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PULSE COUNTER four-channel with MODBUS RTU output

MB-LI-4 Lo

5 909312 598329

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

The 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.

Features

* four independent counters
* counter input designed to work with AC/DC signals
* 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

Operation

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 (0 V) or high (V+) 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.

Protocol parameters MODBUS RTU

Communication parameters	
Protocol	MODBUS RTU
Operation mode	SLAVE
Port settings (factory settings)	bit/s: 1200 / 2400 / 4800 / **9600** / 19200 / 38400 / 57600 / 115200 Data bits: **8** Parity: **NONE** / EVEN / ODD Start bits: **1** Stop bits: 1 / 1.5 / **2**
Range of network addresses (factory settings)	1÷245 (**1**)
Command codes	1: Input state reading (0×01 - Read Coils) 3: Registers group reading (0×03 - Read Holding Register) 6: Single register value setting (0×06) - Write Single Register)
Maximum frequency of queries	15Hz

Communication registers				
address	**description**	**function**	**type**	**atr**
256	Reading of current one and recording of new base address: 1÷245	03 06	int	read write
257	Reading of current one and recording of new transmission rate: 0:1200 / 1:2400 / 2:4800 / 3:9600 / 4:19200 / 5:38400 / 6:57600 / 7:115200	03 06	int	read write
258	Reading of current one and recording of new parity value: 0:NONE / 1:EVEN / 2:ODD	03 06	int	read write
259	Readout of current one and recording of new stop bits quantity: 0:1bit / 1:1,5bit / 2:2bits	03 06	int	read write
260	Factory settings: Enter 1.	06	int	write
Note! Any change in communication parameters (transmission rate, quantity of stop bits, parity) will be applied only after power restart.				
1024-1025	Module operation time [s] R1024×256²+R1024	03	int	read
1026-1027	Serial number R1026×256²+R1027	03	int	read
1028	Production date: 5 bits – day, 4 bits – month, 7 bits – year (without 2000)	03	int	read
1029	Software version	03	int	read
1030	Completion: 0 – Lo; 1 – Hi	03	int	read
1031-1035	Identifier: F& | F | MB | -4 | LI	03	int	read
1039	Configuration jumper: 0 – open, 1 - closed	03	int	read
The transducer does not support broadcast commands (address 0).				

Digital inputs registers				
address	**description**	**command**	**type**	**atr**
0	Input states reading 0/1 - 4 bits (e.g. 1001) Order: | In4 | In3 | In2 | In1 |	01	int	read
16	In1: input state 0/1	03	int	read
32	In2: input state 0/1	03	int	read
48	In3: input state 0/1	03	int	read
64	In4: input state 0/1	03	int	read

Counters registers				
address	**description**	**command**	**type**	**atr**
17-18	In1: input state. R17×256²+R18	03	int	read
33-34	In2: input state. R33×256²+R34	03	int	read
49-50	In3: input state. R49×256²+R50	03	int	read
65-66	In4: input state. R65×256²+R66	03	int	read
19-20	In1: rescaled value	03	float	read
21-22	In1: rescaled value - integer part	03	int	read
23-24	In1: rescaled value – fraction part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	read
31	In1: counter reset. Enter 0.	06	int	write
35-36	In2: rescaled value	03	float	read
37-38	In2: rescaled value - integer part	03	int	read
39-40	In2: rescaled value – fraction part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	read
47	In2: counter reset. Enter 0.	06	int	write
51-52	In3: rescaled value	03	float	read
53-54	In3: rescaled value - integer part	03	int	read
55-56	In3: rescaled value – fraction part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	read
63	In3: counter reset. Enter 0.	06	int	write
67-68	In4: rescaled value	03	float	read
69-70	In4: rescaled value - integer part	03	int	read
71-72	In4: rescaled value – fraction part: 6 digits ×0.000001 (250000 -> 0.25)	03	int	read
79	In4: counter reset. Enter 0.	06	int	write

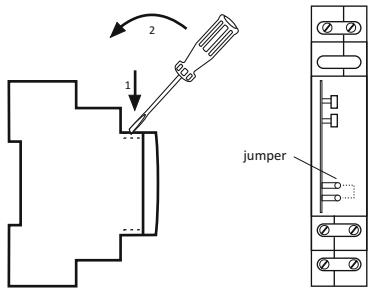
Configuration registers				
address	description	command	type	atr
512	In1: min. pulse time [ms]. Range 1÷15000	03/06	int	r/w
513	In1: logika. 0: trailing edge; 1: leading edge	03/06	int	r/w
514	In1: multiplier. Range 1÷10000	03/06	int	r/w
515	In1: divisor. Range 1÷10000	03/06	int	r/w
528	In2: min. pulse time [ms]. Range 1÷15000	03/06	int	r/w
529	In2: logic. 0: trailing edge; 1: leading edge	03/06	int	r/w
530	In2: multiplier. Range 1÷10000	03/06	int	r/w
531	In2: divisor. 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: trailing edge; 1: leading edge	03/06	int	r/w
546	In3: multiplier. Rang 1÷10000	03/06	int	r/w
547	In3: divisor. Range 1÷10000	03/06	int	r/w
560	In4: min. pulse time [ms]. Zakres 1÷15000	03/06	int	r/w
561	In4: logic. 0: trailing edge; 1: leading edge	03/06	int	r/w
562	In4: multiplier. Range 1÷10000	03/06	int	r/w
563	In4: divisor. Range 1÷10000	03/06	int	r/w

Setting of the factor for the rescaled value is the result of the multiplication and division of the registers set values (e.g. registers R514 and R515 for In1)
Example:
factor of 2: multiplier = 2; divisor = 1 (2/1 = 2)
factor of 1.68: multiplier = 168; divisor = 100 (168/100 = 1.68)
factor of 0.68: multiplier = 68; divisor = 100 (68/100 = 0.68)

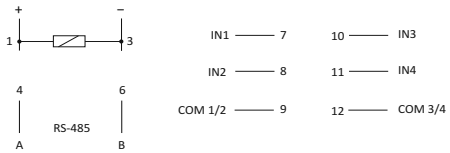
Default values :
logic = 1; pulse duration = 5 ms; multiplier = 1; divisor = 1

Reset of communication settings

The configuration jumper is located under the front casing of the module. Activating the controller with closed jumper will restore factory settings of the communication parameters. To do this, remove the front casing of the module and put the jumper cap on both pins. When the reset is done, remove the jumper.

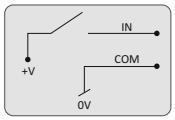


Description IN/OUT

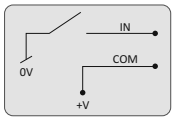


1-3	converter power supply
4-6	RS-485 serial port
7-8	counter inputs In1 and In2
9	COM input (shared) for In1 and In2
10-11	counter inputs In3 and In4
12	COM input (shared) for In3 and In4

Connecting the counting and digital inputs



Triggering with high voltage



Triggering with low voltage

Installation

General guidelines:
* Use of surge protectors and interference filters is recommended (e.g. OP-230).
* 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.
* Do not run signal cables parallel and in direct proximity to high- and medium-voltage line.
* Do not install the module in direct proximity to high power receivers, electro-magnetic measuring devices, appliances with phase power adjustment and any other devices that can create interferences.

Instalation:
1. Set the selected MODBUS communication parameters and counting options prior to unit installation.
2. Disconnect the power to the distribution box.
3. Install the module on the rail.
4. Connect the module power supply to terminals 1-3 as indicated.
5. Connect signal output 4-6 (RS-485 port) to the MASTER output of another device.
6. Connect the wires to counting inputs in accordance with selected triggering option (with low or high signal).

Protection

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

Please note!
External control voltage is needed in each case to trigger input. If the module power supply is used to this end, it results in the loss of galvanic separation between control inputs, power supply and communication.

Technical data

supply voltage	9÷30V DC
number of LI/DI inputs	4
counting input voltage	6÷30V AC/DC
max. counting frequency	100Hz
max. pulses number	2↑32 (4.294.967.295)
circuit input impedance	≥10kΩ
port	RS-485
communication protocol	Modbus RTU
operation mode	SLAVE
communication parameters	
rate – to set	1200÷115200 bit/s
data bits	8
stop bits	1 / 1.5 / 2
parity bits	EVEN / ODD / NONE
address	1÷247
power consumption	0,1W
working temperature	-20÷50°C
terminal	2,5mm² screw terminals
tightening torque	0,4Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
ingress protection	IP20