SLOVENSKI STANDARD
SIST EN 50123-7-1:2003

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Nadomeġļ a:
SIST ENV 50123-7-1:1998

Ģelezniġke naprave ï Stabilne naprave elektriļ ne vleke ï Stikalne naprave za enosmerni tok ï 7-1. del: Merilne, krmilne in zaġļ itne naprave za specifiļ no uporabo v vleļ nih sistemih za enosmerni tok ï Navodila za uporabo

Railway applications - Fixed installations - D.C. switchgear -- Part 7-1: Measurement, control and protection devices for specific use in d.c. traction systems - Application guide

Bahnanwendungen - Ortsfeste Anlagen - Gleichstrom-Schalteinrichtungen -- Teil 7-1: Mess-, Steuer- und Schutzeinrichtungen in Gleichstrom-Bahnanlagen - Anwendungsleitfaden

Applications ferroviaires - Installations fixes - Appareillage à courant continu -- Partie 7-1: Appareils de mesure, de commande et de protection pour usage spécifique dans les systèmes de traction à courant continu - Guide d'application

Ta slovenski standard je istoveten z: EN 50123-7-1:2003

ICS:

29.130.99	Druge stikalne in krmilne naprave	Other switchgear and controlgear
29.280	Elektriļ na vleļ na oprema	Electric traction equipment

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EUROPEAN STANDARD **EN 50123-7-1**

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English version

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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

Ref. No. EN 50123-7-1:2003 E

Foreword

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

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50123-7-1 on 2002-09-01.

This European Standard supersedes ENV 50123-7-1:1998.

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) 2003-09-01

- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-09-01

This Part 7-1 is to be used in conjunction with EN 50123-1:2003.

Annexes designated "informative" are given for information only.
In this standard, annexes A, B and C are informative.

Contents

1 Scope

This European Standard provides assistance, guidance and requirements for the design of protection, control and measuring systems in d.c. installations intended to provide a power supply to traction systems. This application guide identifies the characteristics and parameters of equipment used in the measurement, control and protection of d.c. traction systems.

Guidance is given concerning the appropriate application of electrical protection systems.

2 Normative references

This European Standard makes reference to other parts of the EN 50123 series.

3 Definitions

For the purposes of this European standard the terms and definitions given in EN 50123-1. apply.

4 Measurement

4.1 General

Two types of measurements are made on traction systems:

a) measurements of current and voltage for connections to instruments and metering;

b) current and voltage signals used for operating protection devices.

NOTE 1 It is necessary to take care that inductive circuits can alter the inherent di/dt response.

NOTE 2 In traction systems with trains supplying regenerative energy and in double end fed line sections, the current measurement device should be capable of measuring forward and reverse currents.

4.2 Current

4.2.1 d.c. shunt

A shunt is usually used for measurement purposes, but, when used for protection where accuracy of response is required, the device is preferably of the non-inductive type.

Use of an isolating transducer permits operation of secondary devices at lower voltage and with lower rated insulation. This is preferable to taking full mains voltage into what may otherwise be low voltage compartments.

It should be noted that shunts can run very hot when carrying their rated normal current, with one terminal hotter than the other, dependant on the direction of current flow. Where they are used inside switchgear assemblies, then temperature rise tests of the assemblies should take this fact into account.

4.2.2 Isolating transducer

See EN 50123-7-2 and EN 50123-7-3.

This device requires an auxiliary power supply which should be derived from a guaranteed source whose loss of supply should initiate an alarm.

The output signal is usually not of the same level as the input and is dependant on the requirements of the secondary device.

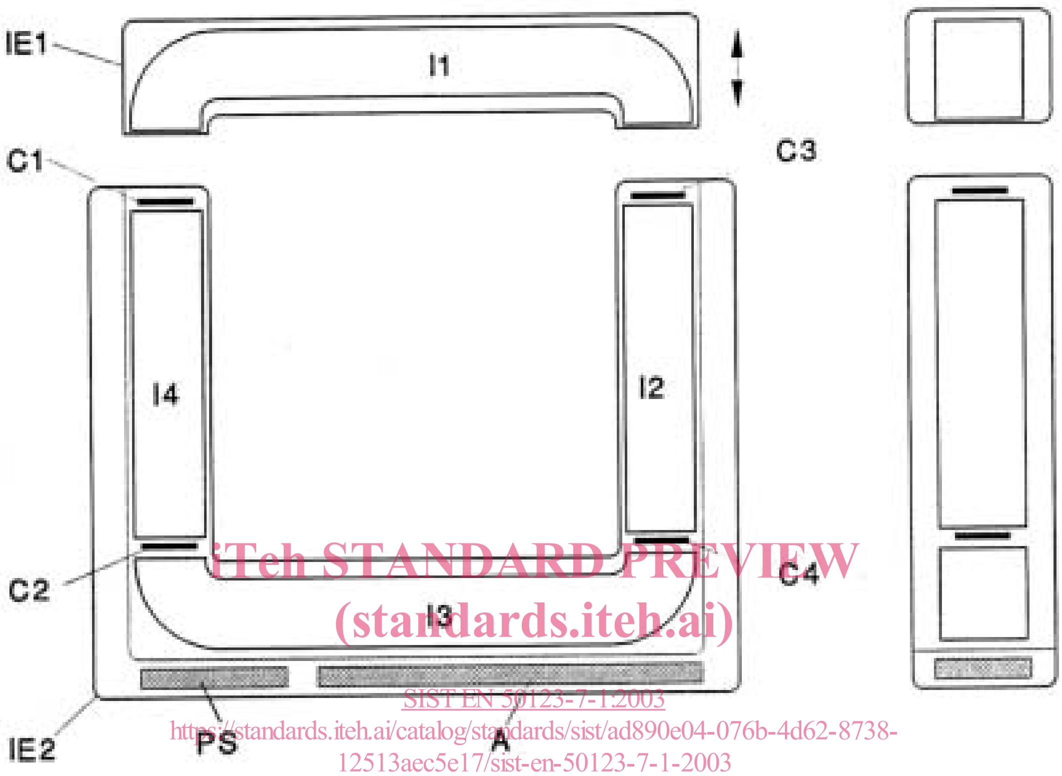
4.2.3 Hall effect sensor

This device requires an auxiliary power supply which should be derived from a guaranteed source whose loss of supply should initiate an alarm.

This device provides an isolated output. The primary insulation is generally provided by encapsulation of the iron circuit and sensors. The device is sometimes constructed in a split form for ease of fitting to a main conductor. See Figure 1 for typical example of a split form of Hall effect sensor.

The output signal from the device is proportional to the current in the main conductor. This signal is very low in magnitude and usually requires amplification to provide a suitable input to the secondary device. Thus an auxiliary power supply is required.

Reliability and overall accuracy can be improved by using an average value obtained from multiple devices. Placing devices at different locations around a conductor can reduce proximity effects.



C1....Cn	Hall effect cells
A	Amplifier
PS	Internal Power Supply
I1....In	Iron Circuits
IE1 , IE2	Insulated Encapsulation

Figure 1 – Example of a split form hall effect sensor

4.3 Voltage dividers

Dividers have the same insulation voltage requirements as the main circuit. Isolating transducers should be employed if the secondary device can not withstand the main circuit insulation level.

NOTE Failure to open circuit of the footing resistor will result in approximately full mains voltage appearing on the output side of the divider. A voltage limiter connected in parallel to the footing resistor may be employed for protection against overvoltages

5 Control systems

5.1 General

Control systems are usually only those which involve the electrical closing of switchgear devices. Their effect is to permit or inhibit a closure depending on the status of the system and the compliance with specified requirements.

5.2 Anti-pumping

This system permits the closing device to effect a single attempt while the signal to close is maintained. If the device fails to complete a satisfactory close operation whilst the close signal is maintained, then attempts at further reclosing (pumping) are inhibited.

Anti-pumping can be achieved in the closing control circuit in various ways, either by using mechanism auxiliary switches or a timing relay. It only allows a single closing pulse to the closing device, which resets when the initial closing signal is released.

Anti-pumping should be explicitly requested by the purchaser and may be applied to all types of switchgear closing device.

5.3 Auto-reclose with variable reclose time and final lock out

Auto-reclose is only applied to the line circuit breaker L. Its purpose is to reclose the line circuit breaker automatically after an overcurrent release operation.

On traction systems especially light-rail or trolleybus systems, overcurrent release operations of line circuit breakers are often due to overcurrents at simultaneous accelerations of vehicles or due to temporary short circuits. An auto-reclose system can enhance the reliability of the system.

Auto-reclose is usually associated with a timing device which initiates several attempts at reclosing with varying adjustable intervals of circuit dead time. After a prescribed number of unsuccessful recloses, then a lock out of the reclosing circuit is instigated. This lock out is either electrically or manually resettable.

The purchaser should specify the need for an auto-reclose device and provide the following information:

a) number of recloses: e.g. 2 recloses then lock out;

b) time interval between each attempt: e.g. 15 s, followed by 60 s, followed by 180 s;

c) lock out reset: i.e. local or remote.

5.4 Line test device

This system is used on line circuit breakers L before closing, to prevent the line circuit breaker closing onto an overload or a short circuit condition. A typical basic line test device circuit is shown in Figure 2.

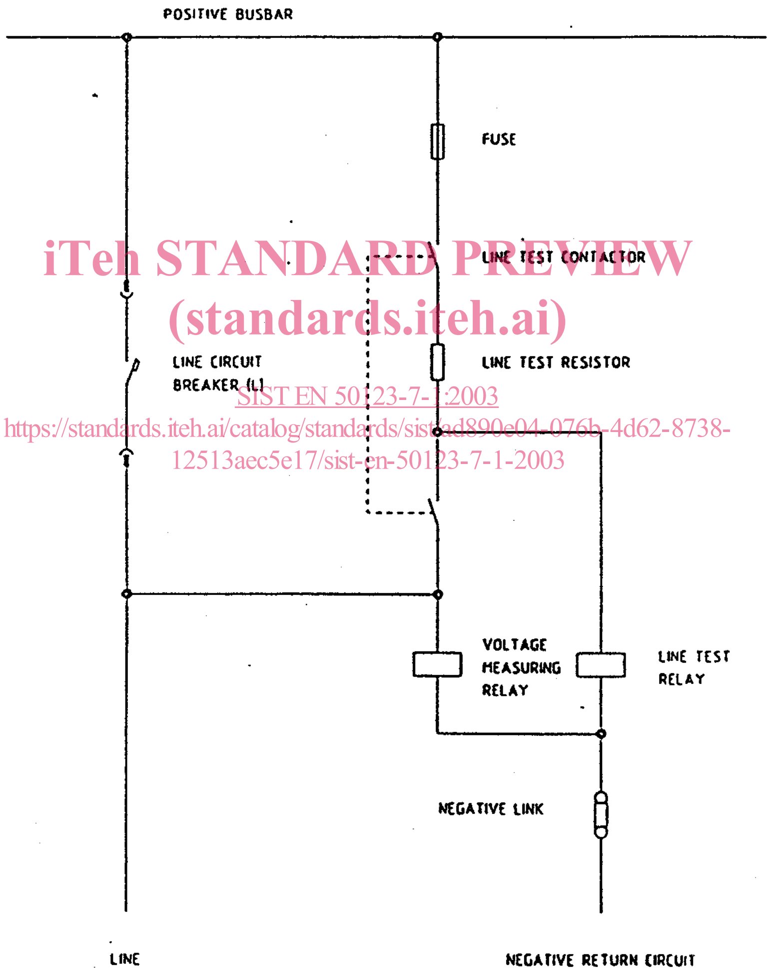


Figure 2 – Basic circuit for line test device

This is achieved by inserting a resistor by means of a suitably rated contactor between the switchboard busbars and the contact line. An auxiliary supply is alternatively used as the test voltage. The load impedance acts as a footing resistance to the inserted resistor and, by measuring the voltage between feeder and return circuit, it can allow/inhibit a close signal.

When the measured voltage is below a prescribed level, then there is an overload on the line and the close is inhibited. When this voltage is above a prescribed level, a close is permitted.

Line test device systems may be either of the low resistance or the high resistance type. The problem with line testing measurements is the effect of the negative voltage drop which can appear on the return circuit, due to currents in the return circuit from loads external to the line test device zone, which can give misleading interpretation of the line testing measurements. Where negative voltage drop in the return circuit can give this effect, it can be minimised by resorting to the low resistance system which tends to swamp out this effect.

The line test device can be coupled with auto-reclose schemes, thereby inhibiting a reclose if the original trip was due to a fault which had not cleared itself in the dead time.

The line test device can be by-passed if the line is already live from the line circuit breaker at the remote end.

The purchaser should specify the need for a Line test device system and provide the following information:

a) high or low value of the resistor: i.e. involving a current value to be chosen from 1 A to 400 A;

b) whether line test device is combined with auto-reclose.

5.5 Undervoltage close inhibit

Operation of undervoltage close inhibit is usually achieved by the fitting of an undervoltage release to the circuit breaker. Alternatively undervoltage relays with accurate pick up and drop off voltage levels, operating on to shunt trip devices and close inhibits, can achieve similar effects.

When fitted to a rectifier circuit breaker, this device has the effect that the circuit breaker cannot be closed unless the rectifier is live. The voltage source is the output of the rectifier.

When fitted to a line circuit breaker, the voltage source is that of the busbar. Unless the busbar is live the circuit breaker cannot be closed.

The purchaser should specify the requirements for undervoltage close inhibit and provide the following information:

a) direct acting undervoltage trip relay;

b) indirect acting via undervoltage relay;

c) minimum pick up voltage (V);

d) maximum drop off voltage (V).

NOTE Direct acting devices require a very wide operating voltage range.