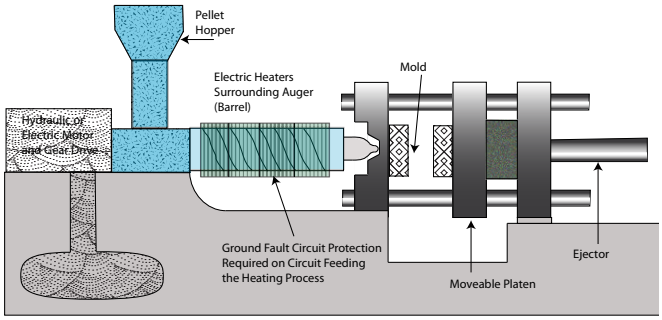
Electrical Heating System Protection From Faults to Ground

The National Electric Code requires that all (with few exceptions) electric heating sources be protected against faults to ground. While the requirement is not to protect a person from being shocked when working at the process being heated, the method of detecting the fault is the same as when electrocution or electrical shock protection is needed. Bare feet on a bathroom floor provides a dangerous path for current to flow from a hand held hair dryer, where touching equipment during a fault while standing on a concrete floor with work boots is much less hazardous. Disconnecting the circuit is the best protection in both instances, and the faster the circuit is de-energized the safer the installation.

Most heating protection against ground fault is termed "equipment protection" and the target fault current level that will cause the faulting circuit to be de-energized is 30 milliamperes, although this value is arbitrary and can be much higher if the need arises. In general, a heating element will either work as designed or it will short to ground, with only a few instances where insulation deteriorates causing current to leak to earth in lower quantities.

Electric Heating Applications

- Heat Trace Cable
- Snow Melt Mats
- Fuel Preheaters
- Plastic Injection Molding
- Drying
- Finish Curing
- Water Heating
- Baking



In a plastic injecting molder application, the plastic pellets are melted using electric heater bands between the hopper and the nozzle directing the plastic into the mold. If the heaters fail, the best approach is to let the process complete rather than disassembling the machine to clean out the solidified plastic.

NK Technologies' Ground Fault Protection

Since the late 1980's, NK Technologies has been manufacturing current sensors made specifically for sensing fault current in AC branch circuits of 50 amps or lower. By using the zero sequence concept, a single magnetically permeable toroid surrounds all of the current carrying conductors. If there is any current over five milliamps flowing to ground, the sensor actuates a contact. The contact can be used to open the circuit of an operating coil of a contactor, close a shunt trip breaker solenoid, or in applications where turning off the offending circuit would create a major problem, the contact can be used to alarm an operator or controller.

NK Technologies makes sensors using this technology with larger circuit monitoring capacity by enlarging the window through which the conductors pass. This makes it possible to monitor conductors carrying over 200 amps. NK Technologies also manufactures sensors designed to produce an analog signal directly proportional to the fault current. This output can be used to identify areas where insulation is failing, allowing the user to take corrective measures before equipment is damaged.

AGL Series

AG Series

AG Series

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