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Thermal energy meters - Part 3: Data exchange and interfaces

Thermische Energiezähler - Teil 3: Datenaustausch und Schnittstellen

Compteurs d'énergie thermique - Partie 3 : Échange de données et interfaces

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Thermal energy meters - Part 3: Data exchange and interfaces

Compteurs d'énergie thermique - Partie 3 : Échange de données et interfaces

Thermische Energiezähler - Teil 3: Datenaustausch und Schnittstellen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 294.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1434-3:2023) has been prepared by Technical Committee CEN/TC 294 “Communication systems for meters”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1434-3:2015.

EN 1434-3:2023 includes the following significant technical changes with respect to EN 1434-3:2015:

a) Editorial change from heat to thermal energy meters in accordance to the EN 1434-series,

b) deletion of Annex B,

c) protocol modes according to EN 62056-21 for the optical interface of heat meters are no longer supported,

d) deletion of (sub)Clauses 6.1.2, 6.4, and C.3 (regarding EN 62056-21 protocol) as well as in subclause 7.1,

e) Clause 5.5 Physical layer current loop interface was deleted and Table 1 updated,

f) Clause 5.6 Physical layer local bus was deleted in accordance with the withdrawal of EN 13757-6,

g) Clause 6.4 Link layer current-loop interface was deleted,

h) Annex E was moved to EN 13757-2.

EN 1434 consists of the following parts, under the general title “Thermal energy meters”:

— Part 1: General requirements

— Part 2: Constructional requirements

— Part 3: Data exchange and interfaces *(this document)*

— Part 4: Pattern approval tests

— Part 5: Initial verification tests

— Part 6: Installation, commissioning, operational monitoring and maintenance

1 Scope

This document specifies the general requirements of data exchange and interfaces for thermal energy meters.

This document is applicable to unidirectionally and bidirectionally transmitting thermal energy meters.

This document applies also to networks with up to 250 meters, for which a master unit with AC mains supply is necessary to control the M-Bus. In these cases, the document is only applicable in conjunction with EN 13757-2 (physical and link layer) and EN 13757-3 (application layer).

For wireless thermal energy meter communications, this document is only applicable in conjunction with EN 13757-4, which describes several alternatives of walk/drive-by readout via a mobile station or by using stationary receivers or a network.

NOTE Thermal energy meters are instruments intended for measuring the energy which in a heat-exchange circuit is absorbed (cooling) or given up (heating) by a liquid called the heat-conveying liquid. The meter indicates thermal energy in legal units.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13757-2, *Communication systems for meters - Part 2: Wired M-Bus communication*

EN 13757-3:2023, *Communication systems for meters and remote reading of meters — Part 3: Dedicated application layer*

EN 13757-4, *Communication systems for meters - Part 4: Wireless M-Bus communication*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

4 Meter interfaces and protocols overview

Table 1 — Possible combinations of interfaces and standards

Hardware interface type	Recommended standard	Alternative standards
Optical EN 62056-21:2002, 3.2	EN 13757-2	No alternative
M-Bus	EN 13757-2	No alternative
Wireless	EN 13757-4 and EN 13757-5	No alternative
Application layer (All interfaces)	EN 13757-3	EN 13757-1

5 Physical layer

5.1 General

A meter can have either none or a number of interfaces to communicate with the outside world. If a meter has an interface in accordance with this standard, it shall fulfil at least one of the following requirements for the physical layer.

5.2 Physical layer optical interface

The optical interface is used for local data readout. A hand-held unit, equipped with an optical readout head, is temporarily connected to one thermal energy meter and the data are read out, one thermal energy meter at a time. The physical properties of the optical interface are defined in EN 62056-21.

5.3 Physical layer M-Bus

The physical layer of the M-Bus is described in EN 13757-2. It can be used for “point to point” or for “multi-point” communication in bus systems. If a thermal energy meter presents more than one unit load to the bus, the number of unit loads has to be shown on the meter documentation as “xUL” where x is the number of unit loads. Only integer values are allowed. Especially in extended installation, meters with an M-Bus interface might need additional protection against surge and lightning. EN 13757-2:2023**Error! Bookmark not defined.**, Annex B shows various techniques for either constructing meters with an M-bus interface and integrated enhanced protection elements. In addition, it shows how to construct external protection elements for meters with a standard (unprotected) M-Bus interface. Two variants are given: one (preferred) for situation where a ground connection is available and a variant with weaker protection if no ground connection is available. An enhanced version of the protection additionally protects the meter and its interface from destruction if mains power is connected to the M-Bus terminals of the meter. If the readout frequency of the meter is limited either by software or by the battery capacity, the meter documentation shall signal the readout frequency as “x per day”, “y per h” or “z per min” where x, y or z are the number of readouts within the corresponding period allowed by the software without impairing the battery lifetime. Thermal energy meters with unlimited readout frequency do not need such information.

5.4 Physical layer wireless interface

The physical layer wireless interface shall be according to EN 13757-4.

6 Link layer

6.1 Link layer optical interface

6.1.1 Link layer optical interface with the EN 13757-2 protocol

If the optical interface is used with the EN 13757-2 protocol, a wake-up message can be sent after every idle time of > 330 bit times to the thermal energy meter. The wake up message consists of zeroes and ones alternating at the desired baud rate for a duration of (2,2 ± 0,1) s. After an idle time of 33 bit times to 330 bit times, the communication can start.

6.1.2 Link layer optical interface with automatic protocol recognition

If the user or the hand-held unit does not know which of the two alternative protocols a meter uses, it is suggested to use a combined wake-up and recognition sequence as described in the informative Annex C.

6.2 Link layer of M-Bus

The link layer of the M-Bus is described in EN 13757-2. All required functions shall be implemented in a thermal energy meter with an M-Bus connector.

If the readout frequency of the meter is limited either by software or by the battery capacity, the meter documentation shall signal the readout frequency as “x per day”, “y per h” or “z per min” where x, y or z are the number of readouts within the corresponding period allowed by the software without impairing the battery lifetime. Thermal energy meters with unlimited readout frequency do not need such information.

6.3 Link layer wireless interface

The link layer wireless interface shall be according to EN 13757-4.

7 Application layer

7.1 Application layer optical interface

Further details are given in the section on the application layer of the M-Bus.

NOTE Protocol modes according to EN 62056-21 for the optical interface of heat meters are no longer supported from this version of the standard on.

7.2 Application layer M-Bus and Local Bus

7.2.1 General

This protocol of EN 13757-3 is recommended for the M-Bus and the Local Bus interface. It can be used for the optical interface alternatively and in this case, the thermal energy meter shall be marked with a label “M-Bus” identifying the protocol. Alternatively, the application layer of EN 13757-1 may also be used.

7.2.2 Coding of data records

Of EN 13757-3 only the variable data structure with low byte first multibyte-elements (CI = 72h) shall be used.

8 Application

8.1 General

The application layer (Clause 6) describes how to code telegrams and data elements. The quoted standards contain many different options for different applications. This clause describes which minimum function of the quoted standards shall be implemented in a thermal energy meter according to this standard.

8.2 Physical layer

As a minimum, two baud rates of 300 baud and 2 400 baud shall be implemented. If the thermal energy meter does not support automatic baud rate detection, the commands for baud rate switching and fallback shall be implemented.

8.3 Link layer

A thermal energy meter shall support both the primary and the secondary addressing via the link layer. The application shall support the assignment of primary addresses via the M-Bus. All application layer command for managing the secondary addressing mode (including the functions of extended secondary addressing) shall be supported. All application layer commands for managing the secondary address shall be supported. When the user is able to change the secondary address of the meter, the commands for the extended secondary addressing mode shall be supported as well.

8.4 Application layer

All readout telegrams shall contain at least the standard header with the meter-ID. The minimum variable data element list shall contain the actual accumulated energy. The default unit shall be the unit on the meter display. The minimum resolution of the accumulated energy shall be the same as on the meter display. The minimum value actuality shall be 15 min. The minimum readout frequency is the readout of up to 250 meters in a segment once per day.

8.5 Control applications

Meter suitable for control applications shall fulfil, in addition to the minimum requirements of 7.4, the requirements of Annex D. The suitability of a thermal energy meter with M-Bus interface for such applications may only be declared ("Suitable for control applications" Annex D) in the meter description if all these requirements are met.

Annex A
(informative)

Recommendation for thermal energy meter test interface

Modern thermal energy meters are mainly equipped with CMOS microprocessors with a very low power consumption, allowing battery operation. Testing and adjusting of this type of meters needs a completely different approach. Until now, almost every meter type needed its own test equipment to handle the manufacturer's specific requirements. This is a very complicated and expensive way for users of several types of meters and for initial verification institutes. The more different types of thermal energy meters a user has installed, the more testing equipment he may need. An economical testing of several meters should be possible and an easy adaptation to the existing test bench is of great interest.

Since this problem came up, experts have been researching an acceptable solution to it. Details of one example of an acceptable solution are given in AGFW FW 203, “Normierter Wärmezähler-Adapter” [3].

Annex B
(informative)

Additional information for thermal energy meters

This Annex was deleted.