

# IRF

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



Protection for **distribution feeders, transformers and generators, transmission line backup, and BCU** (bay control unit)

### 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)

The **IRF** is applicable in **any substation scheme**, from single / double bus, to ring-bus or breaker-and-a-half substations.

The **IRF** protection functions are suitable for **any neutral configuration**, solid-grounded, resistor-grounded, Petersen coil compensated, and isolated. Depending on the IRF model, it is applicable to three-pole and single-pole circuit breakers.

The breaker failure protection, synchrocheck and recloser can supervise two circuit breakers. The powerful **programmable logic** features **selectable execution times** according to the required priority (2 ms, 10 ms and 20 ms). Includes many digital and analog operators, which allows the creation of complex protection and control functions.



## Characteristics

### Saturation Detector

CT saturation detection is based on the current derivative. The detector modifies the overcurrent units operating principle when activated. Overcurrent units use instantaneous voltage besides RMS voltage, allowing for less strict CT requirements.

### Directional units

Directional units determine the direction of the fault in complex scenarios such as: zero voltage faults, voltage inversion faults in series compensated lines, faults in isolated or compensated neutral grids, and more.

### Protection Schemes

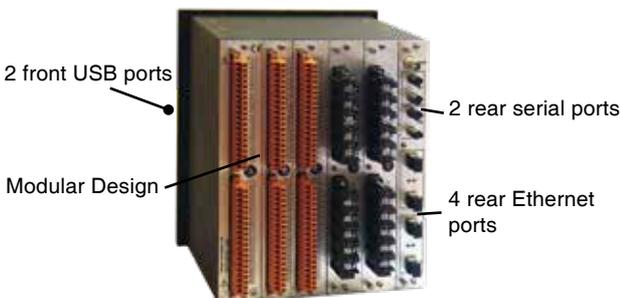
Directional overcurrent units include DTT, PUTT, POTT, DCUB and DCB schemes, allowing instantaneous operation for faults inside 100% of the line.

### Restricted Earth Fault

The REF unit detects transformer winding faults located very close to the neutral point. In addition to the neutral differential unit, the restricted earth fault unit includes a directional comparison unit that increases security against external faults with CT saturation.

### Communication between IEDs

- Up to 4 ports: Communication without redundancy with up to 4 remote ends or with redundancy with up to 2 remote ends.
- Selectable speed: from 1 x 64 kbit/s up to 2 Mbit/s.
- Multimode or single mode FO interfaces (optional SFPs).
- Communication with SDH multiplexers via C37.94 or via ZIV model F2MUX optical-electric converter that integrates G703 and V35 output interfaces.
- Up to 16 digital signals can be exchanged between terminals to implement teleprotection schemes.



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

## Protection units

ANSI	FUNCIONES	
50	Instantaneous phase overcurrent	3
51	Time phase overcurrent (inverse/fixed)	3
50N	Instantaneous neutral overcurrent	3
51N	Time neutral overcurrent (inverse/fixed)	3
50Q	Instantaneous negative-sequence overcurrent	3
51Q	Time negative-sequence overcurrent (I2) (inverse/fixed)	3
50G	Instantaneous ground overcurrent	3
51G	Time ground overcurrent (inverse/fixed)	3
50Ns	Instantaneous sensitive neutral overcurrent	1
51Ns	Time sensitive neutral overcurrent	1
51Ns EPTR_C	Time sensitive neutral overcurrent with curve EPTR_C	1
51Ni/C	Time Isolated/Compensated neutral overcurrent	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
67Ns	Sensitive neutral directional overcurrent	1
67P	Positive-sequence directional overcurrent	1
67Q	Negative-sequence directional overcurrent	1
67Ni/C	Isolated/Compensated neutral directional overcurrent	1
85	Overcurrent teleprotection schemes	1
50FD	Fault detector	1
	Phase selector	1
46	Open phase detector	1
37	Phase undercurrent	1
27	Phase undervoltage	1
59	Phase overvoltage	1
59N	Neutral overvoltage	3
64	Ground overvoltage	3
47	Negative sequence overvoltage	1
49	Thermal image	1
81M	Overfrequency	4
81m	Underfrequency	4
81D	Frequency Rate of change	4
	Load shedding	1
32P/Q	Active/Reactive directional power	2
50BF	Breaker failure	1
78	Out-of-Step	1
	Cold load	1
59V/Hz	Overexcitation	1
87N	Restricted earth faults	1
60VT	VT supervision and fuse failure detector	1
60CT	CT supervision	1