

## RFD – Application

KONPRO generation presents RFD as a part of a group of devices that offer the complete range of protective functions necessary for reliable differential protection of medium voltage transformers.

### — The basic concept

The basic function of the RFD device is a differential protection which consists of two stages.

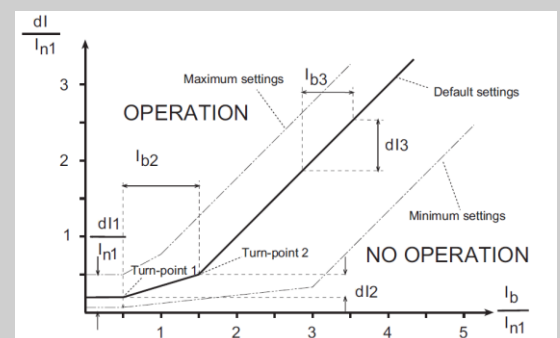
The first stage is stabilized with respect to the amount of current through the transformer and is subject to blocking by energization detection, while the second stage is immediate and without stabilization. Differential operates for each phase individually. (tripping characteristic)

With standard differential protection there is limited earth fault protection of transformers (high and low impedance) applicable for sensitive ground fault detection of the transformer windings. This type of failure detection for transformer is much more sensitive than differential protection for transformer earth fault.

There is a possibility to control primary and secondary transformer breakers and monitoring of trip circuits for both breakers, which can be activated separately.

The breaker wear monitoring function for both switches, which is usually performed as an additional function in protection relays, provides enough insight into the state of MV circuit breakers, and as such provides lower costs of maintenance.

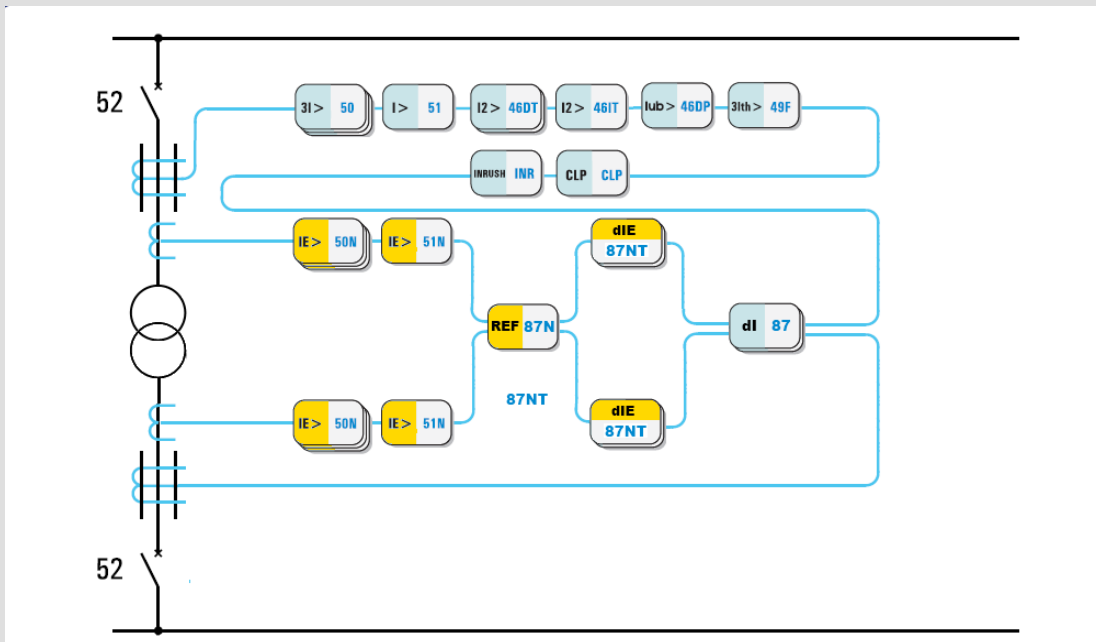
### — Working characteristics



Graphic status display of the apparatus state in the field (single line diagram of the HV and MV systems) is fully configurable by the user. Since apparatus are switching conditions during operation, each apparatus uses four tags that indicate the following possible states: closed, open, intermediate, fault.

The function of the transformer thermal supervision by temperature measurement allows continuous monitoring of temperature in seven points with RTD elements.

# Protection block scheme



## Protection, measurement and control functions

- stabilized three phase differential protection (87T)
- restricted earth fault protection (high and low impedance) (87N, 87N-A/B)
- overcurrent protection with DT and IT characteristic (50, 51)
- earth fault protection with DT and IDMT characteristic (50N-A, 50N-B, 51N-A, 51N-B)
- inverse current component protection with DT and IDMT characteristic (46DT, 46IT)
- phase loss protection (46DP)
- transformer thermal overload protection (49T)
- transformer energization detection based on second harmonic (INR)
- breaker failure protection (50BF)
- trip circuit supervision TCS1, TCS2 (74TC)
- transformer thermal supervision by temperature measurement (Pt-100)\*\*
- time synchronization
- event recorder + trip logger
- disturbance recorder
- management control (local/remote)
- local and remote control of apparatus
- binary inputs and outputs (basic version)
  - 10 binary inputs (7 predefined) – expandable to 42
  - 8 relay outputs (5 predefined) – expandable to 40
- local communication
  - front interface – COM1 – USB port
  - protocol IEC 60807-5-103
- remote communication
  - system/servis interface/protocol
  - COM0 – IEC 60870-5-103 or IEC 61850
  - COM2 – IEC 60870-5-103 or IEC 61850

## Other properties

- 16 LEDs for signalization (4 predefined)
- measurement IAA, IBA, ICA, IEA, IAB, IBB, ICB, IEB, dIA, dIB, dIC, dIEA, dIEB
- test mode (simulation of executive functions during testing)
- self supervision and diagnostics
- software adaption to transformer connection group (Y, Yn, D, Z, Zn)
- software adaption to phase angle(0-11)
- field rotation selection (left or right)
- tap changer correction coefficient

## Dimension drawing

