

# User Guide

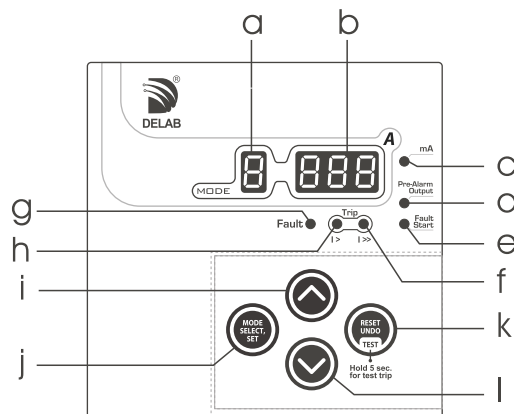
## DP-10

Digital Earth Leakage Relay

### features

- True RMS Measurement with SPARC<sup>1</sup> and DCO<sup>2</sup> Algorithm
- Fundamental Signal Detection<sup>3</sup>
- Real Time Display of  $I_{\Delta n}$  in mA/A
- Fault / lo-set & hi-set Trip LED Indication
- Fault Start Event Recording & LED Indication + Output<sup>4</sup>
- Pre-Alarm LED Indication + Output<sup>4</sup>
- 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)
- Auto Z.C.T. detection
- Software Lock to Prevent Unauthorized Setting
- Complies with IEC-60255-26/27 ; BS EN 50121-5 Standards
- 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. (mA) indication
- 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

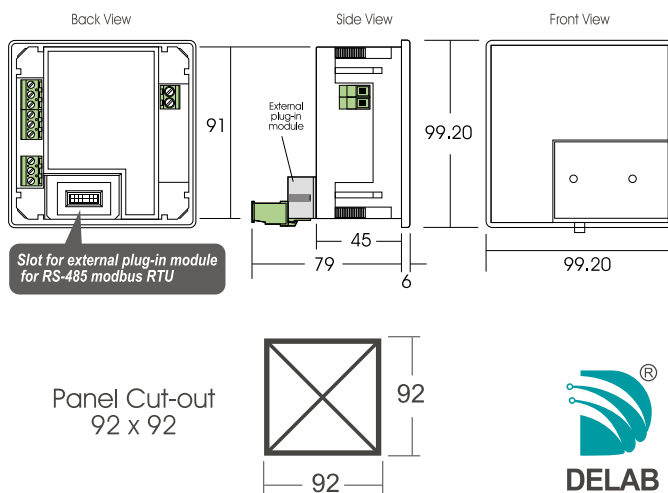
### Technical Data

Aux Power	: 65 ~ 275 Vac (45 ~ 65 Hz); 90 ~ 300 Vdc or 18 ~ 72 Vdc
Fundamental Frequency	: 50 or 60 Hz (software selectable)
Current Input ( $I_{\Delta n}$ )	: ZCT (multiple sizes from ID of 30~200mm)
Measurement Range	: 0.01 ~ 30.0 A
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)	: mA, 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

$I_{\Delta n} > (A)$ : lo-set trip	0.03 ~ 1.00 A (step of 0.01 A)
<b>0.03 ~ 30.0 A</b>	1.00 ~ 3.00 A (step of 0.05 A)
	3.00 ~ 10.0 A (step of 0.10 A)
	10.0 ~ 30.0 A (step of 0.50 A)
$t > (sec)$ : lo-set trip time delay	0.03 ~ 0.10 s (step of 0.01s)
<b>0.03 ~ 20.0 s</b>	0.10 ~ 1.00 s (step of 0.02s)
	1.0 ~ 20.0 s (step of 0.1s)
$I_{\Delta n} \gg (A)$ : hi-set trip	0.10~10.0 A (step of 0.10 A)
<b>OFF or 0.10 ~ 30.0 A</b>	10.0 ~ 30.0 A (step of 0.50 A)
$t \gg (sec)$ : hi-set trip time delay	<b>fixed @ 30ms</b>

### Casing

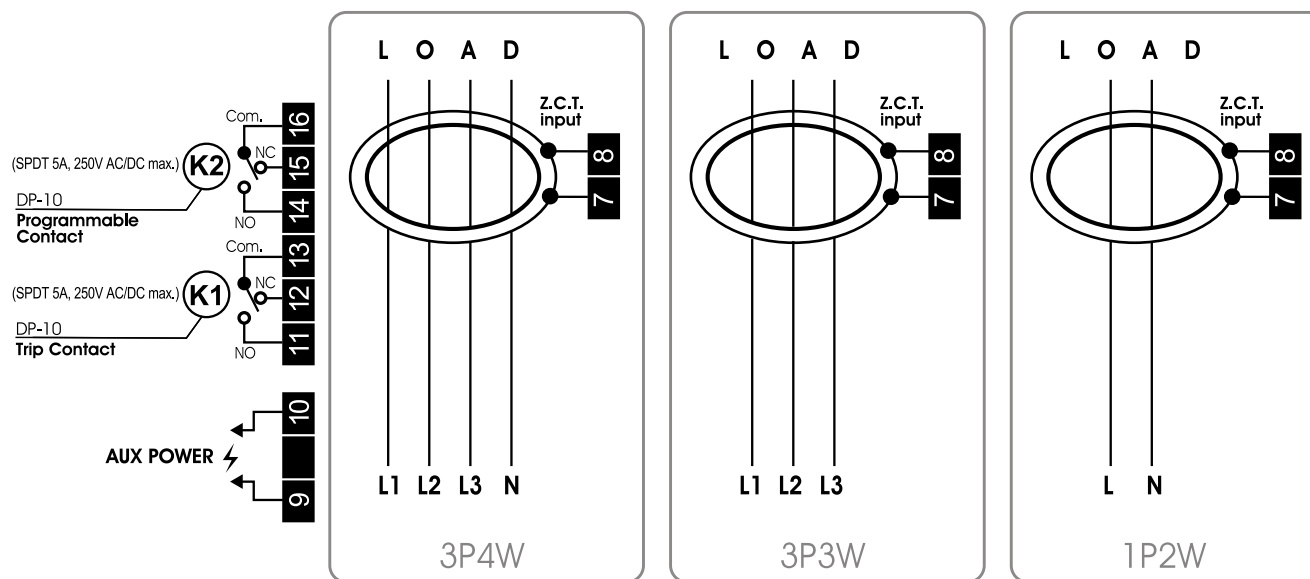


Note: All measurement in mm.

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



### Wiring





## Modes



SETTING

<b>1</b> $I_{\Delta n} > (A)$ : Lo-set leakage current	<b>3</b> $I_{\Delta n} \gg (A)$ : Hi-set leakage current
<b>2</b> $t > (sec)$ : Trip time delay	



INFO VIEWING

<b>6, 01 to 06</b> Trip memory	7 trip event memories (non-volatile)
<b>8</b> Last trip elapsed time	Last trip elapsed time
<b>01 to 04</b> Fault start memory	4 fault start event memories (non-volatile)
<b>F U E r</b> Version	Firmware version
<b>F o P h</b> Operation hour	Device operated in hours ( x 1000 hr. )



SPECIAL SETTING MODE

<b>L</b> Software lock	Keypad lock : OFF or ON
<b>01</b> Trip relay K1 response type	Latching (Lc) or Non-latching (nLc)
<b>02</b> Output relay K2 function	Programmable relay output
<b>02</b> Trip relay K2 response type	Latching (Lc) or Non-latching (nLc)
<b>F r</b> Network frequency	Selectable as : 50 Hz or 60 Hz
<b>-</b> Standby mode	Running LED bar : ON or OFF
<b>06</b> Z.C.T. detection	Auto detection or No detection
<b>00</b> Selection of plug-in module	A-01s / A-01sp (RS485 modbus module) or none
<b>Ad</b> Modbus address	Selectable from 1 ~ 247
<b>0r</b> Baud rate setting	Selectable from 3,6,12,24,48,96,192,288
<b>End</b> End program setting	Save changes and exit setting mode



## Parameters Setting



### **1** $I_{\Delta n} > (A)$ : To set lo-set leakage current

- Step 1 :** Press [ SELECT ] button once to enter mode **1**.  
Display will show the existing set value. (Range : 0.03 ~ 30.0 Ampere)
- Step 2 :** Set the desired lo-set leakage current using the [ Up ] or [ Down ] button.  
Newly selected value will flash.
- Step 3 :** Press [ SELECT ] button to store / confirm new value and advance to mode **2** or press [ UNDO ] button to undo changes.



### **2** $t > (sec)$ : To set trip time delay

- Step 1 :** Press [ SELECT ] button until mode **2** is displayed.  
Display will show the existing set value. (Range : 0.03 ~ 20.0 seconds)
- Step 2 :** Set the desired trip time using the [ Up ] or [ Down ] button.  
Newly selected value will flash.
- Step 3 :** Press [ SELECT ] button to store / confirm new value and advance to mode **3** or press [ UNDO ] button to undo changes.



### **3** $I_{\Delta n} \gg (A)$ : To set hi-set leakage current

- Step 1 :** Press [ SELECT ] button until mode **3** is displayed.  
Display will show the existing set value. (Range : OFF or 0.10 ~ 30.0 Ampere)
- Step 2 :** Set the desired hi-set leakage current using the [ Up ] or [ Down ] button.  
Newly selected value will flash.
- Step 3 :** Press [ SELECT ] button to store / confirm new value and advance to mode **6** or press [ UNDO ] button to undo changes.



## Info Viewing

### **6, 01 ~ 06** Tripped values for last 7 events

Press [SELECT] button until mode **6**.  
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>6</b> .
Double flash : Indicate a high-set trip	

Manual tripped event will display a flashing **ErrP**.  
If display shows **---** (No tripping has occurred)  
Press [SELECT] button again to scroll thru mode **01** to **06**. (Auto skip to mode **6** if memory is empty)  
To skip directly to mode **6**, hold [SELECT] button for 1 sec.  
To exit, press [UNDO] button.

### **8** View last trip elapsed time

Press [SELECT] button until mode **8**.  
Display will show **---** (device has no tripping since last power up).

e.g. 

hour	min	Display up to
00h	23n	99 hr 99 min

day	hour	Display up to
00d	23h	99 day 99 hr

over 99 day
00r 99d

To exit, press [ UNDO ] button.

### **01 ~ 04** Fault start event memory

Press [ SELECT ] button until mode **01**. If display show **---** (no fault event has occurred).  
Press [ SELECT ] button again to scroll thru mode **02** to **04**. (Auto skip to mode **6** if memory is empty)  
To reset memory, hold [ RESET ] button for 3 seconds in mode **01**.  
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

**OFF** or **ON**

### **01** Trip relay K1 response type

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

### **02** Output relay K2 function

**ErrP** : Tripping output (Lc / nLc)

#### Fault Start Output Function

**LFS** : Lo-set fault start signal output (Lc / nLc)  
**HFS** : Hi-set fault start signal output (Lc / nLc)  
**AFS** : 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 **01** while no fault is present.  
K2 output will be on if programmed as fault start event. To latch fault events output, select **02** to Lc in trip relay K2 response type.

#### Device Failure Output Function

**DUF** : Device failure output (nLc only)  
K2 automatically turns ON when device and Z.C.T. are functioning normally.  
K2 will turn OFF when device is malfunction or Z.C.T. is open-circuited.

#### Circuit Breaker Failure Output Function

**CBF** : 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  $I_{\Delta n} >$  (Lc / nLc)  
**A90** : >90% of  $I_{\Delta n} >$  (Lc / nLc)  
If K2 is programmed to pre-alarm [A50 or A90].  
Pre-alarm output LED (d) will indicate the status of K2. Set **02** to Lc in trip relay K2 response type if need to latch pre-alarm events.

Press [ RESET ] button to clear output.

### **02** Trip relay K2 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

### **-** Standby option

**OFF** : De-activate **ON** : Activate

After about 3 minutes of idle and no leakage is detected, running LED bar will be displayed instead of the real time leakage current if activated. It automatically exits on leakage detection or Z.C.T. is not connected or when any button is pressed. When device trips, standby mode is temporary de-activated until device is reset.

When Z.C.T. is open-circuited, standby mode is temporarily de-activated until Z.C.T. is connected.

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

### **06** Z.C.T. detection

**OFF** : No detection **Aut** : Auto detection

**2CC** is being displayed and flashing instead of the real time leakage current when auto Z.C.T. detection is activated, it means that the Z.C.T. is not connected properly. User may need to check the wiring connection with the device.

### **00** Selection of plug-in module

**A01** : A-01s / A-01sp **non** : None

### **Ad** Modbus address

Selectable from 1~247

### **0r** 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.

### **End** End setting

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