

DRY-TYPE TRANSFORMERS

# ABB dry-type transformers with Transient Voltage Protection (TVP)

## Complete protection during network switching



Depending on the system, network switching can damage electrical equipment that, over time, may lead to failure. Avoid complicated system studies and save yourself from costly outages with ABB dry-type transformers equipped with Transient Voltage Protection (TVP).

With the world's largest installed base of distribution transformers and reputation for continuously advancing transformer technology, ABB has spent the last 15 years researching and developing protective solutions to network switching. These efforts have culminated in a complete protective solution for transformers: Transient Voltage Protection (TVP).

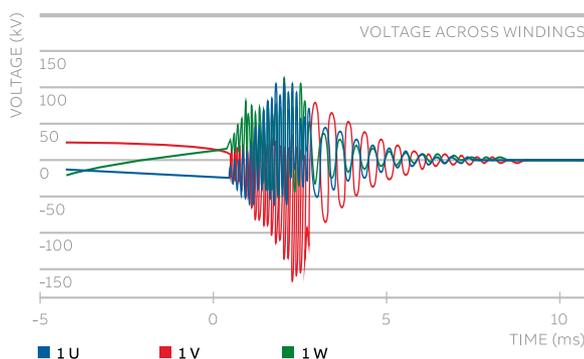
### Complex problem

The introduction of fast switching breakers in the early 90s was a step change for electrical networks. It wasn't until a decade later that it was discovered that this new current chopping ability was subjecting network devices to extreme voltage transients. New failure modes were observed in an undeterminable and random number of transformers. Due to complex system variables, switching transients had become the worst voltage stress that a transformer could see during use.

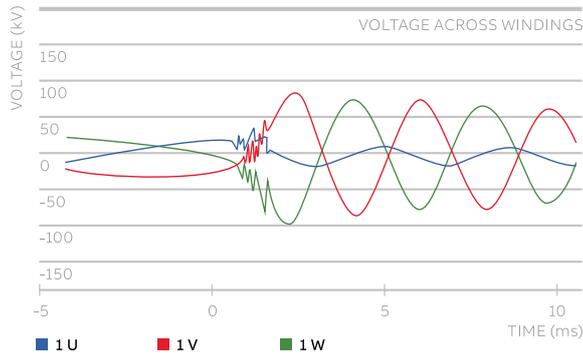
### Simple solution

ABB's TVP technology for transformers uses varistors that are strategically placed across the windings of the transformer to protect it from virtual current chopping and resonance amplification. These winding varistors act as pressure relief valves and prevent voltage peaks inside the winding from reaching levels that could damage the transformer insulation.

Extreme transients in an unprotected transformer during a single switching event. Overtime, these transients will lead to insulation failures.

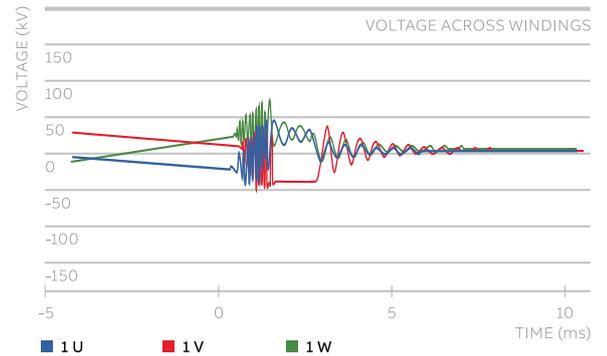


## Extreme switching case comparison



### RC snubber circuit

- Delta primary
- 250 Hz oscillation, 85 kV peak amplitude



### Transformers with TVP technology

- Delta primary
- 40 – 45 kV (hf transients up to  $\approx$  65 kV)

### Complete protection

When compared with other protection methods available today, ABB's TVP technology is the only solution that controls the internal winding voltage peaks with minimal impact to the transformer design. Resistor, capacitor (RC) snubber circuits, though effective, do not control voltage peaks and increase design complexity and can increase the depth or width of the transformer by nearly 1 meter.



ABB transformers with TVP are ideal for all applications that experience frequent switching

### Additional benefits:

