

FALCON PR6/PR7 Operating instructions

M-Bus module for Elster water meter with Falcon register

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1 Description of functions

The Falcon M-Bus makes it possible to read out Elster water meters (having a Falcon register) in an M-Bus system. To accomplish this, an attachment is mounted onto an appropriately prepared water meter. The volume pulses will be summed by the Falcon M-Bus to a volume meter count.



PR6/PR7 Falcon communications module

Once the meter count has been parameterised via the M-Bus, the Falcon M-Bus will transfer the exact meter count shown on the water meter's drum-type register. The free program MBCONF can be used for parameterisation. Because of its intuitive user interface, MBCONF is very simple to use.

Another feature of the Falcon M-Bus is its reporting date function. The user can program an annual reporting date. In conjunction with the unit's real-time clock with calendar function, the meter's current meter count will be specially stored on the configured date at 00:00 (change of day to the reporting date). The reporting date can be changed without losing the previous reporting date's meter count. A write-protect function prevents pre-set values from being altered.

More information about this can be found in the Falcon M-Bus protocol.

When operated on the M-Bus, the Falcon derives its power from the M-Bus. A built-in battery backs up operation even when the M-Bus has an outage failure. The battery is already activated when the unit is delivered.

The Falcon M-Bus stores the meter count on the first day of every month at 00:00.

The Falcon M-Bus 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 M-Bus

Refer to the separate installation instructions.

2.2 Connection

The Falcon M-Bus will be delivered with a permanently attached 2 conductor M-Bus cable having a length of 2 m (PR6) or 5 m (PR7). Conductor ends are fit with insulated sleeves to improve handling. M-Bus system connections can be implemented, for example, with suitable distribution terminal strips. The polarity of the M-Bus voltage is irrelevant.

3 Parameterisation 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 2.7 and higher, which will be described below.

3.1 Installation

The MBCONF parameterisation software for the Falcon M-Bus is a 32-bit application that can be executed on an IBM compatible PC running a Windows 95 / 98 / XP / NT 4.0 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).

The Falcon M-Bus device to be set up 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 Operation

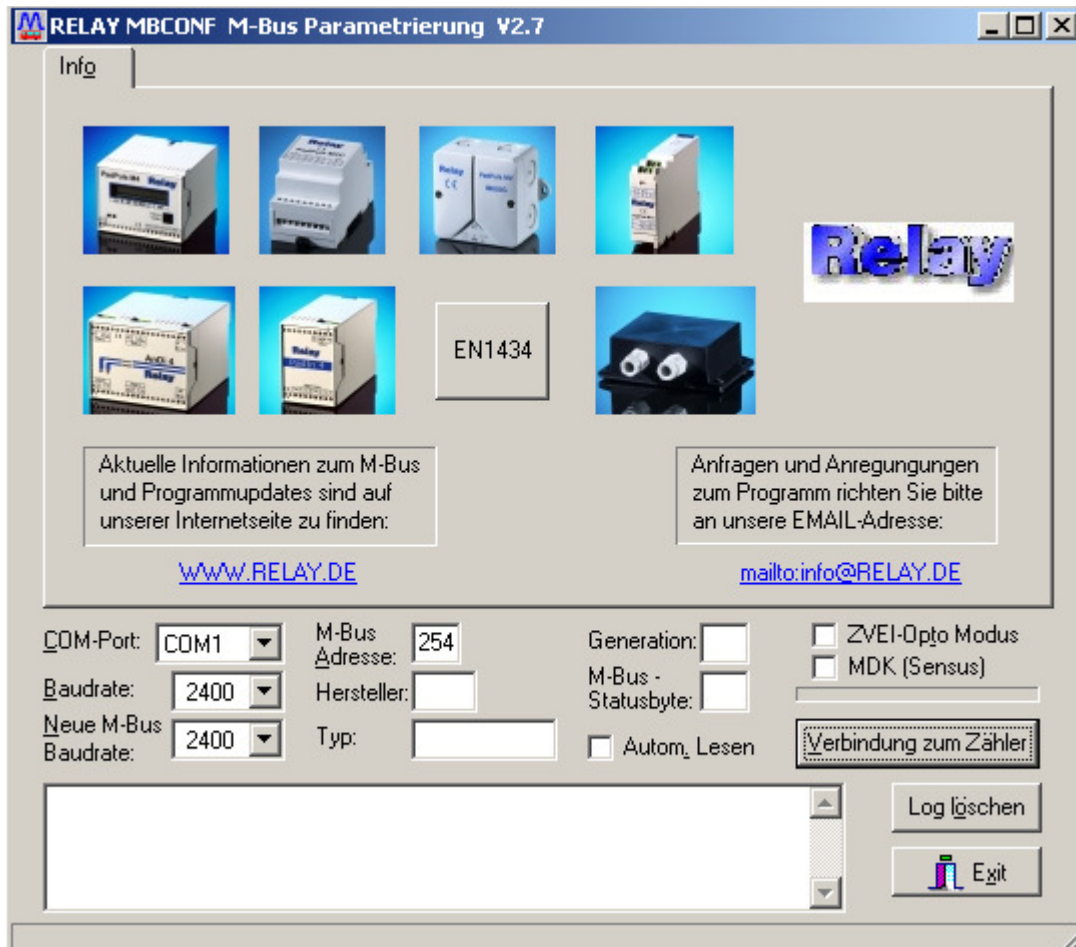
Once the program has been started, it can be operated according to Windows conventions with the mouse and keyboard. When the mouse pointer is placed on a control button or entry field, a tip will appear with a brief description of the object's function. Fields and boxes displayed in light grey cannot be edited.

All entry fields and control buttons have an underscored letter in their name label. The respective function can be activated by pressing the keyboard key combination of [Ctrl] and the given underscored letter. Within dialogues, the cursor can be moved forward or back with the keyboard keys [TAB] and [SHIFT][TAB], respectively. [SPACE] activates or deactivates selection fields. Multiple selections (control arrow at right end) can be activated with [⇓]. The selection itself is then done with [⇓] and [⇑]. Pressing [RETURN] will adopt the selection. Pressing [ESC] will exit the selection without adopting the selection.

The program's interface is designed as a tab card system. The card "Info" contains the general settings for establishing communications with the M-Bus device to be parameterised. For example, it is here that the PC's COM port, the PC's baud-rate, M-Bus device's baud-rate and the primary address to be used for M-Bus communication can be set. Once a means of communicating with the M-Bus device has been

successfully established, additional manufacturer information and device-specific information will appear in the "Info" card.

3.3 Info tab card



This tab card shows several photos of supported M-Bus devices from the product lines of the companies Relay GmbH, PadMess GmbH and other manufacturers. Here there are also Internet links for downloading the program's current version and an email address where critique and program suggestions can be posted.

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, (600, 1200) and 2400 baud and corresponds to the currently used M-Bus baud-rate. The baud-rate set must match the baud-rate for the given M-Bus device (see also, New baud-rate). The Falcon M-Bus supports the baud-rates 300, 600, 1200 and 2400 without automatic detection, i.e. the baud-rate is programmed permanently. However, only the baud-rates 300 and 2400 can be set.

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. Once the Falcon M-Bus has understood this command, it will acknowledge the command in the old baud-rate with the single character "0xE5" (0x for hexadecimal notation). Only then does a changeover to the new baud-rate take place. Thereafter the baud-rate of the PC should be changed to correspond if the Falcon M-Bus is to be read out again.

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.

Meter connection

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). This field cannot be edited (read only).

Generation displays the version of the connected M-Bus module's firmware. This field cannot be edited (read only). For the Falcon M-Bus, this is GEN = 0A.

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

Status displays the M-Bus status of the connected device. This field cannot be edited (read only).

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 parameterised with the help of an optical head (e.g. the PadPuls M4/M4L).

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

Autom. read 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 present in the log window.

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

3.4 Falcon tab card

The screenshot shows the 'RELAY MBCONF M-Bus Parametrierung V2.7' software window. The 'Falcon' tab is selected. The interface contains several input fields and control buttons:

- Primäradresse:** 6
- ID (Sek.Adr.):** 60000000
- Medium:** Kaltwasser
- Akt. Zeitpunkt:** 16.05.2009, 19:09:00
- Volumen:** 00005888 Liter
- Volumen (rückwärts):** 00000009 Liter
- Momentaner Durchfluss:** 0 l/h
- Stichtagswert:** 00000000 Liter
- Stichtag:** 31.08.08
- Nächster Stichtag:** 06.08.2009
- M-Bus Telegramm-Einstellungen:** Kurztelegramm (selected), Langtelegramm
- COM-Port:** COM3
- M-Bus Adresse:** 254
- Generation:** 0A
- Baudrate:** 2400
- Hersteller:** ELS
- M-Bus - Statusbyte:** 00
- Neue M-Bus Baudrate:** 2400
- Typ:** Elster Falcon
- Autom. Lesen:** unchecked
- ZVEI-Opto Modus:** unchecked
- MDK (Sensus):** unchecked

Buttons include 'PC-Uhr übernehmen', 'Einstellungen / Warnungen', 'Monsatwerte löschen', 'Monsatwerte zeigen', 'Kurztel. einschalten', 'Langtel. einschalten', 'Lesen', 'Schreiben', 'Log löschen', and 'Exit'. A green highlight is visible over the 'Schreibschutz ist aus' text.

Hex dump (RX-Puffer):

```

10 5B FE 59 16
68 4E 4E 68 08 06 72 00 00 00 60 93 15 00 16 84 00 00 00 0C 13
68 50 00 00 0C 93 3C 09 00 00 00 04 60 09 13 38 15 42 6C 1F 18
4C 13 00 00 00 00 42 EC 7E 26 18 42 6C 3E 14 12 38 00 00 02 38
00 00 0F 06 02 24 01 01 01 00 01 02 F4 01 20 09 05 01 00 FE 16

```

This tab card shows the current settings and values for the Falcon 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. A value between 0 and 250 is to be entered into this field if the primary address is to be changed. Activation of the "Write" control button will transfer the primary address and other alterable settings on this tab card to the Falcon M-Bus. 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 M-Bus. We recommend that the serial number of the connected water meter be programmed here.

Medium describes the medium to be measured on the selected Falcon M-Bus. Selection: water, hot water, cold water, hot/cold water

Cur. time is the date and time currently in effect in the meter's internal clock in the format DD.MM.YY_hh.mm. This field can only be edited, and changed in the Falcon M-Bus if the check-box "Time change / write" is activated. The "Adopt PC clock" control button will make a one-time 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.

Time change / write activation of this control check-box permits editing and programming of the "Cur. time" and "Next reporting date" fields. This check-box will automatically deactivate again after parameterisation with the "Write" control button has been done successfully.

Volume is the summed meter count in litres. Through programming, this value for volume can be used to adjust the pulse adapter to the connected meter (see section 3.5.3).

Volume (reverse) is the meter count in litres for return flow water.

Change volume activation of this check-box permits editing and programming of the "Volume" and "Volume (reverse)" fields. This check-box will automatically deactivate again after parameterisation with the "Write" control button has been done successfully.

Current flow displays the current flow throughput in [l/h] or in [m³/h].

Delete monthly values deletes all monthly values in the Falcon M-Bus, i.e. every monthly date will be set to 00.00.00 and every monthly meter count will be set to 00000000 in memory.

Display monthly values displays all Falcon M-Bus stored monthly values in a pop-up window. This control button is only active when the "Long telegram" ra-

dio button is active. This control will also store values for maximum throughput of the day and the month.

Adopt PC clock

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

Reporting date value is the stored meter count for the aforementioned date. This field cannot be edited (read only).

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

Next reporting date

is the next reporting date (i.e. date for the next storage of meter count) in the format DD.MM.YY. Storing will take place at 00:00 on the reporting 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 or programmed when the check-box "Time change / write" is activated. Here too, a click on the control arrow will open the calendar.

Settings / Warnings

opens a new tab card responsible for the configuration of alarms and other reports (see section 3.5).

M-Bus telegram settings

displays the setting for telegram type effective for the Falcon M-Bus.

Short teleg. on

switches the mode for M-Bus protocol on the Falcon M-Bus to short-form telegram (without monthly values) without writing all other parameters.

Long teleg. on

switches the mode for M-Bus protocol on the Falcon M-Bus to long-form telegram (with monthly values) without writing all other parameters.

Read

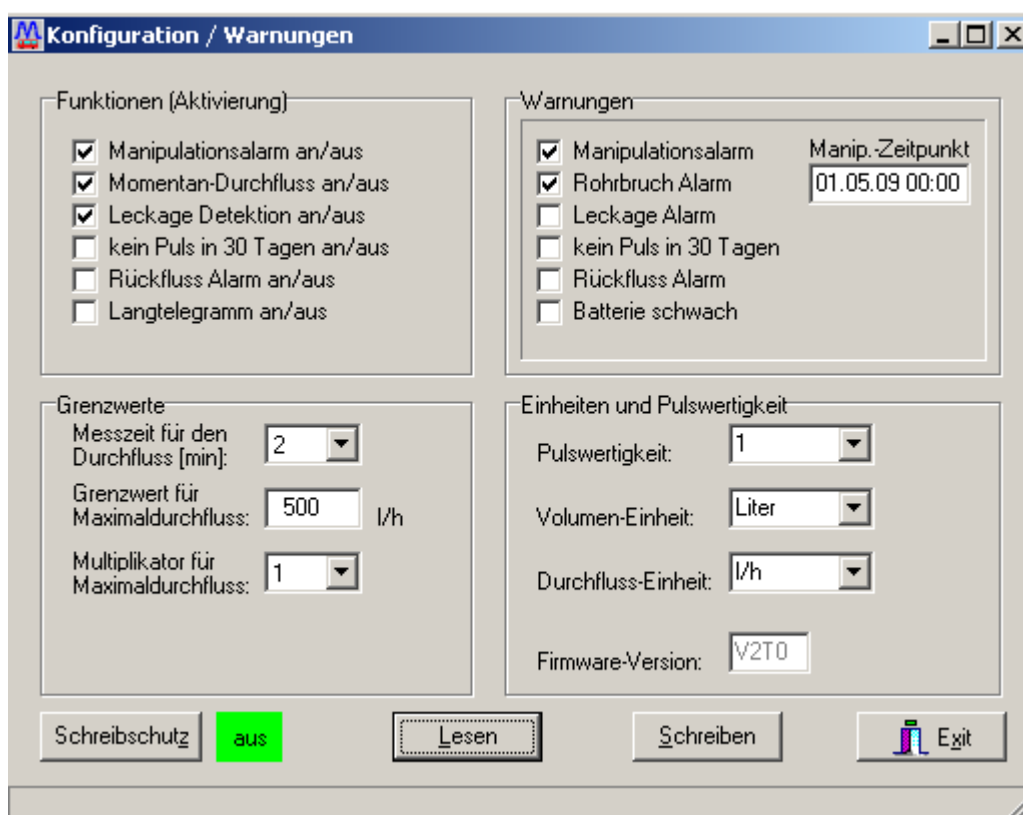
updates M-Bus data on the selected tab card. Even fields which cannot be modified will be updated.

Write sends the current settings to the device where they will be stored in RAM. These values even remain intact even after a warm-start or watchdog reset. A review of parameterisation by way of a subsequent read operation is recommended.

Notice 1:

If a new device is connected, the control button "Meter connection" must first be activated. Afterwards the tab card will be brought into the appropriate state.

3.5 Configuration / Warnings tab card



This tab card shows the currently set configuration for the Falcon M-Bus. Limit values and functions can be activated by marking respective check-boxes in the "Functions" group box.

3.5.1 Warnings / Alarms

An alarm is activated by marking its check-box in the "Functions" group box (top left). A warning signals compliance with certain conditions.

Manipulation alarm

is switched on/off with the **Manipulation alarm on/off** check-box and, if activated, will signal if the Falcon M-Bus is removed from the meter. This warning will be displayed with date and time (but does not specify minutes).

Pipe break alarm

is switched on/off with the **Current throughput on/off** check-box and, if activated, will signal if current throughput is greater than the pre-set threshold (**Limit value:** see section 3.5.2). This warning will be displayed with date and time (but does not specify minutes).

Leakage alarm

is switched on/off with the **Leakage detection on/off** check-box. This alarm signals that at least 1 pulse was output every hour within a day (24 hours).

No pulse in 30 days

is switched on/off with the **No pulse in 30 days on/off** check-box. It signals that no water flow has taken place within the last 30 days (the meter count has not changed).

Return flow alarm

is switched on/off with the **Return flow alarm on/off** check-box. It signals that a volume of at least 1 litre of water (PR6) or 3 litres of water (PR7) has flowed back. This warning will be displayed with date and time (but does not specify minutes).

Long telegram on/off

is switched on/off with the **Long telegram on/off** check-box and determines the output of monthly values.

3.5.1.1 Limit values (for throughput measurement)

Throughput measurement time (min)

The length of time for a measurement is to be entered here. A value between 1 minute and 60 minutes can be entered.

Limit value for maximum throughput

Enter the threshold value for throughput in l/h or in m³/h (see section 3.5.3).

Maximum throughput multiplier

Specifies how often throughput may exceed the pre-set threshold before an alarm is issued.

3.5.2 Units and pulse value

Pulse value specifies how many pulses are generated when the modulation disc has made one turn.

Volume unit allows selection of a 5, 6 or 7-digit drum-type register. The Falcon M-Bus realises the meter count wrap-around to 0 then according to the selection (litre, 10 litres, 100 litres):

Type A: 99,999.999 m³ (5-digit) will be displayed as 99999999 L (1 litre resolution)

Type B: 999,999.99 m³ (6-digit) will be displayed as 99999999 L (10 litre resolution)

Type C: 9,999,999.9 m³ (7-digit) will be displayed as 99999999 L (100 litre resolution)

Throughput unit provides an opportunity to select the volume unit ([l/h] or [m³/h]).

Firmware version displays the current firmware version (e.g. V2T0).

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.

Write sends the current settings to the device where they will be stored in RAM. A review of parameterisation by way of a subsequent read operation is recommended.

Write protect off/on

when switched on, this prevents modification of the following settings:

- Volume level (additionally protected by the "Change volume" check-box).
- Volume reverse (also additionally protected by the "Volume (reverse)" check-box).
- Date and time (additionally protected by the "Time change" check-box).
- Next reporting date (additionally protected by the "Change volume" check-box).
- Delete monthly values
- Delete maximum throughput
- Alarms / warnings on/off and delete
- Limit values
- Volume unit / pulse value

4 M-Bus telegrams

4.1 RSP_UD: data transfer on request

4.1.1 Short – telegram

Falcon M-Bus generation 02, RSP_UD short telegram with sample values (Falcon M-Bus → master)

| No. | Field | Content in hex. | Remarks | See section |
|-----|--|-------------------|---|-------------|
| 1 | Start | 68 | Long frame start character | |
| 2 | L | 74 | Field length, excluding C-field to CS | |
| 3 | L | 74 | Field length, repeated | |
| 4 | Start | 68 | Long frame start character | |
| 5 | C | 08 | Response with user data | |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing | |
| 7 | CI | 72 | Response with variable data format / LSB first | |
| 8 | Identification number | 45 | 8-digit BCD, here: 70112345 (serial no. 12345, produced in 01/2007) | |
| 9 | | 23 | | |
| 10 | | 11 | | |
| 11 | | 70 | | |
| 12 | Manufacturer identification | 93 | 3 letter manufacturer code: ELS | |
| 13 | | 15 | | |
| 14 | Generation | 0A | Falcon M-Bus generation 0A | |
| 15 | Medium | 06 / 07 / 16 / 17 | hot water or water or cold water or hot and cold water | |
| 16 | Access counter | 02 | Access counter (will increment after every RSP_UD), here: 02 | |
| 17 | Status | 00 | Status byte, here: 00 -> no error | |
| 18 | Signature | 00 | no encryption, for wireless M-Bus only | |
| 19 | | 00 | | |
| 20 | DIF | 0C | 8-digit BDC | |
| 21 | VIF | 13 | Volume level in litres | 5.1 |
| 22 | current volume | 67 | here: 01234567 litres | |
| 23 | | 45 | | |
| 24 | | 23 | | |
| 25 | | 01 | | |
| 26 | DIF | 04 | 32-bit binary data | |
| 27 | VIF | 6D | Date and time: data type F (CP32) | |
| 28 | current date / time | 3A | here: 06.02.2007 13:58 | |
| 29 | | 0D | | |
| 30 | | E6 | | |
| 31 | | 02 | | |
| 32 | DIF | 42 | 16-bit binary data, memory number 1 | |
| 33 | VIF | 6C | Date: data type G (CP16) | |
| 34 | last annual reporting date | E1 | here: 01.01.2007 | |
| 35 | | 01 | | |
| 36 | DIF | 4C | 8-digit BCD, memory number 1 | |
| 37 | VIF | 13 | Volume in litres | |
| 38 | Volume on the last annual reporting date | 51 | here: 00456951 litres | |
| 39 | | 69 | | |
| 40 | | 45 | | |
| 41 | | 00 | | |
| 42 | DIF | 42 | 16-bit binary data, memory number 1 | |
| 43 | VIF | EC | Date: data type G (CP16) | |
| 44 | VIFE | 7E | Future value | |
| 45 | Next annual reporting date | 01 | here: 01.01.2008 | |
| 46 | | 11 | | |
| 47 | DIF | 12 | 16 bits, binary coded | |
| 48 | VIF | 3B / 3E | Throughput in l/h or m ³ /h | 5.2 |
| 49 | Max. | 39 | e.g. 5945 l/h | |

| | | | | |
|----|------------|----|--|--|
| 50 | throughput | 17 | | |
|----|------------|----|--|--|

Continued on the next page!

Continuation

| No. | Field | Content in hex. | Remarks | See section |
|-----|----------------------------------|-----------------|--|-------------|
| 51 | DIF | 42 | | |
| 52 | VIF | 6C | Date: data type G (CP16) | |
| 53 | Date of last max. throughput | 01 | here: 01.01.2008 | |
| 54 | | 11 | | |
| 55 | DIF | 02 | | |
| 56 | VIF | 3B / 3E | Throughput in l/h or m³/h | |
| 57 | Current throughput | F9 | e.g. 6137 l/h | |
| 58 | | 17 | | |
| 59 | DIF | 0F | all subsequent characters are manufacturer-specific (up to the checksum) | |
| 60 | Alarm activation | 0E | 2 bytes, set alarm. | 5.3 |
| 61 | | 42 | | |
| 62 | Warning | 20 | 1 byte, alarm messages. Here: manipulation message | 5.4 |
| 63 | Units and pulse value | 01 / 02 / 04 | Pulse value 1 / 10 / 100 | |
| 64 | | 01 / 02 / 04 | Meter type A / B / C | |
| 65 | | 01 / 02 | Units in l/h or m³/h | |
| 66 | | 00 | 1 byte, reserved for expansion | |
| 67 | | 05 | 1 byte, multiplier for maximum throughput . Here: 5 | |
| 68 | | 08 | here: 8 min. Coded in 1 byte, throughput measurement time (1 ... 60 minutes) | |
| 69 | Limit values | 5E | 1 byte, limit value for maximum throughput (low order byte) | 350 l/h |
| 70 | | 01 | 1 byte, limit value for maximum throughput (high order byte) | |
| 71 | Firmware version | 20 | 1 byte, 20 stands here for version: V2T0 | 5.5 |
| 72 | Date and time output of warnings | 3D | 3 bytes, manipulation alarm. Here: 29.02.08 17:00 | 5.6 |
| 73 | | 12 | | |
| 74 | | 08 | | |
| 75 | | 3D | | |
| 76 | | 12 | | |
| 77 | | 08 | 3 bytes, return flow alarm. Here: 29.02.08 17:00 | |
| 78 | PBITS | 00 / 01 | PBITS = 00 : short telegram write protect off. | 5.7 |
| 79 | CS | | Checksum across C-field up to PBITS | |
| 80 | Stop | 16 | Stop character | |

4.1.2 Long – telegram

Long telegram with monthly values. Sequence: most recent monthly value first

Falcon M-Bus generation 0A, RSP_UD long telegram with sample values (Falcon M-Bus → master)

| No. | Field | Content in hex. | Remarks |
|-----|--|-------------------|---|
| 1 | Start | 68 | Long telegram start character |
| 2 | L | 217 | Field length |
| 3 | L | 217 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 08 | Response with user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 72 | Response with variable data format / LSB first |
| 8 | Identification number | 45 | 8-digit BCD, here: 70112345 (serial no. 12345, produced in 01/2007) |
| 9 | | 23 | |
| 10 | | 11 | |
| 11 | | 70 | |
| 12 | Manufacturer identification | 93 | 3 letter manufacturer code: ELS |
| 13 | | 15 | |
| 14 | Generation | 0A | Falcon M-Bus generation 0A |
| 15 | Medium | 06 / 07 / 16 / 17 | hot water or water or cold water or hot and cold water |
| 16 | Access counter | 02 | Access counter (will increment after every RSP_UD), here: 02 |
| 17 | Status | 00 | Status byte, here: 00 -> no error |
| 18 | Signature | 00 | no encryption, for wireless M-Bus only |
| 19 | | 00 | |
| 20 | DIF | 0C | 8-digit BDC |
| 21 | VIF | 13 | Volume level in litres |
| 22 | current volume | 67 | here: 01234567 litres |
| 23 | | 45 | |
| 24 | | 23 | |
| 25 | | 01 | |
| 26 | DIF | 04 | 32-bit binary data |
| 27 | VIF | 6D | Date and time: data type F (CP32) |
| 28 | current date / time | 35 | here: 01.04.2008 07:53 |
| 29 | | 07 | |
| 30 | | 01 | |
| 31 | | 14 | |
| 32 | DIF | 42 | 16-bit binary data, memory number 1 |
| 33 | VIF | 6C | Date: data type G (CP16) |
| 34 | last annual reporting date | 01 | here: 01.01.2008 |
| 35 | | 11 | |
| 36 | DIF | 4C | 8-digit BCD, memory number 1 |
| 37 | VIF | 13 | Volume in litres |
| 38 | Volume on the last annual reporting date | 51 | here: 00456951 litres |
| 39 | | 69 | |
| 40 | | 45 | |
| 41 | | 00 | |
| 42 | DIF | 42 | 16-bit binary data, memory number 1 |
| 43 | VIF | EC | Date: data type G (CP16) |
| 44 | VIFE | 7E | Future value |
| 45 | Next annual reporting date | 21 | here: 01.01.2009 |
| 46 | | 11 | |
| 47 | DIF | 12 | 16-bit binary data |
| 48 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 49 | Max. throughput | 39 | e.g. 5945 l/h |
| 50 | | 17 | |

Continued on the next page!

Continuation:

| No. | Field | Content in hex. | Remarks |
|-----|------------------------------|-----------------|--|
| 51 | DIF | 42 | |
| 52 | VIF | 6C | Date: data type G (CP16) |
| 53 | Date of last max. throughput | 01 | here: 01.01.2008 |
| 54 | | 11 | |
| 55 | DIF | 02 | 16-bit binary data |
| 56 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 57 | Current throughput | 67 | e.g. 17767 l/h |
| 58 | | 45 | |
| 59 | DIF | 82 | 16-bit binary data |
| 60 | DIFE | 01 | Memory number 2 |
| 61 | VIF | 6C | Date: data type G (CP16) |
| 62 | Month1-Date | 01 | here: 01.04.2008 |
| 63 | | 14 | |
| 64 | DIF | 8C | 8-digit BDC |
| 65 | DIFE | 01 | Memory number 2 |
| 66 | VIF | 13 | Date: data type G (CP16) |
| 67 | Monat1-State | 79 | Meter count, month 1 = 00000279 |
| 68 | | 02 | |
| 69 | | 00 | |
| 70 | | 00 | |
| 71 | DIF | C2 | 16-bit binary data |
| 72 | DIFE | 01 | Memory number 3 |
| 73 | VIF | 6C | Date: data type G (CP16) |
| 74 | Month2-Date | 01 | here: 01.03.2008 |
| 75 | | 13 | |
| 76 | DIF | CC | 8-digit BDC |
| 77 | DIFE | 01 | Memory number 3 |
| 78 | VIF | 13 | Date: data type G (CP16) |
| 79 | Month2-State | 67 | Meter count, month 2 = 00000267 |
| 80 | | 02 | |
| 81 | | 00 | |
| 82 | | 00 | |
| | ... | ... | |
| 178 | DIF | 82 | 16-bit binary data |
| 179 | DIFE | 06 | Memory number 12 |
| 180 | VIF | 6C | Date: data type G (CP16) |
| 181 | Month11-Date | E1 | here: 01.03.2007 |
| 182 | | 03 | |
| 183 | DIF | 8C | 8-digit BDC |
| 184 | DIFE | 06 | Memory number 12 |
| 185 | VIF | 13 | Date: data type G (CP16) |
| 186 | Month11-State | 12 | Meter count, month 11 = 00000112 |
| 187 | | 01 | |
| 188 | | 00 | |
| 189 | | 00 | |
| 190 | DIF | C2 | 16-bit binary data |
| 191 | DIFE | 06 | Memory number 13 |
| 192 | VIF | 6C | Date: data type G (CP16) |
| 193 | Month12-Date | E1 | here: 01.02.2007 |
| 194 | | 02 | |
| 195 | DIF | CC | 8-digit BDC |
| 196 | DIFE | 06 | Memory number 13 |
| 197 | VIF | 13 | Date: data type G (CP16) |
| 198 | Month12-State | 99 | Meter count, month 12 = 00000099 |
| 199 | | 00 | |
| 200 | | 00 | |

| | | | |
|-----|--|----|--|
| 201 | | 00 | |
|-----|--|----|--|

Continued on the next page!

Continuation:

| No. | Field | Content in hex. | Remarks |
|-----|----------------------------------|-----------------|---|
| 202 | DIF | 0F | all subsequent characters are manufacturer-specific (up to the checksum) |
| 203 | Alarm activation | 0E | 2 bytes, set alarm. |
| 204 | | 42 | |
| 205 | | 20 | |
| 206 | Warning | 01 / 02 / 04 | 1 byte, alarm messages. Here: manipulation message |
| 207 | | 01 / 02 / 04 | |
| 208 | | 01 / 02 | |
| 209 | Units and pulse value | 00 | Pulse value 1 / 10 / 100 |
| 210 | | 05 | Meter type A / B / C |
| 211 | | 08 | Units in l/h or m ³ /h |
| 212 | | 5E | 1 byte, reserved for expansion |
| 213 | | 01 | 1 byte, multiplier for maximum throughput . Here: 5 here: 8 min. Coded in 1 byte, throughput measurement time (1 ... 60 minutes) |
| 214 | Limit values | | 1 byte, limit value for maximum throughput (low order byte) |
| 215 | | | 1 byte, limit value for maximum throughput (high order byte) 350 l/h |
| 216 | Firmware version | 20 | 1 byte, 20 stands here for version: V2T0 |
| 217 | Date and time output of warnings | 3D | 3 bytes, manipulation alarm. Here: 29.02.08 17:00 |
| 218 | | 12 | |
| 219 | | 08 | |
| 220 | | 3D | |
| 221 | | 12 | |
| 222 | PBITS | 80 / 81 | PBITS = 80 : long telegram, 7-digit meter count |
| 223 | CS | | Checksum across C-field up to PBITS |
| 224 | Stop | 16 | Stop character |

Second frame

| No. | Field | Content in hex. | Remarks |
|-----|-----------------------------|-------------------|---|
| 1 | Start | 68 | Long frame start character |
| 2 | L | 160 | Field length |
| 3 | L | 160 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 08 | Response with user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 72 | Response with variable data format / LSB first |
| 8 | Identification number | 45 | 8-digit BCD, here: 70112345 (serial no. 12345, produced in 01/2007) |
| 9 | | 23 | |
| 10 | | 11 | |
| 11 | | 70 | |
| 12 | Manufacturer identification | 93 | 3 letter manufacturer code: ELS |
| 13 | | 15 | |
| 14 | Generation | 0A | Falcon M-Bus generation 0A |
| 15 | Medium | 06 / 07 / 16 / 17 | hot water or water or cold water or hot and cold water |
| 16 | Access counter | 02 | Access counter (will increment after every RSP_UD), here: 02 |
| 17 | Status | 00 | Status byte, here: 00 -> no error |
| 18 | Signature | 00 | no encryption, for wireless M-Bus only |
| 19 | | 00 | |
| 20 | DIF | 82 | 16-bit binary data |
| 21 | DIFE | 01 | Memory number 2 |
| 22 | VIF | 6C | Date: data type G (CP16) |
| 23 | Month1-Max throughput date | 01 | here: 01.04.2008 |
| 24 | | 14 | |
| 25 | DIF | 92 | 8-digit BDC |
| 26 | DIFE | 01 | Memory number 2 |
| 27 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 28 | Month1-Max throughput | 79 | Maximum throughput, month 1 = 00000279 |
| 29 | | 02 | |
| 30 | | 00 | |

| | | | |
|----|--|----|--|
| 31 | | 00 | |
|----|--|----|--|

Continued on the next page!

Continuation:

| No. | Field | Content in hex. | Remarks |
|-----|---------------------------------|-----------------|--|
| 32 | DIF | C2 | 16-bit binary data |
| 33 | DIFE | 01 | Memory number 3 |
| 34 | VIF | 6C | Date: data type G (CP16) |
| 35 | Month2- Max throughput date | 01 | here: 01.03.2008 |
| 36 | | 13 | |
| 37 | DIF | D2 | 8-digit BDC |
| 38 | DIFE | 01 | Memory number 3 |
| 39 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 40 | Month2- Max throughput | 67 | Maximum throughput, month 2 = 267 l/h |
| 41 | | 02 | |
| 42 | | 00 | |
| 43 | | 00 | |
| | ... | ... | |
| 139 | DIF | 82 | 16-bit binary data |
| 140 | DIFE | 06 | Memory number 12 |
| 141 | VIF | 6C | Date: data type G (CP16) |
| 142 | Month11- Max throughput date | E1 | here: 01.03.2007 |
| 143 | | 03 | |
| 144 | DIF | 92 | 8-digit BDC |
| 145 | DIFE | 06 | Memory number 12 |
| 146 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 147 | Month11- Max throughput | 12 | Maximum throughput, month 11 = 00000112 |
| 148 | | 01 | |
| 149 | | 00 | |
| 150 | | 00 | |
| 151 | DIF | C2 | 16-bit binary data |
| 152 | DIFE | 06 | Memory number 13 |
| 153 | VIF | 6C | Date: data type G (CP16) |
| 154 | Month12- Max throughput date | E1 | here: 01.02.2007 |
| 155 | | 02 | |
| 156 | DIF | D2 | 8-digit BDC |
| 157 | DIFE | 06 | Memory number 13 |
| 158 | VIF | 3B / 3E | Throughput in l/h or m ³ /h |
| 159 | Month12- Max throughput | 99 | Maximum throughput, month 12 = 00000099 |
| 160 | | 00 | |
| 161 | | 00 | |
| 162 | | 00 | |
| 163 | DIF | 0F | all subsequent characters are manufacturer-specific (up to the checksum) |
| 164 | PBITS | 80 / 81 | PBITS = 80 : long telegram, 7-digit meter count |
| 165 | CS | | Checksum across C-field up to PBITS |
| 166 | Stop | 16 | Stop character |

4.2 SND_UD: send user data to the slave

4.2.1 Telegram with sample values

With the illustrated telegram, the master can write the primary address, the ID, the medium, the current meter count, the current time with date, the next reporting date and PBITS.

It is also possible to send only a portion of the SND_UD illustrated below.

Falcon M-Bus Generation 0A SND_UD - telegram with sample values (master → Falcon M-Bus)

| No. | Field | Content in hex. | Remarks |
|-----|-----------------------------|-------------------|---|
| 1 | Start | 68 | Long frame start character |
| 2 | L | 34 | Field length |
| 3 | L | 34 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 51 | Send data |
| 8 | DIF | 01 | 8-bit binary data |
| 9 | VIF | 7A | Address (primary) |
| 10 | Padr | 02 | New primary address (here: 02) |
| 11 | DIF | 07 | 64-bit binary data |
| 12 | VIF | 79 | Volume level in litres |
| 13 | Identification number | 45 | 8-digit BCD, here: 70112345 (serial no. 12345, produced in 01/2007) |
| 14 | | 23 | |
| 15 | | 11 | |
| 16 | | 70 | |
| 17 | Manufacturer identification | 93 | 3 letter manufacturer code: ELS |
| 18 | | 15 | |
| 19 | Generation | 0A | Falcon M-Bus generation 0A |
| 20 | Medium | 06 / 07 / 16 / 17 | Hot water or water or cold water or hot/cold water |
| 21 | DIF | 0C | 8-digit BDC |
| 22 | VIF | 13 | Volume in litres |
| 23 | current volume | 67 | here: 01234567 litres |
| 24 | | 45 | |
| 25 | | 23 | |
| 26 | | 01 | |
| 27 | DIF | 04 | 32-bit binary data |
| 28 | VIF | 6D | Date and time: data type F (CP32) |
| 29 | current date / time | 3A | here: 06.02.2007 13:58 |
| 30 | | 0D | |
| 31 | | E6 | |
| 32 | | 02 | |
| 33 | DIF | 42 | 16-bit binary data, memory number 1 |
| 34 | VIF | EC | Date: data type G (CP16) |
| 35 | Next reporting date | E1 | here: 01.01.2007 |
| 36 | | 01 | |
| 37 | DIF | 0F | The rest of the data is manufacturer-specific |
| 38 | PBITS | C0 | PBITS = C0 : long telegram, 8-digit BCD |
| 39 | CS | | Checksum across C-field up to PBITS |
| 40 | Stop | 16 | Stop character |

4.2.2 Write protect telegram

Receipt of the below illustrated telegram will switch the Falcon M-Bus write protect setting on or off. When switched on, the Falcon M-Bus ensures that values cannot be modified (see section 3.5.3). A check for the current state of the write protect feature can be made with the PBIT (see section 5.7).

| Falcon M-Bus Generation 0A write protect telegram (master → Falcon M-Bus) | | | |
|---|-------|-----------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 05 | Field length |
| 3 | L | 05 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53/73 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 54 | Freeze |
| 8 | X0 | AA | to safeguard the command |
| 8 | X1 | 55 | to safeguard the command |
| 10 | CS | | Checksum across C-field up to the CI-field |
| 11 | Stop | 16 | Stop character |

4.2.3 Erase telegram

Receipt of this telegram deletes all stored monthly values in the Falcon M-Bus. The date for every month will be set to 00.00.00 and the meter count will be set to 0.

| Falcon M-Bus Generation 0A erase telegram (master → Falcon M-Bus) | | | |
|---|-------|-----------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 06 | Field length |
| 3 | L | 06 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 50 | Reset application |
| 8 | Sub | 08 | Installation and restart |
| 9 | X0 | AA | to safeguard the command |
| 10 | X1 | 55 | to safeguard the command |
| 11 | CS | | Checksum across C-field up to X1 |
| 12 | Stop | 16 | Stop character |

4.2.4 Telegram to change baud-rate

The Falcon M-Bus is set by default to a baud-rate of 2400 baud. This can be changed with the M-Bus command illustrated below. If a confirmation is sent with 0xE5, it will still be sent at the old baud-rate.

| Falcon M-Bus Generation 0A SND_UD - telegram to change baud-rate with example (master → Falcon M-Bus) | | | |
|---|-------|-----------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 03 | Field length |
| 3 | L | 03 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | BB | Baud-rate: B8:300Bd; B9:600Bd; BA:1200Bd; BB:2400Bd |
| 8 | CS | | Checksum across C-field up to CI |
| 9 | Stop | 16 | Stop character |

4.2.5 Telegram changeover to short telegram

The telegram illustrated below is an alternative to changeover of telegram type into the short telegram, i.e. without monthly values.

| Falcon M-Bus Generation 0A SND_UD - telegram changeover to short telegram (master → Falcon M-Bus) | | | |
|---|-------|-----------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 04 | Field length |
| 3 | L | 04 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 50 | Reset application |
| 8 | Sub | 02 | Simple billing |
| 9 | CS | | Checksum across C-field up to Sub |
| 10 | Stop | 16 | Stop character |

4.2.6 Telegram changeover to long telegram

In this case there will be a changeover of telegram type into the long telegram with monthly values.

| Falcon M-Bus Generation 0A SND_UD - telegram changeover to long telegram (master → Falcon M-Bus) | | | |
|--|-------|-----------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 04 | Field length |
| 3 | L | 04 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 50 | Reset application |
| 8 | Sub | 03 | Enhanced billing |

| | | | |
|----|------|----|-----------------------------------|
| 9 | CS | | Checksum across C-field up to Sub |
| 10 | Stop | 16 | Stop character |

4.2.7 Write ID number

The telegram illustrated below offers a possibility to assign the Falcon M-Bus a new identification number.

| Falcon M-Bus Generation 0A SND_UD – write ID number (master → Falcon M-Bus) | | | |
|---|-----------------------------|-------------------|---|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 12 | Field length |
| 3 | L | 12 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | 01 | Primary address, here: 1, possible: 00, 01..FA, FD for secondary addressing |
| 7 | CI | 51 | Send user data |
| 8 | DIF | 01 | 8-bit binary data |
| 9 | VIF | 7A | Address format |
| 10 | New address | 07 | New address, here: 07 |
| 11 | DIF | 07 | 8-digit BCD (packed in 4 bytes [packed decimal format]) |
| 12 | VIF | 79 | ID number |
| 13 | ID number | ID1-4 | New ID number (4 bytes) |
| 14 | Manufacturer identification | 93 | 3 letter manufacturer code: ELS (for the customer, unalterable) |
| | | 15 | |
| 15 | Generation | 02 | Falcon M-bus generation 0A |
| 16 | Medium | 06 / 07 / 16 / 17 | Hot water or water or cold water or hot/cold water |
| 17 | CS | | Checksum across C-field up to Sub |
| 18 | Stop | 16 | Stop character |

4.2.8 Telegram, slave / wildcard selection

Secondary addressing can be used with the telegram illustrated below to select a slave or wildcard.

| Falcon M-Bus Generation 0A SND_UD – slave / wildcard selection telegram (master → Falcon M-Bus) | | | |
|---|-----------------------------|-----------------|----------------------------|
| No. | Field | Content in hex. | Remarks |
| 1 | Start | 68 | Long frame start character |
| 2 | L | 07 | Field length |
| 3 | L | 07 | Field length |
| 4 | Start | 68 | Long frame start character |
| 5 | C | 53 | Send user data |
| 6 | A | FD | Secondary address |
| 7 | CI | 52 | Select slave |
| 8 | ID number | ID1-4 | Identification number |
| 9 | Manufacturer identification | FF | 2 byte |
| | | FF | |
| 10 | Generation | FF | 1 byte |
| 11 | Medium | FF | 1 byte |

| | | | |
|----|------|----|-----------------------------------|
| 12 | CS | | Checksum across C-field up to Sub |
| 13 | Stop | 16 | Stop character |

5 Falcon M-Bus – telegram explanations

5.1 Volume level in litres

In general, this unit is coded as follows: binary 0001 0nnn. The three variable bits can take on values between 000 and 111. Employed in the equation below, they decide over the unit: $10^{(nnn-6)} \text{ m}^3$.

5.2 Throughput in l/h or m³/h

The unit for throughput is coded as follows: 0011 1nnn. The three variable bits can take on values between 000 and 111. Employed in the equation below, they decide over the unit: $10^{(nnn-6)} \text{ m}^3/\text{h}$.

5.3 Activating alarms

The bit layout for various alarms.

| Byte 1 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--------|---|---|---|---|---|----------|---------|--------------|
| | 0 | 0 | 0 | 0 | 0 | no pulse | leakage | manipulation |

| Byte 2 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--------|---|-------------|---|---|---|---|---|------------|
| | 0 | return flow | 0 | 0 | 0 | 0 | 0 | throughput |

5.4 Warnings

The bit layout for various warnings.

| Byte | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------|----|---------|--------------|----------|--------------|------------|-------------|----------|
| | NA | leakage | manipulation | no pulse | weak battery | pipe break | return flow | reserved |

5.5 Firmware version

The coding of the current firmware version, VxTy, is packed into one BCD byte.

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------|---|---|---|---|---|---|---|---|
| Decimal | x | | | | y | | | |

The current firmware version is V2T0 and is coded as 0x20.

5.6 Date / Time

This is a special data format used for the event point-of-time of the manipulation and return flow alarms.

First byte

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------|------|---|---|---|---|---|---|---|
| Decimal | Year | | | | | | | |

The year is produced from: year - 2000

Second byte

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------|----------------------|---|---|---|-------|---|---|---|
| Decimal | LSB for hours (time) | | | | Month | | | |

Third byte

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------|----------------------|---|---|-----|---|---|---|---|
| Decimal | MSB for hours (time) | | | Day | | | | |

5.7 PBITS

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-------------|------|---|---|---|---|---|---|---------|
| Value (bin) | Long | 0 | 0 | 0 | 0 | 0 | 0 | Protect |

Long: 1 = long telegram activated, 0 = short telegram activated

Protect: 1= write protect on, 0 = write protect off.

6 Technical data

Housing:

| | |
|------------------|---|
| Installation | on an Elster water meter with Falcon register |
| Material | GE PC143 |
| Colour | grey |
| Protection class | IP68 |

Ambient conditions:

| | |
|-----------------------|----------------------|
| Operating temperature | -15 to 70 °C |
| Storage temperature | -20 to 70 °C |
| Humidity | up to 100 % humidity |

M-Bus cable

| | |
|------------|---|
| Cable type | UL2405, 24AWG /2C with 2 insulated sleeves. Protected against polarity reversal. |
| Length | PR6: 2 m; PR7: 5 m. |

Power consumption

| | |
|---|---|
| Principle | Remote supply from the M-Bus with automatic switch-over to battery when a bus failure occurs. |
| Bus operation | max. 1.5 mA (1 standard load), no load on battery |
| Battery | lithium thionyl chloride 3.6 V, 1200 mAh |
| Battery operation | |
| Battery service life for pure battery operation | typically, 10 years at 20 °C |

M-Bus: physical characteristics

| | |
|-------------------------------|---|
| Closed-circuit current, M-Bus | typ. 1.4 mA, maximum 1.5 mA (1 standard load) |
| Space (0-bit) current | Closed-circuit current + typ. 13 mA |
| M-Bus interface | TI TSS721 with 2 x 215Ω protective resistor |

M-Bus protocol

| | |
|---------------------------------|---|
| Reference standard | EN 13757 |
| Transfer speed | 300, 600, 1200 and 2400 baud |
| Addressing | Primary and secondary addressing with wildcard, each input: 1 primary and 1 secondary address |
| Supported functions | FCB-bit, SND_NKE, REQ_UD2, SND_UD, RSP_UD. |
| Data structure, short telegram: | variable structure, low-byte-first (code 72h) Length = 74 bytes <ol style="list-style-type: none">1. Data record: meter count2. Data record: date and time3. Data record: last reporting date4. Data record: last reporting value5. Data record: next reporting date6. Data record: maximum throughput7. Data record: last maximum throughput date8. Data record: current throughput9. Data record: company specific suffix |

| | |
|--------------------------------|---|
| Data structure, long telegram: | variable structure, low-byte-first (code 72h) Length = 217 bytes <ol style="list-style-type: none">1. Data record: meter count2. Data record: date and time3. Data record: last reporting date4. Data record: last reporting value5. Data record: next reporting date6. Data record: last maximum throughput7. Data record: current throughput8. Data record: most recent monthly date (01.MM.YY)9. Data record: most recent monthly meter count.....29. Data record: oldest monthly date (01.MM.YY)30. Data record: oldest monthly meter count31. Data record: company specific suffix |
|--------------------------------|---|

Data record: second frame

Length = 160 bytes

1. Data record: maximum throughput date, most recent month

2. Data record: maximum throughput, most recent month

.....

22. Data record: maximum throughput date, oldest month

23. Data record: maximum throughput, oldest month

24. Data record: company specific suffix

Parameterisation protocol:

identification number, medium, primary address, initial meter count, date / time, next reporting date and telegram type (short / long) are programmable per SND_UD over the M-Bus.