

AXRAYSER BM111-2D

AXRAYSER Raytools BM111-2D Fiber Laser Cutting Head User Manual

Model: BM111-2D (F200 Hcfa)

1. PRODUCT OVERVIEW

The AXRAYSER Raytools BM111-2D is an advanced auto-focus fiber laser cutting head designed for high-precision metal sheet cutting applications. It features an optimized optical configuration and a smooth gas circuit to significantly improve cutting quality and efficiency. The auto-focus function reduces manual intervention, offering a range of -12mm to +10mm with an accuracy of 0.05mm. This cutting head is built with IP65 class dustproof protection for all-around dust prevention and includes three cover glasses to protect the focus and collimation lenses.

BM111-2D (Flat cutting)



AutoFocus Fiber Laser Cutting Head

Figure 1: Raytools BM111-2D Fiber Laser Cutting Head with HcFa Servo Driver. This image displays the main cutting head unit alongside its compatible HcFa servo driver, illustrating the primary components of the system.

Key features include:

- **Excellent Design:** Optimized optical configuration and smooth gas circuit for improved cutting quality and efficiency.
- **Auto Focus:** Automatic focus adjustment with a range of -12mm to +10mm and 0.05mm accuracy.
- **Multiple Cover Glasses:** Three protective glasses for the focus and collimation lenses.
- **Excellent Dustproof:** IP65 rated for comprehensive dust prevention.
- **High Speed Cutting:** Capable of cutting 12mm thick SUS304 at 0.7m/min and 12mm thick Q235 at 1.2m/min (at 3000W).

2. SAFETY INSTRUCTIONS

Operating a fiber laser cutting head involves high power and potential hazards. Adhere strictly to the following safety guidelines to prevent injury and equipment damage.

- **Eye Protection:** Always wear certified laser safety glasses appropriate for the laser's wavelength and power. Direct or reflected laser light can cause severe eye damage.
- **Skin Protection:** Avoid direct exposure of skin to laser radiation. Wear appropriate protective clothing.
- **Ventilation:** Ensure adequate ventilation in the work area to remove fumes and particulate matter generated during cutting.
- **Electrical Safety:** Ensure all electrical connections are properly grounded and conform to local electrical codes. Do not operate with damaged cables or connectors.
- **Fire Safety:** Keep flammable materials away from the cutting area. Have appropriate fire suppression equipment readily available.
- **Authorized Personnel:** Only trained and authorized personnel should operate or maintain the laser cutting system.
- **Emergency Stop:** Familiarize yourself with the location and operation of all emergency stop buttons on the laser system and the cutting head.
- **Gas Pressure:** Ensure assist gas pressure does not exceed 30 bar. Use appropriate regulators and safety valves.

3. SETUP AND INSTALLATION

Proper installation is crucial for the performance and longevity of the BM111-2D cutting head. Refer to your laser machine's overall installation guide for specific integration steps.

3.1 Unpacking and Inspection

- Carefully remove the cutting head from its packaging.
- Inspect for any visible damage during shipping. Report any damage immediately to your supplier.
- Verify all components listed in the packing list are present.

3.2 Mounting the Cutting Head

- Mount the BM111-2D cutting head securely onto the Z-axis of your laser cutting machine using appropriate mounting hardware. Ensure it is level and stable.
- Connect the fiber optic cable from the laser source to the collimation side (top) of the cutting head. Handle the fiber cable with extreme care to avoid damage.
- Connect the electrical cables for auto-focus control and sensors to the designated ports on the cutting head and the laser machine's control system.

3.3 Gas Connections

- Connect the assist gas supply lines to the appropriate inlets on the cutting head. The BM111-2D supports assist gas pressures up to 30 bar.
- Ensure all gas connections are tight and leak-free. Use suitable fittings and sealants.
- Verify the gas type (e.g., Oxygen, Nitrogen, Air) is correct for the material being cut.



Figure 2: Close-up view of the Raytools BM111-2D label. This label provides critical information such as the model number (BM111-2D), collimation length (CL), focusing length (FL), and serial number, essential for identification and support.

4. OPERATING INSTRUCTIONS

This section outlines the general operating procedures for the BM111-2D cutting head. Always refer to your laser machine's control software manual for specific operational commands.

4.1 Power On and System Initialization

- Ensure all safety precautions are in place.
- Power on the laser cutting machine and allow it to complete its initialization sequence.
- Verify that the BM111-2D cutting head is recognized by the control system.

4.2 Auto-Focus Function

- The BM111-2D features an auto-focus system. In your laser control software, select the auto-focus

function.

- Input the desired focus position relative to the material surface. The auto-focus range is -12mm to +10mm.
- The cutting head will automatically adjust its internal lens position to achieve the specified focus.
- For optimal cutting results, perform a focus test on scrap material before critical cuts.

4.3 Nozzle Selection and Replacement

- Select the appropriate nozzle style (single, double, or custom) and diameter (0.8mm - 5.0mm) based on the material type, thickness, and desired cut quality.
- To replace the nozzle, ensure the laser is off and the assist gas supply is closed. Carefully unscrew the old nozzle and screw in the new one, ensuring it is finger-tight.

4.4 Setting Assist Gas Pressure

- Adjust the assist gas pressure according to the material and thickness being cut. The maximum recommended pressure is 30 bar.
- Higher pressures are typically used for nitrogen cutting of stainless steel, while lower pressures are used for oxygen cutting of mild steel.

5. MAINTENANCE

Regular maintenance ensures optimal performance and extends the lifespan of your BM111-2D cutting head.

5.1 Daily Checks

- Inspect the nozzle for wear or damage. Replace if necessary.
- Check the ceramic ring for cracks or contamination.
- Ensure the protective cover glass is clean and free from spatter.

5.2 Weekly/Bi-Weekly Maintenance

- **Cleaning Lenses:** With the laser off and safety protocols observed, carefully remove the protective cover glasses. Use specialized lens cleaning solution and lint-free wipes to clean the lenses. Avoid touching the optical surfaces with bare hands.
- **Inspect Collimation and Focusing Lenses:** Periodically inspect the internal collimation and focusing lenses for signs of contamination or damage. This may require partial disassembly by a qualified technician.
- **Check Gas Lines:** Inspect all gas lines and fittings for leaks or damage.

5.3 Long-Term Storage

- If storing the cutting head for an extended period, ensure it is clean and dry.
- Store in its original packaging or a protective case in a climate-controlled environment to prevent dust and humidity damage.

Photos

BM111 0-3.3kW



Figure 3: Detailed views of the BM111-2D cutting head components. This composite image shows various angles and parts of the cutting head, including gas inlets, electrical connections, and lens access points, useful for maintenance and troubleshooting.

6. TROUBLESHOOTING

This section provides solutions to common issues encountered during the operation of the BM111-2D cutting head. For complex problems, contact technical support.

Problem	Possible Cause	Solution
Poor Cut Quality / Rough Edges	Incorrect focus position, dirty nozzle, incorrect gas pressure, worn nozzle, contaminated protective lens.	Adjust focus, clean/replace nozzle, verify gas pressure, clean protective lens.
No Laser Output	Laser source issue, damaged fiber optic cable, safety interlock engaged, power supply issue to cutting head.	Check laser source status, inspect fiber cable (with caution), verify all safety interlocks are closed, check power connections.
Auto-Focus Malfunction	Sensor contamination, electrical connection issue, mechanical obstruction.	Clean auto-focus sensor, check electrical wiring, inspect for physical obstructions in the focus mechanism.
Gas Leakage	Loose fittings, damaged O-rings or seals.	Tighten fittings, replace damaged O-rings or seals.

7. TECHNICAL SPECIFICATIONS

The following table details the technical specifications for the AXRAYSER Raytools BM111-2D Fiber Laser Cutting Head (F200 Hcfa variant).

Parameter	Value
Model Number	BM111-2D
Wattage	3.3 KW
Auto-Focus Range	-12mm ~ +10mm
Auto-Focus Velocity	≤ 170mm/s
Auto-Focus Accuracy	0.05mm
Auto-Focus Acceleration	≤ 10 m/s ²
Nozzle Styles	Single, Double, Custom
Nozzle Tip Diameter	0.8mm - 5.0mm
Max Assist Gas Pressure	≤ 30bar
Weight	10kg
Collimation Side (Top) Lens	24.9 x 1.5 mm
Focusing Side (Middle/Bottom) Lens	27.9 x 4.1 mm

Parameter	Value
Collimation Length Options	75 mm, 100 mm
Focusing Length Options	125 mm, 155 mm, 200 mm (Current model: F200)
Dustproof Rating	IP65

8. WARRANTY AND SUPPORT

AXRAYSER products are manufactured to high-quality standards. This product comes with a standard manufacturer's warranty against defects in materials and workmanship from the date of purchase. Please refer to your purchase documentation for specific warranty terms and duration.

8.1 Technical Support

For technical assistance, troubleshooting beyond this manual, or warranty claims, please contact your authorized AXRAYSER dealer or the manufacturer directly. When contacting support, please have your product model number (BM111-2D) and serial number ready.

Manufacturer: Axrayser

For more information, visit the [AXRAYSER Store on Amazon](#).