

# ADAPTIVE OVERCURRENT ELEMENT

ADVANCED CT SATURATION COMPENSATION



# PROVIDE HIGH-SPEED OPERATION, EVEN WITH SEVERE CT SATURATION



## **IMPROVE SAFETY**

Reduce flash exposure with higher-speed tripping for severe faults. Current transformer (CT) saturation can cause reduced operating current to microprocessor-based relays even as fault current increases. The SEL Adaptive Overcurrent Element detects CT saturation and responds with faster operation.

## **REDUCE EQUIPMENT DAMAGE**

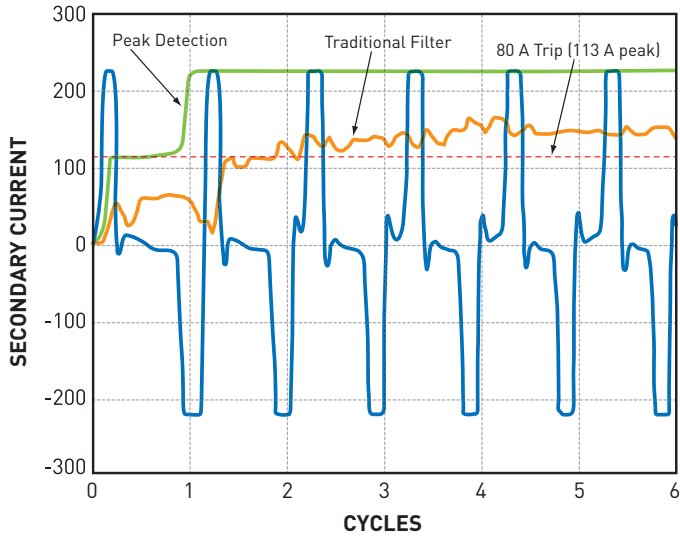
Minimize damage to transformers, circuit breakers, and conductors caused by very high fault currents. Avoid delays caused by CT saturation during severe faults by using the SEL Adaptive Overcurrent Element, provided standard in many SEL relays.

## **SECURE COORDINATION**

Reduce the opportunity for upstream relays to overtrip with high-speed operation for severe faults. The SEL Adaptive Overcurrent Element's ability to operate at high speed in the presence of CT saturation can prevent unnecessary tripping of unfaulted parts of a power system.

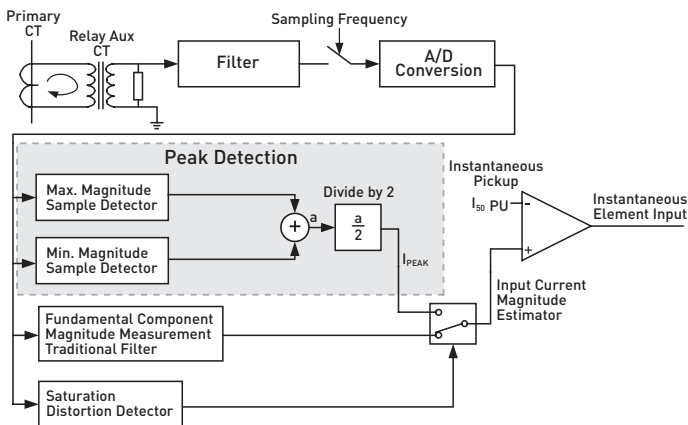
## FAST OPERATION WITH CT SATURATION

As seen for the saturated waveform in the figure below, the peak-detection output reaches the operate point more than one cycle faster than the traditional filter.



## OPERATING PRINCIPLE

Traditional filters extract phasor quantities and eliminate dc and harmonic components. Once saturation occurs, traditional filters cannot accurately measure the fault current, and the fast-rising response of peak detection is more representative of the fault magnitude. Harmonic current above a preset threshold switches to peak detection instead of the traditional filter used for unsaturated waveforms.



## AVAILABLE IN A WIDE RANGE OF PRODUCTS\*

The Adaptive Overcurrent Element is a standard feature in the following products:

- SEL-351A
- SEL-351S
- SEL-351 [-0 through -7]
- SEL-501
- SEL-551
- SEL-551C
- SEL-587
- SEL-700G
- SEL-701
- SEL-710
- SEL-710-5
- SEL-749M
- SEL-751
- SEL-751A
- SEL-787
- SEL-787-3
- SEL-787-4
- SEL-849

\*Please check specific product literature or with your SEL representative for availability on other SEL relays.

## CT SELECTION

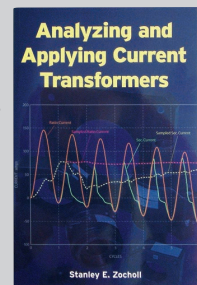
IEEE/ANSI Standard C57.13-1993 suggests that CTs for relaying be applied so that the maximum symmetrical fault current does not exceed 20 times the CT current rating and that the burden voltage does not exceed the accuracy class voltage of the CT.

Using the capabilities of the bipolar peak detector filter and the Adaptive Overcurrent Element, effective instantaneous overcurrent protection can be provided for the majority of metal-clad switchgear applications. Simple acceptance criteria equations can be used to verify proper CT selection where short-circuit currents or X/R ratio is high, low-ratio CTs are used, or CT burdens are high.

For additional information on CT selection, please review the following SEL literature at [www.selinc.com](http://www.selinc.com):

- SEL Application Guide AG2005-04
- *Selecting CTs to Optimize Relay Performance* (WPRC 1996)
- *The Impact of High Fault Current and CT Rating Limits on Overcurrent Protection*

CTs are used throughout the world as current transducers for protective relays in industrial, commercial, and utility applications. This book presents transformer concepts that provide the fundamentals to understand the nonlinear characteristics, accuracy ratings, and transient behavior of CTs.



Buy now at [www.selinc.com/zocholl](http://www.selinc.com/zocholl).



**MAKING ELECTRIC POWER SAFER,  
MORE RELIABLE, AND MORE ECONOMICAL**

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