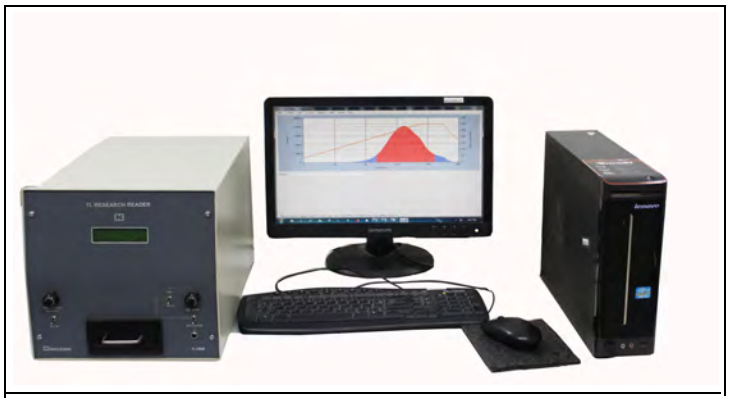
PC CONTROLLED THERMOLUMINESCENCE READER

TYPE: TL 1009I

Technical Data



FEATURES :

- Micro Controller based Integral system and works as a PC controlled TL Reader.
- Built-in USB port facilitates connection to PC.
- **Heating rates** are 1^0C / sec to 40^0C / sec.
- Max. Set temperature 500^0c.
- **Heating profile:** Linear, plateau heating (One/Two/Three).
- Online Glow Curve Plotting, Saving, Area under curve (ROI), raw data for processing, Automatic BG subtractions overlapping of glow curves.

Thermo luminescence Reader Type TL1009 designed and offered by NUCLEONIX SYSTEMS is a versatile controller based unit, facilitating the user to subject the TL sample under study to the desired heating profile, to record the digitized TL glow curve. This unit stores both integral value and digitized glow curve into EEPROM memory.

This unit records the data in 150 channels, temp, TL intensity & Run time values. Entire electronics including PMT, HV bias, Temperature controller circuit, Heater transformer heater strip, sample drawer assembly, data acquisition electronics is all integrated into a single enclosure.

The user interface to the unit is through a powerful software GUI, coded in .net frame works which runs on Windows platform. This system essentially works as a **PC controlled TLD reader** with command buttons and drop down menus defined for various functions. Built-in USB port in the unit facilitates the user to connect it to a PC for GUI and to achieve full functionality. This system is provided with an optional CCD spectrometer as an additional attachment, which enables one to record TL intensity Vs wavelength for the sample under study.

HARDWARE SPECIFICATIONS

PMT housing and TL sample heating assembly:

This unit has a low dark current photomultiplier Tube generally of Hamamatsu / ET make, is used. However, assembly facilitates one to go in for other photomultiplier Tubes also with appropriate modification in the PMT socket wiring.

The cylindrical shell containing the Photomultiplier is fitted on to a rectangular base drawer block containing a heater arrangement and thermocouple, heater rods, connected to a power transformer.

PMT: PMT used is, of 11 dynode 29mm, low dark Current PMT of ET enterprises make.

Dark current at 20°C = 0.2nA

Max. cathode to anode voltage = 2000V

Temperature Sensor: Thermocouple Sensor (Cr-Al spot-welded to heater strip).

High voltage to PMT:

A continuously adjustable HV (0-1200V) @1.0mA is generated by HV circuits. User can select desired HV from front panel.

Arrangement for Optical Filters :

One Heat absorbing glass & (IR cutoff filter is optionally provided): This combination essentially allows only visible light.

These are provided just below the PMT WINDOW. Additional filters such as band pass filters or neutral density filters can

- be positioned above the slot provided on the heater strip in the drawer assembly.

Heating Arrangement:

Resistive heating method.

Heating Element:(Heater Strip)

Kanthal strip (72% Fe, 23% Al and 2% Cr or Nichrome) is used as a heating element.

Kanthal Strip has a circular depression of 14mm to hold discs and powder samples. Additional flat heater strips can be provided on request.

Heating Process:

Heating can be done in two modes: "PROG MODE" of Temp. Controller through personal computer program.

"ISO MODE" (Internal mode) of Temperature Controller, by varying the ten turn dial.on the front panel.

Auto-Ranging: Current output from the photomultiplier is taken to I-F converter, to give frequency output proportional to PMT current. This wide dynamic range is achieved for plotting TL intensity on Y-axis.

Temperature range: From room temperature upto 500^0 C, in linear, plateau heating (One / Two / Three) modes of heating can be programmed.

Heating Rates: Heater strip can be programmed to heat the sample from 1^0 C/sec upto 40^0 C/sec and a max set temperature (allowed) is 500^0 C.

Nitrogen Flushing Nozzle:

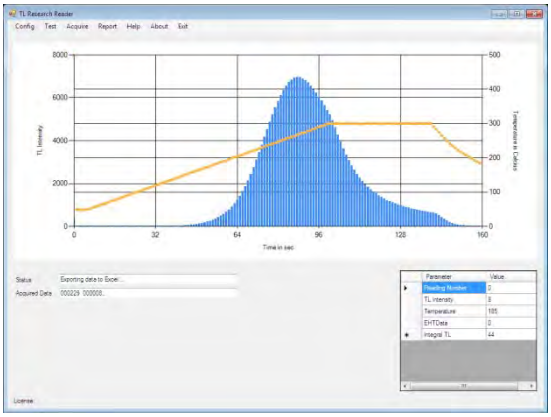
Nitrogen gas flushing (sent through a flexible rubber pipe), suppreses spurious luminescence from oxidation effects & combustion phenomena has been provided, on the rear panel side.

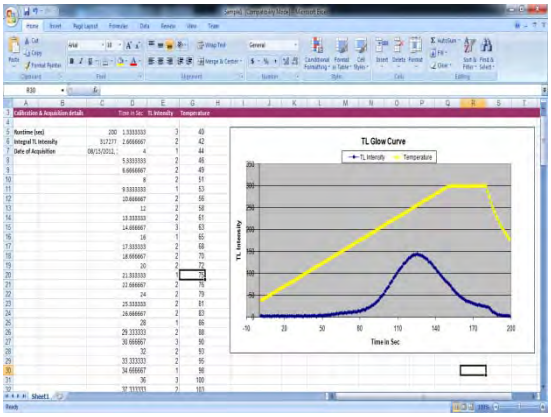
Dimensions of Integral unit:

25.5W X 26ht. X 48D in mm

SOFTWARE FOR TL RESEARCH READER

The software for TL Research reader is advanced, user-friendly, and reliable and feature rich.





Key features of Software:

- Provides convenient temperature calibration.
- **Multi-plateau temperature profile** definition along with visualization.
- Multiple temperature profiles can be saved & retrieved as and when necessary.
- **Calibration factor** for Reader can be set.
- **Background subtraction.**
- Selection of Region of Interest (ROI) will automatically calculate Integral TL Intensity for the region.
- Glow curve data is acquired and stored in Text file as well as Excel along with Timestamp.
- Glow curve data can be viewed at a later date either in App or in Excel.
- **Overlapping** of up to 10 Glow curves is possible. Data can be exported to Excel and printed.

APPLICATIONS:

TL Phosphor Characterization, Medical Dosimetry, Personal Monitoring Research, Archeology dating, Environmental Radiation Monitoring, Medicine, Biology, Neutron Dosimetry, Reactor Engineering, High Level Photon Dosimetry with TL materials,

standardization and inter comparison of TL dosimeters used in personnel monitoring etc.

Applications in radiation oncology: Therapy machine calibration checks & inter-comparison studies with other centres, treatment planning accuracy verification using phantoms, patient specific dosimetry, studies in Brachytherapy physics, in X-ray diagnostics to determine absorbed doses to patients & in research etc.

OPTIONAL ACCESSIORIES :

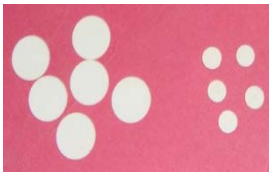
A.TL Materials & Phosphors

(i) TL Phosphor $CaSO_4$: Dy Powder
(ii) TL Discs $CaSO_4$: Dy discs with Teflon base 13.5mm dia X 0.8mm thick.
(iii) LiF; Mg, Ti square chips (3.2mm x 3.2mm x 0.9mm)
(iv) Vacuum Tweezers
(v) Neutral density filters.

(i)

(ii)

(iii)



(iv)

(v)

B. Annealing Oven

Internal Dimensions 14 X 14 X 14 (inches)

Temp Range : upto 400^0 C

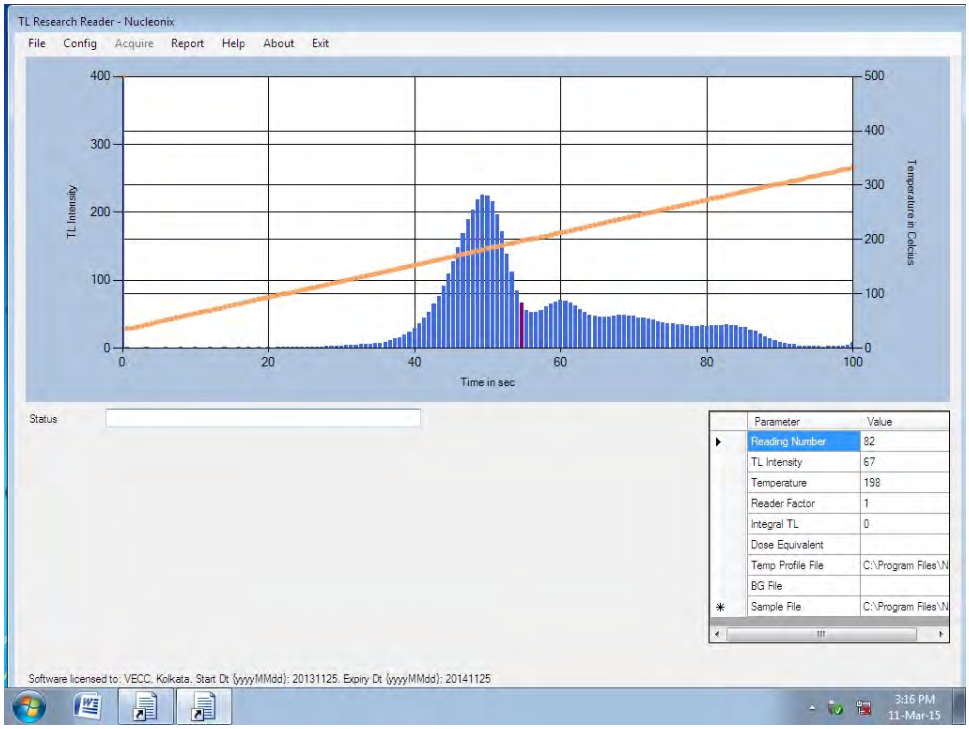
Temp Indication: Digital

No. of trays : 2 nos.

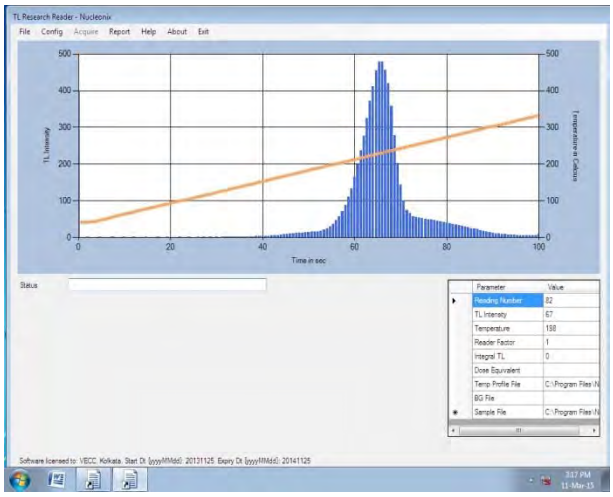
Heating : High grade Nichrome wire placed in the ribs of sides and bottom for uniformity.

Power requirement : Single phase 220/230VAC supply.

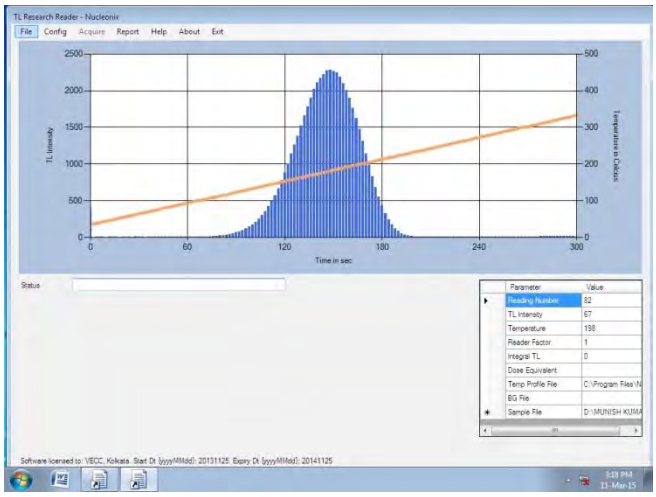
Accuracy : +/-1^o or better.



II. LiF- Glow Curve [LiF–N (Mg,Ti)]



III. a) Glow Curve of LiF – Mg copper



b) Glow Curve of Al_2O_3 (ALUMINA)