M-BUS and SCR with OBIS acc. OMS

AE.05:05.01:01.01

Protocol Specification

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Technische Information
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Contents

1. Introduction

The Honeywell Multiprotocol unites two communication protocols (M-Bus according to OMS and SCR in accordance with IEC 62056-21, formerly IEC 1107) to one protocol. Which protocol is activated, is decided automatically in the field by assembly of the suitable communication module. With the help of the Honeywell Multiprotocol the Gas Meter becomes flexible, because all Honeywell Communication Modules can be directly connected to the meter or changed in field without adjusting the settings of the meter (Smart Ready).
For battery powered communication modules, a short data telegram without any request commands for activating the transmission is very helpful to reduce power consumption. The communication module can activate the “ECO Respond” at every time. In this case the AE5 replies at power on with a reduced M-Bus frame “ECO Push” imminently without any request/respond procedure.

2. Switching between M-Bus and SCR Mode

The external communication module, which is mounted to the Gas Meter, can switch between M-Bus and SCR Mode every time. The switching process is managed by the interface between Gas meter and communication module (ACM Interface). As the communication module chooses the right mode automatically, it is not necessary to change the modus over the communication protocol.

3. Switching between M-Bus and ECO Respond

In M-Bus Mode the ECO Respond can be activated using the MMS b input pin (pin 4) of the ACM Interface. For more information see the specification of the ACM Interface. The reduced M-Bus frame “ECO Push” of the ECO Respond is described by section 4.7.

4. Modus M-Bus according to OMS

If this modus is activated by the external communication module, the Gas Meter communicates Wired M-Bus according to OMS Vol.2 Primary 2.0.0. In case of a Wired M-Bus communication module (e.g. **ACM 5.2 M-Bus**) is used, the physical layer is designed according to DIN EN13757-2

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

4.1 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

4.1.1 SND_NKE

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

Table 2:SND_NKE

4.1.2 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	*Checksum*		
4	Stop Character	16	Always 16

Table 3:REQ_UD1

4.1.3 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	*Checksum*		
4	Stop Character	16	Always 16

Table 4:REQ_UD2

4.1.4 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	*CI-Field Data Block*		
7	*Checksum*		
8	Stop Character	16	Always 16

Table 5: SND_UD

4.1.5 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	*CI-Field Data Block*		
7	*Checksum*		
8	Stop Character	16	Always 16

Table 6: RSP_UD

4.2 Application Layer

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

4.2.1 Short Data Header

	Field		Hex	Remark
0	*SND_UD Frame*			
1		CI	5A	Data send (master to slave)
2	4 byte data header	Access No	AC-0	Access Number
3		Status	S-0	Status
4		Signature	X0	Number of bytes encrypted, must be multiple of 16
5			EC-0	Encryption Method Code; for Absolute Encoder AE5 always zero
6	*Variable Data Blocks*			

Table 7: Short Data Header

4.2.2 Long Data Header

	Field			Hex	Remark
0	*SND_UD Frame*				
1			CI	5B	Data send (master to slave)
2	Long Header	Short ID	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		Short Header	Access No	AC-0	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	*Variable Data Blocks*				

Table 8: Long Data Header

4.2.3 Fixed Data Header

	Field			Hex	Remark
0	*RSP_UD Frame*				
1			CI	72	Data send (slave to master)
2	Long Header	Short ID	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		Short	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	*Variable Data Blocks*				

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.

4.3 Error Status Codes

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

$b_7\ b_6\ b_5\ b_4\ b_3\ b_2\ b_1\ b_0$

	Bit	Meaning	Set Conditions	Reset Conditions
0	b_0	Application Busy	Absolute Encoder was not able to read the Index	Flag is reset after the next successful readout.
1	b_1	Not used	-	-
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

4.4 Version field

The Version field byte is used to distinguish the different M-Bus protocols which are supported by the Absolute Encoder AE5. The 8 bits of the version byte have the following meanings:

b_7	b_6	b_5	b_4	b_3	b_2	b_1	b_0
Protocol Type		Protocol Version					

Table 11: Version Field

Protocol Type

Code	Meaning
00	M-BUS Standard acc. EN 13757 (Protocol: AE.05:04.01:01.01)
01	M-BUS acc. DSMR V2.2 (Protocol: AE.02:01.01:01.01)
10	M-BUS acc. to OMS Vol.2 (Protocol: AE.05:02.01:01.01)
11	Reserved for future use

Table 12: Protocol Type Definitions

Actually there are two M-Bus protocols according to OMS available. The protocol version is used to distinguish the protocol dialects “M-BUS acc. to OMS Vol.2 (Protocol: AE.05:02.01:01.01)“ and “M-BUS and SCR with Obis acc. OMS (Protocol: AE.05:02.01:01.01)“

Code	Meaning
000000	M-BUS acc. to OMS Vol.2 (Protocol: AE.05:02.01:01.01) (this document)
000001	M-BUS and SCR with Obis acc. OMS (Protocol: AE.05:02.01:01.01)
any other value	Reserved for future OMS Implementations

Table 13: Protocol Version Definition

4.5 Variable Data Blocks

Data Points Overview

ID	Name	Data Record Header				
		DIF	DIFE	VIF	VIFE	LVAR
T01	Ownership number	0D	-	FD	11	00…14
T02	Volume, converted	0C	-	13…15	-	-
T03	Volume, unconverted	OC	-	93…94	3A	-

Data Points

4.5.1 Ownership Number

	Field	Hex	Remark
0	DIF	0D	Variable length
1	VIF	FD	Ownership Number
2	VIFE	11	Ownership Number
3	LVAR	01…14	Number of characters (max. 20)
4	Ownership number	ON-0	Ownership Number, where ON-0 is the LSB (i.e. last character) of the ownership number. The characters are ASCII coded.
5		ON-1	
6		ON-2	
7		…	
8		ON-n	

Data Point D001: Serial Number

4.5.2 Volume, converted

	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

4.5.3 Volume, unconverted

	Field	Hex	Remark
0	DIF	0C	Data format 8 Digit BCD, Storage Number Bit = 0 / 1
1	VIF	93, 94, 95	3, 2 or 1 digit(s) after decimal point
2	VIFE	3A	VIF contains unconverted units
3	Volume	V-0	Value, where V-0 is the LSB of the value
4		V-1	
5		V-2	
6		V-3	

Data Point D003: Volume

4.6 Procedures

Overview

ID	Telegram Name	CI-Field
T001	SND_UD Set Baud Rate	B8/BB
T002	SND_UD Application Reset	50
T003	SND_UD Set primary address	51
T004	SND_UD Slave Select	52
T005	RSP_UD Standard Data Record	72

4.6.1 SND_UD Set Baud Rate

	Field
0	*SND_UD Frame*
1	*Control Information:* *B8 set baud rate to 300 baud* *BB set baud rate to 2400 baud*

Procedure T001: SND_UD Set Baud Rate

4.6.2 SND_UD Application Reset

	Field
0	*SND_UD Frame*
1	*Control Information: 50 Application Reset*

Procedure T002: SND_UD Application Reset

4.6.3 SND_UD Set Primary Address

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

Procedure P003: SND_UD Set Primary Address

4.6.4 SND_UD Slave Select

	Field
0	*SND_UD Frame*
1	*Control Information: 52 Slave Select*
2	*Short ID*

Procedure T004: SND_UD Slave Select

4.6.5 RSP_UD Standard Data Record

	Field
0	*RSP_UD Frame*
1	*Control Information: 72 slave to master*
2	*Fixed Data Header*
3	*Data Point D001 Ownership Number* ***Note:** This data point is optionally and only available when the ownership number is activated (customer depending)!*
4	*Data Point D002 Volume, converted* *or* *Data Point D003 Volume, unconverted* *(gas meter depending)*

Procedure T005: RSP_UD Standard Data Record

4.7 ECO Respond

For battery powered communication modules, a short data telegram without any request commands for activating the transmission is very helpful to reduce power consumption. The communication module can activate the “ECO Respond” at every time (see “Specification V6 3V3 Encoder Eco AE5 V1.3). In this case the AE5 replies at power on with a reduced M-Bus frame “ECO Push” imminently without any request/respond procedure. The frame of ECO Push is constructed according to EN13757-3 with a fixed header and fixed data. No request/respond procedure has to be processed by the external communication master. A frame example is shown by annex A10.

Note: As ECO Push is a reduced M-Bus frame the owner ship number (see also section 4.5.1) will not transferred. The owner ship number will only transferred after REQ_UD2 according to section 4.1.3!

5. Modus SCR/ SCR+ with OBIS numbers according to OMS

SCR means **S**ystem for meter **C**ommunication and **R**eadout. It is specified for powerless meters in which the meter is powered by an interruptible or permanent connection for communication and remote readout.
The meter power supply and the meter communication interface is realised by a DC electrical connection (two wires), with arbitrary polarity.
The modus of the multiprotocol is used by the communication module e.g. **ACM 5.5 SCR**.

- Communication: asynchrony
- Baud rate: 300
- Parity: Even
- Data Bits: 7
- Stop Bit: 1

5.1 Reading the meter

To read the meter, the transmission unit starts communication with a sign on either (all characters are ASCII coded)

a) /?!<CR><LF>
b) /? MeterNumber!<CR><LF>
c) continuous Power up

The meter replies with a Data Readout according to section 4.2

Notes:

1. The Sign on “/?!<CR><LF>” or “/?Meternumber!<CR><LF>” must observe the timing requirements of IEC 62056-21.
2. Continuous Power up is treated as a Sign On without meter address (/?!<CR><LF>)
3. A minimum power down time of 2 sec must be observed before Power up Sign on
4. When reading the protocol with power on, depending on the hardware used, some extra characters may be present before the leading /. These should simply be skipped.

5.2 Answer of the meter

The OBIS designators of this protocol are according to OMS, Issue 2.0.0 / 2009-07-20

A Data Readout (unconverted volume) is as follows:

/Manuf_Id Medium Version<CR><LF>
<STX>7-0:3.0.0(Reading*m3)<CR><LF>
0-0:96.1.0(MeterNumber)<CR>LF>
0.0.0(NominaSize)<CR><LF>
!<CR><LF>
<ETX><BCC>

A Data Readout (temperature converted volume) is as follows:

/Manuf_Id Medium Version<CR><LF>
<STX>7-0:3.1.0(Reading*m3)<CR><LF>
0-0:96.1.0(MeterNumber)<CR>LF>
0.0.0(NominaSize)<CR><LF>
!<CR><LF>
<ETX><BCC>

Note:

- Between “Manuf_Id” and “Medium” is a space character
- Between “Medium” and “Version” is a space character

Protocol Element	OBIS-Code	Description
Manuf_ID	Not available	The Manuf_Id is a three Uppercase letter ID according to www.dlms.com/flag/
Medium	Not available	The Medium String is a clear text with uppercase or upper and lowercase characters describing the Medium. “Gas” is used for gas meter.
Version	Not available	This element descripts the protocol version. It starts with ‘V’, followed by the fist digit (major version), a dot and a second digit (minor version).
Reading	7-0:3.0.0 (unconverted) 7-0:3.1.0 (converted)	The Reading is a String with up to 10 digits and decimal separator ‘.’ or ‘,’ if appropriate. In case of Register errors, the Reading String contains ‘?’ in place of one or more digits (Roller error) or ‘?’ in place of all digits (Register error)
MeterNumber	0-0:96.1.0	This line contains the Meter Number (always 8 digits).
NominalSize	0.0.0	This is the meter size. The element is a string which may start and end with non digit characters, but it always contains a numeric part, eventually with decimal separator ‘.’ or ‘,’ (e.g. ‘G4’)
<BCC>	Not available	The Protocol ends with the Block check character (BCC) according to DIN 66219 / IEC 1155

Annex A Examples (Mode M-Bus according to OMS)

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

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

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

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

A.9 Standard Data Record

Example 9 shows a RSP_UD telegram with activated ownership number (customer depending) and unconverted volume.

0	Field	Hex	Remark
1	Start	68	Start byte long telegram
2	L	1F	Length
3	L	1F	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	80	Protocol “M-BUS acc. to OMS Vol.2”
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	0D	Variable length
21	VIF	FD	Ownership number
22	VIFE	11	Ownership number
23	LVAR	05	Ownership number length 5 characters
24	Ownership number	42	Ownership number with 5 characters e.g. “123AB”
25		41	
26		33	
27		32	
28		31	
29	DIF	0C	8 digit BCD
30	VIF	93	Unconverted volume with 3 digits after decimal point
31	VIFE	3A	Unconverted volume

0	Field	Hex	Remark
32	Volume	03	Volume e.g. 00000,003
33		00	
34		00	
35		00	
36	CS	CS	Checksum
37	Stop	16	Stop byte

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

A.10 ECO Push data record

Example 10 shows a ECO Push data record

	Field	Hex clear	Remark
1	Start	68	Start byte long telegram
2	L	15/16	Length
3	L	15/16	Length
4	Start	68	Start byte long telegram
5	C	08	Sending „requested data“
6	A	00	Secondary addressing mode
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	81	Multiprotocol
15	Medium	03	Medium = gas
16	Access No	01	Access Number
17	Status	00	Error Status
18	Signature	00	No encryption
19		00	
20	DIF	0C	Data format 8 Digit BCD
21	VIF	93… 96 / 13… 16	No Temperature compensation / Temperature compensation
22	VIFE	3A / –	No Temperature compensation / -
23	Volume	44	Volume e.g. 11223344
24		33	
25		22	
26		11	
27	CS	CS	Checksum
28	Stop	16	Stop byte

Example 10: ECO Push data record