



Support Application Notes



Commonly Asked Questions about the TD-700 Fluorometer

Questions about:

- * [Sensitivity](#)
- * [Linear Range](#)
- * [Ease of Use](#)
- * [Data Collection](#)
- * [Sample Test](#)
- * [Tubes/Cuvettes](#)
- * [Lamps](#)
- * [PMTs](#)
- * [Calibration](#)

SENSITIVITY

• What is the sensitivity of the TD-700?

The TD-700's sensitivity is defined in terms of the minimum detection limits of various analytes. The TD-700 can detect:

Analyte	Minimum Detection Limit
FITC	< 20 picograms/mL
Chlorophyll <i>a</i>	.01 ppb or .01 µg/L
Rhodamine WT	10 ppt in potable water (using a 25 x 150 mm test tube)
Thiazole Orange	2 ng of dsDNA
Hoechst 33258	10 ng of dsDNA
PicoGreen®	25 pg/mL of dsDNA
NanoOrange™	10 ng/mL
Gasoline	100 ppb in water
Diesel	25 ppb in water
BTEX	10 ppm in water
Ethidium Bromide	50 ng/mL of tRNA

• How does this sensitivity compare with other fluorometers on the market?

The TD-700 is comparable or better in sensitivity to the leading fluorometers on the market. The TD-700 is as sensitive and linear as some research-grade fluorometers that are 10 times its price.

• How does the TD-700 sensitivity compare to the sensitivity of the Turner Designs 10-AU Fluorometer?

The TD-700 is very close in sensitivity to the 10-AU, however the 10-AU has greater stability which allows it to see slightly lower levels of certain analytes.

• Do I adjust the sensitivity with a gain knob or switch?

With the TD-700, there is no need to use a gain knob or switch. Upon

calibration, the TD-700 will electronically set the optimal sensitivity for your samples.

LINEAR RANGE

• What is the linear range of the TD-700?

The linear range, as with sensitivity, depends on the analyte being measured. The TD-700's linear range for Chlorophyll *a* and Rhodamine WT is as follows:

FITC: 200 ppt to 1 ppm.

Chlorophyll *a*: 10 ppt (0.01 µg/L or 0.01 ppb) to 250 ppb (using a 13 x 100 mm test tube).

Rhodamine WT: 10 ppt to 100 ppb (using a 25 x 150 mm test tube).

EASE OF USE

• How long does it take to learn how to use the TD-700 Fluorometer?

The TD-700 is one of the easiest laboratory instruments to use. Once the instrument is turned on, a short series of commands guides the user through calibration and sample analysis. The integrated design and easily removable filter cylinder, sample adaptors and lamp panel allow the user to quickly become familiar with the instrument's components and easily change them when necessary.

• Can I use this instrument as a teaching instrument?

The TD-700 is the ideal teaching instrument. The fluorometer's menu-driven software guides you through instrument calibration and sample readings. The unit's small footprint conserves bench space and the rotating filter cylinder and multiple sample holders allow easy demonstration of fluorescence principles. Just ask our customers!

DATA COLLECTION

• Does the instrument attach to a printer?

Yes. The TD-700 can be used with any RS-232 serial printer. You can purchase a printer from Turner Designs or use a serial printer already in your laboratory. Please note that the TD-700 cannot be used with a parallel only printer. A printer cable comes with the printer when purchased from Turner Designs.

• If I use my own printer do I need a special printer cable?

A standard 9 to 25 pin serial cable should be used. You may purchase one from Turner Designs or your local computer store.

• How do I collect data from the TD-700 and use it in my computer? Do I need the data collection software?

You can use various communications software packages to transfer data

from the TD-700 to your computer. The signal is sent from the TD-700 in ASCII format. If you have Microsoft Windows on your computer, data can be collected and stored in a file using the Windows 3.1 Terminal program or Windows 95 Hyperterminal program. Simply connect the 9-pin cable included with the TD-700 to the RS-232 serial port on the back panel of the instrument. Then connect the other end of the cable to the serial communications port on the back of your computer, (you may need a 9-25 pin serial adaptor to do this). Step by step instructions on how to collect data using the Microsoft Windows Terminal program are on page 39 of the TD-700 Operations Manual.

• **Can I use my Macintosh with the TD-700?**

Yes, you can collect TD-700 data using a Macintosh computer. You will require a cable that connects to the Mac phone port on your computer and has a DB9 male RS-232 type connector (or an adaptor) for plugging into the fluorometer. This cable is often referred to as a "modem cable" and can be purchased from Turner Designs (P/N 7000-940). Once you are connected to the Mac, you can capture the instrument data with the Microphone II Program. Turner Designs includes detailed instructions on how to do this.

SAMPLE TUBES/CUVETTES

• **What size test tubes/cuvettes can I use? How do I decide which ones to use?**

The TD-700 can accommodate 25 x 150 mm test tubes, 13 x 100 mm test tubes, 10 x 10 x 45 mm cuvettes, minicells, or capillary cells. The size and material of your test tube or cuvette will depend on your analysis. For example, the 10 x 10 mm cuvette is generally used for DNA quantitation while the 13 x 100 mm test tube is typically used for chlorophyll analyses. Certain materials transmit specific wavelengths of light better than others, so your analyte's excitation and emission wavelengths will determine the best material for your sample tube. Glass tubes and cuvettes work fine for most analyses. Quartz cuvettes are required for excitation wavelengths below 300 nm. Methacrylate cuvettes are used for analytes fluorescing down to 300 nm. With regard to size, the greater the diameter of the test tube, the greater the sensitivity achieved (the lower the minimum detection limit).

• **What size sample tube/cuvette is standard with the TD-700?**

It depends on the configuration of the TD-700 you order. The TD-700 equipped with a standard PMT, (P/N 7000-009), comes with a 10 x 10 mm cuvette holder as standard. Other tube adaptors may be purchased separately. The TD-700 equipped with a red-sensitive PMT, (P/N 7000-000), comes with the 13 x 100 mm and 25 x 150 mm adaptors as standard. In this case, the 10 x 10 mm, minicell, or capillary cell adaptors may be purchased separately.

• **How easy is it to switch between different size test tubes/cuvettes?**

The adaptors quickly and easily slide in and out of the TD-700 sample compartment. Notches on the adaptors and sample compartment enable quick and easy alignment. Sample adaptors can be switched in seconds.

- **Do the sample tubes/cuvettes require minimum volumes? If so, what are they?**

Sample tubes do require minimum volumes so that enough sample is exposed to the incoming light. The minimum volumes are as follows: =

Sample Adaptor	Cuvette/Tube	Minimum Volume
10 x 10 mm adaptor w/ short aperture	10 x 10 mm (3.5 ml)	2.0 ml
minicell*		75 µl
capillary cell*		3 µl
13 x 100 mm adaptor	13 x 100 mm	3.6 ml
25 x 150 mm adaptor	25 x 150 mm	30 ml

***Note:** The minicell and the capillary cell are designed to be used in conjunction with the 10x10mm adapter.

- **When would I need to use a quartz cuvette?**

A quartz cuvette is needed for compounds requiring excitation light below 300 nm.

- **What sample tubes/cuvettes, if any, can I order from Turner Designs?**

The following sample tubes and cuvettes are available for purchase from Turner Designs:

Sample Tube/ Cuvette	P/N
Minicells Borosilicate Glass	7000-950
Capillary Tubes Quartz	7000-953
Capillary Tubes Glass	7000-954
10 x 10 mm Square Glass Cuvette (3.5 ml)	7000-955
10 x 10 mm Square Quartz Cuvette (3.5 ml)	7000-956 (For transmission <330nm)
10 x 10 mm Square Polystyrene Cuvette (3.5 ml)	7000-957
10 x 10 mm Square Methacrylate Cuvette (3.5 ml)	7000-959 (For transmission <300nm)
13 x 100 mm Round Glass Test Tubes	10-031
13 x 100 mm Round Suprasil Quartz Test Tube	10-297
13 x 100 mm Round Quartz Test Tubes	10-299 (For transmission <330nm)
25 x 150 mm Round Glass Test Tubes	10-028A

• **What other small volume cuvettes can be used with the TD-700?**

There are several small volume cuvettes that can be used with the TD-700 fluorometer. Turner Designs recommends contacting Starna Cells, Inc. at (805) 466-8855 or NSG Precision Cells, Inc. at (516) 249-7474. Both companies carry a large selection of small volume 10 x 10 x 45 mm cuvettes that can be used with the TD-700. Be sure that the cuvette meets the following requirements:

- The cuvette is a 10 x 10 x 45 mm square cell
- The cuvette is a fluorometer cell
- The cuvette has completely polished surfaces for excitation and emission light transmission and a "z" dimension of 15 mm. (z = the distance from the base of the cell to the center of the optical window.)
- The cuvette transmits the wavelengths of light required for the analysis.

LAMPS

• **Why are there two lamp options? When would I use a quartz halogen lamp over the mercury vapor lamps?**

Turner Designs offers both a quartz halogen lamp and application specific mercury vapor lamps with the TD-700 in order to give customers ultimate flexibility in configuring the fluorometer for their specific needs. The quartz halogen lamp irradiates the sample with a broad range of light, operating best at wavelengths above 400 nm. This broad range of light allows the user to analyze many different analytes without a lamp change. The less expensive mercury vapor lamps emit a narrow band of light. Turner Designs sells mercury vapor lamps for chlorophyll, rhodamine, and hydrocarbon measurement. For multiple applications, the user could purchase several mercury vapor lamps but would need to switch lamps between analyses.

• **What are the lamp lifetimes? Can I order replacement lamps?**

The average life of a mercury vapor lamp is 8000 hours. The average life of the quartz halogen lamp is 2000 hours. Yes, you can order replacement lamps from Turner Designs. They are as follows:

Lamp	P/N
Quartz Halogen Replacement Bulb	7000-970
Daylight White Mercury Vapor Lamp	10-045
Clear Quartz Mercury Vapor Lamp	10-046
Near UV Mercury Vapor Lamp	10-049
Blue Mercury Vapor Lamp	10-089

• **How would I know that the lamp needed to be replaced?**

It is advised that you check the lamp periodically, especially toward the end of its lifetime. For the mercury vapor lamp, check the viewport on the back of the lamp panel. If it needs to be replaced, the lamp will flicker. Please note that if you remove the lamp panel to check the lamp,

the lamp will automatically shut off for safety reasons, so using the viewport is advised. The quartz halogen lamp can be easily checked by removing the back lamp panel. The quartz halogen lamp does not flicker, it will be off when it needs replacement.

PMTs

• When would I buy a TD-700 with a red-sensitive PMT?

The red-sensitive PMT has a wider range of detection than the standard PMT. The red-sensitive tube can detect fluorescence emission from 185 nm to 870 nm, while a standard tube detects fluorescence emission from 300 nm to 650 nm. Certain analytes, such as BTEX and Chlorophyll a, fluoresce outside the range of the standard tube and require the red-sensitive PMT. If your analyte fluoresces between 185 and 300 nm or between 650 and 870 nm, you will require a red-sensitive PMT.

• If I buy the TD-700 with the red-sensitive photomultiplier tube, can I use it for other applications? How does the red tube affect the other applications?

The red-sensitive tube will not affect the other applications. You will simply have a wider range of light detection with the red photomultiplier tube.

CALIBRATION

• Tell me about the TD-700's calibration procedure.

The TD-700 calibration procedure sets the instrument's range and sensitivity based on a fluorescent sample or standard. The instrument can be calibrated using a single or multi-point calibration. For direct concentration readout and samples requiring highly accurate measurement, the multi-point calibration procedure is used.

• How often do I need to calibrate the TD-700?

- For greatest accuracy, calibrate before running a new batch of samples.
- Recalibrate if the ambient temperature changes by +/- 5 degrees C.
- Recalibrate after changing lamps, filters, cuvette sizes, or the analyte you are measuring.
- Verify the need to calibrate by reading a stable, known concentration standard immediately after calibration and again every few hours to see if the readings have changed significantly. Recalibrate when the accuracy becomes unacceptable for your study.

Turner Designs manufactures more fluorometers and research grade luminometers than any other company in the world.

fluorometer.committed™