



ANTRIEBSELEMENTE

Operating Instructions

ACOUSTIC MEASURING
DEVICE FOR BELT TENSION

LüCo TensionPro2©



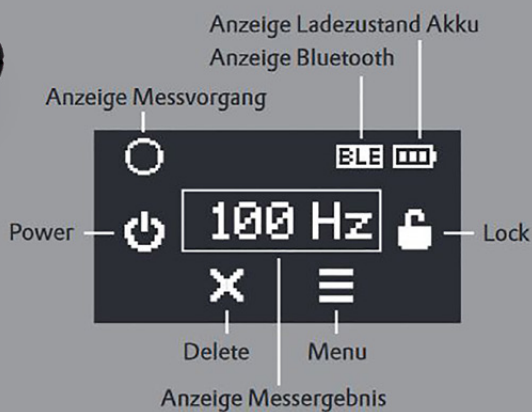
When performance is required

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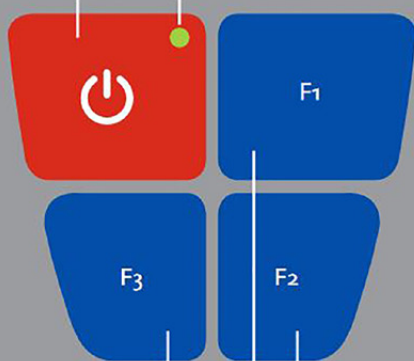
DISPLAY / MENU NAVIGATION



Standard display Main menu



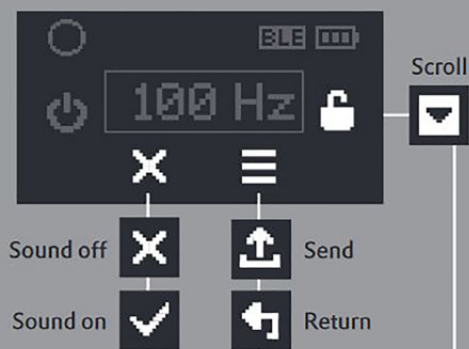
On/Off-Taste Anzeige Ladezustand Akku



Funktionstasten zur Menüsteuerung

Menu control via the F1, F2 and F3 function keys

Inkl. alternativer Tastenbelegung



F1 für Funktionen rechts Mitte
F2 für Funktionen rechts unten
F3 für Funktionen links unten

1. SPECIFICATIONS

Measuring range	10 - 600 Hz
Measurement accuracy / Measurement tolerance	10 – 400 Hz: $\pm 1\%$ 400 – 600 Hz: $\pm 2\%$
Measurement resolution	10 – 99,9 Hz: 0,1 Hz > 100 Hz: 1 Hz
Measurement method	contactless acoustically
Power supply	integrated lithium polymer battery pack 3,7 V / 850 mAh
Runtime	approx. 16 h continuous measurement
Energy consumption	< 50 mA
Display	OLED display monochrome white Dot Matrix 128 x 64 pixels Display size 1.45 x 0.75 inches (37 x 19.5 mm)
Sensor	acoustic sensor with electronic noise suppression on an integrated gooseneck total length approx. 6.5 inches (165 mm)
Dimensions (without gooseneck)	approx. 130 x 60 x 30 mm
Weight	approx. 4.41 oz. (125 g)
Mobile App	compatible with iOS 12.0 or newer versions Android 6.0 or newer versions
Data transmission	via Bluetooth

2. SAFETY PRECAUTIONS

Caution! The measurement must never be carried out while the drive is running! Before starting the measurement, ensure that the drive unit is switched off and secured against being switched on unintentionally. The safety recommendations of the machine manufacturer must be observed here.

Never use the device in potentially explosive areas of application.

Protect the device from shocks, impacts and strong vibrations.

Do not bring the device into contact with water, solvents or other liquids.

Clean the device with a dry cloth.

Never use cleaning agents containing solvents.

Protect the device from dust and dirt.

Please note that the OLED display only works in the temperature range between + 4°C and + 60°C. Measurement readings outside of this temperature range cannot be guaranteed.

The device contains a lithium polymer battery. Therefore, do not expose it to high temperatures and/or direct sunlight, e. g. when storing in the car. If handled improperly, lithium polymer batteries can explode, burn and release toxic gases as well as cause chemical burns or poisoning.

When shipping devices with a lithium polymer battery, it is essential to observe the relevant shipping regulations and warnings.

No technical changes may be made to the device.

If the safety instructions are not observed, the operator may be injured and the device may be damaged, for which we assume no liability.

3. THE MEASUREMENT PROCESS

General information

Caution! The measurement must never be carried out while the drive is running! Please note the safety instructions.

Make sure that there is as little interference and background noise as possible during the measurement. More on this under 3.3. "Possible problem sources".

When not in use, the device switches to an energy save mode, viz. the display goes dark. This idle state is automatically terminated by pressing any function key or by transmitting acoustic signals. In order to optimize battery performance, the device switches off automatically after about 2 minutes of idle status.

Note on remounting belts: After remounting a belt, the drive should be rotated a few times by hand to allow the belt to fully seat as well as any tension differences in the belt spans to be equalized prior to measurement.

3.1. THE MEASUREMENT PRINCIPLE

This acoustic tension meter is used for quick and easy measurement of the belt tension, also called strand tension, belt strand force or belt tension force.

Optimal belt tension is necessary to ensure a long service life of the belt and a trouble-free operation of your drive.

The device is fully electronic and equipped with the latest microprocessor technology for simple, high-precision measurements.

It is suitable for all belt types, e. g. V-belts, toothed and power belts or ribbed belts, which are in the measuring frequency range between 10 and 600 Hz. The type, color and quality of the belt have no influence on the measurement result.

An impact impulse on the belt, e. g. by hand or a suitable tool, creates a fundamental frequency, which is measured in Hertz (Hz) and is shown on the display of the device. This fundamental vibration is in a fixed relationship with the belt tension. This means the higher the frequency of a belt, the higher its tension.

Calculation formulas

The strand force target value can be calculated using the following formulas:

Formula A $f = \frac{1}{2 \cdot L} \cdot \sqrt{\frac{F_v}{m}}$	Formula B $F_v = 4 \cdot m \cdot L^2 \cdot f^2$	F_v = pretension force (N) m = belt weight per meter (kg/m) L = belt length capable of vibrating (m) f = belt vibration frequency (Hz)
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4. OPERATION OF THE METER

The device is switched on with the on/off button.

The start screen „**Welcome**“ now appears briefly on the display.
The display then changes to the standard screen with the main menu.

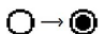
A short signal confirms readiness for measurement.
All acoustic impulses are immediately recorded by the sensor.

The measuring process on the belt can now begin.

The measurement should be taken in the middle of the free span length. Hold the sensor head at least 0.4 inches to max. 1.2 inches (1 cm to max. 3 cm) away from the straps. A greater distance can falsify the measurement result.


Strike the belt with your hand or a suitable tool, e. g. a wrench or hammer handle, in the middle of the span length.

The sensor now measures the fundamental vibration frequency of the belt.

The ring symbol on the upper left side of the display is shown as a filled circle to indicate the measurement process. 

The measurement result is now shown in the field in the middle of the display in Hertz (Hz).



When using the app:


As soon as the measuring device is connected to the app and the „Start measurement“ function is activated, the Bluetooth symbol  appears in the upper right display field. The first measurement result is automatically transferred to the app.


In order to secure the measurement result, e. g. if access to the machine is difficult, the measurement should be saved by pressing „Lock“  (F1)

We recommend using the „Lock“ function for all measurements, since the measured value cannot be overwritten, e. g. by loud machine and background noise or an accidental hitting the sensor.


When using the app:


To transfer a saved measurement result to the app once more, press „Lock“  (F1) again. The „Menu“  icon changes to the „Send“  icon. Now press „Send“ (F2) to transfer the measurement result to the app. The Bluetooth symbol now shows the data exchange again.


By pressing „Delete“  (F3) you delete the saved measurement result in order to carry out a new measurement.

If you have not secured the measurement result via „Lock“ , you can take a new measurement immediately without any further key operations

The keys are coupled with a sound signal as standard. „Menu“ (F2) takes you to the submenu of the device.

By pressing **“Sound on/off”** you can switch off the sound signals (F3). By pressing (F3)  once more, you switch them on again.

„Return“ (F2)  takes you back to the standard screen with the main menu.

„Scroll“ (F1)  takes you one level down in the submenu.

There you can see the serial number of your device and the version of the firmware.

Use „Return“ (F2)  to go back to the standard screen with the main menu.

3.3. POSSIBLE PROBLEM SOURCES

Interfering background noise can falsify the measurement result. Therefore, ensure that background noise is kept to a minimum during the measurement. When measuring in a windy environment, the sensor should be shielded, as it also reacts to drafts.

Toothed belts have a certain transverse rigidity depending on the belt width. In the case of very short strand lengths in particular, this can lead to measurement results that are higher than the actual belt tension. The measurement should therefore be made on span lengths that are more than twenty times the length of the belt pitch.

If no measurement result appears despite repeated impact impulses on the belt, this can have several causes:

- The belt vibrates outside the measurable frequency range of 10 - 600 Hz.
- There is a noise source within the measurement environment that is in the same frequency range.
- The belt vibrates only slightly or not at all.
- The belt pretension is too low

4. ADDITIONAL MOBILE APP



Additional functions, e. g. the logging of the measurement with date, time, the assignment of a machine profile or a machine number can be made via a specially developed app.

The App **TMconnect** is suitable for Apple and Android mobile phones. It is compatible with operating iOS 12.0 or newer versions and Android 6.0 or newer versions.

5. MAINTENANCE AND CALIBRATION

Before delivery, the device is subjected to a factory calibration, during which the device is checked at defined measuring points within the measuring range and the results are confirmed in a calibration protocol.

If recalibration is required by internal guidelines, you can request a new factory calibration from us.

6. DISPOSAL INSTRUCTIONS

Lithium polymer batteries contain toxic substances and do not belong in the household waste! The customer is legally obliged to professional disposal or return.



7. CERTIFICATES

