Transformer Design Training

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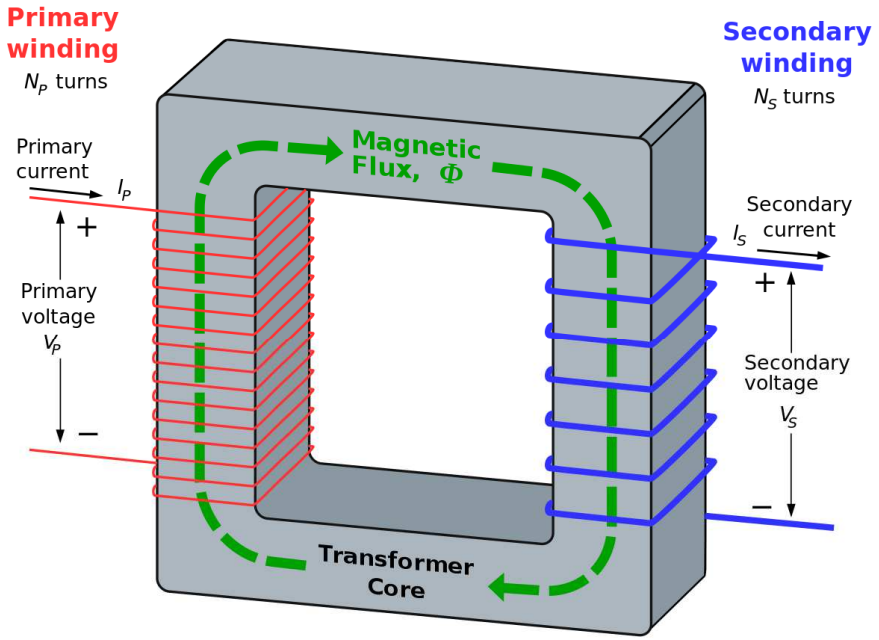
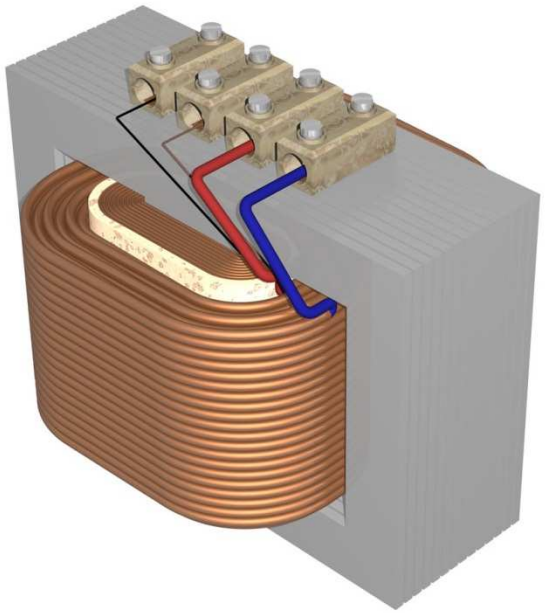
Transformer

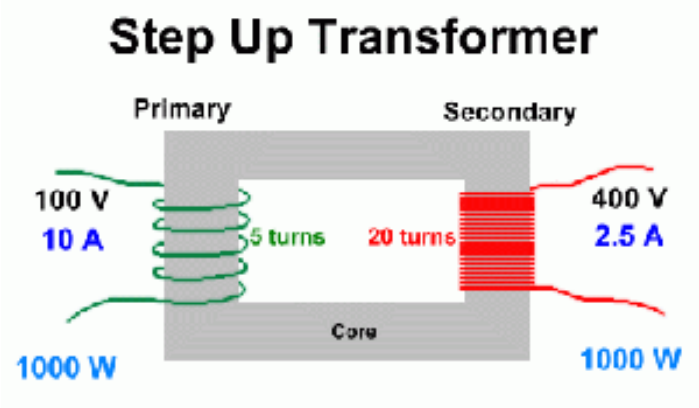
A transformer is a static machine used for transforming power from one circuit to another without changing frequency. This is a very basic definition of transformer. Since there is no rotating or moving part so transformer is a static device. Transformer operates on ac supply. Transformer works on the principle of mutual induction.

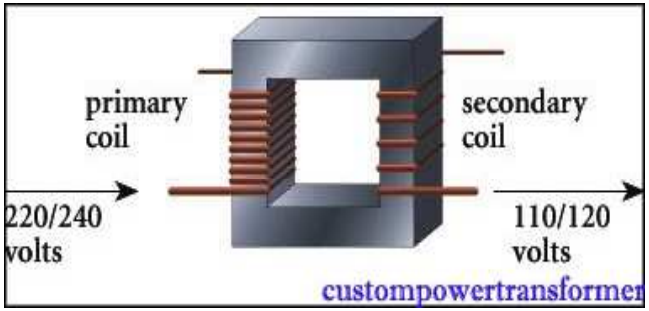


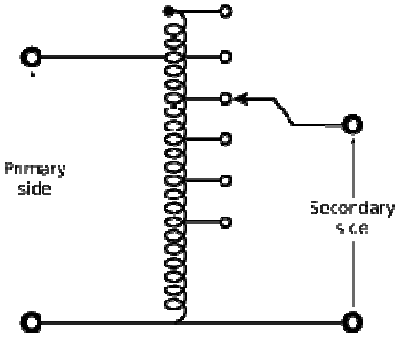


Types of Transformer

- 1. Step Up Transformer
- 2. Step DownTransformer
- 3. Auto Transformer



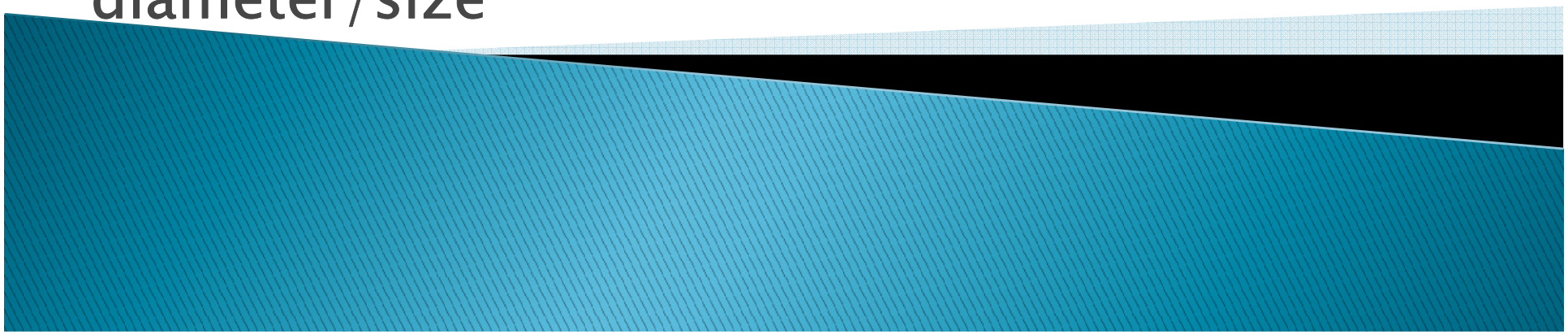




Design Parameters

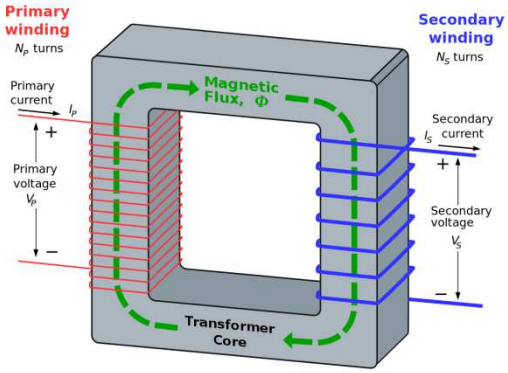
For designing a transformer, we need:

1. Power rating
2. Voltage levels (primary and secondary)
3. Currents on both sides
4. Iron Core area
5. Numbers of turns (primary and secondary
6. Primary and secondary coils wire diameter/size



Design Of a Step down Transformer

Primary Voltage(Vp) =230v
Secondary Voltage(Vs) =24v
Secondary Current(Is) =5Amp
Primary CurrentIp) =?
Frequency =50Hz
Ws =Secondary Watt



Design Calculetion

Ps=Vs x Is =>24 x 5=120VA

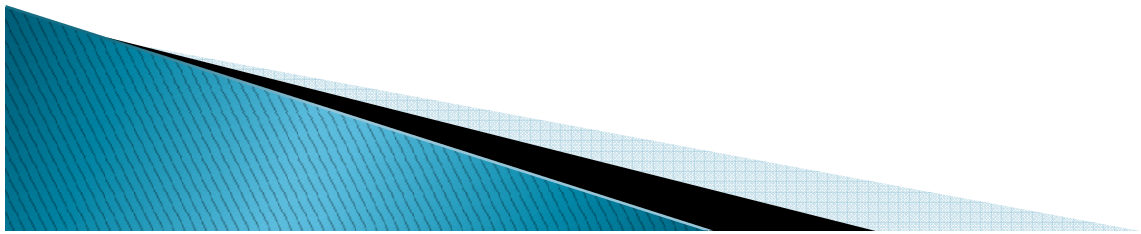
Ws =120cosϕ => 120 x 0.8 =96 Watts

First we have to know Core area (A)

$A = \sqrt{Ws}/5.58$

$= \sqrt{96}/5.58$

=1.7559 sq”



Design Calculetion

Now we can find Turn Per Voltage of Transformer

Turn Per Voltage

$T/V = 10^8/4.44 \times B_{max} \times A \times f$

$= 10^8/4.44 \times 85000 \times 1.76 \times 50$

$= 3.01$ Turn (Here, $B_{max=}$ Max Flux (And its constant

$= 3+10\%$

$= 3+(3 \times 10)/100$

$= 3+0.3$

$= 3.3$ Turn

Design Calculetion

So Primary Turn Np=230 x 3.3

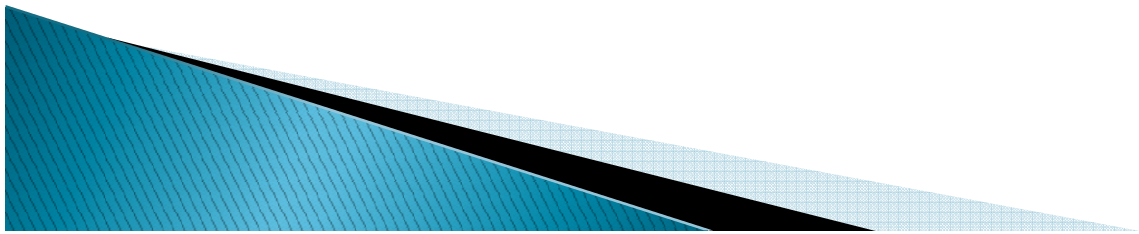
= 759 Turn

And

Secondary Turn Ns=24 x 3.3

=79.2 Turn

=79-80 Turn



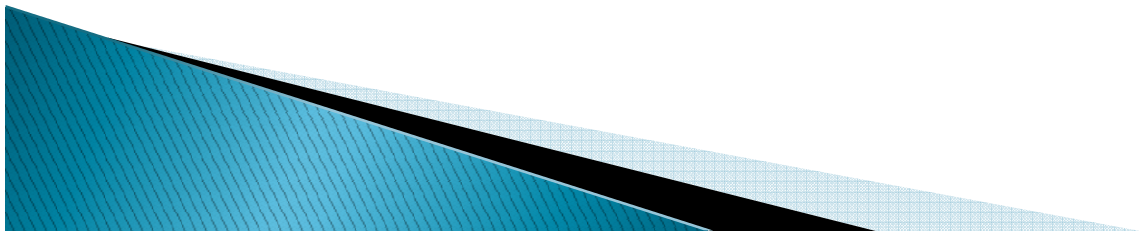
Wair diameter/size

Wair diameter/size with Current ratting

Wair size= Gauge

7= 80 Amp
8= 66.67 Amp
9= 53.34 Amp
10=40 Amp
11=33.33 Amp
12= 20.66 Amp
13=20 Amp
14= 16.66 Amp
15= 13.33 Amp

16= 10 Amp
17=8.34 Amp
18= 6.67 Amp
19=5 Amp
20= 4.167 Amp
21=3.334 Amp
22=2.5 Amp
23=2.076 Amp
24=1.67 Amp
25= 1.25 Amp



THANK YOU