

AREVA Introduces Low Voltage Vacuum Starters for the Nuclear Industry

Significantly Lowering Maintenance Cost through Replacement of Low Voltage Circuit Breakers

The Challenge for Low Voltage Circuit Breakers for Repetitive Motor Starting Applications

During the construction of nuclear plants in the 1970s and 1980s, low voltage circuit breakers were the only option for motor loads in plants, such as fan compressors and pump motors. These applications require high switching rates considered to be more than one per day with inrush currents, which can drastically shorten the life of all power circuit breakers regardless of the type of mechanism or interrupters utilized.

A draw out low voltage power circuit breaker has a no-load design life of approximately 9,700 operations. This life is reduced to 1,400 rated operations when subjected to inrush currents during motor starting, based on IEEE/ANSI C37.16-2000. This reduction results in increased maintenance and reconditioning costs of approximately \$20,000 to \$30,000 for the circuit breaker since it is not designed specifically for repetitive motor starting applications.

The Low Voltage Vacuum Starter Solution

To increase system safety and reliability, and to lower maintenance costs associated with this issue, AREVA is providing the industry with safety-related low voltage vacuum starters (LV-VSR) to replace low voltage circuit breakers. Aligning with the NEI initiative for Delivering the Nuclear Promise, this upgrade can have a payback in less than 18 months.

At one U.S. nuclear plant, AREVA successfully provided safety-related LV-VSR to replace circuit breakers in a screen wash application. This application required starting the motor load six to seven times per day. Through this replacement, the nuclear power plant eliminated the circuit breaker maintenance costs, which ranged from \$20,000 to \$30,000 per reconditioning of each circuit breaker.

AREVA provided the LV-VSR as safety-related by performing commercial grade dedication on the Eaton equipment in accordance with EPRI guideline 3002002982 (Rev 1 to EPRI 5652/TR-102260) and seismically testing it in compliance with IEEE 344. In addition, AREVA provided an analog overload device (C306) instead of a digital overload device, which eliminated concerns regarding cyber security.





Low Voltage Vacuum Starters

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Features and Benefits

- Eliminate circuit breaker maintenance costs of \$20,000 to \$30,000 per reconditioning of each circuit breaker
- Capable of hundreds of thousands of switching operations
- Draw out capability
- Utilizes the same cell interface components for levering and interlocking
- Current limiting fuses as primary fault protection
- Analog overload device eliminates concerns regarding cyber security
- Seismically qualified to nuclear industry standards
- Safety related in compliance with EPRI guideline 3002002982 (Rev 1 to EPRI 5652/TR-102260)

Designs Available for Replacing Select Models of Westinghouse, GE and ITE Low Voltage Circuit Breakers

- Westinghouse DB-25 & DBL-25
- Westinghouse DS-206, DSL-206 & DS-416
- ITE K600, K1600 & KDon 600
- GE AK-2A, AKR-4A-30 & AKRU-4A-30, including Masterpact circuit breaker retrofits

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