



Optalert®
In the blink of an eye



eagle™

USER GUIDE

INDUSTRIAL

PORTABLE

Eagle Industrial and Eagle Portable User Guide

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Why do I need drowsiness detection?

Congratulations on becoming a new user of the most state-of-the-art, scientifically-proven wearable technology available in the world. You are joining some of the most recognised and safety conscious companies who have already implemented Optalert's early-warning detection systems.

Professional drivers and operators of life-saving equipment and heavy or dangerous machinery must be attentive and alert at all times. A loss in concentration may create a situation of extreme danger for the operator and others sharing their environment. It is equally important for workers to be alert when commuting to and from work, especially if they are responsible for driving at either end of the commute.

Your employer has invested in Optalert's **eagle** early-warning drowsiness detection system as a personal safety device for you. Optalert's products provide the only scientifically-proven technology in the world capable of measuring and communicating **in real time** the user's drowsiness/alertness level. The predictive and interactive nature of this technology means you can better understand your own alertness level as it fluctuates through the day. The technology and the subsequent data collection and reporting also helps your supervisors to support you when you're working and make ongoing decisions about when you should be working.

What is drowsiness?

Drowsiness is the intermediate state between alert wakefulness and sleep.



We all go through this state each time we fall asleep, often without realising it because it is a state of reduced awareness. How often have you been watching television on the sofa but fall asleep unintentionally and wake to find you've missed the end of the show you were watching? That is because drowsiness intermittently causes a lack of awareness of the “here-and-now”.

That means you cannot predict exactly when sleep will happen – even if you are used to the feeling of being tired when working or in your personal time.

Drowsiness can also result in a micro-sleep, which can be dangerous if you are doing tasks involving a potentially hazardous outcome and especially if you are in control of a vehicle, heavy machinery or life-saving equipment at the time.

The difference between fatigue and drowsiness

Fatigue is often confused with drowsiness.

Fatigue is a state associated with weariness, muscle aches or discomfort.

Fatigue gets progressively worse with the duration and intensity of the task.

Doing a task for many hours without a rest stop may cause you to feel fatigued, but not necessarily drowsy. The intermittent lack of awareness characterising drowsiness is not caused by fatigue.

Consequently, **drowsiness is much more dangerous than fatigue** from a safety perspective.

Fatigue is relieved by rest and inactivity, but the same rest and inactivity will make drowsiness worse.

Importantly, the only way to overcome drowsiness is to sleep.

Causes of drowsiness

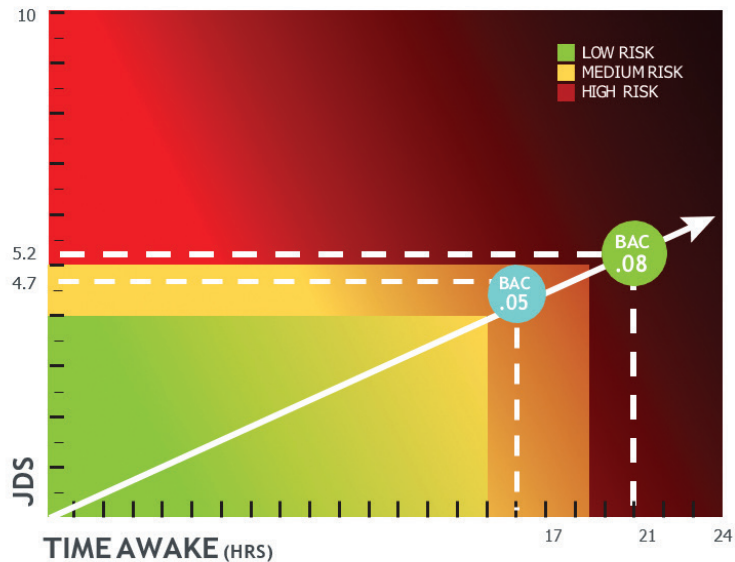
Factors influencing drowsiness include:

- The length of time you have been awake.
- The duration and quality of your last sleep.
- The time of day. Your biological clock (circadian rhythm) influences how alert and drowsy you are at certain times of the day. We typically feel sleepy during the early hours of the morning and mid-afternoon.
- The presence of a sleep disorder such as sleep apnoea. Symptoms of sleep apnoea include heavy snoring, periods without breathing, restless sleep and constantly being tired during the day.
- The most common cause of excessive drowsiness is not having enough sleep.

The risks of drowsy driving

Being drowsy significantly increases your risk of a crash. The US National Transportation Safety Board reports driver drowsiness may be a contributing factor in up to 40 per cent of heavy vehicle accidents; however drowsy drivers are often not aware of their condition. This means drivers can lapse into a micro-sleep lasting only a few seconds; long enough to drive off the road and crash. Unfortunately, crashes caused by drowsy driving tend to be the most severe in terms of injury and death, as the driver makes no attempt to avoid or prevent the crash.

Drowsiness can impair your judgement, reaction times and driving performance as much as alcohol. Studies show that going without sleep for 17 hours has the same effect on driving ability as a Blood Alcohol Concentration (BAC) of .05. Being awake for 21 hours has the same effect as a BAC of 0.08.



©Copyright Optalert 2013. Johns Drowsiness Scale (JDS) is recognised worldwide and was developed by Sleep Medicine Expert Dr Murray Johns.

Strategies for dealing with drowsiness

Used in conjunction with your eagle[®] system, the following strategies may help delay the onset of drowsiness, but will only provide short-term benefits.

Stop and sleep

- Powernaps for 15-30 minutes can partially overcome drowsiness. Allow at least 15 minutes after waking up to fully recover alertness before starting to drive.
- Naps should not be used as an alternative to major continuous rest breaks.

Increase physical activity (only if safe)

- Change position of your head and neck, trunk, or limbs.
- Chew gum or other food.
- Tap toes or fingers.
- Talk to yourself, or preferably, to someone else.

Caffeine

- For an average person, at least 150 mg is needed (2 cups of strong coffee or 3 cola drinks) to counteract drowsiness temporarily.

Please note, it takes approximately 15 minutes for caffeine to have any effect on drowsiness.



Suggestion:

An effective strategy to temporarily combat drowsiness is to take caffeine first, and then nap for 15-30 minutes by which time the caffeine will have begun to work. The combined effect of the nap and caffeine is greater than either alone.

Measuring drowsiness

The Johns Drowsiness Scale (JDS™), named after Optalert Founder Dr Murray Johns, is a 10-point scale used to measure an individual's drowsiness; a score of 0 = 'very alert' and 10 = 'very drowsy'. The JDS™ was developed specifically for use with Optalert's technology, which uses an infrared (IR) reflectance oculography system housed in a pair of glasses to monitor eye and eyelid movements.

Risk is identified in three phases – Low Risk between 0-4.4, Medium Risk between 4.5 and 4.9 and High risk (5.0 & above). The risk of performance failure increases substantially at JDS™ scores of 4.5 or above. Once JDS™ scores reach 5.0 or more, the risk is approximately five times higher than for an alert operator.



Understanding your risk

It is impossible to objectively measure your own level of alertness without assistance. Through continuous, objective scores calculated using the JDS™ the eagle system displays your level of alertness in real time. After six months of using our early-warning drowsiness detection system, users tend to become more aware of the external factors impacting their alertness levels through seeing their JDS™ scores displayed on the eagle INDUSTRIAL and eagle PORTABLE.

eagle™ WIRELESS glasses

The eagle™ WIRELESS glasses measure your eyelid movements 500 times a second using a tiny LED mounted on the frame and sends this information wirelessly to the eagle™ INDUSTRIAL or eagle™ PORTABLE system.



Using your eagle[™] glasses

The eagle[™] glasses *should only be worn if they have been professionally fitted by an authorised Optalert technician.*

eagle[™] glasses come with the following main components:

- Glasses frame
- Three detachable wrap lenses (dark, yellow, clear)
- Prescription lens adaptor (if applicable)

To exchange or remove the lenses, flip the lens carrier up and hold it between thumb and forefinger. Stretch out your other hand above the glasses frames, then grip one side of the frame with your thumb and the other side with your fingers. Squeeze the frames gently, and pull the lenses away from the frame.

Inserting new lenses is the reverse of this process – slide the lens carrier into the frame while gently squeezing the sides of the frames.



Charging the WIRELESS glasses before use

The glasses can be charged using the mains power adaptor. To charge the glasses, connect the charging cable by pushing the micro-USB plug (small end of cable) into the corresponding USB socket located on the underside of the left arm of the glasses. Note: *USB connectors are designed to fit only one way – check before inserting.*

Connect the other end of the cable to the mains power adaptor and plug the adaptor into the wall socket. The LED on the glasses arm will turn on and indicate the current battery level (see table p.17)



Charging the **WIRELESS** glasses while in use

The glasses can also be recharged while they are being worn. Simply connect the glasses to the eagle[®] **INDUSTRIAL** Connection Point or the eagle[®] **PORTABLE** in-vehicle USB adaptor using the charging cable. You will see a lightning bolt appear inside the battery icon on the device screen to indicate that the glasses are re-charging.

Checking the **WIRELESS** glasses battery level

To check the battery level of the glasses, gently press the button on the outside of the left glasses arm. The colour of the LED will indicate the current battery charge level. See the table below:

LED	Battery level
Flashing red	Low (glasses need re-charging)
Flashing green	Medium
Solid green	High

Activating the WIRELESS glasses

To turn the glasses on, gently press the button on the outside of the left glasses arm. The glasses will enter Discovery mode, and the LED will light up orange for 5 seconds.

The glasses are now ready to connect to an Optalert eagle[®] device. Simply select your pair of glasses from the list of available glasses on the eagle[®] device screen (see “Connecting your glasses”, p.19).



As a power-saving measure, the glasses will automatically go into standby mode when they have been disconnected from an eagle[®] device for more than 10 minutes.

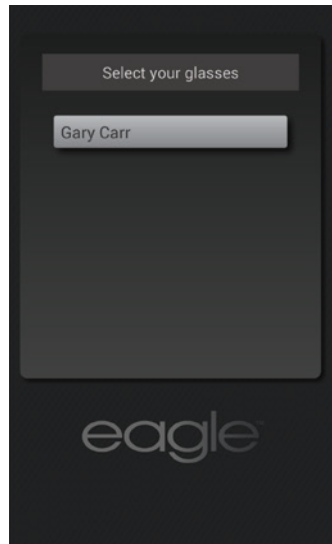


Connecting your **WIRELESS** glasses

If you are using a pair of the eagle[®] **WIRELESS** glasses, and your eagle[®] **INDUSTRIAL** or eagle[®] **PORTABLE** device is configured for connection with them, you will see the following dialog on-screen.

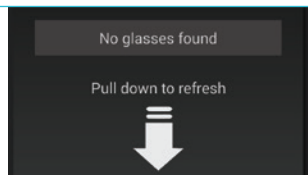
This dialog lists all the **WIRELESS** glasses detected by the device and a message “Select your glasses”.

If you are using the **WIRED** glasses, simply plug them in to the eagle[®] **INDUSTRIAL** device. The device display will then show the “glasses connected” state (see “Glasses connected”, p.33).

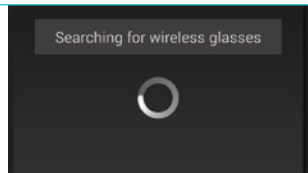


If no eagle[™] WIRELESS glasses are detected, you will see the following screen.

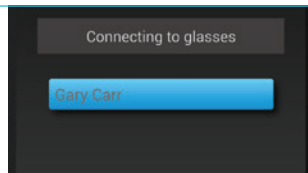
You will need to activate your glasses to enable the device to discover them (see “Activating the glasses”, p.18).



Then simply drag the “refresh arrow” down to get the eagle[™] device to search again and refresh the list of WIRELESS glasses.



Now simply select your glasses by touching the button containing the friendly name you have chosen for your glasses. The button will turn blue and the text in the title box will say “Connecting to glasses”. Allow a few seconds for the glasses to connect.



Persistent Pairing and Auto-connect

Eagle devices can be configured with one-touch (Persistent) or No-touch (Auto-connect) pairing.

If your Eagle device is configured for **Persistent Pairing**, you will see an open padlock in the wireless glasses bar. Touch the Padlock to lock it. This will enable Persistent Pairing.

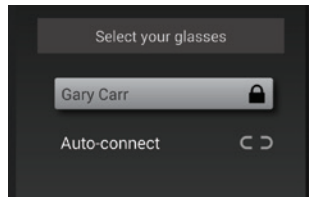
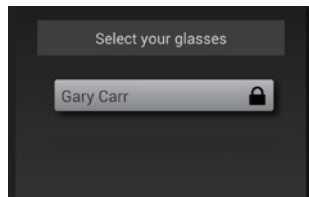
The Eagle device will not perform a search for any other glasses, and will only connect to the padlocked glasses when the user touches the wireless glasses bar.

To disable Persistent Pairing, touch the padlock to unlock it.

If your Eagle device is configured for **Auto-connect**, locking the padlock will cause the Auto-connect link to appear. Touch the link to close it. This will enable Auto-connect.

After a 3 second delay, the Eagle device will connect to the padlocked glasses automatically. The Eagle device will now automatically connect to those glasses whenever they are activated and are in-range.

To disable Auto-connect, touch the link to open it.



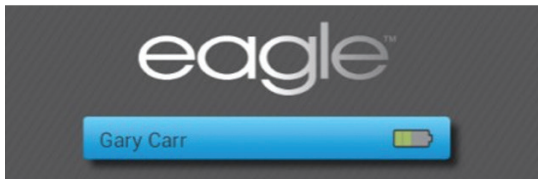
Once a wireless connection is established with the glasses, the list of glasses will disappear and a button (the **wireless glasses bar**) will appear below the eagle logo. The **wireless glasses bar** will display the name you have assigned your glasses, and a battery icon showing the charge status of the glasses. Your eagle WIRELESS glasses are now connected to the eagle unit.



The **wireless glasses bar** will remain on-screen continually while the wireless glasses are connected to the eagle device.

Disconnecting your WIRELESS glasses

To disconnect your eagle[™] WIRELESS glasses from the eagle[™] device, touch and hold the **wireless glasses bar** for three (3) seconds. The bar will remain blue while you hold it down, and it will then disappear from the screen once the glasses disconnect from the eagle device.



The eagle[™] WIRELESS glasses can also be disconnected from an eagle[™] device by pressing and holding the eagle[™] WIRELESS glasses button for 3 seconds.

Low battery warning

If the glasses battery level gets low (<5%), a low battery warning dialog will be displayed on the screen of the eagle device. You should now plug your **WIRELESS** glasses in to charge them. Click “OK” to dismiss the dialog.



Wireless glasses temperature warning

If the glasses' electronics operating temperature approaches a pre-determined level, a 'temperature' icon (red triangle with white thermometer) will flash alternately with the glasses battery icon.



Wireless glasses thermal shutdown warning

If the glasses stay in a 'temperature warning' state for an extended period of time, they may automatically shut-down to avoid damaging the electronics, and the following message will appear on the eagle device screen. Click "OK" to dismiss the dialog. You may need to wait for five (5) to 10 minutes for the glasses to cool down before you attempt to connect them to the eagle device again.



WIRED glasses

The WIRED glasses monitor your eyelid movements in the same way as the eagle WIRELESS glasses, but require a USB cable to power them and send data to the eagle INDUSTRIAL system.



To connect the glasses cable to the **WIRED** glasses, push the mini-USB plug (small end of cable) gently into the corresponding USB socket located on the underside of the glasses arm as shown.

To connect the glasses cable to the vehicle connection point, push the USB plug (larger end of glasses cable) gently into the corresponding USB socket in the connection point as shown.

USB connectors are designed to fit one way only: check before inserting.



The eagle™ INDUSTRIAL

The system takes the form of a ruggedized tablet which processes the information collected by the glasses to calculate your risk of a drowsy incident. A large touchscreen with modern interface displays your JDS™ score and risk level in real time, gives audible warnings if you reach a medium or high risk level, and provides a history of risk warnings to keep the operator informed of their recent drowsiness levels.

An anti-glare Gorilla® Glass screen and robust specifications (MIL-STD-810G, IP65) ensure reliability in rugged environments. Data and system status is transferred wirelessly via an on-board 3G/WiFi radio.

Operating the eagle™ INDUSTRIAL

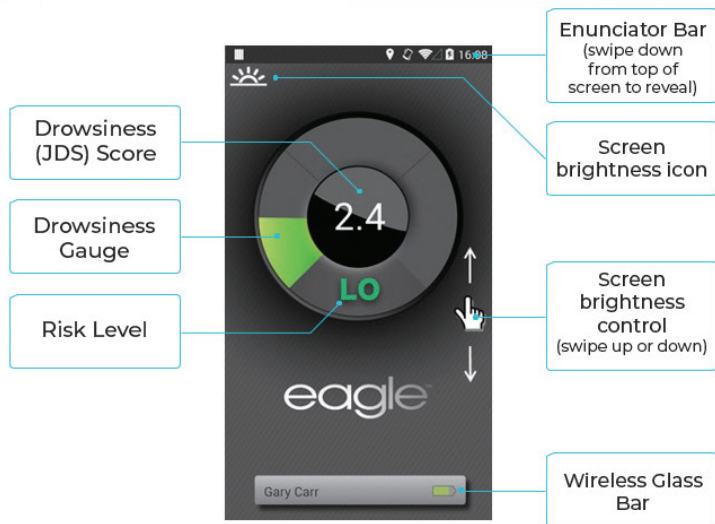


The eagle™ PORTABLE

Small and lightweight, the eagle™ PORTABLE is equally functional whether mounted in a vehicle, sitting on a desk or worn by the user. It processes the information collected by the glasses to calculate your risk of a drowsy incident, displays your JDS™ score and risk level in real time and gives audible warnings if you reach a medium or high risk level.

Data and system status is transferred wirelessly via an on-board 3G/WiFi radio.

Operating the eagle™ PORTABLE

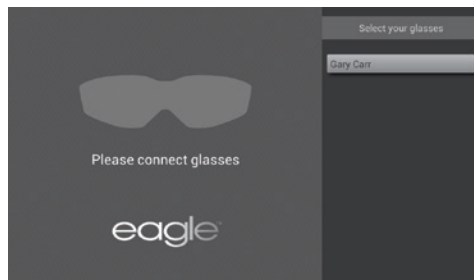


Powering up your device

The eagle[™] INDUSTRIAL will start automatically when the vehicle ignition is turned on.

To turn on the eagle[™] PORTABLE, press and hold the power button down for approximately five (5) seconds.

After the device boots up, the following screen will be displayed:



eagle[™] INDUSTRIAL



eagle[™] PORTABLE

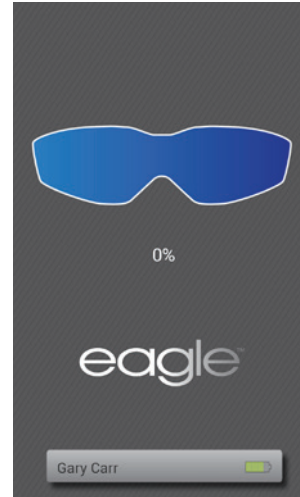
Glasses connected

When you connect your **WIRELESS** glasses to an **eagle[™] INDUSTRIAL** or **eagle[™] PORTABLE** device, the screen will change to display a light grey glasses icon with a white outline.

Additionally, if you take your glasses off for more than 15 seconds during a journey, the **eagle[™]** device will show this screen with the glasses icon flashing slowly (glasses off state). This indicates the system is in a paused state and is no longer monitoring your alertness. An audible reminder to 'please take care' will be heard.

Initialisation

Once the glasses are being worn, the **eagle[™]** device will detect two blinks and change the grey glasses' icon to a blue icon to indicate the Initialisation process has begun. This stage takes around 3-4 minutes and progress is shown as a percentage (0%; 25%; 50%; 75%) beneath the glasses.



Measuring your alertness (JDS™)

Your eagle unit displays your alertness score each minute on the JDS™ scale.

Low risk

Alertness score (0 to 4.4)

If you remain in the low risk category for five (5) continuous minutes, the drowsiness score and risk status bar will fade. This is known as **Safe Mode**. To return to your JDS™ score, touch your eagle screen.



Safe Mode only activates if your risk is low and will not activate if your risk is medium or high.

No score

If the eagle[®] system cannot accurately detect the user's blinks, JDS scores will not be able to be calculated. The system then displays two dashes (" - ") to indicate this.

Such a situation usually arises because the glasses are no longer being worn in the position on the face in which they were fitted. The user should adjust the wearing position of the glasses to enable accurate detection of blinks and calculation of JDS scores.



Medium risk

Alertness score (4.5 to 4.9)

Medium risk (**caution**)

You must be cautious when operating as your risk has increased.

A Medium Risk Warning will be accompanied by an audible alert -
“caution, medium risk”



High risk

Alertness score (5.0 to 9.9)

High risk (**danger**)

You are in danger of a fatigue-related incident.

A High Risk Warning will be accompanied by an audible alert -
“danger, high risk” and the drowsiness gauge and risk level (HI)
will flash for ten (10) seconds.



Caring for your glasses

- Your glasses have been specifically fitted to you. They will not operate correctly if worn by other people.
- Do not disconnect the glasses or change lenses while driving
- When not using your glasses, store them in the case provided
- Only recharge the glasses by using the charging cable and AC adaptor supplied – do not use other 3rd party adaptors or cables
- Do not expose the glasses to excessive heat (i.e., avoid placing them on vehicle dashboards)
- The glasses battery can be charged between 0°C - 45°C
- The normal operating temperature range for the glasses is 0°C - 60°C
- Never attempt to disassemble, repair or make any modifications to your glasses
- If you suspect the glasses have malfunctioned or are damaged, contact your Optalert Customer Support Manager

Cleaning your lenses

1. Remove lenses from frame
2. Run the lenses under cold water to remove dirt and dust
3. Remove excess water using soft tissue
4. Clean lenses using the Optalert micro cloth (provided)



Do not use solvents or cleaning products on the lenses.
The Optalert micro cloth is re-usable and can be washed.

Prescription lens adaptor (if applicable)

If you require prescription lenses to drive, you will need to see a qualified optometrist. Optalert will provide a letter to your optometrist confirming the lens type required.

Caring for your eagle™ PORTABLE or eagle™ INDUSTRIAL device

- Taking good care of your device will ensure trouble-free operation and reduce the risk of damage to your device.
- Do not place anything on top of your device or drop objects on your device.
- Do not drop your device or subject it to severe shock.
- Do not subject your device to sudden and severe temperature changes. This could cause moisture condensation inside the unit, which could damage your device. In the event of moisture condensation, allow your device to dry out completely before use.
- The screen surface can be scratched. Avoid touching it with sharp objects. Non-adhesive generic screen protectors designed specifically for use on portable devices with LCD panels may be used to help protect the screen from minor scratches.
- Always clean your device while it is turned off. Use a soft, lint-free cloth to wipe the screen and the exterior of your device.
- Do not use paper towels to clean the screen.
- Never attempt to disassemble, repair or make any modifications to your device. Disassembly, modification or any attempt at repair could cause damage to your device and will void the warranty.
- Do not store or carry flammable liquids, gases or explosive materials in the same compartment as your device, its parts or accessories.

Troubleshooting

I cannot see my glasses in the list of available glasses

Your glasses may be at the bottom of the list. Scroll down by swiping upwards on the list of glasses. If your glasses still do not appear in the list, pull down on the Refresh arrow to start a new search for wireless glasses.

Screen shows the message “No glasses found”

Make sure the  glasses are activated (in “Discoverable” mode) by pressing the button on the left arm of the  glasses. Then pull down on the Refresh Arrow on the eagle  or eagle  user interface to start a new search for wireless glasses.

Screen shows message “Cannot connect to glasses”

The attempt to connect to the eagle  glasses has failed. Please try to pair again. (additional messages may be seen that reference an “incorrect PIN or passkey” or say “Can’t communicate with glasses”). If this message continues to occur, contact your Optalert Customer Support representative.

Resetting the glasses

The eagle[™] WIRELESS glasses are designed to be resettable in the field if necessary. To reset, press and hold down the button on the left side of the glasses. The LED will light up to indicate the current battery charge level. After seven (7) seconds, the LED will go out, indicating the glasses have reset. Release the button.

Safety notes

- Optalert's eagle[®] INDUSTRIAL and eagle[®] PORTABLE systems detect the onset of reduced alertness and help you manage it. These devices do not prevent drowsiness.
- Using eagle[®] units does not replace regulations or OH&S (Occupational Health and Safety) policies already in place within your organisation.
- We do not recommend changing the lenses on your glasses while the vehicle is in motion.
- Any repairs to your eagle[®] system or glasses must be made by an authorised Optalert technician.
- Your glasses have been specifically fitted to you. They will not operate effectively on other people without being refit by an authorised Optalert technician.
- Talk to your supervisor or on-site Optalert representative if you have any concerns regarding your eagle[®] system or glasses.

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