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Application Note

Switchgear Life Extension: Replacement of Electromechanical Overcurrent Relaying

Electromechanical overcurrent relays such as the IAC and CO are the historical backbone of a power system's protection. These relays use delicate mechanisms and precision components to develop their operating characteristics. Thus, they are subject to misoperation and failure due to contamination, corrosion, and simple aging. They require frequent testing and recalibration to ensure proper operation. Proper operation is, of course, essential to prevent unnecessary outages and/or extensive damage due to overloads and faults.

This Application Note explores the solutions the Basler BE1-50/51B provides to these problems and the benefits that convenient and effective retrofits provide.

Replacing Electromechanical Relays

When facing electromechanical overcurrent relay obsolescence, a chemical facility in the Midwest chose to upgrade to Basler BE1-50/51B-214 Time Overcurrent relays. Seventy-two relays were to be installed as direct "plug and play" replacements for existing electromechanical General Electric type "IAC" relays.

The microprocessor-based BE1-50/51B requires less maintenance and improves flexibility and reliability. Basler's retrofit relays are designed to install in the existing GE case, so no wiring changes or panel work is required. This makes for a simple, economical way to upgrade from aging relays without the expense of completely redesigning and rewiring your systems to accept currently available functional replacements.

The Retrofit Process

In order to help with the retrofit process, Basler and our sales representative agreed to do a day of on-site training for the facility's Test and Maintenance personnel.

The BE1-50/51B-214 retrofit kit (Figure 1) consists of a relay cradle, an adapter plate, and a cover. It allows plug-in installation in an existing IAC case without making any wiring changes.

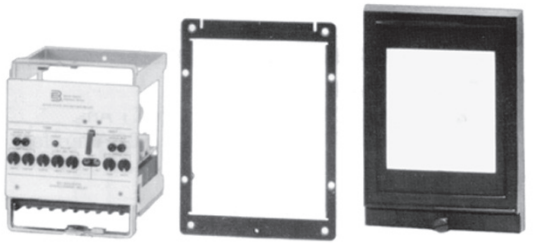

Figure 1 - BE1-50/51B-214 Retrofit Kit

A midwestern chemical facility (Figure 2) replaced 72 electromechanical General Electric type "IAC" relays.

Figure 2 - Chemical Facility

Fifteen employees spent most of a day learning about the BE1-50/51B. The training covered BE1-50/51 relay basics, specifics of the "214" retrofit version, the retrofit process, and relay setup and testing. Basler's free "Time Current Characteristics" spreadsheet was used to convert the existing time dial settings for old induction disk relays to the correct equivalent time dial setting for the BE1-50/51B-214. Afterwards, the Basler trainers supervised the actual replacement of the first six in-service GE relays.

They followed a six-step process:

1. Select the desired relay settings on the new BE1-50/51B relay.
2. Remove the existing relay.
3. Attach the cover adapter to the existing case.
4. Insert the new BE1-50/51B relay.
5. Reinstall the existing connection plug.
6. Install the new Basler Electric cover.

The newly trained personnel were able to set, test and install half a dozen relays in about two hours. At that pace, they should be able to upgrade all of their electromechanical relays to Basler solid state relays within a few days!

The retrofit was accomplished with minimal downtime, minimal work, and most importantly, minimal expense. Because they are solid state, the relays have no critical moving parts that can affect their performance and will require minimal maintenance. Plus, they meet all ANSI standards for operation in harsh power system environments.

Benefits for the Future

During periodic maintenance or troubleshooting, an electromechanical relay's timing characteristics must be checked and calibrated. Correct pickup and timing have to be determined by test in an iterative process. In Basler Electric retrofit relays, settings are made by front panel switch settings. There is no calibration. The microprocessor-based BE1-50/51B is not subject to drift or change in performance, so recalibration is never necessary. This can save you valuable outage time in an emergency and save you money in periodic maintenance costs on an ongoing basis. The savings in maintenance costs alone easily justify the cost of the new relays!

Other Retrofit Options

The BE1-50/51B-219 retrofit kits can be installed in an existing Westinghouse CO case without making any wiring changes.

Also, Basler retrofit relays provide a wide operating current range, as well as flexible setup and configuration. One Basler retrofit relay model replaces more than 100 IAC or 40 CO models. (See tables below.) This provides not only convenience when performing relay maintenance, but also savings in inventory stocking costs.

Basler also offers the BE1-79A Multiple Shot Reclosing Relay retrofit kit. Most General Electric type ACR11 style reclosing relays can be directly replaced by the BE1-79A.

All the retrofit units are also available with cases for new installations.

For More Information

For more information on retrofit solutions, visit our web site at www.basler.com and download *Bulletin UHD* on the BE1-50/51B family or *Bulletin UHN* on the BE1-79A.

You can also download a copy of the *Time Current Characteristic Curve Calculator* spreadsheet on the BE1-50/51B product page in the Technical Resources tab at www.basler.com.

IAC models that may be retrofitted with the BE1-50/51B-214

Curve	IAC Model Numbers
Inverse	12IAC51A***A 12IAC51B***A
Very Inverse	12IAC53A***A 12IAC53B***A
Extremely Inverse	12IAC77A***A 12IAC77B***A
Short Time	12IAC55A***A 12IAC55B***A
Long Time	12IAC66A**A

CO models that may be retrofitted with the BE1-50/51B-219

Curve	CO Model Numbers
Short Time	CO-2*11*1N
Long Time	CO-5*11*1N
Definite	CO-6*11*1N
Moderately Inverse	CO7*11*1N
Inverse	CO-8*11*1N
Very Inverse	CO-9*11*1N
Extremely Inverse	CO-11*11*1N

*NOTES: * = any digit covering all pickup ranges, instantaneous, non-instantaneous, and 50 Hz and 60 Hz models. Units with instantaneous elements are designated with a "B" for the eighth character in the model number.*

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