Switchgear

Electrical Apparatus

K-FILS

FILS Automated Vacuum Switchgear

DESCRIPTION

Cooper Power Systems Kearney ™ Fault Interrupting Line Sectionalizer (FILS) is an automated switchgear system, that can be configured to provide uninterrupted primary power for critical distribution loads. Other systems that offer this level of power continuity can cost up to a million dollars; FILS costs about the same as an automatic transfer switch.

FILS also cables-up and has the same dimensions as an Auto-Transfer Switch (ATS), and can easily replace an existing throwover switch (as a power quality upgrade). Referring to Figure 3 and 4 on page 2, a single FILS switchgear installation is configured the same as an ATS. Two or more sources are brought to the FILS switchgear, which is located at the critical load site. FILS feeds the load through a fault interrupter protected tap.

Instead of loadbreak source switches, FILS features fault interrupters for each source. The key difference between FILS and ATS is in the mode of operation. An ATS connects only one source to the load, and if that source loses voltage, ATS disconnects from that source and closes the other source. FILS connects both sources to the load continuously. This configuration is referred to as a Primary Network.

Figure 4 on page 2, illustrates a typical FILS operation. FILS doesn't wait for a loss of voltage like ATS. Instead, it looks for the system fault that precedes a voltage outage. In this example, a fault has occurred on Source 1. FILS analyzes the direction and magnitude of the overcurrent. If the event is great enough to disturb the load, FILS trips open the Source 1 fault interrupter and disconnects that feeder from the load. During this event, the load still receives uninterrupted power from Source 2. A system fault occurred, but the critical load saw a 0-cycle interruption.

The proliferation of Personal Computers in homes and businesses has set new standards for quality power delivery. Previously accepted protection schemes, such as circuit reclosing to clear a fault, cause short voltage outages that will shut down a computer. Even more sensitive to these voltage "blips" are the microprocessor-based motor controllers used in manufacturing plants.

Traditionally, Automatic Transfer or SCADA controlled switchgear has been applied at critical load sites. This equipment is capable of quickly restoring lost power, but must wait until system voltage is lost, guaranteeing a power outage. Clearly, there is a need for switchgear that can foresee loss of feeder voltage, and correct for the problem, before system voltage is lost.

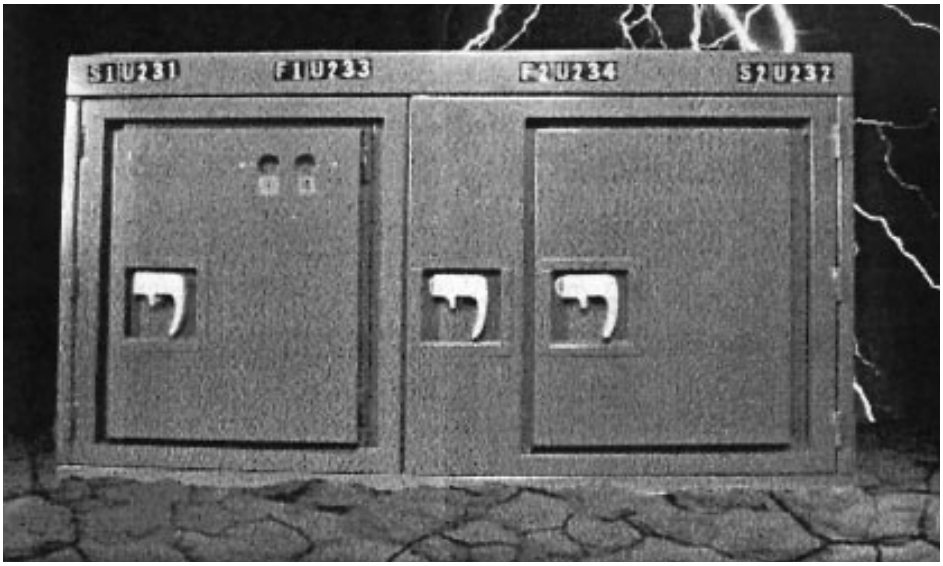

Figure 1.
Automated vacuum switchgear.

Figure 2.
Interior of automated vacuum switchgear.

PRIMARY NETWORK

Primary network systems have been serving critical loads for over 70 years. Recently, there has been a resurgence of this technology as a low cost source of uninterruptible power. This closed loop system feeds each load from two directions, providing double the cable capacity. The result is a power delivery system that greatly reduces occurrences of voltage sags and flicker.

FILS Loop

Figure 7 is a one-line of four FILS switchgear arranged in a closed loop. This is an excellent application for critical loads such as industrial parks or shopping malls. The incoming sources are relayed as described above, and the URD cables interconnecting the switchgear are continuously monitored via a FILS communication link.

A low voltage communication cable is buried along with the primary cable. This cable provides a link between FILS switches. Figure 8 shows FILS response to a URD cable fault FILS detect the fault, interrupts the fault, and sectionalizes the bad run of cable; without a power outage to the loads.

The FILS system incorporates an alarm loop, so that a single RTU reports any FILS operation.

On site, indicating flags (similar to faulted circuit indicators) are located at each FILS interrupter to identify the fault location. Visual interrogation of the FILS control indicates if FILS opened due to a system fault, or from loss of communication link.

ADVANCED FEATURES

FILS will automatically reset Source 1 (after a preset time interval) once the feeder problem has been corrected. In addition, FILS is fully SCADA compatible and will report events and the status of the source and tap fault interrupters. SCADA can bypass FILS' auto-reset mode and the gear can be reset remotely after an event occurs.

FILS can be interrogated on site with an IBM compatible PC. FILS' built-in event recorder gives a full report including date, time, and type of event. Phasor diagrams of prefault, fault, and postfault conditions may be constructed. Real-time voltage, current, and phase data is always accessible.

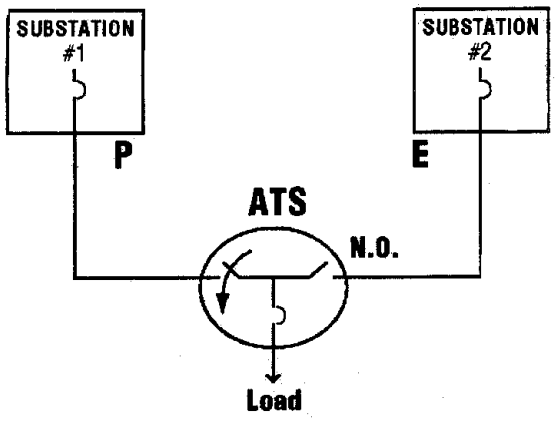

Figure 3.
Automatic transfer switch connects only one source to the load. Power loss to the load during transfer operation.

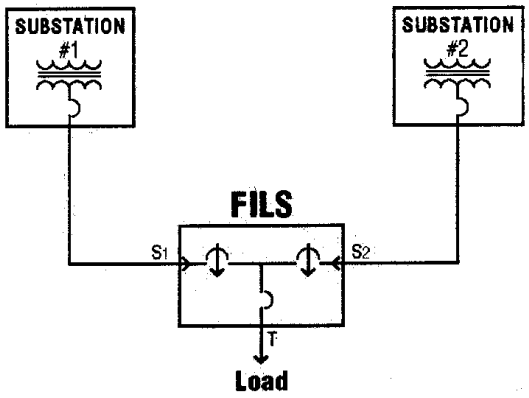

Figure 4.
FILS with both sources connected to the load.

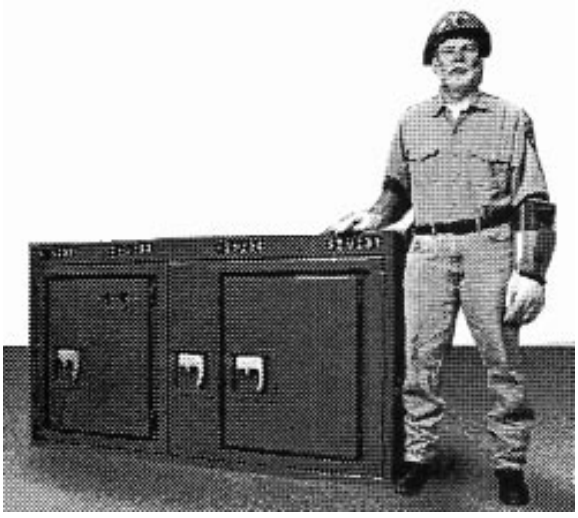

Figure 5.
Single sided access has the lowest profile in the industry.

TECHNICAL INFORMATION

- Padmounted or Submersible
- 15 kV, 25 kV, 35 kV
- 200 A, 600 A Continuous
- 20 A (ASYM) Fault Interrupting
- Relaying Compatible with existing substation protection

SUBMERSIBLE FILS

VACpac®

- Submersible construction
- Most compact design available
- Vacuum interruption, SF6 insulated
- Wide variety of operators
- Deadfront construction
- 200 A, 600 A applications
- 15 kV, 25 kV, 35 kV systems

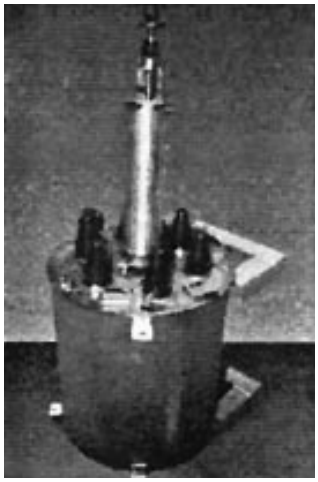

Figure 6.
VACpac ® is a submersible FILS.

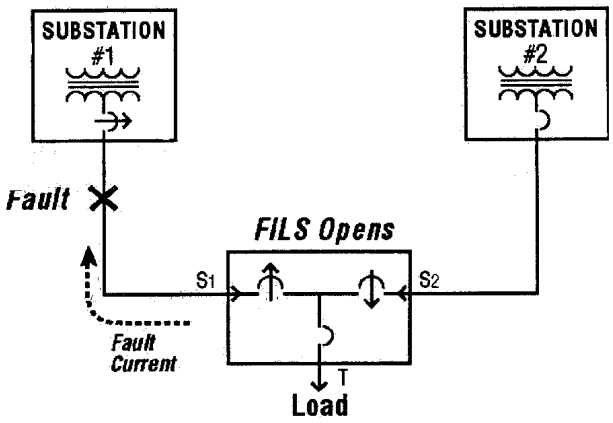

Figure 7.
FILS–Load sees zero-cycle interruption.

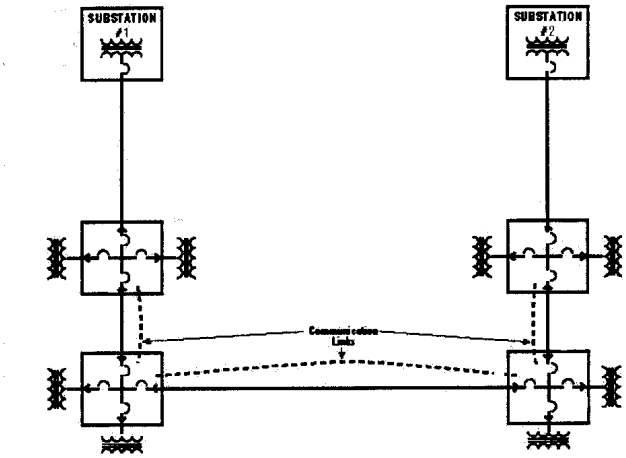

Figure 8.
Closed loop primary network.

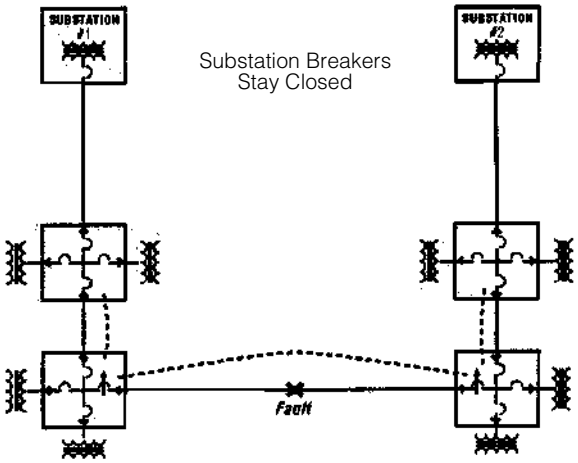

Figure 9.
Fault is interrupted without power loss to loads.

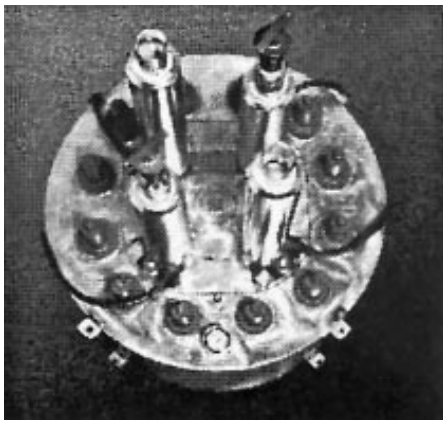

Figure 10.
VACpac® deadfront construction.

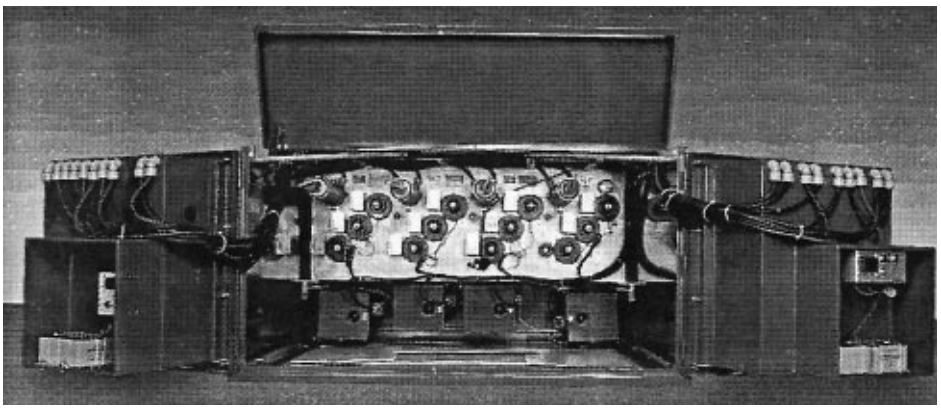

Figure 11.
FILS automated cacuum switchgear.

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