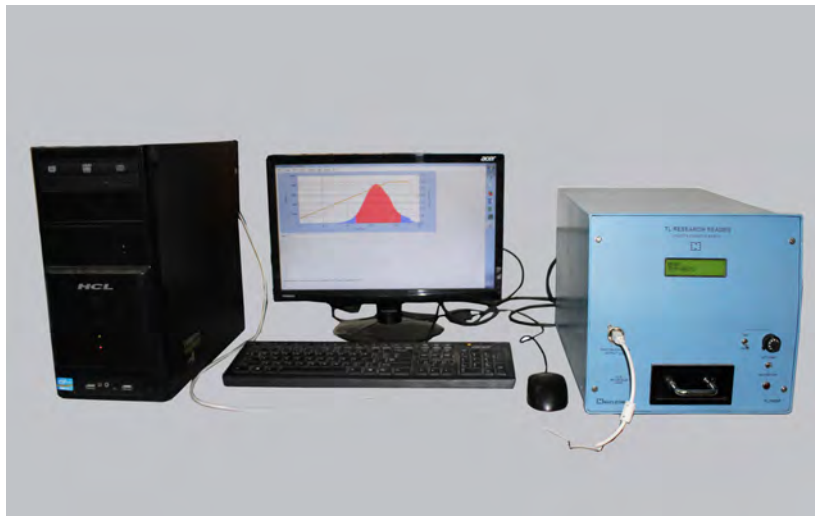


Technical Data

**PC CONTROLLED
THERMOLUMINESCENCE READER
(PHOTON COUNTER BASED)
TYPE: TL1009P**



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 1⁰c/sec to 40⁰c/sec.
- Max. Set temperature 500⁰c.
- Heating profile:** Linear, plateau heating (One/Two/Three).
- Software features** include glow curve, acquisition, display, filing, printing, processing over lapping Area under peak, subtraction etc.
- System uses photon counting module for TL data acquisition.
- Minimum Detectable Dose 10mR

Thermo luminescence Reader Type TL1009P 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 system is designed around photon counting module which acquires TL emission in terms of photon counts compared to normal system in which PMT current is converted to frequency and counted. This unit stores both integral value and digitized glow curve into EEPROM memory.

This unit records the data in 200 channels, temp, TL intensity & Run time values.

Entire electronics including Photon counting module, 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 which runs on Windows platform. This system essentially works as a **PC controlled TLD reader** with command buttons and dropdown 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.

HARDWARE SPECIFICATIONS

Photon Counting Module:

The light detection system consists of a plug-and-play photo detector package configured for photon counting. It comprises of a selected 25mm diameter end window photomultiplier tube. Positive high voltage power supply, high speed amplifier-discriminator, counter and micro-controller. All are encapsulated within a cylindrical mu-metal case, providing a high level of immunity from the effects of external magnetic fields. Low voltage and signal output connections to these packages are by flying leads. Three options from Electron Tubes range of 25mm end window photomultipliers are offered to cover the spectral range from UV

to IR spectral response curves. P25232/9107U70 Selected bi-alkali photomultiplier with high blue sensitivity and ultra-low dark counts. Photon Counting Module provides a fast, accurate light measurement via an RS232/Serial USB interface to a host PC. Some of the important features are- Simplicity of operation, Minimal set up time, Compact cylindrical assembly, Electrostatic and magnetic shielding, RS 232/Serial USB interface, UV window

option, 100 MHz count rate capability, Automatic dead time correction, Operates from +5V supply, Pre-set discriminator level and HV are factory set for optimal performance.

Temperature Sensor:

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

Temperature range: From room temperature upto 500°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° C/sec upto 40° C/sec and a max set temperature (allowed) is 500°C.

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:

Programmed 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.

Arrangement for Optical Filters :

One Heat absorbing glass / filter (IR cutoff filter): This is essentially an IR cut-off filter which allows only visible light and cuts-off IR Radiation has been provided just below the PMT window in the filter basket. Additionally Neutral density/Band pass filter may be

added in the same filter basket.

Nitrogen Flushing Nozzle:

Nitrogen gas flushing (sent through a flexible rubber pipe), suppresses 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.

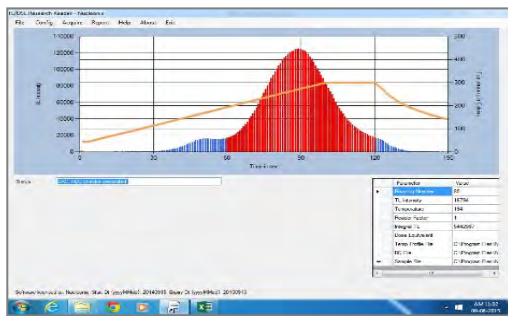


Fig: TL Glow curve, using photon counting module

DOSE(R)	INT.TL
0.01	60970
0.02	119987
0.05	345786
0.1	634125
0.5	2785841
1	5442997
2	11578465
5	26780704
10	53844901

Fig: Dose Vs TL intensity Linearity data & graph using photon counting module

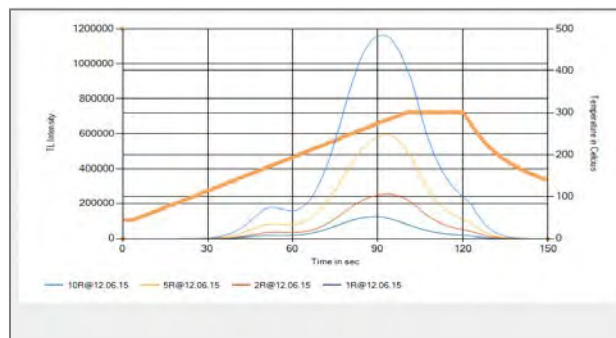
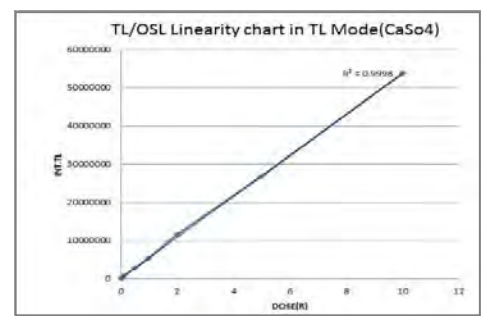


Fig : TL-Glow curves shown in overlapped condition

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.
- **Reader (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.

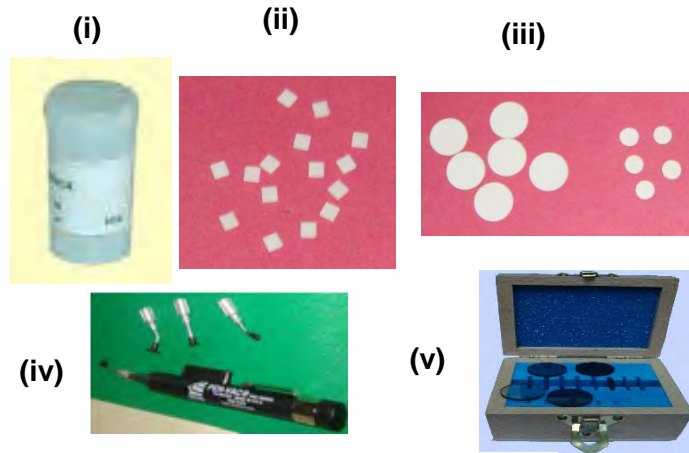
Applications in radiation oncology: Therapy machine calibration checks & inter-comparison studies with other centers, treatment planning accuracy verification using phantoms, patient specific dosimetry, studies in Brachytherapy physics, in X-ray diagnostics to determine absorbed doses to patients & in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

OPTIONAL ACCESSORIES :

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) Absorptive Neutral density filters box (EDMUND Optics)

(Consisting of 0.15, 0.3, 0.4, 0.6, 0.9, 2.5 (Optical Density))



B. Annealing Oven

Internal Dimensions 14 X 14 X 14 (inches)

Temp Range : upto 400°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° or better

