

Bay-O-Net™ with ELSP Fuse vs. Drywell Canister Fusing

At Issue

There are numerous overcurrent protection schemes for padmounted transformers. Each method has strengths and weaknesses. To protect against available fault currents above 3500 amps, there are two practical choices:

1. A Bay-O-Net with expulsion fuse (Bay-O-Net) and back-up current-limiting fuse combination.
2. A dry-well canister fuse.

It is a common misconception that these two choices provide the same protection at the same price.

Recommendation

The Bay-O-Net and back-up current-limiting fuse combination's two-fuse concept is

- safer
- easier to coordinate
- more cost effective

than drywell canister fusing for today's transformers. Already recognized throughout the utility market, it is the fusing scheme of choice at most industrial accounts, as well.

Rationale

At first glance, the Bay-O-Net and drywell fusing schemes might be assumed to be equivalent. Each system protects against fault currents up to 50 kA, each limits the energy allowed into the transformer tank, and each offers the features of loadbreak/loadmake capability, deadfront construction, and hotstick fuse removal. The advantages of the Bay-O-Net become obvious upon further review.

The Bay-O-Net fuse is an inexpensive underoil expulsion fuse contained in a loadbreak holder. The fuse is easily replaced when pulled from its holder using a standard hotstick. The back-up current-limiting fuse is a partial-range current-limiting fuse, mounted under oil on a panel inside the transform-

er tank. The major benefit of the Bay-O-Net system is that for overloads or secondary faults (the most common causes of fuse openings), only the inexpensive expulsion fuse requires replacement. The back-up current-limiting fuse remains intact.

Fuse coordination is relatively easy. Since a transformer's impedance is known, the maximum external fault current, or bolted secondary fault current, can be calculated and the Bay-O-Net fuse sized accordingly.

The drywell canister fuse system contains a single sand-filled fuse with high-current and low-current filaments. The entire fuse is lost in instances of transformer winding fault, secondary fault, or significant overload. This fuse typically sells for 6 to 10 times the price of a Bay-O-Net expulsion fuse, so fuse change-outs (as well as fuse inventory carrying costs) can be much more costly with the canister fuse system. In addition, holders for canister fuses can be as much as eight times more expensive than Bay-O-Net fuse holders.

There is also a safety advantage to using the Bay-O-Net system. Because of its two-fuse scheme, the Bay-O-Net system protects line personnel from re-fusing a faulted transformer. In the case of an internal transformer fault, the back-up current-limiting fuse will clear. It is likely that the Bay-O-Net fuse will also be open. The first thing line personnel will do upon discovery of a blown Bay-O-Net fuse is to try re-fusing. Here, the new Bay-O-Net fuse will not re-energize the transformer because the back-up current-limiting fuse is also open. Line personnel may now safely conclude that the fault is an internal one, and that the transformer must be repaired or replaced.

When a transformer protected with drywell canister fuses internally fails, the high-current portion of the fuse opens. The fact that the high-current portion of the fuse link has opened is unknown and undetectable to line personnel. When line personnel re-fuse the unit, the fault is re-energized – this time with the cabinet doors open and the fuse not yet securely in place. This can lead to a violent expulsion of the fuse from the canister.



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Conclusion

For safety, ease of use, and overall dollar value, the Bay-O-Net with expulsion fuse and back-up current-limiting fuse is the clear choice when compared to drywell canister fusing.

The Eaton Connection

See Eaton Publications

- CA132015EN: Sidewall-Mounted & Cover-Mounted Bay-O-Net Fuse Assembly
- CA132023EN: Bay-O-Net Fuse Assembly Drip Guard
- CA132009EN: Current Sensing Bay-O-Net Fuse Link
- CA132010EN: Dual Sensing Bay-O-Net Fuse Link
- CA132012EN: Isolation Link
- CA132011EN: Dual Element Bay-O-Net Fuse Link
- CA132007EN: High Amp Overload Bay-O-Net Fuse Link
- 240-50: ELSP Current-Limiting Backup Fuse

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