

Department of EEE

UNIT-V

AC Distribution

Subject: Power systems - I

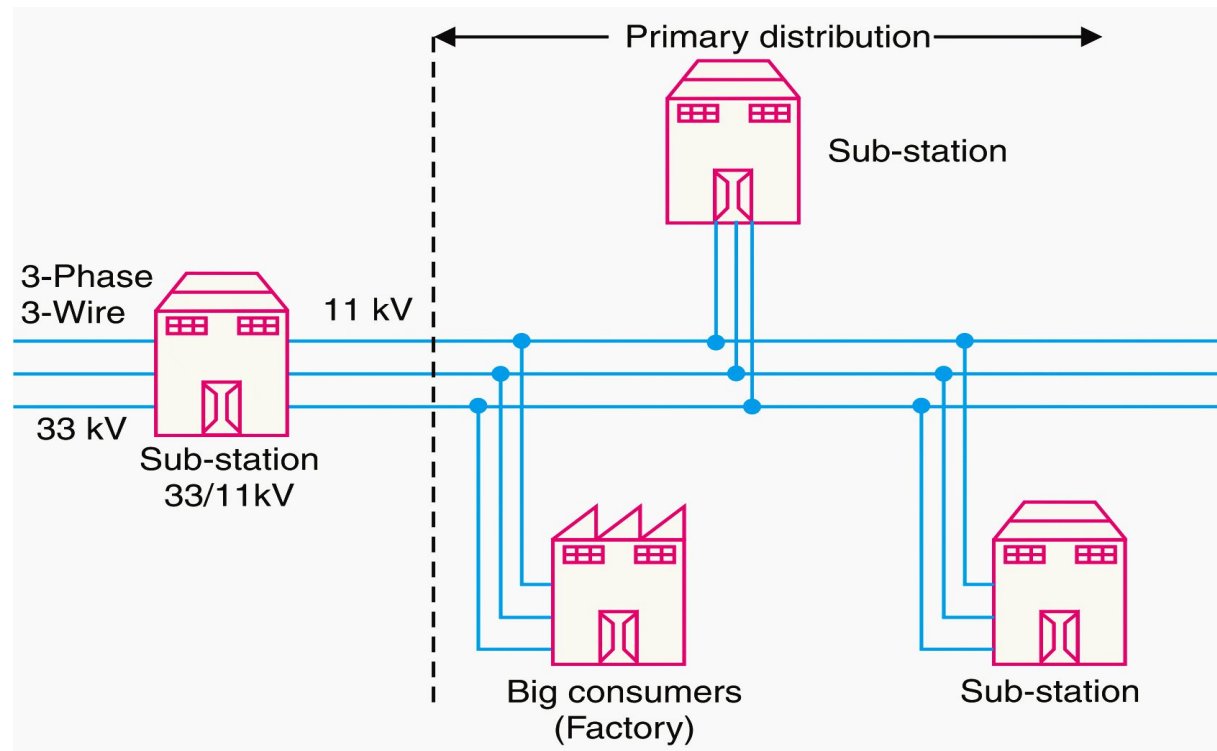
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- **A.C. Distribution**

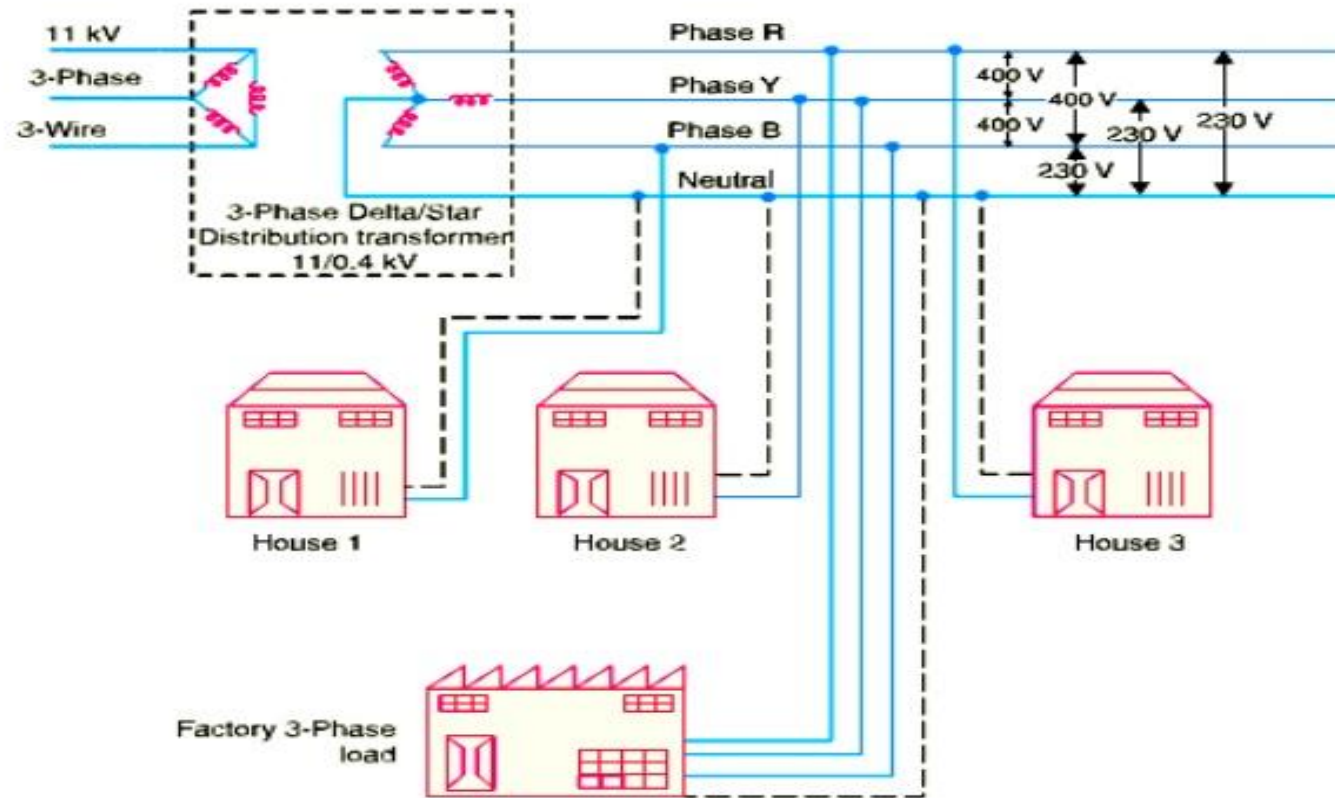
- Now a days electrical energy is generated, transmitted and distributed in the form of alternating current.
- One important reason for the widespread use of alternating current in preference to direct current is the fact that alternating voltage can be conveniently changed in magnitude by means of a transformer.
- Transformer has made it possible to transmit a.c. power at high voltage and utilise it at a safe potential.
- High transmission and distribution voltages have greatly reduced the current in the conductors and the resulting line losses.
- There is no definite line between transmission and distribution according to voltage or bulk capacity.
- However, in general, the a.c. distribution system is the electrical system between the step- down substation fed by the transmission system and the consumers' meters.

- The a.c. distribution system is classified into
 - (i) primary distribution system and
 - (ii) secondary distribution system.

- **(i) Primary distribution system.** It is that part of a.c. distribution system which operates at voltages somewhat higher than general utilisation and handles large blocks of electrical energy than the average low-voltage consumer uses.
- The voltage used for primary distribution depends upon the amount of power to be conveyed and the distance of the substation required to be fed.
- The most commonly used primary distribution voltages are 11 kV, 6.6 kV and 3.3 kV. Due to economic considerations, primary distribution is carried out by 3-phase, 3-wire system.



- Above diagram is a typical primary distribution system. Electric power from the generating station is transmitted at high voltage to the substation located in or near the city.
- At this substation, voltage is stepped down to 11 kV with the help of step-down transformer. Power is supplied to various substations for distribution or to big consumers at this voltage. This forms the high voltage distribution or primary distribution.
- **2.Secondary distribution system:** It is that part of AC Distribution System which includes the range of voltages at which the ultimate consumer utilises the electrical energy delivered to him.



- The secondary distribution employs 400/230 V, 3-phase, 4-wire system.
 - The above diagram is a typical secondary distribution system. The primary distribution circuit delivers power to various substations, called **distribution substations**.
 - The substations are situated near the consumers localities and contain step-down transformers. At each distribution substation, the voltage is stepped down to 400 V and power is delivered by 3-phase,4-wire a.c. system.
 - The voltage between any two phases is 400 V and between any phase and neutral is 230 V. The single phase domestic loads are connected between any one phase and the neutral, whereas 3-phase 400 V motor loads are connected across 3- phase lines directly.
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- <https://www.electricaleasy.com/2018/02/types-of-ac-power-distribution-systems.html>

- A distribution system usually begins from a substation where the power is delivered by a transmission network.
- In some cases, the distribution system may start from a generating station itself, such as when consumers are located near the generating station.
- For larger areas or industrial areas, primary and secondary distribution may also be used.

Types Of AC Power Distribution Systems

1. According to phases and wires involved, an **AC distribution system can be classified as -**
Single phase, 2-wire system
2. Single phase, 3-wire system
3. Two phase, 3-wire system
4. Two phase, 4-wire system
5. Three phase, 3-wire system
6. Three phase, 4-wire system

THANK YOU