A Maintenance

⚠ WARNING

The input voltage to the laser weld unit is potentially lethal!

- All electrical cables and connections should be treated as if they were at a harmful level.

⚠ WARNING

Invisible class 4 laser radiation when the LightWELD device is energized

Risk of permanent skin or eye damage and vision impairment from invisible direct, reflected, and scattered Class 4 laser radiation during maintenance.

- Shut off the Light**WELD** device (section 5.10 [▶97]).
- Remove the AC power connection.
- Secure the device against being switched on again.

A.1 IPG Weld Head Maintenance

Personnel Qualifications: Maintenance Personnel (see section 1.4 [▶19]).

▼ *Table 36. Recommended Maintenance and Intervals*

What Item	Interval	Type of Maintenance
Nozzle Tip	Daily	Regular inspection for contamination. Cleaning, if contaminated.
Protective Window	Daily	Regular inspection of the protective window for contamination and timely replacement, if contaminated. Follow procedure in section A.1.1 [▶166] which describes the steps for disassembling and replacing this window if needed.
Focus Lens	Daily	Regular inspection of the focus lens for contamination and timely replacement, if contaminated. Follow procedure in section A.1.2 [▶168] which describes the steps for disassembling and replacing this lens if needed.
Fiber Cable	Daily	Daily visual inspection of yellow fiber cable for damage.
QBH Connection	Every 3 days	Regular inspection of QBH connector for looseness.

▼ *Table 36. Recommended Maintenance and Intervals (Continued)*

What Item	Interval	Type of Maintenance
Trigger 1 & 2 Switches	3.2 years	The weld head trigger switches should be replaced every 3.2* years. *Refer to section A.1.3 [▶169].

▼ *Table 37. List of Field Replaceable Parts*

IPG Part Number	Quantity	Description
CDSBOM00023702XU (20 Pack)	1	Protective Window Replacement Kit (Only need one protective window for this procedure)
CDSBOM000234XXXU	1	LightWELD Focus Lens
CDHRA051CQCXXXXU	1	LightWELD 2000 XR Weld Head

A.1.1 Protective Window Replacement

This procedure is applicable for all models. The protective window must always be clean and checked regularly.

NOTICE

Weld Head Maintenance Precaution

Weld Head can become damaged if maintenance is performed while AC power is ON.

- Prior to performing any kind of maintenance on the hand weld head, maintenance personnel should (1) shut off the unit (section 5.10 [▶97]) and (2) remove AC power connection.

NOTICE

Installing Protective Window from Other Suppliers

This may damage the weld head! This will also alter the specifications and performance of the device.

- For safe and reliable operation only use an IPG supplied protective window. Only the IPG protective window will have the correct specifications and coating specifically designed to work with the laser inside the device.

NOTICE

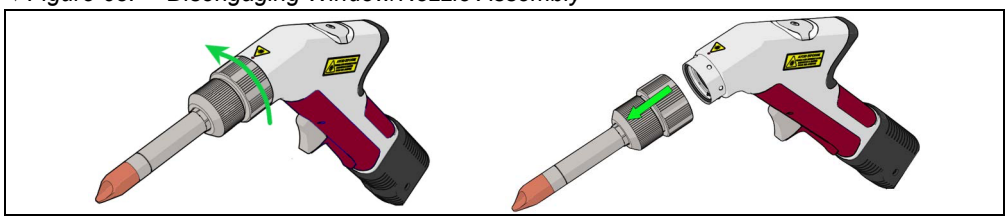
Delicate Protective Window - Handle with Care!

Contamination or scratches on the protective window degrades the laser welding process. This may eventually crack the window and could damage the weld head.

- Wear nitrile gloves. Avoid touching the flat surface of the protective window.
- Do NOT use tweezers or other tools (may scratch the coating on the window).
- Carefully pick up (or place) the protective window by its edge.

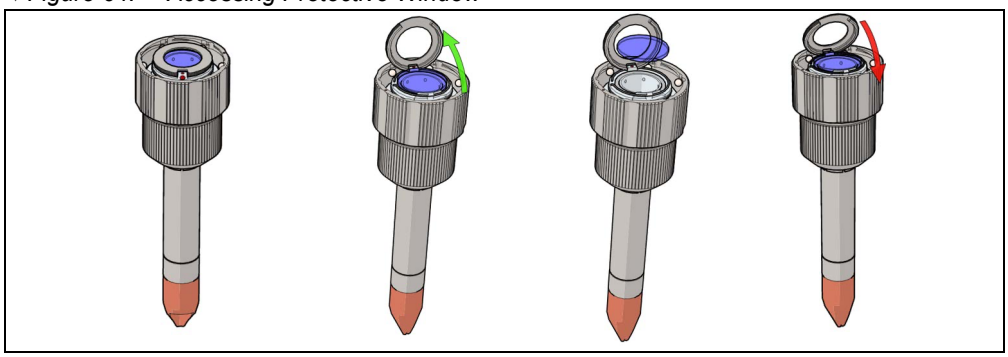
4. On the weld head, turn the silver nut counterclockwise to disengage window/nozzle assembly (Figure 63 [▶ 167]).

▼*Figure 63. Disengaging Window/Nozzle Assembly*



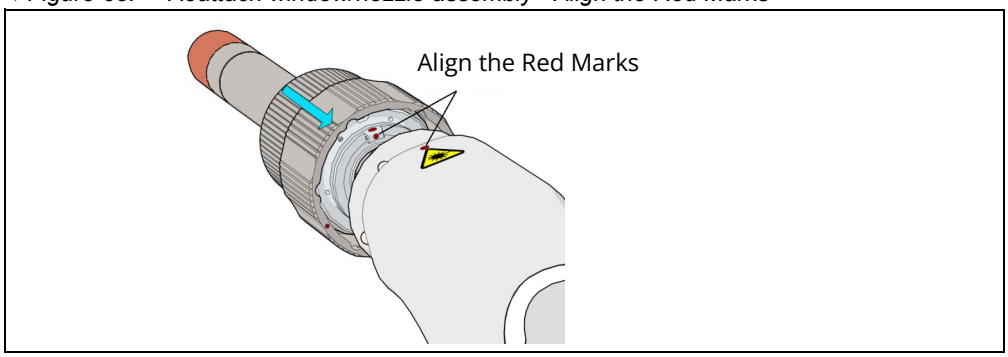
5. Flip open the cap to access the protective window underneath. Users should inspect the new protective window for contamination prior to installing it. Use CDA to blow any dust or debris off the new protective window. Replace the protective window and securely close cap (Figure 64 [▶ 167]).

▼*Figure 64. Accessing Protective Window*



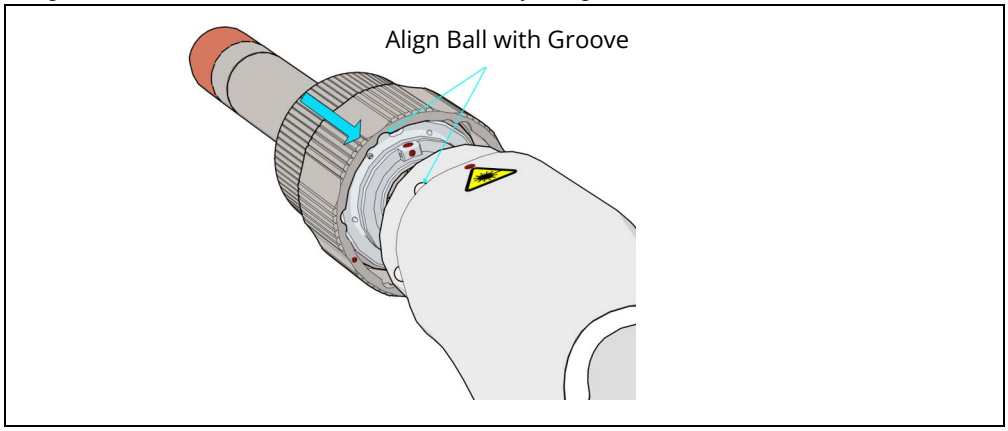
6. To reattach window/nozzle assembly:
   a. Align the red marks (Figure 65 [▶ 167]).

▼*Figure 65. Reattach window/nozzle assembly - Align the Red Marks*



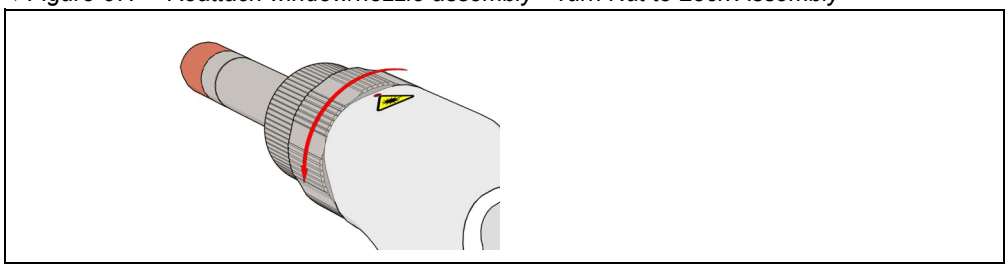
   b. Align balls with circular cutouts (Figure 66 [▶ 168]).

▼*Figure 66. Reattach window/nozzle assembly - Align Balls with Circular Cutouts*



c. Turn nut as shown to lock assembly in place (Figure 67 [▶ 168]).

▼*Figure 67. Reattach window/nozzle assembly - Turn Nut to Lock Assembly*

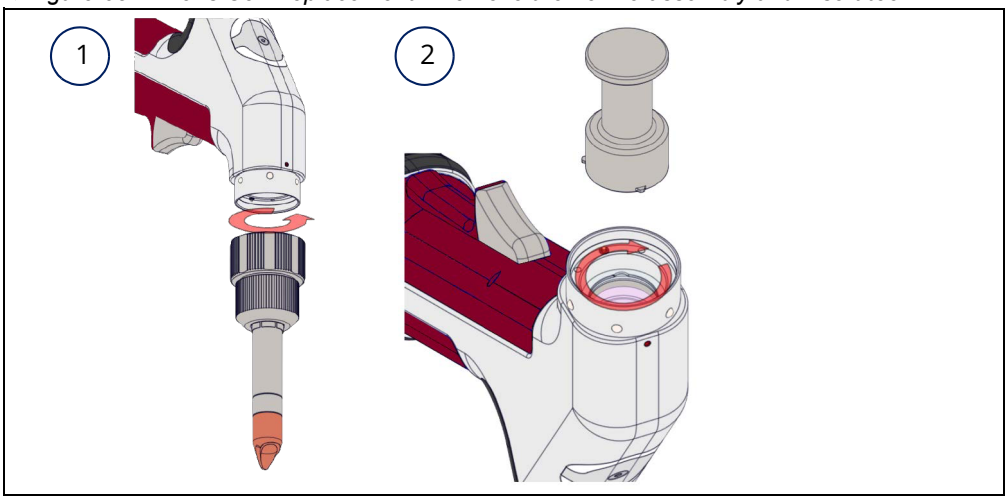


End of Procedure

A.1.2 Focus Lens Replacement

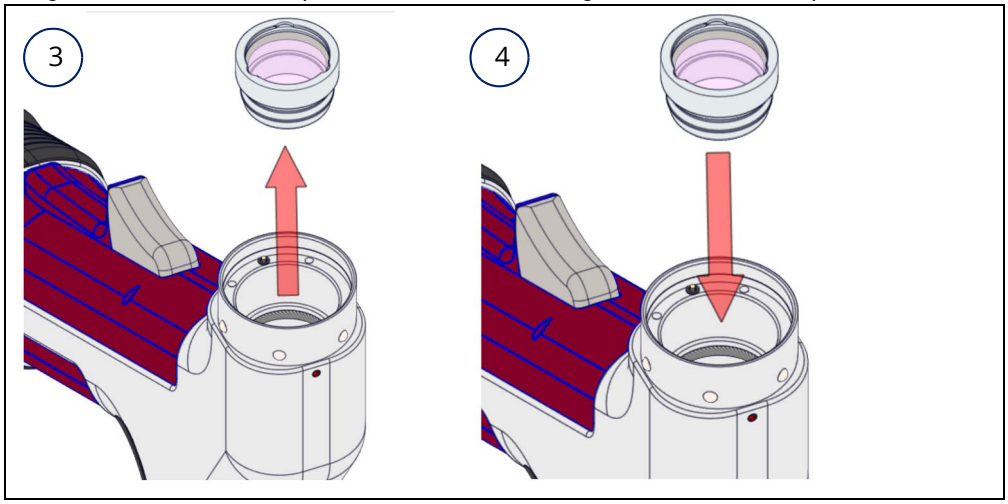
1. Twist and remove the nozzle assembly. See Figure 68 [▶ 168].
2. Insert the Lens Cell Removal tool (CMUS0010493XXXXU). See Figure 68 [▶ 168].

▼*Figure 68. Lens Cell Replacement - Remove the nozzle assembly and insert tool*



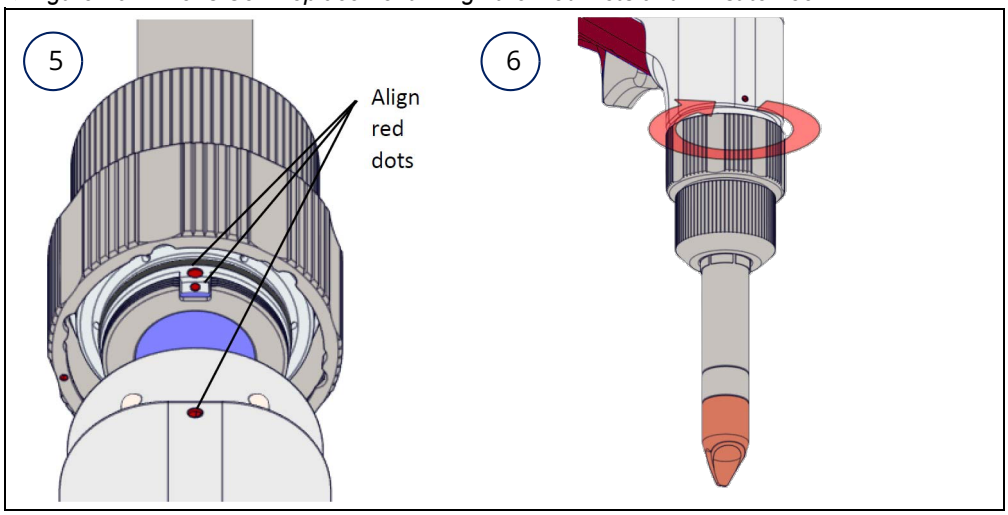
3. Using the tool, pull out the damaged lens cell. See Figure 69 [▶ 169].
4. Using the tool, carefully insert the new lens cell (CDSBOM000234XXXU). Push to make sure the lens is properly seated. See Figure 69 [▶ 169].

▼*Figure 69. Lens Cell Replacement - Pull out damaged Lens Cell and Replace*



5. Align the red dots on the nozzle assembly with the red dot on the head. See Figure 70 [▶ 169].
6. Push the nozzle assembly over the ball bearings and twist to lock in place. See Figure 70 [▶ 169].

▼*Figure 70. Lens Cell Replacement - Align the Red Dots and Twist to Lock*



End of Procedure

A.1.3 Wearing Safety-Related Components

NOTICE

Replacement of safety-related components

An n_{op} value is provided for wearing safety-related components (median value of annual component actuations as per EN ISO 13849-1). If the actual median value of annual component actuations exceeds this value, the time T_{10d} must be ascertained as per EN ISO 13849-1. Dependent on this, the safety-relevant component must be prematurely replaced.

▼ *Table 38. Weld Head Trigger Switch Replacement*

Test Point	Trigger Switches in Weld Head
Remedy	Replace the trigger switches
Time Interval	At n_{op} = 125000 cycles/year replace at 3.2 years. (B_{10d} = 4 x 10^5) or in the event of defects.
Item	Weld Head
Description	Contact local IPG Service to have weld head returned for switch replacement or exchanged (refer to section B.1 [▶179]).

The replacement of the weld head switches is only to be performed by IPG service personnel.

A.1.4 Replacing the Weld Head

Personnel Qualifications: Maintenance Personnel (see section 1.4 [▶19]).

NOTICE

Weld Head Maintenance Precaution

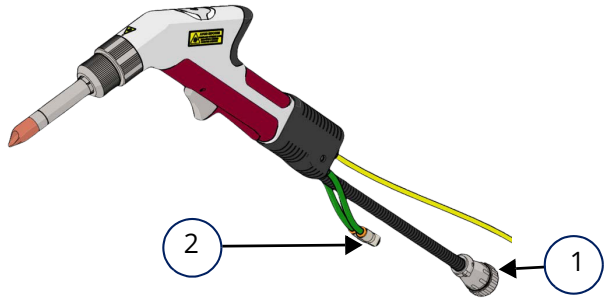
Weld Head can become damaged if maintenance is performed while AC power is ON.

➤ Prior to performing any kind of maintenance on the hand weld head, maintenance personnel should (1) shut off the unit (section 5.10 [▶97]) and (2) remove AC power connection.

1. Unpack the new weld head and make sure to prepare it to receive the fiber bayonet. Place it on table nearby.
2. Remove the AC power cord from the system and turn off the gas supply.
3. From the bottom of the weld head, remove approximately 0.5 m (1.5 ft) of the netted sheathing from the umbilical cable to expose the cabling within.
4. Disconnect the electrical cable (see Figure 71 [▶ 171], #1). Rotate the connector counter clockwise and pull to disconnect.
5. Disconnect the gas tubing (see Figure 71 [▶ 171], #2). Press in fitting to remove tubing.
6. Remove the boot and disconnect the fiber output bayonet from the bottom of the weld head. Refer to section A.2 [▶171] for instructions on how to do this.
7. Once the bayonet is removed, and to maintain cleanliness, immediately connect the fiber output bayonet to the new head. There are instructions in section A.2 [▶171] on how to connect bayonet to the new weld head.
8. Once the bayonet is connected, re-install the boot.
9. Reconnect the electrical cable. Check the orientation of the plug and plug into other connector. Rotate connector to lock in place.
10. Reconnect the gas tubing.
11. Re-install the netted sheathing that was removed from the umbilical cable in step 3.

12. Turn on gas supply. Power up the welding system.

▼*Figure 71. Disconnecting Weld Head*



Item	Designation	Item	Designation
1	Electrical Connection	2	Gas Tubing Connection

A.2 Connect/Disconnect Fiber Output

Personnel Qualifications: Maintenance Personnel (see section 1.4 [▶19]).

The following procedures to disconnect and connect the fiber output to the weld head should only be necessary when replacing the output weld head. During normal operation, this does not need to be performed. Prior to reconnecting the fiber to the weld head, the cleaning procedure (section A.3 [▶175]) must also be performed.

These procedures are applicable for all models.

A.2.1 Precautions for Fiber Maintenance Procedures

These precautions are applicable for all Light**WELD** models.

NOTICE

Weld Head Maintenance Precaution

Weld Head can become damaged if maintenance is performed while AC power is ON.

- Prior to performing any kind of maintenance on the hand weld head, maintenance personnel should (1) shut off the unit (section 5.10 [▶97]) and (2) remove AC power connection.

NOTICE

Fiber Cable Terminator Contamination

The quartz block is very delicate and must stay perfectly clean. Any contamination will result in serious damage to the fiber cable. See section 3.6 [▶72].

- Always wear clean nitrile gloves when disconnecting fiber from weld head.
- NEVER touch the quartz block at the end of the fiber connector.
- Only remove fiber from weld head when necessary for replacement.
- Always follow instructions in this section.

NOTICE

Laser Fiber Cable Handling

Severe laser damage will occur if optical fiber cable, routed through the umbilical, is mishandled (extreme bending, pulling or impact).

- Do not bend the yellow optical fiber cable to a radius less than 50 mm minimum bending radius.
- Do not apply excessive load or impact to the fiber cable.
- NEVER move or lift the unit by pulling or dragging on the umbilical cabling.

A.2.2 Disconnect Fiber Output

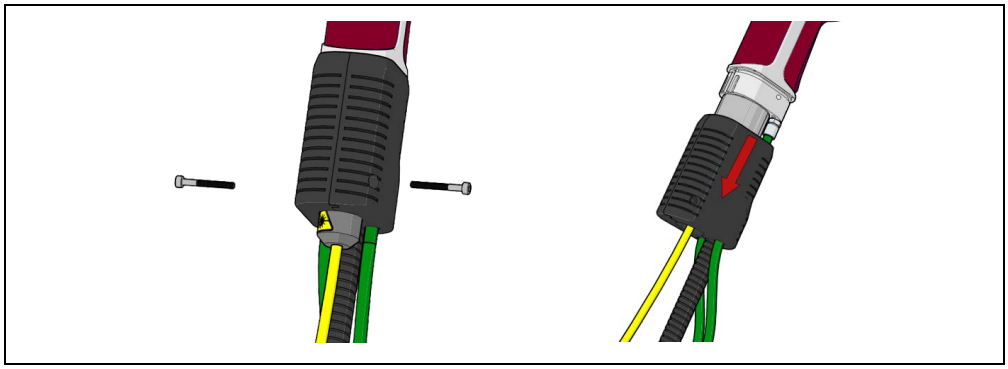
IMPORTANT

Must read and follow precautions in section A.2.1 [▶171] before beginning this procedure.

The output fiber connection is within the boot section of the weld head.

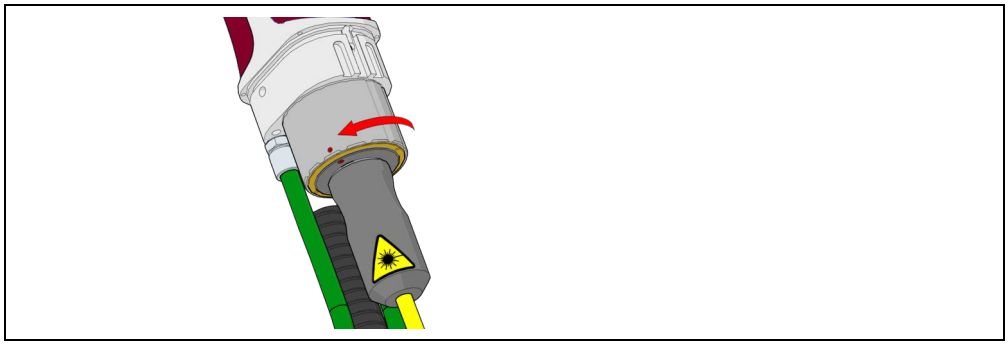
1. Remove power from device.
2. To remove the boot, unscrew the 2 SHCS shown here and pull down the boot (Figure 72 [▶ 172]).

▼*Figure 72. Removing boot from weld head to expose fiber connector*



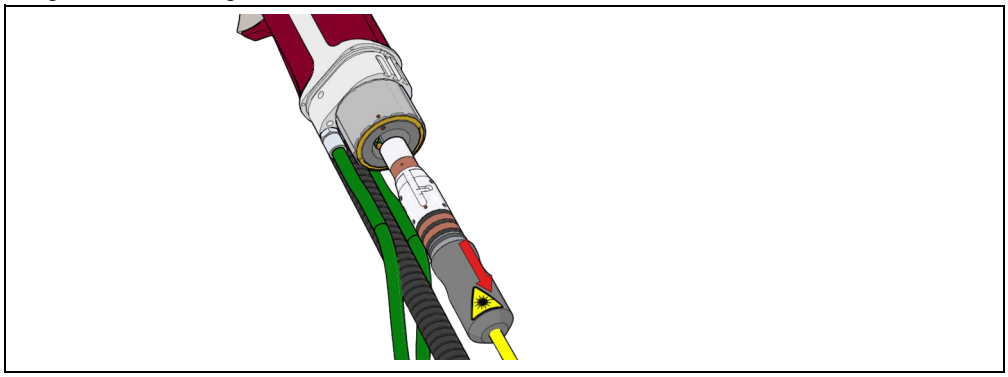
3. Rotate receiver nut to align red dots as indicated in drawing below (Figure 73 [▶ 172]).

▼*Figure 73. Rotate receiver nut to align red dots*



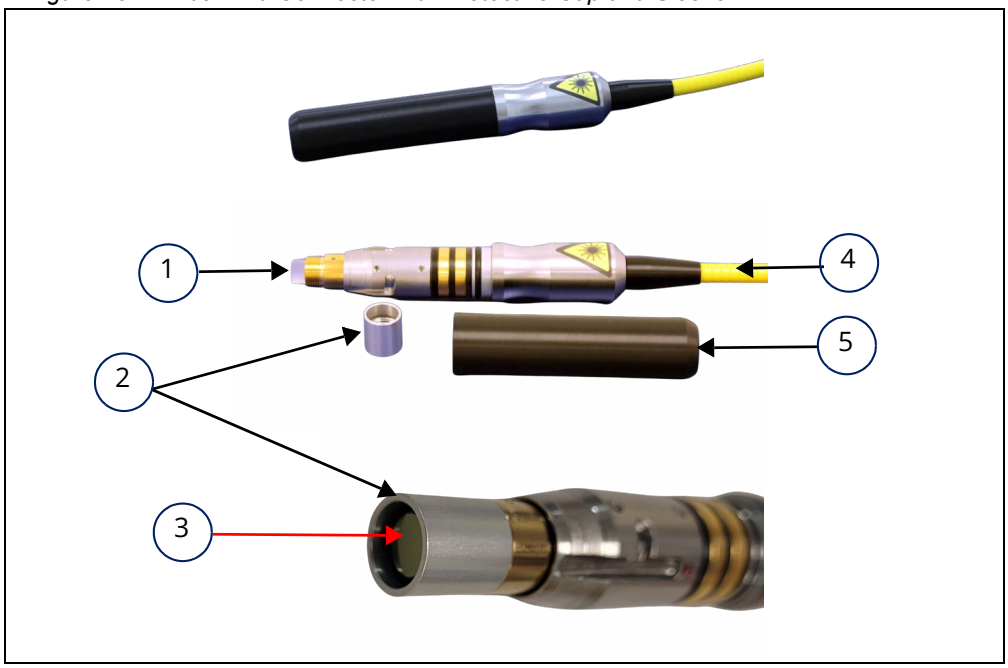
4. Carefully pull out the fiber connector (Figure 74 [▶ 173]).

▼*Figure 74. Pulling out fiber connector from weld head*



5. Leave protective cap installed over quartz block. Install storage sleeve. Never touch the protective cap window or quartz block optical surfaces. These surfaces must remain clean.
6. Close the welding head with a protective cap.

▼*Figure 75. Fiber End Connector with Protective Cap and Sleeve*

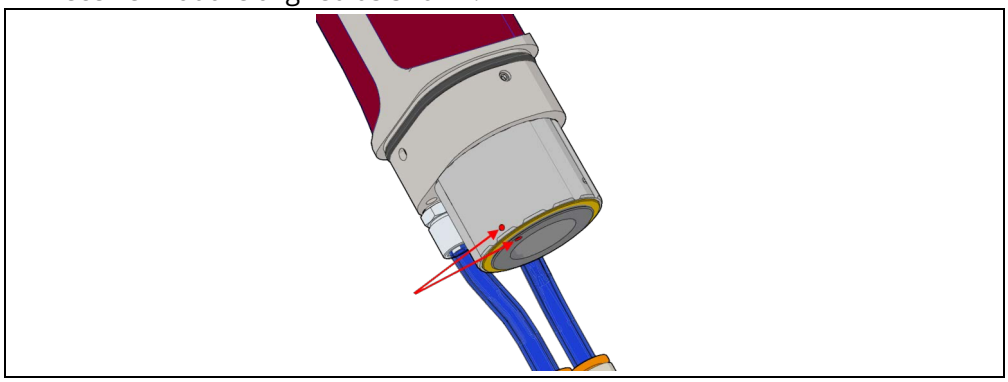


Item	Designation	Item	Designation
1	Quartz Block	4	Fiber
2	Protective Cap	5	Storage Sleeve
3	Protective Cap Window	--	--

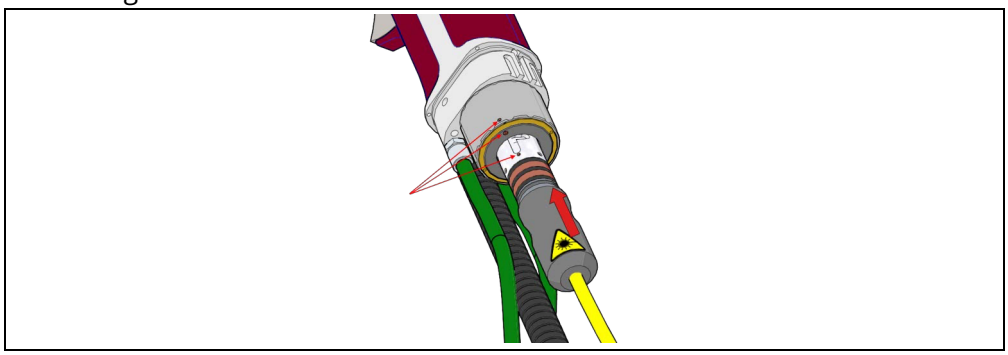
A.2.3 Connecting Fiber Cable to IPG Weld Head

IMPORTANT Must read and follow precautions in section A.2.1 [▶171] before beginning this procedure.

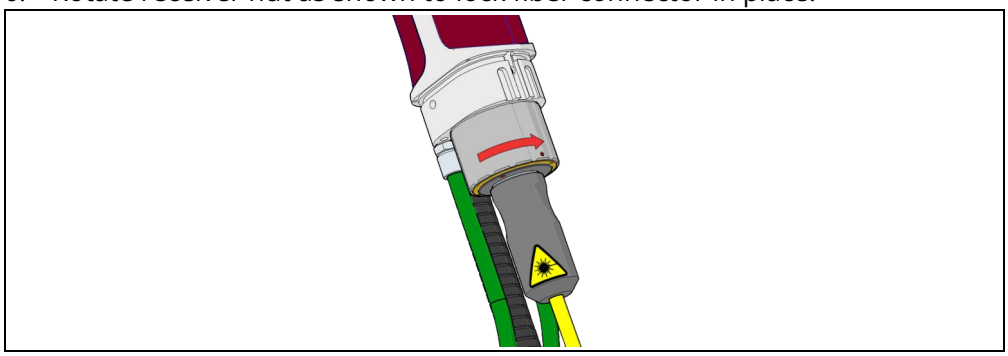
1. Remove power from the device.
2. Before reconnecting the fiber to the weld head, the technician must first perform the cleaning procedure (section A.3 [▶175]) on the fiber output quartz block.
3. Remove storage sleeve from fiber bayonet. Leave protective cap on quartz block.
4. To reconnect the fiber output connector, please ensure the red dots on the receiver nut are aligned as shown.



5. Insert the fiber by aligning the red dot on the fiber output connector with the red dots on the receiver as shown. Insert the fiber output connector as far as it will go but do not force it.



6. Rotate receiver nut as shown to lock fiber connector in place.



7. Reinstall and secure the weld head boot. Do not operate the weld head with the boot not secured in place (see pictures in section A.2.2 [▶172]).

End of Procedure

A.3 Output Termination Cleaning Procedure

Personnel Qualifications: Maintenance Personnel (see section 1.4 [▶19]).

It is imperative that a fiber termination is checked for dust, dirt or damage every time the fiber output connection to the weld head is disconnected.

NOTICE

Fiber Cable Terminator Contamination

The quartz block is very delicate and must stay perfectly clean. Any contamination will result in serious damage to the fiber cable and welding head. See section 3.6 [▶72].

- Always wear clean nitrile gloves when disconnecting fiber from weld head.
- NEVER touch the quartz block at the end of the fiber connector.
- Only remove fiber from weld head when necessary for replacement.
- Always follow instructions in this section.

NOTICE

- The use of a dirty or improperly cleaned output fiber termination can lead to serious damage to the unit. IPG Photonics is not responsible for any damages due to contaminated output fiber termination. Custom fiber terminations may require a different procedure.

A.3.1 Recommended Cleaning Supplies

NOTICE

Weld Head Maintenance Precaution

Weld Head can become damaged if maintenance is performed while AC power is ON.

- Prior to performing any kind of maintenance on the hand weld head, maintenance personnel should (1) shut off the unit (section 5.10 [▶97]) and (2) remove AC power connection.

The following items are recommended for cleaning the output termination:

- Powder free rubber gloves or finger cots
- Optical cleaning wipes and/or swabs
- Lens tissue
- Isopropanol (water free)
- Acetone (optical grade, water free)
- Compressed air (oil free, water free)
- Microscope (IPG model or equivalent) or 20X Eye Loupe
- Light Source

▼*Figure 76. Recommended Cleaning Supplies (not included)*

A.3.2 Cleaning the Quartz Block (Generic Procedure)

IMPORTANT It is imperative that you wear powder free rubber gloves during this cleaning procedure!

Perform the following procedure to clean the fiber output termination:

1. Turn off in the welder unit and remove power from the device (section 5.10 [▶97]).
2. Spray the quartz block end face with Isopropyl Alcohol. Wipe it with a new sheet of lens tissue and blow the surface with clean compressed air.
3. Inspect the end face surface with the microscope.
4. Use light source to illuminate the end face of the fiber termination so that the light is reflected from the surface.

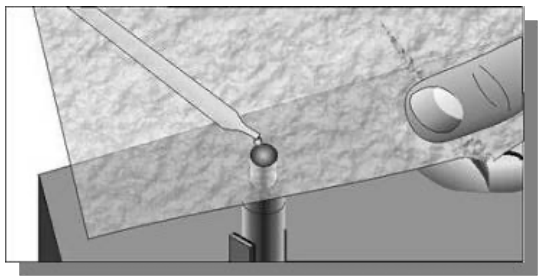
IMPORTANT Always look at the surface at a slight angle to improve visibility.

5. Inspect the surface carefully. If contamination is visible on the quartz block, cleaning is necessary. Contamination will lead to dark spots on the surface.
6. Try to blow off the dust with compressed air from the side.

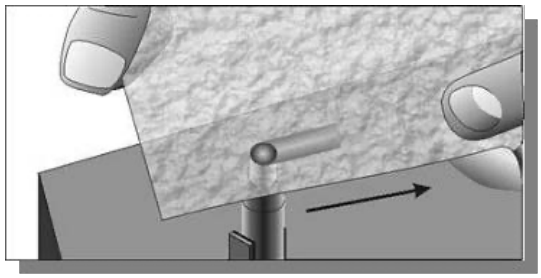
IMPORTANT Never blow air directly at the surface because you might embed contaminants into the surface. Always blow across the surface being cleaned!

7. Place a new sheet of lens tissue on the surface of the quartz block as shown in the picture below. Put one drop of Isopropanol onto the lens tissue and wipe the wet spot laterally across the surface until it is dry.

▼*Figure 77. Isopropanol on lens tissue*



▼*Figure 78. Lateral wipe across surface*



IMPORTANT

Do not let the areas where your fingers have touched the tissue come into contact with the surface being cleaned.

8. Re-inspect the surface
9. Repeat step 7 with Acetone if it is still contaminated.
10. If necessary you should put a drop of acetone onto a cleaning swab and wipe away contamination in a circular motion, do not scratch the surface.

IMPORTANT

- Do not touch the tip of the cleaning swab with your fingers.
- To prevent contamination, only use each swab once.

11. Repeat above cleaning steps until all contamination is removed. This cleaning procedure can be stopped at any time if a good result has already been achieved.

IMPORTANT

It is hereby stated that damage to the fiber termination can occur due to mishandling; the use of incorrect cleaning procedures or chemicals for cleaning and is not covered by the warranty.

End of Procedure

Learn more
visit www.ipgphotonics.com