



**Pragati Electrocom Pvt. Ltd.**

## **PHASE & NEUTRAL BALANCING SYSTEMS**

### **INTRODUCTION**

Voltage fluctuation problems are quite common in most of the countries in the world, particularly in India. A Three Phase Power System when unevenly loaded it causes different phase - neutral voltages and a heavy current in the neutral conductor. Due to dynamic nature of single-phase loads / utility it is not possible to rearrange the configuration of the system to make it symmetrical. To overcome these problems, Phase & Neutral Balancing System is a complete solution.

### **PHASE & NEUTRAL BALANCE SYSTEM (PNBS):**

Phase & Neutral Balancing System is a three-phase system, which is installed at the low voltage supply line between phases and neutral i.e. parallel to the impedances. PNBS due to its magnetic symmetry tries to establish neutral point symmetrical with respect to the phase voltages. Thus, it equalizes the voltages in all the three phases and minimizes the neutral current.

### **REDUCTION OF POWER BILL**

PNBS equalizes the voltages and minimizes the current flowing through the neutral conductor, eliminating wastage of energy. As a result, there is substantial reduction of electricity bill. Further, due to balancing of the voltages, three phase electric / electronic equipment work efficiently, minimizing power loss in the system.

### **EQUALIZATION OF UNBALANCED PHASE VOLTAGES**

PNBS has a specially wound coil which due to the magnetic symmetry equalizes voltages in all the three phases which is quite important for efficient working of three phase equipment. The differences between unequal phase voltages are typically reduced by approximately 2/3.

### **REDUCTION IN CABLE LOSSES**

In an unbalanced system of three phase voltages a considerable portion of power gets wasted since large current flows through the neutral conductor. After installation of PNBS the voltages get equalized in all the phases and the current in the neutral comes down to almost zero thus reducing losses in the distribution cables.

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#### **GENERATION OF THIRD PHASE**

PNBS generates the third phase when only two are available. The voltage is equalized in all the three phases, making it possible to drive any three-phase equipment. This is very useful in process industries where rejection losses can be minimized by installing a PNBS.

#### **ACHIEVEMENT OF BETTER PROTECTION**

After installation of PNBS fuses blow faster in the event of a short circuit. Thus it provides a better protection for the sensitive equipment. In case, circuit breakers are used instead of fuses, PNBS minimizes the tripping time.

#### **INSURANCE AGAINST NEUTRAL BREAK**

Due to any break in neutral connection, a consumer gets 415 Volts instead of 230 Volts. This damages most of the Electrical, Electronic, Telecom equipments and Household appliances. PNBS continues to provide neutral, protecting valuable equipment / appliances against any such damages.

#### **AVOIDING HAZARDS OF A NEUTRAL BREAK**

A neutral break causes high voltage to appear in Single Phase Circuits. The phenomenon of burning of power supply, electrical and electronics equipments is quite common. The high voltage (Phase to Phase) due to neutral break damages costly equipment within fraction of a second. PNBS eliminates this possibility by providing a neutral. As a result, all the three phases with neutral are available, even if the neutral breaks in the supply line. Thus, all single phase equipment / appliances have complete safety against any hazard of a neutral break.

#### **CAPACITY OF PNBS**

In a balanced Three Phase system the current flowing through the neutral should be zero. However, it is practically not possible to distribute & ensure equal loading of each phase. Uneven loading on the phases causes unbalanced phase voltage, phase distortion and excessive current flowing through the neutral, which results in loss of energy. PNBS corrects this situation.

The PNBS equalizes the phase voltage, maintains phase angle symmetry and minimizes the neutral current. The capacity of PNBS is therefore defined in terms of its ability to correct the error measured in terms of the neutral current. The capacity of the PNBS required is dependent on the situation, at a particular location.

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PNBS is most effective when it is installed at nearest possible location of unbalancing. The imbalance i.e. the neutral current is caused by uneven loading of the three phases. In the above Line Diagram each phase has different loads. All the loads would not be equal / switched ON simultaneously which would result in uneven loading / imbalance and would result in excessive neutral current. As such, PNBS should be installed at imbalance locations and not at Location A / B.

### **ADVANTAGES**

Reduction of Neutral Current.

Energy Saving.

Better Quality of Power – Equalized Three Phase Voltages.

Efficient working of Electrical / Electronic Equipment.

Safety against Neutral Break.

Availability of Three Phases even in case of Phase Failure in Supply.

No Dips in voltage on Sudden Loading.

Equalize Phase Angle of each phase at 120 0.

Reduction of DG running.

Electricity tariff saving.

Diesel Saving in Rural & Urban areas.

### **CLASS C TYPE SURGE ARRESTER**

Surge Arrester for the use in the Lightning Protection Zones Concept at the boundaries of LPZ 0B – 1 and more. For protection of low voltage consumer's installations against surges (Over voltage Category III according to DIN VDE 0110-1:1997-04). SPD Class II according to IEC 61643-1:1998-02. SPD Type 2 according to EN 61643- 11:2001.

- Complete prewired unit for common network configurations, consisting of a base part and plug gable protective components.
- Energy coordination possible with upstream lightning current arrester.
- High discharge capacity due to powerful zinc oxide varistors or zinc oxide varistors / sparkgaps.
- Reliable control due to disconnection device "thermodynamic control" with dual monitoring.
- Fault indication by red mark in the inspection window.
- Multifunctional terminals for conductors and bus bars.

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