

M-BUS Standard acc. EN 13757

AE.05:04.01:01.01

Protocol Specification

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1. Introduction

The Gas Meter with Absolute Encoder Index communicates Wired M-Bus according to DIN EN13757-2

- Communication: asynchrony
- Baud rate: **2400**/ 300
- Parity: Even
- Data Bits: 8
- Stop Bit: 1

2. Data Link Layer

Supported C-Fields

Name	Hex
SND_NKE	40
REQ_UD1	5A
REQ_UD2	5B
SND_UD	53
RSP_UD	08

Table 1: C-Fields Overview

2.1 SND_NKE

	Field	Hex	Remark
0	Start Character	10	Short frame
1	C-Field	40	SND_NKE
2	A	A-0	Primary Address
3	<i>Checksum</i>		
4	Stop Character	16	

Table 2: SND_NKE

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2.2 REQ_UD1

	Field	Hex	Remark
0	Start Character	10	Start byte short telegram
1	C	5A / 7A	Request User Data (alarm sending)
2	A	A-0	Primary Address
3	<i>Checksum</i>		
4	Stop Character	16	Always 16

Table 3:REQ_UD1

2.3 REQ_UD2

	Field	Hex	Remark
0	Start Character	10	Start byte short telegram
1	C	5B / 7B	Request User Data (counter sending)
2	A	A-0	Primary Address
3	<i>Checksum</i>		
4	Stop Character	16	Always 16

Table 4:REQ_UD2

2.4 SND_UD

	Field	Hex	Remark
0	Start Character	68	Start byte long telegram
1	L	L-0	Length
2	L	L-0	Length
3	Start Character	68	Start byte long telegram
4	C	53 / 73	Master sent user data to slave
5	A	A-0	Primary Address
6	<i>CI-Field Data Block</i>		
7	<i>Checksum</i>		
8	Stop Character	16	Always 16

Table 5: SND_UD

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2.5 RSP_UD

	Field	Hex	Remark
0	Start Character	68	Start byte long telegram
1	L	L-0	Length
2	L	L-0	Length
3	Start Character	68	Start byte long telegram
4	C	08	Sending "requested data"
5	A	A-0	Primary Address
6	<i>CI-Field Data Block</i>		
7	<i>Checksum</i>		
8	Stop Character	16	Always 16

Table 6: RSP_UD

3. Application Layer

3.1 Supported CI Fields

Control Information	Hex	Header
Application Reset	50	None
Command to device	51	None
Selection of device	52	None
Command to device	5A	Short Data Header
Command to device	5B	Long Data Header
Response error from device	70	None
Response from device	72	Fixed Data Header
Set Baud Rate	B8/BB	None

3.2 Short Data Header

	Field	Hex	Remark
0	<i>SND_UD Frame</i>		
1	CI	5A	Data send (master to slave)
2	4 byte data header	AC-0	Access Number
3		S-0	Status
4		X0	Number of bytes encrypted, must be multiple of 16
5		EC-0	Encryption Method Code; for Absolute Encoder AE5 always zero
6	<i>Variable Data Blocks</i>		

Table 7: Short Data Header

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3.3 Long Data Header

		Field	Hex	Remark	
0	<i>SND_UD Frame</i>				
1		CI	5B	Data send (master to slave)	
2		Identification Number	ID-0	Identification Number	
3			ID-1		
4			ID-2		
5			ID-3		
6		Manufacturer Identification	MI-0	Manufacturer ID	
7			MI-1		
8		Version	V-0	Generation	
9		Medium	M-0	Medium	
10	Long Header	Short Header	Access No	Access Number	
11			Status	ST-0	Error Status Code
12			Signature	X0	Number of bytes encrypted, must be multiple of 16
13	EC-0	Encryption Method Code; for Absolute AE5 always zero			
14	<i>Variable Data Blocks</i>				

Table 8: Long Data Header

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3.4 Fixed Data Header

		Field	Hex	Remark
0	<i>RSP_UD Frame</i>			
1		CI	72	Data send (slave to master)
2	Short ID	Identification Number	ID-0	Identification Number
3			ID-1	
4			ID-2	
5			ID-3	
6	Short ID	Manufacturer Identification	MI-0	Manufacturer ID
7			MI-1	
8	Short ID	Version	V-0	Generation
9	Short ID	Medium	M-0	Medium
10	Long Header	Access No	AC-0	Access Number
11		Status	ST-0	Error Status Code
12		Signature	00	Number of bytes encrypted, must be multiple of 16
13	EC-0		No encryption method use	
14	<i>Variable Data Blocks</i>			

Table 9: Fixed Data Header

Note 1: The combination of Identification Number (4 octets), Manufacturer identification (2 octets), Version identification (1 octet) and Device Type identification (Medium field, 1 octet) is defined as the Short ID.

Note 2: The Short ID shall be unique within the network of the grid operator. The manufacturer guarantees uniqueness with a Version field that is fixed over the lifetime of the individual M-Bus device. Hence firmware upgrades are not possible without changing the Version number.

4. Error Status Codes

The following table shows the M-Bus status byte according to EN 13757-3:2004

b7 b6 b5 b4 b3 b2 b1 b0

	Bit	Meaning	Set Conditions	Reset Conditions
0	b ₀	Not used	-	-
1	b ₁	Any application error	Absolute Encoder was not able to read the Index	Flag is reset after the next successful readout.
2	b ₂	Not used	-	-
3	b ₃	Not used	-	-
4	b ₄	Not used	-	-
5	b ₅	Not used	-	-
6	b ₆	Not used	-	-
7	b ₇	Not used	-	-

Table 10: M-Bus Status Byte

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5. Variable Data Blocks

Data Points Overview

ID	Name	Data Record Header				
		DIF	DIFE	VIF	VIFE	LVAR
D001	Serial number	0C	-	78	-	-
D002	Volume	0C	-	13...15	-	-

Data Points

5.1 Serial Number

	Field	Hex	Remark
0	DIF	0C	8 digit BCD
1	VIF	78	Serial number
2	Serial number	SN-0	Serial number, where SN-0 is the LSB of the serial number. Note: The serial number and the identification number are always the same (see also Annex 9)!
3		SN-1	
4		SN-2	
5		SN-3	
6		SN-4	
7		SN-5	
8		SN-6	
9		SN-7	

Data Point D001: Serial Number

5.2 Volume

	Field	Hex	Remark
0	DIF	0C	Data format 8 Digit BCD, Storage Number Bit = 0 / 1
1	VIF	13, 14, 15	3, 2 or 1 digit(s) after decimal point
2	Volume	V-0	Value, where V-0 is the LSB of the value
3		V-1	
4		V-2	
5		V-3	

Data Point D002: Volume

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6. Procedures

Overview

ID	Telegram Name	CI-Field
P001	SND_UD Set Baud Rate	B8/BB
P002	SND_UD Application Reset	50
P003	SND_UD Set primary address	51
P004	SND_UD Slave Select	52
P005	RSP_UD Standard Data Record	72

6.1 SND_UD Set Baud Rate

	Field
0	<i>SND_UD Frame</i>
1	<i>Control Information: B8 set baud rate to 300 baud BB set baud rate to 2400 baud</i>

Procedure P001: SND_UD Set Baud Rate

6.2 SND_UD Application Reset

	Field
0	<i>SND_UD Frame</i>
1	<i>Control Information: 50 Application Reset</i>

Procedure P002: SND_UD Application Reset

6.3 SND_UD Set Primary Address

	Field
0	<i>SND_UD Frame</i>
1	<i>Control Information: 51 Command to device</i>
2	<i>DIF: 0x01 VIF: 0x7A Set primary address</i>
3	<i>New primary address (8 Bit integer)</i>

Procedure P003: SND_UD Set Primary Address

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6.4 SND_UD Slave Select

	Field
0	<i>SND_UD Frame</i>
1	<i>Control Information: 52 Slave Select</i>
2	<i>Short ID</i>

Procedure P004: SND_UD Slave Select

6.5 RSP_UD Standard Data Record

	Field
0	<i>RSP_UD Frame</i>
1	<i>Control Information: 72 slave to master</i>
2	<i>Fixed Data Header</i>
3	<i>Data Point D001 Serial Number</i>
4	<i>Data Point D002 Volume</i>

Procedure P005: RSP_UD Standard Data Record

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Annex A Examples

A.1 SND_NKE

	Field	Hex	Remark
0	Start Character	10	Sort frame
1	C-Field	40	SND_NKE
2	Primary Address	01	e.g. 01
3	Checksum	CS	Checksum
4	Stop Character	16	Always 16

Example 1: SND_NKE

A.2 REQ_UD1

	Field	Hex	Remark
0	Start Character	10	Start byte sort telegram
1	C	5A	Request User Data (alarm sending)
2	A	01	Primary Address
3	CS	CS	Checksum
4	Stop Character	16	Always 16

Example 2: REQ_UD1

A.3 REQ_UD2

	Field	Hex	Remark
0	Start Character	10	Start byte sort telegram
1	C	5B	Request User Data (counter sending)
2	A	01	Primary Address
3	CS	CS	Checksum
4	Stop Character	16	Always 16

Example 3: REQ_UD2

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A.4 SND_UD Set Baud Rate

	Field	Hex		Remark
		clear	encrypted	
0	Start Character	68		Start byte long telegram
1	L	03		Length
2	L	03		Length
3	Start Character	68		Start byte long telegram
4	C	53		Master sent user data to slave
5	A	01		Primary Address
6	CI	BB		Set Baud Rate to 2400 baud
7	CS	CS		Checksum
8	Stop Character	16		Always 16

Example 4: Set Baud Rate to 2400

A.5 SND_UD Set Baud Rate

	Field	Hex		Remark
		clear	encrypted	
0	Start Character	68		Start byte long telegram
1	L	03		Length
2	L	03		Length
3	Start Character	68		Start byte long telegram
4	C	53		Master sent user data to slave
5	A	01		Primary Address
6	CI	B8		Set Baud Rate to 300 baud
7	CS	CS		Checksum
8	Stop Character	16		Always 16

Example 5: Set Baud Rate to 300

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A.6 SND_UD Set Primary Address

	Field	Hex		Remark
		clear	encrypted	
0	Start Character	68		Start byte long telegram
1	L	06		Length
2	L	06		Length
3	Start Character	68		Start byte long telegram
4	C	53		Master sent user data to slave
5	A	01		Primary Address
6	CI	51		Command to device
7	DIF	01		8 Bit Integer
8	VIF	7A		Set primary address
9	Primary address	AA		New primary address
10	CS	CS		Checksum
11	Stop Character	16		Always 16

Example 6: Set Baud Rate to 2400

A.7 SND_UD Application Reset

	Field	Hex		Remark
		clear	encrypted	
0	Start Character	68		Start byte long telegram
1	L	03		Length
2	L	03		Length
3	Start Character	68		Start byte long telegram
4	C	53		Master sent user data to slave
5	A	01		Primary Address
6	CI	50		Application Reset
7	CS	CS		Checksum
8	Stop Character	16		Always 16

Example 7: Application Reset

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A.8 SND_UD Slave Select

	Field	Hex		Remark
		clear	encrypted	
12	Start Character	68		Start byte long telegram
13	L	0B		Length
14	L	0B		Length
15	Start Character	68		Start byte long telegram
16	C	53		Master sent user data to slave
17	A	FD		Secondary Addressing
18	CI	52		Slave Select
19	Identification Number	78		Identification Number, e.g. 12345678
20		56		
21		34		
22		12		
23	Manufacturer ID	93		Manufacturer ID e.g. "ELS"
24		15		
25	Version	33		
26	Medium	03		Gas
27	CS	CS		Checksum
28	Stop Character	16		Always 16

Example 8: Slave Select

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A.9 Standard Data Record

Example 9 shows a RSP_UD telegram (used communication module ACM 5.2 M-Bus)

0	Field	Hex	Remark
1	Start	68	Start byte long telegram
2	L	1B	Length
3	L	1B	Length
4	Start	68	Start byte long telegram
5	C	08	Sending „requested data“
6	A	00	Primary Address
7	CI	72	Answer with variable data frame
8	Identification Number	78	Identification Number, e.g. 12345678
9		56	
10		34	
11		12	
12	Manufacturer ID	93	Manufacturer ID according to IEC 870, e.g. "ELS"
13		15	
14	Generation	3C	
15	Medium	03	Medium = gas
16	Access No	01	Access Number = 01
17	Status	00	No error
18	Signature	00	No encryption
19		00	
20	DIF	0C	8 digit BCD
21	VIF	78	Serial number
22	Serial Number	78	8 digit, BCD. The serial number and the identification number are always the same (here: 12345678)
23		56	
24		34	
25		12	
26	DIF	0C	8 digit BCD
27	VIF	13	3 digits after decimal point
28	Volume	03	Volume e.g. 00000,003
29		00	
30		00	
31		00	
32	CS	30	Checksum
33	Stop	16	Stop byte

Example 9: RSP_UD telegram with communication module ACM 5.2 M-Bus

Schutzvermerk ISO 16016 beachten