

M-Bus Communication Protocol

Cyble M-Bus

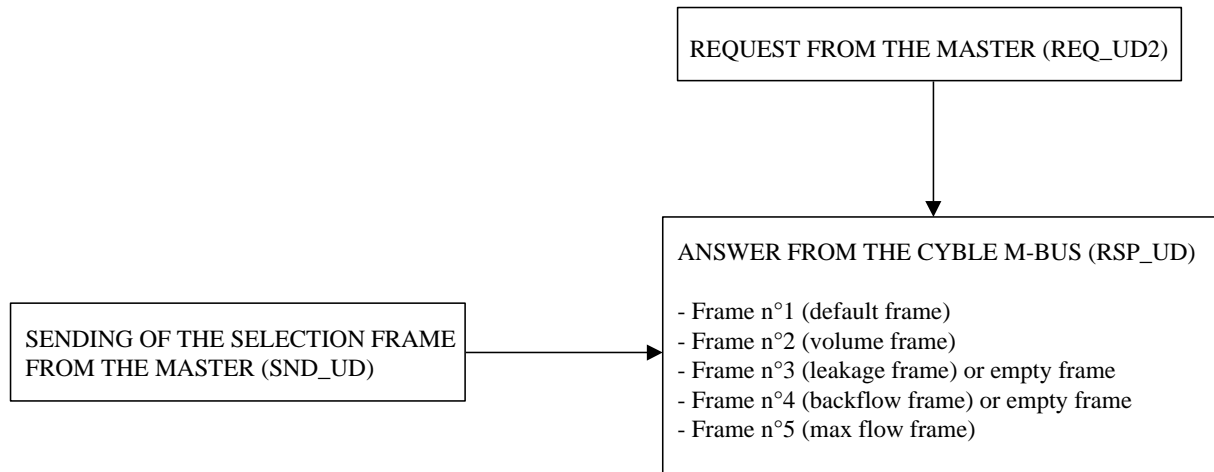
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1. CYBLE M-BUS frames

The CYBLE M-BUS can answer to a request from a master one frame among six available frames. The answered frame had been selected by a long frame sent previously by the master.



1.1. Frame n°1

The frame n°1 is the default frame. This frame is answered to a request REQ_UD2 after an « application reset ».

Header:

68h

Start character of a long frame.

50h ou 56h

Length.

50h ou 56h

Length.

68h

Start character of a long frame.

08h

C-field.

XXh

CYBLE M-BUS primary address.

72h

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CI-field.

XXh

XXh

XXh

XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h

4Dh

Schlumberger manufacturer number.

03h

Generation n°3: CYBLE M-BUS.

XXh

Medium.

XXh

Acces number.

XXh (b₇b₆b₅b₄b₃b₂b₁b₀)

Status.

b₀ : reserved

b₁ : reserved

b₂ : low battery (1 : remaining battery lifetime less than one year)

b₃ : permanent error (1 : tampering or ASIC error or RAM error)

b₄ : temporary error (1 : memorisation of tampering)

b₅ : tampering

b₆ : ASIC error

b₇ : RAM error

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

0 0 0 0 1 1 0 0

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0Ch

- VIF

0	1	1	1	1	0	0	0
---	---	---	---	---	---	---	---

78h

XXh

XXh

XXh

XXh

Customer number

This number (10 ASCII digits) is programmable on the field.

- DIF

0	0	0	0	1	1	0	1
---	---	---	---	---	---	---	---

0Dh

- VIF

0	1	1	1	1	1	0	0
---	---	---	---	---	---	---	---

7Ch

08h

8 ASCII digits

44h

} cust. ID

49h

20h

2Eh

74h

73h

75h

63h

0Ah

} 10 ASCII digits (LSB first)

XXh

XXh

XXh

XXh

XXh

XXh

XXh

XXh

XXh

XXh

XXh

XXh

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XXh
XXh

Date and time
- DIF

0 0 0 0 0 1 0 0

04h
- VIF

0 1 1 0 1 1 0 1

6Dh

XXh
XXh
XXh
XXh

Battery remaining lifetime

- DIF

0 0 0 0 0 0 1 0

02h

- VIF

0 1 1 1 1 1 0 0

7Ch

09h 9 ASCII digits (LSB first)

65h { bat. time

6Dh

69h

74h

20h

2Eh

74h

61h

62h

XXh

XXh

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Volume

- DIF

0 0 0 0 0 1 0 0

04h

- VIF

unit	code	VIF
0.001l	0 0 0 1 0 0 0 0	10h
0.01l	0 0 0 1 0 0 0 1	11h
0.1l	0 0 0 1 0 0 1 0	12h
1l	0 0 0 1 0 0 1 1	13h
10l	0 0 0 1 0 1 0 0	14h
100l	0 0 0 1 0 1 0 1	15h
1000l	0 0 0 1 0 1 1 0	16h
10 000l	0 0 0 1 0 1 1 1	17h

XXh

XXh

XXh

XXh

Backflow volume

- DIF

0 0 0 0 0 1 0 0

04h

- VIF

unit	code	VIF
0.001l	1 0 0 1 0 0 0 0	90h
0.01l	1 0 0 1 0 0 0 1	91h
0.1l	1 0 0 1 0 0 1 0	92h
1l	1 0 0 1 0 0 1 1	93h
10l	1 0 0 1 0 1 0 0	94h
100l	1 0 0 1 0 1 0 1	95h
1000l	1 0 0 1 0 1 1 0	96h
10 000l	1 0 0 1 0 1 1 1	97h

- VIFE

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0 1 1 1 1 1 1 1

7Fh

XXh

XXh

XXh

XXh

Last month volume (if it occurred)

- DIF

0 1 0 0 0 1 0 0

44h

- VIF

unit	code	VIF
0.001l	0 0 0 1 0 0 0 0	10h
0.01l	0 0 0 1 0 0 0 1	11h
0.1l	0 0 0 1 0 0 1 0	12h
1l	0 0 0 1 0 0 1 1	13h
10l	0 0 0 1 0 1 0 0	14h
100l	0 0 0 1 0 1 0 1	15h
1000l	0 0 0 1 0 1 1 0	16h
10 000l	0 0 0 1 0 1 1 1	17h

XXh

XXh

XXh

XXh

Flags showing possible leak, backflow, monthly readout date as well as optional frames and push button state.

0Fh

Manufacturer specific.

XXh (b₇b₆b₅b₄b₃b₂b₁b₀)

b₀ : =1 backflow since the last M-Bus readout

b₁ : =1 leak since the last M-Bus readout

b₂ : =1 b₀ valid (backflow option)

b₃ : =1 b₁ valid (leak option)

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b₄ : =1 push button status (pushed)
 b₅ : =0 volume fixed date reading option valid
 b₆ : =0 flow option valid
 b₇ : =0 unused

Number of volume programming

XXh

Monthly readout day

XXh

CSh

Checksum.

16h

Stop character.

1.2.Sum up of the frame :

68h	start
50h ou 56h	
50h ou 56h	
68h	start
08h	C
xxh	address
72h	CI (mode 1)
xxh	{ Identification number
xxh	}
xxh	}
xxh	}
82h	{ Manufacturer identification number
4Dh	}
03h	generation
xxh	medium
xxh	acces number
xxh	status
00h	{ signature
00h	{ signature
0Ch	fabrication number (8 BCD digits)
78h	
xxh	}
xxh	}

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```

xxh      }
xxh      }
0Dh      } customer number (10 ASCII digits)
7Ch      }
08h      }
44h      } cust. ID
49h      }
20h      }
2Eh      }
74h      }
73h      }
75h      }
63h      }
0Ah      } 10 ASCII digits
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
xxh      }
04h      } date and time
6Dh      }
xxh      }
xxh      }
xxh      }
02h      } battery remaining lifetime
7Ch      }
09h      }
65h      } bat. time
6Dh      }
69h      }
74h      }
20h      }
2Eh      }
74h      }
61h      }
62h      }
xxh      }

```

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xxh	}	
04h		volume
10h/.../17h		
xxh	}	
xxh	}	
xxh	}	
xxh	}	
04h		backflow volume
90h/.../97h		
7Fh		
xxh	}	
xxh	}	
xxh	}	
xxh	}	
44h		last month volume (if it occurs)
10h/.../17h		
xxh	}	
xxh	}	
xxh	}	
xxh	}	
0Fh		specific manufacturer data
xxh		flags showing leak or backflow, the optional
		frames and the push button state
xxh		number of volume programming
xxh		monthly readout day
CS		
16h		

1.3.Frame n°2

The frame n°2 is the volume frame. This frame is answered to a request REQ_UD2 after the reception of the correct selection frame.

Header:

68h Start character of a long frame.

Lh Length.

Lh Length.

68h Start character of a long frame.

08h C-field.

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XXh CYBLE M-BUS primary address.

72h CI-field.

XXh

XXh

XXh

XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h

4Dh

Schlumberger manufacturer number.

03h

Generation n°3: CYBLE M-BUS.

XXh

Medium.

XXh

Acces number.

XXh

Status.

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

1 0 0 0 1 1 0 0

8Ch

- DIFE

0 0 0 1 0 0 0 0

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10h

- VIF

0	1	1	1	1	0	0	0
---	---	---	---	---	---	---	---

78h

XXh

XXh

XXh

XXh

Volume fixed date readings

Date of fixed date reading n°1

- DIF

1	1	0	0	0	0	1	0
---	---	---	---	---	---	---	---

C2h

- DIFE

0	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---

10h

- VIF

0	1	1	0	1	1	0	0
---	---	---	---	---	---	---	---

6Ch

XXh

XXh

Volume fixed date n°1

- DIF

1	1	0	0	0	1	0	0
---	---	---	---	---	---	---	---

C4h

- DIFE

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0 0 0 1 0 0 0 0

10h

- VIF

10h/.../17h

XXh

XXh

XXh

XXh

Volume fixed date n°2 to 13 :

Fixed date reading number	date		volume	
	DIF	DIFE	DIF	DIFE
1 the oldest	C2h	10h	C4h	10h
2	82h	11h	84h	11h
3	C2h	11h	C4h	11h
4	82h	12h	84h	12h
5	C2h	12h	C4h	12h
6	82h	13h	84h	13h
7	C2h	13h	C4h	13h
8	82h	14h	84h	14h
9	C2h	14h	C4h	14h
10	82h	15h	84h	15h
11	C2h	15h	C4h	15h
12	82h	16h	84h	16h
13 the most recent	C2h	16h	C4h	16h

- VIF :

6Ch for the date and

10h/.../17h for the volume

CSh

Checksum.

16h

Stop character.

1.4.Sum up of the frame :

68h

start

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Lh
 Lh
 68h start
 08h C
 xxh address
 72h CI (mode 1)
 xxh { Identification number
 xxh }
 xxh }
 xxh }
 82h { Manufacturer identification number
 4Dh }
 03h generation
 xxh medium
 xxh acces number
 xxh status
 00h { signature
 00h { signature
 8Ch **fabrication number (8 BCD digits)**
 10h
 78h
 xxh }
 xxh }
 xxh }
 xxh }

according to the fixed date reading event :

C2h **fixed date reading n°1**
 10h
 6Ch date
 xxh }
 xxh }
 C4h
 10h
 10h/.../17h volume
 xxh }
 xxh }
 xxh }
 xxh }
 :
 :
 :
 :

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CS
16h

1.5.Frame n°3

The frame n°3 is the leak frame. This frame is answered to a request REQ_UD2 after the reception of the correct selection frame.

Header:

68h

Start character of a long frame.

Lh

Length.

Lh

Length.

68h

Start character of a long frame.

08h

C-field

XXh

CYBLE M-BUS primary address.

72h

CI-field.

XXh

XXh

XXh

XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h

4Dh

Schlumberger manufacturer number.

03h

Generation n°3: CYBLE M-BUS.

XXh

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Medium.

XXh

Acces number.

XXh

Status.

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

1	0	0	0	1	1	0	0
---	---	---	---	---	---	---	---

8Ch

- DIFE

0	0	1	0	0	0	0	0
---	---	---	---	---	---	---	---

20h

- VIF

0	1	1	1	1	0	0	0
---	---	---	---	---	---	---	---

78h

XXh

XXh

XXh

XXh

Leak Flags

These flags (2×8 bits for the two leak types on 8 days + 8 validation bits) describe the leaks (2 thresholds) of the water meter during the last 8 days before the remote reading.

- DIF

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1 0 0 0 1 1 0 1

8Dh

- DIFE

0 0 1 0 0 0 0 0

20h

- VIF

0 1 1 1 1 1 0 0

7Ch

0Ah 10 ASCII characters

73h } man. flags

67h }

61h }

6Ch }

66h }

20h }

2Eh }

6Eh }

61h }

6Dh }

E3h }

XXh } validation flags ($b_7 = 1$: D-1 valid, b_6 : D-2 ...)

XXh } leak flags (type 2) ($b_x = 1$: leak)

XXh } leak flags (type 1) ($b_x = 1$: leak)

Leak thresholds

- DIF

1 0 0 0 0 0 1 0

82h

- DIFE

0 0 1 0 0 0 0 0

20h

- VIF

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Unit	code	VIF
0.001l	1 0 0 1 0 0 0 0	90h
0.01l	1 0 0 1 0 0 0 1	91h
0.1l	1 0 0 1 0 0 1 0	92h
1l	1 0 0 1 0 0 1 1	93h
10l	1 0 0 1 0 1 0 0	94h
100l	1 0 0 1 0 1 0 1	95h
1000l	1 0 0 1 0 1 1 0	96h
10 000l	1 0 0 1 0 1 1 1	97h

- VIFE

0 0 1 0 0 0 1 0

22h

XXh

XXh

- DIF

1 0 0 0 0 0 1 0

82h

- DIFE

0 1 1 0 0 0 0 0

60h

- VIF

Unit	code	VIF
0.001l	1 0 0 1 0 0 0 0	90h
0.01l	1 0 0 1 0 0 0 1	91h
0.1l	1 0 0 1 0 0 1 0	92h
1l	1 0 0 1 0 0 1 1	93h
10l	1 0 0 1 0 1 0 0	94h
100l	1 0 0 1 0 1 0 1	95h
1000l	1 0 0 1 0 1 1 0	96h
10 000l	1 0 0 1 0 1 1 1	97h

- VIFE

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0 0 1 0 0 0 1 0

22h

XXh

XXh

Leak fixed date reading

Date of fixed date reading n°1

- DIF

1 1 0 0 0 0 1 0

C2h

- DIFE

0 0 1 0 0 0 0 0

20h

- VIF

0 1 1 0 1 1 0 0

6Ch

XXh

XXh

Number of leak days (threshold 1)

- DIF

1 1 0 0 0 0 0 1

C1h

- DIFE

0 0 1 0 0 0 0 0

20h

- VIF

0 1 1 1 0 1 1 1

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77h

XXh

Number of leak days (threshold 2)

- DIF

1	1	0	0	0	0	0	1
---	---	---	---	---	---	---	---

C1h

- DIFE

0	1	1	0	0	0	0	0
---	---	---	---	---	---	---	---

60h

- VIF

0	1	1	1	0	1	1	1
---	---	---	---	---	---	---	---

77h

XXh

Leak fixed date readings 2 to 13 :

Fixed date reading number	date		nbr days leak type 1		nbr days leak type 2	
	DIF	DIFE	DIF	DIFE	DIF	DIFE
1 the oldest	C2h	20h	C1h	20h	C1h	60h
2	82h	21h	81h	21h	81h	61h
3	C2h	21h	C1h	21h	C1h	61h
4	82h	22h	81h	22h	81h	62h
5	C2h	22h	C1h	22h	C1h	62h
6	82h	23h	81h	23h	81h	63h
7	C2h	23h	C1h	23h	C1h	63h
8	82h	24h	81h	24h	81h	64h
9	C2h	24h	C1h	24h	C1h	64h
10	82h	25h	81h	25h	81h	65h
11	C2h	25h	C1h	25h	C1h	65h
12	82h	26h	81h	26h	81h	66h
13 the most recent	C2h	26h	C1h	26h	C1h	66h

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- VIF

6Ch for the date and
77h for the number of days

CS
Checksum.

16h
Stop character.

1.6.Sum up of the frame :

68h	start
Lh	
Lh	
68h	start
08h	C
xxh	address
72h	CI (mode 1)
xxh	{ Identification number
xxh	}
xxh	}
xxh	}
82h	{ Manufacturer identification number
4Dh	}
03h	generation
xxh	medium
xxh	access number
xxh	status
00h	{ signature
00h	{ signature
8Ch	fabrication number (8 BCD digits)
20h	
78h	
xxh	}
xxh	}
xxh	}
xxh	}
8Dh	leak flags on 8 days
20h	
7Ch	
0Ah	

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```

73h      } man. flags
67h      }
61h      }
6Ch      }
66h      }
20h      }
2Eh      }
6Eh      }
61h      }
6Dh      }
E3h      }
xxh      }
xxh      }
xxh      }
82h      leak threshold (type 1)
20h
90h/.../97h
22h
xxh
xxh
82h      leak threshold (type 2)
60h
90h/.../97h
22h
xxh
xxh

```

according to the fixed date reading event :

```

C2h      Fixed date reading n°1
20h
6Ch      date
xxh      }
xxh      }
C1h
20h
77h      number of leak days (type 1)
xxh
C1h
60h
77h      number of leak days (type 2)
xxh
:
:

```

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:
:

CS
16h

1.7.Frame n°4

The frame n°4 is the backflow frame. This frame is answered to a request REQ_UD2 after the reception of the correct selection frame.

Header:

68h

Start character of a long frame.

Lh

Length.

Lh

Length.

68h

Start character of a long frame.

08h

C-field.

XXh

CYBLE M-BUS primary address.

72h

CI-field.

XXh

XXh

XXh

XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h

4Dh

Schlumberger manufacturer number.

03h

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Generation n°3: CYBLE M-BUS.

XXh

Medium.

XXh

Acces number.

XXh

Status.

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

1	0	0	0	1	1	0	0
---	---	---	---	---	---	---	---

8Ch

- DIFE

0	0	1	1	0	0	0	0
---	---	---	---	---	---	---	---

30h

- VIF

0	1	1	1	1	0	0	0
---	---	---	---	---	---	---	---

78h

XXh

XXh

XXh

XXh

Backflow Flags

These flags (2×8 bits for the two backflow types on 8 days + 8 validation bits) describe the backflows (temporary or permanent) of the water meter during the last 8 days before the remote reading.

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- DIF

1 0 0 0 1 1 0 1

8Dh

- DIFE

0 0 1 1 0 0 0 0

30h

- VIF

0 1 1 1 1 1 0 0

7Ch

0Ah 10 ASCII characters

73h } man. flags

67h }

61h }

6Ch }

66h }

20h }

2Eh }

6Eh }

61h }

6Dh }

E3h }

XXh } validation flags ($b_7 = 1$: D-1 valid, b_6 : D-2 ...)

XXh } permanent backflow flags ($b_x = 1$: backflow)

XXh } temporary backflow flags ($b_x = 1$: backflow)

Backflow fixed date readings

Date of fixed date reading n°1

- DIF

1 1 0 0 0 0 1 0

C2h

- DIFE

0 0 1 1 0 0 0 0

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30h

- VIF

0 1 1 0 1 1 0 0

6Ch

XXh

XXh

Number of temporary backflow days

- DIF

1 1 0 0 0 0 0 1

C1h

- DIFE

0 0 1 1 0 0 0 0

30h

- VIF

0 1 1 1 0 1 1 1

77h

XXh

Number of permanent backflow days

- DIF

1 1 0 0 0 0 0 1

C1h

- DIFE

0 1 1 1 0 0 0 0

70h

- VIF

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08h	C
xxh	address
72h	CI (mode 1)
xxh	{ Identification number
xxh	}
xxh	}
xxh	}
82h	{ Manufacturer identification number
4Dh	}
03h	generation
xxh	medium
xxh	access number
xxh	status
00h	{ signature
00h	{ signature
8Ch	fabrication number (8 BCD digits)
30h	
78h	
xxh	}
xxh	}
xxh	}
xxh	}
8Dh	backflow flags on 8 days
30h	
7Ch	
0Ah	
73h	{ man. flags
67h	}
61h	}
6Ch	}
66h	}
20h	}
2Eh	}
6Eh	}
61h	}
6Dh	}
E3h	
xxh	}
xxh	}
xxh	}

according to the fixed date reading event :

C2h

Fixed date reading n°1

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30h	
6Ch	date
xxh	}
xxh	}
C1h	
30h	
77h	number of temporary backflow days
xxh	
C1h	
70h	
77h	number of permanent backflow days
xxh	
:	
:	
:	
:	

CS
16h

1.9.Frame n°5

The frame n°5 is the max flow frame. This frame is answered to a request REQ_UD2 after the reception of the correct selection frame.

Header:

68h

Start character of a long frame.

Lh

Length.

Lh

Length.

68h

Start character of a long frame.

08h

C-field.

XXh

CYBLE M-BUS primary address.

72h

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CI-field.

XXh

XXh

XXh

XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h

4Dh

Schlumberger manufacturer number.

03h

Generation n°3: CYBLE M-BUS.

XXh

Medium.

XXh

Acces number.

XXh

Status.

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

1 0 0 0 1 1 0 0

8Ch

- DIFE

1 0 0 0 0 0 0 0

80h

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- DIFE

0	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---

10h

- VIF

0	1	1	1	1	0	0	0
---	---	---	---	---	---	---	---

78h

XXh

XXh

XXh

XXh

Max flow fixed date readings

Date of fixed date reading n°1

- DIF

1	1	0	0	0	0	1	0
---	---	---	---	---	---	---	---

C2h

- DIFE

1	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

80h

- DIFE

0	0	0	1	0	0	0	0
---	---	---	---	---	---	---	---

10h

- VIF

0	1	1	0	1	1	0	0
---	---	---	---	---	---	---	---

6Ch

XXh

XXh

Max flow fixed date n°1

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- DIF

1 1 0 1 0 0 1 0

D2h

- DIFE

1 0 0 0 0 0 0 0

80h

- DIFE

0 0 0 1 0 0 0 0

10h

- VIF

38h/.../3Fh (10h/.../17h + 28h)

XXh

XXh

Max flow fixed date 2 to 13 :

Fixed date reading number	date			index		
	DIF	DIFE	DIFE	DIF	DIFE	DIFE
1 the oldest	C2h	80h	10h	D2h	80h	10h
2	82h	81h	10h	92h	81h	10h
3	C2h	81h	10h	D2h	81h	10h
4	82h	82h	10h	92h	82h	10h
5	C2h	82h	10h	D2h	82h	10h
6	82h	83h	10h	92h	83h	10h
7	C2h	83h	10h	D2h	83h	10h
8	82h	84h	10h	92h	84h	10h
9	C2h	84h	10h	D2h	84h	10h
10	82h	85h	10h	92h	85h	10h
11	C2h	85h	10h	D2h	85h	10h
12	82h	86h	10h	92h	86h	10h
13 the most recent	C2h	86h	10h	D2h	86h	10h

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- VIF :

6Ch for the date and
38h/.../3Fh for the max flow

CSh
Checksum.

16h
Stop character.

1.10.Sum up of the frame :

68h	start
Lh	
Lh	
68h	start
08h	C
xxh	address
72h	CI (mode 1)
xxh	{ Identification number
xxh	}
xxh	}
xxh	}
82h	{ Manufacturer identification number
4Dh	}
03h	generation
xxh	medium
xxh	acces number
xxh	status
00h	{ signature
00h	{ signature
8Ch	fabrication number (8 BCD digits)
80h	
10h	
78h	
xxh	}
xxh	}
xxh	}
xxh	}

according to the fixed date reading event :

C2h **Fixed date reading n°1**
80h

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```

10h
6Ch          date
xxh         }
xxh         }
D2h
80h
10h
38h/.../3Eh max flow
xxh         }
xxh         }
:
:
:
:

```

CS
16h

1.11.Frame n°6

The frame n°6 is an « empty frame ». Indeed, there are only the header and the fabrication number. This frame is answered to a request REQ_UD2 when the optionnal frames (leak and backflow frames) are not available.

Header:

68h

Start character of a long frame.

15h

15h

68h

Start character of a long frame.

08h

C-field.

XXh

CYBLE M-BUS primary address.

72h

CI-field.

XXh

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XXh
XXh
XXh

Identification number (8 BCD digits).

This number can be written on the field. By default, this number is equal to the CYBLE M-BUS number.

82h
4Dh

Schlumberger manufacturer number.

03h

Generation n°3: CYBLE M-BUS.

XXh

Medium.

XXh

Acces number.

XXh

Status.

00h

00h

Signature.

Data:

Fabrication number

This number is unique and not programmable.

- DIF

1 0 0 0 1 1 0 0

0Ch

- VIF

0 1 1 1 1 0 0 0

78h

XXh

XXh

XXh

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XXh

CS

16h

1.12.Sum up of the frame

68h	start
15h	
15h	
68h	start
08h	C
xxh	address
72h	CI (mode 1)
xxh	{ Identification number
xxh	}
xxh	}
xxh	}
82h	{ Manufacturer identification number
4Dh	}
03h	generation
xxh	medium
xxh	acces number
xxh	status
00h	{ signature
00h	{ signature
0Ch	fabrication number (8 BCD digits)
78h	
xxh	}
xxh	}
xxh	}
xxh	}
CS	
16h	

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2. Examples of fake frames

The fake frames are read by M-BUS APPLICATION 1.22 from Prof. Ziegler.

2.1.Default frame

```
68 56 56 68 08 02 72 78 56 34 12 82 4D 03 07 08 00 00 00 0C 78
11 11 11 11 0D 7C 08 44 49 20 2E 74 73 75 63 0A 36 35 34 33 32
31 41 41 37 39 04 6D 1E 0C 30 C9 02 7C 09 65 6D 69 74 20 2E 74
61 62 6D 01 04 16 0F 00 00 00 04 96 7F 0A 00 00 00 44 16 10 00
00 00 0F 0A 01 0F 31 16
```

```

2: REQ_UD2                RSP_UD                State: 00h
ID: 12345678            Man: SLB            Gen: 3            TC: 8            Water
1: Unit 0                instant.            Storage-No. 0      Tariff 0
   fabrication # = 11111111
2: Unit 0                instant.            Storage-No. 0      Tariff 0
   = 97AA123456 cust. ID
3: Unit 0                instant.            Storage-No. 0      Tariff 0
   time point = 16.09.'97 12:30 Win V
4: Unit 0                instant.            Storage-No. 0      Tariff 0
   = 365 bat. time
5: Unit 0                instant.            Storage-No. 0      Tariff 0
   volume = 15 m^3
6: Unit 0                instant.            Storage-No. 0      Tariff 0
   volume manufacturer specific = $0A000000
7: Unit 0                instant.            Storage-No.1       Tariff 0
   volume = 16 m^3
man.specific data = $0A010F
```

2.2.Volume frame

```
68 B2 B2 68 08 02 72 78 56 34 12 82 4D 03 07 08 00 00 00 8C 10
78 11 11 11 11 11 C2 10 6C 41 C1 C4 10 16 01 00 00 00 82 11 6C 42
C1 84 11 16 02 00 00 00 C2 11 6C 43 C1 C4 11 16 03 00 00 00 82
12 6C 44 C1 84 12 16 04 00 00 00 C2 12 6C 45 C1 C4 12 16 05 00
00 00 82 13 6C 46 C1 84 13 16 06 00 00 00 C2 13 6C 47 C1 C4 13
16 07 00 00 00 82 14 6C 48 C1 84 14 16 08 00 00 00 C2 14 6C 49
C1 C4 14 16 09 00 00 00 82 15 6C 4A C1 84 15 16 0A 00 00 00 C2
15 6C 4B C1 C4 15 16 0B 00 00 00 82 16 6C 4C C1 84 16 16 0C 00
00 00 C2 16 6C 4D C1 C4 16 16 0D 00 00 00 E8 16
```

```

2: REQ_UD2                RSP_UD                State: 00h
ID: 12345678            Man: SLB            Gen: 3            TC: 8            Water
1: Unit 0                instant.            Storage-No. 0      Tariff 1
   fabrication # = 11111111
2: Unit 0                instant.            Storage-No. 1      Tariff 1
   time point = 01.01.'98
3: Unit 0                instant.            Storage-No. 1      Tariff 1
```

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4:	Unit 0	instant. time point = 02.01.'98	Storage-No. 2	Tariff 1
5:	Unit 0	instant. volume = 2 m ³	Storage-No. 2	Tariff 1
6:	Unit 0	instant. time point = 03.01.'98	Storage-No. 3	Tariff 1
7:	Unit 0	instant. volume = 3 m ³	Storage-No. 3	Tariff 1
8:	Unit 0	instant. time point = 04.01.'98	Storage-No. 4	Tariff 1
9:	Unit 0	instant. volume = 4 m ³	Storage-No. 4	Tariff 1
10:	Unit 0	instant. time point = 05.01.'98	Storage-No. 5	Tariff 1
11:	Unit 0	instant. volume = 5 m ³	Storage-No. 5	Tariff 1
12:	Unit 0	instant. time point = 06.01.'98	Storage-No. 6	Tariff 1
13:	Unit 0	instant. volume = 6 m ³	Storage-No. 6	Tariff 1
14:	Unit 0	instant. time point = 07.01.'98	Storage-No. 7	Tariff 1
15:	Unit 0	instant. volume = 7 m ³	Storage-No. 7	Tariff 1
16:	Unit 0	instant. time point = 08.01.'98	Storage-No. 8	Tariff 1
17:	Unit 0	instant. volume = 8 m ³	Storage-No. 8	Tariff 1
18:	Unit 0	instant. time point = 09.01.'98	Storage-No. 9	Tariff 1
19:	Unit 0	instant. volume = 9 m ³	Storage-No. 9	Tariff 1
20:	Unit 0	instant. time point = 10.01.'98	Storage-No. 10	Tariff 1
21:	Unit 0	instant. volume = 10 m ³	Storage-No. 10	Tariff 1
22:	Unit 0	instant. time point = 11.01.'98	Storage-No. 11	Tariff 1
23:	Unit 0	instant. volume = 11 m ³	Storage-No. 11	Tariff 1
24:	Unit 0	instant. time point = 12.01.'98	Storage-No. 12	Tariff 1
25:	Unit 0	instant. volume = 12 m ³	Storage-No. 12	Tariff 1
26:	Unit 0	instant. time point = 13.01.'98	Storage-No. 13	Tariff 1
27:	Unit 0	instant.	Storage-No. 13	Tariff 1

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actuality duration = 68 days
 17: Unit 0 instant. Storage-No. 5 Tariff 2
 time point = 05.01.'98
 18: Unit 0 instant. Storage-No. 5 Tariff 2
 actuality duration = 5 days
 19: Unit 1 instant. Storage-No. 5 Tariff 2
 actuality duration = 85 days
 20: Unit 0 instant. Storage-No. 6 Tariff 2
 time point = 06.01.'98
 21: Unit 0 instant. Storage-No. 6 Tariff 2
 actuality duration = 6 days
 22: Unit 1 instant. Storage-No. 6 Tariff 2
 actuality duration = 102 days
 23: Unit 0 instant. Storage-No. 7 Tariff 2
 time point = 07.01.'98
 24: Unit 0 instant. Storage-No. 7 Tariff 2
 actuality duration = 7 days
 25: Unit 1 instant. Storage-No. 7 Tariff 2
 actuality duration = 119 days
 26: Unit 0 instant. Storage-No. 8 Tariff 2
 time point = 08.01.'98
 27: Unit 0 instant. Storage-No. 8 Tariff 2
 actuality duration = 8 days
 28: Unit 1 instant. Storage-No. 8 Tariff 2
 actuality duration = 24 days
 29: Unit 0 instant. Storage-No. 9 Tariff 2
 time point = 09.01.'98
 30: Unit 0 instant. Storage-No. 9 Tariff 2
 actuality duration = 9 days
 31: Unit 1 instant. Storage-No. 9 Tariff 2
 actuality duration = 25 days
 32: Unit 0 instant. Storage-No. 10 Tariff 2
 time point = 10.01.'98
 33: Unit 0 instant. Storage-No. 10 Tariff 2
 actuality duration = 10 days
 34: Unit 1 instant. Storage-No. 10 Tariff 2
 actuality duration = 26 days
 35: Unit 0 instant. Storage-No. 11 Tariff 2
 time point = 11.01.'98
 36: Unit 0 instant. Storage-No. 11 Tariff 2
 actuality duration = 11 days
 37: Unit 1 instant. Storage-No. 11 Tariff 2
 actuality duration = 27 days
 38: Unit 0 instant. Storage-No. 12 Tariff 2
 time point = 12.01.'98
 39: Unit 0 instant. Storage-No. 12 Tariff 2
 actuality duration = 12 days
 40: Unit 1 instant. Storage-No. 12 Tariff 2

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actuality duration = 28 days
 41: Unit 0 instant. Storage-No. 13 Tariff 2
 time point = 13.01.'98
 42: Unit 0 instant. Storage-No. 13 Tariff 2
 actuality duration = 13 days
 43: Unit 1 instant. Storage-No. 13 Tariff 2
 actuality duration = 29 days

2.4.Backflow frame

```

68 D1 D1 68 08 02 72 78 56 34 12 82 4D 03 07 08 00 00 00 8C 30
78 11 11 11 11 8D 30 7C 0A 73 67 61 6C 66 20 2E 6E 61 6D E3 01
02 03 C2 30 6C 41 C1 C1 30 77 01 C1 70 77 11 82 31 6C 42 C1 81
31 77 02 81 71 77 22 C2 31 6C 43 C1 C1 31 77 03 C1 71 77 33 82
32 6C 44 C1 81 32 77 04 81 72 77 44 C2 32 6C 45 C1 C1 32 77 05
C1 72 77 55 82 33 6C 46 C1 81 33 77 06 81 73 77 66 C2 33 6C 47
C1 C1 33 77 07 C1 73 77 77 82 34 6C 48 C1 81 34 77 08 81 74 77
18 C2 34 6C 49 C1 C1 34 77 09 C1 74 77 19 82 35 6C 4A C1 81 35
77 0A 81 75 77 1A C2 35 6C 4B C1 C1 35 77 0B C1 75 77 1B 82 36
6C 4C C1 81 36 77 0C 81 76 77 1C C2 36 6C 4D C1 C1 36 77 0D C1
76 77 1D 7E 16
  
```

2: REQ_UD2 RSP_UD State: 00h
 ID: 12345678 Man: SLB Gen: 3 TC: 8 Water
 1: Unit 0 instant. Storage-No. 0 Tariff 3
 fabrication # = 11111111
 2: Unit 0 instant. Storage-No. 0 Tariff 3
 = 197121 man. flags
 3: Unit 0 instant. Storage-No. 1 Tariff 3
 time point = 01.01.'98
 4: Unit 0 instant. Storage-No. 1 Tariff 3
 actuality duration = 1 days
 5: Unit 1 instant. Storage-No. 1 Tariff 3
 actuality duration = 17 days
 6: Unit 0 instant. Storage-No. 2 Tariff 3
 time point = 02.01.'98
 7: Unit 0 instant. Storage-No. 2 Tariff 3
 actuality duration = 2 days
 8: Unit 1 instant. Storage-No. 2 Tariff 3
 actuality duration = 34 days
 9: Unit 0 instant. Storage-No. 3 Tariff 3
 time point = 03.01.'98
 10: Unit 0 instant. Storage-No. 3 Tariff 3
 actuality duration = 3 days
 11: Unit 1 instant. Storage-No. 3 Tariff 3
 actuality duration = 51 days
 12: Unit 0 instant. Storage-No. 4 Tariff 3
 time point = 04.01.'98
 13: Unit 0 instant. Storage-No. 4 Tariff 3

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actuality duration = 4 days
 14: Unit 1 instant. Storage-No. 4 Tariff 3
 actuality duration = 68 days
 15: Unit 0 instant. Storage-No. 5 Tariff 3
 time point = 05.01.'98
 16: Unit 0 instant. Storage-No. 5 Tariff 3
 actuality duration = 5 days
 17: Unit 1 instant. Storage-No. 5 Tariff 3
 actuality duration = 85 days
 18: Unit 0 instant. Storage-No. 6 Tariff 3
 time point = 06.01.'98
 19: Unit 0 instant. Storage-No. 6 Tariff 3
 actuality duration = 6 days
 20: Unit 1 instant. Storage-No. 6 Tariff 3
 actuality duration = 102 days
 21: Unit 0 instant. Storage-No. 7 Tariff 3
 time point = 07.01.'98
 22: Unit 0 instant. Storage-No. 7 Tariff 3
 actuality duration = 7 days
 23: Unit 1 instant. Storage-No. 7 Tariff 3
 actuality duration = 119 days
 24: Unit 0 instant. Storage-No. 8 Tariff 3
 time point = 08.01.'98
 25: Unit 0 instant. Storage-No. 8 Tariff 3
 actuality duration = 8 days
 26: Unit 1 instant. Storage-No. 8 Tariff 3
 actuality duration = 24 days
 27: Unit 0 instant. Storage-No. 9 Tariff 3
 time point = 09.01.'98
 28: Unit 0 instant. Storage-No. 9 Tariff 3
 actuality duration = 9 days
 29: Unit 1 instant. Storage-No. 9 Tariff 3
 actuality duration = 25 days
 30: Unit 0 instant. Storage-No. 10 Tariff 3
 time point = 10.01.'98
 31: Unit 0 instant. Storage-No. 10 Tariff 3
 actuality duration = 10 days
 32: Unit 1 instant. Storage-No. 10 Tariff 3
 actuality duration = 26 days
 33: Unit 0 instant. Storage-No. 11 Tariff 3
 time point = 11.01.'98
 34: Unit 0 instant. Storage-No. 11 Tariff 3
 actuality duration = 11 days
 35: Unit 1 instant. Storage-No. 11 Tariff 3
 actuality duration = 27 days
 36: Unit 0 instant. Storage-No. 12 Tariff 3
 time point = 12.01.'98
 37: Unit 0 instant. Storage-No. 12 Tariff 3

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actuality duration = 12 days
 38: Unit 1 instant. Storage-No. 12 Tariff 3
 actuality duration = 28 days
 39: Unit 0 instant. Storage-No. 13 Tariff 3
 time point = 13.01.'98
 40: Unit 0 instant. Storage-No. 13 Tariff 3
 actuality duration = 13 days
 41: Unit 1 instant. Storage-No. 13 Tariff 3
 actuality duration = 29 days

2.5.Max flow frame

```

68 B3 B3 68 08 02 72 78 56 34 12 82 4D 03 07 08 00 00 00 8C 80
10 78 11 11 11 11 C2 80 10 6C 22 C1 D2 80 10 3E 01 00 82 81 10
6C 23 C2 92 81 10 3E 02 00 C2 81 10 6C 24 C3 D2 81 10 3E 03 00
82 82 10 6C 25 C4 92 82 10 3E 04 00 C2 82 10 6C 26 C5 D2 82 10
3E 05 00 82 83 10 6C 27 C6 92 83 10 3E 06 00 C2 83 10 6C 28 C7
D2 83 10 3E 07 00 82 84 10 6C 29 C8 92 84 10 3E 08 00 C2 84 10
6C 2A C9 D2 84 10 3E 09 00 82 85 10 6C 2B CA 92 85 10 3E 0A 00
C2 85 10 6C 2C CB D2 85 10 3E 0B 00 82 86 10 6C 2D CC 92 86 10
3E 0C 00 C2 86 10 6C 4E C1 D2 86 10 3E 0D 00 F5 16
  
```

2: REQ_UD2 RSP_UD State: 00h
 ID: 12345678 Man: SLB Gen: 3 TC: 8 Water
 1: Unit 0 instant. Storage-No. 0 Tariff 4
 fabrication # = 11111111
 2: Unit 0 instant. Storage-No. 1 Tariff 4
 time point = 02.01.'97
 3: Unit 0 maximum Storage-No. 1 Tariff 4
 volume flow = 1 m³/h
 4: Unit 0 instant. Storage-No. 2 Tariff 4
 time point = 03.02.'97
 5: Unit 0 maximum Storage-No. 2 Tariff 4
 volume flow = 2 m³/h
 6: Unit 0 instant. Storage-No. 3 Tariff 4
 time point = 04.03.'97
 7: Unit 0 maximum Storage-No. 3 Tariff 4
 volume flow = 3 m³/h
 8: Unit 0 instant. Storage-No. 4 Tariff 4
 time point = 05.04.'97
 9: Unit 0 maximum Storage-No. 4 Tariff 4
 volume flow = 4 m³/h
 10: Unit 0 instant. Storage-No. 5 Tariff 4
 time point = 06.05.'97
 11: Unit 0 maximum Storage-No. 5 Tariff 4
 volume flow = 5 m³/h
 12: Unit 0 instant. Storage-No. 6 Tariff 4
 time point = 07.06.'97
 13: Unit 0 maximum Storage-No. 6 Tariff 4

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	volume flow = 6 m ³ /h		
14:	Unit 0 instant. time point = 08.07.'97	Storage-No. 7	Tariff 4
15:	Unit 0 maximum volume flow = 7 m ³ /h	Storage-No. 7	Tariff 4
16:	Unit 0 instant. time point = 09.08.'97	Storage-No. 8	Tariff 4
17:	Unit 0 maximum volume flow = 8 m ³ /h	Storage-No. 8	Tariff 4
18:	Unit 0 instant. time point = 10.09.'97	Storage-No. 9	Tariff 4
19:	Unit 0 maximum volume flow = 9 m ³ /h	Storage-No. 9	Tariff 4
20:	Unit 0 instant. time point = 11.10.'97	Storage-No. 10	Tariff 4
21:	Unit 0 maximum volume flow = 10 m ³ /h	Storage-No. 10	Tariff 4
22:	Unit 0 instant. time point = 12.11.'97	Storage-No. 11	Tariff 4
23:	Unit 0 maximum volume flow = 11 m ³ /h	Storage-No. 11	Tariff 4
24:	Unit 0 instant. time point = 13.12.'97	Storage-No. 12	Tariff 4
25:	Unit 0 maximum volume flow = 12 m ³ /h	Storage-No. 12	Tariff 4
26:	Unit 0 instant. time point = 14.01.'98	Storage-No. 13	Tariff 4
27:	Unit 0 maximum volume flow = 13 m ³ /h	Storage-No. 13	Tariff 4

2.6.Empty frame

68 15 15 68 08 02 72 78 56 34 12 82 4D 03 07 08 00 00 00 0C 78
11 11 11 11 39 16

2: REQ_UD2	RSP_UD	State: 00h
ID: 12345678	Man: SLB	Gen: 3 TC: 8 Water
1: Unit 0 instant.	Storage-No. 0	Tariff 0
fabrication # = 11111111		

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3. Frame selection process

3.1. Selection of the frames n°1, 2, 3, 4 and 5

Master — SND_UD2 → selection frame
Slave — ACK → E5h
Master — REQ_UD2 → data request
Slave — RSP_UD2 → frame selected

Subcode	selected frame
00	default frame
01	volume frame
02	leak frame or empty frame if leak option not valid
03	backflow frame or empty frame if backflow option not valid
04	reserved
05	max flow frame
Other values	default frame

The default frame can be selected by either a subcode or by an application reset command.

3.1.1. Selection frame

68h start
04h length
04h length
68h start
53h/73h Send User Data
xxh primary address
50h CI application reset
xxh **subcode**
CS checksum
16h stop

3.1.2. Application reset

68h start
03h length
03h length
68h start
53h/73h Send User Data
xxh primary address
50h CI application reset
CS checksum
16h stop

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16h Stop

4.3.Complete identification programming

68h start
0Dh L
0Dh L
68h start
53h/73h
xxh address
51h
07h
79h **identification**
xxh }
xxh }
xxh } n°ID, n°MAN, GEN and MEDIUM
xxh }
xxh }
xxh }
xxh }
xxh }
xxh }
CS checksum
16h stop

4.4.Partial identification programming

68h start
09h L
09h L
68h start
53h/73h
xxh address
51h
04h
79h **identification**
xxh }
xxh } n°ID
xxh }
xxh }
CS checksum
16h stop

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4.5. Baudrate programmation

68h	start
03h	L
03h	L
68h	start
53h/73h	
xxh	address
CI	B8h = 300 bauds / B9h = 600 bauds BAh = 1200 bauds / BBh = 2400 bauds
CS	checksum
16h	stop

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