

Line Relays TIOCRS

Time Inverse Over-Current Relay Standard

This relay is identical in all respects to the TIOCR1 relay, except for how the *TimeToClose* time-inverse overcurrent curve is specified and the units of the threshold current (for TIOCRS us Amps, while TIOCR1 uses per unit). This includes the treatment of the Monitor Flag, Transfer Trip, and Reset functions. For TIOCRS, instead of using a piece-wise linear curve, a function as described in various world standards is used. To specify which standard to use, the parameter *CurveType* must be set to either 1, 2, or 3 which translates to the following standards.

1. IEEE C37.112-1996 standard
2. IEC 255-4 or British BS142
3. IAC Curves from GE

The *TimeToClose* functions are specified by the parameters T_{dm} , p , A , B , C , D , and E depending on the Curve Type. The three standards are shown below. (Note: The use of the reset time is identical for all standards and is the same as used in TIOCR1 and LOCTI).

IEEE C37.112-1996 Standard (*CurveType* = 1)

Using the parameters Threshold, T_{dm} , p , A , and B , the *TimeToClose* as a function of per unit current is calculated using the following equations

$$TimeToClose = T_{dm} \left(B + \frac{A}{\left(\frac{I_{current}}{Threshold} \right)^p - 1} \right)$$

IEC 255-4 or British BS142 Standard (*CurveType* = 2)

Using the parameters Threshold, T_{dm} , p , and A the *TimeToClose* as a function of per unit current is calculated using the following equations

$$TimeToClose = T_{dm} \left(\frac{A}{\left(\frac{I_{current}}{Threshold} \right)^p - 1} \right)$$

IAC GE Curves (*CurveType* = 3)

Using the parameters Threshold, T_{dm} , A , B , C , D , and E the *TimeToClose* as a function of per unit current is calculated using the following equations

$$TimeToClose = T_{dm} \left(A + \frac{B}{\left(\frac{I_{current}}{Threshold} - C \right)} + \frac{D}{\left(\frac{I_{current}}{Threshold} - C \right)^2} + \frac{E}{\left(\frac{I_{current}}{Threshold} - C \right)^3} \right)$$

Extra note: Any current higher than 30 times the threshold is simply treated as though it is equal to 30 times the threshold in these equations.