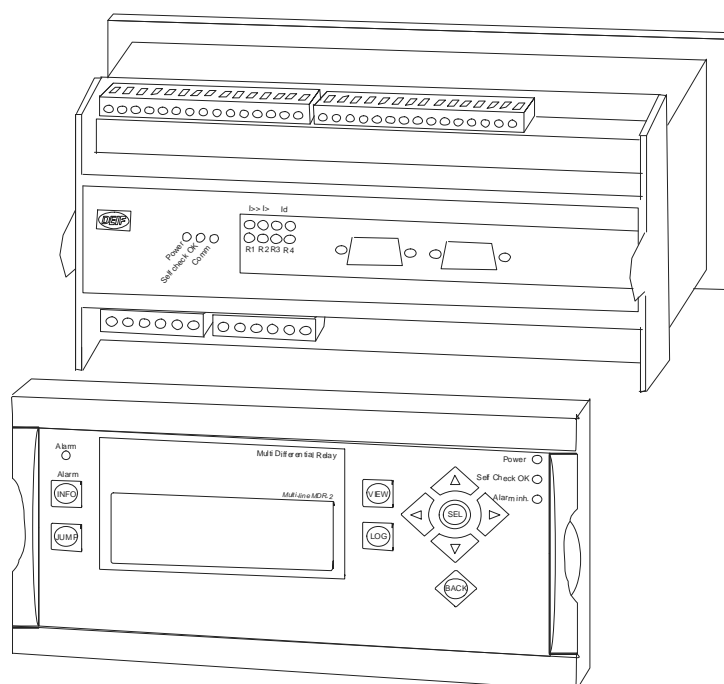


Description of option Option C3



Multi Differential Relay, MDR-2 multi-line 2

4189340344B



- 2 x overcurrent, definite time or inverse time characteristic
- 1 x short circuit, definite time





This document is a description of option C3 for the DEIF multi-line 2 Multi Differential Relay, MDR-2.

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1 Preface

1.1 Warnings and legal information

This document gives guidelines to the use and installation of the DEIF multi-line 2 Multi Differential Relay (MDR-2). It is, however, not a complete installation instruction. Therefore, even if terminal numbers are shown in the drawings, the drawings are to be used as guidance only.

Installing and operating the MDR-2 product implies work with dangerous currents and voltages, and therefore qualified personnel should do it only.

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

DEIF takes no responsibility for operation or installation of the generator set. If there is any doubt about how to install or operate the system on which the MDR-2 product is measuring, the company responsible for the installation or the operation must be contacted.

1.2 References

Reference is made to the MDR-2 Designer's Reference Handbook for further informations.



1.3 General data

1.3.1 Technical specifications

Accuracy:	0.1 x I _N < I < I _N : 1% of I _N I > I _N : 1% of I (I _N = 1 or 5 A, I = measured current on secondary side of CT)
Operating temperature:	-25...70°C
Aux. supply:	12-24 VDC -25/+30%
Frequency:	30...70 Hz
Measuring current:	From current transformers .../1 A or .../5 A. Consumption max. 0.3 VA per phase
Binary inputs:	Input voltage 6...32 VDC. Impedance 2.4 kΩ, bi-directional
Relay outputs:	250 V/8 A or 24 VDC/1 A. Refer to Designer's Reference Handbook for actual layout.
Safety:	To EN 61010-1 installation category (overvoltage category) III, 600 V, pollution degree 2
Galvanic separation:	Between AC current and other I/O's: 3250 VAC – 50 Hz – 1 min.
EMC/CE:	According to EN-61000-1/2/3/4 IEC 255-3
Material:	All plastic parts are self-extinguishing to UL94 (V1)
Climate:	HSE, to DIN 40040
Connections:	AC currents: 4 mm ² multi stranded Others: 2.5 mm ² multi stranded Display: 9-pin Sub-D female Service port: 9-pin Sub-D male
Response times:	Response times are measured from end of period of measured current cycle. Over current: <70 ms Short circuit: <50 ms
Protection:	Case: IP40 Terminals: IP20 Operator panel (option): IP52 (IP54 when mounted with gasket) To IEC 529 and EN 60529
Mounting:	Base mounted with six screws or DIN-rail mounted.
Weight:	Approx. 1kg incl. packing

2 Option C3 functions

2.1 Overcurrent protection

The overcurrent protection is separated into two different protections: one protection based on when a constant current level is exceeded with a definite time characteristic and another protection based on an inverse time-characteristic.

For each overcurrent alarm (I and II) it's possible individually to select between inverse and definite time characteristics and enable/disable the protection.

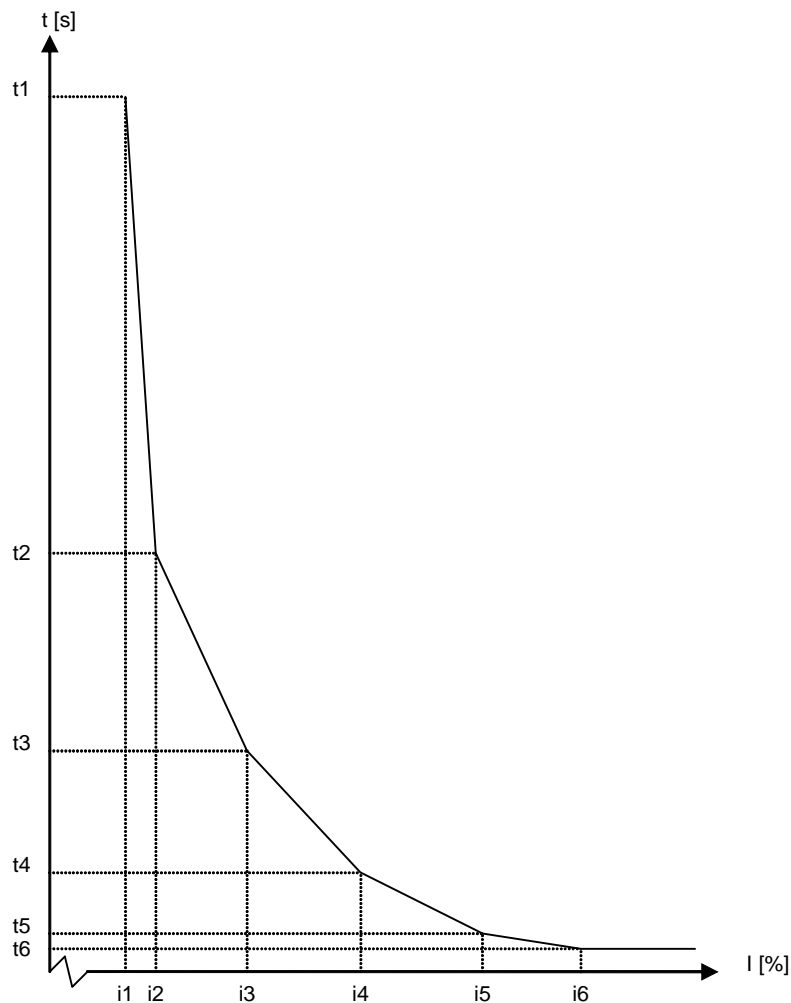
2.1.1 Definite time characteristic overcurrent

This is a high level alarm. When the set point for the current level is exceeded, the associated timer starts and will run for as long as the fault condition remains. If the fault disappears, the timer is reset. When the timer expires, the alarm is signalled.

2.1.2 Inverse time characteristic overcurrent

If the inverse time characteristics is selected a large overcurrent will result in a faster protection than a smaller overcurrent.

Via the menu system six set points giving the slope of the inverse time characteristic are available (each set-point indicating a current (in % of the nominal value) and a time delay).



The inverse time characteristic for the overcurrent protection is illustrated above – the t 's and i 's refer to the six set points giving the slopes of the curve. Notice that the curve is extended horizontal from (i_6, t_6) to (∞, t_6) indicating that a current higher than i_6 corresponds to a delay equal to t_6 .



When the actual current first exceeds the $i1$ -value the timer is started. This actual current and each subsequently calculated actual current is used with the inverse time pick-up curve to set the timeout time for the timer (if the current is rising the timeout time is reduced, if the current is falling the timeout time is enlarged). The timer is stopped and cleared if the current falls to a level below the $i1$ -value. When the timer expires, the alarm is signalled.

NOTE: The user is responsible for stating a valid curve. A cautious definite time protection scheme is used if the software finds an error (see below), but the user is not signalled in any way if the curve is not valid.

For a curve to be valid the following must be fulfilled:

$$i1 < i2 < i3 < i4 < i5 < i6$$

and

$$t6 < t5 < t4 < t3 < t2 < t1$$

The lowest of current settings ($i1$, $i2$, $i3$, $i4$, $i5$ or $i6$) and the lowest of the time settings ($t1$, $t2$, $t3$, $t4$, $t5$ or $t6$) is used in a definite time protection scheme (please see above) if the curve is not valid.

2.1.3 Protection handling

All three $I2$ currents are supervised by the overcurrent protection functionality.

Each time a new set of values is measured/calculated the largest of the three currents are searched out and used in the above described protection scheme (definite or inverse characteristics).

2.2 Short circuit protection

The short circuit protection is a high level alarm. When the set point for the current level is exceeded, the associated timer starts and will run for as long as the fault condition remains. If the fault disappears, the timer is reset. When the timer expires, the alarm is signalled.

It's possible to enable/disable the protection.

All three $I2$ currents are supervised by the short circuit protection functionality.

Each time a new set of values is measured/calculated the largest of the three currents are searched out and used in the above described protection scheme.

2.3 Base unit LED indicators

There are 11 LED indicators on the front of the base unit. The indications are:

Power:	DC Power is ON.
Self check OK:	The microprocessor watchdog status is OK. This relates to the "Status" relay output (normally energized).
Comm.:	Communication status (for future communication options, not used at the moment).
I>>:	Option C3 short circuit trip indication.
I>:	Option C3 overcurrent trip indication.
Id:	There are 2 LED's. The leftmost is differential current warning, the rightmost is differential current trip.

NOTE: I> level I and II share the same LEDs.

For further details, see the Designer's Reference Handbook for MDR-2.



3 Parameter programming

All settings can be programmed using the DEIF Utility Software for multi-line 2 or via the display. All parameters are protected by a password.

In the following, the term “No.” (number) refers to a specific number used for each setting. The first digit in the number indicates the group which the setting belongs to.

3.1 Overcurrent

Settings in % relates to nominal current (setting 4112). Note the special min. delay setting for inverse time set point 1 and the special max. delay setting for inverse time set point 6.

3.1.1 Overcurrent I

No.	Setting	Min. setting	Max. setting	Factory setting
1040	Overcurrent I Selection display	-	-	-
1041	Overcurrent I Set point	50%	400%	115%
1042	Overcurrent I Delay	0.01 s	120.00 s	10.00 s
1043	Overcurrent I Relay output A	R0 (none)	R5 (relay 5)	R2 (relay 2)
1044	Overcurrent I Relay output B	R0 (none)	R5 (relay 5)	R5 (relay 5)
1045	Overcurrent I Enable	OFF	ON	ON
1046	Overcurrent I Characteristic	Definite	Inverse	Definite

No.	Setting	Min. setting	Max. setting	Factory setting
1050	Inverse charc. I Selection display	-	-	-
1051	Inverse charc. I Current set point 1	50 %	500 %	105%
1052	Inverse charc. I Time set point 1	1.00 s	320.00 s	75.00s
1053	Inverse charc. I Current set point 2	50 %	500 %	109%
1054	Inverse charc. I Time set point 2	0.01 s	320.00 s	15.00s
1055	Inverse charc. I Current set point 3	50 %	500 %	120%
1056	Inverse charc. I Time set point 3	0.01 s	320.00 s	5.00s

No.	Setting	Min. setting	Max. setting	Factory setting
1060	Inverse charc. I Selection display	-	-	-
1061	Inverse charc. I Current set point 4	50 %	500 %	150%
1062	Inverse charc. I Time set point 4	0.01 s	320.00 s	2.00s
1063	Inverse charc. I Current set point 5	50 %	500 %	300%
1064	Inverse charc. I Time set point 5	0.01 s	320.00 s	0.65s
1065	Inverse charc. I Current set point 6	50 %	500 %	500%
1066	Inverse charc. I Time set point 6	0.01 s	30.00 s	0.45s



3.1.2 Overcurrent II

No.		Setting	Min. setting	Max. setting	Factory setting
1070	Overcurrent II	Selection display	-	-	-
1071	Overcurrent II	Set-point	50%	400%	120%
1072	Overcurrent II	Delay	0.01 s	120.00 s	5.00 s
1073	Overcurrent II	Relay output A	R0 (none)	R5 (relay 5)	R2 (relay 2)
1074	Overcurrent II	Relay output B	R0 (none)	R5 (relay 5)	R5 (relay 5)
1075	Overcurrent II	Enable	OFF	ON	ON
1076	Overcurrent II	Characteristic	Definite	Inverse	Definite

No.		Setting	Min. setting	Max. setting	Factory setting
1080	Inverse charc. II	Selection display	-	-	-
1081	Inverse charc. II	Current set point 1	50 %	500 %	110%
1082	Inverse charc. II	Time set point 1	1.00 s	320.00 s	100.00s
1083	Inverse charc. II	Current set point 2	50 %	500 %	115%
1084	Inverse charc. II	Time set point 2	0.01 s	320.00 s	17.00s
1085	Inverse charc. II	Current set point 3	50 %	500 %	125%
1086	Inverse charc. II	Time set point 3	0.01 s	320.00 s	6.50s

No.		Setting	Min. setting	Max. setting	Factory setting
1090	Inverse charc. II	Selection display	-	-	-
1091	Inverse charc. II	Current set point 4	50 %	500 %	150%
1092	Inverse charc. II	Time set point 4	0.01 s	320.00 s	2.80s
1093	Inverse charc. II	Current set point 5	50 %	500 %	300%
1094	Inverse charc. II	Time set point 5	0.01 s	320.00 s	0.90s
1095	Inverse charc. II	Current set point 6	50 %	500 %	500%
1096	Inverse charc. II	Time set point 6	0.01 s	30.00 s	0.59s

3.2 Short circuit

Settings in % relates to nominal current (setting 4112).

No.		Setting	Min. setting	Max. setting	Factory setting
1100	Short circuit	Selection display	-	-	-
1101	Short circuit	Set point	50%	500%	250%
1102	Short circuit	Delay	0.01 s	2.00 s	0.50 s
1103	Short circuit	Relay output A	R0 (none)	R5 (relay 5)	R1 (relay 1)
1104	Short circuit	Relay output B	R0 (none)	R5 (relay 5)	R5 (relay 5)
1105	Short circuit	Enable	OFF	ON	ON

3.3 Relay outputs

For each function (overcurrent and short circuit) 2 relay outputs can be set (relay output A and B). For both of these, any of the relays available (standard: Relay 1-5) can be used.

It is recommended to use one of these relay outputs to trip the breaker in case of fault.

If warning or trip messages are to be sent to an alarm system, it is suggested to use separate relays for each warning or trip alarm sent to the alarm system. This enables the alarm system to identify the cause of alarm.

Errors and changes excepted