

BDD

Percentage\Differential with Harmonic Restraint

Description

BDD relays are for the protection of transformers rated 2000 kVA and above and for transformers with windings rated 15 kV or above. However, the importance of the transformer to the system, not its size alone, should be the basis for the decision on this quality of protection.

Applications

The BDD differential relays should be used for all applications where high-speed operation and system stability are important. These relays have a percentage slope operating characteristic which prevents operation unless the differential current is greater than a certain percentage of the through current. A tap plug on the front of the relay provides slope percentages of 15, 25, or 40 which is usually adequate even for inphase tap changing under load. Current transformer errors should not exceed 20 percent at 8 times tap value.

Six different forms of the BDD relay are available. Each relay is a single-phase unit with one differential circuit. Three relays are required for three-phase protection. The six different forms are provided with two, three, four, five, six or seven through-current restraint circuits for the protection of power transformers with two or more windings or circuits.

The BDD15B, -16B, -17B, -18B, -19B and -20B with two, three, four, five, six and seven throughcurrent restraint circuits, respectively, also have provision for accommodating one additional circuit connection to the transformer without a throughcurrent restraint in the relay. This application can safely be made only when the additional circuit has no in-feed or is at best a very weak source and needs no through-current restraint.



High speed phase and ground protection of 2- and 3-winding power transformers and autotransformers.

Features and Benefits

- No auxiliary CT's are required
- Ratio matching taps
- Harmonic restraint prevents incorrect tripping upon transformer energization
- Self-contained target indicator
- Inherently selective
- Drawout case

Applications

- Power and autotransformer protection
- Current differential single phase

Protection and Control

- High speed percentage differential
- Phase and ground fault detection
- Current restraint circuits available
- Percent differential slope selection



Connection Diagram

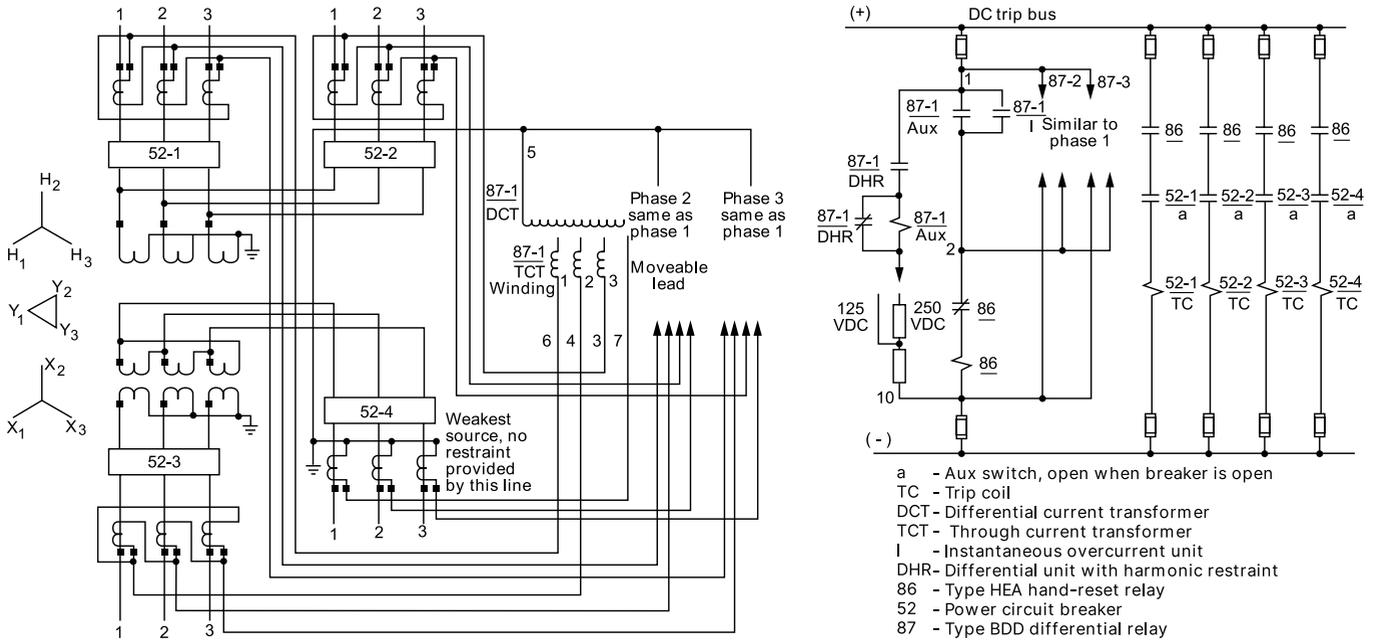


Fig. 1. Typical elementary diagram for Model No. 12BDD16B11 relays for four-circuit transformer protection with three restraints (0264B0499-1)

- ① Burden of operating coil is zero under normal conditions.
- ② Burden of 50 Hz relay is the same or slightly lower.
- ③ It should be recognized that pickup current flows not only through the differential current transformer but also through one of the primary windings of the through current transformer producing some restraint. However, compared to the operating energy, this quantity of restraint is so small that it may be assumed to be zero.

Contacts

The BDD15B relay is provided with two sets of open contacts and the BDD16B, -17B, -18B, -19B and -20B are provided with one set of open contacts. The current-closing rating of the contacts is 30 A for voltages not exceeding 250 V. If more than one circuit breaker per set of contacts is to be tripped, or if the tripping current exceeds 30 A, an auxiliary relay must be used with the BDD relay. After tripping occurs, it is necessary that the tripping circuit of these relays be opened by an auxiliary switch on the circuit breaker or by other automatic means. A hand-reset relay is recommended and normally used.

Burdens

NOTE: Burdens and minimum pickup values are substantially independent of the percent slope settings and are approximately 100 percent power factor. Figures given are burdens imposed on each current transformer at 5.0 A.

RELAY	TAP SETTING (A)	ZERO RESTRAINT PICKUP ③ (A)	OPERATING CIRCUIT ① 60 Hz RELAYS ②		RESTRAINT CIRCUIT 60 Hz RELAYS ②	
			BURDEN VA	IMPED Ohms	BURDEN VA	IMPED Ohms
BDD 15B	}	0.87	3.2	0.128	1.3	0.052
16B		0.96	2.7	0.108	1.2	0.048
17B		1.05	2.4	0.096	1.1	0.044
18B		1.14	2.0	0.080	1.0	0.040
19B		1.26	1.9	0.076	0.9	0.036
20B		1.38	1.5	0.064	0.8	0.032
		1.50	1.5	0.060	0.7	0.028
		2.61	0.7	0.028	0.5	0.020

Selection Guide

Single-phase (3 Relays Required for 3-phase Protection); RATINGS Single-phase 5 A 1.5 A minimum pick-up; 15/25/40 percent slope.

RATINGS		NUMBER OF CONTACTS	DC CONTROL VOLTS			CASE SIZE	APPROX. WT. IN lbs (kg)	
Amps	FREQUENCY (Hz)		125/250	148/125	24/48		NET	SHIP
MODEL NUMBER								
For Transformer Protection Requiring 2 Restraints								
5	60	2 N.O.	BDD15B11A	BDD15B16A	BDD15B13A	M1	22 (10)	34 (15.4)
	50		BDD15B12A	BDD15B17A	BDD15B14A			
For Transformer Protection Requiring 3 Restraints								
5	60	1 N.O.	BDD16B11A	BDD16B16A	BDD16B13A	M1	24 (10.9)	36 (16.3)
	50		BDD16B12A	BDD16B18A	BDD16B14A			
For Transformer Protection Requiring 4 Restraints								
5	60	1 N.O.	BDD17B1A	BDD17B3A	-----	L2	26 (11.8)	39 (17.7)
	50		BDD17B2A	-----	-----			
For Transformer Protection Requiring 5 Restraints								
5	60	1 N.O.	BDD18B3A	BDD18B5A	-----	L2	28 (12.7)	42 (19)
	50		BDD18B1A	BDD18B6A	-----			
For Transformer Protection Requiring 6 Restraints								
5	60	1 N.O.	BDD19B1A	BDD19B2A	-----	L2	28 (12.7)	42 (19)
For Transformer Protection Requiring 7 Restraints								
5	60	1 N.O.	BDD20B1A	-----	-----	L2	28 (12.7)	42 (19)

① Minimum pickup is 1.5 A with tap plugs in the 5 A and the 25 percent slope positions

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