

Global Instrumentation and Control

Nuclear Instrumentation System

Source Range High Voltage Cutoff

Background

The Westinghouse original ex-core Nuclear Instrumentation System (NIS) has been protecting nuclear plants for over 50 years. Westinghouse continues to support the NIS with upgrades such as the source range high voltage cutoff modification. This modification adds manual control capability for high voltage to the source range neutron detector and improves the high voltage control circuit.

Component degradation can cause erratic operation of the original silicon-controlled rectifier (SCR)-based high voltage cutoff circuit. If high voltage is inadvertently applied while the plant is at power, the source range detector could be damaged. If high voltage is inadvertently removed during startup or shutdown, an unexpected loss of the source range signal will occur. The improved high voltage control circuit prevents these problems.

Description

The source range high voltage cutoff modification removes the original SCR-based high voltage cutoff circuit (CB103 and T105) from the source range drawer. It installs a new relay (K101) to positively control the high voltage to the source range neutron detector.

The modification adds a three-position high voltage control switch and an HV manual control indicator light to the front of the source range drawer. The switch can be used to manually turn the high voltage on or off, or to operate in the normal (automatic) mode based on permissive signals.

The modification can be provided as a field kit for on-site upgrades or installed by Westinghouse during new NIS drawer builds or refurbishment.

The kits are seismically and environmentally qualified as class 1E components in accordance with the Institute of Electrical and Electronics Engineering 323-1983 and 344-1987 requirements.

Westinghouse can provide licensing support, field change notices, drawing updates, technical manual updates and installation services.



Front panel indicator illuminates when high voltage control switch is not in normal position.



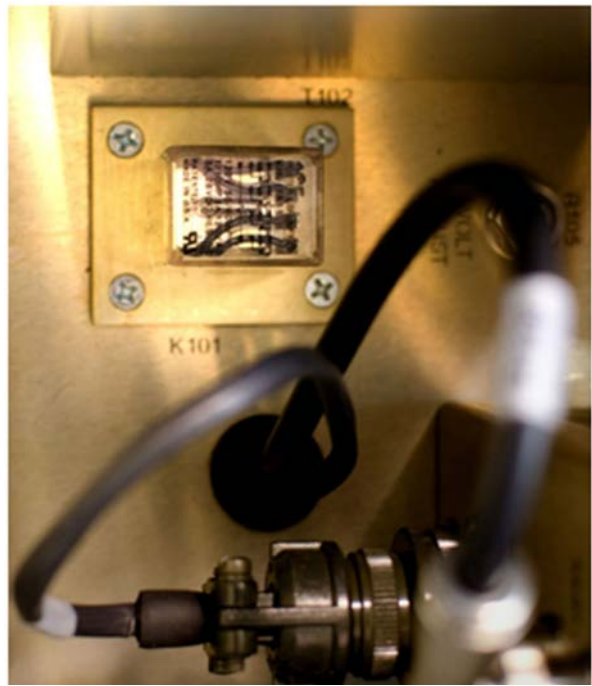
High voltage cutoff upgrade factory-installed during a new source range drawer build.

Benefits

- **Avoids Potential Detector Damage** – Inadvertent turn-on of high voltage, which could damage the source range detector, is eliminated.
- **Reliably Controls Source Range High Voltage** – Effects of component degradation are eliminated, and a positive control of detector high voltage is provided.
- **Able to Test Source Range Operation** – Prior to reaching the source range operating level, the operator can determine operability and plan remedial action if necessary.
- **Simplifies Maintenance and Surveillance** – Eliminates the need for temporary wiring.

Experience

High voltage cutoff modifications have been installed in 10 reactor units.



New relay K101 in source range drawer provides positive control of neutron detector high voltage.