



**SLOVENSKI STANDARD**  
**oSIST prEN 50463-3:2011**  
**01-marec-2011**

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**Železniške naprave - Merjenje energije na vlaku - 3. del: Ravnanje s podatki**

Railway applications - Energy measurement on board trains - Part 3: Data handling

Bahnanwendungen - Energiemessung auf Bahnfahrzeugen - Teil 3: Daten-Behandlung

Applications ferroviaires - Mesure d'énergie à bord des trains - Partie 3 : Traitement des données

**Ta slovenski standard je istoveten z: prEN 50463-3:2011**

**ICS:**

45.060.10      Vlečna vozila                                      Tractive stock

**oSIST prEN 50463-3:2011**

**en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 50463-3**

January 2011

ICS

Will supersede EN 50463:2007 (partially)

English version

**Railway applications -  
Energy measurement on board trains -  
Part 3: Data handling**

Applications ferroviaires -  
Mesure d'énergie à bord des trains -  
Partie 3 : Traitement des données

Bahnanwendungen -  
Energiesmessung auf Bahnfahrzeugen -  
Teil 3: Daten-Behandlung

This draft European Standard is submitted to CENELEC members for CENELEC enquiry.  
Deadline for CENELEC: 2011-06-24.

It has been drawn up by CLC/TC 9X.

If this draft becomes a European Standard, CENELEC 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.

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

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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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**CENELEC**

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

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## Foreword

2 This draft European Standard has been prepared by the Technical Committee CENELEC TC 9X, Electrical  
3 and electronic applications for railways. It is submitted to CENELEC enquiry.

4 This series of European Standards is based on and will supersede EN 50463:2007. The scope is extended,  
5 new requirements are introduced and conformance assessment arrangements are added.

6 The EN 50463 series will consist of the following parts, under the generic title *Railway applications - Energy*  
7 *measurement on board trains*:

8 Part 1            General;

9 Part 2            Energy measuring;

10 Part 3            Data handling;

11 Part 4            Communication;

12 Part 5            Conformity assessment.

13 The requirements for energy measuring systems in Technical Specification for Interoperability are supported  
14 by this series of European Standards.

15 This draft European Standard has been prepared under mandate M/334 given to CENELEC by the  
16 European Commission and the European Free Trade Association and covers essential requirements of  
17 EC Directives MID (2004/22/EC) and RAIL (2008/57/EC).

18

[SIST EN 50463-3:2013](https://standards.iteh.ai/catalog/standards/sist/cbdc675e-4ff4-4c20-aa92-f3af5f008cd2/sist-en-50463-3-2013)

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52 **Introduction**

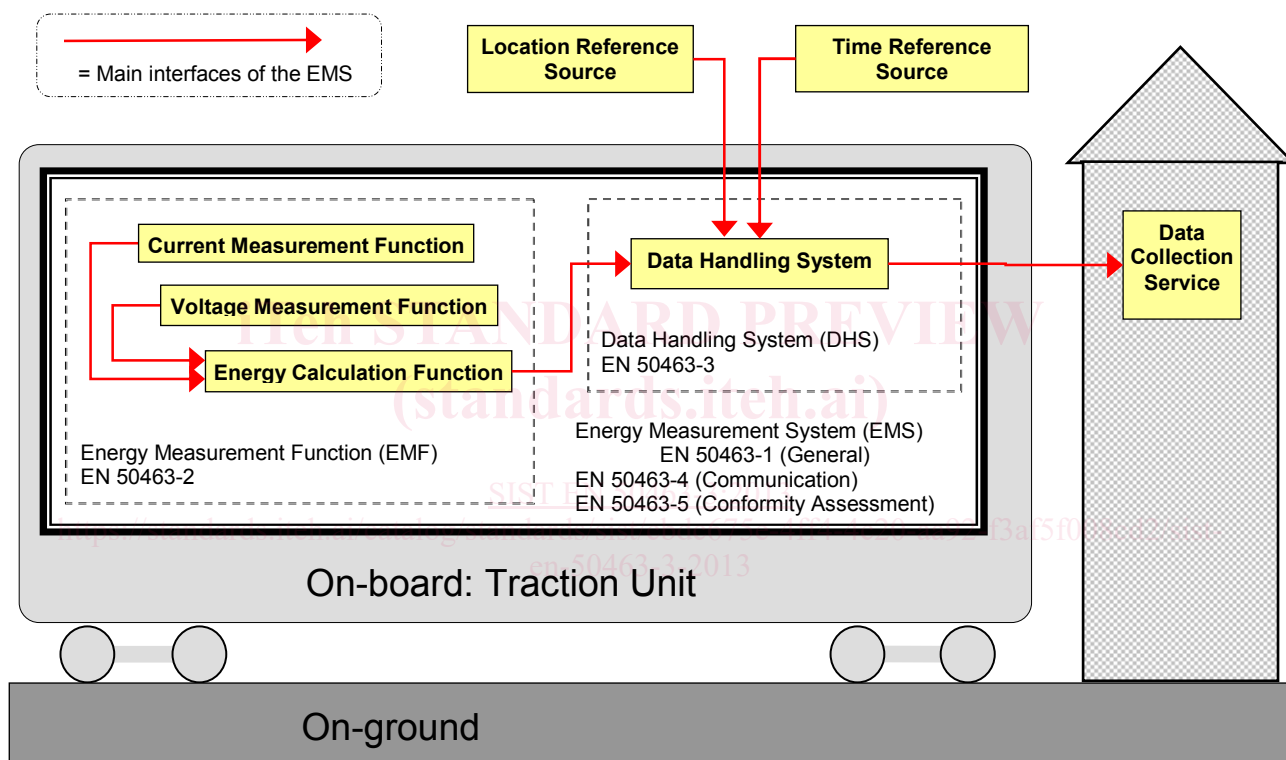
53 The energy Measurement System provides metering suitable for billing and may also be used for energy  
54 management, e.g. energy saving.

55 The standard has been developed taking into account that in some applications the Energy Measurement  
56 Function could be submitted to fiscal legal metrological certification.

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

60 Figure 1 illustrates the functional blocks of the EMS, their main sub-functions and the structure of the  
61 dataflow, and is informative only. Only connections required by this series of standards are displayed. The  
62 communication function has been omitted for clarity. Essential requirements for the Data Collection Service  
63 on-ground are also covered by EN 50463-3.

64



65

66 **Figure 1 – EMS and DCS functional block and data flow diagram**

67

68

69

## 70 1 Scope

71 This draft European Standard covers the requirements applicable to the Data Handling System of an Energy  
72 Measurement System, to be used onboard railway traction units for the measurement of energy taken from  
73 or returned to the Contact Line system.

74 The Data Handling System receives, produces and stores data, ready for transmission to any authorised  
75 receiver of data on-board or on-ground. The main goal of the Data Handling System is to produce Compiled  
76 Energy Billing Data and transfer it to an on-ground Data Collection Service. The Data Handling System can  
77 support other functionality onboard or on-ground with data, as long as this does not conflict with the main  
78 goal.

79 This document also includes the Essential Requirements for the Data Collection Service on-ground, relating  
80 to the acquisition and storage of Compiled Energy Billing Data.

81 The Conformity Assessment arrangements for the DHS are specified in this document.

## 82 2 Normative references

83 The following referenced documents are indispensable for the application of this document. For dated  
84 references, only the edition cited applies. For undated references, the latest edition of the referenced  
85 document (including any amendments) applies.

86 EN 50121-3-2:2006, *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock –*  
87 *Apparatus*

88 EN 50155:2007, *Railway applications – Electronic equipment used on rolling stock*

89 EN 50463-1:201X <sup>1)</sup>, *Railway applications – Energy measurement on board trains – Part 1: General*

90 EN 50463-2:201X <sup>1)</sup>, *Railway applications – Energy measurement on board trains – Part 2: Energy*  
91 *Measuring*

92 EN 50463-4:201X <sup>1)</sup>, *Railway applications – Energy measurement on board trains – Part 4: Communication*

93 EN 50463-5:201X <sup>1)</sup>, *Railway applications – Energy measurement on board trains – Part 5: Conformity*  
94 *Assessment*

95 EN 60068-2-75:1997, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests* (IEC 60068-2-  
96 75:1997)

97 EN 60359:2002, *Electrical and electronic measurement equipment – Expression of performance*  
98 (IEC 60359:2001)

99 EN 61000-4-2:2009, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques*  
100 *– Electrostatic discharge immunity test* (IEC 61000-4-2:2008)

101 EN 61000-4-3:2006 + A1:2008, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement*  
102 *techniques – Radiated, radio-frequency, electromagnetic field immunity test* (IEC 61000-4-3:2006 + A1:2007)

103 EN 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques*  
104 *– Electrical fast transient/burst immunity test* (IEC 61000-4-4:2004)

105 EN 61000-4-5:2006, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques*  
106 *– Surge immunity test* (IEC 61000-4-5:2005)

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1) At draft stage.

- 107 EN 61000-4-6:2009, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques*  
 108 – *Immunity to conducted disturbances, induced by radio-frequency fields* (IEC 61000-4-6:2008)
- 109 IEC 60050 series, *International Electrotechnical Vocabulary*
- 110 ebIX-code system, UN-EDIFACT Data Element 4405 Release D.05A
- 111 World Geodetic System, revision WGS 84

## 112 3 Terms, definitions and abbreviations

### 113 3.1 Terms and definitions

114 For the purposes of this document, the terms and definitions given in EN 50463-1:201X and the following  
 115 apply.

116 NOTE When possible, the following definitions have been taken from the relevant chapters of the International Electrotechnical  
 117 Vocabulary (IEV), IEC 60050-311, IEC 60050-312, IEC 60050-313, IEC 60050-314, IEC 60050-321 and IEC 60050-811. In such cases,  
 118 the appropriate IEV reference is given. Certain new definitions or modifications of IEV definitions have been added in this standard in  
 119 order to facilitate understanding. Expression of the performance of electrical and electronic measuring equipment has been taken from  
 120 EN 60359.

#### 121 3.1.1

#### 122 **coordinated universal time**

#### 123 **UTC**

124 time scale which forms the basis of a coordinated radio dissemination of standard frequencies and time  
 125 signals, and corresponds exactly in rate with international atomic time, but differs from it by an integral  
 126 number of seconds

127 NOTE 1 Coordinated universal time is established by the International Bureau of Weights and Measures (BIPM) and the International  
 128 Earth Rotation Services (IERS).

129 NOTE 2 The UTC scales is adjusted by the insertion or deletion of seconds, so called positive or negative leap seconds, to ensure  
 130 approximate agreement with UT1.

131 [UIT/ITU-R Rec. 686 MOD]

#### 132 3.1.2

#### 133 **energy delta value**

134 energy consumed and/or regenerated during a time period

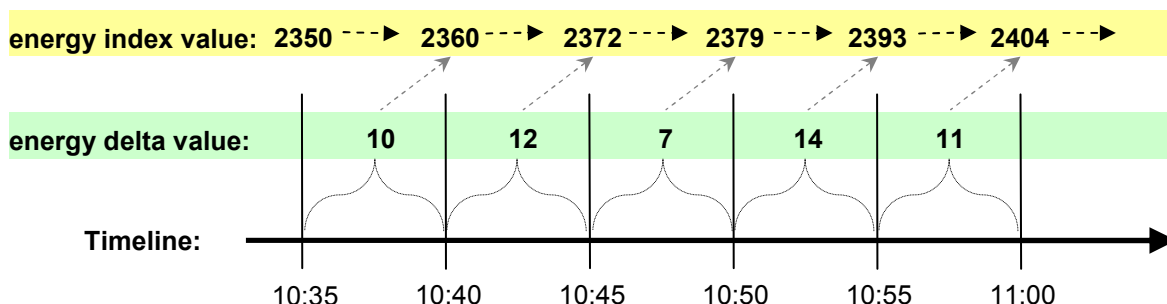
135 NOTE See illustration under definition of energy index value for an example.

#### 136 3.1.3

#### 137 **energy index value**

138 total accumulated energy consumption and/or energy regeneration at the end of a time period

139 NOTE See illustration below for an example.



140  
 141 **Figure 2 – Example of energy index value**  
 142



143

144 **3.1.4**

145 **flag**

146 code indicating information relevant to the functioning of the EMS

147 NOTE Examples include data quality, operational status, etc.

148 **3.1.5**

149 **index value overrun**

150 return to zero of the index value after reaching the maximum value allowed by the register

151 **3.1.6**

152 **k-factor**

153 multiplicand necessary to convert a secondary value into a primary value

154 NOTE Each Voltage Measurement Function and/or Current Measurement Function can have a specific k-factor. If the k-factor is  
155 applied to Energy Data, this factor is the product of the k-factors of the Voltage Measurement Function and/or Current Measurement  
156 Function used.

157 **3.1.7**

158 **location data**

159 data describing the geographical position of the traction unit

160 **3.1.8**

161 **log**

162 list of registered events

163 **3.1.9**

164 **primary value**

165 value referred to the measuring inputs of an EMF

166 **3.1.10**

167 **secondary value**

168 value of current, voltage, power or energy which needs to be multiplied by a k-factor to become a primary  
169 value

170 **3.1.11**

171 **time data**

172 data describing a time and date of a defined time source

173 **3.1.12**

174 **time period**

175 time period for which energy data is produced

176 **3.1.13**

177 **Time Reference Period (TRP)**

178 time period for which CEBD is produced

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## 179 3.2 Abbreviations

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

181	CEBD	Compiled Energy Billing Data
182	CL	Contact Line
183	DCS	Data Collection Service
184	DHS	Data Handling System
185	ECF	Energy Calculation Function
186	EMF	Energy Measurement Function
187	EMS	Energy Measurement System
188	RAMS	Reliability, Availability, Maintenance and Safety
189	TRP	Time Reference Period
190	UTC	Coordinated Universal Time

## 191 4 Requirements

### 192 4.1 General

193 The DHS shall comply with the following requirements except for 4.11.

194 The DCS shall comply with the requirements in 4.11 only.

195 The requirements in EN 50463-1:201X, Clause 4 apply to any device containing one or more functions of the  
196 DHS where applicable. EN 50463-3 only defines additional requirements that are specific for functions of the  
197 DHS.

### 198 4.2 Time data

#### 199 4.2.1 Source

200 The DHS shall produce time data using an internal time source (clock).

#### 201 4.2.2 Reference time source

202 The internal time source shall use as its reference Standard UTC time/date (UTC +0).

#### 203 4.2.3 Format

204 The time data shall have the following format: CCYYMMDDHHmmss:

- 205 a) CC : Century;
- 206 b) YY : Year;
- 207 c) MM : Month;
- 208 d) DD: Day;
- 209 e) HH : Hour;
- 210 f) mm : Minute;
- 211 g) ss: Second.

212 **4.2.4 Resolution level**

213 The time data shall have resolution of 1 s.

214 **4.2.5 Stability**

215 The internal time source shall have a stability of 20 ppm.

216 **4.2.6 Synchronisation**

217 The internal time source shall be checked for synchronisation with external time source on a regular basis to  
218 ensure that the internal time source shall not deviate from the external time source (UTC+0) by more than 2  
219 s.

220 **4.2.7 Flags for time data**

221 A quality flag shall be attached to the time data if a change (i.e. synchronisation, manual adjustment, error  
222 etc) has resulted in a change of the DHS internal time source by 2 s or more.

223 This is necessary to highlight a change in time data (e.g. resulting in an abnormal TRP length which may  
224 affect the subsequent processing and use of the associated data).

225 **4.3 Energy data**

226 **4.3.1 Type**

227 The DHS shall acquire from the EMF sets of energy data necessary for the creation of CEBD.

228 NOTE Each set of Energy Data will consist of two mandatory values (active energy consumption/regeneration) and two conditional  
229 values (reactive energy consumption/generation)

230 **4.3.2 Format**

231 The energy data received from EMF is either energy delta values or energy index values or both together.

232 In case that the data received from the EMF are only energy delta values and the DHS produce the optional  
233 energy index values, DHS shall use the received delta values.

234 In case that the data received from the EMF are only energy index values, the DHS shall produce energy  
235 delta values using the received index values.

236 In case that data received from the EMF are both energy delta values and energy index values, DHS shall  
237 use respectively the received energy delta values and the received index values to produce the energy delta  
238 values and energy index values of the CEBD.

239 NOTE The algorithms for producing energy delta values of CEBD are specified in 4.7.3.

240 **4.3.3 Index value overrun**

241 The DHS shall be able to detect any index value overrun in the ECF from the energy data received from the  
242 ECF. When this occurs, the DHS shall still be able to calculate required energy delta values and energy  
243 index values.

244 **4.3.4 Merging with time data**

245 Energy data in the DHS shall be accompanied by time data, where required for the production of CEBD. If  
246 the energy data provided by the ECF does not include time data, the DHS shall add time data without  
247 introducing any time displacement error to the energy data.

248 **4.3.5 Energy data flags**

249 The DHS shall accept any quality flags attached to the energy data received from the EMF.

250 The DHS shall, as a minimum, attach one the following types of quality flags to the energy data:

251 a) Measured (ebIX-code: 127): based on measurements and calculations in the EMF;