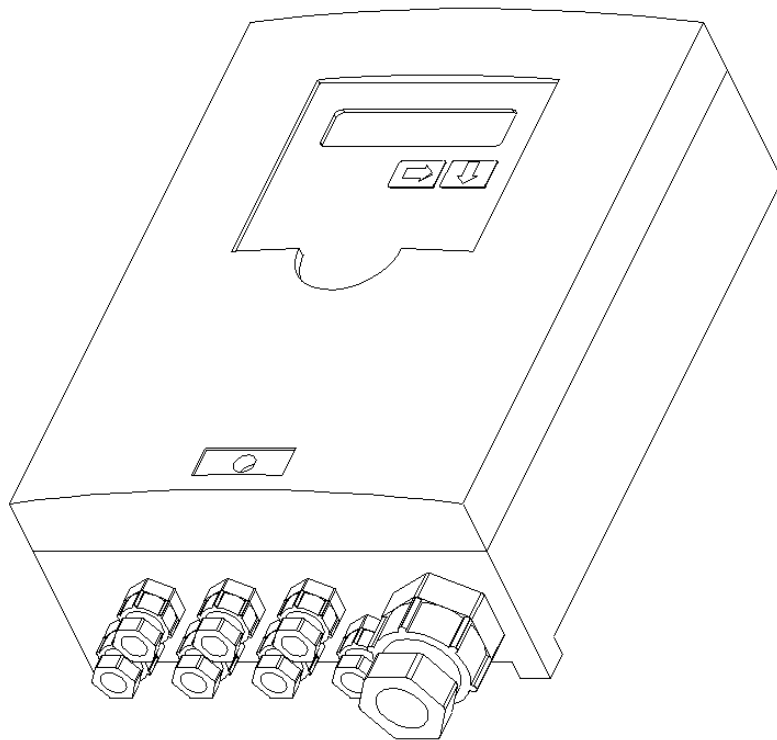


HYDROMETER

OPEN SYSTEM calculator

- *Communication description*



Version 1.0

M-Bus

Preface

M-Bus is standardized communication protocol and physical interface described in EN 1434 and is a general way to communicate with energy meters in European countries. In real implementations manufacturers have extended narrow definition of M-Bus and use term M-Bus for referencing to protocol now. This has been done because a lot of new physical interfaces became normal, like ISM band radio, optical links and new L-Bus derivative.

Information in this article is intended for M-Bus system integrators or other specialists with technical background on M-Bus protocol.

Physical interface

Calculator has two primary interfaces to communicate with hosts. First is optical link, second – wired M-Bus. Optical link is always active and presents in each device as a standard. Wired M-Bus requires optional plug-in module with second pulse output in disabled state, because M-Bus and second pulse output channel share the same communication line.

Protocol basics

Actual implementation of the protocol is according to EN 1434 -3. Refer to www.m-bus.com for detailed information.

Device supports Mode 1 (Least Significant Bit first) only.

Only data read out is possible, configuration of the device must be done with aid of Meter Configurator application only.

Supported commands are listed in table below.

Table 1: M-Bus. Supported commands

Command	Description
SND_NKE	Initialization of the device.
SND_UD	Send used data to slave. See next table for supported subcommands.
REQ_UD2	Request for Class 2 data

Supported subcommands for SND_UD

Table 2: M-Bus. Supported subcommands for SND_UD

Subcommand	Description
CI = \$50, No parameters	Reset answer on REQ_UD2 to Type 1 (see description below). Use this command to select accumulated values for both heat circuits and pulse counters
CI=\$50, Parameter = 1	As above
CI=\$50, Parameter = 2	Reset answer on REQ_UD2 to Type 2 (see description below). Use this command to select values of first heat circuit only
CI=\$50, Parameter = 3	Reset answer on REQ_UD2 to Type 3 (see description below). Use this command to select values of second heat circuit only
CI=\$50, Parameter = 4	Reset answer on REQ_UD2 to Type 4 (see description below). Use this command to select values of the hardware only
CI=\$50, Parameter = 5	Reset answer on REQ_UD2 to Type 5 (see description below). This command is used for testing of the meter because trip counter for energy are selected

Each answer of REQ_UD2 starts with header. Header includes manufacturer ID: \$33 \$48 (RAS) and device/medium type: \$04 or “Heat meter on water circuits with flow meter on return pipe“.

Addressing

Device supports primary addressing mode only. Secondary addressing with aid of fabrication number is not supported. This is done because of specific niche of the device on a marked – practically device is used as a standalone product only.

Table 3: M-Bus. Addressing

Address	Description
0 – 250	Individual addresses, must be unique to the same bus
254	Device answers always Generally used for peer-to-peer communications only

Baud rate

Baud rate is fixed to 9600 on both physical interfaces. Baud rate can not be altered by any means.

Storages

Table 4: M-Bus. Storages

Storage ID	Storage Abbreviation	Storage Description
0	ST_TOTAL	Total values or standard values according to EN 1434
1	ST_FORWARD	Values for flow pipe parameters
2	ST_RETURN	Values of return pipe parameters
3	ST_DELTA	Leakage
4	ST_CH0	Values of hardware parameters related to channel 0. I.e. Pulse counter V3, Pressure sensor P1
5	ST_CH1	Values of hardware parameters related to channel 1. I.e. Pulse counter V4, Pressure sensor P2
6	ST_CH2	Values of hardware parameters related to channel 2. I.e. Pulse counter V5
7	ST_CH3	Values of hardware parameters related to channel 3. I.e. Pulse counter V6
8	ST_COLD	Cold water temperatures
9	ST_FAIL	Counters for Fail Time parameter
10	ST_HW	General hardware parameters

Answer type 1

Table 5: M-Bus. Answer 1

No	What	Where	M-Bus			
			Type	Unit	Storage	VIF
1	Total energy	Circuit 1	32-bit float	0	ST TOTAL	\$03
2	Flow volume	Circuit 1	32-bit float	0	ST FORWARD	\$13
3	Return volume	Circuit 1	32-bit float	0	ST RETURN	\$13
4	Flow weight	Circuit 1	32-bit float	0	ST FORWARD	\$1B
5	Return weight	Circuit 1	32-bit float	0	ST RETURN	\$1B
6	Work Time	Circuit 1	32-bit integer	0	ST TOTAL	\$20
7	Fail Time	Circuit 1	32-bit integer	0	ST TOTAL	\$24
8	Status	Circuit 1	16-bit integer	0	ST TOTAL	\$FD \$17
9	Total energy	Circuit 2	32-bit float	1	ST TOTAL	\$03
10	Flow volume	Circuit 2	32-bit float	1	ST FORWARD	\$13
11	Return volume	Circuit 2	32-bit float	1	ST RETURN	\$13
12	Flow weight	Circuit 2	32-bit float	1	ST FORWARD	\$1B
13	Return weight	Circuit 2	32-bit float	1	ST RETURN	\$1B
14	Work Time	Circuit 2	32-bit integer	1	ST TOTAL	\$20
15	Fail Time	Circuit 2	32-bit integer	1	ST TOTAL	\$24
16	Status	Circuit 2	16-bit integer	1	ST TOTAL	\$FD \$17
17	Pulse counter V3	Hardware	32-bit integer	0	ST_CH0	\$FD \$61
18	Pulse counter V4	Hardware	32-bit integer	0	ST_CH1	\$FD \$61
19	Pulse counter V5	Hardware	32-bit integer	0	ST_CH2	\$FD \$61
20	Pulse counter V6	Hardware	32-bit integer	0	ST_CH3	\$FD \$61
21	Status	Hardware	16-bit integer	0	ST_HW	\$FD \$17

Example

\$68, \$A3, \$A3, \$68, \$28, \$01, \$72, \$78, \$56, \$34, \$12, \$33, \$48, \$01, \$04, \$01
 \$00, \$00, \$00, \$85, \$00, \$03, \$B3, \$A4, \$92, \$4B, \$C5, \$00, \$13, \$AE, \$BB, \$6D
 \$48, \$85, \$01, \$13, \$45, \$F5, \$1E, \$48, \$C5, \$00, \$1B, \$90, \$5E, \$65, \$48, \$85
 \$01, \$1B, \$31, \$58, \$1E, \$48, \$84, \$00, \$20, \$18, \$94, \$1A, \$00, \$84, \$00, \$24
 \$C7, \$7B, \$02, \$00, \$82, \$00, \$FD, \$17, \$AA, \$DE, \$85, \$40, \$03, \$00, \$00, \$00
 \$00, \$C5, \$40, \$13, \$00, \$00, \$00, \$00, \$85, \$41, \$13, \$00, \$00, \$00, \$00, \$C5
 \$40, \$1B, \$00, \$00, \$00, \$00, \$85, \$41, \$1B, \$00, \$00, \$00, \$00, \$84, \$40, \$20
 \$A5, \$D1, \$13, \$00, \$84, \$40, \$24, \$B4, \$50, \$09, \$00, \$82, \$40, \$FD, \$17, \$2A
 \$DC, \$84, \$02, \$FD, \$61, \$00, \$00, \$00, \$00, \$C4, \$02, \$FD, \$61, \$00, \$00, \$00
 \$00, \$84, \$03, \$FD, \$61, \$7D, \$00, \$00, \$00, \$C4, \$03, \$FD, \$61, \$41, \$00, \$00
 \$00, \$82, \$05, \$FD, \$17, \$05, \$00, \$02, \$16

Answer type 2

Table 6: M-Bus. Answer 2

No	What	Where	M-Bus			
			Type	Unit	Storage	VIF
1	Total energy	Circuit 1	32-bit float	0	ST TOTAL	\$03
2	Flow energy	Circuit 1	32-bit float	0	ST FORWARD	\$03
3	Return energy	Circuit 1	32-bit float	0	ST RETURN	\$03
4	Flow volume	Circuit 1	32-bit float	0	ST FORWARD	\$13
5	Return volume	Circuit 1	32-bit float	0	ST RETURN	\$13
6	Flow weight	Circuit 1	32-bit float	0	ST FORWARD	\$1B
7	Return weight	Circuit 1	32-bit float	0	ST RETURN	\$1B
8	Power	Circuit 1	32-bit float	0	ST TOTAL	\$2B
9	Flow volume flow	Circuit 1	32-bit float	0	ST FORWARD	\$3B
10	Return volume flow	Circuit 1	32-bit float	0	ST RETURN	\$3B
11	Flow weight flow	Circuit 1	32-bit float	0	ST FORWARD	\$53
12	Return weight flow	Circuit 1	32-bit float	0	ST RETURN	\$53
13	Leakage	Circuit 1	32-bit float	0	ST DELTA	\$53
14	Flow temperature	Circuit 1	16-bit integer	0	ST TOTAL	\$59
15	Return temperature	Circuit 1	16-bit integer	0	ST TOTAL	\$5D
16	Cold water temperature	Circuit 1	16-bit integer	0	ST COLD	\$5D
17	Temperature difference	Circuit 1	16-bit integer	0	ST TOTAL	\$61
18	Work time	Circuit 1	32-bit integer	0	ST TOTAL	\$20
19	Fail time	Circuit 1	32-bit integer	0	ST TOTAL	\$24
20	Status	Circuit 1	16-bit integer	0	ST TOTAL	\$FD \$17

Example

\$68, \$92, \$92, \$68, \$28, \$01, \$72, \$78, \$56, \$34, \$12, \$33, \$48, \$01, \$04, \$03
 \$00, \$00, \$00, \$85, \$00, \$03, \$B3, \$A4, \$92, \$4B, \$C5, \$00, \$03, \$7C, \$03, \$B2
 \$4B, \$85, \$01, \$03, \$42, \$F6, \$7A, \$4A, \$C5, \$00, \$13, \$AE, \$BB, \$6D, \$48, \$85
 \$01, \$13, \$45, \$F5, \$1E, \$48, \$C5, \$00, \$1B, \$90, \$5E, \$65, \$48, \$85, \$01, \$1B
 \$31, \$58, \$1E, \$48, \$85, \$00, \$2B, \$00, \$00, \$00, \$00, \$C5, \$00, \$3B, \$00, \$00
 \$00, \$00, \$85, \$01, \$3B, \$00, \$00, \$00, \$00, \$C5, \$00, \$53, \$00, \$00, \$00, \$00
 \$85, \$01, \$53, \$00, \$00, \$00, \$00, \$C5, \$01, \$53, \$00, \$00, \$00, \$00, \$82, \$00
 \$59, \$00, \$24, \$82, \$00, \$5D, \$F6, \$0B, \$82, \$04, \$5D, \$58, \$02, \$82, \$00, \$61
 \$00, \$00, \$84, \$00, \$20, \$18, \$94, \$1A, \$00, \$84, \$00, \$24, \$AF, \$7C, \$02, \$00
 \$82, \$05, \$FD, \$17, \$AA, \$DE, \$CD, \$16

Answer type 3

Table 7: M-Bus. Answer 3

No	What	Where	M-Bus			
			Type	Unit	Storage	VIF
1	Total energy	Circuit 2	32-bit float	1	ST TOTAL	\$03
2	Flow energy	Circuit 2	32-bit float	1	ST FORWARD	\$03
3	Return energy	Circuit 2	32-bit float	1	ST RETURN	\$03
4	Flow volume	Circuit 2	32-bit float	1	ST FORWARD	\$13
5	Return volume	Circuit 2	32-bit float	1	ST RETURN	\$13
6	Flow weight	Circuit 2	32-bit float	1	ST FORWARD	\$1B
7	Return weight	Circuit 2	32-bit float	1	ST RETURN	\$1B
8	Power	Circuit 2	32-bit float	1	ST TOTAL	\$2B
9	Flow volume flow	Circuit 2	32-bit float	1	ST FORWARD	\$3B
10	Return volume flow	Circuit 2	32-bit float	1	ST RETURN	\$3B
11	Flow weight flow	Circuit 2	32-bit float	1	ST FORWARD	\$53
12	Return weight flow	Circuit 2	32-bit float	1	ST RETURN	\$53
13	Leakage	Circuit 2	32-bit float	1	ST DELTA	\$53
14	Flow temperature	Circuit 2	16-bit integer	1	ST TOTAL	\$59
15	Return temperature	Circuit 2	16-bit integer	1	ST TOTAL	\$5D
16	Cold water temperature	Circuit 2	16-bit integer	1	ST COLD	\$5D
17	Temperature difference	Circuit 2	16-bit integer	1	ST TOTAL	\$61
18	Work time	Circuit 2	32-bit integer	1	ST TOTAL	\$20
19	Fail time	Circuit 2	32-bit integer	1	ST TOTAL	\$24
20	Status	Circuit 2	16-bit integer	1	ST TOTAL	\$FD \$17

Example

\$68, \$92, \$92, \$68, \$08, \$01, \$72, \$78, \$56, \$34, \$12, \$33, \$48, \$01, \$04, \$04
 \$00, \$00, \$00, \$85, \$40, \$03, \$00, \$00, \$00, \$00, \$C5, \$40, \$03, \$00, \$00, \$00
 \$00, \$85, \$41, \$03, \$00, \$00, \$00, \$00, \$C5, \$40, \$13, \$00, \$00, \$00, \$00, \$85
 \$41, \$13, \$00, \$00, \$00, \$00, \$C5, \$40, \$1B, \$00, \$00, \$00, \$00, \$85, \$41, \$1B
 \$00, \$00, \$00, \$00, \$85, \$40, \$2B, \$00, \$00, \$00, \$00, \$C5, \$40, \$3B, \$00, \$00
 \$00, \$00, \$85, \$41, \$3B, \$00, \$00, \$00, \$00, \$C5, \$40, \$53, \$00, \$00, \$00, \$00
 \$85, \$41, \$53, \$00, \$00, \$00, \$00, \$C5, \$41, \$53, \$00, \$00, \$00, \$00, \$82, \$40
 \$59, \$18, \$24, \$82, \$40, \$5D, \$49, \$0C, \$82, \$44, \$5D, \$F4, \$01, \$82, \$40, \$61
 \$04, \$00, \$84, \$40, \$20, \$A5, \$D1, \$13, \$00, \$84, \$40, \$24, \$FD, \$51, \$09, \$00
 \$82, \$05, \$FD, \$17, \$2A, \$DC, \$F0, \$16

Answer type 4

Table 8: M-Bus. Answer 4

No	What	Where	M-Bus			
			Type	Unit	Storage	VIF
1	Pulse counter V3	Hardware	32-bit integer	0	ST_CH0	\$FD \$61
2	Pulse counter V4	Hardware	32-bit integer	0	ST_CH1	\$FD \$61
3	Pulse counter V5	Hardware	32-bit integer	0	ST_CH2	\$FD \$61
4	Pulse counter V6	Hardware	32-bit integer	0	ST_CH3	\$FD \$61
5	Pressure P1	Hardware	16-bit integer	0	ST_CH0	\$69
6	Pressure P2	Hardware	16-bit integer	0	ST_CH1	\$69
7	Status	Hardware	16-bit integer	0	ST_HW	\$FD \$17

Example

\$68, \$3F, \$3F, \$68, \$28, \$01, \$72, \$78, \$56, \$34, \$12, \$33, \$48, \$01, \$04, \$05
 \$00, \$00, \$00, \$84, \$02, \$FD, \$61, \$00, \$00, \$00, \$00, \$C4, \$02, \$FD, \$61, \$00
 \$00, \$00, \$00, \$84, \$03, \$FD, \$61, \$7D, \$00, \$00, \$00, \$C4, \$03, \$FD, \$61, \$41
 \$00, \$00, \$00, \$82, \$02, \$69, \$70, \$FE, \$C2, \$02, \$69, \$E0, \$FC, \$82, \$05, \$FD
 \$17, \$05, \$00, \$08, \$16

Answer type 5

Table 9: M-Bus. Answer 5

No	What	Where	M-Bus			
			Type	Unit	Storage	VIF
1	Test energy	Circuit 1	64-bit float	0	ST_TOTAL	\$03
2	Test energy	Circuit 2	64-bit float	1	ST_TOTAL	\$03
3	Simulated flow volume per cycle	Circuit 1	32-bit float	0	ST_TOTAL	\$13
4	Simulated return volume per cycle	Circuit 1	32-bit float	0	ST_TOTAL	\$13
5	Simulated flow volume per cycle	Circuit 2	32-bit float	1	ST_TOTAL	\$13
6	Simulated return volume per cycle	Circuit 2	32-bit float	1	ST_TOTAL	\$13
7	Temperature difference	Circuit 1	16-bit integer	0	ST_TOTAL	\$61
8	Temperature difference	Circuit 2	16-bit integer	1	ST_TOTAL	\$61
9	Temperature on channel FT1	Hardware	16-bit integer	0	ST_CH0	\$5D
10	Temperature on channel RT1	Hardware	16-bit integer	0	ST_CH1	\$5D
11	Temperature on channel FT2	Hardware	16-bit integer	0	ST_CH2	\$5D
12	Temperature on channel RT2	Hardware	16-bit integer	0	ST_CH3	\$5D
13	Real temperature of cold water	Hardware	16-bit integer	0	ST_COLD	\$5D
14	Pressure P1	Hardware	16-bit integer	0	ST_CH0	\$69
15	Pressure P2	Hardware	16-bit integer	0	ST_CH1	\$69
16	Config code	Hardware	16-bit integer	0	ST_HW	\$FD \$17
17	Simulated cycles	Hardware	16-bit integer	0	ST_HW	\$FD \$17

Example

\$68, \$7C, \$7C, \$68, \$08, \$01, \$72, \$78, \$56, \$34, \$12, \$33, \$48, \$01, \$04, \$06
 \$00, \$00, \$00, \$8D, \$00, \$03, \$F8, \$00, \$00, \$00, \$00, \$00, \$00, \$00, \$00, \$00, \$8D
 \$40, \$03, \$F8, \$00, \$00, \$00, \$00, \$00, \$00, \$00, \$00, \$85, \$00, \$13, \$00, \$00
 \$C8, \$42, \$85, \$00, \$13, \$00, \$00, \$B4, \$42, \$85, \$40, \$13, \$00, \$00, \$80, \$3F
 \$85, \$40, \$13, \$00, \$00, \$00, \$3F, \$82, \$00, \$61, \$00, \$00, \$82, \$40, \$61, \$00
 \$00, \$82, \$02, \$5D, \$97, \$63, \$C2, \$02, \$5D, \$97, \$63, \$82, \$03, \$5D, \$97, \$63
 \$C2, \$03, \$5D, \$97, \$63, \$82, \$04, \$5D, \$97, \$63, \$82, \$02, \$69, \$70, \$FE, \$C2
 \$02, \$69, \$E0, \$FC, \$82, \$05, \$FD, \$17, \$02, \$00, \$82, \$05, \$FD, \$17, \$64, \$00
 \$14, \$16