INSTRUMENT TRANSFORMERS AND SENSORS

FERROGUARD™ FSR-983
Outdoor saturable reactor

The FSR-983 outdoor saturable reactor minimizes the effects of ferro-resonance activity in the secondary circuits of voltage instrument transformers (VTs), control power transformers (CPTs), and distribution transformers, where the nominal secondary voltage is 600 V or less.

Product features
- 600 V secondary auxiliary device
- Outdoor class, 105°C insulation system
- Single or multiple taps available
- Secondary voltage ratings: 69.4 – 600 V
- Ideal for ferro-resonance suppression
- Approximate weight: 55 lbs (25 kg)

Application
The FERROGUARD™ FSR-983 outdoor rated saturable reactor is used in the secondary circuits of voltage instrument transformers (VTs), control power transformers (CPTs), and distribution transformers where the nominal secondary voltage is 600 V or less. Its purpose is to minimize the effects of ferro-resonance activity, which can be harmful to transformer primary windings by creating a high reactive load on the transformer secondary when the transformer becomes over-excited, thus dampening the oscillation amplitude. The FSR-983 has also been found to be effective during capacitive discharging of power breakers and switches which have a finite oscillatory period, but at frequencies above and below the fundamental.

Under normal voltage conditions the saturable reactor, in most cases, poses a minimal burden to the main transformer on which it is connected to. When an over-voltage occurs, the FERROGUARD™ core saturates, thus dramatically increasing the burden on the main transformer being protected. This in turn prevents the main core of the transformer being protected from saturating, thus preventing its primary winding from overheating. The reactor will remain saturated as long as the unstable conditions forcing the over-voltage condition are present.

Because no two transformer designs are alike, the FERROGUARD™ is custom engineered to match the core excitation characteristic of the transformer it is protecting. Therefore, it is necessary to provide the secondary excitation characteristics of each protected transformer when specifying this product.

Mechanical description
The core is a continuously tape-wound toroid made of grain-oriented silicon steel. The reactor winding is insulated from the core and wound with high temperature copper magnet wire. The reactor winding has 3.0 kV isolation from the baseplate and conduit box. The unit is encapsulated in a polyurethane resin suitable for outdoor use. The secondary terminals are ½-20 studs with associated hardware, housed inside a weather-tight thermoplastic conduit box with (2) 1”-11.5 NPT hubs.
**Mounting**

The FSR-983 is provided with a 0.25” (6.4 mm) aluminum baseplate with four (4) 0.56” (14 mm) open slots, suitable for mounting in any orientation.

**Testing**

This unit is custom engineered to match specific excitation characteristics and is tested accordingly to verify that performance. Low voltage dielectric tests are performed in accordance with all applicable IEEE, CSA, or IEC standards as applicable.

**Options**

- Multiple taps available for various voltages or devices
- Non-inductive impedances available to add resistance
- Consult factory for other special needs.

**How to specify**

The specific reactor design parameters are selected based on the secondary exciting characteristics of the transformer being protected. This will ensure the transformer accuracy and performance is not negatively impacted during normal operation and is appropriately protected during resonant conditions. Secondary excitation characteristics should be provided to ABB prior to ordering if the transformer being protected is not an ABB product.

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**Unit dimensions (inches [mm]) and connection diagram**

![Connection Diagram](image-url)