

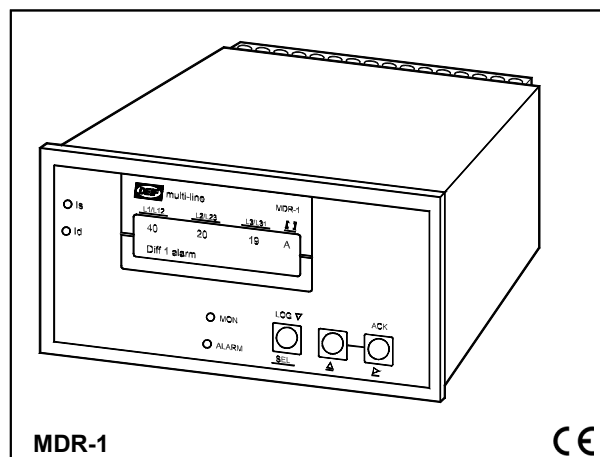
Type MDR-1

multi differential protection relays

multi-line

49212400821

- **Relay for generating sets**
- **3-phase AC measurements**
- **Dynamic compensation for ext. failures**
- **3-step tripping of circuit breaker**
- **Short reaction time (min. 40 ms)**
- **Display indicating all measurements**



Application

The MDR-1 differential protection relay is a micro-processor-based control unit containing all necessary functions for the monitoring of the differential currents for a synchronous generator or a synchronous/an asynchronous motor (the object).

The MDR-1 measures via current transformers each phase current on both sides of the object. The current transformers determine the limits of the protection area. Any failure within these limits (2 or 3-phase short circuits or earth leaks) will be detected as an error (I_d : differential currents, the currents flowing through the two current transformers of the phase in question differ and, if a preset limit value is exceeded, a warning will be given or a tripping signal transmitted).

The MDR-1 dynamic compensation curves for warning and tripping are defined by the user.

Should an error occur outside the limits of the protection area, the MDR-1 will not transmit a tripping signal, as the above-mentioned phase currents are equal. A selective tripping is thus achieved.

Except for external measuring transformers the MDR-1 contains all necessary measuring circuits and presents all values on a LC display. Values and messages are presented in clear text (measuring values in engineering units).

The MDR-1 is a flexible and menu-programmed unit, enabling the user easily to adapt the unit to the object in question. The programming procedures are password protected.

Standard functions

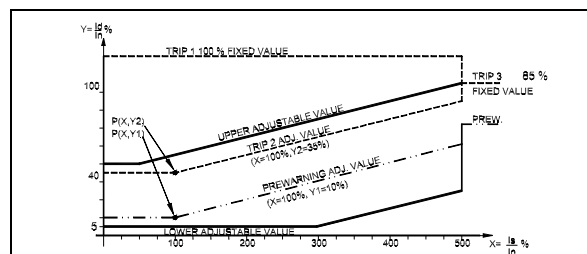
The unit is designed for differential current protection of a 3-phase generator/motor

Inputs and outputs:

- Inputs:
- 6 currents via current transformers
 - 4 binary control inputs
- Outputs:
- 4 relay outputs ("SYSTEM OK", "WARNING", simultaneous tripping of 2 relays)
 - Time delay: min. 40 ms.

Generator protective functions

- Differential current (3-phase) protection, with programmable dynamic compensation (tripping curve).
 - Warning: programmable value and delay.
 - Trip 1: fixed value, differential current >100% of the nominal generator current, programmable delay.
 - Trip 2: programmable value, programmable delay
- Trips 1 and 2 become a common trip (trip 3, differential current = 85% of nominal current) at generator currents $\geq 500\%$ of the nominal current.



A tripping curve is shown in Fig.1. The curves represent the warning and tripping values (Y), defined as the differential current divided by the nominal generator current (I_n) referring to the generator stabilisation current (I_s) divided by $I_n = (X)$. The stabilisation current is defined as the average of the values measured at the 2 measuring points for each phase.

The starting horizontal limit lines are placed according to the keyed in values of the points P(X,Y1) and P(X,Y2). These can be positioned anywhere within the marked area, and must be decided according to the specifications of the plant in question.

For warning and tripping lines, the following ranges are available:

- | | |
|---------------------|---|
| $L_d/I_n > 100\%$ | fixed tripping point (Trip 1), independent of the stabilisation current |
| $L_s/I_n 0 \dots X$ | tripping (Trip 2) independent of the stabilisation current. |

Type MDR-1

$I_s/I_n \times 5 \times I_n$ tripping (Trip 2) depends on the stabilisation current. A 100% change of the stabilisation current will result in a 10% shift of the tripping curve.

$I_s/I_n > 5 \times I_n$ tripping (Trip 3, replacing Trips 1 and 2) point is constant (85%).

For the prewarning and the tripping values, different curves may be entered. The tripping X-value defines the horizontal position for both steps. The vertical position (Y-value) can, however, be selected individually for prewarning/tripping, i.e. at any stabilisation current, a fixed difference between the warning and tripping values will always exist.

Relay outputs "TRIP 1" and "TRIP 2" (see wiring diagram) are activated simultaneously, if a differential current tripping (Trip 1, 2 or 3) occurs.

The relays are identical, one intended for breaker tripping, the other for de-excitation of the generator.

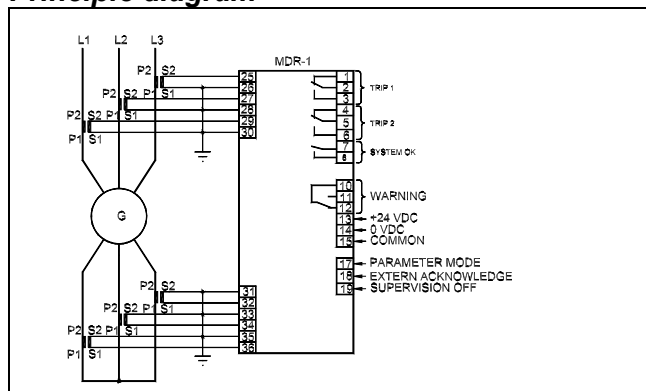
Display of values and texts

- LEDs: Supervision, alarm.
- alarm and condition indication in clear text on LC display
- AC values (differential or actual currents) on LC display

Acknowledgement of alarms

- automatic acknowledgement YES/NO (programmable)
- remote acknowledgement via push-button input
- local acknowledgement via front push-button marked "Ack."

Principle diagram



Technical specifications

Accuracy: 1%, referring to the nominal current

Operating temp.: -20...70°C
(display, however: -20...60°C)

Climate: Class HSE, to DIN 40040

Meas. current: -/1 or -/5 A, consumption:
max. 0.1VA per phase

Overcurrent:
5 x I_n , continuously
30 x I_n , for max. 100 ms
100 x I_n , for max. 10 ms
-/1 A: max. 100 x I_n for 1 s
-/5 A: max. 20 x I_n for 1 s

Meas. frequency: 40...70Hz

Aux. supply: 24V DC -25/+30%, max. 10W

Binary inputs: Input voltage: 18...250V DC or 18...250V AC.
Input impedance: 68kΩ

Fuse: All voltage inputs should be protected by a 2A fuse.

Relay outputs: Contact rating: 8A / 250V AC. Max. voltage: 380V AC.
Mechanical life: min. 100,000 change-overs

Safety: To EN 61010-1. Installation Cat. III, 300V. Pollution degree 2.

Galv. separation: Between all binary input groups, and between binary inputs and remaining circuits.
Between all relay outputs
Insulation resistance
>1000MΩ / 500V DC

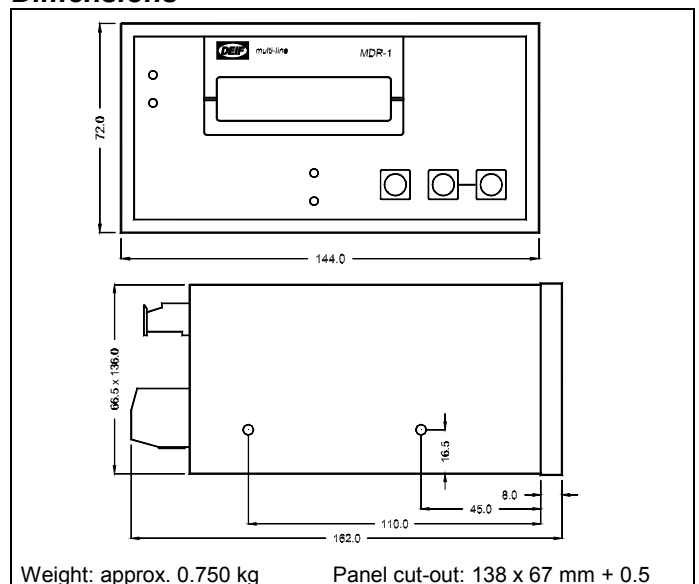
EMC: To EN 50081-1/2 and EN 50082-1/2

Connections: Current: max. 4 mm² (multi-stranded)
6 mm² (single-stranded)
Others: max. 1.5 mm² (multi-stranded),
2.5 mm² (single-stranded).

Protection: IP21. Front: IP52. To IEC 529 and EN 60529

Housing: To DIN 43700

Dimensions



Order specifications

Type – Current transformer – Auxillary voltage

Examples: MDR-1-1 - -/1A - 24V DC
MDR-1-5 - -/5A - 24V DC

Due to our continuous development we reserve the right to supply equipment which may vary from the described.



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