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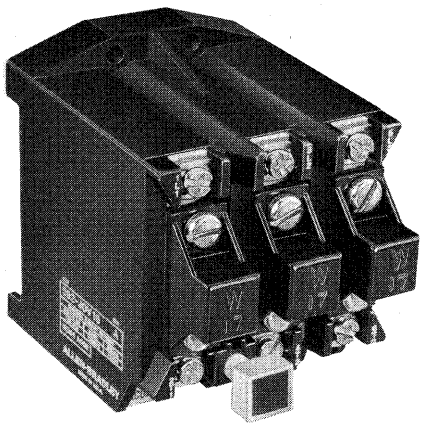
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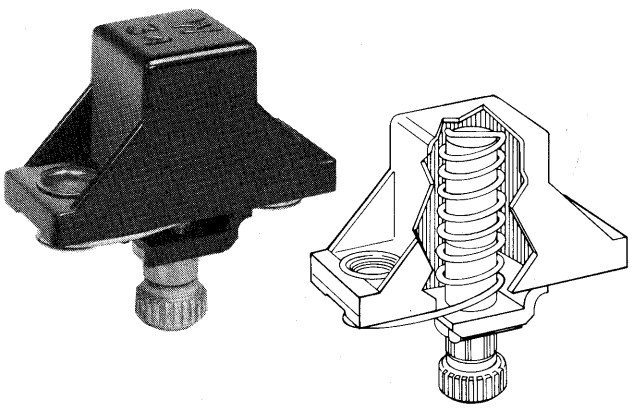
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ADVANTAGES OF EUTECTIC ALLOY OVERLOAD RELAYS -



Typical Allen-Bradley
Eutectic Alloy Overload Relay



Typical Allen-Bradley
One-Piece Eutectic Alloy Heater Element

Publication 592-2.4.1 - October, 1989
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Introduction

For maximum protection without sacrificing performance, overload relays must be tailored to motor and application. The eutectic alloy overload relay permits this flexibility, and is the predominantly used overload relay design in North America for this reason.

Allen-Bradley eutectic alloy overload relays are designed with many outstanding features to offer superior motor protection. They are designed for one-piece interchangeable heater elements which can be selected to closely match the motor and application. The rugged design guards against nuisance tripping due to shock and vibration which can unexpectedly open the relay contact and drop out the starter. The pressure on the overload relay contact remains constant until the trip point is reached.

Allen-Bradley eutectic alloy overload relays are tamper-resistant, "trip-free", non-adjustable, and non -convertible to automatic reset. Many other important features such as the highly visible optical trip indicator, the test circuit actuator or optional alarm circuit contact module, the large slip-resistant reset button, and self lifting pressure connectors for convenient wiring make the Allen-Bradley eutectic alloy overload relay truly "unique".

Because of the international popularity of the bimetal overload relay, we have chosen it for comparison to the eutectic alloy overload relay.

Current Adjustability

The eutectic alloy overload relay uses interchangeable heater elements that allow the selection and installation of heaters designed to match the motor and application in terms of trip current and trip time. This construction also discourages irresponsible adjustment of the trip point because there is no adjustment dial.

The bimetal overload relay with integral heater elements is available for a range of motor currents, and has a provision to externally adjust the overload relay trip point. It therefore does not provide inherent adjustment protection because it can be easily misadjusted, reducing the amount of overload protection provided for a given motor.

Field Convertibility

The eutectic alloy overload relay is available as manual reset only. Most bimetal overload relays are field convertible between manual and automatic reset modes. On many applications, an automatic reset of the overload relay may be undesirable because it could allow a piece of equipment that had stopped due to an overload condition to restart without any apparent warning. This situation could lead to property damage or even worse, bodily injury to an unsuspecting operator. In the United States, the National Electrical Code (NEC) and many user specifications restrict applications on which overload relays with automatic reset can be used.

Range of Protection

Eutectic alloy overload relays are available with a variety of separate interchangeable heater elements designed to provide a choice of trip

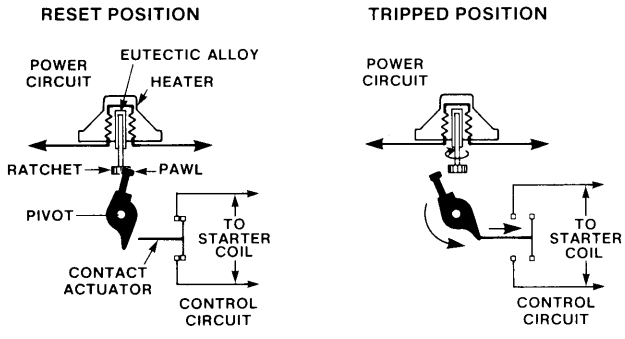
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Range of Protection (continued)

times. This allows the overload relay trip characteristics to be tailored to the specific motor application requirements. Alternatively, most bimetal overload relays do not allow the user to select the appropriate trip time for the application. As a result, if the load has a longer acceleration time than the overload relay will allow, nuisance tripping is likely. This may occur on starting times as short as two seconds if the overload relay is in the hot state. Compensating for this situation by turning the full load current adjustment up reduces the running overcurrent protection because the overload relay trip is then set higher than what the motor was designed for. This allows the motor to run hotter, thereby reducing the life of the motor.

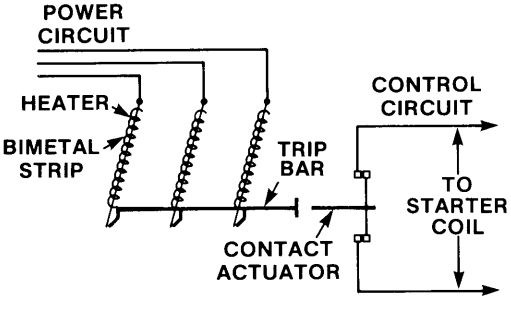
Resistance To Shock

Eutectic Alloy Overload Relay



The eutectic alloy overload relay is designed with precision heater elements utilizing a eutectic alloy that liquefies at a predetermined temperature. When the eutectic liquefies, it releases a spindle mechanism and allows the overload relay to "trip". Neither the contacts nor any part of the mechanism move until this time. As a result, the eutectic alloy overload relay is less sensitive to shock and vibration than the bimetal overload relay.

Bimetal Overload Relay



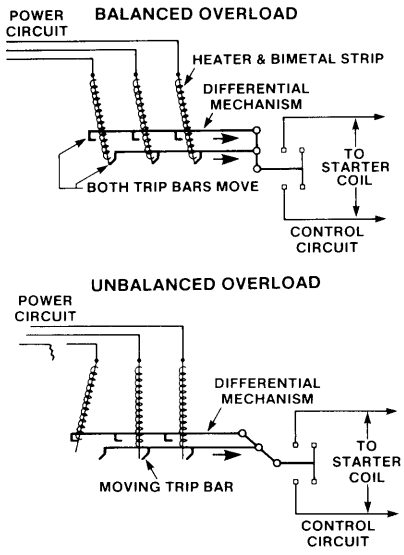
The bimetal overload relay uses a trip mechanism that is gradually moved by two dissimilar metals (bimetals) that deflect when heated. When the bimetals have deflected sufficiently, the mechanism opens a contact and the overload relay is "tripped".

Due to this gradual movement of the trip mechanism as the bimetals are heated, the overload relay is inherently more susceptible to false trips caused by shock and vibration than a corresponding eutectic alloy design.

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Phase Loss Sensitivity

Bimetal Overload Relay with Differential Mechanism



Many manufacturers of bimetal overload relays with a differential mechanism claim phase loss protection or single phase protection. In actuality, what these bimetal overload relays provide is phase loss sensitivity. The phase loss sensitivity is a necessary design characteristic of most bimetal overload relays because in the phase loss or single phase condition, bimetal overload relays lose the force on the trip bar from one of the bimetals. To compensate for this loss of trip force, most bimetal overload relays have a differential mechanism that uses the action of the cooling bimetal on the lost phase to help initiate a trip at or below the normal three phase tripping current level.

The eutectic alloy overload relay does not need this type of additional linkage because each phase operates independently to trigger the trip mechanism. Excess current in any one of the phases due to a single phase or normal overload condition will cause the mechanism to trip and open the control circuit contact.

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