

Operating time counter
 four-channel
 with MODBUS RTU output

MB-LG-4
 Hi

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 complaint can be found on the website: www.fif.com.pl/reklamacja



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 MB-LG-4 counter is a four-channel, one-way operating time counter with implemented function to exchange the registered data via RS-485 port in accordance with the MODBUS RTU protocol.

Features

- * four independent counters
- * overall results in the FLOAT (floating) values for hours and INT (integer) broken down into seconds, minutes, hours, days (4 registers per counter).
- * counter input designed to work with AC/DC signals
- * factor adjustment (a floating-point value)
- * selecting a mode of state 1 trigger: with high or low voltage
- * time filter that allows you to limit the maximum length of the input signal (to eliminate interferences on the input of the counter)
- * memory of counter status after power failure
- * digital input

Operation

The MB-LG-4 module is a four-channel one-way counter. Each channel is independent and counts the time in accordance with individual settings. The result is presented in the form of a floating-point number, and in parallel as integer values broken down into components in the form of days, hours, minutes and seconds.

The counter has a software function that allows to reset the counter of each channel independently. Maximum time is approx. 150 years. After reaching the maximum number (overflow), the counter automatically resets itself and starts counting from 0. The module has configurable options of counting with low (0V) or high (V+) signal and the closing or opening of the input signal circuit. Counter allows to set the minimum length of input signal time, which will be seen at the input and will be treated as an activation of the input (time filter). Shorter signals are ignored. This is used for correcting the interference (false pulses) that may appear on the input. Counting input can be used as a DI digital input with the ability to read its state. 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 (0V) or high (V+) signal and with leading or trailing edge. Reading the counted values, 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.

MODBUS RTU Communication parameters

| 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 setting) | 1+245 (1) |
| Command codes | 1: Input state reading (0x01 - Read Coils) 3: Registers group reading (0x03 - Read Holding Register) 6: Single register value setting (0x06 - Write Single Register) |
| Max. frequency of queries | 15Hz |

| Communication registers | | | | | |
|---|---|--------|------|---------|-------|
| address | description | funct. | type | attrib. | |
| 256 | Reading of current one and recording of new base address: 1-245 | 03 | 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 | int | read | write |
| 258 | Reading of current one and recording of new parity value: 0:NONE / 1:EVEN / 2:ODD | 03 | int | read | write |
| 259 | Readout of current one and recording of new stop bits quantity: 0:1 bit / 1:1.5 bit / 2:2bits | 03 | int | read | write |
| 260 | Factory settings : Enter 1. | 06 | int | write | |
| Please 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] R1024×256 ² +R1024 | 03 | int | read | |
| 1026-1027 | Serial number R1026×256 ² +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 LG | 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 | attrib. | |
| 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 | |
| 38 | In2: input state 0/1 | 03 | int | read | |
| 54 | In3: input state 0/1 | 03 | int | read | |
| 70 | In4: input state 0/1 | 03 | int | read | |

| Counters registers | | | | | |
|--------------------|--|---------|-------|---------|--|
| address | description | command | type | attrib. | |
| 16-17 | In1: operating time – overall result [hours] | 03 | float | read | |
| 18 | In1: operating time – constituent [days] | 03 | int | read | |
| 19 | In1: operating time – constituent [hours] | 03 | int | read | |
| 20 | In1: operating time – constituent [minutes] | 03 | int | read | |
| 21 | In1: operating time – constituent [seconds] | 03 | int | read | |
| 23 | In1: input activations number | 03 | int | read | |
| 31 | In1: counter reset. Enter 0. | 06 | int | write | |
| 32-33 | In2: operating time – overall result [hours] | 03 | float | read | |
| 34 | In2: operating time – constituent [days] | 03 | int | read | |
| 35 | In2: operating time – constituent [hours] | 03 | int | read | |
| 36 | In2: operating time – constituent [minutes] | 03 | int | read | |
| 37 | In2: operating time – constituent [seconds] | 03 | int | read | |
| 39 | In2: input activations number | 03 | int | read | |
| 47 | In2: counter reset. Enter 0. | 06 | int | write | |
| 48-49 | In3: operating time – overall result [hours] | 03 | float | read | |
| 50 | In3: operating time – constituent [days] | 03 | int | read | |
| 51 | In3: operating time – constituent [hours] | 03 | int | read | |
| 52 | In3: operating time – constituent [minutes] | 03 | int | read | |
| 53 | In3: operating time – constituent [seconds] | 03 | int | read | |
| 55 | In3: input activations number | 03 | int | read | |
| 63 | In3: counter reset. Enter 0. | 06 | int | write | |
| 64-65 | In4: operating time – overall result [hours] | 03 | float | read | |
| 66 | In4: operating time – constituent [days] | 03 | int | read | |
| 67 | In4: operating time – constituent [hours] | 03 | int | read | |
| 68 | In4: operating time – constituent [minutes] | 03 | int | read | |
| 69 | In4: operating time – constituent [seconds] | 03 | int | read | |
| 71 | In4: input activations number | 03 | int | read | |
| 79 | In4: counter reset. Enter 0. | 06 | int | write | |

The overall result and the constituent results.
 For input In1: registers 18÷21 are the four constituents of the overall value of the registers 16÷17. For example: operating time (R16÷R17) = 12.53 (h) when converted from decimal value for: R18=0 (days); R19=12 (h); R20=31 (min); R21=48 (sec). Similarly for inputs In2, In3 and In4.

| Configuration registers | | | | |
|-------------------------|--|---------|------|---------|
| address | description | command | type | attrib. |
| 512 | In1: min. pulse time [ms]. Range 1÷15000 | 03/06 | int | r/w |
| 513 | In1: logic. 0: circuit open; 1: circuit closed | 03/06 | int | r/w |
| 528 | In2: min. pulse time [ms]. Range 1÷15000 | 03/06 | int | r/w |
| 529 | In2: logic. 0: circuit open; 1: circuit closed | 03/06 | int | r/w |
| 544 | In3: min. pulse time [ms]. Range 1÷15000 | 03/06 | int | r/w |
| 545 | In3: logic. 0: circuit open; 1: circuit closed | 03/06 | int | r/w |
| 560 | In4: min. pulse time [ms]. Range 1÷15000 | 03/06 | int | r/w |
| 561 | In4: logic. 0: circuit open; 1: circuit closed | 03/06 | int | r/w |

Default values: logic = 1; pulse duration = 10 ms.

Implementation of connecting of counting and digital inputs

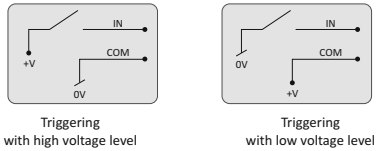
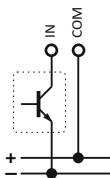


Table of triggering options and assigned to them logic states TRUE (1) and FALSE (0)

| option | registry setting | closed | setting | open |
|----------|------------------|--------|---------|-------|
| level +V | 0 | TRUE | 0 | FALSE |
| | 1 | FALSE | 1 | TRUE |
| level 0V | 0 | TRUE | 0 | FALSE |
| | 1 | FALSE | 1 | TRUE |

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Example of OC (open collector) type output connection to the input of the module



Registry setting: 0
 OC ON -> IN = TRUE (1)
 OC OFF -> IN = FALSE (0)

Registry setting: 1
 OC ON -> IN = FALSE (1)
 OC OFF -> IN = TRUE (0)

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, electromagnetic measuring devices, appliances with phase power adjustment and any other devices that can create interferences.

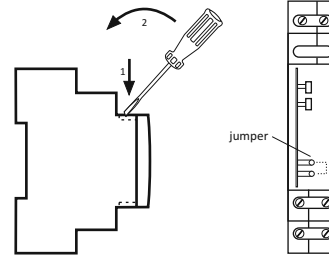
Installation:

1. Set the selected MODBUS communication parameters and counting options prior to unit installation.
2. Disconnect the power in 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).

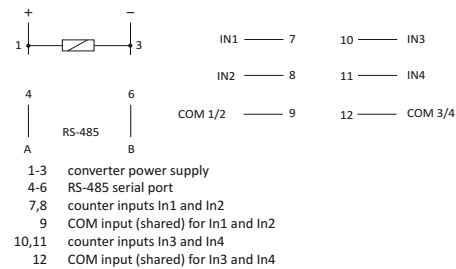
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Reset of communication settings

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 of in/out



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Protection

1. Galvanic isolation between IN... and COM... contacts and the rest of the system (2.5 kV min.).
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 for this, it results in the loss of galvanic separation between control inputs, power supply and communication.

Specifications

| | |
|--------------------------|------------------------------------|
| supply voltage | 9÷30V DC |
| number of LG/DI inputs | 4 |
| counting input voltage | 160÷265V AC/DC |
| max. counting frequency | 100Hz |
| maximum measured time | >150 years |
| circuit input impedance | ≥300kΩ |
| 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 | 2.5mm ² screw terminals |
| tightening torque | 0.4Nm |
| dimensions | 1 module (18 mm) |
| mounting | on TH-35 rail |
| ingress protection | IP20 |

D160630

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