Extracted from

HRI-Mei Bx / ResidiaM Communications Protocol Specification

Release: 8 July 2008.

GLOSSARY

Residia	name for ResidiaM V2
RSW	"Residia Status Word"
| **0f MT 1f 20 ID** |	**0f** - Manufacture specific data , **MT** -Meter Type,**1f-(**write) or **2f(**read) command , **20-**parameter**,** ID-descriptor ,
| **FDH** |	Fixed Data Header
| **68 L L 68** |	Header , L - Telegram length
| **53 fe 51** |	C-field, A-field , CI –field in master to slave direction
| **08 00 72** |	C-field, A-field , CI –field in slave to master direction
| **CS 16** |	Checksum , Stop sign
| **PoP** |	Package of Parameters

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1 INTRODUCTION

The Residia M is a microprocessor-based, battery-operated unit that uses M-Bus and Mini-Bus.
In the case of M-Bus, Mini-Bus baud rate switches automatically 300/ 2400 baud.

This document specifies the communications protocol in accordance with European Standard “prEN 13757-3:2003(E)” and
“M-Bus Documentation Ver 4.8”

ResidiaM can been configured only via M-Bus, Meter Type [**MT**] is equal **3**.

1.1 -

Chapter is deleted.

1.2 IDENTIFICATION

The “Fabrication number” is a 32-bit number that uniquely identifies each individual ResidiaM. This number is assigned at the factory and is not changeable.

1.3 OPERATING MODES

The ResidiaM is a microprocessor-based, battery-operated unit that consumes very low power in “sleep” mode. In this mode all electronic circuits are swiched off with the exception of the microprocessor.
In the case of M-Bus link, microprocessor wakes up only when he received commands with valid address.
If there are no commands with a valid address while standby timeout (60 seconds) the microprocessor goes back to sleep.

2 REFERENCE DOCUMENTS

1) "The M-Bus : A Documentation" Version 4.8 Nov 11 , 1997
2) European Standard "prEN 13757-3:2003(E)"
3) "HRI Reply Examples.xls"

3 MODES

3.1 --

3.2 OPEPATOR MODE

3.2.1 Get Package of Parameters

Master to slave:
| 68 L L 68 | 53 fe 51 | 0f MT **2f** 20 c0 | CS 16 |
Slave to master:
| 68 L L 68 | 08 00 72 | FDH | 0f MT **1f** 20 **c0** | PoP | CS 16 |

Command is used for getting a package of parameters [PoP] .
The size of [PoP] is 12 bytes for Residia

1		Select Telegram
2		Billing Day
3	Low Byte	Day of Fixed Data
4	High Byte	Month of Fixed Data
5	Low Byte	Error Masks
6	High Byte	Error Masks
7	Low Byte	Limit Flow for Break
8	High Byte	Limit Flow for Break
9		Limit Time for Break
10		Limit Time for Leakage
11		Liter Per Rotation
12		Number of Digits

3.3 USER MODE

In “User Mode “only unprotected commands are available.

3.3.1 SND NKE

Master to slave:
10 40 fe 3e 16
Slave to master: e5
Note: for multi-telegram reply after **“SND_NKE**” the meter begins answer with the first telegram-**”Standard telegram”.**

3.3.2 ID Number

Master to slave: (12345678)
| 68 09 09 68 | 53 fe 51 | 0c 79 | 78 56 34 12 | CS 16 |
Slave to master: e5

See [1]) chapter **6.4.2 :** Enhanced Identification Record:

With this optional data record the identification (secondary address) can be changed.

Data is only the identification number **(in our context it is “ ID-Number “)**

DIF = 0Ch	VIF = 79h	Data = Identification No. (8 digit BCD)

3.3.3 ---

Chapter deleted.

3.3.4 Primary Address

Master to slave: **(0)**
| 68 06 06 68 | 53 fe 51| 01 7a | 00 | CS 16 |
Slave to master: e5

3.3.5 Customer Location

Master to slave: (**11223344**)
| 68 0a 0a 68 | 53 fe 51 | 0c fd 10 | 44 33 22 11 | CS 16 |
Slave to master: e5

In the ResidiaM "*Customer Location"* is used for **Enhanced Identification,** but not for **Enhanced selection**.

3.3.6 Reset Errors

Command clear temporary errors and alarms .
Master to slave:
| 68 L L 68 | 53 fe 51 | 0f MT **1f** 20 **10** | CS 16 |
Slave to master :e5

3.3.7 Reset Maxima

Command reset minimum , maximum flow values)
Master to slave:
| 68 L L 68 | 53 fe 51 | 0f MT **1f** 20 **15** | CS 16 |
Slave to master: e5

3.3.8 Application Reset (CI = $50)

Master to slave:
| 68 03 03 68 | 53 fe **50** | CS 16 |
Slave to master: e5

See item 6.1, "The M-Bus A Documentation Vers, 4.8 November 11.1997".

"With the CI-Code $50 the master can release a reset of the application layer in the slaves. Each slave himself decides which parameters to change - e.g. which data output is default - after it has received such an application reset. This application reset by a SND_UD with CI=$50 is the counterpart to the reset of the data link layer by a SND_NKE. "

ResidiaM reset readout to default multi-telegram reply **"Select All Telegrams".**

3.3.9 Select Telegram

Master to Slave: | 68 04 04 68 | 53 FE **50** | **00** | CS 16 |
Slave to Master: E5
Command is implementation for ResidiaM "Application Reset subcode" (4.2.1 : prEN 13757-3:2003 E)

00h: "Select All Telegrams" (Global readout request : "Standard" + "Statistic "+"Yearly Data"+" All Monthly Data") (**default)**
10h : "**Standard Telegram**" (First telegram for multi telegram reply)
21h : "Standard Telegram" + Yearly Data"
31h : "Standard Telegram" +"All Monthly Data"
41h : "Standard Telegram" +"Last Month Telegram"
50h : "Statistic Telegram"
51h : "Standard Telegram**"**+ "Statistic telegram"
90h : "Test telegram"

3.3.10 Get Telegram Selection

Master to slave:
| 68 L L 68 | 53 fe 51 | 0f MT **2f** 20 **b0** | CS 16 |
Slave to master: Value (00h … c0h)
| 68 L L 68 | 08 00 72 | FDH | 0f MT **1f** 20 **b0** | 10 | CS 16 |

4 REPLY TELEGRAMS

All telegrams are shorter then 128 bytes.

4.1 TELEGRAMS CONTENT

4.1.1 Test telegram

- Residia status word (16 bits)
- Volume Index.
- Software version
- Hardware version
- Forward index register
- Backward index register

4.1.2 Standard telegram

- Volume Index.
- Backward index register
- Volume flow
- Fabrication Number
- Customer location
- Time point(Date + Time)
- Model / version (water meter number) ASCII

4.1.3 Statistic telegram

- max. flow rate + date/time
- min. flow rate + date/time
- Last backward event time point
- max. backward flow rate +date/time
- min. backward flow rate +date/time
- First Start time point
- Tamper counter
- Last Tamper event time point

4.1.4 Monthly historical telegrams (up to 24 months)

- Storage date/time
- Volume index
- Backward index register
- Residia Month's Status Word for corresponding month

4.1.5 Yearly historical telegram (up to 2 years)

- Last year storage date
- Volume index at last year storage date
- Backward index register at last year storage date
- Year before last storage date
- Volume index at year before last storage date
- Backward index register at year before last storage date

4.2 ---

Chapter deleted.

4.3 Residia STATUS WORD [RSW]

Flags Name	Values	Clearing Commands
ALARM_ FLOW_RETURN ALARM_ FLOW_LEAKAGE ALARM_ FLOW_BREAK ALARM_HALT	0x0001 0x0002 0x0004 0x0008	Reset Errors, Reset Errors, Reset Errors, Reset Errors,
ALARM_ TAMPER ALARM_ POWER _LOW ALARM_ WARM_BOOT ALARM_ SOFTWARE	0x0010 0x0020 0x0040 0x0080	Reset Errors, Reset Errors, Reset Errors, Reset Errors,
STATUS_ OPEN STATUS_ NO_INIT STATUS_ SERVICE ALARM_ MAGNET	0x0100 0x0200 0x0400 0x0800	Close Device, Time Out Complete Initialize Exit Service Mode, Complete Initialize Time Out Reset Errors, (optional for Residia M)
ERROR_ TAMPER_DEFECTED ERROR_ PICKUP ERROR_ STORAGE ERROR_ HARDWARE	0x1000 0x2000 0x4000 0x8000	Reset Errors, Reset Errors, Erase Historical Data, Complete Initialize Power OFF, Residia Reset,

“Residia Status Word” contains device specific information about ResidiaM state.
Value equal to zero means “No Errors”, ”No Alarm”, “Initialize completed“.

“Residia Month’s Status Word” has the same structure, but it is clearing automatically after saving historical month data.

5 M-BUS STANDARD NOTES

This section describes the specific of implementation European Standard "prEN 13757-3:2003(E)" for HRI.

5.1 M-BUS STATUS BYTE

Each of bits: 0, 3…7 in "M-Bus Status Byte" is disjunction of the following "Residia Status Word" flags. If **RSW** equal to zero, "M-Bus Status Byte" is zero too.
See item 5.9 in [2])

Bit 0: Application Busy
- STATUS_OPEN
- STATUS_ SERVICE

Bit 1: Any Application Error
- ALARM_SOFTWARE

Bit 2: Power low
- ALARM_ POWER _LOW

Bit 3: Permanent errors
- ERROR _HARDWARE
- ERROR _STORAGE
- STATUS _NO_INIT

Bit 4: Temporary errors
- ERROR_PICKUP
- ERROR _TAMPER_DEFECTED
- ALARM _WARM_BOOT

Bit 5: Alarm Tamper
- ALARM _TAMPER
- ALARM _MAGNET *(optional for Residia M)*

Bit 6: Alarm Flow
- ALARM _FLOW_RETURN
- ALARM _FLOW_LEAKAGE
- ALARM _FLOW_BREAK

Bit 7: Alarm Halt (Stop measure)
- ALARM _HALT

5.2 REQ_UD2

After command **"Select all " HRI** provides multi-telegram global readout request answers (RSP_UD) from slave to master. See of items 6.4.3, 5.5.1 "The M-Bus A Documentation Vers, 4.8 November11.1997".

"If the selected data is supported by the slave but too long for one RSP_UD telegram (especially for readout of all historic values), the slave transmits an additional data record consisting only of the **DIF=$1F**, which means that more data records follow in the next respond telegram. In this case the master must readout the slave again until the respond telegram is only an **$E5 (no data)** or there is no **DIF=$1F** in the RSP_UD.

To avoid lost of data respond telegrams the slave should in this case support the Frame Count Bit (**FCB**). If the master wants to premature end such a multitelegram sequential readout of the selected data, it may send an application reset with CI=$50 instead of further REQ_UD2´s."

ResidiaM will transmit **DIF=$1F** at the end of telegram, which means that more data records follow in the next respond telegram otherwise **no DIF=$1F** for last reply telegram or for the single telegram.

5.3 STORAGE NUMBER

In ResidiaM Storage Number (6.5 : prEN 13757-3:2003 E) uses for historical values.

0: actual values,
1-24: monthly historical values,
30: last year historical values,
31: year before last year historical values.

5.4 TARIFF INFORMATION

ResidiaM uses tariff fields for optional test values.

5.5 SUBUNIT INFORMATION

Unit-field in ResidiaM is using for **backward** values.

5.6 SECONDARY ADDRESSIND

ResidiaM supports secondary addressing, enhanced selection (mode 1) (items 11.2,11.3,11.4 European Standard "prEN 13757-3:2003(E)")

5.7 SND_UD

Otherwise to REQ_UD2 HRI no support multi-telegram data from master to slave see **[1])** chapter 5.5 , so ResidiaM ignores the FCB in the **SND-UD**.