M2M Modbus RS485 IO® modem

Installation Manual

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Document specifications

This document was made by the *WM Rendszerház Kft.* for **M2M Modem Plus®** and **M2M Modem Plus IO®** product family members.

The document contains the description of the technical data, operation and construction of the devices.

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Chapter 1. Modem Operation

1.1 Introduction

The modem can be ordered with several software and firmware variations according to the different purpose of usage.
Before configure the modem, check the available features in the next table – which contains the most important properties of the modes.

Data communication / Connection	IO (4- or more* inputs, 2 outputs) +RS232 (DB9) or RS485
Transparent communication	GPRS data sending
Automatic mobile network reconnection	YES
Readout of Modbus registers (Function Code 3)	YES
PLC / Data concentrator connect.	YES
Modbus Gateway (incoming Modbus TCP message from GPRS and forwarded to serial port in Modbus RTU format for a PLC)	YES
Pulse signal counting	YES
Voltage/Contact input	YES
Relay output switch	OPTIONAL
Modbus TCP client connection possibility (industrial standard)	YES
Modbus TCP server connection (Scada, AVReporter)	OPTIONAL
Sabotage sensing	OPTIONAL
2MB flash memory for storage of programs, data	OPTIONAL, with Ftp usage
Watchdog, monitoring, log	YES
Firmware updates (ftp server)	YES
Configuration with software	RS232 or RS485

The modem is also capable of connecting to a data concentrator. In this mode, we offer the M2M IO/RS485 CONCENTRATOR to connect, which provides you further 32 digital inputs for the connection. The number of the inputs can be raised by connecting further data concentrators up to hunderds of input lines.

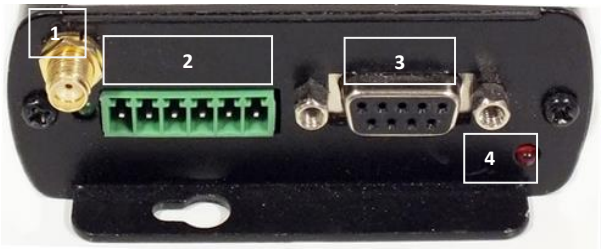
1.2 Product Overview

- Power Supply: 12V 1A (10-32V DC, 8-24V AC), battery (12V or 16V)
- Current: stand-by: 20mA @ 12V, max.: 150mA
- Gemalto® MC55i-W GSM/GPRS modem (850/900/1800/1900MHz), SMA (50 Ohm) antenna connection
- Input high signal level: 5-24V, low signal level: 0-1V
- Input operation mode: 12V Voltage or Pulse (max. 12V), Contact (sensing short/wire cut)

- Current in active status: 5-7 mA, switchable voltage: 2A 120VAC, 1A 24VDC
- C-rail mountable, industrial aluminum case, IP51 protection
- Operation temperature: -40°C..+85°C, storage temperature: -40°C..+85°C

1.3 Port connections

The modem front-face lag and bottom-side lag description can be found here for the available versions.



1 - SMA antenna connector (50 Ohm)
2 - RS485 port connector
(in case of RS232 version cannot be used!)
3 - RS232 (Dsub9) serial port (DCE)
4 - GSM/GPRS status LED

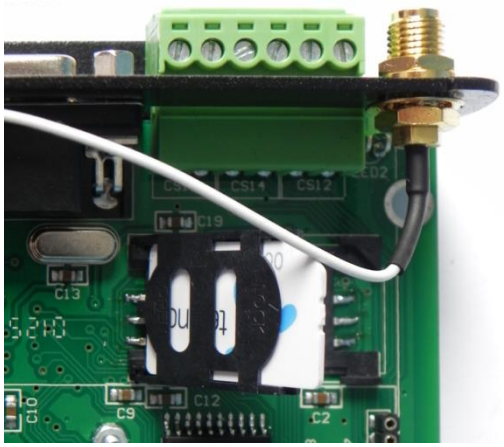
5 - AC/DC power supply connector port (-/+)
6 – Battery connection (-/+)
7 - 4 earth independent input lines
(Input1..Input4 -/+)
8 – 2 relay output lines (Out1 -/+, Out2 -/+)
9 - Custom LED (optional, programmable)

Chapter 2. Installation and Configuration

2.1 Installation

Let's follow the hints in sequence for the successful installation and configuration of the modem:

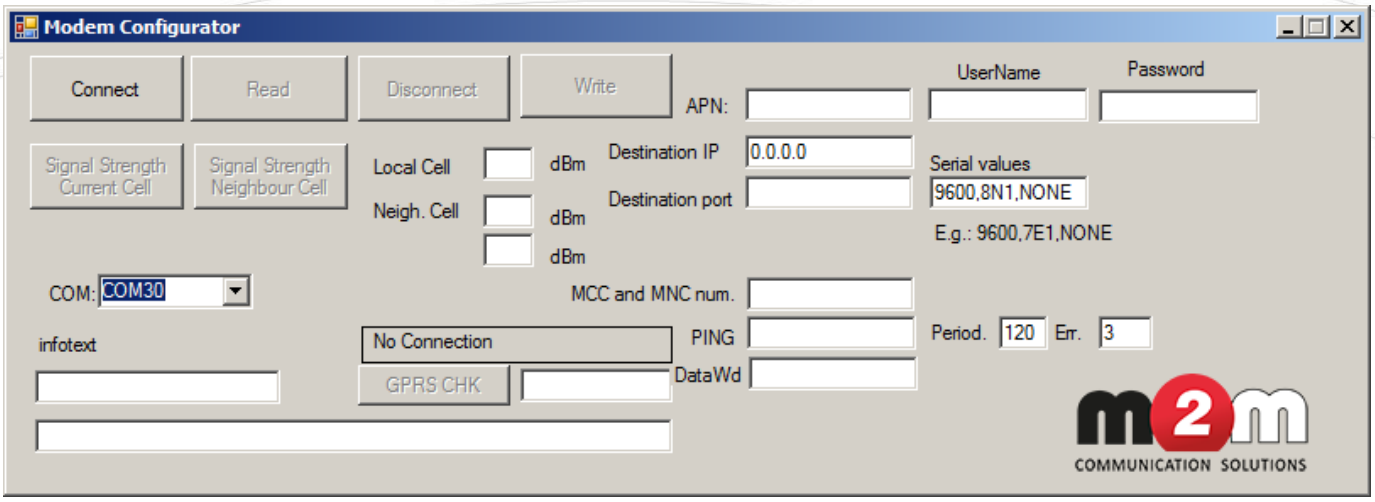
1. Unplug the power cable (**5** or **6**) from the modem – if it was connected to the power – then the **Status LED** will not light further.
2. Remove the two screws from front-plate and slide the PCB from the antenna connector side, while the SIM-card holder will appear.
3. Push the SIM-holder fixation lag to the **OPEN** position, open up and insert the SIM card in the right direction into the SIM-holder. Then close it and push it back to the **LOCK** position.
4. When the modem will connect on the RS232 interface, then remove the RS485 additional expansion PCB from the mainboard. (When you will use the modem through RS485 then not necessary to change the boards).



5. Assemble the mainboard into the case and fix the front-plate with the screws.
6. Connect and mount a GSM/GPRS antenna (50 Ohm) to the SMA connector (**1**).
7. Connect a RS232 serial cable to the DB9 (**3**) port, and the PC to the other side of cable (when the PC has only USB port, you also have to use a RS232-USB converter and its driver must be installed to the PC).
8. Download the ***Modem Configurator*** from the product webpage from our site here: http://www.m2mserver.com/en/product/m2m-modbus-rs485-io/
9. Uncompress the downloaded file to your PC.

2.2 Configuration

1. Execute the **ModemCfg2.exe** file on a *Windows* system.
2. Choose the proper serial port number at the **COM** field (drop-down the list and choose). Then push the **Connect** button.
3. Turn on the modem (give the power supply to the **5 6** (or **6** if battery will be used)).
4. Wait until you will receive the ***Modem Connection OK*** message (ca. 30-40 seconds) in the framed message box.



5. Push the **Read** button and wait until the ***Modem Connection OK*** message will appear again – wait for another 30-40 seconds.
6. Modify the settings (for details, see above), then push the **Write** button and wait for the ***Modem Connection OK*** message.
7. When you have finished, push the **Disconnect** button and disconnect the RS232/RS485 cable (**2** or **3**).
8. Restart the modem – by unplug and connect the power supply. Then the modem will operating regarding the new configuration settings.
9. In case of error/fault: You will found the CommLine.txt file in the program directory. In case of the support line, you have to send this log file.

Configurable Parameter settings:

GPRS settings:

- **APN**: APN network name by the mobile operator, for using the internet zone
- **UserName**: given by the mobile operator, for using the internet zone
- **Password**: given by the mobile operator, for using the internet zone

Server settings:

- **Destination IP:** Server IP where you will send the data. (The IP must be accessible on the mobile network (format as 123.123.123.123)
- **Destination Port:** Server access port number where the data will be sent

MCC+MNC: GSM service code (5 digit number, ask your mobile operator)

Serial Values (serial port parameters) – in sequence with comma separated (without space character), e.g.: 9600,8N1,NONE

- **Speed:** 1200 / 2400 / 4800 / 9600 / 19200 / 38400 /115200
- **Data bits:** 7 / 8, **Parity: N** (none) **/ E** (even) **/ O** (odd)
- **Stop bits:** 1 / 2, **Hardware control:** NONE / HW

2.3 Checking the configuration and operation

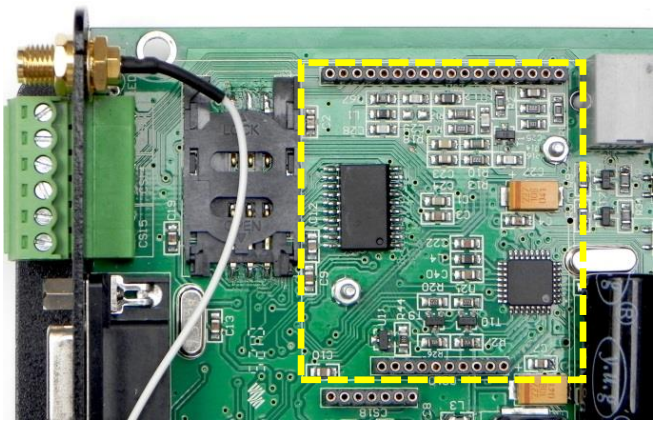
- **GPRS signal strength** by the **Signal Strength Current Cell** button (value at the **Local Cell**). It must be between 30 and 85. When the value is different, then change the antenna position or its location. When you get 0 or -99 value it means a fault or no antenna attached.

- **Mobile Internet connection** test to the GPRS network with the **GPRS CHK** button.

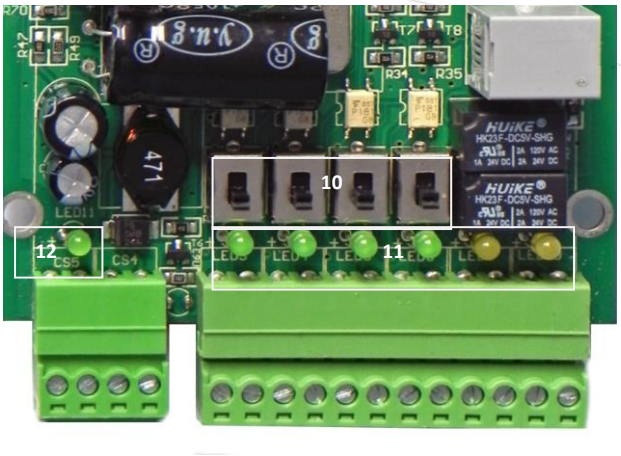
- **Server IP** availability with the **PING** (server IP), the **Period** (in seconds), **Err** (ping retry).

2.4 Starting and usage of the modem

1. The RS232 and RS485 ports cannot be used in the same time! You have to choose the RS232 OR the RS485 connection.
2. When the Modem Plus RS485 device will be used with RS232 serial interface, first of all the internal RS485 expansion board must be removed!



In case of IO versions:



3. Turn off the device then connect the wires of the input line(s) (**7 - IN1..IN4**). and the output wire(s) (**8 - OUT1..OUT2**) – to the terminal blocks. **In case of using voltage input line(s), take care about the polarity when wiring!**
4. Setup the input operation mode at the input lines – see figure at nr. **10** (jumper in upper position: 12V Voltage polarity, or max. 12V pulse signal (for pulse counting), in low position: Contact (short/wire cut detection)

RS232/RS485 wiring:

5. Connect the RS232 cable (**3**) or the RS485 (**2**) connector, due to the terminal block (use only one of them in the same time!)

Turning on the modem:

6. Turn on the modem by adding the power supply at the AC/DC (**5**) port or/and add an external battery (**6**). The battery can be used together with the PSU as well – as a spare supply (in this case the battery will be charged from the power source).
7. When you will turn on the modem, the internal LED signals will be operating according the wiring. IO LEDs (**11**) and power LED (**12**) will sign the operation.
8. Check the **GSM/GPRS** LED signals (**4**) and wait while the modem connects to the GPRS network. Use the device according to the uploaded software.

2.6 LED signals

The modem has 7pcs internal and 3 pcs external LEDs.

Internal LEDs:

- 4 input LEDs (11) – IO port
- 2 output LEDs (11) – IO port
- 1 power LED (12)

External LEDs:

- GPRS LED (4) – for signing the modem connection and the data communication
- Programmable LED (9) – free to use, programmable
- it has one another free to use and programmable LED for further developments and usage.

When giving the power supply to the modem, the GPRS LED signs the system initialization and starting, and the modem operation regarding the following signals:

GPRS LED (4)

Not lights	the modem is turned off or in stand-by operation mode
Blinks in every 0.5 second	no SIM-card/ bad PIN code / searching the GPRS network / connection in progress
1 short blinking in every 3 seconds	connection to the GPRS network was successful / GPRS data connection is active
Blinking in every 0.5 seconds	GPRS data transmitting/receiving, sending data
Lights	initiating the data connection/disconnection , transmitting parameters

Chapter 3. Important notes

Software versions

Our company have developed more than a dozen of the M2M Modbus RS485 IO applications for the customer needs and different purposes, during the years. Therefore, the current a default factory software version can be uploaded by us with the proper communication protocol software by the Customer requirements. The modems are shipped with the appropriate software version, according to your needs.

When ordering, please clearify that for which tasks will be used the modem and what kind of data connection and which registers must be readout or will be received by the modem. Furthermore you have to define the data sending requirements (as data sending interval or the transparent communication needs).

Using external communication antenna

The GPRS data communication is only operating with the help of using an GSM/GPRS antenna – you may choose a 2 or 5 dBi gained one. The modem cannot communicate on the network without an antenna.

Using an external battery or accumulator

Take care of the polarity when connect the battery wires!

You are allowed to use a 12V or 16V battery! The battery can be used as a spare power source or a standalone source (without the ACDC).

When you are using all the two sources, then the battery will be recharged from the ACDC.

Safe shutdown or restart of the modem

Simply unplug the power connector of the nr. 5 and/or the nr. 6 power source(s). The modem will halted immediately.

When you would like to restart the modem, you may wait 5 seconds, then plug the power connector of the power source to the modem. Take care for the power wire polarity!

Cables, wiring

You are allow to wiring ONLY on a turned off device!

Call center

Our support needs the properly used software version nr. for the better identification, therefore you may give us further information to locate the project, aim, usage of the Modem Plus.

Chapter 4. Using AT-commands with the modem

Accessing the modem with AT commands

The AT command interface can be reach by a DATA call, e.g. for remote restarting of the device.

For first you have to setup the call phone number and the ph. nr. sending and displaying must be active. You have to request the CSD data service from your mobile operator.

The AT-commands can be executed from a terminal application (as theWindows Hyperterminal, extraputty, etc.).

The Modem Plus-ban has an internal Gemalto MC55i-W module whereas, the AT command set of the module can be downloaded from our website, here:

http://www.m2mserver.com/m2m-downloads/mc55i-w_atc_v01301a.pdf

Checking the accessability of the modem

You can ping the IP address which is using by the SIM card, therefore you can check the modem availability on the GPRS network.

Furthermore, you can ask us to provide a software version, where you can define an IP address for the modem for automatic ping by the device – as for contiuous checking of the GPRS network connection.

The service has to be also be required by the service provider of the SIM card!

The next AT command will help you:

AT+CLIP=1

AT+CLIR= # 31 #

(Sometimes the call can be initiated with the USSD code, when the device sends the ph. number, **if it were configured at the provider's system**)

Calling the modem on GMS service

***31#SIMphonenumber**

The customer can call the Modem Plus to ask the modem software to handle the incoming call.

This CSD data service must be also granted by your mobile operator!

The further GSM serice codes are described here:

http://www.geckobeach.com/cellular/secrets/gsmcodes.php

Accessing the memory/data

ATDphonenumber or **ATD*31#phonenumber**

Then you will get an AT command interface, whereas you can query the flash storage content by the **AT#DIR** command.

You can download the files with the *Y modem* protocol and with the **AT#READY=filename** command. Then you have to allow receivement of the incoming file with the serial terminal application – to save the file to your PC.

SMS messages

Some software versions are able to send or forward SMS text messages.

The related commands can be found in the Gemalto MC55i-W module AT command set description.

Email sending

Some software versions are able to receive POP3 email messages and forward them.

The related commands can be found in the Gemalto MC55i-W module AT command set description.

Accessing the File system and handling files

By using AT-commands, yuo can access the files and listing them, which are all located in the modem's non-volatile memory. You can move, delete, create or copy files by following the next hints.

This can be grathful when there are created files here on the modem and the data are continously incoming to the modem device. There you may need to transfer or copy these files to a remote location (remote IP address) by the local ftp servic, and after the tranmission you will b e attmepting to delete the unnecessary files.

Certainly, you can automatize the executing of these commands by creating a script.

The next part will list the main important, basic file handling methods and modes, syntax.

Listing files, directory

Command: **AT#DIR**

By answering the command, the files of the current directory will be listed with its length, date and name. Lastly, the free space of the memory will be also signed.

Example for response of the command:

---------- 1 ews ews 3873 Jan 1 10:12 industrial.jpg

---------- 1 ews ews 7868 Jan 1 10:12 indust-io.jpg

---------- 1 ews ews 3197 Jan 1 10:12 industrial.htm

---------- 1 ews ews 119 Jan 1 10:12 indust.cid

---------- 1 ews ews 242 Jan 1 10:12 indust.ini

Free space: 1504768

OK

Reading a text file, displaying

Command: **AT#TAIL=<file_name>**

Example: *AT#TAIL=test.txt*

Reading an XMODEM text file, displaying

The process of reading can be interrupted anytime with the Crtl-X buttons.

Command: **AT#READ=<file_name>**

Example: *AT#READ=test.txt*

Writing XMODEM file

The XMODEM file can be written to the DTE by the following command. Then the Xmodem-1K protocol will be used for transmitting the file. After executing the command, the DTE starts the transmission of the Xmodem file to a remote distance. The process of reading can be interrupted anytime with the Crtl-X buttons.

Command: **AT#WRITE=<file_name>,<size>**

The packet size can be configured between 1K and 128 bytes, where the value of *size* parameter is in *byte* currency.

Example: *AT#WRITE=test.xmodem,128*

Deletion of a file

Command: **AT#DEL=<file_name>**

The filename can be max. 80 characters long.

Be very careful, when deleting files!

Example: *AT#DEL=test.txt*

Ping an IP address

Command: **AT#PING=<server_mnemonic>**

The **<server_mnemonic>** parameter means a remote IP address, which you are attempting to access.

The ping command sequence waits 10 seconds between the steps. Response will be the OK message or a failure message.

Using an FTP client

The device can connect to an ftp client (the usage requirement of the ftp service must be taken forahead, because we have to upload the proper software for that). The ftp data port nr. is 20 and the control port nr. is 21. The ftp operates in passive mode only. After filling the necessary client-side settings, the temporary data on the modem will be accessable. The further aim of the data storage on the modem is a secondary data path for case of network outage.

FTP services:

Opening a new Ftp session

When you would like to work with ftp, its necessary to open an ftp session for perfroming any further operation (e.g. before receiving or sending a file).

Command: **AT#FTPOPEN=<FTPServer>,<user-name>,<password>**

Parameters:

<FTPServer> the IP address of the ftp server IP címe, where you can use domain name also (as ftp.server.com or similar).

<username> the registered username/account on the ftp server which is necessary to declare for the connection.

<password> the registered account's password on the ftp server which is necessary to declare for the connection

Example: *AT#FTPOPEN=192.168.1.1,user1,pwd1*

Closing an Ftp session

If you don't need the opened ftp session furthermore, you can close it by the next command.

Command: **AT#FTPCLOSE**

Attention!

The following command are requiring an opened ftp session as a prequisite!

Listing a directory through Ftp

You can check the current directory / position in the path on the remotely located server.

Command: **AT#FTPCWD**

Changing a directory on Ftp

Here you can configure the workplace (directory) on the remote server.

Command: **AT#FTPCWD=<directory>**

The **<directory>** parameter defines a location path on the remote server.

Example: *AT#FTPCWD=/home/usr/bin*

Listing files with Ftp

List the located files in a directory (at the remote server):

Command: **AT#FTPLST**

Downloading a file with Ftp

Download file(s) by ftp, from the remote server.

Command: **AT#FTPREAD=<file_name>**

The **<file_name>** parameter defines the filename you are attempting to download.

Example: *AT#FTPREAD=file1.txt*

Sending/uploading a file with Ftp

Upload file(s) by ftp, from the local modem to the remote server.

Command: **AT#FTPWRITE=<file_name>**

The **<file_name>** parameter defines the filename you are attempting to upload

Example: *AT#FTPWRITE=file2.txt*

Delete remote file(s) through Ftp

When you don't need a file on the remote ftp server, you can delete it.

Command: **AT#FTPDEL=<file_name>**

The **<file_name>** parameter defines the filename you are attempting to delete.

Daily planned restart

The daily normal restart of the modem is not programmed. When you would like to restart the modem every day you are allowed to use a schedulable or programmable connector switch.

Manual restart

It is possible with executing the **AT#RESET** or the **AT#QUIT** command.

Chapter 5. Support availability

Should you have any questions regarding the usage of the device, you can contact us in the following ways:

Email: support@m2mserver.com

Telephone: +36 20 333 1111

5.1 Support help

For identifying the device, please, use the sticker on the PCB, which contains important information to the support staff.

ATTENTION
The product sticker removal causes loss of the warranty!

5.2 Product support

Click the following link to download the available product documentations and software:
M2M Modbus RS485 IO: http://www.m2mserver.com/en/product/m2m-modbus-rs485-io/

The documents and softwares related to the product are available at our website:
http://www.m2mserver.com/en/support/

Online product support can be used at here:

http://www.m2mserver.com/en/support/

Chapter 6. Legal notice

The pictures in the user guide are only for illustration purposes.
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The published information in this document is subject to *change without notice*.
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Warning
Any errors occurring during the program update process may result in failure of the device.