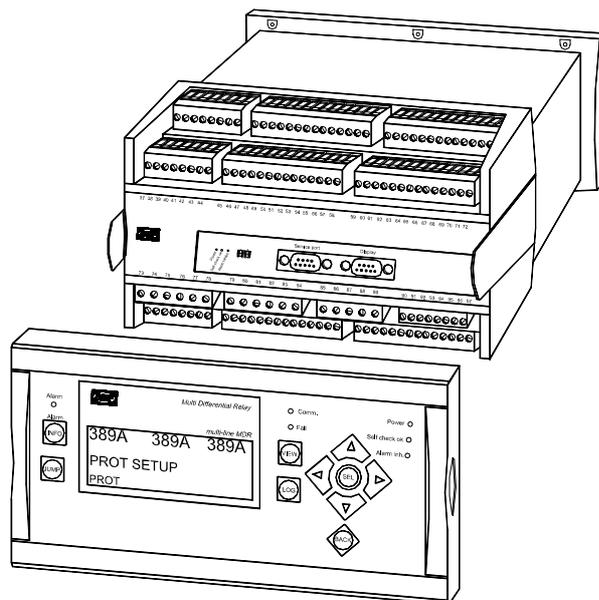


## Application Notes

### MDR-2 test procedures

4189340423A

MDR-2 SW version 1.1 and later



- *Test of current measurement*
- *Test of differential current measurement*
- *Test of trip*

CE

Table of contents

**1. ABOUT THIS DOCUMENT..... 3**

    GENERAL PURPOSE..... 3

    INTENDED USERS ..... 3

    CONTENTS/OVERALL STRUCTURE..... 3

**2. WARNINGS AND LEGAL INFORMATION ..... 4**

    LEGAL INFORMATION AND RESPONSIBILITY ..... 4

    ELECTROSTATIC DISCHARGE AWARENESS ..... 4

    SAFETY ISSUES ..... 4

    CLASSIFICATION SOCIETIES' APPROVALS ..... 4

    DEFINITIONS ..... 4

**3. TEST PROCEDURES..... 5**

    SINGLE CURRENT CHECK ..... 5

    DIFFERENTIAL CURRENT CHECK..... 6

## 1. About this document

---

### General purpose

This document is the Application Notes for DEIF's MDR-2 (Multi Differential current Relay).



**For functional descriptions, the procedure for parameter setup, complete standard parameter lists etc., please see the Designer's Reference Handbook.**

The general purpose of the Application Notes is to offer the designer information about suitable applications for DEIF products.



**Please make sure to read the relevant documentation before working with the DEIF units and the gen-sets to be controlled. Failure to do this could result in damage to the equipment or human injury.**

### Intended users

The Application Notes is mainly intended for the person responsible for designing generator control systems. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in this document.

### Contents/overall structure

The Application Notes is divided into chapters, and in order to make the structure of the document simple and easy to use, each chapter will begin from the top of a new page.

## 2. Warnings and legal information

---

### Legal information and responsibility

DEIF takes no responsibility for installation or operation of the engine/generator set. If there is any doubt about how to install or operate the engine/generator set controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

**The units are not to be opened by unauthorized personnel. If opened anyway, the warranty will be lost.**

### Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

### Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.



**Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.**

### Classification societies' approvals

The MDR-2 unit is approved by major classification societies. Please refer to [www.deif.com](http://www.deif.com) for documentation.

### Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

#### Notes



**The notes provide general information which will be helpful for the reader to bear in mind.**

#### Warnings



**The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.**

### 3. Test procedures

In order to test the MDR-2, the MDR-2 must be programmed and connected to the generator, and a load bank or equivalent is needed to apply load (and thereby current) to the generator.

#### Single current check

The MDR-2 measures 6 currents (2 for each phase). The current check can be made in different manners, the easiest of course by comparing the MDR-2 current reading with other equipment such as meters or generator controllers with AC readings. Note that the readings may not match 100%, since all equipment has a certain accuracy and this may cause slight deviations.

Of course the readings of the 2 currents in the same phase must be equivalent when starting a new generator plant.

If no other possibilities exist, a meter can be placed in series with the single current transformer connection. Note that the reading on the meter is the secondary side of the current transformer (-/1 A or -/5A AC measuring range).

This example shows the reading of phase L1:

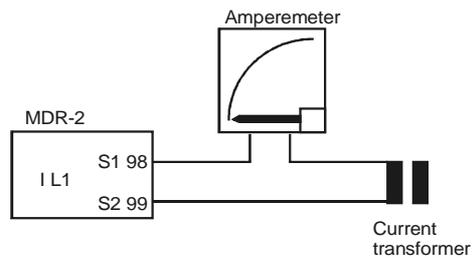


Fig. 1

### Differential current check

Since all 6 current measurements of the MDR-2 have already been checked, we assume that these are correct.

To check the differential current, an amperemeter can be mounted across the input terminals:

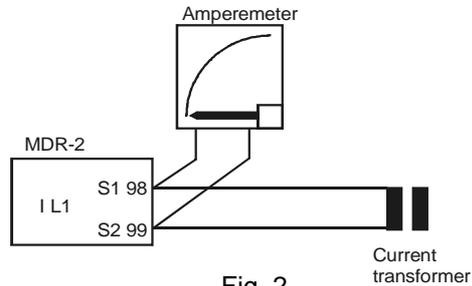


Fig. 2

The amperemeter has fairly low impedance as well (a DEIF analogue meter type EQ has an internal burden of 0.5-1.2 VA) and therefore a portion of the current from the current transformer will flow through the meter and thereby bypass the MDR-2 input and create a differential current. Thereby the differential current is:

$$I_d = \text{current measured by the instrument}$$

where:  $I_d$  = differential current.

The reading of  $I_d$  in the MDR-2 display should equal that of the amperemeter.

If a change of the differential current is needed, the easiest way is to work with the cable length to the amperemeter (longer cable = higher cable impedance/lower differential current):

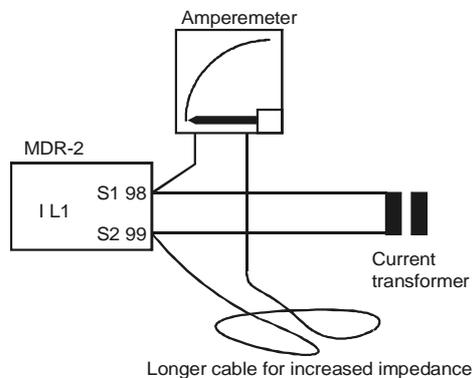


Fig. 3

The above test can be made for all 6 current inputs, and at the same time the trip can be tested. The easiest way is to use the PC utility software (USW) to change the setting of the  $I_d$  trip to a value below the MDR-2 differential current reading. Since all 3 phases are checked individually, the presence of differential current in just one phase will trigger the trip.

After finishing the test, remember to remove the amperemeter and the wirings belonging to it.

DEIF A/S reserves the right to change any of the above without notice