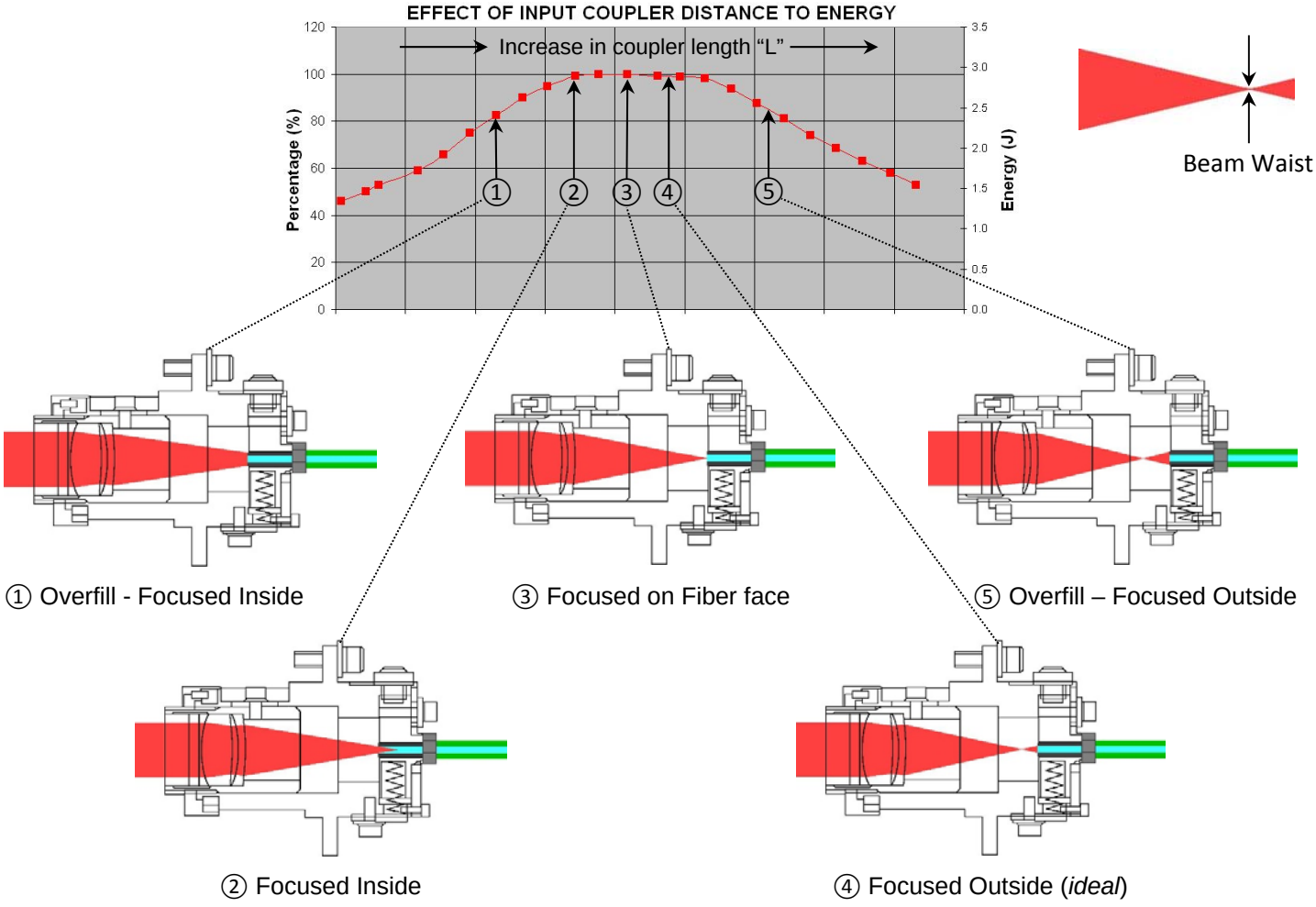
SL – 04/12/18

Input Coupler Alignment

The purpose of the Input Coupler is to focus the IR energy from the Laser into the Optical Fiber. The Input Coupler itself has a longitudinal Z-Axis adjustment that is used to adjust the focus of the IR energy into the fiber. Where the focus occurs is more or less critical to get the best energy transfer. The Z-Axis adjustment has enough variation to allow the IR energy to be focused outside and inside the optical fiber. A typical graph showing the effects of energy coupling vs. focus is shown below:



When focusing long or short (① and ⑤ respectively), the IR energy will overfill the fiber face and flood the entire surface of the fiber which will result in poor energy transfer and poor welds (*as only a portion of the IR energy will couple into the fiber core*).

When the IR energy is focused just inside the optical fiber (②) but covers the entire core diameter, the beam waist (focal point) will be inside the optical fiber. At higher Laser powers, the optical fiber may become damaged due to the high energy densities produced at the focal point.

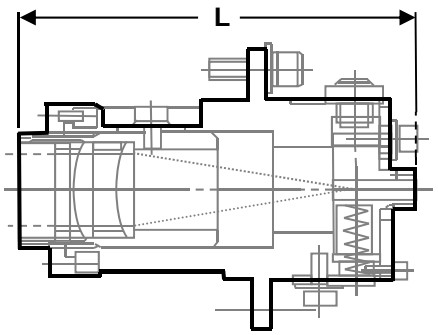
If the IR energy from the Input Coupler is focused on to the fiber face (③), then the fiber will be damaged when the Laser is fired due to the high energy densities produced by the Laser.

The ideal Input Coupler setting is where the focus (beam waist) is just outside the optical fiber and all IR energy is focused over the entire face of the fiber core (④). This is where the fiber is fully coupled for maximum energy transfer.

To maximize the IR energy (full coupling) into the optical fiber, the longitudinal Z-Axis adjustment must be set correctly. Instead of performing a Z-Axis adjustment test for each Input Coupler to precisely set the Z-Axis, years of experience have defined the optimal adjustment setting for each Input Coupler based on Laser Model and optical fiber.

The optimal setting for each Input Coupler can be factory set by adjusting the overall length "L". This distance is pre-set at the factory for each configured Laser that is shipped from AMYA. There is typically no need to check or adjust the Input Coupler unless the Laser or Optical Fiber is changed. The overall distance can be measured with a pair of calipers.

Note: If the Input Coupler is removed from the Laser or adjusted, the Laser will need to be re-aligned.



The tables below list the optimal length "L" based on Laser Model, Fiber Diameter and Fiber Type (S.I. = Stepped Index or G.I. = Graded Index as indicated on the optical fiber label). Any fiber diameter not listed for a particular Laser Model means the fiber is not used with that particular Laser (exceeds divergence limits).

A-Series Laser Welders

Laser Model		Fiber Diameter	Dimension "L"		Input Coupling Unit (AMYA #)	FL
U.S. Models	Japan Models		S.I. (± 0.4mm)	G.I. (± 0.4mm)		
LW2AG(E)	ML-8050A	300µm	66.5mm	Not Used	A-05736-001	80mm
LW5AG(E)	ML-8150A	200µm – 1mm	66.5mm	Not Used		
LW5AM(E)	ML-2052A	100µm – 200µm	67.7mm	Not Used	MLU-0405-00	80mm
LW5A(E)	ML-2051A	200µm	67.7mm	67.7mm		
		300µm – 1mm	67.7mm	68.2mm		
LW15A(E)	ML-2050A	300µm – 1mm	67.7mm	68.2mm		
LW25A(E)	ML-2150A	400µm – 1mm	67.7mm	68.2mm		
LW50A(E) + BET	ML-2351A	200µm – 1mm	67.3mm	68.2mm	A-04158-001 (MLU-0405-00)	80mm
LW50A(E) *no BET*		300µm – 1mm	68.2mm	68.2mm		
LW70A(E) + BET	ML-2350A	200µm – 1mm	67.3mm	68.2mm		
LW70A(E) *no BET*		300µm – 1mm	68.2mm	68.2mm		
LW150A(E) + BET	ML-2450A	200µm – 1mm	67.3mm	68.2mm		
LW150A(E) *no BET*		300µm – 1mm	68.2mm	68.2mm		
LW300A(E)	ML-2551A	300µm – 1mm	66.7mm	66.5mm	A-04158-003 (MLU-0247-00)	80mm
LW400A(E)	ML-2550A	400µm – 1mm	66.7mm	66.5mm		
LW500A(E)	ML-2651B	300µm – 1mm	65.5mm	64.6mm	A-04158-002 (MLU-0593-00)	40mm
LW600A(E)	ML-2650B	400µm – 1mm	65.5mm	64.6mm		

Note: BET = Beam Expander (optional)

Classic Laser Welders (*obsolete models*)

Laser Model		Fiber Diameter	Dimension "L"		Input Coupling Unit (AMYA #)	FL
U.S. Models	Japan Models		S.I. (± 0.4mm)	G.I. (± 0.4mm)		
LW10(E)	ML-2030A	200µm	67.7mm	67.7mm	MLU-0405A-00	80mm
		300µm – 1mm	67.7mm	68.2mm		
LW15(E)	ML-2130A	300µm – 1mm	67.7mm	68.2mm		
LW51(E)	ML-2331B	200µm – 1mm	66.7mm	67.0mm	MLU-0247-00	80mm
LW52(E)	ML-2332B	200µm – 1mm	66.7mm	67.0mm		
LW100(E)	ML-2333B	400µm – 1mm	66.7mm	67.0mm		
LW250	ML-2531A	400µm – 1mm	66.7mm	66.5mm		
LW300	ML-2530A	600µm – 1mm	66.7mm	66.5mm		
LW400(E)	ML-2651A	300µm – 1mm	65.5mm	64.6mm	MLU-0593-00	40mm
LW500(E)	ML-2650A	400µm – 1mm	65.5mm	64.6mm		

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