



Earth Fault Indicator DF-01(M)

User Guide

PACKAGE INCLUDES

- 1 x Signalling unit Model DF-01(M)
Wall / surface mounted with LED and mechanical flag indication
- 3 x Mounting screws (M4)
- 1 x Drill guide sticker

- 1 x Current Sensor (CT)
with 16m cable
- 1 x Steel belt with 2 tightening screws attached
- 1 x Cable tie

Designed for installation up to 33kV cable line distribution networks

Monitors and locate earth fault

LED & Mechanical Flag Indication for trip

Permanent Fault Indication (double flashing of trip LED)

Single Front Push-button for manual test/reset & battery check

Lithium battery operated (easily replaceable AA / 3.6V / 2600mAh)

Input for automatic reset on power restoration (80-260Vac input)

Input for supervisory reset (12-110Vdc input)

5 Selectable trip current level (dip switch)

4 Selectable trip delay (dip switch)

4 Selectable reset timer (dip switch)

Split core CT for easy installation

IP65 for signalling unit

IP67 for current sensor unit

The signalling unit (EFI) is able to keep attached and withstand short circuit of 24kA in the cable to which it is attached to.



Safety Notice

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazard, use this product only as specified. Electrical shock can cause serious or fatal injury. This unit may be connected to other equipments of high voltages. Improper use can cause serious or fatal injury.

WARNING



Under certain fault conditions, high voltages can be brought into the earth fault indicator enclosure. All parts within the enclosure should be handled as if carrying dangerous voltages.



Use extreme caution during the installation and use of the Signalling unit (EFI) as high voltages and currents may be present in the circuit.



Observe precautions when handling Electrostatic Sensitive Devices

- Ensure that the CT sensor is installed on the screened part of the HV cable system and is at earth potential.
- This product must be installed and used only by qualified personnel that are familiar with practicing applicable safety precautions.
- EFI product should not be installed on live conductors.
- Wear necessary protective gears as required.
- Always inspect the EFI, CT sensor, and all leads for damage before using the product. Do not use the product if damaged.
- If the EFI is not used in a manner specified, the protection afforded by the equipment may be impaired.
- Static Electricity can damage sensitive electronic parts inside the unit. Any accumulated charge on the body of the human operator should be discharged first before removing the cover. The discharge can be accomplished by putting a hand on a grounded surface or, ideally, by wearing a grounded antistatic wrist-strap.
- The use of an antistatic strap prior to removing the cover is highly recommended.
- Education and training on ESD preventive measures is recommended.

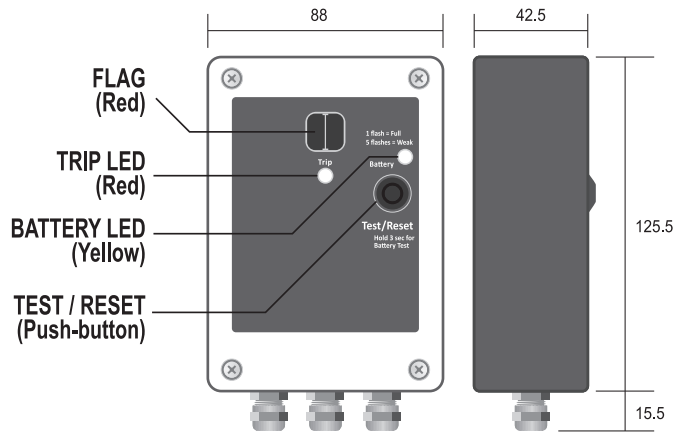
Technical Data

Power supply	Lithium battery (LiSOCL2) type AA / 3.6V / 2600 mAh
SCADA contact rating	1x NO and 1x NC (max. 230 V AC/ max. 2 A / max. 30 W)
Relay operate time	≤ 4.5 ms
Relay release time	≤ 3.5 ms
Indication of earth-fault trip	Red LED (single flashing of trip LED) & mechanical flag (flips to red)
Indication of persistent earth-fault	Red LED (double flashing of trip LED)
Indication of battery health	Yellow LED (single flash = full, 5 flashes = weak)
Operating temperature range	-25°C to +70°C
Humidity	95%
IP rating	IP65 (Signalling unit), IP67 (Current sensor)
Installation	Wall / Surface mounted
Weight (Signalling unit)	0.25 kg
Standard of compliance	IEEE 495-2007
Earth-fault sensor (CT)	Current transformer for a multi-core cable or three single core cables Diameter : 110 mm or 300 mm (comes with 16m long cable)

DIP Switch Setting

Earth-fault trip current (A)	Selectable : 40 / 80 / 120 / 160 / 240
Trip delay (ms)	Selectable : 50 / 100 / 150 / 200
Reset time (hour)	Selectable : 4 / 8 / 16 / 32
Auto reset	Selectable : On / Off

Signalling Unit (EFI) Dimension



All measurement in mm.

Setting of Functional Values (DIP Switch Setting)

The adjustable values are presented on the back of the front cover. For adjusting the requested trip currents, the cover has to be removed. The requested values can be adjusted by switching the respective DIP switch to "ON" position.

The following functions can be adjusted with the earth-fault indicator unit model DF-01(M):

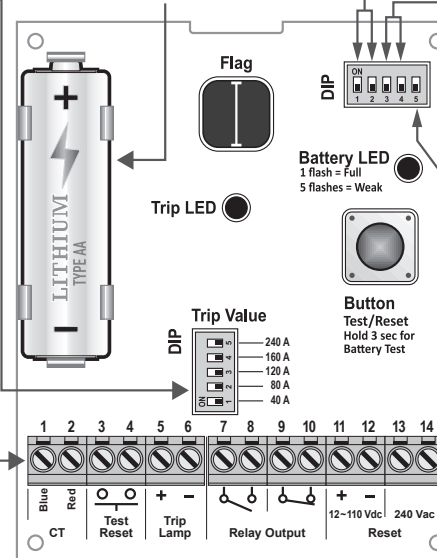
- 1) Trip current for earth-fault (5 values)
- 2) Reset time (4 values)
- 3) Trip delay (4 values)
- 4) Auto reset (enabled or disabled)

DIP switch : Trip current		
ON	OFF	Value
DIP 1	DIP 2,3,4,5	40 A
DIP 2	DIP 1,3,4,5	80 A
DIP 3	DIP 1,2,4,5	120 A
DIP 4	DIP 1,2,3,5	160 A
DIP 5	DIP 1,2,3,4	240 A

* NOTE ONLY 1 DIP switch is to be in 'ON' position at any one time.

Connector Terminal	
Connector 1-2	: Earth Fault sensor (CT)
Connector 3-4	: Remote reset or test
Connector 5-6	: External trip lamp
Connector 7-8	: SCADA contact NO
Connector 9-10	: SCADA contact NC
Connector 11-12	: External voltage input reset (12-110 Vdc)
Connector 13-14	: External voltage input reset (240 Vac)

Self-powered by lithium battery with 10 years lifetime and over 2500 flashing hours.



DIP switch : Reset time		
DIP 1	DIP 2	Value
OFF	OFF	4 h
OFF	ON	8 h
ON	OFF	16 h
ON	ON	32 h

DIP switch : Trip delay		
DIP 3	DIP 4	Value
OFF	OFF	50 ms
OFF	ON	100 ms
ON	OFF	150 ms
ON	ON	200 ms

DIP switch : Auto reset	
DIP 5	Value
ON	Enable
OFF	Disable

If enabled, auto reset will activate within 2 seconds only if fault is cleared.

Signalling Unit (EFI) Operations

Function Test

Press once on the front push-button when Trip LED is not flashing. Trip LED starts to flash and mechanical flag flips to Red. SCADA relay contact will be energized.



Battery Health Test

Press and hold the front push-button for 3 seconds. Yellow LED flash once means battery is in healthy condition. If yellow LED flash 5 times means that the battery needs to be replaced.

Remote Function Test (Terminal 3 & 4)

To remote test the signalling unit, closing potential-free on connector terminal no.3 and no.4. (Refer to connector terminal Fig.A)

Resetting of the Signalling Unit (EFI)

1. Push-button Reset

Press once on the front push-button to do manual reset.



2. Time Reset

Signalling unit resets automatically when selected reset time has elapsed.

DIP switch : Reset time		
DIP 1	DIP 2	Value
OFF	OFF	4 h
OFF	ON	8 h
ON	OFF	16 h
ON	ON	32 h

3. Remote Function Reset (Terminal 3 & 4)

By closing potential-free on connector terminal no.3 and no.4 to remote reset when Trip LED is flashing. (Refer to connector terminal Fig.A)

4. DC Voltage Reset (Terminal 11 & 12)

Supervisory resets the signalling unit by (12~110) Vdc input. (Refer to connector terminal Fig.A)

5. AC Voltage Reset (Terminal 13 & 14)

Signalling unit resets when (80~260) Vac is back after fault restoration. (Refer to connector terminal Fig.A)

Note: AC voltage must disappear when the fault occurs. i.e. it must be cut off by MV circuit breaker that breaks faulty line, otherwise device may reset immediately after the fault.

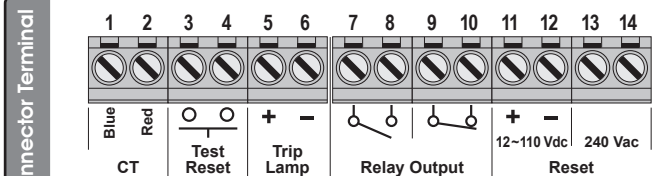
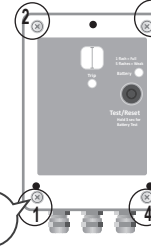


Fig.A

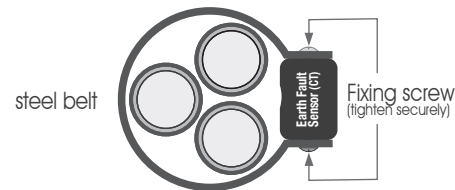
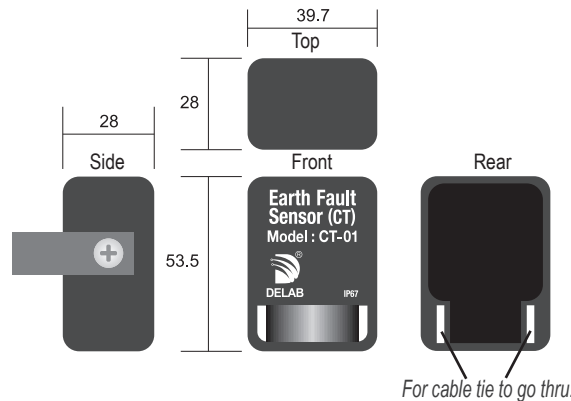
Signalling Unit (EFI) Installation

Mounting Signalling Unit (EFI) :

- Place the provided drill guide sticker onto the location (wall) where the signalling unit is to be mounted.
- Mark the 3 (4mm) screw hole accordingly to the provided drill guide sticker before drilling.
- Remove the lid / cover of the signalling unit by unscrewing the 4 secured screws as shown to access to the 3 drilled mounting holes.
- Mount on the signalling unit using the provided M4 screws (3 pcs). Ensure that the M4 screws are securely tightened.
- Secured the lid / cover of the signalling unit back tightly with the 4 secured screws.



Earth Fault Sensor (CT) Dimension



Earth Fault Sensor (CT):

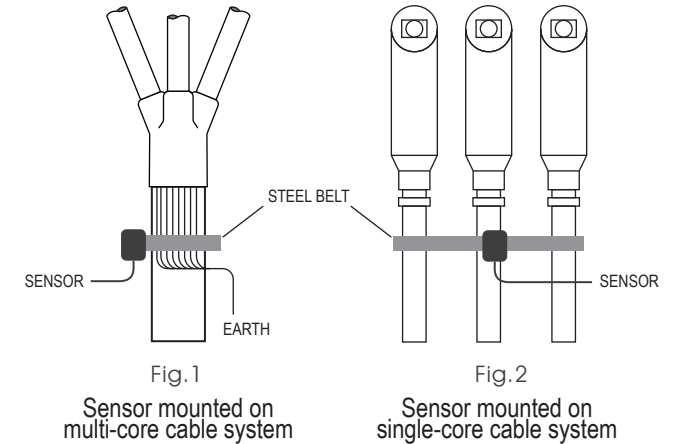
Current transformer for a three single-core or multi-core cables.
 Diameter : 110 mm or 300mm
 Cable Length : 16 meter

Earth Fault Sensor (CT) Installation

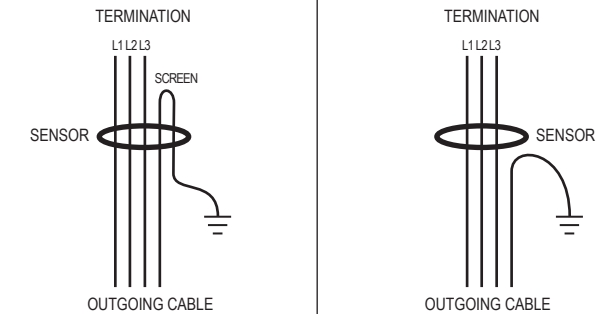
Installing Earth Fault Sensor (CT):

- Unmount one side of the steel belt from the housing of sensor by loosening the fixing screws.
- The belt has to be laid around the multi-core cable or around the three single-core cables. (Fig.1 or Fig.2)
- The sensor is wrapped tightly around the three-phase system using adjustable cable ties provided.

Mounting the Sensor (CT)



Screen Cable Earth Termination



The screen cable current will be neutralized itself.

The screen cable current will not flow through the sensor.