

## ON-Load Tap changer.

An On-Load Tap Changer (OLTC) is a device used in electrical power transformers to regulate the voltage output by changing the transformer's turns ratio while the transformer is energized and under load. It is a vital component that helps maintain a stable and consistent supply of electrical power to various consumers.

The primary function of an OLTC is to adjust the tap position on the transformer's winding, thereby modifying the voltage ratio between the primary and secondary sides of the transformer. This adjustment compensates for variations in the input voltage or load conditions, ensuring that the output voltage remains within specified limits.

The OLTC consists of several key components, including a diverter switch, tap selector mechanism, motor drive, control system, and associated sensors. The diverter switch redirects the current flow to the desired tap position, while the tap selector mechanism provides the mechanical arrangement to change the tap connections. The motor drive is responsible for rotating the tap changer mechanism, enabling the selection of the desired tap position.

The control system of an OLTC incorporates various sensors and monitoring devices to measure critical parameters such as voltage, current, power factor, and load conditions. Based on these measurements, the control system automatically adjusts the tap position to maintain the desired output voltage.

OLTCs can be categorized into two types based on their operation: mechanical OLTCs and electronic OLTCs.

Mechanical OLTCs are commonly used in distribution transformers and utilize mechanical linkages and gears to change the tap position. These tap changers have a limited number of fixed tap positions, typically ranging from 5 to 33 taps, and require manual adjustment or periodic maintenance.

Electronic OLTCs, also known as thyristor-based OLTCs, are more advanced and offer a higher degree of control and flexibility. These tap changers use thyristor-based switching devices, which provide continuous and stepless voltage adjustment. Electronic OLTCs can have hundreds or even thousands of tap positions, allowing for precise voltage regulation and minimizing voltage fluctuations.

The advantages of OLTCs are numerous. They ensure that the output voltage of a transformer remains stable, even when there are variations in the input voltage or load

conditions. This stability is crucial for maintaining the quality and reliability of the power supply. OLTCs also enable transformers to operate at optimal efficiency by matching the voltage to the specific requirements of the load.

Additionally, OLTCs allow for voltage regulation over a wide range, making them suitable for diverse applications. They are particularly beneficial in scenarios where the input voltage is unstable, such as in rural areas or locations with significant voltage fluctuations. By adjusting the tap position, OLTCs can compensate for these voltage variations and deliver a consistent output voltage.

In conclusion, an On-Load Tap Changer is a critical component in power transformers that enables precise and continuous adjustment of the voltage output. It ensures stable and reliable power supply by compensating for variations in input voltage and load conditions. Whether in mechanical or electronic form, OLTCs play a vital role in maintaining the quality and efficiency of electrical power systems.