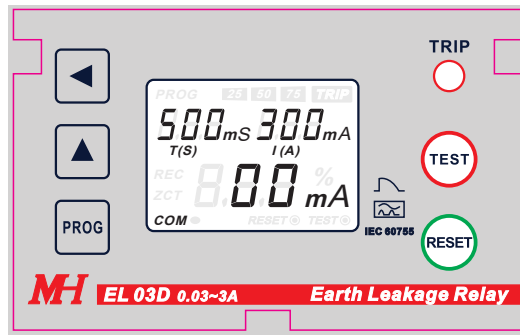


# EL-xx D series

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## Operation Manual

**RTC**  
**Elapse time**



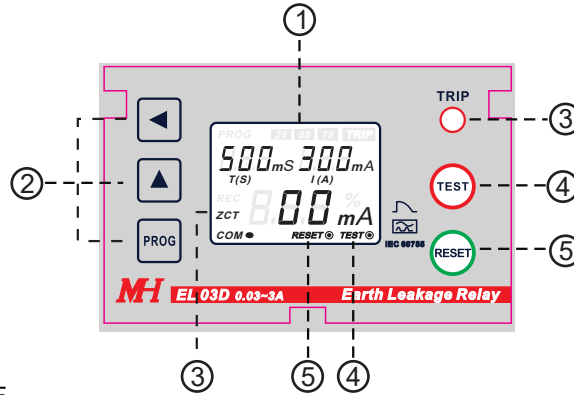
**MH**

Mun Hean Singapore Pte Ltd

# 1: Display and Button Description

## 1.1 Front panel

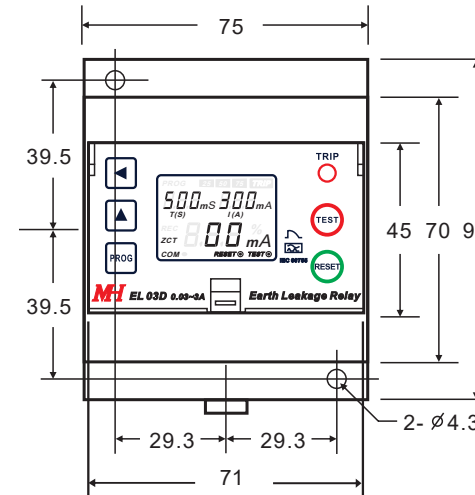
- ① LCD screen  
Real time current (A / %), Setting, Records
- ② Functions keys  
Configuration, Screen switching
- ③ Trip LED  
On: Relay trip  
Flashing: ZCT open circuit  
(‘ZCT’ shown on screen)
- ④ TEST button  
Press 2 times, TRIP and Pre-alarm contact energise and Trip LED ON  
(*TEST* ● shown on screen)
- ⑤ RESET button  
Press once to reset, TRIP LED OFF  
(*RESET* ● shown on screen)



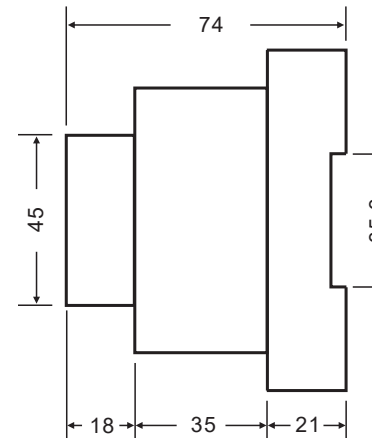
# 2: Size and Cut out

## 2.1 Size dimension, unit = mm

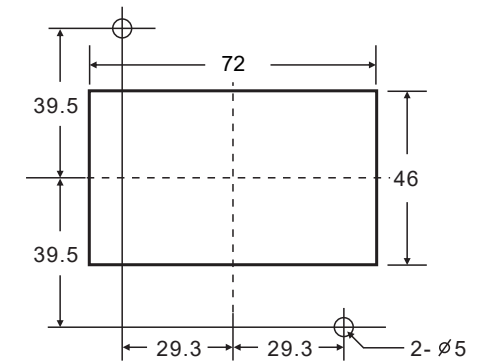
### ● Front view



### ● Side view

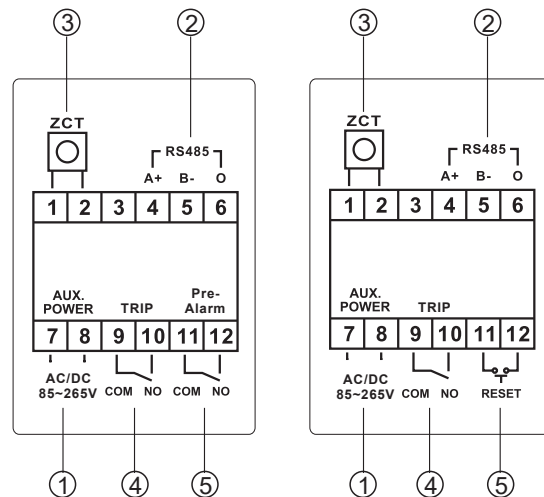


### ● Cut Out



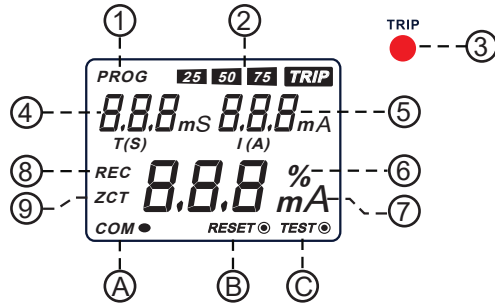
## 1.2 Terminals

- ① Power supply
- ② RS 485 Communication
- ③ ZCT current input
- ④ TRIP contact
- ⑤ Pre-Alarm / Remote reset contact (Select one)



### 3: Display and Buttons Functions

#### 3.1 LCD display descriptions



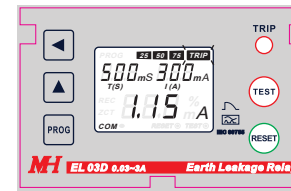
- ① PROG Mode display
- ④ ⑤ Show setting parameter and values in PROG mode
- ② Leakage indication bar in '%' and 'TRIP'  
When relay pick up, **TRIP** will flash  
When relay Trips, **TRIP** will stay ON, and **TRIP** LED ON
- ③ TRIP LED: ON when the relay trip  
ON: Relay Trip, Trip and Pre-Alarm contact close  
Display will toggle between Trip record (⑧ REC on) and setting  
Flashing: ZCT terminal detect open circuit (⑨ ZCT on)
- ④ T(S) Time delay setting: range from 0.01 - 0.5sec, the display will show ms  
The display show T(S), it indicates setting values, other display type will not show  
The display show **PR**, it indicates Pre-alarm activated, other display type will not show
- ⑤ I(A) Pickup Current setting: range from 0.03 - 3A or 0.3 - 30A, mA will show if setting <1A  
The display show I(A), it indicates setting values, other display type will not show
- ⑥ ⑦ Real-time Leakage current: Press **▲** to toggle between ⑥ % and ⑦ A / mA  
Activate the SCR function for Auto scrolling the two displays (% or mA)
- ⑧ REC: Record memory show on ④ and ⑤, T(S) and I(A) is off
- ⑨ ZCT: Detect open circuit, ③ Trip LED flashing
- A COM: RS485 enable, ● ON if it is communicating
- B RESET: Press to reset the relay
- C TEST: Press 2 time to Trip.

#### 3.2 Display and buttons function description

- ◀** Changing from setting display to record memory (REC on)  
Record memory description (refer to 4.1)
- ▲** Changing from real-time leakage current (%) to (A / mA)  
In record memory: changing between the 4 memories
- PROG** Enter into Program mode (refer to 4.1)
- TEST** Test button  
Press once and the display shows **ALL OFF**  
and **PR5 REN** when the button is release.  
Press again, the relay Trips (Trip and Pre-alarm contact close)
- RESET** RESET button  
Press once, Trip and Pre-Alarm contact open  
Display shows **RESET ●**

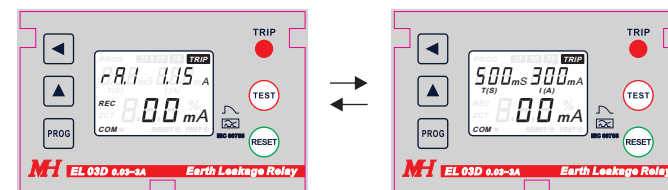
#### 3.3 Detection and Tripping descriptions

Example of display during detection of fault current.



The **TRIP** symbol flashes during the delay time  
Trip LED will not light up

Example of trip display screen (trip record and Setting value, display scrolling)



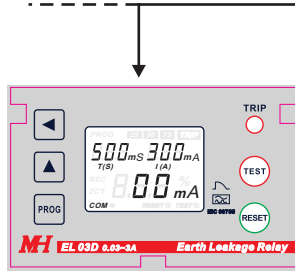
Trip LED will light up  
and contact output close

The Tripping record and Setting values display  
will toggle in event of the relay trips

### 3: Display and Buttons Functions

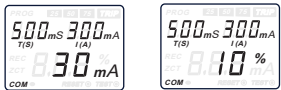
#### 3.4 Different display screen and example description

Input value display screen    Trip record display screen (REC comes ON)



Leakage current and Setting value  
Leakage current is constantly displayed

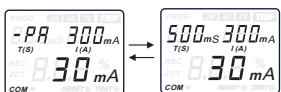
On the main page, press to toggle between % and mA as below



>1000% = 1.0E %

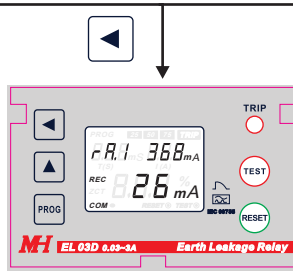
Pre-Alarm display

For setting, refer to P5 r

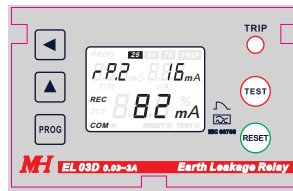


Display change after delay

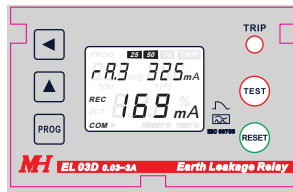
When in trip status, it will not show



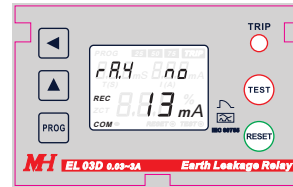
RR1 : RR1 Latest Trip event  
RR1 Trip cause by current  
Fault current: 368mA  
Real time current: 26 mA



RR2 : RR2 2nd Last Trip event  
RR2 Trip cause by TEST button  
Current when trip 816mA  
Real time current: 82 mA  
> 25 %

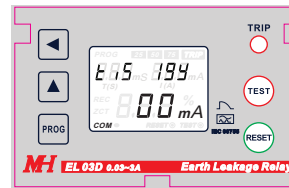


RR3 : RR3 3rd Last Trip event  
RR3 Trip cause by current  
Fault current: 325mA  
Real time current: 169 mA  
> 50 %

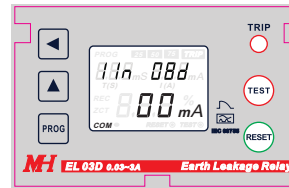


RR4 : RR4 4th Last Trip event  
RR4 No Trip event record  
Real time current: 113 mA

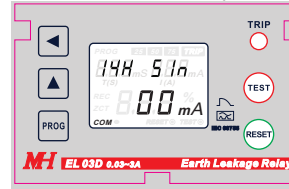
Real Time Clock (RTC)  
E.g: 2019-11-08, 14:51:36



Date / Time Stamping:  
Year



Date / Time Stamping:  
Month and Day



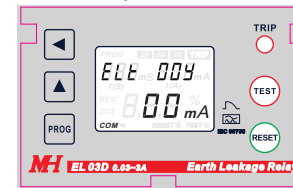
Date / Time Stamping:  
Hour and Minutes

Memories record are base on FIFO.  
RR1 is the latest record  
RR4 is the oldest record

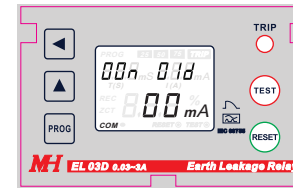
\*Oldest record will deleted if new record is capture.

Elapse tripping time  
E.g: Interval between 2 trip event

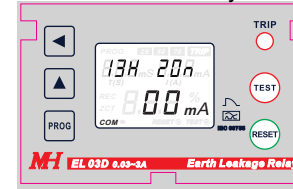
1 day, 13hrs and 20mins.  
Note: Relay off time not included



Elapse Time:  
Year

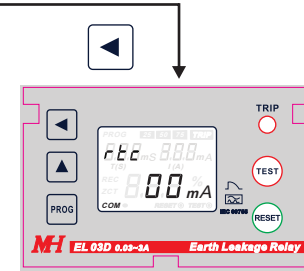


Elapse Time:  
Month and Day

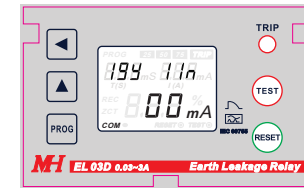


Elapse Time:  
Hour and Minutes

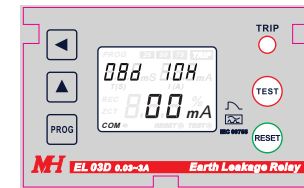
\*\*Displayed only with RTC function  
RTC value display



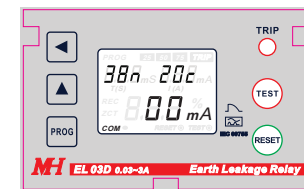
Auto scrolling of RTC  
E.g: 2019-11-08, 10:38:20



Year and Month



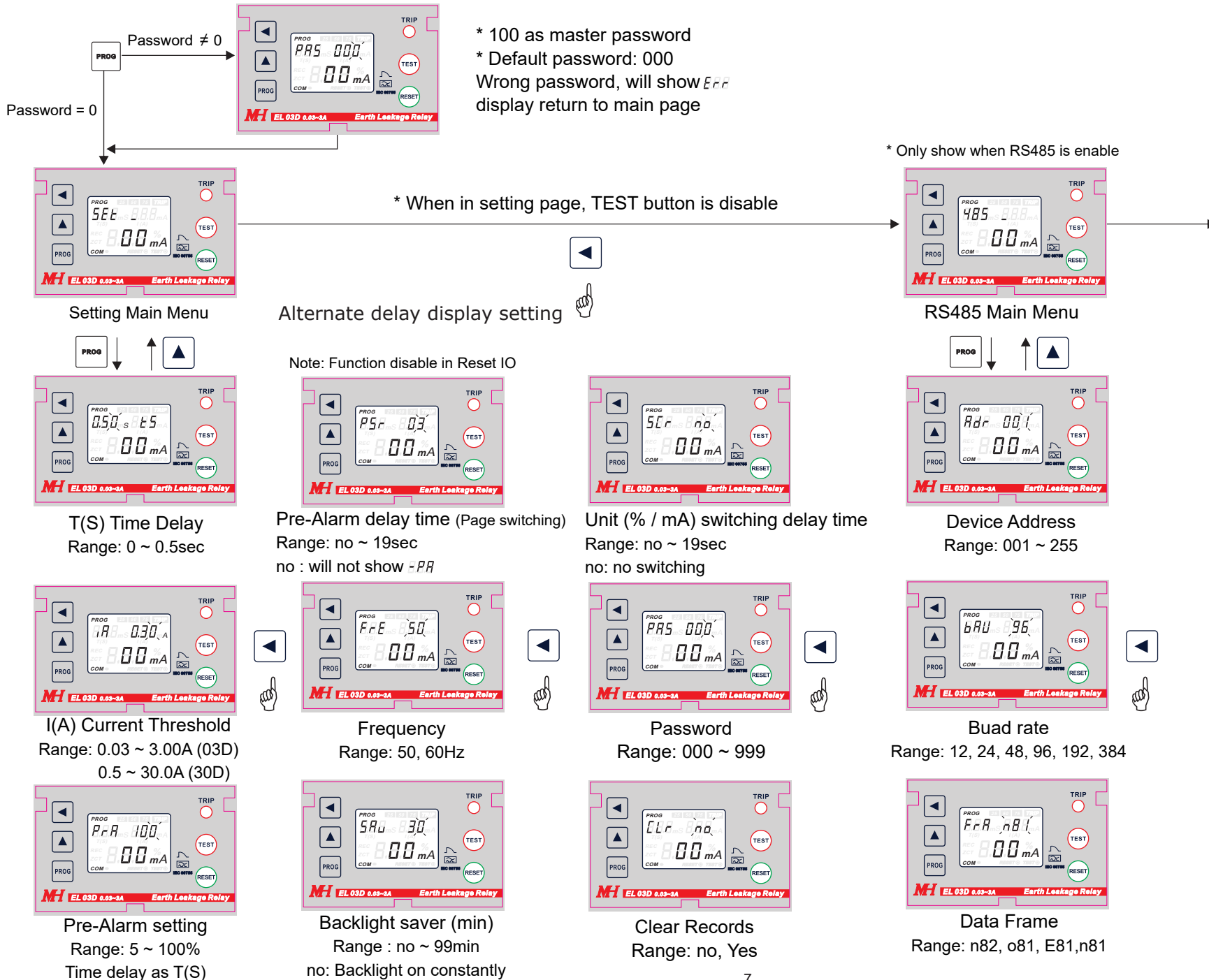
Day and Hour



Minutes and Second

## 4. Setting and Buttons function

### 4.1 Setting menu



### 4.2 Buttons functions

#### ● Descriptions

##### Main Menu

- Enter Sub-menu
- Switching between Main Menu
- Return to previous page
- No effect
- Reset

##### Sub-Menu

- Enter to setting
- Switching between Sub Menu
- Return to Main Menu
- No effect
- Reset






##### Values Setting

- Increment
- Decrement
- Shift Cursor
- Enter and Save  
Return to Sub Menu
- No effect
- Reset






## 4.2 Buttons functions

### ● Descriptions








#### Main Menu

-  Enter Sub-menu
-  Switching between Main Menu
-  Return to previous page
-  No effect
-  Reset

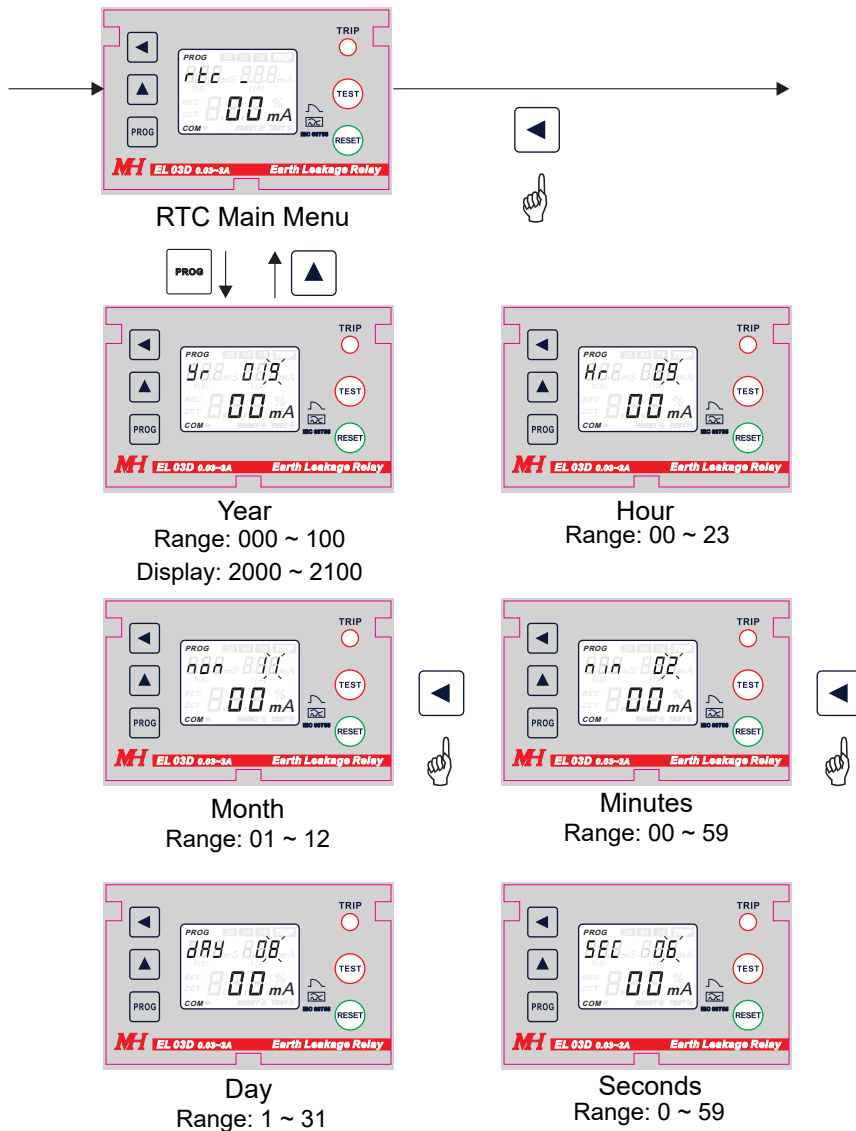
#### Sub-Menu

-  Enter to setting
-  Switching between Sub Menu
-  Return to Main Menu
-  No effect
-  Reset

#### Values Setting

-  Increment
-   Decrement
-  Shift Cursor
-  Enter and Save  
Return to Sub Menu
-  No effect
-  Reset

\*Only show when RTC is enable



## 5: Specifications

Operation voltage range	:	AC 85 ~ 265V (Other voltages upon request)
Voltage burden	:	≤ 3.5VA
Input current	:	Zero - Phase Current Transformer
Sensitivity adjustment	:	EL-03D : 0.03~3.00A in step of 0.01A. EL-30D : 0.3~30.0A in step of 0.1A
Delay time adjustment	:	0.01 ~ 0.5sec (0-5sec upon request)
Output relay contact	:	AC 250V 5A.
Real-time leakage current	:	LCD backlight display. 6mm high, T(S),I(A) 4mm high.
Tripped Indicator	:	Red led (relay tripped).
Trip Event recording	:	4 events recording with Trip current, date and time stamping
Operation temperature range	:	0 ~ 60 °C.
Storage temperature range	:	-10 ~ 70 °C.
Communication	:	Modbus-RTU RS485, upto 38.4kbps baud rate
Dielectric strength	:	AC 2KV, 60Hz, 1 minute, INPUT/OUTPUT/POWER/CASE.
Electrical Fast Transient	:	According to IEC 61000-4-4.
Withstanding impulse voltage	:	According to IEC 61000-4-5.
Voltage dips and short interruptions	:	According to IEC 61000-4-11.
Electromagnetic wave	:	Non-operation for radio frequency at 130~180MHz and 400 ~ 500MHz (by walkie-talkie of 5W).
Protection Class	:	IP54 (Front)
Connection	:	Plug-in terminal block.
Weight	:	About 0.2 kg (excluding ZCT).

## 6.9 Data Register address: (integer format)

### Parameter List

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0000	0000H	T(S) Time Delay	Integer	1	R	0 - 50 (0.01Sec)
0001	0001H	I(A) Pick up Current	Integer	1	R	3 - 300 (0.01A)
0002	0002H	Pre-Alarm threshold	Integer	1	R/W	5 - 100 (%)
0003	0003H	Pre-Alarm Display	Integer	1	R/W	0(no) - 19(sec)
0004	0004H	Frequency	Integer	1	R/W	0 - 1 (note)
0005	0005H	Backlight saver	Integer	1	R/W	0(no) - 99(min)
0006	0006H	% and A Interchanging	Integer	1	R/W	0(no) - 19(sec)
0007	0007H	Password	Integer	1	R/W	000 - 999
0008	0008H	Device Address	Integer	1	R/W	1 - 255
0009	0009H	Baud Rate	Integer	1	R/W	0 - 5 (note)
0010	000AH	Data Frame	Integer	1	R/W	0 - 3 (note)
0011	000BH	Clear record	Integer	1	R/W	0 - 1 (1:Clear)
0012	000CH	Reversed	Integer	1	R/W	
0013	000DH	Reset	Integer	1	R/W	0 - 1 (1:Reset)
0014	000EH	RTC Year	Integer	1	R/W	0 - 100 (note)
0015	000FH	RTC Month	Integer	1	R/W	1 - 12 (note)
0016	0010H	RTC Date	Integer	1	R/W	1 - 31 (note)
0017	0011H	RTC Hour	Integer	1	R/W	0 - 23 (note)
0018	0012H	RTC Minutes	Integer	1	R/W	0 - 59 (note)
0019	0013H	RTC Second	Integer	1	R/W	0 - 59 (note)

### Note:

Index	Descriptions
Frequency	0: 50Hz, 1: 60Hz
Baud rate	0: 1200, 1: 2400, 2: 4800, 3: 9600, 4: 19200, 5: 38400
Data Frame	0: n,8,2 ; 1: o,8,1 ; 2: e,8,1 ; 3: n,8,1
RTC setting	No effect if RTC is not enable

### Measured value List :

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0512	0200H	Leakage current (A)	Integer	1	R	mA
0513	0201H	Leakage current (%)	Integer	1	R	%
0514	0202H	Pre-Alarm Status	Integer	1	R	1: Pre-Alarm
0515	0203H	Sensing Status	Integer	1	R	1: Pickup exceeded
0516	0204H	Tripping Status	Integer	1	R	1: Trip
0517	0205H	ZCT Status	Integer	1	R	1: Abnormal
0518	0206H	REC. 1 Trip Type	Integer	1	R	note
0519	0207H	REC. 1 Trip Current	Integer	1	R	mA
0520	0208H	REC. 2 Trip Type	Integer	1	R	note
0521	0209H	REC. 2 Trip Current	Integer	1	R	mA
0522	020AH	REC. 3 Trip Type	Integer	1	R	note
0523	020BH	REC. 3 Trip Current	Integer	1	R	mA
0524	020CH	REC. 4 Trip Type	Integer	1	R	note
0525	020DH	REC. 4 Trip Current	Integer	1	R	mA
0526	020EH	REC. 1 Trip Year	Integer	1	R	note(+2000)
0527	020FH	REC. 1 Trip Month	Integer	1	R	note
0528	0210H	REC. 1 Trip Day	Integer	1	R	note
0529	0211H	REC. 1 Trip Hour	Integer	1	R	note
0530	0212H	REC. 1 Trip Minutes	Integer	1	R	note
0531	0213H	REC. 1 Trip Sec	Integer	1	R	note
0532	0214H	REC. 2 Trip Year	Integer	1	R	note(+2000)
0533	0215H	REC. 2 Trip Month	Integer	1	R	note
0534	0216H	REC. 2 Trip Day	Integer	1	R	note
0535	0217H	REC. 2 Trip Hour	Integer	1	R	note
0536	0218H	REC. 2 Trip Minutes	Integer	1	R	note
0537	0219H	REC. 2 Trip Sec	Integer	1	R	note
0538	021AH	REC. 3 Trip Year	Integer	1	R	note(+2000)
0539	021BH	REC. 3 Trip Month	Integer	1	R	note
0540	021CH	REC. 3 Trip Day	Integer	1	R	note
0541	021DH	REC. 3 Trip Hour	Integer	1	R	note
0542	021EH	REC. 3 Trip Minutes	Integer	1	R	note
0543	021FH	REC. 3 Trip Sec	Integer	1	R	note
0544	0220H	REC. 4 Trip Year	Integer	1	R	note(+2000)
0545	0221H	REC. 4 Trip Month	Integer	1	R	note
0546	0222H	REC. 4 Trip Day	Integer	1	R	note
0547	0223H	REC. 4 Trip Hour	Integer	1	R	note
0548	0224H	REC. 4 Trip Minutes	Integer	1	R	note
0549	0225H	REC. 4 Trip Sec	Integer	1	R	note

### Note:

Index	Descriptions
Tripping Type	0: No Rec, 1: Fault current Trip, 2: Test button Trip
Tripping time record	RTC : Trip Time refer to the current time
	Elapse time: Trip Time refer to the time different from the current time