

**Raudteelased rakendused. Energiamõõtmised  
rongides. Osa 4: Kommunikatsioon**

Railway applications - Energy measurement on board trains  
- Part 4: Communication

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 50463-4:2013 sisaldab Euroopa standardi EN 50463-4:2012 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.01.2013 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

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This Estonian standard EVS-EN 50463-4:2013 consists of the English text of the European standard EN 50463-4:2012.

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English version

**Railway applications -  
Energy measurement on board trains -  
Part 4: Communication**

Applications ferroviaires -  
Mesure d'énergie à bord des trains -  
Partie 4: Communications

Bahnanwendungen -  
Energienmessung auf Bahnfahrzeugen -  
Teil 4: Kommunikation

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## Foreword

This document (EN 50463-4:2012) has been prepared by CLC/TC9X "Electrical and electronic applications for railways".

The following dates are proposed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-10-15
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-10-15

This document (EN 50463-4:2012), together with parts 1, 2, 3 and 5, supersedes EN 50463:2007.

EN 50463-4:2012 includes the following significant technical changes with respect to EN 50463:2007:

- the series is based on and supersedes EN 50463:2007;
- the scope is extended, new requirements are introduced and conformity assessment arrangements are added.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive 2008/57/EC amended by Commission Directive 2011/18/EU, see informative Annex ZZ, which is an integral part of this document.

This document is Part 4 of the EN 50463 series which consists of the following parts, under the title *Railway applications - Energy measurement on board trains*:

*Part 1, General;*

*Part 2, Energy measuring;*

*Part 3, Data handling;*

*Part 4, Communication;*

*Part 5, Conformity assessment.*

This series of European Standards follows the functional guidelines description in Annex A "Principles of conformity assessment" of EN ISO/IEC 17000 tailored to the Energy Measurement System (EMS).

The requirements for Energy Measurement Systems in the relevant Technical Specifications for Interoperability are supported by this series of European Standards.

## Introduction

The Energy Measurement System provides measurement and data suitable for billing and may also be used for energy management, e.g. energy saving.

This series of European Standards uses the functional approach to describe the Energy Measurement System. These functions are implemented in one or more physical devices. The user of this series of standards is free to choose the physical implementation arrangements.

### Structure and main contents of the EN 50463 series

This series of European Standards is divided into five parts. The titles and brief descriptions of each part are given below:

#### EN 50463-1 – General

The scope of EN 50463-1 is the Energy Measurement System (EMS).

EN 50463-1 provides system level requirements for the complete EMS and common requirements for all devices implementing one or more functions of the EMS.

#### EN 50463-2 – Energy measuring

The scope of EN 50463-2 is the Energy Measurement Function (EMF).

The EMF provides measurement of the consumed and regenerated active energy of a railway traction unit. If the traction unit is designed for use on a.c. traction supply systems the EMF also provides measurement of reactive energy. The EMF provides the measured quantities via an interface to the Data Handling System.

The EMF consists of the three functions: Voltage Measurement Function, Current Measurement Function and Energy Calculation Function. For each of these functions, accuracy classes are specified and associated reference conditions are defined. EN 50463-2 also defines all specific requirements for all functions of the EMF.

The Voltage Measurement Function measures the voltage of the Contact Line system and the Current Measurement Function measures the current taken from and returned to the Contact Line system. These functions provide signal inputs to the Energy Calculation Function.

The Energy Calculation Function inputs the signals from the Current and Voltage Measurement Functions and calculates a set of values representing the consumed and regenerated energies. These values are transferred to the Data Handling System and are used in the creation of Compiled Energy Billing Data.

The standard has been developed taking into account that in some applications the EMF may be subjected to legal metrological control. All relevant metrological aspects are covered in EN 50463-2.

EN 50463-2 also defines the conformity assessment of the EMF.

#### EN 50463-3 – Data handling

The scope of EN 50463-3 is the Data Handling System (DHS).

The on board DHS receives, produces and stores data, ready for transmission to any authorised receiver of data on board or on ground. The main goal of the DHS is to produce Compiled Energy Billing Data and transfer it to an on ground Data Collection Service (DCS). The DHS can support other functionality on board or on ground with data, as long as this does not conflict with the main goal.

EN 50463-3 also defines the conformity assessment of the DHS.

#### EN 50463-4 – Communication

The scope of EN 50463-4 is the communication services.

This part of the EN 50463 gives requirements and guidance regarding the data communication between the functions implemented within EMS as well as between such functions and other on board units where data are exchanged using a communications protocol stack over a dedicated physical interface or a shared network.

It includes the on board to ground communication service and covers the requirements necessary to support data transfer between DHS and DCS.

EN 50463-4 also defines the conformity assessment of the communications services.

### EN 50463-5 – Conformity assessment

The scope of EN 50463-5 is the conformity assessment procedures for the EMS.

EN 50463-5 also covers re-verification procedures and conformity assessment in the event of the replacement of a device of the EMS.

### EMS functional structure and dataflow

Figure 1 illustrates the functional structure of the EMS, the main sub-functions and the structure of the dataflow and is informative only. Only the main interfaces required by this standard are displayed by arrows.

Since the communication function is distributed throughout the EMS, it has been omitted for clarity. Not all interfaces are shown.

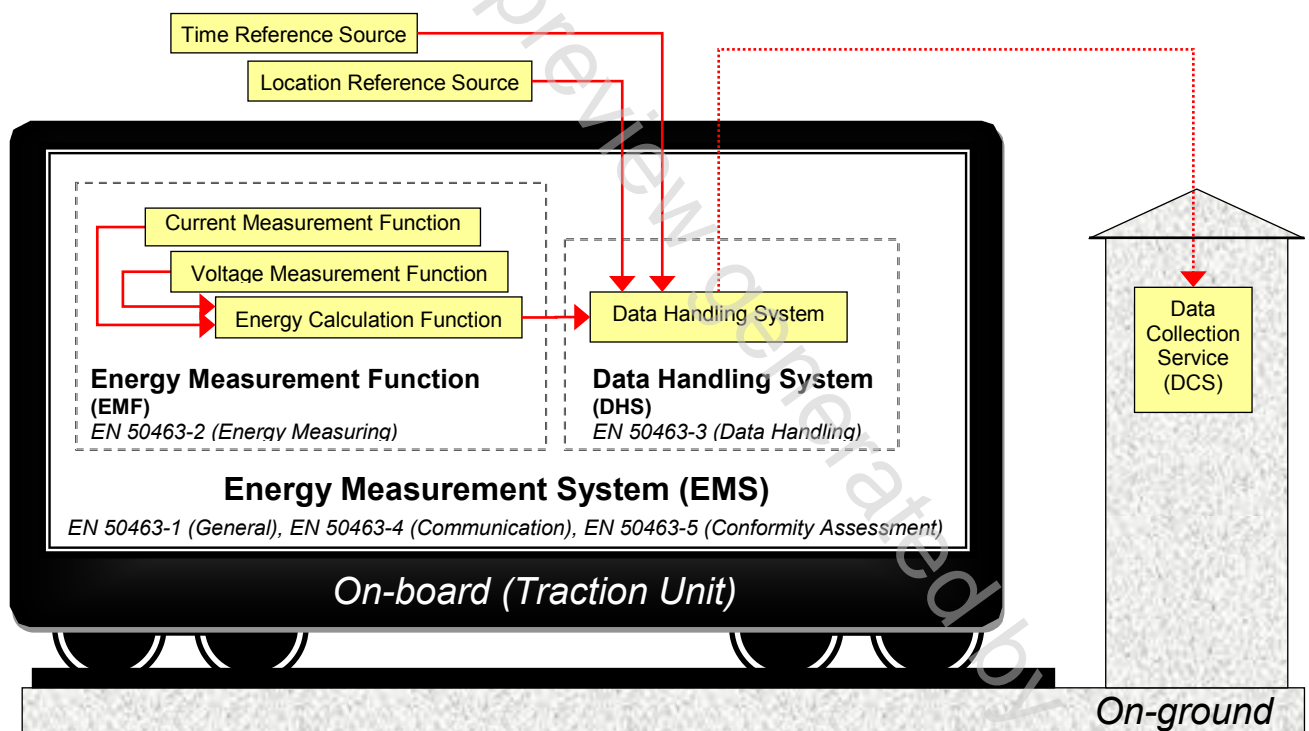


Figure 1 – EMS functional structure and dataflow diagram



## 1 Scope

This European Standard applies to the on board and on board to ground communication services, i.e. it covers the data communication using digital interfaces:

- a) between functions implemented within the EMS;
- b) between EMS function and other on board subsystems;
- c) between EMS and ground communication services.

The on board data communication services of the EMS are covering the data exchange between functions of the EMS and the data exchange between EMS and other on board units, where data is exchanged using a communications protocol stack over a dedicated physical interface or a shared communication network.

The on board to ground communication services are covering the wireless data communication between the DHS and the on ground server.

Furthermore, this document includes conformity assessment requirements.

## 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 50463-1:2012, *Railway applications — Energy measurement on board trains — Part 1: General*

EN 50463-2:2012, *Railway applications — Energy measurement on board trains — Part 2: Energy measuring*

EN 50463-3:2012, *Railway applications — Energy measurement on board trains — Part 3: Data handling*

EN 50463-5, *Railway applications — Energy measurement on board trains — Part 5: Conformity assessment*

EN 60870-5 (all parts), *Telecontrol equipment and systems — Part 5: Transmission protocols (IEC 60870-5 series)*

EN 61158-2, *Industrial communication networks — Fieldbus specifications — Part 2: Physical layer specification and service definition (IEC 61158-2)*

IEC 61375 (all parts), *Electronic railway equipment — Train communication network (TCN)*

ISO 11898-1:2003, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 11898-2:2003, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

ISO/IEC 8482, *Information technology — Telecommunications and information exchange between systems — Twisted pair multipoint interconnections*

ISO/IEC 8825 (all parts), *Information technology — ASN.1 encoding rules*

ISO/IEC 8802-3:2000, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 9646-1:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts* <sup>1)</sup>

ITU-T Recommendation V.24, *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)*

RFC 1035, *Domain names: implementation and specification*

RFC 1123, *Requirements for Internet Hosts – Application and Support*

RFC 1535, *A Security Problem and Proposed Correction With Widely Deployed DNS Software*

RFC 2181, *Clarifications to the DNS specification*

TIA/EIA-422-B, May 1994, *Electrical Characteristics of Balanced Voltage Digital Interface Circuits*

### 3 Terms, definitions and abbreviations

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50463-1:2012 and the following apply.

NOTE When possible, the following definitions have been taken from the relevant chapters of the International Electrotechnical Vocabulary (IEV), IEC 60050. In such cases, the appropriate IEV reference is given. Certain new definitions or modifications of IEV definitions have been added in this standard in order to facilitate understanding. Expression of the performance of electrical and electronic measuring equipment has been taken from EN 60359.

##### 3.1.1

##### **Board to Ground Interface**

##### **BGI**

interface used for the communication between the train and the ground

##### 3.1.2

##### **consist**

single vehicle or group of vehicles that are not separated during normal operation; train set and rake of coaches are synonyms

Note 1 to entry: A consist may contain one or more traction units.

##### 3.1.3

##### **consist network**

##### **CN**

communication network interconnecting communication devices in one consist

Note 1 to entry: It is possible that more than one CN is installed in the same consist.

##### 3.1.4

##### **Consist Network Interface**

##### **CNI**

interface to an on board consist network used by the EMS and by other on board devices interfacing with the EMS

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<sup>1)</sup> Also available as ITU-T Recommendation X.290 (04/95), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts*