IBC

Directional Overcurrent

Directional overcurrent protection of feeders and transmission lines.

Application

- Directional phase fault protection (IBC)

Protection and Control

- Time overcurrent

Features

- Mechanical targets
- 3 inverse time/current operating characteristics
- Drawout case

APPLICATION

The IBC directional overcurrent relays are employed primarily for the protection of feeders and transmission lines in applications where single-phase relays are desired or required.

The IBC relays consist of two units, an instantaneous power-directional unit (bottom) of the induction-cup type, and a time overcurrent unit (top) of the induction-disk type. The directional-unit contacts control the operation of the overcurrent unit (directional control).

Phase Faults—IBC

The IBC relays are frequently applied for phase-fault protection of a single line. Typical external connections of current and potential transformers are shown in Fig. 1. With this connection, the current (at unity-power-factor load) leads the polarizing potential by 90 degrees. Since the directional unit has a 45-degree characteristic, its maximum torque will occur when the fault current (balanced 3-phase fault) lags its unity-power-factor position by 45 degrees.

General

Inverse Time Characteristic preferred where fault current magnitude depends largely upon system generating capacity at time of fault.

Very-inverse and Extremely-inverse Time Characteristics are preferred where fault current magnitude is dependent mainly upon location of fault relative to relay and only slightly upon system generation setup.

Target Seal-in-units are provided for the time and instantaneous overcurrent units and are rated 0.2/2 A.

COIL

The short-time and continuous ratings of the operating coil circuits are shown in Table 1.

The current and potential polarizing coils of the dual-polarized ground relay are rated as follows:

Potential polarizing coils—120 V continuous at rated frequency.

Current polarizing coils—continuous rating of 5 A with a one (1) sec rating of 160 A.

Table 1. Time overcurrent unit taps and ratings

Tap Range (A)	Character	1 Sec Rating (A)	Cont. Rating (A)	
			Min. Tap	Max. Tap
0.5-4.0	Inverse	70	1.6	5.0
	V. Inverse	140	4.0	13
	Ext. Inv.	125	3.5	10
1.5-12	V. Inverse	260	10	30.5
	Ext. Inv.	260	9.5	20
2-16	Inverse	260	8	20

Table 2. Non-directional instantaneous unit ratings

Range (A)	Connection and Range (A)		Contin. Rating (A)	1 Sec Rating (A)
6-150	Low (Series)	6-30 ①	10.2	260
	High (Parallel)	30-150 ①	19.6	

① This range is approximate, which means that 6-30 and 30-150 might actually be 6-28 and 28-150. However, there is at least a one-amp overlap between the maximum "Low" setting and the minimum "High" setting.

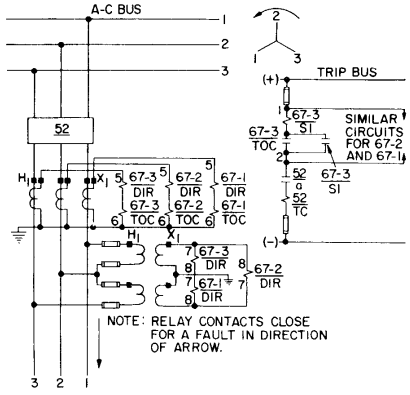
AVAILABLE SETTINGS

Time Overcurrent Units:

- 0.5-4.0 — 0.5, 0.6, 0.7, 0.8, 1, 1.2, 1.5, 2, 2.5, 3, 4
- 1.5-1.2 — 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 10, 12
- 2-16— 2, 2.5, 3, 4, 5, 6, 7, 8, 10, 12, 16

CONNECTION DIAGRAM

Fig. 1. Typical 90-degree connection of three Type IBC relays used for directional overcurrent protection of a single line.



CONTACTS

The current-closing rating of the induction unit contacts is 30 A for voltages not exceeding 250 V. Their current-carrying rating is limited by the tap rating of the seal-in unit.

SELECTION GUIDE

0.2/2.0 A TARGET AND SEAL-IN UNIT

Freq. (Hz)	Rating (A)			Model Number						Case Size	Approx. Wt. in lbs (kg)	
	Time Unit	Non-Dir. Inst. Unit	Dir. P.U. ①	Inverse Time	Very Inverse Time	Ext. Inverse Time	Inverse Time	Very Inverse Time	Ext. Inverse Time		Net	Ship
IBC, PHASE-TYPE, 120 V					1 N.O. CONTACT			2 N.O. CONTACTS				
60	1.5-12		—	-----	IBC53M1A	IBC77M1A	-----	IBC54M1A	IBC78M2A	M1	22 (10)	35 (15.9)
	2-16		—	IBC51M1A	-----	-----	IBC52M1A	-----	-----			
	1.5-12	6-150	—	-----	IBC53M1Y1A	IBC77M1Y1A	-----	-----	-----		23 (10.4)	36 (16.3)
	2-16		—	IBC51M1Y1A	-----	-----	-----	-----	-----			
50	1.5-12		—	-----	IBC53M2A	IBC77M2A	-----	IBC54M2A	IBC78M3A		22 (10)	35 (15.9)
	2-16		—	IBC51M2A	-----	-----	IBC52M2A	-----	-----			
	1.5-12	6-150	—	-----	IBC53M2Y1A	IBC77M2Y1A	-----	-----	-----		23 (10.4)	36 (16.3)
	2-16		—	IBC51M2Y1A	-----	-----	-----	-----	-----			

① At rated voltage.