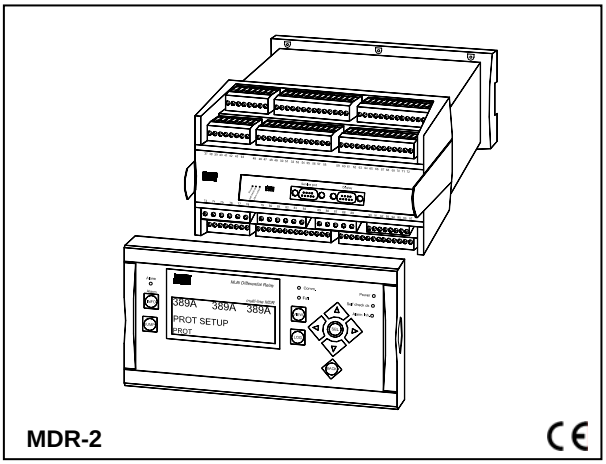
Type MDR-2

Multi differential protection relay

multi-line 2

4921240275G

- ***Relay for generators/electric motors***
- ***3-phase AC measurements***
- ***Dynamic compensation for ext. failures***
- ***Short response time (50 ms)***
- ***Display indicating all measurements***



MDR-2 CE

Application

The MDR-2 differential protection relay is a micro-processor-based control unit containing all necessary functions for monitoring of the differential currents for a synchronous/asynchronous generator or motor (the object).

Via current transformers the MDR-2 measures 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-2 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-2 will not transmit a tripping signal, as the above-mentioned phase currents are equal. In that way a selective protection is achieved.

Except for external measuring transformers the MDR-2 contains all necessary measuring circuits and presents all values on an LC display. Values and messages are presented in clear text (measuring values in engineering units).

The MDR-2 is a flexible and menu/PC programmed unit, enabling the user to easily 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
- 2 binary control inputs

Outputs: - 6 relay outputs
("SYSTEM OK", 5 configurable relays)

Generator protective functions:

- Differential current (3-phase) protection, with programmable dynamic compensation (pick-up curves)
- Warning: Programmable value and delay
- Trip: Programmable value and delay

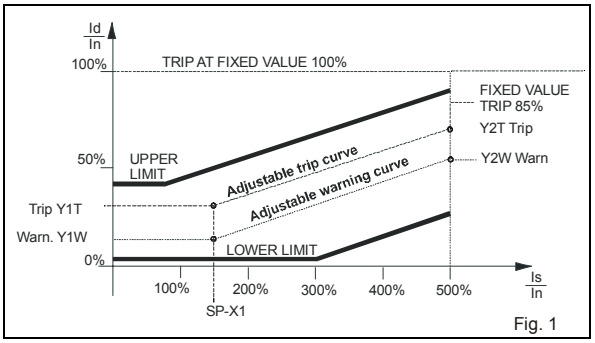


Fig. 1

A pick-up curve is shown in Fig. 1. The curves represent the warning and tripping values (Id/In=Y), defined as the differential current (Id) divided by the nominal generator/motor current (In) referring to the stabilisation current (Is) divided by In (Is/In=X).

The starting horizontal limit lines are placed according to the keyed in values of the points P(X1, Y1T) and P(X1, Y2T). 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 pick-up curves the following ranges are available:

Id/In > 100% Fixed tripping point
Independent of the stabilisation current

Is/In > 500% Fixed tripping (Id/In > 85%)
Fixed warning (Y2W)

Is/In < 500% Trip and warning programmable within "UPPER LIMIT" and "LOWER LIMIT" values and dependent on the Is/In value

DEIF A/S

Type MDR-2

Display of values and texts:

- LEDs: Supervision, alarm
- Alarm and condition indication in clear text on LC display
- AC values (differential and actual currents for all 3 phases) on LC display

Acknowledgement of alarms:

- Automatic acknowledgement YES/NO (programmable)
- Remote acknowledgement via push button input
- Local acknowledgement via display front push button

Options

Overcurrent/short circuit protection (option C3):

- 2 x definite time or inverse time (curve with 6 programmable points) overcurrent protection (400% overcurrent max.)
- 1 x definite time short circuit protection (500% short circuit current max.)

Block differential current protection (option C4):

The block differential protection option protects a generator and a step-up transformer (a block) together.

The option handles the following:

- Step-up transformer ratio
- Different CT ratios on generator and on high voltage (HV) side of the step-up transformer
- Step-up transformer inrush current (2nd harmonic)
- Step-up transformer overexcitation current (5th harmonic)
- Step-up transformer phase angle shift from primary to secondary side. At present the following transformer couplings are supported:
    - Dd 0, phase angle shift 0 deg.
    - Dd 6, phase angle shift 180 deg.
    - Dy 1, phase angle shift 30 deg.
    - Dy 5, phase angle shift 150 deg.
    - Dy 7, phase angle shift 210 deg.
    - Dy 11, phase angle shift 330 deg.
    - Yd 1, phase angle shift 30 deg.
    - Yd11, phase angle shift 330 deg.

Cables (option J):

J1: Display cable, 3m
J2: Display cable, 6m
J3: Serial interface cable for PC utility software
J6: Display cable, 1m

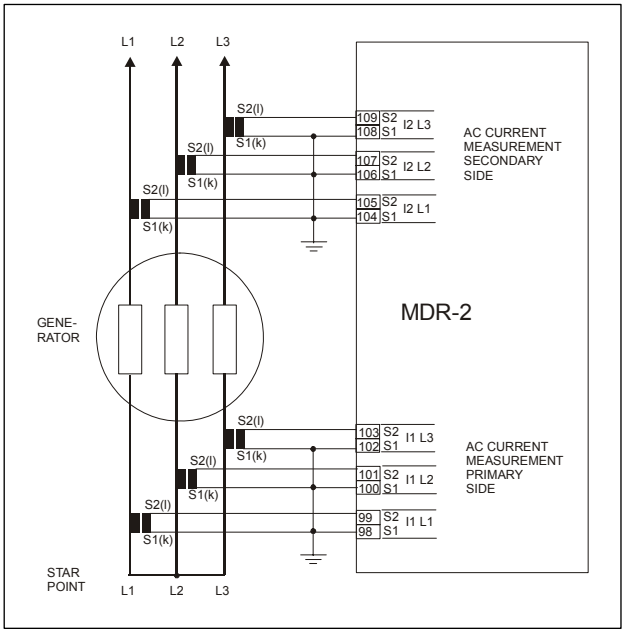
Documentation (option K):

K1: Designer's Reference Handbook (hard copy)
K2: CD-ROM with complete documentation

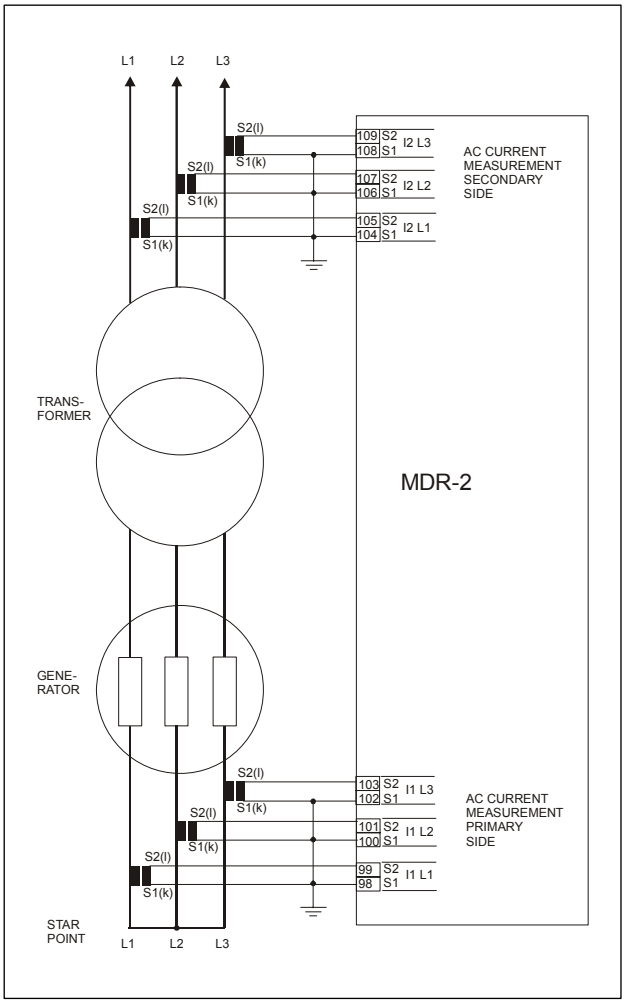
Display gasket (option L):

Rubber gasket makes display protection IP54 (standard IP52)

Principle diagram



Principle diagram, option C4



Type MDR-2

Technical specifications

Accuracy: 0.1 x I_N < I < I_N: 1% of I_N
I_N < I: 1% of I
(I_N = 1A or 5A, I = measured value)

Operating temp.: -25...70°C (-13...158°F)

(UL/cUL Listed: Max. surrounding air temp.: 55°C/131°F)

Climate: Class HSE, to DIN 40040

Meas. frequency: 30...70Hz (nominal 50Hz or 60Hz)

Aux. supply: 12/24V DC -25/+30%, max. 8W

The aux. supply inputs are to be protected by a 2A slow blow fuse

(UL/cUL Listed: AWG 24)

Binary inputs: Input voltage: 6...32V DC (bi-directional)

Input impedance: Max. 2.4 kΩ

Meas. current: -/1A or -/5A (option C4 -/1A only)

(UL/cUL Listed: From CTs 1-5A)

Consumption: Max. 0.3VA per phase

Overcurrent: 4 x I_N, continuously
20 x I_N, 10 sec. (max. 75A)
80 x I_N, 1 sec. (max. 300A)

Response times:

Differential current:	50 ms
Block diff. current (option):	120 ms
Overcurrent (option):	70 ms
Short circuit (option):	50 ms

Response times are measured from end of period of measured current cycle

Relay outputs: Contact rating: 5A/250V AC
("Status": 1A)

(UL/cUL Listed: 250V AC/24V DC, 2A resistive load)

Safety: To EN 61010-1. Installation cat. III, 600V. Pollution degree 2

To UL 508 and CSA 22.2 no. 14-05, overvoltage category III, 300V, pollution degree 2

Galv. separation: Between AC inputs and others: 3250V AC – 50Hz – 1 min.

EMC/CE: To EN 61000-1/2/3/4 and IEC 255-3

Connections: Current: Max. 4 mm^2 (multi-stranded)
6 mm^2 (single-stranded)

(UL/cUL Listed: AWG28-10)

Tightening torque:
0.5-0.6 Nm (4.4-5.3 lb-in)

Connections: Others: Max. 2.5 mm^2 (multi-stranded)

(UL/cUL Listed: AWG28-12)

Tightening torque:
0.5-0.6 Nm (4.4-5.3 lb-in)

Display: 9-pin SUB-D (female)

Service port: 9-pin SUB-D (male)

Protection: Terminals: IP20
Display front: IP52 (IP54 with gasket)

(UL/cUL Listed: Type Complete Device, Open Type)

According to IEC 529 and EN 60529

Material: All plastic parts are self-extinguishing to UL 94 (V1)

Approval: The MDR-2 is approved by the major classification societies. Contact DEIF for details

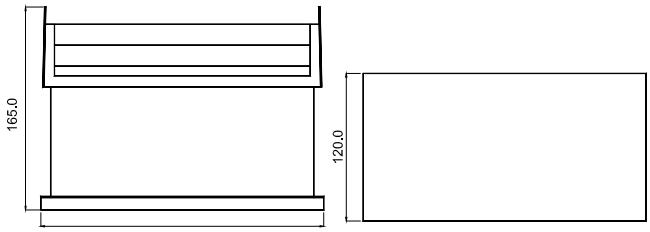
UL and cUL

UL markings: Wiring:
Use 60/75°C copper conductors only

Mounting:
For use on a flat surface of type 1 enclosure

Installation:
To be installed in accordance with the NEC (US) or the CEC (Canada)

Dimensions



Weight: Approx. 1 kg

Order specifications

Type – Option – Option
Example: MDR-2 – J1

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