What does zs mean in relay protection

Overview

The impedance of this complete loop is called Zs — the impedance of the earth fault loop. Zs determines how much fault current will flow when an earth fault occurs. A lower Zs means higher fault current, which causes the protective device (MCB, fuse, or RCBO) to operate more. What Zs values are, how earth fault loop impedance works, the Zs = Ze + R1+R2 formula, and maximum permitted values from BS 7671. Davies, Electrical Engineering InstructorLast reviewed: March 2026 What Is Earth Fault Loop Impedance?

Earth fault loop impedance is the total. Earth fault loop impedance (Zs) is the total impedance of the complete path that fault current follows when a live conductor contacts earth in an electrical installation — from the supply transformer, through the line conductor to the fault, through the protective earth conductor back to the main. ⚡ Understanding Fault-Loop Impedance (Zs) and Why It Must Be Measured When you install or upgrade a fuse, MCB, or RCBO, one of the most important safety checks is ensuring that the circuit's fault-loop impedance (Zs) is low enough for the protective device to disconnect quickly during a fault. This. How to calculate earth fault loop impedance value (Zs) ?

Where Uo is the voltage to earth and Ia is the current to trip the breaker in a given breaker disconnection time. Usually we consider two breaker disconnection times: 5 seconds and 0,4 seconds, depending of the application.

Article Content

Jun 11, 2026

What is Zs in electrical?

What is Zs in electrical? Zs represent earth fault loop impedance and consists of Ze and (R1+R2). These are measurements of the fault current from the supply transformer to the building. It

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Earth Fault Loop Impedance Calculation | Zs Guide | Elec-Mate

Earth fault loop impedance (Zs) is the total impedance of the path that fault current follows during an earth fault. It is measured in ohms and is one of the most important values in

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Application Guidelines for Ground Fault Protection

r conditions which produce minimum fault current. The ground relay zone of protection can be de s that measure the zero-sequence current [7, 15]. Many microprocessor-based relays now offer negative

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What Is Earth Fault Loop Impedance? Zs Explained for Practitioners

Earth fault loop impedance (Zs) explained — components, testing methods, BS 7671 compliance, earthing system differences, and common failure causes.

Mar 02, 2026

Determining Zs for a lighting circuit

For overcurrent protective devices not covered by those Tables, further information relating to the limiting values of Zs must be obtained from the device

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Earth Fault Loop Impedance (Zs)

The earth fault loop impedance (Zs) directly effects the amount of current that flows under earth fault conditions. (Ipf = V / Zs).

Feb 24, 2026

⚡ Understanding Fault-Loop Impedance (Zs) and Why

When you install or upgrade a fuse, MCB, or RCBO, one of the most important safety checks is ensuring that the circuit''s fault-loop impedance (Zs) is

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Ze and zs? | DIYnot Forums

Just a quick question, but what does Ze and Zs mean in relation to earthing? Is it to do with calculations? Thanks for your help :)

May 05, 2026

Relaying and System Protection for Electric Utilities Volume III: Line ...

Preface This course is one of a series of five courses on the design of relaying and system protection programs for electric utilities. These courses describe the fundamental concepts of electric system

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A fault on a critical element of the power system followed by its isolation by protective relays will cause variations in power flows, network bus voltages, and machine rotor speeds. Voltage variations will

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Online courses and training for electricians

Hier sollte eine Beschreibung angezeigt werden, diese Seite lässt dies jedoch nicht zu.

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TN system

Do check if Zs is reasonable for the circumstances - on a short circuit a high Zs may well be caused by corrosion or a loose connection - which means

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Earth Fault Loop Impedance Explained: Zs, Ze & Testing

A high Zs value does not mean the circuit will never disconnect; it means the circuit may not disconnect quickly enough to prevent a serious injury. What factors push impedance higher Several elements

Aug 29, 2025

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The values of maximum earth fault loop impedance (Zs) given in Tables 41.2, 41.3 and 41.4 in Chapter 41 of BS 7671: 2008, for commonly-used overcurrent protective devices, should not be exceeded

May 10, 2026

14 14LINE PROTECTION WITH DISTANCE REL

Distance relaying should be considered when overcurrent relaying is too slow or is not selective. Distance relays are generally used for phase-fault primary and back-up protection on

Feb 26, 2026

ZS (Earth Loop Impedance) Calculator

Calculate ZS (Earth Loop Impedance) by entering the external earth loop impedance, and resistance of line and protective conductors into the calculator.

Nov 10, 2025

A True Understanding of R-X Diagrams and Impedance

ABSTRACT This paper discusses 10 myths or common misunderstandings about R-X diagrams and impedance relay characteristics.

Aug 21, 2025

Earth Fault Loop Impedance Calculation | Zs Guide | Elec-Mate

Earth Fault Loop Impedance: The Zs Calculation Explained Zs determines whether the protective device will disconnect fast enough to prevent electric shock. If it is too high, the circuit is

Dec 08, 2025

A Tutorial on Calculating Source Impedance Ratios for Determining

The SIR is the ratio of the source impedance, ZS, to the line impedance, ZL. The SIR is well established in the industry as the preferred method for classifying the electrical length of a line for the purpose of

Jul 24, 2025

Zs readings over limits

Doing an EICR in a block of flats and quite a few of the lighting circuits have excessive Zs readings. All the circuits are on 60898 C10''s without RCD

Sep 15, 2025

Max Zs Calculator UK | Free Loop Impedance Tool

Free max Zs calculator for UK electricians. Check earth fault loop impedance for MCBs, RCBOs & fuses. BS 7671 Table 41.3 with 0.8 correction factor applied.

Apr 01, 2026

(Microsoft Word

This paper begins with clarifying the proper use of the terms power swing and out-of-step. The paper then provides a brief discussion of these phenomena, how these phenomena affect the protective

Sep 07, 2025

Why is a too high zs reading on a circuit okay if it''s

Zs'' is the highest impedance at which the fault current is sufficient for the MCB or fuse to clear an earth fault rapidly. An earth fault on an RCD

Feb 02, 2026

How to calculate earth fault loop impedance value (Zs) ?

How to calculate earth fault loop impedance value (Zs) ? Where Uo is the voltage to earth and Ia is the current to trip the breaker in a given breaker disconnection time. Usually we consider two breaker

Aug 05, 2025

Zs Values & Earth Fault Loop Impedance Explained

The impedance of this complete loop is called Zs — the impedance of the earth fault loop. Zs determines how much fault current will flow when an earth fault occurs. A

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