

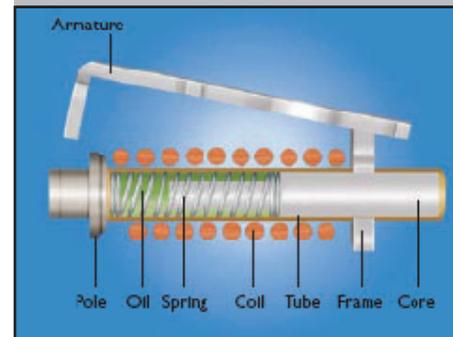
## Principles of Operation of Hydraulic-Magnetic Circuit Breakers

**Our Hydraulic-Magnetic circuit breakers** have a number of unique features:

- Precision circuit breaker
- Current sensing rather than thermal sensing
- Tripping stability, unaffected by ambient temperature unlike that of a thermal magnetic circuit breaker, which is affected by internal & external temperature variations
- Tripping characteristic mainly determined by the number of turns of the solenoid coil
- Can be immediately reset after a fault (no thermal memory)

### Principle of Operation

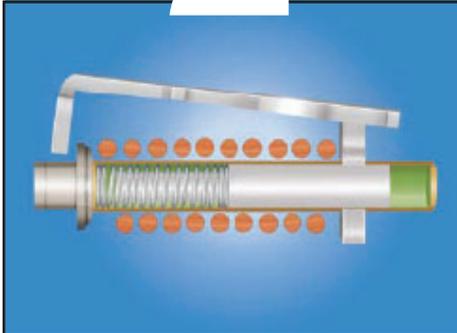
# 1



It operates on the magnetic force produced by the load current flowing through a solenoid coil. The coil is wound around a hermetically sealed tube containing an iron core, a spring and dampening fluid. At currents below the circuit breaker rating the magnetic flux in the solenoid is insufficient to attract the core to the pole piece due to the opposing spring pressure. When an overload occurs, the magnetic flux in the solenoid produces sufficient magnetic attraction to overcome the spring force and the core moves towards the pole.

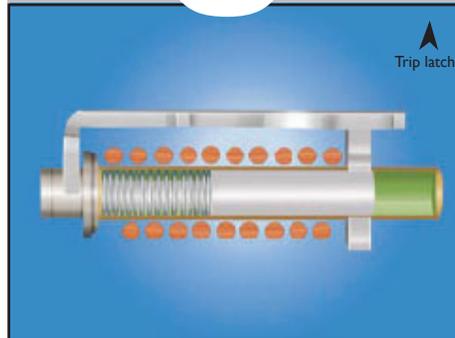
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2



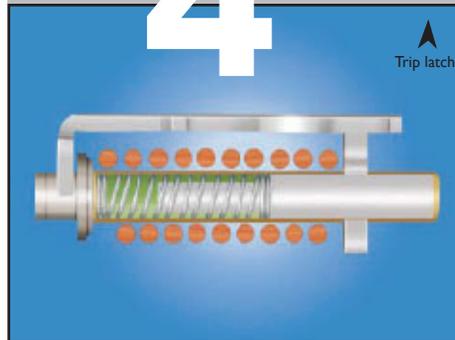
**T**he fluid, creating a time delay inversely proportional to the current dampens the speed of movement. If the overload is of short duration - such as during start up of motors - the core returns to its rest position when the overload disappears.

3



Trip latch

4



Trip latch

**I**f an overload persists, the core reaches the pole piece with a delay particular to that current. In so doing the reluctance of the magnetic circuit drops so that the armature is attracted to the pole face with sufficient force to collapse the latch mechanism and trip the breaker. The contacts separate, the current stops flowing and the core returns to the reset position.

**A**t high overload values or short circuit, the magnetic flux produced by the coil is sufficient to attract the armature to the pole face and trip the breaker even though the core has not moved. This is referred to as the 'instantaneous trip' characteristic of the circuit breaker.

The circuit breaker may be immediately reclosed after tripping, provided the fault has been cleared, as there is no cooling down time required. Its principle of operation allows for a variety of time/current characteristics to be tailored to individual requirements.