Type ICR

Phase-sequence and Undervoltage Relays

For Undervoltage, Open or Reverse Phase-starting Protection for A-c Machines. Also Used in Automatic Throw-over Equipments

APPLICATION

MOTOR RUNNING:

Undervoltage or complete loss of voltage on the armature circuit of a-c motors and synchronous condensers requires disconnection from the power source to prevent damage to the machines. The closing of the normally closed (right) contacts can be adjusted within 75 to 90 per cent of the closing calibration of the normally open left contact.

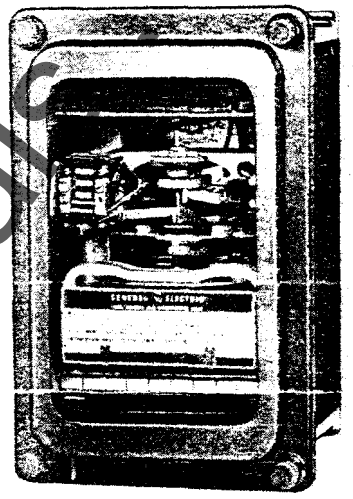
MOTOR STARTING:

Closing-voltage Control is necessary for reduced voltage-started machines in unattended stations for undervoltage protection to be effective on both starting and running connections. The normally open (left) contacts are electrically separate and may be set to close at any value between 75 and 100 per cent of rated 3-phase voltage except for the ICR51A whose range is 65 to 95 per cent.

Open-phase Conditions because of a blown fuse or a defective circuit breaker will initiate relay operation and prevent motor starting. However, usually the relay will not disconnect a running motor, if one phase of the supply is open circuited, because the motor will supply three-phase potential to the relay.

Reverse-phase-sequence starting causing motor rotation reversal is prevented by proper relay action preventing the starting circuit from being energized. Such protection is recommended in automatic throw-over equipments where it is desired to check the presence of 3-phase voltage of correct sequence.

Time Delay of contact operations are dictated by circuit requirements. Some delay may be necessary to prevent shutdown on temporary dips in voltage or delay may be necessary to attain proper sequential operation with other devices in the control circuit. Timing is determined by the calibration settings of the right and left contacts for all relays except the ICR51A which has one normally open contact and has a time dial adjustment.



(Photo 8014333)

Fig. 1. Type ICR53A phase-sequence and undervoltage relay

RATINGS

Ratings	Closing Volts Factory Setting		Target Seal in 0.2/2 Amp	60 Cycle Model No.	★50 Cycle Model No.	* Case Size	Approx Wt in Lb	
Volts	Normally Closed †Right Contacts	Normally Open ‡Left Contacts					Net	Ship.
ADJUSTABLE TIME (10 SECONDS MAXIMUM TO CLOSE CONTACTS AT RATED VOLTAGE) TIME DIAL								
120	...	90	No	12ICR51A1A	.....	S1	10	19
240	...	180	No	A2A	12ICR51A5A			
480	...	360	No	A3A	.....			
LONG TIME (1.2 SECONDS TIME DELAY ON LOSS OF VOLTAGE)								
			S.I. Unit on NC Contact Only					
120	96	108	Yes	12ICR53A1A	12ICR53A4A	S2	10	19
240	191	216	Yes	A2A	A7A			
480	384	432	Yes	A3A	.....			
★208	166	187	Yes	A8A	.....			
120	96	108	No	12ICR53B1A	.....	S2	10	19
240	191	216	No	B2A	12ICR53B4A			
480	384	432	No	B3A	.....			
★208	166	188	No	B6A	.....			
			S.I. Unit on NO. and NC Contacts					
★120	96	108	Yes	12ICR53C1A	.....	S2	10	19
SHORT TIME (0.17 SECOND TIME DELAY ON LOSS OF VOLTAGE)								
120	96	108	Yes	12ICR54A1A	12ICR54A7A	S2	10	19
240	191	216	Yes	A2A	.....			
480	384	432	Yes	A3A	.....			

† The right contacts are opened when the relay is energized, and will close when the voltage drops to values equal to, or less than, those listed in this column. (See ordering directions.)

‡ The left contacts, which are closed when the relay is energized, will open when undervoltage occurs. If single-phase or reverse-phase sequence exists, these contacts will not close when the relay is energized. (See ordering directions.)

ORDERING DIRECTIONS

See Section 7211.

If operating volts other than the normal factory setting are required, specify desired values when ordering.

PRICES

See Section 7210.

DIMENSIONS

*See Section 7340, page 1.

Publications:

Descriptive.....GEA-2524
Instructions:
ICR51A, 53A, 53B, 54A.....GEH-1783
ICR53C.....GEI-39023

Formerly Section 7235, page 5, dated Sept. 4, 1956. ★Added.

Type HFA

Multicontact Auxiliary Relays

For A-c and D-c Circuit Applications

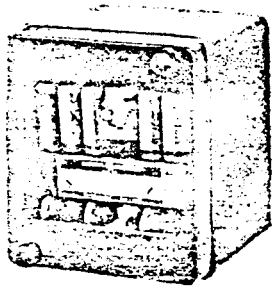
APPLICATION

The Type HFA relay is designed for application where a number of auxiliary functions must be performed simultaneously. **Six contacts** are provided. If more than six circuits are to be controlled, the coils of two or more relays may be connected in series (d-c only) or in parallel.

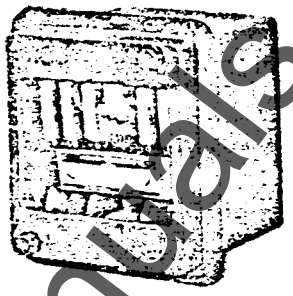
They have six electrically separate contact circuits adaptable for either circuit-opening or circuit-closing applications.

The HFA relays are available for front or back connection. The front-connected relays are suitable for **surface mounting only.**

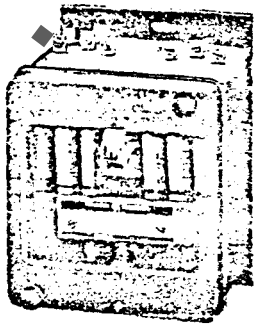
The back-connected relays are suitable for either surface mounting or semi-flush mounting; a steel flange is provided for the latter.



(Photo 8025536)
Fig. 1. Surface mounting (back connected) Type HFA51A



(Photo 8025537)
Fig. 2. Semi-flush (back connected) Type HFA51A-F



(Photo 8025781)
Fig. 3. Surface mounting (front connected) Type HFA51A-H

Selection of Series Resistor (For D-c Relays for Continuous Duty Where Target Operation Is Required): For continuous tripping and other continuous applications, the operating current may be too low to provide a definite target operation of the initiating protective relay. It is standard practice to select a relay with a lower rating and use a series resistor to limit the current. It is usual to limit the operating coil current to approximately twice the rating of the target coil, insuring positive target operation.

Selection of D-c Relays for Tripping Duty Where Operating Coil Circuit Is Opened By An Auxiliary Switch: The operating time of the standard HFA relay is approximately 5 cycles d-c and 2 cycles a-c (60-cycle basis). If used on d-c for tripping a circuit breaker, the operating time should be reduced to approximately 1 cycle in order that no appreciable time delay will be added to the operating tim of the protective relay. This can b accomplished by selecting a relay whic has a lower voltage rating than the con trol circuit. Recommended voltage rating for one minute tripping duty are listed i Table 2 of GET-7292.

When so applied, the HFA operatin coil must be opened by the breaker auxil ary switch, to prevent overheating. The increased current through the HFA operating coil will assure operation of th target on the protective relay.

RATINGS—Six-contact Instantaneous Relays

Rating, Volts	D-c Resistance, Ohms at 25 C †	* Impedance Ohms 25 C †	Operating Time, Cycles ‡	Self-reset Model No. §	Hand-reset Model No. §	Hand and Electric Reset Model No. §*	Hand and Electric Reset with Mechanical Target Model No. §*	Electric Reset Only Model No. §*	Approx W in Lb Net	Approx W in Lb Shi
DIRECT CURRENT—Models Given Are for Surface-mounted Relays—See Fig. 1										
6	5.2	....	5	12HFA51A48	12HFA51B48	12HFA54B1	12HFA54C1	12HFA54E1	5	7
12	21	....		A47	B47	B32	C32	E32		
24	82	....		A46	B46	B63	C63	E63		
32	140	....		A45	B45	B94	C94	E94		
48	336	....		A44	B44	B125	C125	E125		
62.5	510	....		A43	B43	B156	C156	E156		
125	2000	....		A42	B42	B187	C187	E187		
250	8000	....		A41	B41	B218	C218	E218		
ALTERNATING CURRENT, 60 CYCLES										
115	13	415	2	12HFA51A49	12HFA51B49	12HFA54B249	★12HFA54C249	12HFA54E249	5	7
125	15.5	455		A67	B62	....	....	....		
208	45	1350		A50	B50	B656	C656	E656		
230	52	1650		A51	B51	B280	C280	E280		
460	212	6600		A52	B52	B311	C311	E311		
575	336	10000		A53	B53	B342	C342	E342		

* On hand and electric reset Types HFA54B, 54C, and 54E one contact is wired in series with reset coil to provide positive cutoff. Thus **five** contacts are available for external circuits. Also, available upon request are the Types HFA54H, 54J, and 54L with reset coil wired to separate studs, giving 6 contacts for external circuits.

† Within plus or minus 10%.

‡ 60-cycle basis. Time for energizing operating coil to closing of normally open contacts.

§ Prices are the same for either **surface** or semiflush mountin Specify desired mounting on order. If for **semiflush** mounting, ad letter "F" to listed model number. For example—12HFA51A42 If for **surface mounting, front connected,** add letter "H" to list Model number, for example—12HFA51A42H.

PRICES

See Section 7210.

ORDERING DIRECTION

See Section 7211.

DIMENSIONS

See Section 7340.

(Continued on Page 2)

★*Changed or added since Mar. 9, 1959 issue.*

Type HFA

Multicontact Auxiliary Relays

44-46

Dec. 21, 1964

For A-c and D-c Circuit Applications

APPLICATION

The Type HFA relay is designed for application where a number of auxiliary functions must be performed simultaneously. **Six contacts** are provided. If more than six circuits are to be controlled, the coils of two or more relays may be connected in series (d-c only) or in parallel.

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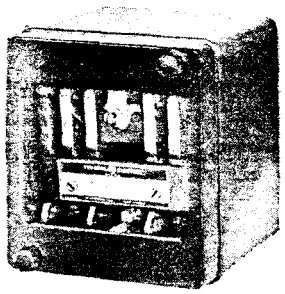
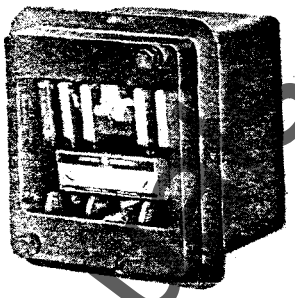


(Photo 8025536)

Fig. 1. Surface mounting (back connected) Type HFA51A



(Photo 8025537)

Fig. 2. Semi-flush (back connected) Type HFA51A-F

(Photo 8025781)

Fig. 3. Surface mounting (front connected) Type HFA51A-H

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PRICES

See Section 7210.

ORDERING DIRECTIONS

See Section 7211.

DIMENSIONS

See Section 7340.

(Continued on Page 2)

★*Changed or added since Mar. 9, 1959 issue.*

Type /