Connector Adapters

For kineFLEX™ systems that contain in-line FC/PC polarization maintaining connectors, the connector adapter will influence the performance of the system. A good adapter should provide a lifetime of around 2500 couplings. Qioptiq adapters contain only zirconia insert sleeves for extended lifetime performance. However, repeated coupling/uncoupling of connectors can result in a build up of dirt and contaminants and system performance degradation. This may be detected if system transmission decreases with an adapter that has been used several times.

Qioptiq recommends cleaning the adapter every 25 connector insertions. Cleaning should be performed with a clean cotton bud and alcohol.

Laser Safety Precautions

Laser light in the visible region (400-700nm) is detectable by the eye, however direct or indirect viewing may be harmful and may cause permanent damage. Never look directly into the laser, the fiber output end, scattered light from a reflective surface or into the beam along its optical axis when the laser is operational.

For laser light emitted outside the range above, the light is invisible and undetectable to the human eye. To avoid permanent eye damage, do not look directly into the laser, the fiber output end, scattered light from a reflective surface or into the beam along its optical axis when the laser is in operation. Use suitable detector cards to convert the invisible laser output into a visible feedback signal in order to confirm the beam path.

Ensure that you are aware of the wavelength and class of laser that you are fiber coupling.

Light will be emitted by an aligned fiber system as soon as the laser is enabled.

Be especially careful of reflections from optical components within the beam path and keep all beam paths at sufficiently low levels to prevent inadvertent beam-eye contact.

Ensure the laser is used in an enclosed room with controlled and restricted access and that appropriate laser safety eye protection is worn. *NOTE that the use of laser safety glasses will protect against inadvertent exposure but will prevent the user seeing the beam. Therefore, exercise extreme caution even when using protective eyewear.*

It is recommended that access to the laser is limited to qualified users who are familiar with laser safety practices and who are aware of the dangers involved.

CAUTION: THE USE OF THIS PRODUCT IN OPTICAL INSTRUMENTS WILL INCREASE THE EYE HAZARD.

Technical Support

If you have any difficulty in following the instructions, or if you require some specific assistance then please call

US Toll free: **+1 800 898 6504**
Europe: **+44 (0) 2380 744500**
Or e-mail: **technical.support@qpl.qioptiq.com**

Terms of Warranty

The product is covered by the following:

Use at 100mW combined wavelength, incident input power excluding 405nm. Special conditions apply for kineFLEX-HPV and kineFLEX-UV.

Under the following conditions.
- Optimal coupling efficiency for maximum transmission.
- Any extended period of time where the laser and fiber is not optimized, the fiber is susceptible to damage. This damage is not covered by the warranty.
- The maximum period for misalignment during optimization @ 30mW is 30 mins.
- Operating temperature: 10-40°C
- Operating Humidity: Non-condensing
- Operating Pressure: Atmospheric

Warranty does not cover:
Damage to exposed fiber/connectorised ends

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kineFLEX
Flexible Laser Technology ™
Operating Instructions

kineFLEX
Operating Instructions

Laser/Fiber Manipulator Adjustment
The kineFLEX™ features a high precision ultra-stable manipulator for coupling the fiber to the laser of your choice. Since the fiber has a pre-focussed optical assembly, tilt of this assembly becomes translation in the focal plane and translation becomes tilt. Refer to figure 1. As the fiber has a relatively large acceptance angle the system is less sensitive to translational motion provided by the manipulator. The manipulator thus requires only 2 degrees of freedom enabled by using a 4 point cradle design that is kinematic.

Principles of Operation
The manipulator is pre-aligned using an alignment tool with a pinhole aperture. The input fiber coupler and manipulator are keyway aligned such that the polarization alignment is instantaneous. Once optimized for coupling efficiency,
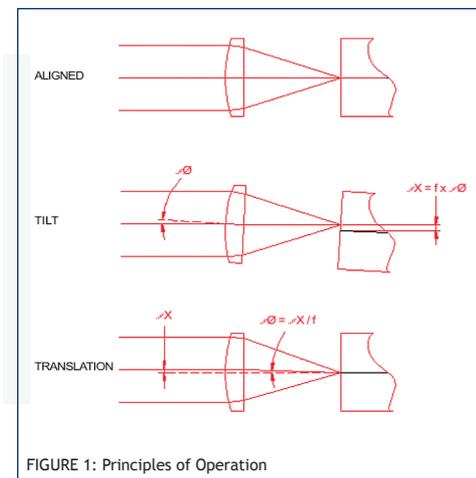

FIGURE 1: Principles of Operation

locking mechanisms on the adjustment screws ensure long term stability of launch conditions. The kinematic design ensures maintenance of polarity on repeat connections.

Points of Note
To avoid damage to the end face of the fiber, the fiber manipulator alignment process must be performed at low powers, ideally less than 10mW. Ensure that adequate laser safety precautions are taken before proceeding.

Mounting
1. Mount the Manipulator to the laser using 4 x M3 mounting screws or similar
   The polarization keyway on the carrier must be at the bottom of the mount.

Pre-alignment
For this you will require a power meter preferably with an audible output or an analogue display.

2. Press locking mechanism **E** and insert alignment tool **G** with the pinhole (step) nearest to the laser. Release locking mechanism **E**.
   The alignment tool is used to pre-position the adjusting screws relative to the position of the laser beam.

3. Align the tool by adjusting screws **A1** & **B1**, such that the pinhole aperture is causing minimal clipping of the beam.

Adjust each screw in turn to maximize the near field light transmitted through the pinhole.

4. Press locking mechanism **E**, reverse the tool and align screws **A2** & **B2**.
   Repeat step 3 for these screws thus maximizing the far field transmitted light through the pin hole.

5. Press locking mechanism **E**, remove and reverse the tool once more and repeat step 3 for adjusting screws **A1** & **B1**.
   The mount is now pre-aligned and ready for the insertion of the fiber delivery system.

Launch Optimization
You will be required to monitor the transmitted power through the fiber.

6. Insert the fiber input coupler assembly into the carrier.
   *Important - Ensure the polarizing key **D** locates into the keyway **F** on the fiber carrier. Monitor the transmitted light on the power meter.*

7. Rapid adjustment is provided using screws A1 & B1.
   *Tilt the fiber coupler using screws **A1** & **B1** in turn to achieve the highest transmission efficiency.*
   TIP – If low level light is transmitted along the fiber this is probably coupled into the cladding and only a minor adjustment should be required for the

light to be coupled down the core at which moment the intensity from the output will become markedly brighter.

8. Optimize the launch by ultra-fine adjustment using horizontal translation provided by screws A1 & A2.
   *Alternately turn screws **A1** & **A2** in the same direction in small steps whilst monitoring the output power. The fiber coupler can be translated in one direction axis by using this 'walking' motion and the point of maximum coupling efficiency detected.*

9. Adjust screws **B1** & **B2** by vertical translation for final optimization.
   *Repeat step 8 for screws **B1** & **B2**.*

Fixing of launch
10. Lock down all adjustment screws.
    *Tighten locking nuts **C** (@1.5Nm) whilst holding the adjustment screws in position using Allen wrench provided. Monitor the transmitted power whilst performing the lock-down process. It is important that this is done firmly as this will have a direct impact on the stability performance of the system over time. Torque Wrench (012130) is available for purchase on request.*

11. Insert retaining screw **H**.
    *Qioptiq recommend fitting the retaining screw **H** to ensure that the fiber cannot accidentally be removed from the mount.*

Repeat coupling
If the fiber is required to be repeatedly coupled and uncoupled from the laser, then only screw H needs to be removed before depressing locking mechanism E.

Care and Maintenance

Output Optic Couplers
During the lifetime of the product it will undoubtedly be exposed to environments with air-borne contaminants. To avoid contamination of the lenses & fiber ends the unit must operate in the conditions as specified in the datasheets namely:

Operating Pressure: Atmospheric
Operating Temperature: 10 to 40°C
Operating Humidity: Non-condensing

When the system is not in operation the dust caps provided should be used.

Connectors
Careless handling and poor maintenance can have a detrimental effect on the connector's performance. The following guidelines should help maintain the connector's integrity.

- Do not touch or expose the fiber end to any contaminants.
- Use the protective dust cap provided when not in use or connectorised.
- Adhere to strict cleaning procedures.

If the fiber connector end is contaminated, it is essential that the contaminant is removed as quickly as possible. If you
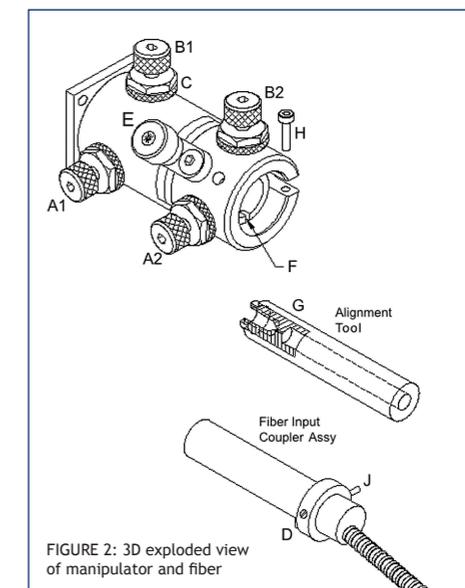

FIGURE 2: 3D exploded view of manipulator and fiber

are unsure whether the fiber has been exposed, it is preferable to clean the fiber. The contaminant could otherwise cause irreparable damage to the core of the fiber, which would require the connector be replaced.

Cleaning Procedure
- Ensure no light is emitted from the fiber.
- Qioptiq recommends cleaning connectors with an 'automatic connector cleaner', which incorporates a dry, woven polyester cloth as the cleaning medium. These units are commercially available on request from Qioptiq (011170) or from fiber termination houses.
- Alternatively moisten a cotton bud with alcohol and wipe the face of the connector.