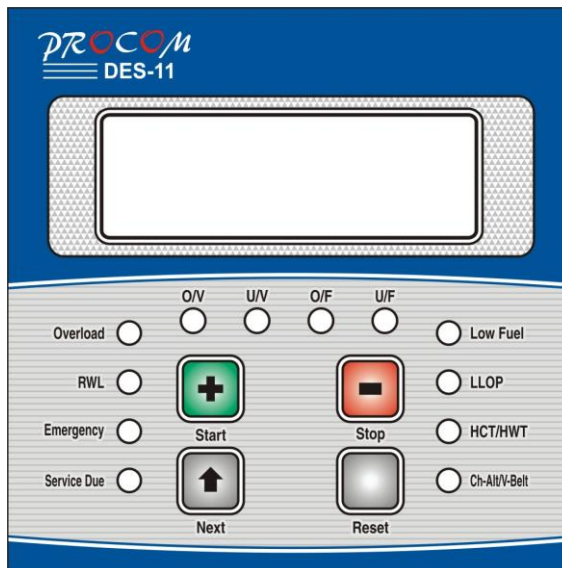




## **OPERATING INSTRUCTIONS DES-11**



MRM **PROCOM**<sup>®</sup> Pvt Ltd

**ISO-9001-2008 certified organization**

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## 1.0 Introduction

- 16 Bit RISC, state of art, microcontroller based System.
- True RMS measurement of all measured parameters with 1% accuracy of measured value (Not full scale)
- Backlit LCD Display for easy reading and parameter settings. No need to consult the manual while programming the unit.
- All the inputs, such as Mains, Generator and Battery voltages are fully isolated, providing the freedom to design a totally isolated system. This avoids and prevents malfunctioning/ burning of the unit.
- Fully operational up to 4V. Can withstand a voltage dip up to 0V for 1sec.
- All system parameters are user programmable
- Measurement and display of LLOP, Fuel Level and HWT
- Records last 20 faults
- Suitable for all types of engines
- All digital inputs are optically isolated for enhanced reliability
- All outputs are through potential free contacts for system stability and reliability
- All contacts are protected by TVS to strengthen the EMI/EMC capabilities of the unit.
- Housed in 92X92mm Din Standard housing.

## 2.0 Protection, Supervision Salient features

- Voltage monitoring and protection for under/over voltage and over speeding.
- Oil Pressure
- HWT
- Canopy Temperature/RWL
- Over Load
- Emergency
- Low Fuel
- Charging Alternator Fail/V-Belt
- Fan Fault protection( 1Ph model B)

## 3.0 Measurement & Display

DES-11 equipped with LCD display and displays

- Generator voltage (Ph-N, Ph-Ph)
- Generator Frequency
- Generator Current
- Fan Current( 1Ph Model B)
- Battery Voltage
- Generator Run Hour
- RPM
- Oil Pressure in KG/cm
- Radiator Temp in degree centigrade(Model –A)
- Fuel Level
- Programmed settings
- KW
- PF
- KWhr

Normally the display auto scrolls and displays a set of parameter for 10 seconds, but any time the Next key (↑) can be pressed to select the next parameter window.

## 4.0 Annunciations

DES-11 is equipped with the following annunciations for system status and faults:

- LLOP
- HWT(Model A)
- HCT (Model B)
- Fuel
- RWL (Radiator Water Level-Model A)
- Canopy Temperature (Model –B)
- DG Under Voltage
- DG Over Voltage
- DG Over/Under Frequency
- Charging Alternator/ V-Belt
- DG Overload
- Emergency

## 5.0 Contacts

The following digital Output are provided. Annunciation contacts are available in models requested with Annunciation features.

- Crank (NO Contact)
- Solenoid (NO Contact)
- Hooter (NO Contact)
- Electrical Feed for Charger ON (+12V)

## 6.0 Timers

DES-11 is equipped with the following timers:

- Generator voltage supervision timer
- Generator over speed supervision timer
- Generator Over load supervision time
- Stop Solenoid on time
- Fuel supervision time
- LLOP supervision time
- HWT supervision time ( Model-A)
- RWL supervision time (Model-A)
- HCT supervision time (Model-B)
- Canopy Temperature Time (Model-B)
- Hooter Reset Time
- Service Time
- Ch –Alt contact On time
- Crank Timer

## 7.0 Switches Description

Four switches are provided on front panel of DES-11. Switch can have more than one functions assigned to it. The table below describes the operation of these.

S.No.	Switch Symbol	Switch Function	Description
1	↑	Next	<b>Normal operation mode:</b> In this mode, it is used to change the parameters being displayed on LCD. <b>Programming Mode:</b> Next key is used to select the next parameter to be programmed.
2	+	Increment	<b>Programming Mode:</b> It is used to increment the value of the parameters under programming. <b>Normal operation mode:</b> It is used to Start the Engine
3	-	Decrement	<b>Programming Mode:</b> It is used to decrement the value of the parameter under programming. <b>Normal operation mode:</b> It is used to Stop the Engine
4	R	Reset	Reset key resets the Hooter and Fault signals. The first press shall reset the hooter and next shall reset the faults. A long press of 1 Sec shall reset both.
5	R & ↑	Programming Mode Entry	Press “R” Key and than press “↑” while the “R” Key is pressed to enter the programming mode.

## 8.0 Operation.

DES-11 is an engine monitoring and supervisor unit.

The engine can be Started/Stopped from the front panel of DES-11 or externally by means of key Switch etc. The start / stop from the front or remote is one touch operation, meaning that once the switch is pressed the start /stop command shall be operational till the “Crank time or DG start detection / Stop Sol Time”, as programmed, has expired . DES-11 automatically detects that the engine on conditions by monitoring the generator voltage and starts monitoring the engine for under/over voltage, LLOP, HWT and emergency faults. On detection of any of these faults for the pre-programmed duration the engine is automatically shut down and fault along with run hour is recorded in non-volatile memory.


The run hour time of engine is recorded in internal non-volatile memory.


## 9.0 Setting Procedure

DES-11 has provision to program the operating parameters, resetting the service hours and viewing the last 20 fault history.


Press R &  switches simultaneously.


The LCD shall display, “Enter Para Mode”

To enter parameter setting mode press .


To go to next menu press .



The LCD shall display “View Fault Records”.

This menu can be entered by pressing .

To go to next menu press .

The LCD shall display “Reset Service Hours”.

This menu can be entered by pressing .

Pressing , shall reset the service hours. Pressing  shall terminate the menu.

## 9.1 Parameter Mode

Sl. No	Display	Explanation of parameter	Factory setting	Setting Range
1	Generator O/V	Max. permissible voltage, above this the voltage is treated unhealthy & the Generator is stopped.	270V	80-300 V
2	Generator U/V	Min. permissible voltage, below this the voltage is treated unhealthy & the Generator is stopped .	180V	80-300 V
3	Gen Sup Delay	The time for which the Generator voltage should, continuously be unhealthy to generate a fault condition.	10Sec	1-999 Sec.
4	CT Ratio	Available in models having provision for /5 CTs. Not required for Procom Make CTs	1	1-999
5	Generator O/C*	Max. permissible current, above this the Current is treated unhealthy & the Generator is stopped.	6(For /5 A CT) 42A( for Procom CT)	1-999(for /5 A CT) 1-199 A (for Procom CT)
6	Gen O/C Delay	The time for which the Generator Current should, continuously be unhealthy to generate a fault condition.	5Sec	1-999 Sec.
7	Generator S/C*	Max. permissible current, above this the Current is treated unhealthy & the Generator is stopped.	6(For /5 A CT) 42A( for Procom CT)	1-999(for /5 A CT) 1-199 A (for Procom CT)
8	Gen S/C Delay	The time for which the Generator Current should, continuously be unhealthy to generate a fault condition.	5Sec	1-999 Sec.
9	Generator O/F*	Over frequency setting	65 Hz	40 – 80 Hz
10	Gen O/F Delay	Monitoring time for Over frequency	5 Sec	1-999Sec
11	Generator U/F*	Under frequency setting	45 Hz	40 – 80 Hz
12	Gen U/F Delay	Monitoring time for Under frequency	10 Sec	1-999Sec
13	Available Sensor	This select the installed sensors in the Gensets. The display shall only display the parameters for the sensor installed and uninstalled sensor data shall not be displayed. The protection for the	All sensors	All sensors, Fuel &HWT, Fuel & LLOP, LLOP & HWT, Fuel Only,

**DES-11 Digital Engine Supervisor**

		function with no measurement sensor installed shall be through switch. Eg. If Oil pressure sensor is not installed the unit shall provide protection for LLOP through oil pressure switch and not through the oil pressure sensor (linear measurement)		HWT Only, LLOP Only, No sensor
14	Fuel < Level in %	Level of fuel at which the audio visual warning is issued without initiating shut down.	25%Sec	10-100%
15	Fuel < delay	Monitoring time of Fuel Fault	5 Sec	1-999Sec
16	Fuel << Level in %	Level of fuel at which the Engine shall shut down	15%Sec	10-100%
17	Low Lube Pressure	Level of LLOP at which the Engine shall shut down	2.0 Kg /Cm2	0-8.5 Kg /Cm2
18	High Water Temp	Temperature of water at which the Engine shall shut down	80	0-150 Degree centigrade
19	Sensor Type	A : For engines other than SDEC B : SDEC Engine	A	A,B
20	Fuel << delay	Monitoring time of Fuel << Fault	5 Sec	1-999Sec
21	LLOP delay	Monitoring time of LLOP Fault	5 Sec	1-999 Sec
22	HWT delay	Monitoring time of HWT Fault	5 Sec	1-999 Sec
23	Rad. Water Delay	Monitoring time of RWL Fault	5 Sec	1-999 Sec
24	Charging Delay*	Time delay after which the charging alternator/V-Belt fault shall be activated.	5 Sec	1-999Sec
25	Hooter Reset Time	Time for which the Hooter is active if not reset manually	30 Sec	1-999Sec
26	Stop Sol On Time	Time for which the fuel solenoid is activated for shutting the engine	30Sec	1-100Sec
27	Emer Sol Time	This setting is to protect the fuel solenoid in case the Stop button or Emergency is kept pressed. In such a case the solenoid shall be released after this time.	40Sec	1-100Sec
28	Gen Pick Up Vol	Voltage of generator above which the generator is assumed to be ON.	100V	80-150V
29	Service Time Hr	Time, in hours, after which the service is due.	250Hrs	1-999 Hrs
30	Disp Auto Scroll	Setting ON will enable Auto Scroll of display. OFF: No scroll and next parameter can be viewed by pressing next	ON/OFF	ON
31	Vol Dis Format	DES-9A Can display either Phase to Phase OR Phase to Neutral Voltage	Phase- Neutral	Phase- Neutral, Phase-Phase
32	Engine RPM	Engine RPM selection.	1500	1500/3000
33	Chg Alt Relay Tim	Time for which the magnetizing relay of charging alternator will be switched on after the engine has started.( Model A only)	5Sec	5-100Sec
34	Crank Time	Maximum duration for which the crank is activated after the start command is given	5Sec	1-25Sec
35	Comm 232 Or	Selection of communication mode	RS232	RS232/ SMS

	SMS	either on RS232, Or SMS via GSM modem		
36	Start SMS	Activated only in SMS communication mode for activating / disabling the SMS communication	Disable	Enable/ Disable
37	Crank Cut Method	Only Voltage based / Voltage or LOP based	Voltage	Voltage/ LOP Or Voltage

*\* This parameter can be disabled while programming*

## 9.2 Fault History.

To view the last 20 fault history enters in this mode as explained above. Maximum of last 20 faults along with Run Hour stamp shall be displayed on the LCD. The first row shall display the fault and the next row shall display the run hour at which the fault has occurred. The next fault can be viewed by pressing “NEXT”. The mode shall exit to normal mode after the last fault recording is displayed. Absence of any fault recording shall not display any fault data.

## 9.3 Resting Service Hours.

Service due, warning is issued by DES-11, by flashing the Ser LED. This LED shall keep flashing till it is not reset by entering this mode.

## 9.4 Programming Solenoid Mode

For changing the solenoid mode first press (R) (reset) button, than press + button while the reset button is pressed.

**Fuel Solenoid** In this mode fuel solenoid contact changes from Open to Close at the time of cranking and remains close till the genset is running. For stopping the generator this contact opens.

**Stop Solenoid** In this mode fuel solenoid contact remains open at the time of cranking and till the genset is running. For stopping the generator this contact closes for a user programmed time.

**Don't change the mode while generator is running. It's a good practice to switch OFF and than switch ON the battery supply after changing this mode.**

## 10.0 Faults

There are two categories of faults

- Internal Faults
- External faults

### 10.1 Internal Faults

Internal faults are the faults, which do not need any external signals and are detected by the system itself. They are:

- Generator Voltage Unhealthy.
- Generator Over & under frequency.
- Generator Over Load
- LLOP
- Fuel
- HWT (Model –A)

### 10.2 External Faults

Those faults which cannot be sensed by the unit itself (these faults are not reflected by the generator voltage) and are to be provided externally. They are:

- Canopy Temperature (Model-B)
- RWL (Model-A)
- HCT (Model-B)

### 10.3 Fault Reset

All internal faults can be reset by pressing (R) switch after the generator is stopped. In case the engine fails to stop “STOP KEY” can be pressed for manual attempt to stop engine.



## 11.0 Communication Setup.

DES-11 can be used in 2 modes of communication:

- a) **RS232 mode** : For connection to a PC or a MODEM.
- b) **SMS Mode** : If a GSM modem, with SIM, is connected to the RS232 link of the unit, the unit shall be able to send alarm through SMS. The Genset can also be controlled remotely via SMS.

### 11.1 SMS Operation

DES-11 can store up to five GSM enabled telephone numbers. In case of any fault, or starting/stopping of the generator, a SMS shall be send to all the active telephone numbers. This SMS shall include the fault details, the engine running/not running information, the voltage, current, battery voltage and run hour information.

The owner of the first 2 telephone numbers can, on demand, access the above information through SMS by sending an SMS to AC3. The SMS is “STATUS”, without quotes and all capital.

### 11.2 Feeding Telephone numbers:

Up to five telephone numbers can be stored in DES-11.

To feed the numbers switch off DES-11, press the Reset and  $\uparrow$  Switch and while they are pressed power on the unit.

The display shall display

X C.No

+91ZZZZZZZZ

The first row “X” indicates the cursor position.

The second row displays the telephone number.

The first number is always +.

If the next digit is 0. It signifies that this particular number is not in use.

The digit at the cursor positions can be modified by pressing  $\blacksquare$  key. The digits shall change from 0-9 and blank.

The blank digit signifies the end of the telephone number. The digits after this shall be discarded.

To go to next digit press  $\oplus$  key.

Continue till the desired number is programmed.

Make sure that the last digit after the valid number is a blank.

To go to next telephone number press  $\uparrow$ Key.

The process can be terminated and all previous programmed numbers can be stored by pressing R (Reset) Key

## 12.0 Terminal description

Terminal Number	Description
1	Generator R Phase Voltage
2	Generator Y Phase Voltage
3	Generator B Phase Voltage
4	Generator neutral
5	LLOP Sensor
6	HWT Sensor (Model-A), HCT Logic Level Low (Model-B)
7	Fuel Sensor
8	RWL / Canopy Temperature
9	Charging Alternator Input
10	Auxiliary supply +ve
11	Auxiliary supply -ve
12	Crank NO Contact
13	Solenoid NO Contact
14	Charging Alternator On
15	Hooter
16	Common for All Contacts
17	Remote Start
18	Remote Stop
19,20	R Phase CT ( <i>For /5 Unit. 5Amps Unit</i> )
21,22	Y Phase CT ( <i>For /5 Unit. 5Amps Unit</i> )
23,24	B Phase CT ( <i>For /5 Unit. 5Amps Unit</i> )
19	R Phase CT ( <i>For Whole Current Unit with Procom Make Cts</i> )
20	Y Phase CT ( <i>For Whole Current Unit with Procom Make Cts</i> )
21	B Phase CT ( <i>For Whole Current Unit with Procom Make Cts</i> )
22	Common Point Of CTs ( <i>For Whole Current Unit with Procom Make Cts</i> )
20-22	Fan Current input for Single Phase Model-B

## 13.0 Model Selection

The nomenclature for selecting the model is as follows:

DES-11

-1P/3P for Single Phase /3 Phase Mains monitoring

-K :-Additional measurement & display of KW & KWh

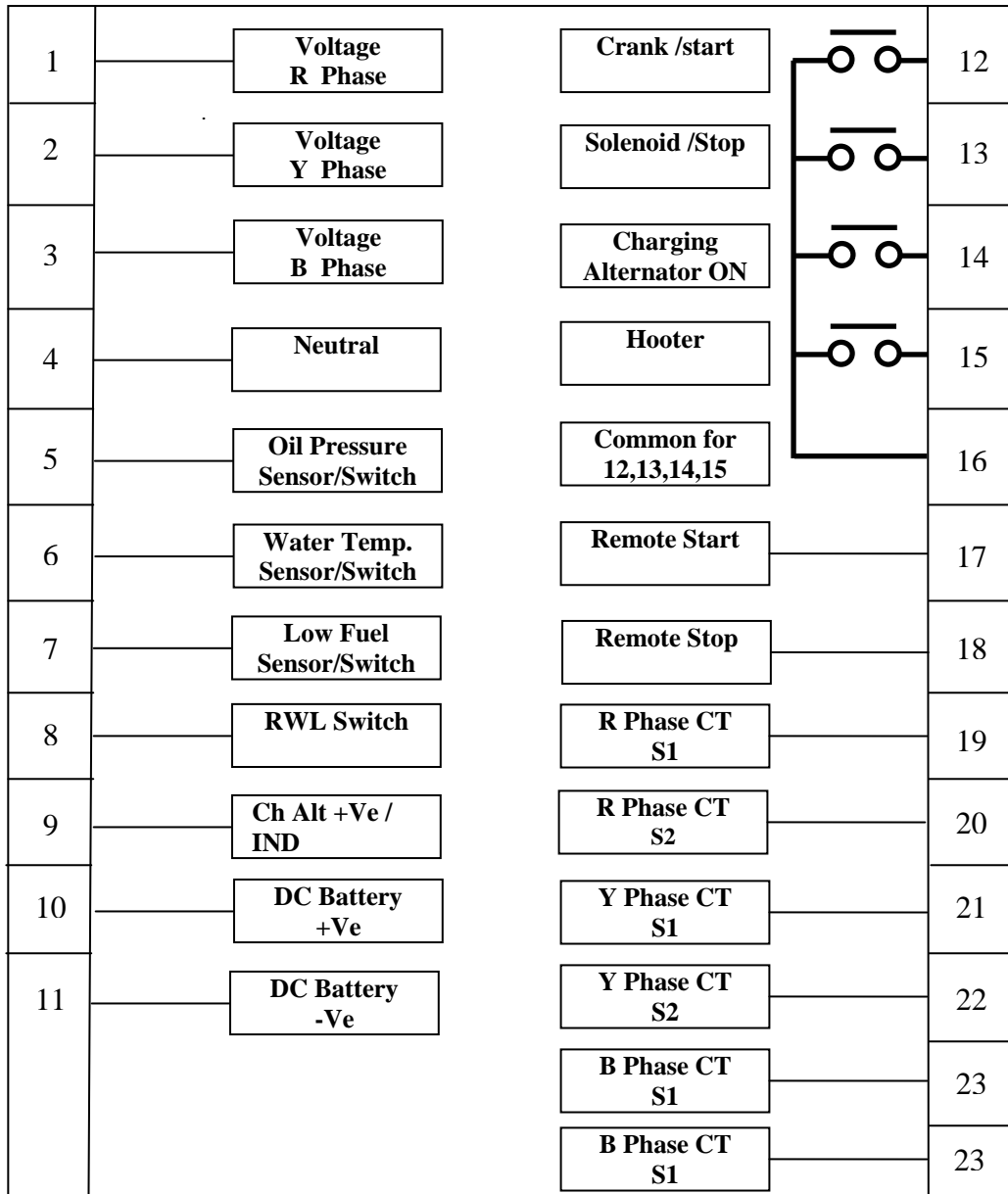
-6500 /INCT , For PROCOM CT :6500, For \*\*\*/5 CT :INCT

**Procom make CTs can accommodate upto 199 Amps for current higher than these use /5 configuration**

## 14.0 Specifications

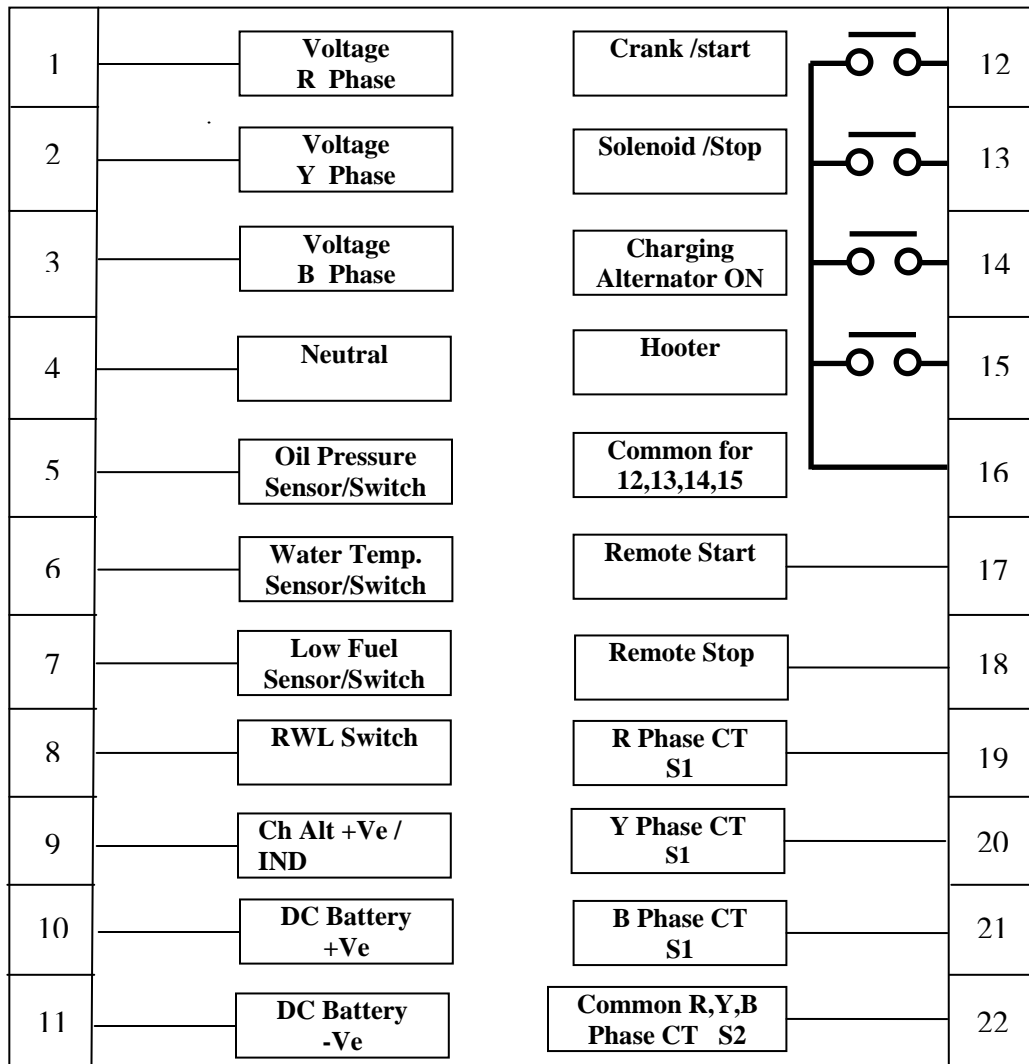
▪ AC voltage withstand	330 VAC (Phase to neutral)
▪ Measurement Accuracy	
Voltage & Current	1%
Power & KWh	2%
▪ Surge 1.2/50Usec	2.5KV
▪ Battery Voltage	Suitable for 12V/24 VDC System
▪ Min. voltage to power on	9V
▪ Min Running Voltage after Power on	4V
▪ Max. Battery Voltage	35V
▪ DC Interruption time	1 Sec.
▪ Digital Output	+ 12V
▪ Cut out Dimensions	92mm X 92mm
▪ Depth	120mm
▪ Digital Input Level	Battery Voltage (Negative) except Charging Alt,
which is battery supply	

**15.0 Connection Diagram : \*\*\*/5 CT (INCT Model)**



**For single phase version Y&B Phase Voltages and Curent terminal are to be left open**

15.1 Whole Current Unit. (PROCOM make 6500 T CT)



**Note :** In case of 6500T CT, CT secondary common point should not be connected to earth

**For single phase version Y&B Phase Voltages and Current terminal are to be left open**

It is our endeavour to constantly upgrade our products, hence specifications are subject to change without any notice.