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MB-LI-4 Lo

Pulse counter,
4-channel,
with Modbus RTU output

5 908312 598329

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 chage 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.

CE

Purpose

The MB-LI-4 pulse counter is used for counting the AC/DC signals generated by external devices to determine the number of completed work cycles and for exchanging the data via RS-485 port in accordance with the Modbus RTU protocol.

Functions

» 4 independent counters;
» Counter input designed to work with AC/DC signals 160÷265 V;
» Factor adjustment (a floating-point value);
» Rescaled value (Number of pulses × factor);
» Selecting a mode of state 1 trigger: high or low voltage;
» Selecting an input pulse edge (leading or trailing);
» Frequency filter that allows you to limit the maximum frequency of counted pulses (to eliminate interferences on the input of the counter);
» Memory of counter status after power failure;
» Digital input.

Functioning

The MB-LI-4 module is a four-channel one-way counter. Each channel is independent and counts the impulses in accordance with individual settings.
The results are presented in the form of a Number of pulses and rescaled value in a range from 0 to ~4,29 billion. Reading of the counter can be reset independently for each channel. Once the maximum Number of pulses (overflow) is reached, counter automatically resets and counts from 0.
The module has configurable options of counting pulses with low or high signal and with leading or trailing edge.
In addition, counting input can be used as a DI digital input with the ability to read its state.
Reading the values of counted pulses, a rescaled value, adjustment of all counting parameters, communication and data exchange is carried out via RS-485 port using Modbus RTU communication protocol. Power is indicated by a green LED "U" light. Correct data exchange between the module and other device is indicated by the LED yellow "Tx" light.

Mounting

The use of anti-interference and surge filters (such as OP-230) is recommended.

It is recommended to use shielded twisted-pair cables to connect the module to another device.

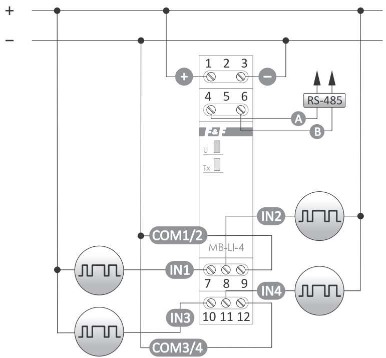
When using shielded cables, ground the shields only on one side and as close to the device as possible.

Do not route signal cables in parallel in close proximity to high and medium voltage lines.

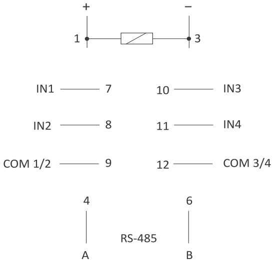
Do not install the module in the immediate vicinity of high-power electric receivers, electromagnetic measuring instruments, phase power control devices and other devices that may cause interference.

1. Before installing the module, set the selected Modbus communication parameters and measurement options.
2. Disconnect the power supply in distribution box.
3. Install the module on the rail.
4. Connect the module power supply to terminals 1-3 as indicated.
5. Connect the A-B signal output (RS-485 port) to the Master device output.
6. Connect the signal wires to the counter inputs according to the selected trigger option (low or high signal).

Wiring diagram



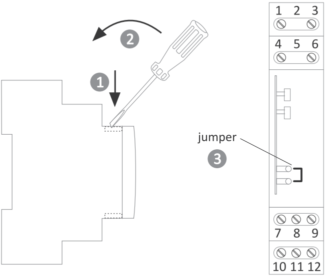
Terminal description



1-3	9÷30 V DC power supply
4-6	RS-485 serial port
7	IN1 counter input
8	IN2 counter input
9	COM input (common) for IN1 and IN2
10	IN3 counter input
11	IN4 counter input
12	COM input (common) for IN3 and IN4

Communication settings reset

A configuration jumper is available under the module casing. Starting the controller with the jumper closed restores the factory settings of the communication parameters. To do this, remove the casing of the module and put the jumper on both pins. After the reset is done, remove the jumper.



Implement. of connection counting and digital inputs

Triggering level
high voltage

Triggering level
low voltage

Security

1. Galvanic isolation between the IN..., COM... contacts and the rest of the circuit (min. 2.5 kV). and the rest of the system (min. 2.5 kV).
2. No galvanic isolation between module power supply and RS-485 lines.
3. Overcurrent protection for power supply and communication inputs (up to a maximum of 60 V DC) with automatic return function.

An external control voltage is needed to trigger the input in any case. If the module's supply voltage is used for this, the galvanic separation between the control inputs and the power supply and communication is lost.

Modbus RTU protocol parameters

Communication parameters	
Protocole	Modbus RTU
Operating mode	Slave
Port settings (factory settings)	Number of bits per second: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Data bits: 8 Parity: NONE, EVEN, ODD Start bits: 1 Stop bits: 1/1.5/2

Communication parameters (cont.)

Network address range (factory settings)	1÷245 (1)
Command codes	1: Read inputs status (0×01 – Read Coils) 3: Read the values of a group of registers (0×03 – Read Holding Register) 6: Set the value of a single register (0×06) – Write Single Register)
Max. frequency of queries	15 Hz

Communication registers

address	description	func.	type	atr.
256	Read current and write new base address: 1÷245	03 06	int	R/W
257	Read current and write the baud rate: 0:1200/1:2400/2:4800/3:9600/4:19200/5:38400/6:57600/7:115200	03 06	int	R/W
258	Read current and write new parity value: 0:NONE/1:EVEN/2:ODD	03 06	int	R/W

Communication registers (cont.)

address	description	func.	type	atr.
259	Read current and write new number of stop bits: 0:1 bit/1:1,5 bita/2:2 bity	03 06	int	R/W
260	Restore the factory settings: Set the value 1.	06	int	W

Note!
Changes in communication parameters (baud rate, number of stop bits, parity) are only taken into account only after the power is restarted.

address	description	func.	type	atr.
1024 ÷ 1025	Module working time [s] $R1024 \times 256^2 + R102$	03	int	R
1026 ÷ 1027	Serial number $R1026 \times 256^2 + R1027$	03	int	R
1028	Production date: 5 bits – day; 4 bits – month; 7 bits – year (without 2000)	03	int	R
1029	Software version	03	int	R
1030	Execution: 0 – Lo; 1 – Hi	03	int	R
1031 ÷ 1035	Identifier: F& | F | MB | -4 | LI	03	int	R
1039	Configuration jumper: 0 – open; 1 – close	03	int	R

Converter does not support broadcast commands (address 0).

Digital input registers

address	description	func.	type	atr.
0	Read inputs status: 0/1 – 4 bits (e.g. 1001) Order: | In4 | In3 | In2 | In1 |	01	int	R
22	In1: Input status 0/1	03	int	R
32	In2: Input status 0/1	03	int	R
48	In3: Input status 0/1	03	int	R
64	In4: Input status 0/1	03	int	R

Counters registers

address	description	func.	type	atr.
17÷18	In1: Number of pulses $R18\times256^2+R17$	03	int	R
33÷34	In2: Number of pulses $R34\times256^2+R33$	03	int	R
49÷50	In3: Number of pulses $R50\times256^2+R49$	03	int	R
65÷66	In4: Number of pulses $R66\times256^2+R65$	03	int	R

Counters registers (cont.)				
address	**description**	**func.**	**type**	**atr.**
19÷20	In1: Scaled value	03	float	R
21÷22	In1: Scaled value – integer part	03	int	R
23÷24	In1: Scaled value – fractional part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	R
31	In1: Counter reset. Enter value 0.	06	int	W
35÷36	In2: Scaled value	03	float	R
37÷38	In2: Scaled value – integer part	03	int	R
39÷40	In2: Scaled value – fractional part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	R
47	In2: Counter reset. Enter value 0.	06	int	W
51÷52	In3: Scaled value	03	float	R
53÷54	In3: Scaled value – integer part	03	int	R
55÷56	In3: Scaled value – fractional part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	R

Counters registers (cont.)

address	description	func.	type	atr.
63	In3: Counter reset. Enter value 0.	06	int	W
67÷68	In4: Scaled value	03	float	R
69÷70	In4: Scaled value – integer part	03	int	R
71÷72	In4: Scaled value – fractional part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	R
79	In4: Counter reset. Enter value 0.	06	int	W

Configuration registers

address	description	func.	type	atr.
512	In1: min. pulse time [ms]. Range 1÷15000.	03 06	int	R/W
513	In1: logic. 0: falling edge 1: rising edge	03 06	int	R/W
514	In1: multiplier. Range 1÷10000.	03 06	int	R/W
515	In1: divider. Range 1÷10000.	03 06	int	R/W

Configuration registers (cont.)				
address	**description**	**func.**	**type**	**atr.**
528	In2: min. pulse time [ms]. Range 1÷15000.	03 06	int	R/W
529	In2: logic. 0: falling edge 1: rising edge	03 06	int	R/W
530	In2: multiplier. Range 1÷10000.	03 06	int	R/W
531	In2: divider. Range 1÷10000.	03 06	int	R/W
544	In3: min. pulse time [ms]. Range 1÷15000.	03 06	int	R/W
545	In3: logic. 0: falling edge 1: rising edge	03 06	int	R/W
546	In3: multiplier. Range 1÷10000.	03 06	int	R/W
547	In3: divider. Range 1÷10000.	03 06	int	R/W
560	In4: min. pulse time [ms]. Range 1÷15000.	03 06	int	R/W
561	In4: logic. 0: falling edge 1: rising edge	03 06	int	R/W

Configuration registers (cont.)				
address	**description**	**func.**	**type**	**atr.**
562	In4: multiplier. Range 1÷10000.	03 06	int	R/W
563	In4: divider. Range 1÷10000.	03 06	int	R/W

The ratio setting for the scaled value is the result of multiplying and dividing the set values of the registers (e.g. for In1, registers R514 and R515)
Example:
factor 2: multiplier =2; divider=1 (2/1=2)
factor 1.68: multiplier =168; divider=100 (168/100=1.68)
factor 0.68: multiplier =68; divider=100 (68/100=0.68)

Default values:
logic = 1; pulse time = 5ms; multiplier = 1; divider = 1

Legend:
R – read, W – write

Technical data

power supply	9÷30 V DC
number of counting inputs	4
counting input voltage	6÷30 V AC/DC
maximum counting frequency	100 Hz
maximum number of pulses	2^{32} (4.294.967.295)
input circuit impedance	≥10 kΩ
port	RS-485
communication protocol	Modbus RTU
operating mode	Slave
power indication	green LED
communication indication	yellow LED
parametry komunikacji	
baud rate (adjustable)	1200÷115200 bit/s
data bits	8
stop bits	1/1.5/2
parity bit	EVEN/ODD/NONE
address	1÷247
power consumption	0.3 W
working temperature	-20÷50°C
terminal	2.5 mm² screw terminals
tightening torque	0.4 Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
ingress protection	IP20

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.

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 at www.fif.com.pl on the product page.