Beam Delivery Components for High-Power Lasers

FIBER-TO-FIBER SWITCH

1030 nm to 1090 nm

The Fiber-to-Fiber Switch (FFS) provides maximum flexibility for laser beam distribution from a single high-power laser source. It can route the laser beam to up to four outputs, enabling either simultaneous operation through energy sharing or sequential operation through time sharing.

By connecting fibers with different core diameters, the FFS allows multiple beam qualities to be generated from a single laser source. Certified safety electronics, combined with short switching times and an integrated high-efficiency beam dump, also enable the FFS to function as a fast and reliable beam shutter, reducing process downtime.

When equipped with wavelength-selective mirrors, the FFS can additionally be used to filter unwanted laser wavelengths, such as Raman-shifted light, ensuring optimal beam quality at the output.



FEATURES

- Up to 20 kW (CW)
- High-resolution fiber adjustment
- Fiber alignment feedback
- High-speed switch
- Certified safety electronics (PL e)

APPLICATIONS

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

COHERENT

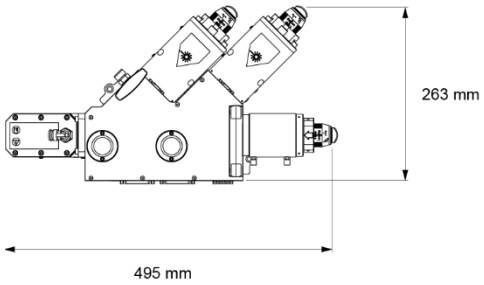
Specifications	FFS Water-cooled	FFS Air-cooled
Maximum Power CW (kW)	20[1]	4.5
Wavelength (nm)	1030 to 1090	
Magnification, M	0.6, 1.0, and 1.2	
Maximum NA		
M = 1.2	0.14	0.18
M = 1.0	0.14	0.18
M = 0.6	0.12	0.09
Switching Time Mirrors (ms)	45	
Coupling Margins		
Minimum Fiber Diameter Increase (µm)	**<6 kW**	**6 to 10 kW**	**>10 kW**
M = 1.2	≥50	≥100	≥150
M = 1.0	≥50	≥50	≥100
M = 0.6	Single-mode to Multi-mode[2]		
Cooling		
Cooling Method	Water	Air (passive)
Fiber Delivery System		
Fiber Interfaces	QBH / QD / LLK-B (Q5)	
Dimensions & Weight		
Dimensions	See pages 3 and 4	
Weight (kg)		
2-way / 4-way	16 / 27	11 / 19
Electronics		
Supply Voltage (V DC)	24	
Maximum Current (A)	2.5	
Fieldbus	CANopen	
Certified Safety Function	ISO 13849-1:2023-12 Category 3 PL e	
Environmental Conditions		
Humidity (% RH)	<80	
Operating Temperature (°C)	5 to 50 (non-condensing)	5 to 45 (non-condensing)
Storage Temperature (°C)	-25 to 70	
Compliance Information		
RoHS	Directives 2011/65/EU and (EU) 2015/863	
REACH	Regulation (EC) No. 1907/2006	
CE	EMC Directive 2014/30/EU; RoHS Directive 2011/65/EU	
UKCA	EMC Regulations SI 2016/1091; RoHS Regulations SI 2012/3032	

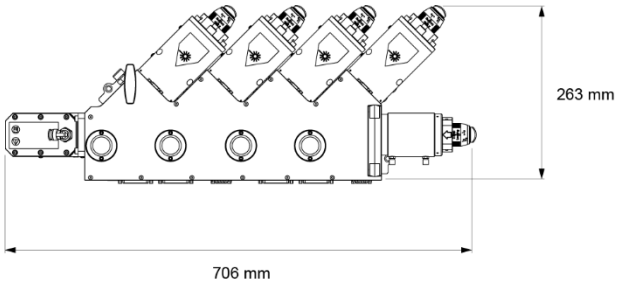
1 Not applicable for FFS with energy-sharing design. The energy-shared FFS is specified to max 15 kW.

2. 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.

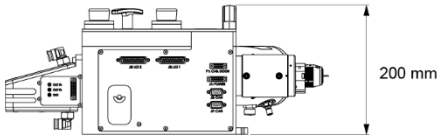
Mechanical Specifications

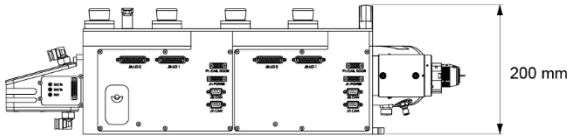
Fiber-to-Fiber Switch Water-Cooled (FFS wc)



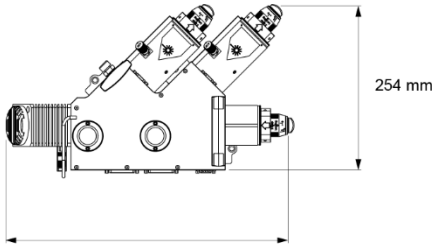


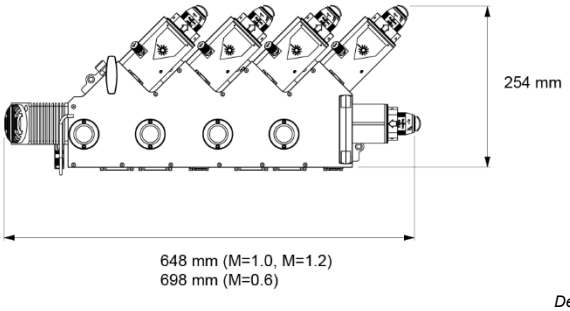
Design shown with QBH fiber interface



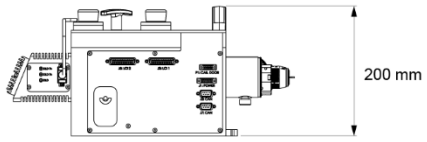


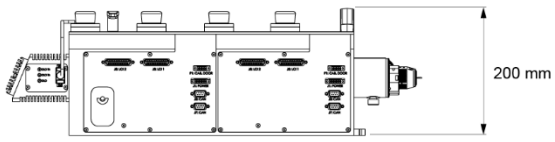
Fiber-to-Fiber Switch Air-Cooled (FFS ac)





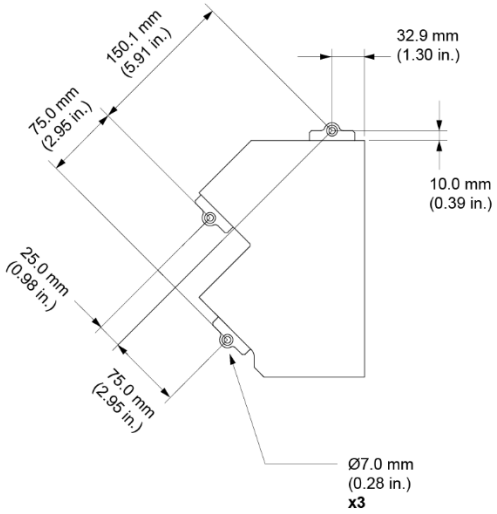
Design shown with QBH fiber interface



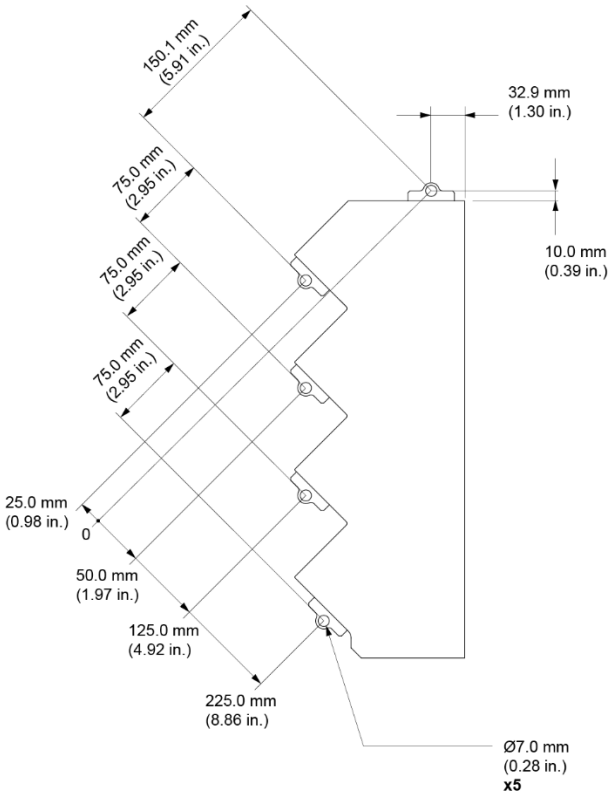


Mechanical Specifications

Mounting Plate



Above View 2-way
(without FFS house)



Above View 4-way
(without FFS house)

Part Numbers

Fiber-to-Fiber Switch Water-Cooled (FFS wc)

Time Shared	Input Interface	Output Interface	M=0.6	M=1.0	M=1.2
2-way	QBH-	QBH	2290984	2290985	2290986
		QD	2290987	2290988	2290989
	QD-	QD	2290996	2290997	2290998
		QBH	2290999	2291000	2291001
4-way	QBH-	QBH	2290990	2290991	2290992
		QD	2290993	2290994	2290995
	QD-	QD	2291002	2291003	2291004
		QBH	2291005	2291006	2291007

Note: LLK-B (Q5) interface and 1&3-ways FFS are available upon request.

Energy Shared	Input Interface	Output Interface	M=0.6	M=1.0	M=1.2
2-way	QBH-	QBH	2291008	2291009	2291010
		QD	2291011	2291012	2291013
	QD-	QD	2291014	2291015	2291016
		QBH	2291017	2291018	2291019
4-way	QBH-	QBH	2291020	2291021	2291022
		QD	2291023	2291024	2291025
	QD-	QD	2291026	2291027	2291028
		QBH	2291029	2291030	2291031
4-way ESx2	QBH-	QBH	2291032	2291033	2291034
		QD	2291035	2291036	2291037
	QD-	QD	2291038	2291039	2291040
		QBH	2291041	2291042	2291043

Note: LLK-B (Q5) interface and 1&3-ways FFS are available upon request.

Part Numbers

Fiber-to-Fiber Switch Air-Cooled (FFS ac)

Time Shared	Input Interface	Output Interface	M=0.6	M=1.0	M=1.2
2-way	QBH-	QBH	2291044	2291045	2291046
		QD	2291047	2291048	2291049
	QD-	QD	2291056	2291057	2291058
		QBH	2291059	2291060	2291061
4-way	QBH-	QBH	2291050	2291051	2291052
		QD	2291053	2291054	2291055
	QD-	QD	2291062	2291063	2291064
		QBH	2291065	2291066	2291067

Note: LLK-B (Q5) interface and 1&3-ways FFS are available upon request.

Accessories

Accessories	Part Number
FFBD cable MCX (and DLD), 1500 mm	1-5135X01
USB Interface, USB-to-CAN V2, Compact, D-sub 9	2-5022X01

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