

9 Relay Protection Settings

Article Overview

Relay protection settings define how protective relays detect faults and trip circuit breakers selectively, ensuring system reliability and safety.

Key Relay Settings

1. **Plug Setting Multiplier (PSM)** PSM indicates how many times the actual current exceeds the relay's pickup current. It is crucial for inverse definite minimum time (IDMT) relays, determining the basic operating time based on the fault current. A higher PSM results in faster tripping, and settings must comply with IEC 60255-151 standards for overcurrent relays .
2. **Time Setting Multiplier (TSM)** TSM scales the base operating time derived from the relay's characteristic curve. It allows coordination between upstream and downstream relays, ensuring backup protection. Lower TSM values produce faster tripping, while higher values delay operation to maintain selectivity. TSM selection follows IEC 60255-3 standards .
3. **Overload Setting (OL)** OL protects equipment from thermal overloads. It is set based on the maximum continuous load and thermal limits of the protected element. Proper OL settings prevent unnecessary tripping while safeguarding equipment from prolonged overcurrent conditions .
4. **Earth Leakage / Earth Fault Setting (EL)** EL defines the current threshold at which the relay detects ground faults. It ensures rapid isolation of earth faults to prevent equipment damage and maintain system stability .
5. **Multiplying Factor (MF)** MF, also called the metering or scaling factor, adjusts the relay's measured current to match the actual system current. It is essential when using instrument transformers (CTs/VTs) to ensure accurate relay operation .

Relay Coordination and Calculation

Relay coordination ensures that only the relay closest to the fault operates first, while upstream relays provide backup. This involves:

- o Selecting pickup currents for instantaneous and time-delayed units. Instantaneous units should not trip for normal load currents or downstream faults .
- o Adjusting time-current characteristics using TSM and PSM to achieve proper grading. Downstream relays have faster tripping, upstream relays slower .
- o Considering maximum short-time overloads and fault levels for phase and ground relays .

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Practical Considerations

- o System Analysis: Identify protection zones, fault levels, and equipment ratings.
- o Relay Selection: Choose relays based on type (current, voltage, differential, distance), function, and system requirements .
- o Testing and Commissioning: Verify settings through simulations and field tests to ensure reliability and selectivity .
- o Documentation: Maintain a database of relay settings, including "as-left" versions for future reference .

Summary

Proper relay protection settings involve careful selection of PSM, TSM, OL, EL, and MF, coordinated to ensure selective, fast, and reliable fault clearance. Following standards, performing system studies, and testing are essential to safeguard electrical networks and maintain operational stability .

When studying electrical protective relays, we often use specific terms. To understand how different protective relays

Also principles of various protective relays and schemes including special protection

Relay protection circuitry This handbook covers the code of practice in protection circuitry

IDMT relay settings and instantaneous relay settings calculations have been described

During external faults, the relay changes to high-security mode and switches from Slope 1 to Slope 2 to avoid relay mal-operation

Learn about the best methods and tools to choose the right settings for power system protection relays, and improve your network

Learn how protective relays detect faults, trip breakers, coordinate protection zones, and protect feeders,

Our Overcurrent Relay Setting Calculator will accurately calculate your overcurrent relay settings. Enter rated current,

Power System Protection Setting Calculations The electrical grid is a vast and intricate system designed to ensure the

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

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calculated stabilizing

Protective relays are critical in power systems because they serve as decision-making devices that ensure the safe

SID The calculated settings are tabulated in a schedule and co-ordination curves demonstrating grading for the over current

A fast and selective arc fault mitigation for air-insulated LV & MV switchgear and Relion protection and control relays and sensor

Protection relay setting is the process of choosing the current threshold and time delay at which a relay trips a circuit

Protective relays and devices have been developed over 100 years ago to provide "last line" of defense for the electrical systems.

Learn generator protection relay settings: voltage/current inputs, overvoltage, undervoltage. Electrical engineering presentation.

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