

INTRODUCTION

BE3-47N phase balance relays protect three-phase lines, transformers, motors, and generators against phase unbalance, phase loss, and phase reversal. BE3-47N/27 relays have the added feature of undervoltage protection. The output relay energizes and the red RELAY LED lights when a balanced input with the proper phase sequence is sensed. The output relay de-energizes and the RELAY LED goes out when a fault condition is detected. The green POWER LED indicates the condition of the power supply. Two external controls are provided: UNBAL (unbalance) and DELAY. The UNBAL control adjusts the percentage of unbalanced voltage at which the relay trips. The DELAY control provides an adjustable time delay to prevent tripping on voltage transients.

SPECIFICATIONS

Inputs

All units are self powered.

Nominal Voltage:	120 Vac, 240 Vac, 380 Vac, or 480 Vac
Overload Withstand:	1.25 times nominal continuously. 2 times nominal for 3 s.
Frequency:	50, 60, or 400 Hz
Burden:	<2 VA

Setpoint

Range:	Adjustable 5 to 15% ($\pm 5\%$) of nominal)
Repeatability:	Greater than 0.5% of full span
Undervoltage:	Preset at 85% of nominal (BE3-47N/27 only)
Time Delay:	Adjustable 0 to 10 s
Operating Time:	200 ms, typical

Outputs

Relay Type:	D.P.D.T.
AC Rating:	250 V, 5 A, non-resistive, 1200 VA
DC Rating:	125 V, 1 A, resistive, 120 W
Mechanical Life:	5 million operations

Temperature

Operating Temperature:	0°C (32°F) to 60°C (140°F)
Functional Temperature:	-25°C (-13°F) to 70°C (158°F)
Storage Temperature:	-40°C (-40°F) to 70°C (158°F)
Temperature Coefficient:	0.03% per °C (300 ppm/°C)

Humidity

Relative Humidity:	95% non-condensing
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Physical

Mounting:	DIN rail 1.38" by 0.29" (35 mm by 7.5 mm)
Case:	Complies with IEC 529, DIN 40050, BS 5490
Case Material:	Complies with UL 94V0
Weight:	0.88 lb (0.4 kg)
Size:	2.17" wide (55 mm)

Agency

cULus listed to UL 508 and CSA C22.2 No. 14
CE compliant
GOST-R certified per the relevant standards of Gosstandart of Russia

OPERATION

The BE3-47N and BE3-47N/27 phase balance relays have two external, user-adjustable controls marked UNBAL and DELAY. The UNBAL control adjusts the relay trip point. The relay trips when the voltage becomes unbalanced by the percentage set by the UNBAL control. The trip point is adjustable from 5 to 15% ($\pm 5\%$) of nominal input. The DELAY control adjusts the time from when a fault is detected until the output contacts change state. The delay is adjustable from 0 to 10 seconds. The undervoltage feature of the BE3-47N/27 has no external adjustment and is fixed at 85% of the nominal input voltage. If all three phases remain balanced, but decrease below 85% of nominal voltage, the relay de-energizes.

Settings Example

A BE3-47N/27 relay with a nominal input rating of 120 Vac has the following settings:

- UNBAL - 10%
- DELAY - 5 s

The relay detects a phase unbalance when any one phase decreases to 108 Vac or increases to 132 Vac. The output relay trips five seconds after the phase unbalance is detected. The output relay also trips if all phases decrease to 85% of nominal, or 102 Vac.

INSTALLATION

BE3 phase balance relays are designed for mounting on standard DIN rails that comply to DIN-EN 50022. Mounting involves hooking the top edge of the cutout on the base of the case over one edge of the DIN rail. The opposite side of the cutout containing the release clip is then pushed over the opposite side of the DIN rail. To remove or reposition the relay, lever the release clip and move the relay as required. BE3 relays should be installed in a dry, vibration-free location where the ambient temperature does not exceed the operating temperature range. Connections to the relay should be made using wire that meets applicable codes and is properly sized for the application. Figure 1 shows the terminal connections for the BE3-47N/27 relay. Connections for the BE3-47N relay are identical.

CALIBRATION

The calibration marks on the faceplate have a maximum error of 10% and are provided only as guides. Proper calibration requires using an accurate voltmeter in parallel with the input signal. Use the following procedure to calibrate your relay.

Unbalance

1. Adjust the UNBAL control fully clockwise and the DELAY control fully counterclockwise.
2. Apply three-phase, nominal input voltage with the proper phase sequence to the relay. The output relay should energize.
3. Lower one phase of the applied voltage to the desired trip level. Slowly adjust the UNBAL control counterclockwise until the relay trips.

Delay

1. Set the DELAY control at the desired time setting.
2. Apply three-phase, nominal input voltage with the proper phase sequence to the relay.

3. Step down one phase of the applied voltage below the relay trip point. Using an appropriate timing device, measure the time from when the voltage is reduced until the relay trips.
4. Compare the measured time to the desired time delay and adjust the DELAY control accordingly.
5. Repeat Steps 3 and 4 as required.

MAINTENANCE

BE3 relays are solid-state devices that require no maintenance. In the event that your relay requires repair, contact Basler Electric, Highland, IL, USA for return authorization.

ORDERING INFORMATION

Figure 2 shows the BE3 phase balance relay style chart.

- BE3-47N - Phase Balance
- BE3-47N/27 - Phase Balance/Undervoltage

FIGURES

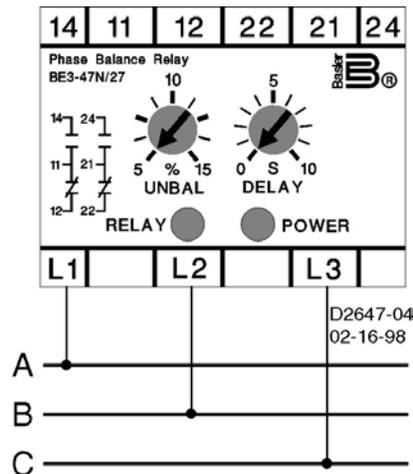


Figure 1. BE3-47N, BE3-47N/27 Phase Balance Relay Connections

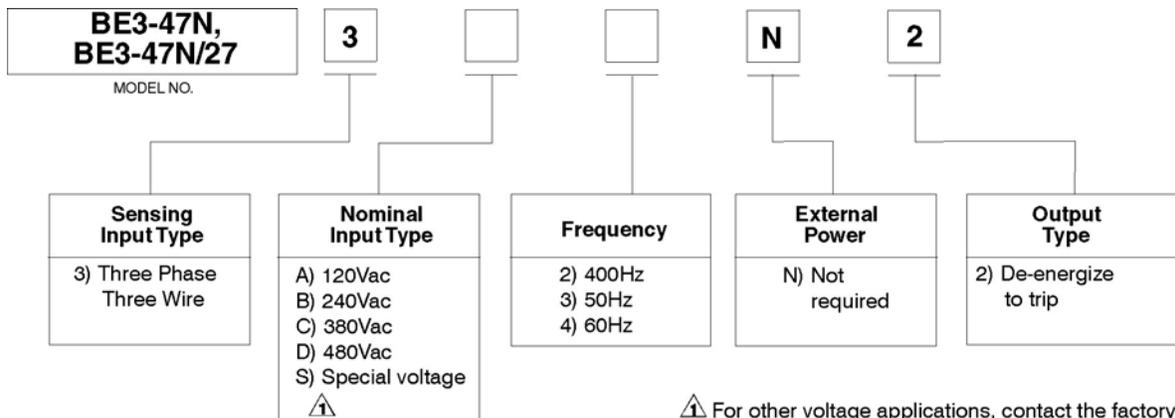


Figure 2. BE3-47N, BE3-47N/27 Style Number Identification Chart