

## MAPro103 Numerical Sensitive Earth Fault relay

### Protection Functions

- This protection is based on fundamental frequency.
- Earth current setting range 0.005 to  $2.5I_{en}$  step of 0.001
- Thresholds:
  - 3 independent levels,  $I_{se>}$ ,  $I_{se>>}$ ,  $I_{se>>>}$
  - $I_{se>}$  setting range: 0.005 to  $2.5I_{en}$  step of 0.001
  - $I_{se>>}$  setting range: 0.005 to  $2.5I_{en}$  step of 0.001
  - $I_{se>>>}$  setting range: 0.005 to  $2.5I_{en}$  step of 0.001
- Reset ratio: 95%
- Shortest operation time: <50 mSec (Instantaneous operation)
- Drop out time: <50 mSec
- Definite time delay(trip & reset): 0 to 600 Sec step of 0.01 Sec
- IDMT curves for trip: IEC: Short time Inverse (STI)  
Standard Inverse (SI)  
Very Inverse (VI)  
Extremely Inverse (EI)  
Long Time Inverse (LTI)  
IEEE: Moderately Inverse (IMI)  
Very Inverse (IVI)  
Extremely Inverse (IEI)
- IDMT curves for reset: IEEE Moderately Inverse (IMI)  
IEEE Very Inverse (IVI)  
IEEE Extremely Inverse (IVI)
- Time multiplier setting:
  - Trip: 0.025 to 1.5 step of 0.001
  - Reset: 0.025 to 3.2 step of 0.001

### Automation Functions

- Multi shot Auto Recloser
- Trip Circuit Supervision & circuit breaker fail detection
- Inrush Restrain
- Circuit breaker control

### Recording

- Event recording (Capacity: 1000, Info.: state of D. inputs, D. outputs & LEDs. Data: event name label + time with 1ms acc.)
- Fault recording (Capacity: 50)
- Disturbance recording Capacity: 10 records, 16 samples/cycle
  - Pre fault time: 0.2 – 3 seconds (10 – 150 cycles)
  - Post fault time: 0.2 – 5 seconds (10 – 250 cycles)
  - Data: AC & digital inputs & outputs + date & time (with 1mSec accuracy)

### Communication

- RS485 (rear connector, twisted pair wire)
  - Protocol: Modbus RTU
- USB (front connector) - USB (front connector)
  - Connector: Mini USB standard connector
  - Application: Information extraction & system programming by a local PC or laptop

### Inputs & outputs

#### - AC inputs

- Earth current input: 1A & 5A by connection (specified in setting)
- Frequency: 50 Hz
- Burden:
  - Earth: <0.01VA for 1A input at 0.1A  
<0.05VA for 5A input at 0.5A
- Current thermal withstand: 1 Sec at  $8I_n$   
2 Sec at  $5I_n$   
Continuous at  $3I_n$

#### - Digital inputs & outputs

- Digital inputs: 2 Independent optical isolated  
Burden <10mA  
Voltage range 35 to 150Vdc  
Recognition time <5mSec
- Digital outputs: 4 configurable dry contacts  
Contact ratings:
  - AC max 10A/250V, 50W resistive, 25W  
Inductive with L/R 40mSec
  - DC max 0.3A/135V, 40W L/R 30mSec
- Contact operation time: <10mSec  
Contact electrical & mechanical operate lifetime: >100000 times (at rated load)

#### - Power supply

- Aux. voltage range: 55 to 160Vac/dc
- Ripple: <8%
- Burden: 3W min, 6.8W max with all output relays energized.

### Accuracy

- O.C. thresholds: +/- 0.5%
- Trip time:
  - Definite time: +/-1%, min: 10mSec
  - Inverse curves: +/-3% for STI, SI, VI, IMI, IVI  
+/-5% for LTI, EI, IEI