



Variable LP₀₁-LP₁₁ Mode Coupler

Product Overview

The Phoenix Photonics variable LP₀₁-LP₁₁ mode coupler is for use with dual mode optical fiber. The principle of operation is to create a periodic bending of the fiber by varying the pressure applied by a mechanical long period grating (LPG). The pressure grating created in the fiber will couple power between the LP₀₁ mode and the LP₁₁ mode when the period is matched to the beat length between the modes.

The unit has been designed to enable the user to place the fiber across the grating beneath the pressure plate so it can be placed at any position along the fiber. As with any coupling device the transfer of power between modes is cyclic. For a pure LP₀₁ input mode applying pressure couples power to LP₁₁, through 50/50 coupling position to complete coupling to LP₁₁. Increasing pressure further reduces coupling to LP₁₁ until all power is once again in LP₀₁. Adjusting coupling ratio for 100% coupling gives isolation between modes of typically 30dB at the center wavelength. Inputting an LP₁₁ mode couples to LP₀₁. For conversion from LP₀₁ to LP₁₁ a LP₀₁ mode filter at the input of the LPG is recommended.

The mechanical gratings are replaceable enabling different pitch gratings to be used with different fibers and different number of coupling points to change coupling bandwidth. The LPG is angularly adjustable to move the center coupling wavelength.



Features & Applications

FEATURES

- Adjustable coupling between LP₀₁ and LP₁₁
- Coupling center wavelength adjustment
- Custom fiber design
- High mode isolation

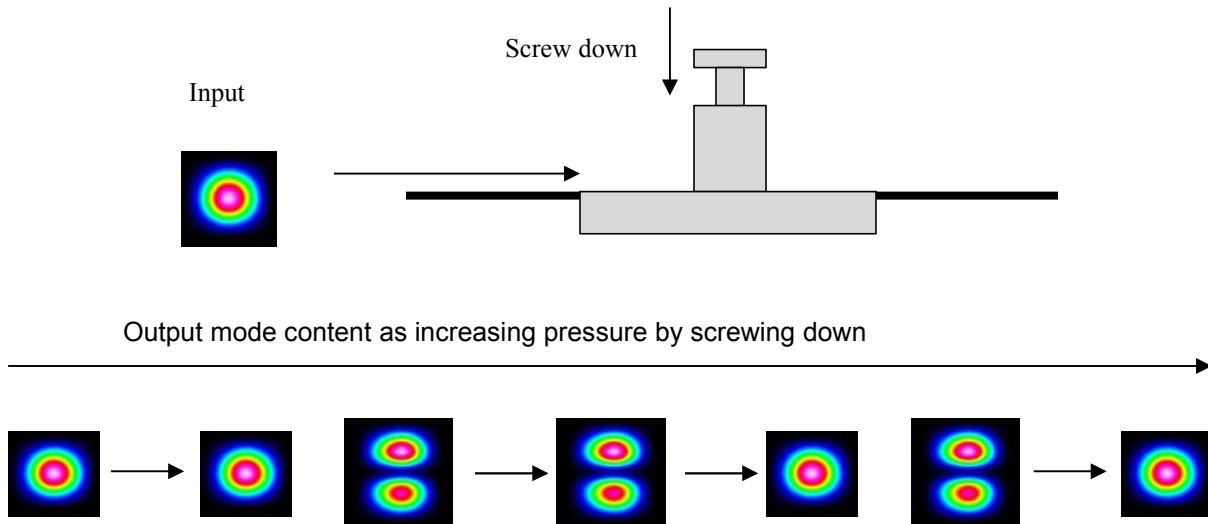
EXAMPLE APPLICATIONS

- LP₀₁ to LP₁₁ mode conversion
- Mode division multiplexing
- Dual mode fiber component test
- Dual mode fiber sensors



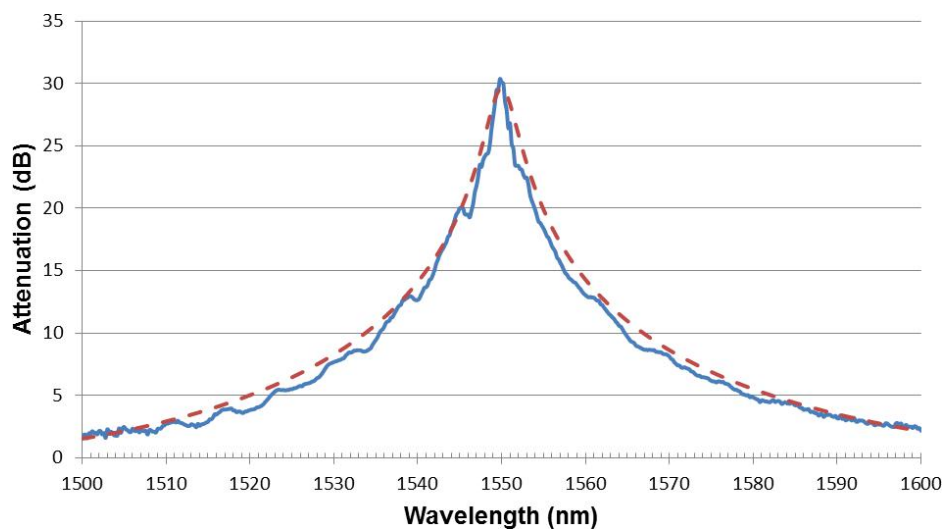
Variable power coupling between modes

LP₀₁ input and turning adjustment screw to increase grating pressure changes the modal content cyclically from LP₀₁ to combined to LP₁₁ to combined to LP₀₁.



Wavelength response

The graph below shows typical wavelength response for 30 coupling points giving 30dB isolation.



Wavelength response of LP₀₁ transmission for mechanical LPG. Solid curve shows experimental results and dashed curve theoretical curve with the same number of coupling points and coupling coefficient.

SPECIFICATION	Units	
Center wavelength range	nm	1520 - 1620
Center wavelength tuning	%	3
Bandwidth (3dB)	nm	5nm to 30nm (depending on number of coupling points)
Insertion Loss ¹	dB	<0.5
Maximum isolation (output mode to input mode)	dB	30
Return Loss ¹	dB	>60
Operating Temperature Range	°C	0 to 50
Storage Temperature	°C	-40 to +85

Notes:

1. Losses do not include connectors.

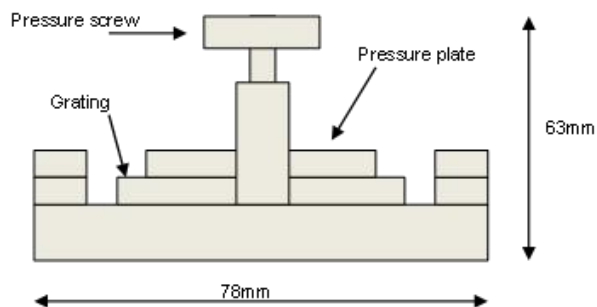
Mechanical Grating



The mechanical grating is cut at an angle of 15 deg and screws are in place to allow rotation and change the center wavelength. Gratings are ordered separately from the variable coupler and several can be selected for different bandwidth and center wavelength requirements.

Dimensions

All dimensions are approximate and may vary slightly.



Ordering Information

The LPGs are supplied separately to the variable coupler and designed with grating period to meet the customer fiber specification.

Mode Coupler

M L P G - 1

Long period grating

L P G 1 - [] - [] - []

No periods: 5 - 30 Center Wavelength: 1520 - 1620 Grating period: mm