

Operating guide

SonoMeter 40, SonoMeter 40c Wireless M-Bus protocol description



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1. Description

Main data:

- Communication type: Wireless M-Bus
- Power:
<25 mW (868MHz)
- Transmitting frequency:
868,95 MHz
- Band: 50 kHz
- Protocol:
T1 OMS
S1 (optional)

- Mode:
Mode 5
Mode 7 (optional)
- Encryption: AES-128
- Activation: Self-activated after passed 10L of volume
- Max bytes of data telegram: 255 bytes
- Data telegram structure: Selected according to the data tables below

2. OMS telegram structure

Field Code	Byte pos.	No. of Bytes	Value	Description	Note
L field	1	1	xx	Message length	-
C field	2	1	xx	Control Field: indicates service telegram	-
M field	3-4	2	D3 10	Manufacturer code DFS – Danfoss A/S	-
A field	5-6-7-8	4	xx xx xx xx	Serial number of the device (8-digit)	-
Generation	9	1	xx	wMbus generation of the device	-
Medium	10	1	04	Device type 04 – Heating application 0D – Heating / Cooling application	-
CI field	11	1	xx	Control Information	-
Count	12	1	xx	Progressive count (access number = transmission counter)	-
Status byte	13	1	xx	Contains flag of alarm	-
Signature	14-15	2	xx xx	Configuration word (ciphering OMS with profile A: xx xx or not ciphering: 00 00)	-
AES-verify	16-17	2	2F 2F	Encryption verification field (if the transmission is not enabled, this field is missing)	Opt.
Data	xx...xx	-	xx...xx xx xx xx	User Data telegram structure can be selected individually	-

3. Main User Data telegram structure

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Date and Time	04 6D	4	Type F	32-bit integer
Date and Time of error starting	34 6D	4	Type F	32-bit integer
Error code	34 FD 17	4	-	32-bit integer
Battery operation time	04 20	4	sec	32-bit integer
Working time without error	04 24	4	sec	32-bit integer
Energy for Heating	04 86 3B 04 8E 3B 04 FB 8D 3B	4	kWh MJ Mcal	32-bit integer
Energy for Cooling*	04 86 3C 04 8E 3C 04 FB 8D 3C	4	kWh MJ Mcal	32-bit integer
Energy of Tariff 1 *	84 10 86 3x 84 10 8E 3x 84 10 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Energy of Tariff 2 *	84 20 86 3x 84 20 8E 3x 84 20 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Volume	04 13	4	0,001 m ³	32-bit integer
Volume of Pulse Input 1 *	84 40 13	4	0,001 m ³	32-bit integer
Volume of Pulse Input 2 *	84 80 40 13	4	0,001 m ³	32-bit integer
Power	04 2B	4	W	32-bit integer
Flow rate	04 3B	4	0,001 m ³ /h	32-bit integer
Flow Temperature	02 59	2	0.01 °C	16-bit integer
Return Temperature	02 5D	2	0.01 °C	16-bit integer
Temperature Difference	02 61	2	0.01 K	16-bit integer
Serial Number	0C 78	4	-	32-bit integer BCD8

* Depends on meter's configuration and request

4. Hours Logger Data telegram structure

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Logger Date and Time	C4 86 03 6D	4	Type F	32-bit integer
Average Power	C4 86 03 2B	4	W	32-bit integer
Average Flow Rate	C4 86 03 3B	4	0,001 m ³ /h	32-bit integer
Average Flow Temperature	C2 86 03 59	2	0.01 °C	16-bit integer
Average Return Temperature	C2 86 03 5D	2	0.01 °C	16-bit integer
Logger Minimum Flow	E4 86 03 3B	4	0,001 m ³ /h	32-bit integer
Logger Maximum Flow	D4 86 03 3B	4	0,001 m ³ /h	32-bit integer
Logger Minimum Temperature Difference	E2 86 03 61	2	0.01 K	16-bit integer
Logger Maximum Temperature Difference	D2 86 03 61	2	0.01 K	16-bit integer
Logger error code	F4 86 03 FD 17	4	-	32-bit integer
Logger working time without error	C4 86 03 24	4	sec	32-bit integer

* Depends on meter's configuration and request

4. Hours Logger Data telegram structure (continuous)

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Logger Energy for Heating	C4 86 03 86 3B C4 86 03 8E 3B C4 86 03 FB 8D 3B	4	kWh MJ Mcal	32-bit integer
Logger Energy for Cooling	C4 86 03 86 3C C4 86 03 8E 3C C4 86 03 FB 8D 3C	4	kWh MJ Mcal	32-bit integer
Logger Energy of Tariff 1 *	C4 96 03 86 3x C4 96 03 8E 3x C4 96 03 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Energy of Tariff 2 *	C4 A6 03 86 3x C4 A6 03 8E 3x C4 A6 03 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Volume	C4 86 03 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 1 *	C4 C6 03 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 2 *	C4 86 43 13	4	0,001 m ³	32-bit integer
Logger duration when $q > q_{max}$	C4 86 03 BE 58	4	sec	32-bit integer

* Depends on meter's configuration and request

5. Days Logger Data telegram structure

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Logger Date and Time	84 08 6D	4	Type F	32-bit integer
Average Flow Temperature	82 08 59	2	0.01 °C	16-bit integer
Average Return Temperature	82 08 5D	2	0.01 °C	16-bit integer
Logger working time without error	84 08 24	4	sec	32-bit integer
Logger Energy for Heating	84 08 86 3B 84 08 8E 3B 84 08 FB 8D 3B	4	kWh MJ Mcal	32-bit integer
Logger Energy for Cooling *	84 08 86 3C 84 08 8E 3C 84 08 FB 8D 3C	4	kWh MJ Mcal	32-bit integer
Logger Energy of Tariff 1 *	84 18 86 3x 84 18 8E 3x 84 18 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Energy of Tariff 2 *	84 28 86 3x 84 28 8E 3x 84 28 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Volume	84 08 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 1 *	84 48 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 2 *	84 88 40 13	4	0,001 m ³	32-bit integer
Logger duration when $q > q_{max}$	84 08 BB 58	4	sec	32-bit integer

* Depends on meter's configuration and request

6. Months Logger Data telegram structure

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Logger Date and Time	84 08 6D	4	Type F	32-bit integer
Average Flow Temperature	82 08 59	2	0.01 °C	16-bit integer
Average Return Temperature	82 08 5D	2	0.01 °C	16-bit integer
Logger working time without error	84 08 24	4	sec	32-bit integer
Logger Energy for Heating	84 08 86 3B 84 08 8E 3B 84 08 FB 8D 3B	4	kWh MJ Mcal	32-bit integer
Logger Energy for Cooling *	84 08 86 3C 84 08 8E 3C 84 08 FB 8D 3C	4	kWh MJ Mcal	32-bit integer
Logger Energy of Tariff 1 *	84 18 86 3x 84 18 8E 3x 84 18 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Energy of Tariff 2 *	84 28 86 3x 84 28 8E 3x 84 28 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Volume	84 08 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 1 *	84 48 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 2 *	84 88 40 13	4	0,001 m ³	32-bit integer
Logger duration when $q > q_{max}$	84 08 BB 58	4	sec	32-bit integer

* Depends on meter's configuration and request

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7. Years Logger Data telegram structure

Parameter	Bytes (DIF VIF)	No. of Data Bytes	Units	Description
Logger Date and Time	44 6D	4	Type F	32-bit integer
Logger working time without error	44 24	4	sec	32-bit integer
Logger Energy for Heating	44 86 3B 44 8E 3B 44 FB 8D 3B	4	kWh MJ Mcal	32-bit integer
Logger Energy for Cooling *	44 86 3C 44 8E 3C 44 FB 8D 3C	4	kWh MJ Mcal	32-bit integer
Logger Energy of Tariff 1 *	C4 10 86 3x C4 10 8E 3x C4 10 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Energy of Tariff 2 *	C4 20 86 3x C4 20 8E 3x C4 20 FB 8D 3x	4	kWh MJ Mcal	32-bit integer x = B – for Heating energy, x = C – for Cooling energy
Logger Volume	44 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 1 *	C4 40 13	4	0,001 m ³	32-bit integer
Logger Volume of Pulse Input 2 *	C4 80 40 13	4	0,001 m ³	32-bit integer

* Depends on meter's configuration and request

8. Definition of the Type F format

Byte 1								Byte 2								Byte 3	Byte 4
0	0	N5	N4	N3	N2	N1	N0	0	0	0	H4	H3	H2	H1	H0	= Byte 1 Type G	= Byte 2 Type G

H4...H0 – code of the hour (0...23)

N5...N0 – code of the minute (0...59)

9. Definition of the Type G format

Byte 1								Byte 2							
Y2	Y1	Y0	D4	D3	D2	D1	D0	Y6	Y5	Y4	Y3	M3	M2	M1	M0

Y6...Y0 – code of the year (0...99)

M3...M0 – code of the month (1...12)

D4...D0 – code of the day (1...31)

10. Definition of the Status code

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Not used	Burst	Leakage	Temporary error	Permanent error	Low power	00 – no error 01 – not used 10 – not used 11 – abnormal condition	

11. Example of data telegram

D8 44 09 07 48 26 00 03 0B 0D 7A 9C 10 00 00 04 6D 00 09 C2 22 34 6D 00 00 01 01 34 FD 17 00 04 00 04 04 20 B3 84 4C 05 04 24 B3 84 4C 05 04 86 3B 00 00 00 00 04 86 3C 00 00 00 00 04 13 00 00 00 00 84 40 13 00 00 00 00 84 80 40 13 00 00 00 00 04 2B AE 09 00 00 04 3B B2 09 00 00 02 59 FC FF 02 5D 48 26 C4 86 03 6D 3B 08 C2 22 C4 86 03 2B 00 00 00 00 C4 86 03 3B 00 00 00 00 C2 86 03 59 A1 09 C2 86 03 5D A5 09 E4 86 03 3B 00 00 00 00 D4 86 03 3B 00 00 00 00 E2 86 03 61 ED FF D2 86 03 61 16 00 F4 86 03 FD 17 00 14 00 04 C4 86 03 24 8E 84 4C 05 C4 86 03 86 3B 00 00 00 00 C4 86 03 86 3C 00 00 00 00 C4 86 03 13 00 00 00 00 C4 86 03 BB 58 00 00 00 00

OVS Header	D8 44 09 07 48 26 00 03 0B 0D 7A 9C 10 00 00
Current Data	04 6D 00 09 C2 22 34 6D 00 00 01 01 34 FD 17 00 04 00 04 20 B3 84 4C 05 04 24 B3 84 4C 05 04 86 3B 00 00 00 00 04 86 3C 00 00 00 00 04 13 00 00 00 00 84 40 13 00 00 00 00 84 80 40 13 00 00 00 00 04 2B AE 09 00 00 04 3B B2 09 00 00 02 59 FC FF 02 5D 48 26
Hours Data	C4 86 03 6D 3B 08 C2 22 C4 86 03 2B 00 00 00 00 C4 86 03 3B 00 00 00 00 C2 86 03 59 A1 09 C2 86 03 5D A5 09 E4 86 03 3B 00 00 00 00 D4 86 03 3B 00 00 00 00 E2 86 03 61 ED FF D2 86 03 61 16 00 F4 86 03 FD 17 00 14 00 04 C4 86 03 24 8E 84 4C 05 C4 86 03 86 3B 00 00 00 00 C4 86 03 86 3C 00 00 00 00 C4 86 03 13 00 00 00 00 C4 86 03 BB 58 00 00 00 00

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