

# kineFLEX

## Fiber delivery system

The kineFLEX® is a robust laser beam delivery system for precision measurement applications. Designed around pre-focussed and integrated optical assemblies the fiber is mode matched to your laser to achieve transmission efficiencies greater than 60%. A kineFLEX system includes; collection optics, coupler, fiber & output termination.

Single-mode fiber delivers a circular, near perfect, Gaussian beam profile. Plus, it enables the user to decouple the laser beam astigmatism and dynamic beam pointing instability from the measurement application. Fiber also provides a convenient packaging solution by relocating sources of heat, and by removing bulk components, thereby reducing the amount of optical surfaces in the beam path.

### kineMATIX manipulator mount

The kineFLEX fiber delivery system includes our patented kineMATIX® fiber coupler, which is used for aligning the fiber to the laser, and for mounting the fiber to the front of the laser. The kinematic design of the laser to fiber coupler enables true 'Plug & Play' benefits for single-mode and polarization-preserving fiber designs, because once aligned and locked into position it remains stable.

The kineMATIX has 4-axes of adjustment with sub-micron repeatability and sub-microradian stability, to deliver 10nm positioning accuracy for the ultimate in laser-to-fiber beam alignment. The robust "set & forget" design means that single-mode fiber systems can be aligned once only and are stable for multiple remove and insert operations, thus providing true modularity for instrument designs.

### Customization

Qioptiq kineFLEX fiber systems and kineMATIX mounts can be customized to fit exacting OEM specifications. Custom design examples include; pure Gaussian profiles, extremely low wavefront and aberrations, custom beam

shapes, focussed waists, custom diameters and custom beam profiles. Fiber optic designs suitable for Ultra-High Vacuum compatibility and ultra-clean environments are also offered (see PSM1054). Fiber systems may also be miniaturized into custom OEM picoFLEX® fiber designs, collection fibers, and multi-mode options offered. In the same way, the kineMATIX manipulator mount and fiber output mechanics can be customized to better suit the application. Contact us to discuss your requirements.

### Product feature highlights:

- TEM<sub>00</sub> output - circular beam, diffraction limited, Gaussian and spatially filtered
- Extremely stable output beam, with world's smallest beam wander at <1μrad/°C
- Align once. Lock position. Detach and re-insert with highly repeatable performance
- "Plug & Play" - true modularity for instrument design
- High stability to opto-mechanical thermal effects
- Truly co-linear beams for multiple laser wavelengths
- Options available for various wavelength ranges and wavelength combinations
- OEM versions available (custom beam shaping, various lengths, opto-mechanics, mounts, size, custom inputs and outputs, collection fibers etc.)



## Technical specification

Fibers	Operating Wavelengths ( $\lambda$ in nm)																			
	UV	405	445	458	473	488	515	520	532	561	594	633	637	642	660	670	730	780	830	852
Single- $\lambda$ laser																				
Multi- $\lambda$ laser						488								640						
		405												640						
Input (mW)			< 25 mW											< 100 mW						

- See kineFLEX-UV datasheet for wavelengths below 400nm
- See kineFLEX-HPV datasheet for input laser powers above 100mW CW
- Contact us for custom wavelengths, other wavelength ranges, custom laser beam diameters, and for laser powers over 500mW, plus alternative custom mechanical dimensions like the picoFLEX.

### Operating performance

Input beam, collimated diameter mm	$\emptyset$ 0.7	mm
Polarization ratio	$\leq$ -20	dB
Throughput efficiency (assuming 0.7 input beam diameter)	> 65 (single wavelength fibers) > 60 (multi- $\lambda$ & broadband systems)	%

### Fiber parameters

Fiber type	Single-Mode, Polarization Maintaining	-
Fiber length	1, 2 or 3	m
Fiber protective jacket	Stainless steel, 5mm OD, standard Stainless steel, 3mm OD, option picoFLEX	-

### Collimated output beam

Beam diameter	$\emptyset$ 0.7	mm
M Squared	typ < 1.1	-
Pointing stability	$\leq$ 1	$\mu$ rad/ $^{\circ}$ C
Beam divergence	Diffraction Limited	-
Mechanical dimensions	$\emptyset$ 12 x 50 standard $\emptyset$ 12 x 25 short barrel $\emptyset$ 6 x 25 option picoFLEX	mm
Beam position	$\leq$ $\pm$ 0.15	mm
Beam angle	$\leq$ $\pm$ 0.5	mrad

### Connectorized output beam

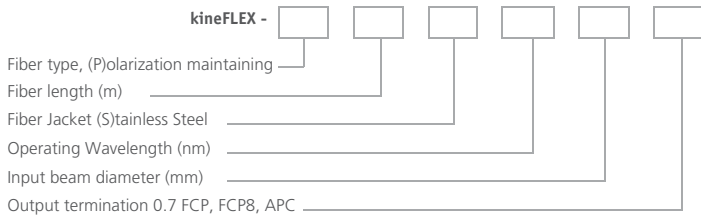
Polarization maintaining fiber	FCP (polarization keyed) FCP8, APC (polarization keyed and 8 degree polished)	-
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### Environmental conditions

Storage temperature	10 to 50	$^{\circ}$ C
Operating pressure	Atmospheric	-
Operating temperature	10 to 40	$^{\circ}$ C
Operating humidity	Non-condensing	-

Note: OEM versions available please call

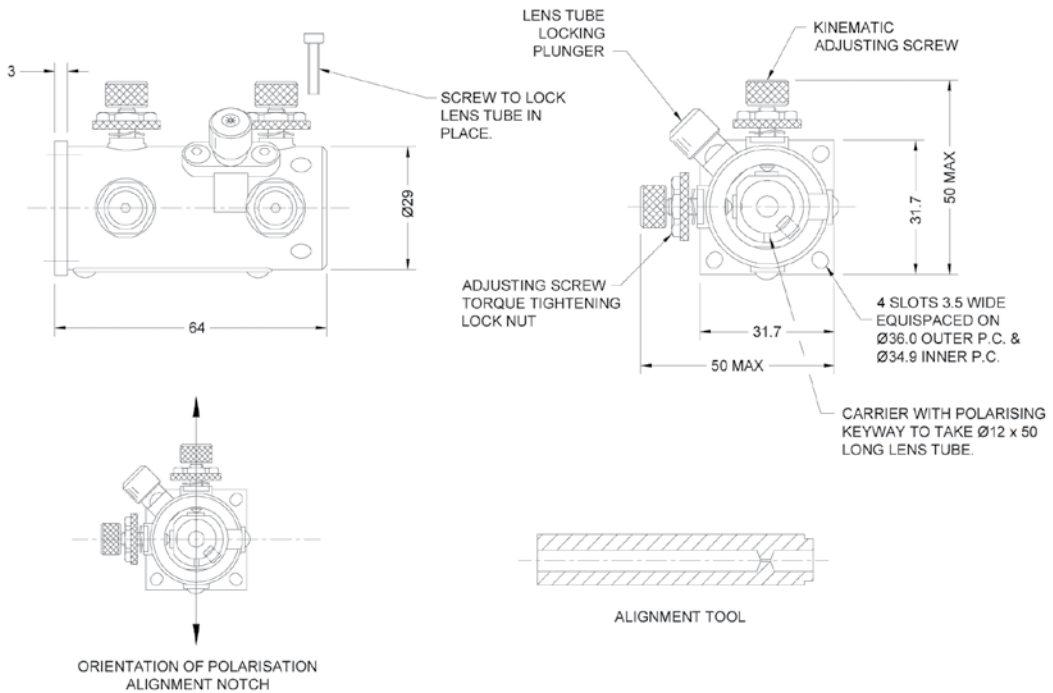
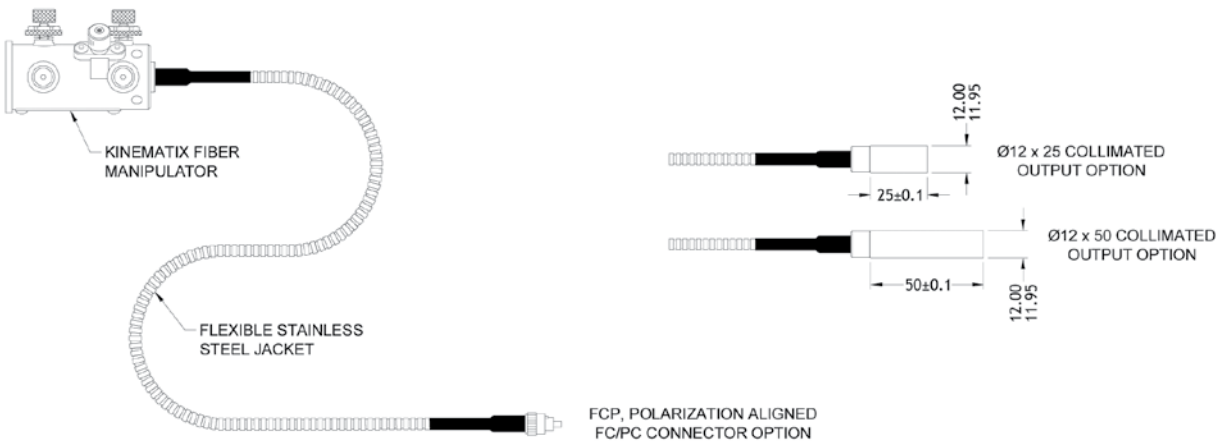
**Order code:**



**Example:**

**kineFLEX-P-2-S-488-0.7-FCP-P2**

This is a 2m length kineFLEX fiber delivery system using single-mode polarization maintaining fiber and has the standard stainless steel fiber jacket. It is designed for operation at 488nm. It expects a 0.7mm diameter collimated input laser beam and is terminated in a FCP connector output. It includes kineMATIX-P2 manipulator mount.



## Fiber Optics



### kineFLEX-HPV™ / kineFLEX-UV™

Robust high power laser beam delivery system for precision measurement applications

- Input power up to 500mW for 488nm or higher wavelengths
- Input power up to 20mW for 355nm
- OEM multi-wavelength versions



### kineFLEX-DUO™

Robust laser beam delivery system for two laser sources at visible wavelengths

- Efficient and simple beam combination
- Single-mode design
- Rugged platform for industrial applications



### laserPLATE™

Rapid and convenient mechanical mounting and packaging system for laser to fiber alignment

- Compatible and integrated laser to fiber coupling
- Combined laser chassis and heatsink
- Easy to integrate and align



### kineMATIX®

4-axis kinematic mount for coupling free space laser beams into fiber. Part of kineFLEX® fiber system

- Compatible with most lasers
- Easy to use
- “Set & Forget” alignment lock
- “Plug & Play” performance
- OEM options with kineFLEX system



### Custom fiber examples

- (left) Large collimated output beam from custom kineFLEX
- (center) Standard kineFLEX
- (right) example of a custom miniaturized fiber **piCoFLEX®** fiber

For technical information contact:

[sales.ham@excelitas.com](mailto:sales.ham@excelitas.com)  
 phone +44 (0) 2380 744 500  
[www.qioptiq.com](http://www.qioptiq.com)



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## Lasers



### iFLEX-iRIS™

Extremely reliable and robust compact laser system with optional fiber output designed for volume manufacturing

- UV, VIS and NIR Wavelengths
- Integrated smart drive and temperature control electronics
- Exceptional brightness, stability and long-term reliability
- Detachable single-mode fiber

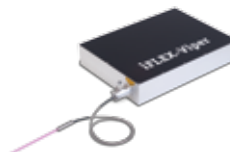


### iFLEX-Adder™

5 into 1 fiber-coupled laser beam combination system

- True ‘Plug & Play’ capability enabling ultimate flexibility of laser suite
- Upgradeable from 2 to 5 wavelengths as required
- Compatible with kineFLEX™ and kineFLEX-HPV™

## Multi-Wavelength Laser Engines



### iFLEX-Viper™

The world's first integrated multi-laser engine

- Combines 5 wavelengths in one instrument
- Delivers wavelengths via a singlemode fiber optic cable
- On-board acousto-optic modulation up to 2MHz



### iFLEX-Gemini™

Dual wavelength laser engine

- Combined, co-axial output beam
- Single-mode fiber optic beam delivery options
- End user and OEM versions