

# User Guide

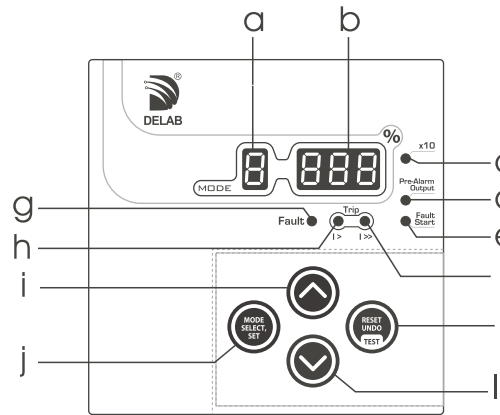
## DP-21

(DTL) Digital Earth Fault Relay

### features

- True RMS Measurement with SPARC<sup>1</sup> and DCOIP<sup>2</sup> Algorithm
- Fundamental Signal Detection<sup>3</sup>
- Real Time Display of Earth Fault in (%)
- 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)
- 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

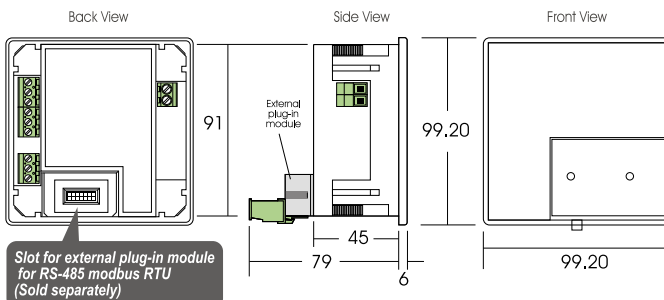
### Technical Data

Aux Power	: 65 ~ 275 Vac (45 ~ 65 Hz); 90 ~ 300 Vdc (for model 220a)
	: 18 ~ 72 Vdc (for model 024d)
Current Input (I <sub>n</sub> )	: ..5A or ..1A (depending on model CT...5A or CT...1A)
Fundamental Frequency	: 50 or 60 Hz (software selectable)
Burden	: <0.3 VA @ I <sub>n</sub>
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 <sub>e</sub> > (%) : lo-set trip	2% ~ 100% (step of 1%)
t <sub>e</sub> > (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 <sub>e</sub> >> (%) : hi-set trip	OFF or 20% ~ 1000% (step of 10%)
t <sub>e</sub> >> (sec) : hi-set trip time delay	fixed @ 30ms

### Casing

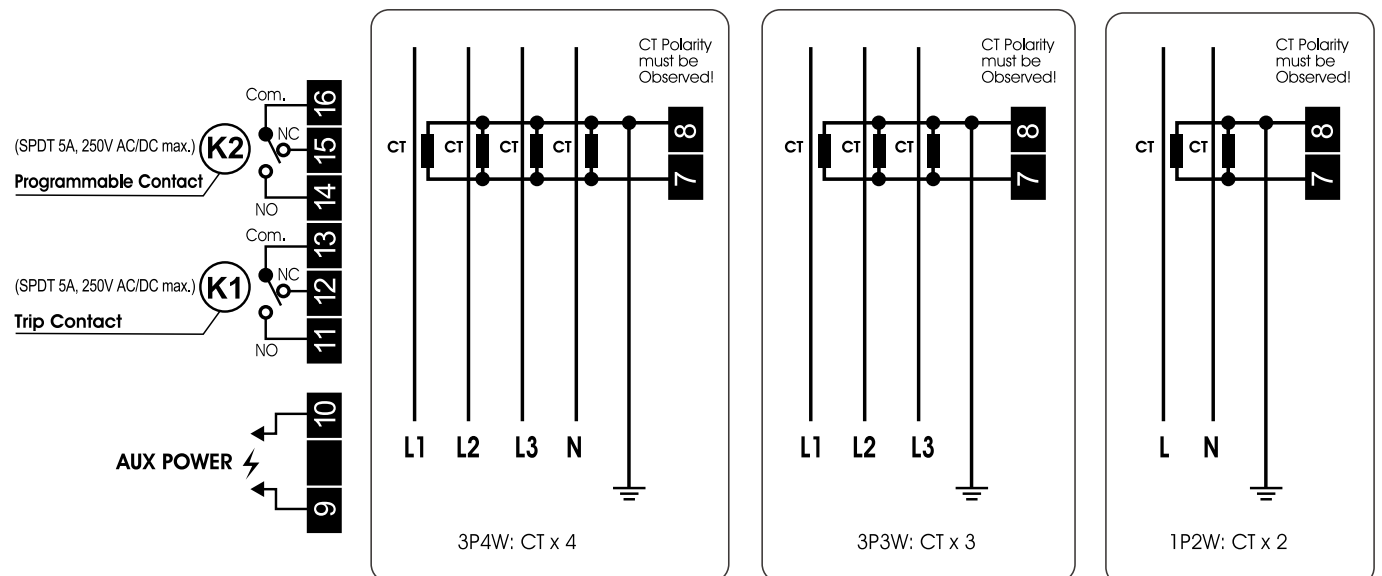


Panel Cut-out  
92 x 92

Note: All measurement in mm.



### Wiring



Modes			
Factory Setting			
PARAMETER SETTING	10	1 I <sub>e</sub> > (%)	lo-set trip
	0.3	2 t <sub>e</sub> > (sec)	Trip time delay
	400	3 I <sub>e</sub> >> (%)	hi-set trip
VIEWING INFO	b, c01 to c06	Trip memory	7 trip event memories (non-volatile)
	d	Last trip elapsed time	Last trip elapsed time
	e01 to e04	Fault start memory	4 fault start event memories (non-volatile)
	f uEz	Version	Firmware version
	f oPh	Operation hours	Device operated in hours (x 1000 hr)
SPECIAL SETTING MODE	OFF	l Software lock	: Keypad lock : OFF or ON
	Lc	rP1 Trip relay K1 response type	: Latching (Lc) or Non-Latching (nLc)
	trP	rP2 Output relay K2 function	: Programmable relay output
	nLc	rP2 Trip relay K2 response type	: Latching (Lc) or Non-Latching (nLc)
	50	rP2 Network frequency	: Selectable as : 50 Hz or 60 Hz
	On	Standby mode	: Running LED bar : ON or OFF
	non	rP2 Selection of plug-in module	: A-01s / A-01sp (RS485 modbus isolated type) or none
	1	rP2 Modbus address	: Selectable from 1 ~ 247
	96	rP2 Baud rate setting	: Selectable from 3, 6, 12, 24, 48, 96, 192, 288
	non	rP2 Parity setting	: Selectable: None or Odd or Even
Factory Setting	End	End program setting	: Save Changes and exit setting mode

## Parameters Setting

Single digit mode display

Three digit mode display

**Mode decimal**  
Indicates seconds count

**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, c01 ~ c06 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>b</b> .
Double flash : Indicate a high-set trip	

Manual tripped event will display a flashing **c r P**.  
If display shows **---**. (No tripping has occurred)

Press [SELECT] button again to scroll thru mode **c01** to **c06**. (Auto skip to mode **b** 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).

hour min

Display up to 99 hour 99 min

e.g. **00h23n**

day hour

Display up to 99 day 99 hour

e.g. **00d23h**

over 99 day

e.g. **oUr99d**

To exit, press [UNDO] button.

### e01 ~ e04 Fault start event memory

Press [SELECT] button until mode **e01**. If display show **---** (no fault event has occurred).  
Press [SELECT] button again to scroll thru mode **e02** to **e04**. (Auto skip to mode **b** if memory is empty)  
To reset memory, hold [RESET] button for 3 seconds in mode **e01**.  
To exit, press [UNDO] button.

### f uEz Firmware version

This mode is not adjustable. For user to view firmware version.  
Press [SELECT] button until mode **f uEz** is being displayed.  
The display will show the firmware version of the device.  
To exit, press [UNDO] button.

### f oPh Total operation hour

This mode shows the total time of the device that has been in operation.  
Press [SELECT] button until mode **f oPh** 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 & hold for 5 seconds until mode **b** appears

Press 'UP or Down' button to modify parameters

Press 'SET' button to confirm & proceed to next mode

### l Software keypad lock

**0FF** or **0n**

### rP2 Trip relay K2 response type

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

### rP1 Trip relay K1 response type

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

### rP2 Electrical network system frequency

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

### rP2 Output relay K2 function

**c r P** : 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 **e01** 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 **rP2** to Lc in trip relay K2 response type.

**Device Failure Output Function**

**oUF** : 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<sub>e</sub>> (Lc / nLc)  
**A90** : > 90% of I<sub>e</sub>> (Lc / nLc)

If K2 is programmed to pre-alarm A50 / A90, Pre-alarm output LED (d) will indicate the status of K2. Set **rP2** to Lc in trip relay K2 response type if need to latch pre-alarm events.  
Press [RESET] button to clear output.

### 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.

### rP2 Selection of plug-in module

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

### rP2 Modbus address

Selectable from 1~247

### rP2 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

### rP2 Parity setting

**non** : None **Odd** : Odd **Even** : Even

Set the parity for Modbus communication between host computer and the unit.

### End End setting

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