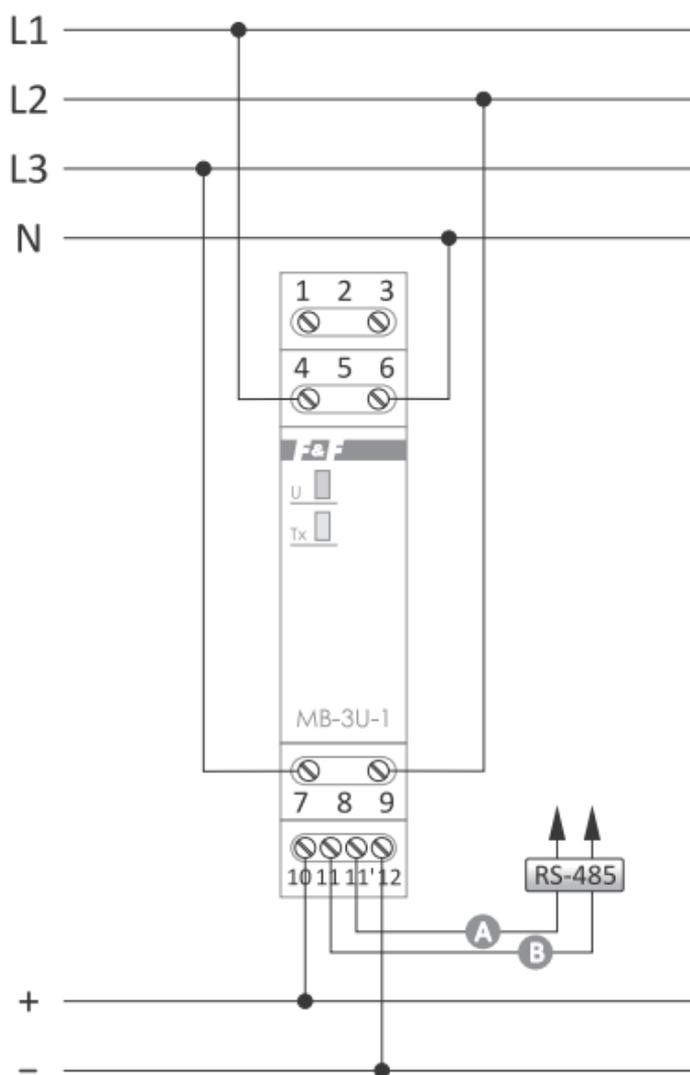


Direct voltage measurement
DC circuit



Indirect measurement of 3-phase network voltage
using the voltage transformers

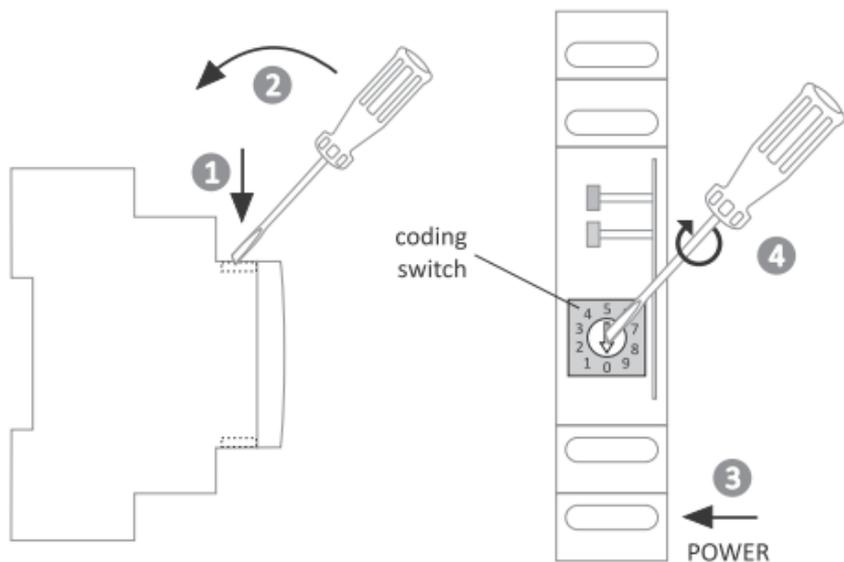
Wiring diagram



Reset communication settings

Under cover is available code switch.

1. Disconnect the power.
2. Remove front panel.
3. Set "9" on the switch.
4. Connect the power and within 3 sec switch to "0".

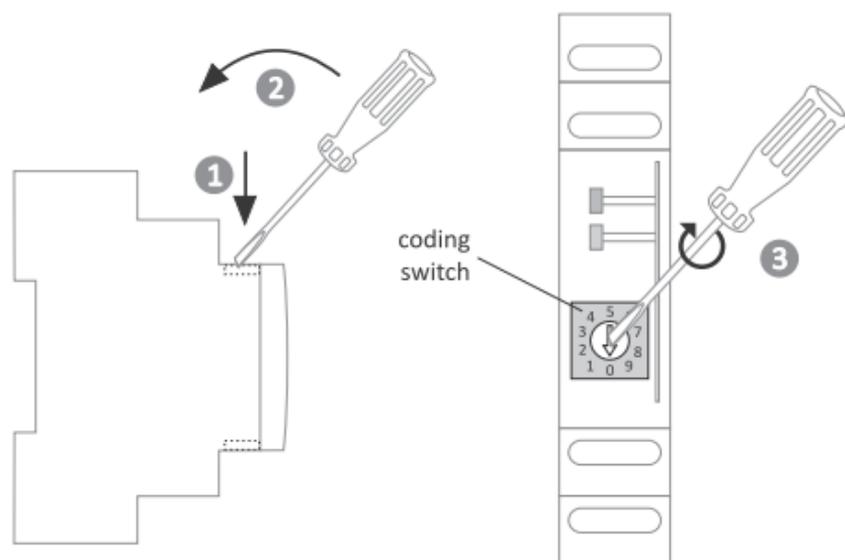


MB Config service program

Service program for quick device configuration. The program is available on the device's subpage or in the "Download" tab on the website: www.fif.com.pl.

Network address settings

The module can receive network addresses in the range 1÷247. The network address of the module is set in a combined way: using the MODBUS protocol user sets the base address, which is a number between 1÷238, and using a multi-position switch he sets the residual address, which is a number between 0÷9. The sum of these two values designate a network address (e.g. $1+6=7$, $70+3=73$, $238+9=247$). Multi-position code switch is located under the front casing. Removed the front casing with a 3 mm flat screwdriver by gently prying the tabs on the sides of the housing. With 3 mm flat screwdriver move the rotary switch on the selected digit as a partial address (range 0÷9). When the setting is done, reattach the front casing, paying particular attention to correctly fit LEDs in to mounting holes.



Modbus RTU protocol parameters

Communication parameters

Protocol	Modbus RTU
Working mode	Slave
Port settings (<u>factory settings</u>)	Bits/s: 1200, 2400, 4800, <u>9600</u> , 19200, 38400, 57600, 115200 Data bits: <u>8</u> Parity: <u>NONE</u> , EVEN, ODD Start bits: <u>1</u> Stop bits: <u>1/2</u>
Range of network addresses (<u>factory settings</u>)	1÷247 (<u>10</u>)
Range of base addresses	1÷238
Range of residual addresses (coding switch)	0÷9
Command codes	3: Readout of outputs registers values (0×03 – Read Holding Register) 4: Readout of all or a couple of input values registers (0×04 – Read Input Register) 6: Single output value setting

cont. on next page

Communication parameters cont.

Command codes	16: Setting values of multiple outputs (0x10 – Write Multiple Registers) 17: ID readout (0x11 – Report Slave ID)
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Maximum frequency of queries	15 Hz
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Communication registers

adr	description	function	type	atr
0	Readout of a current base address	03	int	R
0	Recording of a new base address: 1÷238	06, 16	int	W

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1	Readout of a current transmission rate	03	int	R
1	Recording of a new transmission rate	06, 16	int	W

Transmission rate [bits/s] is given in the form of an integer divided by 100, for example:

- transmission rate of 9600 bits/s is written as 96;
- transmission rate of 115200 bits/s is written as 1152.

Communication registers cont.

adr	description	function	type	atr
2	Readout of a current parity value	03	int	R
2	Recording of a new parity value	06, 16	int	W
Parity adopts adequate value: NONE - 0; ODD - 1; EVEN - 2.				
3	Readout of a current number of stop bits	03	int	R
3	Recording of a new number of stop bits	06, 16	int	W
Stop bits number adopts value 1 or 2.				

Legend: R – read, W – write

Input parameters

adr	description	function	type	atr
1000	Readout of measured of the voltage value channel 1 (L1)	04	int	R
1001	Readout of measured of the voltage value channel 2 (L2)	04	int	R
1002	Readout of measured of the voltage value channel 3 (L3)	04	int	R

The values of the input voltage is stored in the register as an integer times the one (for example: the value of the register 230 corresponds to the voltage of 230 V).

In response to the "read ID" command (code 17), we get a packet of information about module:

- code 0xEC in the "Slave ID" field;
- code 0xFF in the "Run Indicator Status" field;
- text „PU-1Mv1.2“ in the "Additional Data" field.

Legend: R – read, W – write

Technical data

power supply	9÷30 V DC
maximum load current	50 mA
measurement range (TrueRMS)	
AC voltage	0÷285 V
DC voltage	0÷400 V
maximum measurement error	±0.5%
reading registry precision	1 V
IN -> OUT breakdown voltage	3 kV
port	RS-485
communication protocol	Modbus RTU
work type	Slave
power indication	green LED
communication signalling	yellow LED
communication parameters	
speed (adjustable)	1200÷115200 bit/s
data bits	8
stop bits	1/2
parity bits	EVEN/ODD/NONE
address	1÷247
power consumption	0.8 W
working temperature	-20÷50°C
terminal	2.5 mm ² screw terminals
tightening torque	0.4 Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
ingress protection	IP20

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 sp. j. declares that the device is in conformity with the essential requirements of The Low Voltage Directive (LVD) 2014/35/EU.

The CE Declaration of Conformity, along with the references to the standards in relation to which conformity is declared, can be found at www.fif.com.pl on the product page: www.fif.com.pl from the product subpage.

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