Potential transformer control diagram

Potential transformers are a type of instrument transformer and these transformers are used to measure the voltages of high transmission lines or any electrical circuit. Potential transformers are used to lower high voltages. Its primary coils are connected to a high voltage side and its secondary coils are connected to various instruments such as voltmeters, wattmeters, power factor meters, etc. These potential transformers provide 100v to 150 v in their secondary winding so that measuring instruments are easily connected according to their input voltages and these are enough to operate in this voltage range. Measuring instruments such as wattmeters, voltometers that are connected to the secondary winding of the potential transformer provide low readings according to their input voltage. The exact readings are obtained from these measuring instruments dividing the transformation ratio. So that we can easily get the exact amount of tension with the help of possible transformer. The figure shows that the potential transformer is connected to the voltometer and how it is used when connected alongside high voltage below: Potential transformers and power transformers are equal to each other only the difference between these is that potential transformers have special requirements for measuring various electrical parameters. These requirements are as follows: The attenuation ratio must be kept accurately in a possible transformer for measuring electrical parameters. Voltage droplets should be reduced as possible and these are reduced by using a suitable kernel design and by using large conductors. The load voltage / secondary voltage must be minimal and few volt-amperes so that the measuring instruments are easily connected to the secondary of the potential transformers. A potential transformer consists of its so many parts in its construction and these potential transformer parts (PT) are discussed below: Potential transformers are made with their two main construction types and these two types are the basic type PT and PT shell type. Basic type PT are used for low voltage, while shell type PT are used for high voltage. The basic laminations of both the shell type and the PT's type core are coupled so carefully to avoid the air gap between the joints. The two windings (primary and secondary) are types of coaxial cable so that the leak reaction is minimized. Secondary sinuousness is placed closer to the nucleus and primary sinuousness is twisted over secondary sinuousness. The primary coil is made of a single coil when PT is required for low voltage use otherwise the primary coil double coil for high voltage uses. Insulation is necessary to separate the primary and secondary winding so that cotton tape and varnish are more widely used as an insulation in PT's. PT's are filled with solid compounds for low voltage otherwise the insulation is immersed in oil. PT shrubs are made up of several some are oil presented and these shrubs are used for potential transformers filled with oil. Some PT have two shrubs for high voltage and some only have one shrub for high voltage and some have two shrubs and these are on the ground and these do not require any neutral connection. Potential transformers are commonly used for the voltage and power measurement of a distribution line or transmission lines and is used for measuring high voltage and power between the high-power cable and mainly used in grid stations, power plants and in those places where power is generated and controlled for power transmission and distribution. The work of a potential transformer is that it goes down by high voltage and provides the power according to the reading of a measuring instrument that is installed for measuring voltage or power. Therefore, its main purpose is to provide voltage according to the measuring instrument so that the power is controlled based on its rating. The theory of the potential transformer figure shows the equivalent circuit of potential transformer and the potential transformer theory is as below: Ep = induced voltage in primary sinuousness Es = secondary sinuously induced ic voltage = component central loss of current Im = magnetizing component of current Rp = primary winding resistance Xp = primary sinuous Rs reaction = secondary sinuous resistance Xs = secondary sinuousness reaction Rc = imaginary wind resistance / xm = magnetizing reaction Re = external load resistance Xe = external load reaction Np = primary sinuousness turns Ns = secondary sinuous rotations Φ = potential transformer flow δ = Phase angle between voltage secondary winding and β secondary winding = Phase angle between primary current and secondary current α = Phase angle between load current I0 and φ The flow is conspired along the x-axis. Im in phase with flow. Ic leads im 900. The sum of Ic and Im does not produce io current load. EP is in phase with the main loss component of the current IC. It is 180o out of phase with the primary winding voltage Ep. Secondary Voltage Vs are obtained by subtracting secondary voltage ISRs and ISXs. Potential Transformer Fasor Diagram (PT) The fasor diagram is shown below: The phase angle between primary voltage and secondary voltage is called the PT phase angle. From the fasor diagram we have, but in reality, the phase angle is very small and the primary and secondary tension are perpendicular to the flow and then; Where Rs is equivalent resistance of PT and Xs equivalent reaction of PT. Potential transformer phase angle (PT) From the fasor diagram the terms Ip and IS are less compared to the high voltage and these terms are neglected We get: Errors in potential transformers (PT) There are two types of errors occurring in potential transformers. These errors also start in tension. These errors occur in terms of the magnitude of the measured values. These errors are discussed below: The relationship of the potential transformer is the difference between the minor and real transformation ratio. This error occurred in tension measures and these errors occur due to the lower relationship between the transformation ratio. Phase angle errors occur during power measurements. In these errors, the primary circuit of the potential transformer cannot be achieved by multiplying the voltage measured by voltometer. These errors are determined by resistance and reaction and by the non-load current of the transformer. Reduction of errors in the potential transformer (PT) The following points are used for reducing errors in the potential transformer: To reduce the length of the magnetic path in the kernel. With this, the main stream is reduced without load. By using thick conductors and to reduce the length of the average spin of the sinuous. Staying close to primary and secondary windings with each other. This reduces the flow of leaks and the leak reaction. By reducing the length of the winding wound over the nucleus. This will reduce winding resistance and provide high flow densities in the core. The features of where Load Potential Transformer (PT) The features of the potential transformer are determined through the fasor diagram shown above and the determination between relationship errors and phase angle errors of potential transformers. The following are the effects of various electrical parameters through which we will know the characteristics of the practical potential transformer. Effects of change on the secondary voltage of the potential transformer When we increase the secondary voltage of the potential transformer, then the secondary current also increases and this secondary current also increases the primary current of the potential transformer. In this way there are voltage drops in both primary and secondary sinuousness and increases with respect to the increase in primary and secondary currents. Secondary voltage is reduced according to primary supply voltage. Thus, this effect increases the transformation ratio (Vp / Vs on Vp are the primary voltage and Vs are the secondary voltage) and also increases the error of relation and phase angle and these errors remain linear in position as shown in the figure below: Effects of change in the secondary voltage power factor According to the fasor diagram of the potential transformer, the secondary current delays in default to secondary voltage and the difference in angle When we lower the power factor, this phase angle increases and moves absent from the secondary voltage. The fasor diagram represents that the primary current is approaching no load current and primary voltage secondary are in phase with tension induced in primary and secondary tension. Primary tension remains the same and the transformation ratio increases due to power factor. The figure below identifies the phase angle and relationship errors in the potential transformer according to changes in the secondary voltage power factor. Tension.