

## Percentage \ Differential with Harmonic 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





## 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 (A)	Operating Circuit <sup>®</sup> 60 Hz Relays <sup>®</sup>		Restraint Circuit 60 Hz Relays <sup>®</sup>	
			Burden VA	Imped Ohms	Burden VA	Imped Ohms
		0.87				
BDD 15B	2.9	0.96	3.2	0.128	1.3	0.052
16B	3.2	1.05	2.7	0.108	1.2	0.048
17B	3.5	1.14	2.4	0.096	1.1	0.044
18B	3.8	1.26	2.0	0.080	1.0	0.040
19B	4.2	1.38	1.9	0.076	0.9	0.036
20B	4.6	1.50	1.6	0.064	0.8	0.032
	5.0	2.61	1.5	0.060	0.7	0.028
	8.7		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					
<b>FOR TRANSFORMER PROTECTION REQUIRING 2 RESTRAINTS</b>								
5	60	2 N.O.	BDD15B11A	BDD15B16A	BDD15B13A	M1	22 (10)	34 (15.4)
	50		BDD15B12A	BDD15B17A	BDD15B14A			
<b>FOR TRANSFORMER PROTECTION REQUIRING 3 RESTRAINTS</b>								
5	60	1 N.O.	BDD16B11A	BDD16B16A	BDD16B13A	M1	24 (10.9)	36 (16.3)
	50		BDD16B12A	BDD16B18A	BDD16B14A			
<b>FOR TRANSFORMER PROTECTION REQUIRING 4 RESTRAINTS</b>								
5	60	1 N.O.	BDD17B1A	BDD17B3A	-----	L2	26 (11.8)	39 (17.7)
	50		BDD17B2A	-----	-----			
<b>FOR TRANSFORMER PROTECTION REQUIRING 5 RESTRAINTS</b>								
5	60	1 N.O.	BDD18B3A	BDD18B5A	-----	L2	28 (12.7)	42 (19)
	50		BDD18B1A	BDD18B6A	-----			
<b>FOR TRANSFORMER PROTECTION REQUIRING 6 RESTRAINTS</b>								
5	60	1 N.O.	BDD19B1A	BDD19B2A	-----	L2	28 (12.7)	42 (19)
<b>FOR TRANSFORMER PROTECTION REQUIRING 7 RESTRAINTS</b>								
5	60	1 N.O.	BDD20B1A	-----	-----	L2	28 (12.7)	42 (19)

<sup>®</sup> Minimum pickup is 1.5 A with tap plugs in the 5 A and the 25 percent slope positions.