



Reader surgery

Janet Roadway from ABB tackles the great protection debate.

Q. Should I opt for fuses or circuit breakers to protect my equipment from electrical faults?

A. When it comes to fuses versus fuseless technology, it's not a case of either approach being intrinsically superior to the other. Instead, each technology has its pros and cons for particular applications.

Fuses and switchfuses are cheaper than circuit breakers, up to a capacity of around 400A. Fuses are also interchangeable with switches from different manufacturers, which reduces the cost of stocking spares.

However, the fact that they can't be precisely adjusted to match current requirements can mean having to specify oversized cables to match the current rating of the fuse.

Fuses also provide only single-shot protection. Once the element has blown it must be replaced, incurring the cost and time of manual intervention. Furthermore, if anyone is tempted to replace a frequently blowing fuse with a higher-rated version or even a piece of copper wire, it's relatively easy for them to severely compromise the protection. Also, fuses lack any intelligence, with only simple on/off

protection and no way of identifying the cause of a fault.

Thermomagnetic

Thermomagnetic circuit breakers adopt a dual approach to protection. A bimetallic strip offers thermal protection against an overcurrent, while a coil protects against short circuits by generating a magnetic field instantaneously as the current appears. This field activates a trip bar, which trips the switch.

These circuit breakers are easier to automate than fuses and offer multi-shot protection. Replacing the protection element can be more expensive, however, because it is the actual switch contacts that break the circuit, rather than a separate fuse.

Circuit breakers can also be adjustable, enabling users to optimise the size of the associated cables more precisely. On the downside, their added flexibility makes it more complex to set up reliable discrimination with circuit breakers than with fuses.

Like fuses, thermomagnetic circuit

breakers can only offer information about whether they're on, off or tripped. But the most fundamental disadvantage of circuit breakers is that they cannot match the energy limitation of a fuse.

Electronic

Electronic relays and circuit breakers use either an external or integral programmable electronic relay to control the switch response. Although more complex than fuses, they can be programmed to trip only after a predefined time at a given overcurrent or to provide different levels of protection, depending on the current flow direction.

Their big advantage is their innate intelligence, providing access to more diagnostic information than simpler alternatives. Like thermomagnetic devices, however, they can never match a fuse's energy limitation levels.

For devices between around 400 and 630A capacity, the price of fuses and circuit breakers is similar. Above that, circuit breakers can be the cheaper option. However, replacement following major faults can be more expensive.

Each technology has its pros and cons for particular applications.

CAREERS

(Continued from p.18)

single parents who hope to escape the poverty trap while supporting children. In addition, Bromfield suggests that companies could attract more custom by advertising their female electricians: "There are a lot of women who own houses, live on their own and don't particularly want a man working in their house when they're by themselves. There's an obvious niche that's being overlooked. I don't know of any company that advertises its female electricians."

Bateman and Bromfield agree that workplace open days or one-day electrical courses for schoolgirls, such as those offered by Alliance Learning, are a good way to inspire potential electricians before thoughts of GCSE options and college. It is vital, however, such interest is maintained and Bateman believes

contractors should make regular visits to schools and work in conjunction with careers advisers to promote the opportunities for women in the industry.

A combined approach between government, schools and industry is clearly needed if the numbers of women are ever to match men in the workplace. Alfred McAlpine will take on around 50 apprentices this year and women have already filled three of the positions but not all companies have such a progressive outlook.

"I would tell all electrical contractors out there that society might say we're the weaker sex but it's not true," says Bromfield. "Sure, a bit of heavy lifting's difficult but I can bend 25mm conduit – most men can't. Take a chance on a female apprentice because you certainly won't regret it." ●

Decisions, decisions

Although choosing which type of protection to opt for can be tricky, some applications make the choice quite straightforward. For example, in a remote installation it may be critical to restore power remotely after a fault, making one-shot solutions, such as fuses, inappropriate. There may also be the need to monitor remotely whether the fault current has been cleared. At the other end of the spectrum, certain equipment calls for the current limiting effect that only fuses can provide.

There are many applications in which either approach can be used successfully. In such cases, it's really a matter of personal preference. The key is to understand the behaviour and the limitations of the chosen protection and to design a system that takes these considerations properly into account. ●

Tel: 02476 368500