

# Close Differential Undervoltage Relay PFR

## Introduction

The Close Differential Undervoltage Relay, or Phase Failure Relay (PFR), continuously monitors for “**Undervoltage**” and/or “**Phase Loss**” conditions of a three-phase power source and provides dependable response to protect generators, transformers and motors from damage due to a continual undervoltage and/or phase loss condition.

Where most Undervoltage Relays are designed to measure the average voltage of all three phases and operate on the average voltage, the Lake Shore Undervoltage Relay measures each phase separately. It will not “pickup” until all three phases attain the value selected by the potentiometer setting. Correspondingly, the Relay will “dropout” as soon as any of the three phases show a drop-in voltage below the value selected by the potentiometer setting.

## Product Features

- UL 508 Listed
- Rated for up to 480 VAC
- True Three Phase Sensing
- Separate 70 - 100% Adjustable Pick-Up and Drop-Out Ranges
- Field Calibration Capable

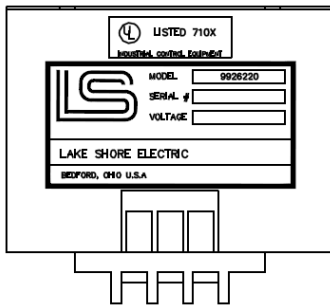


Figure 1

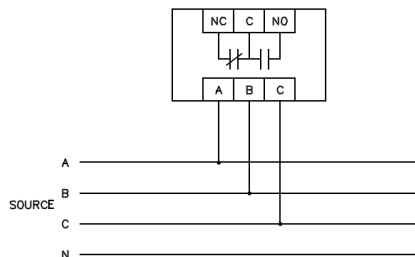


Figure 2

## Operation and Adjustment

This Relay continuously monitors for undervoltage and/or phase loss conditions of a three-phase power source.

When the voltage in each phase attains a value equal to or greater than the “pickup” setting, the output contacts change state and an LED is energized.

When the voltage of any phase fails below the “dropout” setting, the output contacts revert to their de-energized state and the LED is de-energized.

**PICK-UP** - When the voltage in each phase attains a value equal to or greater than the “PICK-UP” setting, the output contacts change state.

**DROP-OUT** - When the voltage of any phase falls below the “DROP-OUT” setting, the output contacts revert to their de-energized state and the “LED” turns off.

Both PICK-UP and DROP-OUT are easily field adjustable on all three phases by means of a single potentiometer accessible with a screwdriver from the front of the relay. The range of adjustment is 70 - 100% of nominal voltage.

## Field Calibration Instructions

Reference Figure 2 and Figure 3 during instructions below.

1. Verify Base Voltage of PFR unit. This is fixed and will be either 240V or 480V depending on the model number. Check the model number on the unit to the order guide table on the back of this sheet for voltage verification.
2. Set the PICK-UP potentiometer to 100%.
3. Remove the nylon plug between the PICK-UP and DROP-OUT potentiometers, uncovering the calibration potentiometer.
4. Using a small screwdriver, turn the calibration potentiometer fully clockwise.
5. Apply nominal 3 phase input voltage from a known source to the PFR unit.
6. Slowly turn the calibration potentiometer counterclockwise until the unit picks up as indicated by the “Energized” light.
7. Reinsert the Nylon Plug above the calibration potentiometer.
8. Set PICK-UP and DROP-OUT potentiometers at desired settings.
9. Remove nominal 3 phase input voltage from the known source to the PFR Unit.
10. Unit is ready for operation.

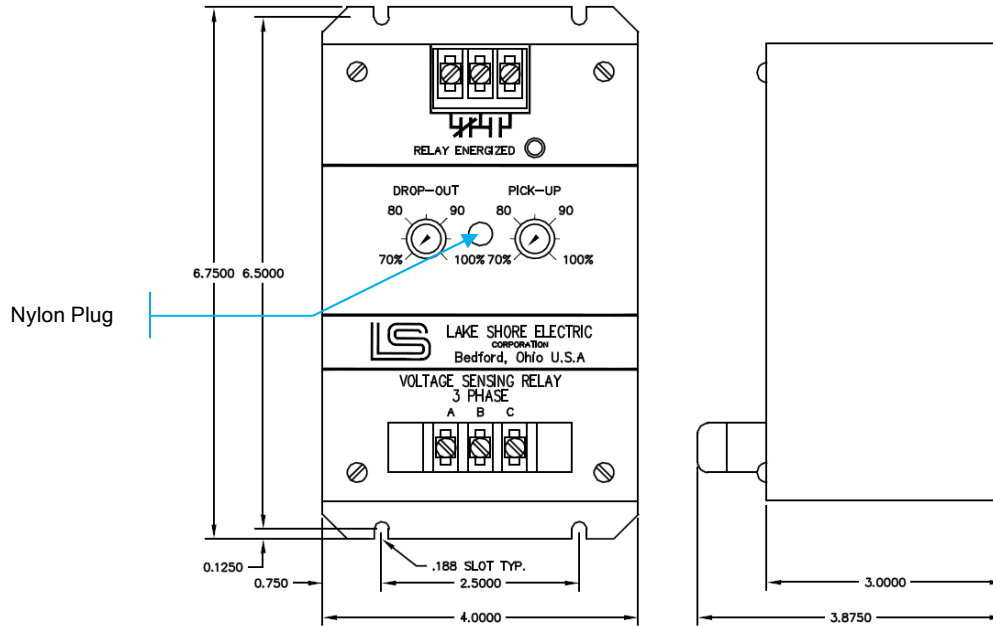


Figure 3

## Product Specifications

NOMINAL INPUT VOLTAGE	208 - 480Vac (wide-range input)
ACCURACY	± 2% of nominal over operating temp. range
TRANSIENT	110% of nominal continuously 150% of nominal 10 seconds 200% of nominal 1 second
FREQUENCY	50/60 Hertz 40/70 Hertz ± 1% of normal
POWER CONSUMPTION	3 VA maximum
AMBIENT TEMPERATURE: OPERATING	-20°C to +60°C [-4°F to 140°F]
AMBIENT TEMPERATURE: STORAGE	-40°C to +80°C [-40°F to 176°F]
HUMIDITY	Up to 95% at +25°C (+77°F), no condensation
CONTACT TYPE	One form "C" dry contact
CONTACT RATING	5 amp @ 120VAC or 28VDC resistive
WEIGHT	30 oz., 1.9 lbs.
HIGH POT	Minimum of 2X's nominal voltage + 1,000 volts
VISUAL SETTING	±10% of nominal voltage
INDUSTRIAL CONTROL EQUIPMENT	UL 508 Listed
CONSTRUCTION	Solid state sensor with relay output housed in a steel enclosure
DIMENSIONS (W x H x D)*	4" x 6 3/4" x 3 7/8"
MOUNTING HOLES (W x H)*	2 1/2" x 6 1/2"

\* Reference Figure 3.

## PFR Order Guide

70LSEUV9926220		-
<b>VOLTAGE CODE</b>		
B = 208 Vac		
C = 480 Vac		
E = 220 Vac		
F = 240 Vac		
I = 380 Vac		
J = 440 Vac		

**Part Number Example:** 70LSEUV9926220C (480 Vac Calibrated PFR)

## Recommendations

Lake Shore Electric Corporation believes that a voltage relay that does not provide discrete monitoring of all three phases should never be relied upon in critical applications.

Please consult the factory for further information.