User Manual
AGE Scanner

D Diagnoptics

Introduction

Thank you for purchasing the AGE Scanner. Please read this manual carefully and follow its instructions before using this product in order to familiarize yourself with its capability and to ensure an accurate measurement result.

The AGE Scanner developed by DiagnOptics Technologies B.V. is an optical consumer device that uses LED light sources and light sensors to provide a measurement of the concentration of Advanced Glycation Endproducts (AGEs) in human skin tissue. The process of accumulation of AGEs in tissue is commonly known as glycation.

The AGE Scanner is used with either the myAGEnow, BodyAge or SkinAge app on your mobile phone or tablet (Android, iOS) through a Bluetooth® connection set up from the app. These apps are available from the Google Play Store and Apple App Store.

The new *triple mode* provides improved measurement accuracy by ensuring that any biological variation across the skin is minimized (explained in section 3.2).

1 Getting started

1.1 What is in the box

The following items are included in the box:

- AGE Scanner
- User Manual
- 2x AAA batteries
- Scanner ID card
- Drawstring bag

1.2 Prepare your mobile device

To get started first prepare your mobile device by following these steps:

1. Install the AGE Scanner app of your choice (myAGEnow, BodyAge or SkinAge: see chapter 2) from one of these online stores:
   - Apple® App Store® for iOS devices such as an iPhone® or iPad®.
   - Google Play™ Store for Android devices.
2. Turn on the Bluetooth® function on your mobile device. The AGE Scanner is not a standard Bluetooth® device: do not try to pair from the list of Bluetooth devices on your mobile device.

1.3 Prepare your AGE Scanner

Before the AGE Scanner can be used the batteries need to be placed. To open the battery compartment, slide off the battery cover located at the bottom of the device by applying a gentle pressure on the embossed ring.

Inside the battery compartment you will find a label including instructions on how to position the batteries. The AGE Scanner serial number can be found on the Scanner ID card and in the battery compartment.

Supported AAA battery types: **alkaline batteries**
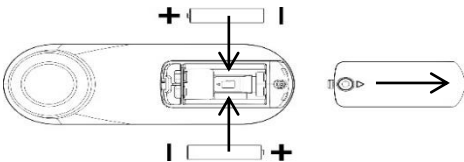
After placing the batteries the AGE Scanner can be turned on:
1. Start the AGE Scanner by pressing the button on the top of the device once.
2. The ring around the button lights up blue continuously as the AGE Scanner searches for a mobile device to pair with. Please see chapter 6 in case the ring around the button blinks blue or lights up red.
3. The AGE Scanner is not a standard Bluetooth® device: do not try to pair from the list of Bluetooth devices on your mobile device. Instead open the AGE Scanner app of your choice (myAGEnow, BodyAge or SkinAge: see chapter 2) on your mobile device and choose 'next' to display the available AGE Scanner device(s).
4. Select the serial number of the AGE Scanner you want to connect to. (the serial number is mentioned on the Scanner ID card and in the battery compartment).
5. After successful pairing of the AGE Scanner with your mobile device the ring around the button will change from blue to green.

During the initialization, the device's internal light sources are switched on briefly. This is completely harmless.

When no connection can be established, the AGE Scanner will turn itself off after 2 minutes.

For troubleshooting of connectivity problems please see chapter 6.

1.4 Switching off the AGE Scanner

The AGE Scanner can be switched off by briefly pressing the button on top of the device twice in quick succession. The AGE Scanner will also switch itself off automatically after approximately 2 minutes of inactivity.

1.5 Bluetooth® compatibility

The AGE Scanner is compatible with mobile devices that run Android (version 4.3 or higher) and iOS operating systems and support Bluetooth® 4.1 or higher (Bluetooth Low Energy (BLE)). The AGE Scanner is however not a standard Bluetooth® device and can not be connected from the mobile device OS.
Please see chapter 7 for further product specifications.

2 Apps

The following free apps are available for operating the AGE Scanner. The app of your choice can be downloaded from the Apple® App Store® for your iPhone® or iPad® and from the Google Play™ Store for your Android phone or tablet.
All apps allow viewing of the measurement result, support both triple and single measurement mode (explained in section 3.2) and result sharing.

2.1 myAGEnow
The myAGENow app is intended for health applications that require direct reporting of the AGE score. In the result screen of this app a further comparison is made with the mean score for healthy individuals of the same age. What is reported is the percentage with which the measured score deviates from the average score at the calendar age of the client.

2.2 BodyAge
The BodyAge app is intended for healthy aging applications that require a measure of the biological age of the client. This app automatically calculates this body age, based on the measurement result and reference data for healthy individuals from the scientific literature.

2.3 SkinAge
The SkinAge app is intended for skin aging applications that require a measure of the skin age of the client. This app automatically calculates the estimated skin age, based on the measurement result and reference data for healthy individuals from the scientific literature.

2.4 Reference data for healthy individuals

In the result screen of each of the apps the measurement result is compared to reference results for the healthy population. These reference results are based on a clinical study by Koetsier and co-workers (Diabetes Technology & Therapeutics 2010; 12(5):399-403], and have been confirmed in more recent studies. The following table shows the mean values and standard deviations of the AGE score (myAGEnow score) distribution for several age ranges, divided into 10-year increments. AGE scores are given in arbitrary units.

Age group (years)	myAGEnow score
0-10	97 ± 17
10-20	111 ± 20
20-30	153 ± 30
30-40	173 ± 42
40-50	181 ± 36
50-60	209 ± 36
60-70	246 ± 57
70-80	273 ± 55

Besides comparing a measurement result to that of the healthy population it is also meaningful to monitor the measurement result at regular intervals during aging.

3 Performing measurements

3.1 Measurement instructions

The AGE Scanner gives a correct measurement result provided that the following conditions are met:

- The AGE measurement is performed directly on healthy skin. The skin at the measuring area should be homogeneous and free of birthmarks, tattoos or excessive hair growth and without recent exposure to skin creams or any substance that may have fluorescent properties. Self-tanning agents should not be used for at least 10 days before a measurement. Sun-blockers and other skin care products should not be used for 3 days before a measurement.
- The measurement window is kept clean (see chapter 5.1).
- The measurement head of the AGE Scanner is **positioned on the inner lower forearm at about 8cm (3 inches) from the elbow**. See the illustrations on the next page.
- The silicon ring of the measurement head of the AGE Scanner is pressed ***gently*** to the skin and evenly on all sides such that ambient light cannot enter the measurement window.
- Both the AGE Scanner and the person's arm are kept still during the measurement.

## 3.2 Performing a measurement

To perform a measurement on a person please do the following:

1. Make sure you have completed all preparation steps in chapter 1.
2. For the best possible accuracy of the measurement result make sure that the *triple mode* is selected in the Settings menu in the app.
   Alternatively, one can select single mode for the fastest result at a lower accuracy.
3. Place the AGE Scanner on the person's dominant lower forearm with ***gentle*** pressure and avoid ambient light entering the device. Please make sure to use the prescribed measurement location (see section 3.1 and the illustration on the next page).

Measurement locations in triple mode (most accurate result). The distance between the three measurement locations is about 1-2 cm. :
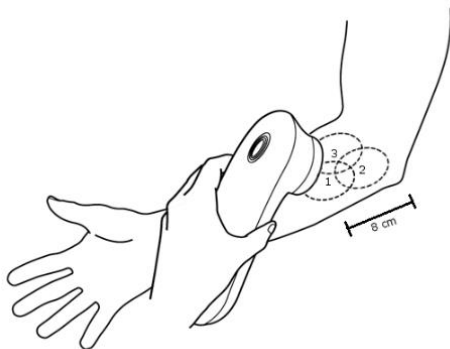
Measurement location in single mode (fastest result):
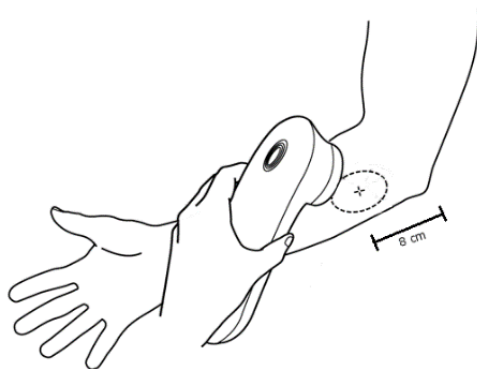
4. Start the measurement by a short press and release of the button.
5. During a measurement, the ring around the button turns orange. Avoid movements of the arm and the AGE Scanner during that time. When using triple mode re-position the AGE Scanner immediately when the LED ring around the button of the AGE Scanner blinks green. This may take some practice.
6. When the measurement is successfully completed, the LED ring blinks green for four seconds and the measurement result is displayed in the app.

3.3 LED ring

The color of the LED ring around the button of the AGE Scanner changes depending on the status of your device. Please find below an overview of the different device statuses:

Blue continuous	Available for connection to a mobile device from the myAGEnow, BodyAge or SkinAge app
Blue blinking	Connection not suitable for myAGEnow, BodyAge or SkinAge app (see section 6.2 for information)
Green	Connected
Orange	Measuring
Green blinking	Measurement successful. In triple mode this status is also used to indicate the need to re-position the AGE Scanner between measurements.
Red	Error (see section 5.2 for further information)

3.4 Biological variation and measurement results

The level of tissue AGEs can vary over time. For example, for healthy individuals the AGE value has been shown to increase with calendar age by 10-20% in 10 years (section 2.4).

Tissue glycation can also vary from one skin location to another. If used as instructed the typical difference between measurements on the same location of the same arm is within +/-10%.

4 Updating your AGE Scanner

Firmware updates are made available via the Diagnoptics Service app using Over The Air (OTA) technology via the Bluetooth® connection.

4.1 How to update

Please follow these instructions to update the firmware of your AGE Scanner through the Bluetooth® connection:

1. Download the "Diagnoptics Service app" from the Apple® App Store® or Google Play™ Store.
2. Turn on the Bluetooth® function of your mobile device and make sure that you have an internet connection.
3. The AGE Scanner is not a standard Bluetooth® device: do not try to pair from the list of Bluetooth devices on your mobile device. Open the Diagnoptics service app on your mobile device.
4. Select the serial number of the AGE Scanner you want to update from the list of available devices.
5. After connecting, the app will check if a new firmware version is available. If a firmware update is available you can start a download by pressing 'Update Firmware'.
6. After the update process is started the AGE Scanner will switch to update mode and the LED ring will turn purple.
7. The Diagnoptics Service app will transfer the new firmware to the AGE Scanner. The progress of the transfer will be shown in the progress bar.
8. After a successful update the AGE Scanner will automatically reset and reconnect to the Diagnoptics Service app. Press 'Complete' to finish the update and to disconnect the AGE Scanner.

4.2 What to do when an update fails

When an update fails, the device might remain in update mode until a successful update has been performed. Pressing the 'Retry' button after an error occurs will in most cases suffice to successfully update the device. When this does not work, try one of the following solutions:

	Situation:	Solution:
1	LED ring is off	Return to the list of available devices and turn on the AGE Scanner, reconnect and retry updating the device. If, after turning on, the LED ring is purple please continue as described at situation 3.
2	LED ring is blue	Return to the list of available devices, reconnect and retry the update.
3	LED ring is purple	Return to the list of available devices, select device 'MFR_BOOT' and retry the update. Note: when the AGE Scanner is in update mode, no device status information will be shown in the app.
4	Device does not respond	When the AGE Scanner is stuck in update mode, it will switch off automatically after one minute of inactivity. If this is not the case and you cannot connect to the device, reset the device by removing the batteries and reinstalling them.
5	Device does not switch to update mode	After starting an update, the Service app will put the AGE Scanner in update mode (purple LED ring). If this is not the case and the AGE Scanner remains in normal mode (green or blue LED ring) causing the update to fail, disconnect and close the app. Then turn on the AGE Scanner and wait for the LED ring to turn on. Press and hold the button for 30 seconds until the LED ring turns purple. (Note: after ten seconds the LED ring will first turn red. Keep holding the button until the LED ring turns purple). The AGE Scanner is now in update mode. Open the Diagnoptics Service app and continue as described under situation 3.

5 Cleaning your AGE Scanner

5.1 Cleaning instructions

5.1.1 Measurement window

With proper storage and usage the AGE Scanner hardly requires cleaning apart from dust removal. To ensure an accurate measurement result the measurement window can be cleaned with a cotton swab or a pre-moistened lens cleaning wipe, ideally using a standard 70% alcohol solution.

Avoid scratching the window by carefully handling the device during use and by storing it in the box or drawstring bag when it is not used.

5.1.2 Skin interface

The silicon skin interface of the measurement head can be cleaned with standard mild cleaning agents. When desired this skin interface can also be disinfected with alcohol or chlorohexidine.

6 Troubleshooting your AGE Scanner

6.1 Button ring blinks blue or turns red on startup

In case the button ring **blinks blue** on startup, the AGE Scanner cannot connect with the myAGEnow, BodyAge or SkinAge app. To be able to connect with one of these apps press and hold the button until it turns red. Release the button. Now press the button again to turn on the AGE Scanner. The button ring now turns blue continuously to indicate that the AGE Scanner is ready for a connection from the app.

In case the button ring turns **red** on startup a possible cause is that the temperature of the device is too low. When the device temperature drops below 10° Celsius (equals 50° Fahrenheit) normal operation is not possible and the button ring turns red. Raise the device temperature above this limit and the button ring should turn blue.

6.2 Bluetooth® connection

The AGE Scanner is not a standard Bluetooth® device and requires a connection to be set up from one of the apps described in chapter 2. In case of a connection problem first make sure that Bluetooth® on your mobile device is turned on.
If the connection problem still persists open the AGE app on your mobile device, go to the settings menu and choose 'Reconnect AGE Scanner'. Follow the instructions in the app to reconnect with the AGE Scanner.

In case the above steps are not successful the AGE Scanner may have been paired from your mobile device. This is not supported. Please unpair the AGE Scanner from the paired devices list in your mobile device and retry. It is also advised to restart the app (make sure the app is no longer running in the background after closing it). For details on how to perform these actions see the user instructions of your particular mobile device.

6.3 Warning messages

Low battery

When the AGE Scanner is unable to perform a measurement due to low battery power the ring around the button of the device turns red and a low battery

warning indication is shown in the app. Please replace the batteries (section 1.2) and restart the AGE Scanner.

6.4 Error messages

When the AGE Scanner is unable to perform a measurement, the measurement is aborted and an error indication is displayed in the app. You may receive one of the following three error indications:

Measurement setup error

In case the measurement head of your device is not placed properly on the person's skin, ambient light may reach the detectors and cause interference. The AGE Scanner is capable of detecting such unwanted light. When this occurs, the measurement is aborted and an 'Ambient light error' is displayed in the app.

Low signal error

In case the detected signal from the person's skin is too low, the device is unable to perform a reliable measurement. When this occurs, the measurement is aborted and a 'Low signal error' is displayed in the app.

In general, a 'Low signal error' is the result of the person's skin having too much pigment to allow for a reliable measurement (e.g. birth marks, freckles or strongly pigmented skin).

External error

An 'External error' is displayed in the app when the measurement is out-of-bounds. When the 'External error' persists, your device may need to be re-calibrated. Please contact your re-seller or Diagnoptics for support.

7 AGE Scanner specifications

7.1 Technical specifications

- Operation   Continuous indoor operation
- Power   3 VDC from two exchangeable AAA batteries
- Dimensions   Width: 60mm, Depth: 170 mm, Height: 55 mm
- Weight   150g
- Operating Conditions   Indoors
  - Temperature range: Lower limit 10°C - Upper limit + 30°C
  - Relative humidity: 20% to 75% non-condensing
- Storage & Transport Conditions
  - Temperature range: Lower limit - 40°C - Upper limit + 70°C
  - Relative humidity: 10% to 100% non-condensing
- Wireless communication
  - Method: Bluetooth Low Energy
  - ISM frequency band: 2402 – 2480MHz
  - Rated power: 6mW

7.2 Classifications

- Elec. shock protection   Class III equipment
- Standard(s)

Electrical Safety:	EN 60950-1:2006 (up to: A12:2011)
EMC:	EN 301 489-1 & EN 301 489-17 V2.2.1
Telecom:	EN 300 328 v 1.9.1
FCC:	47 CFR part 15, Subpart 15C & 15.247
CMIIT ID:	2019XXXXXX
EM Exposure Safety:	EN 62479:2010
Japanese Radio Law:	Article 38-24, Paragraph 1
Safety of lamps:	IEC 62471:2008
Hazardous Substances:	2011/65/EU (ROHS II)
	SJ/T 11364-2014 PRC (ROHS II)
Waste:	2012/19/EU (WEEE)

8 Regulatory & Safety Notices

8.1 Safety statement
This equipment has been tested to comply with safety certification in accordance with the specifications of EN Standard: EN60950-1:2006.

8.2 USA: Federal Communications Commission (FCC) statement
This device complies with FCC part 15 FCC Rules.
Operation is subject to the following two conditions:
1. This device may not cause harmful interference and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Warning
Changes or modifications not approved by DiagnOptics Technologies B.V. will void the user's authority to operate the equipment.

This device meets the FCC requirements for RF exposure in public or uncontrolled environments.
FCC ID: 2AKA5-MFR

8.3 European Union
Declaration of Conformity with Regard to the EU Directive 1999/5/EC R&TTE.
DiagnOptics Technologies B.V. is authorized to apply the CE Mark on device type MSC00100, thereby declaring conformity to the essential requirements and other relevant provisions of Directive EN 300 328 V1.8.1 and other applicable Directives.

7.4 Japan
This device has been granted modular approval for sale and operation in Japan.
Classification of specified radio equipment: Article 2, Clause 1, Item 19 2,4GHz Wide Band Low Power Data Communication.
This certification by type has been granted in accordance with the provisions of Article 38-24, Paragraph 1 of the Radio Law.

⬆ Ⓡ 005-101459

8.5 China

This device complies with SRRC (State Radio Regulatory Commission) regulations administered by the Ministry of Industry and Information Technology of the People's Republic of China.

DiagnOptics Technologies B.V. is authorized to apply the SRRC approval code (the so called: 'China MIIT ID') on device type MSC00100, thereby declaring conformity to the SRRC provisions.

9   Disposal and recycling information

The symbol on the product or its packaging signifies that this product must be disposed of separately from ordinary household wastes at its end of life (according to Directive 2012/19/EU).
Please kindly be aware that it is your responsibility to dispose of electronic equipment at recycling centers to help conserve natural resources.
Each country in the European Union should have its collection centers for electrical and electronic equipment recycling. For information about your recycling drop off point, please contact your local related electrical and electronic equipment waste management authority or the retailer where you bought the product.
•   Do not dispose of your AGE Scanner with household waste
•   Disposal of the packaging and your AGE Scanner should be done in accordance with local regulations.
•   Batteries are not to be disposed of in the municipal waste stream and require separate collection.

This symbol (China RoHS II) indicates that this electrical product does not contain any hazardous substances exceeding concentration limits and is a green environmentally friendly product *(the artistic style "e" in the middle of the logo)*, which can be recycled if not casually discarded *(curved arrows form a circulating circle)*.

10 Liability and warranty

10.1 Liability

DiagnOptics Technologies B.V. and its respective directors, officers, employees and agents and their respective successors, heirs and assignees, are not liable for any damages, losses, obligations, costs and expenses, including attorney's fees that may be incurred by third parties in connection with a claim for damage to or loss of tangible personal property, breach of warranty, or for bodily injury, sickness and/or death sustained by any customer (collectively "Damage") if or where the damage is caused by or arises from any instance regarded as (a) improper use of the AGE Scanner, (b) unauthorized modification of the AGE Scanner, (c) fault or negligence by the user, (d) breach of any warranty or other obligation by the user or (e) invalid or incorrect conclusions, and any consequences thereof, drawn by third parties from the measurement results provided by the AGE Scanner.

10.2 Warranty

The warranty supplied with this AGE Scanner System is provided by DiagnOptics Technologies B.V.

10.3 Declaration of Conformity

The Declaration of Conformity can be provided to you on request. Please contact DiagnOptics Technologies B.V. to request a copy of the Declaration of Conformity.

Footnote
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