

IDV

Transformer Differential Protection



Complete and Innovative solution for Transformer Bays and other Machines

IDV Relays include all **Protection**, **Control** and **Measurement** functions for **Two** or **Three Winding** transformers or autotransformers at any voltage level, with **Single** or **Double Breaker**. It may also be applied as differential protection in **Reactances**, **Generators** or **Motors**.

87	Phase Differential with Percentage and Harmonic Restraint.
87/50	Instantaneous Phase Differential without Restraint.
87/50FD	Fault Detector. External Fault Detector.
87N	Restricted Earth Faults.
50/51	Phase O/C.
50N/51N	Neutral O/C.
50Q/51Q	Negative Sequence O/C.
50G/51G	Ground O/C.
50OL/51OL	Overload O/C.
50HR	O/C with Harmonic Restraint for the Tertiary.
50V/51V	Voltage Dependent Phase O/C.
67N	Neutral Directional Units.
49W	Winding Thermal Image.
49G	Ground Thermal Image.
26	Hot Spot Thermal Image.

59/27	Phase Over/Under Voltage.
64	Ground Overvoltage (measured VN).
81M/m	Over/Underfrequency.
81ROC	Frequency Rate of Change. Load-Shedding.
59V/Hz	Overexcitation.
50BF	Breaker Failure Protection. Cold Load.
21N/21P	Distance Protection (Ground/Phase).
50SUP	Phase O/C for Distance Supervision. Load Encroachment
60CT	Current Measurement Supervision.
60VT	Fuse Failure Detector.
68/78	Power Swing Detector / Out-of-Step.
3	Trip Coil Supervision. Breaker Supervision.



Application

The use of differential protection is recommended for identifying **internal faults** of the protected machine as well as **faults occurring within the zone of influence** of its CTs. It is also very important for the protection to include **restraint elements** to avoid **false trips** due, primarily, to the current produced in energizing the transformers or the high values of current produced by external faults, that might cause the saturation of some CTs.

This application presents additional problems due to the very nature of differential protection. The CTs use different transformer ratios but do not compensate that difference. Also, the power transformer connection could displace the phase angles between the primary and secondary currents.

IDV Differential Protection ensures stability against:

- ✓ Saturation and errors in the CTs.
- ✓ Energizing maneuvers.
- ✓ All types of internal and external faults.
- ✓ Variation in the transformer taps and/or their connection group.

IDV is suitable for all types of **two** or **three winding machines (transformers, autotransformers, motors, generators and reactance)**. This IED can compensate the transformer taps and the connection group of the machine to be protected eliminating the need for matching transformers. Its quick action **Differential Element**, together with leading edge **Blocking** and **Harmonic Restraint** and **External Fault Detection**, provides great reliability under all conditions.

External Fault Detector

The External Fault Detector is based on the ratio between differential and restraint instantaneous currents and two phase and positive sequence directional comparison elements. This detector blocks the differential element upon external faults with severe CT saturation, providing high safety.

Double Breaker Bays

Up to 12 current channels are available for breaker-and-a-half or ring bus bay applications. The measurement of the two currents associated with this bay, instead of current sum, provides reliable restraint to the differential element upon external faults. Also, it prevents current reversal in directional comparison elements integrated into the External Fault Detector.

Solid State Trip Outputs

IDV relays can include six solid state trip outputs, with operating times less than 0.5 ms and breaking capacity up to 10 A, designed to operate directly on the breaker winding, resulting in a reduction of the tripping time.

Ethernet Ports

IDV relays include Ethernet ports (electrical and FO) supporting DNP3.0, PROCOM, Modbus protocols and IEC61850 standard. These ports may operate under the following types of redundancy: Bonding, PRP and RSTP.

