HOW TO SELECT A CURRENT TRANSFORMER

The steps to select a transformer from our catalogue are as follows:

O Selection of Highest Equipment Voltage:
Rated highest equipment voltage shall be given V or kV.
Example: 12kV, 17.5 kV, 24 kV, 36 kV etc.

O Selection of Rated Transformer Ratio:

a. Primary current is calculated from the following equation

\[ I = \frac{Sn}{\sqrt{3} \times U \times I} \]

Where
\[ Sn : \text{Rated apparent power of main distribution transformer (kVA)} \]
\[ Un : \text{Rated voltage on phase to phase (kV)} \]
\[ I : \text{Current on each phases (A)} \]

The standard values in amperes of rated primary current are: 10-15-20-25-30-40-50-60-75
and their decimal multiples or sub-multiples.

Example:
For a power transformer 34.5 kV and 250 KVA the value of current of chosen a measuring C.T. is calculated from the following equation

\[ I = \frac{250\text{KVA}}{\sqrt{3} \times 34.5\text{kV}} \approx 4.2\text{A} \]

The value of primary current of measuring C.T. shall be chosen as 5A.

b. Rated secondary currents in amperes are 1A and 5A. Generally rated secondary current is chosen as 5A. If the distance where between a power transformer and the equipments is too far secondary current may be chosen 1A. If secondary load is given in impedance (Ω)

calculation to get it in VA should be as follows:

\[ P(\text{VA}) = I_{sn}^2 \times Z = 25 \times Z \]

When I_{sn} = 5A

\[ P(\text{VA}) = I_{sn}^2 \times Z = 25 \times Z \]

When I_{sn} = 1A

\[ P(\text{VA}) = I_{sn}^2 \times Z = Z \]

O Selection of Rated Burden:
That property of the circuit connected to the secondary winding that determines the active and reactive power at the secondary terminals.

The values of burden as voltamperes of some equipment are shown in Table.

<table>
<thead>
<tr>
<th>Value of Burden of some equipment</th>
<th>Painted (A)</th>
<th>Unpainted (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammeter with moving iron</td>
<td>0.70-1.50</td>
<td>0.50-1.50</td>
</tr>
<tr>
<td>Wattmeter</td>
<td>0.20-5.00</td>
<td>0.20-5.00</td>
</tr>
<tr>
<td>Cosimeter</td>
<td>2.00-6.00</td>
<td>2.00-6.00</td>
</tr>
<tr>
<td>Energy meter(Active-Reactive)</td>
<td>0.40-1.00</td>
<td>0.40-1.00</td>
</tr>
<tr>
<td>Reactive Power Relays</td>
<td>0.40-1.00</td>
<td>0.40-1.00</td>
</tr>
<tr>
<td>Overcurrent Relays</td>
<td>0.20-6.00</td>
<td>0.20-6.00</td>
</tr>
</tbody>
</table>

O Selection of Accuracy Class:

For measuring circuits 0.1-0.2-0.5-1-3
For protective circuits 5P and 10P

Accuracy classes of current transformers are guarantee at between 100% and 120% of rated current according with the standards that are shown in Table and diagram.

1. Ratio error increases when the value of current decreases at 20% and 5%. Usually for energy meter circuits are used transformer of class 0.5 for ammeters (not sensitive).

O Selection of Instruments Security Factor (Fs):
Security factor is defined as Fs5 in IEC standard and as M5 in VDE standard.
For measuring current transformers: Fs5, Fs10.

O Selection of Accuracy Limit Factor:
The ratio of the rated accuracy limit primary current to the rated primary current for protective current transformer: 10, 15, 20.

O Shape and Dimension of the Primary Winding:
Primary can be wound primary and bus-bar type. In case of wound primary, Ist and Idyn shall be taken into account, defined before. These values are indicated for each type and ratio in corresponding pages. For bus-bar type, size and layout of the bar or cable must be considered. In Table shows permissible current at 35 degree Celsius for copper bars according to DIN4370.

<table>
<thead>
<tr>
<th>Permissible current at 35°C for copper bars according to DIN4370</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (mm x mm)</td>
</tr>
<tr>
<td>Painted (A)</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>20 X 5</td>
</tr>
<tr>
<td>23 X 3</td>
</tr>
<tr>
<td>30 X 5</td>
</tr>
<tr>
<td>40 X 5</td>
</tr>
<tr>
<td>40 X 10</td>
</tr>
<tr>
<td>50 X 10</td>
</tr>
<tr>
<td>60 X 10</td>
</tr>
<tr>
<td>80 X 10</td>
</tr>
<tr>
<td>100 X 10</td>
</tr>
</tbody>
</table>

O Selection of Rated Thermal Current (ith):
Rated thermal current shall be given either 100, 200, 300..., etc times of rated current or as “kA”.
Example: If the short-time current on the network have being calculated as 10 kA, rated thermal current equal to 10kA (ith =10kA).
If the value of rated primary current is 100A, rated thermal current is determined from:

\[ \text{ith = } \frac{100 \text{kA}}{100 \text{A}} = 100 \times 1 \text{n} \]

O Selection of Environment Use:
Environment use shall be defined as indoor or outdoor. If it has being not defined, it is accepted as indoor. All the above mentioned data shall be considered when the order is given.

Example:

a. 0.72 kV, 200/5A, class 0.5 Fs5, 10VA
\[ \text{ith}=100 \times 1 \text{n}, \text{for } 30 \times 10 \text{ bar} \]

b. 36 kV, 200/5-5, class 0.5 Fs5-SP10
\[ 30\times30 \text{VA}, \text{ith}=100 \text{ln}, \text{for indoor}. \]