



INTELIS / ECHODIS+ MBUS

MBUS Frame Description

Date: 16/10/2014

Distribution (Check all appropriate):

- Sales Department
- Local Partner
- Final Customer
- Itron Internal Department:
 - Product Management
 - Support Services
 - System Deployment Team
- Others:

Availability:

- Public (No restriction)
- Controlled
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1 INTRODUCTION

1.1 Purpose of the document

The purpose of this document is described from a high-level point of view the M-Bus communications features of the M-Bus Product.

2 COMMON FEATURES TO ALL VERSIONS

The M-Bus product embeds a new concept of Itron M-Bus product that allows a full customization of the content of the M-Bus frames.

This is achieved using definition of Block of data that are configurable in 16 different frames.

This is described in the second part of this document.

The first part is dedicated to the description of the standard product as it is delivered from factory if no specific configuration has been required.

2.1 MBUS Hardware features

The Physical layer of M-Bus product is fully compliant with the EN13757-2 Standard, M-bus connection is non-polarized and the Unit Load (UL) requested on the bus is 1,5UL.

The Baudrate is by default selected from factory to 2400 Bds but can be set to 300Bds.

2.2 MBUS protocol/standard

The M-bus communication protocol implemented in M-Bus product is compliant with last MBUS standard EN13757-3 version 2013.

2.3 MBUS Format/Unit

2.3.1 MBUS Format

The product can manage few different non metrics Units:

- Cubic meter (M³) for Volume Index, and Liter /hour (L/h) for Flow
- Imperial Gallon for Volume Index, and Imperial Gallon / Min for Flow
- US Gallon for Volume Index, and US Gallon / Min for Flow
- Cubic Feet for Volume Index, and Cubic Feet / Min for Flow

This is possible during manufacturing and is done only for personalized version

2.3.2 MBUS Units

The product uses a basic rule for volume index format and unit transmitted in the M-bus frame, it uses the same unit as for the LCD Display. That means, for instance, that if the display is set to 5/3, (5 digit before the coma, and 3 after), meaning a display in Cubic meters but with 3 decimals, then last digit=Liters.

The unit used for the transmission of the index, backflow, FDR in all M-bus frames will be liters (VIF 13)

If the Display is 6/2, then last digit = 10liters, so the M-Bus format will be 10 of liters (VIF 14)

In the following tables this is mentioned as VIF 12-14.

The choice can be done only during manufacturing and can't be changed on field.

The possibilities according to the format (see previous chapter) are

For cubic meters:

- 0, 0001 m³, 0,001m³, 0,001m³, 0,1 m³ => VIF Values from 12 to 15

Or for Imperial Gallons:

- 0,01 Imp Gallon, 0, 1 Imp Gallon => VIF Values FC/74/04/"laGi", FC/75/04/"laGi"

Or for US gallons:

- 0,01 US Gallon, 0,1 US Gallon (91/3D, 92/3D)

Or for Cubic Feet:

- 0,001 CuFt, 0,01cuFt, 0,1 CuFt, (FC/73/04/"tFuC", FC/74/04/"tFuC",FB/21)

Note that for the flow rate, the unit are fixed, whatever the display and are transmitted accordingly in:

- Liter per hour
- Imp Gallon /Min
- US Gallon /Min
- Cubic Feet /Min

2.4 Standard command/request

The M-bus product can manage the following command or request

- Addressing
 - o Primary addressing
 - o Secondary addressing (Selection C=SND_UD=43h/53h/63h/73h, CI = 52h)
 - o Extended secondary addressing (selection with Customer Id)
- Request
 - o Frame request (C= REQ_UD2=4Bh/5Bh/6Bh/7Bh)
 - o Status request (C= REQ_SKE=49h)
- Command (C Codes)
 - o Application Reset (SND_NKE, C= 40h)
 - o Baud Rate Change (C= BBh : 2400 Bds, C= B8h : 300 Bds)
 - o Frame Selection (C = SND UD, CI =50)
 - o Primary address Modification (C = SND UD,CI =51, DIF/VIF= 01h/7Ah)
 - o Secondary Address Modification (C = SND UD,CI =51, DIF/VIF= 0Ch/79h)
or (C = SND UD, CI =51, DIF/VIF= 07h/79h)
 - o Date and time setting
 - Date and date setting Using CI=6Ch command
 - Date and Time Adjustment using CI=6Dh Command
 - Date and time setting using (C = SND UD,CI =51 DIF/VIF= 04h/6Dh)

3 M-BUS FRAMES OF STANDARD VERSION

3.1 Overview

The Product in standard configuration has 5 different frames (0 to 4) accessible using the selection frame command.

The frame 00, so called Default frame, is normally the frame requested on a regular basis to get all the main information from the meter

The other are used to get more advanced features

Note that, due to the big number of values using the same DIF and VIF, the Storage number is used to distinguish the nature of the value. This can be useful to parse and filter data, if they are all received in the same buffer and not managed in real time.

Here below is the table containing the Frame numbers and their designation:

NAME	Designation
Frame 0	Default Frame
Frame 4	Fixed date reading (FDR)

3.2 M-Bus Configuration Tool

3.2.1 Global Strategy

The configuration tool allows the following actions:

- Visualization and demo of all the standard M-Bus capabilities of the product
- Highlight all the features of the product (Metering, water intelligence, alarm...)
- Display and modification of the parameters
- Reading of advanced values
- Basic M-Bus setting modification (Address, Date & Time...)
- Parameterization of the advanced functions (Threshold...)
- On field investigation in case of problem
- Frame configuration

To have a complete view of the features of this M-Bus Field tool application, please refer to the user manual.

This Software “M-Bus Configuration Tool” is protected by a license attached to the machine.

3.2.2 Connection

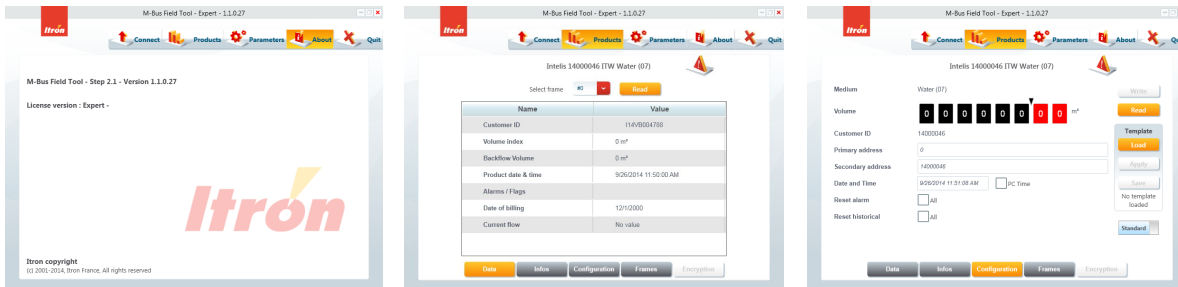
The field tool, based on configuration, can communicate with to the product using a M-Bus to USB (or RS232) converter.

It can be used:

- Point to point in broadcast mode
- In addressed mode, for instance if you are connected on field to an existing Bus.

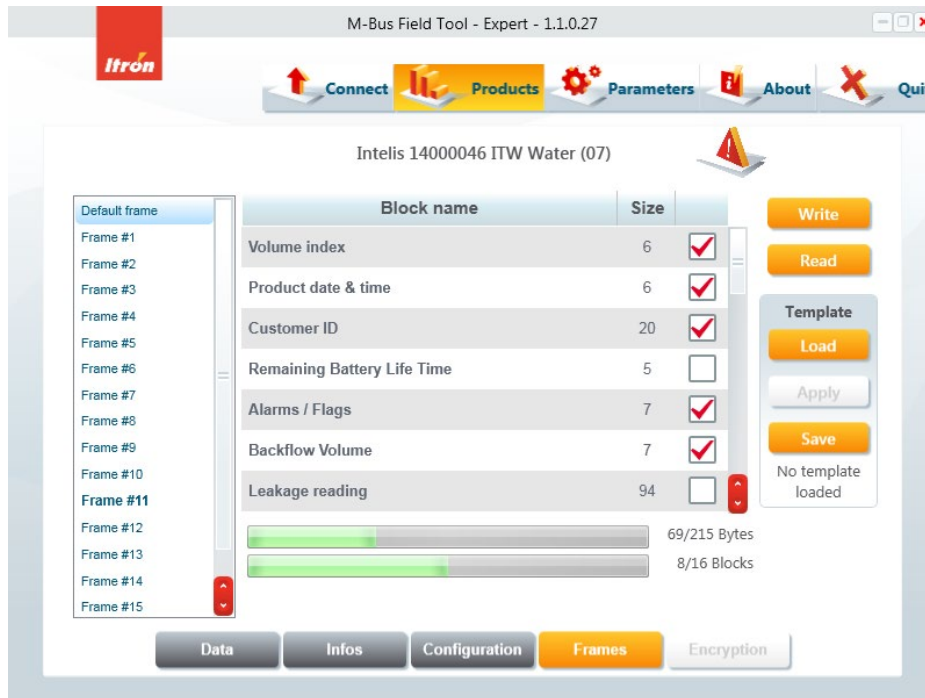
3.2.3 Screenshot

Here below are few screen shot of this application



3.2.4 Frame configuration

In order to use the new concept of configuration frame, this application has a specific screen in order to allow this function.



3.2.5 List of blocks

Below is the list of possible blocks you can use in a frame

2 rules are applied by the application

- the size maximum of the payload cannot exceed 215 bytes (This is shown with the bar graph)

(the size of each block is calculated according to the unit, for instance “Imp Gallon” are the bigger one)

- It’s not possible to set more than one manufacturer bloc in a frame

Block name	Size	
Volume index	6	<input checked="" type="checkbox"/>
Product date & time	6	<input checked="" type="checkbox"/>
Customer ID	20	<input checked="" type="checkbox"/>
Remaining Battery Life Time	5	<input type="checkbox"/>
Alarms / Flags	7	<input checked="" type="checkbox"/>
Backflow Volume	7	<input checked="" type="checkbox"/>
Leakage reading	94	<input type="checkbox"/>
Fdr	106	<input type="checkbox"/>
Highest peak	13	<input type="checkbox"/>
Volume above threshold	25	<input type="checkbox"/>
Volume below threshold	25	<input type="checkbox"/>
Times of use	49	<input type="checkbox"/>
Customer billing	14	<input checked="" type="checkbox"/>
Current flow	5	<input checked="" type="checkbox"/>
T° below threshold (Specific block)	64	<input type="checkbox"/>
Flow repartition (Specific block)	50	<input type="checkbox"/>
Meter info (Specific block)	23	<input type="checkbox"/>
Echodis frame (Specific block)	215	<input type="checkbox"/>
Volume BCD	6	<input type="checkbox"/>
Flowrate BCD	5	<input type="checkbox"/>

4 ANNEX 1: DIB DESCRIPTION

Table 21 — Coding of the data field

Length in bit	Code	Meaning	Code	Meaning
0	0000	No data	1000	Selection for readout
8	0001	8 bit integer/binary	1001	2 digit BCD
16	0010	16 bit integer/binary	1010	4 digit BCD
24	0011	24 bit integer/binary	1011	6 digit BCD
32	0100	32 bit integer/binary	1100	8 digit BCD
32 / N	0101	32 bit real	1101	Variable length
48	0110	48 bit integer/binary	1110	12 digit BCD
64	0111	64 bit integer/binary	1111	Special functions

Table 20 — Coding of the Data Information Field (DIF)

Bit 7	6	5	4	3	2	1	0
Extension bit (E)	LSB of storage number	Function field		Data field : Length and coding of data			

Table 24 — Coding of the Data Information Field Extension (DIFE)

Bit	7	6	5	4	3	2	1	0
Value	Extension Bit (E)	(Device) Subunit	Tariff		Storage number			

INT4 = 4 Bytes Integer (Lsb first)

INT2 = 2 Bytes Integer

BIN4 = 4 bytes Binary (Lsb First)

BCD8 = 8 Digit BCD Lsb First

BCD4 = 8 Digit BCD Lsb First

5 ANNEX 2: VIB DESCRIPTION

Table 25 — Coding of the Value Information Field (VIF)

Bit	7	6	5	4	3	2	1	0
Value	Extension Bit (E)	Unit and multiplier (value)						

6 ANNEX 3: FRAMES DESCRIPTION

6.1 The default frames

The default frame is the frame with Number Identification “00” read on REQ-UD2 after Application Reset or if the frame selection 00 is used.

It contains the main information of the meter, and is composed of the blocks: 0, 1,2,4,5, 12, 13, 16

Designation	U	T	S	Data	Value	Fct.	VIB
S/N #	0	0	0	BCD8	14000046	Inst.	Fabrication Number
Volume index	0	0	0	INT4	0	Inst.	Volume in 0, 1 l/ 1l/ 10 l/ 100l
Date & Time	0	0	0	INT4	17.09.2014 13:02	Inst.	Time Point [Date+Time]
Meter Identification	0	0	0	Var.	I14VB004788	Inst.	Enhanced Identification
Alarm Flags	0	0	0	BIN4	0	Inst.	Error Flags (binary)
Backflow Index	0	0	0	INT4	0	Inst.	Volume in 0, 1 l/ 1l/ 10 l/ 100l => Accumulation of Abs. Value only if Neg. Contrib.
Billing date	0	0	45	INT2	01.12.2000	Inst.	Time Point [Date]
Billing Index	0	0	45	INT4	0	Inst.	Volume 0, 1 l/ 1l/ 10 l/ 100l [l]
Flow	0	0	0	INT3	0	Err.	Volume Flow [l/h]
Temperature	0	0	0	INT2	0	Err.	Flow Temperature 100 [m°C]

(U= Unit, T=Tariff, S= Storage, Fct. = Function, VIB = Variable Information Block)

6.2 Alarms description.

The alarm Block is composed of 4 bytes containing 32 flags of alarm.
 These flags can be simple warnings or alarms
 They can be temporary (real time or cyclic i.e. daily for instance) or permanent (memorized).
 In case of permanents flags, only a configuration tool can remove them
 Byte 0 (Lsb) is received first in the frame and Byte 3 (MsB) is the last

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 3	A32	A31	A30	A29	A28	A27	A26	A25
Byte 2	A24	A23	A22	A21	A20	A19	A18	A17
Byte 1	A16	A15	A14	A13	A12	A11	A10	A9
Byte 0	A8	A7	A6	A5	A4	A3	A2	A1

Designation		Designation	
A1	Daily volume Above threshold	A17	Meter Stopped
A2	Yearly volume Above threshold	A18	Reversed meter
A3	Daily volume below threshold	A19	Broken Pipe Alarm
A4	Yearly volume below threshold	A20	Manufacturer specific 1
A5	Daily Water temp Above alarm	A21	Date and time reconfiguration
A6	Monthly Water temp Above alarm	A22	Manufacturer specific 2
A7	Daily Water temp Below alarm	A23	Deb Battery Alarm
A8	Monthly Water temp Below alarm	A24	Daily leakage
A9	Monthly leakage	A25	Manufacturer specific 3
A10	PKF_Daily_Alarm	A26	Battery
A11	PKF_Month_Alarm	A27	Memorized removal
A12	Daily backflow	A28	Manufacturer specific 4
A13	D-1 Daily backflow	A29	Real time removal
A14	Monthly backflow	A30	Manufacturer specific 5
A15	Daily Air in pipe	A31	Manufacturer specific 6
A16	Monthly Air in pipe	A32	Reconfiguration

6.3 Fixed date reading frames (FDR)

The Fixed Date Reading frame so called FDR frame, is the frame with Number Identification “04” read on REQ-UD2 after frame selection 04 is used.

It contains the information related to the monthly indexes of the latest 13 months.

It is composed of the blocs: 0, 1, 4, 7

Note that Blocks 0, 1, 4 (Index, D&T, and Alarms) are duplicated in this frame

Designation	U	T	S	Data	Value	Fct.	VIB
S/N #	0	0	0	BCD8	14000046	Inst.	Fabrication Number
Volume index	0	0	0	INT4	0	Inst.	Volume 10 [I]
Date & Time	0	0	0	INT4	17.09.2014 13:04	Inst.	Time Point [Date+Time]
Alarm Flags	0	0	0	INT4	0	Inst.	Error Flags (binary)
Size of the table Storage	0	0	16	INT1	13	Inst.	Size of Storage
Storage interval (Month)	0	0	16	INT1	1	Inst.	Storage Interval [months]
Date of last storage	0	0	28	INT2	31.08.2014	Inst.	Time Point [Date]
Index Month -13	0	0	16	INT4	0	Err.	Volume 10 [I]
Index Month -12	0	0	17	INT4	0	Err.	Volume 10 [I]
Index Month -11	0	0	18	INT4	0	Err.	Volume 10 [I]
Index Month -10	0	0	19	INT4	0	Err.	Volume 10 [I]
Index Month -9	0	0	20	INT4	0	Err.	Volume 10 [I]
Index Month -8	0	0	21	INT4	0	Err.	Volume 10 [I]
Index Month -7	0	0	22	INT4	0	Err.	Volume 10 [I]
Index Month -6	0	0	23	INT4	0	Err.	Volume 10 [I]
Index Month -5	0	0	24	INT4	0	Err.	Volume 10 [I]
Index Month -4	0	0	25	INT4	0	Err.	Volume 10 [I]
Index Month -3	0	0	26	INT4	0	Err.	Volume 10 [I]
Index Month -2	0	0	27	INT4	0	Err.	Volume 10 [I]
Index Month -1	0	0	28	INT4	0	Err.	Volume 10 [I]

7 ANNEX 4: DETAIL OF DIF/VIF FOR DEFAULT FRAME

	Designation	Raw value in the frame																Converted Value				
Header	Length	68	5A	5A	68												90					
	C	8															RSP_UD					
	Add	00															0					
	CI	72															SND_UD					
	Ident N°	75	05	30	17												17300575					
	Manufacturer code	97	26														ITW					
	Version	32															Intelis					
	Device Type	7															Water					
	Access Number	4																				
	Status	00															no alarms					
Payload (Data)	Signature	00	00														No encryption					
	DIB 1	0C	78	75	5	30	17											17300575				
	DIB 2	4	13	0	0	0	0											0,000 m3				
	DIB 3	04	6D	10	0B	28	28											Date & Time				
	DIB 4	0D	79	11	34	38	39	32	30	30	42	56	37	31	49	20	20	20	20	20	20	WaterMeter Id
	DIB 5	04	FD	17	0	0	0	0													Details in Guide	
	DIB 6	04	93	3C	0	0	0	0													-0,000 m3	
	DIB 7	C2	86	1	6C	3E	26														Date storage	
	DIB 8	C4	86	1	13	0	0	0	0												Value	
	DIB 9	33	3B	0	0	0																
DIB 10	32	5A	0	0																		
EOF	CRC	A0																				
	EOF	16																				

RAW DATA OF DEFAULT FRAME FOR FEW CONFIGURATION

Raw value of the frame in Hexadecimal																	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
000X	68	5A	5A	68	8	0	72	75	5	30	17	97	26	32	7	4	Header
001X	0	0	0	0C	78	75	5	30	17	04	13	0	0	0	0	04	Data
002X	6D	10	0B	28	28	0D	79	11	34	38	39	32	30	30	42	56	Data
003X	37	31	49	20	20	20	20	20	20	04	FD	17	0	0	0	0	Data
004X	04	93	3C	0	0	0	0	C2	86	1	6C	3E	26	C4	86	1	Data
005X	13	0	0	0	0	33	3B	0	0	0	32	5A	0	0	A0	16	Footer

8 ANNEX 5: DETAIL OF DIF/VIF FOR FDR FRAME

8.1 Default Frame

		Format of default frame Intelis configuration standard		
Slave → Master		User data response (RSP-UD)		
Header	0	68	Start	Long frame start byte
	1	XX	L-Field	Frame length
	2	XX	L-Field	Frame length (bis)
	3	68	Start	Long frame start byte
	4	08	C-Field	SND-UD
	5	Addr/FD/FE	A-Field	Slave primary address ¹
Application Header	6	72	CI-Field	Data send with Long header
	7	XX	Identification number	Customer number (8 digits BCD) (LSB)
	8	XX	Identification number	Customer number (8 digits BCD)
	9	XX	Identification number	Customer number (8 digits BCD)
	10	XX	Identification number	Customer number (8 digits BCD) (MSB)
	11	97	Manufacturer	Manufacturer (LSB) "ITW"
	12	26	Manufacturer	Manufacturer (LSB)
	13	32	Version Number (Generation)	See X61 relative documents
	14	07	Medium code	Cold water
	15	XX	Access number	
Manufacturer Id	16	XX	Status	Meter status (2)
	17	00	Configuration	
	18	00	Configuration	
	19	0C	DIF	8 digit BCD
Volume index	20	78	VIF	Fabrication number VIF
	21	XX	DAT	Manufacturer number (LSB)
	22	XX	DAT	Manufacturer number
	23	XX	DAT	Manufacturer number
	24	XX	DAT	Manufacturer number (MSB)
	25	04	DIF	32 bit integer
Time stamp	26	12/.../15	VIF	Volume ⁴
	27	XX	DAT	Volume index (LSB)
	28	XX	DAT	Volume index
	29	XX	DAT	Volume index
	30	XX	DAT	Volume index (MSB)
Extended Meter ID	31	04	DIF	32 bit integer
	32	6D	VIF	Time stamp type F
	33	XX	DAT	Time stamp (LSB)
	34	XX	DAT	Time stamp
	35	XX	DAT	Time stamp
	36	XX	DAT	Time stamp (MSB)
	37	0D	DIF	Variable Length
Alarms	38	79	VIF	Meter id
	39	11	DAT	LVAR = 17 characters
	40	XX	DAT	Meter id (Last Character)
	...	XX	DAT	Meter id 15x characters
	56	XX	DAT	Meter id (First Character)
	57	04	DIF	32 bit binary
Backflow volume index	58	FD	VIF	Extended VIF Table
	59	17	VIFE	Alarms flags
	60	XX	DAT	Alarm Flags (LSB) ⁶ (cf default frame)
	61	XX	DAT	Alarm Flags
	62	XX	DAT	Alarm Flags
	63	XX	DAT	Alarm Flags (MSB)
	64	04	DIF	32 bit integer
	65	92/.../95	VIF	Volume, extension bit ⁵
Time stamp Cust. Billing	66	3C	VIFE	Backward flow (sum of abs value of neg)
	67	XX	DAT	Backflow volume index (LSB)
	68	XX	DAT	Backflow volume index
	69	XX	DAT	Backflow volume index
	70	XX	DAT	Backflow volume index (MSB)
	71	C2 (or F2 if Error)	DIF	16 bit integer => Type G
	72	86	DIFE	Storage Nb 45
Volume Index Cust. Billing	73	01	DIFE	Storage Nb 45
	74	6C	VIF	Timestamp Associated To data Type G
	75	XX	DAT	Timestamp (LSB) Date of Billing
	76	XX	DAT	Time stamp (MSB)
	77	C4 (or F4 if error)	DIF	32 bit integer
	78	86	DIFE	Storage Nb 45
	79	01	DIFE	Storage Nb 45
	80	12/.../15	VIF	Volume ⁴
Volume Flow	81	XX	DAT	Billing Index (LSB)
	81	XX	DAT	Billing Index
	82	XX	DAT	Billing Index
	83	XX	DAT	Billing Index (MSB)
Flow Temp.	84	03 (or 33 if Error)	DIF	24 bit integer
	85	3B	VIF	Instantaneous Flow in liter/hour
	86	XX	DAT	Volume Flow (LSB)
	87	XX	DAT	Volume Flow
	88	XX	DAT	Volume Flow (MSB)
Flow Temp.	89	02 (or 32 if Error)	DIF	24 bit integer
	90	5B	VIF	Flow Temp. In Degre Celcius
	91	XX	DAT	Volume index (LSB)
	92	XX	DAT	Volume index (MSB)

8.2 FDR Frame

This Intelis FDR frame is built using the block description management, and is the one proposed by default when no specific frame is requested by the customer.
It is composed of the following blocks:
0 / 1 / 4 / 7

0	Volume Index
1	Date and time
4	State Alarms + Extended Alarms
7	FDR 13 Months

Format of FDR frame Intelis configuration standard

Slave → Master		User data response (RSP-UD)		
Header	0	68	Start	Long frame start byte
	1	XX	L-Field	Frame length
	2	XX	L-Field	Frame length (bis)
	3	68	Start	Long frame start byte
	4	08	C-Field	SND-UD
	5	Addr/FD/FE	A-Field	Slave primary address ¹
Application Header	6	72	CI-Field	Data send with Long header
	7	XX	Identification number	Customer number (8 digits BCD) (LSB)
	8	XX	Identification number	Customer number (8 digits BCD)
	9	XX	Identification number	Customer number (8 digits BCD)
	10	XX	Identification number	Customer number (8 digits BCD) (MSB)
	11	97	Manufacturer	Manufacturer (LSB)
	12	26	Manufacturer	Manufacturer (LSB)
	13	32	Generation number	See X61 relative documents
	14	07	Medium code	Cold water
	15	XX	Access number	
	16	XX	Status	Meter status (2)
Manufacturer Id	17	00	Configuration	
	18	00	Configuration	
	19	0C	DIF	8 digit BCD
	20	78	VIF	Fabrication number VIF
Volume index	21	XX	DAT	Manufacturer number (LSB)
	22	XX	DAT	Manufacturer number
	23	XX	DAT	Manufacturer number
	24	XX	DAT	Manufacturer number (MSB)
	25	04	DIF	32 bit integer
Time stamp	26	12.../15	VIF	Volume ⁴
	27	XX	DAT	Volume index (LSB)
	28	XX	DAT	Volume index
	29	XX	DAT	Volume index
	30	XX	DAT	Volume index (MSB)
	31	04	DIF	32 bit integer
Alarms	32	6D	VIF	Time stamp type F
	33	XX	DAT	Time stamp (LSB)
	34	XX	DAT	Time stamp
	35	XX	DAT	Time stamp
	36	XX	DAT	Time stamp (MSB)
Alarms	37	04	DIF	32 bit binary
	38	FD	VIF	Extended VIF Table
	39	17	VIFE	Alarms flags
	40	XX	DAT	Alarm Flags (LSB) ⁶ (cf default frame)
	41	XX	DAT	Alarm Flags
	42	XX	DAT	Alarm Flags
	43	XX	DAT	Alarm Flags (MSB)

Size of FDR Storage	44	81	DIF	8 bit integer
	45	08	DIFE	Storage 16
	46	FD	VIFE	Table FD
	47	22	DAT	Size of the storage Block
Storage InterVal	48	0D	DAT	13 Fixed date reading
	49	81	DIF	8 bit integer
	50	08	DIFE	Storage 16
	51	FD	VIFE	Table FD
	52	28	DAT	Storage Interval Month
Date of Last FDR Storage	53	01	DAT	Nb of month for interval
	54	82	DIF	16 bit integer => Type G
	55	0E	DIFE	Storage Nb 28
	56	6C	VIF	Date Format G
FDR Volume Month -13	57	XX	DAT	Timestamp (LSB) Last FDR
	58	XX	DAT	Time stamp (MSB)
	59	84 (or B4 if error)	DIF	32 bit integer
	60	08	DIFE	Storage Nb 16
	61	12../15	VIF	Volume ⁴
	62	XX	DAT	FDR Volume Month-13 (LSB)
	63	XX	DAT	FDR Volume
	64	XX	DAT	FDR Volume
FDR Volume Month -12	65	XX	DAT	FDR Volume (MSB)
	66	C4 (or F4 if error)	DIF	32 bit integer
	67	08	DIFE	Storage Nb 17
	68	12../15	VIF	Volume ⁴
	69	XX	DAT	FDR Volume Month-12 (LSB)
	70	XX	DAT	FDR Volume
FDR Volume Month -11	71	XX	DAT	FDR Volume
	72	XX	DAT	FDR Volume (MSB)
	73	84 (or B4 if error)	DIF	32 bit integer
	74	09	DIFE	Storage Nb 18
	75	12../15	VIF	Volume ⁴
	76	XX	DAT	FDR Volume Month-13 (LSB)
	77	XX	DAT	FDR Volume
FDR Volume Month -10	78	XX	DAT	FDR Volume
	79	XX	DAT	FDR Volume (MSB)
	80	C4 (or F4 if error)	DIF	32 bit integer
	81	09	DIFE	Storage Nb 19
	82	12../15	VIF	Volume ⁴
	83	XX	DAT	FDR Volume Month-12 (LSB)
FDR Volume Month -9	84	XX	DAT	FDR Volume
	85	XX	DAT	FDR Volume
	86	XX	DAT	FDR Volume (MSB)
	87	84 (or B4 if error)	DIF	32 bit integer
	88	0A	DIFE	Storage Nb 20
	89	12../15	VIF	Volume ⁴
FDR Volume Month -8	90	XX	DAT	FDR Volume Month-13 (LSB)
	91	XX	DAT	FDR Volume
	92	XX	DAT	FDR Volume
	93	XX	DAT	FDR Volume (MSB)
	94	C4 (or F4 if error)	DIF	32 bit integer
	95	0A	DIFE	Storage Nb 21
FDR Volume Month -7	96	12../15	VIF	Volume ⁴
	97	XX	DAT	FDR Volume Month-12 (LSB)
	98	XX	DAT	FDR Volume
	99	XX	DAT	FDR Volume
	100	XX	DAT	FDR Volume (MSB)
	101	84 (or B4 if error)	DIF	32 bit integer
FDR Volume Month -7	102	0B	DIFE	Storage Nb 22
	103	12../15	VIF	Volume ⁴
	104	XX	DAT	FDR Volume Month-13 (LSB)
	105	XX	DAT	FDR Volume
	106	XX	DAT	FDR Volume
	107	XX	DAT	FDR Volume (MSB)

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FDR Volume Month -6	108	C4 (or F4 if error)	DIF	32 bit integer
	109	0B	DIFE	Storage Nb 23
	110	12../15	VIF	Volume ⁴
	111	XX	DAT	FDR Volume Month-12 (LSB)
	112	XX	DAT	FDR Volume
	113	XX	DAT	FDR Volume
FDR Volume Month -5	114	XX	DAT	FDR Volume (MSB)
	115	84 (or B4 if error)	DIF	32 bit integer
	116	0C	DIFE	Storage Nb 24
	117	12../15	VIF	Volume ⁴
	118	XX	DAT	FDR Volume Month-13 (LSB)
	119	XX	DAT	FDR Volume
FDR Volume Month -4	120	XX	DAT	FDR Volume
	121	XX	DAT	FDR Volume (MSB)
	122	C4 (or F4 if error)	DIF	32 bit integer
	123	0C	DIFE	Storage Nb 25
	124	12../15	VIF	Volume ⁴
	125	XX	DAT	FDR Volume Month-12 (LSB)
FDR Volume Month -3	126	XX	DAT	FDR Volume
	127	XX	DAT	FDR Volume
	128	XX	DAT	FDR Volume (MSB)
	129	84 (or B4 if error)	DIF	32 bit integer
	130	0D	DIFE	Storage Nb 26
	131	12../15	VIF	Volume ⁴
FDR Volume Month -2	132	XX	DAT	FDR Volume Month-13 (LSB)
	133	XX	DAT	FDR Volume
	134	XX	DAT	FDR Volume
	135	XX	DAT	FDR Volume (MSB)
	136	C4 (or F4 if error)	DIF	32 bit integer
	137	0D	DIFE	Storage Nb 27
FDR Volume Month -1	138	12../15	VIF	Volume ⁴
	139	XX	DAT	FDR Volume Month-12 (LSB)
	140	XX	DAT	FDR Volume
	141	XX	DAT	FDR Volume
	142	XX	DAT	FDR Volume (MSB)
	143	84 (or C4 if error)	DIF	32 bit integer
Fixed Data	144	0E	DIFE	Storage Nb 28
	145	12../15	VIF	Volume ⁴
	146	XX	DAT	FDR Volume Month-12 (LSB)
	147	XX	DAT	FDR Volume
	148	XX	DAT	FDR Volume
	149	XX	DAT	FDR Volume (MSB)
	150	0F/1F (3)	DIF	No frame to follow/Frame to follow
	151	XX	Checksum	
	152	16	Stop	Stop byte

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- 1 Slave primary address
 - Addr Address of slave
 - FDh Primary Address in case of secondary addressing
 - FEh Broadcast address with response
 - FFh Broadcast address without response

- 2 Meter status
 - bit 0 Unused (always 0)
 - bit 1 Unused (always 0)
 - bit 2 Unused (always 0)
 - bit 3 Permanent Error (Us asic)
 - bit 4 Temporary Error (Backflow, air in pipe, Overflow, Dirty deposit)
 - bit 5 Unused (always 0)
 - bit 6 Unused (always 0)
 - bit 7 Unused (always 0)

- 3 No frame to follow/Frame to follow

Only if manufacturer specific is needed(0F) or if there is a 1F)

- 4 Volume
 - 12h unit : 0,1 L
 - 13h unit : 1L
 - 14h unit : 10 L
 - 15h unit : 100 L

- 5 Backflow Volume
 - 92h unit : 0,1 L
 - 93h unit : 1L
 - 94h unit : 10 L
 - 95h unit : 100 L

9 CHANGE LOG

Date	Issue	Author	Status	Comments
18/09/2014	0.1	E Frotey	Draft	For internal diffusion to core team
30/09/2014	0.2	E Frotey	Draft	Including core team correction
08/07/2015	0.3	E Frotey	Draft	Add Detail DIF/VIF for customer (Annex 5)
20/01/2017	0.4	E Frotey	Draft	Version for Adewa
07/08/2017	0.5	E Frotey	Draft	Typo correction
08/08/2017	0.6	E Frotey	Draft	Error correction in sample frame table
24/06/2020	0.7	A Laurens	Released	