

INSTRUCTIONS

Switchgear

Types HKA29EM and HKA29FM

CLOSING RELAYS

GENERAL  ELECTRIC

CLOSING RELAYS - HEAVY DUTY

TYPES HKA29EM AND HKA29FM

DESCRIPTION

Application

The Types HKA29EM and HKA29FM relays are used mainly for closing electrically-operated air or oil circuit breakers when the current required for the operation of the reclosing device exceeds the rating of the control switch in use. They are used instead of the moderate duty line of HKA relays when the currents being interrupted are highly inductive.

The essential difference between these heavy duty relays and the moderate duty HKA relays is the addition of a discharge contact that short circuits the closing solenoid of the breaker after the main contacts of the relay open. The plunger of the solenoid does not reset until the circulating current decays to the drop-out value. This time delay can be as high as 8 seconds, depending upon the L/R ratio of the solenoid. The effect is the prevention of immediate successive reclosure of the breaker.

Construction

The relays consist of two hinge-type relay units mounted on a steel plate. The upper unit is known as the X unit, and its main contacts operate the closing mechanism of the breaker. It consists of a main heavy duty contact with magnetic blowout, two electrical interlock contacts, and one discharge contact.

The moving contact of the main contact is constructed to serve as the moving contact of the discharge contact also. With the armature in the de-energized position this moving contact makes with a bracket type stationary contact which is secured to the base and is mounted directly over the armature.

The lower unit, known as the Y unit, is a simple hinge-type relay having one normally open and one normally closed contact. The unit (type HMA relay) is similar to that used on the moderate duty relays except for being smaller in size. A resistor is used in series with its operating coil and is mounted on the mounting plate below the Y unit.

The relays are supplied with a cover that has ventilating cutouts provided for the escape of gases generated by the interrupting arcs. This cover is larger than the one used on moderate duty HKA relays.

Both relays are for front connection only, the difference between the two being that the Type HKA 29EM has one normally open and one normally closed interlock while the Type HKA29FM has two normally open interlocks.

Operation

The X unit of the HKA relay picks up instantaneously when energized through the control switch contact No. 1 and the "b" contact of the breaker, operating the closing mechanism of the breaker. (Refer to Fig. 2) A normally open interlock on the X unit also closes, setting up the circuit to the Y unit. This circuit is completed by a normally open interlock on the breaker (designated as "aa") and the Y unit picks up instantaneously sealing itself in. The normally closed contact of the Y unit opens the coil circuit of the X unit causing it to drop out. The interrupting arc is drawn and blown upward between the main contact. At the instant the discharge contact makes the operating solenoid is shunted and the arc goes out. The stored energy in the magnetic field is dissipated in the form of I²R losses in the solenoid instead of being used in an attempt to maintain the arc. The arc voltage is equal to or greater than the line voltage when the discharge contacts make, so that there is no possibility of additional current being drawn from the source. Because the resistance of the discharge path is low the time constant L/R can be relatively large, depending upon the inductance of the solenoid. The dropout of the plunger is delayed until the magnetic field has decreased to a value too low to hold the plunger up.

The seal-in feature of the Y unit insures "pump free" action.

Ratings and Burdens

The upper unit coils of all relays are rated for 30 seconds at the voltage indicated on the nameplate. The coil circuit of the lower unit is continuously rated. The lower unit is operated in series with an internally mounted resistor as indicated in the internal connections, Fig. 1 of this instruction book.

The upper unit coil has a burden of approximately 60 watts at its intermittent d-c rating.

The approximate total circuit burden for lower units with series resistors included is shown below:

<u>Voltage Rating</u>	<u>Burden</u>
125 d-c	9 watts
250 d-c	16 watts

Interrupting Capacity of Contacts

Because of the variations in the inductance of the closing solenoid of various circuit breakers, and hence in the stored energy in the solenoid, a contact interrupting rating in terms of current does not represent a true picture of the contact capacity. Therefore, for the relays covered by these instructions the main contact rating is given in terms of

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

GEI-25302B Closing Relays - Heavy Duty

an "energy index" which is approximately proportional to $I^2N^2D^2$ where:

- N = number of turns in solenoid.
- I = exciting current - E/R value or cutoff value.
- D = diameter of plunger in inches

Using the product $I^2N^2D^2$ as an index of severity of interrupting duty this relay can be applied where the energy index does not exceed 114×10^9 at the cutoff current value and 455×10^9 at the E/R value.

The lower unit contacts are rated to interrupt safely the current of the main coil at 110% of rated nameplate voltage, and of course will carry continuously the rated coil current of its own operating coil.

UNPACKING - STORING

Immediately upon receipt of the HKA relay an examination should be made for any damage sustained during shipment. If injury or rough handling is evident, a damage claim should be filed at once with the transportation company and the nearest General Electric Sales Office notified promptly.

INSTALLATION

Location and Mounting

Relays shipped as supply items should be mounted on a vertical surface at or near the breaker and preferably away from the circuit breaker solenoid.

Connections

See Figure 1 for internal connections, outline and panel drilling dimensions.

See Figure 2 for an external connection diagram of a typical application of the type HKA29EM relay. Note that the connection from terminal No. 1 on the relay must be connected to the negative bus that is connected to the negative side of the closing coil.

Inspection and Adjustments

The relays have been adjusted at the factory to operate at less than 60% of rating. Normally it should not be necessary to change the settings of the various contact gaps and wipes, but in the event that readjustment is necessary the following points should be observed.

The control springs of both the upper and lower units should be adjusted for the maximum tension which will still result in pick-up voltages of less than 60% of the d-c rating.

The wipe of the upper unit main contacts should be $1/8$ " measured at the top of the pole piece while that of the interlocks should be $1/8$ " when measured at the end of the interlock contact support. The main

contact gap should be at least $23/64$ " and is not adjustable.

The gap of the "b" contact of the lower unit should be $3/64$ to $1/16$ " with the armature closed. This can be set by means of the adjustable back contact screw. There should be approximately $1/32$ " wipe on the "a" contacts; being measured between the upper edge of the armature and the pole piece with the "a" contact just making.

The discharge contact of the upper unit should always have enough wipe to increase the main contact gap approximately $1/8$ ". This can be checked by comparing the gap when the discharge contacts just make and after they have fully wiped in. This wipe is not adjustable. However, the following points should be checked: The upper unit control spring tension should be set at the allowable maximum; the interlocks should not have more than the recommended $1/8$ " wipe; the flexible shunt connected to the movable contact should be free to bend with the armature motion and should not be hindered by any connecting leads that might be used for other internal connections; the armature and moving contact should be free of any mechanical interference.

If it is ever necessary to replace the arc chute, care must be taken to replace the permanent magnet so that the left end of the magnet is the North pole when facing the relay, making sure that the connection polarities are identical with those indicated on the connection diagram, Figure 2.

When it is found necessary to replace the stationary contact, the arc chute assembly must be taken off. The entire assembly can be removed intact by lifting it out by the sides of the pole pieces after the long screw has been removed. Upon replacing the arc chute make sure that the assembly is in the proper position. The bottom of the arc chute should be parallel to the bottom of the stationary contact bracket. The armature should be picked up by hand to check for any possible mechanical interference of the moving contact and the inside of the arc chute.

The types HKA29EM and HKA29FM relays will operate satisfactorily only with the cover having ventilating slots in it. Also, it is important to make sure that the discharge contacts are actually shorting out the solenoid of the breaker.

MAINTENANCE

A periodic check should be made to insure that the relay units are picking up below the limits given under adjustments, and that the various wipes and contact gaps have not been disturbed.

RENEWAL PARTS

When ordering renewal parts, address the nearest Sales Office of the General Electric Company, specify the quantity required, the name of the part and the nameplate data including the serial number if shown. If possible give the General Electric Company's requisition number on which the relay was furnished.

(K-0400715)

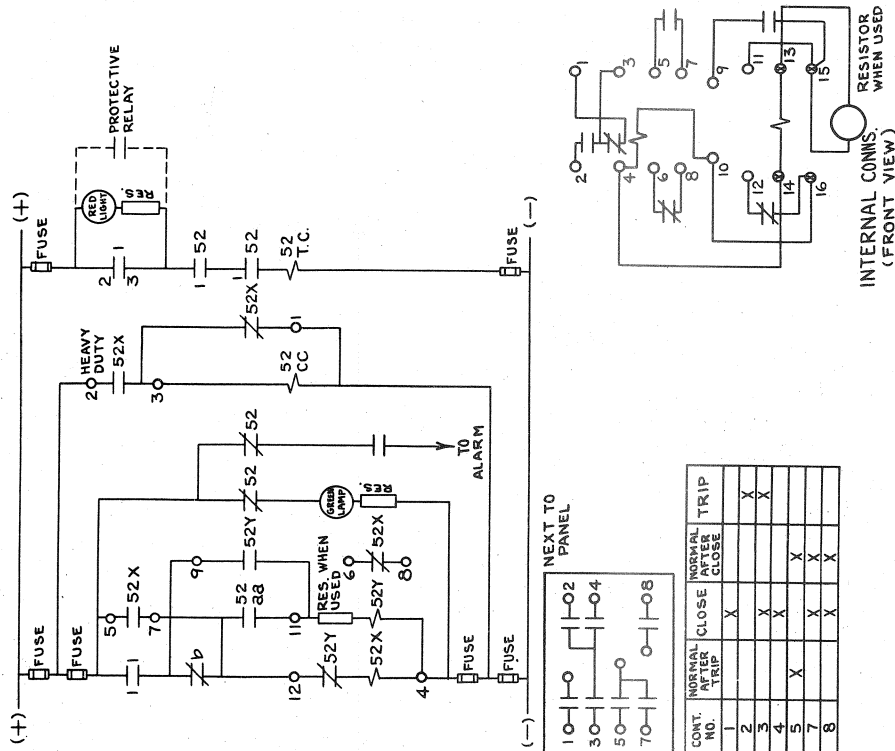


FIG. 2
TYPICAL APPLICATION OF HKA29E RELAY

(-6400714)

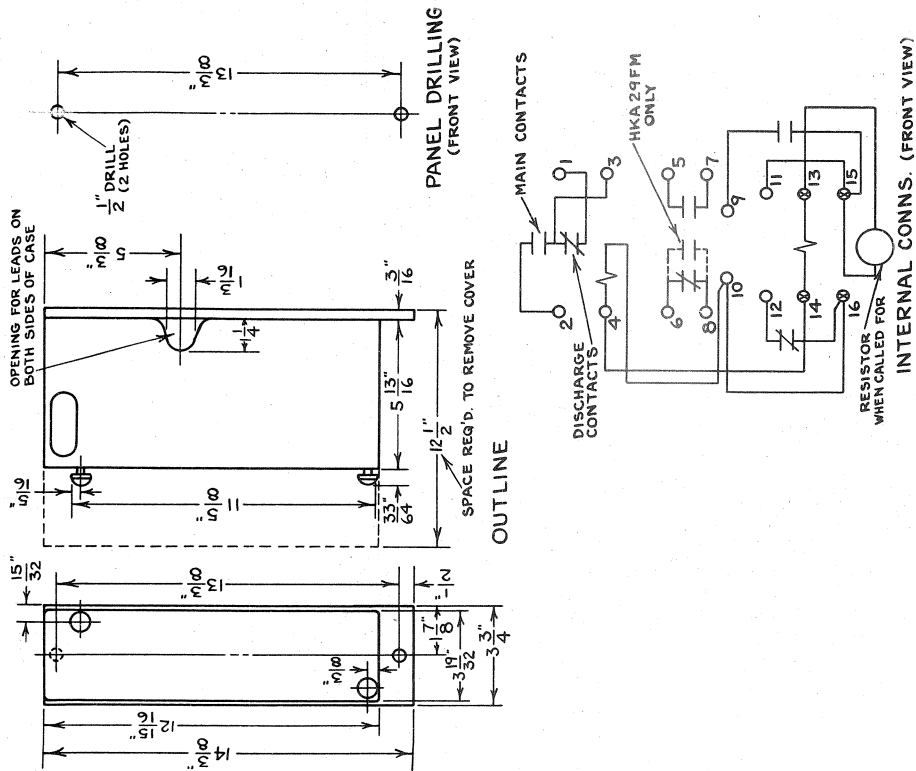


FIG. 1
OUTLINE, PANEL DRILLING AND INTERNAL CONNECTION DIAGRAMS FOR TYPES HKA29EM AND HKA29FM

IF YOU REQUIRE SERVICE

IF AT ANY TIME you find it necessary to repair, recondition, or rebuild your G-E apparatus, there are 29 G-E service shops whose facilities are available day and night for work in the shops or on your premises. Factory methods and genuine G-E renewal parts are used to maintain the original performance of your G-E apparatus. If you need parts only, immediate shipment of many items can be made from warehouse stock.

The services of our factories, engineering divisions, and sales offices are also available to assist you with engineering problems. For full information about these services, contact the nearest service shop or sales office listed below:

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*Convenient G-E Renewal Parts Center for over-the-counter purchases of industrial parts, located at same address.



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APPARATUS DEPARTMENT, GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Supersedes GEI-25302A