

M2M IO/RS485 CONCENTRATOR[®]

(8 / 16 / 32 port version)

Technical Specification



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Document specifications

This document was made by the *WM Systems LLC.* for the **M2M IO/RS485 CONCENTRATOR®** 8 / 16 / 32-port version.

This *Technical Specification* contains the description of the product related technical data.

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Chapter 1. Introduction

1.1 Product Overview

The *M2M IO/RS485 CONCENTRATOR*[®] is an Isolated digital I/O concentrator for industrial automation and remote metering purposes.

The I/O & RS485 Concentrator is the ideal product for IoT system integrators. The product is used to read data from multiple front-end I/O field devices over one communication link and make the data available real-time to a back-end management system through another. This way conventional devices can be attached to a modern control system and through the Modbus RTU protocol easily communicate with most SCADA / HMI systems and PLCs.

The device provides the ability to save Data Logger information to an internal non-volatile memory, allowing real-time I/O channel data from the controller to be recorded. The data files are then periodically sent to the control center.

Modbus or TCP masters are able to read/write data from up to 32 slave devices via a galvanically isolated RS485 port. Our data acquisition concentrator has a modular plastic case, mountable on a DIN-rail.

Multiple Applications in Smart Grid and Industrial Automation.

Cost-effective data acquisition solution for reading consumption data from meters (water, gas, electricity) or readout status of connected I/O inputs. The ability to integrate with SCADA systems and other industrial devices, and the reliable real-time I/O monitoring in combination with the data logger make this concentrator one of the most cost-effective products of industrial IoT.

Connections

- 8- / 16- or 32 galvanical isolated digital inputs: voltage (WET mode)
- 32 bit counter for every input (0-400Hz signal reception)
- Independent, common ground (GND) for ever 8-inputs
- Galvanical isolated RS485 port

Operation

- Modbus RTU protocol communication
- Configurable watchdog for monitoring Modbus communication and activity
- Store of counter values in the non-volatile memory
- LEDs for indicating the operation, input status

Design and outfit

- ABS modular enclosure (EN 50022)
- 35mm DIN-rail compatible mounting (to any position)
- Wire connection with terminal block

Compatibility

- M2M Modem RS485 IO[®] connection (as an external data transmitting modem)
- M2M Router[®] connection (RS485 version)
- Modbus RTU compatible PLC systems
- Scada, metering applications

1.2 Technical Description

M2M IO/RS485 CONCENTRATOR [®]		
Product Versions		• 8 port (3 unit wide) • 16 port (6 unit wide) • 32 port (9 unit wide)
Power	Voltage	• 24V DC power supply (+/- 20%)
	Consumption	• 0.5W (8-port version) / 1W (16-port version) / 2W (32-port version)
Interfaces	Inputs	<ul style="list-style-type: none"> • Galvanical isolated digital inputs (terminal block): • Type: voltage input (WET): <ul style="list-style-type: none"> • Voltage: 5V .. 24V • Current: 2mA .. 10mA • Input frequency range: 0 - 400Hz
	RS485	<ul style="list-style-type: none"> • Galvanical isolated RS485 port (terminal block) • Modbus RTU protocol communication • 1200-115200 baud speed rate (configurable)
	Other	<ul style="list-style-type: none"> • Power connection (24V DC, GND – terminal block) • nINIT (DC-GND connected, reset to factory defaults when power on)
Indication	LED	<ul style="list-style-type: none"> • Operation indication by LED signals • LED indication for input status (optional)
Device operation	Main features	<ul style="list-style-type: none"> • Continuous counting of impulse signals of meter devices (water, gas, electricity) • Readout the status of connected inputs • Modbus RTU protocol communication (RS485) • Configurable watchdog for Modbus communication, activity monitoring • Storage of counter values in non-volatile memory
Protection	Surge withstand	• Peak voltage 2kV (level 4 for signal and control inputs) according to IEC 61000-4-4
Environmental conditions	Operating / Storage	• -25°C to +55°C at 0-95% rel. humidity
Construction	Enclosure	<ul style="list-style-type: none"> • Modular ABS enclosure (EN 50022) • IP40 • DIN standard • Mountable to rail/rack (35mm)

Dimensions	<ul style="list-style-type: none"> • 8-port: 53.5 x 90 x 57.5mm • 16-port: 106 x 90 x 57.5 mm • 32-port: 159.5 x 90 x 57.5 mm
Weight	<ul style="list-style-type: none"> • 130-270gr (depending on version)

1.3 Operation

The concentrator can receive data of registers and stores them in the local non-volatile memory and it is able to write the registers to the output.

The device has a spare memory against the possible power outages for saving the register values into the backup memory area.

The module is writing the data to the RS485 port for an external connected device (M2M Router[®] RS485 or M2M Router PRO4[®]).

The current operation of the module and the status of the inputs/output are signed by LED signals.

The device has a RS485 watchdog feature. If there is no communication through the RS485 data bus, and the configured timer spent, the device will restarts itself. (This feature can be disabled or configured in seconds (as timeout) – see in Modbus registers table).

1.4 Port connections

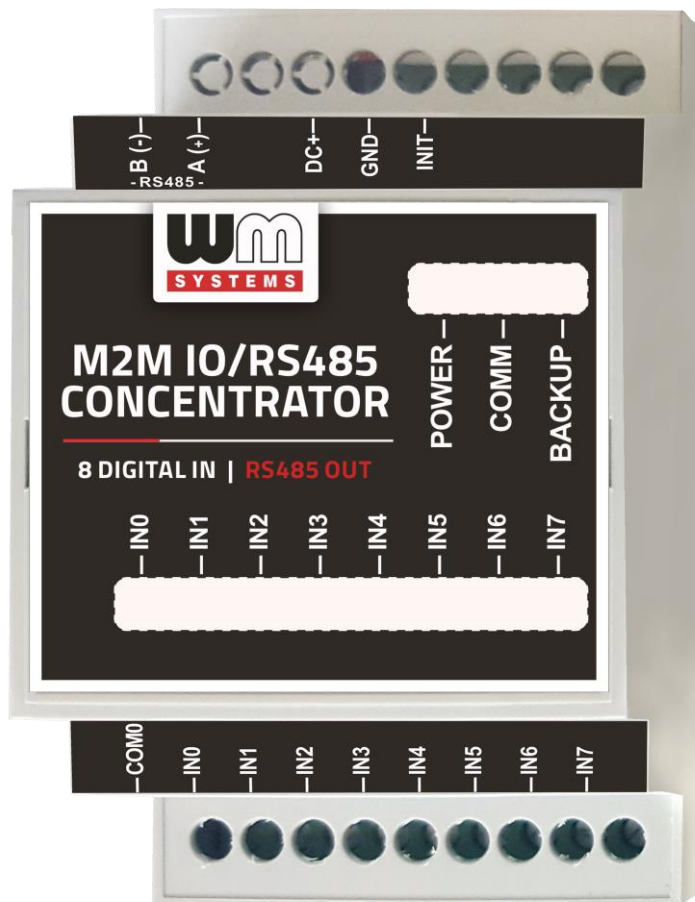
1.4.1 Pinout for 8-port version

- **Inputs (8 pins)**
 - IN0-IN7: 8pcs isolated digital inputs (WET type). Every input has a 32 bit counter for receiving 0-400Hz frequency signals or the current status of the input line can be read out.
 - COM0: common ground (GND) for the inputs

- **RS485 (external modem) connection (2 pins)**

RS485 port output (terminal block) for register write and data sending, Modbus RTU protocol, 1 200 - 115 200 baud speed rate (configurable), slave mode, galvanically isolated)

 - A(+): positive wire
 - B(-): negative wire

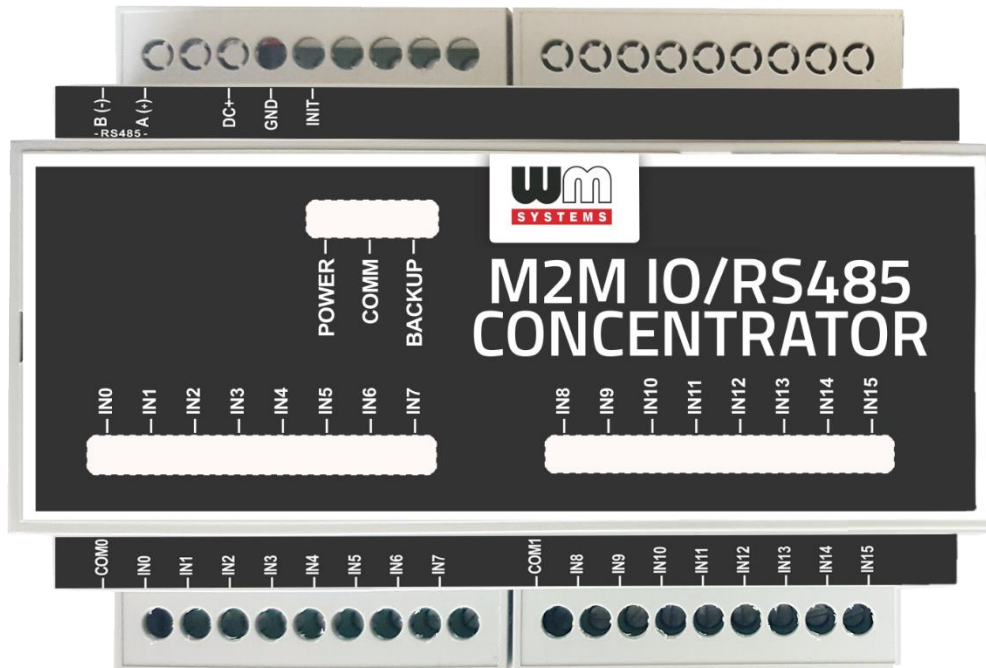


- **Power supply (3 pins)**
 - DC+: 24V DC power supply
 - GND: ground for DC
 - INIT (GND connected, reset to factory defaults when power on)
- **LED signals (3 LEDs)**
 - POWER LED – power supply provided
 - COMM. LED – communication active
 - BACKUP LED – register values are stored in non-volatile memory

1.4.2 Pinout for 16-port version

- **Inputs (2 x 8 pins)**
 - IN0-IN7: 8pcs isolated digital inputs
 - IN8-IN15: 8pcs isolated digital inputs

- Every input has a 32 bit counter for receiving 0-400Hz frequency signals or the current status of the input line can be read out.
- COM0: common ground (GND) for the inputs – for IN0-IN7
- COM1: common ground (GND) for the inputs – for IN8-IN15



- **RS485 (external modem) connection (2 pins)**

RS485 port output (terminal block) for register write and data sending, Modbus RTU protocol, 1 200 - 115 200 baud speed rate (configurable), slave mode, galvanically isolated)

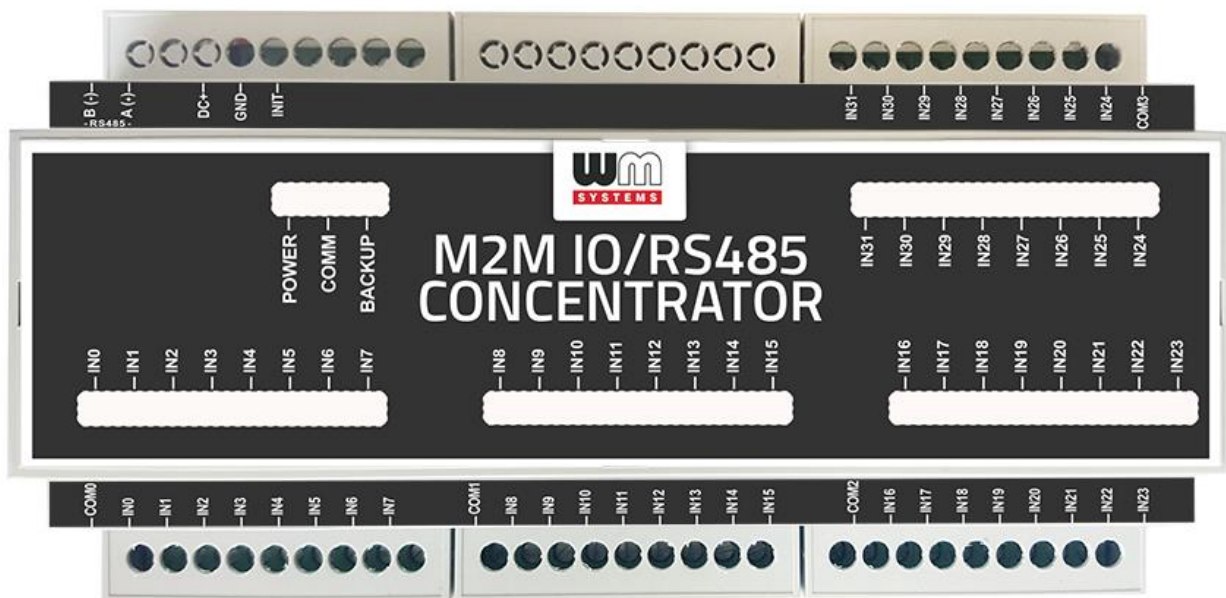
- A(+): positive wire
- B(-): negative wire

1.4.3 Pinout for 32-port version

- **Inputs (4 x 8 pins)**

- IN0-IN7: 8pcs isolated digital inputs
- IN8-IN15: 8pcs isolated digital inputs
- IN16-IN23: 8pcs isolated digital inputs

- IN24-IN31: 8pcs isolated digital inputs
- Every input has a 32 bit counter for receiving 0-400Hz frequency signals or the current status of the input line can be read out.
- COM0: common ground (GND) for the inputs – for IN0-IN7
- COM1: common ground (GND) for the inputs – for IN8-IN15
- COM2: common ground (GND) for the inputs – for IN16-IN23
- COM3: common ground (GND) for the inputs – for IN24-IN31



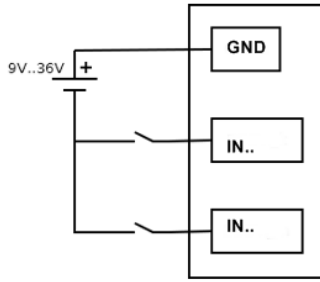
- **RS485 (external modem) connection (2 pins)**

RS485 port output (terminal block) for register write and data sending, Modbus RTU protocol, 1 200 - 115 200 baud speed rate (configurable), slave mode, galvanically isolated)

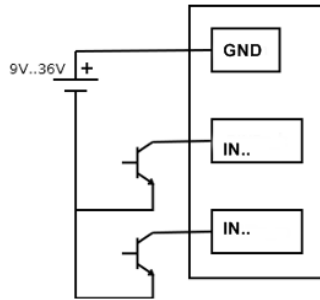
- A(+): positive wire
- B(-): negative wire

1.5 Wiring of input(s)

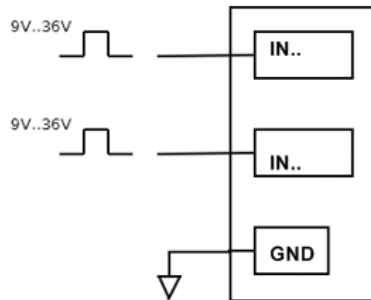
The GND must be connected to the common port (COM0) or to the external power voltage, or connect to the external ground.



Wet switch input (contact)



Wet open collector input



Pulse input

1.6 LED signals

The LED signals of the modules always providing the status of the current operation.

LED	Description
Power LED	Power LED
Comm. LED	RS485 communication LED
Backup LED	Registers are written into the memory

1.7 Installation steps

1. The data concentrator device is assembled into a DIN-standard plastic enclosure.
2. Mount and fix the concentrator enclosure to a 35mm standard DIN-rail equipment. (You can perform the mount to a rack, wall or rail.)
3. Connect the RS485 output to the external communication device (M2M Router[®] RS485 equipped edition or an M2M Router PRO 4[®]), according to the positive (A (+)) and negative (B(-)) wire pinout.
4. Wire the required inputs to IN0..IN7 – or further available – input lines, then fix the wire(s) by a screwdriver at the terminal block interface part. Connect the terminal block to the device.
5. Connect input GND to the COM0 (common).
6. Connect a 24V DC power adapter to the DC+ port (according to the wiring pinout), wire to VDD and GND.
7. The **green POWER LED** must signal the presence power source. The device starts its operation.
8. You can configure the device by the **IO_RS485** tool.

1.8 Operation conditions

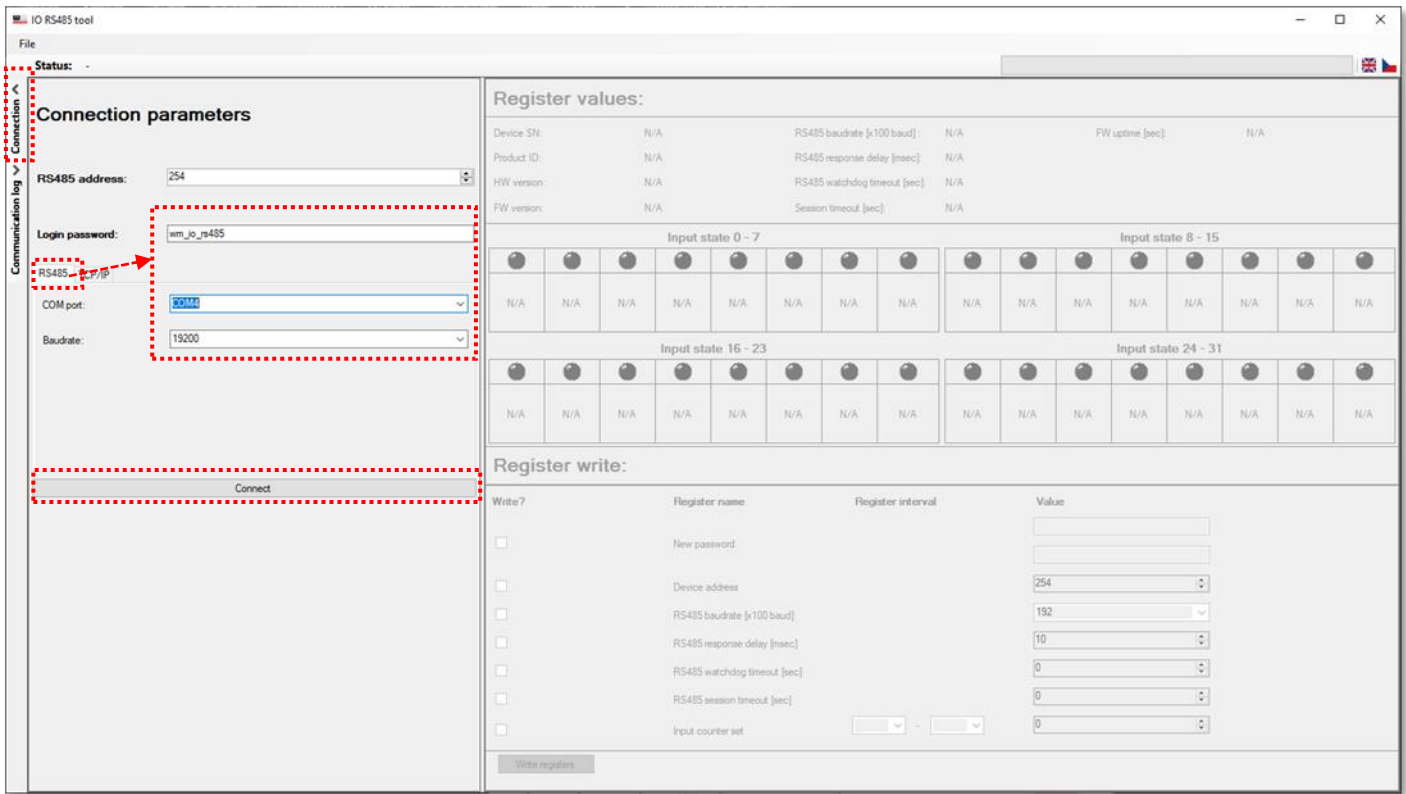
- The device must be used and operated according to the related user manual.
- The device and it's parts must not be changed, modified or repaired without the permission of the *WM Systems LLC*.
- The damage or casualty of the device means the loss of warranty conditions.
- The IP protection will be effective under normal conditions and normal operation and with unharmed hardware conditions and installation, wiring.

1.9 Configuration

1. Connect the M2M IO/RS485 CONCENTRATOR device serial port to your computer serial or USB interface and power up the concentrator device.
2. The configuration tool can be downloaded from our website or by using the following link:
https://www.m2mserver.com/m2m-downloads/IO_RS485_tool_v0_8.zip

3. Extract the file to a directory on a Windows® operation system computer and start the program by the executable *IO_RS485.exe* file.

4. When starting the program, the following window appears:



5. At the left side of the screen you can choose the **RS485 address**.

6. Fill the **Login password**: *wm_io_rs485*

7. Select the **COM port** and choose the proper interface number and the required **Baudrate** (the 19200 baud speed rate is the default, but you can choose from 1200 up to 15200 baud rate). Push the **Connect** button.

(for TCP/IP connection instead of serial connectivity, set the IP address and port number at **TCP/IP** tab. After that you can click the **Connect** button).

8. Then the **Register value** part for **Input states** for 0-31 (or 0-7 for 8-port version / 0-15 for 16-port edition) the ports will be continuously readout and the values are appearing to the screen in every second.

9. At the **Register write** part you can add register values and modify and change the **Device address**, the **RS485 baudrate**.

You need to check the required checkbox to write the register. (Multiple checkbox could be selected.) Then push the **Write registers** button after that.

10. The **Response delay** means the delay interval after sending the Response to the device, to wait the declared time interval in msec to wait until sending a response.

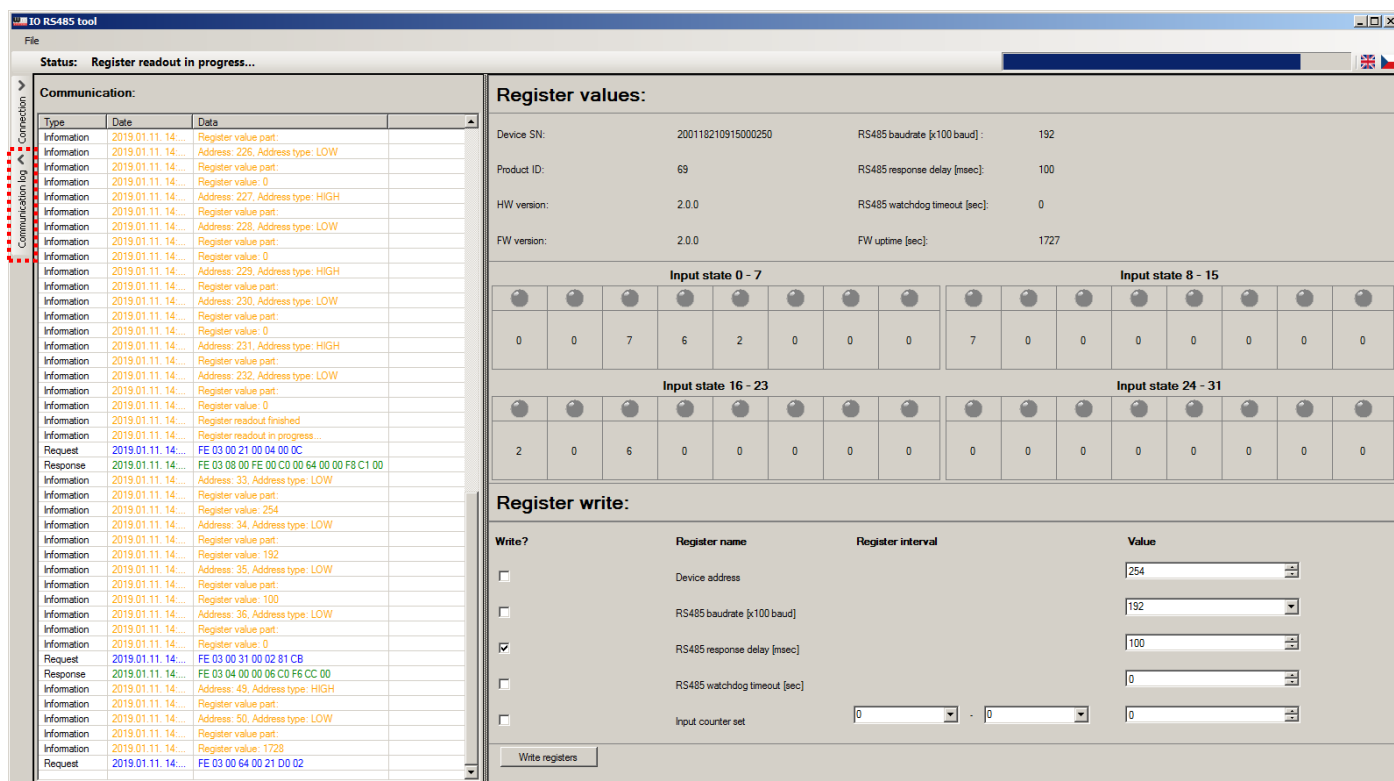
11. At the **Input counter set** you can set the input nr. from-to (range) for the device (e.g „2-5“ (from 2 up to 5) or input nr. „2, 3, 4, 5“, etc.) and to write the defined value.

Then after pushing the **Write registers** button, the device will setup the value for the choosen inputs.

12. The **RS485 watchdog timeout** can be also configured or modified (the 0 sec value is default which means that the feature is currently turned off).

13. You can define a **New Password** at the field on the main screen.

14. At the left edge of the screen you will found the **Communication log** part where the logged last 100 entries and values, activities are presented and recorded.



15. The further messages are logged into a log file – can be found in the same directory, where you’ve started the configuration tool.

1.10 Modbus registers

Address	Values			Description	Protection
	Min	Max	Default		
1-8	-			Device SN, high word first	R
17	69			Product ID	R
18	200			HW version	R
19	200			FW version	R
20	8			Number of the inputs	R
33	1	254	254	Device address	R/W
34	12	1152	192	RS485 baudrate [x100 baud]	R/W
35	1	100	10	RS485 response delay [msec]	R/W
36	0	65535	0	RS485 watchdog timeout [sec]	R/W
49	0	65535	-	FW uptime [sec], high word	R
50	0	65535	-	FW uptime [sec], low word	R
100	0	255	0	IN0... IN7 input status	R
101	0	65535	0	IN0 input counter, high word	R/W
102	0	65535	0	IN0 input counter, low word	R/W
103	0	65535	0	IN1 input counter, high word	R/W
104	0	65535	0	IN1 input counter, low word	R/W
105	0	65535	0	IN2 input counter, high word	R/W
106	0	65535	0	IN2 input counter, low word	R/W
107	0	65535	0	IN3 input counter, high word	R/W
108	0	65535	0	IN3 input counter, low word	R/W
109	0	65535	0	IN4 input counter, high word	R/W
110	0	65535	0	IN4 input counter, low word	R/W
111	0	65535	0	IN5 input counter, high word	R/W
112	0	65535	0	IN5 input counter, low word	R/W
113	0	65535	0	IN6 input counter, high word	R/W
114	0	65535	0	IN6 input counter, low word	R/W
115	0	65535	0	IN7 input counter, high word	R/W
116	0	65535	0	IN7 input counter, low word	R/W

The registers can be read with the standard 0x03 Modbus command and write with the 0x06 command.

The double word, 32 bit register values are writeable with two commands in sequence. First the high word must be written, then the lower.

The change will be acknowledged only if the low word was also written and saved. The 32 counter register also can be read out with one read command.

Further registers (for optional 16 or 32-port versions):

133	1	100	Serial communication answer delay, default: 10ms	R/W
133	1	100		
134-199	-	-	RESERVED	-
200	0	65536	High 16 input status	R
201	0	65536	IN16 input counter, high word	R/W
202	0	65536	IN16 input counter, low word	R/W
203	0	65536	IN17 input counter, high word	R/W
204	0	65536	IN17 input counter, low word	R/W
205	0	65536	IN18 input counter, high word	R/W
206	0	65536	IN18 input counter, low word	R/W
207	0	65536	IN19 input counter, high word	R/W
208	0	65536	IN19 input counter, low word	R/W
209	0	65536	IN20 input counter, high word	R/W
210	0	65536	IN20 input counter, low word	R/W
211	0	65536	IN21 input counter, high word	R/W
212	0	65536	IN21 input counter, low word	R/W
213	0	65536	IN22 input counter, high word	R/W
214	0	65536	IN22 input counter, low word	R/W
215	0	65536	IN23 input counter, high word	R/W
216	0	65536	IN23 input counter, low word	R/W
217	0	65536	IN24 input counter, high word	R/W
218	0	65536	IN24 input counter, low word	R/W
219	0	65536	IN25 input counter, high word	R/W
220	0	65536	IN25 input counter, low word	R/W
221	0	65536	IN26 input counter, high word	R/W
222	0	65536	IN26 input counter, low word	R/W
223	0	65536	IN27 input counter, high word	R/W
224	0	65536	IN27 input counter, low word	R/W
225	0	65536	IN28 input counter, high word	R/W
226	0	65536	IN28 input counter, low word	R/W
227	0	65536	IN29 input counter, high word	R/W
228	0	65536	IN29 input counter, low word	R/W
229	0	65536	IN30 input counter, high word	R/W
230	0	65536	IN30 input counter, low word	R/W
231	0	65536	IN31 input counter, high word	R/W
232	0	65536	IN31 input counter, low word	R/W

Chapter 2. Troubleshooting

How can I read associated input registers from the device?

The registers can be read with the standard 0x03 Modbus command.

How can I write the input registers values to the device?

The registers can be written with the standard 0x06 Modbus command.

Double-word (32-bit) register values can be written with two consecutive commands. The actual register write is performed at the end, when the low word (16 bits) is printed.

What if the machine does not seem to accept the writing to high registers? So, how can I write the high registers?

Try writing a 32-bit Double Word value to the low register address of the input (e.g. to 102).

Then check the Modbus poll help (documentation) to use for the 32-bit values:

https://www.modbustools.com/modbus_poll.html#

Then check the Modbus output again, only function code 06 is valid for this product.

About 32-bit registers

Command nr.6 only writes a 16-bit register, but what happens if 32-bit should be handled?

The registers can be used / read with the standard Modbus commands 0x03 and can be written with the 0x06 commands.

The 32-bit register containing 2 words (double words) can be written with two commands one after each (in line). First write the first upper word (16 bits) and then write the low word (16 bits), which will be 2 x 16 bits, what is equal to 32 bits.

The change will be made/saved on the device when the second (low) word has been already written.

Register reset

Enter „0” by the following example:

Enter a value of 0 for address 107 and enter a value of 0 for address 108.

Thus, DIN0_3 no. the value of the input counter will be "0" (see table on page 14-15).

Chapter 3. Support

➤ If You have a technical question regarding the usage You can find us on the following contact possibilities:

Email: support@m2mserver.com

Phone: +36 20 333-1111

3.1 Support

The product has a identification void which has important product related information for the support line.

Warning! Damaging or removing the void sticker means the loss of product guarantee.

Online product support available here: <http://www.m2mserver.com/en/support/>

3.2 Product Support

The documents and information related on the product are available here.

32-input version:

<https://www.m2mserver.com/en/product/m2m-iors485-concentrator/>

16-input version:

<https://www.m2mserver.com/en/product/m2m-iors485-concentrator-16di/>

8-input version:

<https://www.m2mserver.com/en/product/m2m-iors485-concentrator-8di/>

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