

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Railway applications – Energy measurement on board trains –  
Part 2: Energy measurement**

**Applications ferroviaires – Mesure d'énergie à bord des trains –  
Partie 2: Mesure d'énergie**



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –  
ENERGY MEASUREMENT ON BOARD TRAINS –**

**Part 2: Energy measurement**

**FOREWORD**

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International Standard IEC 62888-2 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This standard is based on EN 50463.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
9/2321/FDIS	9/2332/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62888 series, published under the general title *Railway applications – Energy measurement on board trains*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## INTRODUCTION

Three levels are introduced for categorizing EMS as described in IEC 62888-1:2018, 4.1.

This is Part 2 of the IEC 62888 series, which consists of the following parts, under the common title *Railway applications – Energy measurement on board trains*:

*Part 1: General*

*Part 2: Energy measurement*

*Part 3: Data handling*

*Part 4: Communication*

*Part 5: Conformance test*

*Part 6: Requirements for purposes other than billing*

This series of International Standards follows the functional guidelines description in Annex A, “Principles of conformity assessment”, of ISO/IEC 17000:2004 tailored to the Energy Measurement System (EMS).

The Energy Measurement System (EMS) provides measurement and data suitable for applications such as energy management, energy saving, billing and others.

This series of International Standards uses the functional approach to describe the EMS. 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 IEC 62888 series**

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

#### **IEC 62888-1 – General**

The scope of IEC 62888-1 is the Energy Measurement System (EMS).

IEC 62888-1 provides system level requirements for the complete EMS and common requirements for all devices implementing one or more functions of the EMS.

#### **IEC 62888-2 – Energy measurement**

The scope of IEC 62888-2 is the Energy Measurement Function (EMF).

The EMF provides measurement of the consumed and regenerated active energy of a traction unit. If the traction unit is designed for use on AC 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. This part also defines all specific requirements for all functions of the EMF.

The Voltage Measurement Function measures the voltage of the contact line (CL) system and the Current Measurement Function measures the current taken from and returned to the CL 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 Measured Data.

All relevant metrological aspects are covered in this part of IEC 62888.

IEC 62888-2 also defines the conformance test of the EMF.

### **IEC 62888-3 – Data handling**

The scope of IEC 62888-3 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 Measured 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.

IEC 62888-3 also defines the conformance test of the DHS.

### **IEC 62888-4 – Communication**

The scope of IEC 62888-4 is the communication services.

This part of IEC 62888 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.

IEC 62888-4 also defines the conformance test of the communications services.

### **IEC 62888-5 – Conformance test**

The scope of IEC 62888-5 is the conformance test procedures for the EMS.

IEC 62888-5 also covers re-verification procedures and conformance test in the event of the replacement of a device of the EMS.

### **IEC 62888-6 – Requirements for purposes other than billing**

The scope of IEC 62888-6 is to specify the requirements for EMS to be used for benchmarking, daily energy consumption monitoring, technical research and development.

This part provides the requirements for monitoring consumed energy on-board in daily services in an easy way and the measured data are applicable for general purposes in industry such as energy management, energy saving, etc. However, this part is not applicable for billing purposes.

### 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.

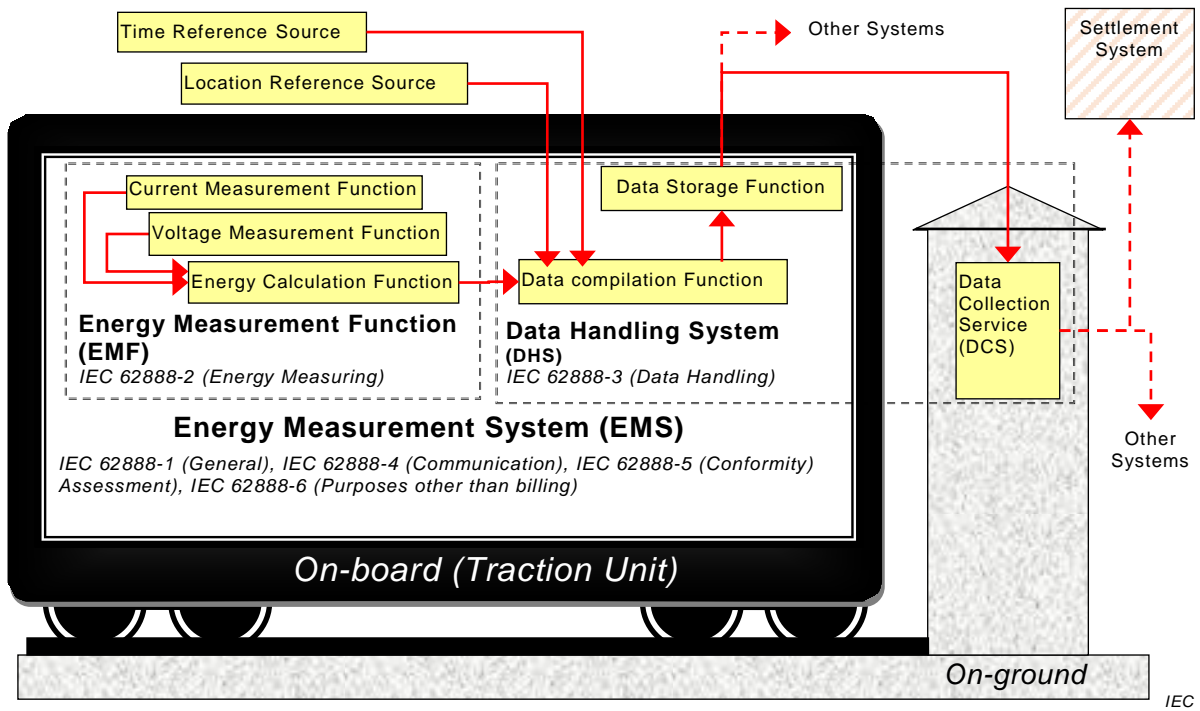


Figure 1 – EMS functional structure and dataflow diagram

# **RAILWAY APPLICATIONS – ENERGY MEASUREMENT ON BOARD TRAINS –**

## **Part 2: Energy measurement**

### **1 Scope**

This part of IEC 62888 specifies the requirements applicable to the Energy Measurement Function (EMF) of an Energy Measurement System (EMS) for use on board traction units for measurement of energy supplied directly from/to the Contact Line system.

This document also gives requirements for the Current Measurement Function (e.g. current sensor), the Voltage Measurement Function (e.g. voltage sensor) and the Energy Calculation Function (e.g. energy meter).

The conformance test arrangements for the Voltage Measurement Function, Current Measurement Function, the Energy Calculation Function and a complete Energy Measurement Function are also specified in this document.

This document has been developed taking into account that in some applications the EMF may be subjected to metrological assessment. All relevant metrological aspects are covered in this part and they are applicable to EMS Level 1.

Specific requirements for EMS Level 2 and Level 3 are specified in IEC 62888-6.

Figure 2 shows the flow between the functional blocks of the EMF. Only connections between the functional blocks required by this document are displayed.