

Directional overcurrent protection of feeders and transmission lines.



Type IBC relay



Type IBCG relay

APPLICATION

The Type 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 Types IBC and IBCG 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 Type 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.

Ground Faults—IBCG

The IBCG relay is designed for protection against ground faults and is consequently of lower operating current range. The relays used for ground-fault protection usually have a low-range operating coil which is rated either 0.5/4 or 1.5/12 A. 2/16 rating is also available.

The directional unit of the Type IBCG is dual-polarized and may be polarized by current alone, voltage alone, or by both simultaneously. This dual polarization is desirable on applications where both current and potential polarizing sources are

IBC/IBCG

Directional Overcurrent Relay

Application

- Directional phase fault protection (IBC)
- Directional ground fault protection (IBCG)

Protection and Control

- Time overcurrent

Features

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

available and there is a possibility that one or the other source may be temporarily lost.

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.

COIL

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)	Cont. Rating (A)	1 Sec Rating (A)
6-150	Low (Series)	6-30 ^①	10.2
	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.

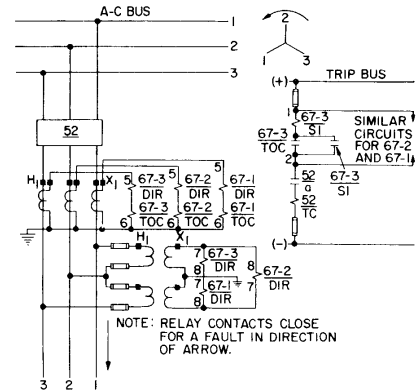
AVAILABLE SETTINGS

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
- 1.5-12 — 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		—	-----	12IBC53M1A	12IBC77M1A	-----	12IBC54M1A	12IBC78M2A	M-1	22 (10)	35 (15.9)
				-----	12IBC51M1A	-----	-----	-----				
	2-16	6-150	—	-----	12IBC53M1Y1A	12IBC77M1Y1A	-----	-----	-----		23 (10.4)	36 (16.3)
				-----	12IBC51M1Y1A	-----	-----	-----				
50	1.5-12		—	-----	12IBC53M2A	12IBC77M2A	-----	12IBC54M2A	12IBC78M3A	M-1	22 (10)	35 (15.9)
				-----	12IBC51M2A	-----	-----	-----				
	2-16	6-150	—	-----	12IBC53M2Y1A	12IBC77M2Y1A	-----	-----	-----		23 (10.4)	36 (16.3)
				-----	12IBC51M2Y1A	-----	-----	-----				
IBC, GROUND-TYPE, 120 V												
				1 N.O. CONTACT			2 N.O. CONTACTS					
60	0.5-4		—	12IBC51M1A	12IBC53M1A	12IBC77M1A	12IBC52M1A	12IBC54M1A	12IBC78M1A	M-1	22 (10)	35 (15.9)
				-----	12IBC53M2A	12IBC77M2A	-----	12IBC54M2A	12IBC78M2A			
				-----	12IBC51M2A	-----	12IBC52M2A	-----	-----			
	1.5-12	6-150	—	12IBC51M1Y1A	12IBC53M1Y1A	-----	-----	-----	-----		23 (10.4)	36 (16.3)
				-----	12IBC53M2Y1A	-----	-----	-----				
				-----	12IBC51M2Y1A	-----	-----	-----				
50	0.5-4		—	12IBC51M3A	12IBC53M3A	12IBC77M3A	12IBC52M3A	12IBC54M3A	-----	M-1	22 (10)	35 (15.9)
				-----	12IBC53M4A	12IBC77M4A	-----	12IBC54M4A	-----			
				-----	12IBC51M4A	-----	12IBC52M4A	-----	-----			
	1.5-12	6-150	—	12IBC51M3Y1A	12IBC53M3Y1A	-----	-----	-----	-----		23 (10.4)	36 (16.3)
				-----	12IBC53M4Y1A	-----	-----	-----				
				-----	12IBC51M4Y1A	-----	-----	-----				

^① At rated voltage.