

# FALCON MJ Pulse/M-Bus operating instructions

## M-Bus module for Honeywell / Elster M100i and M120i waters meters

### Content

1	Description of functions.....	2
2	Installation and commissioning .....	3
2.1	Installing Falcon MJ M-Bus.....	3
2.2	Connection.....	3
3	Configuration with MBCONF.....	3
3.1	Installation.....	3
3.2	Info tab card.....	4
3.3	Falcon MJ tab card .....	7
3.4	Extended configuration / alarms tab.....	10
3.4.1	Alarm (Activation) .....	11
3.4.2	Occurred alarms.....	11
3.4.3	Pulse settings.....	12
3.4.4	Manufacturer / generation .....	13
3.4.5	Other .....	13
3.4.6	Security .....	13
4	M-Bus telegrams.....	15
4.1	SND_UD: Send User data; telegram selection .....	15
4.1.1	Select Normal readout (Short telegram).....	15
4.1.2	Select Enhanced readout (Long telegram).....	16
4.2	RSP_UD: data transfer on request .....	17
4.2.1	Short – telegram (for Modules with Firmware 1.0.3 or older).....	17
4.2.2	Long – telegram (for Modules with Firmware 1.0.3 or older).....	19
4.2.3	Short – telegram (for Modules with Firmware 1.0.5 or newer).....	28
4.2.4	Long – telegram (for Modules with Firmware 1.0.5 or newer) .....	30

## 1 Description of functions

The Falcon MJ makes it possible to read out Honeywell / Elster water meters M100i and M120i in a M-Bus system or via a digital pulse output.



FALCON MJ Pulse/M-Bus communications module

Once the meter index is configured via the M-Bus, the Falcon MJ will transfer the exact meter index shown on the water meter's register. The free of charge software MBCONF can be used for parameterization. Because of its intuitive user interface, MBCONF is very simple to use.

Another feature of the Falcon MJ is its due date function. The user can program an annual due date. In conjunction with the unit's real-time clock with calendar function, the meter's current index will be specially stored on the configured date at 00:00 (change of day to the reporting date). A write-protect function prevents pre-set values from being modified. This write protection can be improved by using a password (optional).

**Warning:** If this password get lost, the write protection cannot be disabled anymore!

When the module is connected to a M-Bus network, the device gets its power from the M-Bus. The internal battery backs up operation even when the M-Bus has an failure. The battery is already activated when the unit is delivered.

The Falcon MJ stores the meter index on the first day of every month at 00:00.

The Falcon MJ offers two different telegram types which are selectable by the user: The long telegram contains all values, including monthly values. The short telegram does not contain any monthly values. Even though the short telegram type may be selected, monthly values are stored internally and are available later on for read out if the telegram type is changed.

## **2 Installation and commissioning**

### **2.1 Installing Falcon MJ M-Bus**

Refer to the separate installation instructions inside the package.

### **2.2 Connection**

The Falcon MJ will be delivered with a permanently attached 5 wires cable, 3m length. The yellow and green M-Bus wires can be connected with e.g. suitable distribution terminal strips. The polarity of the M-Bus wires is irrelevant.

## **3 Configuration with MBCONF**

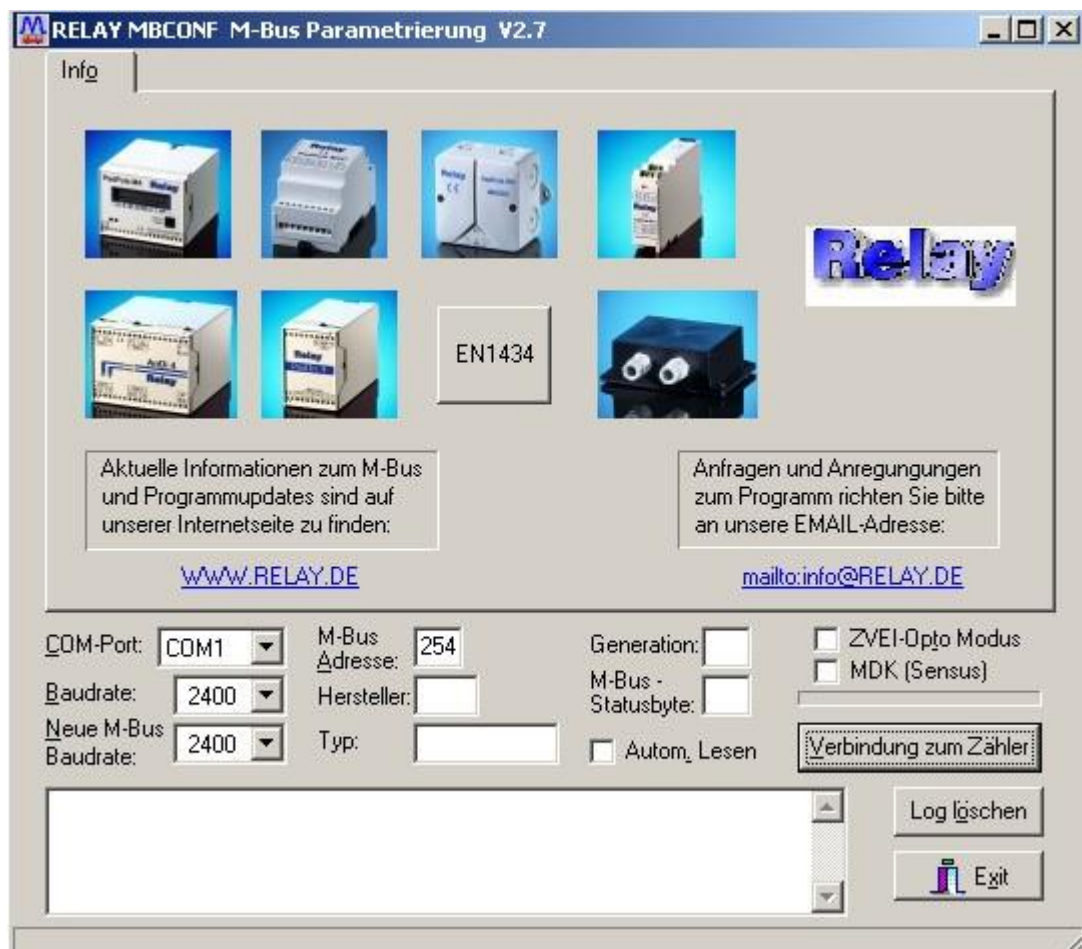
This device's configuration must be adapted by the customer to the given meter. This can be done, for example, with the program MBCONF, version 3.6 and higher, which will be described below.

### **3.1 Installation**

The MBCONF parameterization software for the Falcon MJ is a 32-bit application that can be executed on an IBM compatible PC running a Windows 95 / 98 / XP / 7 / 10 operating system. The desktop or laptop PC to be used must have a free USB interface connection. This interface connection must be connected to an M-Bus level converter (MR003 USB / MikroMaster). The Falcon MJ device which I configured must have a 1:1 connection (i.e. be the only M-Bus device attached) to the M-Bus output of the level converter.

In order to install the software onto the PC, please execute the file "MBCONF\_SETUP.EXE" by selecting it from the Windows Explorer or via "Start – Run". The setup program allows selection of a language during installation. If desired, a program group and a desktop link can be created. Both language variations, German and English, can thereafter be selected for execution from the Start menu or directly from the desktop link.

## 3.2 Info tab card



The lower third of this card is also visible in every other card. This makes the following entry fields and control buttons continuously available:

### COM-Port

specifies the serial interface of the PC to which the M-Bus level converter is connected. This port setting will be stored in the program's INI file so that when the program is restarted it will not be necessary to make this setting again.

### Baudrate

specifies the PC's interface speed. It can be set to 300, 2400 and 9600 baud and corresponds to the currently used M-Bus baudrate. The Falcon MJ module supports the baud-rates 300, 2400 and 9600 WITH automatic detection, that means the baud rate do not need to be configured and adopts automatically to the baud rate of the M-Bus network.

### New M-Bus baud-rate

permits a baud-rate changeover for the M-Bus device. To this end the corresponding selection field is used to set a new baud-rate. Afterwards, the module will be notified of the new baud-rate via the M-Bus.

As the FALCON MJ module supports Auto-bauding a change of the M-Bus speed is not required. The module will automatically detect the selected baudrate of the M-Bus system

## **M-Bus address**

is the primary M-Bus address for the attached M-Bus device. In a 1:1 connection (1 adapter on the M-Bus), the broadcast address 254 can be used. Every M-Bus terminal device must respond to the address 254. The default setting for this address in the program is 254.

## **Connect to meter**

is a control button which requests data from the M-Bus terminal device in conjunction with automatic device type recognition. The fields "Manufacturer", "Generation", "Type" and "M-Bus status byte" will be updated with the device's responses. Depending on the manufacturer and type of M-Bus device, new tab cards will then be created.

## **Manufacturer**

is a field that, following a successful read ("Meter connection"), will display a 3 character M-Bus manufacturer code (upper-case ASCII letters).

## **Generation**

displays the version of the connected M-Bus module's firmware.

## **Type**

displays the device type of the connected device (here: Honeywell / Elster Falcon MJ). This field cannot be edited (read only).

## **Status**

displays the M-Bus status of the connected device.

## **ZVEI-Opto Mode**

if this check-box is activated, devices with an optical interface which use the EN1434-3 communications protocol can be read out and parameterized with the help of an optical head (e.g. the PadPuls M4).

## **MDK (Sensus)**

this check-box activates the read out of Sensus meters with the Mini-Bus interface and special inductive heads (MDK).

## **Autom. readout**

if this check-box is activated, the program will automatically re-read the device's values after every write operation.

## **Log window**

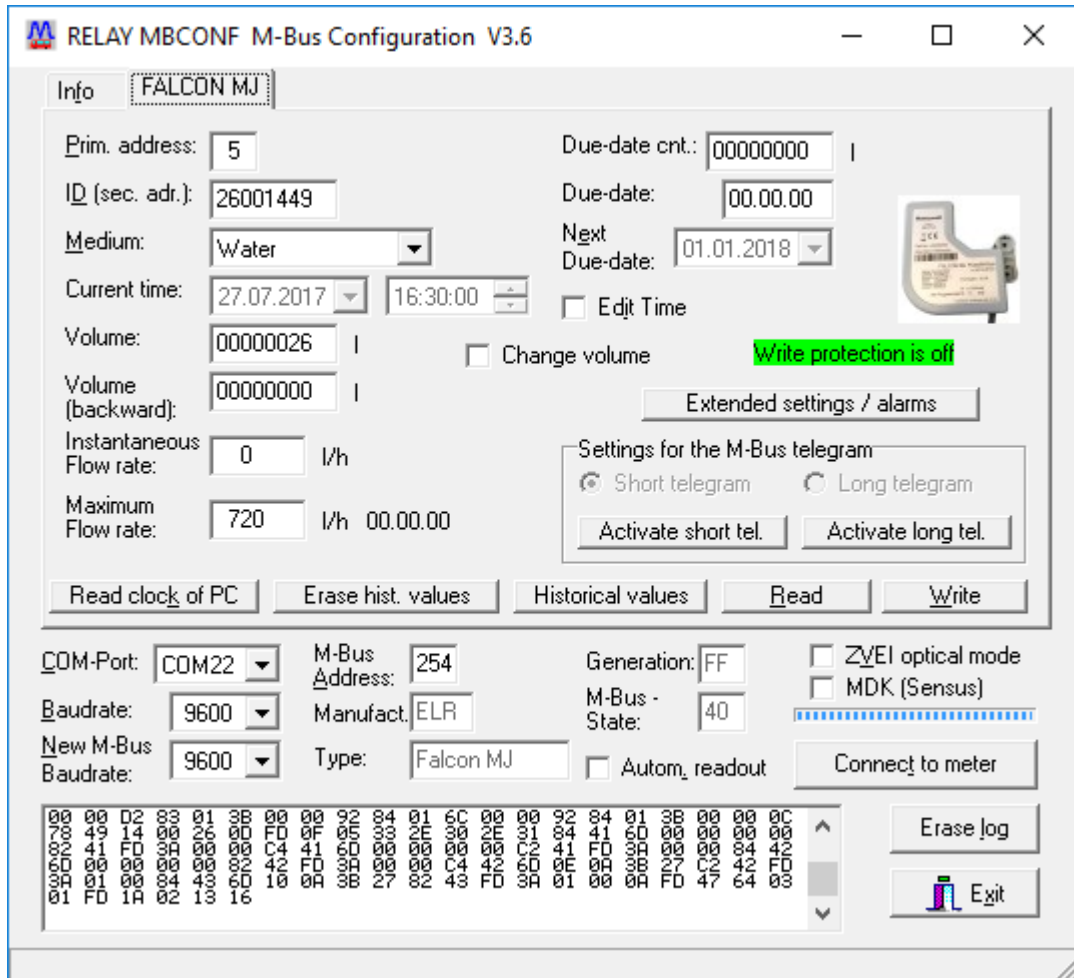
The so-called "Log window" is always visible. All M-Bus communication telegrams will be recorded in this window. Data will be displayed in hexadecimal representation. Output in the log window can be marked and then stored in the Windows clipboard with the "CTRL+C" key combination. From the clipboard it is easy to paste the data into a text processing program for documenting purposes. As soon as this window has reached its storage capacity, no more data will be entered. The displayed data must be deleted in order to allow recording to continue.

The following control buttons are also always visible:

**Erase log**                    deletes all output in the log window.

**Exit**                            terminates the program and writes the current setting for serial interface selection into the INI file.

### 3.3 Falcon MJ tab card



This tab card shows the current settings and values for the Falcon MJ M-Bus. The entry fields and control buttons, described below, permit device parameters to be changed:

#### Primary address

is the M-Bus address of the Falcon MJ. A value between 0 and 250 can be entered into this field if the primary address needs to be changed. Click on "Write" control button will transfer the primary address and other alterable settings on this tab card to the Falcon MJ module. The addresses 253, 254 and 255 are broadcast addresses.

- 253 -> deselect all slaves
- 254 -> select all slaves
- 255 -> select all slaves without confirmation (0xE5).

#### ID (sec.adr.)

is an 8-character M-Bus ID used for secondary addressing on the Falcon MJ. We recommend that the serial number of the connected water meter is programmed here.

Default: Secondary address is set as the last 8 digits of the module's SN

## **Medium**

describes the medium to be measured on the selected Falcon MJ. Selection: water, hot water, cold water, hot/cold water

## **Current time**

is the current date and time inside the module This field can only be edited, and changed in the module if the check-box "Edit Time" is activated. The "Read clock of PC" control button will make a onetime transfer of the PC's current time into this window. A click on the control arrow at the right of the date field will open a calendar for convenient selection of the date.

## **Edit Time**

activation of this control check-box permits editing and programming of the current date and time. This checkbox will automatically deactivate again after parameterization has been done successfully.

## **Volume**

is the current meter index in liters. By checking the box "Change volume" the meter index can be updated.

Only possible if write protection is OFF and the "change volume" box is checked.

## **Volume (backward)**

is the meter count in litres for the amount of backflow

## **Change volume**

activation of this check-box permits editing the "Volume" and "Volume (backwards)" fields. This check-box will automatically deactivate again after parameterization was done successfully.

## **Instantaneous Flow rate**

displays the current flow in [l/h].



**Maximum Flow rate**

displays the max flow rate registered by the module with the according date.

The date will only be shown if the module is connected to the M-Bus permanent. For quick read out via MBCConf, use the "Historical values" button to see the last monthly values and also the last monthly max. flow values.

**Erase hist. values**

deletes all monthly values in the Falcon MJ module. I.e. historic monthly meter index and historic max. flow rate values.

**Historical values**

displays all Falcon MJ stored monthly values in a pop-up window. This control button is only active when the "Long telegram" radio button is active. This control will also store values for maximum throughput of the day and the month.

**Read clock of PC**

reads the PC system's current date and time and enters this data into the "Current time" field.

**Due-date cnt.**

is the stored meter counter index for the Due date. This field cannot be edited (read only).

**Due-date**

is the last reporting date (i.e. date when the meter index was stored the last time) in the format DD.MM.YY. This field cannot be edited (read only).

**Next due-date**

is the next due date (i.e. date for the next storage of meter index) in the format DD.MM.YY. Storing will take place at 00:00 on the due date, e.g. if next reporting day is 01.01. then following a change from 31.12. 23:59 to 01.01. at 00:00. The field can only be edited when the check-box "Edit time" is activated.

**ExtendedSettings / Warnings**

opens a new tab card responsible for the configuration of alarms, pulse outputs settings and other information (see section 3.4).

**M-Bus telegram settings**

displays the setting for telegram type effective for the Falcon MJ.

## Activate short tel.

switches the mode for the M-Bus protocol on the Falcon MJ to short-form telegram (without monthly values)

## Activate long tel.

switches the mode for M-Bus protocol on the Falcon MJ to long telegram (with monthly values).

## Read

updates M-Bus data on the selected tab card.

## Write

sends the current settings to the device where they will be stored.

## Notice:

If a new device is connected, the control button "Connect to meter" must first be pressed. Afterwards the tab card of the Falcon MJ will be shown.

## 3.4 Extended configuration / alarms tab

The screenshot shows a software window titled "Extended configuration / alarms" with the following sections:

- Alarm (activation):**
  - Backward flow alarm
  - Magn. manipulation alarm
  - Removal alarm
  - Battery alarm
  - Set
- Pulse settings:**
  - Pulse incr.:  I/pulse
  - Pulse width:  ms
  - Set
- Manufacturer / Generation:**
  - Manufact.:  (dropdown)
  - Generation:
  - Set
- Security:**
  - Write protection
  - Password:
  - Set
- Occurred alarms:**
  - Alarm (removal)
  - Manipulation alarm
  - Backward flow alarm
  - Low battery
  - Time point 1st alarm / count
  - Backward flow:
  - Manipulation:
  - Removal:
- Other:**
  - Firmware version:
  - Battery voltage:  V

At the bottom of the window are three buttons: "Reset alarms", "Read", and "Exit".

This tab card shows the currently set configuration for the Falcon MJ module. Functions can be activated by marking respective check-boxes.

### 3.4.1 Alarm (Activation)

The alarm activation settings enables or disables the corresponding alarms via the Tamper signal (red wire). The activation or deactivation of any alarm here does not influence the alarm management via the M-Bus wire.

It is also possible to activate multiple alarms, shown on the tamper wire.

**Attention:** There is no differentiator via the tamper wire which alarm just occurs!

#### **Backward flow alarm**

is activated when more than 3 litres continuous backflow are measured.

#### **Magn. Manipulation alarm**

is activated when a manipulation attempt with an external magnet is detected.

#### **Removal alarm**

Is activated when the module is removed from the meter

#### **Battery alarm**

Is activated when the remaining lifetime of the battery is lower than app. 13 months.

### 3.4.2 Occurred alarms

The occurred alarms are shown on the M-Bus when one of those alarms were detected earlier.

#### **Alarm (removal)**

Is activated when the module is removed from the meter. In addition to the check box there is the date and time of the first appearance of the alarm and also a counter how often the module was removed. The removal alarm automatically sets a manipulation alarm as well.

**Manipulation alarm**

Is activated when a magnetic manipulation attempt was detected. It is also activated in combination with the removal alarm. A date and time is stored for the first occurred alarm event.

**Backward flow alarm**

is activated when more than 3 litres continuous backflow are measured. The date and time is stored for the first backflow event.

**Low battery alarm**

Is activated when the remaining lifetime of the battery is lower than app. 13 months.

**3.4.3 Pulse settings**

Those two values reconfigure the compensated pulse output signal (wires White and brown)

White wire → Pulse (+)

Brown wire → Ground (-)

Max contact load: 30 V DC / 30mA

Default setting for pulse output: 1 litre per pulse; 100ms pulse width

For the pulse output an open drain is used. The polarity must be observed.

The pulse output is compatible to the most systems that were used with a Reed-switch before

**Pulse incr.**

Specifies the pulse output resolution in litres per pulses. All full values between 1 and 1000 liters are possible.

**Dosing applications:** For special dosing applications, you can enter the value 9999. This value will give a pulse output of 2,5 litres per pulse!

**Pulse width**

The pulse width can be set between 50 and 500 ms. The setting of pulse incr. and pulse width must be plausible, depending on the meter size and max flow rate values.

Example: For a Q3 10; DN25 meter with a Q4 value of 12,5 m<sup>3</sup>/h

12,5m<sup>3</sup>/h → app. 3,5 l/s

Pulse output 1 litre → max. possible pulse width 140 ms (smaller values are possible)

If a pulse overcount would happen, the pulser stores the pulses and sends them to the output when the flow rate decreases again. The internal storage for this pulse counter is 65.535 pulses.

### 3.4.4 Manufacturer / generation

The manufacturer and generation identifiers of the Falcon MJ module can be changed. For the manufacturer, the following manufacturer codes are possible:

ELR; ELS; EMT; HON

This possibility allows the customer to set up the identification of the module according the DIN 43863-5 meter serial numbers

### 3.4.5 Other

#### **Firmware version**

Here you find the current firmware version of the Falcon MJ module. The firmware version can also be found on the sticker on the top of the module.

#### **Battery voltage**

Indicates the level of the battery voltage. A new module should show app. 3.6 V

### 3.4.6 Security

The security settings enable or disables the write protection setting. With activated write protection, values like the meter index or due date values cannot be changed anymore. In addition, there is the possibility to protect the write protection with an additional password. The password can be max. 32 signs long.

#### **Use of Password to activate write protection:**

Enter a password with max. 32 signs. Check the write protection box and press the “set” button below.

#### **Use of Password to deactivate write protection:**

Enter the password you chose when you activated the write protection. Untick the write protection checkbox and press “Set” again to deactivate the write protection.

**ATTENTION: If you secure the write protection with a password and it got lost, you are not able to deactivate the write protection anymore!**

The following control buttons are also always visible:

**Read**                updates M-Bus data on the selected tab card. Even fields which cannot be modified will be updated.

**Exit**                 Close the extended configuration/alarm tab

**Reset alarms**     All stored alarms will be cleared to “0”

## 4 M-Bus telegrams

### 4.1 SND\_UD: Send User data; telegram selection

#### 4.1.1 Select Normal readout (Short telegram)

### SND-UD (M-Bus)

Byte No	OMS M-Bus frame		Water meter example	Layer
	Field Name	Content	Bytes [hex]	
			plain	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Send user data	53h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	Application Select (long Header)	53h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	B1h	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20		Subcode	20h	
21	Checksum		xxh	DLL
22	Stop	Stop byte	16h	

#### 4.1.2 Select Enhanced readout (Long telegram)

### SND-UD (M-Bus)

Byte No	OMS M-Bus frame		Water meter example	Layer
	Field Name	Content	Bytes [hex]	
			plain	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Send user data	53h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	Application Select (long Header)	53h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	B1h	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20		Subcode	30h	
21	Checksum		xxh	DLL
22	Stop	Stop byte	16h	



## 4.2 RSP\_UD: data transfer on request

### 4.2.1 Short – telegram (for Modules with Firmware 1.0.3 or older)

Byte No	Field Name	Content	Bytes [hex]	Layer
			plain	
		OMS M-Bus frame	Water meter example	Layer
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR1	DIF (8 digit BCD)	0Ch	Application Layer (APL)
21	DR1	VIF (Volume I)	13h	
22	DR1	Value LSB	73h	
23	DR1	Value	42h	
24	DR1	Value ( = 28504,273 m <sup>3</sup> )	50h	
25	DR1	Value MSB	28h	
26	DR2	DIF (Time at readout; Type F)	04h	
27	DR2	VIF (Date, Time)	6Dh	
28	DR2	Value LSB	32h	
29	DR2	Value	37h	
30	DR2	Value ( 31.05.2008 23:50 )	1Fh	
31	DR2	Value MSB	15h	
32	DR3	DIF (Date Stor. 1;Type G)	42h	
33	DR3	VIF (Date)	6Ch	

34	DR3	Value	xxh
35	DR3	Value	xxh
36	DR4	DIF (8 digit BCD Stor. 1)	4Ch
37	DR4	VIF (Volume I)	13h
38	DR4	Value LSB	78h
39	DR4	Value	56h
40	DR4	Value ( = 12345,678 m <sup>3</sup> )	34h
41	DR4	Value MSB	12h
42	DR5	DIF (Date Stor. 1;Type G)	42h
43	DR5	VIF (Date + Extension)	ECh
44	DR5	VIFE (Future Value)	7Eh
45	DR5	Value	xxh
46	DR5	Value	xxh
47	DR6	DIF (8 digit BCD)	0Ch
48	DR6	VIF (Volume I + Extension)	93h
49	DR6	VIFE (backward flow)	3Ch
50	DR6	Value LSB	03h
51	DR6	Value	00h
52	DR6	Value ( = 0,003 m <sup>3</sup> )	00h
53	DR6	Value MSB	00h
54	DR7	DIF (Date Max. Value; Type G)	12h
55	DR7	VIF (Date)	6Ch
56	DR7	Value	xxh
57	DR7	Value	xxh
58	DR8	DIF (16 bit Int, Max. Value)	12h
59	DR8	VIF (Flow Rate l/h)	3Bh
60	DR8	Value	xxh
61	DR8	Value	xxh
62	DR9	DIF (16 Bit Int)	02h
63	DR9	VIF (Flow Rate l/h)	3Bh
64	DR9	Value	xxh
65	DR9	Value	xxh
66	DR10	DIF (Backflow Alarm Date; Type F)	C4h
67	DR10	DIFE (Storage No. 7)	03h
68	DR10	VIF (Date, Time)	6Dh
69	DR10	Value LSB	xxh
70	DR10	Value	xxh
71	DR10	Value	xxh
72	DR10	Value MSB	xxh
73	DR11	DIF (Manipulation Alarm Date; Type F)	84h
74	DR11	DIFE (Storage No. 6)	03h
75	DR11	VIF (Date, Time)	6Dh
76	DR11	Value LSB	xxh
77	DR11	Value	xxh
78	DR11	Value	xxh
79	DR11	Value MSB	xxh

80	DR12	DIF (Manufacturerspecific)	0Fh	DLL
81	DR12	PBIT	xxh	
82	Checksum		xxh	
83	Stop	Stop byte	16h	

## 4.2.2 Long – telegram (for Modules with Firmware 1.0.3 or older)

Long telegram with monthly values.

### Frame 1:

### RSP-UD (M-Bus)

Byte No	OMS M-Bus frame		Meter example	Layer
	Field Name	Content	Bytes [hex]	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR1	DIF (8 digit BCD)	0Ch	Application Layer (APL)
21	DR1	VIF (Volume I)	13h	
22	DR1	Value LSB	73h	
23	DR1	Value	42h	
24	DR1	Value ( = 28504,273 m <sup>3</sup> )	50h	
25	DR1	Value MSB	28h	
26	DR2	DIF (Time at readout; Type F)	04h	
27	DR2	VIF (Date, Time)	6Dh	
28	DR2	Value LSB	32h	

29	DR2	Value	37h
30	DR2	Value ( 31.05.2008 23:50 )	1Fh
31	DR2	Value MSB	15h
32	DR3	DIF (Date Stor. 1;Type G)	42h
33	DR3	VIF (Date)	6Ch
34	DR3	Value	xxh
35	DR3	Value	xxh
36	DR4	DIF (8 digit BCD Stor. 1)	4Ch
37	DR4	VIF (Volume I)	13h
38	DR4	Value LSB	78h
39	DR4	Value	56h
40	DR4	Value ( = 12345,678 m <sup>3</sup> )	34h
41	DR4	Value MSB	12h
42	DR5	DIF (Date Stor. 1;Type G)	42h
43	DR5	VIF (Date + Extension)	ECh
44	DR5	VIFE (Future Value)	7Eh
45	DR5	Value	xxh
46	DR5	Value	xxh
47	DR6	DIF (8 digit BCD)	0Ch
48	DR6	VIF (Volume I + Extension)	93h
49	DR6	VIFE (backward flow)	3Ch
50	DR6	Value LSB	03h
51	DR6	Value	00h
52	DR6	Value ( = 0,003 m <sup>3</sup> )	00h
53	DR6	Value MSB	00h
54	DR7	DIF (Date Max. Value; Type G)	12h
55	DR7	VIF (Date)	6Ch
56	DR7	Value	xxh
57	DR7	Value	xxh
58	DR8	DIF (16 bit Int, Max. Value)	12h
59	DR8	VIF (Flow Rate l/h)	3Bh
60	DR8	Value	xxh
61	DR8	Value	xxh
62	DR9	DIF (16 Bit Int)	02h
63	DR9	VIF (Flow Rate l/h)	3Bh
64	DR9	Value	xxh
65	DR9	Value	xxh
66	DR10	DIF (Backflow Alarm Date; Type F)	C4h
67	DR10	DIFE (Storage No. 7)	03h
68	DR10	VIF (Date, Time)	6Dh
69	DR10	Value LSB	xxh
70	DR10	Value	xxh
71	DR10	Value	xxh
72	DR10	Value MSB	xxh
73	DR11	DIF (Manipulation Alarm Date; Type F)	84h
74	DR11	DIFE (Storage No. 6)	03h

75	DR11	VIF (Date, Time)	6Dh
76	DR11	Value LSB	xxh
77	DR11	Value	xxh
78	DR11	Value	xxh
79	DR11	Value MSB	xxh
80	DR12	DIF (2 digit BCD + Extension)	89h
81	DR12	DIFE (Storagenumber 8)	04h
82	DR12	VIF (Second Extensio table)	FDh
83	DR12	VIFE (Size of storage block)	22h
84	DR12	Value (13)	13h
85	DR13	DIF (2 digit BCD + Extension)	89h
86	DR13	DIFE (Storagenumber 8)	04h
87	DR13	VIF (Second Extensio table)	FDh
88	DR13	VIFE (Storage intervall month)	28h
89	DR13	Value (1)	01h
90	DR14	DIF (16 bit Int. + Ext.)	82h
91	DR14	DIFE (Storagenumber 20)	0Ah
92	DR14	VIF (Date Type G)	6Ch
93	DR14	Value LSB	xxh
94	DR14	Value MSB	xxh
95	DR15	DIF (8 digit BCD + Ext.)	8Ch
96	DR15	DIFE (Storagenumber 8)	04h
97	DR15	VIF (Volume I)	13h
98	DR15	Value LSB	xxh
99	DR15	Value	xxh
100	DR15	Value	xxh
101	DR15	Value MSB	xxh
102	DR16	DIF (8 digit BCD + Ext.)	CCh
103	DR16	DIFE (Storagenumber 9)	04h
104	DR16	VIF (Volume I)	13h
105	DR16	Value LSB	xxh
106	DR16	Value	xxh
107	DR16	Value	xxh
108	DR16	Value MSB	xxh
109	DR17	DIF (8 digit BCD + Ext.)	8Ch
110	DR17	DIFE (Storagenumber 10)	05h
111	DR17	VIF (Volume I)	13h
112	DR17	Value LSB	xxh
113	DR17	Value	xxh
114	DR17	Value	xxh
115	DR17	Value MSB	xxh
116	DR18	DIF (8 digit BCD + Ext.)	CCh
117	DR18	DIFE (Storagenumber 11)	05h
118	DR18	VIF (Volume I)	13h
119	DR18	Value LSB	xxh
120	DR18	Value	xxh

121	DR18	Value	xxh
122	DR18	Value MSB	xxh
123	DR19	DIF (8 digit BCD + Ext.)	8Ch
124	DR19	DIFE (Storagenumber 12)	06h
125	DR19	VIF (Volume I)	13h
126	DR19	Value LSB	xxh
127	DR19	Value	xxh
128	DR19	Value	xxh
129	DR19	Value MSB	xxh
130	DR20	DIF (8 digit BCD + Ext.)	CCh
131	DR20	DIFE (Storagenumber 13)	06h
132	DR20	VIF (Volume I)	13h
133	DR20	Value LSB	xxh
134	DR20	Value	xxh
135	DR20	Value	xxh
136	DR20	Value MSB	xxh
137	DR21	DIF (8 digit BCD + Ext.)	8Ch
138	DR21	DIFE (Storagenumber 14)	07h
139	DR21	VIF (Volume I)	13h
140	DR21	Value LSB	xxh
141	DR21	Value	xxh
142	DR21	Value	xxh
143	DR21	Value MSB	xxh
144	DR22	DIF (8 digit BCD + Ext.)	CCh
145	DR22	DIFE (Storagenumber 15)	07h
146	DR22	VIF (Volume I)	13h
147	DR22	Value LSB	xxh
148	DR22	Value	xxh
149	DR22	Value	xxh
150	DR22	Value MSB	xxh
151	DR23	DIF (8 digit BCD + Ext.)	8Ch
152	DR23	DIFE (Storagenumber 16)	08h
153	DR23	VIF (Volume I)	13h
154	DR23	Value LSB	xxh
155	DR23	Value	xxh
156	DR23	Value	xxh
157	DR23	Value MSB	xxh
158	DR24	DIF (8 digit BCD + Ext.)	CCh
159	DR24	DIFE (Storagenumber 17)	08h
160	DR24	VIF (Volume I)	13h
161	DR24	Value LSB	xxh
162	DR24	Value	xxh
163	DR24	Value	xxh
164	DR24	Value MSB	xxh
165	DR25	DIF (8 digit BCD + Ext.)	8Ch
166	DR25	DIFE (Storagenumber 18)	09h

167	DR25	VIF (Volume I)	13h	
168	DR25	Value LSB	xxh	
169	DR25	Value	xxh	
170	DR25	Value	xxh	
171	DR25	Value MSB	xxh	
172	DR26	DIF (8 digit BCD + Ext.)	CCh	
173	DR26	DIFE (Storagenumber 19)	09h	
174	DR26	VIF (Volume I)	13h	
175	DR26	Value LSB	xxh	
176	DR26	Value	xxh	
177	DR26	Value	xxh	
178	DR26	Value MSB	xxh	
179	DR27	DIF (8 digit BCD + Ext.)	8Ch	
180	DR27	DIFE (Storagenumber 20)	0Ah	
181	DR27	VIF (Volume I)	13h	
182	DR27	Value LSB	xxh	
183	DR27	Value	xxh	
184	DR27	Value	xxh	
185	DR27	Value MSB	xxh	
186	DR28	DIF (Manufacturer specific + Frame)	1Fh	
187	DR28	PBIT	xxh	
188	Checksum		xxh	DLL
189	Stop	Stop byte	16h	

## Frame 2:

### RSP-UD (M-Bus)

Byte No	Field Name	Content	Meter example	Layer
			Bytes [hex]	
		OMS M-Bus frame		
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	

13	Manufr	Manufacturer code	15h	Application Layer (APL)
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR29	DIF (16 bit Int. + max Val. + Extension)	92h	
21	DR29	DIFE (Storagenumber 28)	0Eh	
22	DR29	VIF (Date Type G)	6Ch	
23	DR29	Value	xxh	
24	DR29	Value	xxh	
25	DR30	DIF (16 bit Int. + max Val. + Extension)	92h	
26	DR30	DIFE (Storagenumber 28)	0Eh	
27	DR30	VIF (Volume flow [l/h])	3Bh	
28	DR30	Value	xxh	
29	DR30	Value	xxh	
30	DR31	DIF (16 bit Int. + max Val. + Extension)	D2h	
31	DR31	DIFE (Storagenumber 29)	0Eh	
32	DR31	VIF (Date Type G)	6Ch	
33	DR31	Value	xxh	
34	DR31	Value	xxh	
35	DR32	DIF (16 bit Int. + max Val. + Extension)	D2h	
36	DR32	DIFE (Storagenumber 29)	0Eh	
37	DR32	VIF (Volume flow [l/h])	3Bh	
38	DR32	Value	xxh	
39	DR32	Value	xxh	
40	DR33	DIF (16 bit Int. + max Val. + Extension)	92h	
41	DR33	DIFE (Storagenumber 30)	0Fh	
42	DR33	VIF (Date Type G)	6Ch	
43	DR33	Value	xxh	
44	DR33	Value	xxh	
45	DR34	DIF (16 bit Int. + max Val. + Extension)	92h	
46	DR34	DIFE (Storagenumber 30)	0Fh	
47	DR34	VIF (Volume flow [l/h])	3Bh	
48	DR34	Value	xxh	
49	DR34	Value	xxh	
50	DR35	DIF (16 bit Int. + max Val. + Extension)	D2h	
51	DR35	DIFE (Storagenumber 31)	0Fh	
52	DR35	VIF (Date Type G)	6Ch	
53	DR35	Value	xxh	
54	DR35	Value	xxh	
55	DR36	DIF (16 bit Int. + max Val. + Extension)	D2h	
56	DR36	DIFE (Storagenumber 31)	0Fh	
57	DR36	VIF (Volume flow [l/h])	3Bh	
58	DR36	Value	xxh	



59	DR36	Value	xxh
60	DR37	DIF (16 bit Int. + max Val. + Extension)	92h
61	DR37	DIFE (Extension)	80h
62	DR37	DIFE (Storagenumber 32)	01h
63	DR37	VIF (Date Type G)	6Ch
64	DR37	Value	xxh
65	DR37	Value	xxh
66	DR38	DIF (16 bit Int. + max Val. + Extension)	92h
67	DR38	DIFE (Extension)	80h
68	DR38	DIFE (Storagenumber 32)	01h
69	DR38	VIF (Volume flow [l/h])	3Bh
70	DR38	Value	xxh
71	DR38	Value	xxh
72	DR39	DIF (16 bit Int. + max Val. + Extension)	D2h
73	DR39	DIFE (Extension)	80h
74	DR39	DIFE (Storagenumber 33)	01h
75	DR39	VIF (Date Type G)	6Ch
76	DR39	Value	xxh
77	DR39	Value	xxh
78	DR40	DIF (16 bit Int. + max Val. + Extension)	D2h
79	DR40	DIFE (Extension)	80h
80	DR40	DIFE (Storagenumber 33)	01h
81	DR40	VIF (Volume flow [l/h])	3Bh
82	DR40	Value	xxh
83	DR40	Value	xxh
84	DR41	DIF (16 bit Int. + max Val. + Extension)	92h
85	DR41	DIFE (Extension)	81h
86	DR41	DIFE (Storagenumber 34)	01h
87	DR41	VIF (Date Type G)	6Ch
88	DR41	Value	xxh
89	DR41	Value	xxh
90	DR42	DIF (16 bit Int. + max Val. + Extension)	92h
91	DR42	DIFE (Extension)	81h
92	DR42	DIFE (Storagenumber 34)	01h
93	DR42	VIF (Volume flow [l/h])	3Bh
94	DR42	Value	xxh
95	DR42	Value	xxh
96	DR43	DIF (16 bit Int. + max Val. + Extension)	D2h
97	DR43	DIFE (Extension)	81h
98	DR43	DIFE (Storagenumber 35)	01h
99	DR43	VIF (Date Type G)	6Ch
100	DR43	Value	xxh
101	DR43	Value	xxh
102	DR44	DIF (16 bit Int. + max Val. + Extension)	D2h
103	DR44	DIFE (Extension)	81h
104	DR44	DIFE (Storagenumber 35)	01h

105	DR44	VIF (Volume flow [l/h])	3Bh
106	DR44	Value	xxh
107	DR44	Value	xxh
108	DR45	DIF (16 bit Int. + max Val. + Extension)	92h
109	DR45	DIFE (Extension)	82h
110	DR45	DIFE (Storagenumber 36)	01h
111	DR45	VIF (Date Type G)	6Ch
112	DR45	Value	xxh
113	DR45	Value	xxh
114	DR46	DIF (16 bit Int. + max Val. + Extension)	92h
115	DR46	DIFE (Extension)	82h
116	DR46	DIFE (Storagenumber 36)	01h
117	DR46	VIF (Volume flow [l/h])	3Bh
118	DR46	Value	xxh
119	DR46	Value	xxh
120	DR47	DIF (16 bit Int. + max Val. + Extension)	D2h
121	DR47	DIFE (Extension)	82h
122	DR47	DIFE (Storagenumber 37)	01h
123	DR47	VIF (Date Type G)	6Ch
124	DR47	Value	xxh
125	DR47	Value	xxh
126	DR48	DIF (16 bit Int. + max Val. + Extension)	D2h
127	DR48	DIFE (Extension)	82h
128	DR48	DIFE (Storagenumber 37)	01h
129	DR48	VIF (Volume flow [l/h])	3Bh
130	DR48	Value	xxh
131	DR48	Value	xxh
132	DR49	DIF (16 bit Int. + max Val. + Extension)	92h
133	DR49	DIFE (Extension)	83h
134	DR49	DIFE (Storagenumber 38)	01h
135	DR49	VIF (Date Type G)	6Ch
136	DR49	Value	xxh
137	DR49	Value	xxh
138	DR50	DIF (16 bit Int. + max Val. + Extension)	92h
139	DR50	DIFE (Extension)	83h
140	DR50	DIFE (Storagenumber 38)	01h
141	DR50	VIF (Volume flow [l/h])	3Bh
142	DR50	Value	xxh
143	DR50	Value	xxh
144	DR51	DIF (16 bit Int. + max Val. + Extension)	D2h
145	DR51	DIFE (Extension)	83h
146	DR51	DIFE (Storagenumber 39)	01h
147	DR51	VIF (Date Type G)	6Ch
148	DR51	Value	xxh
149	DR51	Value	xxh
150	DR52	DIF (16 bit Int. + max Val. + Extension)	D2h

151	DR52	DIFE (Extension)	83h	
152	DR52	DIFE (Storagenumber 39)	01h	
153	DR52	VIF (Volume flow [l/h])	3Bh	
154	DR52	Value	xxh	
155	DR52	Value	xxh	
156	DR53	DIF (16 bit Int. + max Val. + Extension)	92h	
157	DR53	DIFE (Extension)	80h	
158	DR53	DIFE (Storagenumber 40)	01h	
159	DR53	VIF (Date Type G)	6Ch	
160	DR53	Value	xxh	
161	DR53	Value	xxh	
162	DR54	DIF (16 bit Int. + max Val. + Extension)	92h	
163	DR54	DIFE (Extension)	80h	
164	DR54	DIFE (Storagenumber 40)	01h	
165	DR54	VIF (Volume flow [l/h])	3Bh	
166	DR54	Value	xxh	
167	DR54	Value	xxh	
168	Checksum		xxh	DIL
169	Stop	Stop byte	16h	

## 4.2.3 Short – telegram (for Modules with Firmware 1.0.5 or newer)

Byte No	OMS M-Bus frame		Water meter example	Layer
	Field Name	Content	Bytes [hex]	
			plain	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR1	DIF (8 digit BCD)	0Ch	
21	DR1	VIF (Volume I)	13h	
22	DR1	Value LSB	73h	
23	DR1	Value	42h	
24	DR1	Value ( = 28504,273 m <sup>3</sup> )	50h	
25	DR1	Value MSB	28h	
26	DR2	DIF (Time at readout; Type F)	04h	
27	DR2	VIF (Date, Time)	6Dh	
28	DR2	Value LSB	32h	
29	DR2	Value	37h	
30	DR2	Value ( 31.05.2008 23:50 )	1Fh	
31	DR2	Value MSB	15h	
32	DR3	DIF (Date Stor. 1;Type G)	42h	
33	DR3	VIF (Date)	6Ch	
34	DR3	Value	xxh	
35	DR3	Value	xxh	
36	DR4	DIF (8 digit BCD Stor. 1)	4Ch	
37	DR4	VIF (Volume I)	13h	
38	DR4	Value LSB	78h	
39	DR4	Value	56h	

40	DR4	Value ( = 12345,678 m <sup>3</sup> )	34h
41	DR4	Value MSB	12h
42	DR5	DIF (Date Stor. 1;Type G)	42h
43	DR5	VIF (Date + Extension)	ECh
44	DR5	VIFE (Future Value)	7Eh
45	DR5	Value	xxh
46	DR5	Value	xxh
47	DR6	DIF (8 digit BCD)	0Ch
48	DR6	VIF (Volume I + Extension)	93h
49	DR6	VIFE (backward flow)	3Ch
50	DR6	Value LSB	03h
51	DR6	Value	00h
52	DR6	Value ( = 0,003 m <sup>3</sup> )	00h
53	DR6	Value MSB	00h
54	DR7	DIF (Date Max. Value; Type G)	12h
55	DR7	VIF (Date)	6Ch
56	DR7	Value	xxh
57	DR7	Value	xxh
58	<b>DR8</b>	<b>DIF (32 bit Int, Max. Value)</b>	<b>14h</b>
59	DR8	VIF (Flow Rate l/h)	3Bh
60	DR8	Value	xxh
61	DR8	Value	xxh
62	<b>DR8</b>	<b>Value</b>	<b>xxh</b>
63	<b>DR8</b>	<b>Value</b>	<b>xxh</b>
64	<b>DR9</b>	<b>DIF (32 Bit Int)</b>	<b>04h</b>
65	DR9	VIF (Flow Rate l/h)	3Bh
66	DR9	Value	xxh
67	DR9	Value	xxh
68	<b>DR9</b>	<b>Value</b>	<b>xxh</b>
69	<b>DR9</b>	<b>Value</b>	<b>xxh</b>
70	DR10	DIF (Backflow Alarm Date; Type F)	C4h
71	DR10	DIFE (Storage No. 7)	03h
72	DR10	VIF (Date, Time)	6Dh
73	DR10	Value LSB	xxh
74	DR10	Value	xxh
75	DR10	Value	xxh
76	DR10	Value MSB	xxh
77	DR11	DIF (Manipulation Alarm Date; Type F)	84h
78	DR11	DIFE (Storage No. 6)	03h
79	DR11	VIF (Date, Time)	6Dh
80	DR11	Value LSB	xxh
81	DR11	Value	xxh
82	DR11	Value	xxh
83	DR11	Value MSB	xxh
84	DR12	DIF (Manufacturerspecific)	0Fh
85	DR12	PBIT	xxh
86	Checksum		xxh
87	Stop	Stop byte	16h

DLL

## 4.2.4 Long – telegram (for Modules with Firmware 1.0.5 or newer)

Long telegram with monthly values.

### Frame 1:

### RSP-UD (M-Bus)

Byte No	OMS M-Bus frame		Water meter example	Layer
	Field Name	Content	Bytes [hex]	
			plain	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR1	DIF (8 digit BCD)	0Ch	Application Layer (APL)
21	DR1	VIF (Volume I)	13h	
22	DR1	Value LSB	73h	
23	DR1	Value	42h	
24	DR1	Value ( = 28504,273 m <sup>3</sup> )	50h	
25	DR1	Value MSB	28h	
26	DR2	DIF (Time at readout; Type F)	04h	
27	DR2	VIF (Date, Time)	6Dh	
28	DR2	Value LSB	32h	
29	DR2	Value	37h	
30	DR2	Value ( 31.05.2008 23:50 )	1Fh	
31	DR2	Value MSB	15h	
32	DR3	DIF (Date Stor. 1;Type G)	42h	
33	DR3	VIF (Date)	6Ch	
34	DR3	Value	xxh	

35	DR3	Value	xxh
36	DR4	DIF (8 digit BCD Stor. 1)	4Ch
37	DR4	VIF (Volume I)	13h
38	DR4	Value LSB	78h
39	DR4	Value	56h
40	DR4	Value ( = 12345,678 m <sup>3</sup> )	34h
41	DR4	Value MSB	12h
42	DR5	DIF (Date Stor. 1;Type G)	42h
43	DR5	VIF (Date + Extension)	ECh
44	DR5	VIFE (Future Value)	7Eh
45	DR5	Value	xxh
46	DR5	Value	xxh
47	DR6	DIF (8 digit BCD)	0Ch
48	DR6	VIF (Volume I + Extension)	93h
49	DR6	VIFE (backward flow)	3Ch
50	DR6	Value LSB	03h
51	DR6	Value	00h
52	DR6	Value ( = 0,003 m <sup>3</sup> )	00h
53	DR6	Value MSB	00h
54	DR7	DIF (Date Max. Value; Type G)	12h
55	DR7	VIF (Date)	6Ch
56	DR7	Value	xxh
57	DR7	Value	xxh
58	<b>DR8</b>	<b>DIF (32 bit Int, Max. Value)</b>	<b>14h</b>
59	DR8	VIF (Flow Rate l/h)	3Bh
60	DR8	Value	xxh
61	DR8	Value	xxh
62	<b>DR8</b>	<b>Value</b>	<b>xxh</b>
63	<b>DR8</b>	<b>Value</b>	<b>xxh</b>
64	DR9	<b>DIF (32 Bit Int)</b>	<b>04h</b>
65	DR9	VIF (Flow Rate l/h)	3Bh
66	DR9	Value	xxh
67	DR9	Value	xxh
68	<b>DR9</b>	<b>Value</b>	<b>xxh</b>
69	<b>DR9</b>	<b>Value</b>	<b>xxh</b>
70	DR10	DIF (Backflow Alarm Date; Type F)	C4h
71	DR10	DIFE (Storage No. 7)	03h
72	DR10	VIF (Date, Time)	6Dh
73	DR10	Value LSB	xxh
74	DR10	Value	xxh
75	DR10	Value	xxh
76	DR10	Value MSB	xxh
77	DR11	DIF (Manipulation Alarm Date; Type F)	84h
78	DR11	DIFE (Storage No. 6)	03h
79	DR11	VIF (Date, Time)	6Dh
80	DR11	Value LSB	xxh
81	DR11	Value	xxh
82	DR11	Value	xxh

83	DR11	Value MSB	xxh
84	DR12	DIF (2 digit BCD + Extension)	89h
85	DR12	DIFE (Storagenumber 8)	04h
86	DR12	VIF (Second Extensio table)	FDh
87	DR12	VIFE (Size of storage block)	22h
88	DR12	Value (13)	13h
89	DR13	DIF (2 digit BCD + Extension)	89h
90	DR13	DIFE (Storagenumber 8)	04h
91	DR13	VIF (Second Extensio table)	FDh
92	DR13	VIFE (Storage intervall month)	28h
93	DR13	Value (1)	01h
94	DR14	DIF (16 bit Int. + Ext.)	82h
95	DR14	DIFE (Storagenumber 20)	0Ah
96	DR14	VIF (Date Type G)	6Ch
97	DR14	Value LSB	xxh
98	DR14	Value MSB	xxh
99	DR15	DIF (8 digit BCD + Ext.)	8Ch
100	DR15	DIFE (Storagenumber 8)	04h
101	DR15	VIF (Volume I)	13h
102	DR15	Value LSB	xxh
103	DR15	Value	xxh
104	DR15	Value	xxh
105	DR15	Value MSB	xxh
106	DR16	DIF (8 digit BCD + Ext.)	CCh
107	DR16	DIFE (Storagenumber 9)	04h
108	DR16	VIF (Volume I)	13h
109	DR16	Value LSB	xxh
110	DR16	Value	xxh
111	DR16	Value	xxh
112	DR16	Value MSB	xxh
113	DR17	DIF (8 digit BCD + Ext.)	8Ch
114	DR17	DIFE (Storagenumber 10)	05h
115	DR17	VIF (Volume I)	13h
116	DR17	Value LSB	xxh
117	DR17	Value	xxh
118	DR17	Value	xxh
119	DR17	Value MSB	xxh
120	DR18	DIF (8 digit BCD + Ext.)	CCh
121	DR18	DIFE (Storagenumber 11)	05h
122	DR18	VIF (Volume I)	13h
123	DR18	Value LSB	xxh
124	DR18	Value	xxh
125	DR18	Value	xxh
126	DR18	Value MSB	xxh
127	DR19	DIF (8 digit BCD + Ext.)	8Ch
128	DR19	DIFE (Storagenumber 12)	06h
129	DR19	VIF (Volume I)	13h
130	DR19	Value LSB	xxh



131	DR19	Value	xxh
132	DR19	Value	xxh
133	DR19	Value MSB	xxh
134	DR20	DIF (8 digit BCD + Ext.)	CCh
135	DR20	DIFE (Storagenumber 13)	06h
136	DR20	VIF (Volume I)	13h
137	DR20	Value LSB	xxh
138	DR20	Value	xxh
139	DR20	Value	xxh
140	DR20	Value MSB	xxh
141	DR21	DIF (8 digit BCD + Ext.)	8Ch
142	DR21	DIFE (Storagenumber 14)	07h
143	DR21	VIF (Volume I)	13h
144	DR21	Value LSB	xxh
145	DR21	Value	xxh
146	DR21	Value	xxh
147	DR21	Value MSB	xxh
148	DR22	DIF (8 digit BCD + Ext.)	CCh
149	DR22	DIFE (Storagenumber 15)	07h
150	DR22	VIF (Volume I)	13h
151	DR22	Value LSB	xxh
152	DR22	Value	xxh
153	DR22	Value	xxh
154	DR22	Value MSB	xxh
155	DR23	DIF (8 digit BCD + Ext.)	8Ch
156	DR23	DIFE (Storagenumber 16)	08h
157	DR23	VIF (Volume I)	13h
158	DR23	Value LSB	xxh
159	DR23	Value	xxh
160	DR23	Value	xxh
161	DR23	Value MSB	xxh
162	DR24	DIF (8 digit BCD + Ext.)	CCh
163	DR24	DIFE (Storagenumber 17)	08h
164	DR24	VIF (Volume I)	13h
165	DR24	Value LSB	xxh
166	DR24	Value	xxh
167	DR24	Value	xxh
168	DR24	Value MSB	xxh
169	DR25	DIF (8 digit BCD + Ext.)	8Ch
170	DR25	DIFE (Storagenumber 18)	09h
171	DR25	VIF (Volume I)	13h
172	DR25	Value LSB	xxh
173	DR25	Value	xxh
174	DR25	Value	xxh
175	DR25	Value MSB	xxh
176	DR26	DIF (8 digit BCD + Ext.)	CCh
177	DR26	DIFE (Storagenumber 19)	09h
178	DR26	VIF (Volume I)	13h

179	DR26	Value LSB	xxh		
180	DR26	Value	xxh		
181	DR26	Value	xxh		
182	DR26	Value MSB	xxh		
183	DR27	DIF (8 digit BCD + Ext.)	8Ch		
184	DR27	DIFE (Storagenumber 20)	0Ah		
185	DR27	VIF (Volume I)	13h		
186	DR27	Value LSB	xxh		
187	DR27	Value	xxh		
188	DR27	Value	xxh		
189	DR27	Value MSB	xxh		
190	DR28	DIF (Manufacturerspecific + Frame)	1Fh		
191	DR28	PBIT	xxh		
192	Checksum		xxh		DLL
193	Stop	Stop byte	16h		

## Frame 2:

### RSP-UD (M-Bus)

Byte No	OMS M-Bus frame		Water meter example	Layer
	Field Name	Content	Bytes [hex]	
			plain	
1	Start	Start byte	68h	Data Link Layer (DLL)
2	L Field	Length of data (xx bytes)	xxh	
3	L Field	Length of data (xx bytes)	xxh	
4	Start	Start byte	68h	
5	C Field	Respond user data	08h	
6	A-Field	Secondary addressing mode	FDh	
7	CI Field	72h (long header)	72h	Transport Layer (TPL)
8	Ident.Nr.	Ident No LSB (BCD)	78h	
9	Ident.Nr.	Ident No (BCD)	56h	
10	Ident.Nr.	Ident No (BCD) (=12345678)	34h	
11	Ident.Nr.	Ident No MSB (BCD)	12h	
12	Manufr	Manufacturer code	92h	
13	Manufr	Manufacturer code	15h	
14	Version	Version (or Generation number)	xxh	
15	Device type	Device type (Medium=Water)	07h	
16	Access No.	Access number of Meter	2Ah	
17	Status	M-Bus state	00h	
18	Config Field	no Encryption	00h	
19	Config Field	no Encryption	00h	
20	DR29	DIF (16 bit Int. + max Val. + Extension)	92h	Appli

21	DR29	DIFE (Storagenumber 28)	0Eh
22	DR29	VIF (Date Type G)	6Ch
23	DR29	Value	xxh
24	DR29	Value	xxh
25	<b>DR30</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>94h</b>
26	DR30	DIFE (Storagenumber 28)	0Eh
27	DR30	VIF (Volume flow [l/h])	3Bh
28	DR30	Value	xxh
29	DR30	Value	xxh
30	<b>DR30</b>	<b>Value</b>	<b>xxh</b>
31	<b>DR30</b>	<b>Value</b>	<b>xxh</b>
32	DR31	DIF (16 bit Int. + max Val. + Extension)	D2h
33	DR31	DIFE (Storagenumber 29)	0Eh
34	DR31	VIF (Date Type G)	6Ch
35	DR31	Value	xxh
36	DR31	Value	xxh
37	<b>DR32</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>D4h</b>
38	DR32	DIFE (Storagenumber 29)	0Eh
39	DR32	VIF (Volume flow [l/h])	3Bh
40	DR32	Value	xxh
41	DR32	Value	xxh
42	<b>DR32</b>	<b>Value</b>	<b>xxh</b>
43	<b>DR32</b>	<b>Value</b>	<b>xxh</b>
44	DR33	DIF (16 bit Int. + max Val. + Extension)	92h
45	DR33	DIFE (Storagenumber 30)	0Fh
46	DR33	VIF (Date Type G)	6Ch
47	DR33	Value	xxh
48	DR33	Value	xxh
49	<b>DR34</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>94h</b>
50	DR34	DIFE (Storagenumber 30)	0Fh
51	DR34	VIF (Volume flow [l/h])	3Bh
52	DR34	Value	xxh
53	DR34	Value	xxh
54	<b>DR34</b>	<b>Value</b>	<b>xxh</b>
55	<b>DR34</b>	<b>Value</b>	<b>xxh</b>
56	DR35	DIF (16 bit Int. + max Val. + Extension)	D2h
57	DR35	DIFE (Storagenumber 31)	0Fh
58	DR35	VIF (Date Type G)	6Ch
59	DR35	Value	xxh
60	DR35	Value	xxh
61	<b>DR36</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>D4h</b>
62	DR36	DIFE (Storagenumber 31)	0Fh
63	DR36	VIF (Volume flow [l/h])	3Bh
64	DR36	Value	xxh
65	DR36	Value	xxh
66	<b>DR36</b>	<b>Value</b>	<b>xxh</b>
67	<b>DR36</b>	<b>Value</b>	<b>xxh</b>
68	DR37	DIF (16 bit Int. + max Val. + Extension)	92h

69	DR37	DIFE (Extension)	80h
70	DR37	DIFE (Storagenumber 32)	01h
71	DR37	VIF (Date Type G)	6Ch
72	DR37	Value	xxh
73	DR37	Value	xxh
74	<b>DR38</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>94h</b>
75	DR38	DIFE (Extension)	80h
76	DR38	DIFE (Storagenumber 32)	01h
77	DR38	VIF (Volume flow [l/h])	3Bh
78	DR38	Value	xxh
79	DR38	Value	xxh
80	<b>DR38</b>	<b>Value</b>	<b>xxh</b>
81	<b>DR38</b>	<b>Value</b>	<b>xxh</b>
82	DR39	DIF (16 bit Int. + max Val. + Extension)	D2h
83	DR39	DIFE (Extension)	80h
84	DR39	DIFE (Storagenumber 33)	01h
85	DR39	VIF (Date Type G)	6Ch
86	DR39	Value	xxh
87	DR39	Value	xxh
88	DR40	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>D4h</b>
89	DR40	DIFE (Extension)	80h
90	DR40	DIFE (Storagenumber 33)	01h
91	DR40	VIF (Volume flow [l/h])	3Bh
92	DR40	Value	xxh
93	DR40	Value	xxh
94	<b>DR40</b>	<b>Value</b>	<b>xxh</b>
95	<b>DR40</b>	<b>Value</b>	<b>xxh</b>
96	DR41	DIF (16 bit Int. + max Val. + Extension)	92h
97	DR41	DIFE (Extension)	81h
98	DR41	DIFE (Storagenumber 34)	01h
99	DR41	VIF (Date Type G)	6Ch
100	DR41	Value	xxh
101	DR41	Value	xxh
102	<b>DR42</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>94h</b>
103	DR42	DIFE (Extension)	81h
104	DR42	DIFE (Storagenumber 34)	01h
105	DR42	VIF (Volume flow [l/h])	3Bh
106	DR42	Value	xxh
107	DR42	Value	xxh
108	<b>DR42</b>	<b>Value</b>	<b>xxh</b>
109	<b>DR42</b>	<b>Value</b>	<b>xxh</b>
110	DR43	DIF (16 bit Int. + max Val. + Extension)	D2h
111	DR43	DIFE (Extension)	81h
112	DR43	DIFE (Storagenumber 35)	01h
113	DR43	VIF (Date Type G)	6Ch
114	DR43	Value	xxh
115	DR43	Value	xxh
116	<b>DR44</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>D4h</b>

117	DR44	DIFE (Extension)	81h
118	DR44	DIFE (Storagenumber 35)	01h
119	DR44	VIF (Volume flow [l/h])	3Bh
120	DR44	Value	xxh
121	DR44	Value	xxh
122	DR44	Value	xxh
123	DR44	Value	xxh
124	DR45	DIF (16 bit Int. + max Val. + Extension)	92h
125	DR45	DIFE (Extension)	82h
126	DR45	DIFE (Storagenumber 36)	01h
127	DR45	VIF (Date Type G)	6Ch
128	DR45	Value	xxh
129	DR45	Value	xxh
130	DR46	DIF (32 bit Int. + max Val. + Extension)	94h
131	DR46	DIFE (Extension)	82h
132	DR46	DIFE (Storagenumber 36)	01h
133	DR46	VIF (Volume flow [l/h])	3Bh
134	DR46	Value	xxh
135	DR46	Value	xxh
136	DR46	Value	xxh
137	DR46	Value	xxh
138	DR47	DIF (16 bit Int. + max Val. + Extension)	D2h
139	DR47	DIFE (Extension)	82h
140	DR47	DIFE (Storagenumber 37)	01h
141	DR47	VIF (Date Type G)	6Ch
142	DR47	Value	xxh
143	DR47	Value	xxh
144	DR48	DIF (32 bit Int. + max Val. + Extension)	D4h
145	DR48	DIFE (Extension)	82h
146	DR48	DIFE (Storagenumber 37)	01h
147	DR48	VIF (Volume flow [l/h])	3Bh
148	DR48	Value	xxh
149	DR48	Value	xxh
150	DR48	Value	xxh
151	DR48	Value	xxh
152	DR49	DIF (16 bit Int. + max Val. + Extension)	92h
153	DR49	DIFE (Extension)	83h
154	DR49	DIFE (Storagenumber 38)	01h
155	DR49	VIF (Date Type G)	6Ch
156	DR49	Value	xxh
157	DR49	Value	xxh
158	DR50	DIF (32 bit Int. + max Val. + Extension)	94h
159	DR50	DIFE (Extension)	83h
160	DR50	DIFE (Storagenumber 38)	01h
161	DR50	VIF (Volume flow [l/h])	3Bh
162	DR50	Value	xxh
163	DR50	Value	xxh
164	DR50	Value	xxh

165	<b>DR50</b>	<b>Value</b>	<b>xxh</b>	DLL
166	DR51	DIF (16 bit Int. + max Val. + Extension)	D2h	
167	DR51	DIFE (Extension)	83h	
168	DR51	DIFE (Storagenumber 39)	01h	
169	DR51	VIF (Date Type G)	6Ch	
170	DR51	Value	xxh	
171	DR51	Value	xxh	
172	<b>DR52</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>D4h</b>	
173	DR52	DIFE (Extension)	83h	
174	DR52	DIFE (Storagenumber 39)	01h	
175	DR52	VIF (Volume flow [l/h])	3Bh	
176	DR52	Value	xxh	
177	DR52	Value	xxh	
178	<b>DR52</b>	<b>Value</b>	<b>xxh</b>	
179	<b>DR52</b>	<b>Value</b>	<b>xxh</b>	
180	DR53	DIF (16 bit Int. + max Val. + Extension)	92h	
181	DR53	DIFE (Extension)	80h	
182	DR53	DIFE (Storagenumber 40)	01h	
183	DR53	VIF (Date Type G)	6Ch	
184	DR53	Value	xxh	
185	DR53	Value	xxh	
186	<b>DR54</b>	<b>DIF (32 bit Int. + max Val. + Extension)</b>	<b>94h</b>	
187	DR54	DIFE (Extension)	80h	
188	DR54	DIFE (Storagenumber 40)	01h	
189	DR54	VIF (Volume flow [l/h])	3Bh	
190	DR54	Value	xxh	
191	DR54	Value	xxh	
192	<b>DR54</b>	<b>Value</b>	<b>xxh</b>	
193	<b>DR54</b>	<b>Value</b>	<b>xxh</b>	
194	Checksum		xxh	
195	Stop	Stop byte	16h	

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