Type CDD

Directional overcurrent and earth fault relays

ALSTOM

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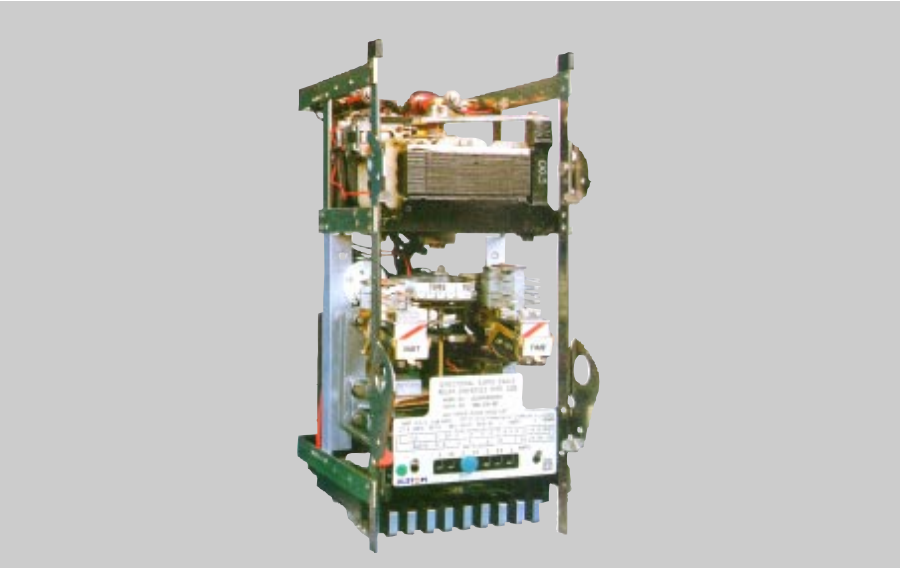

CDD 21 relay
withdrawn from case

Features

- High speed directional control.
- Sensitive directional discrimination down to 1% rated voltage.
- Identical time/current characteristics on all taps.
- High torque, ensuring consistent timing even under adverse conditions.
- Low overshoot.
- Simple construction, easily accessible.
- Comprehensive range of auxiliary and highset unit ratings.
- Dust tight drawout case and tropicalised finish.
- CDD 21 and CDD 31 relays are self powered. Hence no auxiliary supply is required.

Application

Directional phase or earth fault protection of ring mains, parallel transformers, feeders, parallel feeders etc., employing time grading principle.

Description

Type CDD relay comprises an induction disc overcurrent unit with wound shading coils and a directional high speed induction cup unit. The cup unit contact is wired across the shading coils so that no torque is exerted on the disc of the overcurrent unit until the cup unit contact closes. The induction disc unit is thus directionally controlled and it operates only when the current flows in the tripping direction.

The IDMT relay has an auxiliary unit which is powered by a secondary winding on the electromagnet through a rectifier and as such, a separate auxiliary supply is not required. When the disc unit operates and closes its contact, the auxiliary element connected across the secondary winding on the electromagnet operates and one normally open contact of the auxiliary element reinforces the disc contact. Two other contacts of the auxiliary element are brought out to the terminals of the relay.
(Refer figure 2)

The directional unit is a high speed, low inertia four pole induction cup movement designed to give a high, steady and non-vibrating torque. Its current coil is connected in series with the operating coil of the induction disc unit. The directional unit is normally provided with voltage polarising coil. However, the earth fault relay directional unit can be provided with a current polarising coil, if required.

Types CDD 21, CDD 23 and CDD 24 are directional versions of types CDG 11, CDG 13 and CDG 14 (plain inverse, very inverse and extremely inverse time current) relays respectively. Types CDG 11, CDG 13 and CDG 14 relays are described in relevant publications.

A highset instantaneous overcurrent unit can be fitted in the same case to provide instantaneous protection under maximum short circuit conditions and to improve discrimination on time graded protective systems. This highset unit can be directionalised if required.

Types CDD 21, 23 and 24 are single pole relays. Types CDD 31, 33 and 34 have instantaneous highset units, in addition to the directional IDMT. In types CDD 41, 43 and 44, the highset units are also directionalised.

Of the above relays, only CDD 21 and CDD 31 relays are self-powered.

Burdens

Current coil: 3VA or 1VA nominal for disc unit. 3VA disc unit should be used where CTs are adequately rated.

Relay	Burden at min. setting	Burden at max. setting
CDD 21 with 3VA disc unit (self powered)	2.25VA	7.5VA
CDD 21 with 1VA disc unit	1.0VA	5.3VA
CDD 23	1.0VA	6.0VA
CDD 24	0.6VA	6.0VA

Current polarising coil: 1VA at rated current.
Voltage polarising coil: 9VA or 4.5W at 110V ac.
3VA or 1.5W at 63.5V ac.
Current and voltage transformer requirements will be given on request.

Thermal ratings

Maximum continuous current ratings limited by disc unit coil rating.

Current coil tap	1	2	3	4	5	6	7
Times current setting	4.5	3.7	3.2	2.7	2.6	2.4	2.2

Withstands 20 times maximum current for 3s.
Voltage polarising coil continuously rated for 200V ac.

Technical data

Settings

O/C elements

IDMT : 50% - 200%

Highset : 250% - 2000%

E/F element

IDMT : 10% - 40% or
20% - 80%

Highset : 100% - 800%

Directional unit coil ratings

Current coil:

0.2, 1.0, 2.0 and 5 amps. Rating selected as close as possible to centre tap current setting of induction disc unit.

Voltage polarising coil:

63.5 or 110 V ac, 50 Hz.

Current polarising coil:

1A or 5A for earthfault relay. For current polarisation, a suitable current transformer is required in the neutral to earth connection of a power transformer.

Maximum torque angle

(Characteristic angle)

Phase fault:

45° or 30° current leading. Quadrature connection normally used with current coil connected in one phase and voltage coil across other two phases.

Earth fault:

14° current lagging for resistance earthed systems.

45° or 60° current lagging for solidly earthed systems. A 3 phase 5 limb VT with open delta tertiary or 3 single phase VTs with tertiary winding used for supply to polarising coil. MTA for current polarised relay is 0° as current in current coil and polarising coil are in phase.

Operating time

Less than 0.010 second for directional unit which is very small compared with overall operating time of CDD relay.

Accuracy

Error class index:

- E 7.5 as per BS 142
- 7.5 as per IS 3231

Frequency error

Timing error less than 8% for 2 Hz frequency variations. Time grading unaffected by such small error, since all relays are similarly affected.

Temperature error

For 10 times setting current at ambient temperature between +45°C and –5°C, percentage timing errors are as follows:

- CDD 21 : 3 seconds relay –3% and +4%
- CDD 21 : 1.3 seconds relay –4% and +4%
- CDD 23 : +1% and –1%
- CDD 24 : –3% and +5%

Directional discrimination

Down to about 1% normal voltage with 1 to 15 times coil rated current.

Down to about 3% normal voltage with 0.4 to 40 times coil rated current. Directional characteristics of 45° MTA CDD relay shown in Figure 1.

Output contacts

These are provided via an auxiliary unit with 2 pairs of self, hand or combined self and hand reset contacts, which reinforces the disc contact and a hand reset operation indicator is also provided.

Coil rating

Voltage operated auxiliary unit 30, 110 or 220V dc with nominal burden of 3 watts upto 110V and 6W for 220V.

Other coil ratings are available on request.

Contact ratings

Disc contact:
Make and carry for 0.5s 2500 VA with maxima of 10A/660V ac/dc.

Auxiliary unit contact:
Make and carry for 0.5s 5700 VA with maxima of 30A/660V ac/dc.

Insulation

The relay meets the requirements of IS 3231/IEC 255-5 Series C-2 KV for 1 minute.

Case

1½ D vertical case suitable for flush or projection mounting and finished eggshell black and tropicalised. Suitable trip isolating switch and CT shorting switches provided on the cradle assembly/case.

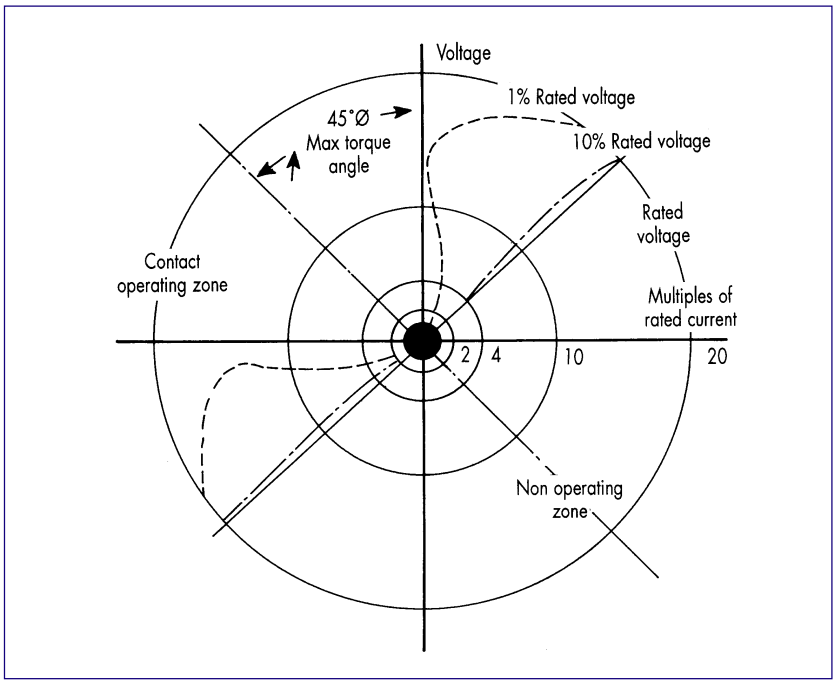

Figure 1:
Directional characteristics of a 45° MTA CDD relay

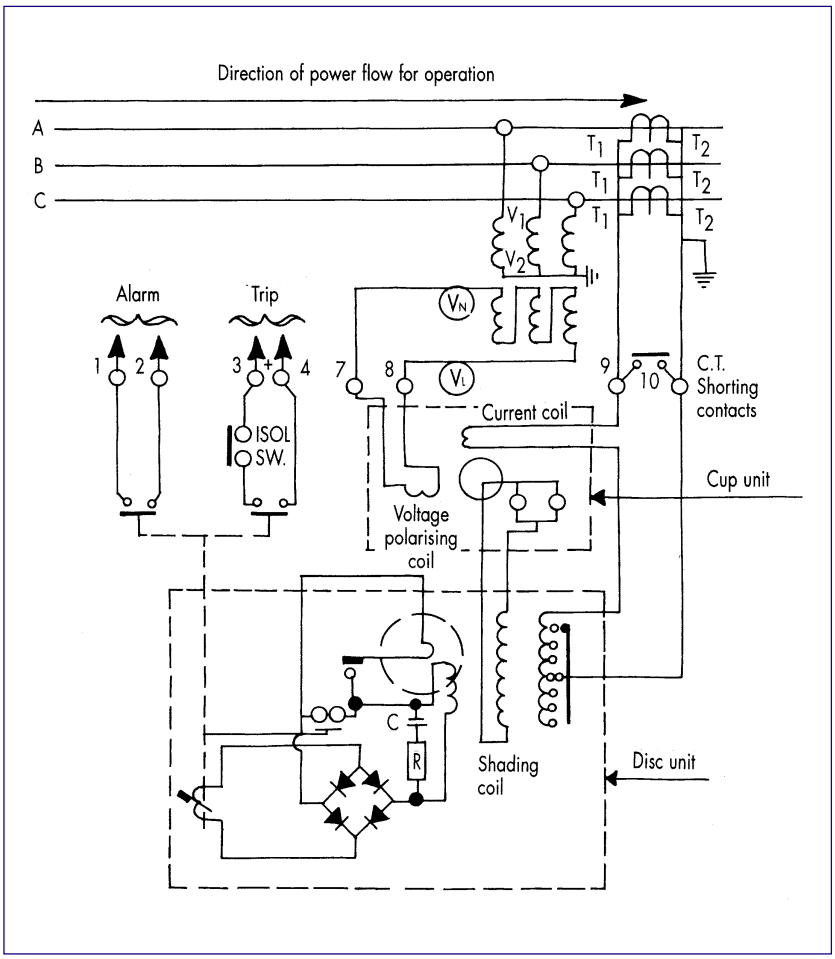

Figure 2:
Typical external and internal connections for type CDD 21 voltage polarised directional earthfault relay with shunt reinforcing unit

Dimensions and weights

Relay	Case size	Maximum overall dimensions			Approximate gross weight Kg.
		Height mm	Width mm	Depth* mm	
CDD 21, 23, 24 CDD 31, 33, 34 CDD 31, 33, 34	1½ D	362	170	203	12.0

* Add 76 mm for maximum length of terminal studs, alternatively, 29 mm for terminal screws.

The approximate gross weights given above are inclusive of cartons, mounting appendages and terminal details.

The relays comply fully with the requirements of IS 3231 and are suitable for use in normal tropical environments.

Information required with order

1. Type of relay (CDD 21, 23 or 24, CDD 31, 33 or 34, CDD 41, 43 or 44) and system frequency.
2. Current transformer secondary rating.
3. Current setting range.
4. Voltage transformer secondary rating (for voltage polarised relays).
5. Current transformer secondary rating (for current polarised earth fault relays).
6. Maximum torque angle.
7. Characteristic (0-3.0s or 0-1.3s at 10 times current setting – for CDD 21 relays only).
8. Self powered or not – for CDD 21/31 relays only.
9. Auxiliary voltage (for shunt auxiliary units).
10. Operation indicator inscription if required.
11. Auxiliary contacts – hand or self reset.
12. Current setting range of highset unit, if required.
13. Type of mounting – flush or projection.

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