

# M-Bus Diag

Diagnostic tool for M-Bus communication

Operating instructions

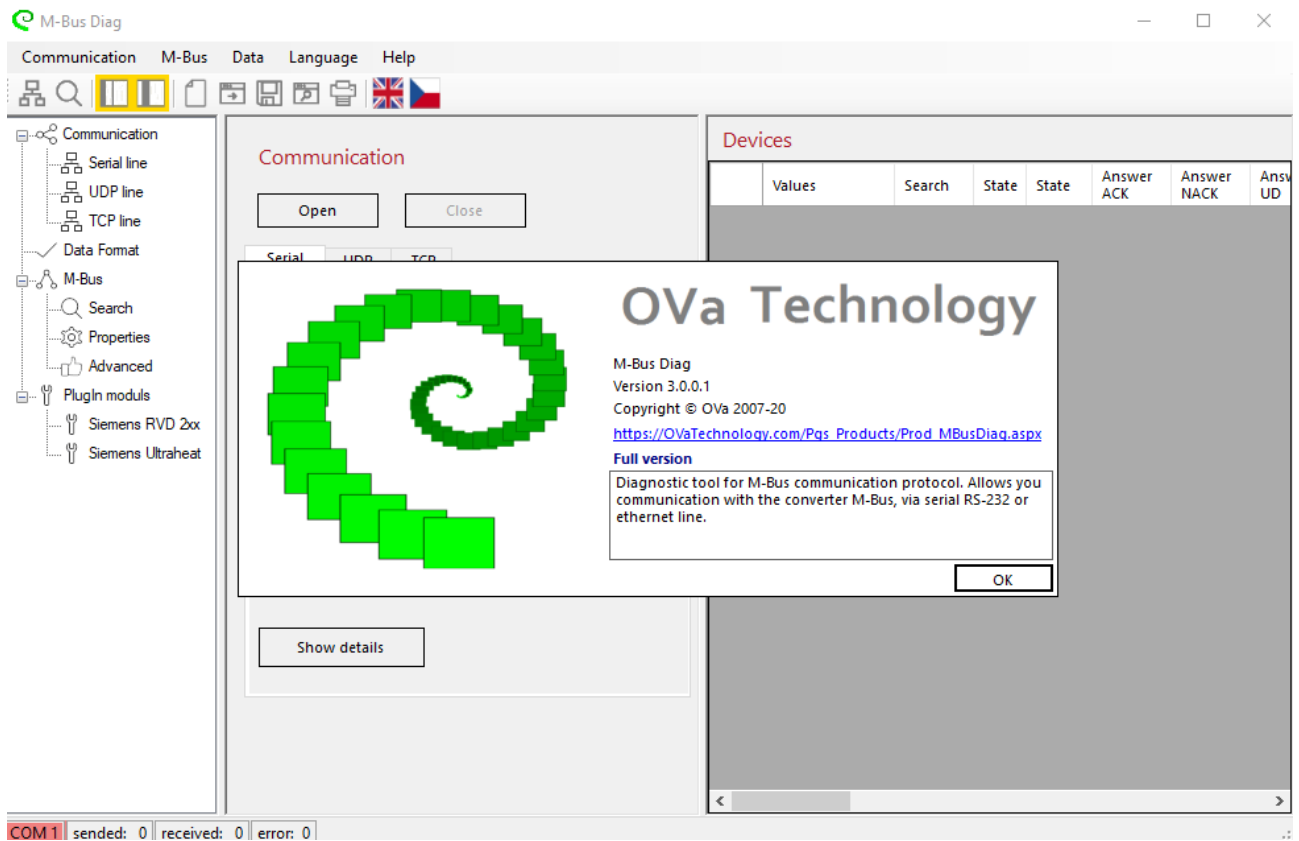
Document version 2.02, of 1. 2. 2020

## 1 Document version

Version	Date	Description
2.01	19. 4. 2019	Introductory description.
2.02	1. 2. 2020	File samples added.

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Diagnostic software M-Bus Diag

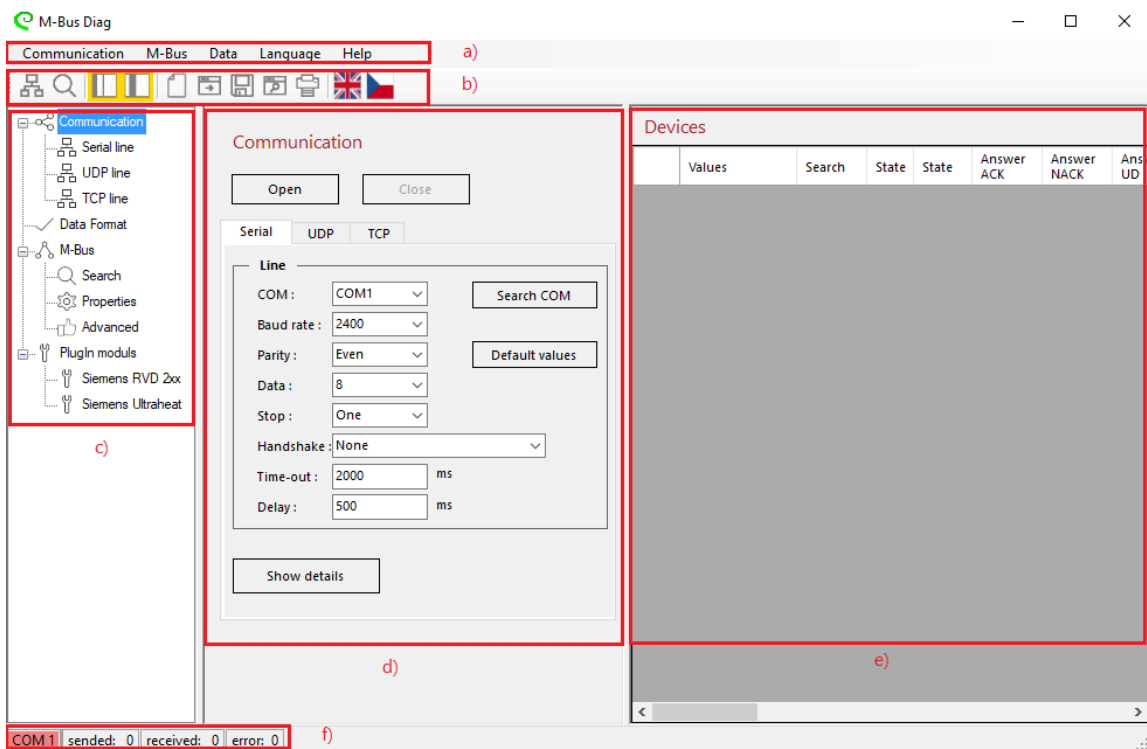
## 3 Introduction

The "M-Bus Diag" software is designed for "M-Bus" bus diagnostics.  
After connecting to the HW converter "M-Bus", it allows sending messages on the bus and detecting connected devices.  
For each device on the "M-Bus" bus, it then reads the data message and displays the data objects contained therein.  
Search for individual devices by primary or secondary address.  
Searching by secondary address allows you to find a device with an unset primary address.  
If only one device is connected to the bus, it can be found using a general "broadcast" message.  
With this SW tool, devices on the "M-Bus" bus can be put into operation.  
The software allows connection of RS232/M-Bus or Ethernet/M-Bus converters.  
On the Ethernet line, it communicates using the TCP or UDP transport protocol.  
It allows you to supplement the application with additional modules (DLL libraries) to operate devices with additional functions against the standard.

### 3.1 PC requirements

The "M-Bus Diag" software is designed to run on PCs equipped with Windows 10.

## 4 Desktop



The workspace is divided into several areas:

- a) Feature menu
- b) Toolbar
- c) Function tree
- d) Parameter bar
- e) Data windows
- f) Status line

## 4.1 Feature menu

### *Communication*

- Serial line** displays the input field for selecting serial line properties.
- UDP line** displays the input field for selecting Ethernet communication properties via the UDP transport layer.
- TCP line** displays the input field for selecting Ethernet communication properties via the TCP transport layer.
- Exit** exits the "M-Bus Diag" application.

### *M-Bus*

- Format of displayed data** displays a input field to select the format in which the data read from the M-Bus or status messages is displayed.
- Search** displays the input field for selecting the device search on the M-Bus.
- Properties** displays the input field for setting the properties of the device on the line and the properties of the communication line itself.
- Advance** allows you to compile your own message for posting on the M-Bus.

### *Data*

- Clear** deletes the contents of the data window.
- Load** retrieves the contents of the data window from the disk file. Allows format selection (TXT, XML). The formats offered for loading depend on the currently set "Data View Format". If the view is chosen "table format", XML is offered. If the display is selected as "text format", the TXT format is offered. In this version, it is not yet possible to reload from JSON and CSV format.
- Save** saves the contents of the data window to a disk file. Allows you to select a file format (TXT, XML, JSON, CSV).  
The formats offered for saving depend on the currently set "Data View Format". If the "table format" view is chosen, XML, JSON, or CSV is offered. If the display is selected as "text format", the TXT format is offered.
- Folder** opens the folder where the previous files are stored.

### *Language*

Allows you to choose the language of the application, between English and Czech.

### *Help*

- Help PDF** displays the help you are currently reading in PDF format.
- About** displays a window with application, version, and author data.

## 4.2 Toolbar



Displays the input field for selecting the properties of the communication line. Similar to "Serial Line", "UDP Line" or "TCP Line" in the "Communication" menu.



Displays the input field for selecting the device search on the M-Bus. Similar to "Search" in the "M-Bus" menu.



Hides / displays the "Function Tree" panel.



Hides / displays the "Parameter Bar" panel.



Deletes the contents of the data window. Similar to "Delete" in the "Data" menu.



Opens the (previously saved) file from the disc and displays its contents in the "Data Window".



Saves the contents of the "Data Window" to the disc. Allows format selection (TXT, XML, JSON, CSV). Similar to "Save" in the "Data" menu.



Opens the folder on the disk where the data files are stored. Similar to "Folder" in the "Data" menu.



Displays the loaded data in an Internet browser. They can print from it.



Allows you to choose the language of the application, between English and Czech.

## 4.3 Function tree

### *Communication*

(Analogy from "Feature Menu")

- Serial line** displays the input field for selecting serial line properties.
- UDP line** displays the input field for selecting Ethernet communication properties via the UDP transport layer.
- TCP line** displays the input field for selecting Ethernet communication properties via the TCP transport layer.

### *Format of displayed data*

(Analogy from "Feature Menu")

Displays the input field to select the format in which the data read from the M-Bus or status messages is displayed.

### *M-Bus*

(Analogy from "Feature Menu")

- Search** displays the input field for selecting the device search on the M-Bus.
- Properties** displays the input field to set the properties of the device on the line and the properties of the communication line itself.
- Advance** allows you to compile your own message for posting on the M-Bus.

### *PlugIn modules*

Here so displays additional modules, added to the application (DLL libraries, plug-ins).

It is used for special operation of certain devices.

The modules are added to the application by simply copying them to the appropriate folder. See annex at the end of this document.

At the time of writing this guide, the following modules were available:

- „**Siemens RVD 2xx**“ allows you to switch the data group for "Siemens RVD 234, 245, 255 and 265".
- „**Siemens Ultraheat**“ allows you to select "short" and "long" messages.



## 4.4 Parameter bar

### 4.4.1 Communication

This is where the communication line opens/closes.

First, the communication parameters are set and then "**Open**" is pressed.

When you press "**Close**", the communication ends. Only then is it possible to open another communication line.

After pressing "**Default values**" the setting occurs before the selected (typical) parameters. It can then change them.

The screenshot shows the 'Communication' dialog box with the 'Serial' tab active. At the top, there are 'Open' and 'Close' buttons. Below them are tabs for 'Serial', 'UDP', and 'TCP'. The 'Serial' section contains a 'Line' box with the following settings: COM: COM1 (with a 'Search COM' button), Baud rate: 2400, Parity: Even (with a 'Default values' button), Data: 8, Stop: One, Handshake: None, Time-out: 2000 ms, and Delay: 500 ms. A 'Show details' button is located at the bottom of the dialog.

Serial communication:

After pressing "**Search COM**", a list of serial lines that are available on the PC you are using will be added to the blind menu. If no serial line is available, the list will contain only "**unavailable**".

"**Baud rate**", "**Parity**", "**Data**" (number of data bits), "**Stop**" (number of stop bits), "**Handshake**" are the parameters of the serial line.

"**Time-out**" is the delay in waiting for a response to be received after a prompt has been sent.

"**Delay**" is the time before the next call is sent.

The screenshot shows the 'Communication' dialog box with the 'UDP' or 'TCP' tab active. At the top, there are 'Open' and 'Close' buttons. Below them are tabs for 'Serial', 'UDP', and 'TCP'. The 'UDP' or 'TCP' section contains a 'Line' box with the following settings: Host: 192.168.0.1, Port: 10002, Time-out: 2000 ms, and Delay: 500 ms (with a 'Default values' button). A 'Show details' button is located at the bottom of the dialog.

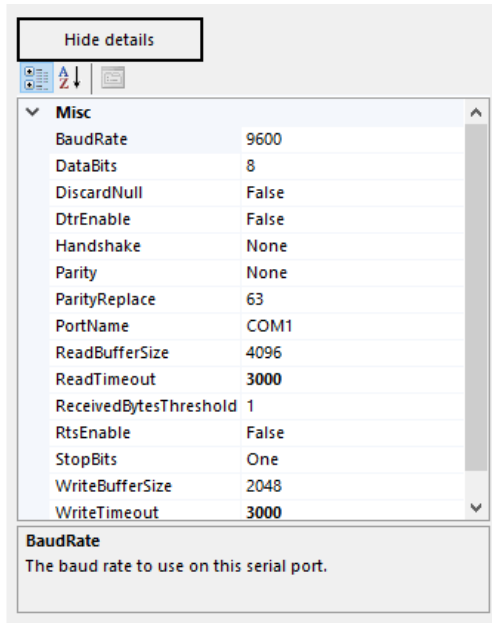
Ethernet communication (UDP or TCP):

"**Host**" is the IP address or domain name of the Ethernet/M-Bus converter.

"**Port**" is the port number open on the converter (1 - 65535).

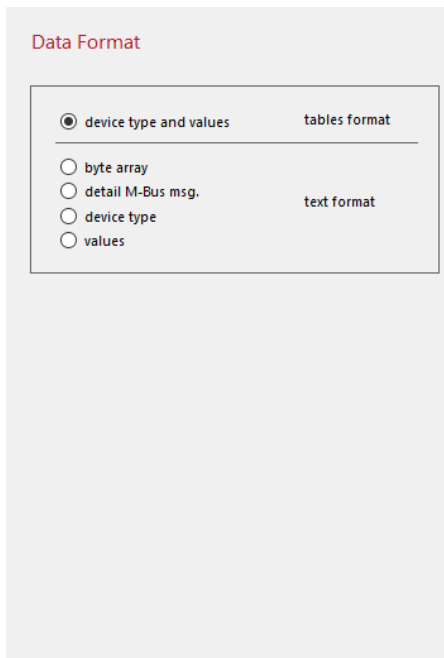
The meaning of "**Time-out**" and "**Delay**" is similar to that of serial line.

a



On all three panels, "Serial", "UDP" and "TCP", it is possible to press the "View details" button. A panel with the system parameters of the communication line is displayed. It is also possible to change the parameters here.

#### 4.4.2 Format of displayed data



This determines the display format in the "Data Window". Select "device type and variables" to select a table format. The other options select text dump display.

Sample display in the format of a table "device type and variables ":

Devices															
	Search	State	State	Answer ACK	Answer NACK	Answer UD	M-Bus addr.	IdentNr	Manufact	Manufact acronym	Manufacturer name	Version	Media	Media descript.	
	2	✓	Data			✓	2	6090352	4DA3 h	SMC	Siemens Buildin...	46 h ~ 70	07 h ~ 7	Water	

Values							
	Index	DIF VIF	Name	Value	Physical unit	Variable type	M-Bus variable type
▶	0	0C 14 h	Volume	3.01	m3	Real	BCD_8_digit
	1	42 6C h	Time Point	12/31/2019	date	DateTime	Int_16_bit
	2	4C 14 h	Volume	3	m3	Real	BCD_8_digit
	3	0C 78 h	Fabrication No	6090352		UInteger	BCD_8_digit

Sample view in the format of a text statement „detail M-Bus msg.“:

```
-->
-----
M-Bus message :
000: 10 .. start char
001: 7B .. Master->Slave, REQ_UD2 Request for Class 2 Data, FCB=True, FCV=True, F0-3=11
002: 02 .. M-Bus address = 2
003: 7D .. check sum
004: 16 .. finished char
-----
<--
-----
M-Bus message :
Message frame
000: 68 25 25 68 .. 0x25=37 .. Msg. length = 43

Header
004: 08 .. Slave->Master, RSP_UD Data Transfer from Slave to Master, ACD=False, DFC=False, F0-3=8
005: 02 .. M-Bus address = 2
006: 72 .. Variable data respond. Data format 'litle indian'.

Fixed Data Header
007: 52 03 09 06 A3 4D 46 07 27 04 00 00
Fabric number = 6090352
Produser-acronym = SMC
Produser-name = Siemens Building Technologies
Version SW = (0x46) .. 70
Medium = (0x07) .. Water
Access No. = 39
Status = (0x04) .. No Error, Power low, No permanent error, No temporary error

Data - records
( offset:record: DIV VIF | value = type | physical unit | comment )
019:000: 0C 14 | 01 03 00 00 = bcd8 | 301 * 0.01 = 3.01 m3 | Volume
025:001: 42 6C | 7F 2C = int16 | 31.12.2019 date | Time Point
029:002: 4C 14 | 00 03 00 00 = bcd8 | 300 * 0.01 = 3 m3 | Volume
035:003: 0C 78 | 52 03 09 06 = bcd8 | 6090352 | Fabrication No

041: 10 .. check sum
042: 16 .. finished char
-----
```

Sample view in the format of a text statement „**byte array**“:

```
--> length=5 ( 10 7B 02 7D 16 )
<-- length=43 ( 68 25 25 68 08 02 72 52 03 09 06 A3 4D 46 07 2E 04 00 00 0C 14 01 03 00 00 42 6C 7F 2C 4C 14
00 03 00 00 0C 78 52 03 09 06 17 16 )
```

Sample view in the format of a text statement „**device type**“:

```
--> REQ_UD2, M-Bus address = 2
<--
-----
M-Bus message :
RSP_UD, M-Bus address = 2
Produser-acronym = SMC
Produser-name = Siemens Building Technologies
Fabric number = 6090352
Version SW = 70
Medium = Water
-----
```

Sample view in the format of a text statement „**values**“:

```
--> REQ_UD2, M-Bus address = 2
<--
-----
M-Bus message :
RSP_UD, M-Bus address = 2
Fixed Data Header
  Fabric number = 6090352
  Produser-acronym = SMC
  Produser-name = Siemens Building Technologies
  Version SW = 70
  Medium = Water
  Access No. = 48
  Status = No Error, Power low, No permanent error, No temporary error

Data - records
( record: value | physical unit | comment )
000: 3.01 | m3 | Volume
001: 31.12.2019 | date | Time Point
002: 3 | m3 | Volume
003: 6090352 | | Fabrication No
-----
```

### 4.4.3 M-Bus

M-Bus messages are sent from the following panels to the communication line.

#### Search

Messages are sent from this panel to find one or more devices.

In standard operation, each device is assigned a unique primary address. This is the target state. However, it is often the case that the device is installed before it is set up. Then it may happen that multiple devices may have set the same address, still from the factory. In that case, we'll use a search based on a secondary address that's unique. From the answer, we will read the currently set primary and secondary addresses. It is then possible to set a correct primary address according to the project documentation.

There may also be a need to revive a device that we can connect to directly. Thus, we are guaranteed that there is only one device on the M-Bus. Then we can use the option "**One device on the bus**", which sends a message with a general "**broadcast**" address. From the answer, we will read the currently set primary and secondary addresses.

The screenshot shows a software interface for searching M-Bus devices. It is titled "Search devices on M-Bus bus". Under the "Address" section, there are radio buttons for "Primary" (selected) and "Secondary". To the right, there are input fields for "From" (Dec: 0, Hex: 0) and "To" (Dec: 250, Hex: FA). A checkbox for "One device on bus" is present but unchecked. Under the "Parameters" section, there are three checkboxes: "Read Data (REQ\_UD2)" (checked), "Application Init (SND\_NKE)" (unchecked), and "Application Reset" (unchecked). At the bottom of the parameters section is a "Search" button with a green checkmark icon.

First, we'll show the search by primary address. The sample is set to the full address range, i.e. from 0 to 250.

The time it takes to search is given by the "**Delay**" and "**Time-out**" parameters specified when opening the communication line. If all stations correspond to the range, there are no timeouts. Then the time is given only by the delay between messages. If this delay is truncated too much, some devices cannot respond, even if they are fully functional and configured correctly.

The "**One device on bus**" option is not selected, so messages will be sent sequentially to individual

addresses from the range.

By default, only a message is sent asking for "REQ\_UD2" data. That's why she's the only one chosen.

In addition, the "**Initialize application (SND\_NKE)**" option sends a "SND\_NKE" message. Use only in justified cases.

In addition, the "**Reset application**" option sends a message to reset the application. Use only in justified cases.

The message is sent at the touch of a "**Search / Stop**" button. Press again to stop searching (sending more messages).

**Search devices on M-Bus bus**

**Address**

Primary  
 Secondary

From: Dec: 254 or Hex: FE  
 To: Dec: 254 or Hex: FE

One device on bus

**Parameters**

Read Data (REQ\_UD2)  
 Application Init (SND\_NKE)  
 Application Reset

Search

In this sample, we'll use primary address search.

The "**One device on bus**" option is set, so one message is sent to the general address "**broadcast**". You only need to have one device on the bus at that time.

**Search devices on M-Bus bus**

**Address**

Primary  
 Secondary

Product num: FFFFFFFF | Producer: FFFF | Version: FF | Media: FF

**Parameters**

Read Data (REQ\_UD2)  
 Application Init (SND\_NKE)  
 Application Reset

Search

In this sample, we'll use a search by secondary address.

Pressing the "**Set for all devices**" button sets the value "FF" to the input fields "**Manufacturer**", "**Version**" and "**Medium**". This searches for all devices on the bus.

Filtering is not applied.

The options in the "**Parameters**" group are the same as in the previous examples.

**Search devices on M-Bus bus**

**Address**

Primary  
 Secondary

Product num: FFFFFFFF | Producer: A34D | Version: FF | Media: 06

**Parameters**

Read Data (REQ\_UD2)  
 Application Init (SND\_NKE)  
 Application Reset

Search

In this sample, we'll use a search by secondary address.

However, the values in the "**Manufacturer**" and "**Media**" check boxes are set. These values are specified in the M-Bus protocol description.

Only devices that match these specified values will be filtered during the search.

## Properties

Messages are sent from this panel to set device parameters.

The options in the "Address" group are the same as in the "Search" panel.

There is also the "Set for all devices, no response" option. This option uses a general "broadcast" address for all devices. Unlike the "One device per bus" option, devices will not respond to this message. Therefore, it is not necessary that there is only one device on the bus.

The options in the "Message" group are similar to those from the "Search" panel.

In addition, there are options for setting the communication parameters of the device.

"Set primary address" allows you to set the primary address of the selected device, ranging from 0 to 250. You must select the device using a secondary address.

"Set communication speed" allows you to set the communication speed of the device on the M-Bus.

## Advanced

You can enter a message in the "Msg. decode" input field to match the M-Bus communication protocol.

The message is in hexadecimal format.

When you press the "Decode" button, a message appears in the "Data Window" as if it were received from a communication line.

In the "Send msg. - Short Frame" group, you can enter the values of the "C field" and "Addr field" fields.

Values are in hexadecimal format.

After pressing the "Send" button, the value "Check sum" is automatically calculated and the whole message is left to the open communication line.

In the "Send msg. - Control, Long Frame" group, you can enter the data part of the message.

Values are in hexadecimal format.

When the "Send" button is pressed, the value "Check sum" is automatically calculated and the entire message is sent to the open communication line.

The "Special Functions" option affects the decoding of the received data message.

If the "Special Functions" flag is received in the middle of the message, the rest will be decoded if the option is set. Otherwise, the rest of the message appears hexadecimal.

(Individual manufacturers deal with the format individually, not part of the M-Bus protocol

specification.)

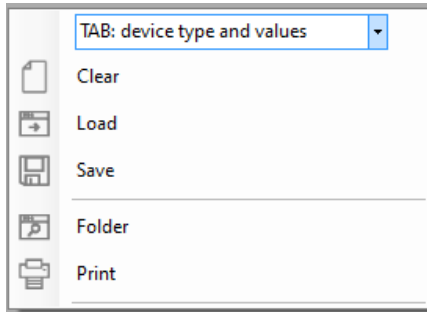
Functionality on the "Advanced" panel is only available in the full version of the application.

## 4.5 Data window

A panel for displaying messages or displaying the results of decoding received messages.  
The display format option was described above, in the paragraph "**Format of displayed data**".

When you right-click the panel, the context menu opens.

In the case of the "**table view**" you choose, you will see:

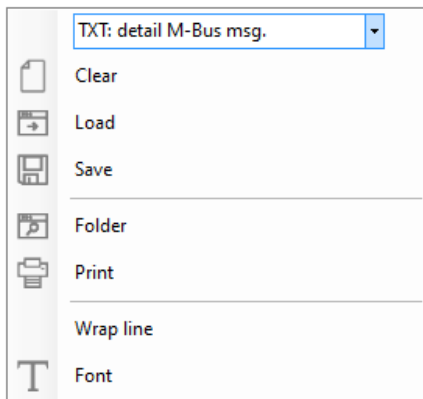


The first option allows you to switch the format of the displayed messages. As well as the option in the "Function Tree".

Other icons have the same function as similar icons in the "Tool bar".

Selecting "**Save**" opens a dialog box to select a folder on the disk. There, the contents of the "Data Window" are saved as a text file. There is a pre-selected folder in "Documents". Selecting "**Load**" loads and displays the previously saved file.

In the case of the "**display in text format**" selected, the:



In addition, here is the option to choose line wrapping for long listings.

And the option to choose the font of the text statement.

Selecting "**Save**" opens a dialog box to select a folder on the disk, as in the previous example. In addition, here we can select "**Save as type**" to select the format of the saved file. **CSV**, **XML**, and **JSON** formats are available.

Reloading data from a file, selecting "**Load**" is only possible for **XML** format.



### 4.5.1 Table view

A sample of the three devices found on the bus.

One device appears on one row of the table. Respectively, it lists the "header" of the M-Bus message. The manufacturer is determined by its numerical identifier. Interpretation in the format of "**manufacturer's name**" is found in the file "M-Bus\_Manufacturers.xml", which is distributed as part of the application. Other entries are determined according to the M-Bus protocol.

Devices																	
Values	Search	State	State	Answer ACK	Answer NACK	Answer UD	M-Bus addr.	IdentNr	Manufact	Manufact acronym	Manufacturer name	Version	Media	Media descript.	Status	Status descript.	
Show values		✓	Data			✓	1	3827	327A h	LSZ	Siemens Buildin...	08 h ~ 11	20 h ~ 32	Reserved	00 h ~ 0	No Error, No permanent error, No t...	
Show values		✓	Data			✓	2	6090352	4DA3 h	SMC	Siemens Buildin...	46 h ~ 70	07 h ~ 7	Water	04 h ~ 4	No Error, Power low, No permanent...	
Show values		✓	Data			✓	145	65003713	4D25 h	SIE	Siemens AG	02 h ~ 2	04 h ~ 4	Heat-return	00 h ~ 0	No Error, No permanent error, No t...	

Clicking on "**Show values**" at the beginning of each row will display a table of values including the current values.

The "**M-Bus variable type**" column is specified in the received message. The "**Variable type**" column interprets it when viewed and stored in a disk file.

The other items are determined by the M-Bus protocol.

Devices																	
Search	State	State	Answer ACK	Answer NACK	Answer UD	M-Bus addr.	IdentNr	Manufact	Manufact acronym	Manufacturer name	Version	Media	Media descript.	Status	Status descript.		
	✓	Data			✓	145	65003713	4D25 h	SIE	Siemens AG	02 h ~ 2	04 h ~ 4	Heat-return	00 h ~ 0	No Error, No permanent error, No t...		

Values							
Index	DIF VIF	Name	Value	Physical unit	Variable type	M-Bus variable type	
0	09 74 h	Actuality Durati...	4	seconds	UInteger	BCD_2_digit	
1	09 70 h	Averaging Dura...	4	seconds	UInteger	BCD_2_digit	
2	0C 0F h	Energy	7.9884E+11	J	Real	BCD_8_digit	
3	0C 14 h	Volume	4337.54	m3	Real	BCD_8_digit	
4	0B 2D h	Power	128800	W	Real	BCD_6_digit	
5	0B 3B h	Volume Flow	2.583	m3/h	Real	BCD_6_digit	
6	0A 5B h	Flow Temperature	84	°C	UInteger	BCD_4_digit	
7	0A 5F h	Return Tempera...	41	°C	UInteger	BCD_4_digit	

The message "**NotValid**" may appear instead of the variable type.

This can happen for two reasons:

- The device manufacturer did not comply with the M-Bus protocol rules (not an exception)
- The device indicates that the sensor is not connected

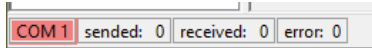
Index	DIF VIF	Name	Value	Physical unit	Variable type	M-Bus variable type
0	02 66 h	External Temper...	17	°C	Real	Int_16_bit
1	82 10 5B h	Flow Temperature	46	°C	Integer	Int_16_bit
2	0A 5F h	Return Tempera...		°C	NotValid	BCD_4_digit
3	8A 30 5B h	Flow Temperature		°C	NotValid	BCD_4_digit
4	8A 30 5F h	Return Temnera...		°C	NotValid	BCD_4_digit

*Note:*

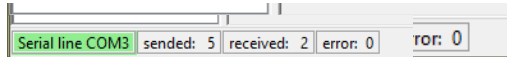
If the last item on the device line "**Status descript.**" contains the text "**Voltage drop**", this indicates a low battery. Applies to battery-powered devices.

## 4.6 Status line

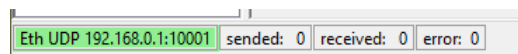
The status and parameters of the selected communication line are displayed here. Red undercolor indicates that the line is closed. Green undercolor that line is open. Additionally, you'll see counters sent, received correct, and received bad messages, or the station didn't respond for a time-out period.



Serial line "COM 1" is chosen, but it is not open.  
No messages have yet been sent or received.

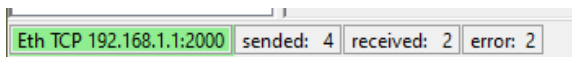


Serial line "COM3" is chosen. The line is open. 5 messages were sent, received correctly 2.



Ethernet communication via the UDP transport layer is selected. The line is open.

The Ethernet/M-Bus converter uses IP address 192.168.0.1 and receives messages on port 10001. No messages have yet been sent or received.



Ethernet communication is selected via the TCP transport layer. The line is open.

The Ethernet/M-Bus converter uses IP address 192.168.1.1 and receives messages on port 2000. 5 messages were sent, 2 messages were received correctly and 2 messages were received with an error or the device did not respond.

## 5 Examples of procedures

Most features can be chosen in multiple ways. Choose from:

- Features menu,
- Toolbar,
- Function Tree.

The choice is to the taste of the user.

Some options are also made possible by right-clicking in the data window.

### 5.1 View previously saved data stored in a file

„Data view format“

„in the format of a table“ will offer XML files

„in the format of text“ will offer TXT files

„Load“ user selects a file

### 5.2 Check the functionality of one particular device and read values

„Communication“ opens a panel with the selection of a communication line for the M-Bus converter

„Serial“ serial line COM1, COM2, ...

„UDP“ Ethernet converter communicates via UDP

„TCP“ Ethernet converter communicates via TCP

The user selects the parameters of the communication line.

„Open“ opens a communication line. Allows communication with the converter.

„Data view format“

„type of device and values“ in the data panel, devices and values will be displayed in the format of a table

Any other option in the data panel, devices or values will be displayed in the format of text

„M-Bus“ – „Properties“

„Primary“

The user fills in the address of the device. Decimal in the range of 0 to 250 or hexadecimal in the range of 00 to FA.

„Reads data (REQ\_UD2)“

We'll leave everything else unchanged.

„Start / Stop“ button to start communication

#### **Note:**

If we do not know the address of the device and at the same time we are sure that only one device is connected to the bus, then we can check the option "**One device on the bus**".

## 5.3 Find devices connected to the bus

„Communication“ opens a panel with the selection of a communication line for the M-Bus converter

„Serial“ serial line COM1, COM2, ...

„UDP“ Ethernet converter communicates via UDP

„TCP“ Ethernet converter communicates via TCP

The user selects the parameters of the communication line.

„Open“ opens communication with the converter.

„Data view format“

„type of device and values“ in the data panel, devices and values will be displayed in the format of a table

„M-Bus“ – „Search“

„Secondary“

„Set for all devices“ fills in the input field with the value "FF" to search for all devices on the bus

„Reads data (REQ\_UD2)“

We'll leave everything else unchained.

„Start / Stop“ button to start communication

### Notes:

From the factory, the devices usually have the same primary address. In this case, it is advantageous to use search by secondary address, because it is unique.

From the factory, the primary address is usually set to 0.

If all devices have a unique primary address between 1 and 250, and I only need to check devices within a certain address range, then I choose search by primary address. And I'm going to set up "From" and "To" addresses.

## 6 Annex

### 6.1 Reading value format

According to the M-Bus specification:

DIF - "Data Field Length"	"Length in Bit"	Format
0	0	No data
1	8	8 Bit Integer
2	16	16 Bit Integer
3	24	24 Bit Integer
4	32	32 Bit Integer
5	32 / N	32 Bit Real
6	48	48 Bit Integer
7	64	64 Bit Integer
8	0	Selection for Readout
9	8	2 digit BCD
10	16	4 digit BCD
11	24	6 digit BCD
12	32	8 digit BCD
13	32 / N	variable length
14	48	12 digit BCD
15	64	Special Function

## 6.2 Folders on disk used by „M-Bus Diag“ application

In the documents folder, the logged on user folder is created "**MBus\_Diag**" (Mostly C:\Users\xxxx\Documents\MBus\_Diag).

Subfolders are created here:

### **Data**

This is where files with read data from the device are stored, preferably, when you select "**Save**".

If you don't change the name when you save it, it's shaped like:

**mbus\_year \_ month \_day\_\_hour\_minute\_second . { CSV, XML, JSON }**

In addition to your files, there are still stored here:

<b>MBus_Data.xsd</b>	xml file format check template.
<b>MBus_Data_EN.xls</b>	transformation file for English.
<b>MBus_Data_CZ.xls</b>	transformation file for Czech.

Transformation files are used when displaying an XML file in an Internet browser. Files are internally converted to **HTML**.

Whether the transformation is applied to English or Czech is determined when the XML file is being disked. According to the currently selected language.

### **Temporary**

Files being temporarily created. They can be deleted.

## 6.3 Save file formats

### XML format

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<!-- Application M-Bus-Diag backup file. -->
<?xml-stylesheet type='text/xsl' version='1.0' href='C:\AppX\MBus_Diag_2\MBusData\MBus_Data_EN.xsl'?>
<mbus_data xsi:noNamespaceSchemaLocation="MBus_Data.xsd" path="C:\AppX\MBus_Diag_2\MBusData\" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <header>
    <application>M-Bus Diag</application>
    <language>en-US</language>
    <timeStamp>2020-09-07T14:40:06+02:00</timeStamp>
    <libraryVersion>3.0.1.1</libraryVersion>
    <applicationVersion>3.0.0.1</applicationVersion>
    <schemaVersion>1.2</schemaVersion>
  </header>
  <device mbus_addr="2" fabrication_no="6090352" manufacturer="4DA3" manufacturer_acronym="SMC" manufacturer_name="Siemens Building Technologies" sw_version="46"
media="07" media_descr="Water" reading_cnt="22" status="04" status_descr="No Error, Power low, No permanent error, No temporary error">
    <record rec_no="0" dif_vif="0C 14" name="Volume" physical_unit="m3" var_type="Real" MBus_var_type="BCD_8_digit">1.57</record>
    <record rec_no="1" dif_vif="42 6C" name="Time Point" physical_unit="date" var_type="DateTime" MBus_var_type="Int_16_bit">12/31/2015</record>
    <record rec_no="2" dif_vif="4C 14" name="Volume" physical_unit="m3" var_type="Real" MBus_var_type="BCD_8_digit">1.54</record>
    <record rec_no="3" dif_vif="0C 78" name="Fabrication No" physical_unit="" var_type="UInteger" MBus_var_type="BCD_8_digit">6090352</record>
  </device>
  <device mbus_addr="145" fabrication_no="65003713" manufacturer="4D25" manufacturer_acronym="SIE" manufacturer_name="Siemens AG" sw_version="02" media="04"
media_descr="Heat-return" reading_cnt="06" status="00" status_descr="No Error, No permanent error, No temporary error">
    <record rec_no="0" dif_vif="09 74" name="Actuality Duration" physical_unit="seconds" var_type="UInteger" MBus_var_type="BCD_2_digit">4</record>
    <record rec_no="1" dif_vif="09 70" name="Averaging Duration" physical_unit="seconds" var_type="UInteger" MBus_var_type="BCD_2_digit">4</record>
    <record rec_no="2" dif_vif="0C 0F" name="Energy" physical_unit="J" var_type="Real" MBus_var_type="BCD_8_digit">7.9884E+11</record>
    <record rec_no="3" dif_vif="0C 14" name="Volume" physical_unit="m3" var_type="Real" MBus_var_type="BCD_8_digit">4337.54</record>
    <record rec_no="4" dif_vif="0B 2D" name="Power" physical_unit="W" var_type="Real" MBus_var_type="BCD_6_digit">128800</record>
    <record rec_no="5" dif_vif="0B 3B" name="Volume Flow" physical_unit="m3/h" var_type="Real" MBus_var_type="BCD_6_digit">2.583</record>
    <record rec_no="6" dif_vif="0A 5B" name="Flow Temperature" physical_unit="°C" var_type="UInteger" MBus_var_type="BCD_4_digit">84</record>
    <record rec_no="7" dif_vif="0A 5F" name="Return Temperature" physical_unit="°C" var_type="UInteger" MBus_var_type="BCD_4_digit">41</record>
  </device>
</mbus_data>
```

Using XML along with XSD and XLS files see the previous paragraph **Folders on Disk, used by "M-Bus Diag"**

*CSV format*

```
[application;language;timeStamp;libraryVersion;applicationVersion;schemaVersion;projectUsed;project;customer;location;person;description]
M-Bus Diag;en-US;2020-09-07T14:40:50+02:00;3.0.1.1;3.0.0.1;1.2;false;;;;
```

```
[mbus_addr;fabrication_no;manufacturer;manufacturer_acronym;manufacturer_name;sw_version;media;media_descr;reading_cnt;status;status_descr]
2;6090352;4DA3;SMC;Siemens Building Technologies;46;07;Water;22;04;No Error, Power low, No permanent error, No temporary error
```

```
[rec_no;dif_vif;name;value;physical_unit;var_type;MBus_var_type]
```

```
0;0C 14 ;Volume;1.57;m3;Real;BCD_8_digit
1;42 6C ;Time Point;12/31/2015;date;DateTime;Int_16_bit
2;4C 14 ;Volume;1.54;m3;Real;BCD_8_digit
3;0C 78 ;Fabrication No;6090352;;UInteger;BCD_8_digit
```

```
[mbus_addr;fabrication_no;manufacturer;manufacturer_acronym;manufacturer_name;sw_version;media;media_descr;reading_cnt;status;status_descr]
145;65003713;4D25;SIE;Siemens AG;02;04;Heat-return;06;00;No Error, No permanent error, No temporary error
```

```
[rec_no;dif_vif;name;value;physical_unit;var_type;MBus_var_type]
```

```
0;09 74 ;Actuality Duration;4;seconds;UInteger;BCD_2_digit
1;09 70 ;Averaging Duration;4;seconds;UInteger;BCD_2_digit
2;0C 0F ;Energy;7.9884E+11;J;Real;BCD_8_digit
3;0C 14 ;Volume;4337.54;m3;Real;BCD_8_digit
4;0B 2D ;Power;128800;W;Real;BCD_6_digit
5;0B 3B ;Volume Flow;2.583;m3/h;Real;BCD_6_digit
6;0A 5B ;Flow Temperature;84;°C;UInteger;BCD_4_digit
7;0A 5F ;Return Temperature;41;°C;UInteger;BCD_4_digit
```



*JSON format*

```
[ {
  "Header": {
    "application": "M-Bus Diag", "language": "en-US", "timeStamp": "2020-09-07T14:40:29+02:00", "libraryVersion": "3.0.1.1", "applicationVersion": "3.0.0.1", "schemaVersion": "1.2"
  },
  "Devices": [
    {
      "mbus_addr": 2, "fabrication_no": 6090352, "manufacturer": "4DA3", "manufacturer_acronym": "SMC", "manufacturer_name": "Siemens Building Technologies", "sw_version": "46", "media":
      "07", "media_descr": "Water", "reading_cnt": "22", "status": "04", "status_descr": "No Error, Power low, No permanent error, No temporary error",
      "Records": [
        { "rec_no": 0, "dif_vif": "0C 14 ", "name": "Volume", "value": "1.57", "physical_unit": "m3", "var_type": "Real", "MBus_var_type": "BCD_8_digit" },
        { "rec_no": 1, "dif_vif": "42 6C ", "name": "Time Point", "value": "12/31/2015", "physical_unit": "date", "var_type": "DateTime", "MBus_var_type": "Int_16_bit" },
        { "rec_no": 2, "dif_vif": "4C 14 ", "name": "Volume", "value": "1.54", "physical_unit": "m3", "var_type": "Real", "MBus_var_type": "BCD_8_digit" },
        { "rec_no": 3, "dif_vif": "0C 78 ", "name": "Fabrication No", "value": "6090352", "physical_unit": "", "var_type": "UInteger", "MBus_var_type": "BCD_8_digit" }
      ]
    },
    {
      "mbus_addr": 145, "fabrication_no": 65003713, "manufacturer": "4D25", "manufacturer_acronym": "SIE", "manufacturer_name": "Siemens AG", "sw_version": "02", "media": "04",
      "media_descr": "Heat-return", "reading_cnt": "06", "status": "00", "status_descr": "No Error, No permanent error, No temporary error",
      "Records": [
        { "rec_no": 0, "dif_vif": "09 74 ", "name": "Actuality Duration", "value": "4", "physical_unit": "seconds", "var_type": "UInteger", "MBus_var_type": "BCD_2_digit" },
        { "rec_no": 1, "dif_vif": "09 70 ", "name": "Averaging Duration", "value": "4", "physical_unit": "seconds", "var_type": "UInteger", "MBus_var_type": "BCD_2_digit" },
        { "rec_no": 2, "dif_vif": "0C 0F ", "name": "Energy", "value": "7.9884E+11", "physical_unit": "J", "var_type": "Real", "MBus_var_type": "BCD_8_digit" },
        { "rec_no": 3, "dif_vif": "0C 14 ", "name": "Volume", "value": "4337.54", "physical_unit": "m3", "var_type": "Real", "MBus_var_type": "BCD_8_digit" },
        { "rec_no": 4, "dif_vif": "0B 2D ", "name": "Power", "value": "128800", "physical_unit": "W", "var_type": "Real", "MBus_var_type": "BCD_6_digit" },
        { "rec_no": 5, "dif_vif": "0B 3B ", "name": "Volume Flow", "value": "2.583", "physical_unit": "m3/h", "var_type": "Real", "MBus_var_type": "BCD_6_digit" },
        { "rec_no": 6, "dif_vif": "0A 5B ", "name": "Flow Temperature", "value": "84", "physical_unit": "°C", "var_type": "UInteger", "MBus_var_type": "BCD_4_digit" },
        { "rec_no": 7, "dif_vif": "0A 5F ", "name": "Return Temperature", "value": "41", "physical_unit": "°C", "var_type": "UInteger", "MBus_var_type": "BCD_4_digit" }
      ]
    }
  ]
}
```

## 7 Information source

### 7.1 Literature

- [1] The M-Bus: A Documentation, Rev. 4.8  
<http://www.m-bus.com/files/MBDOC48.PDF>
- [2] Converter M-Bus/RS232, Teco SX-1181, Catalogue sheet  
[http://www.tecomat.com/wpimages/other/DOCS/cze/PRINTS/Cat\\_Foxtrot-CZ-datasheets/Foxtrot-CZ-SX1181.pdf](http://www.tecomat.com/wpimages/other/DOCS/cze/PRINTS/Cat_Foxtrot-CZ-datasheets/Foxtrot-CZ-SX1181.pdf)

### 7.2 Contact

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Your comments on the M-Bus Diag app are welcome at the e-mail address [apps@OVaTechnology.com](mailto:apps@OVaTechnology.com)  
"M-Bus Diag" in the subject line..