

# Fiber-to-Fiber Coupler

## High-Power Beam Delivery – 1030 nm to 1090 nm

The Fiber-to-Fiber Coupler (FFC) makes it possible to couple a laser beam from one fiber optic cable to another. This can be used for extending the range of an existing fiber cable installation, to change the beam quality by connecting a larger fiber core diameter, or to connect different mechanical fiber cable interfaces together. It can also be used to minimize down-time for laser sources with fixed output fibers that are not plug-and-play replaceable. Using the FFC it is possible to receive an exchangeable process fiber for the laser source.



### FEATURES

- Up to 20 kW (CW)
- High-resolution fiber adjustment
- Fiber alignment feedback
- Eye-safe, stand-alone
- Certified safety electronics (PL e)

### APPLICATIONS

- Welding
- Cutting
- Surface Treatment
- Cladding
- 3D Additive Manufacturing

## Fiber-to-Fiber Coupler

Specifications	FFC wc		FFC ac
Maximum Power (kW)	20		4.5
Wavelength (nm)	1030 to 1090		
Magnification, $M = f_{roc}/f_{coll}$	0.6, 1.0, and 1.2		
Maximum NA			
M = 1.0	0.14		0.18
M = 1.2	0.14		0.18
M = 0.6	0.12		0.09
<b>Coupling Margins</b>			
Min. Fiber Diameter increase ( $\mu\text{m}$ at x kW)	<6 kW	6 to 10 kW	>10 kW
M = 1.0	$\geq 50$	$\geq 50$	$\geq 100$
M = 1.2	$\geq 50$	$\geq 100$	$\geq 150$
M = 0.6		Single-mode to multi-mode <sup>1</sup>	
<b>Cooling</b>			
Cooling Method	Water		Air (passive)
<b>Fiber Delivery System</b>			
Fiber Interfaces	QBH / QD / LLK-B (Q5)		
<b>Dimensions and Weight</b>			
Dimensions	See page 3		See page 4
Weight (kg)	4.5		2.3 to 2.5
<b>Electronics</b>			
Supply Voltage (V DC)	24		
Maximum Current <sup>2</sup> (mA)	100		
Fieldbus	CANopen		
Certified Safety Function	ISO 13849-1:2015 Category 3 PL e		
<b>Environmental Conditions</b>			
Humidity (% RH)	<80		
Operating Temperature (°C)	5 to 50 (non-condensing)		
Storage Temperature (°C)	-25 to 70		
<b>Compliance Information</b>			
RoHS	Directives 2011/65/EU and 2015/863/EU		
REACH	Directive EC no 1907/2006		

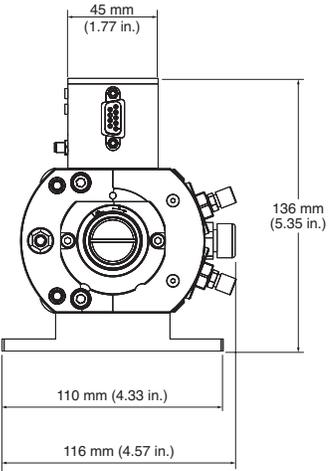
Notes:

- 1 M = 0.6 is recommended for single-mode to multi-mode fiber coupling. With M = 0.6 the NA increase by a factor 1/0.6 which lead to a better mode-mix in the multi-mode fiber. M = 0.6 is typically not recommended for multi-mode to multi-mode fiber coupling due to the large increase of NA.
- 2 The power supply source should be protected by a max. 1 A slow blow fuse.

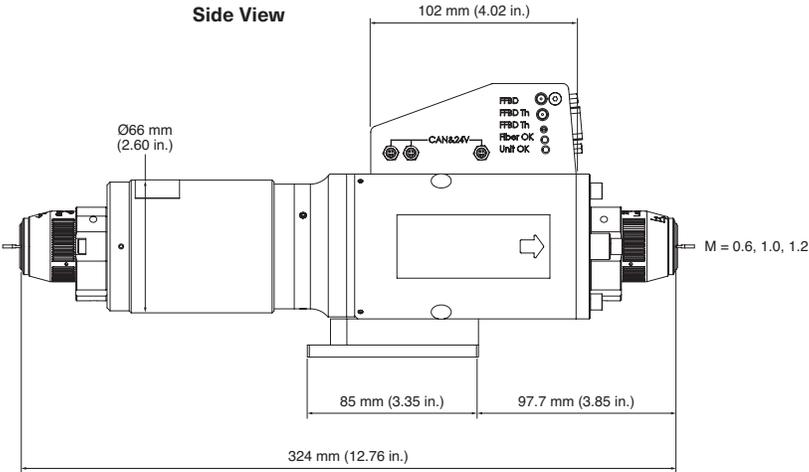
Mechanical Specifications

Fiber-to-Fiber Coupler Water-Cooled (FFC wc)

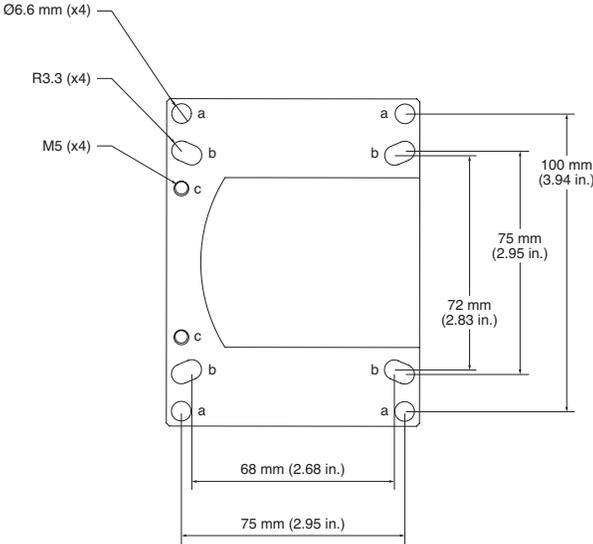
Front View  
(design with QBH  
Fiber Interface)



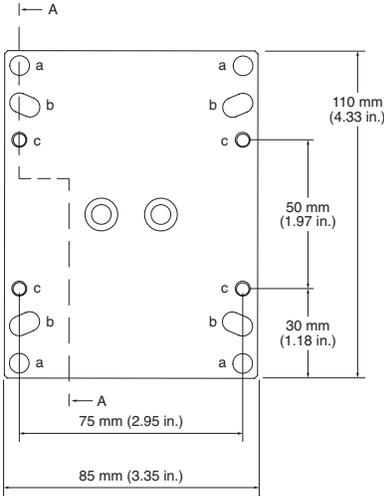
Side View



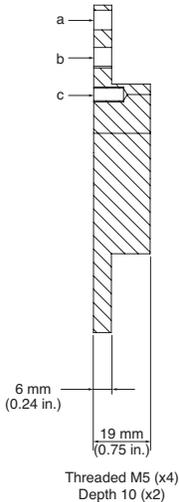
Mounting Plate



Above View  
(without the FFC House)



Below View  
(without the FFC House)

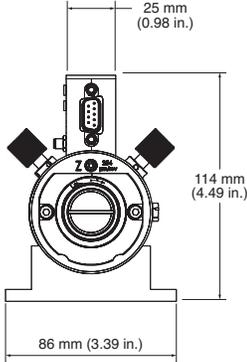


Threaded M5 (x4)  
Depth 10 (x2)

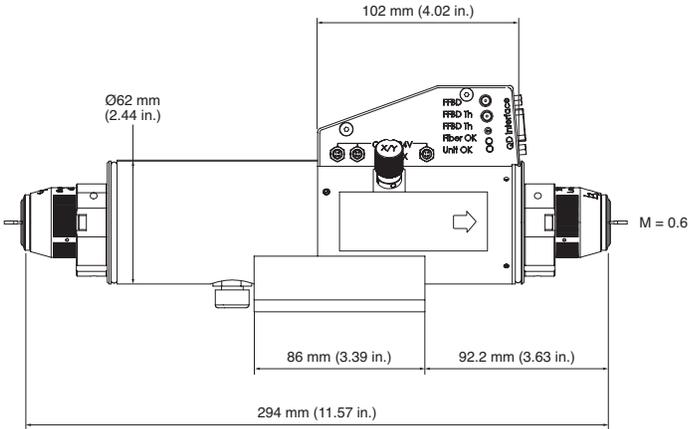
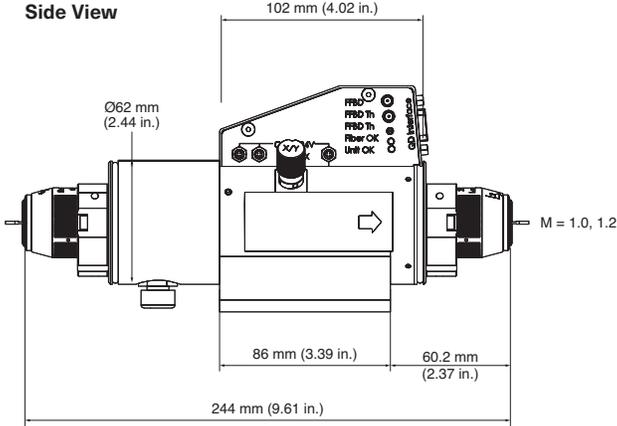
Mechanical Specifications

Fiber-to-Fiber Coupler Air-Cooled (FFC ac)

Front View  
(design with QBH  
Fiber Interface)

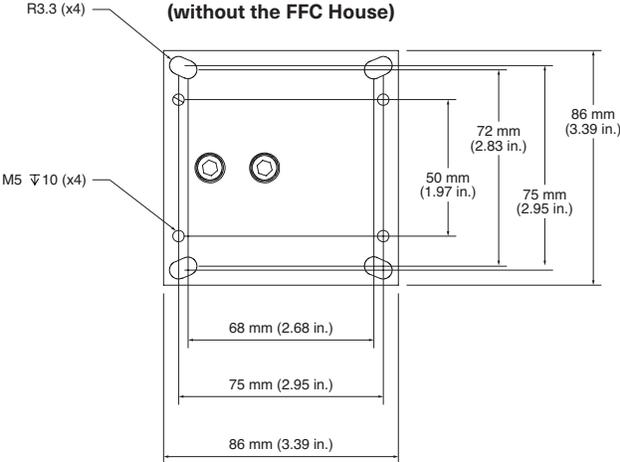


Side View



Mounting Plate

Below View  
(without the FFC House)



Part Numbers

Fiber-to-Fiber Coupler Water-Cooled (FFC wc)

Specifications				
Input Interface	Output Interface	M = 0.6	M = 1.0	M = 1.2
QBH-	QBH	101623X06	101623X10	101623X12
	QD	101623X24	101623X26	101623X28
QD-	QD	103336X06	103336X10	103336X12
	QBH	103336X24	103336X26	103336X28

Note: LLK-B (Q5) interface available upon request.

Fiber-to-Fiber Coupler Air-Cooled (FFC ac)

Specifications				
Input Interface	Output Interface	M = 0.6	M = 1.0	M = 1.2
QBH-	QBH	3-9022X06	3-9022X10	3-9022X12
	QD	3-9191X06	3-9191X10	3-9191X12
QD-	QD	3-9232X06	3-9232X10	3-9232X12
	QBH	1428774	1428775	1428776

Note: LLK-B (Q5) interface available upon request.

Accessories

Accessory	Part Number
Power and Communication cable angled, 5 m	2-5053X01
Power and Communication cable angled, 10 m	2-5053X02
FFBD cable MCX (and DLD), 1500 mm	1-5135X01

## Raman Filter

Stimulated Raman Scattering (SRS) can be a major limiting factor for high power, high brightness fiber lasers. As a result, overall length of the process fiber cable can be restricted.

By introducing a wavelength selective mirror between the two lenses in the Fiber-to-Fiber Coupler (FFC) it is possible to completely remove unwanted Raman radiation. This is a solution patented by Coherent and that also involve the mode-stripping technology inside the Coherent Fiber Optic Cables.

FFC Raman available upon request.

