IFCS

Time-overcurrent Relays with Voltage Control

GE Protective Relays

DESCRIPTION

The Type IFCS relays include an induction disc time overcurrent unit with wound shading coils controlled by the contact of an undervoltage unit. This overcurrent unit is similar to the IFC51(inverse) or the IFC53 (very inverse) except that the shading rings on the U magnet have been replaced with the wound shading coils.

The Type IFCS relays are supplied with two electrically separate contacts. One of these contacts which operates the target seal-in unit is on the induction disc unit and can be used as a trip contact; the second contact of the seal-in unit can be used for alarm or remote indication.

APPLICATON

The Type IFCS relays are designed to provide backup protection at the generator against external phase faults which are not cleared by other protective equipment. An inverse time-overcurrent relay may be used for ground fault protection.

Such back-up protection at the generator is normally provided by either a voltage-controlled inverse time overcurrent relay such as the IFCS, or by a single-step distance relay with definite time delay. The choice between the two forms of back-up relaying depends on the type of relays on the adjacent system with which the back-up relays must be selective. If the adjacent circuits are protected by inverse time overcurrent relaying, then the voltage controlled time-overcurrent relay Type IFCS can be used. Models are available with either in-verse or very inverse time characteristics to coordinate with relays of like characteristic on the adjacent system. But if the adjacent circuits are protected by high-speed pilot or step distance relaying, then distance-type relays must be used for the back-up function with the definite time delay provided by an auxiliary timer.

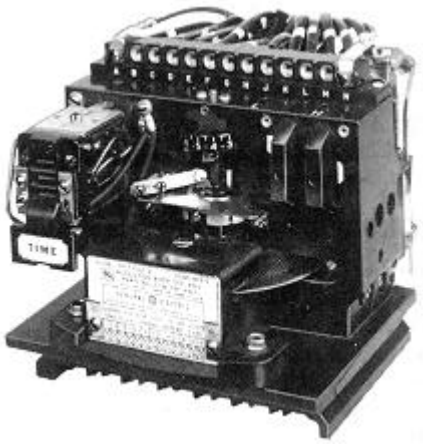
Three single-phase Type IFCS relays are required to provide phase fault back-up protection. The Current source for the relays should be current transformers at the neutral ends of the generator windings when such CT's are available. With these connections the relays will, in addition to external fault back-up protection, provide generator fault back-up protection even if the generator breaker is open or there is no other source of generation on the system.

The undervoltage unit in the Type IFCS relay should be supplied with phase-to-phase voltage preferably from the generator potential transformers . The induction disc unit is typically set to pick up on fault currents below maximum load current and is prevented from operating on normal load conditions by the undervoltage unit. It should be recognized that accidental loss of potential to the Type IFCS relay will cause the relay to trip if generator load current in secondary amperes is greater then the pick-up current of the relay. If a second set of potential transformers is available, an additional relay, the Type CFVB voltage balance relay, can be used to prevent false tripping of the IFCS upon accidental loss of its ac voltage source.

The voltage-controlled phase overcurrent relays, and the inverse time overcurrent ground relay if used, should be connected to trip a Type HEA hand reset auxiliary relay that in turn will trip the main and field breakers, and sound and alarm.

AVAILABLE TAPS (Time-overcurrent unit)

1/12 amp--1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 10.0, 12.0,



(Photo 8043487)
Fig. 1. Type IFCS relay (removed from case)

Voltage Unit

The burden is at unity power factor and is listed below :

Rated Volts	Maximum Burden Watts
120	4.70

SELECTION GUIDE (0.2/2.0 amp target and seal-in)

Voltage	Frequency Hertz	Undervoltage Calibration Range (Volts)	Time Overcurrent Unit Range (Amps)	Model Number	Case Size	Approx Weight lb (kg)	
						Net	Ship
INVERSE CHARACTERISTIC							
120	60	70-100	1/12	12IFCS51AD1A	C1	8	14
120	50	70-100	1/12	12IFCS51AD2A	C1	8	14
VERY INVERSE CHARACTERISTIC							
120	50/60	70-100	1/12	12IFCS53AD1A	C1	8	14

REFERENCES:

BURDENS

Time-overcurrent Unit

Model	Hz	Range	Min Tap Amps	Burdens at Min. Pickup Min. Tap (Ohms)			Burdens in Ohms (Z) Times Pickup		
				R	J_x	Z	3	10	20
1FCS51	60			1.09	4.41	4.55	2.46	1.00	0.77
1FCS53	60	1-12	1.0	0.35	1.18	1.23	1.21	0.82	0.51
1FCS51	50			0.91	3.68	3.79	1.80	0.83	0.64
1FCS53	50			0.29	0.98	1.03	1.01	0.68	0.43

NOTE : The impedance values given are those for minimum tap, the impedance for other taps at pickup current (tap rating) varies inversely (approximately) as the square of the tap rating. For example, an IFCS53 60 hertz relay has an impedance of 1.23 ohms on the 1.0 ampere tap. The impedance of the 4.0 amp tap is $(1.0/4.0)^2 \times 1.23 = 0.77$ ohms.

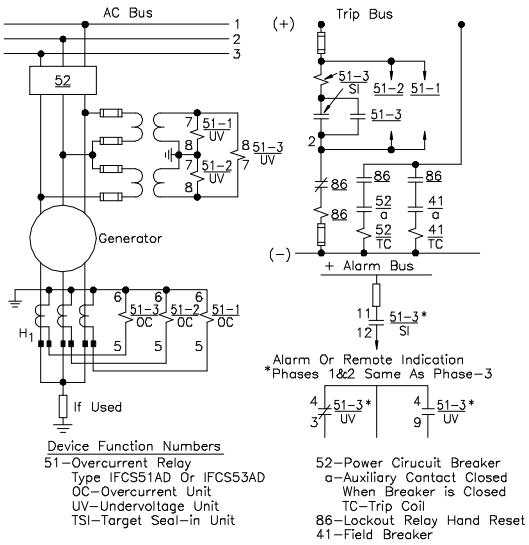


Fig. 3. External connection for relay Type IFCS with generator (275A3812)

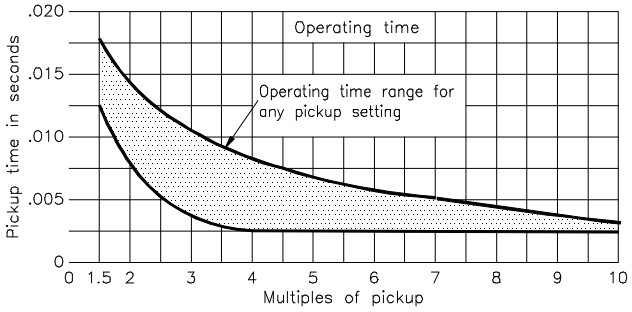


Fig. 2. Time-current curve for instantaneous unit

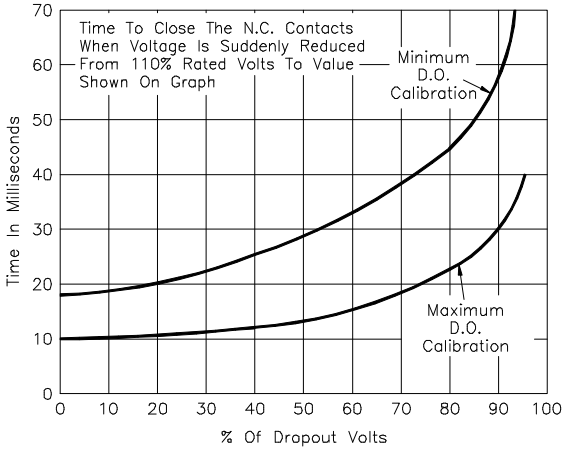
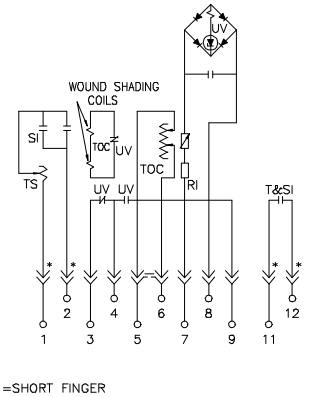


Fig. 4. Operating time curves for the IFCS (165A7560) for voltage unit.



*=SHORT FINGER

Fig. 5. Internal connection diagram (269A3197) for IFCS relay.