**Autotransformer**

An autotransformer is a type of electrical transformer in which a part of the winding is common to both primary and secondary circuit. Unlike a two winding transformer where power transfer is only inductive, the power transformer in an autotransformer is both inductive and conductive.

Figure 1 shows a single phase autotransformer with $N_p$ turns primary and $N_s$ turns tapped from the primary in order to get a lower voltage. The winding section with $N_s$ turns is common to both HV and LV side of the autotransformer. If

$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = a$$

then,

$$\frac{\text{Conducted Power}}{\text{Input Power}} = 1 - a \quad (1)$$

$$\frac{\text{Transformed Power}}{\text{Input Power}} = a \quad (2)$$

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**Advantages**

- For the same VA rating an autotransformer requires less copper, less iron and hence low exciting current, low ohmic loss and less weight as compared to a two winding transformer.

- For the same material used, an autotransformer as compared to a 2-winding transformer gives higher output, has higher efficiency, lower leakage impedance and hence better voltage regulation.

**Disadvantages**

- They are used for a voltage ratio less than 2. If the ratio differs far from unity then the economic advantages decrease.

- A failure of the isolation of the windings of an autotransformer can result in full input voltage applied to the output. Also, a break in the part of the winding that is used as both primary and secondary will result in the transformer acting as an inductor in series with the load (which under light load conditions may result in near full input voltage being applied to the output).

- The short circuit current in Autotransformer is more than that in two winding transformer.
Figure 2: A 2.3 kVA, 10A single phase variac

Figure 3: Cut section of 2.3kVA Autotransformer