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PROK DV'S AN ISO 9001 CERTIFIED COMPANY

Prok dv's

**EARTH LEAKAGE RELAY WITH CBCT, BUILT IN
RTC & COMMUNICATION**

The rise of leakage current in Electrical Power Distribution are quite dangerous, resulting in Electrical hazards and catastrophe. Leakage Current are due to deterioration of insulations, negligence of wire man, Bad wiring, Inferior / substandard usage of Electrical Materials, ageing or endurance of Electrical environment. First and foremost importance should be given for the proper earthing of electrical net work-system. Most of the Industries, Commercial establishment and domestic application the earthing of electrical system is ignored and improper maintenance of the same.

The Earth Leakage Current are very low and are sensitive leakage current can be detected by Earth Leakage Relay and core balance current transformer. ELR detects the Leakage Current in the circuit and isolate the power supply by switching off the tripping device (circuit breaker / contactor etc).

Earth Leakage Relays are more sensitive than Earth Fault Relay because in Earth Fault Relay the Fault Current magnitude is quite high and also depends on the fault impedance whereas the Earth Leakage relay detects the frame leakage current, which are quit small in magnitude ensuring the Earth leakage detection and isolation of electrical fault results in safety and are free from hazardous environment. By installing Earth Leakage Relay with CBCT protects your electrical systems and gadgets from electrical casualty.

Total reliability in power system protection.....

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EARTH LEAKAGE RELAY μ P BASED MPEL SERIES ELR

Description: Prok dv's brand earth leakage relay MPEL series uses the state of the art microcontroller based protection device to detect low level leakage due to degradation of insulation of phase conductors or high impedance faults.

The main feature of MPEL is the continuous display of earth leakage currents of the power system. The unit is immune to external disturbance like harmonics and transients.

Features:

- Microcontroller based compact design.
- Continuous monitoring and display of set value and measured value of leakage current.
- 8 character 2line LCD displays with back lit.
- Test & Reset facility.
- CBCT connection monitoring facility
- True Rms measurement of leakage current.
- Trip Circuit Failure indication (Optional) Default:Disabled
- Serial RS 485 communication port with modbus protocol (optional)
- Fault recording with date and time stampings, max up to 10 Faults (optional)
- Tropicalised and rugged design.
- External test, reset, fault & healthy indication suitable for mining Application
- High sensitive leakage current setting (5mA to 1.00A) (MODEL:MPELSPL)

Application:

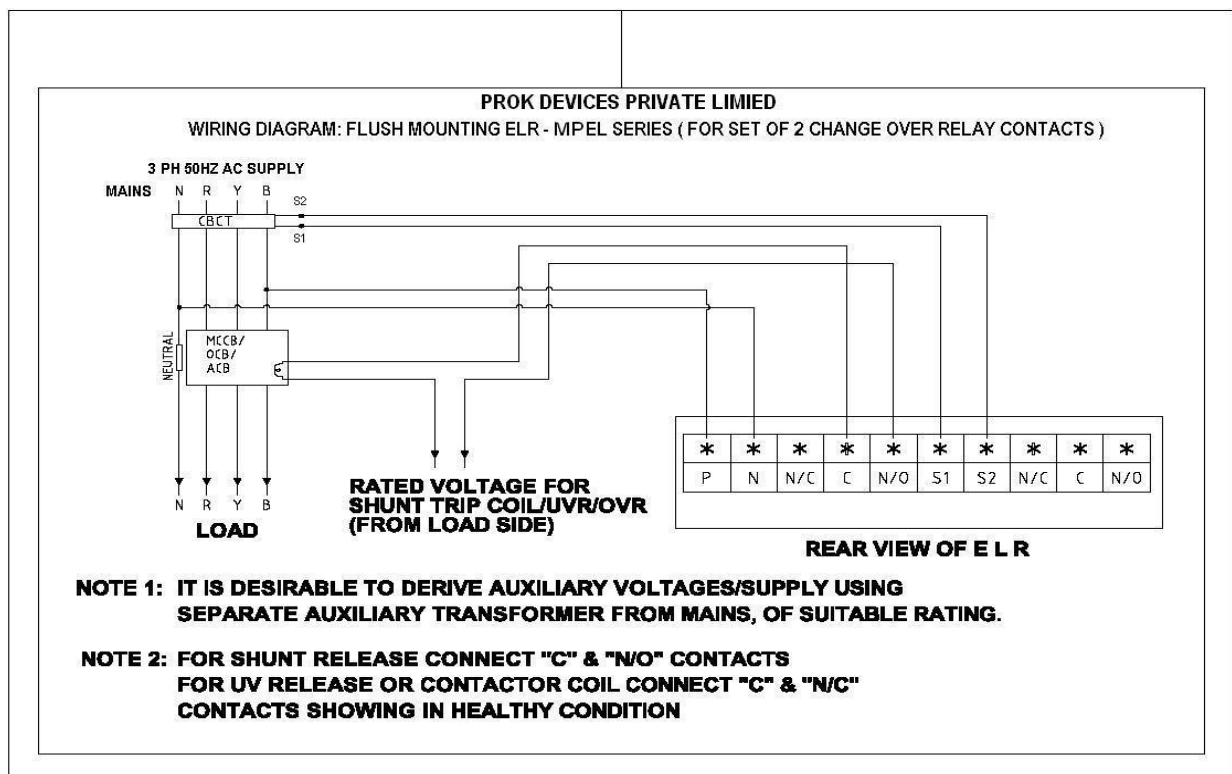
- Frame leakage protection for LT control panels and switchboards.
- Earth leakage protection for feeders.
/motors/generators/transformers/mobile operating equipments.
- Protection for hazardous sensitive environments like oil refineries/chemical platform/pulp industries and general electrical distribution also where drives and soft starters are used.
- Protection for mining and control engineering.
- Protection for Marine and control engineering.

INSTALLATION PROCEDURE FOR EARTH LEAKAGE RELAY CBCT

1. Check the sensitivity of Earth Leakage Relay and also the inner diameter of core balance current transformer.
2. The Serial No. of the ELR and CBCT should match for better performance (the performance shall be guaranteed if the serial no. of the ELR and CBCT are matched).
3. Check the Auxiliary Supply of ELR and proper Voltage i.e. the rated Auxiliary Voltage.

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4. The ELR have one pair of potential free change over contact for tripping purpose. Use rated current and rated voltage (refer the specification of our product). One pair of change over contact i.e., N/O Contact and N/C Contact can be used depending upon the tripping management.
5. The ELR can be flush mounting or Din mounting type and CBCT can be tape wound or molded case or resin cast type.
6. The CBCT can be mounted at the incoming or outgoing side of the breaker.
7. The ELR has low burden on CBCT.
8. The ELR is fitted in/outside the Panel depending on the type of mounting. The Auxiliary rated voltage is brought to the relay from the incoming supply source. The CBCT outputs are wired up to relay. The tripping arrangement like Shunt trip / Under Voltage Coil can be chosen and accordingly the wiring can be done using potential free contact.
9. The connections scheme as per the following



For ELR the Auxiliary supply should be given from incoming i.e. from mains side only. The reason being the relay should indicate that the systems is healthy or fault.

A. The CBCT can be mounted at the incoming cable entry or at the incoming of tripping mechanism. Alternatively the CBCT can be mounted at the outgoing side or at Bus Bar side. Care should be taken at the cable entry that the cable sheath / shielding should be terminated or Earthed before connecting the CBCT.

B. Use C and N/O Contact for shunt trip and C and N/C Contact for under voltage coil.

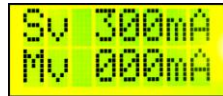
After the successful completion of above mentioned scheme the Earth Leakage Relay is ready for use and installation is completed.

SETTING PROCEDURE FOR EARTH LEAKAGE RELAY MPEL SERIES WITH RTC AND COMMUNICATION

Power up the ELR - Connect the Aux. supply to the ELR terminals P & N terminals (85 – 275 V AC/DC, Line – Line 380V, 440V, 550V / L1 - L2

Display information:  

Pd-ELR and Current range, model & Ver No
Are displayed momentarily
Typical example:




Sv- Set value (set value of leakage current)
Mv- Measured value (leakage current in the System)

Now relay automatically tests the connection of the CBCT to the ELR terminal marked as S1 & S2, if the CBCT is not connected, ELR display shows CBCT open alarms the user to connect the same to ensure proper operation.





CBCT Connection can be checked manually by pressing the  key continuously for 3sec



Display shows

Connect the CBCT to the S1& S2 terminals of the ELR and Hold for a moment and

release  key. Display shows



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User setting mode: In User setting mode

- 1) User can access to View Trip History -Maximum up to 10 Faults with date and time stampings in FIFO basis
- 2) User can access to View Saved Settings- Auto scroll of Set Parameter
- 3) User Can Edit the Settings- With PASSWORD Protection (Factory SET)
- 4) Save and EXIT from User setting mode

Hold and Release Key to enter in to User Setting mode

Display Shows



User can Press key to view the Past Fault Recordings or Trip History



Now Display Shows if NO past Tripping or Clear Trip Records by the User



Or else it displays one after the other and then



display shows




Now Press or Key to View the Previous Fault,

Repeat the steps up to Maximum 10 faults



Press key to come out from View Trip History mode

Now Display Shows




User can Press key to view the Previous stored data OR Saved Set Parameters

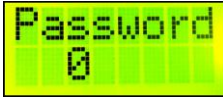
one after the other (scrolling)

After Viewing the Saved Set Values in Scroll Mode

Display Shows



To edit the settings User can press and release  key.


Display Shows 

Now Enter Factory SET Pass word 1000 Using  &  Keys

(Press  key once and  Key 4 times)


If Enter Factory Set Password is Correct


Display shows:  ELFI Lim: Earth Leakage Fault Current-Limit

Set the desired value of leakage current by using  key to increment and



Key to decrement the value (Max steps -18)

To save the selected value Hold for a moment and release  key.

Display Shows for a while 

Display shows  EF TD: Earth Leakage.

Set the desired value of EF TD by using  key to increment and



Key to decrement the value (in steps of 50m sec)

To save the selected value Hold for a moment and release



key.






Display Shows for a while





Now Display shows

Date and time edit Format in (DD/MM/YR & HR: MIN:SEC)

Use  key or  key to vary the data and  key to Save the data



After Saving the Current Date & Time, Display Shows

Enter the Mod bus Device I.D in the Range from 1 to 30 Using  or 

Key, and  Key to Save the Device I.D.





Display Shows for a while

Now Display Shows



Select Trip circuit Monitoring feature Enable or Disable by using  or

 key and  key to save the setting.

Now Display Shows

User can Select Clear Fault Trip Recordings YES/NO option Using



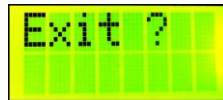
or



Key and Press



Now Display Shows



User Can Save and Exit Simply by pressing



Now the ELR displays the Set leakage current (Sv) and Measured leakage current (Mv).

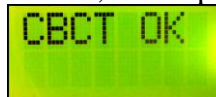


CBCT test facility-

To test the CBCT manually Hold for a moment and release the



If CBCT is properly connected to S1 & S2 terminals, the display shows



NOTE: Relay trip for CBCT OPEN detection

Test and Reset facility – hold



for 3 seconds continuously the out put



Relay changes from NO to NC and NC to NO, the display shows

Hold for a moment and release



key, to reset the out put relay.



Note: if Trip Circuit monitoring feature Enabled
ELR will display the message

If the current measured at S1 & S2 terminals are not reduced to zero within 3 seconds after tripping. (TC Fail means actuating mechanism failure in the trip device.)



Note: if Trip Circuit monitoring feature Disabled
ELR will display the message

ELR-MPELSPL-8 FOR SENSITIVE EARTH LEAKAGE CURRENT (100mA-12A)

MPELSPL-8 having wide sensitive leakage current settings ranges between 100mA to 12A
With 18 variable points (100mA, 250mA, 500mA, 750mA, 1.00A, 1.25A, 1.50A, 1.75A, 2.00A, 3.00A, 5.00A, 6.00A, 7.00A, 8.00A, 9.00A, 10.0A, 11.0A, 12.0A)

ELR-MPELSPL-4 FOR HIGH SENSITIVE EARTH LEAKAGE CURRENT

MPELSPL-4 having wide high sensitive leakage current settings ranges between 5mA to 1.0A
With 18 variable points (5mA, 10mA, 15mA, 20mA, 25mA, 50mA, 75mA, 100mA, 150mA, 200mA, 250mA, 300mA, 350mA, 400mA, 500mA, 600mA, 750mA, 1000mA)

ELR-MPELSPL-6 FOR WIDE SENSITIVE EARTH LEAKAGE CURRENT

(30mA-30A) MPELSPL-6 30mA-30A (30mA, 50mA, 100mA, 150mA, 200mA, 300mA, 500mA, 750mA, 1.00A, 2.00A, 3.00A, 4.00A, 5.00A, 10.0A, 15.0A, 20.0A, 25.0A, 30.0A)
(18 Steps)

TESTING AND SIMULATION OF FAULT

Method 1:

1. The Earth Leakage Relay has two settings current setting and trip time setting. The same can be set by following the setting procedure explained as above.
2. Having selected current sensitivity and trip time. The leakage current can be injected, slightly above set value at load side. ELR trips after the set time delay.

To simulate the fault connect a bulb/suitable load between a phase and ground using a switch (of suitable rating). The load/bulb should be such that the current drawn by it should be greater than leakage current set in the relay.

3. After making doubly sure of correct wiring and setting of the relay, close the switch and observe tripping of the relay.

Note: The Test should be conducted at the load side of the control panel and not at incoming side. And all the simulation of the leakage current should be done after the CBCT at load side and not before the CBCT. Preferable use the Resistive load and use hand gloves when you are simulating the fault current. The proper earthing should be done before testing and make doubly sure of earthing. The Tripping arrangement should be made properly and ensure the tripping coils are in working conditions, before doing the actual test.

Method 2:

Steps:

- Connect the Aux. supply to ELR (85 – 275 V AC/DC, Line – Line 380V, 440V, 550V)
- Connect CBCT to ELR terminal S1 & S2 of the relay.
- Set the leakage current in the relay and the corresponding time for tripping.

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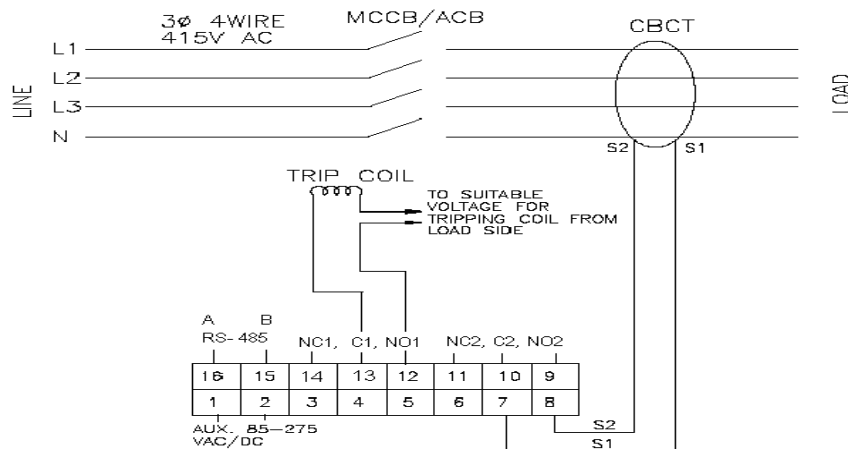
- Inject the current (AC) through CBCT by passing a wire of suitable capacity .connect a suitable calibrated ammeter in series to observe the leakage or fault current.
- Increase the current gradually above the set value, set in the ELR
- ELR picks up and operates
- The magnitude of the current at tripping instant will be displayed by the ELR and the ammeter
- After observing the operation of the ELR for the SET value of current, reset the relay, select a different value of current and repeat the steps mentioned above.

Method 3:

By operating the TEST button in ELR

- Connect the Aux. supply to ELR (85 – 275 V AC/DC, Line – Line 380V, 440V, 550V)
- Operate the test button to check the operation of the - relay trip.
(This test is not the actual simulation, but the test ensures the correct operation of the miniature relay and the trip circuit mechanism.)

ELR WIRING DIAGRAM FOR DIN MOUNTING -RS 485 MODEL



NOTE:
FOR AUX. VOLTAGE — L TO L
380V, 440V & 550V CAN BE
CONNECTED DEPENDING UPON THE MODEL

Specification:

Description	MPEL 01	MPEL 02	MPELSPL-4 /6
Current Setting Range	300mA-12A (300mA , 500mA, 750mA, 1.00A, 1.25A, 1.5A, 2.00A, 2.50A, 3.00A, 4.00A, 5.00A, 6.00A, 7.00A, 8.00A, 9.00A, 10.0A, 11.0A, 12.0A. (18 Steps)	30mA-3000mA (30mA, 50mA,100mA, 125mA,150mA, 175mA 200mA, 250mA, 300mA, 400mA, 500mA, 750mA, 1.00A 1.50A, 1.75A, 2.00A, 2.50A, 3.00A. (18 Steps)	5mA-1A 5mA, 10mA, 15mA, 20mA, 25mA, 50mA, 75mA ,100mA, 150mA, 200mA,250mA, 300mA, 350mA,400mA, 500mA, 600mA 750mA, 1000mA. (18 Steps) MPELSPL-4 30mA-30A (30mA,50mA,100mA, 150mA,200mA,300mA, 500mA ,750mA, 1.00A, 2.00A, 3.00A, 4.00A, 5.00A, 10.0A, 15.0A,20.0A, 25.0A,30.0A (18 Steps) MPELSPL-6
Tripping Time	0.0Sec - 5Sec (in steps of 0.05 sec)	0.0Sec - 5Sec (in steps of 0.05 sec)	0.0Sec - 5Sec (in steps of 0.05) sec
Device ID	1 - 30 (For models with com port)	1 - 30 (For models with com port)	1 - 30 (For models with com port)
Instantaneous Tripping Time	< 35mS	< 35mS	< 35mS
Rated Frequency	50Hz / 60Hz	50Hz / 60Hz	50Hz / 60Hz
Auxiliary Voltage	85 – 275 V AC / DC L – L 380V,440V,550V	85 – 275 V AC/ DC L – L 380V,440V,550V	85 – 275 V AC / DC L – L380V,440V,550V
Operating Temperature	0 - 55°C	0 - 55°C	0 - 55°C
Mounting	Flush /Din rail mounting	Flush /Din rail mounting	Flush /Din rail mounting
Dimensions (in mm)	Flush Type 96 mm X 96mmX 75mm (W X H X D) Din Rail Type 80 mm X 94mmX 76mm (W X H X D)	Flush Type 96 mm X 96mmX 75mm (W X H X D) Din Rail Type 80 mm X 94mmX 76mm (W X H X D)	Flush Type 96 mm X 96mmX 75mm (W X H X D) Din Rail Type 80 mm X 94mmX 76mm (W X H X D)
Panel Cut Out (For Flush Type only)	90mmX90mm + 2 mm	90mmX90mm + 2 mm	90mmX90mm + 2 mm
Reference std.	IEC 60255/IEC755	IEC 60255/IEC755	IEC 60255/IEC755

Note: If the system frequency is 60Hz accuracy is $\pm 10\%$ on maximum current setting and for 50Hz accuracy is $\pm 5\%$ on maximum current setting

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MPELR – Mod bus RTU Protocol Communication

Interface	Half duplex, RS485 multi drop
Protocol	Mod bus RTU
Communication Settings	9600,N,8,1
User settable Relay IDs	1-30
Suggested query interval, timeout	>0.5 Sec, 500 ms
Supported modbus func	0x03 Holding register read, 0x06 single register write

Register Map

Register	Parameter	Read / Write	Remark
40001	Relay Type, Relay Status	R	See below Note
40002	Present Current measured	R	mA
40003	Trip Value set in mA	R/W	500 = 500 mA
40004	Tri delay Set in 0.01sec	R/W	500 = 5.00 Sec
40005	RESET Relay	W	Write 0x5555 to RESET relay
40006	SET Relay	W	Write 0xAAAA to TRIP set relay
40007	RTC Year, Month	R/W	BCD
40008	RTC Date, Hour	R/W	BCD
40009	RTC Min, Secs	R/W	BCD

Note –

Relay Type

1 = 30mA to 3A Relay

2 = 300mA to 12A Relay

3 = 10mA to 5A Relay

4 = 5mA to 1A Relay

5 = 100mA to 1000mA Relay

6= 30mA to 30A Relay

7=300mA to 30A Relay

8=100mA to 12A Relay

Relay Status

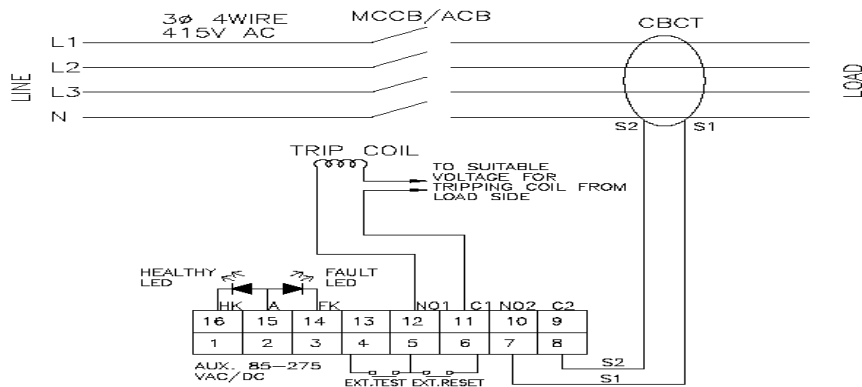
0 = Normal Operation, Current value is the Measured current

1 = Relay Trip, Current value is the Trip current

2 = CBCT Open, Current will be read as 0000

Wiring diagram for mining application:

ELR WIRING DIAGRAM DIN MOUNTING FOR MINING APPLICATION



NOTE:
FOR AUX. VOLTAGE — L TO L
380V, 440V & 550V CAN BE
CONNECTED DEPENDING UPON THE MODEL



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