

IEEE Standard Inverse-Time Characteristic Equations for Overcurrent Relays

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Abstract: The inverse-time characteristics of overcurrent relays are defined in this standard. Operating equations and allowances are provided in the standard. The standard defines an integral equation for microprocessor relays that ensures coordination not only in the case of constant current input but for any current condition of varying magnitude. Electromechanical inverse-time overcurrent relay reset characteristics are defined in the event that designers of microprocessor based relays and computer relays want to match the reset characteristics of the electromechanical relays.

Keywords: inverse-time characteristics, overcurrent relays

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Introduction

(This introduction is not part of IEEE Std C37.112-1996, IEEE Standard Inverse-Time Characteristic Equations for Overcurrent Relays.)

Induction overcurrent relay characteristics have been in continuous use for over 40 years and are a de facto standard in North America. When an overcurrent relay is installed in North America, it often must coordinate with existing induction relays and fuses. Induction characteristics appear in the form of stored data tables, polynomials, or spline curves in most relay coordination programs. There has been no previous defining standard and all the relay curve data was obtained from characteristics plotted from experimental data. Conversely, microprocessor relays execute algorithms that are mathematical procedures. They produce analytic characteristics that can be described accurately by an equation. This standard bridges the gap between the previous graphical practices and the present analytical practices. This is done by defining equations that ensure that microprocessor overcurrent relays will coordinate with induction overcurrent relays. The standard defines equations for the reset region as well as for the trip region of the time-current characteristic that are derived from the basic differential equation for input-dependent time delay as it applies to the induction relay.

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