Precise Overload Protection — with HEINEMANN Hydraulic-Magnetic Circuit Breakers

Heat-Induced Nuisance Tripping Eliminated

HEINEMANN hydraulic-magnetic circuit breakers offer three major advantages over thermal devices.

1. Elimination of nuisance tripping caused by high ambient temperatures in or near the installation. The breaker responds only to current variations, not to temperature change.
2. Assurance that 100% of the rated current will be carried. There is no such assurance with thermal devices, which may fail to carry rated current when subjected to above-normal ambient temperatures. A HEINEMANN breaker rated at 20A, for example, will sustain 20A, even at elevated temperatures. Derating and other forms of temperature compensation are unnecessary.
3. Immediate reset. Since there are no thermal elements, heat build-up is not a factor. Therefore, no "cooling off" period is required after fault interruption.

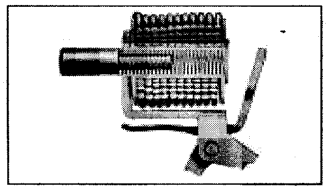
Time Delay Eliminates Breaker Tripping Due to Transient Current Surges

Elimination of transient current surges as a cause of nuisance tripping is accomplished through the creation of a controlled time delay. In any installation where a power supply or compressor motor is on the line, an inrush of current occurs when the equipment is first turned on. The bigger the equipment, the larger the surge. Although inrush surges are, in fact, transient overloads, they usually pose no threat of damage to the line or the equipment. So, it is not necessary or even desirable to interrupt the power when they occur.

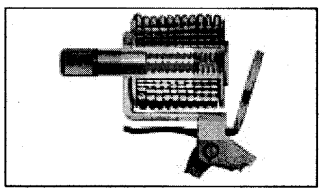
The hydraulically-controlled time-delay mechanism of a HEINEMANN breaker eliminates nuisance tripping without reducing overload protection. The delay is inversely proportional to the overload; response is quicker on large overloads, where greater potential danger exists, and slower on small overloads. Except in special high-inrush models, heavy overload and short-circuit currents of greater than 10 times the breaker's rating provide instantaneous response. (An instantaneous-trip breaker is available for use on, for example, modern medical and communication equipment, which cannot tolerate even brief overloads.)

For added protection, the time-delay is self-adjusting to ambient temperature conditions. At high ambients, where the overload tolerance of most circuits is lowered, the viscosity of the special fluid in the breaker's dashpot is lessened, and the time-delay response is thereby shortened. At low temperatures, the response is correspondingly longer to allow for cold equipment startups.

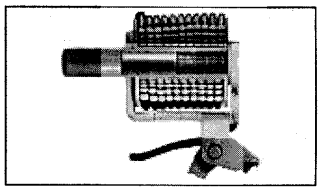
The Hydraulic-Magnetic Principle (how the breaker works)



1. The HEINEMANN hydraulic-magnetic circuit breaker operates on load-current-produced magnetic flux variation in a solenoid. The coil is wound around a hermetically sealed, non-magnetic tube containing a spring-loaded, movable iron core and a silicone liquid fill. With the load current either at or below the breaker's nominal rating, the magnetic flux is of insufficient strength to move the core, and it remains at the end of the tube opposite the armature.



2. On an overload, the magnetic flux force increases, pulling the iron core into the coil toward the armature end of the tube. This core insertion reduces the reluctance of the magnetic circuit and further increases the strength of the magnetic field. The silicone liquid regulates the core's speed of travel, creating a controlled trip delay that is inversely proportional to the magnitude of the overload. If the overload subsides before the core reaches the pole piece, the core returns to its original position, and the breaker does not trip. (For non-delay applications, the breaker is modified to omit the intentional delay.)



3. When the magnetic flux reaches a predetermined value, the armature is attracted to the pole piece and the breaker trips. (The breaker may trip before the core reaches the pole piece if the critical flux value is achieved first.) On very heavy overloads or short circuits, the flux produced by the coil above, regardless of core position, is sufficient to pull in the armature. This circuit interruption occurs with no intentional delay — a highly desirable response characteristic.