INSTALLATION INSTRUCTIONS FOR D2 EFR1

INTRODUCTION

It's the Company's pleasure to enlist you as one of our esteemed user customer. Thank you for selecting & purchasing 'MINILEC'make Earth Fault Relay D2 EFR1.

The following installation instructions wouldguide you in installing your D2 EFR1 andmaking best use of it.

D2 EFR1 operates on current ensing

Principle and is used in electrical circuits & systems where Earth Fault protection is Required. D2 EFR1 relay is accurate, easy to set, compact and easy to install with front terminal connection. This relay offers 1CO/ (2CO) relay contact of 5 Amps at 240 VAC rating.

MOUNTING

Your D2 EFR1 can be RAIL mounted or PANEL Mounted. (See Fig. 4 for mounting on and for releasing from DIN RAIL. Also see fig. 5 for PANEL mounting & drilling details Dimensions.)

CAUTION

Ensure that your D2 EFR1 is -

* Not installed near any heat sources like Burner , sunlight ,electric arc etc.

* Not subjected to abnormal vibration.

* Not subjected to direct rains, stormy wind & dust.

* Installed as near to the starter as possible.

ELECTRICAL CONNECTION OF D2 EFR1

See Fig.3 for electrical connection details of D2 EFR1. See Fig. 2A & 2B for & control wiring. Aux. Supply must be as marked on front cover plate.

Fig.2A shows electrical connections with individual CT & fig. 2B shows Electrical connection with CBCT type CT.

FOR CONTACTOR - The output relay contacts 13 &15 are to be connected in series with the no - volt coil of the contactor.

FOR CIRCUIT BREAKER - In case of circuit Breaker application, relay contacts 13 & 14 are to be connected in series with shunt trip coil or contacts 13 & 15 are to be connected is series with uv trip coil.

FUNCTION

The unit is provided with settable Earth fault Current Trip Settings, Trip Time Delay & with provision of relay energizing on fault condition logic. Select External CT'S to be installed in the system after considering Earth fault current levels expected in systems circuit. External CT'S should have a secondary current rating of 5A or 1A. Rated current input of 5A & 1A can be selected via terminals (1&2) or (1&3) respectively.

When the power is applied to the unit relay remains in de - energized condition. The relay energizes immediately , when input current exceeds Earth Fault set level for selected trip time delay. (Refer note)

The unit operates in manual reset mode hence for resetting it is necessary to press RESET push button provided on front side of unit . D2 EFR1 can also be resetted by using external NO type remote reset push button.
(if conneted externally at terminals 10 & 11)

Note: - D2 EFR1 operates as per reverse logic (Relay energizing on fault) condition.
Hence fail safe mode operation is not available in D2 EFR1. Ensure that your system & wiring connections are proper & temper proof.

TRIP TIME DELAY SELECTION

On occurrence of earth fault condition, D2 EFR1 will trip as per the time selected on front plate.

TECHNICAL SPECIFICATIONS OF D2 EFR1

1. **Auxilliary Supply :** 24 /30 VDC $\pm$ 10%
   110 - 240 VAC/DC$\pm$ 20 %
   380/415/440 VAC $\pm$ 20 %
2. **Rated Current Input :**
   5A /1A (Selection Via. Terminals)
   Terminal 1 & 2 : Current Input 5A
   Terminal 1 & 3 : Current Input 1A
3. **Frequency :** 50 / 60 Hz, $\pm$ 3%
4. **Power Consumption :** 3 VA max.
5. **Output Relay Contact :** 1CO / (2 CO)
6. **Output Contact Rating :**
   5A, 240 VAC (Resistive)
7. **Life Expectancy :**
   0.5×10^{6} operations at 100% rating
8. **EF Trip Setting :**
   10% to 100% of rated Current Input (variable)
9. **Set Accuracy :** $\pm$ 5% w.r.t. Current input of 100% (Full scale)
10. **Trip Time delay :**
    0.1 Sec. To 1 Sec. OR
    1 Sec. To 10 Sec.(Optional)
11. **Reset :** Manual / Remote Reset
12. **Indication :**
    ON (Green) - ON
    EF (Red) - TRIP
13. **Current Sensor :**
    Neutral CT/ CBCT/
    Summation CT with secondary current Rating of 1A Or 5A (Protection class)
14. **Operating conditions :**
    Tempereture : -5^{0}C to 60^{0}C
    Humidity : Upto 95% R.H.
15. **Enclosure :-** ABS
16. **Dimensions (mm) :**
    Overall : 76 x 56.5 x 117.5
    Mounting : 68 x 46
17. **Weight (approx) :** 550 gms.

TESTING PROCEDURE
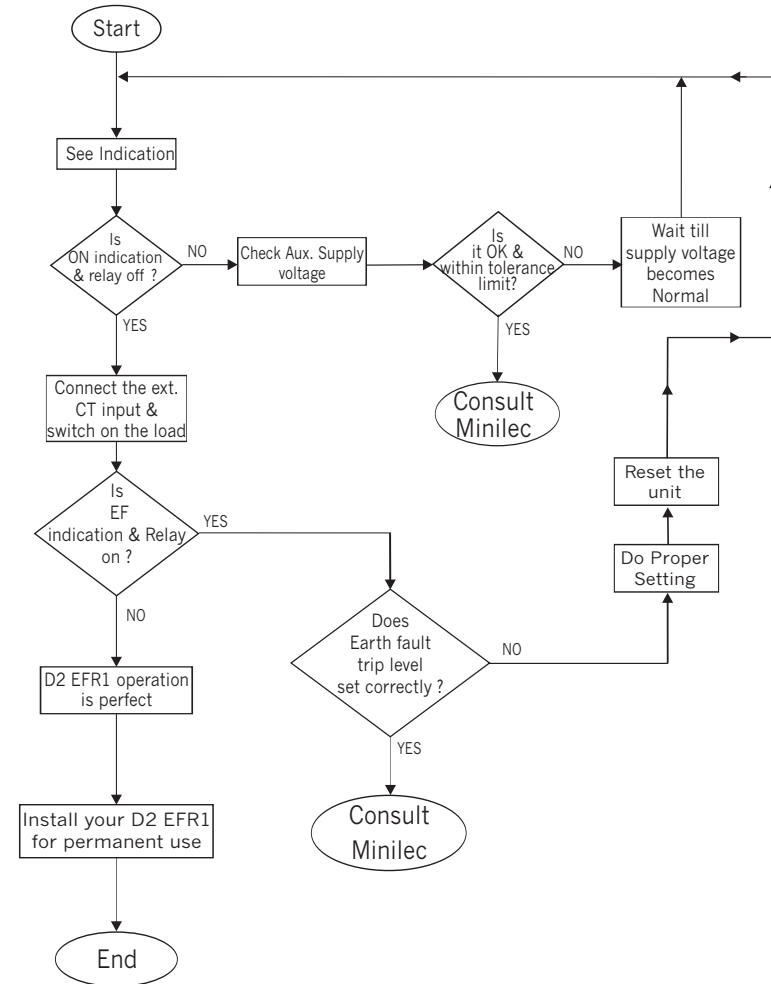
OPERATIONAL DIAGRAM

FIG. 1

Power (ON)

EF% SETTING

Manual Reset — T1

T2

Relay — T1

EF LED
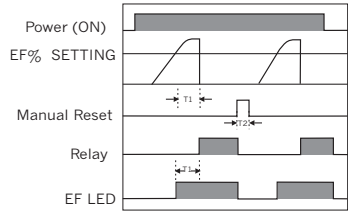
T1 : Trip Delay

T2 : Unit is resetted by pressing MANUAL / REMOTE reset push button switch.

SETTING OF EARTHFAULT RELAY

Typical Earthfault Relay Setting for electrical low voltage system of 415 V AC , 3 phase , 50 Hz, maximum demand of 150 KW at lagging power factor of 0.85 are shown below.

Power $= \sqrt{3} \times V \times I \times \cos \phi$

$\text{Load Current} = \dfrac{150 \times 1000}{1.732 \times 415 \times 0.85}$

Load Current = 245.50 Amps.

Current Transformer Selected = 300/5A, 15 VA , Class 5P10

Minilec make D2 EFR 1 is Provided with Earthfault current setting between 10% - 90%

Hence Earthfault at 10% setting = 10% x 300A = 30Amps

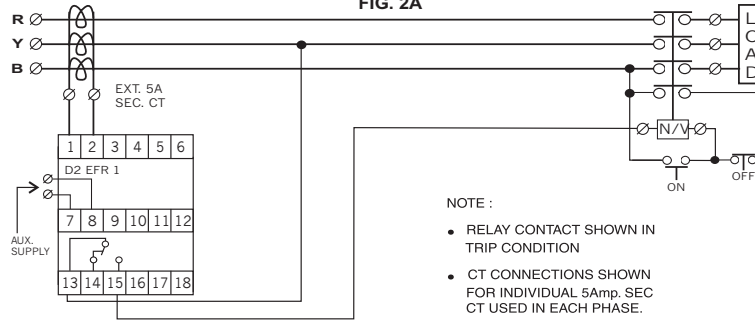Similarly Earthfault at 30% setting = 30% x 300A = 90Amps

These are typical earthfault current calculations and settings shown as an example. Individual user can make the earthfault settings as per their requirement.

For Generator and Transformer application, with 3P-4W system, connection of CT can be made as follows.

R N B Y

External 5A or 1A sec. CT E D2 EFR1
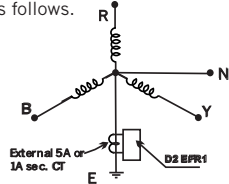
ELECTRICAL CONNECTIONS IN POWER AND CONTROL WIRING (INDIVIDUAL CT)

FIG. 2A

R Y B

EXT. 5A SEC. CT

L O A D

N/V

ON OFF

1 2 3 4 5 6

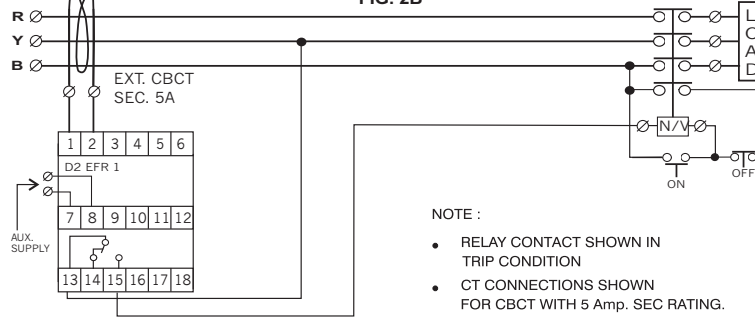D2 EFR 1

7 8 9 10 11 12

AUX. SUPPLY

13 14 15 16 17 18

NOTE :
- RELAY CONTACT SHOWN IN TRIP CONDITION
- CT CONNECTIONS SHOWN FOR INDIVIDUAL 5Amp. SEC CT USED IN EACH PHASE.

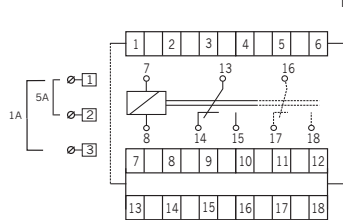## ELECTRICAL CONNECTIONS IN POWER AND CONTROL WIRING (CBCT TYPE)

FIG. 2B

R Y B

EXT. CBCT SEC. 5A

L O A D

N/V

ON OFF

1 2 3 4 5 6

D2 EFR 1

7 8 9 10 11 12

AUX. SUPPLY

13 14 15 16 17 18

NOTE :
- RELAY CONTACT SHOWN IN TRIP CONDITION
- CT CONNECTIONS SHOWN FOR CBCT WITH 5 Amp. SEC RATING.

CONNECTION DIAGRAM

FIG. 3

5A 1 1A 2 3

7 13 16

8 14 15 17 18

7 8 9 10 11 12

13 14 15 16 17 18

INDICATIONS :

ON : POWER ON
EF : EARTH FAULT TRIP

TERMINAL DETAILS

1-2 : CURRENT I/P FROM EXTERNAL CT 5 AMP SECONDARY.

1-3 : CURRENT I/P FROM EXTERNAL CT 1 AMP SECONDARY.

7-8 : AUX. SUPPLY FOR VDC CONNECT + VE TO 7 – VE TO 8

10-11 : EXTERNAL REMOTE RESET PUSH BUTTON (NO TYPE)

13-14-15 : OUTPUT RELAY CONTACT (C1 - NO1 - NC1)
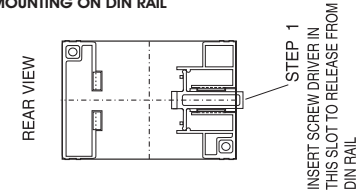
16-17-18 : OUTPUT RELAY CONTACT (C2 - NO2 - NC2)

NOTE : . UNIT WILL NOT OPERATE IN FAIL SAFE MODE.
. RELAY CONTACTS SHOWN FOR UNIT IN TRIP CONDITION.
. DOTTED PART SHOULD BE USED FOR 2 CO CONTACT ONLY.

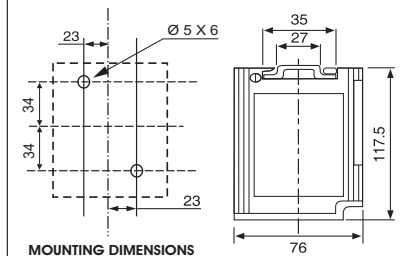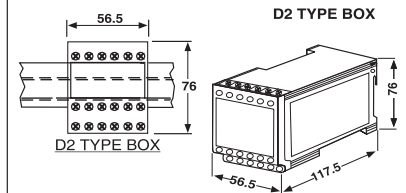## MOUNTING AND RELEASING FROM DIN RAIL

FIG. 4

DIN RAIL (35 mm)

STEP 2

USE SCREW DRIVER NO 936 OR EQUIVALENT
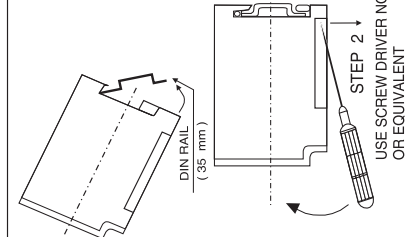
MOUNTING ON DIN RAIL

REAR VIEW

STEP 1

INSERT SCREW DRIVER IN THIS SLOT TO RELEASE FROM DIN RAIL

MOUNTING DIMENSIONS

FIG. 5

56.5

76

D2 TYPE BOX

D2 TYPE BOX

56.5 117.5 76

23 Ø 5 X 6

34 34 34

23

35 27 117.5

76

MOUNTING DIMENSIONS