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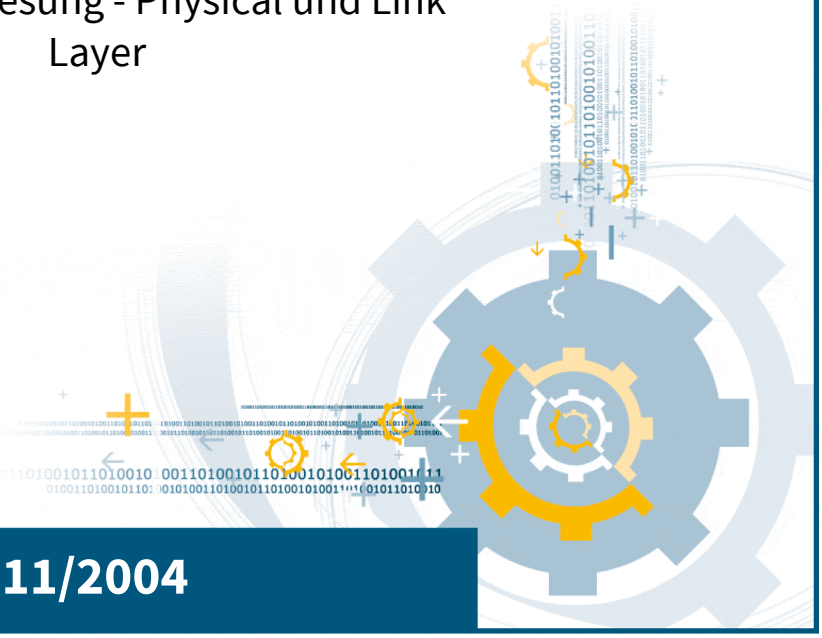
ILNAS-EN 13757-2:2004

Communication systems for meters and remote reading of meters - Part 2: Physical and link layer

Systèmes de communication et de télérelevé de compteurs - Partie 2: Couches physique et couche de liaison

Kommunikationssysteme für Zähler und deren Fernablesung - Physical und Link Layer



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National Foreword

This European Standard EN 13757-2:2004 was adopted as Luxembourgish Standard ILNAS-EN 13757-2:2004.

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EUROPEAN STANDARD EN 13757-2

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Communication systems for and remote reading of meters - Part 2: Physical and link layer

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Kommunikationssysteme für Zähler und deren Fernablesung - Physical und Link Layer

This European Standard was approved by CEN on 23 September 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This document (EN 13757-2:2004) has been prepared by Technical Committee CEN/TC 294 “Communication systems for meters and remote readng of meters”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This standard consists of the following parts:

EN 13757-1, *Communication system for meters and remote reading of meters - Part 1: Data exchange.*

EN 13757-2, *Communication systems for and remote reading of meters - Part 2: Physical and link layer.*

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

prEN 13757-4, *Communication systems for meters and remote reading of meters - Part 4: Wireless meter readout.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

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

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

1 Scope

This document covers the physical and link layer parameters of baseband communication over twisted pair (M-Bus) for meter communication systems. It is especially applicable to heat 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 referenced documents are indispensable for the application 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 60870-5-2, *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: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test – Basic EMV publication (IEC 61000-4-4:1995).*

EN 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 5: Surge immunity test (IEC 61000-4-5:1995).*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

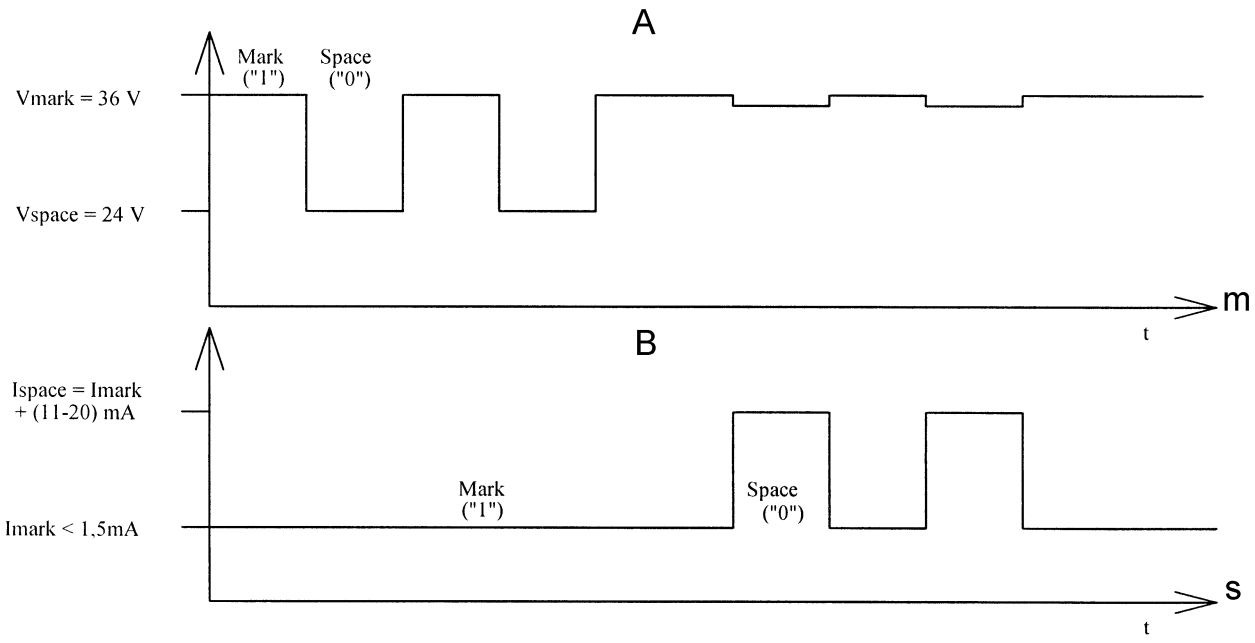
3.1
unit load
one unit load (1 U_L) is the maximum mark state current of 1,5 mA

3.2
other definitions
for further definitions see 4.6 and annex C of EN 13757-1:2002

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 Umark (idle state, typically 36 V) and an active voltage level (space state) which is typically 12 V below Umark (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 signallong 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.