

User Guide

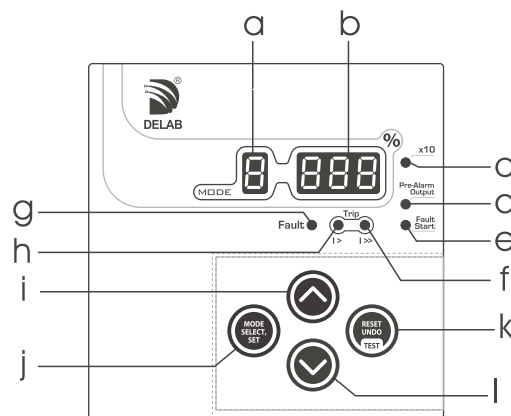
DP-21

(DTL) Digital Earth Fault Relay

features

- True RMS Measurement with SPARC¹ and DCOIP² Algorithm
- Fundamental Signal Detection³
- Real Time Display of Earth Fault in (%)
- Fault / lo-set & hi-set Trip LED Indication
- Fault Start Event Recording & LED Indication + Output⁴
- Pre-Alarm LED Indication + Output⁴
- Trip Event Memory (non-volatile 7 previous records)
- Fault Start Event Memory (non-volatile 4 previous records)
- Selectable Frequency (50 / 60 Hz)
- Programmable Relay Output contact for K2
- Last Trip Elapsed Time (up to 99days)
- Software Lock to Prevent Unauthorized Setting
- Complies with IEC-60255-26 / 27 ; BS EN 50121-5 Standards
- ANSI Code: 50N, 51N
- External Plug-in Module for :- A-01s / A-01sp (RS-485 MODBUS RTU) isolated type

Panel Overview



- a. single digit mode LED display
- b. 3 digit data LED display
- c. x 10
- d. Pre-Alarm output indication
- e. Fault start indication
- f. Hi-set trip indication
- g. Fault indication
- h. Lo-set trip indication
- i. up button / increment
- j. mode select / set button
- k. reset / undo / test trip button
- l. down button / decrement

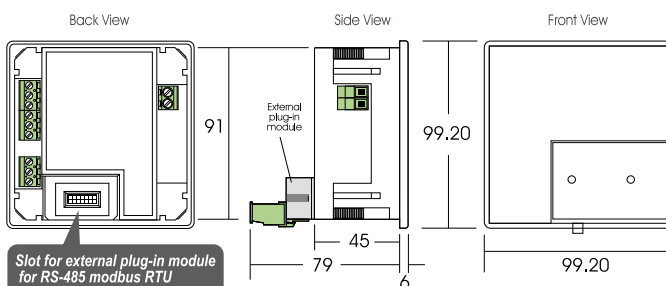
Technical Data

Aux Power	: 65 ~ 275 Vac (45 ~ 65 Hz); 90 ~ 300 Vdc or 18 ~ 72 Vdc
Current Input (In)	: ..5A or ..1A
Fundamental Frequency	: 50 or 60 Hz (software selectable)
Burden	: <0.3 VA @ In
Output Relay Rating	: SPDT 5A, 250V AC/DC
Consumption	: < 3 VA
Accuracy	: Current protection threshold (±5%), Time delayed (+5% or 50ms)
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: x10, pre-alarm, fault start event, lo / hi-set trip, fault
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 230 g

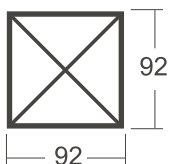
Parameter Setting Range

$I_e > (\%)$: lo-set trip	2% ~ 100% (step of 1%)
$t_e > (\text{sec})$: lo-set trip time delay	0.03s ~ 20.0s
	0.03s ~ 0.10s (step of 0.01s)
	0.10s ~ 1.00s (step of 0.02s)
	1.0s ~ 20.0s (step of 0.1s)
$I_e \gg (\%)$: hi-set trip	OFF or 20% ~ 1000% (step of 10%)
$t_e \gg (\text{sec})$: hi-set trip time delay	fixed @ 30ms

Casing



Panel Cut-out
92 x 92

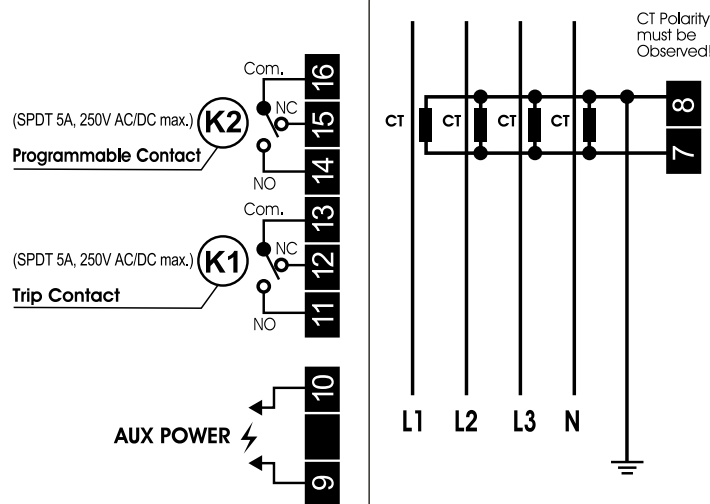


Note: All measurement in mm.

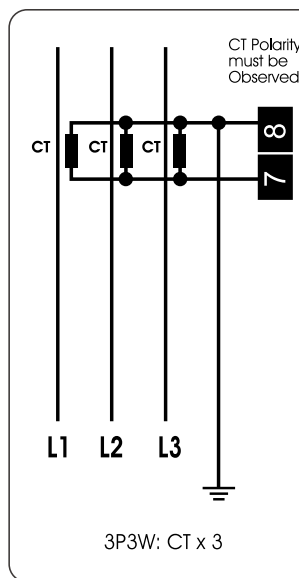
Note: Specification subject to change without prior notification
(please visit www.delab.com.my for latest specification)



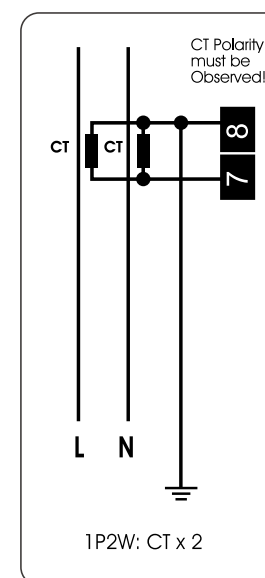
Wiring



3P4W: CT x 4



3P3W: CT x 3



1P2W: CT x 2



Modes



1 $I_e >$ (%)	lo-set trip
2 $t_e >$ (sec)	Trip time delay
3 $I_e >>$ (%)	hi-set trip



b , c1 to c6	Trip memory	7 trip event memories (non-volatile)
d	Last trip elapsed time	Last trip elapsed time
e1 to e4	Fault start memory	4 fault start event memories (non-volatile)
f u e r	Version	Firmware version
f o p h	Operation hours	Device operated in hours (x 1000 hr.)



l	Software lock	Keypad lock : OFF or ON
r1	Trip relay K1 response type	Latching (Lc) or Non-latching (nLc)
r2	Output relay K2 function	Programmable relay output
r3	Trip relay K2 response type	Latching (Lc) or Non-latching (nLc)
f r	Network frequency	Selectable as : 50 Hz or 60 Hz
s	Standby mode	Running LED bar : ON or OFF
p c	Selection of plug-in module	A-01s / A-01sp (RS485 modbus module) or none
a d	Modbus address	Selectable from 1 ~ 247
b r	Baud rate setting	Selectable from 3,6,12,24,48,96,192,288
e n d	End program setting	Save changes and exit setting mode



Parameters Setting



STEP 1

Press [SELECT] button while in default mode (when mode display is blank)
To scroll thru modes, just press & release the Select button

STEP 2

Press [UP] or [DOWN] button to desired value
For fast increment or decrement, press and hold the Up or Down button

STEP 3

Press [SET] button to store new value & proceed to next mode



RESET/UNDO

Press button to undo changes or exit mode

TEST TRIP

Press and hold 5 seconds to test trip device
5 flashes (mode decimal) = 5 seconds

All modes exit automatically if left untouched for more than 20 secs.



Info Viewing

b, **c1** ~ **c6** Tripped values for last 7 events

Press [SELECT] button until mode **b**.

Display will flash the tripped value for the most recent tripped event.

Single flash : Indicate a lo-set trip	To reset trip event memory, hold [RESET] button for 3 sec. in mode b .
Double flash : Indicate a high-set trip	

Manual tripped event will display a flashing **t r p**.

If display shows **---**. (No tripping has occurred)

Press [SELECT] button again to scroll thru mode **c1** to **c6**. (Auto skip to mode **d** if memory is empty)

To skip directly to mode **d**, hold [SELECT] button for 1 sec.

To exit, press [UNDO] button.

d View last trip elapsed time

Press [SELECT] button until mode **d**.

Display will show **---** (device has no tripping since last power up).



To exit, press [UNDO] button.

e1 ~ **e4** Fault start event memory

Press [SELECT] button until mode **e1**. If display show **---** (no fault event has occurred).

Press [SELECT] button again to scroll thru mode **e2** to **e4**. (Auto skip to mode **f** if memory is empty)
To reset memory, hold [RESET] button for 3 seconds in mode **e1**.

To exit, press [UNDO] button.

f u e r Firmware version

This mode is not adjustable. For user to view firmware version.

Press [SELECT] button until mode **f u e r** is being displayed.

The display will show the firmware version of the device.

To exit, press [UNDO] button.

f o p h Total operation hour

This mode shows the total time of the device that has been in operation.

Press [SELECT] button until mode **f o p h** is being displayed.

Display will show a value (x1000 hr).

To exit, press [UNDO] button.



Special Setting Modes

When NO mode is selected (mode display is blank),

- Press [SELECT] & [RESET] button simultaneously and hold for 5 seconds until mode **l** appears.
- Press [Up] or [Down] button to modify
- Press [SET] button to confirm and proceed to next mode

l Software keypad lock

0FF or **0n**

r2 Trip relay K2 response type

Lc : Latching trip **nLc** : Non-Latching trip

r1 Trip relay K1 response type

Lc : Latching trip **nLc** : Non-Latching trip

f r Electrical network system frequency

Electrical network frequency setting:
50 : 50 Hz **60** : 60 Hz

r2 Output relay K2 function

t r p : Tripping output (Lc / nLc)

Fault Start Output Function

l f s : Lo-set fault start signal output (Lc/nLc)

h f s : Hi-set fault start signal output (Lc/nLc)

a f s : Any fault start signal output (Lc/nLc)

Fault start event LED (e) indicates any detected fault events.

To clear event indication, press [RESET] button or scroll to mode **e1** while no fault is present.

K2 output will be activated when there is any fault start event if programmed is being set as 'AFS'.

To latch fault events output, select **r2** to Lc in trip relay K2 response type.

s Standby option

0FF : De-activate **0n** : Activate

If set to on, after about 3 minutes of idle and no fault is detected, running LED bar will be displayed instead of the real time value. It automatically exits on fault detection or when any button is pressed. When device trips, standby mode is temporary de-activated until device is reset.

To toggle this setting, user can also press [SELECT] button when powering up the device.

p c Selection of plug-in module

a01 : A-01s / A-01sp **non** : None

a d Modbus address

Selectable from 1~247

b r Baud rate setting

Set the baud rate in a modbus communication between host computer and device. Selectable as:
(3 = 300, 6 = 600, 12 = 1200, 24 = 2400, 48 = 4800, 96 = 9600, 192=19200 or 288 = 28800) bps
Data parity is fixed to none.

e n d End setting

Press [SELECT] button to exit and save the setting or [UNDO] button to go back.

Device Failure Output Function

d u f : Device failure output (nLc only)

K2 automatically turns ON when device is functioning normally.

Circuit Breaker Failure Output Function

c b f : Circuit breaker failure output (nLc only)

Activates K2 output if fault still exists after 100 ms of trip event.

Pre-Alarm Output Function

a50 : > 50% of $I_e >$ (Lc / nLc)

a90 : > 90% of $I_e >$ (Lc / nLc)

If K2 is programmed to pre-alarm A50 / A90, Pre-alarm output LED (d) will indicate the status of K2. Set **r2** to Lc in trip relay K2 response type if need to latch pre-alarm events.

Press [RESET] button to clear output.