Railroad-1-EP

**DIGITAL COMPLEX PROTECTION
FOR SINGLE PHASE RAILROAD SYSTEM**

Application Field.

RAILROAD-1-EP digital complex protection has been specially designed for single phase electrified railroad system. It contains a distance relay with 5 independently programmable quadrilateral zones, a fault locator, an autoreclosing system, and a thermal overload relay.

Main Features.

- Full scheme distance relay with 5 zones.
- All parameters of the zones can be set independently.
- 2 forward zones, 1 reverse zone, 2 programmable to be forward or reverse.
- All zones have quadrilateral characteristics.
- Two different measuring algorithms:
  1st zone has a very fast three point measuring algorithm which is insensitive to CT saturation,
  the other 4 zones use an algorithm with Fourier filtering.
- Polarising for directional detection without dead zone at close-up faults.
- Instantaneous definitive trip at switch-on-to-fault.
- Signal from VT midget CB is used for VT circuit supervision.
- Built-in automatic fault locator.
- Operating time: 25 ± 5 ms.
- One shot auto-reclosing.
- Each impedance zone from 1 to 4 can be independently set to start or block auto-reclose.
- Operation of zone5 (always reverse) generates definite trip.
- AR function can be blocked or enabled with parameter or hardware input or via user-defined logical equation.
- Complete thermal overload relay for best protection against line overheating.
- Separate current input for thermal overload relay.
- Thermal overload relay has pre-alarm and trip stages.
- Thermal overload relay takes the effect of previous heating into consideration (heating and cooling processes)
- PROTLOG powerful logic with 8 user definable logic equations. User can add breaker-failure and other functions to the basic set. It can also eliminate usage of auxiliary contacts and time relays.

- Built-in software matrix to parameterise the functions of output contacts and indicating LEDs.
- Built-in self test function with dc supply check, trip/close circuit supervision and Watch Dog.
- One serial communication direction with two ports: (selectable with a parameter)
  - an isolated RS 232 connector on the front plate
  - a fiber optic connector on the rear plate.
- Two types of event recording:
  - event log for storing collected data of the last 50 protection operations
  - event sequence recorder with 1 ms resolution for 300 events.
- 16 isolated optical coupled binary inputs.
- 8 output contacts with user-defined functions. Each can be NO or NC.
- 6 programmable indicating LEDs.
- Man-machine communication via external PC or built-in LCD display.,
- Battery backed-up RAM to store events and running real time clock.
- Clock synchronisation with external binary input or on serial link.

Optional Functions

- Digital fault recorder with 80 sec recording time.
- RTU card with IEC 870-5-101, 870-5-103, MODBUS protocols and complete RTU functions.
- Additional binary input and output contact cards for RTU tasks.
- Graphic LCD display (320x240 pixels) on front plate for displaying measured values and one-line scheme.

Technical Data

- Rated secondary current,	**1 A** or 5 A,
- Rated secondary line voltage, U_n	100 V, **110V** or 200 V
- Rated frequency	50 Hz
- Overload capacity, in voltage circuits, continuous	$1 \cdot 2 x U_n$
- Overload capacity, in current circuits, continuous	$2 x I_n$
1 s	$100 x I_n$ (if I_n=1A), $50 x I_n$ (if I_n=5 A)
- Dynamic current limit	$100 x I_n$
- Accuracy of digital impedance relays (> 50 % I_n)	± 5 %
- Accuracy of digital current relays (> 50 % I_n)	± 2 %
- Accuracy of digital timer	± 3 ms at 10 ms steps ± 12 ms at 1 s steps
- Impedance stages, hysteresis	15 %
- Reset ratio of current relays	95%
- Optical isolated inputs	16 pcs, 220V DC
- Output relays	8 pcs printrelays
- Output relay contact type,	
programmable by matrix:	(8 pcs)
- Output contacts ratings,	
rated switching voltage	250 V
continuous load current	8 A
switching on current	16 A
breaking current at 220 V dc,	
pure conductive circuit	0·25 A
L/R = 40 ms load	0·14 A
option: L/R = 40 ms load	4 A
- Auxiliary dc battery voltage (the same supply unit)	220 V, 110 V,
voltage tolerance	88 to 310 V
- Permissive ambient temperature	0^0 to 50^0C
- Insulation test (IEC 255)	2 kV, 50 Hz, 5 kV, 1·2/50 μs
- Disturbance test (IEC 255)	2·5 kV, 1 MHz
- Electrostatic discharge test (ESD) (IEC 801-2)	8 kV
- Burst test (IEC 801-4)	2 kV
- Electromagnetic (radiofrequency) interference test	IEC 801-3

Size.

An ***EuroProt*** device is always rack-mounted type. One of the design form is suitable to mount directly into a ***standard 19" inch cabinet*** frame. The other designs are ***panel mounted devices*** with raised-hinged or flush mounted forms.

Outline size of a *19 inch cabinet frame mounted device* and a *panel mounted device with flush mounted form* is as follows.

Width: 483 mm, height: 132·5 mm, depth: 201 mm.

Outline size of a *panel mounted device with raised-hinged form* is as follows.

Width: 490 mm, height (with terminals): 250 mm, depth: 250 mm.

Terminal type at panel mounted design is as follows (terminal are placed only down).

Switchable: 02 to 20 terminals, WTL6/1 Weidmüller
Not switchable: 21 to 73 terminals, WDU 2,5 Weidmüller.

Weight 8 kg.