DELAB

features

True RMS measurement
Low set & High set
Operation hour recording
Fault & Trip LED indication
Trip value recording (3 memory)
Neutral current display
THD-I display
Last 30 mins. ampere demand
Maximum ampere demand
Selectable 6 IDMT graphs
2 output relays
Programmable software lock
Selectable frequency (50 / 60 Hz)
Flush mount

Technical Specification

Technical data / Setting range

TECHNICAL DATA

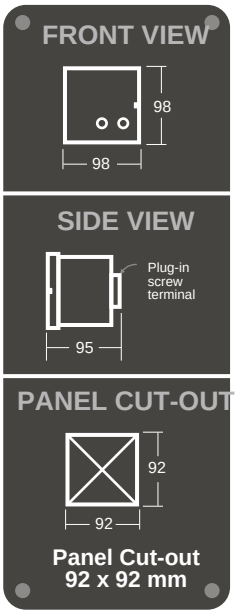
Measurement	True RMS Ampere
Power supply	85 ~ 270 VAC / 100 ~340 VDC
	*16 ~ 36 VDC *(model : D24n:- optional)*
Rated current	../5A (*../1A upon request)*
Rated frequency	50 / 60 Hz *(selectable)*
Relay operation level	⩾1.10 x (IDMT), ⩾ 1.0 x (DTL)
C.T. burden@5A	< 0.5 VA
Tripping contact	SPDT 5A / 240 VAC
Weight	~ 520 g
Operating temp.	0^{o} C ~ +55^{o} C
Standard	IEC : 61000-4-2/4-4/4-5/255-5:1

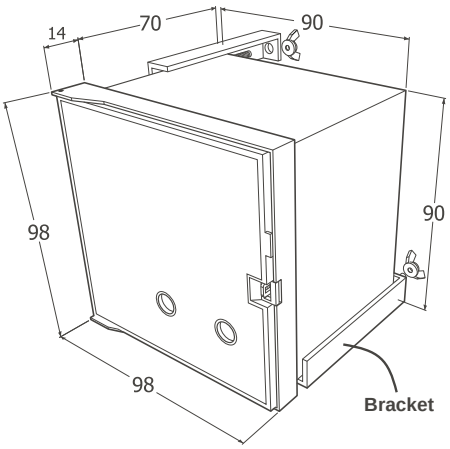
SETTING RANGE

Current Setting (I >)	20 ~ 200% *(1% step) over current*
Current Setting (I_E >)	2 ~ 50% *(1% step) earth fault*
High-set (I ≫)	OFF or 20 ~ 1000% *(10% step) over current*
High-set (I_E ≫)	OFF or 20 ~ 1000% *(10% step)earth fault*
Time setting (TMI or TI)	0.05 ~ 1.0 sec. *(0.1 time multiplier step) oc*
Time setting (TMI_E or TI_E)	0.05 ~ 1.0 sec. *(0.1 sec. step) earth fault*
High-set time (TI ≫)	0.03 ~ 20.0 sec. *(0.1 sec. step)*
High-set time (TI_E ≫)	0.03 ~ 20.0 sec. *(0.1 sec. step)*

Casing Dimension

35 mm wide DIN Rail mount

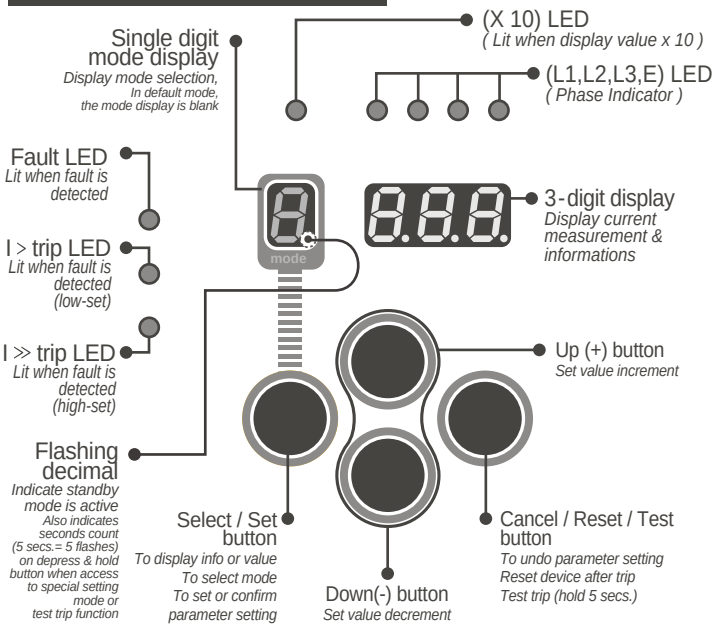




All measurement in millimeters

Panel Description

Overview / Button Functions



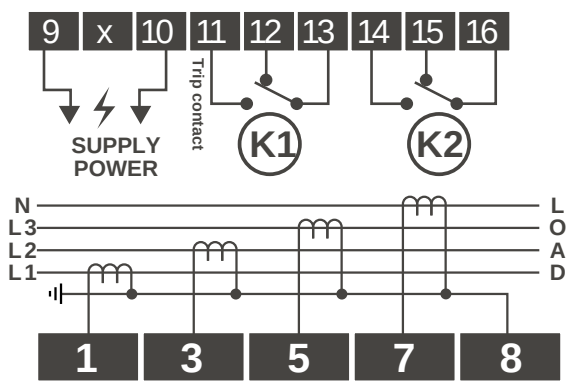
Parameter Modes

Modes definition

	mode	description
OVER CURRENT SETTING	1 I >	To set over current
	2 Characteristict I_E >	Selectable IDMT curves
	3 TM_I > or T_I >	To set trip time (Time Multiplier)
	4 I ≫	To set high set fault (over current)
	5 T_I ≫	To set high set trip time (over current)
EARTH FAULT SETTING	6 I_E >	To set fault current
	7 Characteristict I_E >	Selectable IDMT curves (earth fault)
	8 TM_{IE} > or TI_E >	To set trip time (earth fault)
	9 I_E ≫	To set high set trip (earth fault)
	A TI_E ≫	To set high set trip time (earth fault)
VIEW INFORMATION	b Trip mem.2	Most recent tripped value
	c1 to c6	Tripped memory
	d I-Start	View starting fault current
	E Operation hr. x 1000	View Opt. hr. / THD / Amp Demand
SPECIAL SETTING MODE	L Software lock	Keypad lock : ON or OFF
	r1 TripRelay K1 response type	Latching or Non-latching
	r2 Output relay K2 function	Programmable relay output
	r2 TripRelay K2 response type	Latching or Non-latching
	F Network frequency	Selectable as : 50 Hz or 60 Hz
	- Standby mode	Running LED bar : ON or OFF

Wiring Diagram

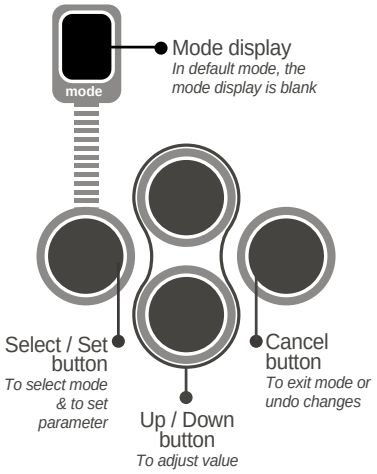
Wiring connection



How to do setting

Step by step instruction

When mode display is blank, press **[Select]** button to acess to parameter setting mode.



1 step Press [Select] button while in default mode to access to parameter setting mode:

mode 1 — I > (%) Set over current | mode 2 — CharI_E IDMT curves | mode 3 ... — TM_I or T_I Set time multiplier

To scroll thru modes, just press & release the [Select] button

2 step Press [Up] or [Down] button to adjust desire value

For fast increment or decrement, press and hold the UP or Down button

3 step Press [Set] to store new value and proceed to the next mode.

Press [Cancel] button to exit mode or undo changes.

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

Setting Parameters

Modes 1 2 3 4 5

1 I > : *To set over current (%)*

Step 1 : Press **[Select]** once to enter mode 1.
Display will show the existing set value. *(Range : 20 ~ 200%)*
Step 2 : Select the desired over current value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 2 or press [Cancel] to undo changes.

2 Characteristic *I* : *To select IDMT curves* — *Over Current*

Step 1 : Press **[Select]** until mode 2 is displayed.
Display will show the existing set value. *(refer to IDMT Graph)*
Step 2 : Select the desired IDMT curve using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 3 or press [Cancel] to undo changes.

3 TM_I or T_I : *To set Time-Multiplier* — *Over Current*

Step 1 : Press **[Select]** until mode 3 is displayed.
Display will show the existing set value. *(Range : 0.05 ~ 1.0 time-multiplier)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 4 or press [Cancel] to undo changes.

4 I » : *To set High-set over current (%)* — *Over Current*

Step 1 : Press **[Select]** until mode 4 is displayed.
Display will show the existing set value. *(Range : OFF or 20 ~ 2000 %)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button. Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 5 or press [Cancel] to undo changes.

5 TI » : *To set High-set trip time (sec.)* — *Over Current*

Step 1 : Press **[Select]** until mode 5 is displayed.
Display show : --- (Disabled -> *Mode 4 is set to OFF)*
When mode 4 is not set to OFF :-
Display will show the existing set value *(Range : 0.03 ~ 20.0 sec.)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 6 or press [Cancel] to undo changes.

6 $I_{E>}$: *To set High-set trip time (sec.)* — *Earth Fault*

Step 1 : Press **[Select]** until mode 6 is displayed.
Display will show the existing set value. *(Range : 2 ~ 50 %)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 7 or press [Cancel] to undo changes.

7 Characteristics ($I_{E>}$) : *To select IDMT curves* — *Earth Fault*

Step 1 : Press **[Select]** until mode 5 is displayed.
Display show : --- (Disabled -> *Mode 4 is set to OFF)*
When mode 4 is not set to OFF :-
Display will show the existing set value *(Range : 0.03 ~ 20.0 sec.)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 8 or press [Cancel] to undo changes.

8 $TM_{IE>}$ or $T_{IE>}$: *To set Eartht Fault trip time* — *Earth Fault*

Step 1 : Press **[Select]** until mode 8 is displayed.
Display will show the existing set value. *(Range : 0.05 ~ 1.00 sec.)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode 9 or press [Cancel] to undo changes.

9 I_{E} » : *To set High-set fault (%)* — *Earth Fault*

Step 1 : Press **[Select]** until mode 9 is displayed.
Display will show the existing set value. *(Range : OFF or 20 ~ 1000 %)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode A or press [Cancel] to undo changes.

A TI_E » : *To set High-set fault trip time* — *Earth Fault*

Step 1 : Press **[Select]** until mode A is displayed.
Display will show the existing set value. *(Range : 0.03 ~ 20.0 sec.)*
Step 2 : Select the desired value using the **[Up / (+)] or [Down / (-)]** button.
Newly selected value will flash.
Step 3 : Press **[Select]** to store / confirm new value and advance to mode b or press [Cancel] to undo changes.

Viewing Info

Modes b / c1 to c6

b , c1 to c6 *View tripped memory (7-tripping memories)*

Press **[Select]** until mode b is displayed.
Display will show the most recent tripped memory for phase L1.
Continue pressing the **[Select]** button to view all tripped memory for phase L2,L3 & E.
After phase E for memory b is viewed, pressing **[Select]** button will go to memory c1 (phase L1 to E) and then c2 (phase L1 to E) and so on until c6 is viewed.
Press **[Cancel]** button each time to back track each individual phase tripped value.

Phase L1,L2,L3 and E will flash once or twice depending on the tripping conditions:-
NO FLASH : Phase did not cause the tripping
FLASH ONCE : Phase cause a low-set trip
FLASH TWICE : Phase cause a high-set trip

d *View Starting fault current value (I-start)*

Press **[Select]** until mode d is displayed. Display will show the I-start fault current value.
Press **[Select]** again to advance to mode E or press **[Cancel]** to exit mode.

E *View Opt. hr. x 1000 / THD / Amp demand*

Press **[Select]** until mode E is displayed.
Display will show the total operation hour of the device.
[Select] button for 2 seconds.
Press **[Select]** again to view individual phase.
After phase E is viewed, pressing **[Select]** will display t-d
[Down / (-)] button. Newly selected value will flash.
Press **[Select]** to store / confirm new value and advance to mode 5 or press [Cancel] to undo changes.

Manual ' test trip '

Test device for fault in tripping

Manual test trip allows the user to test the device for any fault in tripping. To do a manual test trip, follow the instruction below:

W*hen NO mode is selected (mode display is blank),*

i) Press & hold **[Test]** button for 5 seconds.
The mode display decimal will flash 5 times to indicate 5 seconds count.
ii) Release the button when the display show : t-t
iii) Mode starts to count down from 5 and trips at zero. The display will show : trP
To abort test when mode has not counted down to zero, press the **[Cancel]** button.

Reset Trip Memory

Reset recorded trip memories or total trip count

Press [Select] button until mode [A] is displayed.

If the display show --- (NO tripping has occurred), no resetting is required.
If the display show a certain value (tripping has occurred), then follow the steps below:-

Press **[Cancel]** button and hold for 3 seconds in current mode -> mode A
(The mode display decimal will flash 3 times to indicate 3 seconds count)
The display will reset to show CLr. To exit, press the **[Cancel]** button.

Special Setting Modes

Modes L r1 r2 r2 F -

User can lock the keypad on the device to avoid unauthorized or accidental adjustment to the settings and to do special settings.

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

i) Press **[Select]** and **[Cancel]** button simultaneously and hold for 5 seconds.
ii) Press **[Up / (+)] or [Down / (-)]** button to select or modify
iii) Press **[Set]** button to confirm and proceed to next mode

L *Software keypad lock*

OFF : Parameters modification > Allowed
On : Parameters modification > Not Allowed

r1 *Trip relay K1 response type*

Lc : Latching trip signal
nLc : Non-Latching trip signal

r2 *Output relay K2 function*

trP : Tripping output *(Lc or nLc)*
LFS : Low-set fault start signal output *(nLc)*
HFS : High-set fault start signal output *(nLc)*
AFS : Any fault start signal output *(nLc)*
EFt : Earth fault trip output *(Lc only)*
dUF : Device failure output
CbF : Circuit breaker failure output *(Lc or nLc)*
ALr : Alarm output *(nLc)*

r2 *K2 response type*

Lc : Latching trip signal
nLc : Non-Latching trip signal
nA : Not Available

F *Electrical network system frequency*

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

- *Standby option*

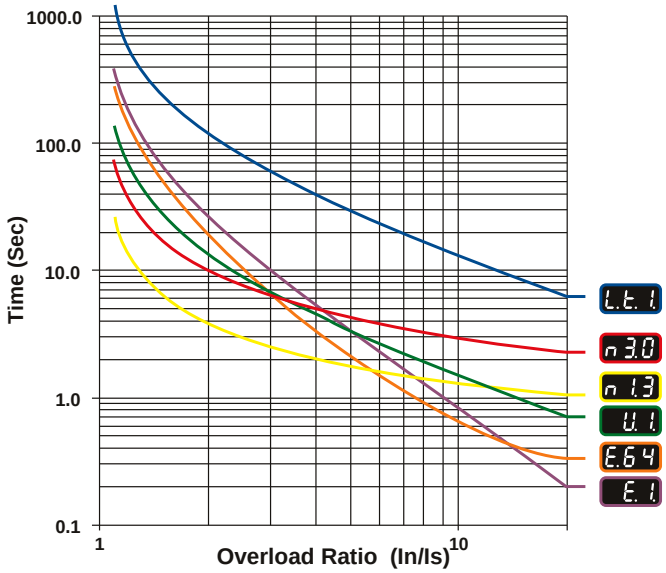
OFF : De-activate On : Activate

A flashing decimal on the mode display indicate standby mode is enable. After about 3 minutes of idle and no leakage is detected, running LED bar will be displayed instead of the real time leakage current. Stanby mode automatically exits on leakage detection or when any button is depressed. When device trips, standby mode is temporary de-activated until device is reset.
Alternatively, simply press [Cancel] button when powering up the device to activate or de-activate standby function.

After Stanby mode, the display will show : End<->SEt.
Press **[Set]** to confirm all of the above settings or press **[Cancel]** to go back one previous mode.
Press & hold **[Cancel]** for 3 seconds to exit and abort the modification without saving*(previous setting unchanged)*.
New setting only takes effect when **[Set]** button is pressed during End<->SEt. is displayed.

IDMT Graph

Time graph based on Time Multiplier 1.0



Characteristics (IE)

n3.0 Normal Inverse 3.0 /10	E.I Extremely Inverse
n1.3 Normal Inverse 1.3 /10	E.64 Extremely Inverse (0.64 sec)
U.I Very Inverse	Lt.I Long Time Inverse
	dtL Definite Time

Special Setting Modes *for model TM-9000c-u240c (communication type)*

Modes r3, r3, r4, r4, dF, bt, rP, Ad, br, Pt

Additional output functions as listed below: *(Not applicable for model TM-9000s-U240n)*

r3 *Output Relay K3 Function*

LPS : Lo-set phase overcurrent start signal output
LPt : Lo-set phase overcurrent trip signal output
HPS : Hi-set phase overcurrent start signal output
HPt : Hi-set phase overcurrent trip signal output
PHS : Phase overcurrent start signal output (lo/hi-set)
PHt : Phase overcurrent trip signal output (lo/hi-set)
HFS : Hi-set fault start signal output (either phase:oc/ef)
AFS : Any fault start signal output (any fault condition)

r3 *K3 Response Type*

Lc : Latching type output for K3
nLc : Non-latching type output for K3
Any of the K3 function can be configured as Lc or nLc type response

r4 *Output Relay K4 Function*

LES : Lo-set Earth fault start signal output
LEt : Lo-set Earth fault trip signal output
HES : Hi-set Earth fault start signal output
HEt : Hi-set Earth fault trip signal output
EFS : Earth fault start signal output (lo/hi-set)
EFt : Earth fault trip signal output (lo/hi-set)
LFS : Lo-set Fault Start signal output (either phase)
ALr : pre-Alarm output *(>= 95% of phase overcurrent or >= 50% of earth fault setting)*

r4 *K4 Response Type*

Lc : Latching type output for K4
nLc : Non-latching type output for K4
Any of the K4 function can be configured as Lc or nLc type response

dF *Digital Input Function*

OFF : De-activate digital input function
LEb : Activate Lo-set Earth fault blocking
HEb : Activate Hi-set Earth fault blocking
EFb : Activate Earth fault blocking (lo/hi-set)
LPb : Activate Lo-set Phase overcurrent blocking
HPb : Activate Hi-set Phase overcurrent blocking
Phb : Activate Phase overcurrent blocking (lo/hi-set)
LSb : Activate Lo-set blocking (either phase)
HSb : Activate Hi-set blocking (either phase)
ALb : Activate all fault blocking
A-b : Activate group B settings
rSt : Activate remote reset when tripped
trP : Activate remote tripping
tcS : Trip circuit supervision.Test continuity of trip circuit. *Only available if K2 set as* dUF

bt *Blocking Timer Selection*

OFF or On

Selection of blocking time from 0.1 ~ 10s or Infinite (Ind)
Temporarily block the trip timer of the associated fault from timeout (and consequent tripping) to allow time for downstream breaker to trip first.
Only available if (dF)digital input function set as blocking function.

rP *Remote Modbus Programming*

OFF : Only remote reading of parameters are allowed.
On : Both remote programming and reading of parameters are allowed.

Ad *Device Address*

To identify the device connected in a modbus communication network. Selectable from 1~250.

br *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 384 = 38400) bps

Pt *Data Parity Setting*

Set the data format in a modbus communication network. All data are 8 bits with parity selectable as:

no = No parity Eun = Even parity odd = Odd parity