TKB 3427 - Description of the Serial Interface 2WR6

for firmware versions 3.10 and higher

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1 Overview

- TKB 3412TKB 3404

The standard equipment of 2WR6 heat meters includes an EN 1434-3 bidirectional optical interface (2.2 optical interface). This interface is used

- to read out data from the unit locally
- to test the heat meter
- for parameterization and calibration in a test center

1.1 Operating modes of the heat meter

The heat meter has various operating modes. The optical interface must be controlled differently in each mode. That is why it is necessary to synchronize the controlling program with the heat meter. That is done with a "determine status" telegram that is transmitted to the heat meter. This telegram will be answered in every operating mode. The response telegram indicates what operating mode the heat meter is currently in.

The operating modes are defined as follows:

- Normal mode (Nb), calibration seal set: Response = "(Nb+)!"
  The heat meter is performing flowrate and temperature measurements in the normal timebase. The data exchange is limited to the functions that interfere neither with the meter readings nor with the measuring function of the heat meter.
  The optical interface operates at 300 baud and is scanned at 1-second intervals when the LCD is permanently switched on. No scanning occurs while the LCD is switched off.

- Normal mode, calibration seal not set: Response = "(Nb-)!"
  The heat meter is performing flowrate and temperature measurements in the normal timebase. However, all functions are permissible, including parameterization and call-up of calibration mode.
  The optical interface works with 2400 baud and is scanned at 1-second intervals.

- Reading for testing after transmission of an encrypted telegram: Response = "(Pb+)!" or "(Eb-)!", depending on the calibration seal.
  The heat meter is waiting for data exchange. "Pb" appears on the LC display. No more measurements will be made. The optical interface works with 2400 baud and is scanned at 500-ms intervals.
  When any command telegram is detected, either the information "Pb" (calibration seal set) or "Eb" (calibration seal not set) will be displayed on the LCD.

- Ready for testing (Pb), calibration seal set: Response = "Pb+"
  The heat meter is waiting for data exchange. The optical interface works with 2400 baud and is scanned at 500-ms intervals. Calibration telegrams are not permissible, parameterization telegrams are permissible with restrictions.

- Calibration mode (Eb), calibration seal not set: Response = "Eb+"
  The heat meter is waiting for data exchange. The optical interface works with 2400 baud and is scanned at 500-ms intervals. All calibration and parameterization telegrams are permissible.

☞ The "determine status" telegram is identical for all operating modes of the heat meter. At a baudrate of 2400 baud it is possible to acquire the operating modes *Nb-*, *Pb*, and *Eb*. For operating mode *Nb+*, a baudrate of 300 baud is necessary.

1.2 Software support

A program is available for reading out heat meter data and controlling and parameterizing the heat meter through the optical interface. It is called *PappaWin* (Programm für Auslesen, Prüfung, Parametrierung und Abgleich for Microsoft Windows 3.x/9x/ME/NT/2000/XP). Commercial versions *PappaWin Standard* and *PappaWin Profi* and a freeware version *PappaWin light* of *PappaWin* are available .

2 Optical interface

2.1 Definitions and conventions for the optical interface

Transmission mode:	Bit-serial asynchronous (start/stop) transmission acc. to DIN 66022, semi-duplex
Transmission rate	300 or 2400 baud, depending on the operating mode
Character format	Character format acc. to DIN 66003 (1°start bit, 8°data bits, 1°parity bit, 1°stop bit)
Character code	Character code acc. to DIN 66003, international reference version
Character error detection and correction	Parity check, even parity acc. to DIN 66022 CS check acc. to EN 1434
Protocol	Acc. to EN 1434-3 (M-bus via optical interface); but header acc. to EN 61107
Definitions of the signal level:	log. 1 = dark log. 0 = light

For read-out, the optical read-out head (with each block) acc. to DIN EN 1434-3 is used.

2.2 Baud rate

The heat meter communicates at 300 or 2400 baud depending on its operating mode.
If the calibration seal is set and the operating mode is "normal mode" (Nb), the heat meter will always receive and transmit at 300 baud. In the other operating modes (Nb-, Pb, Eb), the heat meter receives and transmits at 2400 baud.

2.3 Header

The heat meter can query the optical interface only at fixed time intervals. That is why it is necessary to synchronize data traffic. That is done with the header, that is transmitted ahead of the command telegram. This header consists of standard characters (NUL = ASCII code 00H) and is necessary in every telegram. A time interval of 2.2 s between the header and the telegram code is permissible, but not necessary. It is only required to ensure compatibility with other tariff units.
The time interval between the characters of a complete telegram must not be more than 10 bit lengths. The header must be no longer than 2.5 s. The recommended length depends on the operating mode of the heat meter, see Table 1.

Table 1: Length of the header

Operating mode	Baud rate	Length of the header
Normal mode with calibration seal (Nb+)	300 baud	40 NUL char
Normal mode without calibration seal (Nb-)	2400 baud	229 NUL char
Test mode (Pb) or calibration mode°(Eb)	2400 baud	130 NUL char

2.4 Structure of the telegrams

The telegram structure complies with EN 1434-3. In addition, a header acc. to EN 61107 is required for the optical interface.

- Each command telegram has a header and ends with CR/LF.
- Each response telegram from the heat meter contains an end code, consisting of the character "!" + CR/LF.
- Each valid command telegram is acknowledged by the heat meter with a response code.
- An incorrect or impermissible telegram is also acknowledged by the heat meter with a response code (in pseudo hex). This error code is described in **Table 2**.

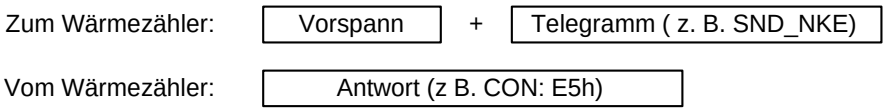

Table 2: Meaning of the acknowledgment

Ack.	Meaning
0	Command executed
1	Syntax error
2	Telegram not defined
3	Pseudo hex figure expected
4	Character expected
5	End code expected
6	LF expected
7	CR expected
8	CR/LF expected
9	Other parameter expected
A	String expected
B	Not permissible in Pb
C	(not defined)
D	Pause between the characters too long
E	Header too long
F	Not permissible in Nb

The data telegrams that the heat meter transmits on request contain the meter readings of the consumption values, the stored yearly and monthly values, the actual values, and the calibration and parameter values, etc.

2.5 Data traffic

2.5.1 Data traffic in normal mode

Normal mode permits only telegrams that do not interfere with metering.

2.5.1.1 With calibration seal

If the calibration seal is set, the following operations are permissible:

- Read-out of the RAM/EEPROM data
- Request telegram
- Set customer number
- Set M-bus address
- Lock service loop
- Lock display call-up button
- Set system time/system date
- Set set day
- Set/cancel commissioning lock

2.5.1.2 Without calibration seal

If the calibration seal is not set, the following operations are also permissible:

- Reset meter readings (master reset)
- Clear faults
- Clear missing time / operating time
- Call up test/calibration mode

2.5.2 Data traffic when ready for testing

You can only call up this mode with an encrypted telegram (exception: calibration seal has not been set or NOWA test has been initialized). After that, the heat meter will display "Pb" on its LCD. Command telegrams can now be used to start and stop all test modes.

If the unit is ready for testing and the calibration seal is set, only telegrams that interfere with neither meter readings nor unit parameters are accepted by the heat meter. On return to normal mode, the original meter readings for heat quantity and volume will be restored.

☞ Do not remove the optical read-out head from the heat meter after you have called up a test mode through the optical interface. If you do, test mode will be terminated too early as soon as another light source falls on the optical interface.
Alternatively, you can cover the optical interface with, for example, a coin.

2.5.3 Data traffic in calibration mode

Only ever call up this mode when the calibration seal is reset. Otherwise, the calibration mark will be destroyed and the calibration button operated, which would reset the calibration seal.

Calibration mode permits complete parameterization of the heat meter. You can also call up all functions of the "ready for testing" mode. Calibration mode can be called up from normal mode by telegram if the calibration seal is not set.

The following operations are also possible:

- Set the measuring path
- Set the sensor type
- Configure the LC display
- Set the calibration values
- Activate simulation
- Set the unit number
- Switch over operating time/missing time recording
- Set the calibration seal
- Initialize EEPROM
- Reset meter readings (master reset)

3 Read-out telegrams

The size of the read-out telegram depends on the operating mode of the heat meter.
A distinction is made between the general M-bus telegrams (see Chapter 6.1) and the manufacturer-specific M-bus telegrams (see Chapter 6.2).

4 NOWA test

For the NOWA test it is possible to switch between normal mode and ready for testing if the calibration seal is set. Simply activate test readiness via an encrypted telegram to initialize the test. Nb/Pb data traffic is then possible for a period of 15 hours. After this time has elapsed or on transmission of the command telegram "End NOWA test", data traffic will be locked again.For further information, see AGFW Publication 6, Vol. 2 "Normierter Wärmezähler-Adapter NOWA Version 1.50" (standardized heat meter adapter NOWA Version 1.50) and the Testing And Calibration Description TKB 3412

5 LCD Functions

5.1 Locking the LCD (commissioning lock)

It is possible to deactivate the display on the heat meter until final commissioning has been performed in situ. This does not restrict the measurement functions or communication.

The display on the heat meter will no longer respond to the display call-up button. The display can easily be distinguished from an error state of the heat meter because the segment test blinks at 2 s intervals.

5.2 Locking the LCD (call-up) button

It is possible to prevent scrolling of the display. The display of the heat meter is then limited to fault display or to display of the heat quantity. Scrolling is still possible through the optical interface.

5.3 Locking the extended LCD loop (service loop)

It is possible to restrict the LCD loop to the user loop. The service loop can then no longer be called up using the call-up button. However, it is still possible to call up the service loop through the optical interface.

5.4 LCD switch-off

The display on the heat meter switches off 15 minutes after the last time a button was pressed. Every time a button is pressed, the display is switched on again or the 15 minute countdown is restarted.

To indicate functional readiness, the display lights up briefly every 5 seconds. While the display is switched off, the optical interface is not queried except during the light-up interval. The brief light-up period can be used to switch on the display again through the optical interface and resume reliable communication.

LCD switch-off can be deactivated with the parameter B.1=1 in telegram I42.

6 Appendix

6.1 General M-bus telegrams 2WR6

Request master:											**Response slave**
		C	A	CS		Comment					
Initialization	**10h**	**40h**	**A**	**CS**	**16h**						**E5h**
Data request	**10h**	**5Bh/7Bh**	**A**	**CS**	**16h**						**Data telegrams acc. to Chapter 6.5**
Deselection for secondary addressing	**10h**	**40h**	**FDh**	**CS**	**16h**	or selection of another secondary address					**E5h**
		L	L		C	A	CI	CS		Comment	
Switchover to 300 baud	**68h**	**3**	**3**	**68h**	**53h/73h**	**A**	**B8h**	**CS**	**16h**		**E5h**
Switchover to 2400 baud	**68h**	**3**	**3**	**68h**	**53h/73h**	**A**	**BBh**	**CS**	**16h**		**E5h**
Resetting of operating mode (frame counter)	**68h**	**3**	**3**	**68h**	**53h/73h**	**A**	**50h**	**CS**	**16h**		**E5h**
Setting frame counter to 1st frame	**68h**	**4**	**4**	**68h**	**53h/73h**	**A**	**50h 01h**	**CS**	**16h**		**E5h**
Setting frame counter to 2nd frame	**68h**	**4**	**4**	**68h**	**53h/73h**	**A**	**50h 02h**	**CS**	**16h**		**E5h**
Setting frame counter to 3rd frame	**68h**	**4**	**4**	**68h**	**53h/73h**	**A**	**50h 03h**	**CS**	**16h**		**E5h**

Request master:																	**Response slave**
		L	L		C	A	CI	Extended secondary address							CS		
Selection of secondary address	**68h**	**0Bh**	**0Bh**	**68h**	**53h/73h**	**FDh**	**52h**	**ID1-4**	**Man**	**Gen**	**Med**				**CS**	**16h**	**E5h**
	Wildcards are possible! (Man = A7h 32h, Gen = 3, Med = 4)																
Selection of secondary address (MSB)	**68h**	**0Bh**	**0Bh**	**68h**	**53h/73h**	**FDh**	**56h**	**ID1-4**	**Man**	**Gen**	**Med**				**CS**	**16h**	**E5h**
	Wildcards are possible! (Man = A7h 32h, Gen = 3, Med = 4)																
Enhanced selection	**68h**	**11h**	**11h**	**68h**	**53h/73h**	**FDh**	**52h**	**ID1-4**	**Man**	**Gen**	**Med**	**0Ch**	**78h**	**Serial No. 1-4**	**CS**	**16h**	**E5h**
	Wildcards are possible! (Man = A7h 32h, Gen = 3, Med = 4)																
		L	L		C	A	CI	DIF	VIF	Data	CS						
Setting the primary address	**68h**	**6**	**6**	**68h**	**53h/73h**	**A**	**51h**	**01h**	**7Ah**	**Prim. Addr.**	**CS**	**16h**					**E5h**
Lockable by user lock	Unconfigured heat meters have primary address 0.																
Setting the secondary address	**68h**	**9**	**9**	**68h**	**53h/73h**	**A**	**51h**	**0Ch**	**79h**	**Sec. Addr.**	**CS**	**16h**					**E5h**
Lockable by user lock	Unconfigured heat meters have secondary address 00000000.																
		L	L		C	A	CI	DIF	VIF	VIFE	Data	CS					
Setting the date and time	**68h**	**0Ah**	**0Ah**	**68h**	**53h/73h**	**A**	**51h**	**04h**	**EDh**	**00h**	**Date/time**	**CS**	**16h**				**E5h**
		L	L		C	A	CI	DIF	VIF	Data	CS						
Setting the date and time	**68h**	**9**	**9**	**68h**	**53h/73h**	**A**	**51h**	**04h**	**6Dh**	**Date/time**	**CS**	**16h**					**E5h**
Lockable by user lock	Date and time according to data type F (4 bytes) in DIN EN1434 (see p. 16)																

6.2 Manufacturer-specific M-bus telegrams 2WR6

Request master:											
General:		L	L		C	A	CI	DIF	**Telegram code + parameters**	CS	
Manufacturer-specific telegram	**68h**	**L**	**L**	**68h**	**53h/73h**	**A**	**51h**	**0Fh**	**L-4 bytes as ASCII characters!!!**	**CS**	**16h**
		L	L		C	A	CI	DIF	**Telegram response: ack. q or data**	CS	
Response slave	**68h**	**L**	**L**	**68h**	**08h**	**A**	**78h**	**0Fh**	**L-4 bytes as ASCII characters!!!**	**CS**	**16h**

If an acknowledgment is transmitted as a telegram response, it has the meaning shown in Table 2.

Function	Level	Tg code	Parameter	Tg response	Explanation
Calibration A0 = Qs	Eb	A0	aaa	q	Optional Q calibration for > Qn/10; absolute value with sign bit. 1 digit = 1/4096*Q = 0.0244 % e.g.: -1.5% = 83Dh = "A0 83="
Calibration A1 = Qmin	Eb	A1	daa	q	Qmin calibration in pseudo hex two's complement format. 1 digit = 1/160 * Qmin = 0.625 %; d is only a dummy e.g.: -4% = FAh = "A1 0?:"
Calibration A2 = Qnenn	Eb	A2	aaa	q	Q nominal calibration; pseudo hex, absolute value with sign bit. 1 digit = 1/4096*Q = 0.0244 % e.g.: 1.5% = 03Dh = "A2 03="
Calibration A3 = TVnull	Eb	A3	aaa	q	TV zero calibration in pseudo hex two's complement format. 1 digit = 6.25 mK e.g.: -2K = EC0h = "A3 ><0"
Calibration A4 =TVnenn	Eb	A4	aaa	q	TV nominal calibration; pseudo hex, absolute value with sign bit. 1 digit = 1/8192 * Tv = 0.0122 % * Tv e.g.: -1.5% = 87Bh = "A4 87;"
Calibration A5 =TRnull	Eb	A5	aaa	q	TR zero calibration in pseudo hex two's complement format. 1 digit = 6.25 mK e.g.: 2K = 140h = "A5 140"
Calibration A6 =TRnenn	Eb	A6	aaa	q	TR nominal calibration; pseudo hex, absolute value with sign bit. 1 digit = 1/8192 * Tr = 0.0122 % * Tr e.g.: 1.5% = 07Bh = "A6 07;"
Output mode CV	Eb	I71		q	A fitted pulse output outputs volume pulses (count volume).
Output mode CV	Pb	P>1		q	A fitted pulse output outputs volume pulses (count volume).
Output mode CH	Eb	I72		q	A fitted pulse output outputs heat pulses (count heat).
Output mode CH	Pb	P>2		q	A fitted pulse output outputs heat pulses (count heat).
Read-out data (without frame)	Eb+Pb	P5		Data (see Chapters 6.3 and 6.4)	The data are output with code numbers but without a telegram frame. Explanation in a separate table.
Read-out optional data (without frame)	Nb	L1		Data (see Chapters 6.3 and 6.4)	The data are output with code numbers but without a telegram frame. Explanation in a separate table. Response always with 2400 baud.
Read-out obligatory data (without frame)	Nb	L0		Data (see Chapters 6.3 and 6.4)	The data are output with code numbers but without a telegram frame. Explanation in a separate table. Response always with 2400 baud.

Function	Level	Tg code	Parameter	Tg response	Explanation
Bus test µC-Ga	Eb	I:		xyyzz	x = 0 or 1; yy = set bit pattern; zz = actual bit pattern Data traffic is tested between µC and GA
Dimension GJ	Eb	I23		q	Dimension of the Nb heat quantity: GJ
Dimension kWh	Eb	I20		q	Dimension of the Nb heat quantity: kWh In measuring range 15m³/h and greater impermissible. The heat meter therefore turns it into MWh.
Dimension MJ	Eb	I22		q	Dimension of the Nb heat quantity: MJ In measuring range 6m³/h and greater impermissible. The heat meter therefore turns it into GJ.
Dimension MWh	Eb	I21		q	Dimension of the Nb heat quantity: MWh
EEPROM info	Eb	I=!		Info	Info = aa&bb&cc&dd, where: aa..bb = reserved Q area; cc..dd = area of the LCD code list
EEPROM info	Nb	L62		Info	Info = aa&bb&cc&dd, where: aa..bb = reserved Q area; cc..dd = area of the LCD code list
Initialize EEPROM	Eb	I>		q	Initialize all default values: minimum LCD list After that you must transmit the following telegrams: Set LCD list, set measuring range, set device number...
Read EEPROM (without frame)	Eb	I<	aann	EEPROM data	aa=initial address nn=number of EEPROM words - 1 (per 16 bits) Response in pseudo hex format without telegram frame.
Read EEPROM (without frame)	Nb	L61	aann	EEPROM data	aa=initial address nn=number of EEPROM words - 1 (per 16 bits) Response in pseudo hex format at 2400 baud without telegram frame.
Write EEPROM	Eb	I=	aa+d16	q	Address aa: end address d16: Data string (16 pseudo hex figures)
Set the calibration seal	Eb	I3		q	With the "Set the calibration seal" telegram, the simulations are terminated and status Pb set.
Set the calibration seal	Nb-	K0		q	When you set the calibration seal, the simulations are terminated and the baud rate is set to 300 baud. The triangle on the LCD goes out.
Installation in return	Eb	I90		q	Installation of the volume measuring unit in the return branch.
Installation in flow	Eb	I91		q	Installation of the volume measuring unit in the flow branch.
Activate automatic switch-on	Nb-	K20			If the test seal is set, the rolling menu is displayed for setting the data and time when the 2WR6 is first switched on.

Function	Level	Tg code	Parameter	Tg response	Explanation
Set the unit number	Eb	I5	gggggggg	q	8-digit, pseudo hex.
Basic display: Errors	Eb+Pb	P;0		q	Basic display = fault display, if fault has occurred (default)
Basic display: Quantity of thermal energy	Eb+Pb	P;1		q	Basic fault = heat quantity etc. (not faults)
The priority display in Nb- is the device number	Eb	I24		q	In normal mode without the calibration seal set, the device number is selected as the priority display.
The priority display in Nb- is priority acc. to display list	Eb	I25		q	In normal mode without the calibration seal set, the priority set in the LCD display list is shown as the priority display.
Cancel commissioning lock	Nb	L=0000000		q	LCD button function normal again
Set commissioning lock	Nb	L=0000001		q	Only blinking segment test on the LCD; not button response visible; all other functions without restrictions.
Scroll LCD	Nb	L5		q	The LCD show the next display value. The telegram is also executed when the call-up button is locked.
Set customer number	Nb	L>	kkkkkkkk	q	8-digit, pseudo hex. (also M-bus secondary address)
Set customer number	Eb+Pb	P9	kkkkkkkk	q	8-digit, pseudo hex. (also M-bus secondary address)
Display LCD code number	Nb-	K;	KZ	q	Direct display of an LCD code number. This code number does not have to be contained in the EEPROM list. Definition of the codes in a separate table.
Display LCD code number	Nb	L;	KZ	q	Direct display of an LCD code number. This code number does not have to be contained in the EEPROM list. Definition of the codes in a separate table.
Generate LCD code list (default)	Eb	I?		q	A default LCD code list is generated in the EEPROM: Error, WM, V, segment test, FW.
Write LCD code list (1)	Eb	I=K0	d16	q	Write Part 1 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (2)	Eb	I=K1	d16	q	Write Part 2 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (3)	Eb	I=K2	d16	q	Write Part 3 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (4)	Eb	I=K3	d16	q	Write Part 4 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (5)	Eb	I=K4	d16	q	Write Part 5 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)

Function	Level	Tg code	Parameter	Tg response	Explanation
Write LCD code list (6)	Eb	I=K5	d16	q	Write Part 6 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (7)	Eb	I=K6	d16	q	Write Part 7 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Write LCD code list (8)	Eb	I=K7	d16	q	Write Part 8 of the LCD code list into the EEPROM. d16: Data string (16 pseudo hex figures)
Release LCD button	Nb	L20		q	Cancel lock of the call-up button.
Lock LCD button	Nb	L21		q	While the call-up button is locked, all telegrams containing a button function are still active (scroll LCD, change loops).
Delete faults	Nb-	K8		q	Fault F8 and the latches for F0 and switch-off threshold are reset.
Delete faults	Eb+Pb	P<2		q	Fault F8 and the latches for F0 and switch-off threshold are reset.
Delete missing time	Nb-	K:		q	The missing time is reset to zero. The operating time remains unchanged.
Delete missing time	Eb+Pb	P<0		q	The missing time is reset to zero. The operating time remains unchanged.
Reset counters in Nb (master reset)	Nb-	K5		q	The counters for volume and heat quantity are reset, incl. prescalers, previous year's values, monthly values, missing and operating time, and errors are reset. Firmware version 3.10 and higher: The total time of M-bus read-outs is deleted in addition.
Reset counters (master reset)	Eb	A;		q	The counters for volume and heat quantity are reset, incl. prescalers, previous year's values, monthly values, missing and operating time, and errors are reset. Firmware version 3.10 and higher: The total time of M-bus read-outs is deleted in addition.
Reset times	Nb-	K9		q	The operating time and the missing time are reset to zero.
Reset times	Eb+Pb	P<1		q	The operating time and the missing time are reset to zero.
Set M-bus address	Nb	L:	pp	q	Sets the M-bus primary address, the customer number is the secondary address.
Set measuring path (1)	Eb	I8	MF0SWN0 sE000ne	q	The measuring range and measuring path parameters are transmitted as a pseudo hex string (22 chars) MS(1)/FT(1)/0(1)/SLZ(5)/WZ(2)/nLZM(2)/0(1)/SI(1)/EFE(2)/000(3)/N0LZM(1)/EF0(2).
Set measuring path (2)	Eb	I40	UOMAFCH I	q	The measuring path parameters are transmitted as a pseudo hex string (13 chars): U(2)/O(2)/M(2)/A(2)/F(2)/C(1; M12)/H(1; M16)/I(1; M17).
Set measuring path (3)	Eb	I41	v0VFFRR	q	The measuring path parameters are transmitted as a pseudo hex string (8 chars): v(1)/V(1)/F(2)/R(2).
Set MODE register	Eb	I6	r	q	r = mode value
Output monthly values	Nb-	K10		q	In the optional telegram, the 36 previous month's values are output (default).
Output monthly values	Nb+	L<0000002		q	In the optional telegram, the 36 previous month's values are output (default).
Suppress monthly values	Nb-	K11		q	In the optional telegram, the 36 previous month's values are suppressed for one day.
Suppress monthly values	Nb+	L<0000003		q	In the optional telegram, the 36 previous month's values are suppressed for one day.

Function	Level	Tg code	Parameter	Tg response	Explanation
Call up Nowa test	Nb+	L<0000001		q	Sends heat meter to Pb despite calibration seal. Only possible within 15h of a Pb call-up by entering the code..
Lock Nowa test	Nb+	L<0000000		q	Locks jumping from Nb to Pb by telegram.
Call up user loop	Nb	L30		q	The telegram is also executed when the call-up button or loop changing is locked. The 1st user value is normally the error display or heat quantity.
Stop test mode	Eb+Pb	P7		q	Dummy function: The heat meter only responds to BRIGHT.
Call up test mode	Nb	L4	xx0	q	Calls up test mode; Code xx: algorithmic code
Call up PBQ	Eb+Pb	P3		q	Test mode flowrate; the flowrate can be read out under code 9.27
Call up PBT (fast)	Eb+Pb	P406		q	Test mode temperature; 10 temperature measurements per update The differential or return temperature can be read out under code 9.30 or 9.28.
Call up PBT	Eb+Pb	P460		q	Test mode temperature; 160 temperature measurements per update The differential or return temperature can be read out under code 9.30 or 9.28.
Call up PBV	Eb+Pb	P1		q	The volume starts at zero and can be read out under code 9.26.
Call up PBW (fast)	Eb+Pb	P206		q	Test mode heat quantity; the heat quantity results from 10 temp measurements; simulated volume: 2.0m³
Call up PBW	Eb+Pb	P260		q	Test mode heat quantity; the heat quantity results from 160 temp measurements; simulated volume: 2.0m³. Heat quantity, differential and return temperature and simulated volume can be read out under codes 9.8, 9.30, 9.28, and 9.26.
Read RAM (without frame)	Eb	I;	xxxy	RAM data	xxx = final address; y = number of nibbles - 1;(max. 8 nibbles) RAM assignment depends on the version
Read RAM (without frame)	Nb	L60	xxxy	RAM data	xxx = final address; y = number of nibbles - 1;(max. 8 nibbles) RAM assignment depends on the version
Return real	Eb	A<0000000		q	Cancels simulation of the return temperature when the calibration seal is set.
Return simulated	Eb	A<0000001		q	The heat meter also functions if the calibration seal is set with the programmed simulation value for the return temperature.
Cancel loop lock	Nb	L=0000002		q	The service loop can be called up again with the button.
Set loop lock	Nb	L=0000003		q	The service loop can no longer be called up with the button.
Interface test (loop back)	Nb-	K<	aaaaa	aaaaa	5 input ASCII characters are output again unchanged.
Call up service loop	Nb	L31		q	The telegram is also executed when the call-up button or loop changing is locked. The 1st service value depends on the LCD list.
Start simulation Q	Eb	A7	qqqqq	q	The flowrate simulation suppresses errors F0 and F9. 1digit = 1/16000 * Qnom (pseudo hex two's complement format). e.g.: -10% * Qnom = FF9C0h = "A7 ??9<0"
Stop simulation Q	Eb	A8		q	Flowrate simulation is also terminated with setting the calibration seal.
Stop simulation T	Eb	A:		q	Temperature simulation is also terminated with setting the calibration seal.

Function	Level	Tg code	Parameter	Tg response	Explanation
Start simulation TR	Eb	A9R	rrrr	q	Start simulation value for TR and temperature simulation. For simulation of TR with the calibration seal set, the "Return simulated" telegram is also required. rrrr = ((Tr*1.954 - Tr² *2.901E-4)/1.916 + G) * 320; G(basic offset) = 16 K
Start simulation TV	Eb	A9V	vvvv	q	Start simulation value for TV and temperature simulation. vvvv = ((Tv*1.954 - Tv² *2.901E-4)/1.916 + G) * 320; G(basic offset) = 16 K e.g.: 40°C = 4210h or 46B0h = "A9V 4210" or "A9V 46;0"
Status query	all	?		s	s = "Nb+" or "Nb-" or "Pb+" or "Eb-" or "Qb" LCD display in Eb: "Eb" / in Pb: "Pb" / in Nb: no response.
Set set day	Nb	L9	ttm	q	On the set day, the volume, heat quantity, and fault duration are stored in the previous year's memory. dd = day; m = month, e.g.: 31.10. = 1Fh Ah = "L9 1?:"
Set set day	Eb+Pb	P8	ttm	q	On the set day, the volume, heat quantity, and fault duration are stored in the previous year's memory. dd = day; m = month, e.g.: 31.10. = 1Fh Ah = "P8 1?:"
Set system date	Eb	A>	ttmjj	q	dd = day; m = month;yy = year-1900, e.g. 28.10.1996 = 1Ch Ah 60h = "A> 1<:60"
Set system date	Nb	L8	ttmjj	q	dd = day; m = month;yy = year-1900, e.g. 28.10.1996 = 1Ch Ah 60h = "L8 1<:60"
Set temperature measuring interval/ LCD switch-off/ operating and missing time recording/ flowrate starting limit	Eb	I42	B	q	Parameter B(1; M11): Temperature measuring interval: 60s: B.0=0; 8s: B.0=1 LCD switch-off: after 15 min: B.1=0; LCD continuously on: B.1=1 Operating and missing time: in days: B.2=0; in hours: B.2=1 Flowrate starting limit: 20% of Qmin: B.3=0; 40% of Qmin: B.3=1
Set time of the set day to 24:00	Eb	I26		q	The time of storage of the previous year's value is at 24:00 on the set day.
Set time of the set day to 00:00		I27		q	The time of storage of the previous year's value is at 00:00 on the set day.
Set system time	Eb	A=	hhmm	q	hh = hour + 232; mm = minute + 196, e.g.: 23:58 = FFh FEh = "A= ???>"
Set system time	Nb	L7	hhmm	q	hh = hour + 232; mm = minute + 196, e.g.: 15:10 = F7h CEh = "L7 ?7<>"
Heat meter to Eb	Nb-	K6		q	V and W are saved and reset to zero.
Heat meter to Nb	Eb+Pb	P0		q	The volume and heat quantity are restored, all intermediate scalers are reset. If the calibration seal is set, the baud rate is switched too 300 baud.
Accelerated display OFF	Nb-	K40000000		q	
Accelerated display ON	Nb-	K40000001		q	

Level: Operating mode of heat meter
Nb: Normal mode with/without calibration seal (Nb+ or Nb-)
Nb+, Nb-, Pb, Eb: see Chapter 1.1

6.3 Manufacturer-specific M-bus telegrams 2WR6 in normal mode

1.Telegram frame:

Telegram bytes	Explanation	DIN EN 61107
68h L L 68h	Header of the long frame, L = C9h = length data	
08h A 72h	Variable structure, LSB first, A = M-bus address (1 byte)	9.6
78h 56h 34h 12h	Secondary address = Customer number, e.g. 12345678	9.21
A7h 32h	Identification number for LUG ID = (ord('L')-64)*32*32+(ord('U')-64)*32+(ord('G')-64)	
03h	Meter generation 3	
04h	Medium: Heat	
Z	Z = Read-out meter (1 byte)	
S	S = Status (1 byte) Bit 0..4: Acc. to DIN EN 1434 Bit 5: 1 = negative heat power Bit 6: 1 = negative flowrate Bit 7: 1 = negative temperature difference	F
00h 00h	Signature	
09h	DIF: 2-digit BCD, no DIFE, current value	
74h	VIF: updating time in seconds	
02h	2 seconds	
09h	DIF: 2-digit BCD, no DIFE, current value	
70h	VIF: Averaging time in seconds	
02h	2 seconds	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.8
06h/0Eh	VIF: Heat quantity (kWh, MJ)	
78h 56h 34h 12h	12345678 kWh/MJ	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.26
14h	VIF: Volume (m^3*1/100)	
78h 56h 34h 12h	12345.678 m^3	
0Bh	DIF: 6-digit BCD, no DIFE, current value	6.4
2Dh	VIF: Heat power (kW/10)	
56h 34h 12h	12345.6 kW	
0Bh	DIF: 6-digit BCD, no DIFE, current value	6.27
3Bh	VIF: Flowrate (l/h)	
56h 34h 12h	123.456 m^3/h	
0Ah	DIF: 4-digit BCD, no DIFE, current value	6.29
5Bh	VIF: Flow temperature (°C)	
23h 01h	123 °C	
0Ah	DIF: 4-digit BCD, no DIFE, current value	6.28
5Fh	VIF: Return temperature (°C)	
23h 01h	123 °C	
0Ah	DIF: 4-digit BCD, no DIFE, current value	6.30
62h	VIF: Temperature difference (°C/10)	
34h 12h	123.4 °C	
4Ch	DIF: 8-digit BCD, no DIFE, Memory number 1 = previous year's value	6.26*01
14h	VIF: Volume (m^3*1/100)	
78h 56h 34h 12h	12345.678 m^3	

Telegram bytes	Explanation	DIN EN 61107
4Ch	DIF: 8-digit BCD, no DIFE, Memory number 1 = previous year's value	6.8*01
06h/0Eh	VIF: Heat quantity (kWh, MJ)	
78h 56h 34h 12h	12345678 kWh/MJ	
0Ch	DIF: 8-digit BCD, no DIFE, current value	9.20
78h	VIF: Serial No.	
78h 56h 34h 12h	12345678	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.31
22h/23h	VIF: ON time (hours/days) = operating hours/days	
78h 56h 34h 12h	12345678 h/d	
3Ch	DIF: 8-digit BCD, no DIFE, value during error	6.32
22h/23h	VIF: ON time (hours/days) = missing hours/days	
78h 56h 34h 12h	12345678 h/d	
7Ch	DIF: 8-digit BCD, no DIFE, value during error, storage number 1 = previous year's value	6.32*01
22h/23h	VIF: ON time (hours/days) = missing hours/days	
78h 56h 34h 12h	12345678 h/d	
42h	DIF: 16-bit integer, no DIFE, Memory number 1 = previous year's value	6.36
6Ch	VIF: Time = set day; data type G	
01h 01h	Set day 01.01.; year of the set day always 0 because not available in the heat meter	
8Ch/CCh	DIF: 8-digit BCD, DIFE follows (odd/even mem. no.)	6.8*vv
0zh	DIFE: Memory number for (n-1)th previous month's value	
06h/0Eh	VIF: Heat quantity (kWh, MJ)	
78h 56h 34h 12h	12345678 kWh//MJ	
1Fh	DIF: Manufacturer-spec. data, further frame follows	
CS	CS = checksum (1 byte)	
16h	Stop character	

2.Telegram frame:

Telegram bytes	Explanation	DIN EN 61107
68h L L 68h	Header of the long frame, L = E2h = length data	
08h A 72h	Variable structure, LSB first, A = M-bus address (1 byte)	9.6
78h 56h 34h 12h	Secondary address = Customer number, e.g. 12345678	9.21
A7h 32h	Identification number for LUG ID = (ord('L')-64)*32*32+(ord('U')-64)*32+(ord('G')-64)	
03h	Meter generation 3	
04h	Medium: Heat	
Z	Z = Read-out meter (1 byte)	
S	S = Status (1 byte) Bit 0..4: Acc. to DIN EN 1434 Bit 5: 1 = negative heat power Bit 6: 1 = negative flowrate Bit 7: 1 = negative temperature difference	F
00h 00h	Signature	
BCh/FCh	DIF: 8-digit BCD, DIFE follows (odd/even mem. no.)	6.32*vv
0zh	DIFE: Memory number for nth previous month's value	
22h/23h	VIF: ON time (hours/days) = missing hours/days	
78h 56h 34h 12h	12345678 h/d	
8Ch/CCh	DIF: 8-digit BCD, DIFE follows, (odd/even mem. no.)	6.26*vv
0zh	DIFE: Memory number for nth previous month's value	
14h	VIF: Volume (m^3*1/100)	
78h 56h 34h 12h	12345.678 m^3	
1Fh	DIF: Manufacturer-spec. data, further frame follows	
CS	CS = checksum (1 byte)	
16h	Stop character	

3.Telegram frame:

Telegram bytes	Explanation	DIN EN 61107
68h L L 68h	Header of the long frame, L = length data (L = 88h up to firmware version 3.01 / L = 94h firmware version 3.10 and higher)	
08h A 72h	Variable structure, LSB first, A = M-bus address (1 byte)	9.6
78h 56h 34h 12h	Secondary address = Customer number, e.g. 12345678	9.21
A7h 32h	Identification number for LUG ID = (ord('L')-64)*32*32+(ord('U')-64)*32+(ord('G')-64)	
03h	Meter generation 3	
04h	Medium: Heat	
Z	Z = Read-out meter (1 byte)	
S	S = Status (1 byte) Bit 0..4: Acc. to DIN EN 1434 Bit 5: 1 = negative heat power Bit 6: 1 = negative flowrate Bit 7: 1 = negative temperature difference	F
00h 00h	Signature	
04h	DIF: 32-bit integer, no DIFE,	9.36
6Dh	VIF: Time = time + date, data type F	
78h 56h 34h 12h	12345678	
32h	DIF: 16-bit integer, no DIFE, error value *)	6.36*5
6Ch	VIF: Time = date of the F0 prewarning, data type G *)	
34h 12h	1234 *)	
0Fh	DIF: Manufacturer-specific data	
VO VR KT	Parameter temperature measurement in HEX format (8 bytes) VO(6)/VR(6)/KT(4)	9.5*02
FFh	Separator	
12h	Two-digit test number formed acc. to special algorithm (Brunata)	9.37
FFh	Separator	
12h	Measuring range (1 byte) 00: 0.6 m^3/h; 01: 0.75 m^3/h; 02: 1.0 m^3/h; 03: 1.5 m^3/h; 04: 2.5 m^3/h	9.24
FFh	Separator	
Calib	Calibration values (14 bytes) A0(4)/A1(4)/A2(4)/A3(4)/A4(4)/A5(4)/A6(4) The zero calibrations A1, A3, and A5 are two's complement. The nominal calibrations A0, A2, A4, and A6 are absolute values with a sign bit.	9.23
FFh	Separator	

*) Firmware version 3.11 and higher

Telegram bytes	Explanation	DIN EN 61107
ABCDEF	Extension (3 bytes) Bit A.3: 0 = installation in the return / 1 = installation in the flow *) Bit B.0: 0 = no F0 prewarning / 1 = F0 prewarning Bit D.1: Internal communication error (F9) *) Bit D.0: 8-hour error (F8) *) Bit E.3: Error in EEPROM (F7) *) Bit E.2: Short-circuit in return sensor (F6) *) Bit E.1: Short-circuit in flow sensor (F5) *) Bit E.0: Battery empty (F4) *) Bit F0.3: Temperature electronics defective (F3) *) Bit F0.2: Interruption in return sensor (F2) *) Bit F0.1: Interruption in flow sensor (F1) *) Bit F0.0: Flowrate error (F0) *)	9.7
FFh	Separator	
MSP2	Meas. system parameters 2 (28 bytes) V1(1)/V1Calib(1)/V2(2)/V2Calib(2)/DAC_U(2)/DAC_O(2)/DAC_M(2)/AC(2)/0(1)/B(1)/C(1)/D(1)/E(1)/H(1)/ResCnt(4)/WithF(16)/WithR(16)	9.5*01
FFh	Separator	
MSP1	Meas. system parameters 1 (27 bytes) Quality(2)/ThrF(8)/ThrR(8)/DAC_V(2)/DAC_R(2)/DAC_F0(2)/SLZ(6)/WZ(2)/nLZM(2)/n0LZM(1)/SI(1)/EFE(2)/MS(1)/ADW(1)/EF0(2)/KC(4)/KRZK(4)/Err(4)	9.5
FFh	Separator	
VT	Prescaler (11 bytes) nUS(4)/PhiV(6)/PhiW(6)/W0(6) nUS = number of US measurements (in ASCII format); PhiV, PhiW, W0 = prescaler (in pseudo hex two's complement format).	9.3
FFh	Separator	
Sim	Simulation (7 bytes) Tr(4)/Tv(4)/Q(6) Simulation values of return, flow temperature and flowrate	9.2
FFh	Separator	
Config	Device configuration (2 bytes) i(1)g(1)/t(1)/S(1) i = 0: no M-bus / no pulse output fitted i = 1: M-bus fitted i = 2: Pulse output (heat pulse) fitted i = 3: Pulse output (volume pulses) fitted g = 0: error as basic display; g=1: Heat quantity, etc., as the basic display t.0: 0= call-up button released; 1= button locked t.1: 0=commissioning lock inactive; 1=commissioning lock active t.2: 0=loop lock inactive; 1=loop lock active S.0: 0=calibration seal not set, 1=calibration seal set; S.1: 1=meas. interval 8s S.2: 0=TR real, 1=TR simulated; S.3: free	9.1

*) Firmware version 3.11 and higher

Telegram bytes	Explanation	DIN EN 61107
FFh	Separator	
78h 56h 34h 12h	The total time of M-bus read-outs (4 bytes). 12345678 (1 digit corresponds to 50 ms)	9.38
FFh	Separator	
00h 01h	Firmware version (filter processor) 1.00	
FFh	Separator	
10h 03h	Firmware version (main processor) 3.10	
CS	CS = checksum (1 byte)	
16h	Stop character	

6.4 Manufacturer-specific M-bus telegrams 2WR6 in calibration or normal mode

Telegram bytes	Explanation	DIN EN 61107
68h L L 68h	Header of the long frame, L = length data (L = D5h up to firmware version 3.01 / L = E1h firmware version 3.10 and higher)	
08h A 72h	Variable structure, LSB first, A = M-bus address (1 byte)	9.6
78h 56h 34h 12h	Secondary address = Customer number, e.g. 12345678	9.21
A7h 32h	Identification number for LUG ID = (ord('L')-64)*32*32+(ord('U')-64)*32+(ord('G')-64)	
03h	Meter generation 3	
04h	Medium: Heat	
Z	Z = Read-out meter (1 byte)	
S	S = Status (1 byte) Bit 0..4: Acc. to DIN EN 1434 Bit 5: 1 = negative heat power Bit 6: 1 = negative flowrate Bit 7: 1 = negative temperature difference	F
00h 00h	Signature	
09h	DIF: 2-digit BCD, no DIFE, current value	
74h	VIF: Updating time in seconds	
02h	2 seconds	
09h	DIF: 2-digit BCD, no DIFE, current value	
70h	VIF: Averaging time in seconds	
02h	2 seconds	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.8
06h/0Eh	VIF: Heat quantity (kWh, MJ)	
78h 56h 34h 12h	12345678 kWh/MJ	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.26
14h	VIF: Volume (m^3*1/100)	
78h 56h 34h 12h	12345.678 m^3	
0Ch	DIF: 8-digit BCD, no DIFE, current value	9.20
78h	VIF: Serial No.	
78h 56h 34h 12h	12345678	
0Ch	DIF: 8-digit BCD, no DIFE, current value	6.31
22h/23h	VIF: ON time (hours/days) = operating hours/days	
78h 56h 34h 12h	12345678 days	
3Ch	DIF: 8-digit BCD, no DIFE, value during error	6.32
22h/23h	VIF: ON time (hours/days) = missing hours/days	
78h 56h 34h 12h	12345678 h/d	
7Ch	DIF: 8-digit BCD, no DIFE, value during error, storage number 1 = previous year's value	6.32*01
22h/23h	VIF: ON time (hours/days) = missing hours/days	
78h 56h 34h 12h	12345678 h/d	
42h	DIF: 16-bit integer, no DIFE, Memory number 1 = previous year's value	6.36
6Ch	VIF: Time = set day; data type G	
01h 01h	Set day 01.01.; year of the set day always 0 because not available in the heat meter	

Telegram bytes	Explanation	DIN EN 61107
8Ch	DIF: 8-digit BCD, DIFE follows	9.8
40h	DIFE: UNIT 1 (test mode)	
04h	VIF: Heat quantity (kWh*1/100)	
78h 56h 34h 12h	123456.78 kWh	
8Bh	DIF: 6-digit BCD, DIFE follows	9.26
40h	DIFE: UNIT 1 (test mode)	
11h	VIF: Volume (m^3*1/100000)	
56h 34h 12h	1.23456 m^3	
83h	DIF: 24-bit integer, DIFE follows	9.27
40h	DIFE: UNIT 1 (test mode)	
7Fh	VIF: Manufacturer-specific	
56h 34h 12h	123456	
83h	DIF: 24-bit integer, DIFE follows	9.28
40h	DIFE: UNIT 1 (test mode)	
7Fh	VIF: Manufacturer-specific	
56h 34h 12h	123456	
83h	DIF: 24-bit integer, DIFE follows	9.30
40h	DIFE: UNIT 1 (test mode)	
7Fh	VIF: Manufacturer-specific	
56h 34h 12h	123456	
04h	DIF: 32-bit integer, no DIFE,	9.36
6Dh	VIF: Time = time + date, data type F	
78h 56h 34h 12h	12345678	
32h	DIF: 16-bit integer, no DIFE, error value *)	6.36*5
6Ch	VIF: Time = date of the F0 prewarning, data type G *)	
34h 12h	1234 *)	
0Fh	DIF: Manufacturer-specific data	
VO VR KT	Parameter temperature measurement (8 bytes) VO(6)/VR(6)/KT(4)	9.5*02
FFh	Separator	
12h	Test digits (1 byte)	9.37
FFh	Separator	
12h	Measuring range (1 byte) 00: 0.6 m^3/h; 01: 0.75 m^3/h; 02: 1.0 m^3/h; 03: 1.5 m^3/h; 04: 2.5 m^3/h	9.24
FFh	Separator	
Calib	Calibration values (14 bytes) A0(4)/A1(4)/A2(4)/A3(4)/A4(4)/A5(4)/A6(4) The zero calibrations A1, A3, and A5 are two's complement. The nominal calibrations A0, A2, A4, and A6 are absolute values with a sign bit.	9.23
FFh	Separator	

*) Firmware version 3.11 and higher

Telegram bytes	Explanation	DIN EN 61107
ABCDEF	Extension (3 bytes) Bit A.3: 0 = installation in the return / 1 = installation in the flow *) Bit B.0: 0 = no F0 prewarning / 1 = F0 prewarning Bit D.1: Internal communication error (F9) *) Bit D.0: 8-hour error (F8) *) Bit E.3: Error in EEPROM (F7) *) Bit E.2: Short-circuit in return sensor (F6) *) Bit E.1: Short-circuit in flow sensor (F5) *) Bit E.0: Battery empty (F4) *) Bit F0.3: Temperature electronics defective (F3) *) Bit F0.2: Interruption in return sensor (F2) *) Bit F0.1: Interruption in flow sensor (F1) *) Bit F0.0: Flowrate error (F0) *)	9.7
FFh	Separator	
MSP2	Meas. system parameters 2 (28 bytes) V1(1)/V1Calib(1)/V2(2)/V2Calib(2)/DAC_U(2)/DAC_O(2)/DAC_M(2)/AC(2)/0(1)/B(1)/C(1)/D(1)/E(1)/H(1)/ResCnt(4)/WithF(16)/WithR(16)	9.5*01
FFh	Separator	
MSP1	Meas. system parameters 1 (27 bytes) Quality(2)/ThrF(8)/ThrR(8)/DAC_V(2)/DAC_R(2)/DAC_F0(2)/SLZ(6)/WZ(2)/nLZM(2)/n0LZM(1)/SI(1)/EFE(2)/MS(1)/ADW(1)/EF0(2)/KC(4)/KRZK(4)/Err(4)	9.5
FFh	Separator	
VT	Prescaler (11 bytes) nUS(4)/PhiV(6)/PhiW(6)/W0(6) nUS = number of US measurements (in ASCII format); PhiV, PhiW, W0 = prescaler (in pseudo hex two's complement format).	9.3
FFh	Separator	
Sim	Simulation (7 bytes) Tr(4)/Tv(4)/Q(6) Simulation values of return, flow temperature and flowrate	9.2
FFh	Separator	
Config	Device configuration (2 bytes) i(1)g(1)/t(1)/S(1) i = 0: no M-bus / no pulse output fitted i = 1: M-bus fitted i = 2: Pulse output (heat pulse) fitted i = 3: Pulse output (volume pulses) fitted g = 0: error as basic display; g=1: Heat quantity, etc., as the basic display t.0: 0= call-up button released; 1= button locked t.1: 0=commissioning lock inactive; 1=commissioning lock active t.2: 0=loop lock inactive; 1=loop lock active S.0: 0=calibration seal not set, 1=calibration seal set; S.1: 1=meas. interval 8s S.2: 0=TR real, 1=TR simulated; S.3: free	9.1
FFh	Separator	

*) Firmware version 3.11 and higher

Telegram bytes	Explanation	DIN EN 61107
78h 56h 34h 12h	The total time of M-bus read-outs (4 bytes). 12345678 (1 digit corresponds to 50 ms)	9.38
FFh	Separator	
00h 01h	Firmware version (filter processor) 1.00	
FFh	Separator	
10h 03h	Firmware version (main processor) 3.10	
CS	CS = checksum (1 byte)	
16h	Stop character	