

Article Overview

10 kV relay protection settings involve configuring overcurrent, differential, and distance relays using parameters like PSM, TSM, and coordination with circuit breakers to ensure selective and reliable fault clearance.

Key Components of 10 kV Relay Protection

Switchgear and Relays: 10 kV distribution switchgear typically includes isolating switches, vacuum circuit breakers, and microprocessor-based integrated relays for measurement, control, and protection. These relays support remote monitoring, signaling, and control functions, ensuring safe operation and fault detection in the network .

Overcurrent Protection: Overcurrent relays are commonly used as primary or backup protection. Settings are determined using the Plug Setting Multiplier (PSM) and Time Setting Multiplier (TSM). PSM is calculated as the ratio of fault current to relay pickup current, which defines how fast the relay operates according to the IDMT curve. TSM scales the base operating time from the relay characteristic curve to achieve proper coordination with upstream and downstream devices .

Differential Protection: For transformers or lines, differential relays (e.g., SEL-787) compare currents entering and leaving the protected zone. Settings are based on transformer MVA ratings and per-unit scaling (TAP), ensuring that the relay trips only for internal faults while remaining stable for external faults .

Distance Protection: Although more common in higher voltage systems, distance relays can be applied in 10 kV lines with impedance-based zones. Zone 1 typically covers 80-90% of the line impedance with instantaneous operation, Zone 2 extends to 100% of the line plus 50% of the adjacent line with a time delay, and Zone 3 covers the line plus 120% of the longest adjacent line for backup protection .

Calculation and Coordination

- o **Determine Fault Currents:** Calculate maximum and minimum fault currents for the line or transformer.
- o **Set Relay Pickup:** Choose pickup current based on line load and CT ratings.
- o **Compute PSM:** $PSM = \text{Fault Current} / \text{Pickup Current}$. Higher PSM results in faster relay operation.
- o **Select TSM:** Adjust TSM to coordinate with upstream and downstream relays, ensuring selective tripping.
- o **Time Delays:** Apply intentional delays for backup zones to allow primary protection to operate first.
- o **Ground Fault Settings:** Set earth fault pickup and time delays according to system impedance and safety margins.

Practical Considerations

- o **Microprocessor Relays:** Modern relays allow remote adjustment, monitoring, and integration with distributed generation, which can affect fault detection and coordination .
- o **Voltage Deviations:** Ensure compliance with standards like GB/T 12325-2008, maintaining voltage deviations within $\pm 7\%$ for 20 kV and below systems .

10kV Line Relay Protection and Setting

o Testing and Commissioning: Relay settings should be verified during commissioning and periodically re-evaluated based on measured system parameters to maintain selectivity and reliability . By carefully calculating PSM, TSM, and zone settings, and coordinating with circuit breakers, 10 kV relay protection ensures fast, selective, and reliable fault clearance, minimizing equipment damage and maintaining network stability.

2.2 115/13.8KV Transformer LV Restricted Earth Fault Protection Relay Setting Circuit Ref : Aux.

With this Protection Relay Setting Calculator, you'll be able to work out pickup current, time multiplier settings (TMS),

Transmission Line Setting Calculations - Beyond the Cookbook Michael J. Thompson and Daniel L. Heidfeld

Protection configuration and protection time setting. Below, I'll explain in detail how to configure relay protection for 10kV

Then, according to the short-circuit current parameters, the relay protection of transmission lines, transformers,

Transformer Protection Application Guide This guide focuses primarily on application of protective relays for the protection of power

Relay Settings in Real Power System: Requirements And Consideration This blog consists of a discussion on the

Setting values of three-stage current protection for 10kV Line before PV is not connected. Calculation result of

In HV (High Voltage) and MV (Medium Voltage) substations, relay protection safeguards critical assets such as transformers, circuit

Traditionally, protective relays were electromechanical devices utilizing induction disk, coils, contacts, and solenoid elements to

Effective relay protection in HV/MV substations requires a thorough approach encompassing calculations, precise

These devices provide measurement, control, and relay protection for the 10 kV switchgear. Microprocessor-based

10kV Line Relay Protection and Setting

To avoid relay mal-operation, set Slope 2 as high as possible. Normally, a high Slope 2 setting causes slow tripping for evolving

Aiming at the complex situation of multi-branch and multi-distributed power supply in distribution network, a high reliability relay

When the protection is implemented using a voltage relay, the selected setting must be equal to or exceed the calculated stabilizing

The relay settings are in terms of impedance that is R and X Total Positive sequence impedance of protected line with reference to

Web: <https://bssoda.pl>

