**TONOREF™ III Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tr>
<td><strong>Auto refractometer</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>Sphere: -30.00 to +25.00 D (OD: ±12 mm) (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Cylinder</td>
<td>0 to ±13.00 D (0.51 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Axis</td>
<td>0 to ±180° (1°/5° increments)</td>
</tr>
<tr>
<td>Minimum measurable pupillary radius</td>
<td>3 mm</td>
</tr>
<tr>
<td>Measurement area</td>
<td>ø1 to ø6 mm</td>
</tr>
<tr>
<td>Chart</td>
<td>Scymy chart</td>
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<tr>
<td><strong>Auto keratometer</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>Curvature radius: 5.00 to 13.00 mm (0.01 mm increments)</td>
</tr>
<tr>
<td>Refractive power</td>
<td>15.96 to 67.50 D (n = 1.3375) (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Cylindrical power</td>
<td>0 to ±12.00 D (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Axis</td>
<td>0 to ±180° (1°/5° increments)</td>
</tr>
<tr>
<td>Measurement area</td>
<td>ø3.0 mm (R=7.7 mm), ø2.4 mm (R=8.8 mm)</td>
</tr>
<tr>
<td><strong>Non contact tonometer</strong></td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>1 to 60 mm (1 mm increments)</td>
</tr>
<tr>
<td>Measurement range setting</td>
<td>AFC40, AFC60 (AFC=Automatic Puff Control), 40, 60</td>
</tr>
<tr>
<td>Working distance</td>
<td>11 mm</td>
</tr>
<tr>
<td>Eye fixation</td>
<td>Inner fixation light</td>
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<td><strong>Non contact pachymeter</strong></td>
<td></td>
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<tr>
<td>Measurement range</td>
<td>300 to 800 µm (1 µm increments)</td>
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<tr>
<td>OP correction by corneal thickness</td>
<td>Automatic calculation</td>
</tr>
<tr>
<td>Measurement range</td>
<td>CURVE: -30.00 to +30.00 D (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Measurement range</td>
<td>CURVE: -60.00 to +60.00 D (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Measurement range</td>
<td>CURVE: -120.00 to +120.00 D (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Measurement range</td>
<td>CURVE: -240.00 to +240.00 D (0.01 / 0.12 / 0.25 D increments)</td>
</tr>
<tr>
<td>Mean value measurement range:</td>
<td>1.8 to 18.0 mm (1 mm increments)</td>
</tr>
<tr>
<td>Auto tracking</td>
<td>X-Y-Z directions</td>
</tr>
<tr>
<td>Auto shot</td>
<td>Available</td>
</tr>
<tr>
<td>Display</td>
<td>Tiltable 7.0-inch color LCD with touch panel</td>
</tr>
<tr>
<td>Printer</td>
<td>Thermal line printer with easy loading and auto cutter</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-232C: 2 port, LAN: 1 port, USB: 1 port</td>
</tr>
<tr>
<td>Windows LCD</td>
<td>LPA90 (2048 × 1366)</td>
</tr>
<tr>
<td>Power supply</td>
<td>AC 100 to 240 V, 50 / 60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>100 W</td>
</tr>
<tr>
<td>Dimensions / Mass</td>
<td>240 (W) × 495 (D) × 505 (H) mm / 22 kg at ARK standard mode</td>
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<tr>
<td></td>
<td>280 (W) × 495 (D) × 460 (H) mm / 22 kg at NT standard mode</td>
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<tr>
<td></td>
<td>10.2 (W) × 19.5 (D) × 18.1 (H) / 48 lbs at ARK standard mode</td>
</tr>
<tr>
<td></td>
<td>10.2 (W) × 19.5 (D) × 18.1 (H) / 48 lbs at NT standard mode</td>
</tr>
</tbody>
</table>

*Limited to the USA, Canada, and other countries that implement the R&TTE Directive.
A MASTERPIECE of COMBINATION

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
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Auto Refractometer
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**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 in the measurement allows assessment of the effect of pupil size* on vision under mesopic conditions.

*The pupil diameter is measured simultaneously.

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

**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 new mechanical design of the TONOREF™ III reduces noise and air intensity to achieve a more gentle air puff over that of the TONOREF™ II.

Gentle Nozzle Design

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

**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.
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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

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**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 that moves from distance to near. The artificial 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.

**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.

**Wireless LAN (WLAN)**

The TONREF™ III connects with PC and peripheral devices using wireless LAN (WLAN)*, LAN cable, RS-232C cable, EyeCare Card, barcode scanner or magnetic card reader.

*Available for products shipped to USA, Canada, and other countries that implement the R&TTE Directive.

**Automatic Anti Dew Heater**

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

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**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
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 that moves from distance to near. The artificial intelligence algorithm detects the patient's response and reduces the measurement time in patients with a slow or weak accommodative response.

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Retrolumination Image and NIDEK Cataract Indices

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TONOREF™III Specifications

**Auto Refractometer**
- **Measurement range**: Sphere -30.00 to +25.00 D (VD = 12 mm) (0.01 / 0.12 / 0.25 D increments)
- Cylinder 0 to ±12.00 D (0.01 / 0.12 / 0.25 D increments)
- Axis 0 to 180° (1° / 5° increments)
- Minimum measurable pupil diameter: ø2 mm
- Measurement area: ø1 to ø6 mm

**Auto keratometer**
- **Measurement range**: Curvature radius 5.00 to 13.00 mm (0.01 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 (0.01 / 0.12 / 0.25 D increments)
- Axis 0 to 180° (1° / 5° increments)
- Measurement area ø3.5 mm (ø2.7 mm), ø2.4 mm (ø1.8 mm)

**Non contact tonometer**
- **Measurement range**: 1 to 60 mmHg (1 mmHg increments)
- **Measurement range setting**: APC40, APC60 (APC=Automatic Puff Control), 40, 60
- **Working distance**: 11 mm
- **Eye fixation**: Inner fixation light
- **Non contact pachymeter**
  - **Measurement range**: 300 to 800 µm (1 µm increments)
  - **SP correction by corneal thickness**: Automatic calculation
  - **Automatization range**: Acceptable
  - **Corneal thickness measurement range**: 0 to 100 µm (0.1 mm increments)
  - **Cone thickness measurement range**: 0 to 100 µm (0.1 mm increments)
  - **Pupil size measurement range**: 1.6 to 18.0 mm (0.1 mm increments)
  - **Auto tracking**: X / Y / Z directions
  - **Auto shot**: Available
  - **Display**: Touchable 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
  - **Power supply**: AC 100 to 240 V, 50 / 60 Hz
  - **Power consumption**: 450 W
  - **Dimensions / Mass**: 245 (W) × 495 (D) × 505 (H) mm / 22 kg at ARK standard mode
  - **Specifications may vary depending on circumstances in each country.** Specifications and design are subject to change without notice.

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**TONOREF™III**

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

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**Eye & Health Care**

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