DIGITAL EARTH FAULT RELAY

Prok dv's®

An ISO 9001 : 2015 Company

ISO 9001 BUREAU VERITAS Certification

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DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) →MPEFSPL –SERIES IEEE DEVICES CODE-50N

Features

- •Compact
- •IDMT (4 IEC curves), Definite Time & Instantaneous
- •Wide setting ranges
- •Fully digital acquisition & processing of data
- •Wide operating voltages
- •LCD display of operated current & fault current
- •Rugged and Tropicalized design

Applications

- •Earth Fault Protection for Generators / Alternators
- •Earth Fault Protection for Transformers & Feeders

Specifications

SPECIFICATIONS	DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR)
Auxiliary Voltage	85-275 V AC/DC or 50-550V AC/DC
Frequency	50Hz
Neutral or Summation CT rated Current-I_n	1A / 5A (Field Selectable)
Burden on CT	<0.2VA
Sensitivity Settings Plug Setting Range(PS)	PS Range : (5%-80%) of I_n. in steps of 5%
Definite Time Settings in Sec	0.0 -20 Sec. (200 Steps) in steps of 0.10 Sec.
IDMT Curves	4 IDMT Curves : • Normal Inverse (NI) • 1.3 Sec • 3.0 Sec • Long Time Delay (LTD)
Time Setting Multiplier (TMS)	(0.1-20.) in steps of 0.05
High Set Enable/Disable Option	Available
High Set	(0.5 -16) I_n. in steps of 0.1
Time for High Set Operation	(0.0 -1.6) Sec. in steps of 0.1 Sec
CBCT/ZCT size for EFR	**Circul ar:** 40mm,65mm,100mm,150mm,200mm,250mm&300mm **with Secondary 1A only**
Contact Capacity (A)	8A@250V AC 8A@30V DC
Contact type	NC-C-NO Two change over

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Operating Temperature (°C)	-5°C --- +55°C
Standard	IEC - 60255
Relay Setting Mode	Setting through push button • Selection of the relay rating - 5A or 1A (In) • PS - selection • Curve Selection • TMS - selection for IDMT • Time - for DEFT • Relay TEST • RESET
Display/Indication	Back -Lit LCD display Two line 8 characters • Trip value of the current w.r.t. Secondary of CT • Set PS value. • Red LED -DEFT/IDMT trip
Relay Test Facility	Available through push button
Mounting Type	Flush Din/Surface
Dimensions in mm	Flush : 96 x 96 x 70 Din : 80 x 95 x 75 (W x H x D)
Panel cut out in mm (Flush type)	90 x 90 + 0.1 mm

Description

PROK DEVICES PVT LTD an ISO 9001-2008 company introduces DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR).It is a current sensing device which is tropicalised professionally designed and tested for protection of Generators, Transformers and Feeders. Prok dv's make DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) can be employed with various earth fault protective schemes, which are explained in brief with figures. The magnitude of the earth fault current depends on the fault impedance and invariably the fault impedance for earth fault is higher than that for phase faults, hence the earth fault current is low compared to the phase fault currents. The fault impedance depends on the system parameter and also on type of earthing. The neutral may be solidly grounded, grounded through resistance or reactance.

The unit has LCD for displaying the fault current (at the time of tripping) and setting values (curves, plug setting & TMS). The LEDs are provided for indicating power ON status and to indicate IDMT or DEFINITE TIME or INSTANTANEOUS mode operation. Key pads are provided for easy setting/changing of the parameters.The design is tropicalised and rugged.

The DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) measure the current using sampling technique. The analog current signal obtained from the protection CT is stepped down using interposing CT. Current signal is then applied to signal conditioning circuit using the buffer. Signal is then level shifted by adding DC level. This uni-polar signal is applied to ADC of the processor.

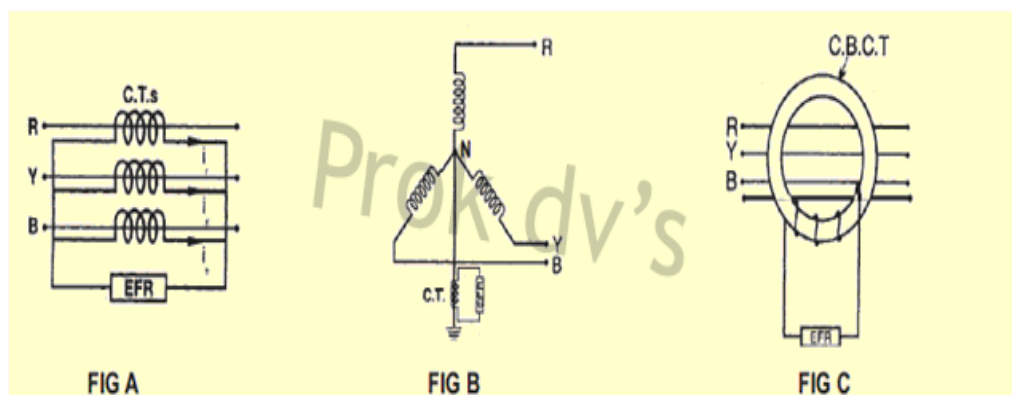ISO 9001 BUREAU VERITAS Certification

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The ADC samples the signal in every cycle. The samples are used to determine the magnitude of the signal. The calculated amplitude value is checked with the set value at every sample instant. When the evaluated value is greater than the set (Current) the algorithm evaluates the trip time. If the operating condition is met the trip initiating signal is issued after the elapse of calculated tripping time.

Figure A Shows how an Earth Fault Relay (EFR) can be energized by a residual current, in this method the secondary 3 CT currents, by summation technique Ir, Iy & Ib of three different phases are connected in parallel. The vectorial sum of three current ie (Ir+ Iy + Ib) is zero under normal condition. During the occurrence of earth fault the residual current is non-zero and when it exceeds the pick-up value (Site Selected), the Earth Fault Relay(EFR) trips. Theoretically during balanced load conditions the Earth Fault Relay (EFR) carries no current hence its current, setting may be any value greater than zero, but in practice such ideal system do not exist. Using the summation techniques it is possible to detect Earth Fault current in the Electrical power system, the choice of summation can be made according to site condition, Economic condition and the Electrical protection scheme.

Figure B Shows schemes for DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) used for protection of Transformer and Generator. On occurrence of earth fault, zero sequence current flows through the neutral, in-turn actuating the earth fault relay (EFR).

Figure C shows a scheme with DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) which utilized a special type of C.T., called core balance current transformer (CBCT/ZCT) which is toroidal in nature, under normal condition of 3 phase to phase faults the current in the toroidal secondary is zero. During earth fault the reflected zero sequence unbalance current flows in the CBCT/ZCT secondary energizing the Earth Fault Relay (EFR).
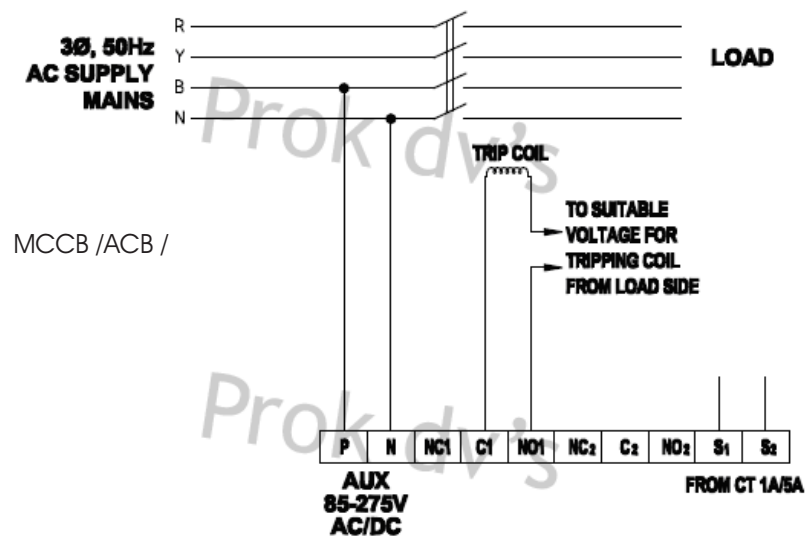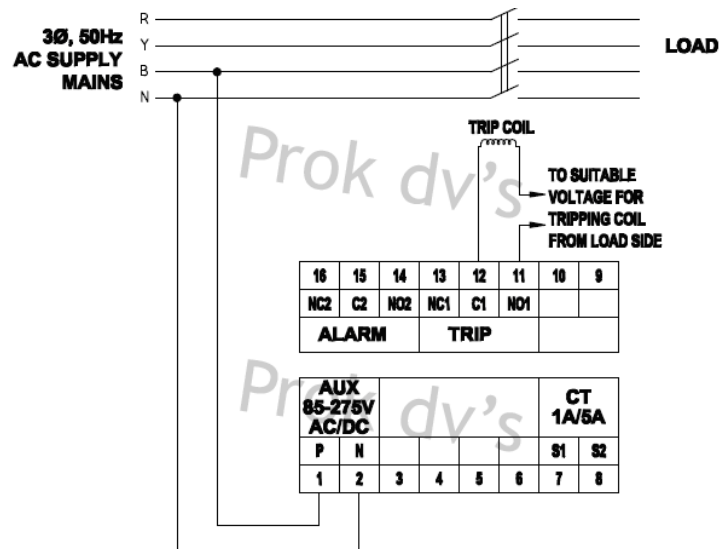

FIG A   FIG B   FIG C

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WIRING DIAGRAM FOR DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) – (MPEFSPL) FLUSH MOUNTING

WIRING DIAGRAM FOR DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) – (DMPEFSPL) DIN MOUNTING
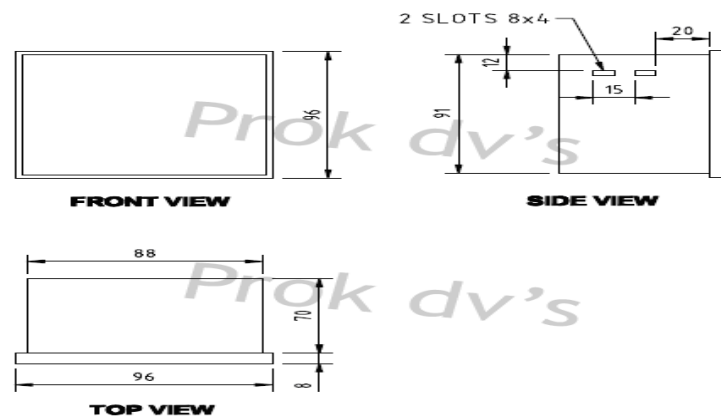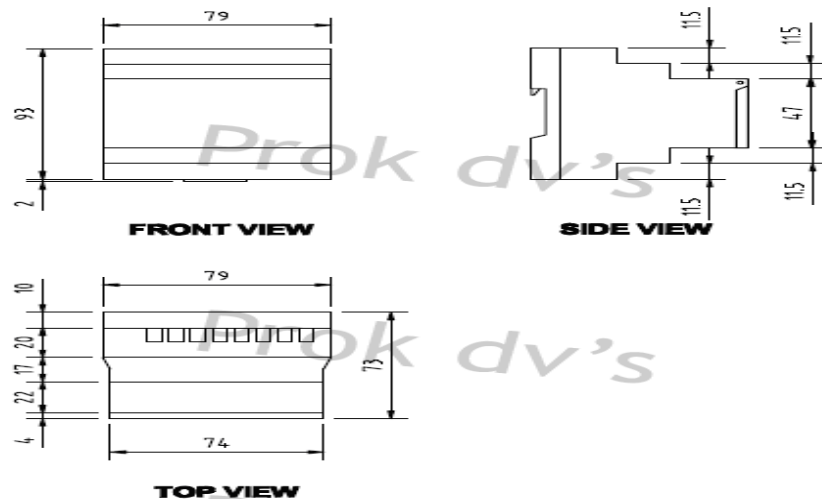
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MECHANICAL DIMENSION OF DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) – (MPEFSPL) FLUSH MOUNTING

FRONT VIEW

SIDE VIEW

TOP VIEW

NOTE: ALL DIMENSIONS ARE IN MM
TOLERANCE:- ± 1MM

MECHANICAL DIMENSION OF DIGITAL MICROPROCESSOR / MICROCONTROLLER BASED IDMT / DEFINITE TIME / INSTANTANEOUS EARTH FAULT RELAY (EFR) – (DMPEFSPL) DIN MOUNTING
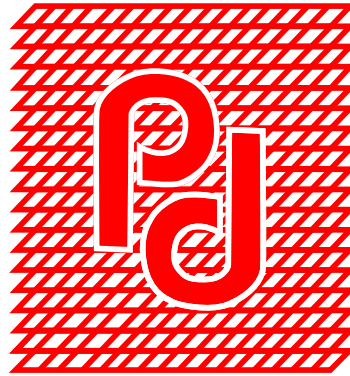

FRONT VIEW

SIDE VIEW

TOP VIEW

NOTE: ALL DIMENSIONS ARE IN MM
TOLERANCE:- ± 1MM

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