SLOVENSKI STANDARD
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Komunikacijski sistemi za merilnike - 2. del: Ožičene M-Bus izmenjave podatkov

Communication systems for meters - Part 2: Wired M-Bus communication

Kommunikationssysteme für Zähler - Teil 2: Drahtgebundene M-Bus-Kommunikation

Systèmes de communication pour compteurs - Partie 2 : Communication M-Bus filaire

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ICS:

33.200	Daljinsko krmiljenje, daljinske meritve (telemetrija)	Telecontrol. Telemetering
35.100.10	Fizični sloj	Physical layer

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ICS 33.200; 35.100.10

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English Version

Communication systems for meters - Part 2: Wired M-Bus communication

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 13757-2:2016) 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 13757-2:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The following significant technical changes have been incorporated in the new edition of this European Standard:

a) more precise definition of collision state under 4.3.3.8;

b) modification of application under 5.7.3.4 from “required” to “optional”;

c) additional explanations for usage of REQ-SKE under 5.7.3.4;

d) addition of new datagram SND-UD2 under 5.7.3.5;

e) alignment of Annex D with revised definition of collision state under 4.3.3.8 and

f) editorial alignments with other parts of this standard, e.g. replacement of $E5 with ACK.

EN 13757 is currently composed with the following parts:

— *Communication systems for meters — Part 1: Data exchange*;

— *Communication systems for meters — Part 2: Wired M-Bus communication* [Enquiry stage; the present document];

— *Communication systems for meters and remote reading of meters — Part 3: Dedicated application layer*;

— *Communication systems for meters and remote reading of meters — Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)*;

— *Communication systems for meters — Part 5: Wireless M-Bus relaying*;

— *Communication systems for meters — Part 6: Local Bus*;

— *Communication systems for meters — Part 7: Transport and security services* [Enquiry stage].

Introduction

This draft European Standard is part of a series of standards which covers communication systems for meters and remote reading of meters.

The physical and link layer parameters for baseband communication over twisted pairs have first been specified in EN 1434-3:1997 ("M-Bus") for heat meters. This standard is a compatible and interworking update of a part of EN 1434-3:2008 and includes also other measured media (e.g. water, gas, thermal energy, heat cost allocators), the master side of the communication and newer technical developments. It should be noted that EN 1434-3:2008 covers also other communication techniques.

It can be used with various application layers especially the application layer of EN 13757-3.

1 Scope

This draft European standard is applicable to the physical and link layer parameters of baseband communication over twisted pair (M Bus) for meter communication systems. It is especially applicable to thermal energy meters, heat cost allocators, water meters and gas meters.

NOTE It is usable also for other meters (like electricity meters) and for sensors and actuators. For generic descriptions concerning communication systems for meters and remote reading of meters see EN 13757–1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13757-1:2014, *Communication systems for meters — Part 1: Data exchange*

EN 60870-5 (all parts), *Telecontrol equipment and systems (IEC 60870-5 series)*

EN 60870-5-1, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section 1: Transmission frame formats (IEC 60870-5-1)*

EN 60870-5-2:1993, *Telecontrol equipment and systems —Part 5: Transmission protocols — Section 2: Link transmission procedures (IEC 60870-5-2:1992)*

EN 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test (IEC 61000-4-4)*

EN 61000-4-5, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test (IEC 61000-4-5)*

3 Terms and definitions

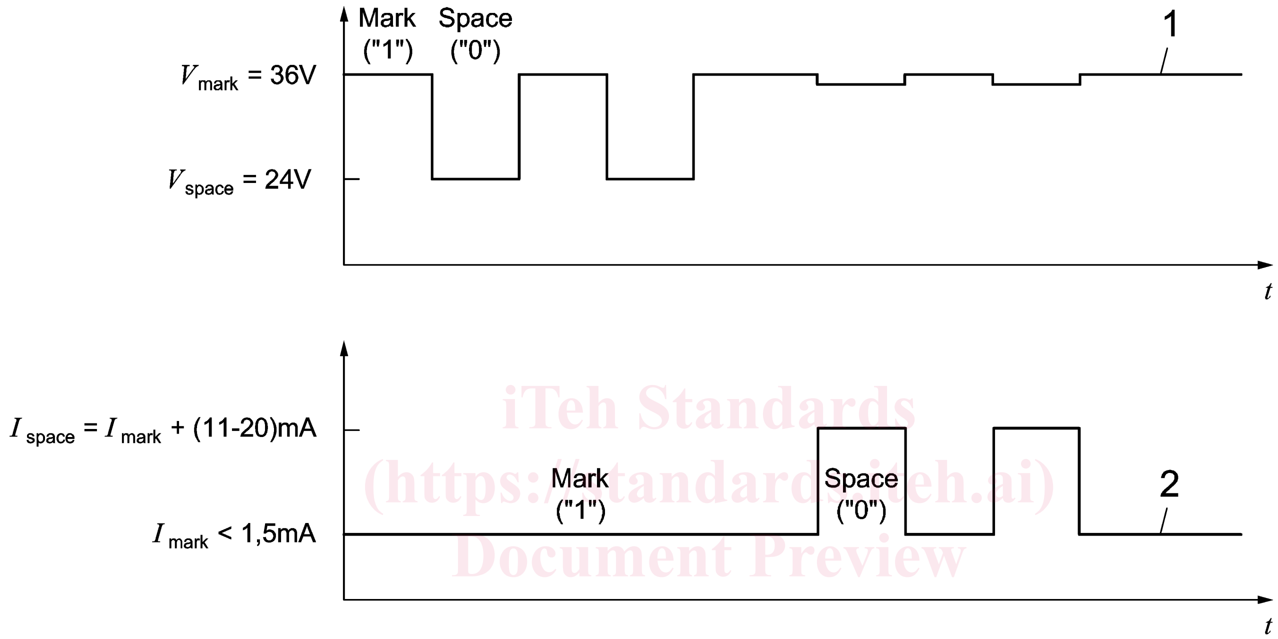
For the purposes of this document, the terms and definitions given in EN 13757-1:2014 and the following apply.

3.1
unit load
one unit load (1 U_L) is the maximum mark state current of 1,5 mA

4 Physical layer specifications

4.1 General

Figure 1 shows the principal electrical concept of the physical layer: Information from the master to the slaves is transmitted via voltage level changes. A (high) quiescent voltage level U_{mark} (idle state, typically 36 V) and an active voltage level (space state) which is typically 12 V below U_{mark} (but at least 12 V) is used for the data transmission. The high voltage step improves the noise immunity in the master to slave direction. The required minimum voltage supports continuous remote powering of all slaves of a segment. Signalling via a voltage change rather than by absolute voltage levels supports even large voltage drops due to wiring resistance of the cable installation. All slaves are constant current sinks. Their idle (mark state) current of typically 1,0 mA to 1,5 mA can be used for powering the transceiver IC in the slave and optionally also the slave (meter). The active (space state) current transmit of a slave is signalled by an increase of this constant current by (11...20) mA. Signalling via constant current improves the immunity against induced voltages and is independent on wiring resistance. On the input of each slave transceiver a rectifier bridge makes each slave independent of the wiring polarity and reduces installation errors. Protective resistors in front of each slave transceiver simplify the implementation of overvoltage protection and safeguards, the bus against a semiconductor short circuit in a slave by limiting the current of such a defective slave to 100 mA. Annex A shows the principal function of a slave transceiver. Integrated slave transceivers which include a regulated buffered voltage output for slave (meter) powering, support of battery supply with supply switchover and power down signalling are commercially available.



Key

A bus Voltage at Repeater

B current composition of a Slave

t time

m master transmits to Slave

s slave transmits to Master

Figure 1 — Representation of bits on the M-Bus

All specification requirements shall be held over the full range of temperature and operating voltage for the responsible system component.

4.2 Electrical requirements slave

4.2.1 Master to slave bus voltages

Maximum permanent voltage: - 50 V ... 0 V ... + 50 V (no damage).

Voltage range for meeting all specifications: ± (12 V ... 42 V).

The Bus voltage at the slave terminals in mark-(quiescent) state of master slave communication (= U_{Mark}) shall be ± (21 V … 42 V).

The mark voltage shall be stored by a voltage maximum detector with an asymmetric time constant. The discharge time constant shall be greater than 30 × (charge constant) but less than 1 s.

The stored voltage maximum U_{Mark} may drop in 50 ms by not more than 0,2 V for all voltages between 12 V and U_{Mark}.

a) Bus voltage Mark/Space state for master slave communication:

   1) Space: $U_{Bus} < U_{Mark}$ - 8,2 V;

   2) Mark: $U_{Bus} \geq U_{Mark}$ - 5,7 V;

b) maximum space state time: 50 ms;

c) maximum space state duty cycle: 0,92.

4.2.2 Slave bus current and multiple unit loads

4.2.2.1 General

A slave device may require a maximum mark current of an integer multiple N (in the range 1 … 4) unit loads. Each terminal device shall be marked with the unit load number N (If > 1) and the device description shall contain a note on the multiple unit loads for this device.

4.2.2.2 Mark state bus current of a slave device

The mark state current I_{Mark} shall be ≤ N unit loads.

4.2.2.3 Variation of the mark state current over bus voltage

For bus voltages in the range of ± (12 V … 42 V) a voltage variation of 1 V … 15 V shall not change the bus current by more than N × 3 µA/V.

4.2.2.4 Short-term variation of the mark state current

At constant bus voltage the bus current shall not change by more than ± 1 % within 10 s.

4.2.2.5 Total variation over allowed temperature and voltage range of slave device

The total variation of the mark state current of a slave device shall not vary by more than ± 10 % over the full voltage and temperature range of the slave device.

4.2.2.6 Maximum bus current for any single semiconductor or capacitor defect

1 min after any single semiconductor or capacitor defect the maximum current of any slave device shall be less than 100 mA for any bus voltage ≤ 42 V.

4.2.2.7 Slow start

For any bus voltage in the range of (0 … ± 42) V the bus current shall be limited to ≤ $N \times U_L$.