

**VOLTAGE MEASUREMENT  
 TRANSMITTER with Modbus RTU MB-3U-1**

**WARRANTY.** The F&F products are covered by a warranty of the 24 months from the date of purchase. Effective only with proof of purchase. Contact your dealer or directly with us. More information how to make a compliant can be found on the website: [www.fif.com.pl/reklamacje](http://www.fif.com.pl/reklamacje)



**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**

MB-3U-1 transducer is designed to measure the voltage and to transmit the data via RS-485 port using MODBUS RTU protocol.

**Operation**

The module continuously measures the values of the input alternating voltage and input direct voltage (three-phase alternating current voltage or voltage circuits of direct current). Readout of recorded voltage and setting of all communication parameters are 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.

**Parameters of MODBUS RTU protocol**

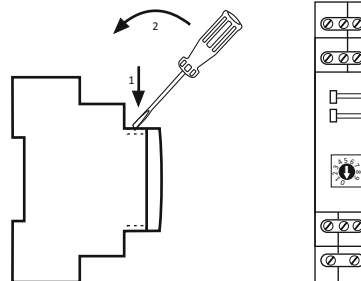
Communication parameters	
Protocol	MODBUS RTU
Work mode	SLAVE
Port settings (factory settings)	Bits numbers on sec: 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 Data bits: 8 Parity: NONE / EVEN / ODD Start bits: 1 Stop bits: 1 / 2
Range of network (factory settings)	1÷247 (10)
Range of base addresses	1÷238
Range of residual addresses (switch code)	0÷9
Command codes	3: Read value of outputs registry (0×03 - Read holding Register) 4: Read all or some records of input values (0×04 - Read Input Register) 6: The setting of a single output (0×06 - Write Single Register) 16: The setting of a multiple outputs (0×10 - Write Multiple Registers) 17: Read ID (0×11 - Report Slave ID)
The maximum frequency of queries	15Hz

**Registers**

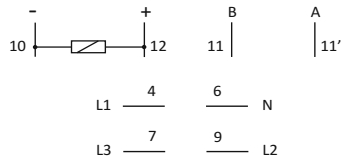
Communication parameters				
address	description	code	type	atr.
0	read actual base address	03	int	read
0	save a new base address: 1÷238	06, 16	int	write
Module can accept network addresses in the range 1÷247. The network address of the module is set in a complex way: using the MODBUS protocol to set the base address, the number in the range 1 to 238, and a multi-position switch to set address residual, i.e. the number from 0 to 9th. The sum of these two values determines the network address (eg. 1+6=7; 70+3=73; 238+9=247).				
1	read a speed of transmission	03	int	read
1	save a new speed of transmission	06, 16	int	write
The speed value [bit/sec] is given in the form of an integer divided by 100, for: example, 9600 bit/sec write in figures 96; 115200 bit/sec write in figures 1152.				
2	read of actual parity value	03	int	read
2	save a new parity value	06, 16	int	write
Parity adopt appropriate meanings: NONE - 0; EVEN - 1; ODD - 2.				
3	read of actual number of stop bits	03	int	read
3	save the number of stop bits	06, 16	int	write
Number of stop bits accepts the importance of 1 or 2				
Registry parameters				
address	description	code	type	atr.
1000	readout of channel 1 (L1) voltage	04	int	read
1001	readout of channel 1 (L2) voltage	04	int	read
1002	readout of channel 1 (L3) voltage	04	int	read
Value of input voltage is stored in the registry as an integer of 1 multiplication factor (e.g. the registry value 230 corresponds to the voltage of 230 V).				
In response to the command "readout ID" (code 17), we obtain a packet of information about the module: in the "Slave ID" code 0xEC; in the "Run Status Indicator" code 0xFF; in the "Additional Data" text "PU-1Mv1.2".				

**Setting the network address**

Module can accept network addresses in the range 1 ÷ 247. The network address of the module is set in a complex way: using the MODBUS protocol to set the base address, the number in the range 1 to 238, and a multi-position switch to set address residual, i.e. the number from 0 to 9th. The sum of these two values determines the network address (e.g. 1 + 6 = 7, 70 + 3 = 73, 238 + 9 = 247). Multi-position code switch is located under the front elevation. Cladding removed using flat-head screwdriver 3mm elevation gently undermining hooks on the sides of the enclosure. 3mm flat screwdriver to switch the rotary switch to the desired number, as a sub-address (range 0 to 9). Set a new module address is the sum of the values and partial base address, after setting the front elevation set up with special attention to the proper fitting of LEDs in the holes.



**Input/output description**



- 6 neutral wire N
- 4, 7, 9 measure inputs
- 11-11' serial port RS-485
- 10-12 module power supply

For alternating voltage measurement is made in relation to the neutral conductor N. For direct voltages measurement is made in relation to a common power supply point- or GND. Do not perform simultaneous measurement of direct and alternating voltages.

**PLEASE NOTE!**

Measurement channels are not galvanically isolated from each other. Measurement channels are galvanically isolated from the transducer power supply input and the RS-485 communication port. RS-485 port is not separated from the power supply.

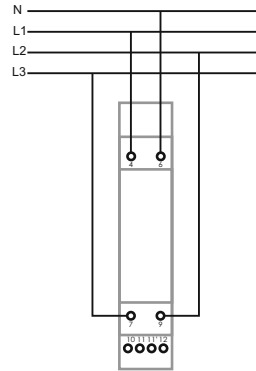
**Assembly**

**General assumptions:**

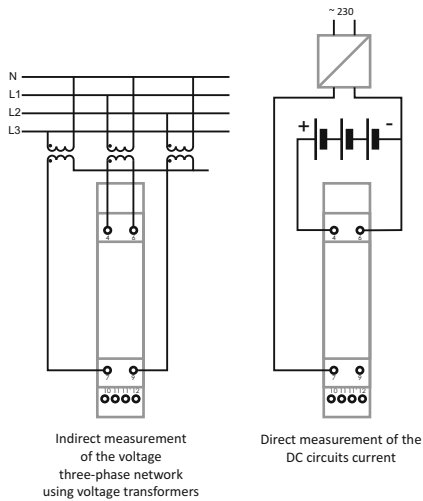
- \* Recommended the use of filters and surge suppression (e.g. OP-230 F&F).
- \* Recommended use of shielded twisted pair signal cables for connecting the module to another device.
- \* Communication lines must be completed by termination module LT-04 (F&F).
- \* When using shielded cables grounded screens performed only on one side and as close to the device.
- \* Do not lay signal cables in parallel in close proximity to the line of high and medium voltage.
- \* Do not install the module in close proximity to high power electrical loads, electromagnetic measurement devices, devices with phase power regulation, and other devices that may introduce noise.

**Installation**

1. Set the address and communication parameters of module.
2. Take OFF the power.
3. Put the module on the rail.
4. Power supply connect to joints 10-12 accordance to marks.
5. Signal output 11-11' connect with output of MASTER device.
6. Connect the voltages measurement circuits to the corresponding inputs of the transducer (as in a given example).

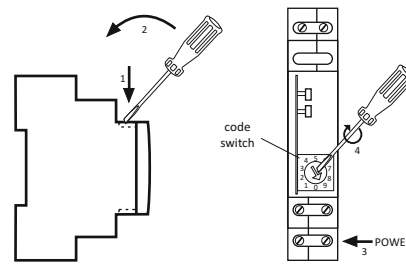


Direct measurement of voltage three-phase network



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

Direct measurement of the DC circuits current



**Technical data**

supply voltage	9÷30V DC
maximum power consumption	50mA
TrueRMS measurement range	
AC voltage	0÷285V
DC voltage	0÷400V
measurement error	0.5%
register readout precision	1V
IN->OUT breakdown voltage	3kV
processing error	±0.5%
sampling frequency	10Hz
port	RS-485
communication protocol	Modbus RTU
operating mode	SLAVE
working temperature	-20÷50°C
relative humidity	85% dla +30°C
terminal	2.5mm <sup>2</sup> screw terminals
tightening torque	0.4Nm
dimensions	1 module (18 mm)
protection level	IP20

**Reset communication settings**

Under cover is available code switch.

1. Take OFF the power.
2. Remove front panel.
3. Set "9" on the switch.
4. Take ON the power and within 3 sec switch to "1".