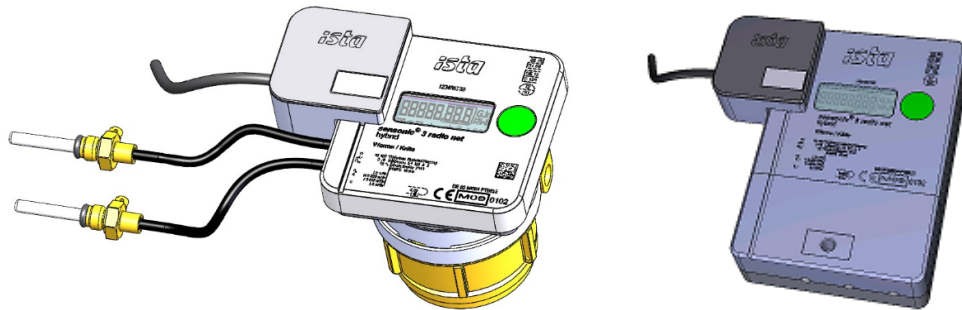


Technical specification **M-Bus telegrams sensonic 3**



Version 1.0.0

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1 M-Bus Module

1.1 Function

General Properties of the M-Bus module: Functions		
Characteristic	value	reference
protocol	wired M-Bus	EN13757
transmission speeds	300, 2400 and 9600 bps	
Automatically enable its recognition	yes	
Compatibility with sensoric II Telegram-Interface	restricted	
Module commissioning & configuration	PDA / tablet Device UI M bus	
update the measurement data	with every M-Bus readout	
max. number of readings per day at normal walking M bus span supply	<ul style="list-style-type: none"> Short telegram: 122 (Ø Interv.₂): 12 mins) Standard telegrams: 21 (Ø interval: 69 min) Short telegram fast₁): 1440 (Ø interval: 1 min) 	
max. number of readings per day at low voltage M bus supply	<ul style="list-style-type: none"> Short telegram: 70 (Ø interval: 21 min) Standard telegrams: 20 (average interval: 72 minutes) Short telegram fast₁): 412 (Ø interval: 3.5 min) 	
smallest off reading interval	1s	

Table 1: General properties of the M-Bus module

- This operating mode reduces the service life of the sensoric 3 to approx. 7 years (the operating mode is activated via the bit "0x10=IncreasedOpticalCredit" in the data object "Mbus:AccessRight (3.4.1.10)"; activation is carried out at the next change of day; instead of "OpticCreditDailyInc (10.7.1.2) then "OpticCreditDailyIncExt" (10.7.1.3) is used as daily budget for optical communication).
- The specified intervals are only calculated average values, the readings can also be used up directly one after the other without a break.

Devices-	mistake	transport layer	application layer
bit0	"F" (pulse incr)	bit4: temporary error	bit0: "F" (pulse incr)
bit1	"c" (calculation)	bit4: temporary error	bit1: "c" (calculation)
bit2	"t" (temperature)	bit4: temporary error	bit2: "t" (temperature)
bit3	"F" (volume)	bit4: temporary error	bit3: "F" (volume)
bit4	"L" (lifetime)	bit2: energy low bit3: permanent error	bit4: "L" (lifetime)
bit5	"U" (unsealed)	bit3: permanent error	bit5: "U" (unsealed)
bit6	"SysErr" (FRAM)	bit3: permanent error	bit6: "SysErr" (FRAM)
bit7	"SysErr" (MetChecksum)	bit3: permanent error	bit7: "SysErr" (MetChecksum)

Table 2: Mapping device to M-Bus error

Characteristic	parameter	value
tension	Supported M-Bus voltage	20 .. 45 V
electricity	power supply	only from the M-Bus network, no battery supply
	maximum power consumption	≤1.5 mA (1 unit load)

Table 3: Electrical properties of the M-Bus module

1.2 Addressing

1.2.1 Primary Addressing

Each device connected to the M-Bus has a 1-byte, unique address from the number range 0 to 250, with which it can be specifically addressed.

In production, the primary address is set to "0", in the field it can then be set to an address from the range 0 to 250 via M-Bus, radio or the device user interface. Addresses 251-255 are reserved and must not be used as device addresses.

This results in the following primary address scheme:

address	Device response to requests to the address	meaning
0	Delivery status of the primary address	"not set"
0 - 250	Only the device with this address processes and answers the request	device address
251 (0xFB) 252 (0xFC)	Requests to these addresses will not be answered by any device	- reserved -
253 (0xFD)	Requests to this address will be answered to devices previously sent via "secondary address" (see below) and were restrained	
254 (0xFE)	Requests to this address will be processed and answered using the primary address of the responding G	
255 (0xFF)	inquiries to this address processed but not answered	

Table 4: M-Bus device primary address scheme

1.2.2 Secondary addressing

The sensonic 3 devices are selected and addressed as in the M-Bus specification DIN EN 13757-3 Chapter 11.3ff. The secondary address is appropriate the M-Bus specification is structured as follows:

byte	length	data type	value	reference
0 .. 3	4 bytes	Serial number of the main device (8-digit BCD, M-Bus Type A format)		EN1375-3 Appendix A
4th 5th	2 bytes	manufacturer code	0x2674 for "ACTUAL"	
6	1 byte	Version code:		
		sensonic 3	0xA9	
		sensonic 3 calculator	0xAA	
		flow sensor	0xAC	

byte length	data type	value	Reference
	ista P4.0 – 51099	0xAD	
7	1 byte device type code		- Table 6: Device type Code

Table 5: Structure of M-Bus secondary address

As in the M-Bus specification [DIN EN 13757-7:2018, chapter 7.5.4 the "Identification of device type"] the device type is assigned according to the following scheme:

sensonic 3 variant	medium	mounting location	device type code
sensonic 3 & sensonic 3 calculator ¹⁾	warmth	return	0x04
		leader	0x0C
	cold	return	0x0A
		leader	0x0B
Hybrid	-	0x0D	
flow sensor	-	-	0x04
ista P4.0 – 51099	any	-	freely programmable, Delivery status = 0x00

Table 6: device type code

¹⁾With sensonic 3 calculator TX with config. Installation location, the device type code is only set when configuring the installation location.

2 Changeover of the working mode (selection of telegrams)

CS - checksum

PB - primary bus address

Switching to standard telegram mode: 3 response telegrams:

- 68 04 04 68 73 PB 50**00**CS or
 - 68 04 04 68 73 PB 53**00**CS "**00**"
- means send all data

Switching to short telegram mode: 1 response telegram:

- 68 04 04 68 73 PB 50**50**CS 68 or
 - 04 04 68 73 PB 53**50**CS
- "**50**" means sending instantaneous values (for controls).

3 sensoric 3 Telegram-Initial

3.1 Ku doctor telegram

Suitable for readings in short time interval (15 min, 30 min, 30 min, etc.). It will be 102 bytes (FDH and Data) in 12 data points transferred.

Data-Point	Language designation bytes	designation M bus	Dif, DIFE	VIF, VIFE	evaluates type	
1	6	serial number	fabrication Number	0C	78	8 digits BCD
2	6	device time	timepoint	04	6D	32 bits Type F
3	8th	Current Warmth-energy	Energy	06	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1 MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
4	8th	Current volume	V _{volume}	06	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	48 bits integer
5	9	Current cold energy	Energy Tariff 1	86 10	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1 MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
6	6	current flow foot	volume flow	04	3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	32 bits integer
7	6	maximum flow foot	volume flow maximum	14	3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	32 bits integer
8th	8th	Current performance	power	06	2B - 1W 2A - 0.1W 28 - 0.001W 2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1MW FB,29 - 1MW	48 bits integer
9	8 - 9	maximum performance Warm	Power, maximum	16	2B - 1W 2A - 0.1W 28 - 0.001W	48 bits integer

					2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1MW FB,29 - 1MW	
10	8 - 9	maximum performance Cold	powercold, maximum	96 10	2B - 1W 2A - 0.1W 28 - 0.001W 2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1MW FB,29 - 1MW	48 bits integer
11	4	Leader-temperature	Flow temperature	02	5A - 0.1°C	16 bits integer
12	4	return temperature	return temperature	02	5E - 0.1°C	16 bits integer
13	6	Temperature-difference	Temp difference	04	60 - 0.001°C	32 bits integer
14	6	time from the day before	time point, Storage No. 1	44	6D	32 bits Type F
15	8th	Warmth-energy from the day before	Energy, Storage No. 1	46	05 - 0.1kWh 06 - 1kWh 0E - 1MJ	48 bits integer
16	8th	volume from the day before	volumes Storage No. 1	46	13 - 1 litre 14-10 liters 15 - 0.1m ³	48 bits integer
17	9	cold energy from the day before	Energy Tariff 1, Storage No. 1	C6 10	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1 MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
18	5	date from the last Deadline	data, storage No. 2	82 01	6C	16 bits Type E
19	9	Warmth-energy finally Deadline	Energy, Storage No. 2	86 01	03 - 1Wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1 MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
20	9	volume finally Deadline	volumes Storage No. 2	86 01	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
21	9	cold energy finally Deadline	Energy Tariff 1, Storage No. 2	86 11	03 - 1wh 05 - 0.1kWh 06 - 1kWh	48 bits integer

					FB 00 – 0.1 MWh FB 01 – 1 MWh 0E - 1MJ FB 08 – 0.1 GJ FB 09 – 1 FY	
22	6	date nearest Deadline	Date future value, Storage No. 2	82 01	EC7E	16 bits Type G
23	7	time from the last end of the month	time point, Storage No. 3	C2 01	6C	16 bits Type G
24	9	Warmth-energy finally end of the month	Energy, Storage No. 3	C6 01	03 – 1wh 05 - 0.1kWh 06 - 1kWh FB 00 – 0.1 MWh FB 01 – 1 MWh 0E - 1MJ FB 08 – 0.1 GJ FB 09 – 1 FY	48 bits integer
25	9	volume finally end of the month	volumes Storage No. 3	C6 01	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	48 bits integer
26	9	cold energy finally end of the month	Energy Tariff 1, Storage No. 3	C6 11	03 – 1wh 05 - 0.1kWh 06 - 1kWh FB 00 – 0.1 MWh FB 01 – 1 MWh 0E - 1MJ FB 08 – 0.1 GJ FB 09 – 1 FY	48 bits integer
27	4	uptime	On time	02	23 - days	16 bits integer
28	5	absenteeism	On time tariff 2	82 20	23 - days	16 bits integer
29	4	error code	Error flags (binary)	01	FD 17	8 bits integer
MDH	1		more records follow in next telegram	1F		

Table 7:sononic 3, short telegram content

3.2 Standard telegram me

It will in four telegrams Hpractice with each other rigwear.

3.2.1 T telegram 1

Current values, final values Vom the day before, stitch day 1 values and values from mon at 1 (previous month). la length of user d Data with FDH: 224 bytes, 29 data points.

Data-Point	lan ge designation bytes it	designation M bus	Dif, DIFE	VIF, VIFE	value type	
1	6	serial number	fabrication Number	0C	78	8 digits BCD
2	6	device time	timepoint	04	6D	32 bits Type F
3	8th	Current Warmth- energy	Energy	06	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
4	8th	Current volume	volume	06	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	48 bits integer
5	9	Current cold energy	Energy Tariff 1	86 10	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
6	6	current flow foot	volume flow	04	3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	32 bits integer
7	6	maximum flow foot	volume flow maximum	14	3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr	32 bits integer

					38 - 0.001 l/h	
8th	8th	Current performance	power	06	2B - 1W 2A - 0.1W 28 - 0.001 W 2E - 1kW 2D - 0.1kW 2B - 0.001 week FB.28 - 0.1 MW FB,29 - 1 MW	48 bits integer
9	8th - 9	maximum performance Warm	Power, maximum	16	2B - 1W 2A - 0.1W 28 - 0.001 W 2E - 1kW 2D - 0.1kW 2B - 0.001 week FB.28 - 0.1 MW FB,29 - 1 MW	48 bits integer
10	8 - 9	maximum performance cold	powercold, maximum	96 10	2B - 1W 2A - 0.1W 28 - 0.001 W 2E - 1kW 2D - 0.1kW 2B - 0.001 week FB.28 - 0.1 MW FB,29 - 1 MW	48 bits integer
11	4	Leader-temperature	Flow temperature	02	5A - 0.1°C	16 bits integer
12	4	return temperature	return temperature	02	5E - 0.1°C	16 bits integer
13	6	Temperature-difference	Temp difference	04	60 - 0.001 °C	32 bits integer
14	6	time from the day before	time point, Storage No. 1	44	6D	32 bits Type F
15	8th	Warmth-energy from the day before	Energy, Storage No. 1	46	05 - 0.1kWh 06 - 1kWh 0E - 1MJ	48 bits integer
16	8th	volume from the day before	volumes Storage No. 1	46	13 - 1 litre 14-10 liters 15 - 0.1m ³	48 bits integer

17	9	cold energy from the day before	Energy Tariff 1, Storage No. 1	C6 10	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
18	5	date from the last Deadline	data, storage No. 2	82 01	6C	16 bits Type E
19	9	Warmth- energy finally Deadline	Energy, Storage No. 2	86 01	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
20	9	volume finally Deadline	volumes Storage No. 2	86 01	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	48 bits integer
21	9	cold energy finally Deadline	Energy Tariff 1, Storage No. 2	86 11	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
22	6	date nearest Deadline	Date future value, Storage No. 2	82 01	EC7E	16 bits Type G
23	7	time from the last end of the month	time point, Storage No. 3	C2 01	6C	16 bits Type G
24	9	Warmth- energy finally end of the month	Energy, Storage No. 3	C6 01	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh	48 bits integer

					0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	
25	9	volume finally end of the month	volumes Storage No. 3	C6 01	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	48 bits integer
26	9	cold energy finally end of the month	Energy Tariff 1, Storage No. 3	C6 11	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
27	4	uptime	On time	02	23 - days	16 bits integer
28	5	absenteeism	On time tariff 2	82 20	23 - days	16 bits integer
29	4	error code	Error flags (binary)	01	FD 17	8 bits integer
MDH	1		more records follow in next telegram	1F		

Table 8: *sonsonic 3, telegram Icontent 1*

3.2.2 T telegram 2

months values of heat e, volume and transferred: m month 2 to month 7. Length of A data points.

Kolder. Values of 6 month-end data ate nwith FDH: 214 bytes , 24

Data-Point	length e bytes	designa- tion	Bmark M bus	DIF DIFE	/ VIF / VIFE	value type
1	7	date from month 2	date, Storage No. 4	82 02	6C	16 bit types E
2	9	Warmth-energy to the month 2	energy Storage No. 4	86 02	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer

3	9	volume to the month 2	volumes Storage No. 4	86 02	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	48 Bit int Ghe
4	9	Cold- energy to the month 2	Energy Tariff 1, Storage No. 4	86 12	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 Bit int Ghe
....
21	7	date from month 7	date, Storage No. 9	C2 04	6C	16 Bit Type E
22	9	Warmth- energy to the month 7	energy Storage No. 9	C6 04	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 Bit int Ghe
23	9	volume to the month 7	volumes Storage No. 9	C6 04	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	48 Bit int Ghe
24	9	Cold- energy to the month 7	Energy Tariff 1, Storage No. 9	C6 14	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 Bit int Ghe
MDH	1		more records follow in next telegram	1F		

Table 9: sensor 3, telegram content 2

3.2.3 Telegram 3

Month sending values of heat e, volume and transfer: month 8 to month . 13. Length of A data points Kolder. Values of 6 M user data with FDH: 217 bytes Onat es, 24

Data-Point	Length Bites	designation	designation M bus	DIF / VIF / VIFE	value type	
1	7	time from month 8	time point, Storage No. 10	82h05	6C	16 bit type E
2	9	warmth to the month 8	energy Storage No. 10	86h05	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 Gj FB 09 - 1 FY	48 bits integer
3	9	volume to the month 8th	Vvolume, Storage No. 10	86h05	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	48 bits integer
4	9, 10	cold to the month 8	Energy Tariff 1, Storage No. 11	86 15	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 Gj FB 09 - 1 FY	48 bits integer
....
21	7	time of the month 13	time point, Storage No. 15	C2 07	6C	16 bit types E
22	9	warmth to the month 13	energy Storage No. 15	C6 07	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 Gj FB 09 - 1 FY	48 bits integer
23	9	volume to the month 13	volumes Storage No. 15	C6 07	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer

24	9	cold to the month 13	Energy Tariff 1, Storage No. 15	C6 17	03 - 1wh 05 - 0.1kWh 06 - 1kWh FB 00 - 0.1MWh FB 01 - 1 MWh 0E - 1MJ FB 08 - 0.1 GJ FB 09 - 1 FY	48 bits integer
MDH	1		more records follow in next telegram	1F		

tabel 10:sensonic 3, telegram m-content 3

3.2.4 Telegram 4

Monthfinal values of cold - . Volume. length d er User data with FDH: 174 bytes tes, 17 data points

Data-Point	la denomination bytes	Bmark M-Bus	DIF / DIFE	VIF / VIFE	evaluates yp	
1	9	Current Not to energy netted volume	Vvolume tariff 2	8620	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
2	9	Current Cold-volume	Vvolume tariff 1	8610	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
3	9	Cold-volume from the day before	Volume tariff 1, Storage No. 1	C6 10	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
4	9	Cold-volume finally Deadline	Volume tariff 1, Storage No. 2	8611	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
5	9	Cold-volume finally end of the month	volume tariff 1, Storage No. 3	C6 11	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	48 bits integer
6	9	Cold-volume to the month 2	volume tariff 1, Storage No. 4	86 12	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	48 bits integer
7	9	Cold-volume	volume tariff 1, Storage No. 5	C6 12	13 - 1 litre 12 - 0.1 liters	48 bits integer

		to the month 3			10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	
8th	9	Cold-volume to the month 4	volume tariff 1, Storage No. 6	86 13	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
9	9	Cold-volume to the month 5	volume tariff 1, Storage No. 7	C6 13	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
10	9	Cold-volume to the month 6	volume tariff 1, Storage No. 8th	86 14	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
11	9	Cold-volume to the month 7	volume tariff 1, Storage No. 9	C6 14	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
12	9	Cold-volume to the month 8	volume tariff 1, Storage No. 10	86 15	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
13	9	Cold-volume to the month 9	volume tariff 1, Storage No. 11	C6 15	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
14	9	Cold-volume to the month 10	volume tariff 1, Storage No. 12	86 16	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
15	9	Cold-volume to the month 11	volume tariff 1, Storage No. 13	C6 16	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48bit integer
16	9	Cold-volume to the month 12	volume tariff 14, Storage No. 11	86 17	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48 bits integer
17	9	Cold-volume to the month 13	volume tariff 1, Storage No. 15	C6 17	13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1 m ³	48 bits integer

Table 11: sensor 3, telegram content 4

4 ista P4 .0 - 51099 telegram content

4.1K short telegram

Appropriate net for readouts in short time intervals n (15 mins, 30 mins, 30 mins, etc.).

Data-Point	Length Bites	designation	designation M bus	DIF, DIFE VIF, VIFE	value type	
1	6	serial no ^{e_{right}}	fabrication Number	0C	78	8 digits BCD
2	8th	current consumption energy	Energy	06	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bits integer
		current consumption volume	volume		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	
		pulses	dimensional SS (Unit for HCA)		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
3	6	current flow	volume flow	0C	3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	8 digits BCD
		Current performance	power		2B - 1W 2A - 0.1W 28 - 0.001W 2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1 MW FB,29 - 1MW	
		pulses/hour	dimensional SS (Unit for HCA)		EE 22 - /h	
4	4	error code	Error flags (binary)	02	FD 17	16 bits integer

Table 12: ista P4.0 - 51099 short message content

4.2 p standard telegram mIt is P4.0 - 51 099

it we four telegrams practice in a row wear.

4.2. 1 telegram 1

current le values, final values from the previous day, engraving day 1 values and values of the month t 1 (previous month). Length of user d data with FDH: 210 bytes, 28 data points.

Data-Point	Length designation Bites	designation serial number right	designation M bus	Dif DIFE	VIF, VIFE	value type
1	6	serial number right	fabrication Number	0C	78	8 digits BCD
2	6	device time	timepoint	04	6D	32 bits Type F
3	6	date seed modification	time point, Storage No. 20	84,0 A	6D	32 bits Type F
4	7 - 8th	seed	energy Storage No. 20	80,0 A	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001Gj FB.08 - 0.1Gj FB.09 - 1 Gj	8 digits BCD
			volumes Storage No. 20		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensional s (Unit for HCA)		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
5	8th	Current energy	Energy	06	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001Gj FB.08 - 0.1Gj FB.09 - 1 Gj	48 bits integer
		Current volume	volume		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	
		pulses	Dimensional s (Unit for HCA)		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
6	6	Current performance	power	0C	2B - 1W 2A - 0.1W 28 - 0.001W	8 digits BCD

					2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1MW FB,29 - 1MW	
		current flow	volume flow		3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	
		pulses/hour	Dimensional S (Unit for HCA)		EE 22 - /h	
7	6	maximum performance	max power	1C	2B - 1W 2A - 0.1W 28 - 0.001W 2E - 1kW 2D - 0.1kW 2B - 0.001KW FB.28 - 0.1MW FB,29 - 1MW	8 digits BCD
		maximum flow	max volume flow		3E - 1m ³ /h 3D - 0.1m ³ /h 3B - 0.001m ³ /h 3A - 0.1L/hr 38 - 0.001 l/h	
		pulses/hour	Dimensional S (Unit for HCA)		EE 22 - /h	
8th	6	date previous day	time point, Storage No. 1	44	6D	32 bits Type F
9	8th	consumption day before	energy Storage No. 1	46	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bits integer
			volumes Storage No. 1		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	
			Dimensional S (Unit for HCA)		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
10	7	date Deadline	time point, store 2	84.01	6D	32 bits Type F

11	9	consumption Deadline	energy store 2	8d.01 03 – 1Wh 05 – 100Wh 06 - 1kWh FB.00 – 0.1 MWh FB.01 – 1 MWh 0E - 0.001GJ FB.08 – 0.1GJ FB.09 – 1 GJ	48 bits integer	
			volumes store 2			13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 – 1m ³
			Dimensional s (Unit for HCA), store 2			6E – 1 EE.73 - 0.001 EE.75 - 0.1
12	6	date nearest Deadline	time point, store 2	8d.01 EC,7E	16 bits Type G	
13	4	uptime	On time	02	23 - days 16 bits integer	
14	5	absenteeism	On time Tariff2	8d.20	23 - days 16 bits integer	
15	5	error code	Error flags (binary)	02	FD 17 16 bits integer	
MDH	1		more records follow in next telegram	1f		
16	6	pulse weight	pulse weight		ZZ,ZZ,NN,NN,NN, NN	

tabel 13: ista P4.0 – 51099, Telegram content 1

4.2.2 Telegram 2

Monthsending values of heat e, volume and transfer: month 2 to month 7. Length of A data points .

Kolder. Values of 6 month-end data aten nwith FDH: 217 bytes, 24

Data Point	Length bytes	Designation	Designation M bus	DIF / DIFE	VIF / VIFE	value type
1	7	time from month 1	time point, Storage No. 3	C4.01	6D	32 bit types f
2	9 - 10	consumption to the month 1	energy Storage No. 3	C6.01	03 – 1wh 05 – 100Wh 06 - 1kWh FB.00 – 0.1 MWh FB,01 – 1 MWh 0E - 0.001 GJ	48 bit integer

					FB.08 - 0.1 GJ FB,09 - 1 GJ	
			volume Storage No. 3		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 3		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
3	7	time from month 2	time point, Storage No. 4	84.02	6D	32 bits Type f
4	9 - 10	consumption to the month 2	energy Storage No. 4	86.02	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB,01 - 1 MWh 0E - 0.001 GJ FB.08 - 0.1 GJ FB,09 - 1 GJ	48 bits integer
			volume Storage No. 4		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 4		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
5	7	time from month 3	time point, Storage No. 5	C4.02	6D	32 bit types f
6	9 - 10	consumption to the month 3	energy Storage No. 5	C6.02	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB,01 - 1 MWh 0E - 0.001 GJ	48 bit integer

					FB.08 - 0.1 GJ FB,09 - 1 GJ	
			volume Storage No. 5		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 5		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
7	7	time from the month 4	time point, Storage No. 6	84.03	6D	32 bits Type f
8th	9 - 10	consumption to the month 4	energy Storage No. 6	86.03	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB,01 - 1 MWh 0E - 0.001 GJ FB.08 - 0.1 GJ FB,09 - 1 GJ	48 bits integer
			volume Storage No. 6		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 6		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
9	7	time from month 5	time point, Storage No. 7	C4.03	6D	32 bit types f
10	9 - 10	consumption to month 5	energy storage no. 7	C6.03	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB,01 - 1 MWh 0E - 0.001 GJ	48 bit integer

					FB.08 - 0.1 GJ FB,09 - 1 GJ	
			volume Storage No. 7		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 7		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
11	7	time from month 6	time point, Storage No. 8th	84.04	6D	32 bits Type f
12	9 - 10	consumption to the month 6	energy Storage No. 8th	86.04	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB,01 - 1 MWh 0E - 0.001 GJ FB.08 - 0.1 GJ FB,09 - 1 GJ	48 bits integer
			volume Storage No. 8th		13 - 1 litre 12 - 0.1 liter 10 - 0.001 liter 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 8th		6E - 1 EE,73 - 0.001 EE.75 - 0.1	
MDH	1		more records follow in next telegram	1F		

Table 14: ista P4.0 - 51099, telegram content 2

4.2.3 Telegram 3

Monthsend values from Wärms, volume and EnergieCold. Values of 6 user data with month transfer: Month 2 to Month 7. Length of FDH: 217 Bites, 24 data points.

Data-Point	lang bytes	designation	designation M bus	Dif / DIFE	VIF / VIFE	werttyp
1	7	time from month 7	time point, Storage No. 9	C4.04	6D	32 bit Type F
2	9 - 10	consumption to the month 7	energy Storage No. 9	C6.04	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bit integer
			volume Storage No. 9		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 9		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
3	7	time of the month 8th	time point, Storage No. 10	84.05	6D	32 bit Type F
4	9 - 10	consumption to the month 8	energy Storage No. 10	86.05	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bits integer
			volume Storage No. 10		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 10		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
5	7	time from month 9	time point, Storage No. 11	C4.05	6D	32 bits Type F
6	9 - 10	consumption to the month 9	energy Storage No. 11	C6.05	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bits integer
			volume		13 - 1 litre	

			Storage No. 11		12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 11		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
7	7	time of the month 10	time point, Storage No. 12	84.06	6D	32 bit Type F
8th	9 - 10	consumption to the month 10	energy Storage No. 12	86.06	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bit <small>integer</small> eeng
			volume Storage No. 12		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 12		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
9	7	time of the month 11	time point, Storage No. 11	C4.06	6D	32 bit Type F
10	9 - 10	consumption to the month 11	energy Storage No. 13	C6.06	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bit <small>integer</small> eeng
			volume Storage No. 13		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 13		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
11	7	time of the month 12	time point, Storage No. 14	84.07	6D	32 bits Type F
12	9 - 10	consumption to the month 12	energy Storage No. 14	86.07	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ	48 bits integer

					FB.09 – 1 GJ	
			volume Storage No. 14		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 14		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
MDH	1		more records follow in next telegram	1F		

tabel 15:ista P4.0 – 51099, Telegram content 3

4.2.4 Telegram 4

Monthsend values from Wärms, volume and i.eCold. Values of 6 user data with months transfer: Month 2 to Month 7. Length of FDH: 217 Bites, 24 data points .

Data-Point	la ng bytes	designation	designation M bus	Dif / DIFE	VIF / VIFE	werttyp
1	7	time of the month 13	time point, Storage No. 15	C4.07	6D	32 bit Type F
2	9 - 10	consumption to the month 13	energy Storage No. 15	C6,07	03 – 1wh 05 – 100Wh 06 - 1kWh FB.00 – 0.1 MWh FB.01 – 1 MWh 0E - 0.001GJ FB.08 – 0.1GJ FB.09 – 1 GJ	48 bit intern eeng
			volume Storage No. 15		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 15		6E - 1 EE.73 - 0.001 EE.75 - 0.1	
3	7	time of the month 14	time point, Storage No. 16	84.08	6D	32 bits Type F

4	9 - 10	consumption to the month 14	energy Storage No. 16	86.08	03 - 1wh 05 - 100Wh 06 - 1kWh FB.00 - 0.1 MWh FB.01 - 1 MWh 0E - 0.001GJ FB.08 - 0.1GJ FB.09 - 1 GJ	48 bits integer
			volume Storage No. 16		13 - 1 litre 12 - 0.1 liters 10 - 0.001 liters 15 - 0.1 m ³ 16 - 1m ³	
			Dimensionless (Unit for HCA) Storage No. 16		6E - 1 EE.73 - 0.001 EE.75 - 0.1	

tabel 16: ista P4.0 - 51099, Telegram content 4