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TONOVET

USER'S AND MAINTENANCE MANUAL



TONOMETER

Icare TONOVET tonometer TV01
INSTRUCTION MANUAL v.2.1 14/09

EN



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Made in Finland

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INTRODUCTION

The TONOVET tonometer is used in the intraocular pressure (IOP) measuring in the veterinary medicine.

The TONOVET is based on the patented rebound technology, which measures IOP accurately, rapidly and without the need of local anaesthetic.

There is no risk of microbiological contamination, as single-use probes are used in the measurement.

IOP changes due to the effects of pulse, breathing, eye movements, and body position. Because the measurement is made handheld in fractions of a second, six measurements are needed to obtain the final reading.

The TONOVET has settings for dog/cat and horse.

The TONOVET is intended for veterinary use only.

SAFETY INSTRUCTIONS

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

- Keep this manual for future use.
- When you have opened the package, check for any external damage or faults. Check especially that the casing is not damaged. If you suspect that there is something wrong with the tonometer, contact the manufacturer or the distributor.
- Use the tonometer only for measuring intraocular pressure of animals. Any other use is incorrect.
- 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 to change the probe base.
- The manual contains instructions for replacing 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 the reach of children or animals.
- Do not use the device near the substances that are flammable - including flammable anaesthetic 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. 70% alcohol solution.
- The tonometer must not come into contact with the eye, except for the probe during the measurement, therefore do not bring the tonometer into contact with the eye or push it to the eye (tip of the probe should be 4–8 mm or 1/6 - 1/3 inch, from the eye).
- The tonometer conforms to EMC requirements, but interference may occur in it if used near to (<1m) a device causing high-intensity electro magnetic emissions (like a cellular phone). Though the tonometers own electromagnetic emissions are well below the levels in the relevant standards, they may cause interference in another device, e.g. a sensitive sensor, nearby.
- If the device is not to be used for a long time, removing the batteries is recommended, as the 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).

Place the wrist strap into the wrist strap attachment. Place the wrist strap around your wrist. The wrist strap protects the tonometer from dropping down accidentally.

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

The display shows "LoAd," instructing the user to load the single use probe into the tonometer prior to measurement.



LOADING THE PROBE

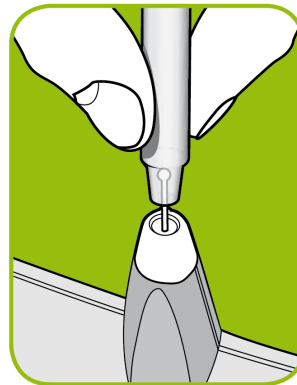
Accurate measurement is guaranteed only when using probes made by Icare Finland Oy.

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

After the probe has been inserted, do not to point the tonometer down to prevent the probe from falling out.

Activate by pressing the measurement button once. The display shows "00" instructing that the tonometer is on the starting position and ready for measurement.

After activating the probe is magnetized and will not fall out.



ACCESSING THE STARTING MODE

Starting mode is displayed as "00".

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

MEASURING THE INTRAOCULAR PRESSURE

The tonometer needs to be in a **horizontal position** during the measurement. The **distance should be 4-8 mm** (1/6 - 1/3 inch) from the probe to the cornea.

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

Six individual measurements are required for the final result. The measurement values displayed during the measurement represents average values of the previous measurements (1.-5.), not individual measurement values.

Press the measuring button six times. The tip of the probe needs to contact the **central cornea****. After each successful, individual measurement a short beep is played. After six successful measurements, a longer beep is played and the final result is shown on the display.

If there is an erroneous measurement, the tonometer will beep twice and show an error message. Press the measurement button to clear the error message and continue the sequence of six measurements. The sequence of six individual measurements does not have to be started from beginning, the tonometer will continue the sequence after cleared error message. If several erroneous measurements appear, see the section "Error messages" (page 7).

Start a new measurement by pressing the measurement button. The display shows "00" indicating the tonometer is ready for the next measurement.

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



MEASUREMENT READINGS ON THE DISPLAY

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

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

If the letter (“d” or “H”) is blinking when the final result is displayed, the **standard deviation** of the measurements is more than ideal (> 1.8 mmHg).

DISPLAY	DEVIATION mmHg	DESCRIPTION	ACTION
d	No line, letter does not blink ≤ 1.8	None or insignificant deviation	-
d_	Line down, the letter blinks > 1.8 ≤ 2.5	Slight deviation; the effect to the result is not likely to be relevant	-
d-	Line in the middle, the letter blinks > 2.5 ≤ 3.5	Deviation is greater than normal, but the effect on the result is usually not relevant	New measurement is recommended if the IOP is higher than normal IOP
d^	Line up, the letter blinks > 3.5	Deviation is is too great	Measurement should be repeated

ACCESSING OLD MEASUREMENT RESULT

The tonometer’s memory stores 10 last measuring results.

- 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.
- Press the measurement button. ‘Scroll’ the old values by pressing the selector buttons (right=older, left=more recent, from 0-9).
- To exit the old values search, press the measurement button.
- The display shows “Old”. Press either selector button to access other functions (00=measurement, End=turning OFF).



TURNING THE TONOMETER OFF

- From the starting mode (“00”), press either selector button until the display shows “End”.
- Press the measurement button for two seconds. The display shows “bye” and the tonometer will switch off. The used probe will be partially 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 measuring settings for dog/cat and horse. The dog and cat use the same setting; displayed as “do”. The horse setting is displayed as “ho”. The third setting “P” is undefined, reserved for future use. The default setting is “do”.

Changing the setting:

1. Press the right or left selector button until the display shows “End”.
2. Press **first** the measurement button, **keep it pressed down and immediately press right selector button**. *Note that buttons have to be pressed down at the same time.*
The display shows “CAL” (or software version).
3. Press the measurement button.
4. Toggle between settings using the selector button.
5. Choose the setting and activate by pressing the measurement button.

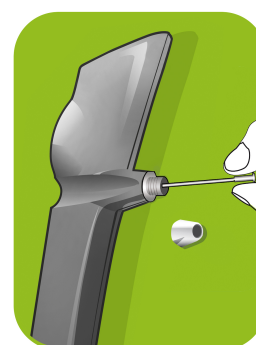
SETTING	SPECIES		RESULT DISPLAY (readings are examples)
do	Dog	Canine	d 15
	Cat	Feline	
ho	Horse	Equine	H 18

REPLACING THE PROBE BASE

During the use some dirt may collect in the probe base, affecting the probe movement. The probe base should be replaced every 12 months or if the probe no longer moves smoothly or 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 downward and pull the probe base out of the tonometer.
3. Put a new probe base into the tonometer.
4. Screw the collar in, to lock the probe base.

NOTE The probe base should be replaced with a new probe base every 12 months, or if the cleaning is not effective.



CLEANING THE PROBE BASE

The probe base should be cleaned every 6 months. The probe base can be reused after careful cleaning. Make sure the probe base is completely dry before using it.

1. Unscrew the probe base collar and remove the probe base from the tonometer.
2. Soak the probe base in 100% pure alcohol for 5 to 30 minutes.
3. Remove the probe base from alcohol and dry carefully by blowing clean canned or compressed air into the probe base. This will additionally remove possible residual dirt.
4. Insert the completely dry probe base and screw the collar back to the tonometer.

NOTE Do not use water or soap solution to clean the probe base.

CLEANING THE TONOMETER SURFACE

The 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 surfaces are dry after cleaning, especially areas near the main buttons, the display and the probe cover.

Chemical resistance to the following liquids has been tested:

- 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.
The probe holder/base has to be removed from the tonometer to be cleaned.

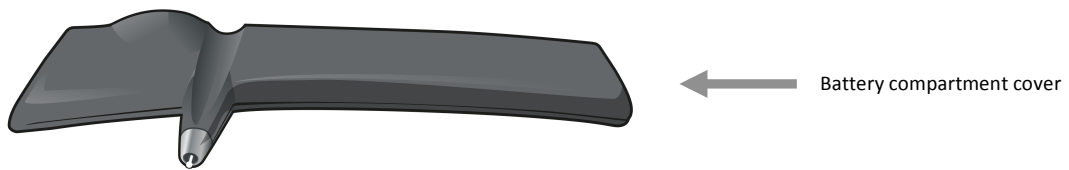
REPLACING THE BATTERIES

Replace the batteries once a year and/or 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. Put new AA batteries into the tonometer according to figures inside the battery compartment. Terminals should point down on the display side and up on the measurement side.
5. Replace the battery compartment cover and secure it in place by screwing it **lightly** with the coin or screwdriver. Be careful not to use excessive force when screwing the cover in place.

NOTE If the device is not to be used for a longer period of time, removing the batteries is recommended, as AA batteries may leak, which may damage the device.

Use only alkaline batteries.



ERROR MESSAGES

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

MESSAGE	STATE	DESCRIPTION
bAtt	The batteries are low.	Replace the batteries.
E 01	The probe did not move at all.	If this error message is repeated, turn the tonometer so that the collar faces down for a short time. If the error message is still repeated take out the probe and replace with a new one. If the error message continues to appear, replace the probe base.
E 02	The probe did not touch the eye.	The measurement was made from too far away or the probe base is dirty.
E 03	The probe speed was too low.	The measurement was made from too far away or the tonometer was tilted upwards too much.
E 04	The probe speed was too high.	The tonometer was tilted downwards. Be sure the groove is in the horizontal position.
E 05	The hit was too "soft".	The probe hit the eyelid.
E 06	The hit was too "hard".	The probe hit the opening eyelid or calcification in the cornea.
E 07	"Bad bounce".	The probe did not hit the central cornea.
E 09	Bad data.	An erroneous measurement for a reason other than those described in E01–E07.

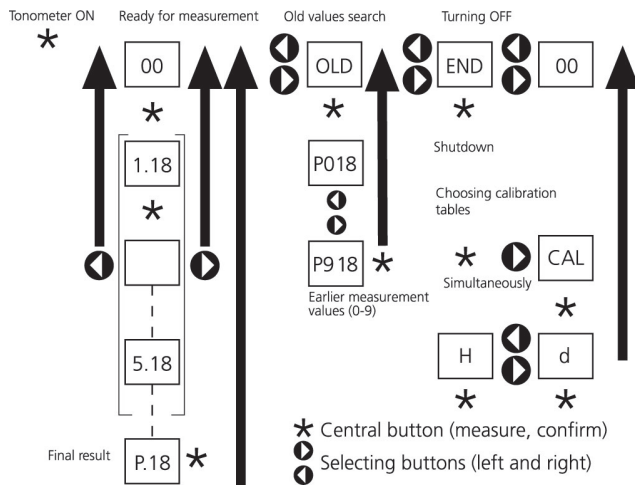
TROUBLE SHOOTING

VISUALLY INSPECT COVERS/ HOUSING OF THE DEVICE		
Cracks or damages are detected.		Contact your Icare representative.
Covers are not correctly in place or cover(s) are loose.		
LOAD THE PROBE AND MAKE A MEASUREMENT		
The probe does not move.		Change / clean the probe base.
The probe moves sluggishly / irregularly.		
The probe does not move although the probe base has been changed.		Contact your Icare representative.
Display Issues	No digits on the display. A beep can be heard.	
	Some segments on the display are dead or vanishing.	
Audible Issues	The beep cannot be heard when the measurement button is pressed.	
	The frequency of the beep is varying.	
Button Issues	The device does not react when buttons are pressed.	
	Any button needs to be pressed hard for the expected function.	
	Buttons react occasionally.	

SERVICE PROCEDURES

- Replace the batteries when the <bAtt> message appears (page 7).
- 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 the instructions (page 6).
- There are no other service procedures that can be carried out by the user. All other servicing and repairs must be carried out by the manufacturer or certified service facilities.

DIAGRAM OF 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 (with 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: Millimetre 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
- Operation 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 allowed

SYMBOLS

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

SPARE PARTS AND SUPPLIES

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



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