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**Railway applications - Fixed installation - D.C. switchgear - Part 7: Measurement, control and protection devices for specific use in d.c. traction systems -Section 3: Isolating voltage transducers and other voltage measuring devices**

Railway applications - Fixed installations - D.C. switchgear -- Part 7: Measurement, control and protection devices for specific use in d.c. traction systems -- Section 3: Isolating voltage transducers and other voltage measuring devices

Bahnanlagen - Ortsfeste Anlagen - Gleichstrom-Schaltanlagen -- Teil 7: Meß-, Steuer- und Schutzeinrichtungen in Gleichstrom-Bahnanlagen -- Hauptabschnitt 3: Spannungswandler und andere Meßeinrichtungen

[SIST EN 50123-7-3:1999](https://standards.iteh.ai/catalog/standards/sist/78886b5b-69f0-4e46-9011-)

Applications ferroviaires - Installations fixes. Appareillage à courant continu -- Partie 7: Appareils de mesure, de commande et de protection pour utilisation spécifique dans les systèmes de traction à courant continu -- Section 3: Transducteurs et autres appareils de mesure de la tension

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**ICS:**

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**EN 50123-7-3**

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**Railway applications - Fixed installations - D.C. switchgear  
Part 7: Measurement, control and protection devices for  
specific use in d.c. traction systems  
Section 3: Isolating voltage transducers and  
other voltage measuring devices**

Applications ferroviaires - Installations  
fixes - Accessoires à courant continu  
Partie 7: Dispositifs de mesure, de  
commande et de protection pour usage  
spécifique dans les systèmes de traction  
à courant continu  
Section 3: Transducteurs de tension  
d'isolement et autres dispositifs de  
mesurage de tension

Bahnanlagen - Ortsfeste Anlagen  
Gleichstrom-Schaltanlagen  
Teil 7: Meß-, Steuer- und  
Schutzeinrichtungen in  
Gleichstrom-Bahnanlagen  
Hauptabschnitt 3: Spannungswandler  
und andere Meßeinrichtungen

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**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by SC 9XC, Electric supply and earthing systems for public transport equipment and ancillary apparatus (fixed installations), of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50123-7-3 on 1998-08-01.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 1999-10-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 1999-10-01

This part 7 is divided into sections to cover an application guide and a number of protecting devices with specific features for d.c. railway applications.

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## Introduction

EN 50123-7 is divided in a number of sections as follows:

- Section 1: Application guide
- Section 2: Isolating current transducers and other current measuring devices
- Section 3: Isolating voltage transducers and other voltage measuring devices

This number of sections is subject to future additions as soon as a protection device is considered suitable for standard requirements.

Section 1 is a guide and its content is informative.

Further sections are normative and apply with respect to equipment falling within the scope of that section.

## 1 Scope

EN 50123-7-3 gives the requirements for isolating voltage transducers and other voltage measuring devices used in d.c. railway applications, fixed installations.

This transducer is normally positioned between the voltage sensor on the live switchboard conductor or rail and the secondary device, giving galvanic insulation between the input and the output.

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## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

- |               |      |  |
|---------------|------|--|
| EN 50121-5    | 199X | Railway applications - Electromagnetic compatibility<br>Part 5: Emission and immunity of fixed power supply installations and apparatus  |
| EN 50123-1    | 1995 | Railway applications - Fixed installations - D.C. switchgear -<br>Part 1: General  |
| ENV 50123-7-1 | 1998 | Railway applications - Fixed installations - D.C. switchgear<br>Part 7: Measurement, control and protection devices for specific use in<br>d.c. traction systems -- Section 1: Application guide |
| EN 50124-1    | 199X | Railway applications - Insulation co-ordination - Part 1: Basic<br>requirements - Clearances and creepage distances for all electrical and<br>electronic equipment                               |
| EN 50163      | 1995 | Railway applications - Supply voltages of traction systems   |

### 3 Definitions

The definitions given in clause 3 of EN 50123-1:1995 and in 3.3 of ENV 50123-7-1 apply.

### 4 Service conditions

Where the equipment described in this standard is mounted on devices or in assemblies covered by the EN 50123 series of standards, the service conditions of the devices or assemblies apply. The normal service conditions are given in EN 50123-1:1995, annex B.

### 5 Characteristics

#### 5.1 Electrical characteristics

##### 5.1.1 General

The isolation transducer has an insulation level between its primary and secondary terminals, the same as that of the main circuit. (standards.iteh.ai)

An isolation transducer shall have an insulation level in accordance with the following table 1.

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**Table 1: Insulation level**

$U_n$ kV	$U_{Nm}$ kV	$U_{Ni}$ A kV	$U_{Ni}$ B kV	$U_a$ (A) kV	$U_a$ (B) kV	Clearance A mm	Clearance B mm
0,6	0,9	6	7,2	3,3	4	10	12
0,75	1,2	8	9,6	4,3	5,2	14	17
0,75	1,6	10	12	5,5	6,5	18	20
1,5	2,3	12	14,4	6,5	7,8	22	26
1,5	3	15	18	8,5	10	27	33
3	4,8	25	30	12	15	45	54

A: to earth between primary and secondary and against other circuits  
B: across the isolating distance if applicable.  
The above values are taken assuming that the overvoltage category 3 and PD4 as defined in EN 50124-1 are used.

Transducers intended for location near live conductors shall be provided with an insulated enclosure, unless alternative arrangements are agreed with the purchaser. Its output signal shall preferably be one of the appropriate devices described in clause 3 of ENV 50123-7-1.

Transducers shall be suitable for providing inputs to measuring devices and/or protection devices. The output impedance, accuracy, linearity of response and phase shift between the input and the output shall be compatible with its designated application.

The frequency range shall be from d.c. to a minimum of 1 kHz.

Based on the rated voltage assigned to the device  $U_N$ , the voltage transducer shall be able to operate correctly at its rated accuracy in the range  $0 U_N$  to  $1,2 U_N$  within the defined tolerance. It is recommended that  $U_N$  is assigned higher or at least equal to  $U_{\max 2}$  (see EN 50163).

The input impedance on the primary side shall be  $> 1 \text{ M}\Omega$  or as agreed with the purchaser.

NOTE: It is recommended that a fuse (preferably accessible from outside the live compartment to provide safe access when the main circuit is still energised) is fitted in the transducer primary connection. It is suggested that for systems connected to the transducer secondary, where both the live and the return conductors are unearthed, a second fuse/removable link is fitted between the transducer and the return conductor. Attention shall be paid to EMC emissions and susceptibility in locating the sensor.

The preferred secondary signal (specified by the purchaser in accordance with 5.2.4 of ENV 50123-7-1) may either be a voltage in the range from 0 V to 10 V or a current in the range from 0 mA to 20 mA (e.g. 0 mA to 20 mA, 4 mA to 20 mA or 0 mA to 10 mA).

When the transducer uses an auxiliary power supply, means shall be provided to indicate that the power supply is not available. If the principle of operation of the transducer is electronic, then self-checking means shall be provided. The need for this requirement depends on the duty of the transducer and will be specified by the purchaser.

Attention shall be paid to provide adequate protection of the transducer and associated circuits against overloads and short circuits. ~~It shall be taken that inductive circuits can alter the inherent  $di/dt$  response.~~

### 5.1.2 Isolating transducer requirements

The following requirements characterise the isolating transducer:

- |   |                      |
|---|----------------------|
| a) Rated input voltage                      | (V);                 |
| b) Rated insulation voltage                 | (V);                 |
| c) Input signal at 100 % signal             | (mV);                |
| d) Input impedance at 100 % signal          | ( $\Omega$ );        |
| e) Output signal at 100 % signal            | (mA or mV or V);     |
| f) Output impedance at 100 % signal         | ( $\Omega$ );        |
| g) Accuracy range at 100 % signal           | (%);                 |
| h) Accuracy                                 | ( $\pm$ %);          |
| i) Upper limit of response frequency        | (kHz);               |
| j) Power frequency withstand voltage (60 s) | (kV);                |
| k) Impulse withstand (if applicable)        | (kV <sub>cr</sub> ); |
| l) Power consumption                        | (W);                 |
| m) Auxiliary voltage                        | (V).                 |
| n) Loss of auxiliary power signal *         |                      |
| o) Electronic circuitry self checking *     |                      |

\* Requirement to be specified by the purchaser



### 5.1.3 Divider requirements

The following requirements characterise the divider and shall be specified:

- |                                      |               |
|--------------------------------------|---------------|
| a) Rated insulation voltage          | (V);          |
| b) Output signal at $U_{Nm}$         | (V);          |
| c) Total divider resistance          | ( $\Omega$ ); |
| d) Footing divider resistance        | ( $\Omega$ ); |
| e) Accuracy range based on $U_{Nm}$  | (%);          |
| f) Accuracy                          | ( $\pm$ %);   |
| g) Upper limit of response frequency | (kHz);        |
| h) Burden                            | (VA).         |

### 5.2 Mechanical characteristics

The enclosure of the transducer may be metal enclosed, or of insulating material. Both may have earthed metal mounting feet.

Mechanical stress caused by the operation of other acting devices within the switchgear or adjacent to the transducer shall not cause damage or loss of accuracy to the transducer.

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## 6 Information to be exchanged between purchaser and supplier

The supplier shall, when practicable, fulfil the requirements specified in 5.1.2 and 5.1.3 as far as they are applicable, and the purchaser shall confirm or complement these requirements as necessary.

If requested the following information shall be provided by the supplier in addition to the requirements specified above:

- a) Insulation levels of the circuits;
- b) Accuracy range and tolerances;
- c) Overvoltage capability;
- d) Input impedance;
- e) Output impedance;
- f) Input impedance of the device connected to the secondary side of the transducer;
- g) Thermal deviation of the secondary signal expressed per  $^{\circ}\text{C}$ ;
- h) If inversion of polarity in the auxiliary supply may damage the device;
- i) Burden.

A rating plate shall be provided with at least the following: conversion ratio, insulation level, serial number and manufacturer's name.