



Coordination Time in Feeder Relays

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This document details the recommended coordination time between digital overcurrent relays (UR and SR relay families).

When coordinating inverse time overcurrent relays, the time interval according to ANSI/IEEE Std-242: 1986 is usually 0.3 to 0.4 seconds. This interval is measured between relays in series either at the instantaneous setting of the load side feeder circuit breaker relay or the maximum short circuit current which can flow through both devices simultaneously, whichever is lowest. The recommended time has the following components:

- circuit breaker opening time (5 cycles): 0.08 seconds
- relay overtravel: 0.10 seconds
- safety factor for CT saturation, setting errors, etc.: 0.22 seconds

For the F60 (digital) relays, the overtravel is eliminated and the coordination time can be reduced by the amount included for overtravel. Also, given the relay performances (current and timing accuracy, operating time), a **0.25 second** time interval can be used for coordination between F60 relays. This is the standard recommendation for carefully calibrated relays. This time interval is suitable for IOC, instantaneous, or definite time overcurrent elements as well as TOC and inverse time delay elements.

The F60 inverse time overcurrent elements have an option for selecting the input current as a fundamental phasor magnitude or total waveform RMS magnitude. Use the phasor magnitude for correct fault coordination. However, when coordinating an F60 overcurrent element with a downstream fuse, choosing the true RMS current as the TOC input improves coordination. In general, caution must be applied when coordinating a digital TOC element with an analog relay downstream as the latter may respond to a fundamental phasor magnitude, true RMS, or rectified magnitude depending on the design.