

# IDF

## Transformer Protection (ZIV e-NET flex family)



**Protection for two or three winding transformer or autotransformer, of any voltage level, with single or double circuit breaker**

### General characteristics

- ✓ Powerful programmable logic
- ✓ 2000 event log. Up to 100 oscillography seconds
- ✓ Alphanumeric or graphic display
- ✓ Easy HW expansion without FW updates
- ✓ Unused protection elements can be hidden
- ✓ Custom mapping of physical current and voltage inputs to protection elements
- ✓ Can be used to protect multiple bays
- ✓ Up to 20 analog channels, 160 DI, 80 DO, and 22 LEDs
- ✓ Bonding, RSTP, PRP and HSR redundancy
- ✓ IEC 61850 ed. 1 & ed. 2 protocols, DNP3.0, Modbus RTU and PROCOME
- ✓ Native process bus. Analog input cards operate as Merging Units for the CPU. Synchronized samples at 4800 Hz (as per IEC 61869-9)
- ✓ Cybersecurity in accordance with IEC 62351 and IEEE 1686-2013 standards. RBAC, secure keys, physical and logical port disabling, cybersecurity event log, and securing of management protocols (PROCOME, HTTPS, SFTP, SSH)
- ✓ Time synchronization by IRIG-B, SNTP and PTP (Ordinary Clock / Transparent Clock)

Suitable for **phase-shifting transformers, Scott or Leblanc transformers.**

Can be applied as a **differential protection** for reactances, SVCs, generators and motors.

A **fast differential unit**, complemented by advanced **blocking** and **harmonic restraint logics** and an **external fault detector**, provides great reliability in all types of conditions.



## Characteristics

### Differential Units

Includes one unit with percentage restraint and harmonic restraint/blocking, and another unrestrained. The latter allows to accelerate tripping of internal faults with high fault currents that cause CT saturation. Both differential units have up to six three-phase current inputs, allowing protection of three windings transformers in breaker-and-a-half or ring-bus schemes in all their windings.

### Harmonic Restraint / Blocking

The harmonic restraint and blocking units avoid trips under transformer inrush and overexcitation conditions. The wide variety of cross-blocking logics provide great security during transformer energization with low second harmonic percentage, common in new power transformer designs. Additionally, the dynamic harmonic blocking / restraint logic allows accelerating internal fault trips with CT saturation. Thanks to this last logic and the use of fast outputs, the differential unit trips in subcycle times.

### External Fault Detector

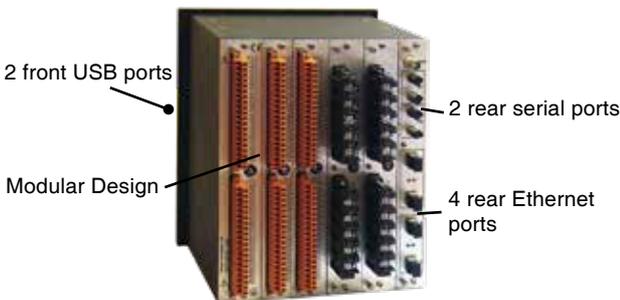
Blocks the differential unit against external faults with very high CT saturation, providing exceptional security.

### Restricted Earth Faults

The restricted earth faults unit detects ground faults in one of the windings of the machine, located very close to the neutral point. In addition to the neutral differential unit, the restricted earth faults unit includes a directional comparison unit that increases its security against external faults with CT saturation.

### Backup Units

The **IDF** has up to nine overcurrent units of each type (phase, neutral, negative sequence, ground). Each of them can be configured as a directional unit. They also include up to four distance zones, which provide a more selective backup than the overcurrent units, especially in transmission grids.



Three sizes: Full 19" rack, 1/2 rack, or 1/3 rack with 6U high

## Protection units

ANSI	FUNCTIONS	
87	Three-phase differential with percentage and harmonic restraints	1
87/50	Three-phase unrestrained instant. differential	1
87/50FD	Fault detector	1
87P	External fault detector	1
87N	Restricted earth faults	3
50	Instantaneous phase overcurrent	9
51	Time phase overcurrent	9
50N	Instantaneous neutral overcurrent	9
51N	Time neutral overcurrent	9
50Q	Instantaneous negative-sequence overcurrent	9
51Q	Time negative-sequence overcurrent	9
50G	Instantaneous ground overcurrent	9
51G	Time ground overcurrent	9
50STUB	Stub Bus Protection	1
50V	Instantaneous voltage dependent overcurrent	1
51V	Time voltage dependent overcurrent	1
67	Phase directional overcurrent	1
67N	Neutral directional overcurrent	1
67G	Ground directional overcurrent	1
67P	Positive-sequence directional overcurrent	1
67Q	Negative-sequence directional overcurrent	1
	Harmonics Blocking	3
49W	Winding thermal image	3
49G	Ground thermal image	3
26	Hot spot	1
50OL	Instantaneous overload overcurrent	1
51OL	Time overload overcurrent	1
27	Phase undervoltage	3
59	Phase overvoltage	3
59N	Neutral overvoltage (calculated VN)	3
64	Neutral overvoltage (measured VN)	3
81M	Overfrequency	4
81m	Underfrequency	4
81D	Frequency rate of Change	4
	Load shedding	1
59V/Hz	Overexcitation	4
50BF	Breaker failure	2
	Cold load	1
21N / 21P	Ground/ Phase distance protection (4 independent zones)	
50SUP	Phase overcurrent for distance supervision	1
60VT	Fuse failure detector and VT Supervision	1
68 / 78	Power swing / Out-of-Step	1
60CT	CT Supervision	6
3	Breaker coil supervision (up to 12 coils)	
	Breaker supervision	6
	Phase selector	1
	Open pole detector	6
2	Pole discordance	6
	Dead line detector	1
	Saturation detector	1
	Trip logic	6