INTRODUCTION

The TONOVET tonometer is used for intraocular pressure (IOP) measurement in veterinary medicine.
The TONOVET is based on the patented rebound technology, which measures IOP accurately, rapidly and with no need for a local anesthetic. Since single-use probes are used, there is no risk of microbiological contamination. IOP changes due to the effects of the pulse, breathing, eye movements and body position. Because measurement is performed with a handheld instrument in fractions of a second, six measurements are needed to obtain the final reading.
The TONOVET has dog/cat and horse settings.
The TONOVET is intended for veterinary use only.
SAFETY INSTRUCTIONS

Read this manual carefully, since it contains important information on using and servicing the tonometer.

- Keep this manual safe for future use.
- When you have opened the package, check for any external damage or flaws. In particular, make sure that the casing is undamaged. If you suspect that there is something wrong with the tonometer, contact the manufacturer or distributor.
- Use the tonometer only for measuring the intraocular pressure of animals. Any other use is forbidden.
- The manufacturer cannot be held responsible for any damage arising from improper use, or for the consequences thereof.
- Never open the casing of the tonometer, except for the battery compartment or when changing the probe base.
- The manual includes instructions on replacing the batteries and changing the probe base.
- Never use the tonometer in wet or damp conditions.
- The probe base, battery compartment cover, collar and probes are so small that a child or animal could swallow them. Keep the tonometer out of reach of children or animals.
- Do not use the device near substances that are flammable – including flammable anesthetic agents.
- Check that a clean, new disposable probe is used before each measurement.
- To avoid transmitting certain microbiological agents (e.g. bacteria), the device should be cleaned regularly with a disinfectant, e.g. a 70% alcohol solution.
- With the exception of the probe itself during measurement, the tonometer must not come into contact with the eye. Do not bring the tonometer into contact with the eye or push it into the eye (the tip of the probe should be held 4–8 mm or 1/6 - 1/3 inch from the eye).
- The tonometer conforms to EMC requirements, but may be affected by interference if used near (<1m) a device (such as a cellular phone) which is a source of high-intensity electromagnetic emissions. Although the tonometer’s own electromagnetic emissions are well below the levels set by the relevant standards, they may cause interference in another device, e.g. a sensitive sensor, located nearby.
- If the device is not to be used for a long period, removal of the batteries is recommended, as AA batteries may leak. Removing the batteries will not affect the subsequent functioning of the tonometer.
- Be sure to dispose of the single-use probes properly (e.g. in a container for disposable needles).
- Batteries, packaging materials and probe bases must be disposed of according to local regulations.

PARTS OF THE TONOMETER
TURNING THE TONOMETER ON

Insert batteries into the tonometer (page 6).

Fix the wrist strap onto the wrist strap attachment. Place the wrist strap around your wrist. The wrist strap will protect the tonometer from falling accidentally.

Press the measurement button in order to turn the tonometer ON. The tonometer display will display all of the LCD segments (see the image to the right).

The display will show “LoAd,” instructing the user to load the single use probe into the tonometer prior to measurement.

LOADING THE PROBE

Accurate measurement is guaranteed only when using probes made by Icare Finland Oy.

Open the probe tube by removing the cap and insert the probe into the probe base as shown in the image.

After the probe has been inserted, in order to prevent the probe from falling out, avoid pointing the tonometer downwards.

Activate by pressing the measurement button once. The display will show “00,” indicating that the tonometer is in starting mode and ready for measurement.

Following its activation, the probe becomes magnetized and will not fall out.

TO ACCESS THE STARTING MODE

Starting mode is displayed as “00”.

AFTER MEASURING  Press the measurement button.
BEFORE LOADING THE PROBE  Press the selector button.

MEASURING INTRAOCULAR PRESSURE

Local anesthetic should not be used during measurement, since this may distort (lower) the reading*.

During measurement, the tonometer must be held in a horizontal position. The distance from the probe to the cornea should be 4-8 mm (1/6 - 1/3 inch).

TIP  The distance from the eye to the probe should be about the length of the probe’s collar.

Six individual measurements are required to achieve an accurate final result. The measurement values displayed during measurement represent the average values of the previous measurements (1-5.), rather than individual measurement values.

Press the measurement button six times. The tip of the probe must make contact with the central cornea**. After each successful, individual measurement you will hear a short beep. After the six measurements have been taken, you will hear a longer beep and the final result will be shown on the display.

If there is an erroneous measurement, the tonometer will beep twice and show an error message. Press the measurement button in order to clear the error message and continue with measurement. If several erroneous measurements occur, see the section “Error messages” (page 6).

Begin a new measurement by pressing the measurement button. The display will show “00” indicating that the tonometer is ready for the next measurement.


**IOP should always be measured from the central cornea to obtain the true value, since the result will vary in different parts of the eye.

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MEASUREMENT READINGS ON THE DISPLAY

After the sixth measurement, you will hear a long beep and the letter “d” or “H” will be displayed, followed by the IOP (Intraocular pressure) reading.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>DISPLAY (the readings below are examples)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting position</td>
<td>00</td>
<td>Tonometer is ready for measuring</td>
</tr>
<tr>
<td>1st measurement</td>
<td>1.15</td>
<td>Result of the 1st individual measurement</td>
</tr>
<tr>
<td>2nd measurement</td>
<td>2.16</td>
<td>Average of the 1st and 2nd individual measurements</td>
</tr>
<tr>
<td>3rd measurement</td>
<td>3.16</td>
<td>Average of the 1st, 2nd and 3rd individual measurements</td>
</tr>
<tr>
<td>4th measurement</td>
<td>4.17</td>
<td>Average of the 1st, 2nd, 3rd and 4th individual measurements</td>
</tr>
<tr>
<td>5th measurement</td>
<td>5.17</td>
<td>Average of the 1st, 2nd, 3rd, 4th and 5th individual measurements</td>
</tr>
<tr>
<td>6th measurement</td>
<td>d 17 OR H 17</td>
<td>FINAL RESULT = average of 4 measurements, excluding the highest and lowest result</td>
</tr>
</tbody>
</table>

If the “d” or “H” blinks when the final result is displayed, this means that the measurements’ standard deviation is greater than ideal.

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>DEVIATION</th>
<th>DESCRIPTION</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>d</td>
<td>No line, letter does not blink</td>
<td>≤ 1.0 No or insignificant deviation</td>
<td>-</td>
</tr>
<tr>
<td>d_</td>
<td>Line in lower position, the letter blinks</td>
<td>1.8 – 2.5 Slight deviation; the effect of the deviation is unlikely to be relevant to the result</td>
<td>-</td>
</tr>
<tr>
<td>d-</td>
<td>Line in the middle, the letter blinks</td>
<td>2.5 – 3.5 Deviation is clearly greater than normal, but the effect on the result will be insignificant in most cases</td>
<td>New measurement is recommended, if the IOP is higher than the normal IOP</td>
</tr>
<tr>
<td>d+</td>
<td>Line in upper position, the letter blinks</td>
<td>&lt; 3.5 Deviation is too great</td>
<td>New measurement is recommended</td>
</tr>
</tbody>
</table>

ACCESSING OLD MEASUREMENT RESULT

The tonometer’s memory stores the last 10 measuring results.

1. From the starting mode (“00”; to access starting mode, see page 4), press the right or left selector button until “Old” appears on the display.
2. Press the measurement button. ‘Scroll’ the old values by pressing the selector buttons (right=older, left=more recent, from 0-9).
3. To exit the ‘old values search’, press the measurement button.
4. The display shows “Old”. Press either selector button to access other functions (00=measurement, End=turning OFF).

TURNING THE TONOMETER OFF

1. From the starting mode (“00”), press either selector button until the display shows “End”.
2. Press the measurement button for two seconds. The display will show “bye” and the tonometer will switch off. The used probe will be partly ejected.

Use the empty probe tube to remove the used probe from the tonometer. Ensure that you dispose of the probe properly.

The tonometer will automatically turn off if not used for two minutes.
CHANGING THE SETTING FOR DIFFERENT SPECIES

The TONOVET tonometer has dog, cat and horse measurement settings. The same setting, displayed as “do”, is used for dogs and cats. The horse setting is displayed as “ho”. The third setting “P” is undefined, being reserved for future use. The default setting is “do”.

Change the setting:
1. Press the right or left selector button until the display shows “End”.
2. Press the right selector button. These buttons must be pressed down at the same time.
3. Press the measurement button.
4. Toggle between settings, using the selector button.
5. Choose the setting and activate it by pressing the measurement button.

REPLACING THE PROBE BASE

During use, some dirt may collect in the probe base, affecting the probe movement. The probe base should be replaced if the probe no longer moves smoothly, or if the probe base error (E 01 or E 03) is displayed.

1. Unscrew the probe base collar.
2. Remove the probe base by tilting the tonometer downwards and pull the probe base out of the tonometer.
3. Insert a new probe base into the tonometer.
4. Now lock the probe base, by screwing the collar in.

NOTE The probe base should be replaced with a new probe base at least annually, or if cleaning is ineffective.

CLEANING THE PROBE BASE

The probe base can be reused after careful cleaning. Make sure that the probe base is completely dry before using it.

1. Unscrew the probe base collar and remove the probe base from the tonometer.
2. Carefully inject an alcohol solution through the inside of the probe base, for instance using a pipette or syringe.
3. Dry the probe base by blowing some clean canned or compressed air into it.
4. Reinsert the completely dry probe base and screw the collar back into the tonometer.

NOTE Never use a water or soap solution to clean the probe base.

CLEANING THE TONOMETER SURFACE

The Icare tonometer may be surface-cleaned using a soft cloth dampened with either a commercial, nonabrasive cleaner, or a solution of 70% alcohol in water. Lightly wipe the surfaces of the tonometer and make sure that they are dry after cleaning, especially areas near the main buttons, display and probe cover.

The surfaces have been tested for chemical resistance to the following liquids:
- Ethanol
- 2-propanol
- Mild soap solution
- 95% Pursept solution

CAUTION Do not spray, pour or spill liquid onto the Icare tonometer, its accessories, connectors, switches or openings in the chassis. Do not leave the surface of the tonometer wet; dry it with a soft cloth.

To be cleaned, the probe holder/base must be removed from the tonometer.
REPLACING THE BATTERIES

Replace the batteries when the <bAtt> message is displayed.

1. Unscrew the battery compartment locking screw with a screwdriver or a small coin.
2. Remove the battery compartment cover.
3. Remove the old batteries.
4. Insert new AA batteries into the tonometer according to the small diagrams inside the battery compartment. The terminals should point downwards on the display side and upwards on the measurement side.
5. Replace the battery compartment cover and secure it in place by lightly screwing it shut with a coin or screwdriver. Be careful not to use excessive force when screwing the cover into place.

NOTE Use only alkaline batteries.

ERROR MESSAGES

Press the measuring button to clear the error message, and continue measuring.

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>STATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>bAtt</td>
<td>The battery power is low.</td>
<td>Replace the batteries.</td>
</tr>
<tr>
<td>E 01</td>
<td>The probe did not move at all.</td>
<td>If this error message is repeated, turn the tonometer so that the collar faces downwards for a short time. If the error message still appears, take out the probe and replace with a new one. If the error message continues to appear, replace the probe base.</td>
</tr>
<tr>
<td>E 02</td>
<td>The probe did not touch the eye.</td>
<td>The measurement was made from too far away, or the probe base is dirty.</td>
</tr>
<tr>
<td>E 03</td>
<td>The probe speed was too low.</td>
<td>The measurement was made from too far away, or the tonometer was tilted too far upwards.</td>
</tr>
<tr>
<td>E 04</td>
<td>The probe speed was too high.</td>
<td>The tonometer was tilted downwards. Make sure that the groove is in the horizontal position.</td>
</tr>
<tr>
<td>E 05</td>
<td>The hit was too “soft”.</td>
<td>The probe hit the eyelid.</td>
</tr>
<tr>
<td>E 06</td>
<td>The hit was too “hard”.</td>
<td>The probe hit the opening eyelid or calcification in the cornea.</td>
</tr>
<tr>
<td>E 07</td>
<td>“Bad bounce”.</td>
<td>The probe did not hit the central cornea.</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

VISUALLY INSPECT THE COVERS/ HOUSING OF THE DEVICE

- Cracks/damage detected
- The covers are not correctly in place, the cover(s) are loose.

LOAD THE PROBE AND MAKE A MEASUREMENT

- The probe does not move.
- The probe moves sluggishly/irregularly.
- The probe does not move, even though the probe base has been changed.

Display Issues
- No digits on the display. A beep can be heard.
- Some segments on the display are dead or fading.

Audible Issues
- A beep cannot be heard when the measurement button is pressed.
- The frequency of the beep varies.

Button Issues
- The device does not react when the buttons are pressed.
- A button needs to be pressed hard for the expected function to work.
- Some buttons react only occasionally.

SERVICE PROCEDURES

- Replace the batteries when the <bAtt> message appears (page 6).
- Change or clean the probe base if the probe does not move smoothly (page 6).
- The device can be cleaned with a damp cloth containing disinfectant, according to the instructions (page 6).
- No other service procedures can be carried out by the user. All other servicing and repairs must be carried out by the manufacturer or a certified servicer.
DIAGRAM OF TONOMETER FUNCTIONS

[Diagram of Icare TONOVENT TV01 tonometer functions]

TECHNICAL INFORMATION

- **Type:** TV01
- **Dimensions:** 13 – 32 mm (W) * 45 – 80 mm (H) * 230 mm (L)
- **Weight:** 155 g (without batteries), 250 g (4 x AA batteries)
- **Power supply:** 4 x AA batteries
- **Measurement range:** 1-99 mmHg
- **Accuracy of display:** ±1
- **Measurement accuracy:** ±2 (5-30 mmHg), 10% (30-80 mmHg)
- **Display unit:** millimeter mercury (mmHg)
- **The serial number is inside the battery compartment cover**
- **There are no electrical connections from the tonometer to the patient**
- **The device has B-type electrical shock protection**
- **Operational environment:**
  - Temperature: +10 °C to +35 °C
  - Relative humidity: 30% to 90%
  - Atmospheric pressure: 800 hPa – 1060 hPa
- **Storage environment:**
  - Temperature: -10 °C to +55 °C
  - Relative humidity: 10% to 95%
  - Atmospheric pressure: 700 hPa – 1060 hPa
- **Transport environment:**
  - Temperature: -40 °C to +70 °C
  - Relative humidity: 10% to 95%
  - Atmospheric pressure: 500 hPa – 1060 hPa

⚠️ **WARNING**  No modification of this equipment is permitted
SYMBOLS

- Caution, Attention!!! See instructions
- Lot number
- Do not dispose of in household waste
- Serial number
- B-type device
- See operating instructions for more information
- Single use only
- Manufacturer
- Temperature limitations
- Keep dry

SPARE PARTS AND SUPPLIES

- Probes in single-use package.
- Probe base replacement kit.