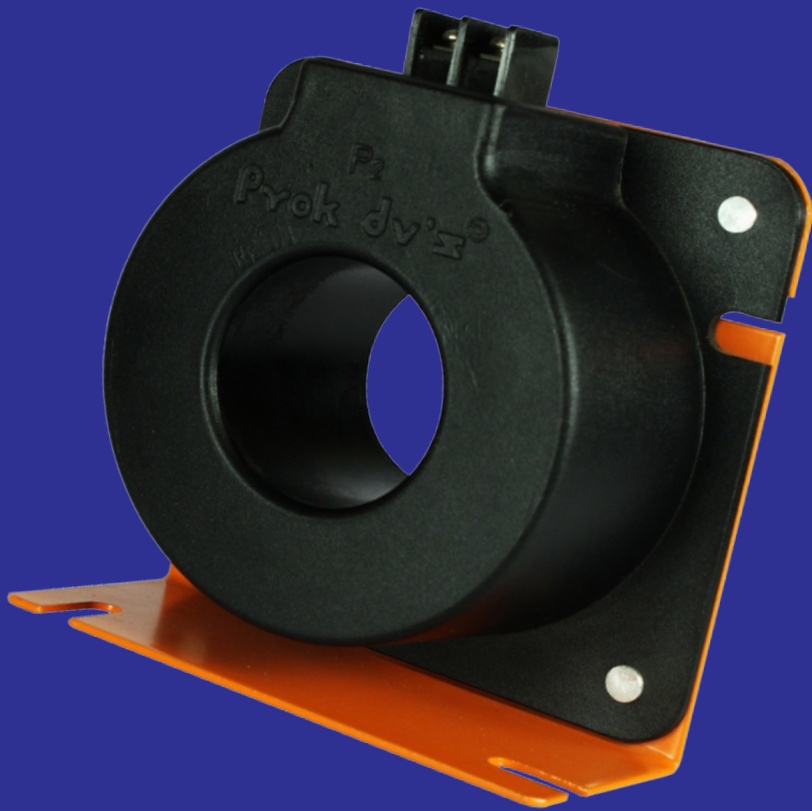# Prok dv's®

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DIGITAL EARTH LEAKAGE RELAY

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DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED EARTH LEAKAGE RELAY (ELR) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)→MPEL SERIES IEEE

Device Code-64

EARTH LEAKAGE RELAY-µP BASED   MPEL 01 / 02

Pd-ELR
0.3A-12A

MODE/SET   ▲ CBCT+RLY TEST   ▼ RESET

• Use MODE/SET Key to access current & time setting
• After the desired value is set press MODE/SET Key
• Use ▲ & ▼ Keys to scroll Up and Down

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Features

• Digital Microprocessor / Microcontroller based compact design.
• Continuous monitoring and display of set value and measured value of leakage current.
• 8 character 2 line LCD displays with back-lit.
• Test & Reset facility.
• CBCT / ZCT connection monitoring facility.
• True RMS measurement of leakage current.
• Trip Circuit Failure indication.
• Immune to harmonics and transients.
• Serial RS. 485 communication port with Modbus Protocol (optional).
• Tropicalized and rugged design.
• Transducer Output- (4 mA-20mA) (optional).
• External Test, Reset, Fault & Healthy indication suitable for Mining application.

Applications

• Frame leakage protection for LT control panels and switch boards.
• Earth Leakage protection for Feeders / Motors / Generators / Transformers / Mobile Operating Equipments.
• Protection for hazardous sensitive environments like Oil Refineries/Cement Plant/Chemical Plant/Steel Plant / Pulp Industries and General Electrical Distribution.
• Protection for Mining and Control Engineering.

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Introduction

Earth Leakage Current give rise to generation of heat and result in progressive failure of insulation, which leads to earth faults sparking flashovers, deterioration of earthing and finally results into catastrophic fires which destroys costly equipments, gadgets and precious lives. It is therefore essential to detect earth leakage current well before they cross the threshold limits and isolate the circuit in the event of leakages.

Prok dv's make Digital microprocessor/microcontroller based Earth Leakage Relays (ELR) with Core Balance Current Transformer (CBCT / ZCT) are used to detect leakage currents in electrical power systems. ELR transmits a signal to activate the trip coil of the MCCB/ACB/OCB/CONTACTOR in the event of earth leakage resulting in automatic isolation of the load. ELR have been widely used and accepted because of field adaptability and are economic.

Prok dv's make Earth Leakage Relay (ELR) MPEL series uses the state-of-the-art, Digital microprocessor/micro controller based protection device to detect low level leakage due to degradation of insulation of phase conductors or high impedance faults.The main feature of Digital microprocessor/microcontroller Earth Leakage Relay (ELR) continuous display of earth leakage currents of the power system. The unit has immunity to external disturbance like harmonics and transients.

Principle of Operation

Digital microprocessor /microcontroller based Earth Leakage Relays (ELR) with Core Balance Current Transformer

(CBCT / ZCT) employs to sense the leakage current the (CBCT / ZCT) is mounted externally and load current carrying cable are passed through the (CBCT / ZCT). Ideally in a leakage in a leakage free system the incoming and outgoing currents are equal and opposite in direction, which means that the vector sum of the three phase currents is zero and can be expressed as

⇨ ⇨ ⇨
$Ir + Iy + Ib = 0$ for 3 phase 3 wire system
⇨ ⇨ ⇨
$Ir + Iy + Ib + In = 0$ for 3 phase 4 wire system.

For the above condition the CBCT / ZCT produces zero resultant magnetic flux keeping the system healthy.

In case of earth leakage either due to insulation degradation / chemical corrosion etc. the vector sum of currents is not zero and CBCT / ZCT generates voltage which is fed to the ELR. This signal is compared with the set value of leakage current and trip command is initiated if the leakage current is more than the set values of current and time. It is worthwhile to emphasize that the unequal / unbalanced loading on phases does not effective the vector sum and as such there is no difficulty in the use of Earth Leakage Relay (ELR) on electrical distribution system with unbalanced loading.

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UKAS QUALITY MANAGEMENT

NABCB

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Prok dv's recommends and suggests to use Digital Microprocessor/ Microcontroller based Earth Leakage Relay (ELR) with core Balance Current transformer (CBCT / ZCT) for typical areas like UPS/ Inverter application, Mining, Cement, Petroleum & Oil Refineries, Steel, Paper and Pulping industries for greater Sensitivity, Selectivity and Reliability. The measurement of Leakage Current is TRUE RMS reading and the device has an external ADC having 24 bit for greater degree of Accuracy. The Earth Leakage Relay (ELR) has Back-Lit LCD Display 2 Line 8 Character for displaying the nature and magnitude of Fault. Earth Leakage Relay (ELR) can detect if the CBCT/ZCT connection status ie detecting the CBCT /ZCT Open to ensure the healthiness of the Relay. The ELR has Auto Re closure facility and also indicates the Trip Circuit Failure if the Circuit Breaker fails to operate. The Earth Leakage Relay (ELR) has wide band Auxiliary Input Universal Power Supply of 85 Volts to 275 Volts AC / DC.

Digital Microcontroller / Microprocessor based Earth Leakage Relay (ELR) has RS 485 Communication Port with Modbus Protocol at a Baud Rate of 9.6 KBPS for Remote Access and Control as an Optional Feature. A Transducer Output of 4 mili Amps to 20 mili Amps is possible as an Optional Feature.

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Specifications

| PARAMETERS	MPEL/DMPEL Series (Microcontroller/Microprocessor based)
CURRENT SETTING RANGE	300mA-12A -(MPEL-01) 30mA-3.0 A - (MPEL-02) (18- steps .)
TRIPPING TIME	0.0 Sec-5 Sec Step size- 0.05Sec.
AUXILIARY VOLTAGE	85-275V AC/DC 415V & 550V. AC
COMMUNICATION WITH MODBUS PROTOCOL RS-485	Device ID: 1-31 Baud Rate:9600 Protocol: Modbus
CORE BALANCE CURRENT TRANSFORMER TYPE	Moulded Case or Resin Cast
CBCT / ZCT STANDARD SIZE Internal Diameter	**CIRCULAR:** 40mm,65mm, 100mm, 150mm 200mm,250mm & 300mm **RECTANGULAR:** User specified.
CONTACT RATING	8A 250V AC/ 8A 30V DC 2C/O
MOUNTING	Flush / Din
DIMENSION	Flush: 96 x 96 x 70mm Din:80 x 94 x 76mm (W x H x D)
PANEL CUT OUT(FLUSH)	90 x 90 + .1mm
OPERATING TEMPERATURE	-5° C to + 55° C
REFERENCE STANDARDS	IEC 60255 / IEC 755 a) IEC-755 clause 8.3 Verification of operating characteristics (PerformanceTest) b) Insulation test IEC60255 Insulation resistance test - As per IEC-60255-Cl-5&7 Di-electric test- As per IEC-60255-Cl-5&6 Impulse Voltage test - As per IEC-60255-Cl-5&8
Note: ELR / DEL-02 / MPEL-02 / DMPEL-02 / EL-05 / DEL-05 is Calibrated for the maximum CBCT / ZCT of size 40mm, 65mm, 100mm & 150 mm only	

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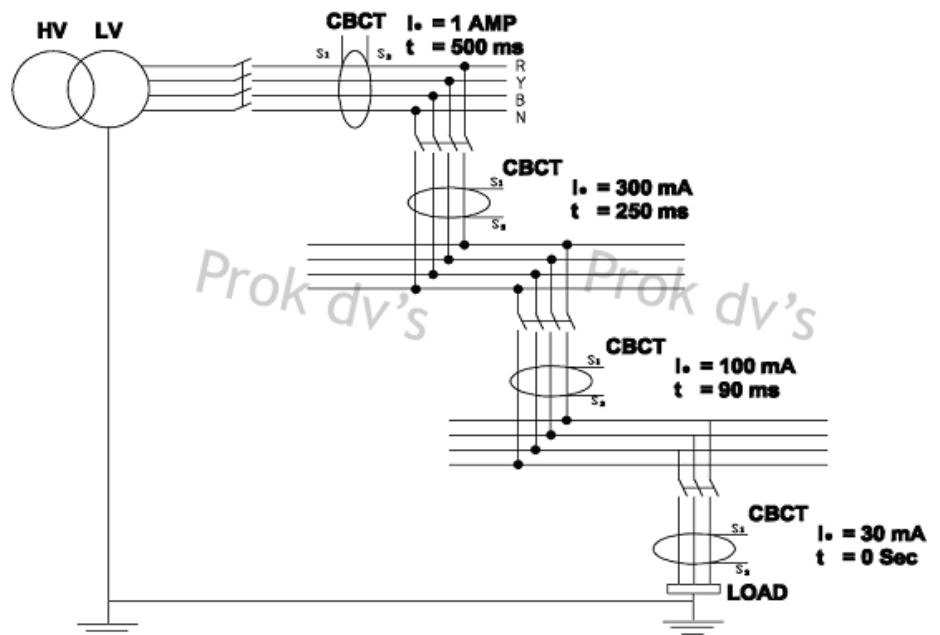
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WIRING DIAGRAM FOR DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED EARTH LEAKAGE RELAY(ELR) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)(MPEL SERIES) - FLUSH MOUNTING TYPE WITH RS-485
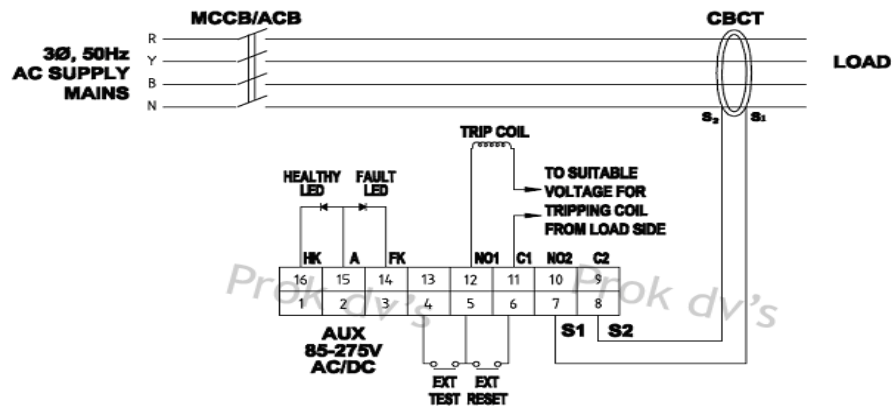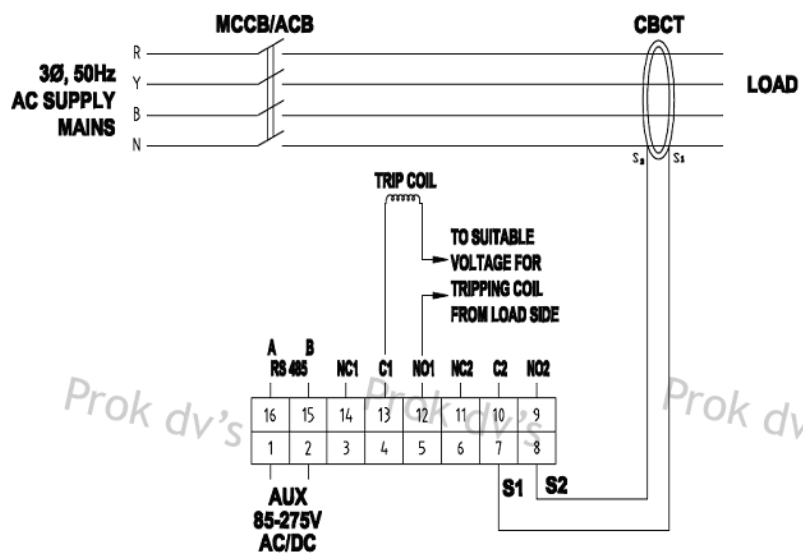

NOTE: FOR AUX. VOLTAGE - L TO L 380V, 440V & 550V CAN BE PROVIDED
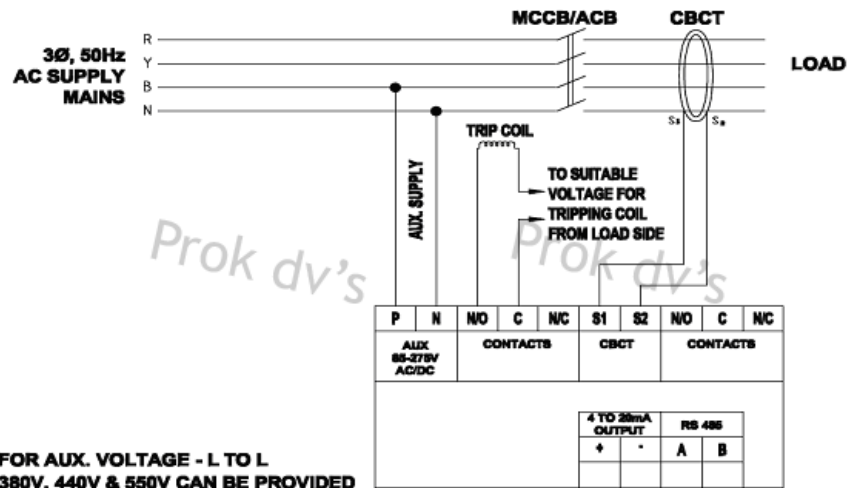
DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED EARTH LEAKAGE RELAY(ELR) –HIERARCHY (Time & Current sensitivity)

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WIRING DIAGRAM FOR DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED EARTH LEAKAGE RELAY(ELR) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)(DMPEL SERIES) - DIN MOUNTING FOR MINING APPLICATION

NOTE: FOR AUX. VOLTAGE - L TO L
380V, 440V & 550V CAN BE PROVIDED

WIRING DIAGRAM FOR DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED EARTH LEAKAGE RELAY(ELR) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)(DMPEL SERIES) - DIN MOUNTING-RS 485 MODEL

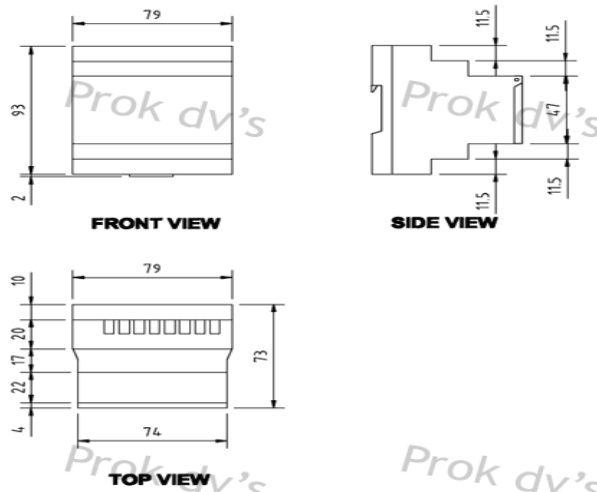NOTE: FOR AUX. VOLTAGE - L TO L
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DIGITAL EARTH LEAKAGE RELAY
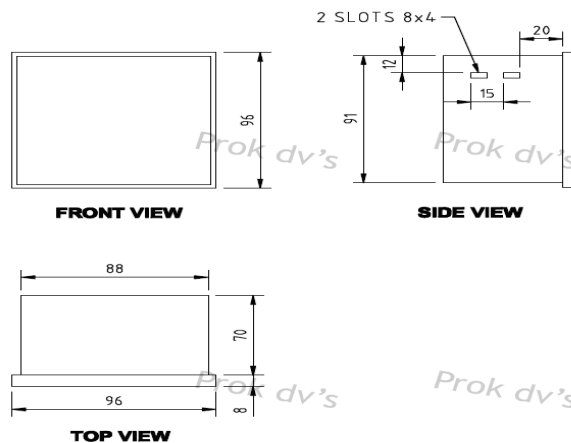
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DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED DIN MOUNTING EARTH LEAKAGE RELAY(ELR) (MPEL) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)

FRONT VIEW — 79, 93, 2

SIDE VIEW — 11.5, 11.5, 47, 11.5, 11.5

TOP VIEW — 79, 10, 20, 17, 22, 4, 73, 74

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

DIGITAL MICROCONTROLLER / MICROPROCESSOR BASED FLUSH MOUNTING EARTH LEAKAGE RELAY(ELR) WITH CORE BALANCE CURRENT TRANSFORMER (CBCT / ZCT)

FRONT VIEW — 96

SIDE VIEW — 2 SLOTS 8x4, 20, 12, 91, 15

TOP VIEW — 88, 70, 96, 8

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

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