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**INSTRUCTION MANUAL
OF
DC Regulated Power Supply**

ELECTRAEDGE
(CAT. No. TPEER-T05050) WITH TIMER
(OLD CAT.NO. 28-T0550)

500 V | 500 mA

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Dear Customer,

Congratulations on procuring the ElectraEdge.

The ElectraEdge is a versatile, robust and highly stable auto-crossover, constant current (CC) and constant voltage (CV), DC power supply designed and manufactured particularly for vertical and horizontal electrophoresis assays and electroblotting.

Some points about the power supply to keep in mind

- The power supply is manufactured in-house from high-quality parts and is specifically designed to suit Indian laboratory conditions.*
- You can carry on your electrophoresis as per your requirements within the full specified range of 500 V and 500 mA (without overriding Ohm's law). This means that you can set it to 500 V and draw 500 mA current.*
- The dual displays help to monitor the status of the voltage and the current simultaneously, and LEDs indicate the mode of operation.*
- It is possible to change the voltage or current setting during the experiment without stopping the run.*
- In the event of a power interruption and subsequent restoration, the power supply will come on and continue operations with the settings remaining unchanged.*
- The timer is versatile and allows different ranges of countdown from 1 milliseconds to 999 hrs.*

This power supply will give you many years of trouble-free use. In any event that there is a problem, our long warranty of 3 years covers all manufacturing defects.

We sincerely hope you that you gain as much satisfaction in using this power supply as we achieved in designing and manufacturing it.

Regards,

The Production Team of TechResource

Precautions:

1. Keep the power supply dry at all times.
2. Avoid utilizing very high current at very low voltage settings
3. Please read the manual carefully before using the power supply

Short Specifications:

Output Voltage	<i>Up to 500 V DV continuously adjustable</i>
Output Current:	<i>Up to 500 mA, continuously adjustable</i>
Digital Meters Voltmeter/ Ammeter	<i>3 digit LED with 1 volt/ mA resolution</i>
Control status indicator	<i>5 mm red LED for CV & CC</i>
Mains supply	<i>230 V $\pm$ 10%, 50Hz</i>
Fuse	<i>1500 mA, fast-blow</i>

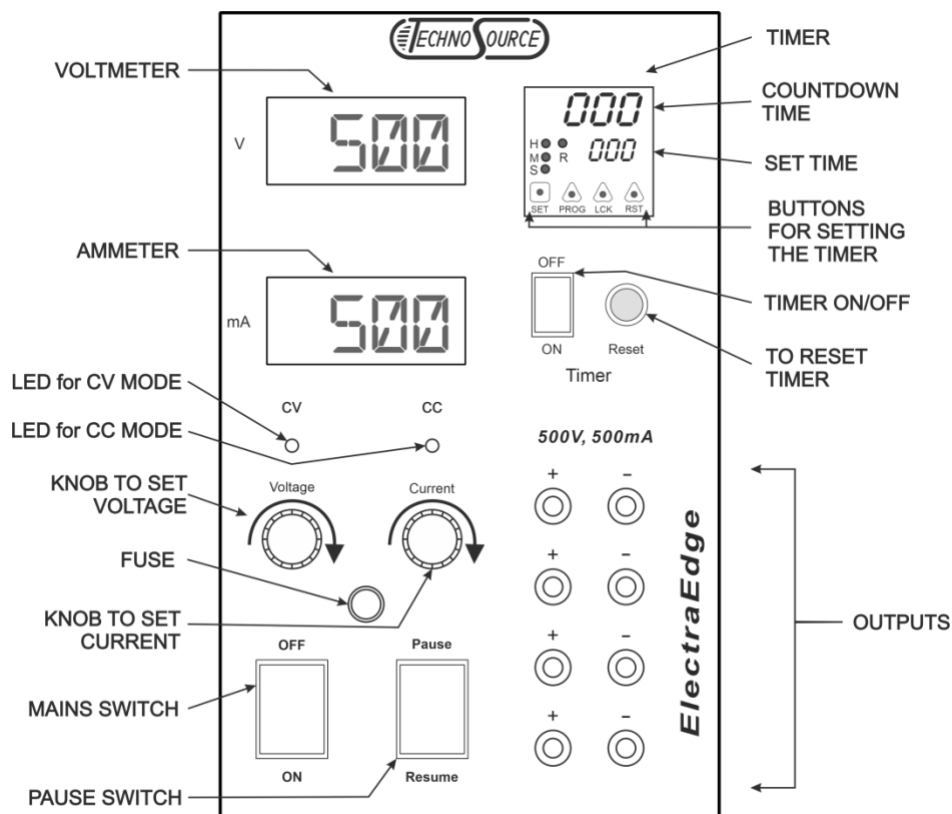
Check before installation

- A. Check for any physical damage to the power supply that may have occurred in transit
- B. Check the mains supply with a multi-meter for proper earthing and correctness of voltage

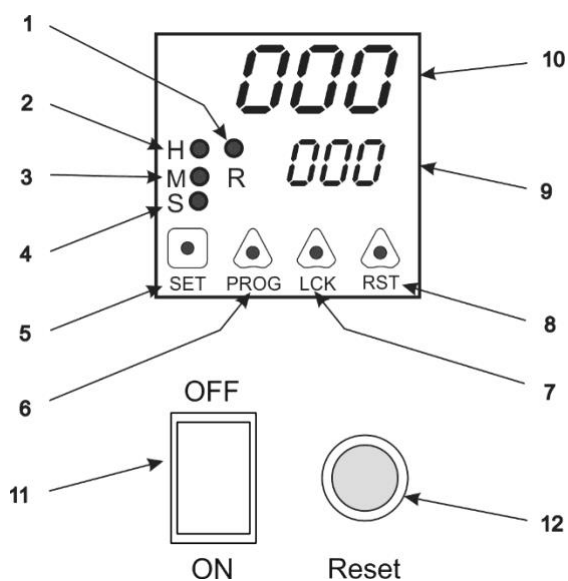
Functionality test

1. Connect the power supply directly or through the stabilizer to the mains
2. Switch it ON via the mains switch on the front panel
3. Switch the pause button to RESUME/ RUN
4. Upon activating the power supply unit the digital panel meters (DPM) will light up
5. Switch off the power supply

Front Panel layout for ElectraEdge



Timer and timer control layout



1. Indicator for Timer at rest
(Indicates cycle is complete)
2. Indicator for hours
3. Indicator for minutes
4. Indicators for seconds
(Blinking lights on 2/ 3/ 4 indicates that the timer is counting down)
5. SET or Go to the next item on the menu
6. PROGRAM or Change the 1st digit of time
7. LOCK or Change the 2nd digit of time
8. RESET or Change the 3rd digit of time
9. Display of the SET time
10. Display of the countdown timer
11. Timer ON/ OFF switch
12. Reset the time switch

Legend for Timer LEDs

 LED ON
 LED OFF

Complete Technical Specifications:

Feature	Model 28-T0550 (with timer)
Voltage output	0-500 V
Current output	0-500 mA DC
Power (wattage)	250 W
Voltage adjustment	1 V increment via ten turn knob
Current adjustment	1 mA increment via one turn knob
Mode of regulation	CVCC with LED indication
Timer	Yes
Timer Display	Dual, 3 digit LED display
Time ranges	Select between nine time ranges 0 – 9.99/ 99.9/ 999 sec 0 – 9.59 min: sec, 99.9/ 999 min 0 – 9.59 hr:min, 99.9/ 999 hr
Programmable timer	Yes
Auto recovery on power failure	Yes, starts automatically when power is restored
Set point stays indefinitely	Yes
Timer recovery on power failure	Yes, memory retention for 10 years
Pause resume function key	Yes
Operating temperature range	0° C to +50° C
Voltage input	230 V rms, 50 Hz, single phase
Voltage variation (from nominal AC input voltage)	+10%, -15%
Frequency	47 Hz to 53 Hz
Transient suppression provided	Yes
Component details Mains switch Fuse Pause/resume switch Timer ON/ OFF switch Timer reset switch Output socket Mains inlet	Illuminated rocker switch On front panel Rocker switch Mini rocker switch Push button (momentary) 4 mm recessed female IEC C14
Output is fully isolated from input	Yes
Line regulation in CV mode in CC mode	Better than +/- 0.25 % +/- 0.5 %
Load regulation in : - No load to full load variation (in CV mode) - Change in zero to max output (in CC mode)	+/- 0.25 % +/- 0.5 %
Ripple and noise In CV mode	100 mV rms max. 20 Hz-20 MHz 5 mA rms max.
Automatic overload & short circuit protection with self-recovery	Yes
3.5 digit voltmeter and ammeter (independent display)	Yes
Isolation - Between AC input & DC output terminals - Between DC output terminals and chassis	2.1 KV AC for 1 min 2 KV AC for 1 min
Insulation between outputs & chassis	100 M ohms Min at 500 VDC
Humidity tolerance	Up to 95% (non-condensing)
Cooling by normal convection, venting at the bottom and sides	Yes
Dimensions of the body (excluding projections)	160 mm (w) x 255 mm (h) x 255 mm (d)

To use the power supply in the Constant Voltage (CV) mode without timer

1. While the power supply is still OFF turn the voltage knob fully counter clockwise and the current knob fully clockwise.
2. If the power supply has a timer make sure the timer switch is OFF
3. Connect the electrophoresis apparatus to the output terminals, taking care of polarity.
4. Switch ON the power supply, and switch the pause button to RESUME/ RUN.
5. Slowly turn the voltage knob clockwise till the desired voltage value is reached.
6. The red LED marked CV will light up indicating that the power supply is operating at the CV mode
7. Ascertain that the current is flowing through the electrophoresis apparatus by reading the mA value on the current DPM
8. If the mA value is within the expected range, continue with the experiment. (Note that voltage and current values will follow Ohm's law)
9. If the mA value is zero or near zero then check the troubleshooting guide at the end of the manual
10. If the LED marked CC (constant current) lights up, it indicates that the power supply has switched over to the CC mode. This will occur when the resistance drops and the current flowing through the apparatus rises to reach the maximum or the set value. To get back into the CV mode either increase the set current value (by turning the current knob clockwise) or by increasing the resistance of the external circuit i.e. by using buffer with lower salt concentration.

To use the power supply in the constant current (CC) mode without timer

1. While the power supply is still OFF, turn the current knob fully counterclockwise and the voltage knob fully clockwise
2. If the power supply has a timer, make sure the timer switch is OFF
3. Connect the electrophoresis apparatus to the output terminals taking care of polarity
4. Switch ON the power supply, and switch the pause button to resume.
5. Slowly turn the current knob counter clockwise till the desired mA value is reached.
6. The red LED marked CC will light up, indicating that the power supply is operating in the CC mode
7. If the voltage value is within the expected range, continue with the experiment. (Note that the voltage and current will follow Ohm's laws)
8. If the mA value is not settable, i.e. it is zero or near zero, or the voltage value is maximum or above expected, then check the troubleshooting guide at the end of the manual
9. If the LED marked CV (constant voltage) lights up, it indicates that the power supply has switched over to the CV mode. This will occur when the resistance rises, and the voltage across the terminals rises in tandem to reach the maximum or the set value. To go back into the CC mode, either increase the set voltage value (by turning the knob clockwise) or decrease the resistance of the external circuit i.e. by using buffer with lower salt concentration.

To use the power supply in the limited wattage (LW) mode without timer

To do this, you need to define the required values of voltage and current desired. This will determine the maximum wattage that will be delivered by the power supply to the apparatus.

Please contact us at sales@techresource.in before attempting these steps.

1. While the power supply is still OFF, turn the current knob fully counter clockwise and the voltage knob fully clockwise.
2. If the power supply has a timer make sure the timer switch is OFF
3. Short one set of terminals with a shorting cord. i.e. insert one male connector into the red terminal and other into the black terminal.
4. Switch on the power supply
5. Slowly turn the current knob clockwise till the desired mA value is reached.
6. Switch OFF the power supply
7. Remove the shorting cord
8. Switch on the power supply.
9. Slowly and gently turn the voltage knob counter clock wise till the desired V value is reached.
10. Switch off the power supply
11. Connect the electrophoretic apparatus to the output terminals taking care of polarity.
12. Switch ON the power supply
13. Depending on the resistance of the external circuit (buffered gel) the power-supply will function in the CC or CV mode. The mode in which it is functioning will be indicated by the red LED that is illuminated.
14. If the power-supply is in the CC mode it means that the current is at the maximum set value. If it is in the CV mode it indicates that the voltage is at the maximum set value.
15. When the unit is in the CC mode and the resistance of the external circuit rises then the voltage will continue to rise till it reaches the maximum value set. At this point the unit will switch over to the CV mode thereby prohibiting the wattage to exceed the maximum permissible limit.
16. When the unit is the CV mode and the resistance of the external circuit falls then the current will continue to rise till it reaches the maximum value set. At this point the unit will switch over to the CC mode thereby not allowing the wattage to exceed the maximum permissible limit

Using the timer

Section 1. General information

The timer is a multifunctional unit which can be set in different ranges to cover from 1 millisecond to 999 hours. Due to the large number of functions the use of the timer may *seem* complicated to a beginner but is quite simple to use.

1. The timer can be used to:
 1. Countdown from a set value of time (described in this manual)
E.g. From 3hr.45min to 0h.00min
 2. Perform cyclical operations
E.g. ON for 10min, OFF for 20min, ON for 10min, OFF for 20min ...
 3. Start at a delayed point and stop after the specified time interval
E.g. Start after 24hr, run for 50min

If you wish to use the timer for any functions other than countdown please contact us.

2. Understanding the range: **Setting the range is not the same as setting the countdown.**

- The range is the maximum time that you could want to set the timer to. Within the range you can set it to any time.

E.g. 1 – If the range selected is **9hr.59min** then you can set the timer to

0 hr. 01 min [1 min] *Minimum time*
 0 hr. 30 min [30 mins]
 3 hr. 50 min [3 hours and 50 minutes]
 9 hr. 59 min [9 hours and 59 minutes] *Maximum time*

E.g. 2 – If the range selected is **99.9hrs** then you can set the timer to

00.1 hr [6 min] *Minimum time*
 00.5 hr [30 mins]
 03.5 hr [3 hours and 30 minutes]
 99.9 hr [99 hours and 54 minutes] *Maximum time*

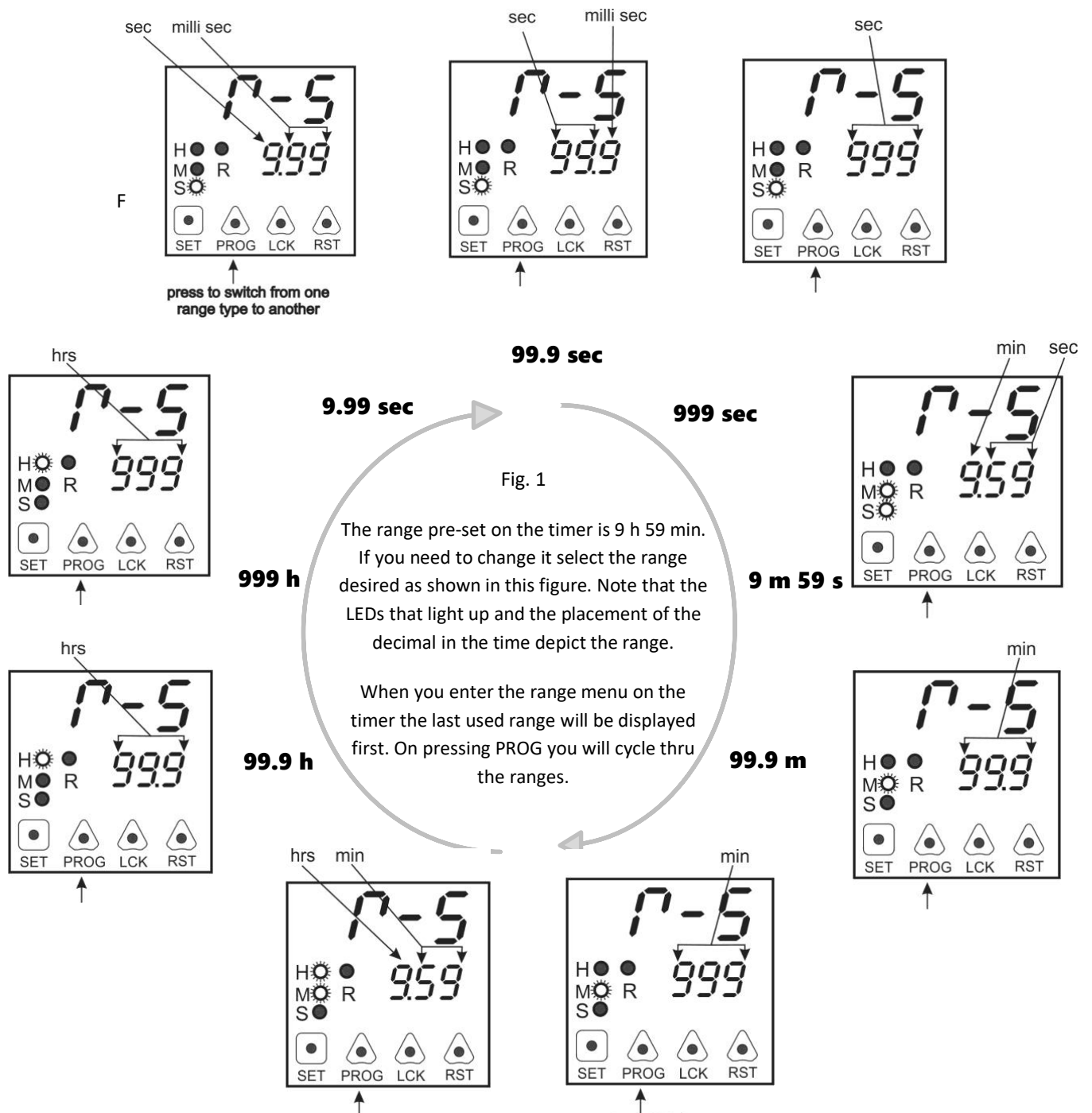
Note - The timer can be set to any other point within the range. The points given above are examples.

- List of all time ranges possible: (for pictorial depiction check Fig. 1)

	Range	Can be set to	Use in Laboratory
Seconds	9.99 sec	0 - 9 sec and 99 milli sec	Not commonly used
	99.9 sec	0 - 99 sec and 9 milli sec	Not commonly used
	999 sec	0 - 999 sec (approx. 16 min)	Not commonly used
Minutes	9.59 min:sec	0 - 9 min and 59 sec	Not commonly used
	99.9 min	0 - 99 min and 54 sec (approx. 1 hr and 40 mins)	Can be used for short gels
	999 min	0 - 999 min (approx. 16 hrs and 40 mins)	Can be used for all gels and blotting. Is tedious to calculate
Hours	✓ 9.59 hr:min	0 - 9 hrs and 59 min	Can be used for all gels and most blotting and is easy to set
	✓ 99.9 hr	0 - 99 hrs and 54 min	Can be used for all gels and blotting
	999 hr	0 - 999 hrs	Not commonly used

- ✓ For common electrophoresis applications you would need to select the range of **9hr.59min**. Our power supply is adjusted to this range when supplied to you.
- ✓ For some long blotting applications you may want to set the range to **99.9hrs**.

Understanding Ranges: Fig. 1



Section 2. Setting the time range and the countdown time on the timer

- *If you wish to only set the countdown time and not the range go directly to section 3.*
- *To understand what 'range' means, go to Pg. 7 and read the section 1 on ranges (also refer Fig. 1.)*

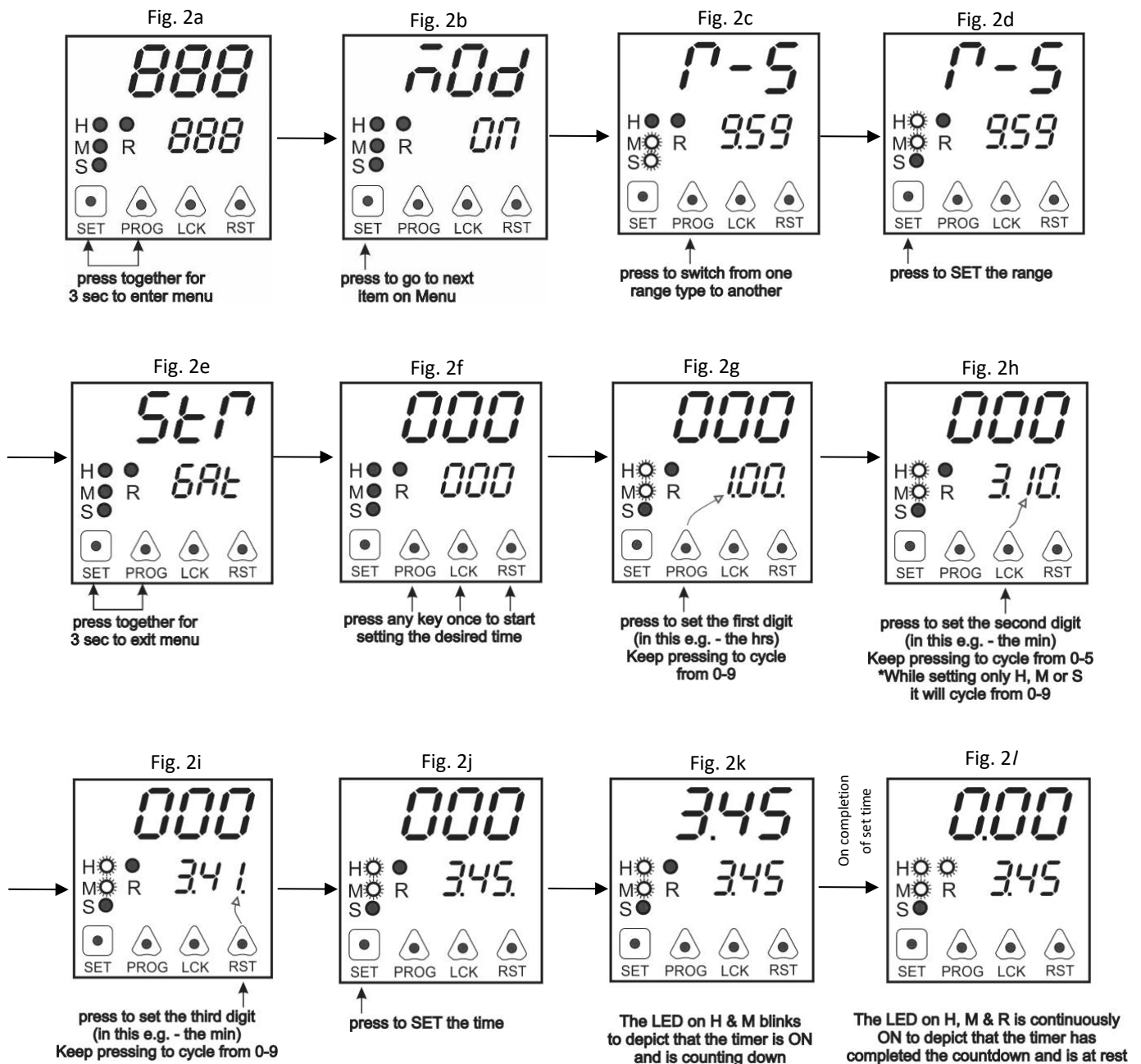
- 1.1. Switch ON the power supply, and switch the pause button to RESUME/ RUN.
- 1.2. Switch ON the Timer ON/ OFF switch.
- 1.3. Press the SET and PROG button on the timer simultaneously for 3 sec. (Fig. 2a)
Note: The timer will exit the menu if unused for 30 sec.
- 1.4. Press SET button once to go to Menu option of setting range. (Fig. 2b)
- 1.5. Press the PROG button to toggle between the different range options. (Fig. 2c)
- 1.6. The range displayed first will depend on what has been previously set. On a new power supply, the timer range is pre-set to 9 h: 59 min. The cycle of ranges have been displayed in Fig. 1.
- 1.7. Once the desired range is displayed, press the SET button once (Fig. 2d)
- 1.8. Press SET and PROG button simultaneously for 3 sec. (Fig. 2e)
- 1.9. The time desired can be set by pressing once any one of the PROG, LCK or RST keys (Fig. 2f).
- 1.10. Use the PROG button to change the first digit (reading left to right), the LCK button to change the second digit and the RST button to change the third digit. (Fig 2g-2i)
E.g. 1 – If the time range selected in **H**, then the digits can denote two possibilities: 99.9 hrs or 999 hrs. Note the decimal on the set time.
Time ranges of **M** and **S** follow the same logic.
E.g. 2 – If the time range selected is **H & M** then the first digit denotes the hours (up to 9 hours) and the second and third digits denote the minutes (up to 59 mins). Time ranges of **M & S** follow the same logic
- 1.11. Once the desired time is selected Press SET. (Fig 2j)
- 1.12. The countdown time display will now depict the countdown time. (Fig 2k)
(Note: the LED for the range selected will start blinking. If the power supply is paused the lights will remain ON continuously)
- 1.13. The countdown time display will countdown till **000**. The timer and the power supply will stop (the voltmeter and ammeter displays will remain ON but will show 000). The LED light on the range set and the indicator for AT REST (**R**) will remain ON continuously. (Fig 2l)

If there is a power failure, or the mains of the power supply is switched off, or the timer is switched off, then the last countdown time and set time will remain stored in memory (for approx. 10 years). Whenever power is restored or mains of the power supply are switched ON or the timer is switched ON the countdown will continue from the time point where it had been interrupted.

Setting the time range and the countdown time on the timer: Figure 2

(This figure pictorially describes section 2)

**Refer to fig 1 to understand ranges*



Section 3a. Setting the countdown time on the timer

- 3.a.1 Switch ON the power supply and the timer ON/ OFF switch
- 3.a.2 Switch the pause button to RESUME/ RUN
- 3.a.3 The timer will come on and display the time set and countdown time pending (if any) from the previous use.
- 3.a.4 The LED lights depict which time range has been selected (Refer to Fig. 1). If you need to change the range please go to section 2. If the selected range is the desired range, please proceed.
- 3.a.5 Use the PROG button to change the first digit (reading left to right), the LCK button to change the second digit and the RST button to change the third digit. (Fig 3a1-3a3)
- 3.a.6 Once the desired time is selected press SET. (Fig 3a4)
- 3.a.7 Press the red RESET button on the front panel. (Fig 3a5)
- 3.a.8 The countdown time display will now depict the countdown time. (Fig 3a6)
(Note: the LED for the range selected will start blinking. If the power supply is paused, the lights will remain ON continuously)
- 3.a.9 The countdown time display will countdown till **000**. The timer and the power supply will stop (the voltmeter and ammeter displays will remain ON but will show 000). The LED light on the range set and the indicator for AT REST (**R**) will remain ON continuously. (Fig 3a7)

If there is a power failure, or the mains of the power supply is switched off, or the timer is switched off, then the last countdown time and set time will remain stored in memory (for approx. 10 years). Whenever power is restored, or mains of the power supply are switched ON or the timer is switched ON the countdown will continue from the time point where it had been interrupted.

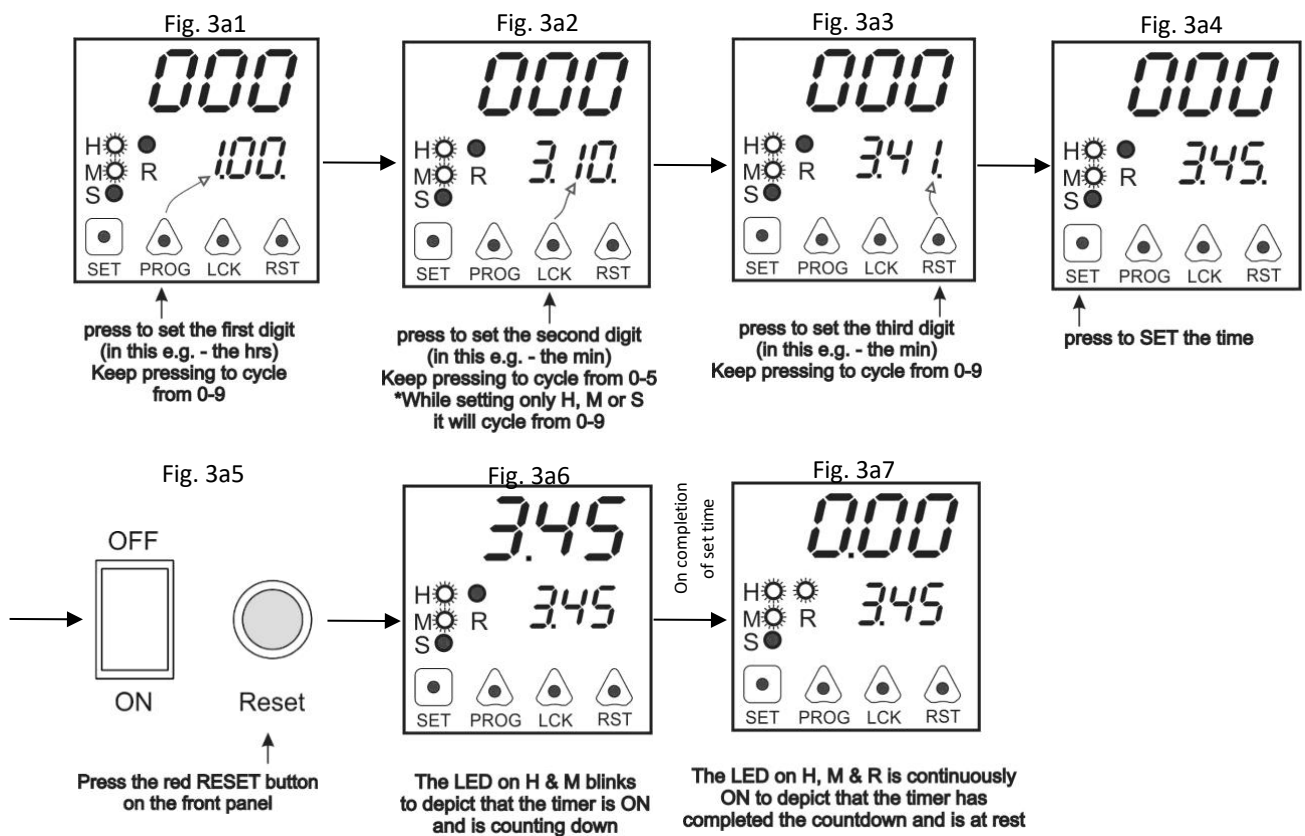
Section 3b. Restarting the countdown time on the timer

- 3.b.1 If you wish to rerun the timer press the RESET switch (red color on front panel).
- 3.b.2 The timer resets and starts the countdown

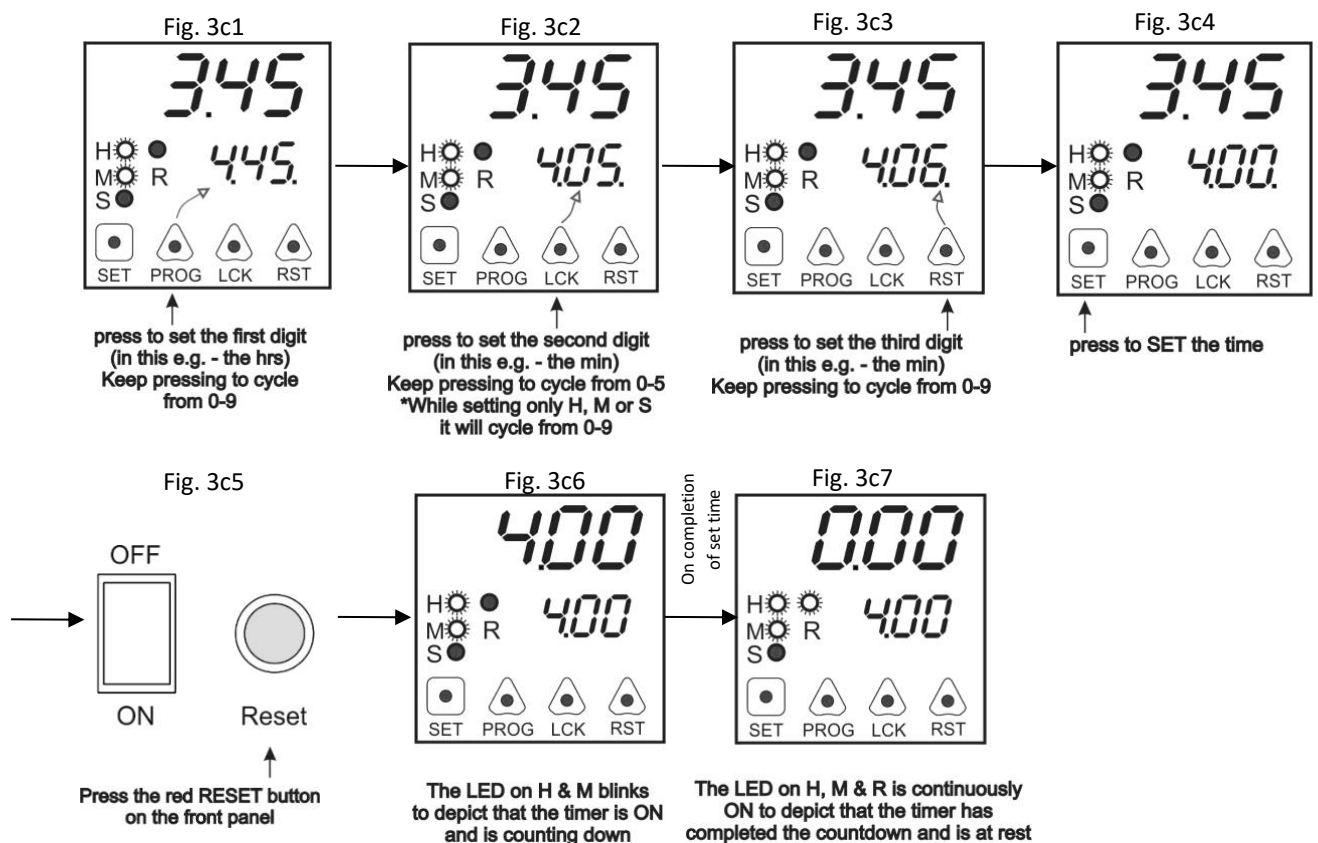
Section 3c. Changing the countdown time on the timer while timer is running

- 3.c.1 While the timer is functioning you can increase or decrease the set time easily
- 3.c.2 Press the PROG, LCK or RST buttons to set the desired time. (Fig 3c1-3c3)
- 3.c.3 Press SET (Fig 3c4)
- 3.c.4 Press the RESET switch (red color on front panel). (Fig 3c5)
- 3.c.5 The timer will start countdown (3c6)
- 3.c.6 The countdown time display will count down to **000**. The timer and the power supply will stop (the voltmeter and ammeter displays will remain ON but will show 000). The LED light on the range set and the indicator for AT REST (**R**) will remain ON continuously. (Fig 3c7)

Setting the countdown time on the timer: Figure 3a This figure pictorially describes section 3a



Changing the time while timer is running: Figure 3c This figure pictorially describes section 3c)



Trouble shooting procedure

Indication	Cause	Remedy
Instrument will not switch ON	Check 230V mains supply	Restore the mains supply
	Instrument fuse blown	Try replacing with correct fuse of 1.5A, only once
	Fuse blows again	Contact us at sales@techresource.in
Instrument ON but no display ON	Defective Digital Panel Meter (DPM)	If DPM LEDs do not glow contact us at sales@techresource.in
Instrument & displays are ON but both displays show 000.	Pause switch is set to pause	Flip it to resume
	Voltage and Current knobs not adjusted	To adjust in CV mode – Refer Pg. 5
		To adjust in CC mode – Refer Pg. 5
Instrument and displays are ON. Voltage shows a reading but current display shows 000.	No apparatus is connected to the power supply	Connect any apparatus to the power supply and check again.
	Apparatus is not properly connected	Check the electrical connecting cords properly.
	Cathode and anode are not connected to the right output terminals	Connect the cathode and anode to the right output terminals <i>i.e. Red to red and black to black</i>
	Electrical connecting cords are not properly inserted	Insert the electrical connecting cords properly
	The connecting cords are damaged	Use new connecting cords
	Low level of buffer in the apparatus	Raise the level of buffer in the apparatus such that the circuit is formed
	Wrong composition of the buffer	Check the buffer composition
Instrument ON but no movement of samples/ bubbles in the buffer	Oxidation/ deposit formation on the contact terminals/connectors of the electrophoresis apparatus	Disconnect the instrument. Clean the terminals. Reconnect the instrument and try again.
	Defective Transformer/ control circuit	Disconnect the load. Check if voltage can be set over the full range. If, OK connect the load and increase the current control slowly clockwise. If you do not get expected results contact us at sales@techresource.in
	Current control device defective	Switch the power supply off. Firmly short one of the output terminals. Switch on the supply and check if current reading can be set over entire range. If not contact us at sales@techresource.in
Cannot set voltage to desired value	High current values (500mA) due to which the power supply has switched to the CC mode	Check buffer. If buffer is correct use another power supply with higher ratings
Cannot set current to desired value	High voltage values (500 V) due to which the power supply has switched to the CV mode	Check buffer. If buffer is correct use another power supply with higher ratings
Timer not coming on	No power delivered to the Timer	Check if timer switch is ON
	Timer defective or damaged	Switch OFF the timer switch and contact us at sales@techresource.in

Note that voltage and current values will follow Ohm's Law

If you are facing any difficulty in understanding the instructions or operating the power supply, kindly contact us with your feedback on the steps given above. This will provide us with necessary information to advise you properly.