DC EARTH LEAKAGE RELAY

Asymmetric & symmetric faults
for unearthed DC supply systems (IT nets)
DDEB

Features

- Monitors insulation deterioration and faults and gives an early warning if a leak current exceeds a preset level
- Programmable leak current limit from 0.2 to 30 mA
- Universal unit for a wide range of distribution system voltages Un from 20 to 500 V
- Power supplied directly from the installation
- Relay function 2 x 1 C/O (leak from + or -) or 1 x 2 C/O
- Fail safe operation
- 3-digit display shows actual current leak

Benefits

- Reacts on both symmetric and asymmetric current leakage
- Improves safety by providing timely notification of leak current level
- Allowing quick corrective action and repair before injury or damage occurs
- Helps reduce maintenance costs
- Minimizes downtime by identifying leakage and enabling quick and easy correction
- Outputs activated in case of missing power supply ensures reliable operation

Applications

- DC power distribution nets
- UPS systems
- Battery banks and charger systems
- Battery back-up in transformer stations
- Central control switch gear

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DESCRIPTION

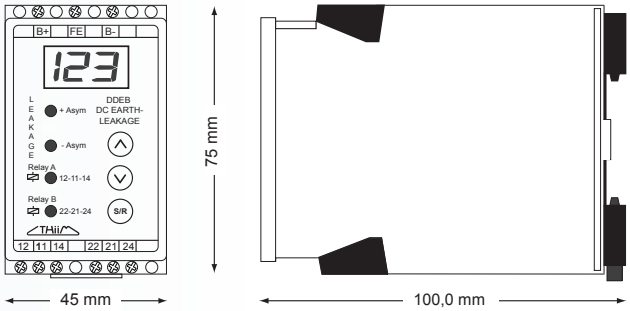
The DC earth leakage relay is designed to monitor unearthed DC IT systems for insulation deterioration or faults. The DDEB is power supplied from the installation it is monitoring.
It is connected to earth through an active current limiter circuit, keeping the earth voltage at half the nominal system voltage.

If there is a leak to ground from one of the supply lines the DDEB will compensate in order to keep the earth voltage at half the supply voltage. When the compensation current rises to a higher level than the set point the relay will switch, and the DDEB will let the earth float with the limited compensation current still running. This ensures that the special features of an unearthed system are still available while the fault can be found and repaired. The internal relays can be set to work in parallel for a fault or individually for faults in the positive or the negative line.

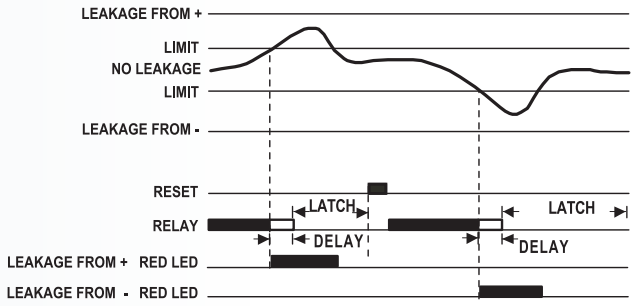
APPLICATION

Unearthed systems can function even with a direct short from any point in the wiring to ground, but another short or leak from another point in the system can be fatal. Either direct with heavy currents, overheating or indirect through component malfunction. The DDEB solves the problem by monitoring the circuit and giving an early warning as soon as it senses a leak current greater than the set value. Securing the ground level at half system voltage reduces at the same time personal risks for electric shock.

DIMENSIONS



FUNCTIONS



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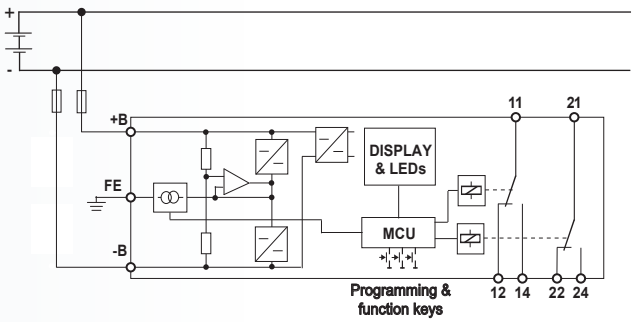
INSTALLATION AND SETUP

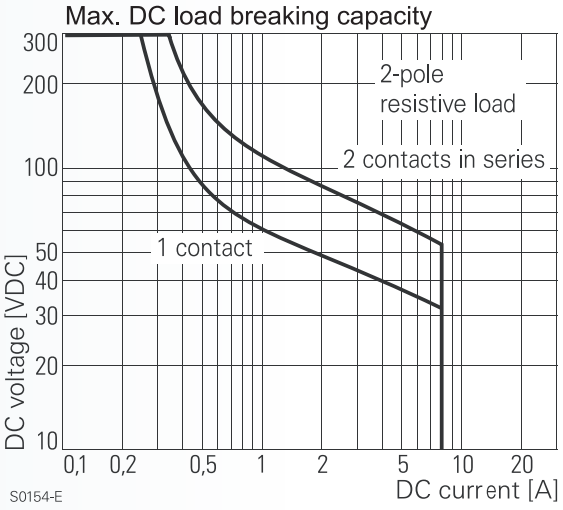
In order to minimize the size of the DDEB the unit is powered by 3 independent switch mode supplies. Two supplies are used to either source or drain current from the earth terminal and a third supply powers the electronics. With leak currents below 10 mA, the DDEB is either sourcing or draining with a DC current. At higher leak current, high supply voltage and high ambient temperature the DDEB automatically changes mode to a safe pulse pause mode where the pulses (leak and measuring current) are 600 ms and the pause up to 20 s or long enough to keep the temperature in the box below 65 °C.
If LATCH is selected the relays can be reengaged – if the leak current is under the set point – by pressing the S/R button on the front.

CONNECTIONS

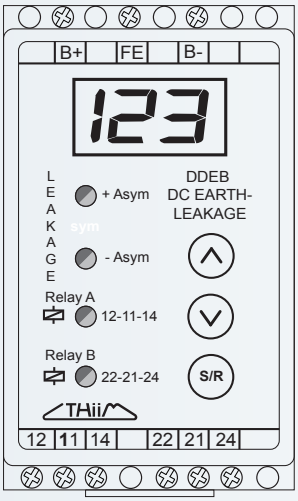


Please note
If the two relay contacts are in “Fault” position and all LED’s are red and the display shows “FFF”, then the DDEB is defect and must be replaced.

RELAY CONTACT RATING



FRONT



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CONFIGURATION AND SETUP PARAMETERS

To enter Setup Menu pres S/R button for app. 5 s
If no activity on the buttons for 50 s, then the setup will end without saving data.
To return to factory default see below.

Step 1: Set Trip to over current. Relay ON to OFF
LEDs: “Leakage to +” and “Leakage to –“ are flashing Red
Set trip value from 0.1 to 30.0 mA
Press Up or Down keys to change trip value and press S/R for next Setup menu.

Step 2: Set Return to acceptable current. Relay Off to ON
LEDs: “Leakage to +” and “Leakage to –“ are flashing Green
Set return value 0.1 to “trip value” x.x mA
Press Up or Down keys to change trip value and press S/R for next Setup menu.

Step 3: Set Delay time from ON to OFF
LEDs: “Relay Leakage to +” and Relay Leakage to –“ are flashing Red
Set OFF time delay from 0.0 to 99.9 s
Press Up or Down keys to change trip value and press S/R for next Setup menu.

Step 4: Set Delay time from OFF to ON
LEDs: “Relay leakage to +” and “Relay leakage to –“ are flashing Green
Set ON delay time from 0.0 to 99.9 s
Press Up or Down keys to change trip value and press S/R for next Setup menu.

Step 5: Set Latch OFF (0) or ON (1)
If latch OFF all 4 LEDs are Green
If latch ON all 4 LEDs are Red
Press Up or Down keys to change latch setting and press S/R for next Setup menu.

Step 6: Set Relay Function
Function 1: Individual functioning C/O contact for leakage to + and for leakage to -.
Relay LEDs flashing Red and Green out of phase
Function 2: 2 parallel functioning C/O contacts for leakage to + or leakage to –.
Relay LEDs are flashing Red and Green in phase
Press Up or Down keys to change the relay function and press S/R to Store Data and Exit setup.

To return to factory default setup values press “S/R” and “UP” buttons simultaneously for app. 5 s

Over current trip:	10.0 mA
Return trip:	9.8 mA
Delay time ON to OFF:	2.0 s
Delay time OFF to ON:	2.0 s
Latch:	OFF (0)
Relay function:	Function 1 (individual)

FUNCTION 1
Relay A for Asymmetric current fault
Relay B for Symmetric current fault
Or Relay A & B with parallel function Asymmetric or Symmetric fault.

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SPECIFICATIONS

INPUT

To Earth connector	DC current up to the setpoint
Set points	Programmable from 0.2 to 30 mA
Differential	Programmable from 0.1 to set point -0.1 mA
Voltage limit	Voltage on earth connector FE (Functional Earth) must be within nominal system voltage

PERFORMANCE PARAMETERS

TIMING

Response time	Typical <200 ms below 10 mA and not pulsed earth leakage current. At higher current, voltage and ambient temperatures dependent on pause time. Max. 20 s
Time range during run	Programmable separate On and Off delay 0-99.9 s MCU controlled.

ELECTRICAL

Accuracy	Set point ±2 % within system voltage
Temp. dependence	Typ. ±0.02 %/°C

OUTPUT

RELAY	2 relays x 1 C/O, AgNi/Au
Contact rating	6 A, 250 VAC, 1500 W See figure for DC rating
Mechanical life	20 million operations

ANALOG INDICATION

Display	3-digit LED Current resolution 0.1 mA Time resolution 0.1 s

SUPPLY

DC voltage

Supply range	20-500 V ±10 %
Power consumption	Max. 3.5 W

GENERAL

Temperature range	-25 °C to +55 °C ambient
Humidity	Up to 90 % RH non-condensing
Dielectric test voltage	DC circuit to contact 4000 Vrms Contact to contact 2500 Vrms
Open contact circuit	1000 Vrms

TERMINALS

Tightening torque	0.32 Nm to 0.39 Nm
Screw type	PH1
Cable size	Accepts up to 3.3 mm^2 or 12 AWG

Weight	0.2 kg

CE

International standards

Product Safety:
EN 60255-27: 2006

EMC directives:

EN 50263: 2000	
EN 61000-25	Emission
EN 60255-22	Immunity

ORDERING INFORMATION

EXAMPLE DDEB 2050 P A 4 C

TYPE
DC Earth Leakage Relay — DDEB

SUPPLY VOLTAGE
20-500 VDC — 2050

ADJUSTMENT
Programmed — P

HOUSING
Rail mounting — A

SIZE
45 mm — 4

CODE END
Code end — C

Company info

Datablad_DDEB_S24_v1

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