M-Bus Rev. 4.8

M-Bus Rev. 4.8 communication protocol

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Supported device types and versions

Communication implements data reading from devices that support the M-Bus protocol by the Rev. 4.8 specification. Communication was tested with MULTICAL® III, MULTICAL® 5 measuring devices by KARMSTRUP Company, CALSTREEM EEM-C measuring device by Danfoss Company, and PolluTherm Pt500 by Sensus.
The communication was also verified against the water flow meter Sensus MeiStream 150 with communication module HRI-Mei using EthMBus-5 converter manufactured by JC-e (it was necessary to configure a converter to TCP mode and use a TCP/IP-TCP line category).

Communication line configuration

- Communication line category: Serial, SerialOverUDP Device Redundant, MOXA IP Serial Library, RFC2217 Client, TCP/IP-TCP.
  Note: when using TCP/IP-TCP or RFC2217 Client lines, in case of redundant systems multiple names/addresses separated by commas can be entered.
- Standard settings for most of the M-Bus devices:
  - Mode 1: Baud rate 300, 8 bit, 1 stop bit, even parity, RTS=1, DTR=1.
  - Mode 2: Baud rate 2400, 8 bit, 1 stop bit, even parity, RTS=1, DTR=1.

Line protocol parameters

The following station protocol parameters can be defined:

Keyword	Full name	Meaning	Unit	Default value
CHBR	Change Baudrate	Value Yes means that communication will be switched between modes 1 and 2 (only Serial line). Value No means that communication will be performed using mode 1 (300 Bauds).	-	No
SNKEBR	Send SND_NKE as Broadcast	The Yes value means that the SND_NKE (slave device initialization) command is sent as Broadcast before reading from the first station on the line. The No value means that the SND_NKE command is sent to each device individually before the start of the reading. Note: if the parameter is set to Yes, after sending Broadcast, there is a delay configurable by parameter WAI .	-	Yes

Communication station configuration

- Communication protocol: **M-Bus Rev 4.8**
- The station address is a decimal number within the range of 1..250 – slave address, it is derived from the serial number of the measurement device (last three digits). If the last three digits are greater than 250, the highest digit is not to be taken into account. If the serial number is one of the numbers of 000, 300, 400, 500, 600, 700, 800, 900, then it must be changed.

Station protocol parameters

The following station protocol parameters can be defined:

Keyword	Full name	Meaning	Unit	Default value
ASCM	Address Scan Mode	Each reading of values increments the station address. This mode can be used to find a device with an unknown address.	-	No
RC	Retry Count	Request repetition count in case of a communication error.	-	2

RT	Retry Timeout	Delay between request repetition in case of a communication error.	ms	100 ms
WFT	Wait First Timeout	First waiting for a response after sending the request.	ms	800 ms
WT	Wait Timeout	Delay after transmitting the request before reading the response.	ms	500 ms
MWR	Max Wait Retry	Repetition count of response readings till its finalization.	-	40
WAI	Wait After SND_NKE Broadcast	Delay after sending a broadcast SND_NKE, before reading from the first station on a communication line.	ms	8000 ms
WBR	Wait before REQ_UD2 Request	Delay before sending the REQ_UD2 request to a slave.	ms	4000 ms
SFAI	Set FCB Bit after SND_NKE	The parameter specifies whether an FCB bit in a first request after sending SND_NKE should be set to 1 (YES) or 0 (NO).	-	YES
AFOR	Accept Following Records (0=disable, 255=read all)	If the slave station has Variable Data available, the parameter specifies the number of records read during one polling of the station. A value of 255 means that all available records will be read.	-	0
RESB	Send Application Reset before REQ_UD2	Optional sending of "application reset" message (50h) prior to reading the values from the station.	-	NO
WUL	WakeUp Length	Length (given in characters) of the so-called wake-up message sent before each request. Value 0 disables the sending of the wake-up message.	bytes	0
WUD	WakeUp Delay	The delay between the wake-up message and a request.	ms	400
ARB	Accept Reply To Broadcast	If the station has address 254 (according to the protocol definition it is a broadcast address to which stations can respond), this parameter allows processing the response from any station. The practical use is on lines with a single station - in case of its exchange, it is not necessary to find out the address of a new device.	-	YES
FULL_DEBUG	Full Debug	Enables debug logs on the communication and acquired data.	-	NO
MULTICALIII	Multical III	Enables decoding the Manufacture specific data of Multical III device.	-	NO

A string containing the protocol parameters is defined as follows:

```
Keyword=value;Keyword=value; ...
```

Example:

```
RC=1;RT=500;LBR=1;
```

If a keyword with an invalid value in the initialization string is used, a corresponding default value according to the table 1 will be used.

I/O tag configuration

Possible I/O tag types: **Ai, Ci, TiA, TiR, TxtI**

Two types of addresses can be configured:

- **Simple address**: a number that is an index of the value in the M-Bus data packet. To get detailed information on unknown devices, activate debug logs using the **FULL_DEBUG** parameter.
  An example of debug log (individual rows correspond with addresses 1 to 9, value is displayed at the end of listing after the text "Val"):

```
>> Adr.1,DF:0CH (8 digit BCD)(inst. val),VIF:05H=Energy 0*10^2 [Wh],VIFE:7DH=Multiplicative corr. factor
10^3,Val:0
>> Adr.2,DF:0CH (8 digit BCD)(inst. val),VIF:15H=Volume 0*10^-1 [m3],Val:0
>> Adr.3,DF:0CH (8 digit BCD)(inst. val),VIF:3DH=Volume Flow 0*10^-1 [m3/h],Val:0
>> Adr.4,DF:0CH (8 digit BCD)(inst. val),VIF:2DH=Power 0*10^2 [W],Val:0
>> Adr.5,DF:02H (16 bit int)(val during err),VIF:5AH=Flow temperature 0*10^-1 [C],Val:0
>> Adr.6,DF:02H (16 bit int)(val during err),VIF:5EH=Return temperature 0*10^-1 [C],Val:0
>> Adr.7,DF:03H (24 bit int)(val during err),VIF:60H=Temperature difference 0*10^-3 [K],Val:0
>> Adr.8,DF:0CH (8 digit BCD)(inst. val),VIF:78H=Fabrication No.,Val:53155203
>> Adr.9,DF:0CH (8 digit BCD)(inst. val),VIF:7DH=Extension of VIF-codes,VIFE:10H=Customer location,Val:
53155203
```

- **Address of header objects**: in *0.subadr* format enables to address objects located in a header of an answer. A device can answer using fixed or variable responses that have different header contents. The following table lists header objects and their addresses for fixed and variable respond.

Object	Value type	Address in fix respond	Address in variable respond
Identification No.	Ci, TxtI	0.0	0.0

Manufacturer	TxtI (3 characters)	-	0.1
Version	Ci	-	0.2
Medium	Ci	-	0.3
Access No.	Ci	0.1	0.4
Status	Ci	0.2	0.5
Signature	Ci	-	0.6

An example of a debug log for variable response:

```
Variable data respond CI=0x72 mode 1 from St:'B.MBUS_SENSUS'(0) detected.
>> Adr.0.0,Identification No.,Val=53155203
>> Adr.0.1,Manufacturer,Val='SEN'
>> Adr.0.2,Version,Val=12
>> Adr.0.3,Medium,Val=4
>> Adr.0.4,Access Nr.,Val=50
>> Adr.0.5,Status,Val=16
>> Adr.0.6,Signature,Val=0
```

Specific data of Multical III device

Multical III device sends extended "manufacture specific data". Activating the parameter **MULTICALIII** allows to configure I/O tags according to the following table:

Address	Value description	Type
12	Access counter	Ci
13	Number of customer 1	Ci
14	Number of customer 2	Ci
15	Info	Ci
16	TAR2	Ci
17	TL2	Ci
18	TAR3	Ci
19	TL3	Ci
20	AUX1	Ai
21	AUX2	Ai
22	Prog_No	Ci
23	Config	Ci
24	Date	TiA
25	Date*	TiA

Parameters settings and data acquisition method

Recommended polling parameters are at least 1 minute. When the polling time comes, before polling the first station on the line, an SND_NKE(255) datagram is broadcasted, i.e. init for all measuring devices (Slaves) and the KOM process waits for a period specified by the WAI parameter. The slaves prepare all current measured values and implicitly change their Baudrate to 300.

Then the communication speed can be optionally changed to a higher speed (specified on the communication line as mode 2) by SND_UD data if it configured by the means of the Change Baudrate line parameter. Only baud rates 300/600/1200/2400/9600/19200/3840 are supported by M-Bus protocol. Note: change of baud rate is supported only on Serial, MOXA IP Serial Library, and RFC2217 Client line.

Then a REQ_UD2 request is sent to every slave (after waiting according to the value specified by the WBR parameter) to which they all should respond by the RSP_UD data datagram.

Times of individual values are not set to the time when the telegram was received, but to the time of the required polling period. So if the period is set to 1 hour, all the times of values are set to the given hour.

Note: Polling period, as well as station parameters, should be the same on all stations on a single line.

Literature

- The M-Bus: A Documentation Rev. 4.8

Blog

You can read a blog about M-Bus protocol: Communication – M-Bus

Changes and modifications

- November 22nd, 2005 - Redesigned by M-Bus Rev. 4.8.

Document revisions

- Ver. 1.0 - June 26th, 2000 – Document creation.
- Ver. 1.1 – November 9th, 2000 – Testing Danfoss CALSTREEM.
- Ver. 1.2 – December 14th, 2000 – Change of the outputs AUX1 and AUX2 from Ci to Ai
- Ver. 1.3 - November 22nd, 2005 - Redesigned by M-Bus Rev. 4.8.
- Ver. 1.4 - March 10th, 2021 - Added "Accept Reply To Broadcast" parameter

Related pages:

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