Fixed Optical Coupler



Overview

Collimation / Coupling Thorlabs also offers a range of fixed and adjustable collimation packages for collimating a laser beam from the end of an FC/PC, FC/.

Key Takeaways

A fixed optical coupler is a passive fiber optic device that splits or distributes light from one input fiber to one or more output fibers with a predetermined, unchangeable ratio.

Overview

A fixed optical coupler is designed to divide optical signals in a fiber network without requiring adjustment. Unlike variable couplers, the splitting ratio is set during fabrication and cannot be altered. These devices are essential in applications such as passive optical networks (PON), fiber optic monitoring, and signal distribution in telecommunications and sensing systems.

Types and Fabrication Methods

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Fixed couplers can be manufactured using several techniques: Fused Biconic Taper (FBT) Couplers: Created by twisting and heating fibers until their cores fuse, offering low insertion loss and reliable performance for single-mode (SM), multimode (MM), and polarization-maintaining (PM) fibers. Planar Lightwave Circuit (PLC) Couplers: Fabricated using photolithography and etching on a silica substrate, ideal for high fiber counts, compact size, and broad wavelength operation, though with slightly higher coupling loss. Micro-optic Couplers: Use lensed fiber collimators and optical elements to achieve ultra-broad bandwidth and high polarization extinction ratios, suitable for specialized applications requiring thermal stability and integration with filters or polarizers.

Key Specifications

Splitting Ratio: Fixed ratios such as 50: 50, 70: 30, or custom ratios depending on the application. Insertion Loss: Typically low, around 0. 3 dB for fused couplers, slightly higher for PLC devices.

Wavelength Range: Can operate across 300–2000 nm depending on fiber type and fabrication method. Power Handling: Up to 100 W for high-power applications, with thermal stability up to 300°C in some designs. Fiber Compatibility: Supports SM, MM, PM, large-core, and double-clad fibers.

Applications

Signal Distribution: Splitting a single optical signal to multiple receivers in PONs or sensor networks. Monitoring and Tapping: Using tap couplers to divert a small fraction of light for measurement without disrupting the main signal.

Pump-

Signal Combining: In fiber amplifiers, dichroic or wavelength-selective couplers combine pump and signal light efficiently.

High-

Power Systems: Fixed couplers designed for high-power lasers or industrial fiber systems.

Advantages

Stability: No moving parts, ensuring long-term alignment and consistent performance. Compactness: Especially PLC couplers, which are suitable for high-density fiber networks. Low Maintenance: Once installed, they require minimal adjustment or calibration.

Fixed optical couplers are fundamental components in fiber optic systems, providing reliable, passive light distribution with predictable performance across a wide range of applications.

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Article Content

Collimation / Coupling

Thorlabs also offers a range of fixed and adjustable collimation packages for collimating a laser beam from the end of an FC/PC, FC/APC, or SMA

Fiber Coupler Tutorials

The coupling ratio is calculated from the measured insertion loss. Coupling ratio (in %) is the ratio of the optical power from each output port (ports 2 and 3) to the sum of the total power of both output ports

Fiber Couplers – optical fiber

Broadband couplers (or wideband couplers) are designed to maintain a relatively constant coupling ratio over a wider wavelength range (e.g., ±40 nm or more). This is often achieved by specific tapering

Optical Coupler

The well-known passive optical networks (PON) are basically constructed with directional optical couplers so that a large number of users can share the broadcasted optical signal from the central

Multimode Fiber Optic Couplers

Newport''s Fiber Optic Coupler family has been developed using fused fiber technology. These multimode fiber optic couplers allow bi-directional coupling and can be used to either split or combine

Fixed Ratio Polarization Maintaining Couplers | Fiber

These PM couplers come in a small, specially designed silicone rubber package that allows low stress contact of the fiber halves over a broad range of temperatures.

Fiber Couplers/Splitters/Combiners

We offer a full line of fiber optic couplers and splitters supporting SM, MM, PM, large core, and double-clad fibers across 300–2000 nm, with power handling up to 100 W and operating temperatures up to

How Optical Fiber Coupling Works and What Causes Loss

Learn the physics of optical fiber coupling and the precision engineering needed to overcome signal loss caused by alignment errors and intrinsic light

Fiber Optic Couplers

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Optical fused Fiber Couplers are one of the basic elements within fiber-optic networks and are used for the redistribution of optical signals.

Tutorial Passive Fiber Optics, Part 8: Fiber Couplers

Dichroic couplers can be used to combine a pump and a signal input for a fiber amplifier, or to remove residual pump light after the amplifier. For high-power

Fiber Coupler

A fiber coupler is defined as a device that enables the coupling of light between two single-mode fibers, achieved by bringing their cores close enough to allow optical modes to overlap,

Fiber Optic Couplers Information

Fiber optic couplers are optical devices that connect three or more fiber ends, dividing one input between two or more outputs, or combining two or more inputs into one output. The device allows

Grating Couplers on Silicon Photonics: Design

One important issue of silicon photonics that comes with its high integration density is an interface between its high-performance integrated

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Purchase top-tier fiber optic connectors and couplers from our expansive collection at the EFB-Elektronik fiber optics online shop. Peruse not just the cutting-edge in fiber optic tech, but also legacy

BSc Chemistry

Distribution of optical singals to more than one station is not so simple and hence we cannot simply connect a few fibers. To distribute optical signals from one to many and many to one we use devices

Fiber Directional Coupler

A fiber directional coupler is defined as an optical component that splits and combines optical signals by utilizing the interference of evanescent waves from two closely positioned fibers, enabling power

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Collimation / Coupling

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Thorlabs offers a variety of fiber collimation and coupling solutions. FiberPorts can be used to provide a stable platform for coupling light into and out of FC/PC, FC/APC, or SMA terminated fiber with five or

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