

LACHMETER®



USER MANUAL

LACHMETER

Digital arthrometer for accurate assessment of the tibial anteroposterior translation in relation to the femur.

For diagnosis of total or partial injuries of the anterior cruciate ligament (ACL), anterolateral ligament (LAL) and posterior cruciate ligament (PCL).

CLINICAL EXAMINATION - Anterior Cruciate Ligament Evaluation

In clinical examination, an increased anteriorization of the tibia in relation to the uninjured contralateral side indicates a partial or complete injury of the cruciate ligament. The test Lachman, Drawer Previous and Pivot Shift are those who have best sensitivity / specificity, especially the Lachman test, to point out ACL injury.

The Lachman test is considered the gold standard of clinical examination to diagnose this lesion due to its well-established sensitivity, specificity and likelihood ratio.

For a side-by-side comparative and quantitative assessment of the Lachman test, the reference values, according to scientific studies, are:

NO ACL INJURY: Up to 03 mm difference

PARTIAL ACL INJURY: Between 03 and 04 mm difference (with negative Pivot Shift test)

COMPLETE ACL INJURY: Beyond 04 mm difference

On the other hand, the anterior tibial translation can be quantitatively estimated with the same flexion as the Lachman test, 30 degrees. A classification in 3 degrees is widespread. Remembering that these values refer to the total anterior translation of a knee (without comparison with the contralateral side).

Grade I	+	1 to 5 mm
Grade II	++	6 to 10 mm
Grade III	+++	More than 10 mm

During physical testing for ACL assessment it is necessary to consider that, depending on the sensitivity of the examiner, the perception of the amount of translation or endpoint may differ for the same lesion and different examiners. Thereupon the importance of the arthrometer.

Instrumented measurement of the anterior tibial translation

An instrumented measurement of the tibial translation in relation to the femur at a fixed flexion angle, with support cushion behind the thigh (which holds the knee at approximately 30 degrees of flexion), allows accurate and reproducible determination of tibial anteriorization in the Lachman test (gold-standard test).

Several studies have shown that the quantification of tibial translation in the Lachman arthrometer test is significantly higher than the subjective clinical examinations. In this sense, in recent years several devices have been developed for this purpose. However, in clinical application, they have some drawbacks:

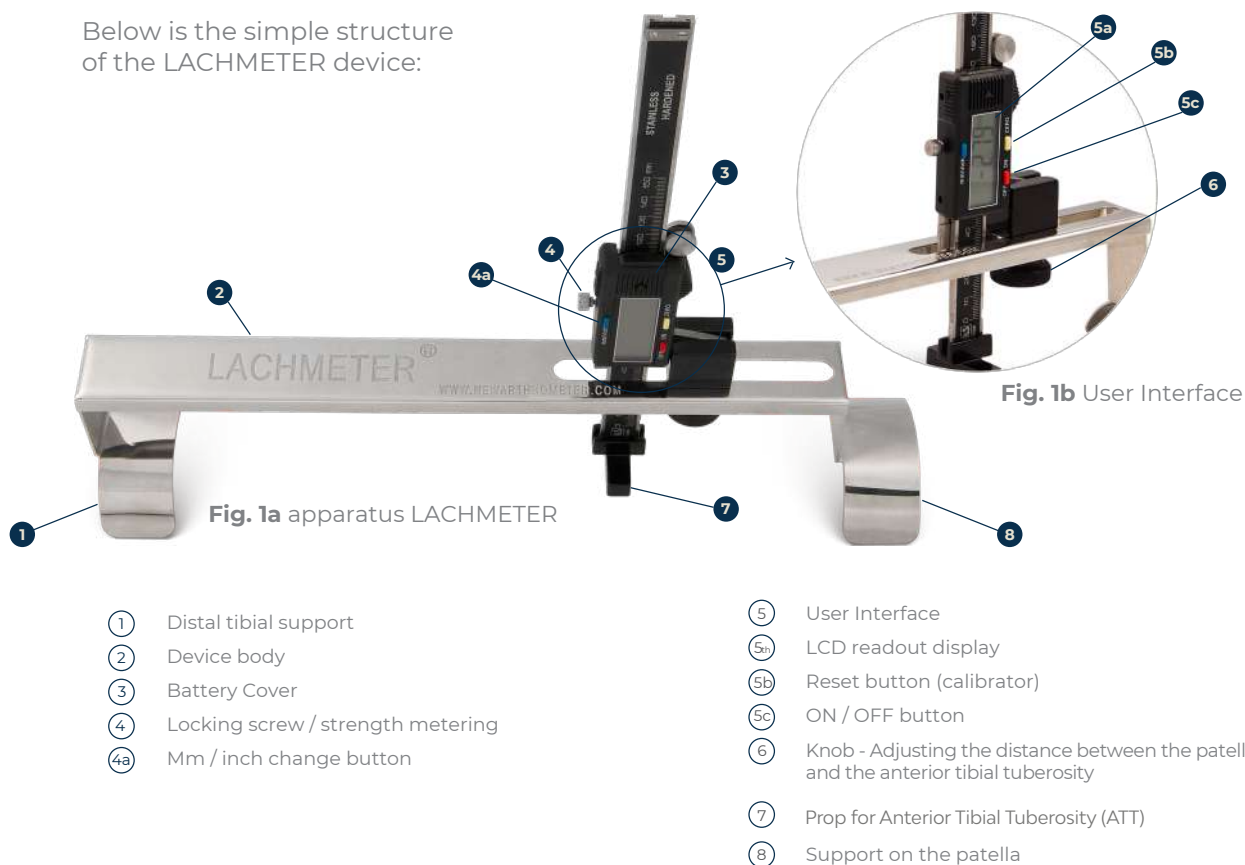
- **Time consuming examination**
- **Difficult procedure**
- **Inaccurate or complicated calibration (calibration procedure)**
- **Measurement inaccuracy**
- **Poor or inaccurate readability of measurement values**
- **High acquisition cost**

LACHMETER

LACHMETER has been developed to enable simple, rapid and reproducible anterior knee stability assessment. Through a lightweight instrument, cheap and high strength and durability. Its advantages are:

- Convenience (lightweight and easy to carry)
- Ease of handling
- Simple and quick fixation
- Simple and fast calibration (by pressing the “zero” button)
- Simple learning curve
- High measurement accuracy (Accuracy up to +/- 0.1 mm)
- Quick measurement procedure
- Useful for other tests (can be used for Anterior and Posterior Drawer tests)

Below is the simple structure of the LACHMETER device:



- ① Distal tibial support
- ② Device body
- ③ Battery Cover
- ④ Locking screw / strength metering
- ④a Mm / inch change button

- ⑤ User Interface
- ⑤a LCD readout display
- ⑤b Reset button (calibrator)
- ⑤c ON / OFF button
- ⑥ Knob - Adjusting the distance between the patella and the anterior tibial tuberosity
- ⑦ Prop for Anterior Tibial Tuberosity (ATT)
- ⑧ Support on the patella

Instrumental



Presentation of Lachman Test Application / LCA test

On clinical examination, the existence of a spontaneous posterior drawer should be ruled out. This is accomplished through an inspection of the Tibial Anterior Tuberosity compared to the contralateral knee with the same 90 ° flexion. If there is a difference, rule out the possibility of PCL injury or Osgood-Schlatter disease, for example. If an enlarged posterior drawer is suspected, it is recommended to quantify it and then discount the values found in the Lachman Test.

1. Position

Place the wedge cushion behind the thigh (fig. 2) with the patient supine on the examination table.

2. LACHMETER positioning

LACHMETER has three attachment points:

- 1- The proximal support / flap that can be placed on the patella (fig 1b. Arrow 8);
2. The support / tab distally, which settles on the distal tibia (Fig 1 first arrow);
3. The support of the ATT (anterior tibial tuberosity) (Fig. 1B arrow 7)

Firstly, adjust the distance between the patella and the anterior tibial tuberosity by means of the rotary knob (fig 1b. Arrow 6) so that the tibial anterior tuberosity support (fig 1b. Arrow 7) rests on it with the proximal part of the device on the patella (fig. 3).

One of the examiner's hands should rest on the proximal flap resting on the patella (Fig. 5).

Place the thumb on the body of the device (Fig. 5) so that the time of testing, the distal flap LACHMETER not detached from the leg.

With the other hand ensure that the tendons of the muscles hamstrings are relaxed (Fig. 4).

Tip: If tense, ask the patient to rest his head on the stretcher and close his eyes.

3. Calibration

Pull the stem of the anterior tibial tuberosity on it and reset the device pressing the "zero" button. At this point it is very important that the device is zero calibrated with it resting on the anterior tibial tuberosity (fig. 5).

Pressing the calibration button "ZERO" the LACHMETER is calibrated and the display shows ha value 0.0 mm.



Fig. 2: Place the cushion, which comes with the LACHMETER, behind the thigh.



Fig. 3: Place the device over the ATT / Patella.



Fig. 4: Check that the hamstring muscles are relaxed.

04. Test

Without tilting the LACHMETER or moving the measuring stem, with the other hand pull / anterior the tibia to the maximum limit and wait until it moves to its extremity. (if in doubt see the demo video at www.newarthrometer.com)

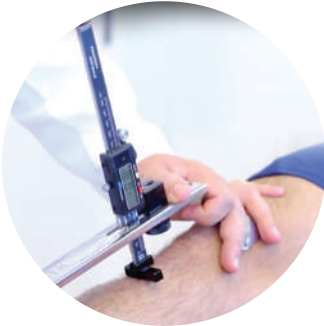


Fig. 5: Place the stem over Anterior Tibial Tuberosity



Fig. 6: Pull the leg to the maximum limit as you would do in the Lachman test.

Attention: Ensure that the proximal flap does not slip from the patella during the test. This can greatly change the measurement.

Take the test three times and use the average value as the final value (1st + 2nd + 3rd / 3rd). Then perform the test on the contralateral side (fig. 7 and 8).

Switch off the appliance at the end of use.

For more details visit the demo video at www.newarthrometer.com

05. Interpretation of Results

At the end of the exam, with the mean values of the measurements on both knees, the difference between them is made. Up to 03 mm difference is considered as knee without ACL injury. Between 03 and 04 mm , with negative Pivot Shift test , partial ACL injury is considered. Values greater than or equal to 04 mm are considered total ACL injury.

Assessment

**up to
3mm
no ACL injury**

**between
3 and 4mm
partial ACL injury***

**greater than
4mm
complete injury**

assessment of laxity | side-to-side difference

*Without a positive pivot shift test

06. Battery Replacement

Display changes (weak or flashing digits). To change the battery just remove the protective cap (fig. 1st arrow 3) in the direction of the arrow shown on it. Observe the correct side for battery replacement, positive outside. The LACHMETER uses 1.5v LR44 battery.

07. Technical specifications

Accuracy: **0.01 mm / 0.0005 inches**

Battery: **LR 44 1.5v**

Measuring Speed: **< 1.5m / s**

Working Temperature: **0 ~ + 40 ° C**

Relative Humidity: **<80%**

Stock Temperature: **-10 ° C ~ + 60 ° C**

08. Maintenance Guidelines

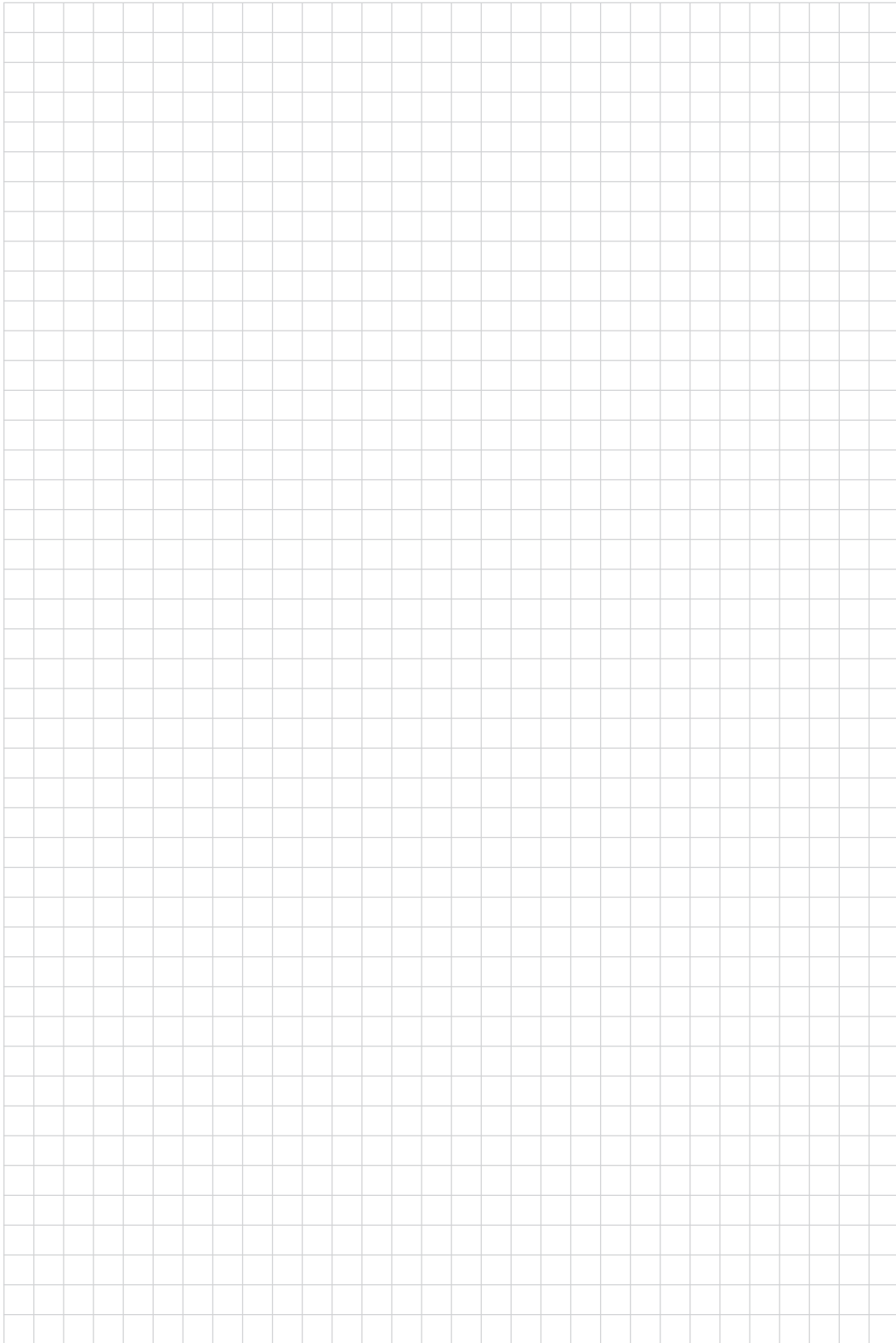
Problems	Possible causes	Solutions
Flashing Digits	Low battery charge	Change the battery
Without display	1. Low load 2. Bad contact	1- Battery replacement 2- Clean and adjust the battery count
Fixed digits, locked	Accidental circuit problem	Remove the battery and replace it in 01 minute.

09. Bibliography / Scientific material

Lachmeter - The digital Rolimeter ®

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Notes

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

It is advisable to ensure proper application of the products prior to use.

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www.newarthrometer.com



+55 16 98177-1166



sales@lachmeter.com