

WESTCO Electrical & Equipment Corp. Case Study Modifying Relays For LRT With Basler Electrics' BE1-FLEX Protection

Engineered for a Secure Future

WESTCO and Basler Electric collaborated on a critical modernization initiative for a major Metro Manila rapid transit system, which is essential for the daily mobility of approximately 460,000 commuters. The project focused on the retrofit of aging protective and testing infrastructure. The outdated, single-function electro-mechanical relays (EMRs) were replaced with the state-of-the-art Basler Electric BE1-FLEX numerical (digital) protection, automation, and control system (PACS). This upgrade was necessitated by the obsolescence of existing equipment, the presence of defective devices (e.g., relays with unreadable screens and failed test results), and, critically, persistent issues with fault protection coordination. The transition to the BE1-FLEX resolved these technical deficiencies, significantly enhancing system reliability, optimizing maintenance, and ensuring precise fault isolation to prevent cascading equipment failure.

The Challenge: Outdated, Single-Function Protection

-  **Aging Infrastructure:** Obsolescence and Age: The system relied on dated, single-function EMRs, which are inherently limited in their diagnostic and operational capabilities compared to modern digital platforms. This necessitated a complex system retrofit.
-  **Device Reliability:** A significant number of older protective relays were found to be defective, exhibiting compromised functionality, such as unreadable Human-Machine Interface (HMI) screens and failures during routine testing, compromising their reliability for asset protection.
-  **Protection Coordination Deficiencies:** The most critical technical challenge was faulty protection coordination. This was primarily evidenced by instances where an equipment fault—specifically a transformer fault—was not correctly cleared by the designated relay, but instead by upstream devices like fuses, or worse, resulted in collateral damage to the primary asset. This failure in a selective tripping scheme indicated incorrect relay settings, often due to a highly non-linear coordination curve or components operating in data silos, failing to ensure that only the minimal affected section of the network was isolated.



The Solution: BE1-FLEX Numerical Protection

The technical solution involved a direct replacement of the EMRs with the Basler Electric BE1-FLEX numerical relay, a modern multi-function digital device integrated into a single platform:

-  **Numerical Protection and Multi-Function Integration:** The BE1-FLEX consolidates multiple individual protection, automation, and control functions (e.g., overcurrent, differential, distance) into a single hardware and software package. This consolidation simplified the panel design and significantly reduced the device count per panel, which directly lowers the mean time between failures (MTBF) for the overall protection scheme.
-  **Real-Time Monitoring and Diagnostics:** As a digital relay, the BE1-FLEX enables real-time system monitoring and provides access to advanced diagnostic data, including event reports and oscillography. This supports a shift toward predictive maintenance and improved asset health management through remote access capabilities.
-  **Resolution of Intricate Protection Coordination Issues:** The core technical achievement was resolving the complex coordination failures. This required a setting recalculation and re-implementation of the protective characteristics within the BE1-FLEX. The objective was to ensure a precise, selective tripping hierarchy, guaranteeing that in the event of a transformer fault, the dedicated primary relay would instantaneously isolate the faulted component, thus preventing current propagation to the fuse or catastrophic failure of the transformer.

IS YOUR CRITICAL INFRASTRUCTURE AT RISK FOR FAILURE DUE TO AGING PROTECTION AND CONTROL SYSTEMS?

Book a demo with WESTCO today to discover how the Basler Electric BE1-FLEX and our expert engineering services can modernize your power system protection, resolve complex coordination issues, and ensure the uninterrupted, safe operation of your critical infrastructure.

CONTACT US:

 +63 (2) 8365-0068

 sales@westco-phil.com

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The Impact



Business Result:

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Enhanced System Availability: The reduction in Mean Time to Repair (MTTR) and Mean Time Between Failures (MTBF), attributed to the replacement of unreliable Electro-Mechanical Relays (EMRs), directly enhances operational uptime.
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Maintenance Optimization: The consolidation of multiple protection, automation, and control functionalities into a single BE1-FLEX device simplifies panel design and drastically reduces device count. This streamlines maintenance procedures, lowers Spare Part Holding Costs (SPHC), and reduces the complexity of preventive maintenance schedules.
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Improved Operational Efficiency: The digital nature of the BE1-FLEX facilitates remote diagnostics and asset health management. The device supports advanced recording (e.g., COMTRADE Oscillography, Sequence of Events logs, Load Profiles), which enables data-driven optimization of power system performance and adherence to modern power quality standards.



Technical Result:



Successful System Modernization: Achieved the full digital retrofit by replacing antiquated, single-function EMRs with the multi-function, numerical BE1-FLEX relays. The BE1-FLEX architecture allows for field-upgradable hardware and software, future-proofing the protection scheme.



Protection Function Consolidation: Multi-function integration within the BE1-FLEX (capable of combining ≥ 40 protective elements, e.g., 50/51, 67, 87, 21) simplified the control scheme. This resulted in a reduced physical footprint and eliminated the complexities associated with wiring and coordinating discrete protective devices.



Resolved Selective Fault Isolation:

The implementation resolved critical protection coordination problems via precise setting recalculation and the utilization of the BE1-FLEX's fine-tune capabilities (e.g., multi-zone configurations). This ensures selective tripping—guaranteeing that only the minimal faulted segment of the rail power network is isolated—thereby preventing cascading outages and minimizing collateral damage to critical assets like power transformers. The device's Synchrophasor and IRIG-B/NTP synchronized clock features enable highly accurate fault location and analysis.



Conclusion:

The implementation of the BE1-FLEX system marks a successful technical modernization of the LRT's electrical infrastructure. By replacing obsolete, single-function EMRs with modern, multi-function numerical relays, the project fundamentally enhanced system resilience. The resolution of the protection coordination issues, achieved through meticulous setting adjustments, ensures that the system's ability to selectively isolate faults is now robust and reliable, thereby minimizing equipment damage and significantly reducing the risk of wide-area operational disruption for the over 460,000 daily commuters. This strategic investment has demonstrably improved the system's operational efficiency and reliability, meeting modern demands for critical infrastructure protection.

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