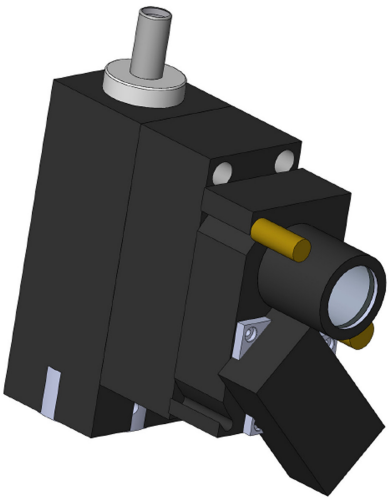
Laser Induced Fluorescence Microscope with Confocal detection zone.

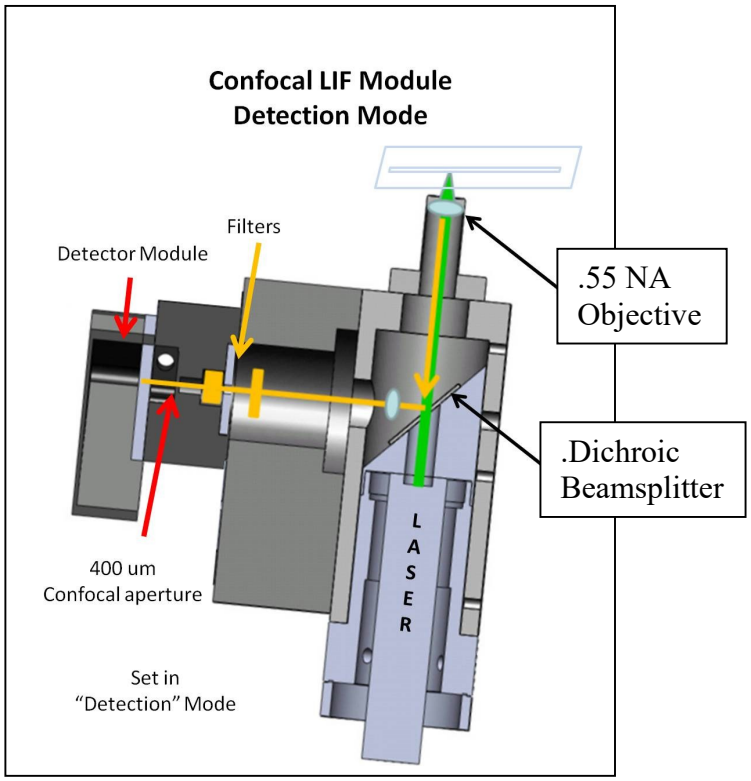
Starlight Technical Services



The optical unit is primarily designed for Laser induced fluorescence measurements in Capillary electrophoresis but can also be used in the investigation of materials. The system is a stand alone unit with a laser excitation source and photo multiplier detection system on board. The operators system must provide a 0 to 1 volt input to set the photo multiplier gain and must input the signal into their data acquisition system. [0 to 5 vdc]

Optics Unit:

The optics unit is designed around a custom built compact microscope with the necessary beam combining optics to project the unit's laser through the microscope objective and onto a capillary in your Capillary Electrophoresis instrument. The induced fluorescence is collected by the .55 N.A. objective and reflected off our beam splitter into the Infinity collection optics. From here the fluorescence is passed through long pass filters, then through a 10 nm band pass filter and finally focused through a confocal aperture into a Hammamatsu miniature Photo Multiplier module. The PMT controller electronics has 5x 10^7 to 2x 10^8 trans-impedance gain, and 0 to 5 VDC output. A 0-800 millivolt signal input on the PMT voltage control line produces 0 to 800 Volts on the PMT cathode, and



controls the PMT gain. The microscope unit is equipped with a mechanical switch, "turret" which allows the user to view through the microscope, focus the image and center the laser spot onto the point of interest in the Capillary. The switch is placed into the detection position, and the unit is ready to collect data.

Objective:

The standard Objective is a 4.5 mm f_{eff}, .55 NA lens with a 2.9 mm working distance. It is a very compact unit that gives you extra space in the crowded environment of a CE system. Other objectives are available, for greater working distance, like a 13.8 mm f_{eff}, .18 NA lens with a 12. mm working distance. The microscope can be fitted with any infinity corrected objective with the standard RMS microscope thread.

Lasers:

The standard LIF systems presently come with 635 nm or 532 nm laser sources.

The 635 nm lasers are 7 to 10 mw diode lasers. Diode lasers produce a low level broad band emission, which will elevate the background level if not dealt with. This broad band radiation is stripped with a built in 10 nm band pass filter. Post filter, the laser output is 3 to 5 milliwatts. Our Diode lasers consume ~100 to 150 milliamps of current.

The 532 nm laser is a Diode Pumped Solid State Laser, a frequency doubled YAG. These lasers are notoriously unstable, but we have a built in feedback loop to stabilize the laser. These lasers have very clean emission lines, so do not need filtration. DPSS lasers consume 350 to 500 milli amps of current.

PMT Controller:

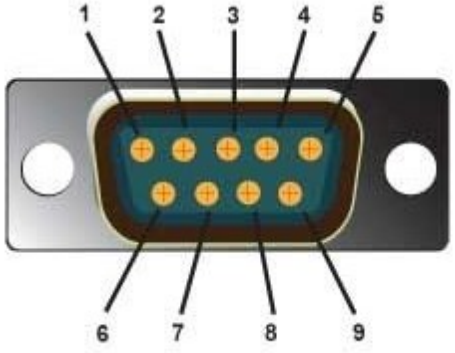
The PMT controller uses a low offset, low noise Trans-impedance amplifier with a gain of 5.1 $X10^7$ Volts/amp. It requires a ±15 Volt supply and outputs a 0 to +5vdc signal proportional to the collected fluorescence and the pmt gain. The controller has a HT control input that regulates the PMT excitation voltage, and thussly the PMT gain. The input requires 0 to 800 millivolts to set the PMT excitation voltage to 0 to 800 volts. The proportionality is exactly 1000:1. Current consumption for the PMT controller is ~50 ma.

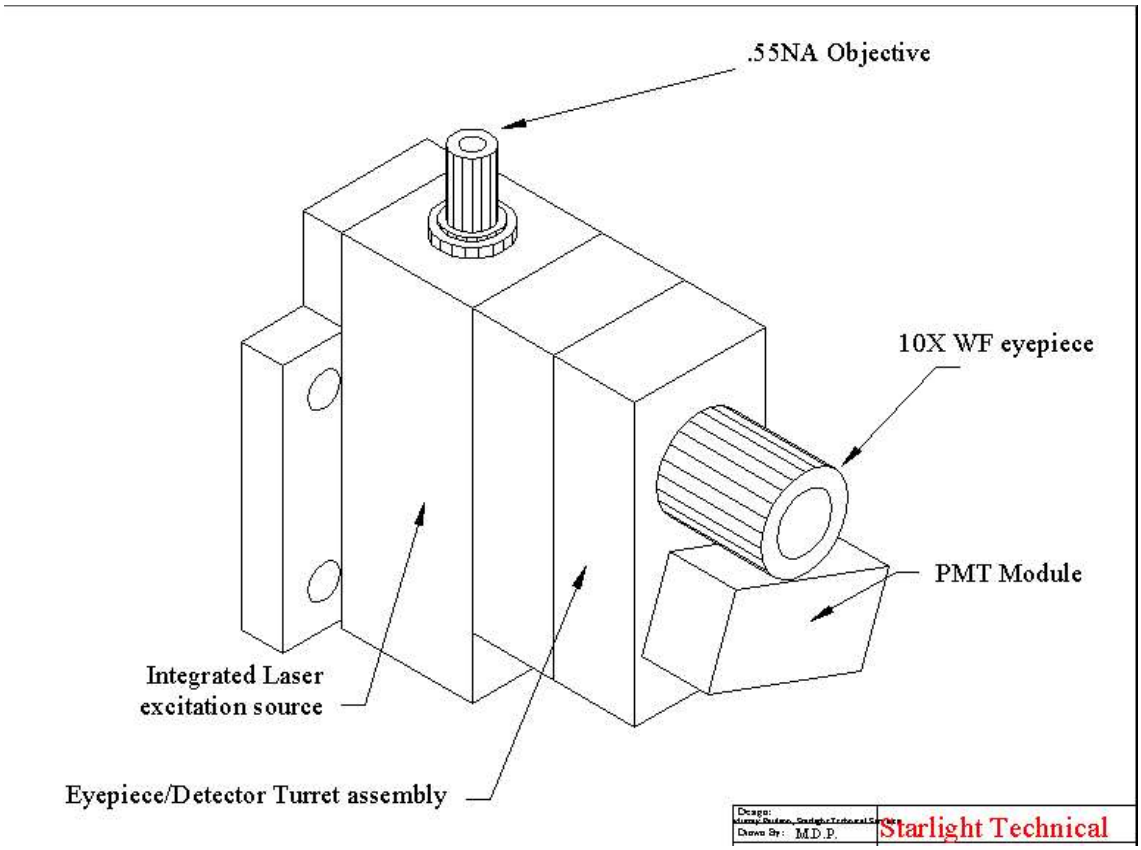
Weight and measures:

LIF Unit weight	1100 gms
Height including supplied objective:	130mm
Width	55 mm
Depth	135 mm

Electrical:

line	Signal
1	PMT Signal OUT
2	Gnd
3	Ref 1.25vdc
4	Control input (0-0.800V)
5	+5 vdc Laser supply
6	+15 VDC
7	Gnd
8	-15 VDC




.55NA Objective
10X WF eyepiece
PMT Module
Integrated Laser
excitation source
Eyepiece/Detector Turret assembly
Drawn By: M.D.P.
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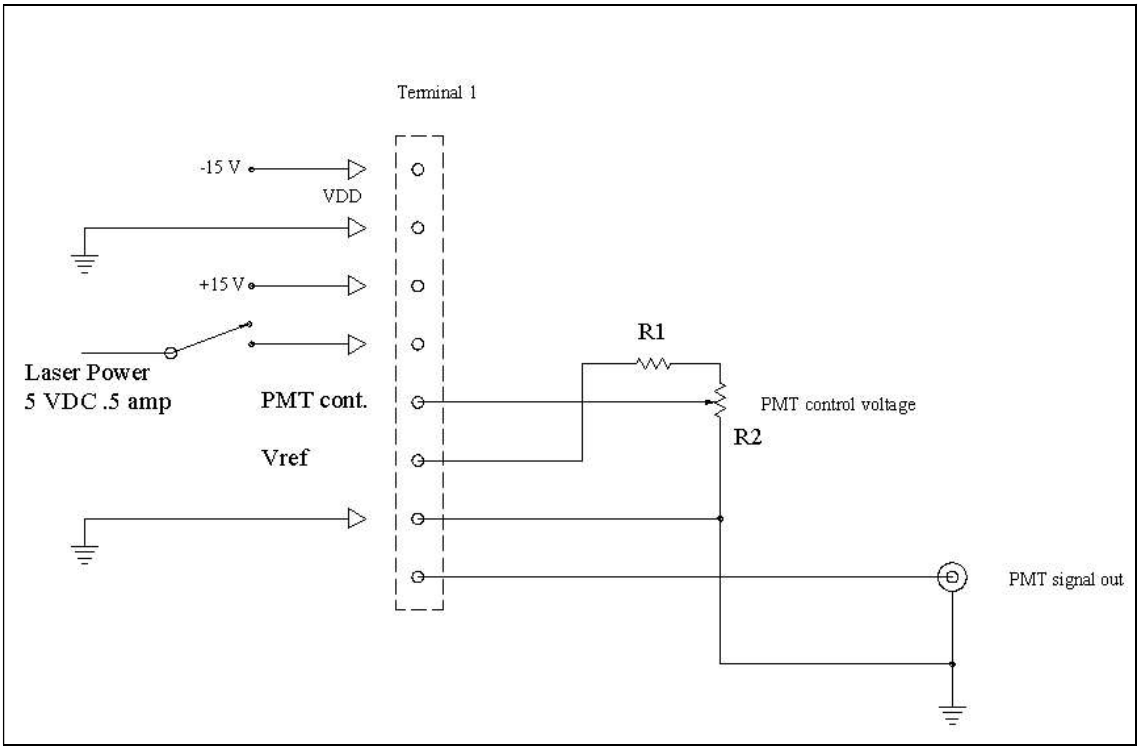
Terminal 1
-15 V
VDD
+15 V
Laser Power
5 VDC .5 amp
PMT cont.
Vref
R1
R2
PMT control voltage
PMT signal out