



**Sciencetech 2515 Mode Characteristics in Fiber Optics** experimental setup has been designed to study the mode characteristics of different fiber optic cables. The two basic types of fiber, Single Mode and Multi Mode can be characterized by measuring Numerical Aperture and the Normalized Frequency ( $V$  number) parameter, which guides modes that are allowed to propagate in a particular waveguide structure. When  $V < 2.405$ , only single mode propagates in the wave guide and when  $V > 2.405$ , the other modes propagate in the wave guide. Using this experimental, the student can easily differentiate between Single Mode and Multi Mode optical fiber cables.

### Features

- Complete set up for Numerical Aperture measurement and  $V$  number verification for Single Mode and Multi Mode fiber cables
- Complete set up for observation of intensity patterns of modes in Single Mode and Multi Mode fiber cables
- He-Ne LASER Source (650nm; 2mW) with mounting stand and fiber coupler
- Single Mode & Multi Mode fibers with SMA connectors at each end
- Numerical Aperture measurement / Mode observation screen with holding assembly
- Optics bench with fiber coupling assembly and customized mechanical fixtures

### Scope of Learning

- Measurement of Numerical Aperture and verification of  $V$  number of a fiber test cable (Single Mode and Multi Mode)
- Coupling light into a test fiber cable (Single Mode and Multi Mode) and observing the intensity patterns of modes

### Technical Specifications

#### Optical Source

Source Type	: He-Ne LASER source.
Wavelength	: 650 nm
Output Power	: 2mW

#### LASER to fiber coupler

Coupling efficiency	: >70% for SM fiber >90% for MM fiber
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#### Single Mode fiber cable

Connector type	: Standard SMA
Cable type	: Step indexed, Glass cable
Core diameter	: 9 microns
Refractive indices	: Core: 1.52; Cladding : 1.48
Numerical Aperture	: 0.13
Central wavelength	: 1300 nm to 1600 nm

#### Multi Mode POF cable

Connector type	: Standard SMA
Cable type	: Step indexed, Polymer fiber cable (POF)
Core diameter	: 1000 microns
Refractive indices	: Core: 1.49; Cladding : 1.42
Numerical Aperture	: 0.5
Central wavelength	: 650 nm to 1300 nm

**Fiber length** : 1.0 m

**Power Supply** : 110-220V,  $\pm 10\%$ , 50 / 60 Hz

**Power consumption** : 10 VA (approximately)

**Dimensions** :

LASER Source	: W 95 x H 110 x D 355 mm
Optics bench	: W 40 x H 75 x D 500 mm

**Weight** : 4 Kg. (approximately)

**Product Tutorial** : Online on [www.SciencetechLearning.com](http://www.SciencetechLearning.com)

**Operating conditions** : 0-40<sup>o</sup> C, 85% RH

### List of Accessories

He-Ne LASER source with mounting stand,	
Mains cord & Optics bench	: 1no
Optics bench stands with bolts	: 2nos
Numerical Aperture measurement / Mode observation screen	: 1no
NA measurement / Mode observation screen holder with base and screws	: 1no
Fiber coupling assembly with base and screws	: 1no
Single Mode fiber optic cable, length 1 meter	: 1no
Multi Mode fiber optic cable, length 1 meter.	: 1no
Measuring scale (6 inches)	: 1no
Plastic box for cables	: 1no

