**TONOREF™ III Specifications**

### Auto Refractometer
- **Measurement range**
  - Sphere: -35.00 to +25.00 D (φ0: 12 mm) 0.01/0.12/25.0 D increments
  - Cylinder: 0 to ±12.00 D (φ0:12/0.12/0.25 D increments)
- **Axis**: 0 to 180° (1°/5° increments)
- **Minimum measurable pupil diameter**: a2 mm
- **Measurement area**: ø1 to 6 mm
- **Chart**: Scenery chart

### Auto Keratometer
- **Measurement range**
  - Curvature radius: 5.00 to 13.00 mm (φ0.01 mm increments)
  - Refractive power: 25.96 to 67.50 D (n = 1.3375) (0.01/0.12/0.25 D increments)
  - Cylindrical power: 0 to ±12.00 D (φ0:12/0.12/0.25 D increments)
- **Axis**: 0 to 180° (1°/5° increments)
- **Measurement area**
  - ø3.3 mm (φ7.7 mm), ø2.4 mm (φ5.8 mm)

### Non-contact Tonometer
- **Measurement range**: 1 to 60 mmHg (1 mmHg increments)
- **Working distance**: 11 mm
- **Eye fixation**: Inner fixation light

### Non-contact Pachymeter
- **Measurement range**: 300 to 800 μm (1 μm increments)
- **IOP correction by corneal thickness**: Automatic calculation
- **Automatization range**: Accurate
- **Accommodation measurement range**: 0 to ±15.00 D (φ0:0.12/0.25 D increments)
- **APC measurement range**: 60 to 150 mm (φ0.12/0.25 D increments)
- **Pupil diameter range**: ø2 mm
- **Auto tracking**: X-Y-Z directions
- **Auto shut**: Available

### Display
- Tiltable 7.0-inch color LCD with touch panel

### Printer
- Thermal line printer with easy loading and auto cutter

### Interface
- RS-232C: 2 port
- LAN: 1 port
- USB: 1 port
- Wireless LAN (WLAN)*: 1ch

### Power supply
- AC 100 to 240 V, 50/60 Hz
- Power consumption: 100 W

### Dimensions/Mass
- 260 (W) × 495 (D) × 505 (H) mm / 22 kg at ARK standard mode
- 260 (W) × 495 (D) × 460 (H) mm / 22 kg at NT standard mode
- 260(W) × 495 (D) × 505 (H) mm / 23.2 kg at ARK standard mode
- 260(W) × 495 (D) × 460 (H) mm / 24.3 kg at NT standard mode
- 10.2 (W) x 19.5 (D) x 19.9 (H)” / 48 lbs. at ARK standard mode
- 10.2 (W) x 19.5 (D) x 18.1 (H)” / 48 lbs. at NT standard mode

* Only for the countries (regions) certified by the Radio Law

---

**Eye & Health Care**

**NIDEK CO., LTD.**

**HEAD OFFICE** (International Div.)
34-14 Maehama, Hiroishi-cho, Gamagori, Aichi 443-0038, JAPAN
TEL: +81-533-67-8895
URL: www.nidek.com

**TOKYO OFFICE** (International Div.)
3F Sumitomo Fudosan Hongo Bldg., 3-22-5 Hongo, Bunkyo-ku, Tokyo 113-0033, JAPAN
TEL: +81-3-5844-2641
URL: www.nidek.com

**HEAD OFFICE** (Manufacturer)
NIDEK INC.
2040 Corporate Court,
San Jose, CA 95131, U.S.A.
TEL: +1-800-223-9044
URL: usa.nidek.com

**NIDEK S.A.**
Boulevard de l’Industrie,
13 Avenue du Plateau,
92350 Milly-la-Forêt (France)
TEL: +33 1 60 89 87 67
URL: www.nidek.fr

**NIDEK TECHNOLOGIES S.R.L.**
Via dell’Artigianato,
6/A, 35020 Albignasego (Padova), ITALY
TEL: +39 049 8629200 / 8626399
URL: www.nidektechnologies.it

**NIDEK (SHANGHAI) CO., LTD.**
Rm3205,Shanghai Multi Media Park, No.1027 Chang Ning Rd, Chang Ning District, Shanghai, CHINA 200050
TEL: +86 021-5212-7942
URL: www.nidek-china.cn

**NIDEK SINGAPORE PTE. LTD.**
51 Changi Business Park Central 2, #06-14, The Signature, SINGAPORE 486066
TEL: +65 6588 0389
URL: www.nidek.sg

---

**Product/Model name**: AUTO REF/KERATO/TONO/PACHYMETER TONOREF III

**Specifications**
Brochure and listed features of the device are intended for non-US practitioners.
Specifications may vary depending on circumstances in each country.
Specifications and design are subject to change without notice.
Bluetooth is a registered trademark of Bluetooth SIG, Inc.

---

**TONOREF III, MFGD09**
The space saving TONOREF™ III is a comfortable and efficient upgrade to your practice.

Auto Refractometer
Auto Keratometer
Non Contact Tonometer and
Non Contact Pachymeter
The space saving TONOREF™ III is a comfortable and efficient upgrade to your practice.

A MASTERPIECE of COMBINATION

Auto Refractometer
Auto Keratometer
Non Contact Tonometer
and
Non Contact Pachymeter
Refraction

Large Pupil Zone Imaging Method

The use of a wide area measurement within the pupil increases the accuracy of measurement that is more indicative of the subjective refraction.

The large pupil zone imaging method measures the central refraction and a large area refraction.

The difference of the measurement allows assessment of the effect of pupil size such as a vision in dim light.

Measurements can be performed on small pupils as small as 2 mm.

Super Luminescent Diode (SLD) Light and Highly Sensitive CCD Camera

The system combining the SLD light and highly sensitive CCD camera significantly improves measurement capability even in dense cataractous eyes.

Optimal Fogging to Minimize Accommodation

Fogging is performed after correcting the patient’s astigmatism with built-in cylinder lenses. This minimizes the effect of accommodation even of patients with high astigmatism.

Keratometry

Double Mire Ring Method

Keratometry measurements performed with the mire ring method reduces interference from the eyelids.

The TONOREF™ III performs measurements at diameters of 3.3 mm and 2.4 mm.

Comparison of the two values allows a better understanding of the cornea shape.

Pachymetry

Non-contact optical pachymetry is used to measure corneal thickness.

The principle of specular reflection for pachymetry allows a more compact design of TONOREF™ III.

Tonometry

Automated Calculation of Corrected IOP

The TONOREF™ III provides the automated calculation function of the corrected IOP based on the central corneal thickness.

Generally, the IOP is overestimated for thick corneas and underestimated for thin corneas. The corrected IOP value allows a more accurate assessment.

Patient-friendly Air Puff

Automatic Puff Control (APC)

In subsequent measurements, the APC function performs the measurement with the minimum air pressure based on the previous measurement data.

Softer and Quieter Air Puff

The mechanical design of the TONOREF™ III reduces noise and air intensity to achieve a more gentle air puff.

Gentle Nozzle Design

A gentle nozzle design reduces patient’s perception of physical pressure.
**Refraction**

**Large Pupil Zone Imaging Method**

The use of a wide area measurement within the pupil increases the accuracy of measurement that is more indicative of the subjective refraction.

The large pupil zone imaging method measures the central refraction and a large area refraction.

The difference of the measurement allows assessment of the effect of pupil size such as a vision in dim light. Measurements can be performed on small pupils as small as 2 mm.

**Super Luminescent Diode (SLD) Light and Highly Sensitive CCD Camera**

The system combining the SLD light and highly sensitive CCD camera significantly improves measurement capability even in dense cataractous eyes.

**Optimal Fogging to Minimize Accommodation**

Fogging is performed after correcting the patient's astigmatism with built-in cylinder lenses. This minimizes the effect of accommodation even of patients with high astigmatism.

**Keratometry**

**Double Mire Ring Method**

Keratometry measurements performed with the mire ring method reduces interference from the eyelids. The TONOREF™ III performs measurements at diameters of 3.3 mm and 2.4 mm.

Comparison of the two values allows a better understanding of the cornea shape.

**Pachymetry**

Non-contact optical pachymetry is used to measure corneal thickness.

The principle of specular reflection for pachymetry allows a more compact design of TONOREF™ III.

The pachymetry data can be used to display a corrected IOP value.

**Tonometry**

**Automated Calculation of Corrected IOP**

The TONOREF™ III provides the automated calculation function of the corrected IOP based on the central corneal thickness.

Generally, the IOP is overestimated for thick corneas and underestimated for thin corneas. The corrected IOP value allows a more accurate assessment.

**Patient-friendly Air Puff**

**Automatic Puff Control (APC)**

In subsequent measurements, the APC function performs the measurement with the minimum air pressure based on the previous measurement data.

**Softer and Quieter Air Puff**

The mechanical design of the TONOREF™ III reduces noise and air intensity to achieve a more gentle air puff.

**Gentle Nozzle Design**

A gentle nozzle design reduces patient's perception of physical pressure.
Accommodation Measurement

The accommodation measurement helps to assess such as pseudomyopia, eyestrain, and accommodative palsy. Objective measurement of accommodation is performed with patient’s focusing on a target which moves from distant to near. Intelligence algorithm detects the patient’s response and reduces the measurement time in patients with a slow or weak accommodative response.

Opacity Assessment

Retroillumination Image and NIDEK Cataract Indices

The retroillumination image allows evaluation of media opacity. NIDEK cataract indices indicate the severity of the opacity and helps to assess the progression of pathology.

NIDEK Cataract Indices

- [COI. H] Opacity size within a diameter of 3 mm in the center (vertical diameter)
- [COI. A] Opacity proportion within a diameter of 3 mm in the center
- [POI] Opacity proportion within the entire periphery

The NIDEK cataract indices are for reference only. The following conditions may indicate different indices from ones of actual status:
- Peripheral image is darkly captured due to alignment position
- Opacities are not in focus
- Bright spot reflecting observation light occurs on the cornea apex
- Fraction of the 3 mm-diameter circle is drifted due to incorrect pupil detection caused by opacity location.

Amplitude of accommodation

Accommodation graph

Eye with light opacity

Eye with dense opacity

Easy to Use Screen

- Tiltable 7-inch color LCD touchscreen
- Summary Display
  Summary screen allows easy and quick confirmation of patient data.

Easy Access to Patients Eyelids

The radical cut design allows direct access to patient eyelids.

3-D Auto Tracking and Auto Shot

The 3-D auto tracking and auto shot provide faster, simpler, and more accurate measurements. Once alignment is completed, the measurement starts automatically.

Joystick for Flexible Alignment

The joystick helps the operator make fine adjustments during alignment to improve the precision, even for eyes with poor fixation which cannot be tracked with automated tracking systems.

Quick and Easy Wireless Data Transfer

NIDEK refraction products allow for quick and easy wireless data transfer using the Eye Care card, Bluetooth, WLAN or infrared communication. This is helpful for making a simple refraction system without complicated wired connection.

*The specifications for wireless data transfer differ according to each product and from country to country. The requirements also differ depending on the method of wireless data transfer.

Automatic Anti Dew Heater

Automatic anti dew heater for measuring windows prevents condensation to provide accurate measurements in cooler rooms.
Accommodation Measurement

The accommodation measurement helps to assess such as pseudomyopia, eyestrain, and accommodative palsy. Objective measurement of accommodation is performed with patient's focusing on a target which moves from distant to near. Intelligence algorithm detects the patient's response and reduces the measurement time in patients with a slow or weak accommodative response.

Opacity Assessment

Retroillumination Image and NIDEK Cataract Indices

The retroillumination image allows evaluation of media opacity. NIDEK cataract indices indicate the severity of the opacity and helps to assess the progression of pathology.

Easy to Use Screen

- Tiltable 7-inch color LCD touchscreen
- Summary Display
  Summary screen allows easy and quick confirmation of patient data.

3-D Auto Tracking and Auto Shot

The 3-D auto tracking and auto shot provide faster, simpler, and more accurate measurements. Once alignment is completed, the measurement starts automatically.

Joystick for Flexible Alignment

The joystick helps the operator make fine adjustments during alignment to improve the precision, even for eyes with poor fixation which cannot be tracked with automated tracking systems.

Quick and Easy Wireless Data Transfer

NIDEK refraction products allow for quick and easy wireless data transfer* using the Eye Care card, WLAN or infrared communication. This is helpful for making a simple refraction system without complicated wired connection.

*The specifications for wireless data transfer differ according to each product and from country to country. The requirements also differ depending on the method of wireless data transfer.

Automatic Anti Dew Heater

Automatic anti dew heater for measuring windows prevents condensation to provide accurate measurements in cooler rooms.
**TONOREF™ III Specifications**

**Auto Refractometer**
- **Measurement range**
  - Sphere: -30.00 to +25.00 D (0.12 mm increments)
  - Cylinder: 0.0 to ±12.00 D (0.001 mm increments)
  - Minimum measurable pupil diameter: ø2 mm
- **Measurement area** ø1 to 8 mm

**Auto keratometer**
- **Measurement range**
  - Curvature radius: 5.00 to 13.00 mm (0.01 mm increments)
  - Refractive power: 0.00 to ±12.00 D (0.001 mm increments)
  - Cylindrical power: 0.0 to ±12.00 D (0.001 mm increments)
- **Measurement area** ø0.3 mm (R=7.7 mm), ø2.4 mm (R=1.8 mm)

**Non contact tonometer**
- **Measurement range**
  - 1 to 60 mmHg (1 mmHg increments)
- **Measurement setting**
  - Working distance: 11 mm
  - Eye fixation: Inner fixation light

**Non-contact pachymeter**
- **Measurement range**
  - 300 to 800 µm (1 µm increments)
- **OP correction by corneal thickness**
  - Automatic calculation

**Non-reflection image**
- **Accurate**
- **Accurate spherical measurement range**
  - 0 to 12.00 D (0.01 mm increments)
  - 0 to 12.00 D (0.01 mm increments)
- **Accurate spherical measurement area**
  - ø3.3 mm (P=7.7 mm), ø2.4 mm (P=1.8 mm)

**Display**
- Tiltable 7.0-inch color LCD with touch panel

**Printer**
- Thermal line printer with easy loading and auto cutter

**Interface**
- 8-bit 2 directions

**Auto shot**
- Available

**Dimensions/Mass**
- 245 (W) x 495 (D) x 505 (H) mm / 22 kg at ARK standard mode
- 245 (W) x 495 (D) x 460 (H) mm / 22 kg at NT standard mode
- 10.2 (W) x 19.5 (D) x 19.9 (H)” / 48 lbs. at ARK standard mode
- 10.2 (W) x 19.5 (D) x 18.1 (H)” / 48 lbs. at NT standard mode

* Only for the countries (regions) certified by the Radio Law

**Product/Model name:** AUTO REF/KERATO/TONO/PACHYMETER TONOREF III

Brochure and listed features of the device are intended for non-US practitioners. Specifications may vary depending on circumstances in each country. Specifications and design are subject to change without notice.