



*High speed, sensitive, three phase  
voltage-unbalance relay.*

#### Features and Benefits

- Drawout case

#### Applications

- Motor bus
- Detection of upstream blown fuse

#### Protection and Control

- 3 phase voltage unbalance



## Description

The NBV11A relay is a high speed sensitive three-phase voltage unbalance relay which is capable of detecting a small voltage unbalance in a three-phase system. The NBV11A when applied as a protective device is normally used in conjunction with a time-delay relay. One NBV11A relay and one timing relay are required at each terminal.

## Application

The principal application of the NBV11A relay is to protect three-phase motors from the damage which may be caused by single-phase operation. When one fuse blows in a three-phase supply to a group of motors, these motors will continue to run on single-phase power. At this time the voltage unbalance will be small since the motors will maintain nearly full voltage across the open phase and a sensitive voltage unbalance relay is required to detect the single phase power so the NBV11A relay is used to trip the supply breaker or to sound an alarm. Since the NBV operates on a percentage of the

unbalance in line voltages, it will detect a single-phase condition on light load as well as on heavy load. The NBV is usually connected to a bus and it will effectively protect a group of many motors when the open circuit is between source and the bus. The NBV11A is a high speed relay and a timing relay should be used to prevent false tripping or alarm. When undervoltage tripping is permissible, the scheme using a 27 device should be used. If a reliable source of dc power is available, a dc timing relay such as the SAM may be used. In the above application the relay also provides protection against reverse phase-sequence operation.

## Contact Ratings

The relay contact ratings are as shown below.

Table 1 Contact Ratings

Rating	Continuous Current (Amps)	Interruption Current (Amps)	
		Ind	Non-ind
125 V-DC	1.0	0.3	0.75
250 V-DC	1.0	0.01	0.2
115 V-60 cy	1.0	2.0	4.0
230 V-60 cy	1.0	1.0	2.0

## Burdens

The three-phase burden of the NBV relay does not divide equally

Table II Burdens

Volts	Frequency (Hz)	Current (mA)			Burden per PT (VA) Wye-connected PTS			Burden per PT (VA) Open Delta PTS	
		1 <sub>s</sub>	1 <sub>6</sub>	1 <sub>7</sub>	PT #1 (Studs 5-6)	PT #2 (Studs 6-7)	PT #3 (Studs 7-5)	PT #1 (Stud 5)	PT #2 (Stud 7)
120	60	77	115	38	5.32	7.97	2.63	9.23	4.56
120	50	40	95	66	2.77	6.57	4.57	4.80	7.82
208	60	38	59	23	3.96	7.07	2.76	7.90	4.78
208	50	32	49	19	3.30	5.90	2.30	6.60	3.98
240	60	80	120	40	2.70	4.00	1.30	4.60	2.28

## Selection Guide

Ratings		Model Number	Pickup (VN) <sup>①</sup>	Range (V)		Case Size	Approx Wt in lbs (kg)	
Voltage	Frequency (Hz)			VS	VT		Net	Ship.
120 208 240	60	NBV11A1A A3A A4A	5.8-11.5 10-20 11.5-23	10-20 17-34 20-40	5.8-11.5 10-20 11.5-23	S1	15(6.8)	22(10)
120 208	50	A2A A5A	5.8-11.5 10-20	10-20 17-34	5.8-11.5 10-20			

① See Figure 1.

Note: Harmonic filter – 60 Hz, 165A6788G1; 50 Hz, 165A6788G2

among the potential transformers that supply the relay. Thus, Table II illustrates how this burden divides when the relay is supplied from 3 potential transformers that are connected in wye with relay stud 5 connected to PT #1, relay stud 6 to PT #2, and relay stud 7 to PT #3.

Table II gives the burden division when the relay is supplied from two potential transformers connected in open delta. It is recommended that terminal 6 of the relay be connected to the "V" point of the delta- potential transformers.

Fig. 1. System voltages under balanced and unbalanced conditions

