

What does Zs refer to in relay protection



AI Overview

Zs represents the earth fault loop impedance, the total impedance of the path that fault current follows during an earth fault. In relay protection and electrical installations, Zs is the total impedance of the complete loop that fault current travels when a live conductor contacts earth. This loop starts at the supply transformer, passes through the line conductor to the fault, continues through the protective earth conductor back to the main earthing terminal, and returns to the transformer neutral. The value of Zs determines the magnitude of fault current: a lower Zs allows higher fault current, causing protective devices like MCBs, fuses, or RCBOs to disconnect the supply more quickly, reducing the risk of electric shock or fire.

Calculation The earth fault loop impedance is calculated using the formula: $Z_s = Z_e + (R_1 + R_2)$

- Z_e : Impedance of the earth path from the supply transformer to the origin of the installation, including transformer winding and supply line.
- R_1 : Resistance of the phase conductor from the distribution board to the fault point.
- R_2 : Resistance of the circuit protective conductor (CPC) from the fault point back to the distribution board.

This calculation ensures that Zs is low enough for the protective device to operate within the required disconnection time: typically 0.4 seconds for final circuits and 5 seconds for distribution circuits, as specified in BS 7671.

Importance in Relay Protection

- Safety**: Ensures sufficient fault current flows to trip protective devices quickly, preventing electric shock.
- Compliance**: Maximum Zs values are defined in standards like BS 7671 to guarantee timely disconnection.
- Testing**: Zs is measured at the furthest point of a circuit to verify worst-case conditions, accounting for cable length, resistance, and installation quality.

In summary, Zs is a critical parameter in relay protection, representing the total impedance of the earth fault loop, directly influencing fault current magnitude and the speed at which protective devices disconnect the supply to maintain electrical safety.

Article Content

Solved: Earth fault loop impedance

Once we got Z_s from calculation, So the Z_s value referred between distance of cable of Phase & Ground (PE). kindly advise & explain more on how to select the cable size of Phase &

Z_s Testing Explained: Max Z_s Values BS 7671 Table

Z_s Testing Explained - Maximum Z_s Values for MCBs, RCDs and RCBOs (BS 7671) A practical reference to earth fault loop impedance testing, BS

Z_s Values: How to Calculate & Maximum Permitted Z_s (BS 7671)

A higher Z_s means lower fault current, which may result in the protective device taking too long to disconnect — or not disconnecting at all. This is why BS 7671 sets maximum permitted Z_s values: to

✂ Understanding Fault-Loop Impedance (Z_s) and Why It Must Be

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 (Z_s) is low enough for the protective device

The zone selective interlocking logic of protection relays

In case of SEPAM relay, assigning protection devices to the two zone selective interlocking (ZSI) groups is fixed and cannot be modified. When

Types of Electrical Protection Relays or Protective Relays

□□ Key learnings: Protective Relay Definition: A protective relay is an automatic device that senses abnormal conditions in electrical circuits and

Earth Fault Loop Impedance (Z_s)

The earth fault loop impedance (Z_s) directly effects the amount of current that flows under earth fault conditions. ($I_{pf} = V / Z_s$).

Protection relays — ABB Group

ABB's smart protection technology ensures smooth and safe everyday life without blackouts. ABB released its first programmable relays based on the use of microprocessors in 1985. ABB's Relion®

Intro to Relays #2

Intro to Relays #1 - What are Relays, CTs, & PTs? Intro to Relays #2 - ANSI/IEEE Relay Device Numbers (below on this page) Intro to Relays #3 - What does SEL stand for? Relay

Protective relay

Electromechanical protective relays at a hydroelectric generating plant. The relays are in round glass cases. The rectangular devices are test connection blocks,

Electrical Safety: Zs Values and Disconnection Times in Circuit ...

Terms in this set (20) What does Zs mean? Total earth fault loop impedance of a circuit. What does a high Zs mean? Slower disconnection time. Where do you find max Zs values in the On-Site Guide?

Understanding Protective Relays in Power Systems

Protective relays are critical components in power systems, providing essential protection for various elements such as generator sets, outgoing feeder

What Are ANSI Relay Numbers? The Complete C37.2

Understanding power system protection requires familiarity with ANSI standard relay numbers. These codes, detailed in the IEEE C37.2

The basics of power system protection that every

Introduction to relay protection Protection is the branch of electric power engineering concerned with the principles of design and operation of

Zones of Protection in Power Systems

Closed and Open Zones In electrical power system protection, the terms "closed "and "open" zones of protection refer to the different methods of

Earth Fault Loop Impedance Explained | Ze & Zs Guide | Elec-Mate

Zs is measured at the furthest point of each circuit because this gives the highest (worst-case) value — the point where the conductor lengths are longest and therefore the impedances are

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

Why are the values of maximum earth fault loop impedance different

"Circuits are designed to meet the shock protection requirements by limiting the earth fault loop impedances to the end of the circuit (Z s) to the maximum values given in Tables 41.2 to 41.4 of BS

(PDF) Dictionary of Acronyms and Technical Abbreviations

The use of registered names, trademarks, etc. in this publication does not imply, even in the abs of a specific statement, that such names are exempt from the

Basic protection relay knowledge

STABILITY OF PROTECTION A protection scheme – for example, a differential protection scheme – is stable when it does not operate on the fault outside of its protected zone. So, stability of protection is

how to calculate impedance of fault in distance relay

the relay location. Source impedance Z_S is a measure of the fault level at the relaying point. For faults involving

MG ZS EV OWNER'S MANUAL Pdf Download

View and Download MG ZS EV owner's manual online. ZS EV automobile pdf manual download.

4 essential implementations of protective relays in

2. Transmission line protection Transmission lines can be protected by several types of relays, however the most common practice to protect

Types of Protective Relays

This article covers various types of protective relays, such as overcurrent, directional, and differential relays, highlighting their operating characteristics and

Z_s Values: How to Calculate & Maximum Permitted Z_s (BS 7671)

$Z_s = Z_e + (R_1 + R_2)$. What earth fault loop impedance is, how to calculate and test Z_s , and the maximum permitted Z_s values from BS 7671 Chapter 41.

Protective Relays: Types, Working Principle & Uses

What Is a Protective Relay? A protective relay is a control and measurement device used in power systems to detect faults, unsafe operating

Contact Us

For more information, pricing, or custom solutions, please contact us:

Website: <https://araziyahsafety.co.za>

Email: info@araziyahsafety.co.za

Phone: +27 72 418 3692

Address: 123 Rivonia Road, Sandton, Johannesburg, 2196, South Africa

This document is for informational purposes only. Specifications subject to change without notice.

