I.L. 3810-100

DESCRIPTION • OPERATION • MAINTENANCE

INSTRUCTIONS

Navy Service A*

D-C MAGNETIC RELAYS, TYPE HIN

Voltage or Current Responsive Relays

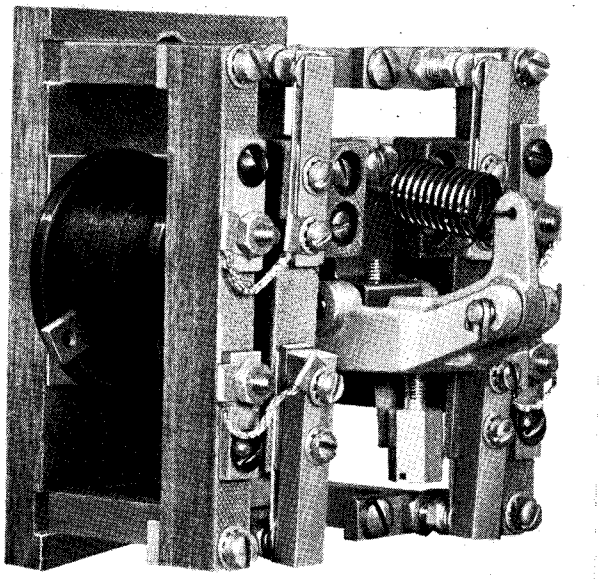

FIG. 1. Type HIN Relay with Wire-Wound Operating Coils

D-C MAGNETIC RELAYS, TYPE HIN may be operated with either series or shunt-wound coils. They are principally applied as adjustable voltage or current relays, reverse current or field failure relays. They are recommended for application to Navy Service A* controllers.

Rating. The relay contacts have a continuous carrying capacity of five amperes. The inductive rating of the contacts is 150 volt-amperes with a maximum of one-half ampere load.

The operating coils are designed for continuous duty on d-c only. The application will determine whether strap-wound series coils or wire-wound shunt coils should be used. The coils and stationary contacts are insulated from the frame for 600 volts.

DESCRIPTION

This relay is adjustable in a wide range to pick up and drop out at definite values of energization. If energized by shunt coils, these are usually designed to operate with very low temperature rise in order to assure that the pick-up and drop-out settings are affected only slightly by variations in coil resistance. Where necessary to assure still greater accuracy of settings, coils with lower voltage ratings are used in series with resistors. The relay has two normally-open and two normally-closed contacts. It has an insulating base and is suitable for mounting on a steel panel, if the insulating sheet supplied with the relay is placed under the base.

The magnetic circuit consists of an iron base plate, two cores, core pole pieces, and a moving armature. A total of two coils (any combination of shunt or series-wound coils) may be mounted on the cores. The cores of the relay are approximately $1\frac{9}{16}$ inches in length.

The contacts have silver contact buttons. The contacts may be easily removed for replacement.

The current-carrying shunt is made of round flexible copper cable which gives complete freedom to the moving armature. It has ample capacity to carry the maximum current for which the relay is rated.

Wire-wound coils are used when the application requires coils with a great number of turns. Coils with a few turns are wound from heavy copper strap.

OPERATION

The moving armature which completes the magnetic circuit and carries the moving contacts is normally spring biased to the open position. The biasing or calibrating spring also provides the contact pressure for the normally-closed contacts composed of the moving contacts and the lower stationary contacts. When the magnetic field which can be created either by the application of a d-c potential to a shunt-wound coil or by current flowing through a series coil reaches a certain value, the armature will be attracted toward the core pole pieces. The normally-closed contact circuits will be opened and the normally-open contact circuits will be closed. The stationary contacts also serve as armature stops.

* Exception to N. D. Specification—Contacts may open or close under shock but this will not interfere with the satisfactory operation of the controller with which it is applied.

Type HIN relay may be operated by only one coil. However, by using two coils in parallel or series depending upon the current capacity or voltage range desired, the operating range of the relay can be approximately doubled over that provided by only one coil.

By using two shunt coils in series with each coil rated at full voltage, the coil resistances will remain practically constant when continuously energized, so that the pick-up and drop-out settings will not be appreciably affected.

ADJUSTMENT

The relay is adjusted by varying the minimum and maximum magnetic gap between pole pieces and armature, and by varying the tension of the armature spring. The stationary contact screws of the upper contacts determine the minimum gap and the lower stationary contacts the maximum gap. The contact screws are locked in position by locknuts, which should be loose while adjustments are being made and securely tightened afterwards. Spring tension is varied by turning the large hexagonal nut at the lower front of the relay. A blade spring holds this nut in position.

The first adjustment to be made is for the drop-out setting. The minimum magnetic gap is set at about one sixteenth of an inch and the spring tension varied so that the armature drops out at the desired value if the energization is lowered from a higher value. Then, the pick-up adjustment is made by varying the maximum gap until the armature is picked up at the desired value if energization is increased from a lower value. Satisfactory settings may be obtained if the drop-out value is 80 percent or less of the pick-up value. The contact gaps should then be checked. A one-eighth inch gap is usually satisfactory for a-c circuits. More may be required to open d-c control circuits. If the contact gap is too small, the adjustment procedure may be repeated, beginning with a slightly increased minimum gap. Care should be taken that the contact pressure on the upper contacts is distributed evenly; likewise, on the lower contacts. If the armature moves slowly instead of instantaneously, the minimum gap should be increased.

MAINTENANCE

General instructions for installation and maintenance may be found in Instruction Leaflet 6100-1. All current-carrying connections should be kept as clean and tight as possible.

The relay should be inspected frequently to see that it functions satisfactorily.

Cleaning. Accumulations of dust should be removed with a dry cloth or a compressed air jet. Oily cloths should be avoided as an oil film helps to collect dust.

Contacts. The contacts should be examined periodically to make certain that they are in good operating condition. Oil or other lubricants should not be used on the contacts. The discoloration of silver contacts which results from arcing and exposure to the atmosphere usually is not harmful to the performance. Only when the silver contact buttons are severely burned should they be dressed or cleaned with a fine file. It may be necessary to adjust the contact gaps as the contacts wear in order to maintain the original current or voltage setting of the relay.

Shunt. The flexible shunt between the bearing bracket and the moving contact should be examined occasionally to make sure that it is in good condition and that it makes good electrical contact between the parts.

Bearings. The bearings and hinge pin of the moving armature should be inspected occasionally to make sure that the armature and contact assembly rotates freely. This bearing usually operates more satisfactorily without than with lubrication.

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