OTOS 2024–05

***Realtime* Measuring**

of Arc length & Welding seam & Weld pool width

WG3+

Ray-X Camera Helmet

OWNER's manual

OTOS

Be sure to read the user manual before use and use the product correctly for its intended purpose. After reading the User Guide, keep it in a place where it is readily available to the person using it.

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Before you use

Reading and understanding the entire manual is the best way to ensure your safety.
The items below are essential checks for efficient use of the welding helmet.
Please make sure to follow them.

Check during initial operation or when working conditions (environment) change

- Adjust the sensitivity to suit the operator's welding environment before use.
- After storing the welding Helmet, it can be immediately possible to use for welding.
  (Auto/On function)

Inspections and precautions when working

- The cartridge (sensor, solar panel and sight glass) must never be shielded from the welding light.
- Ensure that the welding light and the sensor in the cartridge are in a straight line.
- Outside of the 120° field of view, the lens may brighten (unshaded).
- Replace the batteries as soon as the battery replacement signal indicator lights up
  (CR 2450/3V, use the specified size).

Storage Inspection and Precautions

- The camera welding helmet is composed of electronic components and should not be subjected to severe shock or throwing, should not be exposed to snow or rain, and should not be exposed to moisture or stored in high humidity.

Precautions for storing the welding helmet

- If possible, do not store the welding helmet in a place where welding operations are constantly taking place, as this may cause continuous battery drain.
- Do not store in proximity (within 80 cm) close to fluorescent or incandescent light bulbs
  ⇒ the lens will operate and drain the battery.

Welding Camera Features

● Image clarity

- Color camera with Full HD (1920×1080) resolution
- 140+ dB U-HDR with composite of 3 images captured at 3 different exposure times

● Transferring captured video externally

- You can transfer captured video directly to your PC if you have PC's image grabber board or, if your PC has an HD-SDI communication port.
- If the PC does not have an HD-SDI port, the captured video can be transferred to the PC via an SDI to USB converter.
- Captured video can be transferred over long distances (100 meters) without loss.
- If you are using multiple cameras, you can use the QVM converter to transfer up to 4 channels of captured video to your PC simultaneously.

● Adjust the quality of the video image

- If the camera captures the image upside down, the captured video image can be converted to the vertical direction by the video image adjustment program provided by OTOS.
- If the captured video image is flipped horizontally from side to side, the video image can be flipped horizontally.
- Horizontal and vertical grid lines can be displayed simultaneously on top of the video image captured from the camera. This can help the user to adjust the angle and FOV of the camera.
- The welding camera is equipped with a single photo sensor. This sensor outputs a high signal when the arc is on and a low signal when the arc is off. When this signal is high, the light-shielding filter glass mounted on the front part of the camera is activated.
- When this light-shielding glass is activated, a video image containing strong arc light is captured by the camera at the specified transmittance.
- In the short circuit transfer mode of GMAW, the arc is frequently switched on and off during welding. If the sensitivity of the photo sensor is set to sensitive, the video image captured by the camera in that mode may not have sufficient U-HDR quality. Therefore, the sensitivity can be adjusted using the program provided by the OTOS.
- By adjusting the transmittance of the light-shielding filter glass mounted on the front part of the welding camera, the video image captured by the camera can be brightened or darkened. The user can use the adjustment program provided by OTOS to capture the desired brightness of the video image.

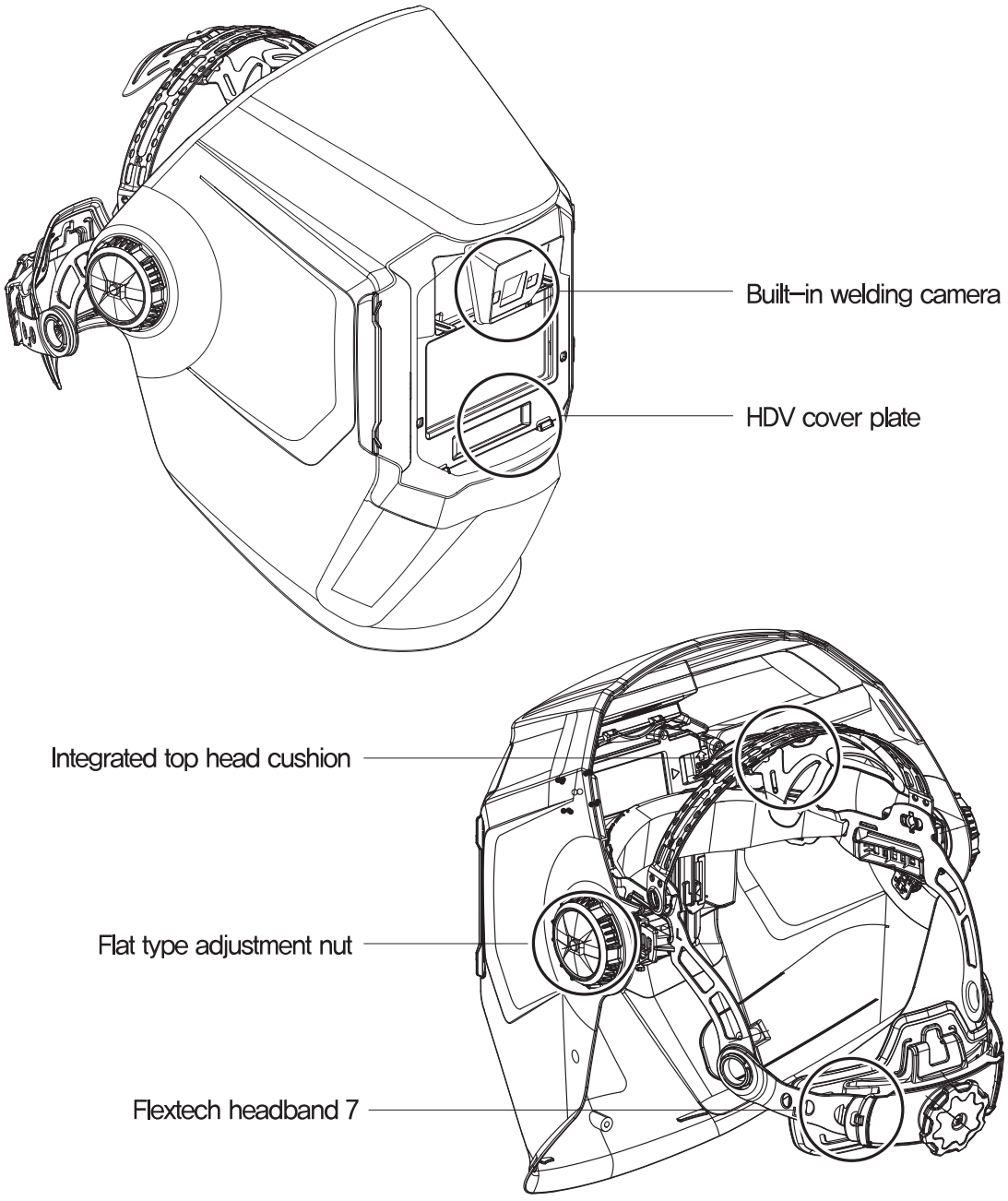
● Auxiliary lighting

- Welding cameras do not use any auxiliary lighting. They use only the arc light as a light source to control U-HDR and produce clear video images.
- As camera helmet don't use auxiliary lighting, they don't need a cooling system.

● Real-time extraction of welding information from captured video images

- Welding cameras can capture clear video images even in flux cored arc welding (FCAW), where a lot of fumes are generated during welding.
- As clear video images of the arc and arc periphery can be captured, welding information such as arc length, bead width, and distance error between electrode position and weld seam can be extracted in real time.

Features of OTOS camera welding Helmet



Clear video images

You can clearly see the welding arc and the area around the arc that would otherwise be too bright to see.

- During welding, you can clearly see every detail of the arc and its surroundings without being affected by the extremely bright arc light.

Welding process control in real time

Using image processing algorithms, it is easy to extract the information needed to control the welding process from the clear images captured.

- Tracking control of the weld seam is possible without the use of laser vision sensors.
- The amount of melt can be controlled using bead width information.

Control of weld phenomena (or quality)

All data such as captured video, extracted information, and predicted quality are stored on the server, and users can quickly solve or respond to problems in the welding process or weld defects.

- By retrieving the stored data, the user can investigate problems and defects.
- Additional information such as the amount of gap in the joint geometry, the position of the welding electrode, the amount and flow of the melt pool, and the feeding status of the welding wire can also be checked.
- It is possible to create quality assurance reports for customers.

Efficient use of production resources

Optimize costs and increase efficiency in the production of welded products.

- Saves production resources such as time, money and materials.
- Minimize problems such as production downtime due to defects and improve productivity.
- Reduce the cost of non-destructive testing through real-time weld quality assurance.

Cautions for safety

Precautions are categorized as "Danger," "Warning," or "Caution" depending on the expected risk and magnitude of damage if used incorrectly.

The following safety-related precautions are intended to help you use the product safely and correctly to prevent unexpected hazards or damage.

They pose a significant risk of personal injury and can cause the product to malfunction. Be sure to observe them.

This product is not intended to be used for any purpose other than as a welding face shield
Do not use as protection for transportation or sports.

The product must not be subjected to external shocks.
The inside of the cartridge consists of liquid crystals and electronic components and should not be dropped or thrown. Doing so may damage the product or cause it to fall out and malfunction.

Never use the camera helmet without the lens protector attached.
If the lens protector is not used, the lens may crack due to external impact, and welding fumes, spatter, and other foreign substances may enter the lens, rendering it unusable. In addition, free service will not be available.

The cartridge should not be exposed to snow, rain, or high humidity, or exposed to heat above 80℃.
Since the inside of the cartridge is composed of liquid crystal and electronic components, corrosion of the components may cause failure.

Before use, adjust the sensitivity to suit the welding environment.
If the sensitivity does not match the user's welding environment, the welding surface may not work.

They pose a significant risk of personal injury and can cause the product to malfunction. Be sure to observe them.

Do not allow contaminants to get on the cartridge sensor.
(Use a cotton swab to gently wipe it off.) The lens will not work, and it will cause serious damage to your eyes.

Make sure the sensors are not obscured from the welding light.
If the four sensors (two on the camera and two on the cartridge) are obscured, the lens will not work and can cause serious eye damage.

Never disassemble or tamper with the camera or cartridge.
The camera and cartridge are of a non–disassembled construction and cannot be reassembled.
(Free service is not available.)

Be sure to peel off the protective vinyl on the lens protector plate (outside and inside) for first use.
The protective vinyl can be pressed down by the heat of welding, obscuring the view or covering the camera lens or sensor, making the cartridge inoperable.

Replace the lens protector regularly. (Outside and inside)
Debris can get stuck and obstruct the view or cover the sensor, making the lens inoperable and making it difficult to get a clear view.

CAUTION

Always be aware of anything that may cause malfunctions in the use of the product.

Before use, check that the lens on the Camera welding helmet is working properly.
If the lens is not shielded when welding, stop using the camera immediately and check it according to page 21.

Select the shade number that suits your welding environment.
The factory is set to shade #11. Choose a shade number from #8 to #13 that fits your environment.

Do not block the solar panel (solar) from the welding light.
If the solar panel is obscured during welding, the battery usage will be high, and the battery will drain quickly.

When storing, it may be triggered by bright fluorescent lights, incandescent lights, or nearby welding lights. Avoid these areas when storing. Or desensitize before storing.
The lens operates for 45 minutes (at room temperature 23℃) before entering standby mode, which drains the battery quickly.

Replace the battery (CR 2450/3V) as soon as the battery change signal indicator (LED) lights up.
It is possible to use about 24 hours from the time the battery change signal indicator lights up, but it is recommended to replace the batteries immediately as it depends on the working environment.

Cautions for safety

Precautions are categorized as "Danger," "Warning," or "Caution" depending on the expected risk and magnitude of damage if used incorrectly.

The following safety-related precautions are intended to help you use the product safely and correctly to prevent unexpected hazards or damage.

Please always pay attention to them as they may cause malfunctions in the use of the product.

If the lens protector plate gets dirty, clean it.
Remove the lens protector plate and gently rub it under running water with a clean cloth, or gently wipe it off with a dry cloth.

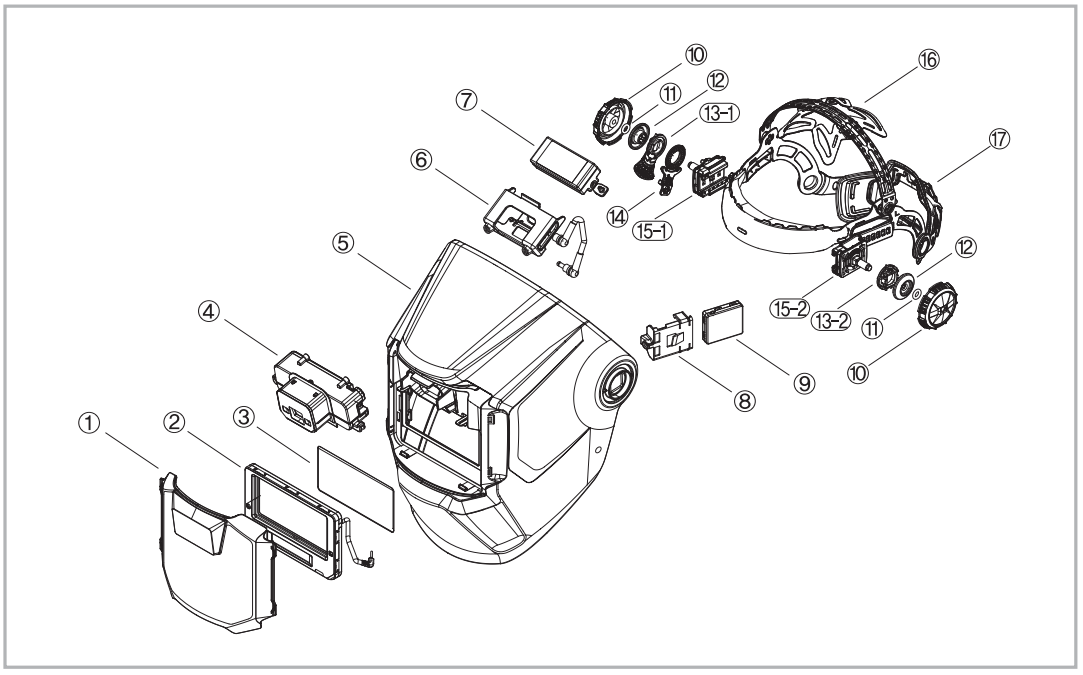
Do not tamper with the welded helmet.
By tampering, it may cause damage such as eye disease or skin burns.

Use a CR2450/3V lithium battery for the battery.
You can purchase them at any major store, online, or from the place of purchase.

Keep the welding light and sensor in a straight line.
If the viewing angle of the welding light and the sensor differs by more than 120°, it may not work, or may appear closed or open.

Use an original OTOS lens protector.

Use an original lens protector produced by our company. Otherwise, gaps may form between the cartridge and the lens protector, allowing molten fumes to penetrate, and a protector with weak heat resistance may cause the cartridge to melt from welding heat.
This lens protector has passed Korean industrial safety standards, American safety standards, European safety standards, German safety standards, and Canadian safety standards.



NO.	Parts	NO.	Parts
1	HDV Lens cover plate (outside)	11	Rubber O-ring
2	Cartridge	12	Key washer
3	Cover plate (Inside)	13-1	Shell washer (R)
4	Camera assay	13-2	Shell washer (L)
5	Shell	14	Rotation Stopper (R)
6	Camera Battery Case	15-1	Fixing bolt (R)
7	Camera Battery	15-2	Fixing bolt (L)
8	Cartridge battery case	16	Top headgear Cushion
9	Cartridge battery	17	Flextech Cushion case
10	Shell nut		

Product specifications

Specifications	
Welding Camera	1920 x1080 (Full HD) / UV + IR cut Filter / Fixed Focus Lens–
Catridge size	127㎜ × 80㎜ × 10㎜
Lens size	102㎜ × 50㎜
Reaction Time	Light → Dark State: 1/25,000 sec Dark → Light state: 0.1 ~ 1 sec (Delay Control)
Available Shades	Darkened State: #8 ~ #3 Light state: #3
Sensitivity Control & Gride	The brightness of the weld light varies depending on the strength of the welding current or gas usage, and the sensitivity of the sensor is adjusted accordingly.
Delay Control	Dark ⇨ Light state (0.1~1 sec control function)
Power Supply	Camera: 9V 1A / Cartridge: (Coin Type battery) CR 2450(3V)
Sensors	Four sensors (Four independent sensors detect weld signals at high speeds)
Automatic Power Off	After a single weld lasts 45 minutes or remains unchanged, it becomes desensitized and will not respond to normal light but will respond to strong weld light.
Cover Plate	Polycarbonate for impact, heat, and spatter resistance / HDV (integrated cover plate in outside)
Welding Helmet	Use heat, abrasion, insulation, and chemical resistant resins
Flextech cushion	Relieves pressure and pain on the forehead and neck during long and short–term wear and prevents slippage
Operating temperature	–5℃ ~ +55℃
Storge temperature	–20℃ ~ +80℃
Cartridge Weight	156g ±2%
Total weight	592g ±2% (Headband : 137g)

It is used for shielded arc welding, MIG welding (alloys of iron, copper, and chromium, light metals), TIG welding, MAG welding, CO2 welding, arc air gouging, plasma welding, plasma cutting, etc.

〈Table 1〉 Please refer to the usage standards according to the shielding number.

- Since the emission of harmful rays varies depending on the strength of the welding current, adjust the shading degree (darkness) according to the current strength. The ability to block harmful rays varies depending on the shading degree.
  (Refer to Korean Industrial Safety Standards, US Safety Standards, European Safety Standards, German Safety Standards, Canadian Safety Standards)
- The product is set to #11 at the factory. Adjust the shading number according to the welding environment before use.

Shielding range based on weld type and current strength

#shade

Processa	Arc Current (A) 10 15 20 30 40 60 80 100 125 150 175 200 225 250 275 300 335 400 450 500
Shielded Metal Arc Welding	#8,9 | #10 | #11 | #12 | #13
MIG (Alloys of iron, copper)	#10 | #11 | #12 | #13
MIG (light metal)	#10 | #11 | #12 | #13 | #14
TIG	#8,9 | #10 | #11 | #12 | #13 | #14 | #15
MAG CO_2	#10 | #11 | #12 | #13 | #14 | #15
Arc Air gouging	#8,9 | #10 | #11 | #12 | #13 | #14 | #15
Plasma Welding	#8,9 | #10 | #11 | #12 | #13 | #14 | #15
Plasma Cutting	#11 | #12 | #13

〈표1〉

그라인드 작업

Grind	Shade	#3

Components and before-use checks

Be sure to check the components before use.

WG3+ Camera Welding Helmet

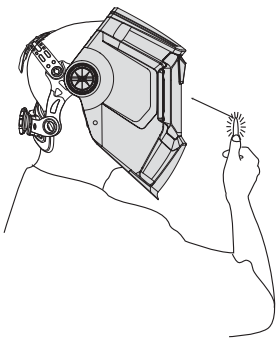
User Manual

Components

- Camera Welding Helmet
- User Manual
- Wiping cloth
- Outer Cover Plate 5ea
- Inner Cover Plate 5ea

1. Be sure to read all the contents of this manual before use, so that you can use the product more conveniently and safely. After reading the instruction manual, please keep it in a place where the user can see it at any time.

2. The product may be damaged during transportation, so please check the following items before use.
a) Check the components b) Check the welding helmet for external damage c) Check the lens operation status (see how to check the operation status below)

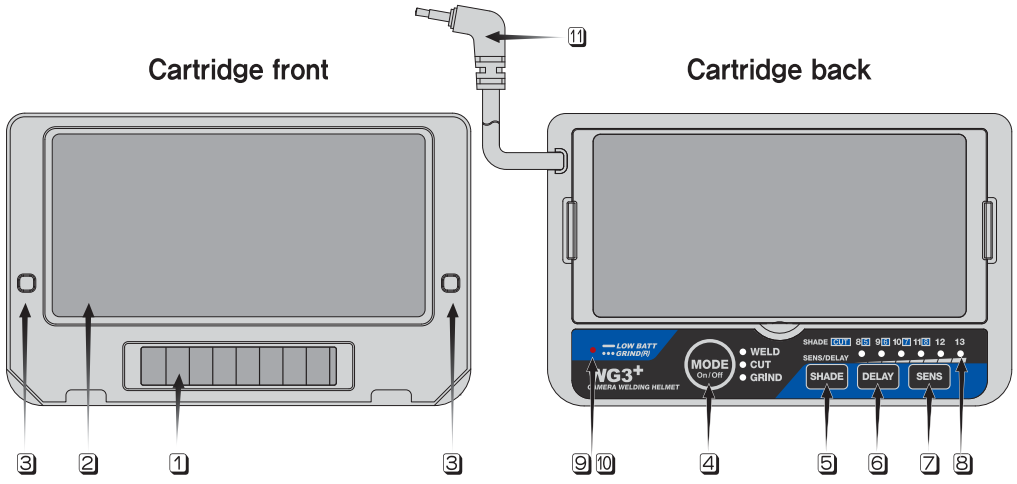


How to check lens operation

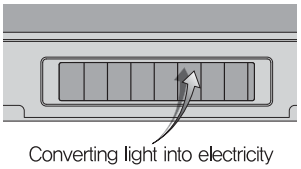
- After the numbers are in the bottom liquid crystal display, put on the welding helmet and Keep the lens and lighter at a distance of about 15 ~ 20 cm and light the lighter in a straight line. The lens darkens and brightens.

⇨ If it does this, it is normal operation

※ The correct check method is by welding, and this is an alternative check method if welding is not possible.



1 Solar panel 2 Lens 3 Sensor 4 Welding mode selection, on/off button 5 Shade adjustment button
6 Delay adjustment button 7 Sensitivity adjustment button 8 Shade/Delay/sensitivity signal indicator (LED)
9 Battery change signal indicator (LED) 10 Grind function indicator (LED) 11 Power connection (9V 1A)



Converting light into electricity

1 Solar panels

Solar panels convert light energy from sunlight or welding lights into electrical energy to use as a backup power source to extend the life of your battery.

2 Lens

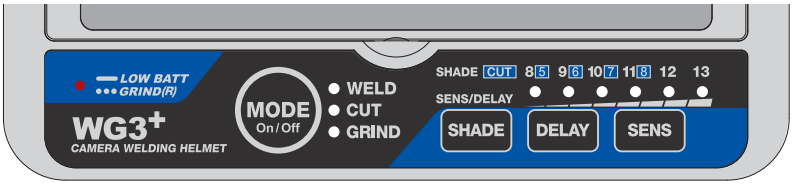
After detecting the welding signal, the lens darkens at a very fast speed of 1/25,000 of a second, allowing you to see the welding area while completely blocking harmful rays. The lens part protects the eyes by blocking harmful rays according to Korean industrial safety standards, American safety standards, European safety standards, German safety standards, and Canadian safety standards, and can be used by adjusting the darkness of the lens (#8~#13) according to the type of welding and welding current strength.

3 Light Sensors

Two independent sensors are responsible for detecting the welding light and relaying the signal to the circuitry. The optimal angle is when the welding arc and the sensors are aligned in a straight line, otherwise the lens may not be able to detect the welding light and may not work.
The optimal distance is between 30 cm and 50 cm.

④ On/Off button / Function selection, adjustment buttons

The welding surface has an on/off function that automatically turns on when it detects the welding light.



On / Off function buttons

Auto On : Turns on automatically when welding light is detected.
Auto Off : Turns on automatically after 45±2 minutes of inactivity (at room temperature 23℃).

Press the MODE button to switch between welding, cutting, and grinding. Each time you press the button once, it will switch to each function in turn.

1_WELD ⇒ used for general welding
Shading : #8~#13 (adjustable)
Delay : 0~10(adjustable)
Sensitivity : 0~10(adjustable)
Auto-off function: After 45±2 minutes
(at room temperature 23℃)

2_CUT ⇒ Used for cutting, torching, etc.
Shade: #5~#8 (adjustable)
Delay: Not adjustable when sensitivity is 10, but adjustable when sensitivity is 0~9.
Sensitivity : 0~10 (Sensitivity 10 – Sensitivity fixed [blackening])
Auto-off function: 0~10 (Sensitivity 10 – Sensitivity fixed [blackening])

3_GRIND ⇒ Used for grinding operations
Shade level: #3 (fixed) • Auto-off function: after 45±2 minutes (at room temperature 23℃)

⑤ Darkness Adjustment

The initial state before operation (light state) is shade #3, and during operation, the user should adjust the darkness of shade #8~#13 to suit the working environment. Select the shade number according to the type of welding and the strength of the current used. The shade can be selected with the SHADE button and the selected shade number can be checked through the LED. Selecting a shade number is described in detail on page 13.

⑥ Adjusting the Delay

Delay the time the lens switches from dark to light after welding is finished to protect your eyes from the afterglow of the welding light. This protects your eyes from the flickering of the residual welding current when working with high currents on stainless steel, when intense welding light remains after welding is finished, or when welding with TIG (Puls TIG).
The delay time can be adjusted with the DELAY button and confirmed by the LED: Left (fast opening time) / Right (slow opening time)

⑦ Sensitivity adjustment

The brightness of the welding light varies depending on the strength of the welding current or the amount of gas used, and you can adjust the sensitivity of the sensor accordingly. You can adjust the sensitivity to suit different types of welding in different welding locations. There are two ways to adjust the sensitivity: under standard conditions and at the welding site.
The sensitivity can be adjusted step by step with the SENS button, and the LED indicates the selected sensitivity.
Left (dull sensitivity) / Right (sensitive sensitivity)
Select the method that is most convenient for you to adjust the sensitivity (see How to Adjust Sensitivity on page 18).